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4. A vacuum of ten (10”) inches of mercury shall be placed on the manhole and the time measured for the vacuum to drop to nine (9”) inches of mercury. The vacuum shall not drop below nine (9”) inches of mercury for the following time periods:
 - 48” diameter manhole – sixty (60) seconds
 - 72” diameter manhole – ninety (90) seconds
5. If the test fails, the contractor shall seal all leaks and re-test until acceptable.
6. All necessary repairs or seals shall be done on the exterior of the manhole, not from the inside.

SECTION 8.40 – STORM WATER DRAINAGE

8.401 – INTRODUCTION

All developments, regardless of size within the corporate limits or under the control of the Village, shall include provisions for the construction of storm water drainage facilities designed in accordance with this Section. (The only exception allowed by the Village Engineer would be the redevelopment of a site that is already predominantly covered with impervious surfaces, then the Village Engineer may use “Best Management Practices” i.e. BMPs for storm water management and water quality at the discretion of the Village Engineer) The design of all storm water drainage facilities proposed for construction as independent projects under the control of the Village shall also meet the technical requirements of this Section. The requirements of Section 8.2 are also applicable to storm water facility construction.

8.402 – GENERAL PROJECT REQUIREMENTS

8.402A. SURFACE FLOW:

Surface swales/ditches are described in Article 8.404C. Natural swales and depressional storage areas shall be incorporated into storm water facilities design wherever practicable. Swales and ditches, together with any underground storm sewer system, shall provide an adequate outfall for runoff from the 100-year frequency, critical duration rainstorm. ~~*In areas where swales/ditches cannot be provided, the underground storm sewer system shall be designed for the 100-year storm condition.*~~ In case the storm sewers *or the inlets* get blocked, there shall always be a viable 100-year overland flow route. Said 100-year overland flow routes shall be designed to:

- Limit depth of ponding to a maximum of one foot on top of a storm sewer structure in a rear/side yard;
- Limit depth of ponding to a maximum of six inches at a street crown or extend a maximum of six feet into the street from the gutter (in a designated overland flood route) and the top of curb shall remain visible;
- Streets designated as an overland flood route shall limit the ponding to the roadway and not encroach into the parkway area; *and,*
- Limit the computed design velocities to a maximum of 4 ft/sec; applicable to both swales and street overflows.

Where allowed by the Village Engineer, storm sewers may be constructed to drain the development and any contiguous drainage areas. The owner/developer shall submit to the Village Engineer two (2) copies of the storm drainage computations.

8.402B. STORM WATER DETENTION:

Storm detention is required and subject to the review of the Village Engineer. In concept, a detention pond shall have high-water level based on a 100-year design storm and shall have an outlet for low flows and flood (100 year) flows. Detention to be provided shall be for the entire site evaluated in its *natural developed* state and shall be constructed prior to all other improvements. This shall include mass grading and all necessary erosion control measures. See section 8.403 for further details.

8.402C. DRAINAGE BASIN DIVIDES:

The design of storm water drainage systems shall not result in the inter-basin transfer of drainage, unless no reasonable alternative exists and there is no legal restraint preventing such transfer. Any transfer will require detailed supporting calculations showing no net change up to and including the 100-year storm event.

8.402D. SUMP PUMP CONNECTIONS:

All new subdivisions will supply a minimum 4" diameter PVC service connection for each unit or habitable lot in said subdivision. The minimum size of a sump collection line servicing more than one house sump connection shall be a 6" diameter PVC SDR 26 and all such lines shall have an approved clean out structure at its terminus. The pipe from the house shall be the responsibility of the house builder and shall be a minimum 4" diameter PVC pipe with an approved air-gap system immediately outside the house for the event of a pipe blockage. Minimum depth of cover shall be 36". All connections to the storm sewer system shall be through a neat, tight fitting bored hole and the joint shall be sealed with hydraulic cement. In no case shall the sump pump connection extend beyond the inner surface of the storm structure to which it is connected. All work must be approved, inspected and verified by the Village or their representative prior to the issuance of an occupancy permit.

