DESIGN MANUAL FOR PUBLIC AND PRIVATE IMPROVEMENTS FOR ENGINEERING AND CONSTRUCTION STANDARDS & SPECIFICATIONS

CITY OF BATAVIA

KANE COUNTY, ILLINOIS

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DESIGN MANUAL FOR PUBLIC AND PRIVATE IMPROVEMENTS

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SECTION 1

GENERAL PROVISIONS

SECTION 1
GENERAL PROVISIONS

All improvements included within the City of Batavia's Engineering Construction Standards and Specifications (herein after Batavia Standard Specifications), unless noted otherwise, shall conform to the specifications of the "Standard Specifications for Road and Bridge Construction" and the "Standard Specifications for Water and Sewer Main Construction in Illinois", both of which shall be the latest edition. These specifications shall be considered a part of Batavia's Standard Specifications. In the event of a conflict between the State Specifications and the Batavia Standard Specifications, the most stringent provisions shall take precedence. These specifications shall be included in every project submitted to and approved by the City Engineer. Any variations or alternatives to the Batavia Standard Specifications must be submitted to and approved by the City Engineer.

In special conditions the City Engineer may grant a variance to the Batavia Design Manual. A contractor, developer or interested party may prepare a written proposal for review by the City Engineer. Any variances to the Batavia Design Manual will be made in writing and approved by the City Engineer. The City Engineer may further request the interested party to seek the City Council approval for such variance.

Any unauthorized material or labor practices will not be permitted. The site superintendent, developer or owner will be contacted by the City Engineer or his representative upon the witness of any such occurrence. The developer or owner shall take immediate action to correct any violations to the General Provisions. The City retains the right to refuse payment or bond reduction of any work in which unauthorized material or labor have been incorporated.

The developer shall ensure that the contractor is using safe labor practices. The developer or contractor shall be responsible for all utilities being located, including but not limited to J.U.L.I.E. and the City of Batavia.

The developer shall be responsible for applying for and obtaining all permits. Fees for all permits shall also be the responsibility of the developer. Check Appendix C for more information on other agencies permit applications and their contact information. Additional permits may be required depending on the scope of the project. The developer or contractor shall be responsible for determining which permits must be obtained. If at any time the contractor or developer is operating without all applicable permits, the City of Batavia reserves the right to issue a stop work notice to the contractor or developer until all necessary permits have been granted. Copies of approved permits and plans from all interested agencies shall be kept at the job site at all times. The approved plans with City of Batavia Approved For Construction stamp are the only plan set to be used on-site.

A pre-construction meeting and payment of Building Permit fees is required prior to the release of the Approved for Construction Engineering plans. After the pre-construction meeting the City of Batavia shall receive a minimum of 48 hours notice prior to the start of any construction or testing. All inspections require a 48 hour advanced notice to the City of Batavia. Any construction or testing performed with less than the required notice is subject to being unacceptable, with the City Engineer having the right to require retesting, rejection of improvements or refusal of payment/bond reduction. In addition the Kane DuPage Soil & Water Conservation District must also be notified by the developer that construction is about to commence.

SECTION 2

INSPECTION OF PUBLIC IMPROVEMENTS

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INSPECTION OF PUBLIC IMPROVEMENTS

The developer shall provide an onsite superintendent during construction of all public improvements. The City Inspector will report problems to the developer's superintendent and not the contractor. It shall be the developer's responsibility to correct problems.

It is imperative that the contractor or developer notify the City of Batavia and/or other applicable agency for inspection for all aspects of work. Without a representative (i.e.; engineering inspector), the work cannot be fully verified or approved. Failure to notify the City of Batavia or other agencies for all necessary inspection for all aspects may result in the rejection of the completed work. All requests for inspection must be called into the Engineering Department 48 hours in advance at 630-454-2750.

SECTION 3

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SECTION 3 COMMERCIAL SITE DESIGN

3.1 GENERAL DESIGN CRITERIA

This section covers the City of Batavia standards for site engineering for non-residential developments and apartments. Design elements that are incorporated into this section include parking areas, vehicular and pedestrian access, and drainage. Stormwater detention requirements are provided in Section 9 of this manual.

The City of Batavia follows the standards of the Institute of Transportation Engineers (ITE) for parking lot design unless otherwise adopted by the City Zoning Code. Reference is made to the Institute of Transportation Engineers (ITE) publication Guidelines for Parking Facility Location and Design, latest edition.

3.2 SITE ACCESS

3.2.1 Commercial Driveway Geometrics

Commercial driveways designed for one-way traffic flow shall not exceed 18 feet in width measured at the property line. Commercial driveways designed for two-way traffic flow shall have a minimum width of 24 feet and shall not exceed 40 feet in width measured at the property line. This width dimension is measured between the face of curbs. Administrative design review approval is required for driveways wider than 40 feet.

The minimum turning radius for commercial driveways, measured along the curb return, shall be 15 feet. A right- in/right-out driveway access should have a 50-foot radius, measured along the curb return.

The angle between the curb line of the street and the centerline of a full access driveway shall not be less than 90 degrees unless approved by the City Engineer.

3.2.2 Commercial Driveway Safety Standards

No commercial driveways shall be permitted into any parking lot or other facility which is designed in such a way as to make it necessary for exiting vehicles to back onto the street.

No driveway will be permitted into any facility which would require and/or allow a vehicle to drive or maneuver on the sidewalk area in any manner other than to cross it.

No driveway will be permitted for the purpose of allowing vehicles to park on the

public right-of-way.

In no case shall a driveway be constructed in such a way as to present a hazard to pedestrians or traffic on the public right-of-way.

In no case shall an object located within the right-of-way be permitted to obscure the vision of drivers of motor vehicles. Items in the right-of-way, within the required 30-foot sight triangle, shall be limited in height to no greater than 36 inches, including shrubs, ornamental grasses and tree branches.

3.2.3 Commercial Driveways on Arterial Streets

Any driveway onto an arterial street represents a potential impediment to traffic and/or a safety hazard. For this reason, access onto arterial streets shall be limited both in number of driveways and location, and may be granted only after review of the overall land development plan and traffic study for the project. Design criteria as established in this section represent minimum standards. Where hardships are demonstrated through the variance process, exceptions to the minimum standard will be considered on a project-by-project basis. The use of cross-access easements or frontage roads are preferable alternatives to additional driveways on arterial streets.

3.2.3.1 Minimum Spacing

Driveways shall be located as far apart as practical. A minimum of 400 feet between centerlines of driveways on arterial streets (major and minor) should be sought. Any deviation from this standard can be requested for consideration through the variance process.

3.2.3.2 Minimum Distance from Intersections

Driveway placement shall always be designed to maximize the distance from the nearest intersections. Along arterial streets, a full-access driveway shall be a minimum of 250 feet from an intersecting public street. This distance is measured from the near edge of the intersection to the centerline of the driveway. Right-in/right-out driveways may be located closer, provided that they do not cause operational problems at the intersection. Any deviation from this standard can be requested for consideration through the variance process.

3.2.4 Commercial Driveways on Collector and Local Streets

3.2.4.1 Location

Driveways on collector and local streets shall be located in accordance with the following:

a) The distance from the end of the driveway curb cut to the

prolongation of the nearest intersecting street property line shall not be less than 20 feet on the near side of the intersection and not less than 10 feet on the far side.

b) The distance from the end of the driveway curb cut to the end of the intersecting street curb return shall not be less than 5 feet.

c) The distance from the end of the driveway curb cut to the nearest crosswalk shall not be less than 5 feet.

d) The distance between driveways, measured at the curb line of the street, shall not be less than 20 feet.

e) Where bus stops exist at locations where driveways are desired, the minimum allowable distance between driveways, measured at curb line of the street, shall be 40 feet.

No driveway shall be constructed which enters a public street within the limits of an intersection, with the limits of the intersection being defined as the area included within the prolongation of the lateral boundary lines of two or more streets or highways which join one another at an angle whether or not one such street or highway crosses the other.

At intersections where a separate right-turn lane exists, no driveway shall be constructed where the edge of the turning lane taper pavement is greater than 5 feet from the edge of the through pavement.

3.3 PARKING LOTS

3.3.1 Required Number of Parking Spaces

Refer to Section 4-2 of the Zoning Code, Title 10 of the City Code.

3.3.2 Stall and Aisle Dimensions

Parking stall dimensions shall be 9 feet wide by 19.0 feet in length, or as otherwise demonstrated to be in accordance with Tables in Section 4.205 of the City of Batavia Zoning Code.

Minimum drive aisle widths are established in Tables in Section 4.205 of the Zoning Code.

3.3.3 Parking Lot Island Requirements

Islands are required at the ends of all parking rows and at intermediate locations to provide shade trees and landscaping in accordance with Section 4.211.B

of the Zoning Code.

3.3.4 Parking Lot Pavement

All parking lots constructed in the City of Batavia must have a paved surface and a minimum pavement structural number of 3.0. The structural coefficients for pavement design are as follows:

STRUCTURAL MATERIAL	COEFFICIENT (per inch)
Hot-Mix Asphalt Surface	0.40
Hot-Mix Asphalt Binder	0.33
Hot-Mix Asphalt Base Course	0.23
Aggregate Base Course (CA-6)	0.11
Aggregate Sub-base (CA-1)	0.11

3.3.5 Boundary Controls

All parking lots shall have B6.12 concrete curb and gutter around the perimeter.

3.3.6 Drainage

Storm sewers which serve parking lots shall be designed to accommodate the 10-year storm event without surcharging out of the rim. The maximum depth of ponding in parking lots is 1 foot. This applies in the event that all storm sewers are blocked and surface overflows must be used to drain the lot.

3.4 LIGHTING

The City has developed exterior lighting standards to control glare and obtrusive light while maintaining a safe and secure environment for pedestrians and property. These standards are incorporated into Design Manual Section 8.For private parking lot reference Zoning Code Section 4.211.B.

3.5 PEDESTRIAN ACCESS

All commercial sites shall be designed so that sidewalks or other delineated pedestrian routes are available to provide pedestrian access continuity between the public sidewalk adjacent to the site and the main entrance to the building.

3.6 LANDSCAPING

Parkway landscaping, perimeter landscaping, parking lot landscaping and refuse area screening shall be required as specified in Chapter 4.211.B and Chapter 4.3 of the City Zoning Code, City Code Title 7 Chapter 2A of or as otherwise specified and approved in a required landscape plan.

3.7 BARRIER-FREE ACCESSIBILITY

All commercial sites shall comply with the accessibility requirements of the Illinois Accessibility Code, as amended; the provisions of Title 9 (Building Regulations) of the City of Batavia Municipal Code, as amended.

To ensure compliance with the requirements referenced above, the following guidelines should be considered in the site design for new construction of commercial projects (and may not apply for additions, alterations, or historic preservation):

An accessible route should be provided from accessible parking and passenger loading zones to an accessible entrance. Accessible routes shall be constructed with a maximum slope (< 2%) and be free from obstacles.

The cross slope of sidewalks should be kept at a minimum (¼":1 foot) as necessary for drainage.

Sidewalks should be flush with grass areas on either side.

Sidewalks should be 5 feet wide, minimum, to allow two wheelchairs to pass. In high pedestrian traffic areas, such as the Central Business District, Downtown Mixed Use District, Downtown Historic District, sidewalks should be 10 feet wide.

Where passenger loading zones are provided, an adjacent access aisle should be provided where the sidewalks are flush with the pavement.

Entrance areas near the door should have a nearly flat area to allow for proper drainage to avoid ponding and icing.

All power door pedestals with push plates should be clear of the door swing, typically 5 feet from the door.

Accessible entrances should be considered for secondary entrance points in addition to the main entrance.

Accessible parking stalls should be closest to both the main and auxiliary entrances, to provide maximum access for persons with disabilities.

Accessible parking stalls should be constructed with minimal slopes (¼":1 foot).

Wheel stops shall not be used in any parking stall unless approved by the City Engineer.

The sidewalk adjacent to accessible parking stalls should be flush with the pavement.

Accessible parking spaces shall be appropriately designated through signage and striping. Signs shall be vertically mounted on a post or wall at front center of the parking space, no more than 5 feet horizontally from the front of the parking space and set a minimum of 4 feet from finished grade to the bottom of the sign.

SECTION 4

STORM SEWER DESIGN

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SECTION 4
STORM SEWER DESIGN

4.1 INTRODUCTION

General: A properly designed storm water management system shall be installed, consisting of pipes, manholes, inlets, and other necessary drainage structures, appurtenances, ditches, swales, detention/retention facilities, etc., that will adequately drain and manage storm water from the subdivision and/or development. All storm water management system components shall meet the requirements of the Kane County storm water management ordinance as adopted per ordinance 01-36, June 18, 2001, and any revisions made thereto.

4.2 ADOPTION OF BEST MANAGEMENT PRACTICES

The City of Batavia has adopted the Best Management Practices (BMP) approach for the design of all stormwater and floodplain management system components. The basis of this approach is the City's support of Kane County Stormwater Ordinance and its Technical Manual.

4.3 HYDROLOGIC ANALYSIS

4.3.1 General

The City of Batavia uses the term "Design Storm" to define precipitation events used in the design and analysis of all stormwater management facilities in the City. The Design Storm is the frequency with which a given rainfall event is equaled or exceeded, on average, once in a period of years. The probability of occurrence is equal to the reciprocal of the design storm frequency. For example, a 100-year design storm has a 1.0 percent probability of occurrence in any one year. The storm sewer system shall be designed to intercept and convey the storm water runoff resulting from a design rainfall event that has a statistical probability of occurring once every ten (10) years.

4.3.2 Rainfall Data

The Illinois State Water Survey (ISWS) publication entitled "Frequency Distributions and Hydroclimatic Characteristics of Heavy Rainstorms in Illinois," commonly called "Bulletin 70" shall be used as the rainfall data reference source for the design of stormwater management facilities or any official update issued thereto.

4.3.3 Design Storm

The standard design storm for all Minor Drainage System components will be the appropriate “10- year recurrence interval” rainfall, as defined in ISWS Bulletin 70. The standard design storm for all Major Drainage System components will be the appropriate “100-year recurrence interval” rainfall, as defined in ISWS Bulletin 70.

4.3.4 Topographic Data

Topographic data shall be referenced to at least one established City of Batavia benchmark. Contour intervals shall be one foot and shall directly correlate to the City datum.

