



CITY OF O'FALLON, ILLINOIS

DEVELOPMENT MANUAL

Adopted by the City Council
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SECTION 1: INTRODUCTION

The following are the minimum development standards of the City of O'Fallon, Illinois and shall apply to all developments subject to the City's Subdivision and Development Control Ordinance. Unless lawfully waived or varied in writing, failure to conform any development or subdivision subject to the Subdivision and Development Control Ordinance ("Ordinance") to the terms of this Development Manual ("Manual") shall be unlawful and a violation of this Ordinance punishable as set forth therein. This Ordinance establishes minimum requirements to provide for the coordinated, efficient and economic development of the City, to insure the adequacy of street and utility facilities, and to promote the public health, safety and welfare and to implement the City's comprehensive plan. If any other provision of law relates to any matter covered herein, the regulation providing the higher, stricter, standard shall apply.

Terms used herein shall have the meaning set out in the Definitions section of the City's Zoning Code and/or Development Code or, if not defined therein, shall have the customary and ordinary meaning in the context.

SECTION 2: MINIMUM STANDARDS OF DESIGN

SECTION 2.1 - GENERAL STATEMENT

The subdivider shall conform to the following principles and standards of land subdivision in the design of each subdivision or portion thereof. No Preliminary Plat shall be approved unless it conforms to the following minimum standards of design. IDOT (Illinois Department of Transportation) standards and polices shall be followed for all street design and construction, except as modified by this Ordinance.

SECTION 2.2 – UTILITY EASEMENTS

1. Easements of not less than ten (10) feet in width shall be provided on each side of all rear lot lines, and alongside lot lines where necessary for storm and sanitary sewers, water, and drainage swales. Separate rear and side lot easements are required for other public utilities. Easements of greater width may be required for adequate access along or across lots when necessary for the extension of main sewers where both water and sewer lines are located in the same easement, at the discretion of the City Engineer. Easements of not less than fifteen (15) feet in width shall be provided in front of all lots for sanitary sewer, water, and other utilities.
2. Adequate easements for storm water drainage shall be established along any natural drainage channel and in such other locations as may be necessary to provide satisfactory disposal of storm water from streets, alleys and all other portions of the subdivision. The location and minimum widths of such easements shall be determined by the City Engineer.
3. No private tree, shrub, fence, building, other structure, or sprinkler system shall be placed or erected in any easement for utility, access, or drainage purposes, except at the owner's risk as to all costs for demolition, removal and reconstruction. The proper authorities may have free access to and use of the easements at any time. No fence or structure shall impede the free flow of surface water across any lot with an easement.
4. No brick mailboxes, decorative walls, sprinkler systems, private landscaping, or other permanent structure protruding above the natural ground level shall be located within any easement or public rights-of-way unless authorized by the City Engineer, and only at the owner's risk as to all costs for demolition, removal and reconstruction.
5. All easements shall be aligned such that existing, and any future, utilities or drainage facilities can be extended beyond the boundaries of the subdivision.
6. Where a subdivision is traversed by a natural water course, drainage way, wetland, channel, or stream, there shall be provided a drainage easement, conforming substantially to the lines of such water course. It shall include an additional width, adjoining both edges of the established area that encompasses the 100-year floodplain. Required width shall be approved by the City Engineer.
7. All utility distribution lines for telephone and electric service shall be installed underground within general utility easements and dedicated public rights-of-way.

8. Easements shall be clearly identified on all plats; e.g., drainage easement or utility easement. Easements shall be marked noting location, width, and nature of the easement.
9. No utility pedestals or transformers shall be located within fifteen (15) feet of City utilities.
10. All easements for City utilities shall be in such form as approved by the City and shown as such on the plat. All other easements shall include the City as a beneficiary and shall be shown on such plat in such form as approved by the City.

SECTION 2.3 - BLOCKS

1. No block shall be longer than one thousand four hundred (1,400) feet or shall be less than five hundred (500) feet in length and no block width shall be less than the minimum required to meet the applicable provisions of the Zoning Ordinance governing lot depth.
2. All blocks, whenever it is deemed essential to provide access to schools, playgrounds, shopping centers and other community facilities, shall have a crosswalk with a right-of-way of at least ten (10) feet in width near the center of the block, or as otherwise determined by the City Engineer.
3. The length, width and shapes of blocks shall be determined with due regard to building sites, land use, zoning requirements, access, safety and convenience.
4. Where a subdivision adjoins an arterial or collector, the greater dimension of the block shall generally front or back upon such arterial or collector to avoid unnecessary ingress or egress.

SECTION 2.4 - LOTS

1. Lot area and dimensions shall conform to the requirements of the applicable district of the Zoning Ordinance.
2. The lot arrangement and design shall be such that all lots will provide satisfactory and desirable building sites, properly related to topography and the character of surrounding development.
3. All side lines of lots shall be at right angles to straight street right-of-way lines and radial to curved street right-of-way lines except where a variation of this rule will provide a better street and lot design.
4. All remnants of lots below minimum lot area size left over after subdividing of a larger tract shall be added to adjacent lots, rather than allowing to remain as unusable land, except when designated for utility purposes or accepted for public space for park or other public uses.
5. Lots which cannot be served by a public or private sanitary sewage collection system, and/or a public or private water distribution system, shall comply with the applicable provisions of the applicable zoning ordinance or shall be not less than one (1) acre in size

per lot or household unit, whichever is greater. Such lots shall have a width of not less than one hundred twenty-five (125) feet or a depth in excess of three (3) times its width, unless otherwise permitted and approved by the City.

6. Double frontage lots should be avoided except where they are needed to provide for the separation of residential development from major streets or to overcome specific disadvantages, topography or orientation.
7. Whenever the back or side yards of a residential development face non-subdivision streets a landscape berm as provided for in Section 5.7 is required.
8. Corner lots and lots with double frontage shall have extra dimension sufficient to permit the establishment of front building setback lines on the adjoining streets.
9. The subdividing of the land shall be such as to provide each lot with satisfactory access to a public street.
10. No grading or excavation shall be permitted within the floodplain or flood hazard areas without the following:
 - a. approval of applicable City, state and federal agencies
 - b. adequate documentation showing that the floodplain revisions will not cause an increase of flooding of property downstream by showing that the floodplain storage through the project reach has remained the same or increased for the 10 and 100 year frequency peak flood levels, and
 - c. that the project floodplain revisions do not cause an increase in flooding upstream of the proposed development by meeting the Illinois Department of Natural Resources created head requirements for property upstream of the proposed project. The City also requires the Developer provide survey and hydraulic analyses, if necessary, showing that the allowable increases do not cause an increase of flooding of structures or collector roads (or higher category roads), or acquire flood easements from the parties upstream whose structures and/or roads (collector level or higher) will experience an increase of flooding.
11. Any proposed lot which touches a portion of the floodplain as defined herein shall have shown on the final plat a legal description of the portion of each lot which is in the floodplain as defined herein.

SECTION 3: MINIMUM STANDARDS OF IMPROVEMENTS

SECTION 3.1 - GENERAL STATEMENT

All development and subdivision of land within the City and within the 1.5 mile area of extraterritorial subdivision jurisdiction shall conform to the standards adopted within this ordinance and development manual, as well as the standards adopted herein by reference. The following standards are herein adopted by reference:

1. Illinois Department of Transportation (IDOT) Standard Specification for Road and Bridge Construction.
2. Standard Specifications for Water and Sewer Main Construction in Illinois.
3. IDOT Drainage Manual.
4. "Illinois Urban Manual", dated December 2002 or more recent publication date. (The Illinois Urban Manual is a compilation and updating of the "Standards and Specifications for Soil Erosion and Sediment Control" (the Yellow Book) published by the Illinois Environmental Protection Agency.
5. "Illinois Procedures and Standards for Urban Soil Erosion and Sedimentation Control" (the Green Book) prepared by the Northeastern Illinois Soil Erosion and Sedimentation Control Steering Committee.

In the event there exist conflicts among or between any of these adopted standards and/or the provisions of this Ordinance and Development Manual, the stricter standard shall prevail. Three (3) copies of each of these standards have been on file in the office of the City Clerk for a period of fifteen (15) days prior to the ordinance adopting this Manual and shall remain on file in the City Clerk's office.

The requirements set forth in this Development Manual shall be considered as minimum requirements and nothing contained herein shall be construed to mean that the subdivider cannot construct or provide improvements of a higher type.

All proposed water and sanitary sewer facilities shall comply with the minimum requirements and recommendations of the Environmental Protection Agency of the State of Illinois, the City Engineer and the City Council. When a proposed subdivision is reasonably accessible to a public sewer system and/or water distribution system, the subdivider shall provide the subdivision with a complete sanitary system and/or water distribution system to be connected to the proper public system(s). An analysis of the demand for water service and discharge into the sanitary sewer receiving system may be required by the City Engineer to determine if there are any significant system-wide impacts that may harm the City's utility system or services.

Upon the City's review of any development and upon its determination, communicated to Applicant in writing, that a traffic safety or service level concern or any other such infrastructure service or public safety concern may reasonably exist relating to the construction or development to be permitted by the City, the City may subsequently require the Applicant, at Applicant's cost, to submit a traffic study or such other study as may be needed to address the identified concern. The City may accept such studies as presented by the Developer, however, the City may require additional studies to be prepared as necessary to ensure the standards

herein are conformed to and that the public safety and welfare is protected. The City may, at its discretion, direct the conduct of such studies and may require such studies to be paid for by the Developer/subdivider.

Minimum Testing Standards: The following table sets minimum testing standards for infrastructure construction in development governed by the Subdivision and Development Control Ordinance.

MINIMUM TESTING STANDARDS INFRASTRUCTURE		
<i>The Developer shall provide written test reports for all tests required herein. He shall also provide certification by the testing agency that the tests sections selected were representative of the item constructed in the field. The testing agency shall further certify that all tests were completed in accordance with the specified standards and according to the generally accepted standards of the industry.</i>		
ITEM	TEST	STANDARD
Sanitary Sewers	Developer shall provide the following tests upon completion of construction: Exfiltration of Air Under Pressure; Deflection of Thermoplastic Piping; Manhole vacuum test; and Lamping. Areas not passing tests shall be corrected and retested. City Engineer may increase required frequency of tests if initial tests fail minimum requirements.	Frequency and technique per the Standard Specifications for Water and Sewer Main Construction in Illinois, Article 31-1.11 utilizing methods C, D, and E.
Earthwork	Developer shall provide representative ASTM D698 (Standard Proctor) tests for each type of material to be field tested for compaction. Developer shall provide one (1) compaction test per 1,000 s.y. of surface area for each lift, using the nuclear method (ASTM D2922 and D3017).	Compact all fill within the building pad or within the proposed roadway to at least 95% of the maximum dry density in accordance with ASTM D698, in lifts not exceeding 8" loose thickness.
Portland Cement Concrete Curbs	Developer provides the following tests: Slump (ASTM C143); Air Entrainment (ASTM C231); Compressive Strength (ASTM C39 and C31). Concrete shall be Class S1 per IDOT Standard Specifications. Articles 606 and 1020. Minimum concrete compressive strength shall be 3500 psi at the age of 14 days.	Air Entrainment and Slump: Once each per day min. and once per 50 c.y. concrete. Compressive Strength: Cast three (3) 6" dia. x 12" cylindrical test specimens per day min. or three per each 50 c.y. of concrete each day. Cast all three specimens from a single batch of concrete. Test the 1st concrete specimen at the age of 7 days. Test the 2nd concrete specimen at the age of 14 days. Test the 3rd concrete specimen in the event the 14-day test does not indicate compliance with specified strength requirements or as directed by the City Engineer. 6.4 bag mix is required.
Portland Cement Concrete Pavement	Developer provides the following tests: Slump (ASTM C143); Air Entrainment (ASTM C231); Compressive Strength (ASTM C39 and C31). Concrete shall be Class S1 per IDOT Standard Specifications Section 420 and 1020. Minimum concrete compressive strength shall be 3500 psi at the age of 14 days.	Air Entrainment and Slump: Once each per day min. and once per 50 c.y. concrete. Compressive Strength: Cast three (3) 6" dia. x 12" cylindrical test specimens per day min. or three per each 50 c.y. of concrete each day. Test concrete specimens as prescribed for PCC Curbs. 6.4 bag mix is required
Bituminous Concrete Pavement, BAM	Developer shall provide four (4) density tests per mix per day for each lift, using the nuclear method (ASTM D2950).	Compact all bituminous concrete binder and surface courses to an average density of 93% of the theoretical density, with no individual tests less than 91%. Compact all BAM to a minimum of 90% of the theoretical density.

