VILLAGE OF FRANKFORT

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DESIGN STANDARDS

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VILLAGE OF FRANKFORT - DESIGN STANDARDS

SECTION 1 - ENGINEERING AND ADMINISTRATIVE PROCEDURES

1.01 INTRODUCTION

These standards have been prepared to insure that the design and construction of public improvements will meet the minimum requirements of the Village. The intent of Section 1 is to provide an overview of requirements and procedures required by the Subdivision Ordinance, which govern the design and construction of public improvements. These standards are also intended to provide uniform design criteria for facilities designed for or directly by the Village, as well as provide specifications for private development within the Village.

1.02 DEFINITION OF TERMS

For the purposes of all sections of this Ordinance certain terms used herein are defined as set forth below:

<u>Adverse Impacts</u>: Any deleterious impact on water resources or wetlands affecting their beneficial uses including recreation, aesthetics, aquatic habitat, quality, and quantity.

<u>Alley:</u> A strip of land, not less than 20 feet and not more than 30 feet in width along the side or in the rear of properties, intended to provide access to these properties. A 16-foot alley may be considered for a one-way alley.

<u>Applicant</u>: Any person, firm, or governmental agency who executes the necessary forms to procure official approval of a development or permit to carry out construction of a development from the Village of Frankfort.

<u>Armoring:</u> a form of channel modification which involves the placement of materials (concrete, riprap, bulkheads, etc.) within a stream channel or along a shore line to protect property above streams, lakes and ponds from erosion and wave damage caused by wave action and stream flow.

<u>Base Flood Elevation</u>: The elevation at all locations delineating the level of flooding resulting from the 100-year frequency flood event.

<u>Bounce</u>: Distance between the calculated 100-year high water level and normal water level (or in the case of a dry bottom facility, the distance between the calculated 100-year high water level and outlet elevation).

<u>Building Permit:</u> A permit issued by the Village for the construction, erection or alteration of a structure or building.

Bulkhead: means a retaining wall that protects property along water.

<u>Bypass Flows</u>: Stormwater runoff from upstream properties tributary to a property's drainage system but not under its control.

<u>Certify or Certification:</u> Formally attesting that the specific inspections and tests where required have been performed, and that such tests comply with the applicable requirements of this Ordinance.

<u>Channel:</u> A natural or artificial watercourse, including, but not limited to a river, stream, creek, brook, branch, natural or artificial depression, ponded area, flowage, slough, ditch, conduit, culvert, gully, ravine, wash, or natural or manmade drainageway, which has a definite bed and bank or shoreline, in or into which surface or groundwater flows, either perennially or intermittently, has perceptible extent, or which forms a connecting link between two bodies of water.

<u>Channel modification or channelization</u>: To alter a watercourse by changing the physical dimension or materials of the channel bed or banks. Channel modification includes damming, riprapping (or other armoring), widening, deepening, straightening, relocating, lining and significant removal of bottom or woody rooted vegetation. Channel modification does not include the clearing of debris or trash from the watercourse. Channelization is a severe form of channel modification involving a significant change in the channel cross-section and typically involving relocation of the existing channel (e.g. straightening).

Clearing: Any activity which removes vegetative ground cover.

<u>Compensatory Storage</u>: An artificially excavated, hydraulically equivalent volume of storage within the floodplain used to balance the loss of natural flood storage capacity when fill or structures are placed within the floodplain.

<u>Conduit:</u> Any channel, pipe, sewer or culvert used for the conveyance or movement of water, whether open or closed. Also, a buried pipe for the installation of wires or cables or the conveyance of gas, water, storm water or sewage.

<u>Control structure</u>: A structure designed to control the rate of stormwater runoff that passes through the structure, given a specific upstream and downstream water surface elevation.

<u>Critical Duration</u>: The duration of a storm event that results in the greatest peak runoff. However, in such events where one duration results in the peak runoff and another duration results in the maximum storage volume required, the design shall provide sufficient volume for all storm durations while maintaining a release rate at or below the allowable release rate for that storm event. (See Section 4.03E-1).

<u>Contractor:</u> An individual, company, firm or other party of organization who contracts to physically construct all or a portion of a project for either an Owner/Developer or the Village.

<u>Cradle:</u> Bedding placed under and around a conduit for proper support.

<u>Cubic Yards:</u> The amount of material in excavation and/or fill measured by the method of "average end areas."

<u>Cul-de-sac</u>: A Street having one open end and being permanently terminated by a vehicle turnaround.

<u>Culvert:</u> A structure designed to carry drainage water or small streams below barriers such as roads, driveways, or railway embankments.

<u>Design Engineer:</u> The individual or firm retained by the Owner/Developer who is responsible for the design and preparation of construction documents for a project.

<u>Depressional area:</u> Any area which is lower in elevation on all sides than surrounding properties (i.e. does not drain freely), or whose drainage is severely limited such as by a restrictive culvert. A depressional area will fill with water on occasion when runoff into it exceeds the rate of infiltration into underlying soil or exceeds the discharge through its controlled outlet. Large depressional areas may provide significant stormwater or floodplain storage.

<u>Detention Basin</u>: A facility constructed or modified to provide for the temporary storage of stormwater runoff and the controlled release by gravity of this runoff at a prescribed rate during and after a flood or storm.

<u>Development:</u> The carrying out of any building, agricultural, or mining operation, or the making of any change in the use or appearance of land, the dividing of land into two or more parcels or creation of a Planned Unit Development. The following activities or uses shall be taken, for the purposes of this ordinance, to involve development as defined herein:

- a. Clearing of land as an adjunct of construction for agricultural, private residential, commercial or industrial use
- b. Redevelopment of a site and any construction, reconstruction, or alteration of structure or materials to occupy more or less ground area, or the on-site preparation for same;
- c. Construction, excavation or filling relating to the creating or modification of roads, parking lots, dams, bridges, culverts, fences or similar projects, including but not limited to the installation of utilities:
- d. Filling, mining, dredging, grading, clearing, excavating, drilling (except to obtain soil samples), paving, or other non-agricultural alterations of the ground surface/existing topography;
- e. Any agricultural use of land including, but not limited to, the use of land in horticulture, floriculture, forestry, dairy, livestock, poultry, beekeeping, pisciculture, and all forms of farm products and farm production;
- f. Deposit of refuse, solid or liquid waste; fill on a parcel of land; or storage of materials;
- g. Installation of a manufactured home on a site, preparing a site for a manufactured home, or installing a travel trailer on a site for more than 180 days;
- h. Any other activity that might alter the magnitude, frequency, deviation, direction, or velocity of stormwater flows from a property.

<u>District:</u> The Lowland Conservancy Overlay District as defined in Section 4.05D (2) of this ordinance.

<u>Drainage Plan</u>: A plan, including engineering drawings and supporting calculations, which describes the existing stormwater drainage system and environmental features, as well as the drainage system and environmental features which are proposed after development of a property.

<u>Drainage Way:</u> Any channel that conveys surface runoff through the site.

<u>Drawdown Time</u>: The time in which a pond holds water and/or the period of inundation in which the side slope plantings are subjected to water levels after a storm event. For intents of the Village of Frankfort review, the drawdown time shall be calculated after the pond fills to six inches (6") above the normal level to the time the pond empties to the six inches (6") above the normal water level. The drawdown time shall be identified on the time vs. elevation data and graphically illustrated.

<u>Dry Basin</u>: A detention basin designed to drain completely after temporary storage of stormwater flows and to normally be dry over the majority of its bottom area.

<u>Easement:</u> A grant by a property owner for the use of a strip or parcel of land by the general public, a corporation, or a certain person or persons for a specific purpose or purposes.

<u>Emergency Overland Flow Route:</u> The drainage system that conveys the 100-year storm over land, beyond the capacity of storm sewer, culverts, etc. in the event of complete storm sewer failure.

<u>Erosion:</u> The general process whereby soils are moved by flowing water, wind or wave action.

<u>Erosion and Sediment Control Plan:</u> A plan prepared by or under the direction of a licensed professional engineer indicating the specific measures and sequencing to be used to control sediment and erosion on a development site during and after construction.

Erosion Control: A measure that prevents erosion.

<u>Excavation</u>: Any act by which organic matter, earth, sand, gravel, rock or any other similar, material is cut into, dug, quarried, uncovered, removed, displaced, relocated or bulldozed and shall include the conditions resulting therefrom.

<u>Excess Stormwater Run-off</u>: The volume and rate of flow of stormwater discharged from an urbanized drainage area which is or will be in excess of that volume and rate which pertained before urbanization.

Existing Grade: The vertical location of the existing ground surface prior to excavation or filling.

<u>Fill:</u> Any act by which, earth, sand, gravel, rock or any other material is deposited, placed, replaced, pushed, dumped, pulled, transported or moved by man and machine to a new location and shall include the conditions resulting therefrom.

<u>Filtered View:</u> means the maintenance or establishment of woody vegetation of sufficient density to screen developments from a stream or wet land, to provide for streambank stabilization and erosion control, to serve as an aid to infiltration of surface runoff, and to provide cover to shade the water. The vegetation need not be so dense as to completely block the view. Filtered view means no clear cutting.

<u>Final Grade:</u> The vertical location of the ground or pavement surface after the grading work is completed in accordance with the site development plan.

<u>Flood Fringe</u>: That portion of the floodplain outside of the regulatory floodway.

Floodplain: That land typically adjacent to a body of water with ground surface elevations at or below the base flood or the 100-year frequency flood elevation. Flood plains may also include detached Special Flood Hazard Areas, ponding areas, etc. The flood plain is also known as the Special Flood Hazard Area (SFHA). The floodplains are those lands within the jurisdiction of the Village of Frankfort that are subject to inundation by the base flood or 100-year frequency flood. The SFHA's of the Village of Frankfort, those parts of unincorporated Will County that are within the extraterritorial jurisdiction of the Village, or those parts of unincorporated Will County that may be annexed into the Village, are generally identified as such on the countywide Flood Insurance Rate Map of Will County, Illinois and Incorporated Areas prepared by the Federal Emergency Management Agency and as amended from time to time.

<u>Floodway</u>: That portion of the floodplain (sometimes referred to as the base flood or Special Flood Hazard Area) required to store and convey the base flood. The floodway is the 100 year floodway as designated and regulated by the Illinois Department of Natural Resources Office of Water Resources (IDNR/OWR). The remainder of the floodplain that is outside the regulatory floodway is referred to as the flood fringe or floodway fringe. Also, the portion of the floodplain adjacent to a stream or watercourse which is needed to store and convey the anticipated existing and future 100-year frequency flood discharge with no more than a 0.1 foot increase in stage due to any loss of flood conveyance or storage and no more than a ten percent increase in velocities

<u>Freeboard:</u> An increment of height added to the base flood elevation or 100-year design water surface elevation to provide a factor of safety for uncertainties in calculations, unknown local conditions, wave actions and unpredictable effects such as those caused by ice or debris jams.

<u>Grading:</u> Excavation or fill or any combination thereof and shall include the conditions resulting from any excavation or fill.

Hydraulic characteristics: The features of a watercourse that determine its water conveyance capacity. These features include but are not limited to: size and configuration of the cross-section of the watercourse and floodway; texture and roughness of materials along the watercourse; alignment of watercourse; gradient of watercourse; amount and type of vegetation within the watercourse; and size, configuration, and other characteristics of structures within the watercourse. In low-lying area the characteristics of the overbank area also determine water conveyance capacity.

<u>Hydrograph</u>: A graph showing for a given location on a stream or conduit, the flow rate with respect to time.

<u>Field Inspector:</u> An individual, company or firm approved by the Village to observe construction for compliance with approved drawings and specifications.

IEPA: Illinois Environmental Protection Agency

Infiltration: The passage or movement of water into the soil surfaces.

Lake or pond: Any inland water body, fed by spring or surface water flow.

<u>Letter of Credit:</u> An irrevocable commercial letter of credit on bank letterhead to the Village of Frankfort for 115% of the value of identified improvements.

<u>Live Storage:</u> That volume available in a reservoir for holding storm water in accordance with the requirements of these design standards.

<u>Lot:</u> A platted parcel of land with defined boundaries, intended to be separately owned, developed and otherwise used as a unit.

<u>Lowest Foundation Grade:</u> The foundation of a building at its lowest elevation, including a walk-out or look-out elevation. If lowest adjacent grade is not 6" below this elevation (slab on grade, for example) both the Lowest Foundation Grade and Lowest Adjacent Grades shall be indicated.

<u>Lowland Conservancy District</u>: Village of Frankfort authority asserted over wetland and other environmentally sensitive areas.

<u>Major Drainage System</u>: That portion of a drainage system needed to store and convey flows beyond the capacity of the minor drainage system. Also, the system which conveys the 100-year storm to the appropriate storm water facility.

<u>Minor Drainage System</u>: That portion of a drainage system designed for the convenience of the public. It consists of street gutters, storm sewers, small open channels, and swales and, where manmade, is usually designed to handle the 10-year runoff event or less.

<u>Mitigation</u>: Mitigation includes those measures necessary to minimize the negative effects which stormwater drainage and development activities might have on the public health, safety and welfare. Examples of mitigation include compensatory storage, soil erosion and sedimentation control, and channel restoration.

<u>Natural</u>: Conditions resulting from physical, chemical, and biological processes without intervention by man.

<u>Natural Drainage</u>: Channels formed in the existing surface topography of the earth prior to changes made by unnatural causes. A natural stream tends to follow a meandering path; its floodplain is not constrained by levees; the area near the bank has not been cleared, mowed or cultivated; the stream flows over soil and geologic materials typical of the area with no alteration of the course or cross-section of the stream caused by filling or excavating.

<u>Notice-to-Proceed</u>: Written notice issued by the Village of Frankfort authorizing development, site improvement and/or construction of public improvements.

One Hundred-Year Event: A rainfall, runoff, or flood event having a one percent chance of occurring in any given year.

Ordinary high water mark (OHWM): The point on the bank or shore up to which the presence and action of surface water is so continuous so as to leave a distinctive mark such as by erosion, destruction or prevention of terrestrial vegetation, predominance of aquatic vegetation, or other easily recognized characteristics.

Owner/Developer: The person or persons responsible for preparing and recording the plats of the subdivision and for carrying out all appropriate requirements relating thereto as outlined in these requirements.

<u>Parcel:</u> All contiguous land under single or same ownership.

<u>Parkway:</u> That area of a street right-of-way between the back of curb or pavement edge and the right-of-way limit intended for use primarily by pedestrian traffic and developed in a park like character.

<u>Peak Flow</u>: The maximum rate of flow of water at a given point in a channel or conduit.

<u>Perimeter Control:</u> A barrier that prevents sediment from leaving a site by filtering sediment-laden

runoff or diverting it to a sediment trap or basin.

<u>Phasing:</u> Clearing a parcel of land in distinct phases, with the stabilization of each phase completed before the clearing of the next phase.

<u>Positive Drainage</u>: Provision for overland paths for all areas of a property including depressional areas that may also be drained by storm sewer.

Property: A parcel of real estate.

<u>Qualified Professional:</u> A person trained in one or more of the disciplines of biology, geology, soil science, engineering, or hydrology whose training and experience ensure a competent analysis and assessment of stream, lake, pond and wetland conditions and impacts.

<u>Registered Professional Engineer:</u> A professional engineer registered under the provisions of "The Illinois Professional Engineering Act" and any act amendatory thereof.

Regulatory Floodway: The channel, including on-stream lakes, and that portion of the flood plain adjacent to a stream or watercourse as designated by IDNR/OWR, which is needed to store and convey the existing and anticipated future 100-year frequency flood discharge with no more than a 0.1 foot increase in stage due to the loss of flood conveyance or storage, and no more than a 10% increase in velocities. The regulatory floodway are designated for Hickory Creek within the Village of Frankfort, those parts of unincorporated Will County that are within the extraterritorial jurisdiction of the Village, or those parts of unincorporated Will County that may be annexed into the Village on the Countywide Flood Insurance Rate Map of Will County, Illinois and Incorporated Areas prepared by the Federal Emergency Management Agency and as amended from time to time. To locate the regulatory floodway boundary on any site, the regulatory floodway boundary should be scaled off the regulatory floodway map and located on a site plan, using reference marks common to both maps. Where interpretation is needed to determine the exact location of the regulatory floodway boundary, the IDNR/OWR should be contacted for the interpretation.

<u>Retention/Detention Facility:</u> A facility that provides for storage of storm water runoff and controlled release of this runoff during and after a flood or storm.

<u>Runoff:</u> The portion of precipitation on the land that is not absorbed by the soil or plant material and which runs off the land.

<u>Sedimentation</u>: The process that deposits soils, debris, and other materials either on other ground surfaces or in bodies of water or stormwater drainage systems.

<u>Permittee:</u> Any person to whom a site development permit is issued.

<u>Person:</u> Any individual, firm or corporation, public or private, the State of Illinois and its agencies or political subdivisions, and the United States, of America, its agencies and instrumentalities, and any agent, servant, officer or employee of any of the foregoing.

<u>Record Drawings:</u> Design drawings checked in the field and which are revised to show as-constructed location, elevation grading and specification of material for improvements and utilities.

Release Rate: The controlled rate at which storm water is released from a holding reservoir.

Removal: Cutting vegetation to the ground or stumps, complete extraction, or killing by spraying.

<u>Sedimentation:</u> The processes that deposit soils, debris, and other materials either on other ground surfaces or in water bodies or watercourses.

Sediment Control: Measures that prevent eroded sediment from leaving the site.

<u>Setback</u>: The horizontal distance between any portion of a structure or any development activity and the ordinary high water mark of a perennial or intermittent stream, the ordinary high water mark of a lake or pond, or the edge of a wetland, measured from the structure's or development's closest point to the ordinary high water mark, or edge.

<u>Site:</u> A parcel of land or a contiguous combination thereof, where grading work is performed as a single unified operation.

Stabilization: The use of practices that prevent exposed soil from eroding.

<u>Standard Specifications:</u> The most current edition of the "Standard Specifications for Road and Bridge Construction", State of Illinois, Department of Transportation, which may be used in conjunction with the specifications of the Village.

<u>Start of Construction:</u> The first land-disturbing activity associated with a development, including land preparation such as clearing, grading, and filling; installation of streets and walkways; excavation for basements, footings, piers, or foundations; erection of temporary forms; and installation of accessory buildings such as garages.

Storm Water Detention Basin: A reservoir for the temporary storage of storm water.

Stormwater Drainage System: All means, natural or man-made, used for conducting stormwater to, through or from a drainage area to the point of final outlet from a property. The stormwater drainage system includes but is not limited to any of the following: conduits and appurtenance features, canals, channels, culverts, ditches, streams, culverts, streets, storm sewers, detention basins, swales and pumping stations.

<u>Stormwater Runoff</u>: The waters derived from melting snow or rain falling within a tributary drainage basin which are in excess of the infiltration capacity of the soils of that basin, which flow over the surface of the ground or are collected in channels or conduits.

Storm Sewer: A closed conduit for conveying collected stormwater.

Stream: A body of running water flowing continuously or intermittently in a channel on or below the surface of the ground. 7.5 minute topographic maps of the U.S. Geological Survey are one reference for identifying perennial and intermittent streams. For purposes of this ordinance, the term "stream" does not include storm sewers.

Street Right of Way: The shortest distance between the lines of lots delineating the public street.

<u>Street:</u> An area of land that serves or is intended to serve as a vehicular and pedestrian access to abutting lands or to other streets.

<u>Street - Public:</u> All primary, secondary and minor streets that are shown on the subdivision plat and are to be dedicated for public use.

<u>Street - Major:</u> A street for interurban continuity, or regional importance; that provides reasonably continuous routes through the whole or major portion of the Village, or any street which carries volumes greater than 12,000 vehicles per day.

<u>Street - Secondary:</u> Those which carry volumes between 5,000 and 12,000 vehicles per day and act as main feeders or connector streets between major streets, serving as major traffic way for heavy traffic flow between the various residential districts and areas in and surrounding the Village.

<u>Street - Commercial and Industrial:</u> Those which act as feeders to commercial and industrial districts from and between major and secondary streets, serving as major traffic ways for heavy traffic and truck traffic regardless of volume.

<u>Street - Major Residential:</u> Those carrying 1,000 to 5,000 vehicles per day from minor streets within residential development areas, to secondary or major streets.

<u>Street - Residential</u>: Those having limited continuity and carrying up to 1,000 vehicles per day which are used primarily for access to abutting properties, or to meet the local traffic flow needs of a neighborhood or community.

<u>Street - Marginal Access</u>: A minor street which is parallel to and adjacent to major streets and highways, and which provides access to abutting properties and protection to local traffic from fast, through-moving traffic on the major streets.

Structure: Anything that is constructed, erected or moved to or from any premise, which is located above, on, or below the ground including, but not limited to roads, signs, billboards, and mobile homes. Temporary recreational facilities including, but not limited to tents, camper trailers, and recreation vehicles are not considered structures when used less than 180 days per year and located landward of the minimum setback provided as a natural vegetation strip.

<u>Site:</u> A lot or parcel of land, or a contiguous combination thereof, where grading work is performed as a single unified operation.

<u>Site Development:</u> Altering terrain and/or vegetation and constructing improvements.

<u>Site Development Permit:</u> A permit issued by the Village for the construction or alteration of ground improvements and structures for the control of erosion, runoff and grading.

<u>Storm Water Pollution Prevention Plan (SWPPP):</u> A plan in compliance with the provisions of the USEPA Clean Water Act NPDES Phase II requirements.

<u>Stream:</u> Any river, creek, brook, branch, flowage, ravine, or natural or man-made drainageway which has a definite bed and banks or shoreline, in or into which surface or groundwater flows, either perennially or intermittently.

<u>Stripping:</u> Any activity that removes the vegetative surface cover including tree removal, clearing, and storage or removal of topsoil.

<u>Subdivision</u>: A subdivision is the division of a lot, tract or parcel of land into two or more lots, parcels or other divisions of land, or a resubdivision of a lot, for the purpose, whether immediate or future, of transfer of ownership or building development, including all changes in street or lot lines; provided, however, that a division of land, for agricultural purposes, in parcels of more than five acres not involving any street or easement of access, shall be exempted. A Planned Unit Development shall be considered as a subdivision regardless if any division of property is proposed.

<u>Swale:</u> A ditch or surface drainage channel meeting certain specific criteria as established herein for the surface movement of storm water.

<u>Time of Concentration</u>: The elapsed time for stormwater to flow from the most hydraulically remote point in a drainage basin to a particular point of interest in that watershed.

<u>Tributary Watershed</u>: All of the land surface area that contributes runoff to a given point.

<u>Two-year Event</u>: A runoff, rainfall, or flood event having a fifty percent chance of occurring in any given year.

<u>Vacant:</u> Land on which there are no structures or only structures, which are secondary to the use or maintenance of the land itself.

Vegetation: All plant growth, especially trees, shrubs, mosses, and grasses.

Village: The Village of Frankfort, Will and Cook Counties, Illinois; and its area of jurisdiction.

<u>Village Board</u>: The President and Board of Trustees of The Village of Frankfort.

<u>Village Engineer:</u> The individual or firm appointed or contracted by the Village who is licensed to practice professional engineering in the State of Illinois and is responsible for reviewing subdivision plans on behalf of the Village, recommends changes from time to time to these design standards and performs other duties as directed by Village Ordinance.

<u>Village Plan</u>: Reference to "Comprehensive Plan" or "Village Plan" shall mean the Comprehensive Plan of the Village of Frankfort, as approved by the Plan Commission and adopted by the President and Board of Trustees of the Village of Frankfort.

<u>Watercourse:</u> Any body of water, including, but not limited to lakes, ponds, rivers, streams, creeks, brook, branch, natural or artificial depression, ponded area, slough, gulch, draw, ditch, channel, conduit, culvert, swale, grass waterway, gully, ravine, wash, or natural or man-made drainageway, which has a definite channel, bed and banks, in or into which stormwater runoff and floodwater flow either regularly or intermittently and bodies of water delineated by the Illinois Department of Natural

Resources Office of Water Resources, the United States Geologic Survey, the United States Army Corps of Engineers or the Village.

<u>Watershed:</u> That land area from which all runoff from rainfall would eventually reach the point in question by flowing over the surface of the ground or through existing improvements.

Waterway: A channel that directs surface runoff to a watercourse or to the public storm drain.

Wet Basin: A detention basin designed to maintain a permanent pool of water after the temporary storage of stormwater runoff.

<u>Wetlands:</u> An area of land, which meets the criteria as defined in current Federal methodology recognized by the U.S. Army Corps of Engineers whether or not the area of land is subject to the regulatory authority of U.S. Army Corps of Engineers or any other regulatory authority.

1.03 SCOPE

In addition to the Village, the review and approval of contract documents for certain types of improvements may also fall within the jurisdiction of other public agencies. These standards are not intended as a substitute for the requirements of other public agencies. It shall be the owner/developer's responsibility to insure that the proposed contract documents meet the requirements of all other public agencies and that any and all permits and bonds required by such agencies are secured.

1.04 PRE-DESIGN CONFERENCE

It is recommended that after preliminary plat approval and prior to the development of detailed drawings, the Owner/Developer and the Design Engineer meet with the Village Engineer to review Village requirements and any other proposed projects or existing conditions that may affect the final project design. The request for this preliminary meeting, if desired, shall be initiated by the Design Engineer.

1.05 DRAWING PREPARATION REQUIREMENTS

All drawings submitted for approval shall be prepared according to the Village CADD/GIS requirement (See Appendix A) and shall bear the name of the Design Engineer, his/her original signature, the imprint of the Professional Engineer seal, drainage certificate and his/her address and telephone number.

A CD or DVD with all drawing files (in DWG and PDF format) and one (1) paper copy of plan drawings signed and sealed by the Design Engineer or other independent professional employed by the Owner/Developer shall be submitted. The drawing files shall be submitted to the Village Engineer prior to the Owner/Developer's request for the Notice to Proceed.

A location map shall be provided on the cover sheet of the drawings with the boundaries of the proposed subdivision indicated and showing existing streets and boundary lines of adjoining unsubdivided or subdivided land. This map shall cover the area within a one-half (1/2) mile radius of the proposed subdivision. The cover sheet shall also include the name, address and phone number of the design engineer.

Where feasible, drawings shall consist of 24-inch x 36-inch sheets. Drawings shall be clear and legible, and shall be drawn to a conventional, even scale which will permit all necessary information to be plainly shown, 1"=50" minimum. All elevations shall be referenced to U.S.G.S. datum and benchmarks within the Village of Frankfort Control Monumentation shall be noted.

All materials proposed for use on the project shall be indicated on the drawings. All proposed improvements and all existing municipal and privately owned utilities shall be shown in both plan and profile.