4.3.5 Rainfall-Runoff Modeling Methodology

The following summarizes the application of common rainfall-runoff models:

Model	Product	Usage	Assumptions	Limitations
Rational Method	Peak Discharge	For estimating peak discharge rate.	Watershed size 1-20 acres	
TR-20	Hydrograph	For developing: Runoff hydrographs, Channel and reservoir routed hydrographs, Separated or combined hydrographs.		
TR-55 Tabular Method	Hydrograph	For measuring the effect of land use and/or structure changes in sub-catchments on the composite hydrograph for the watershed	Sub-catchment size less than 20 square miles. Precipitation runoff volume not less than 1.5 inches. Little to no variation in soil and land use characteristics within a sub-catchment.	The TR-55 Tabular Method was derived from TR-20 using curve numbers of 75 and rainfall amounts sufficient to produce 3 inches of runoff volume. Characteristics should not vary significantly from those used in the method derivation.
HEC-1 HEC-HMS	Hydrograph	For computation of flood hydrographs due to a single recorded or synthetic rainstorms, or snowfall-snowmelt conditions. Model can simulate dam-break conditions and compute expected annual flood damages.	Hydrologic processes can be simulated assuming that individual parameters can be used in representing average sub-basin temporal and special characteristics.	Only one storm can be modeled for each program run because the model does not have a provision for soil moisture recovery during non-precipitation periods. Results are in terms of discharge, not stage. If discharges are stage-dependent, a user specified rating curve must be provided. Hydrologic routings used for open channel flow. If gradually varied, unsteady flow occurs, such as in very flat channels, then hydrologic routings are not accurate. Hydrologic routings used for storage reservoirs. If reservoir outflow is dependent on downstream controls, then hydrologic routings are not accurate.

4.4 HYDRAULIC ANALYSIS

4.4.1 General

The following table summarizes the application of common hydraulic models:

Model	Usage	Assumptions	Limitations
HEC-2 (BFE Only)	For computing water surface profiles for subcritical or supercritical open channel flow.	One-dimensional, gradually-varied, steady flow conditions. Channel slopes are less than 10%.	Program is not capable of modeling movable flow boundaries such as those that occur due to sediment transport.
HEC-RAS (BFE Only)	For computing subcritical, supercritical, and mixed flow regime open channel flow water surface profiles. Model has improved routines for evaluating the effects of obstructions such as bridges, culverts weirs, and structures in the floodplain.	Gradually-varied, steady flow conditions.	
WSP2 (BFE Only)	For computing open channel water surface profiles for subcritical open channel flow.	Model assumes only gradually-varied flow in a given reach. Since only friction losses are considered, velocity changes must be relatively small.	Cannot model supercritical flow regimes. For accurate modeling of bridges, the channel needs to be straight, and have a uniform cross-section and slope. Culverts can only be modeled as standard circular rectangular, and arch shapes.

4.4.2 Gravity Flow

All stormwater management facilities in the City of Batavia shall be designed for gravity- flow conditions without surcharging at any point within the system for the appropriate design storm. Stormwater pumping facilities will only be considered if it can be demonstrated that there is no means of providing for gravity- flow drainage. The design of each stormwater management component must be based on sub-critical flow conditions. Super-critic al or critical flow conditions have the potential for high velocities that are dangerous and damaging. Furthermore, these conditions are unstable and can result in widely fluctuating and unpredictable flow depths.

4.4.3 Pressure Flow

Pressure flow conditions occur in a closed-conduit system when the hydraulic grade line (HGL) is above the crown of the pipe. When it is not possible to restrict the HGL to the crown of the pipe, due to topographic constraints, the HGL may be contained within the rim, as approved by the City Engineer. Storm sewers shall be designed for the appropriate design storm based on flowing- full conditions without any pressure head. While pressure flow conditions may occur for runoff events in excess of the design storm, such conditions should be avoided by allowing excess flows to be channeled to overflow routes.

4.5 MINOR DRAINAGE SYSTEM

4.5.1. General

The minor drainage system consists of curb and gutter sections, storm sewers (with appurtenant inlets, catch basins, and manholes), swales (side yard, back yard), and small natural or man- made open channels. The function of the minor drainage system is to quickly collect and convey the runoff from the smaller, more frequent storms. Except as modified and/or appended herein, all minor drainage system components covered in this section shall be designed in accordance with the most current edition of the Illinois Department of Transportation (IDOT) Drainage Manual.

Specifications: All storm sewer system construction work shall be done in accordance with applicable sections of the "Standard Specifications For Sewer And Water Main Construction In Illinois", latest edition, with any special provisions specified, and in accordance with current city standards and specifications.

4.5.2 Swales

Side yard and rear yard swales shall be analyzed as open channels with a triangular cross-section and a mowed turf grass surface. The minimum longitudinal slope should be 2 percent. Where hardship is demonstrated, 1.5 percent may be permitted. The maximum slope allowed is 25 percent. The swale shall have sufficient hydraulic capacity to convey the design storm peak flow rate with the appropriate freeboard clearances. For residential developments, there shall be not less than 2 feet of freeboard between the design high water level in the swale and the lowest adjacent top of foundation elevation. For commercial developments, there shall be no less than 2 feet of freeboard between the design high water level in the swale and the lowest adjacent top of foundation elevation.

Yard Drainage: Positive rear and side yard drainage shall be required in all developments. Side slopes on swales, ditches, berms, and storm water detention/retention facilities shall not exceed 4:1.

Minimum as built swale grades shall be two percent (2%). Swale drainage shall be picked up with inlets prior to reaching street right of way and conveyed by pipe into the storm sewer system. Yard drainage plans shall be part of the site grading plans. Yards shall not have more than 18" of ponding.

4.5.3 Pavement Drainage

Maximum flow depths on any roadway shall not exceed 6 inches during the base flood condition. Inlets are to be located such that these encroachments are not exceeded and that flow will not cross-intersecting streets. These standards will apply to all local and collector streets. The following table provides equations that should be used in computing inlet spacing. The equations are based on the standard City of Batavia gutter width of 12 inches, and a recommended pavement roughness coefficient of 0.015. The maximum flow depth at the face of curb is about 1.7 inches which occurs for the steepest cross-slope of 2.5%. These equations; therefore, are applicable for both roll and barrier curb situations

Flow Component	Pavement Cross-slope		
	3/16" per foot (1.56%)	**1/4" per foot (2.08%)**	**5/16" per foot (2.5%)**
Q_{Total}	$(2.147)\ S^{1/2}$	$(3.068)\ S^{1/2}$	$(3.902)\ S^{1/2}$
Q_{Gutter}	$(1.464)\ S^{1/2}$	$(1.966)\ S^{1/2}$	$(2.412)\ S^{1/2}$
$Q_{Grate\ Capacity}$	(0.014) K	(0.019) K	(0.024) K

S = longitudinal pavement slope in feet per foot.
K = conveyance factor that is unique to the geometry of each grate. Values for the conveyance factors are provided in "Inlet Grate Capacities" published by the Neenah Foundry Company.

For the ponded water condition, stormwater flow bypassed from uphill inlets accumulates at a low point. At lower depths, the flow into most inlet grates takes on the characteristics of flow though a weir. As the ponding depth increases, the inlet grate opening acts more like an orifice. The equations and assumptions applicable for both types of ponded condition flow are found in the above referenced Neenah Foundry publication.

4.5.4 Storm sewers

Storm sewers shall be designed in accordance with the procedures outlined in Chapter 8 of the IDOT Drainage Manual. These procedures use the Rational Method to determine peak stormwater flow rates for both inlet spacing and storm sewer sizing.

All storm sewers that will be within the City of Batavia right-of-way shall be designed with the appropriate ASTM Class of reinforced concrete pipe (RCP). Every effort shall be made to minimize the placement of storm sewers in side yard easements. All storm sewer pipes within side yard easements shall have gasketed joints. For RCP, these joints shall be in accordance with ASTM specification C-361.

Storm sewers sizes are to be determined based on flowing- full (non-surcharging) conditions for the appropriate design storm. The minimum and maximum allowable subcritical design flow velocities are 2.5 fps and 10 fps, respectively. A conventional development has one or more storm sewer networks that discharge to the detention facility for the site. To avoid surcharging conditions, storm sewer outfalls to detention facilities shall be designed such that the invert of the outfall pipe is at or higher than the normal high water elevation of the facility. An exception to this policy will be made if the hydraulic grade line calculations can demonstrate that the design water surface is kept below the street edge of pavement elevation throughout the site.

All storm sewer calculation tables shall be included for review. These calculations must include all necessary rainfall, soil and watershed data. The calculation table must include at a minimum, the pipe length, pipe slope, velocity, design capacity, pipe capacity, time of concentration, and HGL. In addition a tributary area map for the overall site with subcatchment areas must be delineated including Time of Concentration and Area for each subbasin. The City uses 100 feet as the maximum distance for the sheet flow flow length when calculating the time of concentration.

The minimum pipe size in any storm sewer system shall be twelve inches (12") in diameter. All storm sewer pipe shall be reinforced concrete pipe (RCP), with a

minimum class IV strength rating as defined using the most current version of ASTM specification C76 unless otherwise approved by the city engineer. The minimum depth of cover over the top of the pipe shall be thirty inches (30") unless site conditions prevent it and the city engineer or his/her authorized representative approves a lesser depth.

For pipe 36" or less in diameter, the maximum spacing between manholes shall be no more than 300'. A maximum spacing of 500' may be used for pipe diameters greater than 36".

A trench of three times the width and four times the depth of the pipe diameter must be excavated. Maximum trench width and depth are as follows: (Max Trench Width=Outside Pipe Diameter +2') (Maximum Trench Depth= Outside Pipe Diameter +2.5'). A stone bed 6" in depth shall be placed prior to the placement of any pipe. The pipe shall then be centered in the trench, which shall be 3/4 filled with washed stone. The remainder of the trench shall be filled with topsoil in non-pavement areas or other approved backfill and then graded to match the adjacent existing ground. Stone must extend past the top of pipe regardless of depth.

4.5.5 Sump Pumps

A sump pump junction box, a minimum of twenty four inches (24") in diameter by thirty inches (30") deep, shall be provided for each lot or pair of lots and generally located in the parkway centered on the side lot line. The sump pump junction box shall have an east Jordan number 1020 type M1 frame and lid, or approved equal, at finished grade.

House or building sump pump services shall be a minimum four inch (4") diameter pipe, PVC pipe with a maximum SDR of 26 ASTM D-3034, and shall be connected to the junction box. All sump pumps shall have an air gap (no solid connection) at the house, an air gap should be located where the pipe exits the house and continues to the exterior sump pump discharge line to allow spill over in the event the pipe freezes or breaks.

Where properly located, curb and yard inlets may be used in lieu of a sump pump junction box.

At no time will a sump pump line be permitted to discharge into sanitary sewers or onto the street or sidewalk. In areas where a storm sewer system is not present, sumps will be allowed to discharge into swales at the rear of the lot.

4.5.6 Subdrainage (Underdrain)

In areas with poorly drained soils and/or a high water table, perforated pipe subdrains, six inch (6") minimum diameter, will be required as directed by the city engineer or his/her authorized representative. Subdrains shall be designed in accordance with the most current IDOT procedures and requirements. The subdrain trench shall be lined with the appropriate geotextile fabric. The pipe shall have two (2) rows of perforations and shall be laid with the perforations down. The trench shall be backfilled with crushed rock, IDOT class CA-7 or approved equal to the top of subgrade elevation with geotextile folded over the top of the backfill. The minimum depth of cover over the top of the subdrain pipe shall be eighteen inches (18") unless site conditions prevent it and the city engineer or his/her authorized representative approves a lesser depth. The minimum trench width shall be eighteen inches (18"). Subdrains will be provided at all roadway sag locations.

4.5.7 Culverts

All culverts that will be within the City of Batavia right-of-way shall only be designed with approval of the City Engineer. The preferred material for Culverts that are being replaced is the appropriate ASTM Class of RCP, but can be replaced in-kind materials at the discretion of the City Engineer or their designee. All new culverts shall be designed with the appropriate ASTM Class of RCP and will have the appropriately sized precast concrete flared-end section on each end. All culverts shall be a minimum of 12 inches in diameter and shall have the appropriate grating covering the flared-end section opening. Culverts shall have a positive pitch of a minimum of 0.50%.

4.5.8 Structures

Storm sewer structures will be permitted in the back yards of residential areas only to the minimum extent needed to effectively drain these areas as determined by the city engineer or his/her authorized representative. Storm sewer mains will not be allowed in rear yard easements. Storm sewer structures in back yards must be connected directly to storm sewer mains in the city right of way using lateral sewers in side yard easements. All storm sewer pipes within side yard easements shall have gasketed joints in accordance with ASTM specification C-361-03a.

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Storm Sewer Structures: Storm sewer structures consist of inlets, storm manholes, catch basins, and sump pump junction boxes. Inlets shall be a minimum twenty four inch (24") diameter precast concrete type A inlets as shown on the current City of Batavia Engineering Department standard construction detail drawings. Storm manholes and catch basins shall be sized, located and constructed in accordance with the referenced city construction details. Inlet and manhole structures shall have a poured concrete invert or slope, finished in

accordance with the city construction details, to prevent standing water in these structures. The most downstream structure in every development shall be a catch basin fitted with a grit/oil separation device as shown on the city construction details. Additional catch basins with grit/oil separators within the development may be required as directed by the city engineer or his/her authorized representative. Two (2) inlets or catch basins shall be provided on each side of the road at all sag locations.

The maximum spacing of inlets shall be four hundred feet (400') unless otherwise directed by the city engineer or his/her authorized representative.

Frames and grates for storm sewer structures shall be as follows or approved equal:

Inlets or catch basins in the curb line	East Jordan number 7220, type 1 curb back, type M1 grate
Structures in ditches or detention/retention facilities	East Jordan number 6527 or 6517
Yard inlets	East Jordan number 1020, type M1 grate
Manholes	East Jordan number 1020, type M1 or type A
Sump pump junction box	East Jordan number 1020, type M1 or type A grate as appropriate

Restrictors: Restrictors will not be restricted to a pipe restrictor that is grouted-in-place or the weir within the structure. Restrictors shall be sized for the required release rate of 0.10 cfs per tributary acre, the pre-development release rate, or as codified in section 11-7-2 for areas within the McKee Tributary and Batavia Highlands (whichever is the lesser rate) at the high water elevation of the required storage. The minimum size for a single outlet storm detention release pipe shall be twelve inches (12”) RCP with a minimum restrictor size of four inches (4”). Restrictors less than four inches (4”) become maintenance issue and therefore are restricted.

