ORDINANCE NO. 5852

AN ORDINANCE REPEALING CHAPTER 550 OF THE MUNICIPAL CODE OF THE CITY OF ST. PETERS, AND ENACTING A NEW CHAPTER 550, IN LEIU THEREOF, WHICH ADOPTS "STANDARD CONSTRUCTION SPECIFICATIONS FOR SEWERS AND DRAINAGE FACILITIES OF THE METROPOLITAN ST. LOUIS SEWER DISTRICT," 2009, CHAPTER 4 OF "THE METROPOLITAN ST. LOUIS SEWER DISTRICT – RULES AND REGULATIONS AND ENGINEERING DESIGN REQUIREMENTS FOR SANITARY SEWAGE AND STORM WATER DRAINAGE FACILITIES," FEBRUARY 2006, AS PUBLISHED BY METROPOLITAN ST. LOUIS SEWER DISTRICT, AND THE "MANUAL OF BEST MANAGEMENT PRACTICES FOR STORMWATER QUALITY," AUGUST 2009, AS PUBLISHED BY THE KANSAS CITY MID-AMERICA REGIONAL COUNCIL (MARC) AND THE KANSAS CITY METRO CHAPTER OF THE AMERICAN PUBLIC WORKS ASSOCIATION (APWA), TOGETHER WITH THE ADDITIONS, INSERTIONS, DELETIONS, AND CHANGES PRESCRIBED IN THE NEW CHAPTER 550: STORM SEWER AND DRAINAGE FACILITY GUIDELINES

WHEREAS, the Board of Aldermen of the City of St. Peters, Missouri, does hereby find and determine that the Metropolitan St. Louis Sewer District has published "Standard Construction Specifications for Sewers and Drainage Facilities of the Metropolitan St. Louis Sewer District, 2009, and "The Metropolitan St. Louis Sewer District – Rules and Regulations and Engineering Design Requirements for Sanitary Sewage and Storm Water Drainage Facilities", February 2006, and the Kansas City Mid-America Regional Council (MARC) and the Kansas City Metro Chapter of the American Public Works Association (APWA) has published the "Manual of Best Management Practices for Stormwater Quality", August 2009; and

WHEREAS, the Board of Aldermen of the City of St. Peters, Missouri, deems it to be in the best interest of the City and its citizenry, and pursuant to its general police powers and in order to promote the health, safety, and general welfare of its citizens, that it adopt said "Standard Construction Specifications for Sewers and Drainage Facilities of the Metropolitan St. Louis Sewer District, 2009, Chapter 4 of "The Metropolitan St. Louis Sewer District – Rules and Regulations and Engineering Design Requirements for Sanitary Sewage and Storm Water Drainage Facilities", February 2006, and the "Manual of Best Management Practices for Stormwater Quality", August 2009, and to repeal Chapter 550 of the Municipal Code of the City of St. Peters and enact a new Chapter 550.

NOW THEREFORE, BE IT ORDAINED BY THE BOARD OF ALDERMEN OF THE

CITY OF ST. PETERS, MISSOURI, AS FOLLOWS:

SECTION 1. The Board of Aldermen of the City of St. Peters, Missouri, do hereby adopt the "Standard Construction Specifications for Sewers and Drainage Facilities of the Metropolitan St. Louis Sewer District", 2009, Chapter 4 of "The Metropolitan St. Louis Sewer District – Rules and Regulations and Engineering Design Requirements for Sanitary Sewage and Storm Water Drainage Facilities", February 2006, and the "Manual of Best Management Practices for Stormwater Quality", August 2009, together with the additions, insertions, deletions, and changes prescribed in the new Chapter 550: Storm Sewer and Drainage Facility Guidelines.

SECTION 2. Repeal of Chapter 550: Storm Sewer and Drainage Facility Guidelines of Title V: Building and Construction of the Municipal Code of the City of St. Peters and Enactment of a new Chapter 550 of Title V of the Municipal Code of the City of St. Peters.

Chapter 550: Storm Sewer and Drainage Facility Guidelines, of Title V: Building and Construction of the Municipal Code of the City of St. Peters is hereby repealed, and there is hereby enacted in lieu thereof a new Chapter 550: Storm Sewer and Drainage Facility Guidelines of Title V: Building and Construction of the Municipal Code in the form of **Exhibit A** attached hereto and made a part hereof.

SECTION 3. Savings Clause.

Nothing contained herein shall in any manner be deemed or construed to alter, modify, supersede, supplant or otherwise nullify any other Ordinance of the City or the requirements thereof whether or not relating to or in any manner connected with the subject matter hereof, unless expressly set forth herein.

SECTION 4. Savings Clause.

If any term, condition, or provision of this Ordinance or of the "Standard Construction Specifications for Sewers and Drainage Facilities of the Metropolitan St. Louis Sewer District", 2009, or of Chapter 4 of "The Metropolitan St. Louis Sewer District – Rules and Regulations and Engineering Design Requirements for Sanitary Sewage and Storm Water Drainage Facilities", February 2006, or of the "Manual of Best Management Practices for Stormwater Quality", August 2009., shall, to any extent, be held to be invalid or unenforceable, the remainder hereof shall be valid in all other respects and continue to be effective and each and every remaining provision hereof shall be valid and shall be enforced to the fullest extent permitted by law, it being the intent of the Board of Aldermen that it would have enacted this Ordinance without the invalid or unenforceable provisions. In the event of a subsequent change in applicable law so that the provision which had been held invalid is no longer invalid, said provision shall thereupon return to full force and effect without further action by the City and shall thereafter be binding.

SECTION 5. This Ordinance shall be in force and take effect from and after its final passage and approval.

Read two times, passed, and approved this 20th day of December, 2012.

Len Pagano, Mayor of St Peters

Attest: Patricia E. Smith
Patricia E. Smith, City Clerk

Approved this 20th day of December, 2012.

Len Pagano, Mayor of St Peters

Attest:
Patricia E. Smith, City Clerk

EXHIBIT A

CHAPTER 550: STORM SEWER AND DRAINAGE FACILITY GUIDELINES

SECTION 550.010: PURPOSE

With continued growth and development the community has been confronted with issues of increased stormwater runoff and its impact upon streams, the environment and quality of life. Increased stormwater runoff causes more frequent and intense flooding problems as well as erosion, rechannelization, and sedimentation of the natural water courses and creeks. In addition, changing and proposed new water quality regulations impact the City's ability to meet the requirements of the community's Municipal Separate Storm Sewer System (MS4) discharge permit.

The natural condition of the land before development is in relative balance with the natural capacity of the receiving streams. Undeveloped conditions provide natural absorption of water into the ground and longer periods of concentration. Modification of the ground surface from its natural vegetated state to solid paved surfaces and buildings causes water to runoff site at faster rates. The solid surfaces don't allow absorption and filtering of the stormwater, and all the benefits that vegetated ground cover provides. It is the policy of the City of St. Peters to protect and promote the public health, safety and general welfare. The management of stormwater will reduce the possibility of damage to public and private property, will reduce the erosion on land and creek channels, will assist in the attainment and maintenance of water quality standards, and will preserve and enhance the environmental quality of the watercourses in the City of St. Peters.

Stormwater management must be performed on a watershed basis. A City-wide Stormwater Master Plan was developed in 2011, studying watersheds and subwatersheds throughout the city. The study assessed stream stability and habitat, flooding, and water quality for streams and detention basins. The Stormwater Master Plan will be used for the planning of future capital improvement projects, improving water quality through the reduction of pollutants into streams, and continuing compliance with Missouri Department of Natural Resources MS4 Regulations.

SECTION 550.020 DEFINITIONS

For the purposes of this Chapter, the following terms, phrases, words, and their derivations shall have the meanings given herein. Unless the context clearly indicates to the contrary, words used in the present tense include the future tense; words used in the singular shall include the plural, and vice-versa; the words "these regulations" mean "this Chapter"; and the word "shall" is always mandatory.

ALLOWABLE RELEASE RATE: The pre-development or existing condition peak flow corresponding to a selected rainfall frequency event.

APPLICANT: The specific Person applying for the Permit for an approved stormwater management system.

BASE FLOOD: The flood having a one percent probability of being equaled or exceeded in any given year, i.e., the one hundred year flood. (The base flood, adopted by the Federal Emergency Management Agency, FEMA, is the 100 year flood)

BEST MANAGEMENT PRACTICES (BMP): Practices, procedures or a schedule of activities to reduce the amount of sediment and other pollutants in stormwater discharges associated with construction and land disturbance activities.

CITY ENGINEER: The City Engineer or his/her designee.

CULVERT: A closed conduit for the free passage of surface drainage water under a highway, railroad, or other embankment.

DEDICATION: The process by which the owner gives approved storm sewers and facilities to the City for public use and maintenance.

DETENTION BASIN: Any man-made area or facility designed to detain (hold) stormwater temporarily during and immediately after a runoff event.

DETENTION STORAGE: The temporary detaining or storage of stormwater in reservoirs, on rooftops, on parking lots and other areas under pre-determined conditions.

DEVELOPED RUNOFF RATE: The peak flow corresponding to a selected rainfall event as a result of developed site conditions.