8.402E. LOT GRADING:

The location and top of foundation elevation for all proposed structures shall be shown on the engineering drawings. Generally, the top of foundation of any structure must be constructed at least 18 inches above the centerline (or back of curb) of the abutting street. Where foundations are lower than the street centerline, or in the case of depressed driveways, alternate means of surface drainage diversion must be shown to avoid structure flooding. Sufficient finished grade elevations must be shown on the drawings to ensure positive drainage away from each structure. The top of foundation should be at least 18" above the 100-year water surface elevation of adjacent overflow routes. The lowest opening in the foundation must also be taken into consideration when siting overflow routes and the high water levels of adjacent retention basins. ***All rear yard, side yard, ditch, and drainage way grades should be at least 2 percent minimum slopes, unless otherwise approved by the Village Engineer.***

8.403 – DESIGN CRITERIA FOR STORM WATER MANAGEMENT

8.403A – RELEASE RATES

The maximum allowable release rates are 0.04 cubic feet per second per acre for the two-year frequency storm and 0.15 cubic feet per second per acre for the 100-year storm. A single release rate of 0.10 cubic feet per second per acre for the 100-year frequency storm is also considered to satisfy the requirement of this Section. *The Village Engineer may require a developer to adhere to a release rate as recommended by a published watershed study, for example, the Blackberry and Aux Sable Creeks.* In no case shall the allowable release rate from the site exceed the site's existing release rate.

8.403B – DESIGN CALCULATIONS

The design of storm water detention facilities shall be based on runoff hydrographs from the two (2) year and one hundred (100) year frequency, critical duration rainstorms. The modified rational formula shall not be used for development of hydrographs. All design rainfall events shall be based on the Illinois State Water Survey, Bulletin 70 isohyetal intensities, *as established by the Village Engineer.* All design computations that do not rely on continuous accounting of antecedent soil moisture conditions shall assume “wet” conditions. Storm water runoff from areas tributary to the site shall be considered in the equations for the design of the project site drainage system. If the tributary areas are undeveloped or do not meet release rate requirements, the Owner/Developer may bypass all tributary area flows around rather than through the storage facility. Runoff calculations for all undeveloped tributary land shall assume a reasonable fully developed land cover based on anticipated zoning.

8.403C – BASIN DESIGN

Wet Bottom: The use of wet-bottom detention basins shall be ~~encouraged~~ and designed to be safe, aesthetically pleasing, and available for recreational use if desired by the Village or Park District. *The Village places a preference on dry-bottom basins over wet-bottom basins. In considering allowing wet-bottom basins within a development, the Village will only allow wet-bottom basins in areas that: have natural springs, high groundwater tables, large diameter and continually flowing field tiles, or some other source of continual water supply. Basins to be deeded to the Park District for recreational uses, shall meet the Park District criteria for vegetation, basin slope, and placement of the storm sewer structures, and shall be accepted by the Park District prior to the release of financial sureties.* Wet-bottom basins shall be a recommended minimum six feet (6') deep, excluding near-shore banks and safety ledges, *with a recommended ratio of watershed area (i.e. tributary area) to basin normal pool surface area of 25:1 to enhance the frequency of “turnover” of water in the basin and the overall water quality of the basin. Wet detention basins shall be designed to have a natural appearance with undulating shorelines and varying side slopes.* If fish habitat is provided, at least 25 percent (25%) of the bottom area shall be a minimum of ten feet (10') deep. Wet-bottom basins shall be designed to remove storm water pollutants and sediments *with pretreatment basins capable of capturing and retaining the initial ¾ inch of rainfall*, and designed in such a manner to reduce nuisance problems such as embankment erosion and algae. Wet-bottom basins shall provide a recommended maximum “bounce” or storage depth of four (4') feet. Aeration shall be provided