SECTION 3.2 - REFERENCE MONUMENTS

Permanent monuments of stone or reinforced concrete with a one-quarter (1/4) inch iron rod cast in the center and of suitable size set in such a manner that they will not be moved by frost shall be placed in the field as required by the Statutes of the State of Illinois as revised and are in effect at such time.

All lot corners shall be marked by one-half (1/2) inch iron pins not less than twenty-four (24) inches in length and driven into the ground and shall not protrude above the ground surface more than one and one-half (1 1/2) inch. The lot corners shall be installed and certified by a Professional Land Surveyor prior to the release of the letter of credit.

SECTION 3.3 - STREET ACCESS, STANDARDS, AND IMPROVEMENTS

1. The street and alley arrangement shall be such as to not impose undue hardship upon the owners of adjoining property when they plat their own land and seek to provide for convenient access thereto. Reserve strips controlling access to streets are prohibited except where their control is placed with the City Council.
2. The arrangement of rights-of-way in a subdivision shall provide for the continuation of the existing streets or rights-of-way in adjoining areas, unless the City deems such continuation undesirable for reasons of topography or design. Where subdivision streets or rights-of-way are continuations or extensions of existing streets or rights-of-way, the width thereof shall be of the same or greater width as the existing street or right-of-way except that in no case shall the street or right-of-way in the subdivision be of less width than hereinafter provided by the typical cross section shown on typical cross sections hereto attached.
3. Where, in the opinion of the City, it is desirable to provide future street access to adjoining areas, the streets and rights-of-way in the subdivision shall be extended to the property line. If deemed necessary by the City, any temporary dead-end street shall be provided with a temporary turn-around. Access shall not be denied to any parcel or part of a parcel of ground by the subdividing of land. When cross-access between properties is provided or required, it shall be noted on the plat, and recorded ingress-egress easements shall be provided to the City.
4. Streets shall intersect, as nearly as possible, at right angles.
5. Local and collector street curb intersections shall be rounded by radii of at least twenty-five (25) feet.
6. Street intersections with center line offsets of less than one hundred twenty-five (125) feet are prohibited, unless otherwise permitted and approved by the City.
7. Dead-end streets shall have a length no greater than eight hundred (800) feet except as provided herein. If topography justifies a need for a greater length, dead-end streets or cul-de-sacs designed to be so permanently, may be longer than eight hundred (800) feet and will terminate in a circular open space having a radius at the outside of the pavement of at least forty (40) feet and a diameter at the outside of the right-of-way of at least one hundred (100) feet. Temporary dead-end streets may be permitted at a greater length if

the City determines that a through connection is feasible and likely in the near future and other design requirements are met. Unless otherwise approved, the Developer shall install at the entrance of all dead-end streets for which the terminus is not visible from the entrance a "no outlet" sign or other approved signage indicating that the street has no outlet.

8. Local streets shall be designed so as to discourage through traffic.
9. No local street grade shall be in excess of eight (8) percent and no collector street grade shall be in excess of five (5) percent, except as otherwise approved by the City due to the adverse topographic conditions for adequate drainage. The minimum grade of any new street shall not be less than one (1) percent except where vertical curves in the grade line of the street make this provision inapplicable. A minimum of 500 L.F. of the existing street grade shall be shown from the point of extension for the new street to aid in evaluating the vertical alignment.
10. The City shall not approve streets which will be subject to frequent inundation or flooding, per IDOT standards, or as otherwise specified herein.
11. Alleys may be required in multiple-family districts and commercial or industrial districts unless other definite and assured provision is made for service access, such as off-street loading, unloading and parking consistent and adequate for the use proposed.
12. Dead-end alleys shall not be permitted, except where provided with adequate turn-around facilities at the dead-end, or where such dead-end alleys provide the only access to off-street parking.
13. Alleys, where provided, shall have a right-of-way of not less than twenty (20) feet.
14. The minimum right-of-way of local, collector, and arterial streets shall be in accordance with the typical cross sections hereto attached.
15. Intersection of more than two (2) streets at one (1) point shall be avoided.
16. Where the subdivision abuts on or contains an existing or proposed arterial street, the City may require that marginal access streets be provided in order that no lots front on such existing or proposed arterial street.
17. Dedication of half-streets shall be discouraged, but may be permitted whenever there is no other logical method of platting. However, wherever there exists a dedicated or platted half-street or alley adjacent to the tract to be subdivided, the other half of the street or alley shall be platted, unless otherwise permitted by the City.
18. All new streets, which are created and dedicated for use within a subdivision, shall be graded, drained and surfaced in accordance with the minimum requirements herein below set forth and in a manner which will provide complete and adequate drainage of all the streets, alleys and public grounds in the entire subdivision, including any such work which may be necessary in order to provide adequate and satisfactory drainage along the side of any existing public street which lies adjacent to the subdivision.

In general, all such new streets within the subdivision and all work to be undertaken thereon shall be designed and constructed according to the specifications and policies

adopted by the Division of Highways of the Department of Transportation of the State of Illinois, as the same are in effect at the time the Preliminary Plat and plans for such improvement work are submitted for approval.

19. Grading Roadway and Side Slopes. The roadway shall be considered to be that part of the improvement which lies between the right-of-way lines, which roadway shall be constructed in accordance with the standards and typical cross sections as provided for in this Manual.
20. Curbing. Combination concrete curb and gutters shall be built in accordance with the detail shown in this Manual. The minimum distance from back of curb to back of curb shall be as shown in the street cross-sections attached to this Manual, and all curbs at driveways shall be mountable.
21. Street Construction Standards. All streets within the jurisdictional authority of the City, other than county and state highways, shall be designed as provided for in this Manual, or as determined by specific needs and designed accordingly. All streets shall be improved with pavements bounded by integral concrete curbs and gutters in accordance with the minimum criteria set forth in this Manual and shall be laid out and constructed substantially in accordance with the standards hereto attached.
22. All new residential driveway aprons must be six (6) inch PCC concrete. All other driveway entrances, including multi-family three-units and above, shall be constructed to the same pavement thickness as the street it accesses.
23. The earth sub-base shall have not less than ninety-five (95) percent of compaction and shall extend across the entire width of the roadway and two feet behind the back of curb. In some instances, it might be necessary that the subgrade be disked or tilled to dry it to the proper moisture content for construction.
24. The Developer shall daily clean all mud and dirt from the pavement surface that has accumulated due to construction work or as a result of storm water erosion within the subdivision. No materials, debris, field trailers, etc., shall be stored on the completed pavement or within the recorded right-of-way lines.
25. Utility Lines. Underground utility lines in street or alley rights-of-way shall be installed prior to the construction of such streets and/or alleys. All trenches for utility lines made in the subgrade, and all trenches made outside the subgrade where the inner edge of the trench is closer than two (2) feet to the edge of any pavement, shoulder, curb or sidewalk shall be backfilled full depth to the subgrade elevation with coarse aggregate CA-6 or CA-11. The backfill shall be compacted by tamping it in eight (8) inch lifts. Jetting to achieve compaction will not be allowed.
26. The City shall have the authority to permit the type, number, and location of all entrances, exits, and circulation patterns located on or accessing any development site or any public or private street within the City's jurisdiction.
27. Where appropriate and as directed by the City Engineer, traffic calming measures shall be incorporated to expedite the safe movement of traffic.

SECTION 3.4 – SANITARY SEWERS

1. Each lot in the subdivision shall be provided at the property line with a connection to a public sanitary sewer system. The termination or termini of the subdivision sewerage system shall be located at a point acceptable to the City Engineer. The construction of the sewer system shall conform to the approved plans and specifications and all work should be properly inspected and approved by the City Engineer. Trenches shall be backfilled per the requirements of this Ordinance and Manual.
2. Where connection to a public sanitary sewer system is not feasible, subdivisions with lots greater than 40,000 square feet may be on a temporary septic system where standard seepage test or other investigations, conducted by the Madison or St. Clair County Health officials or their representatives, indicated that the ground in the subdivision is suitable for individual sewage disposal facilities dependent upon seepage of the effluent into the soil. These temporary systems may remain until such time that a public sewerage system can take and treat the wastes. Nothing in this subsection 2 shall waive the requirement in subsection 1 to construct the onsite collection system in anticipation of public sewers.
3. Sewer systems and sewage treatment facilities shall meet the requirements set forth by the Illinois Environmental Protection Agency, Department of Public Health of the State of Illinois, applicable public sewer system, and the City. No oxidation ponds, seepage lagoons, or holding lagoons, will be permitted. Sanitary and storm sewer systems shall not be combined. "Package plants" or other private multi-user treatment facilities are prohibited within the one and one-half (1½) mile extraterritorial subdivision review jurisdiction area.
4. Sewer mains with house service stubs to each lot shall be installed prior to the construction of street pavements. Service stubs shall be installed at the centerline of each lot and shall extend to within one (1) foot of the front lot line. Sewer laterals may not share a common trench.
5. Design of public sewers shall follow the Standard Specifications for Water and Sewer Main Construction in Illinois, the City of O'Fallon Standard Specifications, and Title 35 Illinois Administrative Code, Subtitle C, Chapter 2, Part 370: Illinois Recommended Standards for Sewage Works.
6. In subdivisions not required to install community sewage collection systems under this section, individual sewage disposal systems may be permitted.
7. Regardless of locations, lot size, or number of lots, a subdivision shall be disapproved where the City or Madison or St. Clair County Department of Public Health official finds that the drainage, soil conditions, disposal facilities, or other conditions will tend to produce health problems.
8. Sanitary sewers shall be extended through the end of all stub streets and capped. They shall also be extended in such other areas as necessary to facilitate future extensions for anticipated development.
9. Sanitary sewers shall be noted on dedicated plan and profile sheets or on a utility plan. Plans shall also include details for manholes, laterals, trench excavation, and any specialties. Profiles shall include grades and pipe size including manhole tops and inverts.

Grading plan shall include finished floor and basement floor elevations to facilitate review of freeboard requirements. Where lift stations are included, these shall be detailed with all relevant piping, structures, pumps and site information.

10. Lift station and force main calculations are required with sanitary sewer plans and shall be constructed in accordance with City of O'Fallon Standard Specifications and the requirements of this Manual.
11. Detailed calculations for gravity sewer design as well as copies of the IEPA permit applications shall be submitted for every development within the City limits or its 1.5 mile jurisdiction.

SECTION 3.5 – WATER

1. Each subdivision shall have an interconnected public water distribution system supplying all lots with water from a source approved by the City of O'Fallon and the Illinois Environmental Protection Agency.
2. Each lot in the subdivision shall be provided at the property line with a connection, including yolk and meter tile, to a water system approved by the City of O'Fallon. The construction of the water system shall conform to the approved plans and specifications and all work shall be properly inspected and approved by the City Engineer. Water mains shall be constructed prior to the construction of street pavements. Trenches shall be backfilled as per the requirements of this Ordinance and Manual.
3. Fire hydrants shall be installed by the subdivider as part of the water distribution system. Single family residential developments shall have fire hydrants spaced at no more than 600 feet from hydrant to hydrant, measured along the street centerline, or as special site conditions may dictate. Multi-family residential development hydrant spacing shall not exceed 400 feet, and high hazard development hydrant spacing shall not exceed 300 feet. No fire hydrant shall be placed on a main smaller than six (6) inches in diameter.
4. Where fire hydrants or fire department connections are located in an area where vehicles may be parked or standing, said parking or standing shall be restricted for ten (10) feet in each direction from the hydrant or connection.
5. The minimum fire flow from a single fire hydrant in any Use Group shall be 1000 gallons per minute at 20 psi residual pressure unless the new hydrant is ordered on a pre-existing main.
6. The minimum fire flow from the next two (2) fire hydrants in any Use Group shall be a cumulative 1000 gallons per minute at 20 psi residual pressure.
7. Fire flow on all new fire hydrant installations shall be tested by the Developer or contractor and witnessed by a representative of the Engineering Department.
8. Private hydrants: Additional private fire hydrants shall be required on developed property, private streets, and/or parking lots, at a spacing between fire hydrants as required by the Use Group as set forth in this Manual. All private hydrants must meet the City of O'Fallon Standard Specifications, testing requirements, and fire flow requirements of public fire hydrants.