A digital file of all approved utilities is required to be submitted following final plat approval, and prior to a notice-to-proceed being issued by the Village. See Appendix A for CADD/GIS requirements.

1.06 SPECIFICATION REQUIREMENTS

Technical specifications shall be complete in themselves, except that appropriate specific sections of the most recent edition of the "Standard Specifications for Road and Bridge Construction", as published by the Department of Transportation, State of Illinois, and the various standard published material specifications prepared by associations such as the "American Society for Testing and Materials" and the "American Water Works Association", may be incorporated by reference.

The specifications shall include, but not be limited to, all information not shown on the drawings which is necessary to establish in detail the quality of materials and work required in the project, allowable parameters for testing the various parts of the project and instructions for testing material and equipment. Wherever there is conflict between the written specifications and the drawings, the more stringent requirements, as determined by the Village, shall apply.

The specification shall include a clause that all work included shall be guaranteed by the Contractor to be free from defects in construction and materials for at least one year from the date of acceptance and in conformance with the approved drawings and specifications. A statement of comprehensive liability insurance shall also be provided as required and as stated in Section 1.09 of this Ordinance.

Specifications and Standards particular to the Village of Frankfort as found within this Ordinance can be referenced in Appendix E.

1.07 DESIGN COMPUTATION REQUIREMENTS

Design computations shall be made by the Design Engineer for all phases of the project when such computations are required to facilitate review by the Village Engineer. Said computations shall be neat and legible and in a form considered acceptable by the Village Engineer. Said computations shall include, but not necessarily be limited to, those listed on Exhibits 1A and 1B of Appendix C.

1.08 OPINION OF PROBABLE COST

The Design Engineer shall prepare an itemized opinion of the probable cost of the work. The opinion shall be delineated public and private (on-site) improvements when applicable.

1.09 INSURANCE

Village Requirements:

Prior to starting work, the Subdivider responsible for construction of public improvements shall file with the Village Clerk a Certificate of Insurance for Comprehensive General Liability Insurance in the amount of \$500,000 per accident for property damage and \$1,000,000 per person and \$3,000,000 aggregate for bodily injury, sickness, disease or death as protection for any and all claims by anyone, including the Subdivider's, Contractor's or Employee's which may arise out of or result from Subdivider's work or by anyone for whose acts the subdivider may be liable. The insurance policy should name the Village of Frankfort, their employees and agents as additional insured. This certificate shall state that the coverage will not be terminated or reduced without 30 days advance written notice to the Village of Frankfort.

1.10 OTHER PERMIT APPLICATIONS AND APPROVALS

Other governmental agencies may review and approve for construction all or certain parts of the work included in a project and may require a permit for such work. They may also require that the Village execute an application for a permit. When such permit application is required, it shall be necessary that authorizations from other governmental agencies shall be secured by the Owner/Developer and copies submitted to the Village.

1.11 NOTICE TO PROCEED

Prior to the commencement of any construction activity, a notice to proceed must be issued by the Village.

1.12 REVISIONS TO APPROVED DRAWINGS AND SPECIFICATIONS

Any deviations from previously approved drawings or specifications affecting capacity, stability or operations of the system shall be approved in writing by the Village Engineer before such changes are made. Minor changes not affecting capacity, stability or operation of the system will not require formal approval, but must be approved in writing by the Field Inspector.

1.13 CONSTRUCTION SUPERVISION

While periodic visits to private project developments shall be conducted by the Village Engineer and/or Field Inspector; full-time inspection and performance certifications are the responsibility of the Design Engineer or other independent professional employed by the Owner/Developer. Confirmation of approved grades and utility installation and preparation of Record Drawings are likewise the responsibility of the Design Engineer or other independent professional employed by the Owner/Developer.

1.14 EXISTING FACILITIES

Drawing and specifications shall provide for the continuous operation of existing facilities without interruption during construction, unless otherwise specifically authorized by the Village Engineer.

1.15 RECORD DRAWINGS

A CD or DVD with all drawing files (in DWG and PDF format) and one (1) paper copy of record drawings signed and sealed by the Design Engineer or other independent professional employed by the Owner/Developer which shall clearly show any and all changes from the approved drawings. The drawing files and record drawings shall be submitted to the Village Engineer prior to the Owner/Developer's request for final inspection of the required improvements. The record drawings shall be based on actual measurements of both horizontal and vertical dimensions, made after the completion of the work.

1.16 FINAL PROCESSING AND ACCEPTANCE

Upon written request of the Owner/Developer, and after the required improvements have been completed and record drawings have been submitted, the Village Engineer shall make a preliminary inspection of the completed work. The Village Engineer shall then prepare a Final Punch list, itemizing all items not meeting the requirements of the approved drawings and specifications. Upon completion of all items listed in the Final Punchlist, the Owner/Developer shall request, in writing, a final inspection. When all items are found to meet the requirements of the Village and the approved drawings and specifications, the Village Engineer shall notify the Village Administrator, in writing, of his recommendation for approval and acceptance of the work.

1.17 PRELIMINARY PLAT REQUIREMENTS

In the case where a subdivision occurs, a Preliminary Plat should be submitted. Preliminary plats must be at least 24" x 36", but no larger than 30" x 36". All application requirements of the Community Development Department must be met.

- 1. Each Preliminary Plat should include the following information. Additional information may be required at the discretion of the Village Engineer, Community Development Department and/or Code Official.
 - a. The proposed name of the subdivision site plan. The proposed name shall not duplicate the name of any plat previously approved by the Village.
 - b. The map should clearly be identified as a preliminary subdivision plat.
 - c. Date of preparation, along with revisions date.
 - d. North arrow, legend and scale which shall be one inch =100 feet, or larger.
 - e. Legal description of the parcel.
 - f. The name and address of the record owner or owners, the applicant, and the Illinois registered land surveyor or the licensed professional engineer who prepared the plat with the appropriate seal affixed.
 - g. A vicinity map showing the general location of the parcel within the Village.
 - h. The exact length and bearing of the exterior boundaries of the subdivision. Dimensions shall be expressed in feet and decimals of a foot.
 - i. The location, width and names of all streets adjacent to the parcel together with easements, public utility and railroad rights-of-way, and other important features such as municipal boundary lines, section lines, corners and monuments.
 - The location and names of adjacent subdivision and the owners of adjoining parcels of unsubdivided land.
 - k. Zoning classifications of the subject parcel and of lands adjacent.

- 2. The following improvements, if proposed or required, shall be shown on the preliminary plat:
 - a. Streets and rights-of-way, showing the location, widths, approximate grades, and if applicable proposed street names and landscape islands identified as outlots.
 - b. Approximate radii of all curves, length of tangents, and central angles on all streets.
 - c. Lots showing dimensions including minimum, average and median lot sizes for residential subdivisions.
 - d. Proposed public utilities.
 - e. Proposed easements showing width and purpose (ie, drainage, detention, public utility, preservation, etc.). All residential lots should provide public utility & drainage easements on all side (5' minimum) and rear (7.5' minimum) property lines.
 - f. Sites to be dedicated for school, park, playground or other public purposes, together with appropriate area of each, measured in square feet or acres where appropriate.
 - g. Proposed building setback lines.
 - h. Natural features such as ponds, lakes, rivers, creeks, streams, wooded areas, and wetland.
 - i. Proposed detention ponds, to be identified as an outlot.
 - j. Location of floodplain/floodway. Include a note that building permits will not be issued for lots within the existing floodplain until FEMA issues LOMC. Individual lots to be listed.

1.18 FINAL PLAT REQUIREMENTS

Within one year after receiving Preliminary Plat of Subdivision approval, the applicant shall file with the Village a Final Plat of Subdivision. Final plats must be at least 24" x 36", but no larger than 30" x 36". All application requirements of the Community Development Department must be met.

- 1. Each Final Plat should include the following information. Additional information may be required at the discretion of the Village Engineer, Community Development Department and/or Code Official.
 - a. The proposed name of the subdivision.
 - b. The map should clearly be identified as a final subdivision plat.
 - c. Date of preparation, along with revisions date.
 - d. North arrow, legend and scale which shall be one inch =100 feet, or larger.
 - e. Legal description of the parcel.
 - f. The exact length and bearing of the exterior boundaries of the subdivision. Dimensions shall be shown to the nearest 0.01 feet.
 - g. The name and address of the record owner or owners, the applicant, and the Illinois registered land surveyor who prepared the plat with the appropriate seal affixed.
 - h. The name and mailing address of the Village for return of the plat by the County Recorder.
 - i. A vicinity map showing the general location of the parcel within the Village.
 - j. Each lot shall be labeled or numbered without duplicating numbers or letters throughout all phases of the subdivision.
 - k. The location, width and names of all streets adjacent to the parcel together with easements, public utility and railroad rights-of-way. Existing streets should be labeled "Heretofore Dedicated".

- 1. Reference points of existing surveys identified, related to the plat by distances and bearing, and reference to a field book or map as required by the Illinois Plat Act.
- m. Forms of certification as provided for in Appendix C and any additional certificates as required by other agencies.
- n. Additional information as required by the Code Official or Village Engineer.
- 2. The following improvements, if proposed or required, shall be shown on the final plat:
 - a. Street rights-of-way location, widths and curve data (including street or right-of-way centerline radii and central angles).
 - b. The name of each proposed and existing street shown on the plat. Each street should be labeled "Hereby Dedicated". All private roads shall be clearly marked "Private Street".
 - c. Landscape islands identified as outlots.
 - d. Proposed easements showing width and purpose (ie, drainage, detention, public utility, preservation, landscaping, no access, etc.). All residential lots should provide public utility & drainage easements on all side (5' minimum) and rear (7.5' minimum) property lines. Associated provisions should be provided, including Village standard easement language, Appendix D.
 - e. Provide separate easements for overland flood routes. The easements are to be entitled "Surface Overland Flow Easements" and provide associated provision, Appendix D.
 - f. Lots with dimensions, bearings, and radii, arcs, points of curvature and tangent bearings. Parcel boundaries and street bearings shall be shown to the nearest 0.01 feet. Lot area in square feet for each lot shall be designated.
 - g. Sites to be dedicated for school, park, playground or other public purposes, together with appropriate area of each, measured in square feet or acres where appropriate.
 - h. Building setback lines.
 - i. Proposed detention ponds, to be identified as outlots.
 - j. Location of floodplain/floodway. Include a note that building permits will not be issued for lots within the existing floodplain until FEMA issues LOMC. Individual lots to be listed.

SECTION 2: EXCAVATION, GRADING, EROSION CONTROL, PROTECTION AND RESTORATION REQUIREMENTS

2.01 INTRODUCTION

Project construction required in connection with a development often occurs in or adjacent to areas with existing surface or underground improvements. The intent of this Section 2 is to specify Village requirements relative to construction affecting existing and future improvements and the restoration of existing improvements. Drawings and specifications presented for Village approval shall provide for the implementation of the requirements of this Section.

2.02 EROSION CONTROL

FINDINGS: The President and Board of Trustees of the Village hereby finds that:

Excessive quantities of soil may erode from areas undergoing development for certain non-agricultural uses including but not limited to the construction of dwelling units, commercial buildings and industrial plants, the building of roads and highways, the modification of stream channels and drainage ways, and the creation of recreational facilities:

The washing, blowing, and falling of eroded soil across and upon roadways endangers the health and safety of users thereof, by decreasing vision and reducing traction of road vehicles;

Soil erosion necessitates the costly repairing of gulleys, washed-out fills, and embankments;

Sediment from soil erosion tends to clog sewers and ditches and to pollute and silt rivers, streams, lakes, wetlands, and reservoirs;

Sediment limits the use of water and waterways for most beneficial purposes, promotes the growth of undesirable aquatic weeds, destroys fish and other desirable aquatic life, and is costly and difficult to remove; and

Sediment reduces the channel capacity of waterways and the storage capacity of floodplains and natural depressions, resulting in increased chances of flooding at risk to public health and safety

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

2.02A GENERAL PRINCIPLES

It is the objective of this ordinance to control soil erosion and sedimentation caused by development activities, including clearing, grading, stripping, excavating, and filling of land, in the Village. Measures taken to control soil erosion and offsite sediment runoff should be adequate to assure that sediment is not transported from the site by a storm event of ten-year frequency or less. The following principles shall apply to all development activities within the Village and to the preparation of the submissions required under Section 2.02B of this ordinance:

- 1. Development should be related to the topography and soils of the site so as to create the least potential for erosion. Areas of steep slopes where high cuts and fills may be required should be avoided wherever possible, and natural contours should be followed as closely as possible.
- Natural vegetation should be retained and protected wherever possible. Areas immediately adjacent to
 natural watercourses, lakes, ponds, and wetlands should be left undisturbed wherever possible.
 Temporary crossings of watercourses, when permitted, must include appropriate stabilization
 measures.
- 3. Special precautions should be taken to prevent damages resultant from any necessary development activity within or adjacent to any stream, lake, pond, or wetland. Preventative measures should reflect the sensitivity of these areas to erosion and sedimentation.
- 4. The smallest practical area of land should be exposed for the shortest practical time during development.
- 5. Sediment basins or traps, filter barriers, diversions, and any other appropriate sediment or runoff control measures should be installed prior to site clearing and grading and maintained to remove sediment from run-off waters from land undergoing development.
- 6. The selection of erosion and sedimentation control measures should be based on assessment of the probable frequency of climatic and other events likely to contribute to erosion, and on evaluation of the risks, costs, and benefits involved.
- 7. In the design of erosion control facilities and practices, aesthetics and the requirements of continuing maintenance should be considered.
- 8. Provision should be made to accommodate the increased run-off caused by changed soil and surface conditions during and after development. Drainageways should be designed so that their final gradients and the resultant velocities and rates of discharge will not create additional erosion onsite or downstream.
- 9. Permanent vegetation and structures should be installed and functional as soon as practical during development.
- 10. Those areas being converted from agricultural purposes to other land uses should be vegetated with an appropriate protective cover prior to development.
- 11. All waste generated as a result of site development activity should be properly disposed of and should be prevented from being carried off the site by either wind or water.
- 12. All construction sites should provide measures to prevent sediment from being tracked onto public or private roadways.
- 13. Provide a traffic control plan and construction traffic maintenance plan through the affected subdivision in accordance with the *Millennium Edition* of the Manual on Uniform Traffic Control Devices (MUTCD) and the latest standards adopted by the Illinois Department of Transportation. Developer shall be responsible for the cost of all permanent traffic control signage upon Village approval of the traffic control plan and for the maintenance of the temporary signage.

2.02B SITE DEVELOPMENT APPROVAL

- Permit Required Except as otherwise provided in this ordinance, no person shall commence or perform any clearing, grading, stripping, excavating, or filling of land which meets the following provisions without having first obtained a site development permit from the Building Department of the Village or formal notice to proceed from the Village of Frankfort, following review by the village engineers.
 - a. Any land disturbing activity (i.e., clearing, grading, stripping, excavation, fill, or any combination thereof) that will affect an area in excess of 5000 square feet;
 - b. Any land disturbing activity that will affect an area in excess of 500 square feet if the activity is within 25 feet of a lake, pond, stream, or wetland; or
 - c. Excavation, fill, or any combination thereof that will exceed 100 cubic yards.

No Site Development Permit shall be issued unless the Village of Frankfort finds that:

- 1. The development will not detrimentally affect or destroy natural features such as ponds, streams, wetlands, and forested areas, nor impair their natural functions, but will preserve and incorporate such features into the development's site;
- 2. The location of natural features and the site's topography have been considered in the designing and siting of all physical improvements;
- 3. Adequate assurances have been received that the clearing of the site of topsoil, trees, and other natural features will not occur before the commencement of building operations; only those areas approved for the placement of physical improvements may be cleared;
- 4. The development will not reduce the natural retention storage capacity of any watercourse, nor increase the magnitude and volume of flooding at other locations; and that in addition, the development will not increase stream velocities; and
- 5. The soil and subsoil conditions are suitable for excavation and site preparation, and the drainage is designed to prevent erosion and environmentally deleterious surface runoff.

There shall be no development, including the immediate or future clearing or removal of natural ground cover and/or trees, within the Lowland Conservancy Overlay District for any purpose, unless a Site Development Permit is granted subject to the provisions of this ordinance or the provisions of the Village of Frankfort zoning ordinance.

Dumping, filling, mining, excavating, dredging, or transferring of any earth material within the district is prohibited unless a Site Development Permit is granted.

No ponds or impoundments shall be created nor other alterations or improvements shall be allowed in the district for recreational uses, storm water management, flood control, agricultural uses or as scenic features unless a Site Development Permit is granted.

2. Exceptions - A permit shall not be required for any of the following provided that the person responsible for any such development shall implement necessary soil erosion and sediment control measures to satisfy the principles set forth in Section 2.02A of this Ordinance:

- Excavation below final grade for the basement and footings of a single-family residence and appurtenant structures on a site in excess of two acres for which a building permit has been issued by the Village;
- b. Agricultural use of land, including the implementation of conservation measures included in a farm conservation plan approved by the Soil and Water Conservation District, and including the construction of agricultural structures;
- c. Installation, renovation, or replacement of a septic system to serve an existing dwelling or structure.
- 3. Permit Fee Application for a site development permit shall be made by the owner of the property or his authorized agent to the Building Department on a form furnished for that purpose. Each application shall bear the name(s) and address(es) of the owner or developer of the site and of any consulting firm retained by the applicant together with the name of the applicant's principal contact at such firm, and shall be accompanied by the required filing fee unless the application is part of a subdivision review where other fees take priority. The applicant further agrees to reimburse the village for any outside review engineering fees, incurred by the village, in addition to the filing fees. Each application shall include certification that any land clearing, construction, or development involving the movement of earth shall be in accordance with the plans approved upon issuance of the permit.
- 4. <u>Submissions</u> Each application for a site development permit shall be accompanied by the following information:
 - a. A vicinity map in sufficient detail to enable easy location in the field of the site for which the permit is sought, and including the boundary line and approximate acreage of the site, existing zoning, and a legend and scale.
 - b. A development plan of the site showing:
 - (1) Existing topography of the site and adjacent land within approximately 100 feet of the boundaries, drawn at no greater than one-foot contour intervals and clearly portraying the conformation and drainage pattern of the area.
 - (2) The location of existing buildings, structures, utilities, streams, lakes, floodplains, wetlands and depressions, drainage facilities, vegetative cover, paved areas, and other significant natural or man-made features on the site and adjacent land within 100 feet of the boundary.
 - (3) A general description of the predominant soil types on the site, their location, and their limitations for the proposed use.
 - (4) Proposed use of the site, including present development and planned utilization; areas of clearing, stripping, grading, excavation, and filling; proposed contours, finished grades, and street profiles; provisions for storm drainage, including storm sewers, swales, detention basins and any other measures to control the rate of runoff, with a drainage area map, indications of flow directions, and computations; kinds and locations of utilities; and areas and acreages proposed to be paved, covered, sodded or seeded, vegetatively stabilized, or left undisturbed.
 - (5) When development is in or near streams, lakes, ponds and/or wetlands, submissions shall be accompanied by:

Site Development Plan Geologic and Soil Report	Sec. 4.05D(4.) Sec. 4.05D(5.)
Drainage Control Plan	Sec. 4.05D(6.)
Site Grading & Excavation Plan	Sec. 4.05D(7.)
Landscane Plan	Sec. 4.05D(8.)

When development includes Watercourse Relocation and Minor Modifications, submissions shall be accompanied by:

Stream Modification/Relocation Plan	Sec. 4.05E(2.)
Channel and Bank Armoring	Sec. 4.05E(3.)
Culverts	Sec. 4.05E(4.)
On-Stream Impoundments	Sec. 4.05E(5.)
Impact Assessment	Sec. 4.05F

- c. A Storm Water Pollution Prevention Plan (SWPPP) showing all measures necessary to meet the objectives of this ordinance throughout all phases of construction and post construction of the development of the site, including:
 - (1) Location and description, including standard details, of all sediment control measures and design specifics of sediment basins and traps, including outlet details. Silt fence shall be provided around the entire perimeter of the site, around all temporary stockpiles and around all ponds. Erosion control blankets shall be placed on side slopes of all ponds.
 - (2) Location and description of all soil stabilization and erosion control measures, including seeding mixtures and rates, types of sod, method of seedbed preparation, expected seeding dates, type and rate of lime and fertilizer application, kind and quantity of mulching for both temporary and permanent vegetative control measures, and types of non-vegetative stabilization measures.
 - (3) Location and description of all runoff control measures, including diversions, waterways, and outlets.
 - (4) Location and description of methods to prevent tracking of sediment offsite, including construction entrance details, as appropriate.
 - (5) Description of dust and traffic control measures.
 - (6) Locations of stockpiles and description of stabilization methods.
 - (7) Description of off-site fill or borrow volumes, locations, and methods of stabilization.
 - (8) Provisions for maintenance of control measures, including type and frequency of maintenance, easements, and estimates of the cost of maintenance.
 - (9) Identification (name, address, and telephone) of the person(s) or entity which will have legal responsibility for maintenance of erosion control structures and measures during development and after development is completed.
 - (10) At least one catch basin shall be provided on each storm sewer run prior to discharge.

- (11) Wetland and floodplain buffering shall be clearly identified.
- (12) Provide silt fence and excelsior blanket around all ponds.
- (13) Provide items, notes and certifications required by NPDES II, including but not limited to:
 - a. Drainage patterns extending ¼ mile beyond property line;
 - b. Approximate slopes before and after major grading;
 - c. Existing and future drainage patterns;
 - d. Areas where runoff will be leaving project site;
 - e. Total site area and areas of soil disturbance;
 - f. Location and names of surface waters;
 - g. Location of high risk/waste-generating area and activities;
 - h. Narrative description of industrial activities, materials, equipment, etc.
 - i. Significant spills or leaks during the past three years;
 - j. Include applicable notes and certifications, see 'Exhibits 2L and 2M';
 - k. Sequence and expected date of major soil disturbing activities (including but not limited to installation of temporary erosion and sediment control measures, stripping, clearing, rough grading, construction of utilities, infrastructure, and buildings, final grading, landscaping, establishment of permanent vegetation);
 - 1. Post Construction runoff coefficient;
 - m. Existing Soils Data;
 - n. Wetland acreage onsite;
 - o. Waste management;
 - p. Material storage;
 - q. Dust control;
 - r. De-watering operations
 - s. Seeding mixtures and rates, types of sod, fertilizer application, etc.
- d. Two fully executed SWPPs shall be submitted to the Village prior to issuing a notice to proceed. One fully executed SWPPP shall be kept on site at all times.

The proposed phasing of development of the site, including stripping and clearing, rough grading and construction, and final grading and landscaping should identify the expected date on which clearing will begin, the estimated duration of exposure of cleared areas, and the sequence of installation of temporary sediment control measures (including perimeter controls), clearing and grading, installation of temporary soil stabilization measures, installation of storm drainage, paving streets and parking areas, final grading and the establishment of permanent vegetative cover, and the removal of temporary measures. It shall be the responsibility of the applicant to notify the Building Department or Village Engineer of any significant changes which occur in the site development schedule after the initial erosion and sediment control plan has been approved.

Specifications for erosion control measures shall be in accordance with the "Illinois Urban Manual" (2002) or latest edition. Sediment and erosion control planning shall be in accordance with "Procedures and Standards for Urban Soil Erosion and Sedimentation Control in Illinois" (rev. 7/88) by the Urban Committee of the Association of Illinois Soil and Water Conservation Districts (The "Green Book") Chapters 1-5. Where the Illinois Urban Manual supercedes sections of The Green Book, the Illinois Urban Manual shall prevail.

The Building Department or Village Engineer may waive specific requirements for the content of submissions upon finding that the information submitted is sufficient to show that the work will comply with the objectives and principles of this ordinance.

- e. <u>Security</u> The applicant is required to file with the Village a letter of credit, or other improvement security satisfactory to the Village in an amount deemed sufficient by the Building Department or Village Engineer to cover all costs of improvements, landscaping, maintenance of improvements and landscaping, and soil erosion and sediment control measures for such period as specified by the Village, and engineering and inspection costs to cover the cost of failure or repair of improvements installed on the site.
- f. <u>Review and Approval</u> Each application for a site development permit shall be reviewed and acted upon according to the following procedures:
 - (1) The Village of Frankfort will review each application for a site development permit to determine its conformance with the provisions of this ordinance. The Village may also refer any application to the Will County Soil and Water Conservation District and/or any other local government or public agency within whose jurisdiction the site is located for review and comment. Within thirty (30) days after receiving an application, the Building Department shall in writing:
 - (a) Approve the permit application if it is found to be in conformance with the provisions of this ordinance, and issue the permit;
 - (b) Approve the permit application subject to such reasonable conditions as may be necessary to secure substantially the objectives of this ordinance, and issue the permit subject to these conditions; or
 - (c) Disapprove the permit application, indicating the deficiencies and the procedure for submitting a revised application and/or submission.
 - (2) No site development permit shall be issued for an intended development site unless:
 - (a) The development, including but not limited to subdivisions and planned unit development, has been approved by the Village where applicable, or
 - (b) Such permit is accompanied by or combined with a valid building permit issued by the Village, or
 - (c) The proposed earth moving is coordinated with any overall development program previously approved by the Village for the area in which the site is situated; and
 - (d) All relevant federal and state permits (i.e., for floodplains and wetlands) have been received for the portion of the site subject to soil disturbance.
- g. <u>Permit Exceptions</u>: The provisions of this ordinance shall not apply to:
 - (1.) Emergency work necessary to preserve life or property; when emergency work is performed under this section, the person performing it shall report the pertinent facts relating to the work to the village engineer within ten (10) days after commencement of the work and shall thereafter obtain a Site Development Permit and shall perform such work as may be determined by the agency to be reasonably necessary to correct

any impairment to the watercourse, lake, pond, floodplain or wetland (in terms of the purposes of this ordinance Section 4.05C (1-10);

- (2.) Work consisting of the operation, repair, or maintenance of any lawful use of land existing on the date of adoption of this ordinance;
- (3.) Lands adjacent to farm ditches if:
 - (a.) Such lands are not adjacent to a natural stream or river; or
 - (b.) Those parts of such drainage ditches adjacent to such lands were not streams before ditching; or
 - (c.) Such lands are maintained in agricultural uses without buildings and structures.

Where farm ditches are found to contribute to adverse environmental impacts or hazards to persons or property, the Village of Frankfort may include designated farm ditches in the District. The Village of Frankfort may also require that linings, bulkheads, dikes and culverts be removed to mitigate hazards, or that other mitigative measures be taken, such as the maintenance of a natural vegetation buffer strip.