4.5.9 Pipe Material

Storm sewer	Reinforced concrete pipe ASTM C76 class IV minimum
Sump pump lines	PVC pipe with a maximum SDR of 26 ASTM D-3034
Subdrainage	PVC perforated pipe with a minimum SDR of 35, 2 rows of perforations; pipe shall meet ASTM D-3034 requirements
Culverts	Reinforced concrete pipe ASTM C76 class IV minimum with precast concrete flared end sections on each end of the culvert. The minimum culvert size is 12 inch diameter. All culverts shall have the appropriate grating conforming to current city standards and specifications. The minimum depth of cover over the top of the culvert pipe shall be 12 inches.
Alternate materials may be considered.	

4.6 MAJOR DRAINAGE SYSTEM

4.6.1 General

The major drainage system consists of overflow routes (streets and larger natural or man- made open channels), man-made stormwater storage facilities (basins and ponds), large natural or man-made channels, and floodplains. The major drainage system serves both conveyance and storage functions. This may occur as a result of runoff from the larger, less frequent storms and/or from an obstruction in the minor system.

4.6.2 Overflow Routes

4.6.2.1 General

Overflow routes should exit a developed site in a common area that is preferably public property such as a park or public right-of-way. As a secondary choice, overflow routes can be designated along a common rear yard property line that is furthest away from homes and buildings. All overflow routes shall be designated on the plans with a large arrow and elevation.

4.6.2.2 Swales

Overflow route swales shall be analyzed as open channels with a triangular cross-section and a mowed turf grass surface. An overflow route swale shall

have side-slopes that are a minimum of 2 percent and maximum of 25 percent. The longitudinal slope should be 2 percent. Where hardship is demonstrated, 1.5 percent may be permitted. The maximum slope allowed is 25 percent. The overflow route swale will have sufficient hydraulic capacity to convey the design storm peak flow rate with the appropriate freeboard clearances.

Swale cross sections shall be included on the final engineering plans as well as in the stormwater report to ensure they are properly constructed in the field. The cross sections shall include the bottom width of the channel, the side slope, the width of the channel at the high water level and the volume it can convey.

For both residential and commercial/industrial developments, there shall be no less than 2 feet of freeboard between the design high water level in the swale and the lowest adjacent top of foundation elevation.

4.6.3 Differentiation between Public and Private Storm Sewers

Public storm system and private storm system shall be indicated in the plans submitted for approval.

SECTION 5

SANITARY SEWER DESIGN

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SECTION 5
SANITARY SEWER DESIGN

5.1 GENERAL DESIGN CRITERIA

5.1.1 Requirement for Sanitary Sewer

All sanitary sewage of domestic and other water borne wastes shall be collected and conveyed in a sanitary sewer pipe system to a point of discharge into an existing sanitary sewer system, City of Batavia interceptor, or sewage treatment plant. No sanitary sewage shall be allowed to enter any storm sewer system or discharge onto the ground or into receiving streams without first being treated in accordance with city, county, state and federal regulations.

No unauthorized person shall uncover, make any connection with or opening into, use, alter or disturb any public sewer, including tributary sewers, without first obtaining a permit or written authorization from the City.

Each proposed sewer which is designed and is to be connected so as to be an integral part of the City of Batavia sanitary sewer system shall not be constructed without a permit issued by the City and the Illinois Environmental Protection Agency (IEPA) where required. Where possible, service connections should be made perpendicular to the main line. All connections shall be made with a manufactured tee or wye. Parallel sewers will not be permitted. All cleanout or inspection manholes are to be placed out of the right of way and are to be maintained by the property owner.

5.1.2 Fees

Refer to the City of Batavia Code Title 8, Chapter 3, Section 13 for Service Charges to determine the appropriate fees.

5.1.3 Design Approval

The Public Works Department shall approve all designs and shall alter the following design requirements as necessary to meet the City's Master Plan.

Proposal of new sanitary sewer lift stations requires approval from the Director of Public Works, prior to the design and review process.

The City of Batavia's standard details should be used in all construction plans. Any modifications to these standard details require approval from the City Engineer.

5.1.4 IEPA Permit Required

All public sanitary sewer mains require an IEPA Construction permit number and an Illinois Pollution Control Board permit number, prior to construction. Some private extensions may require a permit, dependent upon the design population equivalent.

A building sewer constructed to serve a single family home or a building producing less than 1500 g.p.d. domestic sewer flow may be exempt from being required to apply to the Illinois Environmental Protection Agency for a permit from the Bureau of Water, Division of Water Pollution Control, subject to specific standards hereinafter provided.

A building producing any amount of non-domestic flows, even though said building generates less than 1500 g.p.d. (15 P.E.) of domestic flows, shall be required to obtain a permit from the Illinois Environmental Protection Agency, Bureau of Water, Division of Water Pollution Control.

All sanitary sewerage systems shall meet the following minimum standards:

A. For residential units average daily sewage flow (including allowances for infiltration) of one hundred (100) gallons per person per day, and a maximum peak sewage flow of four hundred (400) gallons per person per day or as shown in Appendix –D Figure 1 in the "Illinois Recommended Standards For Sewage Works" printed by the EPA.

B. Commercial and light industrial development shall be designed for ten thousand (10,000) gallons per day per acre of property served.

C. Medium and heavy industrial development shall be based on the type and volume of waste contemplated.

D. Minimum population density for new areas not presently served of 3.5 people per unit for single-family and 2.5 people per unit for multi-family.

E. Maximum allowable infiltration of not more than two hundred (200) gallons per inch diameter per mile per day.

5.1.5 Construction Rules and Regulations

The rules, regulations, and ordinances and policies listed herein, and issued by the authorities indicated, are incorporated herein by reference.

A. The City of Batavia rules, regulations, policies, directives, specifications, general notes, construction details, permit forms and instructions that may be adopted or issued from time to time by the City Council.

B. The Federal Water Pollution Control Act Amendment of 1972 as amended (33 U.S.C. §1251 et seq.)

C. The Illinois Pollution Control Board including all orders, rules and regulations thereof.

D. Environmental Protection Act, including all orders, technical releases, rules and regulations issued from time to time.

E. "Standard Specifications for Water and Sewer Main Construction in Illinois", latest edition.

F. "Recommended Standards for Sewage Works", Great Lakes-Upper Mississippi River Board of State Sanitary Engineers (Ten State Standards).

G. "77 Illinois Administrative Code, part 890, Illinois Plumbing Code", latest edition.

H. The Occupational Safety and Health Administration (O.S.H.A.)– Regulations (Standards-29 CFR) – Standard Number 1926.652.

5.1.6 Differentiation between Public and Private Sanitary Sewers

Those portions of the main line sanitary sewer system that are located within the public right-of-way are the responsibility of the City. The City shall also maintain public mains, serving more than one customer. The maintenance and repair costs for the sanitary sewer system located on private property, beyond the limits of the right-of-way, are the responsibility of the property owner or property owner's association depending on the associate's covenants and guidelines. The maintenance of service laterals in the right-of-way are the responsibility of the property owner, except in such cases where the City deems the maintenance of such service lateral within the ROW requires structural, or other repair, and at such time the City shall be responsible for the repair of such line. In such cases where the City – is required to perform maintenance or repairs on the private sanitary sewer system where conditions deem that health or environmental mitigation is necessary and the owner declines to perform the necessary repair, the City reserves the right to charge the property owner for necessary work.

All engineering plans shall clearly differentiate between public and private sanitary sewers.

5.1.7 Easements

All public sanitary sewers that are not located within a publicly dedicated right-of-way shall be placed in a public utility and drainage easement, minimum 10 feet wide or as directed by the City Engineer. The easement shall be granted to the City either through a recorded plat of subdivision or a recorded plat of

easement. The City shall be granted access to these easements if not directly adjacent to public right-of-way.

At the discretion of the City Engineer, the City may require additional easements for future maintenance or repair of sanitary sewers, even those sewers that may be located within the public right-of-way. For example, the City may have an extra deep sanitary sewer located within the public right-of-way. However, the City may require a public utility and drainage easement parallel to the edge of the right-of-way to accommodate future repair of the sanitary sewer if it ever needs to be excavated and repaired.

5.2 SANITARY SEWERS

5.2.1 Sanitary Sewer Pipe Materials

All sanitary sewer pipe materials and appurtenances shall be in conformance with applicable ASTM, ANSI, AWWA, Section 5 of the City of Batavia Design Manual, or other standards as set forth by the City.

Sewer pipe and fittings shall conform to the following specifications except as approved by the city engineer:

1. Between depths of six feet (6') and fourteen feet (14'), polyvinyl chloride (PVC) pipe ASTM D-3034 SDR 26 shall be required for pipe diameters up to fifteen inch (15”) For pipe sizes over fifteen inch (15”), PVC pipe ASTM F679 PS115 shall be required.

2. For depths shallower than six feet (6') or deeper than fourteen feet (14') PVC pipe shall be required meeting the latest requirements of AWWA C900/C905, latest edition. AWWA C900/905 PVC pipe shall be minimum DR18 with push on joints or restrained joints where applicable. For both shallow depth burial and deep burial, design calculations shall be provided which shows the required wall thickness by considering the soil class, trench load, and degree of backfill compaction.

3. For pipe twenty four inches (24") and larger, PVC pipe shall be required meeting the latest requirements of either ASTM F679 Class PS115 (minimum).

4. Sanitary services shall be a minimum diameter of six inches (6”).

5.2.2 Force Main

Sanitary sewer force main shall conform to the following:

1. 4” minimum diameter;

2. Ductile Iron Pipe Class 52 (minimum) meeting the latest requirements of AWWA C-151. All pipe shall be furnished with asphaltic exterior coating and ceramic epoxy interior lining (Protecto 401 or approved equal) and installed with polyethylene encasement;

3. Ductile iron pipe shall be with Push-On joints meeting the requirements of AWWA C-111, latest edition.

4. Force main fittings shall be constructed of ductile iron with mechanical joints conforming to the latest edition of AWWA Standard C110. Mega-lug restrained joints and thrust blocks shall be required on all fittings;

5. Clean-outs at all vertical and/or horizontal bends, or at 700' minimum intervals in a precast concrete vault. Cleanouts will be installed via the use of a "T" connection with a cap at the top of the cleanout. Longer force main designs shall consider pig and retrieval stations to facilitate cleaning of the pipeline;

6. Minimum flow velocity of two (2) fps. Design calculations shall be submitted for review and approval by the City of Batavia Public Works Division;

7. Air release valves shall be located at the high point of the force main. Air release valves shall be installed in precast concrete vaults with

5.2.3 Location in the Public Right-Of-Way

Sanitary sewers shall be located within the public right-of-way as directed by the City Engineer. In general, sanitary sewers shall be located 7.5 feet inside the right-of-way on the south and east sides of the right-of-way.

5.2.4 Curvilinear Alignment of Sanitary Sewers

Curvature of sanitary sewers is not allowed.

5.2.5 Sewer and Water Main Separation

Sanitary sewers and services that are laid in the vicinity of pipelines designated to carry potable water shall meet the conditions set forth in Section 6 of this manual.

5.2.6 Depth of Pipe Cover

All pipe shall be laid to a minimum depth of 7 feet measured from the proposed ground surface to the top of the pipe, unless specifically allowed otherwise in special circumstances by the Director of Public Works or the City Engineer. In no case shall sanitary sewer and services be installed with ground cover less than 42 inches. For sewer depths shallower than six feet (6') or deeper than fourteen feet (14') PVC pipe shall be required meeting the

latest requirements of AWWA C900/C905, refer to Section 5.2.1. All sanitary sewers and services with less than 4 feet of cover shall be insulated with a 2-inch exterior grade rigid insulation board. The insulation shall have a minimum R-value of R-9, and comply with ASTM C 578-15 Type VI (minimum).

5.2.7 Overhead Sewers

Homes may be required to be constructed with Overhead Sewers where required by the City Engineer.

5.2.8 Sanitary Sewer Sizing

Sewer size shall be designed on the basis of a design average flow of not less that 100 gallons per capita per day and provide a minimum of 2.0 feet per second velocity when flowing full. The Director of Public Works may increase sewer size in accordance with Section 8-3-10-1 noted below. In no case shall a public sewer be sized less than 8 inches in diameter.

5.2.9 Oversizing and Extra Depth Requirements

The Director of Public Works or the City Engineer may request that sanitary sewers either be oversized or installed at an additional depth in order to provide service to additional benefiting properties.

5.2.10 Sanitary Sewer Slopes

All sanitary sewer slopes shall meet the requirements of the following sections:

5.2.11 Minimum Slopes

Sanitary sewers shall be designed such that the minimum slopes are not less than the following:

Pipe Diameter	IEPA Minimum Slope	COB Desired Slope
8 inch	0.40%	0.45%
10 inch	0.28%	0.30%
12 inch	0.23%	0.25%

5.2.12 Maximum Slopes

Sanitary sewers shall be designed such that the slopes do not exceed a maximum of 12%. If the sanitary sewer system cannot be designed without exceeding a slope of 12%, then drop manhole assemblies shall be utilized.

5.2.13 Last Run of Manhole Sets

On last runs of all manhole sets, a minimum 1% slope needs to be provided in order to provide adequate flushing due to low flows.

5.2.14 Limits of Installation

At a minimum, sewers shall extend across the frontage of the property, at the

developer's cost, such that a connection can be made with minimal disturbance in the future. In some cases, the City may require that the sanitary sewer be installed from one corner to the diagonally opposite corner, at the developer's cost.

5.2.15 Trenches

Pipe installation and backfill shall in accordance with the "Standard Specifications for Water and Sewer Main Construction in Illlinois" with the following exceptions. No backfill shall be placed until the work has been inspected by the City. All utility and service trenches within (3) feet of paved surfaces, or at a distance specified by the Engineer, shall be backfilled with Select Granular Backfill materials. For further details, refer to the City of Batavia typical utility trench details. Flowable fill in accordance with IDOT special provision for controlled low strength materials (CLSM) Mixture #1 may be required under certain circumstances but only as directed by the Department of Public Works.

5.2.16 Testing

All sanitary sewers shall be tested in accordance with the applicable sections of the "Standard Specifications For Water And Sewer Main Construction In Illinois", latest edition. In addition, all sewer manholes shall be vacuum tested.

All completed sewers shall be inspected using color closed circuit television camera (CCTV) and document the inspection on a digital recorder. The contractor or developer shall pay to have the lines televised. Televising shall be done with approximately one-half inch (1/2") continual flow in the sewer. All inspection video shall be captured in either MPEG or Windows Media Video (.WMV) file format and saved to portable hard drives for submittal and repairs completed, if necessary, prior to acceptance of the sewers by the city. The final inspection videos provided shall become the property of the City. All work will conform to current NASSCO Pipeline Assessment Certification Program (PACP) coding conventions and all software used by the Contractor will be PACP compliant.