9. The Department of Engineering and Public Works shall approve all designs and shall alter the design requirements as necessary to meet the City water system plan. The City shall specify the type, kind and quality of pipe, fire hydrants, valves, valve boxes, and appurtenances. The contractor shall furnish and install these items. The work shall be inspected by the City.
10. Water mains, hydrants and taps shall be constructed in compliance with the current adopted ICC Fire Prevention Code Appendices B, C, and D, Illinois Plumbing Code, Standard Specifications for Water & Sewer Main Construction in Illinois, Illinois Environmental Protection Agency, and City of O'Fallon Standard Specifications.
11. All commercial developments shall be served by a minimum eight (8) inch main. Residential subdivisions shall be served by a minimum six (6) inch main.
12. Water mains shall be extended through the end of all stub streets and in such other areas as necessary to facilitate future extensions for anticipated development to include frontage along roads. At the direction of the City, additional water mains shall be required to establish needed loops and connection to ensure adequate connectivity volumes and supply.
13. Fire hydrants and water mains shall be placed along the full length of the property to be developed that abuts an existing and/or proposed improved public way. Developer shall be responsible for the cost of said hydrants and water main in sufficient size to serve the development. The City may pay for an upgrade of the main to a larger size to coincide with the overall distribution system plan and the main may be laid on the opposite side of the street to coincide with the location of other existing or proposed mains.
14. Every community water supply system shall have adequate pipe sizes, water pressure, supply, and sufficient fire hydrants to provide fire protection to meet local neighborhood needs in accordance with the standards of the City of O'Fallon. The City Engineer may require construction of water utilities consistent in a manner necessary to accommodate a system of minimum of twelve (12) inch mains generally located on a one (1) square mile grid.
15. No water shall be turned on for service in premises in which the plumbing does not comply with this Ordinance and Manual. Plumbers and contractors are prohibited from turning the water on to any service pipe except upon the order or permission of the City Engineer.
16. No more than one building shall be supplied from one service pipe. Whenever possible, the service pipe shall enter the building in a direct line with the corporation stop and tap.
17. The operation of utility valves shall be limited to Department of Public Works personnel. No valves shall be operated by any contractor without the prior approval of the City Engineer.
18. It shall be unlawful for any person not authorized by the City to tamper with, alter or injure any part of the City waterworks or supply system, or any meter.
19. Connections between potable water systems and other systems or equipment containing water or other substances of unknown or questionable quality are prohibited except when

and where approved cross-connection control devices or methods are installed, tested and maintained to insure proper operation on a continuing basis.

20. All waterlines shall be noted on dedicated plan sheets or on a utility plan. Plans shall include details for valves, fire hydrants, and trench excavation and backfill. Trench detail shall clearly note minimum bury depth.
21. Pressure calculations as well as copies of the Illinois Environmental Protection Agency permit applications shall be submitted for every development within the City limits and its one and one-half (1½) mile jurisdiction.
22. All waterlines constructed within the City and within its one and one-half (1½) mile extraterritorial review authority shall comply with the City of O'Fallon standards and water system requirements.

SECTION 3.6 – STREET MARKERS AND TRAFFIC SIGNS

A permanent street marker shall be provided by the Developer and placed at each intersection designating the names of the streets entering said intersection and shall comply with the specifications as provided by Ordinance of the City of O'Fallon. Additionally all traffic signs, regulatory and information signage shall be provided and placed by the Developer at all locations as directed by the City.

SECTION 3.7 – TELEPHONE AND ELECTRIC UTILITIES

1. All telephone, electric and cable TV shall be placed underground throughout a subdivided area. Said conduits or cables and gas lines shall be placed within designated easements or public right-of-way in a manner that will not conflict with other utilities and as approved by the City Engineer. Where telephone and electric service lines are placed underground entirely throughout a subdivided area, said conduits or cables shall be placed within easements or dedicated public ways in a manner which will not conflict with other underground services. Further, all transformer boxes shall be located so as not to be unsightly or hazardous to the public.
2. The installation of all telephone, electric and cable TV facilities shall be made in compliance with the applicable orders, rules, and regulations of the Illinois Commerce Commission now or hereinafter effective. The Developer shall be responsible for compliance with the rules and regulations, now and hereinafter effective and filed with said Commission pursuant to the Illinois Public Utilities Act.
3. The Developer or Contractor shall be responsible for locating of all existing private and public utilities. Any relocation, bracing, coordination, and associated costs shall be borne by the Developer or Contractor.

SECTION 3.8 – STREET LIGHTS

1. Street lights shall be installed and in good working order immediately upon completion of the roadway base course.
2. Street light style, spacing and location will be specified by the City Engineer. The Developer shall be responsible for purchase, installation, and commissioning of the

appropriate street lights.

3. The Developer shall arrange with the appropriate electric company to energize the street light system as soon as possible. The Developer shall be responsible for all connection fees.
4. The City shall be billed for energy usage. Maintenance of the street light network within the development shall be the Developer's responsibility until formal acceptance of the subdivision improvements by the City.
5. Reports of outages made to the City in the interim will be addressed by the City of O'Fallon Public Works Department or a hired Contractor at the expense of the Developer.
6. No private parking lot lighting or other lighting shall be mounted in public right-of-way or utility easements on utility poles or street lights. All such lighting shall be restricted to the private residential, commercial, institutional, or industrial parcel on which lighting is sought.

SECTION 3.9 – SIDEWALKS AND BIKEWAYS

1. Concrete sidewalks not less than four (4) inches in thickness and four (4) feet in width shall be constructed within the street right-of-way and adjacent to the property line.
2. All sidewalks shall be a concrete section across the entire breadth and width at driveways or entryways and shall be of a thickness equivalent to the street cross-section. Minimum thickness shall be six (6) inches. Six (6) bag mix with two (2) inch clean limestone rock sub-base on compacted subgrade, per IDOT standards, is required.
3. All sidewalks shall be accessible to the handicapped in accordance with the Americans with Disabilities Act (ADA) and the Illinois Accessibility Code. At locations where the sidewalk crosses a driveway entrance, the driveway must conform to ADA requirements. In the case of conflict, the more stringent requirements shall apply. Curb ramps accessible to the disabled shall be provided in accordance with the current edition of IDOT Standard 424001.
4. In those subdivisions where a bikeway or trail is required per the City's Official Map and Comprehensive Plan, including any bicycle masterplan, they shall be designed and constructed by the Developer in accordance with the applicable IDOT and City standards. The Bikeway improvements within any development shall be located and designed to facilitate maximum connectivity of dwellings or other uses within the development to the Bikeway network. Where the bikeway is to be located in a location where a sidewalk is otherwise required, the City may allow the installation of the bikeway in lieu of the installation of a sidewalk in that location. The bikeway shall be located in a public easement, right-of-way, or other interest allowing for public ingress and egress to and from the development as approved by Council on the Final Plat.

SECTION 3.10– DRAINAGE, STORM SEWERS, AND OTHER DRAINAGE
APPURTENANCES

In addition to the installation of curbs or gutters along the streets as required by this Manual, storm sewers and other drainage appurtenances shall be constructed throughout the entire subdivision to carry off water from all inlets and catch basins, and be connected to an adequate outfall. The storm water drainage system shall be separate and independent of the sanitary sewer system and shall be in accordance with drainage laws of the City and the State of Illinois. Specifically, the flow rate and velocity of post-development storm water runoff from the site shall not exceed the flow rate and velocity of pre-development run-off from the site. Storm water detention, retention, or other BMP structures shall be designed, constructed, and maintained to achieve this.

During the final improvement plan phase, the entire subdivision shall be analyzed for the effects of the 100-year storm to assure that buildings are properly elevated (lowest structure opening 1 foot above the 100-year storm hydraulic gradeline) above the floods occurring beyond the design capabilities of the storm water structures. Trenches shall be backfilled as required herein.

The Developer shall be responsible for constructing adequate facilities for the control, collection, conveyance, acceptable discharge of storm water, other surface water and subsurface water which may be detrimental to the safe and convenient use of any portion of the area. The storm drainage system shall provide for runoff from the entire area of the subdivision. It shall take into account land outside the subdivision limits, which normally drains across the area of the subdivision as well as the effects of the subdivision upon downstream drainage systems. As primary focus, the drainage system for the subdivision shall make use of, protect, and improve, as needed, the natural drainage system. Drainage facilities shall be designed and constructed in accordance with the standards and procedures specified in these regulations.

1. Design Storm. All storm drainage facilities shall be designed with sufficient capacity and freeboard where necessary to convey the peak rates of runoff from storms with the average return frequencies listed below:
 - A. 2 year – Water quality BMPs which will be required in the future to comply with the City's NPDES Stormwater Phase II permit requirements.
 - B. 10 Year – All drainage facilities within road and easements from catch basins grates to outlet structures. Pavement encroachment, or maximum in-street spread, for drainage should be designed according to Section 1-303.01 of the Illinois Department of Transportation Drainage Manual.
 - C. 25 Year – All cross culverts under drives, minor and local streets, as well as improved streams, swales and ditches. Pavement encroachment, or maximum in-street spread, for drainage should be designed according to Section 1-303.01 of the Illinois Department of Transportation Drainage Manual.
 - D. 50 Year – All cross culverts and bridges constructed under residential collector and arterial streets.
 - E. 100 year – All detention/retention basins and bridges.

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- (i) The lowest opening elevation in all habitable buildings shall be the 100-year hydraulic gradeline (HGL) elevation plus one foot.
 - (ii) Drainage ditches, open channels, and natural drainage ways shall have zero created head compared with predevelopment conditions at the upstream property line along said drainage way up to the 100-year flood frequency if any increase in flooding up to the 100-year frequency storm affects upstream structures or collector roads (or higher category roads), unless the Developer acquires permanent flood easements to cover the area with increased flooding levels up to the 100-year flood event from the parties upstream whose structures and/or roads (collector level or higher) will experience an increase of flooding.
 - (iii) Drainage ditches, open channels, and natural drainage ways which have no potential to increase flooding upstream of structures or collector roads (or higher category roads) up to the 100-year event, shall not have a created head greater than 0.1 feet at the upstream property line of the project property along said drainage way unless easements are obtained from the upstream property owner to cover the increases of flooding up to 100-year event, or unless there is a storm sewer, culvert, bridge, dam or other drainage structure within two hundred (200) feet downstream of the upstream property line on said drainage way in which case the created head shall not be greater than 0.5 feet at the upstream property line of the project property along said drainage way unless easements are obtained from the upstream property owner to cover the increases of flooding up to 100-year event.
2. Storm Water Discharge. The discharge of all storm water shall be into an established wetlands, watercourse, or drainage structure as approved by the City. Where the discharge shall be into or through private property, proper easements or drainage rights in a form acceptable to the City Attorney shall be secured by the Developer for the City.

Permanent easements, at least twenty (20) feet in width, shall be provided in all cases where storm drainage facilities are installed in land other than the street right-of-way. The centerline of pipes shall be no closer than five (5) feet and the top of the slope for channels shall be no closer than five (5) feet to the boundaries of the drainage easements. Easements shall also be provided for storm drainage facilities that may need to be installed in the future to serve underdeveloped land within the watershed that normally drains across the area of a proposed development. All easements shall be clearly delineated and described on the final plat.

3. Other Requirements

- A. In all instances, unless otherwise waived, a Drainage Analysis Map shall be submitted showing the tributary watershed area, sub-drainage basins, and the downstream area affected by runoff. Drainage computations shall consider the entire tributary area (on-site and off-site) of those drainage basins contributing runoff to all design points. See also Section 3.6.
- B. Roadway underdrains shall be required where a soils report states this is needed, and their installation shall be performed by the Developer and as directed by the City or its duly authorized agent, to protect the stability of the roadway.