(with the preferred method being natural appearing waterfalls or cascades and “bubblers”, over mechanical fountain type aerators) as required by the Village Engineer. Embankments above normal water levels shall be either terraced or sloped at not greater than four to one (4:1) slopes to the 100-year high water level. Safety ledges shall be 1’ below the normal water level measured from the highest point of the ledge. Such ledges shall be not less than six (6’) ten (10’) feet wide and shall be back pitched at a 2% slope towards the basin embankment. The safety ledges shall be sufficiently planted with aquatic plantings at the discretion of the Village Arborist. A minimum of the first ten (10’) feet of the shoreline extending up from the normal water level of wet-bottom basins shall be stabilized and protected from erosion with deep-rooted appropriate native plantings; or reinforced turf mat (geotextiles) may be used at the Village Engineer’s discretion. These native plantings must be properly maintained/weeded and protected.

In areas of permeable soils, a suitable basin lining must be constructed with either a minimum of three (3’) feet of properly compacted clay or a manufactured lining system/polymer installed in full compliance with the manufacturer’s recommendations. The developer’s geotechnical consultant shall be responsible for: assuring the field conditions are consistent with those identified in the project geotechnical report, oversight of the basin/lining construction, compaction testing, and to ensure the basin holds water as per design. Utility trenches that cross or connect the basin shall have compacted clay cut-off trench seals installed to prohibit the migration of ground water from the basin. The use of a privately owned well for replenishment purposes will not be allowed, and the basin shall not be used for irrigation purposes without the Village’s consent.

All wet-bottom basins shall be maintained by the developer for plantings and leakage for a minimum of five (5) years after substantial completion of the basin. The developer shall also be required to provide the Village with a separate acceptable financial surety covering the cost of the construction of the basin, including the cost of excavation, pertinent storm sewer structures, weirs/restrictors, erosion control, and plantings. The Village will hold onto the surety until the five (5) year maintenance period has been successfully completed. The developer must submit to the eventual owner of the basin (i.e. Homeowner’s Association, Park District, or Village) a basin maintenance plan and estimated budget for the basin prior to transfer of ownership. The developer shall also provide the eventual owner of the basin with Village Engineer approved record “as-built” drawings and stage versus storage calculations for the basin. The developer shall notify the Village prior to the transfer of ownership of the basin.

Dry Bottom: Dry-bottom detention basins shall be *encouraged and* designed to be safe, aesthetically pleasing, easily maintainable, and available for multiple uses. *The Village places a preference on dry-bottom basins over wet-bottom basins. Basins to be deeded to the Park District for recreational uses, shall meet the Park District criteria for vegetation, basin slope, and placement of the storm sewer structures, and shall be accepted by the Park District prior to the issuance of any occupancy permits within that development.* Dry-bottom detention basins shall be designed and sized such that a minimum of eighty (80%) percent of the bottom area shall have standing water no longer than 72 hours for the 100-year frequency storm. The basin bottom shall have a minimum slope of two (2%) percent and a maximum embankment slope of four to one (4:1). The length of low flow channels across the bottom of the basin shall be maximized. Concrete low flow channels across the bottom are prohibited. *Wherever*

geologically feasible, the design of the dry basin should promote the safe recharge of the ground water aquifer, and provide for enhanced water quality with native deep rooted vegetation and pretreatment basins capable of capturing and retaining the initial $\frac{3}{4}$ inch of rainfall. Other methods of enhancing the water quality include filter strips, buffer strips, level spreaders, and rain gardens, as approved by the Village Engineer. All of these measures are dependant upon an ongoing maintenance program by the basin owner to keep these measures operating correctly.