- h. Effect on Other Permits: The granting of a Site Development Permit under the provisions herein shall in no way affect the owner's responsibility to obtain the approval required by any other statute, ordinance, or regulation of any state agency or subdivision thereof, or to meet other Village of Frankfort ordinances and regulations. Where state and/or federal permits are required, a Site Development Permit will not be issued until they are obtained.
- i. Expiration of Permit Every site development permit shall expire and become null and void if the work authorized by such permit has not been commenced within one hundred and eighty (180) days, or is not completed by a date which shall be specified in the permit; except that the Building Department may, if the permittee presents satisfactory evidence that unusual difficulties have prevented work being commenced or completed within the specified time limits, grant a reasonable extension of time if written application is made before the expiration date of the permit. The Building Department or Village Engineer may require modification of the erosion control plan to prevent any increase in erosion or offsite sediment runoff resulting from any extension.
 - j. Appeals The applicant, or any person or agency which received notice of the filing of the application, may appeal the decision of the Building Department as provided in Section 2.02B(f), to the Village Board. Upon receipt of an appeal, the Village Board shall schedule and hold a public hearing, after giving 15 days notice thereof. The Village Board shall render a decision within thirty (30) days after the hearing. Factors to be considered on review shall include, but need not be limited to, the effects of the proposed development activities on the surface water flow to tributary and downstream lands, any comprehensive watershed management plans, or the use of any retention facilities; possible saturation of fill and unsupported cuts by water, both natural and domestic; runoff surface waters that produce erosion and silting of drainage ways; nature and type of soil or rock which when disturbed by the proposed development activities may create earth movement and produce slopes that cannot be landscaped; and excessive and unnecessary scarring of the natural landscape through grading or removal of vegetation.

k. <u>Retention of Plans</u> - Plans, specifications, and reports for all site developments shall be retained in original form or digital format by the Building Department.

2.02C DESIGN AND OPERATION STANDARDS AND REQUIREMENTS

- 1. <u>Applicability</u> All clearing, grading, stripping, excavating, and filling which is subject to the permit requirements of this ordinance shall be subject to the applicable standards and requirements set forth in this Section 2.02C.
- 2. Responsibility The permittee shall not be relieved of responsibility for damage to persons or property otherwise imposed by law, and the Village or its officers or agents will not be made liable for such damage, by (1) the issuance of a permit under this ordinance, (2) compliance with the provisions of that permit or with conditions attached to it by the Building Department, (3) failure of Village officials to observe or recognize hazardous or unsightly conditions, (4) failure of Village officials to recommend denial of or to deny a permit, or (5) exemptions from the permit requirements of this ordinance.

3. <u>Site Design Requirements</u>

- a. On-site sediment control measures, as specified by the following criteria, shall be constructed and functional prior to initiating clearing, grading, stripping, excavating or fill activities on the site.
 - (1) For disturbed areas draining less than 1 acre, filter barriers (including filter fences, straw bales, or equivalent control measures) shall be constructed to control all offsite runoff as specified in referenced handbooks. Vegetated filter strips, with a minimum width of 25 feet, may be used as an alternative only where runoff in sheet flow is expected.
 - (2) For disturbed areas draining more than 1 but less than 5 acres, a sediment trap or equivalent control measure shall be constructed at the downslope point of the disturbed area.
 - (3) For disturbed areas draining more than 5 acres, a sediment basin or equivalent control measure shall be constructed at the downslope point of the disturbed area.
 - (4) Sediment basins and sediment traps designs shall provide for both detention storage and sediment storage. The detention storage shall be composed of equal volumes of "wet" detention storage and "dry" detention storage and each shall be sized for the 2-year, 24-hour runoff from the site under maximum runoff conditions during construction. The release rate of the basin shall be that rate required to achieve minimum detention times of at least 10 hours. The elevation of the outlet structure shall be placed such that it only drains the dry detention storage.
 - (5) The sediment storage shall be sized to store the estimated sediment load generated from the site over the duration of the construction period with a minimum storage equivalent to the volume of sediment generated in one year. For construction periods exceeding 1 year, the 1-year sediment load and a sediment removal schedule may be substituted.
- b. Stormwater conveyance channels, including ditches, swales, and diversions, and the outlets of all channels and pipes shall be designed and constructed to withstand the expected flow

velocity from the 10-year frequency storm without erosion. All constructed or modified channels shall be stabilized within 48 hours, consistent with the following standards:

- (1) For grades up to 4 percent, seeding in combination with mulch, erosion blanket, or an equivalent control measure shall be applied. Sod or erosion blanket or mat shall be applied to the bottom of the channel.
- (2) For grades of 4 to 8 percent, sod or an equivalent control measure shall be applied in the channel.
- (3) For grades greater than 8 percent, rock, riprap, or an equivalent control measure shall be applied, or the grade shall be effectively reduced using drop structures.
- c. Disturbed areas shall be stabilized with temporary or permanent measures within 7 calendar days following the end of active disturbance, or redisturbance, consistent with the following criteria:
 - (1) Appropriate temporary or permanent stabilization measures shall include seeding, mulching, sodding, and/or non-vegetative measures.
 - (2) Areas having slopes greater than 12 percent shall be stabilized with sod, mat or blanket in combination with seeding, or equivalent.
- d. Land disturbance activities in stream channels shall be avoided, where possible. If disturbance activities are unavoidable, the following requirements shall be met:
 - (1) Construction vehicles shall be kept out of the stream channel to the maximum extent practicable. Where construction crossings are necessary, temporary crossings shall be constructed of non-erosive material, such as riprap or gravel.
 - (2) The time and area of disturbance of stream channels shall be kept to a minimum. The stream channel, including bed and banks, shall be restabilized within 24 hours after channel disturbance is completed, interrupted, or stopped.
 - (3) Whenever channel relocation is necessary, the new channel shall be constructed in the dry and fully stabilized before flow is diverted.
- e. Storm sewer inlets and culverts shall be protected by sediment traps or filter barriers meeting accepted design standards and specifications.
- f. Soil storage piles containing more than 10 cubic yards of material shall not be located with a downslope drainage length of less than 25 feet to a roadway or drainage channel. Filter barriers, including straw bales, filter fence, or equivalent, shall be installed immediately on the downslope side of the piles.
- g. If dewatering devices are used, discharge locations shall be protected from erosion. All pumped discharges shall be routed through appropriately designed sediment traps or basins, or equivalent.
- h. Each site shall have graveled (or equivalent) entrance roads, access drives, and parking areas of sufficient length and width to prevent sediment from being tracked onto public or private roadways. Any sediment reaching a public or private road shall be removed by shoveling or street cleaning (not flushing) before the end of each workday and transported to a controlled sediment disposal area.

- i. All temporary and permanent erosion and sediment control practices must be maintained and repaired as needed to assure effective performance of their intended function.
- j. All temporary erosion and sediment control measures shall be disposed of within 30 days after final site stabilization is achieved with permanent soil stabilization measures. Trapped sediment and other disturbed soils resulting from the disposition of temporary measures should be permanently stabilized to prevent further erosion and sedimentation.
- 4. <u>Handbooks Adopted by Reference</u> The standards and specifications contained in the "Illinois Urban Manual" and the "Procedures and Standards for Urban Soil Erosion and Sedimentation Control in Illinois" (the Green Book), cited in Section 2.02B, are hereby incorporated into this Section 2.02C and made a part hereof by reference for the purpose of delineating procedures and methods of operation under site development and erosion and sedimentation control plans approved under Section 2.02B. In the event of conflict between provisions of said manuals and of this ordinance, the ordinance shall govern.
- 5. <u>Maintenance of Control Measures -</u> All soil erosion and sediment control measures necessary to meet the requirements of this ordinance shall be maintained periodically by the applicant or subsequent landowner during the period of land disturbance and development of the site in a satisfactory manner to ensure adequate performance.
- 6. <u>Inspection</u> The Building Department or Village Engineer shall make inspections as hereinafter required and shall either approve that portion of the work completed or shall notify the permittee wherein the work fails to comply with the site development or erosion and sedimentation control plan as approved. Plans for grading, stripping, excavating, and filling work bearing the stamp of approval of the Building Department shall be maintained at the site during progress of the work. In order to obtain inspections and to ensure compliance with the approved erosion and sediment control plan, the grading or building permit, and this Ordinance, the permittee shall notify the Building Department or Village Engineer within two (2) working days of the completion of the construction stages specified below:
 - Upon completion of installation of sediment and runoff control measures (including perimeter controls and diversions), prior to proceeding with any other earth disturbance or grading,
 - b. After stripping and clearing,
 - c. After rough grading,
 - d. After final grading,
 - e. After seeding and landscaping deadlines, and
 - f. After final stabilization and landscaping, prior to removal of sediment controls.

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

7. Special Precautions

a. If at any stage of the grading of any development site the Building Department or Village Engineer determines by inspection that the nature of the site is such that further work authorized by an existing permit is likely to imperil any property, public way, stream, lake,

wetland, or drainage structure, the Building Department or Village Engineer may require, as a condition of allowing the work to be done, that such reasonable special precautions to be taken as is considered advisable to avoid the likelihood of such peril. "Special precautions" may include, but shall not be limited to, a more level exposed slope, construction of additional drainage facilities, berms, terracing, compaction, or cribbing, installation of plant materials for erosion control, and recommendations of a registered soils engineer and/or engineering geologist which may be made requirements for further work.

- b. Where it appears that storm damage may result because the grading on any development site is not complete, work may be stopped and the permittee required to install temporary structures or take such other measures as may be required to protect adjoining property or the public safety. On large developments or where unusual site conditions prevail, the Building Department may specify the time of starting the grading and time of completion or may require that the operations be conducted in specific stages so as to insure completion of protective measures or devices prior to the advent of seasonal rains.
- 8. <u>Amendment of Plans Major amendments of the site development or erosion and sedimentation control plans shall be submitted to the Building Department and shall be processed and approved or disapproved in the same manner as the original plans. Field modifications of a minor nature may be authorized by the Building Department by written authorization to the permittee.</u>

2.02D ENFORCEMENT

- 1. The Village Board may, in accordance with the following procedures, authorize exceptions to any of the requirements and regulations set forth in this ordinance:
 - a. Application for any exception shall be made by a verified petition of the applicant for a site development permit, stating fully the grounds of the petition and the facts relied upon by the applicant. Such petition shall be filed with the site development permit application. In order for the petition to be granted, it shall be necessary that the Village Board find all of the following facts with respect to the land referred to in the petition:
 - (1) That the land is of such shape or size or is affected by such physical conditions or is subject to such title limitations of record, that it is impossible or impractical for the applicant to comply with all of the requirements of this ordinance;
 - (2) That the exception is necessary for the preservation and enjoyment of a substantial property right of the applicant; and
 - (3) That the granting of the exception will not be detrimental to the public welfare or injurious to other property in the vicinity of the subject property.
 - b. Each application for an exception shall be referred to the Building Department for review. The Building Department shall transmit its recommendations to the Village Board, which shall review such recommendations prior to granting or denying the exception.
 - c. If it is deemed necessary, the Village Board shall hold a public hearing on each application for exception, within thirty (30) days after receiving application, in the manner provided with respect to appeals. After public hearing, the Village Board may approve the site development permit application with the exceptions and conditions it deems necessary or it may disapprove such site development permit application and exception application or it may take such other action as appropriate. If no hearing is required, the Village Board will act on the recommendation of the Building Department.

- 2. <u>Stop-Work Order; Revocation of Permit</u> In the event any person holding a site development permit pursuant to this ordinance violates the terms of the permit, or carries on site development in such a manner as to materially adversely affect the health, welfare, or safety of persons residing or working in the neighborhood of the development site or so as to be materially detrimental to the public welfare or injurious to property or improvements in the neighborhood, the Building Department may suspend or revoke the site development permit.
 - a. Suspension of a permit shall be by a written stop-work order issued by the Building Department and delivered to the permittee or his agent or the person performing the work. The stop-work order shall be effective immediately, shall state the specific violations cited, and shall state the conditions under which work may be resumed. A stop-work order shall remain in effect until the next regularly scheduled meeting of the Village Board.
 - b. No site development permit shall be permanently suspended or revoked until a hearing is held by the Village Board. Written notice of such hearing shall be served on the permittee, either personally or by registered mail, and shall state:
 - (1) The grounds for complaint or reasons for suspension or revocation, in clear and concise language; and
 - (2) The time when and place where such hearing will be held.

Such notice shall be served on the permittee at least five (5) days prior to the date set for the hearing. At such hearing, the permittee shall be given an opportunity to be heard and may call witnesses and present evidence on his behalf. At the conclusion of the hearing the Village Board shall determine whether the permit shall be suspended or revoked.

- 3. <u>Violations and Penalties</u> No person shall construct, enlarge, alter, repair, or maintain any grading, excavation or fill, or cause the same to be done, contrary to or in violation of any terms of this ordinance. Any person violating any of the provisions of this ordinance shall be deemed guilty of a misdemeanor, and each day during which any violation of any of the provisions of this ordinance is committed, continued, or permitted shall constitute a separate offense. Upon conviction of any such violation, such person, partnership, or corporation shall be punished by a fine of not more than (\$ 750) for each offense per day. In addition to any other penalty authorized by this section, any person, partnership, or corporation convicted of violating any of the provisions of this ordinance shall be required to restore the site to the condition existing prior to commission of the violation, or to bear the expense of such restoration.
- 4. <u>Separability</u> The provisions and sections of this ordinance shall be deemed to be separable, and the invalidity of any portion of this ordinance shall not affect the validity of the remainder.

2.03 PROTECTION OF PROPERTY AND SURFACE STRUCTURES

Trees, shrubbery, fences, poles and all other property and surface structures shall be protected during construction operations. Any fences, poles or other man made surface improvements that are moved or disturbed shall be restored to their original condition or replaced in kind with new material, after construction is completed. A tree preservation plan shall be submitted in accordance with Section 158.07 (Tree Preservation) of the Village Landscape Ordinance #2341 as amended from time to time. Any trees, shrubbery or other vegetation which are approved for removal shall be removed completely, including stumps and roots.

Where trees are to remain, protective temporary fencing shall be installed around the trees and proper care should be taken during excavation operations as required by the Landscape Ordinance. Shrub

and tree limbs shall be tied back to prevent loss or damage. Any damaged limbs and branches shall be pruned and sealed.

Trees which do not survive (in good condition) for a period of 18-months after planting shall be removed and replaced.

2.04 INTERRUPTION TO UTILITIES AND DAMAGE TO SURFACE IMPROVEMENTS

A minimum of 48-hours prior to commencement of work, J.U.L.I.E. (1-800-892-0123) and the Village's Department of Public Works must be notified for location of any existing utilities. All reasonable precautions shall be taken against damage to existing utilities.

In the event of a break in an existing water main, gas main, sewer or underground cable, the Contractor shall immediately notify the Village of Frankfort Utility Department. The Contractor shall lend all possible assistance in restoring service and shall assume all costs, charges or claims connected with the interruption and repair of such services unless it is determined that the utility has not been properly located. In the case of Village utilities, the cost of such work will be billed to the contractor.

2.05 TRAFFIC CONTROL

All work approved by the Village within public rights-of-way shall conform to the requirements of the latest edition of the Manual of Uniform Traffic Control Devices for Highway Control and Maintenance Operations as published by the Department of Transportation, State of Illinois. The provisions of these standards will be enforced:

- 1. When an opening is made into the existing pavement;
- 2. When construction takes place adjacent to the edge of the existing pavement;
- 3. When a utility crossing is made beneath the existing pavement, and;
- 4. When it is necessary to close a lane of traffic due to construction operations.

Permission for lane or road closure must be obtained from the Village prior to commencing construction. Signing will be required in strict conformance to the Traffic Control Manual. No construction operation is to commence until such time that all required signs and barricades have been erected.

2.06 PAVEMENT CROSSING

Unless otherwise specifically approved by the Village Engineer, all conduits crossing existing pavements shall be installed by tunneling, jacking or auguring. When the carrier pipe is a conduit intended to operate under internal pressure, a casing pipe of adequate strength for all applied loads shall be used. The nearest face of pits or other open excavations on each side of a traveled pavement shall be at least 10-feet from the edge of the pavement, and secured against hazard.

When open cutting is allowed or other pavement opening required, they shall be backfilled prior to the end of the working day unless otherwise authorized by the Village. All excavations shall be backfilled with Grade 8 or 9 crushed stone and a temporary bituminous patch of at least <u>2-inches</u> compacted thickness shall be constructed. It is understood that such backfilling and patching is only temporary and that permanent pavement repair will be required as specified in Section 2.10. In lieu of a bituminous patch, a steel plate (minimum of 1-inch of thickness) over the excavation may be approved upon request by the Contractor.

2.07 TRENCHING

Trenches shall be excavated to the depths and grades necessary for pipelines including allowances for

bedding material.

As determined by the Village Engineer, unsuitable soils found at or below the bottom of the trench shall be excavated to meet firm subsoil.

Comply with the following maximum trench widths at the top of pipelines:

Nominal	
Pipe Sizes	Trench Widths
(inches)	<u>(inches)</u>
12 or smaller	30
14-18	36
20-24	48
27-30	55
33 or larger	1 1/3 times pipe O.D.

If trench widths will exceed the maximum limitations above, higher strength pipe may be required or a concrete cradle may be used to achieve the necessary load factor, as specified by design engineer and approved by the Village of Frankfort.

2.08 BRACING AND SHEETING

Open-cut trenches shall be sheeted and braced as required by governing federal and state laws including all OSHA Safety and Health Standards (29CFR 1926/1910), and as may be necessary to protect life, property and the work.

2.09 BEDDING AND BACKFILL REQUIREMENTS

2.09A BEDDING

Bedding shall be provided for all plastic and concrete pipes, except where concrete encasement, concrete cradles, boring or jacking are indicated. Bedding shall be a minimum thickness of ¼ of the inside pipe diameter, in no case less than 4 inches, and consist of gravel, or crushed stone 1/4-inch to 1-inch in size. As a minimum, the bedding material shall conform to the requirements of the "Standard Specifications for Road and Bridge Construction," Illinois Department of Transportation. The gradations shall conform to ASTM gradation CA7 or CA11 therein. Note that when PVC or ABS pipe is used, the bedding material shall extend to 12" over the top of the pipe. Bedding shall be properly compacted.

Wherever two or more pipes or conduits are placed in the same trench or excavated area, backfill the trench with granular bedding material to support the uppermost pipe or conduit.

2.09B BACKFILL

For conduits not requiring SELECTED GRANULAR BACKFILL, backfill shall be made with materials available from the trench excavation. The material shall be free from rocks and be carefully placed in 12-inch lifts. For conduits requiring excavation as described in the "Standard Specifications for Road & Bridge Construction" beneath or within 3-feet horizontally of existing or proposed pavements, driveways, or sidewalks or in other areas which, in the opinion of the Village Engineer, are or may be subject to vehicular traffic loading, SELECTED GRANULAR BACKFILL shall be provided above the bottom of the trench and shall extend upward to the surface of the ground or pavement. Material for SELECTED GRANULAR BACKFILL shall consist of CA-6 Grade 8 or 9 Crushed Stone.

2.10 RESTORATION OF EXISTING IMPROVED SURFACES

2.10A GENERAL

The Contractor shall restore all permanent type pavements, sidewalks, driveways, curbs, gutters, trees, shrubbery lawns, fences, poles and other property and surface structures removed or disturbed during or as a result of construction operations to a condition that existed before the work began. The surface of all improvements shall be constructed of the same material and match in appearance the surface of the improvements that were removed.

2.10B SAW CUTTING

When necessary to remove sections of existing pavement, sidewalk, or curb and gutter, and prior to removal, the edges of the section to be removed shall be cleanly cut with a concrete saw.

2.10C REMOVAL OF ROADWAY PAVEMENTS, SIDEWALKS, DRIVEWAY AND CURB

Where concrete pavement, sidewalk, driveway or curbing is cut, the width of the cut shall exceed the actual width of the top of the trench at subgrade by minimum twelve (12) inches on each side. Exposed surface of Portland Cement or asphaltic concrete shall be cut with a pavement saw to full depth before removal.

2.10D CONCRETE PAVEMENT SURFACE

Where the existing roadway pavement surface is Portland Cement concrete, the pavement replacement shall consist of six (6) inch P.C. concrete pavement or existing concrete depth whichever is greater. Portland Cement concrete and construction methods for Portland Cement concrete pavement shall conform to the current requirements of the "Standard Specifications for Road and Bridge Construction" of the Illinois Department of Transportation, Sections 420 and 421 for Portland Cement concrete pavement. Pavement joints and reinforcing in the replacement pavement shall conform to and match that in the adjacent pavement area.

2.10E BITUMINOUS CONCRETE PAVEMENT SURFACE

Where the existing pavement surface is bituminous concrete and the base consists of a rigid material such as brick or Portland Cement concrete, the base replacement shall consist of 8-inch Portland Cement concrete base course. Portland Cement concrete shall be as noted in Section 2.10D above.

The Surface replacement shall consist of a bituminous prime coat, a 2-inch compacted Binder Course and a 1 ½" inch minimum compacted Surface Course conforming to the requirements of the "Standard Specifications for Road and Bridge Construction" of the Illinois Department of Transportation for Bituminous Concrete Binder and Surface Course, Class I.

2.10F BITUMINOUS PLANT MIX PAVEMENT OR BITUMINOUS TREATED SURFACE- FLEXIBLE BASE

Where the existing pavement is bituminous plant mix material or bituminous surface treatment and the base consists of a flexible material such as gravel, crushed stone, Bituminous Aggregate Mixture, Pozzolanic Material or Soil Cement, the base replacement shall consist of a 6-inch compacted thickness of Bituminous Aggregate Mixture Base Course conforming to the "Standard Specifications for Road and Bridge Construction" of the Illinois Department of Transportation and special provisions thereof. The surface replacement shall be as specified in 2.10E above.

2.10G CONCRETE SIDEWALKS, DRIVEWAYS, CURB, CURB AND GUTTER

Where necessary to remove and replace concrete sidewalk, driveways, curb and curb and gutter, replacements shall be made according to the Village's Standards regulating the construction of driveways, approaches and sidewalks. (See Design Standard 6.11 and 6.12.)

Curb or curb and gutter dimensions and cross-sections shall conform, as nearly as practicable, with the existing installations except that at intersections with sidewalk that does not conform to State of Illinois handicap requirements, sufficient depressed curb and gutter along with sidewalk shall be preformed expansion joints shall be replaced to meet said handicap specifications. One-half-inch (1/2") preformed expansion joints shall be placed at intervals not exceeding 50-feet and at the junction with existing work. Saw cut crack control contraction joints shall be made every 20-feet (minimum) and shall be a minimum of one-half-inch in depth. Sidewalks shall be finished to match existing adjacent sidewalk surfaces. Extra broom finish shall be required on all handicap sidewalk section

2.10H CULTIVATED LAWNS

Provide topsoil, seeding, sodding, and care of grass during establishment period for a complete surface restoration of lawns, parkways, and other areas disturbed as a result of the construction.

1. Topsoil

Topsoil shall be furnished and properly placed, raked, and rolled to a minimum depth of 4-inches.

The topsoil furnished shall consist of loose, friable, loamy, non-acid soil, having at least 90 percent passing a No. 10 sieve, free of large roots, brush, sticks, weeds, stones larger than one-fourth (1/4") inch in diameter, and any other debris.

Before topsoil is placed, the area to be covered shall be brought to the proper grade. If the existing surface has become hardened or crusted, it shall be raked or otherwise loosened to provide a suitable bond with the topsoil.

Apply commercial grade fertilizer uniformly at the following rates: 270 pounds per acre for seeded areas and 180 pounds per acre for sodded areas. Work fertilizer into soil prior to seeding or sodding.

2. Sodding

Provide sod in developed areas that were grassed prior to construction and as indicated on the drawings. Sodding shall also be used in ditches and drainage swales and on all embankment slopes steeper than 4 to 1 unless protection is provided against erosion of seeding. At the Contractor's option, sodding may be substituted for seeding. The cut sod shall be not less than 2-inches thick.

Sod that has been cut more than 48-hours prior to installation shall not be used without the approval of the Village Engineer.

Sod shall be placed according to Section 252 of the IDOT Standard Specifications. Place sod with edges in close contact and alternate courses staggered. On slopes 2 to 1 or steeper, sod shall be staked with at least one stake for each piece of sod. Do not place sod when the ground surface is frozen or when air temperatures may exceed 90 degrees Fahrenheit.

New sod shall be watered daily at the rate specified in Section 252 of the IDOT specifications for a minimum of seven-days after the specified initial watering. Village water used shall be metered and paid for by the contractor. Any defective, dead or dying sod shall be removed and replaced up to one-year after completion of the sodding.

In ditches, the sod shall be placed with the longer dimension perpendicular to the flow of water in the ditch. On slopes, starting at the bottom of the slope, the sod shall be placed with the longer dimension parallel to the contours of the ground.

3. Seeding

Seed all grassed areas disturbed by construction operations and not receiving sod in accordance with Section 250 of the IDOT Standard Specifications. Do not seed in windy weather or when soil is very wet. Sow seed either mechanically or by broadcasting in two directions at right angles to each other to achieve an even distribution.

After seeding, rake seed lightly into ground and roll with a roller weighing between 100 and 200 pounds per foot of roller width.

Immediately after rolling seeded areas, apply vegetative mulch unless hydraulic seeding method is used. Apply mulch in accordance with Section 251 of the IDOT Standard Specifications. Place erosion control excelsior blanket or fiber mat on slopes steeper than 3 horizontal to 1 vertical. Unless otherwise indicated, also place erosion control material at sides and bottoms of ditches, sales, and all areas within 10 feet of catch basins in seeded areas.

Immediately after placing erosion control matting or mulch, water seeded areas thoroughly. Keep soil thoroughly moist until seeds have sprouted and achieved a growth of 1-inch.

SECTION 3- SANITARY SEWERAGE FACILITIES

3.01 INTRODUCTION

All developments, regardless of size within the corporate limits or otherwise within the jurisdiction of the Village, shall include provisions for the construction of sanitary sewerage facilities, designed in accordance with this Section. Sanitary sewers shall be constructed throughout and to the extremities of a development to facilitate future extension of the Village sewer system to adjacent areas.

The design of all sanitary sewerage facilities proposed for construction or reconstruction as independent projects under Village jurisdiction shall also meet the technical requirements of this Section.

3.02 SERVICE AREAS

The Service Area shall include the entire area proposed to be ultimately served by all or a portion of the sanitary sewer system submitted for approval.

If oversizing on-site facilities or extending the sanitary sewer system beyond the limits of the development results in additional construction cost, provisions shall be made for the Owner/Developer's recapture of the incremental cost upon submittal of all waivers of lien and paid invoices for such on-site and off-site improvements.

Adequate details shall be shown on submitted drawings relative to future sewer sizes, elevations and topography to establish the adequacy of the proposed improvements to ultimately serve future sewer extensions.