DIFFERENTIAL RUNOFF: The difference between the calculated developed runoff rate, and the calculated pre-developed runoff rate.

DRAINAGE FACILITY: Any system of artificially constructed drains, including open channels and sewers used to convey stormwater, surface or groundwater either continuously or intermittently to natural watercourses.

DRY BOTTOM BASIN: A facility designed for the temporary storage of stormwater runoff.

ESCROW: A form of security to guarantee the completion or performance of a Stormwater Management Plan or the maintenance of drainage improvements, established as a cash or letter of credit escrow deposit in an amount and form satisfactory to the governing body.

FLOODPLAIN: A geographic area susceptible to periodic inundation from the overflow of natural waterways during the base (100-year) flood.

FLOODWAY: The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one-foot and so delineated in the Federal Emergency Management Agency (FEMA) Flood Insurance Study.

FOREBAY: An area or device to trap silt before it enters a detention pond.

FREEBOARD: The difference in elevation between the hydraulic grade line elevation and (1) the inlet sill elevation; or (2) the top of structure elevation; or (3) the top of channel bank elevation; or (4) the top of wall elevation.

HYDRAULIC GRADE LINE: A line coinciding with the level of flowing water at any given point along an open channel; or the level to which water would rise in a vertical tube connected to any point along a pipe or closed conduit flowing under pressure.

IMPERVIOUS SURFACE: A surface that prevents the infiltration of water.

INFILTRATION: Percolation of water into the ground.

LAND DISTURBANCE: Any activity which affects the ground surface and/or vegetation (i.e. clearing & grubbing, grading, excavating, etc.)

LEVEL OF SERVICE (LS): The level of water quality protection recommended for a development or provided by a postdevelopment stormwater management system. The LS requirement for the development is determined by the change in runoff from the predevelopment condition. The LS provided by the stormwater management system is determined by a combination of detention and water quality treatment.

MAINTENANCE: The act of maintaining or preserving including, but not limited to, operation, construction, and re-construction.

MS4: Municipal Separate Storm Sewer System

ONE HUNDRED-YEAR PEAK FLOW: The peak rate of flow of water at a given point in a channel, watercourse, or conduit resulting from the base flood.

ONE HUNDRED-YEAR STORM: Rainstorms of a specific duration having a one-percent probability of occurrence in any given year.

OUTFALL: The point location or structure where drainage discharges.

PERMIT: A permit granted by the City to a Person to construct a stormwater management system.

PERMITTEE: Any Person to whom a Permit has been granted by the City under this Chapter.
PERSON: An individual, corporation, partnership, and/or unincorporated association of persons.

PRE-DEVELOPED RUNOFF RATE: The amount of flow from an existing site prior to new development or improvements as computed using the Rational Formula.

RATIONAL METHOD: An empirical formula for calculating peak rates of runoff resulting from rainfall.

SITE: The area to be developed or improved.

SOIL CONSERVATION SERVICE METHOD: A technique for calculating stormwater runoff volume and peak flow described in Soil Conservation Service (SCS) Technical Release 55.

STORMWATER MANAGEMENT IMPROVEMENTS FUND: Monies reserved for funding improvements to stormwater systems owned and maintained by the City of St. Peters. (Ordinance 753)

STORMWATER MANAGEMENT PLAN: The drawings, computations, data, reports, etc., which identify how stormwater runoff is to be managed.

STORMWATER MANAGEMENT SYSTEM: All means, natural or man-made, used for conducting stormwater runoff to, through, or from a drainage area to the point of outlet.

STORMWATER MANAGEMENT SYSTEM ESCROW: See escrow.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP): A management plan, the purpose of which is to ensure the design, implementation, management and maintenance of Best Management Practices (BMP's) in order to reduce the amount of sediment and other pollutants in stormwater discharges associated with land disturbance activities.

STORMWATER RUNOFF: Water that results from precipitation which is not absorbed by the soil, evaporated into the atmosphere, or entrapped by ground surface depressions and vegetation.

STORMWATER SEWER: A pipe or closed conduit that carries surface runoff and subsurface waters.

SWALE: A broad, shallow watercourse.

TIME OF CONCENTRATION: Consists of inlet time plus the travel time in the sewer or channel from the most remote point in the watershed to the point under consideration.

TWENTY-FIVE YEAR FLOOD: A flood having a four-percent probability of occurrence in a given year.

TWENTY-FIVE YEAR PEAK FLOW: The peak rate of flow of water at a given point in a channel, watercourse, or conduit resulting from the twenty-five year flood.

TWENTY-FIVE YEAR STORM: Rainstorms of a specific duration having a four-percent probability of occurrence in any given year.

STRUCTURE: Any object constructed above or below ground.

TRIBUTARY AREA: All of the area that contributes stormwater runoff to a given point.

VALUE RATING (VR): The assumed water quality improvement value of a cover type or BMP, based on its ability to improve water quality and mitigate runoff volume.

WET BOTTOM BASIN: A detention basin intended to have a permanent pool.

WATERCOURSE: Any natural or artificial stream, river, creek, channel, ditch, canal, culvert, drain, waterway, gully, ravine, street, roadway, swale, or wash in which water flows, either continuously or intermittently, and which has a definite channel, bed or bank.

WATER QUALITY: The chemical, physical, and biological characteristics of water. This term also can refer to regulatory concerns about water's suitability for swimming, drinking, agriculture, industrial activity, and healthy aquatic ecosystems.

WATER QUALITY STORM: The storm event that produces less than or equal to 90 percent stormwater runoff volume of all 24-hour storms on an annual basis. In the St. Peters area this is the 1.14" storm.

WATER QUALTIY VOLUME (WQv): The storage needed to capture and treat 90 percent of the average annual stormwater runoff volume. It is calculated by multiplying the Water Quality Storm times the volumetric runoff coefficient and site area.

WATERSHED: All the land that drains to a given point (also described as a basin, catchment, and drainage area).

SECTION 550.030 STORMWATER MANAGEMENT PLANS

A city-wide stormwater management plan (SWMP) was prepared in 2011, studying watersheds and subwatersheds in the City of St. Peters. The study assessed stream stability and habitat, flooding, and water quality for our streams and detention basins. The plan contains recommendations for future locations of capital improvements and retrofits to provide for improved stabilization, storage capacity, and water quality best management practices. This plan shall serve as a guide for public policies to protect the watersheds and for the selection and scheduling of specific activities that will protect and promote the public health, safety and welfare. The basic goal of stormwater management is to align water quantity and water quality management techniques in such a way as to prevent further deterioration and to begin improving the quality of the City's watersheds. The three basic methods for addressing these goals include maintaining existing conditions, decreasing peak flows and reducing or removing pollutants. As outlined in the SWMP, this will be accomplished by preserving and protecting quality stream corridors, renovating and improving degraded stream sections, and retrofitting detention basins for water quality benefits.

SECTION 550.040 STORMWATER MANAGEMENT REQUIRED FOR ALL DEVELOPMENTS

Any development or area which is to be paved, expanded, redeveloped or otherwise improved shall be required to provide on-site stormwater management unless the City Engineer waives such requirement for the reasons contained below:

A. *Off-Site or Regional Facility, Two or More Developments.* If two or more developments, including that of the applicant, have provided for a common system. A Stormwater Agreement shall be developed and signed by all developments or properties contributing to a common system that clearly defines maintenance responsibilities between all parties.

B. *Off-Site or Regional Facility by City.* If an off-site stormwater management system has been either constructed or programmed or identified for construction by the City, and applicant has agreed to contribute to or participate in the construction thereof.

C. *Contribution in lieu of On-site Detention:* A financial contribution may be considered in lieu of on-site detention if the increased amount or velocity of stormwater generated by the development will have minor detrimental effect on the receiving water course and there are no known downstream flooding, erosion or water quality issues, and the applicant has agreed to contribute to the Stormwater Management Improvements Fund an amount equal to the cost of the otherwise required on-site stormwater management system. Reference Section 550.090, section A, subsection 5 of this code for criteria to qualify for this option.

1. For the purpose of establishing an amount to be contributed, the developer shall prepare an estimate of cost for a detention basin, including, but not limited to, the land value for the detention basin area, and construction costs (including grading and vegetation) which shall be reviewed and approved by the City Engineer.

2. Contributions to the Stormwater Management Improvements Fund shall only be required if the amount of runoff is increased.

D. *Other Management Techniques*: Management techniques other than detention facilities may be utilized by the development provided the proposed techniques meet the intent of this Chapter and provide a benefit to the watershed that equals or exceeds the benefit that a detention facility would provide.

SECTION 550.050 STORMWATER MANAGEMENT IMPROVEMENTS FUND

The Stormwater Management Improvements Fund, which was created by Ordinance 753, shall be continued and shall be reserved for funding improvements to stormwater systems owned and maintained by the City, and for no other purposes unless authorized in this Chapter. All contributions made by parties developing within the City in accordance with Section 550.040 of this Chapter shall be deposited to said fund. Said fund shall be deposited in an interest bearing account.

SECTION 550.060 CITY PARTICIPATION IN ON-SITE FACILITIES

When the City Engineer determines that additional storage capacity beyond that required by the applicant for on-site stormwater management is necessary in order to correct an existing problem, or to provide protection in a more desirable method for future development, or to complete improvements as outlined in the City's Stormwater Master Plan, the City may acquire from the applicant or owner, by purchase or dedication, the construction of stormwater management systems to the extent that it exceeds the required on-site stormwater management.