Vacuum testing shall test all manholes for leakage. Vacuum testing shall be carried out immediately after assembly and prior to backfilling. All lift holes should be plugged with an approved nonshrink grout, or rubber plug. No grout will be placed in the horizontal joints before testing. All pipes entering the manhole shall be plugged, taking care to securely brace the plugs from being drawn into the manhole.

All manholes will be inspected prior to acceptance and the testing shall be witnessed by the City of Batavia Engineering Division representative. Testing shall be in conformance with the ASTM C1244. A vacuum of ten inches (10") of mercury shall be placed on the manhole and the time measured for the vacuum to drop to nine inches (9") of mercury. The vacuum shall not drop

below nine inches (9") of mercury for the following time periods for each size manhole:

1. Forty eight inch (48") diameter - sixty (60) seconds.
2. Seventy two inch (72") diameter - ninety (90) seconds.

Vacuum tester shall be manufactured by P.A. Glazier, Inc., Worcester, MA 01613, or other testing equipment meeting the same standards, if approved by the city Public Works Department. All work of testing shall be done in accordance with the requirements of P.A. Glazier, Inc. The contractor shall provide all materials and equipment necessary for testing. If testing fails, the contractor shall seal all leaks with material and methods recommended by P.A. Glazier, Inc., and retest until acceptable. It is recommended that this testing be done before backfilling so that any leaks can be found and fixed externally. The manhole frame and adjusting rings shall be in place when testing.

5.2.17 Inspections

The sanitary sewer contractors for all sanitary sewer main extension projects shall notify the City of Batavia Engineering Division two (2) working days prior to the start of work. Notification shall be done via telephone (630) 454-2750 AND fax at (630) 454-2351 to the Engineering Division. For service connections, call the Community Development Office at least twenty-four (24) hours in advance to schedule an inspection at (630) 454-2700 during the hours of 8:00am and 4:00pm.

5.2.18 Construction

All excavations for building sewer installations shall be adequately guarded with barricades and lights so as to protect the public from hazard. Streets, sidewalks, parkways and other public property disturbed in the course of the work shall be restored in a manner satisfactory to the City.

5.2.19 Sanitary Services

Domestic sanitary services shall be constructed of PVC SDR 26 with a minimum diameter of 6”. All domestic services shall connect to the public sewer with a wye fitting. Industrial and commercial sanitary services shall be constructed of PVC SDR 26 or 21 with a minimum diameter of 6”. The minimum slope of sanitary services shall be one percent (1.0%).

Wyes or sanitary sewer tap to be installed to receive building sewers.

All building sewer extensions which are under proposed or existing streets shall be constructed to a distance of seven feet (7') from paved or proposed paved area at the time of construction of the sanitary lateral sewer. In new subdivisions, all sewer services shall extend to the property ROW line.

The connection of the building sewer into the public sewer shall be made at the "Y" branch, if such branch is available at a suitable location. If the public sewer is twelve inches (12") in diameter or less and no properly located "Y" branch is available, the owner shall at his expense install a sewer tap in the sewer at the location specified by the City Engineer or Building Inspector. Where the public sewer is greater than twelve inches (12") in diameter, and no properly located "Y" branch is available, an Inserta-Tee type fitting or equivalent shall be required as the means by which a connection will be constructed on the interceptor pipe. The centerline of the new sewer shall be installed at no greater than a 45 degree angle on the public sewer, above the horizontal “zero degree” point of the existing interceptor pipe, followed by a 45 degree elbow on the upstream side of the riser where the proposed line and grade of the new sewer shall commence. If the new sewer connection is a public sewer, a manhole shall also be constructed outside the District’s permanent easement, no greater than 20’ from the interceptor sewer.

A neat hole may be cored into the public sewer to receive the building sewer, with entry in the downstream direction at an angle of about forty five degrees (45°). A forty five degree (45°) ell may be used to make such connection, with the spigot end cut so as not to extend past the inner surface of the public sewer. The invert of the building sewer at the point of connection shall be at higher elevation than the invert of the public sewer. A smooth, neat joint shall be made, and the connection made secure and watertight by encasement in concrete. Special fittings may be used for the connection only when approved by the City.

5.3 SANITARY SEWER MANHOLES

Manholes for sanitary sewers shall have a minimum inside diameter of 48 inches and shall be constructed of pre-cast concrete units in accordance with ASTM C 478 and Section 32 of the "Standard Specifications for Water and Sewer Main Construction in Illinois," and shall follow the City of Batavia sanitary sewer standards.

Cone sections shall have a 3 inch integrally cast precast concrete collar; Pipe penetrations are to be sealed via the use of a flexible rubber water tight connector per ASTM C-923. All new or adjusted steps shall be made of steel reinforced plastic, using an approved plastic meeting ASTM D4101, Type II, Grade 49108 over a #3 Grade 60, ASTM A615, reinforcing bar.

Manholes frames shall have a waterproof lid with a concealed pick hole and have the words "City of Batavia Sanitary" on top of the lid. External chimney seals shall be installed on all sanitary sewer manholes and shall be manufactured by Mar Mac Construction (SurSeal), Cretex Specialty Products (Classic Seal), Sealing Systems, Inc. (Infi-Shield) or pre-approved equal.

Each manhole joint shall be sealed with an external sealing bands meeting

the requirements of ASTM C877 (Type II), Inc., as manufactured by MacWrap or approved equal. For further details, refer to the City of Batavia Sanitary Sewer Manhole detail.

5.3.1 Manhole Location and Spacing

Manholes shall be located at the junction of two sanitary sewer pipes or at any change in grade, horizontal alignment, pipe material, or size of pipe. Maximum spacing shall be 500 feet for larger diameter sewers 15" and greater and 400 feet for sewers 14" and less. Greater spacing of manholes may be allowed on a case-by-case basis as approved by the Department of Public Works.

Manholes shall be required to be constructed on the existing sanitary main where two or more customers are connecting a new private sanitary sewer service, lateral, or public sewer main to the existing public sanitary sewer system. Details for the construction of the new manhole including any required bypass pumping shall be submitted for review and approval by the Department of Public Works.

In general, the City of Batavia prefers to minimize the number of manholes needed for a project. This will help reduce future operation and maintenance costs.

5.3.2 Invert Elevations in Manholes

Inverts of similar size pipe are to match other inverts. The inverts of all pipes entering a manhole where the existing or proposed outlet sewer is fifteen (15) inches in diameter or larger shall be set so as to match the eighty percent (80%) flow line of the pipe leaving the manhole. A new concrete flow-channel shall be required to be poured inside of the new or existing manhole, or the existing bench shall be cored in conjunction with the manhole wall at the calculated elevation, so as to provide proper flow characteristics through the manhole. If connection to any manhole is a drop connection, this method shall pertain to the lower point of said drop.

The inverts of all pipes entering a manhole where the existing or proposed outlet sewer is less than fourteen (14) inches in diameter shall be set by matching the elevations of the top and existing pipe(s). It shall be required that the bench of any existing manhole be cored in conjunction with the manhole wall in order to provide a situation where there is no vertical "drop" between the new pipe's flow line and the new flow channel of the bench. If a connection to any manhole is a drop connection, this method shall pertain to the lower point of said drop.

5.3.3 Drop Manholes

Drop manhole assemblies shall be provided at the junction of sanitary sewers where the difference in grade is in excess of 2 feet. Drops are to be made

outside of the structure unless otherwise approved by the Batavia Department of Public Works. A minimum of 24 inches between the inverts of the drop assembly must be provided. The drop assembly shall follow the requirements as shown in the City of Batavia Drop Connection Detail.

5.3.4 Requirement for Inspection Manholes

Commercial, office, institutional, industrial, and manufacturing buildings shall have an inspection manhole located outside of the building that will allow the City to observe the discharge from the building into the public sanitary sewer system. The manhole shall be minimum forty eight inches (48") in diameter, located approximately ten feet (10') from the building on the sanitary service line. If metering devices or other devices are required to be located in the inspection manhole, then a separate manhole shall be required for sampling. Said manholes shall be easily accessible.

An inspection manhole is required for any multi- family building that has more than six (6) units. Additionally, clean-outs shall be required on multi- family services serving between two (2) and six (6) units.

A clean-out will also be required for any service line over 90 feet in length which does not have an inspection manhole.

5.3.5 Grease/Oil/Sand Trap Manholes

Grease/oil/sand trap manholes, as required by the Illinois Plumbing Code, shall be shown on the engineering plans. Grease and oil interceptors shall be constructed of impervious materials capable of withstanding abrupt and extreme changes in temperature. They shall be of substantial construction, watertight and equipped with easily removable covers which when bolted in place shall be gastight and watertight.

5.4 APPURTENANCES

5.4.1 Casing Pipes

Manufactured non- metallic or non-corrosive casing spacers, adjustable runners, or cradles shall be used to support the pipe in the casing. A minimum of two supports shall be used per pipe for lengths up to 12.5 feet, and a minimum of three supports shall be used for lengths greater than 12.5 feet, or per manufacturer’s recommendation. The annular space shall be filled with pea gravel or as required by permitting agency, and provisions shall be made so that no voids are left to prevent flotation.

5.4.2 Casing Pipe Material

The steel casing pipe shall be bituminous coated, a minimum of 30 mils thickness inside and out, and shall be of leak proof construction, capable of withstanding the anticipated loadings. The steel casing pipe shall have minimum yield strength of 35,000 psi and shall meet the requirements of

ASTM A139, Grade B. Ring deflection shall not exceed 2% of the nominal diameter. The steel casing pipe shall be delivered to the jobsite with beveled ends to facilitate field welding.

Steel Casing Diameter	Minimum Wall Thickness (Inches)
20” and 22”	0.344
24”	0.375
28”	0.438
30”	0.469
32”	0.501
34” and 36”	0.532

5.4.3 Sizing of Casing Pipes

The diameter of the casing pipe shall be a minimum of 12 inches greater than the outside nominal diameter of the sewer.

5.4.4 Non-Shear Couplings

A non-shear "Mission" brand coupling shall be used when joining pipes made of dissimilar material or where no "hub" end exists. PVC transition fittings shall be used when joining PVC pipes of dissimilar material specifications such as with storm sewer or water main.

5.5 INDUSTRIAL WASTE PERMIT

No Significant Industrial User or “SIU” shall discharge wastewater to the public sewers without having a valid Industrial Waste Discharge Permit issued by the City. A Significant Industrial User shall mean:

1. Any Industrial User of the City of Batavia wastewater treatment system who is subject to Categorical Pretreatment Standards under 40-CFR-403.6 and 40-CFR, Chapter I, Subchapter N; or
2. Any Industrial User of the City of Batavia wastewater treatment system who:
   a) discharges an average of 25,000 gallons per day or more of process wastewater into the wastewater treatment system (excluding sanitary, noncontact cooling and boiler blow-down wastewater); or
   b) contributes a process waste stream which makes up 5% or more of the average dry weather hydraulic or organic capacity of the wastewater treatment plant; or
   c) is designated as such by the City of Batavia on the basis that the Industrial User has a reasonable potential for adversely affecting the City of Batavia’s wastewater treatment system's operation or for violating any pretreatment standard or requirement (in accordance with 40-CFR-403.8(f)(6)).

Refer to Title 8 – Chapter 3 (Sanitary Sewerage System) of the current City of Batavia code detailed information regarding the requirements of the Industrial Waste Discharge Permit.

SECTION 6

WATER DISTRIBUTION SYSTEM DESIGN

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SECTION 6
WATER DISTRIBUTION SYSTEM DESIGN

6.1 GENERAL DESIGN CRITERIA

6.1.1 Design Approval

The Department of Public Works shall approve all designs and shall alter the following design requirements as necessary to meet the City water system plan. The Department of Public Works and the Engineering Department shall review and comment on all designs.

The City of Batavia's standard details should be used in all construction plans. Any modifications to these standard details require approval from the City Engineer.

6.1.2 IEPA Permit Required

All public water main extensions require an IEPA Construction permit, prior to construction.

6.1.3 Construction Rules and Regulations

The rules, regulations, and ordinances and policies listed herein, and issued by the authorities indicated, are incorporated herein by reference.

A. The City of Batavia rules, regulations, policies, directives, specifications, general notes, construction details, permit forms and instructions that may be adopted or issued from time to time by the City Council.

B. The Illinois Environmental Protection Agency (IEPA) Division of Public Water Supplies including all orders, rules and regulations thereof.

C. Environmental Protection Act, including all orders, technical releases, rules and regulations issued from time to time.

D. "Standard Specifications for Water and Sewer Main Construction in Illinois", latest edition.

E. "Recommended Standards for Water Works", Great Lakes-Upper Mississippi River Board of State Sanitary Engineers (Ten State Standards).

F. “77 Illinois Administrative Code, part 890, Illinois Plumbing Code”, latest edition.

G. The Occupational Safety and Health Administration (O.S.H.A.)– Regulations (Standards-29 CFR) – Standard Number 1926.652.

6.1.4 Differentiation Between Public and Private Water Mains

When the water distribution system is complete and the improvements have been formally accepted by the City, the Department of Public Works shall be responsible for the repairs and maintenance of all service lines and water mains located in the public right-of-way and publicly dedicated water mains. Maintenance and repairs for the portion of the system located on private property shall be the responsibility of the property owner, or property owner’s association depending upon the property owner’s covenants and guidelines. In such cases where the City performs maintenance or repairs on the private water distribution system, the City reserves the right to charge the property owner for necessary work.

All engineering plans shall clearly differentiate between all portions of the public and private water distribution system.

6.1.5 Easements

All public water mains and fire hydrants that are not located within a public right of way shall be placed in a public utility and drainage easement, minimum 10-feet wide or as directed by the City Engineer, to the City of Batavia. The easement shall be granted to the City either through a recorded plat of subdivision or a recorded plat of easement. The City shall be granted access to these easements if not directly adjacent to public right-of-way.

At the discretion of the Director of Public Works or City Engineer, the City may require additional easements for future maintenance or repair of the system.

6.2 WATER MAINS

6.2.1 Basis of Design

Distribution main size shall be based on the occupancy of the properties along the line and by the average daily water consumption of each, plus fire demand. The main shall be of sufficient size to deliver the required flow at a residual pressure of not less than twenty (20) pounds per square inch. The main shall in no case be less than as hereinafter specified.