Wetland Bottom: *Wetland bottom basins having pools of water less than six (6') feet deep will not be allowed by the Village Engineer. Such basins are only allowed by the Village Board.*

8.403D – OUTLET

All concentrated storm water discharges leaving a site must be directed into a well-defined receiving channel with adequate capacity for safe conveyance of flows. *Computations addressing the downstream tailwater conditions, if applicable, shall be provided for review by the Village Engineer.*

Single pipe outlets shall have a minimum inside diameter of 12-inches. All outlets greater than 12 inches shall be grated. The preferred structure is an IDOT approved slope box, but flared end sections may be used at the discretion of the Village Engineer. If design release rates call for smaller outlets, structures such as perforated risers, flow control orifices, etc., shall be used with the approval of the Village Engineer. *Restrictor pipes shall be a minimum of 4-inches in diameter; smaller structures shall be at the discretion of the Village Engineer and shall be designed to limit potential for clogging. If offsite tributary areas are to be routed through the detention basin, the restrictor sizes shall be increased to accommodate these tributary areas at Ordinance required release rates while maintaining calculated basin high water levels.*

8.403E – TIME OF CONCENTRATION

Time of concentration (Tc) shall be provided for all calculations. The maximum Tc for rational method calculations will be 20 minutes. The maximum length of overland flow for the Tc calculation *for sheet flow* is three hundred (300') feet. An overland flow route delineated through the development should be submitted with all calculations.

8.403F – WEIR DESIGN AND FREE BOARD

The overflow weir shall be based on a design flow of 1 cfs/acre of tributary area (including off-site areas, if any). The basin's berm shall have a minimum of one (1') foot free board between the water surface elevation through the weir and the top of berm. Example: If the 100 year flow depth through the weir is 0.5', then the difference between the weir invert and the top of the berm shall be 1.5'.

8.404 – DESIGN CRITERIA FOR STORM SEWERS AND SURFACE SWALES

8.404A – STORM SEWER

1. Storm sewers shall be designed to convey a ten-year storm flowing full (no pressure flow), using Manning's Formula with an appropriate roughness coefficient based on pipe material. If a storm sewer is designed with a constantly submerged outfall, the sewer shall be designed using the "hydraulic gradient" being at least 1' below all rim elevations.
2. The rational method shall be employed when computing storm runoff for storm sewer design. The storm system shall be designed with "positive street and swale drainage" such that in the event of a complete storm system failure, storm water runoff will be directed overland to the storm water detention area in a manner to minimize property damage due to flooding *in accordance with the requirements in 8.402A "Surface Flow"*.
3. Storm sewers shall be designed to flow full and have a velocity between three (3) feet per second and ten (10) feet per second. The IDF curve for a ten (10) year storm intensity in the Oswego, Illinois area shall be used for design purposes.
4. In areas where curb and gutter and storm sewers are approved, inlets shall be installed so that the approximate distance between each inlet shall not exceed three hundred feet (300') and each inlet shall drain a maximum street gutter length of three hundred (300') feet. The Design Engineer shall provide inlet spacing calculations based on the type of proposed grate and slope to verify the inlet spacing. Where the inlet is located at a low point, the Village Engineer may require additional inlets. No more than two (2) inlets shall be interconnected. Inlets shall be so located that storm water encroaches no more than three (3) feet into the pavement. Depressed street crowns to facilitate drainage will not be permitted.
5. Yard inlets shall be placed where required by the Village Engineer and shall have the appropriate grate type.
6. The minimum size *public* storm sewer shall be twelve (12") in diameter, ~~and the minimum size inlet connection shall be ten (10") inches in diameter.~~ *To avoid conflicts with electric/phone/cable utilities, storm sewers larger than twenty four (24") inches in diameter will not typically be allowed in either the side or rear yards of residential lots, unless otherwise approved by the Village Engineer. All public storm sewers shall be located in dedicated utility easements.*
7. Unless otherwise approved by the Village Engineer, storm sewers shall be reinforced concrete pipe conforming to ASTM C76 minimum Class III with O-ring joints conforming to ASTM C443. All inlet connections shall be concrete sewer pipe, ASTM C14 for extra strength pipe.
8. Minimum cover shall be generally three feet (3'-0") for all storm sewers unless special precautions are taken to protect the pipe, as approved by the Village Engineer.
9. All manholes, inlet manholes, inlets, and catch basins, and headwalls shall be designed in accordance with the standard details of the Village.
10. Upon installation, all public storm sewer mains shall be internally video taped by remote camera. Tapes shall be in color of VHS format (or other format acceptable to the Village) and submitted to the Village Public Works Department for their review and approval prior to acceptance of the sewer improvements by the Village.
11. *The developer/contractor shall supply to the Village Public Works Department an inventory equal to at least one (1%) percent (minimum one casting) of the number of manhole, inlet, or catch basin castings installed along the public streets and for public parking lots for the development. This inventory type shall be at the discretion of the Public Works Director and used by the Village to replace storm sewer system components that are damaged after expiration of the guarantee period.*