SECTION 550.070 INSPECTION, MAINTENANCE, ACCEPTANCE BY CITY

A. The City Engineer shall inspect, or cause to be inspected, all stormwater management systems constructed within the City of St. Peters, Missouri. Through such inspections the City Engineer shall ensure that the facilities under construction are being constructed in accordance with the approved plans for such development.

B. If it is determined that construction is not in accordance with the approved plans, the City Engineer shall immediately issue written notice to the permittee and the surety, of the nature and location of the non-compliance, specifying what remedial work is necessary to bring the construction into compliance. The notified permittee shall immediately, unless weather conditions or other factors beyond the control of the permittee prevent immediate remedial action, commence the remedial action and shall complete the remedial work within 72 hours, or within a reasonable time, not to exceed seven calendar days, after receipt of said notice. Upon satisfactory completion of the remedial work, the City Engineer shall issue a notice of compliance.

C. In the event that the remedial action is not taken, the City Engineer may then issue a Stop Work Order, which Stop Work Order shall direct all parties involved to cease and desist all or any portion of the work on the development except such work necessary to bring the project into compliance. If such Stop Work Order is ignored, the parties shall be in violation of this Chapter and subject to the penalties contained herein.

D. Each owner of the property being developed has the responsibility and duty to properly operate and maintain any stormwater management system, which has not been accepted for maintenance by the City. The responsibility of maintenance of the system in subdivision projects shall remain with the developer until such time as the stormwater management system escrow for such development has been released. Upon release of escrow the maintenance responsibility shall be vested in the Trustees of the subdivision, by virtue of a trust indenture.

The indenture of trust shall clearly indicate resident responsibility for maintenance. The responsibility for maintenance in single lot development shall remain with the general contractor and owner until final inspection of the development is approved, and an occupancy permit is issued. After occupancy, the maintenance of the management system shall be vested in the owner of the project. All such privately owned and maintained systems and BMPs shall be subject to periodic inspection by the City Engineer or his representative.

E. If, after an inspection by the City Engineer, the City Engineer determines that the condition of a privately owned stormwater management system is an immediate danger to the public health or safety, because of an unsafe condition, or if the trustees or owner fail to provide a reasonable degree of maintenance, the City Engineer shall take such action as may be necessary to protect the public health and safety and make the system safe and correct. Any costs incurred by the City, as a result of the City Engineer's actions, shall be assessed against the owner(s) of the system.

F. Upon acceptance by the Board of Aldermen, a stormwater management system may be dedicated to the City for perpetual maintenance. Any such system shall include adequate perpetual access and sufficient area for maintenance by City personnel and vehicles.

SECTION 550.080 ESCROW

Upon approval of the Final Plans for any stormwater management system, but before the issuance of any permits, the City Engineer shall require the applicant to post an escrow in the form of a Letter of Credit, cash escrow, or certified check, for the amount of the work to be done pursuant to the approved stormwater management plan. This performance security shall not be fully released by the City Engineer until a final inspection has been made and the facility has been found to be in compliance with the approved plans, and in the event the facility is to remain privately owned, provisions have been made to assure perpetual maintenance. A one-year maintenance escrow against defects in workmanship will be required by the City Engineer for any system dedicated to the City.

SECTION 550.090 CRITERIA

A. *APPLICABILTY:* The requirements of stormwater management outlined in this Chapter shall apply to all developments within the corporate limits of the City of St. Peters, Missouri. Stormwater management plans shall be provided and designed in accordance with the requirements of this Chapter and all design and construction specifications adopted by this Chapter. Each development is to strive to maintain or improve predevelopment peak flows,

runoff volumes and water quality. Stormwater quality and quantity management requirements will be evaluated for all projects, and specifically, will be required for projects including:

1. All new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common parcel or project that is greater than one acre.

2. All projects that have a differential runoff of 1 cfs or greater for the 15-year, 20-minute storm event. The differential runoff is calculated by the Rational Method using PI factors.

3. Development or redevelopment of sites without prior stormwater detention shall provide detention or retention, when the cumulative differential increase equals 1 cfs or greater. Projects with prior detention shall provide additional detention or retention for all increased runoff.

4. When existing stormwater management (detention or retention) facilities are going to be used to accommodate additional runoff, the facilities shall be retrofitted to meet the current stormwater management requirements. Projects which cannot meet this requirement due to physical constraints will be evaluated for alternatives on a case by case basis.

5. New development projects that disturb less than one acre and have less than 1 cfs differential runoff, may be given a waiver by the City Engineer in accordance with Section 550.040 of this Chapter.

B. *AFFADAVIT OF DISCLOSURE OF PROPERTY INTEREST*: The effective acreage for a site is not limited to a fractional part of the total. If a project is developed in phases or small plats, the total acreage of the project site will be considered. At the time the owner of any development submits a preliminary plat or development, the owner shall also identify to the City Engineer all contiguous property or property in the watershed that the owner has interest in.

SECTION 550.100 SUBDIVISION AND IMPROVEMENT REGULATIONS REQUIRED INFORMATION

A. *PRELIMINARY STORMWATER MANAGEMENT PLANS:* Concurrent with the filing of a preliminary plat or development plan, the following information shall be submitted to the City Engineer:

1. Topographic map outlining the limits of the contributing watershed. Topographic maps should be the best available. Topographic maps with two-foot contour intervals will be accepted as a minimal requirement.

2. Site plan of suitable scale and contour interval, showing the land to be developed and such adjoining land whose topography may affect the layout or drainage patterns for the site.

3. The location of streams and other flood water runoff channels, the extent of floodplains, the limits of the floodway, if pertinent, and any additional information, all of which shall be properly identified.

4. The normal elevation and shoreline of lakes, ponds, swamps, and detention basins including their floodplains and inflow and outflow structures, if such structures exist.

5. Specific information regarding the type and characteristics of soils which will be encountered within the project, and the locations of any sinkholes on the site.

6. Concepts that will be considered within the site to handle the quantity of stormwater runoff, including the methods for detention or control of increased stormwater runoff generated by the development, and how stormwater quality will be addressed.

7. A general plan showing the extent and nature of the stormwater system planned to serve the site including preliminary calculations indicating the runoff which must be handled by such systems, the methods and criteria which have been utilized in calculating such runoff, and basic information regarding the receiving watercourse into which such system will discharge.

8. A general plan indicating the exterior perimeter of the site, the general development proposed for the project, and an indication by means of rough contours showing the terrain after grading of the site.

9. All computations, plans, and specifications must be prepared and sealed by a professional engineer registered in the State of Missouri.

Following receipt of Preliminary Stormwater Management Plan, and information to be included with such plan, the general concepts and planning proposals will be reviewed by the City Engineer. The City Engineer will schedule a review meeting with representatives of the developer, including, but not limited to, the developer's engineer, to review the overall concepts included in the Preliminary Stormwater Management Plan. The purpose of this

review shall be to jointly agree upon an overall Stormwater Management Concept for the proposed development and to review criteria and design parameters, which shall apply to the final design of the project.

B. *FINAL PLANS:* Following review of the Preliminary Stormwater Management Plan and after the concept review meeting and approval of the preliminary plan by the City Engineer, a Final Stormwater Management Plan shall be prepared for each phase of the proposed project as each phase is developed. The final plan shall constitute a refinement of the concepts approved in the Preliminary Stormwater Management Plan with preparation and submittal of the following additional detailed information unless specifically excluded during the preliminary concept review meeting:

1. A topographic map of the site and adjacent areas, of suitable scale and contour interval, which shall define the location of watercourses, the extent of floodplains and calculated high water elevations, the shoreline and elevation of lakes, ponds, swamps, and detention basins including their inflow and outflow structures.

2. The location and flowline elevation of all existing sanitary and storm sewers.

3. Detailed determination of runoff anticipated for the site following development, indicating design volumes and rates of proposed runoff for each portion of the watershed, the calculations used to determine said runoff volumes and rates, and restatement of the criteria which have been used.

4. A layout of the proposed stormwater management system including the location and size of all drainage structures, storm sewers, channels and channel sections, detention basins, water quality BMPs, and other stormwater improvements, and analysis regarding the effect said improvements will have upon the receiving channel and its high water elevation.

5. A planting palette and seeding rates for vegetated water quality BMP's.

6. The location and calculated flow rates of other existing storm drains, inlets and outfalls.

7. The location and calculated flow rates of any existing storm sewers which occur within the site, or adjacent thereto within a distance of approximately 200 feet from the perimeter of said site; or as conditions warrant.

8. The location and observed flow rates of any flowing springs, existing wells or any existing seepage areas as determined by means of a field inspection of the property.

9. The slope, type, size, and flow calculations for all existing and proposed storm sewers and other waterways.

10. For all detention basins, a detention analysis report for each basin, including, but limited to, a plot or tabulation of storage volumes with corresponding water surface elevations and the basin outflow rates for those water surface elevations.

11. For all detention basins, design hydrographs of inflow and outflow for the 2-year storm and 25-year storm differential runoff rates from the site under proposed development conditions.