3.03 SEWER DESIGN

3.03A SANITARY SEWAGE FLOW FROM RESIDENTIAL DEVELOPMENT

Sanitary sewage flow used in developing Design Average Flow from residential areas shall be computed using not less than 100 gallons per capita per day, and the Design Peak Flow need not exceed 400 gallons per capita per day but shall not be less than 250 gallons per capita per day.

Actual peak flow shall be calculated using Title 35 of the Illinois Administrative Code, Subtitle C, Chapter II, Part 370: Illinois Recommended Standards for Sewage Works (IL RS).

3.03B SANITARY SEWAGE FLOW ESTIMATION (RESIDENTIAL)

Sanitary sewage flow from both single family and multiple family residential areas shall be based on the population of full development of the area. For areas where the details of a proposed development are known, population shall be estimated in accordance with IL RS, Subpart B, Sections 370.211 and 370.310, Appendices A and B.

For undeveloped residential areas where the details of future development are not known, design population per acre shall be estimated based on the zoning classification and any comparable developments within the Village.

Sanitary sewage flow shall be estimated by the Design Engineer and approved by the Village Engineer. Such approval shall not relieve the Owner/Developer of the responsibility of providing adequate sanitary sewers to meet any and all future requirements within the development.

3.03C SANITARY SEWAGE FLOW ESTIMATION (OTHER THAN RESIDENTIAL)

Sanitary sewage flow shall be estimated in accordance with IL RS, Subpart B, Sections 370.211 and 370.310, Appendices A and B.

Sanitary sewage flow shall be estimated by the Design Engineer and approved by the Village Engineer. Such approval shall not relieve the Owner/Developer of the responsibility of providing adequate sanitary sewers to meet any and all future requirements within the development.

3.03D DESIGN FORMULA

Sanitary sewers shall be designed to provide adequate capacity without surcharge for the Design Flow, using Manning's formula:

Q = VA, where

$$V = \frac{1.486}{n} R^{2/3} S^{1/2}$$

(Where R = the hydraulic radius, S = the slope of the energy grade line, n = appropriate coefficient of roughness for the pipe material proposed, but no less than 0.013). Flowing-full velocity shall not be less than 2.0 feet per second. Where velocities greater than 10 feet per second will occur in a sanitary sewer flowing full, special provisions shall be taken to prevent erosion or displacement of the pipe. Design flow at any point in the system shall be the total of the allowable infiltration at that point plus sanitary sewage flow from the fully developed service area (computed in accordance with Sections 3.03B and 3.03C) plus all potential additional flow from the Ultimate Service Area. Infiltration shall not exceed 200 gallons per 24 hours per mile per inch diameter of the sewer pipe for any section of the system at any time during its service life.

3.04 DESIGN DETAILS FOR SANITARY SEWERS

3.04A PIPE AND JOINT TYPES

Sanitary sewer pipe and the joint specification required for the various types of pipe shall be as follows:

<u>Pipe</u>	Pipe Material	<u>Joint</u>
Ductile Iron Pipe	ANSI A-21.51 CL50	ASA A-21.11
PVC SDR 26 (24" dia. or less)	ASTM D-3034	ASTM D-3212
PVC Profile Pipe (over 24" diameter)	ASTM F-1803	ASTM D-3212
Vylon (21" or larger)	ASTM D-1784	ASTM D-3212

Where separation from water main cannot be maintained as required by IL RS, sanitary sewer shall be mechanical joint PVC Pressure Pipe meeting C-900 or C-905. Where appropriate and approved by the Utility Department and Village Engineer, C-909 may be used.

When a sewer is 20' or more below finished grade, structural strength design is required.

3.04B MINIMUM SIZE

No sanitary sewer shall be less than 8 inches in diameter.

3.04C ALIGNMENT

Sewers shall be laid straight in both horizontal and vertical planes between manhole with at least one manhole every four hundred feet (400').

3.04D LOCATION

All sanitary sewers shall be located in the parkway opposite that of Village water main or in easements (10' minimum width) as approved by the Village Engineer.

Sanitary sewers shall be located a minimum of 10' from any building.

3.04E SEWER SIZE CHANGES

Under normal conditions, when sanitary sewers of different diameters join, the invert elevations shall be adjusted to maintain a uniform energy gradient. The alignment of the 0.8 depth points of the sewers will be accepted as meeting this requirement.

3.04F DEWATERING

Prior to pipe laying and jointing, the trench shall be sufficiently dewaterred to maintain the water level in the trench at or below the base of the bedding. State/Federal permits, license agreements, or other required approvals shall be obtained prior to dewatering.

3.05 BEDDING

Bedding shall be provided for all sanitary sewers constructed in trench in accordance with Section 2.09A.

3.06 SANITARY MANHOLES

Manholes shall be provided at all changes in grade, size or alignment. Manholes shall be constructed according to the sanitary manhole detail 'Exhibit 3B,' and shall include an external seal between the frame and cone section and between each barrel section. All manhole covers shall be stamped "Village of Frankfort - Sanitary Sewer" see 'Exhibit 2B.' All castings shall made be in the USA with USA materials.

3.07 SANITARY SEWER SERVICE LINES

3.07A DESCRIPTION

A sanitary sewer service line, for the purposes of these standards, is defined as a pipe designed to receive flow from a single building, extending from the sewer to the building.

3.07B MINIMUM DIAMETER/MATERIAL

Minimum diameter of sanitary sewer service lines is 6 inches. If the service line is larger than 6-inch diameter, a manhole shall be constructed at the point of its connection with the sewer. Allowable service materials are ductile iron and PVC as specified in Section 3.04A.

3.07C DESIGN STANDARDS

Capacity requirements and design details described in Sections 3.02 through 3.04 for sanitary sewers shall apply to sanitary sewer service lines, except the minimum slope shall be 1/8-inch per foot (1%).

The maximum length for the building service shall not exceed 200' (inspection manholes or cleanouts may be used so that lengths in between do not exceed 200'). An inspection manhole shall be installed on the building service line before it connects into the main sewer line, and it shall not be located closer than 8' to the building.

3.07D PLUGS

In those instances when the service line is not immediately connected to the building to be served, it shall be tightly plugged, using a plug provided by the pipe manufacturer for such use.

3.07E SANITARY SEWER SERVICE LINE CONNECTIONS

When sanitary sewer service lines are constructed as part of the same project as the sewer, they shall be connected to the sewer using a wye at the 10:00 and 2:00 positions.

Where a sanitary sewer service line is to connect to an existing sewer, or where specific approval has been granted by the Village Engineer for the construction of a service line after the completion of the sewer main or lateral, the connection shall be made by one of the method detailed below:

- 1. Install a manhole.
- 2. Circular saw-cut sewer using proper tools. Install a hub wye saddle or a hub tee saddle in accordance with manufacturer's recommendations.
- 3. Using pipe cutter, neatly and accurately cut out desired length of pipe for insertion of proper fittings. Use "Band-Seal" couplings and shear rings and clamps to fasten the inserted fitting. Follow manufacturer's recommendations for the installation. Cement joints are prohibited.

Risers shall be required for services where sewers are over twelve (12) feet deep and shall extend within eight (8) feet of finished grade as a minimum.

3.07F SERVICE LOCATIONS

- 1. Place a 4" x 4" x 36" long hardwood stake flush with the ground surface at the property line directly opposite the end of the service line; or
- 2. Where service piping has been installed, make connection to the building piping system.
- 3. Keep a record on forms available from the Engineer of branch fittings, riser pipes, and service lines by measurement to the nearest downstream manhole.
- 4. Deliver the records to the Village Engineer on completion of the project.

3.08 SEWER DEPTH

Sanitary sewers shall be constructed sufficiently deep so as to prevent freezing. For the purposes of this specification, a minimum cover depth of 4 feet over the top of the pipe shall be required. Profiles shall be provided for all sewers to verify minimum cover requirement is met.

In addition, sewers shall be sufficiently deep to provide gravity service for all sanitary sewage within the Service Area, both existing and future, assuming all present and future basement floor drains and sanitary fixtures below finished grade will be connected to ejector pumps discharging to the sanitary sewers.

3.09 WATER MAIN PROTECTION

The requirements relative to water main protection set out in Section 5 are applicable to sanitary sewer facility construction.

3.10 TESTING AND INSPECTING

3.10A GENERAL

Test sewers and service connections for water tightness by the low pressure air testing, or exfiltration, or infiltration method as selected by the Village Engineer. Testing shall be in accordance with latest edition of Standard Specifications for Water & Sewer Main Construction in Illinois (See Appendix B for testing procedures and standards).

3.10B LEAKAGE TESTS:

1. Low pressure air test:

- a. Prior to testing for leakage, flush and clean the sewers.
- b. Seal pipe openings with airtight plugs and braces.
- c. Whenever the sewer to be tested is submerged under groundwater, insert a pipe probe by boring or jetting into the backfill material adjacent to the center of the sewer to determine the groundwater hydrostatic pressure by forcing air to flow slowly through the probe pipe.
- d. Add air to the plugged sewer sections under test until internal air pressure reaches 4.0 psi greater than any groundwater hydrostatic pressure.
- e. Allow at least two minutes for air temperature to stabilize and adding air to maintain the initial test pressure.
- f. Shut off air supply after stabilizing air temperature and record the time in seconds for the internal sewer pressure to drop from 3.5 psi to 2.5psi greater than any groundwater hydrostatic pressure.
- g. Allowable limits: Total rate of air loss not to exceed 0.0030 cubic feet of air per minute per square foot of internal pipe area. See table in Appendix "B".
- h. If the air test fails to meet these requirements, locate and repair, or remove and replace the faulty sections of sewer in a manner approved by the Engineer, as necessary to meet the allowable limits upon retesting.
- i. Do not use acrylamid gel sealant to correct leakage.

2. Water exfiltration tests:

- a. Seal the section of sewer to be tested by inserting inflatable rubber stoppers or by other means approved by the Village Engineer.
- b. Fill the manhole and pipe with water to a point two feet above the top of the sewer at the upper manhole; or, if groundwater is present, two feet above the average adjacent groundwater level for a period of not less than 24 hours prior to measuring leakage.
- c. Measure the leakage by the amount of water added to maintain the water level at that level for

- a period as required by the Engineer but not less than one hour.
- d. If, in the opinion of the Village Engineer, excessive groundwater (a minimum of 24 inches above the top of the sewer) is encountered in the construction of a section of the sewer, the exfiltration test shall not be used.

3.10C DEFLECTION TEST FOR FLEXIBLE THERMOPLASTIC PIPE:

- 1. Test the deflection in the installed PVC and other flexible thermoplastic pipe.
- 2. Perform the test no sooner than 30 days after backfilling has been completed.
- 3. Perform the test by pulling a mandrel or rigid ball having a diameter equal to 95 percent of the inside diameter of the pipe through the pipe from manhole to manhole without using mechanical pulling devices.
- 4. Allowable deflection limits: 5.0 percent of the base inside diameter of the PVC pipe.
- 5. Wherever the deflection limitation is exceeded, uncover the pipe, carefully replace compacted embedment and backfill material, and retest for deflection.

3.10 D VACUUM TESTING OF MANHOLE

Vacuum testing of each manhole shall be carried out immediately after assembly, after all connections are made, and prior to backfilling. All lift holes shall be plugged with an approved non-shrink grout. 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.

The test head shall be placed at the inside of the top of the frame and the seal inflated in accordance with the manufacturer's recommendation. If using a "plate" style manhole tester, position the plate on the frame.

A vacuum of 10 inches of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. The time shall be measured for the vacuum to drop to 9 inches.

The manhole shall pass if the time is greater than that specified on Table 1 of ASTM C 1244-93 (see Appendix B). If the manhole fails the test, make necessary repairs and repeat test procedures until a satisfactory test is obtained.

3.10E TELEVISED INSPECTION

All public sanitary sewer extensions shall be internally video taped by remote camera. Tapes shall be in color using VHS or CD-ROM format and submitted with written reports to the Village Engineer for his review and approval prior to acceptance of the sewer improvements by the Village.

3.11 WASTEWATER PUMPING STATIONS.

3.11A GENERAL

The following Special Provisions contain specifications for the Village standards on wastewater pumping systems. Other systems not listed in these Special Provisions must be pre-approved by the Village Engineer prior to construction.

3.11B LIFT STATION

- 1. GENERAL: Furnish and install a concrete lift station (or other material approved by the Village). System shall include but not be limited to two (2) submersible pumps, with discharge base elbow with lower guide removal supports, discharge piping, valves, Portacon by-pass pumping connectors, one each, on the wet well and valve vault, access frame with cover for each pump, upper guide removal supports, guide cables, and wiring bracket. A NEMA 3R stainless steel weatherproof control box shall be used to house the control panel and transfer switch, etc. Control box to be mounted remotely. Initially, two pumps will be installed, and others will be added as the particular project may require.
- 2. SUMP BASIN: The sump basin shall be constructed in concrete.
 - a. The <u>concrete</u> basin shall be poured in place or pre-cast concrete, and shall have a minimum inside diameter of 6 feet unless otherwise approved by the Village Engineer, and an inside height as shown in the approved plans. Basin walls, top and bottom shall be of sufficient thickness to facilitate loads and to preclude floatation. Shop drawings shall be signed and sealed by an Illinois licensed structural engineer. The access frame and covers shall be cast into the basin top. Pump discharge elbows shall be secured to the bottom of the basin via anchor bolts. Discharge piping from discharge elbows shall be mounted in the basin and extended through basin wall for attaching to piping in valve vault. Shrink proof grouting shall be applied to form a leak proof seal for any inlet/outlet openings in the concrete structures.
 - b. The valve vault shall be a separate concrete structure, which is also to be poured in place or pre-cast concrete, shown on the approved plans. It shall contain all of the valves and the by-pass riser, connecting to the Portacon by-pass pumping system (one to be located on the valve vault and a second Portacon with associated suction piping to be located on the wet well.)
- 3. PIPING: Where applicable, piping in the basin shall accommodate both the initial and ultimate phases. Piping shall terminate with a flange outside the sump basin wall for connection to the piping leading to the valves in an external valve vault. The valve vault shall include two (2) full sized check valves with external operating arms, and two (2) plug valves. A third plug valve shall be supplied with riser pipe and Portacon quick disconnect hose coupling for portable pump connection. Inlet(s) to the basin shall be grouted sleeves for the pipe size shown in the plans. The pump guide cables shall be stainless steel.
- 4. SUBMERSIBLE PUMP MOTOR CONSTRUCTION: Each pump shall be of the submersible type capable of handling raw, unscreened sewage using a non-clog impeller capable of passing 3" minimum diameter spherical solids. The pump shall have two mechanical seals of silicone carbide/silicon carbide for the pump end and the motor end. The pump motor shall be of the sealed submersible type with Class F insulation and operate in an air-filled coolant filled motor housing. The pump and motor shall be specifically designed so they may operate partially dry or completely submerged in the liquid being pumped. The pump motor shall not require cooling water jackets to properly function partially dry. The pump motor shall be explosion-proof rated

for Class 1, Division 1, Groups C&D areas and shall operate on 230/460 volt, 3 phase, 60 hertz power. The pumps shall be sized so that it is non-overloading throughout the entire operating range of the pump curve selected by the manufacturer to meet the duty point. The manufacturer shall trim the impeller in accordance with the designed duty point. The pump motor shaft shall be stainless steel. A stainless steel lifting cable and hook shall be supplied for each pump. Each pump motor shall be provided with heat sensing units which shall trip the starter if the motor over heats. The seal chamber shall be provided with an electrode detector to detect water in the seal chamber.

GUIDE CABLE REMOVAL SYSTEM: Each pump shall be supplied with a stainless steel guide cable removal system to include a discharge base elbow, sealing flange and upper cable tensioning device.

The discharge base elbow shall be mounted directly on the sump floor and sized according to the approved plans. It shall have a standard 125 lb. flange with machined face. The design shall be such that the pump to the discharge connection is made without need for any nuts, bolts, or gaskets. The base elbow shall secure the stainless steel guide cable system in place at the lower portion of the sump but above the sump floor.

The sealing flange shall be mounted on each pump discharge. It shall have a machined mating flange that matches the base elbow discharge connection. Sealing of this discharge connection shall be accomplished by simple linear downward motion of the pump in culmination with the entire weight of the pumping unit supported entirely by the base elbow.

The upper guide cable tensioning system shall mount directly to the lower hatch frame and provide for proper positioning and tensioning of the stainless steel guide system without a need to enter the pump chamber.

Each pump shall be provided with a stainless steel lifting chain, and be of sufficient length to extend from the pump to the top of the wet well. The access frame shall provide a 6-hook cable suspension bracket to attach the lifting cables and motor cables at the entranceway for ease of retrieval. The lifting cable shall be sized according to the pump weight.

- 6. ACCESS FRAME AND COVER: A simplex door access frame assembly shall be supplied for each pump in the wet well, and for the valve vault. Access frame and covers shall be fabricated of aluminum. The frame shall support the guide removal system and cable-mounting bracket. A separate hinged cover shall be provided for each pump. Each cover shall be provided with a lifting handle and safety latch to hold cover in the open position, and shall include locking hasps. Access frames and doors to be manufactured by Halliday, or equal.
- 7. ELECTRICAL CONTROL PANEL (FURNISHED BY PUMP SUPPLIER): The control panel shall have a NEMA 3R rated stainless steel enclosure with dead-front lockable doors, and 3 point latching lockable handle, and an inner sub door where all operator-interfaced controls shall be face mounted through the sub panel door to protect the electrical equipment. All electrical components shall be full-sized NEMA rated and new. A circuit breaker shall be provided for each pump and a magnetic motor starter with 3-leg overload protection shall also be supplied for each pump. A solid-state pump controller shall be provided to control the pumps in accordance with rise and fall in the liquid level of the wet well. The controller shall include an automatic sequential alternating relay and further options as described later in this specification. Motor starters shall have auxiliary contacts to operate both pumps on override condition. An interlock relay shall be provided to automatically re-connect the control circuit in case of circuit breaker trip on one pump. Individual H-O-A switches and run lights shall be supplied for each pump. Indicating pilot lights for motor over temperature and seal failure shall also be supplied for each pump. A terminal strip shall be provided for connecting pump and control wires. Individual elapsed

running time meters shall be furnished for each pump. The panel shall also include all required internal wiring, terminals, relays, connectors, wire markers, color coding for all wiring, laminated engraved I.D. tags for all major components, etc. as required to make up a complete duplex operational pump motor control panel.

The control panel shall be in a freestanding, traffic style, NEMA 3R rated enclosure. The enclosure shall also house the manual transfer switch when a village owned, portable generator will be used to switch power during power outages. The panel shall be supplied with an external generator receptacle compatible with that presently used by the Village's existing generators.

The control panel shall also include full sized NEMA rated pump motor protection for the following conditions:

Ground fault for each pump motor.

Under voltage protection on L1, L2, and L3.

Over voltage on L1, L2, and L3.

Phase rotation fault, for service connection.

Phase loss fault, for each motor.

Over temperature fault for each motor.

Moisture sensor/seal failure, for each motor.

The control panel shall provide for provisions to display and isolate each motor for any of the conditions and faults listed above.

Power to the panel shall be by Commonwealth Edison. The contractor shall provide up to 200' of underground power cable to and a C.T. Contractor shall provide meter socket, main disconnect, concrete power pad and pedestal along with 1 C.E. approved power pole set per C.E.

3.11C CONTROLLER

- 1. GENERAL: The Control logic system shall consist of the following:
 - a. Stainless steel level sensing transducer.
 - b. High/Low level sensing float switches with alarm relays and redundant back-up operation to the level sensing transducer.
 - c. Solid state pump controller.

2. PUMP PROGRAMMER/CONTROLLER:

- a. A solid state Microprocessor-based Controller shall be provided as specified herein. The controller shall be provided with a Class II UL listed transformer/power supply. Voltage regulation and battery charging circuitry shall be "on-board", integral to the controller.
- b. The controller shall be a standard, catalogued product of a water and wastewater pumping automation equipment manufacturer regularly engaged in the design and manufacture of such equipment. The control shall be specifically designed for water and wastewater pumping automation utilizing standard hardware and software. "One of a kind" systems using custom software with generic PLCs (programmable controller) will not be acceptable for this application.
- c. The monitoring/pump control panel shall include a comprehensive automatic microprocessor based controller that will provide the following features:
 - 1. Wet well level indication.
 - 2. Low wet well level alarm.

- 3. High wet well level alarm.
- 4. Watchdog monitor output.
- 5. Three (3) wet well level responsive pump start/stop set points (two variable speed and one constant speed pump).
- 6. Automatic alternation for three (3) pumps.
- d. The controller shall monitor analog and digital information. Analog variable set points shall be provided for the system pressure analog. Each analog shall be presented in engineering units. Set points based on the system pressure shall be provided for the following:
 - 1. High alarm On/Off
 - 2. Lead Pump On/Off
 - 3. Lag 1 Pump On/Off
 - 4. Lag 2 Pump On/Off (as required)
 - 5. Low alarm On/Off
- e. The digital controller shall be furnished with a multiple-ramp output capability implemented in hardware and software for variable speed pumps. The ramp shall be programmed to be re-configurable with the operation of each of the sixteen (16) control stages and the other independent ramp configurable with respect to the full-range conditioned signal of the controller without reference to control stage operations.
- f. Each ramp output signal shall be selectable to be 1-5 VDC into 25K ohms or greater impedance or a 4-20 mADC into not less 600 ohms. Each ramp shall have the following five parameters configurable from the controller keyboard:
 - 1. Whether it is a positive or negative-going ramp.
 - 2. The analog signal input at which the maximum ramp signal is to be produced.
 - 3. The analog signal input at which the minimum ramp signal is to be produced.
 - 4. The percentage of full-scaled ramp signal output desired at the selected analog signal input.
 - 5. The percentage of full-scaled ramp signal output desired at the selected lower analog signal input.
- g. Each control stage shall be capable of re-defining the ramp that is common to all (for purposes of load-sharing under differing conditions.) The other ramp shall be independent of the first and configurable as described without reference to the operation of the control stages. In addition to keypad configurability of each ramp, they shall also be reviewable by the operator by use of a convenient keypad sequence.
- h. The controller shall be capable of accepting three (3) analog (1-5 VDC or 4-20 mADC) and twelve (12) digital inputs in its base form. The controller shall incorporate 12-bit analog and ten (10) digital inputs in its base form. The controller shall provide two (2) analog and ten (10) digital outputs in its base form. The controller shall incorporate 12-bit analog to digital and digital to analog conversion. Additional telemetered analog and digital signal monitoring capability shall be built-in. Additional local analog inputs shall be provided in increments of four (4). Additional local digital inputs or outputs shall be provided in increments of eight (8). Additional analog outputs shall be provided individually.
- i. The operating program shall be resident in ROM and include full-scaled ranging and pump up/down determination. The controller shall be arranged to operate up to eight (8) pumps plus high and low (analog) alarms in its base form. The ON and OFF adjustments of each pump and alarm set point shall be full-range adjustable through use of an authorized operator access code and a keypad. The controller display shall show the

operation of each control stage.

- j. Review of adjustment shall be possible by the operator without use of the access code.
- k. Input signal conditioning shall provide keypad-selectable averaging of the input signal with one reading taken every second and from on to thirty readings being selectable with the controller displaying and providing control based on a moving average of the selected number of samples.
- 1. The controller shall include keypad adjustable on-delay timing logic to provide staggered pump starting following a power failure condition. Keypad adjustable off delay timing for each pump control stage shall provide smooth transition between control stages.
- m. In addition to the pump and alarm control capability, the controller shall provide alarm annunciation. The controller shall, upon the occurrence of an alarm, sound and audible device and flash the alphanumeric display. The display will indicate the alarm description, complete with the time and date of the alarm occurrence. An acknowledge pushbutton shall be provided to allow silencing of the audible device while the digital display will continue to show the alarm function, complete with time and date information, until the condition has cleared. Capabilities shall include:
 - 1. Multiple analog inputs (both local and telemetered) with alarm and control set point capability for each.
 - 2. Multiple pump alternators (for varying sized pumps.)
 - 3. Varying alternation and sequencing schemes (rotary, first-on, first-off, manual, fixed.)
 - 4. Flow totalization.
 - 5. Time-of-day control.
 - 6. Delays (on and off-delay.)
 - 7. Load cycling/shedding with automatic or manual activation.
 - 8. PID (proportional-integral (reset)-derivative (rate)) control.
 - 9. Analog output ramp (variable speed pump/valve positioning) control.
 - 10. Automatic pump replacement upon a pump failure input (pump failed/replaced.)
 - 11. Analog input adder-subtractor-multiply-divide.
 - 12. Automatic highest/lowest analog signal selector (for basis of control.)
 - 13. Pump run time/time of day/day of week/external digital input alternator advancement.
- n. The controller's display shall operate in a manual scrolling menu mod with the various displays shown in sequence as selected by the keypad's up/down arrow keys.
- o. The display shall indicate the specific function entered on the keypad to confirm that selection of particular output or other function from the keypad during adjustment or review routines. When operating a key of the controller the audible alarm shall chirp briefly to confirm that the selected key has operated.
- p. An analog (level) simulation module shall be supplied to provide a normal/simulated signal to the controller. The simulated level signal shall be used to calibrate and test the control system.
- q. The controller shall be housed in a flush-mounted, environmentally protected assembly and mounted on the door of the control panel. All connections shall be made via plug-in terminal blocks.

- r. The controller shall employ an operator interface having a 32-character alphanumeric backlit LCD displays with character height not less than .3" and with a 16-position keypad operating in menu mode.
- s. A watchdog function shall be provided which observes meaningful microprocessor activity. In the unlikely event of microprocessor stoppage the watchdog shall reset the processor. In addition, it shall transfer Form C contacts provided to job connection terminals.
- t. The controller shall have two (2) RS-232C serial communications ports for future use.
- u. It is the intention of this specification that a standard controller/transceiver be provided, with all of the control and communications features described as a fully integrated assembly.