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- C. Suitable head wall or *precast* end sections shall be provided at the open end of any pipe. Culverts under streets shall have a minimum cover of thirty (30) inches and shall be extended to a minimum of ten (10) feet from the edge of pavement, unless otherwise approved by the City Engineer.
 - D. Catch basins shall be provided so that no portion of any road shall drain in one direction more than 300 feet without catch basins on both sides of the road, unless otherwise approved by the City Engineer.
 - E. The hydraulic capacity and the required size and slope of storm sewer pipes and channels shall be established by using the Manning equation. The hydraulic capacity of driveway and roadway cross culverts shall be established only after considering both the inlet and outlet control conditions. The lower of the two flow rates obtained shall be the actual rated capacity. The upstream backwater shall not encroach onto adjacent properties unless backwater is contained within existing watercourse or wetland limits, does not encroach upon roadway beyond existing IDOT standards or driveway areas, and the necessary drainage easements are secured from those affected property owners.
 - F. House and foundation drains shall in no case be permitted to discharge onto a roadway surface. Discharge to existing wetlands, watercourses, and storm drainage facilities shall be made. All such drainage connections shall be made prior to construction of, or be made so as not to cause damage to, pavement surface. Any damage to roadway or its appurtenances will be the responsibility of the property owner from whose property the drain is discharging.
 - G. All pipes and drainage structures shall be thoroughly cleaned by the Developer before acceptance by the City and again following final construction of homes or structures within the subdivision. The Developer shall supply a letter of credit to secure such cleaning.
 - H. Existing wetlands/watercourses proposed to receive storm drainage discharge shall be analyzed to determine the downstream effects on any watercourse or existing storm drainage system for its adequacy to receive the proposed drainage discharge. The extent to which downstream studies are conducted shall be commensurate with the probable impact of the proposed development. Where it is anticipated that the additional discharge resulting from the proposed subdivision will overload the existing downstream drainage system, the City may deny the subdivision until the Applicant has adequately provided for improvements to the drainage system.
 - I. Each lot on any final plat or final development plan shall have identified on the plat of record an elevation height that shall be the minimum elevation of the lowest opening (first floor, walkout basement, or basement window) to adjacent grade. This elevation shall be determined and established by the elevation of the 100-year storm in any drainage way or structure adjacent to that lot or surrounding area that may subject that lot to potential flooding from any of those drainage ways. That elevation will then be required to have one (1) foot of freeboard. All lots shall be noted on the plat of record as either suitable or unsuitable for walkout basements.
 - J. When the street side of any principal structure will be constructed below roadway elevation, the Developer shall submit documentation from an engineer showing how they propose to protect the structures from storm water runoff in excess of the design

capacity of the roadway.

- K. Detention basins shall be located on outlots maintained by the homeowner's association. A Special Service Area may be created for potential maintenance by the City should the homeowner's association become defunct, unable or unwilling to provide sufficient maintenance of the detention basins.
- L. Additional design standards, as appropriate, may be required by the City Engineer.
- M. Scour protection shall be provided for all ditches and storm sewer discharges. The amount of scour protection shall be determined by the flow rate and velocity of the storm water in the drainage structure.

SECTION 3.11 – HYDRAULICS

Hydraulic Calculations for Pipes, Culverts, and Open Channels are to be as follows:

1. Gravity versus Pressure Flow for Enclosed Systems: Two design philosophies exist for sizing storm drains under the steady uniform flow assumption. The first is referred to as open channel, or gravity flow design, in which the water surface within the conduit remains open to atmospheric pressure. Pressure flow design, on the other hand, requires that the flow in the conduit be at a pressure greater than atmospheric. For a given flow rate, design based on open channel flow requires larger conduit sizes than those sized based on pressure flow. While it may be more expensive to construct storm drainage systems designed based on open channel flow, this design procedure provides a margin of safety by providing additional headroom in the conduit to accommodate an increase in flow above the design discharge. However, there may be situations where pressure flow design is desirable. For example, on some projects, there may be adequate headroom between the conduit and inlet/access hole elevations to tolerate pressure flow. In this case, a significant cost savings may be realized over the cost of a system designed to maintain open channel flow. Also, in some cases it may be necessary to use an existing system which must be placed under pressure flow to accommodate the proposed design flow rates. Under most ordinary conditions, it is recommended that storm drains be sized based on a gravity flow criteria at full flow or near full. Pressure flow design may be justified in certain instances. As hydraulic calculations are performed, frequent verification of the existence of the desired flow condition should be made. Storm drainage systems can often alternate between pressure and open channel flow conditions from one section to another. (From Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22, U.S. Department of Transportation Federal Highway Administration).

For gravity flow conditions, Manning's formula shall be used as described below.

$$Q = \frac{(1.486) * A * (R^{2/3}) * (S^{1/2})}{n} \text{ where:}$$

n
Q = Discharge in cubic feet per second

A = Cross sectional area of flow in square feet

n = Roughness Coefficient (see Table A)

R = Hydraulic radius ($R = A/P$) in feet

S = Slope in feet per foot

P = Wetted perimeter in feet

"The hydraulic grade line shall be at least 1 foot below the throat of a curb inlet, and shall be below the throat of an area inlet, as long as this inlet is located on grade and has an overflow path to another area inlet. If no overflow path is available for the area inlet, the hydraulic grade line shall be at least 1 foot below the throat of the area inlet."

In closed conduits flowing under pressure flow, the hydraulic grade line shall be calculated using the following equation:

$$p1/g + z1 = p2/g + z2 + hf + hm \text{ where:}$$

$p1/g$ = pressure head in the upstream system segment in feet

$z1$ = elevation of the system invert in the upstream system segment in feet

$p2/g$ = pressure head in the downstream system segment in feet

$z2$ = elevation of the system invert in the downstream system segment in feet

hf = friction loss in the downstream system segment in feet

hm = minor system losses in the downstream segment in feet

2. Pipe friction losses, hf , may be calculated by the Darcy formula, the Hazen-Williams formula, or the friction slope method.
 - A. *Darcy Formula*: The most common expression for calculating head loss due to friction is the Darcy formula:

$$h_f = \frac{f * L * v^2}{D * 2g} \quad \text{where:}$$

f = the friction factor, determined from the Moody friction factor chart
 L = length of pipe in feet
 v = velocity of flow at point of interest in feet per second
 D = diameter of pipe in feet
 2g = 64.4 feet per second per second

- B. *Hazen-Williams Formula:* Another method for finding the friction head loss is the Hazen-Williams formula. The Hazen-Williams formula gives good results for liquids that have kinematic viscosities around 1.2 EE-5 ft²/sec (corresponding to 60oF water). The Hazen-Williams formula should be used only for turbulent flow. The Hazen-Williams head loss is:

$$h_f = \frac{3.022 * v^{1.85} * L}{(C^{1.85} * D^{1.165})} \quad \text{where:}$$

C = Loss coefficient, determined from H-W chart for various pipe materials

- C. *Friction Slope Method:* This formula is from the FHWA's Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22.

$$h_f = S_f * L = \left(\frac{Q * n}{1.486 * A * R^{2/3}} \right)^2 * L \quad \text{where:}$$

S_f = friction slope, ft/ft, which is also the slope of the HGL

Minor losses, h_m, shall be calculated by :

$$h_m = \frac{k * v^2}{2g} \quad \text{where:}$$

k = Coefficient as shown in Table B

A step-by-step procedure for manual calculation of the EGL using the energy loss method is presented in Section 7.5 of the Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22, U.S. Dept. of Transportation Federal Highway Administration. For most drainage systems, computer methods such as HYDRA or SWMM are the most efficient means of evaluating the EGL and designing the system elements.

3. *Culverts:* Classified as having either entrance or outlet control. Either the inlet opening (entrance control), or friction loss within the culvert or backwater from the downstream system (outlet control) will control the discharge capacity.

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- A. Entrance Control. Entrance control occurs when the culvert is hydraulically short (when the culvert is not flowing full) and steep. Flow at the entrance would be critical as the water falls over the brink. If the tailwater covers the culvert completely (*i.e.*, a submerged exit), the culvert will be full at that point, even though the inlet control forces the culvert to be only partially full at the inlet. The transition from partially full to full occurs in a hydraulic jump, the location of which depends on the flow resistance and water levels. If the flow resistance is very high, or if the headwater and tailwater levels are high enough, the jump will occur close to or at the entrance.
- B. Outlet Control. If the flow in a culvert is full for its entire length, then the flow is said to be under outlet control. The discharge will be a function of the differences in tailwater and headwater levels, as well as the flow resistance along the barrel length.

Alternatively, refer to the Federal Highway Administration website for these charts (www.fhwa.dot.gov/bridge/hec05.pdf). Download applicable design manuals, reports, and FHWA hydraulics engineering such as [Bridge Waterways Analysis Model \(WSPRO\)](#), FHWA Culvert Analysis, and HDS 5 Hydraulic Design of Highway Culverts from www.fhwa.dot.gov/bridge/hydsoft.htm. These are applicable when flow in the upstream channel is subcritical.

- C. Open Channels/Bridges: Proper evaluation of the velocity, depth, and width of flow requires analyses of the structures and conditions that impact the flow. Boundary flow conditions upstream and downstream from the open channel system must be established. The standard-step backwater method, using the energy equation, can be used to determine the depth, velocity, and width of flow. Major stream obstructions, changes in slope, changes in cross-section, and other flow controls can cause significant energy loss. In these cases, the energy equation does not apply and the momentum equation must be used to determine the depth, velocity, and width of flow.

Hydraulic calculations for open channels may also be made by the U.S. Army Corps of Engineer's 'HEC-2 Water Surface Profiles' or 'HEC-RAS River Analysis System' computer programs. The HEC-2 program computes water surface profiles for one-dimensional steady, gradually varied flow in rivers of any cross section. HEC-RAS is an integrated system of software, designed for interactive use in a multi-tasking, multi-user network environment. The system has separate hydraulic analysis components, data storage and management capabilities, graphics and reporting facilities. The HEC-RAS system is intended for calculating water surface profiles for steady gradually varied flow. The system can handle a full network of channels, a dendritic system, or a single river reach. Like HEC-2, HEC-RAS is capable of modeling subcritical, supercritical, and mixed flow regime water surface profiles. (from www.hec.usace.army.mil).

SECTION 3.12 – STORMWATER DETENTION REGULATIONS

If detention basins are necessary, they must be designed in accordance with the requirements of this Development Manual and currently accepted engineering design practices.

Included in the design submission must be the following:

1. Map showing site, its location within the watershed, and the watershed limits. All detention facilities shall be analyzed with hydrograph and storage routing techniques.

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2. Examination must be made of the routing of stormwater through the site and its flow path as it is discharged from the site. Sub-drainage basin limits within the watershed must be delineated.
 3. Designation of the location(s) of the proposed detention basin(s). Provide analysis for the stormwater runoff from those areas tributary to the proposed detention facility. Existing and proposed conditions must be evaluated. Peak storms with return frequencies for the 10, 25, and 100-year events shall be analyzed as follows:
 - a. For detention basins with drainage areas less than two hundred (200) acres, the engineer shall use the Rational Method for Detention Storage (a.k.a. the Modified Rational Method, or the Chicago Method) as described in the Illinois Department for Transportation Drainage Manual under Chapter 4–Hydrology and Chapter 12–Detention Storage and as further defined below.
 - i. Existing and proposed “C” factors for agricultural, pastures, or wooded areas shall be 0.20 or less unless an extensive survey of soil types and land slopes is presented to verify that a higher value is justified.
 - ii. Existing and proposed “C” factors for paved and building areas shall be 0.90 or more. This excludes aggregate surfaces which should be evaluated based on the condition and slope of the aggregate surface
 - iii. Existing and proposed “C” factors for lawns shall be 0.20 or more unless an extensive survey of soil types and land slopes is presented to verify that a lower value is justified.
 - iv. For commercial developments, “C” factors for the proposed development shall be calculated by a full tabulation of the proposed surface areas in the development when known, or by calculating the road “C” factor within the right-of way and by calculating a composite “C” factor based on the maximum allowed coverage (pavement and building area) per lot for the development.
 - v. For residential developments, “C” factors for the proposed development shall be calculated by a composite section of the typical road and lot configuration showing the average amount of paved and building areas per lot, and a full tabulation of the park, other green spaces, and lakes within the development.

Please note that the engineer may also use one of the unit hydrograph methods as described below for drainage areas under 200 acres if they can demonstrate that sub-watersheds have significantly non-homogeneous land use or significantly different sub-watershed timing that effect the proper design of said detention facilities.