12. A refined grading plan for the entire project site drawn at a suitable scale and contour interval, or the terrain within the proposed project site including contours of the existing terrain, along with contours indicating final grades which will be established during completion of the project. The grading plan shall also include a plot of the line defining the high water elevation to be expected under the one-hundred year peak flow conditions produced by the projected development of the contributing watershed based on the best available land use information.

13. Profile and cross-section drawings of all existing and proposed channels or other open drainage facilities, showing existing and proposed conditions, flow volume (Q) and velocity, together with the high water elevations expected from stormwater runoff under the controlled conditions called for by these regulations and the relationship of structures, streets, and other utilities to such channels.

14. Calculations supporting the method and capacity needed for the safe and temporary storage of increased runoff resulting from the proposed development, if temporary storage is needed.

15. Calculations for Water Quality Volume (WQv) to determine the amount of storage needed to capture and treat 90 percent of the average annual stormwater runoff volume.

16. Calculations for Flood Protection Volume (Qp) to protect downstream areas from flooding.

17. Calculations for the Level of Service (LS) and Value Rating (VR) to determine the level of water quality protection needed for a development.

18. Basic information regarding the receiving watercourse into which the proposed stormwater system will discharge including the watercourse location, general cross section, existing downstream culverts and bridges and other waterway openings within a reasonable distance; any existing detention basins or lakes and other information required to determine, in final form, the effect which the proposed development will have on downstream drainage conditions.

19. A Stormwater Pollution Prevention Plan (SWPPP) which shall include the following information:

    a. Name, address and phone number of the site owner.
    b. Site address or parcel identification number(s).
    c. A site map showing the outlines of the total project area, the areas to be disturbed, existing land uses, locations and names of surface water bodies, discharge points, locations of floodplains, locations of temporary and permanent BMP's, and a location map.
    d. Existing contours of the site and adjoining strips of off-site property, and proposed contours.
    e. A natural resources map identifying soils.
    f. Estimated quantity of land to be disturbed.
    g. Details of the site drainage pattern both before and after the Land Disturbance Activities.
    h. Stabilized access to the construction site.
    i. Description of the BMP's to be utilized to control erosion and sedimentation during the period of land disturbance. A table is to be provided that lists each BMP to be utilized and the quantity of each (the quantity for silt fence, etc. is to be listed in linear footage). Label each BMP in the table as temporary or permanent.
    j. Identify potential sources of pollution, waste and construction materials expected to be stored on site and a description of the BMP's to be utilized to prevent the potential pollutants (construction wastes, toxic or hazardous substances, petroleum products, paints, solids, pesticides, herbicides, site litter, sanitary wastes, etc.) from entering the natural drainage ways and/or waters of the U.S. during the period of construction and land disturbance.
    k. Description of the BMP's that will be installed during land disturbance to control pollutants in stormwater discharges that will occur after land disturbance activity has been completed.
    l. Location of stabilized temporary off-street parking, wash-down, and maintenance area for related vehicles.

m. Sources of off-site borrow material or spoil sites, and all information relative to haul routes, trucks and equipment.
n. Narrative describing the timing and schedule of installation of erosion, sediment, and good housekeeping controls.
o. Provisions for maintenance of control facilities, including easements.
p. Schedules and procedures for routine inspections of any structures provided to prevent pollution of stormwater or to remove pollutants from stormwater and of the site in general to ensure all BMP's are continually implanted and effective.
q. Description of measures that will be installed during construction process to control pollutants in stormwater discharges that will occur after construction operations have been completed. During construction, strategies shall be implemented to protect post construction BMP's.
r. Location/description of industrial activities like temporary, on site, concrete or asphalt batch plants.
s. Special measures may need to be taken to ensure conformance with the required total maximum daily load (TMDL) on the implementation plan for developments located in an area draining to a water body that has been listed on Missouri's impaired water body list.

20. All computations, plans, and specifications must be prepared and sealed by a professional engineer registered in the State of Missouri.

21. The City Engineer, or his/her designee, shall review final Stormwater Management Plans.

    a. If it is determined that the proposed development will provide stormwater quantity and quality control in accordance with the purposes, design criteria and performance standards of these regulations and will not be detrimental to the public health, safety, and general welfare, the City Engineer shall approve the plan or conditionally approve the plan, setting forth the conditions thereof.
    b. If it is determined that the proposed development will not manage stormwater quantity and quality in accordance with these regulations the City Engineer shall disapprove the Final Stormwater Management Plan. If disapproved, the data shall be returned to the applicant for resubmittal.

SECTION 550.110 STANDARD CONSTRUCTION SPECIFICATIONS – ADOPTED

The "Standard Construction Specifications for Sewers and Drainage Facilities of the Metropolitan St. Louis Sewer District", 2009, as published by Metropolitan St. Louis Sewer District, is hereby adopted as the Standard Construction Specifications for the City and made a part hereof, as if fully

set out in this Chapter with the additions, insertions, deletions, and changes prescribed in this Chapter.

SECTION 550.120: RULES AND REGULATIONS AND ENGINEERING DESIGN REQUIREMENTS FOR STORM WATER DRAINAGE FACILITIES – ADOPTED

Chapter 4 of "THE METROPOLITAN ST. LOUIS SEWER DISTRICT – RULES AND REGULATIONS AND ENGINEERING DESIGN REQUIREMENTS FOR SANITARY SEWAGE AND STORM WATER DRAINAGE FACILITIES", February 2006, is hereby adopted as the design requirements for storm drainage facilities for the City and made a part thereof, as if fully set out in this Chapter with the additions, insertions, deletions, and changes prescribed in this Chapter.

SECTION 550.125: MANUAL OF BEST MANAGEMENT PRACTICES FOR STORMWATER QUALITY – ADOPTED

The Mid-America Regional Council (MARC) "MANUAL OF BEST MANAGEMENT PRACTICES FOR STORMWATER QUALITY", August 2009, is hereby adopted as the design requirements for stormwater quality for the City and made a part thereof, as if fully set out in this Chapter with the additions, insertions, deletions, and changes prescribed in this Chapter.

SECTION 550.130: STANDARD CONSTRUCTION SPECIFICATIONS, RULES AND REGULATIONS AND ENGINEERING DESIGN REQUIREMENTS FOR STORM WATER DRAINAGE FACILITIES, AND MANUAL OF BEST MANAGEMENT PRACTICES FOR STORMWATER QUALITY – JURISDICTIONAL TITLES

Throughout the Standard Construction Specifications adopted in Section 550.110 and the Rules and Regulations and Engineering Design Requirements for Storm Water Drainage Facilities adopted in Section 550.120, whenever the term "*District*" appears, it shall be deemed to mean the City of St. Peters, Missouri. Wherever the phrase "*St. Louis County*" appears in the Standard Construction Specifications or the Rules and Regulations and Engineering Design Requirements for Storm Water Drainage Facilities, the phrase shall be replaced with the phrase "St. Charles County". Throughout the Manual of Best Management Practices for Stormwater Quality adopted in Section 550.125, whenever the terms *"Kansas City, Kansas City Metropolitan Area, Kansas City Region or MARC Region"* appears, it shall be deemed to mean the City of St. Peters, Missouri.

SECTION 550.140: STANDARD CONSTRUCTION SPECIFICATIONS, RULES AND REGULATIONS AND ENGINEERING DESIGN REQUIREMENTS FOR STORM WATER DRAINAGE FACILITIES, AND MANUAL OF BEST MANAGEMENT PRACTICES FOR STORMWATER QUALITY – OFFICIAL TITLES

Throughout the Standard Construction Specifications adopted in Section 550.110, the Rules and Regulations and Engineering Design Requirements for Storm Water Drainage Facilities adopted in Section 550.120, and the Manual of Best Management Practices for Stormwater Quality adopted in Section 550.125, wherever the term *"Director"* or *"Engineer"* appears, it shall be deemed to mean the City Engineer.

SECTION 550.150: STANDARD CONSTRUCTION SPECIFICATIONS – AMENDMENTS

A. *STANDARD CONSTRUCTION SPECIFICATIONS:* The Standard Construction Specifications adopted in Section 550.110 are amended as follows:

1. Delete: *Materials of Construction, Part 2, Section (G)(1)(e)*: Fiberglass pipe (RPM).

2. Delete: *Materials of Construction, Part 2, Section (G)(2)(a):* Vitrified clay pipe – 12 inch and larger.

3. Delete: *Materials of Construction, Part 2, Section (G)(2)(e):* Fiberglass pipe (RPM) – 12 inch and larger.

4. Delete: *Materials of Construction, Part 2, Section (G)(2)(f) High density polyethylene:* 12 – 24 inch, and replace with: 12 – 48 inch.

5. Delete: *Materials of Construction, Part 2, Section (G)(11) High Density Poly-Ethylene (HDPE) Corrugated Pipe in its entirety and replace with:* The use of HDPE corrugated pipe with an integrally formed smooth waterway is approved for use, with the exception that HDPE pipe cannot be used under or through existing street right-of-way or through an area where potential future right-of-way may occur. Reinforced concrete pipe shall be installed to the next structure outside of the right-of-way. The HDPE corrugated pipe shall be installed, inspected, and tested according to manufacturer specifications or in accordance with ASTM 2390, D2321, C969, C924, and C1103. Nominal sized HDPE pipe 12 to 36-inches in diameter shall conform to the AASHTO M294 classification "Type S"; and 42-inch to 48-inch diameter HDPE corrugated pipe shall conform to AASHTO MP6-95 classification "Type D".