3. LEVEL SENSOR:

- a. The liquid level transducer shall be a 4-wire, 120VAC powered type with its output signal directly proportional to the measured level excursion over a factory-calibrated range of (0'-10, 0'-20', or 0'-30' of water, select one.)
- b. The transducer shall be of the solid-state head-pressure sensing type, suitable for continuous submergence and operation and shall be installed in accordance with manufacturer's instructions. The bottom diaphragm face of the sensor shall be installed 12 inches above the floor of the wet well. The sensor shall be mounted using a 1" vertical stainless steel pipe and cable system. The transducer shall be mounted in a manner to prevent movement during pump operation.
- c. The transducer housing shall be fabricated of type 316 stainless steel with a bottom diaphragm 2-5/8" diameter of heavy-duty, limp, foul-free, molded Teflon bonded to a synthetic rubber back/seal. A hydraulic fill liquid behind the diaphragm shall transmit the sensed pressure to a solid-state variable capacitance transducer element to convert the sensed pressure to a corresponding electrical value. The sensed media shall exert its pressure against the diaphragm that flexes minutely so as to vary the proximity between an internal ceramic diaphragm and a ceramic substrate to vary the capacitance of an electrical field created between the two surfaces. A stable, hybrid, operational amplifier assembly shall be incorporated in the transducer to excite and demodulate the sensing mechanism. The transducer shall incorporate laser-trimmed, temperature compensation and high quality components and construction to provide a precise, reliable, stable output signal directly proportional to the sensed pressure over a factory-calibrated range.
- d. The transducer element shall incorporate high over-pressure protection and be designed to withstand intermittent over pressures five times the full-scale range being sensed. Metallic diaphragms shall not be acceptable in that they are subject to damage or distortion. Sensing principles employing LVDTs, resistive or pneumatic elements shall not be acceptable.
- e. The transducer shall include easily accessible offset and span adjustments in the upper assembly. Span shall be adjustable down to 15% of the sensor range. Fine and coarse adjustments for both span and offset shall be provided, using 25-turn potentiometer. Offset and span adjustments shall be non-interactive, for ease of calibration.
- f. The internal pressure of the lower transducer assembly shall be relieved to atmospheric pressure through a heavy-duty urethane jacketed hose/cable assembly and a slack PVC

bellows mounted in the motor control center. The sealed breather system shall compensate for variations in barometric pressure and expansion and contraction of air due to temperature changes and altitude as well as prevent fouling from moisture and other corrosive elements.

- g. The transducer cable shall be isolated in a separate conduit to protect its signal capabilities from any high voltage bleeding.
- h. A stainless steel cable suspension kit shall be supplied by the manufacturer of the submersible level transducer. The transducer shall be suspended from an operator accessible position permitting removal/retrieval of the transducer from the wet well without the need to enter the below grade area of the wet well chamber. The cable of both the transducer and suspension cable kit shall be sufficient to allow the transducer to hang suspended approximately 1 foot above the wet well floor.
- i. The contractor shall take precautions not to mount the transducer in direct line of turbulence from sewage inlet lines to the wet well or pump suction lines.
- j. The transducer power cable shall be of sufficient length to provide a continuous run between the wet well installation level and the motor control center. A complete spare transducer and suspension kit shall be provided to the Village.
- k. Provide an intrinsically safe barrier between the upper and lower assemblies. The barrier shall render the level sensing system suitable for use in Class 1, Division 1 Groups A, B, C, and D, Class 2, Division 1, Groups E, F and G, and Class 3, Division 1 hazardous locations.

4. REDUNDANT HIGH ALARM/PUMP CONTROL:

- a. An independent high-level alarm and redundant control capability with an independent high level alarm and redundant control capability with features hereinafter listed shall be provided in addition to the specified primary control system.
- b. The independent alarm/control panel equipment shall be designed to UL508 Industrial Control Panel standards and shall incorporate a 120 VAC input transformer with transient protection, a fused primary and a DC power supply with limited 12 VDC to supply the level sensing float circuits. The control shall be used here with a high level float switch arranged in the wet well at a higher elevation than the normal operating range of the primary control and alarm and a low level float switch for pump stopping. The float switches shall be mounted in the wet pit in accordance with manufacturers instructions or as shown on the approved plans. The front face of the controller shall incorporate a High Level Alarm, LED, a Control Turn-On LED, a Control Hold LED, a Control Contacts LED and a time adjustment with a 0 to 5 minute range.
- c. Upon the occurrence of a high level condition sensed by the high alarm float, the High Level Alarm red LED shall light, a form C SPDT alarm output contact circuit shall transfer to operate the specified alarm devices and two (2) form A, normally-open, redundant-control (10 amp/480 VAC) circuit shall close to provide redundant pump operation. These control circuits shall be wired in parallel with the primary control system two-wire control circuits to provide a redundant capability.
- d. As the level recedes from the high-level float, at the alarm contact shall return to its normal state; however, the redundant control contacts are to continue to operate during the time period setting of the off-delay timer or until the wet well level recedes below the

low level stop float.

- e. The Control Turn-On and Control-Hold LEDs circuitry allow two additional floats to be used with the CB1T to provide differential-level automatic control in addition to the High-Level Alarm capability. When the differential level pump is in use, the High Level Alarm circuitry is not generally connected to activate the control circuits in the redundant mode here described.
- f. The redundant control/alarm capability shall be completely integrated in the specified control panel and system as described and in accordance with all applicable codes and Village requirements.
- g. The logic/relay assembly and level-sensing means to perform the described functions shall be a bulletin B300, Model CB1T Controller and Model 9G stainless steel floats.
- h. Time delay and replay logic shall be included to prevent simultaneous starting of the pumps.
- 5. FLOAT SWITCHES: The back-up float switches shall be Bulletin B100, Model 9G Floats with 5-1/2" minimum diameter, Teflon coated stainless steel float ball and stainless steel cable mounting system and 25 lb anchor. A continuous run of cable shall be supplied to the motor control panel.
- 6. WIRING BRACKET: Wiring bracket(s) shall provide cord grip holders for the pump cords and the control cords. All cords shall extend from bracket through conduit to control box. No splices shall be made in the wiring. Continuous cords must be used from control panel to pumps and controls. Wiring bracket shall be fastened to access frame. Kellum connectors shall be furnished for each pump cord.
- 7. ALARM: A high water alarm light shall be supplied. An alarm flashing light shall be supplied for mounting at the control box. The alarm light shall glow dim at all times except under alarm conditions, then the light shall glow bright and flash, and shall have reset button. In case of power failure alarm light shall be powered by a gel-cell battery.
- 8. OPERATION OF SYSTEM (PRIMARY CONTROL): On sump level rise the transducer shall sense a pressure differential and start the lead pump. With lead pump operating sump level shall lower to off setting and pump shall stop. The solid-state controller shall index on stopping of pump so that lag pump will start on next operation. If sump level continues to rise when the lead pump is operating, the controller shall start the lag pump. Both lead and lag pump shall operate together until the off level is reached. If the level continues to rise when both pumps are operating, the transducer will sense an increased pressure differential and signal a high level alarm. If one pump should fail for any reason, the second pump shall operate on the override control. All levels shall be adjustable from the surface.
- 9. OPERATION OF SYSTEM (BACK-UP SYSTEM): In the event there is a failure with the primary control system, the back-up system shall be automatically engaged in the control panel. Operation of the back-up system is as follows:

On sump level rise the high water alarm switch shall energize and start lead pump. With lead pump operating sump level shall lower to low switch turn-off setting and pump shall stop. The solid-state controller shall index on stopping of pump so that lag pump will start on next operation. If sump level continues to rise when lead pump is operating, an override switch shall energize and start lag pump. Both lead and lag pump shall operate together until the low level switch turns off both pumps. If level continues to rise when both pumps are operating, the high

level switch shall energize high-level alarm. If one pump should fail for any reason, the second pump shall operate on the override control.

- 10. REMOTE TELEMETRY/SCADA: The contractor shall provide remote telemetry to their central computer compatible to the existing system in the Village. The data will include high and low alarms, pump fail, phone failure, power failure, intrusion, and high temp. Contacts shall be provided in the panel for these connections, and their connection to the monitoring equipment.
- 11. SYSTEM RESPONSIBILITY: All controls, pumps, and motors shall be furnished by one equipment supplier. The equipment supplier shall have responsibility for the complete and proper operation of the new pumping equipment, control equipment, and programming, as specified and furnished. The system supplier shall furnish 24-hour service for the complete system, and shall stock all parts used for the installation. Start-up services shall be included, and shall include operating instruction to the operators.

3.11D SHOP DRAWINGS:

A minimum of six (6) copies of all drawings shall be submitted to the Village Engineer for approval. Receipt of less than the minimum required number of copies will be cause for withholding the shop drawings from being checked until receipt of the necessary additional copies.

The following items shall be provided for review and approval with final engineering submittals:

- 1. System operation description.
- 2. System head curve and pump head curve.
- 3. Pump equipment-sizing calculations.
- 4. Equipment wiring diagrams.
- 5. Riser diagram for power supply coordination.
- 6. Pump station layout with dimensions.
- 7. Control schematics.

All equipment shop drawings are to be submitted to the Village for review and approval prior to order and release of equipment. All other information necessary to enable the Village to determine whether the proposed equipment meets the requirements shall be submitted.

3.11E INSTALLATION AND OPERATING INSTRUCTIONS:

Two (2) copies of a manual, containing installation instructions, operating instructions, wiring diagrams, parts list and, where applicable, test data and curve shall be provided.

The developer shall provide the services of factory-trained representative for a maximum period of one (1) day to start up the station and to instruct the Owner's operating personnel in the operation and maintenance of the equipment provided. All equipment shall be provided by a local authorized factory representative who shall also file for factory authorized warranty at time of start-up.

3.11 F WARRANTY:

The contractor shall warrant the main pumps to be free from defects in workmanship for a period of seven (7) years from the date of acceptance. The manufacturer shall provide a 10-year factory warranty for the guide cable removal system.

Warranties and guarantees by the suppliers of various components in lieu of single source responsibility by the manufacturer shall not be accepted. The developer shall be solely responsible for the lift station warranty.

In the event a component fails to perform s specified or is proven defective in service during the warranty period, excluding items of supply normally expended during operation, the manufacturer shall install a replacement part without cost to the Village.

This warranty shall be valid only if the product is installed, serviced and operated under normal conditions, in accordance with the manufacturer's instructions, as provided by the local, factory authorized equipment representative.

3.11 G EQUIPMENT MANUFACTURER

In order to establish a standard of quality and to insure a uniform basis of bidding, pump station equipment shall be supplied by local supplier with 25 miles of the site and shall have supplied equipment for equal projects for at least 10 other projects within the last 10 years. The supplier shall be pre-approved by the Village Engineer.

4.01 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 and the Will County Stormwater Management Ordinance as amended March 18, 2004 with an effective date of January 1, 2004. 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 Sections 1 and 2 are also applicable to storm water facility construction. In case of conflict with any part or parts of said documents, the more restrictive ordinance, as interpreted by the village engineer, shall take precedence and shall govern.

4.02 GENERAL PROJECT REQUIREMENTS

<u>SURFACE FLOW:</u> Surface swales/ditches described in Section 4.04C, shall be encouraged for use as designed in accordance with the requirements of this Section. 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 24-hour duration rainstorm. In areas where swales/ditches can not provided, the underground storm sewer system shall be designed for the 100-year storm condition.

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

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 which allows runoff no greater than that for the land in its natural state prior to development. Previously developed sites not providing storm water detention must, when undergoing redevelopment and/or additions, provide detention meeting the requirements of this Section. Detention to be provided shall be for the entire site evaluated in its natural state and shall be constructed prior to all other improvements. This shall include mass grading and all necessary erosion control measures as required by the Storm Water Pollution Prevention Plan.

<u>DRAINAGE BASIN DIVIDES</u>: The design of storm water drainage systems shall not result in the interbasin transfer of drainage, unless no reasonable alternative exists and there is no legal restraint preventing such transfer.

<u>SUMP PUMP CONNECTIONS:</u> All new subdivisions will supply a 4" service connection for each unit or lot in said subdivision such that positive drainage is provided from foundation to the storm sewer, below frost depth. Upon construction the builder will connect the house sump to the storm water connection.

<u>LOT GRADING</u>: 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.

4.03 DESIGN CRITERIA FOR STORM WATER MANAGEMENT

4.03A AUTHORITY AND PURPOSE

This ordinance is enacted pursuant to the police powers granted to the Village of Frankfort by the Illinois Revised Statutes.

The purpose of this ordinance is to diminish threats to public health, safety and welfare caused by runoff of excessive stormwater from new development and redevelopment. This excessive stormwater could result in the inundation of damageable properties, the erosion and destabilization of downstream channels, and the pollution of valuable stream and lake resources.

The cause of increases in stormwater runoff quantity and rate and impairment of quality is the development and improvement of land and as such this ordinance regulates these activities to prevent adverse impacts.

This ordinance is adopted to accomplish the following objectives:

- 1. To assure that new development does not increase the drainage or flood hazards to others, or create unstable conditions susceptible to erosion;
- 2. To protect new and existing buildings and major improvements to buildings from flood damage due to increased stormwater runoff;
- 3. To protect human life and health from the hazards of increased flooding on a watershed basis;
- 4. To lessen the burden on the taxpayer for flood control projects, repairs to flood-damaged public facilities and utilities, correction of channel erosion problems, and flood rescue and relief operations caused by increased stormwater runoff quantities from new development;
- 5. To protect, conserve, and promote the orderly development of land and water resources;
- 6. To preserve the natural hydrologic and hydraulic functions of watercourses and floodplains and to protect water quality and aquatic habitats;
- 7. To preserve the natural characteristics of stream corridors in order to moderate flood and stormwater impacts, improve water quality, reduce soil erosion, protect aquatic and riparian habitat, provide recreational opportunities, provide aesthetic benefits and enhance community and economic development.

4.03B APPLICABILITY

This ordinance shall apply to all developments in the Village of Frankfort except individual single residential properties.

4.03C DRAINAGE PLAN SUBMITTAL REQUIREMENTS

Each applicant shall submit the following information to ensure that the provisions of this ordinance are met.

The submittal shall include sufficient information to evaluate the environmental characteristics of the

property, the potential adverse impacts of the development on water resources both on-site, upstream and downstream, and the effectiveness of the proposed drainage plan in managing stormwater runoff. The applicant shall certify on the drawings that all clearing, grading, drainage, and construction shall be accomplished in strict conformance with the drainage plan. The following information and all information listed on Exhibits 1A and 1B shall be submitted for both existing and proposed property conditions.

- a) Topographic Map: A topographic survey of the property at one-foot contours under existing and proposed conditions, and areas upstream and downstream, necessary to determine off-site impacts of the proposed drainage plan. The map datum shall be correlated to a FEMA reference mark and Village of Frankfort benchmark datum.
- b) The applicant shall also provide a copy of USGS and FIRM maps delineating the proposed development site.
- c) Drainage System: Mapping and descriptions, where relevant, of existing and proposed drainage system features of the property and immediate vicinity including:
 - 1) The banks and centerline of streams and channels;
 - 2) Shoreline of lakes, ponds, and detention basins;
 - 3) Farm drains and tiles;
 - 4) Sub-watershed boundaries within the property;
 - 5) Watershed soils classifications;
 - 6) The property's location within the larger watershed;
 - 7) Location, size and slope of stormwater conduits and drainage swales;
 - 8) Sanitary or storm sewers;
 - 9) Depressional storage areas;
 - 10) Delineation of upstream and downstream drainage features and watersheds that might be affected by the development;
 - 11) Detention facilities:
 - 12) Roads and streets and associated stormwater inlets;
 - 13) Base flood elevation, regulatory floodway, and 100-year base floodplain limit delineation based on topography and the FEMA map.
 - 14) Basis of design for the final drainage network components.
- d) Environmental Features: A depiction of environmental features of the property and immediate vicinity including the following:
 - 1) The limits of wetland areas:
 - 2) Any designated natural areas; and
 - 3) Any proposed environmental mitigation features.
 - 4) A copy of the National Wetlands Inventory Map delineating the proposed development site.
- e) Elevations and maps of 100-year flooding;
- f) Cross-section data for open channel flow paths and designated overland flow paths;
- g) Direction of storm flows;
- h) Flow rates and velocities at representative points in the drainage system;

- i) A statement by the design engineer of the drainage system's provisions for handling events greater than the 100-year's runoff.
- j) The Village reserves the right to request that the IDNR-OWR review all drainage plan submittals.
- k) Area of inundation Exhibit showing affected areas due to storm sewer failure

Minimization of Increases in Runoff Volumes and Rates

In the selection of a drainage plan for a development, the applicant shall evaluate and implement, where practicable, site design features that minimize the increase in runoff volumes and rates from the site. The applicant's drainage plan submittal shall include evaluations of site design features that are consistent with the following hierarchy:

- a) Minimize impervious surfaces on the property, consistent with the needs of the project;
- b) Attenuate flows by use of open vegetated swales and natural depressions and preserve existing natural stream channels;
- c) Infiltrate runoff on-site;
- d) Provide stormwater retention structures;
- e) Provide stormwater detention structures; and
- f) Construct storm sewers. In developments where the Village requires the installation of curb and gutter, storm sewers are preferred. The Village may also modify the above hierarchy as required based on an evaluation of the site conditions.

4.03D WATER QUALITY AND MULTIPLE USES

The drainage system should be designed to minimize adverse water quality impacts upstream, downstream and on the property itself. Detention basins shall incorporate design features to capture stormwater runoff pollutants. In particular, designers shall give preference to wet basin designs in locations adjacent or near existing wetlands or in other areas where they are suitable and acceptable to the Village and all flows from the development shall be routed through the basin (i.e., low flows shall not be bypassed). Dry basins with low flow bypasses may be preferred in certain developments to enhance multiple uses where suitable and acceptable to the Village. Retention and infiltration of stormwater shall be promoted throughout the property's drainage system to reduce the volume of stormwater runoff and to reduce the quantity of runoff pollutants.

The drainage system should incorporate multiple uses where practicable. Uses considered compatible with stormwater management include open space, aesthetics, aquatic habitat, recreation (boating, trails, playing fields), wetlands and water quality mitigation. The applicant should avoid using portions of the property exclusively for stormwater management.

- 1. Release Rates The drainage system for a property shall be designed to control the peak rate of discharge from the property for the two-year, 24-hour and 100-year, critical duration events to levels which will not cause an increase in flooding or channel instability downstream when considered in aggregate with other developed properties and downstream drainage capacities. The peak discharge from events less than or equal to the two-year event shall not be greater than 0.04 cfs per acre of property drained. The peak 100-year discharge shall not be greater than 0.15 cfs per acre of property drained.
 - a) Detention Basin Outlet Design: Backwater on the outlet structure from the downstream drainage system shall be evaluated when designing the outlet.
 - b) Storage facilities shall be designed such that the pre-development peak runoff rate from the 100-year, critical duration rainfall will not be exceeded assuming the primary restrictor is blocked.
- 2. Detention Storage Requirements The design maximum storage to be provided in a detention basin shall be based on the runoff from the 100-year, critical duration event. The design of detention basins for development sizes larger than 5 acres shall be by Runoff Hydrograph Methods described below. The design of detention basins for development sizes smaller than 5 acres shall be by consistent with Figure 1 using the total impervious area for the tributary area being detained.
 - a) Extended Detention Requirement: When an existing agricultural land use is downstream of and adjacent to a site with a proposed storm water outlet facility, and the agricultural land is not proposed or planned for development, the runoff from a 0.75 inch rainfall event, over the hydraulically connected impervious area of the new development, shall be managed on site in conformance with the Will County Storm Water Ordinance.
 - b) Transfers of waters between watersheds shall be prohibited except when such transfers will not increase flood elevations or decrease flood conveyance capacity upstream or downstream. At no time shall the transfer exceed 10% of the total drainage area or 5 acres, whichever is more restrictive.
 - c) The function of existing on-site depressional storage shall be preserved for both onsite and off-site tributary flows in addition to the required detention. When depressional storage is removed it must be compensated for in the site runoff storage facility at a 1 to 1 ratio, in addition to the runoff storage requirements described in Section 4, provided that offsite areas tributary to the existing depressional storage are routed through the site runoff storage facility.
- 3. Drainage System Design and Evaluation The following criteria should be used in evaluating and designing the drainage system. The underlying objective is to provide capacity to pass the 10-year peak flow in the minor drainage system and an overland flow path for the 100-year peak flows.
 - a) Design Methodologies: Major and minor conveyance systems for areas up to 5 acres may be designed using the rational formula. The rational formula may also be used in sizing the minor drainage system for larger sites. Runoff Hydrograph methods as

- described in Section 4.03E-4 must be used for major drainage system design for all systems with greater than 5 acres of drainage area.
- b) Positive Drainage: All areas of the property must be provided an emergency overland flow path that will pass the entire calculated 100-year flow from onsite and offsite tributary parcels at a stage at least 1 foot below the lowest foundation grade in the vicinity of the flow path (1' minimum freeboard), even when 100-year storm sewer is provided, regardless of the size of the drainage area. Emergency overland flow paths shall be provided in drainage easements, which cannot be obstructed.
- c) Drainage easements (10' minimum width) shall be provided in all locations where runoff traverses properties of different ownership. Drainage easements may be of greater width to convey the emergency overland flow route and/or recommended by the Village Engineer.
- 4. Methods for Generating Runoff Hydrographs Runoff Hydrographs shall be developed using the soil conservation service computer model TR 20 or Pond Pack as developed by Haestad Methods, Inc. If an existing regulatory model uses the Corp. of Engineers computer model HEC-RAS, then that model can be used. A continuous simulation model is acceptable only for very complex projects. No other models are acceptable unless approved by the Village Engineer.
 - Rainfall: Unless a continuous simulation approach to drainage system hydrology is used, all design rainfall events shall be based on the Illinois State Water Survey's Bulletin 71. A critical duration analysis for the 2 and 100-year storms of 1, 2, 3, 6, 12, 18, 24 and 48 hours duration shall be prepared in accordance with generally accepted engineering principles. The first quartile Huff rainfall distribution shall be used for the design and analysis of detention and major conveyance systems with critical durations less than or equal to 6 hours. Their second quartile Huff rainfall distribution shall be used for the design and analysis of detention basins and major conveyance systems with a critical duration greater than 6 and less than or equal to 12 hours. The third quartile Huff rainfall distribution shall be used for the design and analysis of detention basins and major conveyance system with critical durations greater than 12 and less than or equal to 24 hours. The fourth quartile Huff distribution shall be used in the design and analysis of detention basins and major conveyance systems with durations greater than 24 hours. The first, second, third, and fourth quartile distributions described by Huff are presented in Table 1. The rainfall data to be used for the critical duration analysis and all other appropriate hydrologic calculations are present as Table 2.
 - b) Antecedent Moisture: Computations of runoff Hydrographs which do not rely on a continuous accounting of antecedent moisture conditions shall assume an antecedent moisture condition of two as a minimum.
- 5. The Village endorses the utilization of the Best Management Practices (BMP) regarding the design of a Storm Water Management System. The primary objectives of a BMP are minimize adverse water quality impacts; preserve beneficial natural features on-site; avoid downstream erosion and habitat loss; maintain natural base flows and groundwater recharge; prevent increases to downstream flooding; provide multiple uses of drainage and storm water storage facilities; and provide for the economical, safe and aesthetically pleasing drainage system for development. BMP methods have been published by the Northeastern Illinois Planning Commission (NIPC) under the following titles: "Designing Stormwater BMP in

Northeastern Illinois," "Urban Stormwater BMP for Northeastern Illinois," "Restoring and Managing Stream Greenways: A Landowners Handbook;" Chicago Wilderness "Biodiversity Recovery Plan;" and Village of Frankfort "Water Resource Management Plan." These, as well as other sources, are recognized BMP which should be considered in the design of a stormwater management system.

Each project shall incorporate conservation design elements as a BMP and a narrative including but not limited to the following:

- a) Keep all work outside the floodplain (if floodplain exists within the project limits)
- b) Maintain existing wetland or depressional areas
- c) Provide open space dedication
- d) Provide a groundwater recharge element
- e) Provide wetland or wildlife enhancement

TABLE 1
HUFF QUARTILE DISTRIBUTIONS

CUMUL.			<10 SQ		AREA>10 & AREA<50			AREA>50 & AREA<400				
STORM	Н	IUFF QU	JARTIL	E	HUFF QUARTILE		HUFF QUARTILE					
PERCENT	1 ST	2^{ND}	3 RD	4 TH	1 ST	2^{ND}	3 RD	4 TH	1 ST	2^{ND}	3 RD	4 TH
5	16	3	3	2	12	3	2	2	8	2	2	2
10	33	8	6	5	25	6	5	4	17	4	4	3
15	43	12	9	8	38	10	8	7	34	8	7	5
20	52	16	12	10	51	14	12	9	50	12	10	7
25	60	22	15	13	62	21	14	11	63	21	12	9
30	66	29	19	16	69	30	17	13	71	31	14	10
35	71	39	23	19	71	40	20	15	76	42	16	12
40	75	51	27	22	78	52	23	18	80	53	19	14
45	79	62	32	25	81	63	27	21	83	64	22	16
50	82	70	38	28	84	72	33	24	86	73	29	19
55	84	76	45	32	86	78	42	27	88	80	39	21
60	86	81	57	35	88	83	55	30	90	86	54	25
65	88	85	70	39	90	87	69	34	92	89	68	29
70	90	88	79	45	92	90	79	40	93	92	79	35
75	92	91	85	51	94	92	86	47	95	94	87	43
80	94	93	89	59	95	94	91	57	96	96	92	54
85	96	95	92	72	94	96	94	74	97	97	95	75
90	97	97	95	84	97	97	96	88	98	98	97	92
95	98	98	97	92	98	98	98	95	99	99	99	97

TABLE 2

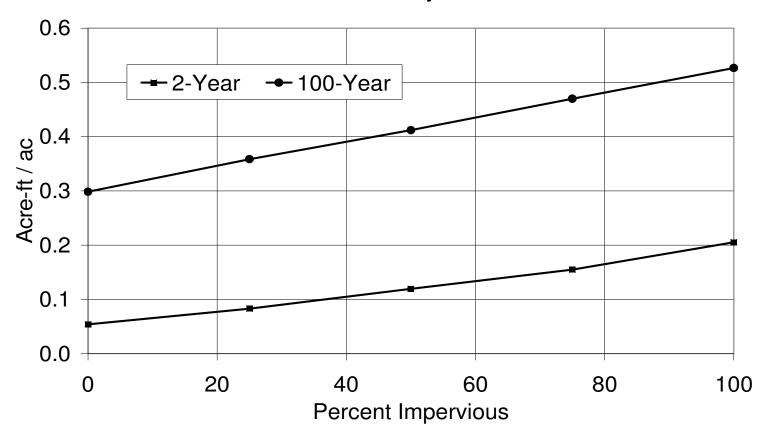
RAINFALL DATA FOR CRITICAL DURATION ANALYSIS AND OTHER HYDROLOGIC CALCULATIONS

RETURN PERIOD	STORM DURATION	RAINFALL DISTRIBUTION	RAINFALL	
(YEARS)	(HOURS)	(QUARTILE)	(INCHES)	
2	1	1 ST	1.50	
2	2	1 ST	1.86	
2 2 2 2 2 2 2	3	1 ST	2.05	
2	6	1 ST	2.40	
2	12	$2^{ m ND}$	2.78	
2	18	3^{RD}	2.92	
2	24	3^{RD}	3.20	
2	48	4^{TH}	3.46	
5	24	3 RD	4.08	
10		1 ST	2.20	
10	1	1 ST	2.28	
10	2	1 ST	2.77	
10	3	1 ST	3.10	
10	6	$2^{ m ND}$	3.64	
10	12	3^{RD}	4.22	
10	18	3^{RD}	4.43	
10	24	4^{TH}	4.85	
10	48	4	5.24	
50	1	1 ST	3.37	
50	2	1 ST	4.12	
50	3	1 ST	4.59	
50	6	1 ST	5.38	
50	12	$2^{ m ND}$	6.24	
50	18	3 RD	6.54	
50	24	3^{RD}	7.10	
50	48	4^{TH}	7.70	
100	1	1 ST	3.98	
100	2	1 ST	4.91	
100	3	1 ST	5.35	
100	6	1 ST	6.35	
100	12	$2^{ m ND}$	7.37	
100	18	3 RD	7.67	
100	24	3 RD	8.36	
100	48	4 TH	9.15	
100	TU	7	7.13	

FIGURE 1

<u>DETENTION VOLUME FOR</u> <u>SITES 5 ACRES OR LESS</u>

Detention Volume vs. Percent Impervious Will County Rainfall



- 6. Wet Detention Basin Design Wet detention basins shall be designed to remove stormwater pollutants, enhance water quality, be safe, be aesthetically pleasing, and as much as feasible to be available for recreational use. A professional shall prepare a detailed landscaping plan in compliance with the Village Landscape Ordinance. Wet Detention Basins can have a wet bottom or wetland bottom meeting the following criteria.
 - a) Wet Detention Basin Depths:
 - i) Wet Bottom Depths: Depths below the normal water level shall be at least three feet deep, excluding near shore banks and safety ledges. If fish habitat is to be provided, they shall be at least ten feet deep over twenty-five percent of the bottom area to prevent winter freeze-out.