- b. For detention basins with drainage areas greater than 200 acres, the engineer shall use a unit hydrograph routing method that is generally accepted to the Illinois Department of Natural Resources Office of Water Resources such as the Clark or TR-20 unit hydrograph methodologies inside computer programs such as HEC-1 or HEC-HMS or other computer programs accepted by the Illinois Department of Natural Resources Office of Water Resources, and as further defined below:
 - i. Rainfall Data and Distributions should be utilized as described in Bulletin 70

and Circular 173 as published by the Illinois State Water Survey. Enough durations of each required frequency must be run to determine the peak storm duration for each frequency.

- ii. Time of Concentrations may be determined as described in either TR-55 or the IDOT Drainage Manual. Lag time if utilized may be assumed to be equal to 0.6 times the time of concentration.
 - iii. The selected curve numbers or other runoff coefficients must be calibrated to surveys of existing flood frequencies in other local watersheds which have already been modeled. This information shall be provided to the City. If the engineer does not have calibrated curve numbers for a similar watershed, the City will provide curve numbers with such a basis.
4. The detention basin may be designed to drain dry or to retain water for extended periods after rain events. All detention/retention basins must be properly maintained and kept free of algae growth, trash, and other debris.
5. The depth-area-volume relationship of the basin is dependent on the storage volume needed to reduce the peak inflow rate to some desired peak outflow rate. As the natural contours in the site dictate, ponding depths should be kept as shallow as possible. However, where stormwater storage depths exceed four (4) feet, a bench width of six (6) feet should be provided around the entire perimeter of the basin (exclusive of bermed areas). Outlets from normally dry detention basins can take on a number of forms, limited only by safety and maintenance considerations. Outlet pipe must be at least twelve (12) inches in diameter to facilitate maintenance. If less capacity is required than a twelve (12) inch pipe would provide, flow should be throttled at the pipe entrance. Trash racks or perforated risers are required at inlets to help guard against plugging of the pipe.
6. The side slope of the basin should be no steeper than four horizontal to one vertical (4:1) for the safety of mechanical mowing equipment and the safety of people during those times when water is being stored. All grades on the bottom of this basin should be at least two (2) percent so that the bottom will drain quickly and leave no wet spots. A low flow concrete channel shall be provided in the basin.
7. An emergency spillway outlet shall be provided for discharge of flows in the event the storage capacity is exceeded or the primary outlet is non-functional. The emergency spillway shall be designed for the 100-year storm frequency event assuming the basin is dry, or at normal pool for a wet basin, and the primary outlet is non-functional (plugged) at the start of the rainfall event.
8. Easements should be included if necessary and access roads provided to allow vehicles and other equipment the access needed for maintenance of the basin.
9. If detention is to be of the wet basin, (retention type), the volume needed for temporary storage must be provided above the normal pond elevation.
10. The outlet structure of wet basins (retention type) must be constructed such that the pond level is maintained. The side slopes beneath the water surface of the pond should be two horizontal to one vertical (2:1), to a depth of three or four feet to discourage the growth of aquatic plants unless a wetland system is developed along the shoreline of the pond. If fish are to be stocked in the pond, at least twenty-five (25) percent of the ponds area

should be at least ten (10) feet deep.

11. An as-built survey of detention basin grades and outlets with an accompanying storage calculation will be required upon completion of the proposed detention basin. Any completed basin below 95% of the design storage shall be regraded and reseeded to obtain the original design storage.
12. Detention dams which meet the criteria as a regulated dam as described in the most recent version of "Rules for Construction and Maintenance of Dams" by the Illinois Department of Natural Resources – Office of Water Resources require an IDNR, Office of Water Resources permit prior to City approval for construction

SECTION 3.13 – DRAINAGE PLANNING SUBMITTAL REQUIREMENTS

1. Phase I Drainage Report requirements:

This report will review at a conceptual level the feasibility and design characteristics of the proposed subdivision. The Phase 1 Drainage Report shall be submitted with the Preliminary Plan and shall be in accordance with the following outline and contain the applicable information listed:

A. Report Contents

I. General Location and Description

a. Location

- i. Township, range, section, $\frac{1}{4}$ section
- ii. City, County, State Highway and local streets showing ROW widths within and adjacent to the subdivision, or the area to be served by the drainage improvements, within $\frac{1}{4}$ mile
- iii. Names of surrounding developments, landuses, and identification of present zoning
- iv. Area in acres

b. Description of Property

- i. Ground cover (type of trees, shrubs, vegetation, general soil conditions, topography, and slope)
- ii. All drainage ways
- iii. Existing slopes and rock outcroppings
- iv. General project description

c. Existing irrigation facilities such as ditches and canals within or near project (note if still in use).

d. Existing or proposed land use with approximate area breakdown and intent for complete over lot grading or other approach

II. Drainage Basins and Sub-Basins

a. Major Basin Description

- i. Reference to all drainage way planning studies such as flood hazard delineation report, drainage way planning reports, and flood insurance rate

- maps.
 - ii. Existing major basin drainage characteristics
 - iii. SCS Soils Classification Map
- b. Sub-Basin Description
- i. Historic drainage patterns of the property in question
 - ii. Offsite drainage flow patterns from tributary areas and impact on development under existing and fully developed basin conditions as defined by the Engineering Department
- III. Drainage Facility Design
- a. General Concept Overview
- i. Concept and typical drainage patterns
 - ii. Compliance with offsite runoff considerations
 - iii. Anticipated and proposed drainage patterns
 - iv. Storm water runoff quality aspects of the drainage design
- b. Specific Details Overview
- i. Drainage problems encountered and solutions at specific design points
 - ii. Detention storage and outlet design (design calculations not required in this phase)
 - iii. Maintenance and access aspects of the design
 - iv. Easements and tracts for drainage purposes.
 - v. Any variances from these Regulations and justification for variance request
- IV. References: Reference all criteria, master plans, and technical information used in support of concept.
- B. Drawing Contents
- I. General Location Map: A map shall be provided in sufficient detail to identify drainage patterns entering and leaving the development and general drainage patterns. The map should be at a scale of 1"=2000' and show the pat of all drainage for all basins which affect, or are affected by, the property in question. (USGS Quad Sheets are ideal for this purpose). Compliance with copyright law is the responsibility of the Consultant Engineer, from the upper end of said basins to defined major drainage ways. The map shall identify any major facilities form the property (*i.e.*, development, irrigation ditches, existing detention facilities, culverts, and storm sewers) along the flow path to the nearest drainage way. Basins and divides are to be identified and topographic contours are to be included.
- II. Floodplain Information: A copy of the applicable FIRM panel. 100-year floodplain boundaries shall be shown on the preliminary plat and final plat.
- III. Drainage Plan: Map(s) of the proposed development at a scale of 1"=20' to 1"=200' on a 24" x 36" drawing shall be included. The plan shall show the following:
- a. Existing (dashed lines) and, if available, proposed (solid-line) topographic contours at 2-foot maximum intervals. In terrain where the slope exceeds 15%, the maximum interval is 10-feet. The contours shall extend a minimum of 100-feet beyond the property lines, unless otherwise authorized by the Director.

- b. Property lines and easements with purposes noted.
- c. All existing drainage facilities.
- d. Approximate flooding limits based on available information.
- e. Conceptual major drainage facilities including detention basins, storm sewers, sewers, riprap, and outlet structures in the detail consistent with the proposed development plan.
- f. Major drainage boundaries and sub-boundaries.
- g. Any offsite feature influencing development.
- h. Proposed flow directions and, if available, proposed contours.
- i. Streets with ROW width if available.
- j. Legend to define map symbols.
- k. Title block in lower right corner.
- l. North arrow, graphic and written scale, and written contour interval.

2. Phase II Drainage Report:

The purpose of this report is to finalize all design details which were either not covered in the Phase I Drainage Report, or which require adjustments resulting from the completion of the construction plans. All aspects of this design for all drainage facilities must be shown and supported in detail. Phase II Reports are typically required at Final Plan stage.

In addition to the Phase I Drainage Report Requirements, the following will be required in the Phase II Drainage Report

A. Report Contents

I. Drainage Design Criteria

- a. Regulations: The optional provisions selected or the deviation from the Regulations, if any, and its justification.
- b. Development Criteria Reference and Constraints
 - i. Previous drainage studies (i.e., project master plans) for the site in question that influence or are influenced by the drainage design and how the plan will affect drainage design for the site.
 - ii. The effects of adjacent drainage studies.
 - iii. The drainage impact of site constraints such as streets, utilities, rapid transit, existing structures, and development or site plan.
- c. Hydrological Criteria
 - i. Identify design rainfall.

-
- ii. Identify runoff calculation method.
 - iii. Identify detention discharge and storage calculation method.
- d. Identify design storm recurrence intervals
- i. Discussion and justification of other criteria or calculation methods used that are not presented in or referenced by the Regulations
- e. Hydraulic Criteria
- i. Identify various capacity references
 - ii. Other drainage facility design criteria used that are not presented in the Regulations
- f. Variances from Criteria
- i. Identify provisions by section number for which a variance is requested.
 - ii. Provide justification for each variance requested

II. Conclusions

- a. Compliance with Standards
- i. "Regulations"
 - ii. "Major Drainage way Planning Studies"
 - iii. "Development Manual"

III. Appendices

- a. Hydrologic Computation
- i. Land use assumptions regarding the project and adjacent properties
 - ii. Table including Basin ID, Basin Acreage, Weighted Runoff Coefficient, Basin Length, Time of Concentration, Minor and Major Rainfall Intensity, Minor and Major Rational Runoff, and Routed Runoff (for major basins if applicable.)
 - iii. Supporting calculations for the Weighted Runoff Coefficients and Times of Concentration (vertical flow path shown on Map).
 - iv. Rational Runoff Calculations
- b. Hydraulic Computations
- i. Gutter capacities with inlet design and spacing
 - ii. Storm water collection pipe design (based on sub-basin rational flows and HGL/EGL calculations)
 - iii. Storm water trunk line design (based on major basin routed flows and HGL/EGL calculations).
 - iv. Energy dissipation and permanent erosion control devices
 - v. Culvert capacities
 - vi. Open channel design
 - vii. Check and drop structure design
 - viii. Detention pond volume and discharge design including emergency spillway.
 - ix. Downstream outfall capacity to Major Drainage way.
- c. GENERAL: All calculations required to achieve the final results must be shown in the appendices. All tables, charts, and nomographs used in the preparation of this report must also be included in the appendices, each following the computation where first utilized. The Hydraulic and Energy Grade Lines must be shown on all construction plan storm profiles. Velocity for storm sewers that discharge to open

channels or detention ponds.

B. Drawing Contents

- I. Drainage Plan: Map(s) of the proposed development at a scale of 1"=20' to 1"=200' on a 24" x 36" drawing shall be included. In addition to the Phase I drawing requirements, the plan shall show the following:
 - a. Streets, if available, indicating name, ROW width, flow line width, sidewalk, etc.
 - b. Existing drainage facilities and structures, including irrigation ditches, roadside ditches, drainage ways, gutter flow directions, and culverts. All pertinent information such as material, size, shape, slope, and / location shall also be included.
 - c. Overall drainage area boundary and drainage sub-area boundaries. Generally, off-site basins may be shown on the General Location map. In some instances, the City Engineer may require that all affected basins be shown on the Drainage Plan, in their entirety. A pre-submission conference should be held with the City Engineer prior to submittal.
 - d. 100-year floodplain for open channels, streams, or other natural water courses not included in the FIRM mapping.
 - e. Proposed type of street flow (i.e., vertical or combination curb and gutter), gutter slope and flow directions, and cross pans, if available.
 - f. Proposed storm sewers and open drainage ways, if available, including inlets, manholes, culverts, other appurtenances, and riprap protection; location and (if known) elevation of all existing and proposed utilities affected by or affecting the drainage design; and definition of flow path leaving the development through the downstream properties ending at a major drainage way.
 - g. Routing of off-site drainage flow from tributary areas through the development.
 - h. Proposed outfall point for runoff from the developed area and facilities to convey flows to the final outfall point without damage to downstream properties.
 - i. Routing and accumulation of flows at various critical points for the initial storm runoff and significant changes in flow, and all drainage structures including manholes, inlets, junction boxes, culverts, and bridges.
 - j. Volumes and release rates for detention storage facilities and information on outlet works and 100-year water line.
 - k. Location and elevations of all existing floodplains affecting the property.