6. Add: *Materials of Construction, Part 2, Section (G)(11)(a):* All HDPE corrugated pipe joints shall consist of bell and spigot joining system with the bell covering two pipe corrugations as recommended in AASHTO M294. Pipe joints with rubber O-Ring gaskets meeting ASTM F477 shall be installed on the spigot end of the pipe. Both the bell and spigot (with O-Ring gasket) ends of each pipe shall be lubricated as recommended by the manufacturer and inserted to the homing mark on the spigot end of the pipe.

7. Add: *Materials of Construction, Part 2, Section (G)(11)(b):* HDPE corrugated pipefittings may be either molded or fabricated and shall conform to the requirements of AASHTO M252 and M294. The fittings shall not reduce or impair the overall integrity or function of the pipeline. Only fittings supplied or recommended by the pipe manufacturer shall be used.

8. Delete: *Materials of Construction, Part 2, Section (G)(13) Fiberglass Pipe:* delete this section in its entirety.

9. Delete: *Materials of Construction, Part 2, Section (H)(1)(a) Sanitary and Combined Sewers:* Vitrified Clay Pipe (VCP) and Fiberglass Pipe (RPM).

10. Delete: *Materials of Construction, Part 2, Section (H)(1)(a) Stormwater Sewers:* Vitrified Clay Pipe (VCP) and Fiberglass Pipe (RPM)

11. Delete: *Materials of Construction, Part 2, Section (H)(7) Type F Joints.*

12. Delete: *Excavation, Part 3, Sections (F)(2)(b and c)* in their entirety.

13. Add: *Pipe Sewer Construction, Part 4, Section (B)(5):* HDPE corrugated pipe manufactured for this specification shall comply with the requirements for test methods, dimensions, and markings found in AASHTO designations M252 and M294. HDPE corrugated pipe and fittings shall be made from virgin PE compounds which conform with the requirements of cell class 335420C as defined and described in ASTM D3350.

14. Amend: *Pipe Sewer Construction, Part 4, Section (G)(4)(a):* The use of precast concrete inlet covers (Detail Sheet 46) is prohibited. Where precast concrete structures are permitted or required by the project plans, they will be manufactured in accordance to Part 2 of this Specification and to the sizes and shapes detailed in the drawings for this Specification.

15, Amend: *Pipe Sewer Construction, Part 4, Section (I)(2) Pipe Sewers*: Any reference to locator disks shall be changed to locator balls.

16. Delete: *Channel Construction, Part 6, Section (C)(1)(c)* and replace with: The rock shall be neatly placed, and shall not be less than one foot thick on the sides and on the bottom. The surface shall be reasonable regular and uniform.

17. Delete: *Detail Sheet 48*, Steel Grates

18. Delete: *Detail Sheet 49,* Steel Vane Grate

19. Delete: *Detail Sheet 71,* Signs.

SECTION 550.160: RULES AND REGULATIONS AND ENGINEERING DESIGN REQUIREMENTS FOR STORM WATER DRAINAGE FACILITIES – AMENDMENTS

A. *RULES AND REGULATIONS:* The Rules and Regulations and Engineering Design Requirements for Storm Water Drainage Facilities adopted in Section 550.120 are amended as follows:

1. *Section 4.020 General Requirements of Storm Sewer Construction:* Hydraulic Grade Line and Inlet/Flow Capacity Data Computations shall be submitted on Attachment A ("Hydraulic Data Form") for all projects. The form may be computerized; however, all information required on the form shall be included in the computerized version.

1. *Section 4.020.11 Overflow/Design System Paragraph 2:* Whenever the phrase "100-year, 20-minute" appears in the design requirements, the phrase shall be replaced with "15-year, 20-minute".

2. *Section 4.030.01 (1) Rainfall Frequency:* This Section shall be deleted and replaced as follows:
   A fifteen (15) year rainfall frequency is to be used in St. Charles County. In the design of local storm sewer systems, a twenty (20) minute time of concentration shall be used. Figure 4-1 gives rainfall curves for 2-5-10-15-20- and 100-year frequencies.

3. *Section 4.030.03 Hydraulic Grade Line Limits, Paragraph 5*: This paragraph shall be deleted.

4. *Section 4.030.04 Inlets Paragraph 2:* Inlet capacity should not be less than the quantity flow tributary to the inlet and by-pass flow shall be avoided whenever possible. Inlets at low points or grade pockets should have extra capacity to compensate for possible flow by-pass of upstream inlets. Figure 4-3 shows inlet capacity/maximum gutter capacity with a given gutter line grade and flow. The value for inlet capacity obtained from Figure 4-3 shall be multiplied by a factor of 0.85 and the result will be used for the capacity of the inlet. The multiplication factor is to account for clogging of inlets and by-pass around the inlet. An example is presented below.

   Example: Street/Gutter at a 3% Grade has an inlet capacity of approximately 1.6 cubic feet per second (CFS) for a single inlet and approximately 5.1 CFS for a double inlet capacity.

   1.6 CFS * 0.85 = 1.36 CFS →→→→ single inlet capacity
   5.1 CFS * 0.85 = 4.34 CFS →→→→ double inlet capacity

   The following guidelines shall also apply to inlets:

   a. Inlets shall be appropriately sized and spaced, taking into consideration by-pass, depth of flow and gutter capacity. Inlets shall be required when the pavement is super elevated or warped causing water to flow from the gutter line across the roadway.
   b. For inlets in vertical sag curves, the center of the main chamber shall be placed within one (1) foot of the computed mathematical low point.
   c. Inlets shall be located so the inlet face is a maximum of two and one-half (2.5) feet behind the back of the roadway curb in new residential subdivisions. The sump shall begin two (2) feet in front of the back of curb. The top elevation of the stone shall remain three (3) inches above the top of rolled curb and level with the top of vertical curb. When required, the nearest two (2) sections of sidewalk on each side of the inlet shall be warped down to the top of the inlet stone elevation. At intersections, inlets shall be placed so no part of the inlet structure or sump is in the curb rounding.
   d. Area inlets in roadway ditches shall be compatible with the ultimate pavement improvements. Rear yard area inlets shall be required when more than one (1) cubic feet per second (CFS) is concentrated between buildings and crossing sidewalks or curbs.
   e. By-pass shall be minimized at inlet structures and shall be shown on the hydraulic computations and site drainage map. By-pass shall be used in determining gutter flow downstream. By-pass shall not be considered in sizing of the storm sewer

pipe system (i.e., pipe shall be designed for total tributary "Q" regardless of bypass). Curb inlets shall be required to intercept runoff when more than one (1) CFS crosses street intersections.

6. *Section 4.030.06 Culverts:* Add Paragraph 3. Crossroad Culverts – Crossroad culverts, not at low points shall be designed on a storm frequency of fifteen (15) years with entrance control and a minimum of two (2) feet of freeboard at the shoulder line. Culverts, functioning as the low point in floodplains shall be designed on a storm frequency of one hundred (100) years with entrance control and a minimum of two (2) feet of freeboard at the shoulder line. Culverts, functioning as the low point not in floodplains, shall be designed on a storm frequency of fifty (50) years with entrance control and a minimum of two (2) feet of freeboard at the shoulder line. Refer to the U.S. Department of Transportation Hydraulic Engineering Circular No. 5, entitled "Hydraulic Charts for the Selection of Highway Culverts".

7. *Section 4.030.06 Culverts:* Add Paragraph 4. Drainage Pipes (Inlet) – At all intake structures such as flared end sections or headwalls, entrance control shall be applied. Two-(2) foot minimum freeboard shall be required. Upstream inundation shall be checked. Where inundation extends beyond the site property line and exceeds the Design Water Surface Elevation of the natural drainageway/channel, a backwater ponding easement from the affected off-site property owner shall be required prior to approval of the improvement plans. Concrete outfall pipes shall have a reinforced concrete headwall or flared end section with cut-off wall and properly sized, placed revetment underlain with a woven geotextile fabric or paved ditch. Cut-off walls shall be two (2) feet deep on upstream headwalls/end sections.

8. *Section 4.030.06 Culverts:* Add Paragraph 5. Drainage Pipes (Outlet) – Outfall termination shall occur at a natural drainageway/channel so that the flow does not exceed the natural capacity of the drainageway/channel. Discharge velocities in an outfall pipe shall not exceed eight (8) feet per second, where practical. Special approved methods of energy dissipation will be required when discharge velocities in outfall pipes exceed five (5) feet per second. Concrete outfall pipes shall have a reinforced concrete headwall or flared end section with cut-off wall and properly sized, placed revetment underlain with a woven geotextile fabric or paved ditch. Revetment shall be a minimum length of ten (10) feet or ten (10) times the diameter of the discharge pipe (in feet) whichever is greater when not discharging to a lake or pond. Revetment in lakes or ponds shall be placed between the outlet pipe and the low water elevations. Cut-off walls shall be three (3) feet deep on downstream headwalls/end sections.