- ii) Wetland Bottom Depths: Depths shall range between 0.5' and 5' with an average of 3'. At least five percent of the area below the NWL shall have pockets up to 5' deep.
- b) Wet Detention Basins Minimum Area:
 - i) Wet Bottom: 1 acre at the normal water level.
 - ii) Wetland Bottom: 8,000 square feet at the normal water level.
- c) Wet Detention Basin Shoreline Slopes: The average sideslope between the freeboard elevation to 1.5' below the normal water level shall not exceed 5:1 (horizontal to vertical). The side slopes below the normal pool elevation shall not be steeper than 2 to 1 (horizontal to vertical). The following criteria are strongly recommended (See Exhibits 4G and 4H).
 - i. Freeboard elevation to 2-year water level: 4:1
 - ii. 2-year water level to NWL: 8:1
 - iii. NWL to 1.5' below NWL: 20:1
 - iv. > 1.5' below NWL: 2:1
- d) Wet Detention Basins Maximum 100-yr Bounce (for wet bottom and wetland bottom): 5.0'.
- e) Wet Detention Basins Maximum Drawdown Time for the 10-year storm (for wet bottom and wetland bottom): 72-hours. The planting materials for the pond side slope above the normal water level shall be selected with consideration of survival during periods of inundation. Planting materials will be reviewed and deemed suitable by the Village and in compliance with the Village Landscape Ordinance. Drawdown calculations shall be provided for the 2-, 5-, 10- and 100-year storm (24-hour duration).
- f) Inlet and Outlet Orientation: To the extent feasible, the distance between detention inlets and outlets shall be maximized. If possible, they should be at opposite ends of the basin. Pond inlets and outlets shall be placed at the pond normal water level. Energy dissipation shall be provided at all inlets and outlets below the normal water level.
- g) Pond Outlets: Where ponds outlet to defined drainage system (storm sewer, swale, etc.) available capacity shall first be verified. Where ponds do not outlet to a defined drainage system, the flow shall be converted from point discharge to resemble the existing flow type (i.e. sheet flow) so not to cause adverse impacts to downstream property. Energy dissipation shall be provided at all pond inlets and outlets.
- h) Wet Detention Basin Aeration: Wet basins may require mechanical aeration at the discretion of the Village Engineer.
- i) Additional Wet Bottom Criteria:
 - i) Safety Ledge: All wet bottom detention basins shall have a safety ledge between

- 0.5' and 1.5' below the NWL. The average width shall be at least 10'. The minimum width shall be 8'.
- ii) Permanent Pool Volume: The permanent pool volume in a wet basin at normal depth shall be equal to or greater than the runoff volume from its watershed for the two-year event.
- j) Additional Wetland Bottom Criteria:
 - i) Wetland design shall be prepared by a qualified wetland designer/ ecologist.
 - ii) Stilling/Sedimentation Basins: A stilling/sedimentation basin should be constructed at each major inlet to a wetland and wetland bottom pond. The volume of the basins should be at least 500 cubic feet per acre of impervious surface in the drainage area. Side slopes of the basins shall be no steeper than 3 horizontal to 1 vertical and basin depths should be at least 3 feet to minimize resuspension of accumulated sediment.
- 8. Dry Detention Basin Design In addition to the other requirements of this ordinance, dry basins shall be designed to remove stormwater pollutants, to be safe, to be aesthetically pleasing and as much as feasible to be available for multiple uses.
 - a) Dry Basin Design Details In order to prevent soil erosion and weed problems, dry detention basins must be landscaped including the establishment of a ground cover over all unpaved areas through sodding or other means which result in a quality of ground cover comparable to that obtained through sodding. Dry detention facilities must be designed so that the cross slope is at least two percent (2%).

A bottom slope of less than 2% requires special approval with consideration of low flows. The bottom of the facility shall be provided with an underdrain or low flow channel that is subject to review by the Village Engineer. The underdrain shall be a minimum six inch diameter perforated drain tile covered on all sides with a minimum of six inches of crushed stone conforming to ASTM C33, Size No. 67. The underdrain shall be installed to drain the basin below grade during periods of low flow and shall connect to a storm sewer outfall pipe. The low flow channel shall be concrete and have a width of four feet.

- b) Dry Basin Maximum Area: 8,000 square feet (calculated below the sideslopes).
- c) Dry Basin Maximum 100-year Bounce: 4.0'.
- d) Maximum Drawdown Time for the 100-year storm: No more than 20% of the basin with standing water for more than 72 hours. The planting materials for the pond side slope above the normal water level shall be selected with consideration of survival during periods of inundation. Planting materials will be reviewed and deemed suitable by the Village.
- e) Dry detention facilities shall be designed with side slopes not steeper than 4 to 1 (horizontal to vertical).
- f) Dry Basin Drainage: The bottom slope of all dry bottom ponds should be a minimum

- of 2%. Underdrains directed to the outlet may be used to supplement this requirement. Grading plans shall clearly distinguish the wet/wetland portion of the basin bottom from the dry portion.
- g) Velocity Dissipation: Velocity dissipation measures shall be incorporated into dry basin designs to minimize erosion at inlets and outlets and to minimize the resuspension of pollutants.
- h) Dry Basin Inlet and Outlet Orientation: To the extent feasible, the distance between detention inlets and outlets shall be maximized. If possible, they should be at opposite ends of the basin. There should be no low flow bypass between the inlet and outlet and paved low flow channels shall not be used.
- i) Pond Outlet: Where ponds outlet to defined drainage system (storm sewer, swale, etc.) available capacity shall first be verified. Where ponds do not outlet to a defined drainage system, the flow shall be converted from point discharge to resemble the existing flow type (i.e. sheet flow) so not to cause adverse impacts to downstream property. Energy dissipation shall be provided at all pond inlets and outlets.
- 9. Minimum Detention Outlet Size Where a single pipe outlet or orifice plate is to be used to control discharge, it shall have a minimum diameter of 2 ½" inches. If this minimum orifice size permits release rates greater than those specified in this section, and regional detention is not a practical alternative, alternative outlet designs shall be utilized which incorporate self cleaning flow restrictor.
- 10. Detention in Floodplains The placement of detention basins within the floodplain is strongly discouraged because of questions about their reliable operation during flood events. However, the stormwater detention requirements of this ordinance may be fulfilled by providing detention storage within flood fringe areas on the project site provided the following provisions are met.
 - a) Detention in Flood Fringe Areas: The placement of a detention basin in a flood fringe area shall require compensatory storage for 1.5 times the volume below the base flood elevation occupied by the detention basin including any berms. The release from the detention storage provided shall still be controlled consistent with the requirements of this section. The applicant shall demonstrate its operation for all streamflow and floodplain backwater conditions. Excavations for compensatory storage along watercourses shall be opposite or adjacent to the area occupied by detention.

All floodplain storage lost below the ten-year flood elevation shall be replaced below the ten-year flood elevation. All floodplain storage lost above the existing ten-year flood elevation shall be replaced above the proposed ten-year flood elevation. All compensatory storage excavations shall be constructed to drain freely and openly to the watercourse.

- b) Detention in Floodways: Detention basins shall be placed in the floodway only in accordance with 403F-10c.
- c) On-stream Detention: On-stream detention basins are strongly discouraged but allowable if they provide regional public benefits and if they meet the other

provisions of this ordinance with respect to water quality and control of the two-year and 100-year events from the property. If on-stream detention is used for watersheds larger than one square mile, it is recommended that the applicant use dynamic modeling to demonstrate that the design will not increase stage for any properties upstream or downstream of the property. Also, impoundment of the stream as part of on-stream detention:

- (1) Shall not prevent the migration of indigenous fish species, which require access to upstream areas as part of their life cycle, such as for spawning,
- (2) Shall not cause or contribute to the degradation of water quality or stream aquatic habitat,
- (3) Shall include a design calling for gradual bank slopes, appropriate bank stabilization measures, and a pre-sedimentation basin,
- (4) Shall not involve any stream channelization or the filling of wetlands,
- (5) Shall require the implementation of an effective non-point source management program throughout the upstream watershed,
- (6) Shall not occur downstream of a wastewater discharge, and
- (7) Shall comply with 92 Illinois Administrative Code Parts 702 and 708 and the floodplain ordinance of Village of Frankfort.
- (8) The applicant must show by a detailed engineering analysis that on-stream detention provides for all storms of critical duration water surface elevations and discharges less than or equal to an off-stream detention basin constructed in accordance with this ordinance.
- (9) An IDNR Dam Safety Permit shall be obtained stating the berm or control structure meets the Class III criteria of the IDNR/DWR. If such a permit is not required, a signoff letter from IDNR shall be provided.
- 11. Protection of Wetlands and Depressional Storage Areas Wetlands and other depressional storage areas shall be protected from damaging modifications and adverse changes in runoff quality and quantity associated with land developments. In addition to the other requirements of this ordinance, the following requirements shall be met for all developments whose drainage flows into wetlands and depressional storage areas (as appropriate):
 - a) Detention in Wetlands and Depressional Storage Areas: Existing wetlands shall not be modified for the purposes of stormwater detention unless it is demonstrated that the existing wetland is low in quality and the proposed modifications will maintain or improve its habitat and ability to perform beneficial functions. Existing depressional storage and release rate characteristics of wetlands and other depressional storage areas shall be maintained and the volume of detention storage provided to meet the requirements of this section shall be in addition to this existing storage.
 - b) Sediment Control: The existing wetland shall be protected during construction by appropriate soil erosion and sediment control measures and shall not be filled.

- c) Alteration of Drainage Patterns: Site drainage patterns shall not be altered to substantially decrease or increase the existing area tributary to the wetland.
- d) Detention/Sedimentation: All runoff from the development shall be routed through a preliminary detention/sedimentation basin designed to capture the two-year, 24-hour event and hold it for at least 24 hours, before being discharged to the wetland. This basin shall be constructed before property grading begins. In addition, the drainage hierarchy should be followed to minimize runoff volumes and rates being discharged to the wetland.
- e) Vegetated Buffer Strip: A buffer strip, preferably vegetated with native plant species, shall be maintained or restored around the periphery of the wetland. The width of the buffer strip shall be 25 feet for a tributary length of 250 feet or less. The width of the buffer strip shall be 50 feet for a tributary length greater than 250 feet and less than or equal to 500 feet. The width of the buffer strip shall be 75 feet for a tributary length over 500 feet. The tributary length is the maximum length of the project limits to the wetland area or the length from a drainage divide to the wetland area, whichever is greater.

12. Streets, Parking Lot, and Culvert Drainage

- a) Streets: If streets are to be used as part of the minor or major drainage system, ponding depths shall not exceed curb heights Depth of 100-year overland flow routes shall not exceed 6" at the crown.
- b) Parking Lots: Ponding of six inches (6") maximum is permitted when necessary to provide conveyance of the 100-year storm through the storm sewer. This ponding shall not be included in the detention calculations. All paved parking lot areas should have a minimum slope of 1%.
- c) Culvert Road and Driveway Crossings: Sizing of culvert crossings shall consider entrance and exit losses as well as tail water conditions on the culvert. Minimum size shall be 12" diameter.

13. Grading Plans

All grassed areas should have a minimum slope of 2% and a maximum slope of 5:1. Where slopes of 2% are not practicable, additional inlets may be used while maintaining 1% minimum slope.

Residential subdivision plans shall include sufficient information (house outline, spot elevations, contours, etc.) such that the rear yards do not exceed 10% slope and side yards do not exceed 5:1.

Drainage easements shall be provided on residential lots to convey the 100-year storm, with minimum widths of 5' on side yards and 7.5' on rear yards.

The use of retaining and/or landscape walls is strongly discouraged. Walls in excess of two and one half feet (2.5') height and/or fifty feet (50') length must be approved by the Village of Frankfort Plan Commission. Where retaining walls are permitted with height 2.5' or more,

drawings and calculations shall be provided, signed and sealed by an Illinois licensed Structural Engineer, as well as a geotechnical report by an Illinois licensed Civil Engineer.

Any proposed walk-out and look-out basement foundations must be designated on the plans. The Village of Frankfort will not issue individual building permits for lots that deviate from the approved plan.

Lowest Basement Floor Elevations shall be identified on lots adjacent to wet bottom ponds, wetland bottom ponds and floodplain.

- 14. Infiltration Practices To effectively reduce runoff volumes, infiltration practices including basins, trenches, and porous pavement should be located on soils in hydrologic soil groups "A" or "B" as designated by the U.S. Soil Conservation Service. Infiltration basins and trenches designed to recharge groundwater shall not be located within seventy-five feet of a water supply well or a building foundation. A sediment-settling basin shall be provided to remove coarse sediment from stormwater flows before they reach infiltration basins or trenches. Stormwater shall not be allowed to stand more than seventy-two hours over eighty percent of a dry basin's bottom area for the maximum design event to be ex-filtrated. The bottom of infiltration facilities shall be a minimum of four feet above seasonally high groundwater and bedrock.
 - a) Vegetated Filter Strips and Swales To effectively filter stormwater pollutants and promote infiltration of runoff, sites should be designed to maximize the use of vegetated filter strips and swales. Wherever practicable, runoff from impervious surfaces should be directed onto filter strips and swales before being routed to a storm sewer or detention basin.
- 15. Safety Considerations The drainage system components, especially all detention basins, shall be designed to protect the safety of any children or adults coming in contact with the system during runoff events.
 - a) Side Slopes: The side slopes of all detention basins at one-hundred year capacity shall be as level as practicable to prevent accidental falls into the basin and for stability and ease of maintenance.
 - b) Safety Ledge: All wet and wetland detention basins shall have a level safety ledge with widths specified in Section 4.03E-6 and 4.03E-7 and shall slope towards the shoreline side slope.
 - c) Velocity: Velocities throughout the surface drainage system shall be controlled to safe levels taking into consideration rates and depths of flow.
 - d) Overflow Structures: All stormwater detention basins shall be provided with an overflow structure capable of safely passing excess flows at a stage at least 1-foot 2 feet below the lowest foundation grade, including walk-out and/or look-out foundation elevations, in the vicinity of the detention basin. The design flow rate of the overflow structure shall be equivalent to the 100-year inflow rate based on a fully developed condition of all upstream areas. Provide slope stabilization in overflow locations when slope exceeds 4:1 and where flows occur with velocity 5 feet per second or higher.

- e) Top of berms shall be 10' minimum to access outlet control structure. Top of berms shall be 5' minimum for remaining portion.
- f) Pond high water levels shall be setback at least 10' plus 1.5 times the total depth of the pond (including permanent pool depth) from adjacent right-of-way.
- g) Retaining Walls: The use of retaining and/or landscape walls in detention basin design is strongly discouraged. Walls in excess of two and one half feet (2.5') height and/or fifty feet (50') length must be approved by the Village of Frankfort Plan Commission.

Where retaining walls are permitted with height 2.5' or more, drawings and calculations shall be provided, signed and sealed by an Illinois licensed Structural Engineer, as well as a geotechnical report by an Illinois licensed Civil Engineer.

16. Maintenance Considerations - The stormwater drainage system shall be designed to minimize and facilitate maintenance. Turfed sideslopes shall be designed to allow lawn-mowing equipment to easily negotiate them. Wet basins shall be provided with alternate outflows, which can be used to completely drain the pool for sediment removal. (Pumping may be considered if drainage by gravity is not feasible.) Pre-sedimentation basins shall be included, where feasible, for localizing sediment deposition and removal. Access for heavy equipment shall be provided.

4.03F ACCOMMODATING FLOWS FROM UPSTREAM TRIBUTARY AREAS

Stormwater runoff from areas tributary to the property shall be considered in the design of the property's drainage system. Whenever practicable, flows from upstream areas that are not to be detained should be routed around the basin being provided for the site being developed.

- 1. Areas tributary to the applicant's property, not meeting the storage and release rate requirements of this ordinance, shall be identified. Conveyance of the 100-year runoff from all tributary areas, developed conditions, shall be routed through or around the proposed site.
- 2. When there are areas which meet the storage and release rate requirements of this ordinance, tributary to the applicant's property, the upstream flows shall be bypassed around the applicant's detention basin, or be routed through the applicant's detention basin if this is the only practicable alternative and the addition of flows will not cause an adverse impact on the period of inundation within the proposed detention facilities. Storage needed for the applicant's property shall still be computed as described in Section 4.03F. However, if the Village decides to route tributary area flows through an applicant's basin, the final design stormwater releases shall be based on the combined total of the applicant's property plus tributary areas. It must be shown that at no time will the runoff rate from the applicant's property exceed the allowable release rate for his/her property alone.

4.03G EARLY COMPLETION OF DETENTION FACILITIES

Where detention, retention, or depressional storage areas are to be used as part of the drainage system for a property, they shall be constructed as the first element of the initial earthwork program. Any eroded sediment captured in these facilities shall be removed by the applicant before project

completion in order to maintain the design volume of the facilities. Pre-sedimentation basins shall be included, where feasible, for localizing sediment deposition and removal. Access for heavy equipment shall be provided.

4.03H FEE IN LIEU OF DETENTION

The Village shall have the option of requiring a fee, as determined by the village engineer, of not less than \$3.00 for each cubic-foot of detention needed in lieu of the applicant building a basin on-site provided the property will discharge stormwater to a Village approved stormwater management system with adequate stormwater conveyance and storage capacity dedicated to site runoff from the area containing the development.

4.03I MAINTENANCE RESPONSIBILITY

Maintenance of stormwater drainage facilities located on private property shall be the responsibility of the owner of that property. Before a permit is obtained from the Village of Frankfort the applicant shall submit a management plan in accordance with applicable IEPA NPDES Phase 2 requirements and in compliance with the provisions of the Village of Frankfort Landscape Ordinance Sections 158.29 and 158.295 as they relate to stormwater management facilities. All future owners of the property will maintain its stormwater drainage system. The plan shall also specifically authorize representatives of the Village to enter onto the property for the purpose of inspections and maintenance of the drainage system.

The plan shall be prepared by:

- 1. Registered Professional Engineers The applicant shall provide an Illinois Registered Professional Engineer or persons working under his direct control and authority to provide construction stake out and construction observation periodically as required when work is being performed. The applicants Registered Professional Engineer shall provide progress reports approved by him to the Village and the Village Engineer on a weekly basis if determined to be necessary by the Village.
- Professional Landscape Architect or Wetland Designer/ Ecologist The applicant shall provide a Professional Landscape Architect or Wetland Designer/Ecologist or persons working under their direct control and authority to provide the required reports and monitoring plans as required by Section 158.295 of the Village Landscape Ordinance #2341.

4.03J CONFLICTS

In the event that there is an apparent conflict in the requirements or with other sections of the development code, the most restrictive interpretation shall prevail.

4.04 DESIGN CRITERIA FOR STORM SEWERS AND SURFACE SWALES

4.04A STORM SEWER

1. Storm sewers shall be designed for all onsite and offsite tributary areas using Manning's Formula with 0.013 as the roughness coefficient unless otherwise approved by the Village Engineer. A ten (10) year storm shall be used for design purposes. Storm sewers shall be designed to flow full and have a minimum velocity of three feet per second and shall not exceed ten feet per second.

If a storm sewer is designed with a constantly submerged outfall or is utilized as the major drainage system, i.e. conveying the 100-year storm, the sewer shall be designed using the "hydraulic gradient" with a maximum upstream allowable water level elevation at the top of the street curb while utilizing a tail water at the downstream end of the 10-year water level or crown of the pipe, whichever is more restrictive.

- 2. The rational method shall be employed when computing storm runoff. The runoff coefficient used in the rational method shall be the weighted average for the proposed tributary watershed based on a c-value of 0.95 for all impervious areas (paved or hard surfaced areas of all types and buildings) and a c-value of 0.45 for all pervious areas.
- 3. Time of concentration shall be calculated using TR-55 Worksheet 3. Rainfall data for storm sewer sizing shall be used from ISWS Bulletin 70, Appendix A, as summarized below:

TABLE 3

RAINFALL DATA FOR
STORM SEWER AND SURFACE SWALES

Time of Concentration	10-year Intensity	100-year Intensity
(min)	(in/hr)	(in/hr)
5	7.0	12.2
10	6.4	11.2
15	5.2	9.2
20	4.5	7.8
25	4.0	7.0
30	3.6	6.3
35	3.2	5.7
40	2.9	5.1
45	2.7	4.8
50	2.5	4.4
55	2.4	4.2
60	2.3	4.0

- 4. In areas where curb and gutter and storm sewers are approved, storm structures shall be installed so that each storm inlet shall drain a maximum street gutter length of three hundred feet (300'). Where the storm structure is located at a low point, additional storm structures may be required by the Village Engineer. No more than two (2) storm structures shall be interconnected. Storm structures shall be so located that storm water runoff will not "pond" greater than the top of the street curbs. Depressed street crowns to facilitate drainage will not be permitted. A 4" perforated underdrain tile shall be installed at all street sag and undercut locations. See 'Exhibit 4D.' Adjustable back curb inlets are not permitted.
- 5. Yard storm structures shall be placed where required by the Village Engineer. Storm structures shall be placed at least every other lot line.
- 6. The minimum size storm sewer shall be twelve inches (12") in diameter, and the minimum size inlet connection shall be ten inches (10") in diameter.
- 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 storm structure connections shall be concrete sewer pipe, ASTM C14 for extra strength pipe. Refer to 'Exhibit 4A.'

When a sewer is 20' or more below finished grade, structural strength design is required.

- 8. Minimum cover shall be generally three feet zero inches (3'-0") for all storm sewers and sump pump connection lines 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.

A two-inch (2") wide non-hardening butyl rubber mastic of minimum thickness one-quarter of an inch (1/4") shall be installed between all manhole sections and adjusting rings for all storm sewer structures lying in pavement.

All manhole covers shall be stamped "Village of Frankfort - Storm Sewer," See 'Exhibit 2B.' All castings shall be made in the U.S.A. with U.S.A. materials.

Structures with 2' diameter shall be limited in depth to allow accessibility for maintenance (4' maximum).

At least one catch basin shall be provided on storm sewer runs for sediment collection.

Rim elevations shall be at least 1' higher than downstream facility (pond, floodplain, etc.).

- 10. All flared end sections less than 48" (effective diameter) require grates in accordance with IDOT specifications.
- 11. Connections to sanitary sewers or existing agricultural drainage systems (tiles) will not be permitted for any new developments. All developments will utilize separate drainage systems to avoid disruption or overloading of the existing agricultural tile drainage system. Any field tile systems cut during the process of land development must be reconnected or rerouted as approved by the Village

Field tile investigations are required in accordance with the Will County Stormwater Management Ordinance.

- 12. Storm sewer shall be located a minimum of 10' from any building.
- 13. Back flow preventors or mechanical type storm water devices are not permitted.
- 14. Grate capacity calculations shall be provided for all 100-year storm sewer and those 10-year storm sewer structures conveying 1.0 acre or more. At no time shall ponding exceed 9" in grassed areas or 6" in paved areas.

4.04B CULVERTS

Culverts shall meet the following minimum standards:

- 1. Minimum pipe diameter of twelve inches (12").
- 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 inches (21") and smaller. Provide 12 gauge CMP for pipe diameters twenty-four inches (24") and larger.
- 3. Reinforced concrete pipe (RCP) shall conform to ASTM C76, minimum Class III.
- 4. Culvert slope and invert elevations shall match the ditch slope and invert elevations.
- 5. Minimum cover at driveways shall be six inches (6") when in public right-of-way.

4.04C SWALES/DITCHES

Manmade 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. Ditches shall meet the following minimum standards:

- 1. Minimum longitudinal grade of two percent (2.0%).
- 2. Maximum longitudinal grade of ten percent (10%).
- 3. Minimum depth of twenty-four inches (24") below the shoulder of the street.
- 4. Swale cross sections shall be trapezoidal with 2' minimum bottom. Maximum bank slope of 4:1 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. 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. Whenever practicable, all areas of the property must be provided an emergency overland flow path that will pass the entire calculated 100-year flow at a stage at least 1 foot below the lowest foundation grades in the vicinity of the flow path (1' minimum freeboard), even when 100-year storm sewer is provided, regardless of the size of the drainage area. Emergency overland flow paths shall be provided in drainage easements, which cannot be obstructed.

4.05 WETLANDS

4.05A AUTHORITY

The Lowland Conservancy Overlay District is adopted by the Mayor and Board of Trustees of the

Village of Frankfort, Illinois, under the authority of the Illinois Revised Statutes, Chapter 34, Paragraphs 3151 et seq. of the Illinois Revised Statutes, Chapter 24, Paragraphs 11-13-1 et seq.

To ensure that proposed development activity can be carried out in a manner which is compatible and harmonious with the natural amenities of the site, Lowland Conservancy Overlay District and with surrounding land uses, a request for a Site Development Permit for such development activity must be submitted for approval by the Village Engineer.

The Village of Frankfort, Illinois also asserts its jurisdiction over all isolated wetlands within the Village corporate limits and facilities planning areas that were formerly under the jurisdiction of the U.S. Army Corps of Engineers prior to January 9, 2000.