SECTION 4: SOIL EXCAVATION AND EROSION CONTROL

SECTION 4.1 – FINDINGS

1. Excessive quantities of soil may erode from areas undergoing development for certain non-agricultural uses including but not limited to the construction of dwelling units, commercial buildings and industrial plants, the building of roads and highways, the modification of stream channels and drainageways, and the creation of recreational facilities.
2. The washing, blowing, and falling of eroded soil across and upon roadways endangers the health and safety of users thereof, by decreasing vision and reducing traction of road vehicles.
3. Soil erosion necessitates the costly repairing of gulleys, washed-out fills, and embankments.
4. Sediment from soil erosion tends to clog sewers and ditches and to pollute and silt rivers, streams, lakes, wetlands, and reservoirs.
5. Sediment limits the use of water and waterways for most beneficial purposes, promotes the growth of undesirable aquatic weeds, destroys fish and other desirable aquatic life, and is costly and difficult to remove.
6. Sediment reduces the channel capacity of waterways and the storage capacity of floodplains and natural depressions, resulting in increased chances of flooding at risk to public health and safety.

SECTION 4.2 – PURPOSE

The purpose of these requirements is to safeguard persons, protect property, prevent damage to the environment, and promote the public welfare by guiding, regulating and controlling the design, construction, use and maintenance of any development or other activity which disturbs or breaks the topsoil or otherwise results in the movement of earth on land situated in or around the City of O'Fallon. It is the intention of these requirements that the delivery of sediment from sites affected by land disturbing activities be limited, as closely as practicable, to that which would have occurred if the land had been left in its natural undisturbed state.

SECTION 4.3 – GENERAL PRINCIPLES

It is the objective of these requirements to control soil erosion and sedimentation caused by development activities, including clearing, grading, stripping, excavating, and filling of land, in and around the City of O'Fallon. Measures taken to control soil erosion and offsite sediment runoff should be adequate to assure that sediment is not transported from the site by a storm event of ten (10) year frequency or less. The following principles shall apply to all development activities within and around the City of O'Fallon and to the preparation of the submissions required herein.

"Illinois Procedures and Standards for Urban Soil Erosion and Sedimentation Control" (prepared by the Northeastern Illinois Erosion & Sedimentation Control Steering Committee, in cooperation with area Soil and Water Conservation Districts and the U.S. Soil Conservation Service, and known as the Green Book) are designed to provide protection against sediment leaving the site during a ten-year storm.

1. Development should be related to the topography and soils of the site so as to create the

least potential for erosion. Areas of steep slopes where high cuts and fills may be required should be avoided wherever possible, and natural contours should be followed as closely as possible.

2. Natural vegetation should be retained and protected wherever possible. Areas immediately adjacent to natural watercourses, lakes, ponds, and wetlands should be left undisturbed wherever possible. Temporary crossings of watercourses, when permitted, must include appropriate stabilization measures. Floodplain and wetland protection will be included in site development plans, a minimum twenty-five (25) foot buffer strip shall be preserved along waterbodies and wetlands.
3. Special precautions should be taken to prevent damages resultant from any necessary development activity within or adjacent to any stream, lake, pond, or wetland. Preventative measures should reflect the sensitivity of these areas to erosion and sedimentation.
4. The smallest practical area of land should be exposed for the shortest practical time during development.
5. Sediment basins or traps, filter barriers, diversions, and any other appropriate sediment or runoff control measures shall be installed prior to site clearing and grading and maintained to remove sediment from run-off waters from land undergoing development.
6. The selection of erosion and sedimentation control measures should be based on assessment of the probable frequency of climatic and other events likely to contribute to erosion, and on evaluation of the risks, costs, and benefits involved.
7. In the design of erosion control facilities and practices, aesthetics and the requirements of continuing maintenance should be considered.
8. Provision should be made to accommodate the increased run-off caused by changed soil and surface conditions during and after development. Drainageways should be designed so that their final gradients and the resultant velocities and rates of discharge will not create additional erosion onsite or downstream.
9. Permanent vegetation and structures should be installed and functional as soon as practical during development.
10. Those areas being converted from agricultural purposes to other land uses should be vegetated with an appropriate protective cover prior to development.
11. All waste generated as a result of site development activity should be properly disposed of and should be prevented from being carried off the site by either wind or water.
12. All construction sites should provide measures to prevent sediment from being tracked onto public or private roadways.

SECTION 4.4 – SITE DEVELOPMENT PERMIT

1. Permit Required

As required in the Subdivision and Development Control Ordinance, no person shall

commence or perform any clearing, grading, stripping, excavating, or filling of land which meets the following provisions without having first obtained a site development permit from the Director, Department of Planning & Zoning for the City of O'Fallon, Illinois, except as provided therein.

2. Application for Permit

Application for a site development permit shall be made by the owner of the property or his/her authorized agent to the City of O'Fallon Department of Planning & Zoning on a form furnished for that purpose. Each application shall bear the name(s) and address(es) of the owner or Developer of the site and of any consulting firm retained by the Applicant, together with the name of the Applicant's principal contact at such firm, and shall be accompanied by a filing fee paid to the City Clerk at a rate or rates established by written order of resolution of the City Council. Each application shall include certification that any land clearing, construction, or development involving the movement of earth shall be in accordance with the plans approved upon issuance of the permit.

In making an application covered by this Manual, the Applicant or the landowner desiring performance of or allowing the work consents to the City's right to enter the site for the purpose of determining the adequacy of any plan, inspecting compliance with the approved plan or for performing any work necessary to bring the site into compliance with the approved plan.

3. Submissions

Each application for a site development permit shall be accompanied by the following information, sealed by a Professional Engineer:

- A. A vicinity map in sufficient detail to enable easy location in the field of the site for which the permit is sought, and including the boundary line and approximate acreage of the site, existing zoning, and a legend and scale.
- B. A development plan of the site showing:
 - I. Existing topography of the site and adjacent land within approximately one hundred (100) feet of the boundaries, drawn at no greater than two (2) foot contour intervals (one (1) foot contours, if ground slope less than three (3) percent) and clearly portraying the conformation and drainage pattern of the area. These are different requirements than mapping for the drainage planning submittal.
 - II. The location of existing buildings, structures, utilities, streams, lakes, floodplains, wetlands and depressions, drainage facilities, vegetative cover, paved areas, and other significant natural or man-made features on the site and adjacent land within one hundred (100) feet of the boundary.
 - III. A general description of the predominant soil types on the site, their location, and their limitations for the proposed use.
 - IV. Proposed use of the site, including present development and planned utilization; areas of clearing, stripping, grading, excavation, and filling; proposed contours, finished grades, and street profiles; provisions for storm

drainage, including storm sewers, swales, detention basins and any other measures to control the rate of runoff, with a drainage area map, indications of flow directions, and computations; kinds and locations of utilities; and areas and acreages proposed to be paved, covered, sodded or seeded, vegetatively stabilized, or left undisturbed.

- C. An erosion and sediment control plan showing all measures necessary to meet the objectives of this Ordinance throughout all phases of construction and permanently after completion of development of the site, including:
- I. Location and description, including standard details, of all sediment control measures and design specifics of sediment basins and traps, including outlet details.
 - II. Location and description of all soil stabilization and erosion control measures, including seeding mixtures and rates, types of sod, method of seedbed preparation, expected seeding dates, type and rate of lime and fertilizer application, kind and quantity of mulching for both temporary and permanent vegetative control measures, and types of non-vegetative stabilization measures.
 - III. Location and description of all runoff control measures, including diversions, waterways, and outlets.
 - IV. Location and description of methods to prevent tracking of sediment offsite, including construction entrance details, as appropriate.
 - V. Description of dust and traffic control measures.
 - VI. Locations of stockpiles and description of stabilization methods.
 - VII. Description of off-site fill or borrow volumes, locations, and methods of stabilization.
 - VIII. Provisions for maintenance of control measures, including type and frequency of maintenance, easements, and estimates of the cost of maintenance.
 - IX. Identification (name, address, and telephone) of the person(s) or entity which will have legal responsibility for maintenance of erosion control structures and measures during development and after development is completed. The maintainers of permanent erosion control devices shall be identified as precisely as possible in the plan.
- D. The proposed phasing of development of the site, including stripping and clearing, rough grading and construction, and final grading and landscaping. Phasing should identify the expected date on which clearing will begin, the estimated duration of exposure of cleared areas, and the sequence of installation of temporary sediment control measures (including perimeter controls), clearing and grading, installation of temporary soil stabilization measures, installation of storm drainage, paving streets and parking areas, final grading and the establishment of permanent vegetative cover, and the removal of temporary measures. It shall be the responsibility of the Applicant to notify the Director or City Engineer of any significant changes which

occur in the site development schedule after the initial erosion and sediment control plan has been approved. These submissions shall be prepared in accordance with the requirements of this Ordinance and the standards and requirements contained in the "Illinois Urban Manual", dated December 2002 or more recent publication date. (The Illinois Urban Manual is a compilation and updating of the "Standards and Specifications for Soil Erosion and Sediment Control" (the Yellow Book) published by the Illinois Environmental Protection Agency and the "Illinois Procedures and Standards for Urban Soil Erosion and Sedimentation Control" (the Green Book) prepared by the Northeastern Illinois Soil Erosion and Sedimentation Control Steering Committee).

- E. A completed Notice of Intent (NOI) to the Illinois Environmental Protection Agency (IEPA), the general permit application to discharge stormwater due to construction site activities.

4. Review and Approval

Each application for a site development permit shall be reviewed and acted upon according to the following procedures:

- A. The Director will review each application for a site development permit to determine its conformance with the provisions of this Ordinance. The Director may also refer any application to the St. Clair or Madison County Soil and Water Conservation District and/or any other local government or public agency within whose jurisdiction the site is located for review and comment. Within thirty (30) days after receiving an application, the Director shall in writing:
 - I. Approve the permit application if it is found to be in conformance with the provisions of this Ordinance, and issue the permit;
 - II. Approve the permit application subject to such reasonable conditions as may be necessary to secure substantially the objectives of this Ordinance, and issue the permit subject to these conditions; or
 - III. Disapprove the permit application, indicating the deficiencies and the procedure for submitting a revised application and/or submission.
- B. No site development permit shall be issued for an intended development site unless:
 - I. The development, including but not limited to subdivisions and planned unit development, has been approved by the City where applicable, or
 - II. Such permit is accompanied by or combined with a valid building permit issued by the City, or
 - III. The proposed earth moving is coordinated with any overall development program previously approved by the City for the area in which the site is situated; and
 - IV. All relevant federal and state permits (i.e., for floodplains and wetlands) relevant to soil erosion and sediment control have been received for the portion of the site subject to soil disturbance.

- C. Failure of the Director to act on an original or revised application within thirty (30) days of receipt shall authorize the Applicant to proceed in accordance with the plans as filed unless such time is extended by agreement between the Director and the Applicant. Pending preparation and approval of a revised plan, development activities shall be allowed to proceed in accordance with conditions established by the Director.

5. Expiration of Permit

Every site development permit shall expire and become null and void if the work authorized by such permit has not been commenced within one hundred and twenty (120) days, or is not completed by a date which shall be specified in the permit; except that the Director may, if the permittee presents satisfactory evidence that unusual difficulties have prevented work being commenced or completed within the specified time limits, grant a reasonable extension of time if written application is made before the expiration date of the permit. The Director may require modification of the erosion control plan to prevent any increase in erosion or offsite sediment runoff resulting from any extension.

SECTION 4.5 – DESIGN AND OPERATION STANDARDS AND REQUIREMENTS

1. Applicability

All clearing, grading, stripping, excavating, and filling which is subject to the permit requirements of this Ordinance shall be subject to the applicable standards and requirements set forth in this Section. Development which is exempted from the permit requirements of this Ordinance are still required to take actions to control erosion and sedimentation leaving that development site, and that those actions shall be generally consistent with this Section.

2. Responsibility

The permittee shall not be relieved of responsibility for damage to persons or property otherwise imposed by law, and the City or its officers or agents will not be made liable for such damage, by (1) the issuance of a permit under this Ordinance, (2) compliance with the provisions of that permit or with conditions attached to it by the Director, (3) failure of City officials to observe or recognize hazardous or unsightly conditions, (4) failure of City officials to recommend denial of or to deny a permit, or (5) exemptions from the permit requirements of this ordinance.