9. *Section 4.040.02 Clearance:* This Section shall be deleted and replaced as follows: The lowest point of the bridge superstructure, not at low points, shall be designed on a storm frequency of fifteen (15) years with entrance control and a minimum of two (2) feet of freeboard clearance. Bridges, functioning as the low point in floodplains shall be designed on a storm frequency of one hundred (100) years with entrance control and a minimum of two (2) feet of freeboard clearance. Bridges, functioning as the low point not in floodplains, shall be designed on a storm frequency of fifty (50) years with entrance control and a minimum of two (2) feet of freeboard clearance.

10. *Section 4.060 Limitations on Areas Draining Across Sidewalks or Driveways:* Delete this section.

11. *Section 4.070 Impervious Areas – In the City of St. Louis:* This Section shall be renamed "Impervious Areas" and the second paragraph shall be deleted.

12. *Section 4.080 General Performance Criteria for Stormwater Management:* Wherever the phrase "100-year" appears in the design requirements, the phrase shall be replaced with "25-year". Wherever a 24-hour event is specified, Technical Release 55 (TR-55) shall be used as the method for calculating flows. Wherever a 20-minute event is specified, flow rates shall be determined using the method set forth in Section 4.030.01 Flow Quantities.

13. *Section 4.080.01When Required,Paragraph 1:* Paragraph 1 shall be deleted and replaced as follows:

    1. The requirements of the stormwater quantity and quality management shall be evaluated for all projects submitted to the City for review and approval. Stormwater management facilities shall be provided and designed in accordance with the requirements of this section and of the Kansas City MARC Manual adopted herein.

14. *Section 4.080.01 When Required, Paragraph 2*: Whenever the phrase "2 cfs" appears, it is to be replaced with "1 cfs".

15. *Section 4.080.02 Unified Stormwater Sizing Criteria: Delete this section in its entirety and replace with:*

    Section 4.080.02 Design Considerations

    1. General

This section presents the summary for sizing stormwater BMPs to meet pollutant removal goals, to prevent flooding, and to pass extreme floods.

Water Quality Volume (WQv) (acre-feet)	$WQ_v=[(P)(R_v)(A)]/12$ P=rainfall depth in inches=1.14 R_v=volumetric runoff coefficient $R_v=0.05 + 0.009(I)$ Where I = percent impervious cover A=area in acres
Flood Protection Volume (Q_2, Q_{25} and Q_{100})	The post-developed peak flow from the site must be released at a rate not to exceed the allowable release rate for the appropriate rainfall events, as discussed in Section 4.080.03.

The following sub-sections provide more information on WQv and Flood Protection Volume.

2. Water Quality Volume (WQ_v)

   a. The Water Quality Volume (denoted WQ_v) is the storage needed to capture and treat the runoff from 90% of the recorded daily rainfall events. It is equivalent to 1.14 inches of rainfall multiplied by the volumetric runoff coefficient (R_v) and site area. The WQ_v is directly related to the amount of impervious cover created at a site. Refer to the MARC Manual for methods and coefficients.

   b. The following assumptions may be made:

      (1) The Water Quality Volume WQ_v for offsite areas is not required.
      (2) Measuring Impervious Cover: The measured area of a site plan that does not have vegetative or permeable cover shall be considered total impervious cover.
      (3) Multiple Drainage Areas: When a project contains or is divided by multiple drainage areas, the WQ_v shall be analyzed for each drainage area. BMP's are not required to be located within each drainage area, but shall be placed to provide the greatest impact on water quality (i.e. the placement of BMP's in drainage areas discharging directly into a creek or body of water is strongly encouraged, rather than placing BMP's in drainage areas that have an existing downstream treatment train).

Although BMP's are not required to be placed within each drainage area, the WQv shall be accounted for the overall tract.

(4) Offsite Drainage Areas: The WQ_v shall be based on the impervious cover of the proposed site. Offsite existing impervious areas may be excluded from the calculation of the WQ_v.

(5) BMP Treatment: The final WQv shall be treated by acceptable BMPs, as provided in the MARC Manual.

3. Flood Protection Volume:

a. To protect downstream areas from flooding, stormwater shall be detained onsite or offsite as approved and released at a rate not to exceed the allowable release rates for the 2-year, 24-hour storm and 25-year, 24-hour rainfall events for sites larger than 10 acres. For sites less than 10 acres, the developed release rate from the site may not exceed the existing peak flow for the 2-year, 20 minute event and the 25-year, 20-minute event. Note that stormwater pipes, downstream from the control structure, shall be sized to carry the runoff from the 15-year, 20-minute design storm for the total tributary upstream watershed. No reduction in outfall pipe size shall be permitted because of detention.

The outlet structure for the basin shall be sized to pass the 100-year, 24-hour storm event for sites larger than ten (10) acres. For sites less than ten (10) acres, the 100-year, 20-minute rainfall event shall be used. The basin shall have a minimum of two (2) feet of freeboard above the high water elevation for the 100-year storm event.

b. The existing and developed peak flows shall be determined by using Technical Release 55 (TR-55) for sites with a drainage area of ten (10) acres or more. All assumptions that are required for the TR-55 method shall be approved, in writing, by the proper agency prior to commencing grading activities or issuance of a grading permit. For sites less than ten (10) acres, flow rates shall be determined using the method set forth in Section 4.030.01 Flow Quantities.

c. The 2-year, 25-year, and 100-year 24-hour inflow hydrographs shall be determined by using Technical Release 55 (TR-55), "Urban Hydrology for Small Watersheds" from the Natural Resources Conservation Service, formerly Soil Conservation Service (SCS). The inflow hydrograph shall be developed based on the actual flow and timing characteristics upstream of the detention facility. The rainfall distribution shall be Type II.

d. The volume of detention may be provided through permanent detention facilities such as extended dry detention basins, permanent ponds or lakes, underground storage facilities or parking lots. The engineer shall make every effort to locate the detention facility at or near the lowest point of the project such that all of the onsite runoff will be directed into the detention facility. Multiple use of detention basins is encouraged. Multiple use may include parking lots, ball fields, tennis courts, playgrounds, and picnic areas. This is subject to the approval of the City.

   Flows from offsite, upstream areas should be bypassed around the detention facility to ensure that the proposed detention facility will function as designed and will provide effective control of downstream flows with development in place. If offsite flows are directed into a detention facility, the allowable release rates shall not be modified without City approval. Modifying the release rate to accommodate offsite flows may reduce or eliminate the effectiveness of the detention facility, because it will no longer control the increased volume of runoff during the critical time period of the watershed.

   The engineer has the option to calculate a site specific release rate based on the procedures provided by the City's Engineering Department. The engineer shall provide detailed modeling to prove that the increase in runoff volume has been limited to existing conditions during the critical time period of the watershed.

e. Detention basin volume will be based on routing the post-developed 2-year and 25-year inflow hydrographs through the detention facility while satisfying the appropriate release rate. The routing computations shall be based on an application of the continuity principle (i.e. level pool routing).

16. *Section 4.080.03 Limits of Maximum Ponding,in Stormwater Ponds Paragraph 1:* Paragraph 1 shall be deleted and replaced with:

    1. For sites larger than ten (10) acres, the maximum ponding elevation shall be calculated based on a routing of the design storm (100-year, 24-hour event) assuming the low-flow outlet is blocked. For sites less than ten (10) acres, the 100-year, 20-minute rainfall event shall be used.

17. *Section 4.080.03 Limits of Maximum Ponding in Stormwater Ponds, Paragraph 4:* Paragraph 4 shall be deleted and replaced with:

4. A minimum of two (2) feet of freeboard shall be provided from the top of the basin to the maximum ponding elevation.

18. *Section 4.080.03 Limits of Maximum Ponding in Stormwater Ponds, Paragraph 5*: Paragraph 5 shall be deleted.

19. *Section 4.080.04 General Stormwater Basin Design Requirements, Paragraph 1(b):* Paragraph 1(b) shall be deleted and replaced with:

1(b). For sites larger than ten (10) acres, the basin should have sufficient volume and spillway capacity to pass/contain the 100-year, 24-hour storm event with the low flow outlet blocked. For sites less than ten (10) acres, the 100-year, 20-minute rainfall event shall be used.

20. *Section 4.080.04 General Stormwater Basin Design Requirements, Paragraph 13:* Paragraph 13 shall be deleted and replaced with:

13. Detention Basin Elevation

If the detention basin discharges to a piped sewer system, the low elevation of the detention basin shall be above the 15 year, 20 minute hydraulic elevation of the receiving storm system.

21. *Section 4.080.04 General Stormwater Basin Design Requirements, Paragraph 15:* Paragraph 15 shall be deleted.

22. *Section 4.080.05 Acceptable Urban BMP Options:* This entire section shall be deleted and replaced with:

Acceptable Urban BMP Options

The design and selection of BMPs shall comply with the Mid-America Regional Council (MARC) "MANUAL OF BEST MANAGEMENT PRACTICES FOR STORMWATER QUALITY", August 2009, with the additions, insertions, deletions and changes prescribed by the City.

23. *Section 4.080.06 Stormwater Credits:* This entire section shall be deleted.