8.404B – CULVERTS

Wherever culverts are allowed by the Village Engineer, culverts shall meet the following minimum standards:

1. Minimum pipe diameter of twelve (12") inches.
2. Corrugated metal pipe (CMP) shall be hot-dipped galvanized steel or aluminum steel conforming to AASTO M36. Provide 16 gauge CMP for pipe diameter twenty-one (21") inches and smaller. Provide 12 gauge CMP for pipe diameters twenty-four (24") inches and larger.
3. Reinforced concrete pipe (RCP) shall conform to ASTM C76, minimum Class III.
4. ***Plastic culvert pipe will not be allowed within the public right of way, unless allowed by the Village Engineer.***
5. Culvert invert elevations shall be 3" less than the ditch invert elevations.
6. Minimum cover at driveways shall be six (6") inches.
7. Culverts will be designed to convey a thirty-(30) year storm with less than 0.1' of head created above the natural (without culvert) conditions. The calculation method shall be the rational method for areas up to 20 tributary acres. Tributary areas greater than 20 acres shall be computed using a hydrograph method (HEC-1, ***HEC-HMS*** or TR-20, ***or approved equivalent***).
8. No one hundred (100) year storm overtopping of the road is allowed.

8.404C – SWALES/DITCHES

Wherever swales and ditches are allowed by the Village Engineer, swales and ditches shall meet the following minimum standards. (Ditches and culverts may be used in lieu of storm sewers if curbs and gutters are not required.)

1. Minimum grade of one and one-half (1.5%) percent. Preferred slope is two (2%) percent.
2. Maximum grade of ten (10%) percent.
3. Minimum depth of twenty-four (24") below the shoulder of the street.
4. Maximum bank slope of 3:1 under normal conditions.
5. The bottom and banks of ditches with grades between 4 and 8 percent shall be sodded and equipped with permanent ditch checks.
6. The bottom and banks of ditches with grades between 8 and 10 percent shall be paved or otherwise stabilized as approved by the Village Engineer.
7. All areas of the property must be provided with an overland flow path that will pass the 100-year flow at a stage at least eighteen inches (18") below the lowest foundation grades in the vicinity of the flow path. Overland flow paths designed for flows in excess of the minor drainage system capacity are required to be contained in dedicated drainage easements.
8. Ditches will be designed to convey a minimum of a thirty-(30) year storm, and in some instances, a one hundred (100) year storm ditch may be necessary at the discretion of the Village Engineer.
9. Ditches should be trapezoidal shaped and have a 2' bottom.

8.405 – WETLANDS/DEPRESSIONAL AREAS

8.405A – DETENTION IN WETLANDS

Existing wetlands as defined in Section 1 shall not be modified or used for the purposes of storm water detention unless it is demonstrated that the proposed modifications will maintain or improve the wetlands beneficial functions. Concurrence from a wetland specialist and/or the Army Corps of Engineers will be required. Prior to discharge into wetlands, all runoff from development shall be routed through an appropriately planned and designed sedimentation basin as described in the “Procedures and Standards for Urban Soil Erosion and Sedimentation Control”. This basin shall be constructed before site clearing and grading. Wetlands will be delineated by the owner’s/developer’s Design Engineer or a sub-consultant. Where the terms of this ordinance conflict with the Village’s separate wetland ordinance, the terms of the separate wetland ordinance shall govern.