Average daily water consumption shall be as follows:

1. One hundred (100) gallons per capita per day per residential development.
2. Four hundred (400) gallons per one thousand (1,000) square feet of floor area for commercial and light industrial development unless otherwise substantiated or quantified.
3. Heavy industrial usage shall be based on the average from past records from the previous 12 months, at a minimum.

Maximum day demand shall be computed by the basis of two (2) times the average day demand. Maximum hourly demand shall be computed by the basis of four (4) times the average day demand.

6.2.2 Public Fire Flow Requirements

Fire flow requirements will be approved by the Department of Public Works.

The required fire flows may be computed at a residual pressure of 20 psi for Fire Department use. It should be recognized that higher residual pressures may be necessary for specific fire protection demands. The supplies shall be available for a continuous four-hour duration except that flows less than 2,000 gpm need be available for a two-hour duration.

The following flow requirements are guidelines which will be modified based upon construction types, size and height of the buildings:

Use	Flow (gpm)
Manufacturing and Storage	3,000 to 5,000
Institutional (Assumed limited hazard, fire resistive	3,000 to 4,000
Commercial and Mercantile	3,000 to 5,000
Business and Office (Assumed limited hazard)	2,500 to 3,500
Single Family Detached Residential (1,000 gpm typically used	1,000 to 1,500
Town or Row Houses (1,500 gpm average, additional quantity	1,000 to 2,000
Apartments (Low-end requirements for fire resistive structures,	3,000 to 4,000

6.2.2.1 Private Fire Protection

Private fire protection demands (standpipe systems, sprinkler systems, etc.) will not be considered cumulative with public fire flow demands. These requirements are based upon the building height, area, use, and construction type.

6.2.3 Watermain Pipe Material

Ductile iron pipe Class 52 or 54 conforming to the latest edition of the following Standards:

1. American Water Works Association (AWWA) Standard C-150, Thickness Design of Ductile-Iron Pipe;
2. American Water Works Association (AWWA) Standard C-151, Centrifugally Cast Ductile Iron Pipe;
3. AWWA Standard C-104, Cement-Mortar Lining for Ductile Iron Pipe and Fittings;
4. AWWA Standard C-111, Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings;
5. AWWA Standard C600, Pipe Laying Conditions, Type 3 minimum.
6. AWWA Standard C-900, Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In., for Water Transmission and Distribution.

Polyvinyl Chloride (PVC) pressure pipe meeting the requirements of AWWA C-900 shall only be used with prior design approval by the City of Batavia Water Division. For information regarding applicable ANSI, AWWA, and ASTM designations, refer to Section 8 of the City of Batavia Standard Specifications and typical drawings.

6.2.4 Watermain Pipe Fittings

Watermain pipe fittings shall be constructed of ductile iron with mechanical joints conforming to the latest edition of the following Standards::

1. AWWA Standard C110, Ductile Iron and Gray Iron Fittings;
2. AWWA Standard C111, Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
3. AWWA Standard C104, Cement-Mortar Lining for Ductile Iron Pipe and Fittings;

Note that retainer glands shall be required on all fittings.

6.2.5 Location in the Public Right-Of-Way

Water mains shall be generally be located on the north and west sides of the public right-of-way, or as directed by the Director of Public Utilities.

6.2.6 Sewer and Water Main Separation

Water mains and water service lines shall be protected from sanitary sewers, storm sewers, combined sewers, house sewer service connections, drains, and sanitary sewer force main. In addition to the guidelines as indicated in Section 41 the Standard Specifications for Sewer and Water Construction in Illinois, refer to the requirements as shown in the City of Batavia Standard Details.

6.2.7 Depth of Pipe Cover

All pipe shall be laid to a minimum depth of five and one half (5.5) feet and a maximum of ten (10) feet as measured from the proposed ground surface to the top of the pipe, unless specifically allowed otherwise in special circumstances by the Director of Public Works or City Engineer. If approved, the pipe shall be insulated with 2-inch exterior grade rigid insulation board. One 2-inch thick sheet of insulation shall be provided for each 6 inches of cover below the required 5-foot minimum depth and extend a minimum of 12 inches on each side of the water main. The insulation shall be extruded polystyrene with a minimum R-value of R-9 in compliance with ASTM C 578- 15 Type VI.

6.2.8 Water Main Sizing

Water mains shall be constructed of 8-inch diameter, 10-inch diameter or 12-inch diameter pipe or as directed by the Department of Public Works. Refer to Section 6.2.1 and 6.2.2 design requirements for distribution main sizing.

6.2.9 Oversizing Requirements

The City of Batavia Water Division may require that the water main be oversized in order to provide service to additional benefiting properties (refer to Section 8-2-9-3 of the City of Batavia Municipal Code for further information).

6.2.10 Limits of Installation

At a minimum, water main shall extend across the frontage of the property, at the developer's cost, such that a connection could be made with minimal disturbance in the future. In some cases, the City may require that the water main be installed from one corner to the diagonally opposite corner, at the developer's cost.

All water main stubs for future extension shall terminate with a valve and hydrant. Restrained joints shall be located 40 feet from the capped end.

6.2.11 Distribution System

The grid of the minor distributor mains supplying residential districts shall have a minimum pipe size of eight inches (8") internal diameter and arranged so that the lengths between intersecting mains do not exceed eight hundred feet (800'). Minimum pipe size supplying high value commercial and industrial areas shall be ten inches (10") or larger. Principal supply mains shall be spaced not greater than two thousand five hundred feet (2,500') apart, and shall be of the size shown in the Batavia Master Water Plan or larger if the type of development warrants.

No dead-end water mains shall be allowed.

6.2.12 Thrust Blocking

All fire hydrants, valves tees and bends require thrust blocking with at least 10"

thick preformed concrete block(s) against undisturbed vertical earth face. The placement of all thrust blocks shall be done in conformance with the standards of "Specifications for Water and Sewer Construction in Illinois". In addition to the above thrust blocking all mechanical joints, bends and fire hydrants shall have a "Mega-lug" restraint, or other as approved by the City of Batavia Water Division. For further details, refer to the thrust block installation detail.

6.3 WATER SERVICES

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 curb stop and tap. Said pipe shall be provided with a valve before and after the water meter, not less than 1- foot inside of the wall or above the foundation floor (main building shutoff valve). The property owner shall be responsible for the maintenance, repair or replacement of the main shutoff valves.

Every building, except auxiliary buildings shall be individually metered.

All valves shall be arranged so that each line can be shut off from the exterior of the building.

6.3.1 Pipe Material

Service line pipe materials and joints shall meet the requirements of the Illinois Plumbing Code.

6.3.2 Water Service Line Sizing

The following guidelines shall be used to size water service lines:

Water Supply Fixture Units	Size, diameter (inches)
< 60	1"
≥ 60	1-1/2"

Building service connections to the mains shall be made by tapping the water main and installing a corporation cock. Service lines shall be a minimum of one inch (1") type "K" copper tubing from the main to the meter. A shut-off with a buffalo box shall be set in the service line approximately seven feet (7') from the property line. Building service connection and pipe to within seven feet (7') of the property line shall be installed with the installation of all secondary water mains in all new service areas and subdivisions.

6.3.3 Buffalo Boxes

The buffalo box shall not be located in driveways or sidewalks.

6.4 FIRE HYDRANTS

6.4.1 Fire Hydrant Locations

Fire hydrants shall be located along public streets so that no portion of the building or structure to be protected will be over (300) feet from any required hydrant. Where this may not be possible, additional hydrants shall be located upon the premises accessible to motorized fire apparatus.

Hydrants shall be located on the north and west side of roads, streets and access routes. Hydrants shall typically be located at street intersections, and in no case shall the space between hydrants exceed (400) feet in single-family areas or 300 feet elsewhere.

Fire hydrants shall be situated five (5) feet from a paved roadway and seventy-five (75) feet from a Fire Department connection, unless otherwise approved by the City of Batavia Water Division.

Access to hydrants shall be provided by paved roadways (minimum structural number = 2.5) routes adequate in width, clearance and strength to support all fire equipment. Such routes shall be maintained during all seasons of the year.

6.4.2 Fire Hydrant Materials

Fire hydrants shall be conform to the latest edition of AWWA Standard C502, Dry-Barrel Fire Hydrants and shall include one four and one-half inch (4 1/2") steamer outlet and two (2) two and one-half inch (2 1/2") hose connections. Additional fire hydrant requirements are shown in the City of Batavia Standard Fire Hydrant Detail and Specifications. All threads shall be national standard. Operating nuts shall open to the left in a counter clockwise direction.

6.5 VALVES

6.5.1 Water Valves

For all water main 20" or less, a resilient wedge gate valve shall be used. Gate Valves shall meet the requirements of AWWA C509, latest edition. Butterfly Valves may be required for water mains greater than 20" in diameter at the discretion of the City of Batavia Water Division. Butterfly Valves shall meet the requirements of AWWA C504, latest edition. All below grade factory installed bolts and fasteners shall be 304-grade stainless steel.

6.5.2 Water Valve Vaults

Valves for water mains or fire service lines 8 inches or larger shall be provided with a vault with a minimum inside diameter of four (4) feet. Refer to the City of Batavia Water Standard Valve Vault Detail for further information.

All adjustments and frames shall be sealed to prevent infiltration. The water valve vault lids shall conform to the requirements shown in the City of Batavia Standard Water Manhole Lid Detail.

For mains 8" and less a 48" vault may be used. For mains larger than 8" a 60" vault must be provided. The valve vault shall be sealed with the use of concrete blocks and mortar. All pipes entering the manhole shall have a 2" wide mortared collar on both the inside and outside walls of the vault. Valve vaults may also be sealed with the use of rubber boots meeting the requirements of ASTM C923.

6.5.3 Valve Boxes

Valve boxes may only be used for fire service lines that are less than 8 inches in size. The valve box shall be located in a grassy area; otherwise a valve vault must be used. Valve box construction and materials shall conform to all standards found in “Standard Specifications for the Construction of Water and Sewer Main in Illinois”. Valve boxes shall be sealed as to not allow the entrance of any loose impediments. All valve boxes shall be installed upon the valve with the use of a Valve Box Adaptor as manufactured by Adaptor Inc. or an approved equal.

The valve box shall be placed vertical with the opening directly above the operating nut. The operating nut of the valve shall be keyable as determined by the City of Batavia Water Department. All boxes shall be adjustable with a minimum of 6" of adjustment remaining, after the box has been brought to match existing grade.

6.5.4 Valve Locations

Gate valves shall be located so that services may be maintained with the least disruption in the case of break or other emergency. Valves shall be located such that no more than a maximum of 600 feet of main may be shut off at any given time on distribution mains or one thousand feet (1,000') apart on principal feeder mains. This spacing should be reduced, such that no more than 25 to 30 single-family homes, or 50 multi- family residences (excluding apartment buildings) would be shut off at any given time.

Where a “tee” is installed, at least two (2) valves will be utilized. Where a “cross” is installed, at least three (3) valves will be utilized.

6.5.5 Pressure Taps

Connections for extending existing water mains shall be made with a tapping tee and valve unless otherwise permitted by the City. Work shall be so scheduled and timed as to cause the least possible interference with the operation of the existing water distribution system. Water shall not be allowed to flow from the new mains into the existing mains until the new mains have been thoroughly flushed and sterilized. Care should be taken so as not to

cause turbulence in the existing mains.

Pressure taps shall be ductile iron tapping sleeves for size-on-size taps, or taps on mains greater than 12 inches (> 12”). Stainless steel tapping sleeves can only be used for non- size-on-size taps or taps on mains less than or equal to 12 inches (≤ 12”). Pressure tap and valve shall be located within a valve vault. Also, refer to the requirements as shown in the City of Batavia Standard Pressure Connection Detail.

6.6 APPURTENANCES

6.6.1 Casing Pipes

Manufactured non- metallic or non-corrosive casing spacers, adjustable runners, or cradles shall be used to support the pipe in the casing. A minimum of three supports shall be used per pipe, or per manufacturer’s recommendation. The annular space shall be filled with pea gravel or as required by the permitting agency, and provisions shall be made so that no voids are left. Water main installed within casing pipes shall have restrained joint construction the entire length of the casing pipe for future removal if necessary.

6.6.1.1 Casing Pipe Material

The steel casing pipe shall be bituminous coated, minimum of 30 mils thickness inside and out, and shall be of leak proof construction, capable of withstanding the anticipated loadings. The steel casing pipe shall have a minimum yield strength of 35,000 psi and shall meet the requirements of ASTM A139, Grade B. Ring deflection shall not exceed 2% of the nominal diameter. The steel casing pipe shall be delivered to the jobsite with beveled ends to facilitate field welding.

Steel Casing Diameter	Minimum Wall Thickness (Inches)
20” and 22”	0.344
24”	0.375
28”	0.438
30”	0.469
32”	0.501
34” and 36”	0.532

6.6.1.2 Sizing of Casing Pipes

The diameter of the casing pipe shall be a minimum of 12 inches greater than the outside nominal diameter of the water main.

6.7 TESTING

All watermain installed within the City of Batavia shall adhere to all applicable

tests found in the “Standard Specifications for Water and Sewer Main Construction in Illinois”. The City of Batavia shall receive a minimum 48 hours notice prior to any testing.

Ductile iron water mains shall be installed and tested in accordance with A.W.W.A. C600 Standard latest edition thereto.

All water mains and appurtenances thereto shall be sterilized before they are put into service. The installer shall be responsible for sterilizing the mains and shall, under the supervision of a representative of the City, take samples which are to be submitted to the Certified Laboratory for bacteriological analysis. Acceptable bacteriological tests shall be required before the water mains will be permitted to be put into service. Water mains shall be disinfected in general accordance with A.W.W.A. C601 Standard latest edition thereto.

6.8 IRRIGATION SYSTEMS

Private lawn irrigation systems shall not encroach into public right-of-way.

SECTION 7

STREET DESIGN

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SECTION 7
STREET DESIGN

7.1 GENERAL DESIGN CRITERIA

This section of the Design Manual generally follows the guidelines as established by the Institute of Transportation Engineers (ITE), the Illinois Department of Transportation (IDOT) and the American Association of State Highway and Transportation Officials (AASHTO). The references used to establish this Design Manual include the following:

- *Guidelines for Major Street Design* (ITE Publication No. RP-010A)
- *Guidelines for Residential Subdivision Street Design* (ITE Publication No. RP-011C)
- *A Policy of Geometric Design of Highways and Streets* (AASHTO, 1994)
- *An Information Guide for Roadway Lighting* (AASHTO, 1994)
- *Traffic Calming – State of the Practice* (ITE Publication No. 1R-098)
- *Illinois Department of Transportation Bureau of Local Roads & Streets Administrative Policies Manual*
- *Illinois Department of Transportation Bureau of Design & Environment Manual*

This chapter presents modifications to these guidelines in accordance with the policies and procedures established by the City of Batavia.