24. *Section 4.080.08 Maintenance Agreement:* Delete the existing paragraphs and insert the following:

Maintenance Agreement

Maintenance of detention basins shall be the responsibility of the property owner. The detention basin shall be kept in working order, per the approved plans, at all times. By submittal of improvement plans, the owner grants the City of St. Peters the right to inspect the basin at any time, prior to and after development. The City may submit a list of deficiencies to the owner, which shall be corrected at the owner's expense, in a reasonable time.

25. *Section 4.100 Detention Report:* Delete section 6.

26. *Exhibit 4-A:* Delete Exhibit 4-A in its entirety.

27. *Table 4-5:* Delete Table 4-5.

SECTION 550.170: ADDITIONAL RULES AND REGULATIONS AND ENGINEERING DESIGN REQUIREMENTS FOR STORM WATER DRAINAGE FACILITIES

A. *VOLUME OF DETENTION REQUIRED:* The volume of storage required shall be sufficient to provide enough storage to control the differential runoff and the water quality storm.

B. *FLOWS FROM UPSTREAM AREAS:*

1. No materials (fence, shed, landscaping, decorative blocks, etc.) shall be placed in a manner that blocks or alters the drainage of adjacent properties.

2. Flows from upstream areas outside the site should be based upon the assumption that those areas are fully developed under forecast land use patterns. For detention sizing, the required storage volume will be based upon the site only, with the flow from upstream areas being by-passed or discharged via overflow spillways or other devices.

C. *EARLY INSTALLATION OF CONTROL SYSTEMS:* Runoff control measures shall be installed prior to any land disturbance.

1. Land disturbances that fall under the requirements for a grading permit, and that are greater than or equal to 1 acre in size, are required to have a Stormwater Pollution Prevention Plan.

2. Land disturbances less than 1 acre are required to have perimeter siltation controls that protect off-site properties, road right-of-ways, storm sewer systems and drainage ways.

D. *FACILITIES IN FLOODPLAINS:* If detention storage is provided within a floodplain, only the storage above the 100 year Base Flood Elevation (BFE) will be credited to the development. No credit will be granted for detention volumes below the 100 year BFE at that location, unless compensatory basin storage is provided elsewhere above the 100 year BFE.

E. *SURFACE DRAINAGE:* Sheet flow in excess of 1.0 cubic feet per second (cfs) shall not be allowed over terraces. Berms and/or vegetated swales shall be provided to collect the flow at the top or the bottom of the terrace and carry it to a drainage structure. Total accumulation inside berms and/or swales shall be a maximum of four (4) cfs. Critical cross sections, profiles, and hydraulic computations for ditches and swales with flows in excess of one (1) cfs and relocated or man-made creeks with flows in excess of four (4) cfs shall be provided.

F. *PIPE SLOPE AND VELOCITY:* The minimum grade shall be the grade establishing a self-cleansing velocity of three (3) feet per second. Velocities shall not exceed 25 feet per second, where practical.

G. *DRAINAGE STRUCTURES:* The lateral location of all street drainage structures shall be shown on the plans by the street centerline stationing and the perpendicular offset distance.

1. All manholes shall be located outside of the proposed roadway pavements.

2. Erosion protection in the form of asphalt curb, gutters, additional structures, paving and/or revetment may be required at the temporary termination of pavements.

3. Subsurface pre-cast stormwater structures may be used provided detailed drawings are submitted and approved prior to construction plan approval.

H. *OPEN CHANNEL SETBACK REQUIREMENT:* Development along natural watercourses shall have residential lot lines, commercial or industrial improvements, parking areas or driveways set back a minimum of 25 feet from the top of existing stream bank or 15-year, 20-minute water surface elevation, where no defined bank exists. The watercourse and 25-foot setback area shall be maintained and made the responsibility of the subdivision trustees. Residential lots having an area of one (1) acre or greater which shall be exempt from this regulation if the stream bank is not erosive. In the case of a site plan, commercial or industrial site, the watercourse and 25-foot setback area shall be maintained and made the responsibility of the property owner. Permanent native vegetation and existing ground elevation and grades

within the 25-foot setback shall be left intact and undisturbed. Variances will include designed stream bank erosion control measures and shall be approved by the appropriate government agency, which has jurisdiction over the land and/or development in question. FEMA and U.S. Army Corps of Engineers guidelines shall be followed where applicable regarding site development areas designated as floodplains and wetlands.

I. *NATURAL DRAINAGEWAY ENCLOSURE*: Engineered construction plans and a permit are required for the enclosure of an existing natural drainageway, or for any channel crossing that causes a restriction to the natural drainageway, if the channel carries greater than 10 cubic feet per second (CFS) of stormwater during a 15-year, 20-minute storm event. The enclosure shall be sized for a 50-year, 20-minute storm event for flows equal or greater than 100 CFS. The enclosure shall be sized for a 15 year, 20 minute storm for flows less than 100 CFS. For flows equal or greater than 100 CFS, two- (2) foot minimum freeboard shall be required and upstream inundation shall be checked for the 100-year, 20-minute storm event. Where inundation extends beyond the site property line and exceeds the Design Water Surface Elevation of the natural drainway/channel, a backwater ponding easement from the affected off-site property owner shall be required prior to approval of the improvement plans.

J. *GENERAL DESIGN FEATURES:*

1. *Dry Basins:* Basins may be constructed to temporarily detain the stormwater runoff so that the rate at which it is released is the same rate as before development. In addition to the design requirements set forth in the MARC Manual, the following features shall be incorporated into the design of any dry detention basin:

   a. Storage Volume – The volume of storage provided shall be sufficient to provide enough storage to control the differential runoff from the 2-year and 25-year storm events.

   b. Freeboard – Detention storage areas shall have adequate capacity to contain the storage volume of tributary stormwater runoff with at least two (2) feet of freeboard above the water surface.

   c. Outlet Control Works – Outlet works shall be designed to limit peak outflow rates from detention storage areas to or below peak flow rates that would have occurred prior to the proposed development. Outlet works shall not include any mechanical components or devices and shall function without requiring attendance or control during operation, unless specifically approved by the City Engineer.

d. Spillway – Emergency spillways shall be provided to permit the safe passage of runoff generated from a 100-year storm.

e. Multipurpose Basins – If the detention basin is to have other uses, the design of the basin bottom should include underdrains to expedite drying of the bottom between runoff events.

f. Aesthetics – Designs should result in aesthetically pleasing configurations, which will enhance public acceptability.

2. *Rooftop Storage:* Detention storage may be met in total or in part by detention on roofs. Details of such design, which shall be included in the building permit application, shall include the depth and volume of storage, details of outlet devices and downdrains, elevations of overflow scuppers, design loadings for the roof structure and emergency overflow provisions. Direct connection of roof drains to sanitary sewers is prohibited.

3. *Parking Lot Storage:* Paved parking lots may be designed to provide temporary detention storage of stormwater on all or a portion of their surfaces. Outlets will be designed so as to slowly empty the stored waters and depths of storage must be limited so as to prevent damage to parked vehicles. Maximum depth shall not exceed 8 inches of water.

4. *Other Detention Methods:* All or a portion of the detention storage may also be provided in underground or surface detention facilities, to include basins, tanks, or swales, etc.

L. *MAINTENANCE OF STORMWATER SYSTEMS AND BMPs*

Designs of stormwater systems and BMPs shall incorporate features, which facilitate their inspection and maintenance. The growth of obnoxious weeds, the creation of conditions which support the growth of mosquitoes and other insects, and the decrease in available storage by accumulated sediments must be controlled. The cleanup of accumulated debris, flotsam and other materials after runoff events have subsided must be assured. Maintenance of stormwater and detention systems, and BMPs, shall be the responsibility of the property owner. Assignment of responsibility for maintaining facilities serving more than one lot or holding shall be documented by appropriate covenants to property deeds unless responsibility is formally accepted by the City.

1. *Inspections:* All privately owned detention storage facilities will be inspected by representatives of the City not less often than once every three years, and BMPs will be

inspected yearly. A letter will be sent to the owner, with a checklist, notifying them of the results of the inspection and listing any deficiencies found that are in need of correction.

2. *Corrective Measures:* If deficiencies are found by the inspector, the owner of the detention facility and/or BMP(s) will be required to take the necessary measures to eliminate nuisances and correct the deficiencies. If the owner fails to do so, the City may undertake the work necessary and recover all expenses from the owner.

M. *SAFETY FEATURES*

Designs of stormwater systems shall incorporate safety features, particularly at outlets, on steep slopes, and at any attractive nuisances to include, as necessary, fencing, hand rails, lighting, steps, grills, signs, and other protective or warning devices so as to restrict access during critical periods and to afford some measure of safety to both authorized and unauthorized persons.

SECTION 550.175: MANUAL OF BEST MANAGEMENT PRACTICES FOR STORMWATER QUALITY – AMENDMENTS

A. *STORMWATER QUALITY:* The Manual of Best Management Practices for Stormwater Quality adopted in Section 550.125 are amended as follows:

1. *Section 3.2 Water Quality Concepts, Paragraph 6:* The last sentence shall be deleted and replaced as follows: In the St. Peters area, the Water Quality Storm is the 1.14" rain event.

All future references in the Manual to the 1.37 inch Water Quality Storm shall be replaced with the 1.14 inch Water Quality Storm.