3. Site Design Requirements

- A. On-site sediment control measures, as specified by the following criteria, shall be constructed and functional prior to initiating clearing, grading, stripping, excavating or fill activities on the site.

- I. For disturbed areas draining less than one (1) acre, filter barriers (including filter fences, straw bales, or equivalent control measures) shall be constructed to control all offsite runoff as specified in referenced handbooks. Vegetated filter strips, with a minimum width of twenty-five (25) feet, may be used as an alternative only where runoff in sheet flow is expected.

- II. For disturbed areas draining more than one (1) but less than five (5) acres, a sediment trap or equivalent control measure shall be constructed at the downslope point of the disturbed area.
 - III. For disturbed areas draining more than five (5) acres, a sediment basin or equivalent control measure shall be constructed at the downslope point of the disturbed area.
 - IV. Sediment basins and sediment traps designs shall provide for both detention storage and sediment storage. The detention storage shall be composed of equal volumes of "wet" detention storage and "dry" detention storage and each shall be sized for the 2-year, 24-hour runoff from the site under maximum runoff conditions during construction. The release rate of the basin shall be that rate required to achieve minimum detention times of at least ten (10) hours. The elevation of the outlet structure shall be placed such that it only drains the dry detention storage.
 - V. The sediment storage shall be sized to store the estimated sediment load generated from the site over the duration of the construction period with a minimum storage equivalent to the volume of sediment generated in one (1) year. For construction periods exceeding one (1) year, the one (1) year sediment load and a sediment removal schedule may be substituted.
- B. Stormwater conveyance channels, including ditches, swales, and diversions, and the outlets of all channels and pipes shall be designed and constructed to withstand the expected flow velocity from the 10-year frequency storm without erosion. All constructed or modified channels shall be stabilized within 48 hours, consistent with the following standards:

Design Flow Velocity (feet per second)	Lining Material
Less than 3	Seeded
0 to 5	Sod, staked
0 to 7	Erosion control blanket as approved by the City Engineer
0 to 10	Rip-rap
0 to 15	Grouted rip-rap
Over 15	Paved concrete or sound in-situ bedrock

- C. Disturbed areas shall be stabilized with temporary or permanent measures within seven (7) calendar days following the end of active disturbance, or redisturbance, consistent with the following criteria:
 - I. Appropriate temporary or permanent stabilization measures shall include seeding, mulching, sodding, and/or non-vegetative measures.
 - II. Areas having slopes greater than twenty (20) percent shall be stabilized with sod, mat or blanket in combination with seeding, or equivalent.
- D. Land disturbance activities in stream channels shall be avoided, where possible. If disturbance activities are unavoidable, the following requirements shall be met:

-
- I. Construction vehicles shall be kept out of the stream channel to the maximum extent practicable. Where construction crossings are necessary, temporary crossings shall be constructed of non-erosive material, such as riprap or gravel.
 - II. The time and area of disturbance of stream channels shall be kept to a minimum. The stream channel, including bed and banks, shall be restabilized within 48 hours after channel disturbance is completed, interrupted, or stopped.
 - III. Channel relocation should be avoided whenever possible. Whenever channel relocation is necessary, the new channel shall be constructed in the dry and fully stabilized before flow is diverted.
- E. Storm sewer inlets and culverts shall be protected by sediment traps or filter barriers meeting accepted design standards and specifications, but implemented in a manner which will avoid unacceptable flooding of public streets.
 - F. Soil storage piles containing more than ten (10) cubic yards of material shall not be located with a downslope drainage length of less than twenty-five (25) feet to a roadway or drainage channel. Filter barriers, including straw bales, filter fence, or equivalent, shall be installed immediately on the downslope side of the piles.
 - G. If dewatering devices are used, discharge locations shall be protected from erosion. All pumped discharges shall be routed through appropriately designed sediment traps or basins, or equivalent.
 - H. Each site shall have graveled (or equivalent) entrance roads, access drives, and parking areas of sufficient length and width to prevent sediment from being tracked onto public or private roadways. Any sediment reaching a public or private road shall be removed by shoveling or street cleaning (not flushing) before the end of each workday and transported to a controlled sediment disposal area.
 - I. All temporary and permanent erosion and sediment control practices must be maintained and repaired as needed to assure effective performance.
 - J. All temporary erosion and sediment control measures shall be disposed of within thirty (30) days after final site stabilization is achieved with permanent soil stabilization measures. Trapped sediment and other disturbed soils resulting from the disposition of temporary measures should be permanently stabilized to prevent further erosion and sedimentation.

4. Maintenance of Control Measures

All soil erosion and sediment control measures necessary to meet the requirements of this Ordinance shall be maintained periodically by the Applicant or subsequent land owner during the period of land disturbance and development of the site in a satisfactory manner to ensure adequate performance. Effective maintenance of control measures is critical to their success and shall be budgeted into the erosion and sediment control plan. Particular emphasis shall be placed on the following types of maintenance needs: repair and replacement of sediment barriers, such as straw bales; removal of excess accumulated sediment from traps, basins, and channels; irrigation, fertilization, or reseeding of vegetatively stabilized areas; repair of scour or gully development on slopes and in channels; removal of sediment from roadways; and control of dust.

5. Inspection

The Director, City Engineer, or their designees shall make inspections as hereinafter required and shall either approve that portion of the work completed or shall notify the permittee wherein the work fails to comply with the site development or erosion and sedimentation control plan as approved. Plans for grading, stripping, excavating, and filling work bearing the stamp of approval of the Director shall be maintained at the site during progress of the work. In order to obtain inspections and to ensure compliance with the approved erosion and sediment control plan, the site development or building permit, and this Ordinance, the permittee shall notify the Director within two (2) working days of the completion of the construction stages specified below:

- A. Upon completion of installation of sediment and runoff control measures (including perimeter controls and diversions), prior to proceeding with any other earth disturbance or grading,
- B. After stripping and clearing,
- C. After rough grading,
- D. After final grading,
- E. After seeding and landscaping deadlines, and
- F. After final stabilization and landscaping, prior to removal of sediment controls.

If stripping, clearing, grading and/or landscaping are to be done in phases or areas, the permittee shall give notice and request inspection at the completion of each of the above work stages in each phase or area. If an inspection is not made and notification of the results given within five (5) working days after notice is received by the City from the permittee, the permittee may continue work at his/her own risk, without presuming acceptance by the City. Notification of the results of the inspection shall be given in writing at the site.

6. Special Precautions

- A. If at any stage of the grading of any development site the Director determines by inspection that the nature of the site is such that further work authorized by an existing permit is likely to imperil any property, public way, stream, lake, wetland, or drainage structure, the Director or City Engineer may require, as a condition of allowing the work to be done, that such reasonable special precautions to be taken as is considered advisable to avoid the likelihood of such peril. "Special precautions" may include, but shall not be limited to, a more level exposed slope, construction of additional drainage facilities, berms, terracing, compaction, or cribbing, installation of plant materials for erosion control, and recommendations of a registered soils engineer and/or engineering geologist which may be made requirements for further work.
- B. Where it appears that storm damage may result because the grading on any development site is not complete, work may be stopped and the permittee required to install temporary structures or take such other measures as may be required to

protect adjoining property or the public safety. On large developments or where unusual site conditions prevail, the Director may specify the time of starting grading and time of completion or may require that the operations be conducted in specific stages so as to insure completion of protective measures or devices prior to the advent of seasonal rains.

8. Amendment of Plans

Major amendments of the site development or erosion and sedimentation control plans shall be submitted to the Director or City Engineer and shall be processed and approved or disapproved in the same manner as the original plans. Field modifications of a minor nature may be authorized by the Director by written authorization to the permittee.

SECTION 5: SUBDIVISION STREET TREE PLANTING REQUIREMENTS

SECTION 5.1 – GENERAL STANDARDS

All subdivisions and developments shall submit a tree planting plan, unless excepted by the City Council, that: (1) supports functional purposes on the site such as creation of privacy, drainage, visual screening, spatial definition, etc.; (2) enhances the appearance of the development and neighborhood; (3) enhances the driving environment; (4) enhances the pedestrian environment; (5) identifies all landscape areas; (6) identifies landscaping elements within landscaped areas; and (7) meets or exceeds the standards of this Program.

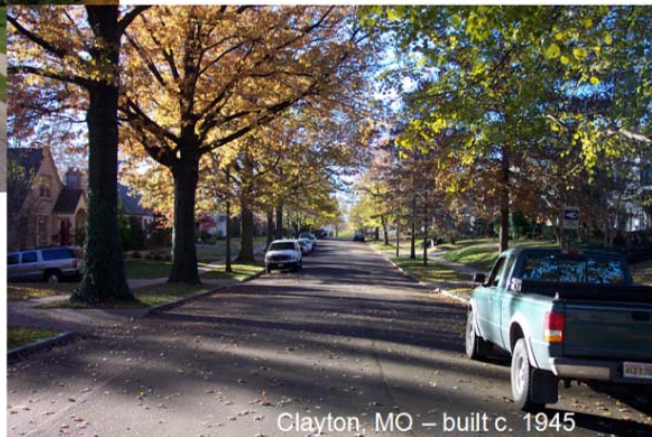
SECTION 5.2 – TREE PLANTING STANDARDS

All developments shall establish belts or groves of trees along all City streets, unless otherwise provided by the City Council. These standards are minimums and are not intended to limit additional tree plantings as may be approved by the City Engineer. All street tree plantings will be designed and installed according to the following guidelines. Where the immediate planting of required trees in the right-of-way may not be in the best interest of the public, the City Council in lieu of such street tree planting requirement may in the final plat ordinance and at its discretion: (1) require an escrow of the costs for future planting of such trees in that subdivision or a fee, or (2) require not less than two (2) trees per lot frontage to be placed within the lot on private property. The escrow or fee shall be in the amount determined by the City necessary for the City to purchase and install the number of street trees of a type on the approved City list equal to two (2) trees for every fifty (50) feet of frontage within the subject subdivision.

Intent and Purpose: Tree-lined streets encourage walking, promote interaction between neighbors, slow vehicle speeds and moderate climatic effects.



O'Fallon, IL – built c. 1993



Clayton, MO – built c. 1945

SECTION 5.3 – LOCATION

Intent: To help create a community environment that is aesthetically pleasing for drivers and pedestrians and promotes a healthy and thriving green space.

- 1) Except as where an alternative design is approved, canopy shade trees will be planted in the parkway between the sidewalk and the street on average every fifty (50) feet apart on center within the parkway. Note: Ordinance requires all parkways to be designed at seven (7) feet wide.
- 2) As a general rule, the canopies of large deciduous trees at maturity should nearly touch.
- 3) Street trees will not be located* within:
 - a) twenty (20) feet of a streetlight
 - b) six (6) feet of a water, sewer, or gas line
 - c) ten (10) feet of a fire hydrant, manhole, or sewer inlet
 - d) thirty (30) feet of an intersection
 - e) An area blocking the view of traffic signs
 - f) ten (10) feet of a driveway
 - g) The valley of a drainage swale

*exception to the above standards will occur within cul-de-sacs, elbows, etc., with approval from the City of O'Fallon

- 4) Ornamental trees shall be planted in substitution for the canopy shade trees where overhead lines and fixtures would interfere with the normal maturing of canopy trees.
- 5) Unless otherwise approved, trees shall be placed at the following set intervals:

<i>Type of Tree</i>	<i>Interval*</i>
Canopy shade trees (50' or taller)	35' – 50' on center
Ornamental trees medium: 35' – 50' tall; small: 25' – 35' tall	25' – 35' on center
Coniferous Evergreens (for use on berms)	25' – 40' on center (staggering is permitted)

*Exact locations and spacing may be adjusted at the option of the applicants with approval from the City of O'Fallon.

- 6) The Developer shall design a street tree plan which corresponds to the character of the subdivision. In subdivisions that are grid-like and more traditional, the Developer should plant trees in a formal and consistent manner, using trees of similar size and shape with regular intervals. In subdivisions with curvilinear streets, the Developer should plant a diversity of species both in size and shape in informal patterns to mimic randomness in

nature.

- 7) Smaller or under-story trees may be planted between or among larger canopy trees to create diversity in scale and to counteract gaps in density when streetlights, utilities, or driveways create voids.

SECTION 5.4 – SPECIES DIVERSITY

All developments will adhere to the following guidelines to prevent uniform insect or disease damage to the extensive landscape being installed. This species diversity standard is set as a minimum only. Extensive monocultures are prohibited.