8.405B – DEPRESSIONAL STORAGE AREAS

Existing depressional storage in wetlands or depressional areas shall be analyzed as part of the critical duration existing watershed analysis. In no case shall the developed release rate exceed the existing release rate of the watershed. If the existing release rate is found to be less than that required by Ordinance for developments, then the developed release rate shall be reduced as to not exceed the existing release rate.

~~*Existing depressional storage in wetlands or depressional areas shall be maintained or compensated for on a 1:1 basis. The volume of detention storage required to meet the requirements of this section shall be in addition to any existing depressional storage.*~~

~~*Depressional areas shall have their volume determined using the 100-year, ten-day storm or the critical duration storm that results in overflows. Multiple durations may be required.*~~

8.405C – CONSTRUCTION IN WETLANDS

If wetlands are part of a storm water management system that proposes topographic change activities involving excavation and/or deposition within the wetlands, a permit may be required from the U.S. Army Corps of Engineers (COE).

As a condition of Village approval of any storm water management system including all detention areas, swales, sewers, berms, etc. which involve wetlands and prior to submission of the final plat of subdivision to the Plan Commission, a permit shall be obtained from the COE or, if a permit is not required, a sign-off letter from the COE must be provided. Any development that has wetlands on the site must obtain a COE sign-off even if the wetlands are not being impacted by the proposed development.

8.405D – ENDANGERED SPECIES

In conformance with the Endangered Species Protection Act, effective December 3, 1990, the Village is required to consult with the Illinois Department of Natural Resources (IDNR) prior to final platting of certain land developments.

As a condition of Village approval of such plats, a determination must be obtained from IDOC, either stating that no further consultation is required or stating recommendations for minimizing or avoiding impacts on endangered species. Although the Village will file the application for an IDOC determination, the Owner/Developer will be required to prepare the application, and to provide any subsequent documentation that may be requested to conform to the intent of the Act.

8.405E – CONSTRUCTION IN FLOODPLAIN

If construction activities are necessary in the regulatory floodplain, all requirements of the Village of Oswego floodplain ordinance shall be met and IDNR-OWR permits may also be required. Detention shall not be allowed in floodplain or floodway unless it can be demonstrated that a regional benefit will result and that water quality and habitat for plants and animals is maintained or enhanced. Any development related correspondence between the Design Engineer and the IDNR-OWR shall be submitted for review to assist in determining proper jurisdiction. Where the terms of this ordinance conflict with the Village’s separate floodplain ordinance, the terms of the separate floodplain ordinance shall govern.

8.406 – FARM TILES

All developments, regardless of size within the corporate limits or under the control of the Village, shall investigate the site for existing farm tile drainage systems. Any field tile systems cut during the process of land development must be properly reconnected. All existing farm tile drainage systems shall be either connected into the development’s proposed storm sewer system or left intact. Connection of existing agricultural drain tiles to new storm water management systems may be approved if proper allowance for flows from said tiles are incorporated in the new system design. Connecting farm tiles to sanitary sewers will not be permitted.

SECTION 8.50 – WATER SYSTEM

8.501 – INTRODUCTION

All developments within the corporate limits, and any development under Village jurisdiction shall include provisions for a complete water supply system and the construction of water distribution facilities, complete with valves, fire hydrants and other appurtenances designed in accordance with this Section and with the applicable “Standard Specifications for Water and Sewer Main Construction in Illinois” unless noted otherwise in the following sections. As a minimum, the distribution system shall include a system of water mains and service lines between a connection or connections to the existing distribution system at approved locations.

The design of all water distribution system facilities proposed for construction as independent projects under the Village jurisdiction shall also meet the technical requirements of this Section.