4.05B SHORT TITLE

This ordinance shall be known and may be cited as the Village of Frankfort Lowland Conservancy Overlay District Ordinance.

4.05C PURPOSE AND INTENT

It is the purpose and intent of this ordinance to promote the health, safety and general welfare of the present and future residents of Village of Frankfort and downstream drainage areas by providing for the protection, preservation, proper maintenance, and use of Village of Frankfort watercourses, lakes, ponds, floodplain and wetland areas. All work to be done in a Lowland Conservancy District will require a permit from the Army Corps of Engineers and the Village of Frankfort. The responsibility for obtaining the permit is by the applicant. If requested by the Village, a sign-off from the Army Corps of Engineers will be required if the site appears to be near a wetland area. Absolutely no work shall be undertaken until the Village Engineer has received an approved permit by the Army Corps of Engineers.

The ordinance is more specifically adopted:

- 1. To prevent flood damage by preserving storm and floodwater storage capacity;
- 2. To maintain the normal hydrologic balance of streams, floodplains, ponds, lakes, wetlands, and groundwater by storing and providing for infiltration of wet-period runoff in floodplains and wetlands, and releasing it slowly to the stream to maintain in-stream flow;
- 3. To manage stormwater runoff and maintain natural runoff conveyance systems, and minimize the need for major storm sewer construction and drainageway modification;
- 4. To improve water quality, both by filtering and storing sediments and attached pollutants, nutrients, and organic compounds before they drain into streams or wetlands, and by maintaining the natural pollutant-assimilating capabilities of streams, floodplains and wetlands;
- 5. To protect shorelines and stream banks from soil erosion, using natural means and materials wherever possible;
- 6. To protect fish spawning, breeding, nursery and feeding grounds;

- 7. To protect wildlife habitat;
- 8. To preserve areas of special recreational, scenic, or scientific interest, including natural areas and habitats of endangered species;
- 9. To maintain and enhance the aesthetic qualities of developing areas; and
- 10. To encourage the continued economic growth and high quality of life of the Village of Frankfort which depends in part on an adequate quality of water, a pleasing natural environment, and recreational opportunities in proximity to the Village of Frankfort.

In order to achieve the purpose and intent of this ordinance, Village of Frankfort hereby designates the Lowland Conservancy Overlay District that shall be considered as an overlay to the zoning districts created by Village of Frankfort zoning ordinances as amended. (See Section 4.05A) Any proposed development activity within the District must obtain a Site Development Permit as approved by the governing body of Village of Frankfort. See Section 2.02B.

4.05D GENERAL PROVISIONS: AREA AFFECTED

This ordinance applies to development in or near streams, lakes, ponds and wetlands within Village of Frankfort. Streams, lakes, and ponds (including intermittent streams) are those which are shown on the United States Department of the Interior Geological Survey (USGS) 7.5 minute quadrangle National Wetlands Inventory Maps and those additional streams, lakes, and ponds delineated on the Village of Frankfort Water Resources Management Plan map adopted as part of this ordinance. Those are hereby made a part of this ordinance, and two copies thereof shall remain on file at the Village of Frankfort administrative building for public inspection. Within the jurisdiction of Village of Frankfort, those water bodies and watercourses that are named and are subject to the provisions of this ordinance are listed within the Village of Frankfort Water Resources Management Plan. Wetlands are those designated in the U.S. Fish and Wildlife Service/Illinois Department of Conservation wetland inventory and those additional wetlands delineated on maps adopted as part of this ordinance.

If new drainage courses, lakes, ponds or wetlands are created as part of a development, the requirements for setbacks and uses within setbacks, and the criteria for watercourse relocation and minor modification shall apply. The District shall be amended as appropriate to include these areas.

- 1. The Lowland Conservancy Overlay District The Lowland Conservancy Overlay District shall be considered as an overlay to the zoning districts created by the Village of Frankfort zoning ordinance as amended in addition to the requirements of this ordinance, applicants for a Site Development Permit within the District shall meet all requirements of the underlying zoning districts. In the event of a conflict between the overlay district requirements and the underlying zoning district requirements, the most restrictive requirements prevail.
- 2. <u>District Boundary</u> The procedures, standards and requirements contained in this ordinance shall apply to all lots within wetlands and streams, and all lots lying wholly or in part:
 - a. Within the Special Flood Hazard Area (SFHA) designated by the Federal Emergency Management Agency (FEMA); or
 - b. Within 100 feet of the ordinary high water mark (OHWM) of a perennial stream or intermittent stream, the ordinary high water mark of a lake or pond, or the edge of a wetland; or

- c. Within depressional areas serving as floodplain or stormwater storage areas, as designated on the National Wetland Inventory (NWI) and as designated on the Lowland Conservancy District Map.
- d. Adjacent to a known wetland.
- 3. Minimum Setback of Development Activity from Streams, Lakes, Ponds, and Wetlands Absolutely no development activity (except as provided below) may occur within the minimum setback, which is defined as 25, 50 or 75 feet (See Section 4.03E-11e) from the ordinary high water mark of streams, lakes and ponds, or the edge of wetlands, or within a designated depressional areas. In no case shall the setback be less than the boundary of the 100-year floodway as defined by FEMA. These setback requirements do not apply to a stream in a culvert unless the stream is taken out of the culvert as part of development activity. If a culvert functions as a low-flow culvert, where water is intended to periodically flow over it, the setback requirements apply.

The following development activities may be permitted, subject to issuance of a Site Development Permit, within the minimum setback areas only if, as a practical matter, they cannot be located outside the setback area. Such development activities will only be approved based upon a report, prepared by a qualified professional, which demonstrates that they will not adversely affect water quality; destroy, damage or disrupt significant habitat area; adversely affect drainage and/or stormwater retention capabilities; adversely affect flood conveyance and storage; lead to unstable earth conditions, create erosion hazards, or be materially detrimental to any other property in the area of the subject property or to the Village of Frankfort as a whole, including the loss of open space or scenic vistas:

- a. Minor improvements such as walkways, benches, comfort stations, informational displays, directional signs, footbridges, observation decks, and docks;
- b. The maintenance, repair, replacement, and reconstruction of existing highways and bridges, electrical transmission and telecommunication lines, poles, and towers; and
- c. The establishment and development of public and private parks and recreation areas, outdoor education areas, historic natural and scientific areas, game refuges, fish and wildlife improvement projects, game bird and animal farms, wildlife preserves and public boat launching ramps.

Review of proposed development activity within the minimum setback area will consider the following:

- a. Only limited filling and excavating necessary for the development of public boat launching ramps, swimming beaches, or the development of park shelters or similar structures is allowed. The development and maintenance of roads, parking lots and other impervious surfaces necessary for permitted uses are allowed only on a very limited basis, and where no alternate location outside of the setback area is available.
- b. Land surface modification within the minimum setback shall be permitted for the development of stormwater drainage swales between the developed area of the site (including a stormwater detention facility on the site) and a stream, lake or pond, or wetland. Detention basins within the setback are generally discouraged, unless it can

be shown that resultant modifications will not impair water quality, habitat, or flood storage functions.

- c. No filling or excavating within wetlands is permitted except to install piers for the limited development of walkways and observation decks. Walkways and observation decks should avoid high quality wetland areas, and should not adversely affect natural areas designated in the Illinois Natural Areas Inventory or the habitat of rare or endangered species.
- d. Wetland area occupied by the development of decks and walkways must be mitigated by an equal area of wetland habitat improvement.
- e. Modification of degraded wetlands for purposes of stormwater management is permitted where the quality of the wetland is improved and total wetland acreage is preserved. Where such modification is permitted, wetlands shall be protected from the effects of increased stormwater runoff by measures such as detention or sedimentation basins, vegetated swales and buffer strips, and sediment and erosion control measures on adjacent developments. The direct entry of storm sewers into wetlands shall be avoided. Environmental impact analysis of wetland modification may be required in accordance with Section 4.05F of this ordinance.

An applicant for a Site Development Permit (See Section 2.02B) must stabilize areas left exposed after land surface modification with vegetation normally associated with that stream or wetland. The planting of native riparian vegetation is recommended as the preferred stabilization measure. Other techniques should be used only when and where vegetation fails to control erosion. The preferred alternative is riprap, using natural rock materials where practicable, installed on eroding bank areas in a manner that provides interstitial space for vegetative growth and habitat for macro invertebrates and other stream organisms. Lining of the stream channel bottom is not permitted.

The applicant shall minimize access to the applicant's proposed development activity within all or part of the Lowland Conservancy Overlay District where such access could adversely affect the stream, lake, pond, wetland, or related environmentally sensitive areas.

- 4. <u>Site Development Plan</u> A site development plan must be prepared for any proposed development within, or Partly within, the Lowland Conservancy Overlay District in compliance with Section 2.02B and must indicate:
 - a. Dimension and area of parcel, showing also the vicinity of the site in sufficient detail to enable easy location, in the field, of the site for which the Site Development Permit is sought, and including the boundary line, underlying zoning, a legend, a scale, and a north arrow. This requirement may be satisfied by the submission of a separate vicinity map;
 - b. Location of any existing and proposed structures;
 - c. Location of existing or proposed on-site sewage systems or private water supply systems;

- d. Location of any perennial or intermittent stream, lake or pond, and its ordinary high water mark;
- e. Location and landward limit of all wetlands;
- f. Location of setback lines as defined in this ordinance;
- g. Location of the 100-year floodway;
- h. Location of existing or future access roads;
- i. Specifications and dimensions of stream, wetland or other water areas proposed for alterations;
- j. Cross-sections and calculations indicating any changes in flood storage volumes; and
- k. Such other information as reasonably requested by Village of Frankfort.

The applicant shall present a wetlands audit and/or report by a qualified professional that indicates whether or not wetlands exist on site, the location of the wetlands and opinion of jurisdiction (ACOE or Village of Frankfort). All said reports and development plans shall be submitted to the ACOE for a letter of no objection/concurrence and/or Jursidictional Determination where applicable.

The applicant shall present evidence, prepared by a qualified professional, that demonstrates that the proposed development activity will not endanger health and safety, including danger from the obstruction or diversion of flood flow. The developer shall also show, by submitting appropriate calculations and resource inventories, that the proposed development activity will not substantially reduce natural floodwater storage capacity, destroy valuable habitat for aquatic or other flora and fauna, adversely affect water quality or ground water resources, increase stormwater runoff velocity so that water levels on other lands are substantially raised or the danger from flooding increased, or adversely impact any other natural stream, floodplain, or wetland functions, and is otherwise consistent with the intent of this ordinance.

- 5. Geologic and Soil Report The site proposed for development shall be investigated to determine the soil and geologic characteristics, including soil erosion potential. A report, prepared by a licensed professional engineer, geoscientist, or soil scientist experienced in the practice of geologic and soil mechanics, shall be submitted with every application for land development within the Lowland Conservancy Overlay District. This report shall include a description of soil type and stability of surface and subsurface conditions. Any area that the investigation indicates as being subject to geologic or soil hazards shall not be subjected to development, unless the engineer or soil scientist can demonstrate conclusively that these hazards can be overcome.
- 6. <u>Hydrologic Controls/Drainage Control Plan</u> A drainage control plan that describes the hydraulic characteristics of on-site and nearby watercourses as well as the proposed drainage plan, prepared by a registered Professional engineer experienced in hydrology and hydraulics, shall be submitted with each application for land development within the Lowland Conservancy Overlay District. Unless otherwise noted, the following restrictions, requirements and standards shall apply to all development within the Lowland Conservancy Overlay District:

- 1. Natural open-channel drainageways shall be preserved; and
- 2. Runoff from areas of concentrated impervious cover (e.g., roofs, driveways, streets, patios, etc. shall be collected and transported to a drainageway (preferably a natural drainageway) with sufficient capacity to accept the discharge without undue erosion or detrimental impact. Vegetated drainage swales are preferred over conveyances constructed of concrete or other manufactured materials.

The drainage control Plan shall identify appropriate measures, such as recharge basins and detention/retention basins, which will limit the quantitative and qualitative effects of stormwater runoff to pre-development conditions.

7. <u>Site Grading and Excavation Plan</u> - Section 7 applies to the extent that grading and excavation and erosion control plans, which satisfy the following requirements, are not already required by a jurisdiction.

A site grading and excavation Plan, prepared by a registered professional engineer, trained and experienced in civil engineering, shall be submitted with each application for a Site Development Permit and shall include the following:

- a. Details of the existing terrain and drainage pattern with one-foot contours;
- b. Proposed site contours at one-foot intervals;
- c. Dimensions, elevation and contours of grading, excavation and fill; slopes of all drainage swales shall be a minimum of 2% through the side and rear yard drainage easements;
- d. A description of methods to be employed in disposing of soil and other material that is removed from allowable grading and excavation sites, including location of the disposal site if on the property;
- e. A schedule showing when each stage of the project will be completed, including the total area of soil surface to be disturbed during each stage, and estimated starting and completion dates. The schedule shall be prepared so as to limit, to the shortest possible period, the time soil is exposed and unprotected. In no case shall the existing natural vegetation be destroyed, removed or disturbed more than fifteen (15) days prior to initiation of the improvements; and
- f. A detailed description of the revegetation and stabilization methods to be employed, to be prepared in conjunction with the landscape plan per Section 4.05D(8). This description should include locations of erosion control measures such as sedimentation basins, straw bales, diversion swales, etc.

The grading and excavation plan must be consistent with all the provisions of this ordinance.

Unless otherwise provided in this ordinance, the following restrictions, requirements and standards shall apply to all development within the District:

a. Every effort shall be made to develop the site in such a manner so as to minimize the

alteration of the natural topography;

- b. No grading, filling, cleaning, clearing, terracing or excavation of any kind shall be initiated until final engineering plans are approved and the Site Development Permit is granted by the Village of Frankfort; and
- c. The depositing of any excavation, grading or clearing material within a stream, lake, pond or wetland area shall be prohibited.

In addition to locating all site improvements on the subject property to minimize adverse impacts on the stream, lake, pond, or wetland, the applicant shall install a berm, curb, or other physical barrier during construction, and following completion of the project, where necessary, to prevent direct runoff and erosion from any modified land surface into a stream, lake, pond, or wetland. All parking and vehicle circulation areas should be located as far as possible from a stream, lake, pond, or wetland.

The Village of Frankfort may limit development activity in or near a stream, lake, pond, or wetland to specific months, and to a maximum number of continuous days or hours, in order to minimize adverse impacts. Also, the Village of Frankfort may require that equipment be operated from only one side of a stream, lake, or pond in order to minimize bank disruption. Other development techniques, conditions, and restrictions may be required in order to minimize adverse impacts on streams, lakes, ponds or wetlands, and on any related areas not subject to development activity.

8. Natural Vegetation Buffer Strip Required: Vegetation and Revegetation/Landscape Plan - To minimize erosion, stabilize the streambank, protect water quality, maintain water temperature at natural levels, preserve fish and wildlife habitat, to screen man-made structures, and also to preserve aesthetic values of the natural water course and wetland areas, a natural vegetation strip shall be maintained along the edge of the stream, lake, pond or wetland. The natural vegetation strip shall extend landward 25, 50 or 75 feet (See Section 4.03D-10e) from the ordinary high water mark of a perennial or intermittent stream, lake or pond and the edge of wetland.

Within the natural vegetation strip, trees and shrubs may be selectively pruned or removed for harvest of merchantable timber, to achieve a filtered view of the water body from the principal structure and for reasonable private access to the stream, lake, pond, or wetland. Said pruning and removal activities shall ensure that a live root system stays intact to provide for streambank stabilization and erosion control.

A landscape plan, prepared by a professional shall be submitted with each Site Development Permit application for development activity within the Lowland Conservancy Overlay District and contain the following:

- a. A plan describing the existing vegetative cover of the property and showing those areas where the vegetation will be removed as part of the proposed construction; and
- b. A plan describing the proposed revegetation of disturbed areas specifying the materials to be used.

The vegetation must be planned in such a way that access for stream maintenance purposes

4.05E WATERCOURSE RELOCATION AND MINOR MODIFICATIONS (INCLUDING CHANNELIZATION AND RELOCATION)

Watercourse relocation or modification is generally not permitted because these activities are not usually consistent with the purposes of this ordinance. Under certain circumstances, relocation and minor modification may be permitted through a Site Development Permit where certain problems can be mitigated by relocation and/or minor modification, specifically when:

- 1. Off-site hydrologic conditions are causing erosion, flooding and related problems; or
- 2. On-site soil and geologic conditions are resulting in unstable conditions that pose hazards to life, health, and existing structures or property; or
- 3. The quality of previously modified or relocated streams can be improved through restoration; or
- 4. Officially adopted stormwater management plans call for placement of detention or retention facilities in a stream; or
- 5. Public utilities, including sanitary sewers, pipelines, and roadways require stream crossing or relocation where there are not practical alternatives.

Modification of watercourses as a convenience for site design purposes is not permitted.

1. Conditions and Restrictions for Permitting Stream Modification

Stream modification, when permitted, is subject to the following conditions and restrictions:

- a. Water quality, habitat and other natural functions must be significantly improved by the modification; no significant habitat area may be destroyed;
- b. The amount of flow and velocity of a stream is not to be increased or decreased as the stream enters or leaves a subject property, unless this reflects an improvement over previous conditions in terms of reduced flooding, reduced erosion, or enhanced low flow conditions:
- c. Prior to diverting water into a new channel, a qualified professional approved by the Village of Frankfort shall inspect the stream modification, and issue a written report to the Village of Frankfort that the modified stream complies with the requirements in Section 4.05E(2.); and
- d. Stream channel enlargement, or other modifications that would increase conveyance, shall not be permitted if the intended purpose is to accommodate development activities in the floodplain.

2. Required Content of Stream Modification, Relocation Plan

Stream relocation may be permitted in accordance with a stream relocation plan that provides for:

- a. The creation of a natural meander pattern, pools, riffles, and substrate;
- b. The formation of gentle side slopes (at least three feet horizontally per one foot vertically), including installation of erosion control features;
- c. The utilization of natural materials wherever possible;
- d. The planting of vegetation normally associated with streams, including primarily native riparian vegetation;
- e. The creation of spawning and nesting areas wherever appropriate;
- f. There-establishment of the fish population wherever appropriate;
- g. The restoration of water flow characteristics compatible with fish habitat areas, wherever appropriate;
- h. The filling and revegetation of the prior channel;
- i. A proposed phasing plan, specifying time of year for all project phases;
- j. Plans for sediment and erosion control; and
- k. Establishment of a low-flow channel that reflects the conditions of a natural stream.

3. Criteria for Permitting Armoring of Channels and Banks

Armoring in the form of bulkheads, riprap or other materials or devices is not permitted except in accordance with the following:

- a. Significant erosion cannot be prevented in any other way and the use of vegetation and gradual bank slopes has not sufficiently stabilized the shoreline or bank;
- b. The bulkhead or other device is not placed within a wetland, or between a wetland and a lake or pond;
- c. The bulkhead, riprap or other device will minimize the transmittal of wave energy or currents to other properties; and
- d. The change in the horizontal or vertical, configuration of the land must be kept to a minimum. Where permission to install bulkheads or other armoring devices is requested as part of the Site Development Permit application documentation and certification pertaining to the items above must be submitted.

4. <u>Criteria for Permitting the Use of Culverts</u>

Culverts are not permitted in streams except in accordance with the following:

a. Where a culvert is necessary for creating access to a property; use of culverts as a convenience, in order to facilitate general site design, is not to be considered;

- b. The culvert must allow passage of fish inhabiting the stream, and accommodate the 100-year flood event without increasing upstream flooding, except where a restricting culvert is desirable as part of an overall storm and floodwater management plan;
- c. The culvert must be maintained free of debris and sediment to allow free passage of water, and if applicable, fish; and
- d. The stream bottom should not be significantly widened for the placement of a culvert as this increases siltation; if multiple culverts must be installed, one culvert should be at the level of the bottom of the stream and the others at or above normal water elevation.

5. Criteria for Permitting On-Stream Impoundments

Impoundment of streams is not permitted except in accordance with the following:

- a. The impoundment is determined to be in the public interest by providing regional stormwater detention, flood control, or public recreation;
- b. The impoundment will not prevent the upstream migration of indigenous fish species;
- A non-point source control plan has been implemented in the upstream watershed to control the effects of sediment runoff as well as minimize the input of nutrients, oil and grease, metals, and other pollutants;
- d. Impoundments without permanent low-flow pools are preferred except where a permanent pool is necessary to achieve the intended benefits of the impoundment (e.g. recreation or water quality mitigation); and
- e. Impoundment design shall include gradual bank slopes, appropriate bank stabilization measures, and a pre-sedimentation basin.

4.05F ENVIRONMENTAL IMPACT ASSESSMENT

The Village of Frankfort may require an applicant to submit an Environmental Impact Assessment prepared by a qualified professional, and approved by the Village of Frankfort, to assess the potential impact of proposed development on a lake, stream, wetland and associated environmentally sensitive areas, including loss of flood storage potential, loss of habitat, changes in species diversity and quantity, impacts on water quality, increases in human intrusion, and impacts on associated streams, lakes, ponds, wetlands, upstream areas or downstream areas. The assessment shall be reviewed by the Village in conjunction with site development permitting.

Alternatively, the applicant can provide a Natural Resource Information Report (NRI) as established by the Will/South Cook Soil & Water Conservation District. The NRI is a complete evaluation of the property proposed for development.

4.05G STREAM MAINTENANCE EASEMENT

The applicant shall grant an access easement for stream maintenance purposes to the Village of Frankfort, for twenty-five feet minimum and parallel to the stream bank.

4.05H SECURITY

Village of Frankfort may require the posting of a letter of credit or surety to ensure compliance with any aspect of this ordinance.

4.05I LIABILITY

Prior to issuance of a construction permit, the applicant shall enter into an agreement with the Village of Frankfort which runs with the property, in a form acceptable to the Village of Frankfort attorney, indemnifying the Village of Frankfort for any damage resulting from development activity on the subject property which is related to the physical condition of the stream or wetland.

4.05J SEPARABILITY

Every section, provision, or part of this ordinance is declared separable from every other section, provision, or part; and if any section, provision, or part thereof shall be held invalid, it shall not affect any other section, provision, or part.

4.05K RETROACTIVITY

The requirements of this ordinance apply to all platted and unplatted lands within the jurisdiction of the Village of Frankfort.

4.05L ENFORCEMENT

Authority for administration of this ordinance resides with the Building Department and the Village Engineer and shall conform with appropriate section of the Village of Frankfort Code of Ordinance.

In the event any person holding a Site Development Permit pursuant to this ordinance violates the terms of the permit, or carries on site development in such a manner so as to materially and adversely affect the health, welfare, or safety of persons residing or working in the neighborhood of the development site, or so as to be materially detrimental to the public welfare or injurious to property or improvements in the neighborhood, the Village of Frankfort may suspend or revoke the Site Development Permit.

1. Suspension of a permit shall be by a written stop work order issued by the Village of Frankfort and delivered to the permittee or his agent or the person performing the work. The stop-work order shall be effective immediately, shall state the specific violations cited, and shall state the conditions under which work may be resumed.

No person shall undertake or continue any development activity contrary to or in violation of any terms of this ordinance. Any person violating any of the provisions of this ordinance shall be deemed guilty of a misdemeanor, and each day during which any violation of any of the provisions of this ordinance is committed, continued, or permitted shall constitute a separate offense. Upon conviction of any such violation, such person, partnership, or corporation shall be punished by a fine not less than \$50.00 nor more than \$750.00 for each offense per day. In addition to any other penalty authorized by this section, any person, partnership, or corporation convicted of violating any of the provisions of this ordinance shall be required to restore the site to the condition existing prior to commission of the violation, or to bear the expense of such restoration.

5.01 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. All equipment and materials shall be made in the U.S.A. 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. Water mains shall be constructed throughout and to the extremities of a development to facilitate future extension of the Village water system to adjacent areas.

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. The requirements of Sections 1 and 2 are also applicable to water distribution system construction.

5.02 GENERAL DESIGN CONSIDERATIONS

Extensions to the distribution system shall include feeder mains and distribution mains.

Feeder mains are those mains forming the arterial system of the Village and are further defined as mains larger than 8-inches in diameter or as required to meet local fire protection needs. Distribution mains shall form a grid to supply water to the local fire hydrants and service lines, and shall have a minimum diameter of 8-inches. Six-inch diameter water main may be used when interconnecting the distribution main in lengths not exceeding 600 feet. Water distribution systems shall be designed for circulation of flow; dead ends shall be avoided whenever possible. All commercial and industrial properties shall provide a minimum of a 10-inch water main across the front of the property.

All water mains shall be located in the parkway, opposite that of the sanitary sewer, approximately ten feet (10') from the property line or in easements (10' minimum width).

Water mains shall be located a minimum of 10' from any building.

5.03 MAIN CAPACITY

Feeders and distribution mains shall be sized to provide sufficient capacity to deliver the required fire flow to all areas served by the proposed construction with consumption at the maximum daily rate.

5.03A REQUIRED FIRE FLOW

Type of Development	Fire Flow
Single-family residential	2,000 gpm
Multiple-family residential	2,500 gpm
Commercial/business (general)	2,500 gpm
Office/research	2,500 gpm
General manufacturing	3,000 gpm
Commercial/business (downtown)	3,500 gpm
Institutional	3,500 gpm
High-risk manufacturing	3,500 gpm

These rates are based on the latest "Fire Suppression Rating Schedule" of the ISO (Insurance Service Office) and must be available while maintaining a twenty (20) psi residual pressure.

5.03B MAXIMUM DAY CONSUMPTION

For purposes of water main design, maximum day consumption in residential areas shall be based on a minimum of 200 gallons per capita per day, with population estimated in accordance with Section 3.03C.

In other than residential areas, maximum day consumption shall be based on the following:

		Maximum Day
Type of		Consumption
Establishment	<u>Unit</u>	Gal./Day/Unit
Shopping Centers	Employee (1 shift)	105
Store	Employee (1 shift)	65
Offices	Employee (1 shift)	50
		Maximum Day
Type of		Consumption
<u>Establishment</u>	<u>Unit</u>	Gal./Day/Unit
Industrial	Employee (1 shift)	75
Restaurant	Meal Served	15
Theater	Per Seat	10
Hotel	Per Guest	210

To the above shall be added all process water requirements.

For other than residential developments, when the details of the development are not known, maximum day consumption and fire flow shall be estimated by the Design Engineer, subject to the approval of the Village Engineer. Such approval shall not relieve the Owner/Developer of the responsibility of providing adequate main capacity for any and all future developments within the development. In such cases, minimum main size shall be 12 inches.