7.2 ROADWAY GEOMETRICS

7.2.1 Functional Classification

7.2.1.1 Arterial

Arterial streets are roadways that serve high volumes of traffic, and provide connectivity to surrounding communities. Generally these roads handle medium- to long- distance trips with some interruptions in traffic flow. The Comprehensive Plan identifies the following routes as Arterial Streets:

- Batavia Avenue / Illinois State Route 31
- Main Street
- Mooseheart Road
- South River Street / Illinois State Route 25
- North Washington Street / Illinois State Route 25
- Wilson Street (East of Randall Road) Western Avenue

7.2.1.2 Collector Streets

Collector streets are roads that serve a medium volume of traffic. These roads connect arterial roads to local streets and neighborhoods. Traffic flows

at a lower speed than on arterial routes.

7.2.1.3 Minor Collector

Minor Collectors typically allow further reduced speed but allow a greater amount of access to adjacent properties. Major collectors typically allow higher speeds and less access to surrounding properties.

7.2.1.4 Local Streets

Local streets provide individual properties direct access to the roadway system. These roads are intended to handle short trips, at a low speed. Local streets may be public or private. Public alleys serve as secondary or alternate connections for properties to these local streets.

7.2.2 Minor Street Design Guidelines

A minor street is defined as any street classified below the functional classification of an arterial. The design guidelines to be used in developing the minor street system layout shall be in accordance with Appendix E "Guidelines for Residential Subdivision Street Design" prepared by the Institute of Transportation Engineers, except as otherwise noted in the following provisions:

7.2.3 Pavement Width

The minimum pavement width for all local streets and cul-de-sacs is 28 feet, measured from back of curb to back of curb. Local Street shall be 37 feet adjacent to all school sites, park sites or other major facilities and on approaches to all collector and arterial roadways or as determined by the City Engineer. The minimum pavement width for collector streets is 37 feet, measured from back of curb to back of curb.

Type Of Street	Improved Street Width	Street Width
Arterial Street	100 feet divided by a median strip	Two 24-foot roadways
Major and Minor Collector	80 feet	37 feet
Local Streets	66 feet	28 feet
Cul-de-sac bulb	62 foot radius	45.5 foot radius

7.2.4 Maximum Cul-de-Sac Length

The length of a cul-de-sac should not exceed 1,000 feet, as measured from the centerline of the intersecting street, along the centerline to the center of the bulb of the cul-de-sac. For lengths in excess of 1,000 feet, a secondary point of

access must be provided. T-shaped turnaround with forty foot (40') extension to either side of the main stem shall be used where a temporary turnaround is recommended by the fire department. Permanent dead end or closed end streets shall have a circular paved turnaround at the end with a diameter of ninety feet (90') as measured from back of curb to back of curb. Islands in the center of the cul-de-sac shall not be allowed. Whenever an existing dead end street with a temporary turnaround is extended into a new subdivision, the new street construction work shall include a removal of the temporary turnaround. The base course in the utility corridor shall be replaced with topsoil and seeding. Any necessary repairs to the existing sidewalks, extension of sidewalks, curb and gutter, and street pavement should be made by the developer of the new subdivision as directed by the city engineer.

7.2.5 Curbs And Gutters

The standard curb and gutter section for all cul-de-sac, local roads, collector streets shall be a barrier type B 6.12 curb and gutter.

Curb Radii: Curb radii shall not be less than twenty five feet (25').

7.2.6 Curb and Gutter Protection

The contractor shall take necessary steps to preserve all curb and gutter. Prior to Hot-Mix Asphalt surfacing the flag line of the curb (typically the edge of the flag is susceptible to cracking and chipping due to heavy construction traffic and/or snow plowing) shall be repaired. Should repairs be required, the City Inspector will determine whether the developer must remove sections of the curb and gutter or if an epoxy patch system may be used. The determination will be the City Engineer's to make and will be based on the extent of damage and the developers efforts to protect the curb and gutter during construction.

The contractor may elect to choose from one of the following preventative maintenance techniques or propose an alternative to the City Engineer. All alternatives shall be approved by the City Engineer, prior to their use. The use of curb protection does not relieve the developer of their responsibility for replacing or repairing curb and gutter at a later date.

Alternative #1

The contractor may elect to place a layer of bituminous surface or binder along the flag line of the curb. The additional pavement shall extend no less than 6 feet from the flag line and be placed flush with the flag line of the curb. At the time of bituminous surfacing this additional layer must then be removed by grinding.

Alternative #2

A second alternative is to place clay or aggregate on the curb at the time that heavy traffic will be passing over the curb. This "padding" shall be removed

immediately after it has served it's purpose.

Alternative #3

The final alternative is for the contractor to leave gaps in the curb and gutter in key locations. The vacant areas could then be poured once heavy construction traffic has ceased.

7.2.7 Sidewalks

Unless the city council approves otherwise after discussion and recommendation by the plan commission, Portland cement concrete sidewalks in accordance with the standards set forth herein shall be required on both sides of all streets in all single-family and multi-family developments, and shall also be required on both sides of all streets in commercial, industrial, other developments and interconnects between park and school sites.

7.2.8 Street Lighting

Street lighting, including underground service cable, is required throughout all subdivisions for all public streets.

7.2.9 Street Name Signs and Traffic Control Devices

Street name signs are required at all street intersections.

Temporary Street Signs:

1. The developer of any subdivision shall provide temporary street signs on at least one corner of each intersection in said subdivision, said temporary street signs to be installed no later than two (2) working days after completion of curb and gutter construction at said intersection, and shall be maintained in a condition conforming with the standards hereinafter described until permanent signs have been erected.

2. Said temporary street signs shall be mounted on a four inch by four inch (4" x 4") post and set a minimum of thirty inches (30") into the ground.

3. Said street signs shall be stenciled and/or painted vertically on the four by four (4 x 4) post, and in a contrasting color to the background in order to be readable from a reasonable distance.

4. That the bottom of any such sign shall be a minimum of six feet six inches (6'6") above the top of the curb.

5. Said signs and post shall remain the property of the developer, and may be removed once permanent signs have been placed.

6. The developer shall provide type III barricades at dead end streets in accordance with IDOT standard 702001-05 or the latest revision thereto as directed by the city engineer or his/her authorized representative. At least one "Road Closed" sign, R11-2, shall be provided meeting the requirements of the most current edition of the "Manual on Uniform Traffic Control Devices". Additionally, the developer shall install “Future Road Extension” sign as approved by the City Engineer.

Permanent Street Signs:

Developers have the option of either; making and installing the signs to the City of Batavia specifications, or have the City install and fabricate each of the signs, at the expense to the developer (labor and materials). Before any signs are made and installed, contact should be made with the City of Batavia Street Department for the latest sign specifications and installation guidelines.

7.2.10 Traffic Control Devices and Pavement Markings

Traffic Control Devices:

Traffic control devices such as Stop signs, yield signs, speed limit signs shall be required as part of development. The city’s police department and public works department shall provide guidelines on the locations of these signs during the engineering plan development process. Developers have the option of either; making and installing the signs to the City of Batavia specifications, or have the City install and fabricate each of the signs, at the expense to the developer (labor and materials). Before any signs are made and installed, contact should be made with the City of Batavia Street Department for the latest sign specifications and installation guidelines.

Crosswalks:

New marked crosswalks shall be ladder-style crosswalks with the accompanying signing per the MUTCD and IDOT. Additional marking and signing may be needed based upon the traffic conditions. Marked crosswalks should keep as much as possible to the natural path of travel. Ideally they will align with existing sidewalks.

7.2.11 Pavement Design

All streets within the subdivision shall be surfaced with either hot-mix-asphalt concrete or Portland cement concrete. The pavement structure shall be designed according to the Sections 402, 403, and 404 of the City of Batavia Standard Specifications. The pavement shall meet or exceed the requirements, materials, equipment, and methods documented in the latest editions of the Illinois department of transportation (IDOT) "Standard Specifications For Road And Bridge Construction", and the IDOT "Supplemental Specifications And Recurring Special Provisions".

Subgrade earth excavation in accordance with approved engineering plans to provide a stable subgrade having an IBR value of no less than 3.0. IBR tests will be required if, in the opinion of the city engineer, they are necessary to evaluate the subgrade material. A proof roll in the presence of a city inspector is required of all street and parking lot subgrades.

7.2.11.1 Type of Pavement

The following are all minimum pavement sections. All materials classifications are IDOT nomenclature. All flexible pavements will conform to the IDOT "Bureau of Design and Environment Special Provision the latest revision thereto, unless modified below. All dimensions are minimum compacted thickness. Friction aggregate for the bituminous surface course may be required as directed by the city engineer.

Public and private streets in commercial and industrial areas:
Following the approved subgrade proof roll, geotextile fabric, twelve (12) ounces per square yard, and otherwise meeting the requirements for ground stabilization found in section 210 of the IDOT standard specifications, shall be placed over the compacted subgrade prior to placement of the subbase or base course unless the subgrade has been lime stabilized.

6 inches crushed coarse aggregate base, gradation CA-1
6 inches crushed coarse aggregate subbase, gradation CA-6
Bituminous materials prime coat, 0.5 gallons per square yard
6 inches Hot-Mix Asphalt Base course
2 1/4 inches hot-mix asphalt binder course, IL19.0
1 1/2 inches hot-mix asphalt surface course, Mix D, IL-9.5

All other public and private streets:
Following the approved subgrade proof roll, geotextile fabric, twelve (12) ounces per square yard, and otherwise meeting the requirements for ground stabilization found in section 210 of the IDOT standard specifications, shall be placed over the compacted subgrade prior to placement of the subbase or base course unless the subgrade has been lime stabilized.

9 inches crushed coarse aggregate base, gradation CA-1
3 inches crushed coarse aggregate subbase, gradation CA-6
Bituminous materials prime coat, 0.5 gallons per square yard
4 inches bituminous base course
2 1/4 inches hot-mix asphalt binder course, IL19.0
1 1/2 inches hot-mix asphalt surface course, Mix D, IL-9.5

Off street private parking lots:

6 inches crushed coarse aggregate base, gradation CA-1
3 inches crushed coarse aggregate subbase, gradation CA-6
Bituminous materials prime coat, 0.5 gallons per square yard
2 1/4 inches hot-mix asphalt binder course, IL19.0, SBR or SBS PG64-28 asphalt cement
1 1/2 inches hot-mix asphalt surface course, Mix D, IL-9.5, SBR or SBS PG64-28 asphalt cement

The city engineer may require Portland cement concrete or composite pavements if site conditions and/or usage warrant. These pavements shall be designed in accordance with the requirements provided in the IDOT "Bureau of Design and Environment Manual".

Before any paving work commences, the city engineer, or engineers retained by the city, shall approve all plans, profiles and specifications.

All underground work such as sewers, water and gas mains, house service connections, etc., for service to both sides of the street, shall be installed and approved by the city engineer prior to the construction of the street pavement.

Controlled backfilling will be required for all trenches excavated for conduits located under existing or proposed roadway and parking lot pavement areas. Said controlled backfilling shall consist of crushed coarse aggregate, IDOT gradation CA-6 or CA-7, or as directed by the city engineer or his/her authorized representative.

7.2.12 Right -of-Way Requirements

Type of Roadway	Minimum ROW (FT)
Arterial	100
Collector	80
Local Streets	Varies from 66 to 80
Cul-de-Sac Bulb	62
Alley	20

7.3 ROADWAY CONSTRUCTION

7.3.1 Roadway Construction

Prior to the placement of a pavements base course the contractor shall schedule a proof roll of the subbase. The City's Inspector shall mark all areas that are not

acceptable and provide direction as to what areas shall be retested. Proof rolling shall conform with all specifications found in the State Standard Specifications for Road and Bridge Construction. A tandem axle truck loaded to a minimum gross weight of 40,000 lbs shall be used for the proof roll. The engineering division representative reserves the right to inspect the truck and load. If necessary the engineering representative can request the truck operator to empty the payload after proof rolling is completed.

7.3.2 Pavement Restoration

If the trench has been excavated in an existing pavement, the developer must replace the pavement with the use of a Class “C” or Class “D” Patch. This patch shall extend an additional one foot (1') in each direction, measured perpendicular from the trench wall.

In the event that the patch is to be constructed in existing concrete pavement it shall consist of eight inches (8") of Portland Cement Concrete Base Course with a surface course of two inches (2") of Hot-Mx-Asphalt. For an Arterial street, ten inches (10") of concrete base course will be used in place of the eight inches (8"). For trenches greater than six feet (6') in width #3 rebars shall be placed at twelve inch (12") centers. This rebar shall be placed 2" above the top of the trench. The rebar shall span the entire width of the patch. All edges of the patch shall be flush with the existing pavement, and will be completed to the approval of the City Engineer or representative.

Patches constructed in hot-mix-asphalt or gravel base pavements shall consist of a 10” hot-mix-asphalt binder course and a surface course of two inches (2”). Binder Course shall be placed and compacted in 3" lifts.

7.4 Right-of-Way Supervision

It is unlawful to construct any sidewalk or driveway approach in the ROW without having first secured a permit from the Community Development. This pertains to all construction within the right of way. All construction within the right of way shall be subject to inspection and approval by the City of Batavia Engineering Division. It shall be the contractor or owners responsibility to contact the Community Development at least forty-eight (48) hours in advance of desired inspection.

7.4.1 Right-of-Way Forms & Installation

All forms shall be set true to line and elevation, substantially built and rigidly braced to prevent bulging. They shall be constructed of clean lumber surfaced on four sides and be uniform in width and thickness or of steel of equal rigidity. An inspection is required during the forming and prior to the pouring of any concrete for all work within the public-right-of-way and other construction as directed by the Engineering Division.

Typical sidewalk shall have a 10:1 slope towards any intersection. The maximum allowable slope is 6:1. Sidewalk approaches shall not have side slopes. All walks shall remain a constant width to the curb. All sidewalk shall conform to the American Public Works Association Guidelines and the Americans with Disabilities Act.

Expansion joints shall be 3/4" thick and shall be placed at intervals of fifty feet in the sidewalks, between driveway pavement and sidewalk, driveway approaches and curbs, and sidewalk approaches and curb. These expansion joints shall consist of premolded bituminous joint filler or an IDOT approved alternative.