- 1) In general, a single species should not make up more than twenty (20) percent of the City of O'Fallon's street tree population.
- 2) Depending on the number of trees planted in the entire development, the following maximum percentage of any one species will be used.

Number of trees	Maximum %	Minimum Number of Species
10-29	50%	2 species
30-59	33%	3 species
60 or more	25%	4 species

- 3) A single species will be placed in no more than four (4) consecutive locations on any one side of the street.
- 4) Species will be determined from the approved street tree list found in Appendix A, attached at the end of these guidelines.

SECTION 5.5 – PROCEDURE AND INSTALLATION

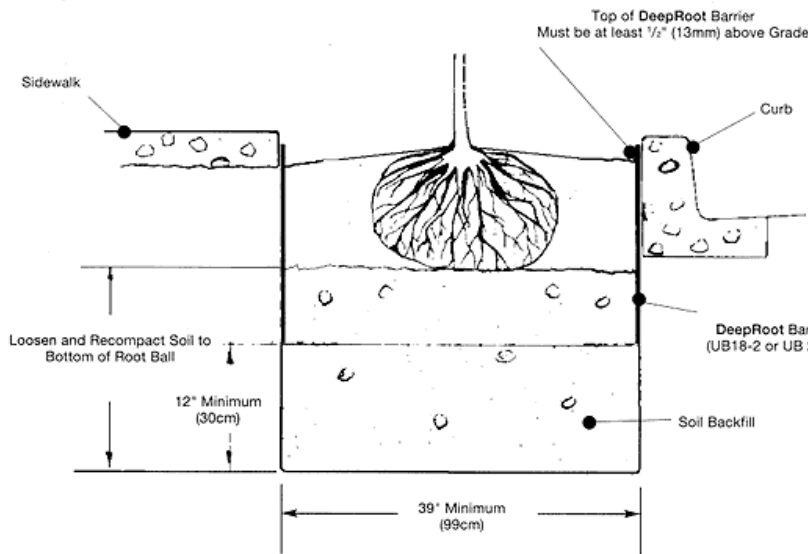
The following insures that the environment desired by the community is created efficiently. These guidelines will prevent costs to the Developer for removal, replacement, or relocation of trees and prevent costs to the homeowner or City for future maintenance or repair of avoidable damages.

- 1) Detailed landscape plans shall be submitted with the final plat or final construction plans. The landscape plan shall be one consolidated sheet showing the locations of street trees, utilities, man holes, fire hydrants, light posts, etc. During the plat design process, landscape and utility plans should be coordinated. Approval will be made during the final plat review for the location and type of street trees. Note: Tree/utility separations shall not be used as a means of avoiding the planting of required street trees.
- 2) At the time of final plat or plan approval, the Developer is required to provide a bond or letter of credit (LOC) to the City for any and all street trees installed within the subdivision. The bond or LOC will last the duration of two (2) years from the date the sidewalks and trees are accepted by the city.
- 3) Planting time, in general, is from October to December and March to May.

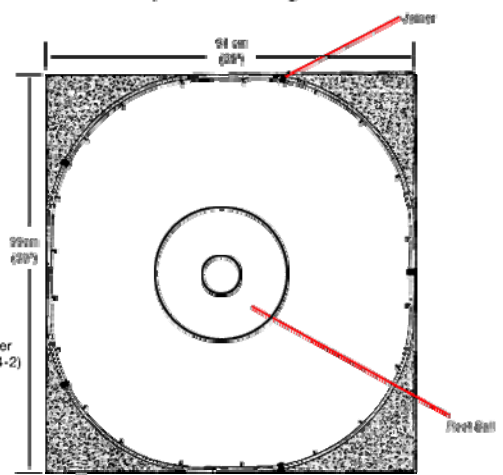
- 4) Immediately prior to planting, the Developer will mark all street tree locations on site, also identifying the species of tree.
- 5) The City of O'Fallon will inspect the locations and species variation on site to affirm adherence to the approved street tree plan in addition to approving any alterations or departures from the original tree plan. The City will also inspect all trees prior to planting to insure acceptable tree quality and size according to the American Standard for Nursery Stock, published by the American Association for Nurserymen.
- 6) Each street tree will be centered in the parkway (e.g., 3'6" from curb in a 7' parkway), unless the parkway is used as a vegetated drainage swale. If a swale is indicated, the species and location will be determined by the City.
- 7) Each tree will be installed with a root barrier to prevent excessive root growth into neighboring utilities or roadways/sidewalks. The following diagrams are two models of acceptable root barrier methods. Examples are taken from www.DeepRoot.com.

Surround Root Barrier

A Typical Surround Planting Installation Using DeepRoot Universal Barrier

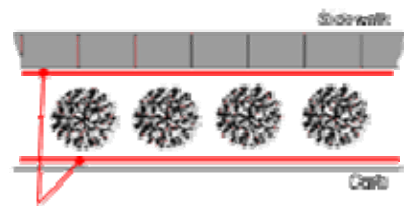
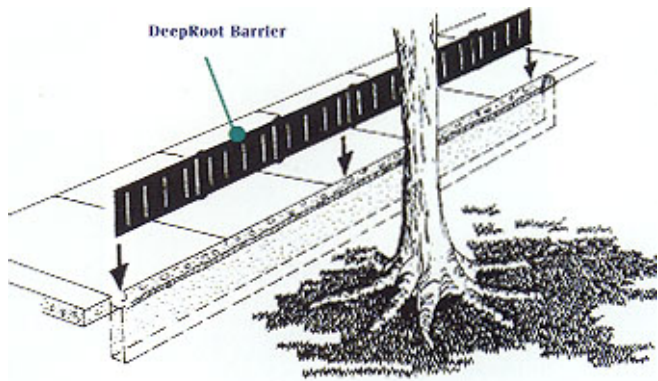


Top View of Planting Pit



Five (5) panels of DeepRoot UB 18-2, 24-2 with a circumference of 805 cm (126") fits into the rectangular hole to form an oval.

Linear Root Barrier



- 8) Trunk protectors will be installed around the trunk flares or bases of all trees to avoid damage from weed eaters, lawnmowers, etc.

9) Trees will be planted with the following minimum sizes (measured at 4' height):

Type of Tree	Minimum Size
Canopy Shade Tree	2" caliper, balled and burlapped
Ornamental Tree	1.5" caliper, balled and burlapped
Evergreen Tree	6' in height, balled and burlapped

10) The City of O'Fallon will perform a post-planting inspection for proper tree installation according to American Standard for Nursery Stock.

11) Following tree and sidewalk acceptance by the City of O'Fallon, the city will be responsible for the maintenance of the tree. The homeowner will be responsible for the area around and beneath the canopy including collection and disposal of leaves, twigs, branches and other tree litter.

SECTION 5.6 – PASTORAL SUBDIVISIONS

Any subdivision which contains lots greater than one (1) acre on average may have the preceding guidelines and requirements waived by the City of O'Fallon. The Developer will then have the option of following these guidelines or creating an alternative street tree planting scheme as approved by the City. If the Developer of such subdivision does not plant trees in the right-of-way or within an approved planting scheme, the Developer is required to donate the equivalent number of trees to the City or to pay a cash contribution in lieu of the tree dedications. The equivalent number of trees shall be determined as two (2) trees for every fifty (50) feet of frontage within the subdivision. The cash contribution shall be based on the fair market value of the trees in place as permitted in the Approved Street Tree List (Appendix A).

SECTION 5.7 – LANDSCAPE BERMS

1. *Required Berms.* A minimum thirty (30) foot wide natural landscape buffer a minimum of four (4) feet in height with a maximum slope of 3:1 (to include a berm that will provide visual protection to the property owner from the roadway) is required whenever the back or side yards of a residential development face non-subdivision streets or whenever a landscape berm is otherwise required on the Plat. There shall be no right of access across a landscape easement. Where fencing is to be constructed along a landscape buffer and is visible from the public roadway, a permanent ornamental fence of a height and design that is consistent and that will be harmonious with the neighborhood and residential character is required in these situations. This can be achieved through either construction by the developer or required in the covenants of the subdivision and deed restricted against the applicable lots. No fence or structure shall be constructed within the landscape buffer without express written authorization of the City.
2. Areas consisting of berms, evergreens, and other landscaping which act as a buffer between the development and major thoroughfares shall be laced in a landscaping easement that will be maintained by the adjacent property owner, or on outlots to be

maintained by a Homeowner's Association. Berms shall not be placed over utilities. Fences will not be allowed in landscape easements.

3. Required landscape berms shall be placed in common ground for permanent maintenance, or if otherwise approved by the Council, may be part of any lot, the buffer shall be subject to a permanent maintenance easement acceptable to the City and shall not be counted in the calculation of minimum lot size required by the applicable zoning. Such easements shall be deed restricted to prevent adjacent property owners from constructing any facilities or structures (including fences) on a berm or easement.

APPENDIX A: APPROVED STREET TREE LIST

Scientific Name	Common Name	Mature Height
SMALL TREES		<35'
<i>Acer griseum</i>	Paperbark Maple	25-30
<i>Acer truncatum</i>	Purple-blow Maple	25-30
<i>Amelanchier spp.</i>	Serviceberry (Improved cultivars)	25-30'
<i>Cercis canadensis</i>	Redbud	25-30'
<i>Chionanthus virginicus</i>	Fringetree	25-30'
<i>Cornus Kousa</i>	Kousa Dogwood	20-30'
<i>Cornus Racemosa</i>	Gray Dogwood	20-30'
<i>Halesia carolina</i>	Carolina Silverbell	25-30'
<i>Malus spp.</i>	Crabapple, (Nonfruiting cultivars)	25-35'
Medium Trees		35-50'
<i>Pyrus calleryana</i>	Callery Pear (Improved cultivars)	30-40'
<i>Carpinus betulus</i>	European Hornbeam	35-40
<i>Carpinus caroliniana</i>	American Hornbeam	25-40'
<i>Koelreuteria paniculata</i>	Golden Rain Tree	35-40
<i>Ostrya virginiana</i>	Hophornbeam	30-40'
Large Trees		>50'
<i>Acer platanoides</i>	Norway Maple (Improved cultivars)	>50'
<i>Acer rubrum</i>	Red Maple (Improved cultivars)	>50'
<i>Acer saccharum</i>	Sugar Maple (Improved cultivars)	>50'
<i>Celtis occidentalis</i>	Hackberry	>50'
<i>Cladrastis kentukea</i>	Yellowwood	>50'
<i>Fraxinus americana</i>	White Ash (Improved seedless cultivars)	>50'
<i>Fraxinus pennsylvanica</i>	Green Ash (Improved seedless cultivars)	>50'
<i>Ginkgo biloba</i>	Ginkgo (Fruitless cultivars only)	>50'
<i>Gymnocladus dioica</i>	Kentucky Coffeetree (Fruitless cultivars only)	>50'
<i>Gleditsia triacanthos</i>	Honeylocust (Fruitless cultivars only)	>50'
<i>Platanus x acerifolia</i>	London Planetree	>50'
<i>Quercus acutissima</i>	Sawtooth Oak	>50'
<i>Quercus bicolor</i>	Swamp White Oak	>50'
<i>Quercus coccinea</i>	Scarlet Oak	>50'
<i>Quercus muehlenbergii</i>	Chinkapin Oak	>50'
<i>Quercus phellos</i>	Willow Oak	>50'
<i>Quercus rubra</i>	Northern Red Oak	>50'
<i>Quercus shumardii</i>	Shumard Oak	>50'
<i>Sophora japonica</i>	Japanese Pagoda Tree	>50'
<i>Taxodium distichum</i>	Bald Cypress	>50'
<i>Tilia americana 'Redmond'</i>	Redmond Linden	>50'
<i>Tilia tomentosa 'Sterling'</i>	'Sterling' Silver Linden	>50'
<i>Ulmus parvifolia</i>	Lacebark Elm	>50'
<i>Zelkova serrata</i>	Japanese Zelkova (Improved cultivars)	>50'

- This list is a guide to selecting trees for use in the Right-of-Way adjacent to the street.
- Trees not on this list must be approved by the City of O'Fallon before installation.
- Improved cultivars should be used when indicated or available.

APPENDIX B: STORM INLET AND STREET CROSS SECTIONS