2. *Section 4.2.1 Predevelopment and Postdevelopment Conditions, Paragraph 3:* The following sentence shall be deleted: Assume that soils which will be disturbed by development are assigned a HSG rating one higher than the predevelopment condition unless they are preserved in accordance with the specifications in Appendix A.

3. *Table 4.4 Best Management Practice Value Ratings:* Table 4.4 shall be modified to include the following Cover Type or BMP's and Overall Value Ratings:

Cover Type or BMP	Overall Value Rating
Rock Filter Strip	3.0
Rock Filter Strip with underdrain system	4.0
Amended Soils	5.0

4. Add Section 4.5 Stormwater Quality Credits:

   Credits towards the weighted Value Rating (VR) or LS can be given by the City Engineer, if the design features of a site, or its BMP(s) are part of a Treatment Train that includes existing offsite downstream BMPs that the stormwater will filter through before reaching its ultimate discharge point (creek, drainage way, lake, etc.) or if the site conditions restrict the ability to meet the VR or LS required. All sites will be evaluated on a case by case basis.

5. *Worksheet 1A on Page 4-17 of the MARC Manual, titled Required Level of Service – Developed Site, section 2, subsection E, shall be deleted and replaced as follows:*

   2.E. Level of Service

   Use percent Impervious to Enter Table 4.3

   LS = 3.0 for a Percent Impervious = 0

6. *Worksheet 1A on Page 4-17 of the MARC Manual, titled Required Level of Service – Developed Site, section 3 shall be deleted and replaced as follows:*

   3.Minimum Required Total Value Rating of BMP Package

   Total Value Rating = LS X Required Treatment Area plus

   "existing impervious area inside disturbed area that is to remain

   Impervious in post development condition" X 1

7. *Table 6.1 Volumetric Coefficients for Urban Runoff for Directly Connected Impervious Areas:* Table 6.1 shall be modified to include the following information for a 1.14 inch storm event:

Rainfall (inches)	Flat roofs and and unpaved parking lots	Pitched roofs and large impervious areas (large parking lots)	small impervious areas and narrow streets	Silty soils HSG-B	Clayey soils HSG-C and D
1.14	0.85	0.98	0.72	0.12	0.22

8. *Table 6.2 Reduction Factors to Volumetric Runoff Coefficients for Disconnected Impervious Surfaces:* Table 6.2 shall be modified to include the following information for a 1.14 inch storm event:

Rainfall (inches)	Strip commercial and shopping center	Medium-to-high-density residential with paved alleys	Medium-to-high density residential without alleys	Low-density residential
1.14	0.99	0.44	0.22	0.22

9. *Table 6.3 Rainfall Intensity for Water Quality Rainfall Event (1.37 inches):* Delete Table 6.3

10. *Appendix A, page A-35, Trees:* Delete all Ash trees (White Ash, Green Ash).

11. *Appendix A:* Add the following supplemental lists of plants and trees to Appendix A:
    A. Plants lists from the *St. Louis MSD guidance and Missouri Botanical Garden resources.*

B. Plant Palette Recommendation, Wet Detention Basin

botanical name	common name	height (ft)	spacing*	water	light	comments
Upper 5 Feet						
Asclepias incarnata	Marsh Milkweed	2 to 3	18" o.c.	moist soil	full sun	
Carex grayi	Gray's Sedge	2 to 3	18" o.c.	moist soil	full to medium sun	
Carex muskingumensis	Palm Sedge	2 to 3	18" o.c.	moist soil	full to medium sun	Plant in massings for best foliage effect
Middle 10 Feet						
Acorus calamus	Sweet Flag	2 to 4	18" o.c.	moist soil to shallow water	full sun	
Carex stricta	Tussock Sedge	1 to 3	18" o.c.	moist to wet soil	full to medium sun	
Iris fulva	Copper Iris	2 to 3	18" o.c.	moist to wet soil	full sun	Plant individuals with other plant massings
Iris virginica	Southern Blue Flag Iris	2 to 3	18" o.c.	moist to wet soil	full sun	Plant in massings for best flower effect
Saururus cernus	Lizard's Tail	2 to 4	18" o.c.	moist soil to shallow water	full to medium sun	
Lower 5 Feet						
Juncus effusus	Soft Rush	2 to 3	18" o.c.	moist soil to standing water (up to 4" deep)	full sun	Good for erosion control on moist banks
Pontederia cordata	Pickerel Weed	2 to 4	18"o .c.	standing water (3"-5" deep)	full sun	Plant in massings for best foliage/flower effect
Sagittaria latifolia	Arrowhead	1 to 4	18" o.c.	wet soil to shallow water	full sun	
Scirpus validus	Softstem Bulrush	1 to 6	24" o.c.	wet soil to shallow water	full sun	

C. **Dominant Tree Species**
Silver Maple Acer saccharinum (not recommended for yards and landscapes)
Sugar Maple Acer saccharum
Cottonwood Populus deltoides
Sycamore Platanus occidentalis
Box Elder Acer negundo
American Elm Ulmus americana
Slippery Elm Ulmus rubra
Hackberry Celtis occidentalis
Sugarberry Celtis laevigata
Black Willow Salix nigra
Bur Oak Quercus macrocarpa
White Oak Quercus alba
Swamp White Oak Quercus bicolor
Black Walnut Juglans nigra
Bitternut Hickory Carya cordiformis
Shellbark Hickory Carya laciniosa
River Birch Betula nigra
Kentucky Coffeetree Gymnocladus dioica
Bald Cypress Taxodium distichum Appendix F -2

D. **Understory Trees and Shrubs**
Sandbar Willow Salix exigua
Gray Dogwood Cornus foemina
Swamp Dogwood Cornus amonum
Pawpaw Asimina triloba
Ohio Buckeye Aesculus glabra
Red Buckeye Aesculus pavia
Horse Chestnut Aesculus hippocastanuum
Eastern Witch Hazel Hamamelis virginiana
Vernal Witch Hazel Hamamelis vernalis
Buttonbush Cephalanthus occidentalis
Spicebush Lindera benzoin
Blackhaw Viburnum Viburnum prunifolium
Shrubby St. John's Wort Hypericum prolificum
Deciduous Holly Ilex decidua
Ninebark Physocarpus opulifolius

SECTION 550.180 MISCELLANEOUS PROVISIONS:

A. *COMPLIANCE WITH LAWS:* Each applicant shall comply with all applicable federal and state laws as well as City Ordinances, resolutions, rules and regulations heretofore and hereafter adopted or established.

B. *JUDICIAL APPEALS:* Any party shall have the right to appeal decisions of the City Engineer to the Board of Adjustment of the City.

C. *PENALTIES FOR VIOLATIONS:*

1. *General:* Violation of the provisions of this Chapter or failure to comply with any of its requirements, including conditions and safeguards established shall constitute a misdemeanor. Each day such violation continues shall be considered a separate offense.

2. *Corrective Action*: Nothing herein contained shall prevent the City of St. Peters from taking such other lawful action as is necessary to prevent or remedy any violation. All such costs connected therewith shall accrue to the person or persons responsible.

D. *CALCULATION OF TIME:* Unless otherwise indicated, when the performance or doing of any act, duty, matter, or payment is required under this Chapter or any permit, and a period of time is prescribed and is fixed herein, the time shall be computed to as to exclude the first and include the last day of the prescribed or fixed period of time.

E. *STANDARD CONSTRUCTION SPECIFICATIONS APPLICABLE TO THE CITY:* Standard construction specifications outlined herein and adopted by this Chapter relating to storm water drainage facilities shall be fully applicable to work performed by the City and its departments.

F. *IMPLEMENTATION:* The Standard Construction Specifications, the Rules and Regulations and Engineering Design Requirements for Stormwater Drainage Facilities, and the Manual of Best Management Practices for Stormwater Quality adopted by this Chapter shall be enforced for all developments for which the preliminary plat is approved by the Planning & Zoning Commission after the effective date of this Chapter, and for all single lot developments for which the site plan is approved by the Planning & Zoning Commission after the effective date of this Chapter. Sites previously approved that are requesting an extension of time or a minor modification to the previously approved plan shall be exempted from the new code requirements and shall comply with the codes intact at the time of their initial approval. Previously approved sites that have no infrastructure constructed and that submit a new reconfiguration of the site shall comply with the codes adopted herein.

PROJECT:

Continued Next Page

Line		Length	Size	Upper Flow Line Elevation	Lower Flow Line Elevation	Flow Line Grade	Upper Structure Elevation	Lower Structure Elevation	Depth to Hyd. Gr. Upper End	Upper Hyd. Elevation	Lower Hyd. Elevation
Upper Struct.	Lower Struct.										

Computed By:

Date:

Checked By:

Date

ATTACHMENT A

PROJECT:

Date

Checked By:

Date:

Computed By:

Hyd. Grade	Frict. Head	Veloc. Ft/sec	$\frac{V^2}{2g}$ (feet)	$+\frac{V^2}{2g}$ U.M.H.	$\triangle$ U.M.H.	Grade @ Inlet %	Inlet Capacity c.f.s.	Bypass	Area Acres	P.I.	Quantity c.f.s.	T.Q.	Manning