Expansion joints ½" thick shall be provided between the sidewalk and all structures such as street light standards, traffic signal posts and sign posts etc., located within the limits of public sidewalk. The expansion joints shall consist of premolded bituminous joint filler or an IDOT approved alternative.

7.4.2 Driveways & Approaches

No driveway approach shall be constructed by the owner or developer without first having obtained a permit from the community development department. The City Engineer shall be notified a minimum of forty-eight (48) hours prior to construction.

Curb cut for driveway approaches shall not exceed twenty two feet (22') in width including a minimum of two foot (2') transitions cut from barrier curb to depressed curb on either side of driveway entrance, unless approved by the city engineer.

Driveway approaches shall not exceed twenty two feet (22') in width at edge of pavement.

Driveway shall not exceed eighteen feet (18') in width at both front and back of sidewalk with garage setbacks less than forty five feet (45') from the garage door to the front property line.

Driveway shall not exceed fourteen feet (14') in width at both the front and back of sidewalk for all garages side load or setbacks greater than forty five feet (45') from the garage door to the front property line.

Distance From Hydrants: Driveway should not be more than two feet (2') closer from any fire hydrant.

7.4.2.1 Residential

Single family residential homes are limited to one driveway approach, unless approval has been granted by the City Engineer. Two family residential homes (duplex) may have two driveway entrances, both of which may be no more than sixteen feet (16)' in width. Residential driveways shall have a maximum width of twenty-two feet (22') at the curb line, with the exception of a single family residential home with a three car garage which may have a thirty-two foot (32') opening.

7.4.2.2 Commercial

New commercial driveway approaches may have a maximum width of forty-five (45') feet measured at the curb line. At an intersection, a length of not less than ten feet shall be left undisturbed between the property line extended and the near edge of the driveway approach. A curb island with a minimum length of six (6') feet measured along both the curbline and the property line shall be placed between the driveway approach. A curb length of not less than three feet shall be left undisturbed adjacent to each property line to serve as an island area should the adjoining property owner request a permit for a driveway approach.

Any alterations to the geometrics or material for a proposed driveway approach must be submitted in writing and approved by the City Engineer.

7.4.3 Material and Specifications

All commercial driveway approaches shall be constructed of Portland Cement Concrete (meeting current IDOT standards) shall have a minimum thickness of 8" with a 4" aggregate base cross section. Residential driveway approaches shall be at least 2"Hot-Mix-Asphalt over 6" aggregate base.

All driveways shall be constructed to eliminate step downs in the sidewalk. The sidewalk should follow a straight line grade through or across driveways. It is unlawful to have the surface finish of any new driveway approach constructed so as to render it slippery and hazardous to pedestrians, or unsightly due to poor workmanship. The finish of the concrete shall be: brushed, consistent without waviness bumps or irregularities.

7.4.4 Underdrains

The developer shall submit with the engineering plans sufficient data concerning existing soil and ground water conditions to determine if a need exists for a pavement underdrain system. If an underdrain system is required it shall be installed by the developer as directed by the City Engineer: All underdrain must be in accordance with the requirements stated in the Storm Sewer Section 4.

7.5 INTERSECTION DESIGN

The design guidelines follow the "Guidelines for Residential Subdivision Street Design" as published by the Institute of Transportation Engineers. Table 3:

Intersection Design Guidelines denotes three classifications for the type of terrain. In the City of Batavia, the terrain is generally level (has a longitudinal slope of 0-8%). Therefore the guidelines under this classification should be followed.

Criteria	Requirement
Approach Speed (mph)	25
Clear Sight Distance (length along each approach leg)(feet)	90
Minimum Angle of Intersection	70° (90° Preferred)
Minimum Curb Radius (feet)	
a. Local-Local	25
c. Local-Collector	25
g. Collector-Collector	30
h. Collector-Arterial	30
Minimum Centerline Offset of Adjacent Intersection (feet)	
a. Local-Local	125
c. Local-Collector	150
f. Collector-Collector	200
Minimum Tangent Length (feet)	
Approaching Intersection (each length)	50

1. Streets shall be laid out so as to intersect as nearly as possible at right angles. A proposed intersection of two (2) new streets at an angle of less than eighty degrees (80°) shall not be acceptable unless adequate circular radii or angular cutouts are provided. Not more than two (2) streets shall intersect at any one point unless specifically approved by the plan commission.

2. Proposed new intersections along one side of any existing street shall, wherever practicable, coincide with any existing intersections on the opposite side of such street. Street jogs with centerline offsets of less than one hundred twenty five feet (125') shall not be permitted. Where streets intersect major streets, their alignment shall be continuous.

3. The corner lots at a major or secondary intersection shall be truncated by straight lines joining points twenty five feet (25') back from the property line intersection in each quadrant. Road or street dedications at intersections shall take this form, and in cases involving major highways, angular intersections, or in any case where more dedications are deemed necessary to provide safe sight distance or for traffic channelization, the plan commission may specify a greater cutoff than the normal cited above. Other intersections and abrupt changes in alignment within a block shall have the corners cut off in accordance with standard engineering practice, to permit safe vehicular movement.

4. Where any street intersection will involve earth banks or existing vegetation inside any lot corner that would create a traffic hazard by limiting visibility, the developer shall cut such ground and/or vegetation (including trees) in connection with the grading of the public right of way to the extent deemed necessary to provide adequate sight distance.

7.6 SIDEWALKS

7.6.1 Minimum Width

The minimum width for sidewalks is 5 feet, except where the volume of pedestrian or bicycle traffic justifies a greater width, or where parked vehicles may overhang onto the sidewalk. The minimum sidewalk width in the Central Business District is 10 feet.

Area	Minimum Width of Sidewalk
Central Business District	Minimum 10 Feet with grass parkway
Commercial areas	6 feet minimum
Arterial and collector streets	6 feet minimum
Industrial areas	5 feet minimum
Multi-family/single-family	5 feet minimum
Carriage walks (when permitted)	6 feet minimum

7.6.2 Thickness

All new and replacement sidewalks shall have a minimum thickness of five inches (5"). Sidewalks shall have a minimum thickness of six inches (6") for wheelchair ramps, carriage walks and residential driveways. Sidewalks shall have a minimum thickness of eight inches (8”) for commercial driveways.

7.6.3 Material

Appropriate Class concrete shall be used for all sidewalk work and shall be in accordance with the appropriate section of the Illinois department of transportation "Standard Specifications for Road and Bridge Construction" as adopted January 1, 1997, or latest edition thereof.

7.6.4 Location

All sidewalks are to be located such that the outside edge of the walk is 1-foot from the dedicated right-of-way line, and entirely within the dedicated right-of-way. Exceptions may be made, with approval of the city engineer or his designee, to avert trees and other natural features.

7.6.5 Lateral Separation

The minimum lateral separation between the edge of a sidewalk and any above ground obstruction (i.e. posts, poles, tree trunks, utility boxes, etc.) shall be 1-foot. When such conflicts require a lateral change in sidewalk alignment, a 10:1 transition shall be made.

7.6.6 Slope And Grade

Transverse Slope, not to exceed 2% (¼" per foot)

Longitudinal Slope, maximum 5% (20:1)

Longitudinal Slope, in excess of 5% shall meet the requirements of the Illinois Accessibility Code.

7.6.7 Intersections

When a sidewalk approaches an intersection with a street to provide a pedestrian crossing; the curb and adjacent sidewalk shall be depressed, meeting the requirements of the Illinois Accessibility Code.

7.6.8 Sidewalk Construction

Sidewalks shall not be placed until building construction has been completed to the point that construction traffic need no longer cross the sidewalk area. In areas where there are to be no buildings (parks, etc.) sidewalks shall be completed following trench settlement and grading of site.

Sidewalk construction shall be completed prior to the issuance of an occupancy permit, except during periods when weather prohibits the installation of the new walk. In such cases, the owner/builder may execute a bond in an amount equal to that of current city policy, to ensure the work is completed.

Sidewalks are to be continuous through paved areas such as driveways and parking lots.

SECTION 8

STREET LIGHTING / ELECTRICAL DESIGN

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SECTION 8
STREET LIGHTING

8.1 PERFORMANCE STANDARDS

The City of Batavia's Electric Dept. reviews all designs, installs and maintains all street lighting. Streetlights along all local, neighborhood connector and collector streets shall meet the performance standards as notated in the ANSI/IESNA RP-8-00 American National Standard Practice for Roadway Lighting.

Item	Collector Streets	Neighborhood Connector	Local Streets
Maximum FC	δ 5.0	δ 3.5	δ 3.5
Minimum FC	ε 0.3	N/A	N/A
Average FC	ε 1.1	ε 0.4	ε 0.4
Ave./Min. Ratio	δ 4.0	N/A	N/A
Max./Min. Ratio	N/A	N/A	N/A
Bulb	LED	LED	LED
Wattage	250	250	54
Lens	Flat		
IES Distribution Type	Medium Cutoff Type II or Type III		
Maintenance Factor	0.7		
Pole Location	3 to 5 feet From Back of Curb		
Pole	Aluminum - Cement		

Item	Collector Streets	Local Streets
Mounting Height (ft.)	32	23
Mast Arm (ft.)	10	0
Mast Arm Type	Truss or davit arm	Single member taper elliptical type or davit "bent fishing pole" arm

8.2 Approval

Catalog cuts for all components of street lights must be submitted for review and approved prior to installation. The components must meet the requirements set forth in Section 600 of the City of Batavia Standard Specifications. Submittals include, but are not limited to: Poles, mast arms, breakaway couplings, luminaries, photo-cells, conduit, cable, fuses, hand holes, junction boxes, ground rods, and controllers.

8.3 Location

Street Light poles shall be placed at the following locations:

- To be determined by the Illuminance Method Criteria from the lighting study.
- At each intersection, in the “stop sign” position, oriented at an angle of 90 degrees to the alignment of the street.
- Inside of all horizontal curves.
- On each cul-de-sac, at the point where the tangent meets the circular outside of the
- cul-de-sac (throat).
- At mid-block locations such that the spacing identified in the following sections is not exceeded.
- At additional locations where conditions warrant additional lighting per the City Engineer.

8.4 Cul-de-Sac and Local Street Design Standards

8.4.1 Mounting Height

The mounting height shall be 23 feet.

8.4.2 Single Aluminum Pole with Traditionaire Style Fixture

The fixture shall be a 54 Watt LED 120-277V Black.

8.4.3 Street Lighting Controller and Power Source

Street lighting controllers are not required for local streets and cul-de-sacs. Each streetlight shall be individually fed from the nearest power source as indicated by the City of Batavia Public Works Department. Each streetlight shall also be equipped with a photocell.

8.4.4 Spacing

For either staggered or single side layout, street light poles shall be located based on the recommended spacing from the Illuminance Method Criteria from the lighting study, and comply with the performance standards established in ANSI/IESNA RP-8-00 American National Standard Practice for Roadway Lighting.

Guideline

Luminaire	***GE M-C-II***	***GE M-C-III***
100 watt	100 feet	125 feet

8.5 Collector Street Design Standards

8.5.1 Mounting Height

The standard mounting height is 32 feet.

8.5.2 Mast Arm

The mast arm shall be 10 feet long.

8.5.3 Controller and Power Source

All streetlights on collector streets shall be run from a street lighting controller meeting the specifications noted in the City Standards. In general, the controller shall be located in the mid-point of all of the streetlights run by the controller. The power source shall be determined by the City of Batavia Department of Public Utilities/Electric. A photocell shall be placed on the nearest streetlight and connected back to the controller.

8.5.4 Spacing

Street light poles shall be located based on the following recommended spacing, and comply with the performance standards established in ANSI/IESNA RP-8-00 American National Standard Practice for Roadway Lighting.

Staggered Streetlight Layout Guideline

Luminaire	***GE M-C-II***	***GE M-C-III***
250 watt	1	170 feet

Single Side Streetlight Layout Guideline

Luminaire	***GE M-C-II***	***GE M-C-III***
250 watt	1	150 feet

SECTION 9

STORMWATER MANAGEMENT

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SECTION 9
STORMWATER MANAGEMENT

9.1 STORMWATER STORAGE

9.1.1 Functional Classification

Existing floodplain storage will be preserved and maintained for the post-development condition. For streams with mapped FEMA Zone AE floodplain (base floodplain elevations determined and subsequently approved by FEMA), the floodplain will consist of the base flood elevation(s) set onto the approved site topography. For streams with mapped FEMA Zone A floodplain (no base floodplain elevations determined), the floodplain will need to be determined with hydrologic and hydraulic modeling acceptable to the IDNR and the City of Batavia.

9.1.2 Natural Depressional Storage

Isolated depressional areas can provide a significant amount of natural stormwater storage in a watershed. Therefore, they shall be included in determining the natural release rate to be compared to the allowable release rate.

9.2 STORMWATER DETENTION

9.2.1 General

Detention requirements within the City of Batavia are subject to review under the applicable Kane County Stormwater ordinance and the City's amendments. The stormwater release rate is the lesser value of the applicable County release rate or as adopted and modified by the City of Batavia.

The Restrictor Manhole shall be located where it can be accessed by heavy vehicles. Preferably, the access shall be from a paved surface. However, in the event that the restrictor is off pavement, it may be requested that a 10 ft. wide paved path be installed from the closest hard surface to the restrictor manhole to allow heavy vehicular access by the City Engineer and / or Streets Division of Public Works.

9.2.2 Basins

A detention basin is a facility that normally drains completely between runoff events. The maximum side-slopes of a detention basin shall be 4 to 1 (4:1, or 4 feet horizontally for every 1 foot drop in elevation). The maximum depth of stormwater storage in a detention basin shall be 6 feet. This depth is measured from the lowest point in the basin (located at the invert of the outlet pipe or at the rim elevation of an inlet grate) to the design high water elevation as illustrated

below.

The bottom of a detention basin must be sloped toward the outlet or inlet grate(s) to provide drainage after it has stored stormwater. The bottom slope will be a recommended 2 percent with an allowable range of 1.5 percent minimum and 25 percent maximum. The proposed grading conditions shall not result in conditions that will cause water to pond (high water elevation) on adjacent property or to rise within (2) feet of any existing or proposed top of foundation elevations or low opening of a structure.

Flared end sections shall be required in any areas where a storm sewer discharges into a detention basin. Trash grates shall be provided on all flared end sections 12 inches in diameter and greater. Permanent erosion control shall be provided with riprap at all flared end sections. Temporary erosion control in the form of coir logs / coconut rolls or approved equal shall be provided at all outlet flared end sections, and shall be maintained until the topsoil has been adequately stabilized with vegetative cover. All flared end sections greater than or equal to 12 inches that will receive or discharge storm water, shall have a removable grate system to prevent entry. This grate system shall be made from steel stock that is hot-dipped galvanized after fabrication.

9.2.3 Ponds

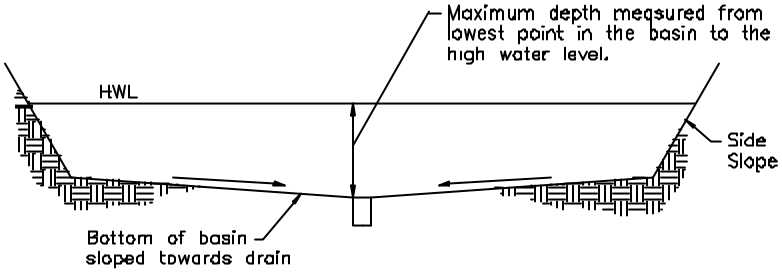
A detention pond is a facility that maintains a fixed minimum water elevation between runoff events. This definition excludes the water volume losses due to infiltration, evaporation, or de-watering due to periodic maintenance. The maximum side-slopes of a detention pond adjacent to a residential area, including multi- family developments, commercial and industrial areas shall be 4 to 1 (4:1, or 4 feet horizontally for every 1 foot drop in elevation). The maximum depth of stormwater storage in a detention pond shall be 6 feet. This depth is measured from the normal water level elevation to the design high water elevation.

9.2.4 Aeration Facilities

Aeration facilities to prevent pond stagnation shall be provided. Design calculations to substantiate the effectiveness of these aeration facilities shall be submitted with final engineering plans. Agreements for the perpetual operation and maintenance of aeration facilities shall be prepared to the satisfaction of the municipality.

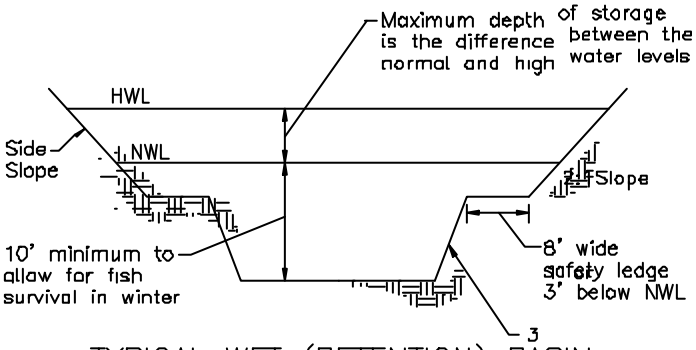
Types of Detention Basins

When detention ponds have been designed to promote the growth of a riparian environment, the use of aeration devices may be waived with approval from the City Engineer.



TYPICAL DRY DETENTION BASIN

At least one quarter of the detention pond area (as measured at the normal water level) shall have a minimum depth of 10 feet below the normal water level to provide a refuge for fish to survive during the winter.



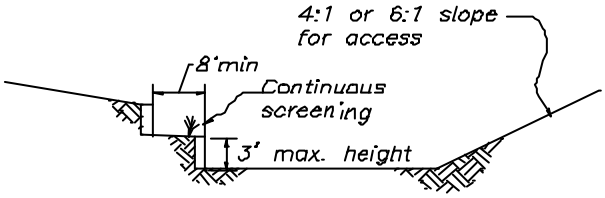
TYPICAL WET (RETENTION) BASIN

A detention pond must have an 8 foot wide safety ledge located 3 feet below the normal water level where emergent plants are not desired, unless a justification is otherwise provided and approved by the City Engineer. This safety ledge provides a stopping point for someone who may have inadvertently fallen into the water.

9.2.5 Retaining Walls Used for Detention Facilities

Retaining walls will be permitted for detention/retention facilities only if it can be demonstrated that there is no practical alternative that would allow the detention/retention facility to be constructed without such walls. Where permitted,

these retaining walls shall not exceed three feet (3') in height. If retaining walls greater than three fee (3') are required, the wall must be terraced after the first three foot (3') lift. A horizontal space of not less than five feet (5') will be required between wall lifts. A landscape buffer will be required around the back of the bottom retaining wall as illustrated below.



PROPOSED RETAINING WALL SECTION

Portland cement concrete walls of any height shall be designed and sealed by a registered professional structural engineer licensed in the State of Illinois. Modular block retaining walls shall be designed and constructed in accordance with the manufacturer's specifications. The appropriate individual(s) licensed and/or certified in the State of Illinois shall provide engineering seals and certifications for modular block wall designs in accordance with the manufacturer's requirements.

9.2.6 Parking Lot Detention

No stormwater storage will be allowed on parking lot surfaces.

9.2.7 Underground Detention

Underground detention/retention facilities will be permitted only if it can be demonstrated that there is no practical alternative that would allow a surface facility to be constructed. The owner of an underground detention/retention facility shall have a qualified engineer, licensed in the state of Illinois, inspect the facility annually and subsequently submit a signed and sealed inspection report to the city engineer. The report shall include any operational and maintenance deficiencies with the facility. If identified, the owner shall append the inspection report with a signed letter that provides a plan and schedule for correcting such deficiencies. Once any deficiencies are corrected, a final signed and sealed inspection report shall be submitted to the city engineer that includes a certification statement that the underground detention/retention facility is operating in full conformance with the original design intent and parameters. The Plat of Dedication and/or Plat of Easement for the development will include specific language to cover this requirement.

9.2.8 Fee-in-Lieu-of Detention

A fee may be paid in lieu of a detention basin or pond if it can be demonstrated that site conditions are such that there is no practical means of constructing such a facility and that there will be no adverse impacts to areas downstream of the site if a detention facility is not provided. The Batavia City Council must approve this alternative before it can be implemented. The fee is the verifiable cost of otherwise providing the required storage, including the value of the land required and all construction costs. For this purpose the land required shall be valued according to the use to which it will ultimately be put if not used to provide the required storage.

9.2.9 Location of Detention Facilities

The minimum separation between the right-of-way of a public street and the high water level of a detention basin or pond is 10 feet plus one and one half times the maximum design depth of the detention facility.

9.2.10 Use of Public Streets for Detention Prohibited

Public street pavements shall not be used for stormwater detention storage.

9.2.11 Fences in Detention Basins and Overflow Routes

Fences are expressly prohibited at any major overflow route locations. Fences shall not be located where they will impede the flow of storm water or drainage. Fences may not be installed in a floodplain as determined by FEMA and designated on the NFIP/FIRM determination maps.

Fences located within a drainage easement must be 50% opaque when water flows through the fence perpendicularly, such as a split rail fence. In the instance where the water runs parallel it may have less openings. Fences that lie within a drainage easement shall have a minimum vertical clearance of 4” from the ground surface to the bottom of the fence to allow free flow of water. The vertical clearance shall be maintained for the entire length of that portion of the fence that is installed in or across the Easement.

9.2.12 Basement Floors

Basement floors shall be a minimum of two feet above the Normal Water Level of any nearby stormwater detention facility.

9.2.13 Letter of Credit

The City of Batavia follows the Kane County Stormwater Ordinance and if a stormwater facility is required the applicant shall provide a letter of credit for 110% of the approved estimated cost to complete the construction of any required stormwater facilities.

The letter can be reduced by up to 90% prior to approval of record drawings and final inspections. A minimum of 10% of the original amount of the security shall be retained for a period of one year after completion of all required stormwater facilities and the facility has been finally inspected and approved by the City Engineer or designee.

9.3 FLOODPLAIN MANAGEMENT

9.3.1 Development Standards

For streams with mapped FEMA Zone AE floodplain (base floodplain elevations determined and subsequently approved by FEMA), the floodplain will consist of the base flood elevation(s) set onto the approved site topography. For streams with mapped FEMA Zone A floodplain (no base floodplain elevations determined), the floodplain will need to be determined with hydrologic and hydraulic modeling acceptable to the IDNR and the City of Batavia with the resulting floodplain delineation based on the approved site topography.

9.3.2 LOMR Requirements

For streams with mapped FEMA Zone A floodplain, there will be, in most cases, a discrepancy between the FEMA delineated Zone A floodplain and the newer, refined delineation. Both delineations need to be shown on the final engineering master grading plan. New development will be allowed in FEMA delineated Zone A floodplain areas that are not part of the approved refined delineation. The developer will be required to apply for and receive a FEMA Letter of Map Revision (LOMR) before the City will issue building permits for the habitable structures proposed for these areas. The City of Batavia will require that the builder submit a FEMA Elevation Certificate for these structures at the time that the Final Grading Survey (FGS) is submitted.

9.4 DRAINAGE & STORMWATER MANAGEMENT REPORT SUBMITTALS

9.4.1 General

All projects that require a stormwater report shall include Form 1 (Flowchart), Form 2 (Permit Application) and Form 3 (Tab 1 Overview) with original signatures and any other applicable Tabs as deemed necessary by Form 1. All reports shall follow the Tabbed format as denoted on the City of Batavia Stormwater forms and any reports that do not will be returned to be revised to follow said format.

The drainage and stormwater report shall including engineering drawings and supporting calculations describing the existing and proposed drainage system as required by the Kane County Stormwater Ordinance.

The following shall be submitted in addition to the information required under the Kane County Stormwater Ordinance:

- A drainage area map indicating the tributary areas and sub-basins within the development. This shall include amount of flows entering the site from off-site upstream tributaries.
- A schematic showing the locations of the Structures and Reaches numbered according to the input data.
- A list of input data, runoff volume, and summary tables.
- A disk shall be submitted containing all input and output files.
- Time of concentration calculations following the TR-55 methodology.
- Supporting documentation for the “CN” value, including a soils map indicating the soils type.
- Input and output data proving that the proposed detention facility will not release more than the existing condition release rate when the restrictor is clogged.

SECTION 10

SOIL EROSION CONTROL

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SECTION 10
SOIL EROSION CONTROL

10.1 Introduction

The developer should take all necessary steps to minimize soil and sediment erosion on the job site. Prior to any construction the developer must possess a soil and erosion control plan that has been approved by Kane DuPage Soil & Water Conservation District, the City of Batavia, and/or the Army Corps of Engineers, and any other applicable agencies and a site development plan approved by the City of Batavia. Acceptance from the Army Corps will be directed through the Kane County Soil and Water Conservation District.

Any violation of this ordinance will result in a notification to the developer from the City of Batavia or Kane DuPage Soil & Water Conservation District. The City Engineer reserves the right to suspend or revoke the developer's site development permit if they feel that the soil erosion and sediment control practices are inadequate.

10.2 NPDES Permit (National Pollution Discharge Elimination System) – IEPA

The Illinois Environmental Protection Agency requires that for any project that meets its criteria both a Notice of Intent (NOI) and Notice of Termination (NOT) be filed for their construction project.

10.2.1 Notice of Intent (NOI)

Under Phase I, operators are required to obtain permit coverage for construction activity that resulted in a total land disturbance of 5 acres or more or less than 5 acres if they were part of a "larger common plan of development or sale" with a planned land disturbance of 5 acres or greater. Phase II reduces that project size to 1 acre or more. The City of Batavia requires a copy of the permit submittal and permit letter.

10.2.2 Notice of Termination

The permittee must submit a Notice of Termination (NOT) to the Agency after the land disturbing activities are complete and the site has been finally stabilized. USEPA considers that a site has been finally stabilized when all land disturbing activities are complete and a uniform perennial vegetative cover with a density of 70 percent of the cover for unpaved areas and areas not covered by permanent structures has been established or equivalent permanent stabilization measures

have been used. The City of Batavia requires a copy of the submittal and approval of the termination from the IEPA.

10.3 Storm Water Pollution Prevention Plans

As part of the Illinois Environmental Protection Agency Notice of Intent (NOI) and the City of Batavia requirement a Storm Water Pollution Prevention Plan must be completed as part of the Final Engineering for the site and approved prior to issuance of a construction permit. The Stormwater Pollution Prevention Plan must follow the NPDES ILR10 permit requirements, see permit, specifically section IV and Kane Dupage Soil & Water Conservation District.

10.3.1 Temporary Soil Erosion Measures

Temporary soil erosion measures should be utilized for shut down of any portion of a site that will not have earthwork completed within the next 14 calendar days and those measures should be placed within 1 day but no more than 14 days after the work ceases. Temporary erosion measures are also required when a site is shut down for the winter. Temporary erosion measures can be used for an interim between mass grading and final buildout of the site.

10.3.2 Permanent Soil Erosion Measures

In order for soil erosion to be considered permanent and able to close out a project either one of the two following conditions need to be met:

- A uniform vegetative cover with a 70% density has been established on all unpaved areas and not covered by permanent structures, or
- Permanent stabilization measures such as riprap, gabions, or geo-textiles have been utilized.

10.4 Letter of Credit

The City of Batavia follows the Kane County Stormwater Ordinance and if an erosion control plan is required the applicant shall provide a letter of credit for 110% of the approved estimated cost to install and maintain the erosion and sediment control measures.

The letter will be released once the construction has been completed, the vegetation has been established, sediment has been removed from all stormwater facilities and the development has been finally inspected and approved by the City Engineer or designee.

10.5 Inspections

The City of Batavia requires inspections of all soil erosion measures prior to

earthwork commencing to ensure they are in place per plan and installed per the approved details. Contact the Engineering Department at (630) 454-2750 at least 48 hours in advance to schedule the inspection.

10.6 Guides & Other Regulatory Agencies

10.6.1 Kane DuPage Soil & Water Conservation District

The City has retained Kane DuPage Soil & Water Conservation District to review all incoming plans one (1) acre in size and larger in regards to erosion control and inspect the site during construction all the way through stabilization. Smaller sites may require just a review of the erosion control measures dependant of type of improvement and proximity to wetlands, waterways, etc. A permit application needs to be filed with KDSWCD concurrently with the City of Batavia Building Plan review of the Engineering plans. A sign-off from the Engineering Department will not be released until the City of Batavia has KDSWCD sign-off in hand.

10.6.2 Kane County Stormwater Ordinance & Technical Manual for Best Management Practices

The City of Batavia has adopted the Kane County Stormwater Ordinance and under Article 3 of both the Stormwater Ordinance and the Technical Manual for BMPs there are standards to follow for Erosion and Sediment Control. These regulations shall be followed as adopted. (Ord. 01-36, Ord. 02-03, Ord. 05-13)

10.6.3 Illinois Urban Manual

The City of Batavia follows the erosion details of the most up-to-date online version of the Illinois Urban Manual.