5.03C STORAGE

Sufficient storage shall be designed and constructed to provide sufficient water to the distribution system (2,000 gallons per minute for Residential or 2,500 gallons per minute for Industrial/Commercial) for a six (6) hour period. Water supply facilities with excess capacity may be used to offset up to 50 percent (50%) of the required storage volume.

5.04 FIRE HYDRANTS

5.04A SPACING

Fire hydrants shall be installed along all mains constructed in public rights-of-way at a maximum spacing of 350 feet in residential areas and 300 feet in commercial and industrial areas with the most remote part of any building or lot no farther than three hundred (300) feet from a hydrant.

5.04B MATERIAL

All castings shall be made in the U.S.A. with U.S.A. materials. Fire hydrants shall meet AWWA C-502 and shall be Mueller "Centurion" A-423, or approved equal with a 5-1/4 inch valve opening, two 2-1/2 inch hose nozzles and one 4 ½ inch diameter pumper nozzle. Threads shall conform with National Standard Specifications.

Construction shall conform to that indicated on the fire hydrant standard detail. Each hydrant shall be equipped with an auxiliary gate valve complete with Roadway Box, Mueller H-10360 or equal with valve box stabilizer. Hydrants shall be installed no closer than three feet nor further than 8 feet from the back of curb. No hydrant shall be installed within 48-inches of any obstruction nor shall any obstruction be placed within 48-inches of a hydrant. The hydrants shall be painted red by the manufacturer. Refer to 'Exhibit 5E' for installation detail.

Finished ground elevation shall be provided for all hydrants on the grading plan.

5.05 VALVES

5.05A SPACING

A sufficient number of valves shall be provided so that a break or other failure will not affect more than 800 feet of mains in residential areas or 600 feet of mains in other areas. Valves shall be placed so that closure of a maximum of three (3) valves are necessary to shut down any point in the system.

5.05B VAULTS

All main valves proposed shall be installed in four (4) foot diameter precast concrete vaults conforming to ASTM C478 as detailed in the Valve Vault Detail ('Exhibit 5D'). All auxiliary valves at fire hydrants shall be installed in cast iron valve boxes with stabilizers. Butterfly valves shall be installed in specially designed vaults similar in general design to that shown in the Valve Vault Detail, but modified as necessary to provide for the proper operation of the valve. Vaults and boxes shall not be allowed under streets, sidewalks or driveways. All manhole covers shall be stamped "Village of Frankfort - Water," See 'Exhibit 2B.'

5.05C TYPES

All valves smaller than 12-inches shall be AWWA C509, cast iron body, bronze fitted, modified wedge disc, resilient seat type with non-rising stem and 0-ring packing designed for 200 pound working pressure, Mueller A2360-20 or equal.

All valves 12-inches and larger shall be butterfly valves Mueller 3211-20. All valves shall open counter clockwise with non-rising stem (except hand valves).

5.06 GENERAL DESIGN DETAILS FOR WATER MAINS, 3 - 24 INCH DIAMETERS

5.06A DUCTILE IRON PIPE, FITTINGS AND JOINT TYPE

Provide ductile iron pipe complying with ANSI A21.51, thickness Class 52, with joints complying with ANSI A21.11. External coating shall be standard, as specified for general use in ANSI Specification A21.51 or asphalitic coating per AWWA C-151. Mechanical joint retainer glands with concrete blocks shall be provided on all fittings.

Use internal cement lining complying with ANSI A21.4 or AWWA C205, standard thickness.

Whenever river crossing pipe is required, provide restrained joint, or ball and socket type joints allowing 15 degrees maximum deflection.

Use ductile iron fittings with mechanical joint complying with ANSI A21.10 or A21.53. Water main shall be encased in 8-millimeter polywrap unless the soils are verified to be non-corrosive.

5.06B PVC PLASTIC PIPE AND JOINTS

All PVC Plastic Pipes shall be installed with a magnetic tracer wire and warning tape 2' above pipe.

The trench bedding material shall extend 12" over the top of the pipe for all PVC pipe. See Section 2.09A.

Provide polyvinyl chloride pipe complying with AWWA C-900 for Class 150 pressure pipe with a standard dimension ratio of 18. Where appropriate and approved by the Utility Department and Village Engineer, C-909 may be used.

Pipe 14-inch through 18-inch: Use pipe with a pressure rating of 235 psi and a standard dimension ratio of 18.

Pipe 20-inch and 24-inch: Use pipe with a pressure rating of 165 psi and a standard dimension ratio of 25.

5.06C DEPTH OF COVER

The depth between the finished grade and the top of the water main shall be not less than five feet (5') nor more than seven feet (7'). Where conflicts arise with other underground improvements, greater depths will be allowed.

5.06D THRUST BLOCKS

Blocking to prevent movement of mains under pressure at bends and fittings shall be Portland Cement Concrete, a minimum of 12-inches thick pre-cast concrete blocks, placed between solid ground and the fittings in such a manner that pipe fittings and joints will be accessible for repairs. All bends of 22-1/2 degrees or greater, and all tees and plugs shall be thrust protected to prevent movement of the line under pressure.

Thrust protection may also be attained by the use of a combination or retaining glands and threaded rods.

5.06E TRENCH

Minimum trench width shall be ample for proper jointing, but in no case less than 1"-6". Bedding and backfill shall be as specified in Section 2.

5.07 CONNECTIONS TO EXISTING MAINS

All connections to the Village water distribution system shall be made under full water service

pressure. The following specifications shall apply when pressure connections are made to the existing Village distribution system:

A. Tapping sleeves:

- 1. Use two-piece bolted sleeve type with mechanical joints, Mueller H615, or equal.
- 2. Provide joint accessories.

B. Tapping valves:

- 1. Use fully ported gate valves complying with AWWA C500.
- 2. Use mechanical joints type, Mueller H667, or equal.

Tapping valves shall be placed in precast concrete vaults as specified in Section 5.05B.

5.08 WATER SERVICE LINES

5.08A DESCRIPTION

A water service line is designed to deliver water from a water main to a single building, extended from the water main to the building, and includes corporation stop, curb stop and service box. Service lines shall be approximately at a right angle to the centerline of the right-of-way whenever possible. Service boxes shall not be located in driveways.

5.08B MATERIALS

- 1. Service lines: Type K soft temper seamless copper water tubing complying with ASTM B-88.
- 2. Service saddles for connecting to PVC pipes:
- a. Use full sleeve stainless steel saddles for connecting to PVC pipes:
- b. McDonald Series No. 3805, or Mueller Series No. H16000, or equal.
- 3. Corporation stops: Mueller No. 15000, or equal.
- 4. Curb stops: Mueller No. H15204 Mark 2 Oriseal or equal.
- 5. Service boxes: Extension type with stationary rods, Mueller series H10300 (Mueller H10350 for 2-1/2 inch service), or equal. May not be installed in, or within 2 feet of, any pavement, driveway or walk.
- 6. All service taps shall be either with a manufactured tap coupling or full stainless steel.
- 7. Individual water services should be provided for each unit within multi-unit dwellings and buildings, or location of meter room shown.

5.08C MINIMUM DIAMETER

No water service line shall be less than 1-inch internal diameter.

5.09 WATER MAIN PROTECTION

All water main, storm sewer and sanitary sewer construction shall meet the requirements of this section.

All utility crossings (with water main or other utilities) shall be noted with bottom and/or top of pipe

elevations and indication locations where alternative materials are required.

5.09A HORIZONTAL SEPARATION

- 1. Whenever possible, water main shall be laid at least 10-feet horizontally from any existing or proposed sewer.
- 2. Should local conditions prevail which would be prevent a horizontal separation of 10-feet, a water main may be laid closer to or in the same trench as a storm or sanitary sewer, provided the main is laid on an undisturbed earth shelf located to one side of the sewer and at such an elevation that the bottom of the water main is at least 18-inches above the top of the sewer.
- 3. If it is impossible to obtain proper horizontal and vertical separation as stipulated in (a) or (b), both the water main and sewer shall be constructed of slip-on or mechanical-joint ductile iron pipe, and be pressure-tested to assure water tightness before backfilling.

5.09B VERTICAL SEPARATION

- 1. Whenever water mains must cross house sewers, storm drains, or sanitary sewers, the water main shall be laid at such an elevation that the bottom of the water main is 18-inches above the top of the drain or sewer. This vertical separation shall be maintained for that portion of the water main located within 10-feet horizontally of any sewer or drain crossed, said 10-feet to be measured as the normal distance from the water main to the drain or sewer.
- 2. Where conditions exist that the minimum vertical separation set forth in (a) cannot be maintained, or it is necessary for the water main to pass under a sanitary sewer, then, within a distance of 10 feet either side of the water main, construct the sewer or drain of pressure pipe, conforming to the specification for water main materials. For storm sewer ASTM C-361 pipe shall satisfy this requirement. The sewer or drain line shall be sup ported to prevent settling and breaking of the water main.

5.10 WATER SERVICE LINE PROTECTION

The horizontal and vertical separation between water service lines and all sanitary sewers, storm sewers, or any drain shall be the same as for water mains, as detailed in Section 5.09.

5.11 TESTING

The following procedures are to be strictly followed by all persons engaged in the pressure testing and/or disinfection of public water distribution mains and private water services 3-inches and larger in diameter. The requirements of these design standards and the requirements of the Illinois Environmental Protection Agency water permit shall be strictly enforced.

The contractor is required to provide any and all equipment necessary to complete the pressure testing and/or disinfection of the water mains and services. Prior to any test, the contractor shall arrange with the <u>Village Utility or Engineering Department</u> to have the required tests witnessed, and shall give a minimum of 48 hours advances notice.

The contractor shall not operate any valves in the existing public water supply system. Requests for valve operations are to be made through the Utility Department. Requests for valve operations shall be made 24 hours prior to any scheduled operations or tests.

5.11A PRESSURE AND LEAKAGE TESTS

The contractor shall pressure test all new water main before water services have been installed. The contractor shall perform a preliminary test to insure that all segments of the system meet the leakage rates as set forth herein. When the contractor has assured himself that the system will meet the required leakage rates, he will arrange for witnessing of the pressure test with the Village Utility Department. Forty-eight hours advance notice shall be given. The hydrostatic tests shall be conducted as follows:

1. Hydrostatic tests:

- a. Where any section of a water line is provided with concrete thrust blocking for fittings, the hydrostatic tests shall not be made until at least 5 days after installation of the concrete thrust blocking.
- b. Disposal of wastewater from hydrostatic tests, and for disinfection, shall be approved in advance by the Village Public Works Department.
- c. The new water mains and service lines including valves and hydrants, shall be subjected to a hydrostatic pressure of 150 psi. See Table 2 In Appendix B (Standard Specifications for Water and Sanitary Sewer Construction).
- d. The test pressure shall be held for a duration of three hours without pressure loss or further pressure application.
- e. Each valve shall be opened and closed several times during the test.
- f. Careful examination of exposed pipe, joints, fittings, and valves is required.
- g. Joints showing visible leakage shall be remade or replaced.
- h. Cracked pipe, defective pipe, and cracked or defective joints, fittings, and valves shall be replaced with sound material and the test repeated until results are satisfactory.

5.11B DISINFECTION

After all mains have been pressure tested and accepted by the Village, the contractor shall proceed to disinfect the main in accordance with AWWA Standard C-651. A chlorine concentration during disinfection shall be maintained at a minimum 50-mg/l available chlorine. The chlorinated water shall be retained in the main for a period of at least 24 hours. At the end of the 24-hour period, the treated water shall contain no less than 25 mg/l chlorine throughout the main. The contractor will sample the chlorinated disinfecting solution to assure that these minimums are maintained.

After an applicable retention period, the heavily chlorinated water shall be flushed from the main until the chlorine concentration in the water leaving the main is not higher than that generally prevailing in the system. After final flushing, and as witnessed by the Village Utility Department, the Contractor shall obtain two samples of water from the main for bacteriological testing. For major water main installation, the number of samples may be increased as determined by the Village Public Works Department. A second series of samples shall be collected no less than 24 hours after the first set of

samples has been collected. The individual sets of samples shall be bacteriologically tested to show the absence of coliform organisms.

If both sets of samples are satisfactory, all valves on the system shall be opened with the permission of the Village Public Works Department. The contractor and the Village will be furnished with copies of the bacteriological report for their records.

5.12 WORKMANSHIP

As a minimum requirement, the specifications for the construction of water distribution facilities shall not be less stringent than the "Standard Specifications for Water and Sewer Main Construction in Illinois", adopted by a joint committee of the Illinois Society of Professional Engineers, Consulting Engineers Council of Illinois, Illinois Chapter of the American Public Works Association, Illinois Municipal League and the Associated General Contractors of Illinois.

SECTION 6 - ROADWAYS, SIDEWALKS AND STREET LIGHTING

6.01 INTRODUCTION

All developments, regardless of size within the corporate limits or under the Village's jurisdiction, shall include provisions for the construction of roadways and appurtenant construction to serve each parcel of property within the development. Where more than one building, other than an accessory building is located or planned on one parcel of property, the proposed construction shall also include access roadways as required to serve each such building.

The design of all roadways proposed for construction as independent projects under the control of the Village shall also meet the technical requirements of this Section. The requirements of Sections 1 and 2 are also applicable to roadway construction.

Proposed streets shall be extended to the boundary lines of the development, unless prevented by topography or other physical conditions, or unless in the opinion of the Village such extension is not necessary or desirable.

6.02 STREET CLASSIFICATION

Certain variables in geometric and structural design discussed in this Section are dependent on the functional classification of the street in question. For the purposes of these standards, all streets will be classified as shown in the Village of Frankfort Transportation Master Plan.

In developments where more than one building is located or planned on one parcel of property and a roadway is provided to serve such buildings, that roadway shall be classified as residential unless otherwise established by the Village Engineer.

6.03 GEOMETRIC

6.03A ENTRANCE GEOMETRICS

Entrances to residential, commercial or industrial development shall be designed to allow maneuverability of emergency and delivery vehicles.

Entrances shall be located to provide sufficient sight distance.

6.03B ROADWAY GEOMETRICS

Roadway geometric shall be as set out in the following table.

	STR	STREET GEOMETRIC CRITERIA	CRITERIA		
	TATACTORIAL	VEHIALIKANOO	GOTAN	doordoutoran	
	REGIONAL ARTERIAL	COMMUNIIY ARTERIAL	MAJOK COLLECTOR	NEIGHBORHOOD COLLECTOR	LOCAL ACCESS
Right-of Way width	120°	80-100°	80,	,99	,99
Roadway width ¹	53-77	36-53'	36'-51'	36,	32,
Sidewalk width ^{2, 3}	,9	,9	5,	5'	5,
Curb type	B-6.24	B-6.24	B-6.12	$M-3.12^{9}$	M-3.12
Number of traffic lanes ⁴	4-6	2-4	2-4	2	2
Minimum Lane width	12,	12,	12,	12'	12,
On Street Parking	Prohibited	Prohibited	Prohibited	OneSidePermitted	One Side Permitted
Minimum cul-de-sac pavement radius ⁵	N/A	N/A	55,	N/A	45,
Maximum cul-de-sac length ⁶	N/A	N/A	1000,	N/A	750'
Maximum grade	%9	%9	%9	%9	8%
Minimum gutter grade	0.5%	0.5%	0.5%	0.5%	0.5%
Design Speed Posted Speed ⁷	65 mph *	30-55 mph *	30-45 mph *	30 mph 25 mph	30 mph 25 mph
Minimum Return radius ⁸	40,	40,	40,	30,	20,
Crown	2%	2%	2%	2%	2%

Dimensions are measured back to back of curb

Sidewalk shall be placed in public right-of-way, 1-foot from the property line unless otherwise approved by the Village Engineer

Sidewalk designated as bike path shall be a minimum width of 10' or as designated on the Bicycle Trail Master Plan.

Four (4) lanes required for traffic volumes over 15,000 ADT. Six (6) lanes required for traffic volumes over 25,000 ADT.

Cul-de-sac right-of-way radius shall be 75-feet for commercial and industrial streets and 65-feet for all others

The combined length of the street and diameter of the cul-de-sac

^{*}Village streets with curb and gutter shall have 45 mph maximum posted speed. Design and posted speeds shall be determined by sight distance and approved by the Village Engineer. -- 7 6 4 6 6 7

Return radii should meet turning requirements of appropriate design vehicle designated in Section 6.05B.

Install B-6.12 if no driveway access is required by the Plan Commission. NOTE: These are guidelines. Actual design subject to Village review and approval. 8 6

6.04 COMBINATION CONCRETE CURB AND GUTTER

Combination concrete curb and gutter shall be constructed along the edge of all pavements. Cross section and details for barrier type curb shall conform to those on the standard details. Material and construction shall conform to the requirements of the "Standard Specifications for Road & Bridge Construction" of the Illinois Department of Transportation for Combination Concrete Curb and Gutter.

6.04A STAMP "S" & "W'

Shortly after the concrete curb is poured, mark the curb with an "S" for sewer and a "w" for water. Obtain the "s" and "w" stamp from the Village.

6.05 ROADWAY CURVES

6.05A CURVILINEAR DESIGN

- 1. All changes in street grades with an algebraic difference (AD) greater than 1.0 shall be connected by vertical curves of a length to provide sufficient stopping sight distance for all roadway classifications. The curve shall have a minimum length of three times the design speed (excluding local access roadways).
- 2. Horizontal curves shall be designed to provide sufficient sight distance.
 - a. Local access roadways shall provide 175' minimum radius.
 - b. Neighborhood Collectors shall provide 300' minimum radius.
 - c. All other roadway classifications shall be designed in accordance with IDOT criteria for Low-Speed Urban Streets (increased curve radius and/or superelevation).
 - d. Tangent sections of at least 150' in length shall be provided between reverse curves for roadway classifications greater than local access. Tangent sections of at least 100' in length shall be provided between reverse curves on local access roadways.

6.05B MANEUVERABILITY

- 1. Analysis shall be provided through all parking lots, entrances and other locations requested by the Village, using a B-40 vehicle with 60' minimum turning radius. Analysis is subject to review by the Frankfort Fire Protection District.
- 2. Analysis shall be provided through intersections including collectors and/or arterials in accordance with IDOT Figure 34-1G.

6.06 INTERSECTIONS

- 1. Streets shall be laid out to intersect as nearly as possible at right angles. A proposed intersection of two (2) new streets at an angle of less than 75 degrees shall not be acceptable. Intersections less than 90 degrees require analysis of adequate sight distance.
- 2. Proposed new intersections along one side of an existing street shall coincide with any existing intersection on the opposite side of such street. Street jogs with center line offsets of less than

150' shall not be permitted. Offset intersections require analysis of adequate sight distance.

3. At an intersection of two streets, Street A shall maintain the profile and cross slope (crown) and Street B shall maintain the cross slope (crown) of Street A on Street B for a distance of at least 50' measured from the nearest ROW line of the intersection street, except where this criteria will interfere with flood routing.

6.07 PAVEMENT TYPES

Pavement construction required under this Section may be either bituminous pavement or Portland Cement concrete pavement in accordance with the following table.

STREET CLASSIFICATION	MINIMUM PAVEMENT REQUIREMENTS
Regional Arterial (Major)*	6" CA-6 Aggregate Sub-base
	8" P.C. Concrete with Wire Fabric
	-or-
	6" CA-6 Aggregate Sub-base
	8" Bituminous Base Course
	2 ¹ / ₄ " Binder Course
	1 ½" Surface Course
Community Arterial	6" CA-6 Aggregate Sub-base
,	8" P.C. Concrete with Wire Fabric
	-or-
	6" CA-6 Aggregate Sub-base
	8" Bituminous Base Course
	2 ¼" Binder Course
	1 ½" Surface Course
	4" CA-6 Aggregate Sub-base
Major Collector	8" P.C. Concrete with Wire Fabric
Major Concetor	-or-
	4" CA-6 Aggregate Sub-base
	8" Bituminous Base Course
	2 ¼" Binder Course
	1 ½" Surface Course
Neighborhood Collector	4" CA-6 Aggregate Sub-base
Neighborhood Concetor	6" P.C. Concrete
	-or-
	4" CA-6 Aggregate Sub-base
	7" Bituminous Base Course
	2 1/4" Binder Course
	1 ½" Surface Course
	-Or-
	14" CA-6 Aggregate Base 2 1/4" Binder Course
	1 ½" Surface Course
Local Access	
Local Access	4" CA-6 Aggregate Sub-base 6" Bituminous Base Course
	1 ½" Binder Course
	1 ½" Surface Course
	-Or-
	12" CA-6 Aggregate Base
	2 ½" Binder Course
D. I. J.	1 ½" Surface Course
Parking Lot	8" CA-6 Aggregate Base
	2 ¼" Binder Course
	1 ½" Surface Course

^{*}Pavement thickness should be determined using the IDOT Modified AASHTO structural pavement design. The more restrictive shall govern.

In all cases, material and construction shall comply with the requirements of the "Standard Specifications for Road and Bridge Construction", prepared by the Illinois Department of Transportation, as modified by these standards.

6.08 STANDARD DESIGN METHOD FOR PAVEMENTS

When, in the opinion of the Village Engineer, the volume and composition of the traffic anticipated to be carried by the pavement can be estimated within reasonable limits and, in all cases, where the roadway is designed as a four or more lane facility, the structural design for bituminous pavements shall be based on the Modified AASHTO Method found in the IDOT BDE Manual (current edition) However, in no case shall the design result in a pavement of lesser strength than those shown in Section 6.0.

6.09 SUBGRADE SUPPORT STRENGTH

Structural design procedures acceptable under this Section require the determination of the subgrade support strength. Regardless of the design method used, a soils report shall be submitted by a soils testing laboratory, approved by the Village Engineer, in which subgrade support strength is recommended. The soils report shall provide recommendation for sub-grade improvements. Field compaction tests, where required by the Village Engineer to verify conformance with the soils report recommendations, shall be provided at the Owner/Developer's expense. Proofrolling of subgrade materials in accordance with applicable articles of Section 300 of the IDOT Standard Specifications will be required for all pavement construction.

When required, soil borings shall extend 7' or at least 1' below the proposed storm sewer invert elevations, whichever is greater.

Pavement cores shall be provided in all areas where the existing pavement is to be rehabilitated/resurfaced.

6.10 SPECIAL REQUIREMENTS FOR BITUMINOUS PAVEMENT

The following qualifications and requirements shall apply to bituminous pavements regardless of design method used:

No construction required by this Section shall be permitted after November 1 without written authorization of the Village Engineer.

In new construction, surface course shall be placed no earlier than the construction season following the season in which the base is placed, unless otherwise approved by the Village Engineer in writing.

Minimum acceptable I.B.R. for subgrade is 3.0. Where I.B.R. for underlying soil is less than 3.0, it shall be removed or otherwise modified as required to meet this minimum.

6.11 SPECIAL REQUIREMENTS FOR CONCRETE PAVEMENT

The following qualifications and requirements shall apply to Portland Cement Concrete Pavement, regardless of design method used:

No Portland Cement Concrete Pavement shall be constructed in any year after November 1st without

the written approval of the Village Engineer and, in no case, when frost is present in the subgrade.

In all roadways, Portland Cement Concrete Pavement shall be reinforced in accordance with the Standard Design for Pavement Fabric, Standard 420701 in the "Highway Standards", of the Department of Transportation, State of Illinois.

In residential streets, pavement with integral curbs, as specified in "Specification for Portland Cement Concrete Pavement (Special)", prepared by the Illinois Department of Transportation, may be used. Standard reinforcing throughout and tie bars and dowel bars at all joints shall be provided. Skewed joints shall be provided at 15-foot maximum spacing.

Subbase shall be a minimum of 4-inches compacted thickness, constructed of granular material.

6.12 SPECIAL REQUIREMENTS FOR UNDERGROUND UTILITIES

6.12A STRUCTURE ADJUSTMENT

Where finished grade or alignment for existing underground structures, such as inlet basins, catch basins, manholes or valve vaults is affected by proposed work, the project drawings shall provide for the adjustment of such structures as required. Where a project is to be constructed under two or more construction contracts, one or more of which includes the construction of pavement, the contract documents for those contracts including paving work shall provide for the adjustment of underground structures that may be constructed under other contracts as may be required to fit the proposed pavement.

6.12B UTILITY CROSSING PROTECTION

All sidewalk, curb and gutter and driveways shall be reinforced with No. 4 bars, 12-inches on center, extending 5 feet on each side of trenches containing Village sewers, water mains or building service lines.

6.13 DRIVEWAYS AND APPROACHES

6.13A GENERAL

In developments, driveways and approaches meeting the requirements of this article shall be provided at all locations where vehicular traffic is intended to leave the roadway and move onto private property. The requirements of this article shall also apply to driveways to be constructed in developed areas where the roadway is already in place. The limits of driveways to be constructed in compliance with this article shall be the roadway itself and the lot side of the sidewalk, except that in the case of isolated driveway construction in developed single family zoning districts only, subject to the approval of the Village, driveway construction may be terminated at the street side of an existing sidewalk. Driveways extending through previously constructed curbs shall be installed using a curb-cutting machine approved by the Village Inspector. No curb cuts shall be allowed without written approval of the Village Inspector.

Residential driveways shall have a minimum slope of 2% and a maximum slope of 8% as calculated in two segments: 1) from the elevation of the garage floor of the proposed house outline to the sidewalk elevation and 2) from the sidewalk elevation to the top of curb elevation on the proposed roadway. Two sidewalk elevations should be shown for this purpose, as well as designing sidewalk slopes. See 6.14H.

Residential driveway slopes should be clearly identified on the grading plan, as well as demarking identifying (or prohibiting) driveway locations due to slope constraints, anticipated drainage, roadway preference, etc.

6.13B STRUCTURAL

Driveways and approaches in residential areas provided with curbs and gutters shall be Portland Cement concrete pavement, a minimum of 6-inches thick on a minimum of 4-inches of compacted CA-6 crushed stone. Driveways and approaches in non-residential areas shall be Portland Cement concrete pavement, a minimum of 8-inches thick on a minimum of 6-inches of compacted CA-6 crushed stone. Crushed stone base compaction shall equal or exceed 95 percent of maximum dry density.

6.13C MATERIALS

Material and construction of driveways and approaches in urbanized areas shall conform to the requirements of the "Standard Specifications for Road and Bridge Construction" of the Illinois Department of Transportation for Portland Cement Concrete Driveway Pavement.

Bituminous driveways may be approved, on a case-by-case basis, in non-urbanized areas.

6.14 SIDEWALKS AND BIKE PATHS

6.14A GENERAL

Sidewalks shall be required in all appropriate zoning districts as specified in Section 6.03. As a minimum requirement, the specifications for the construction of sidewalk facilities shall be no less stringent than the requirements set out in the following articles.

6.14B STRUCTURAL

All sidewalks shall be a minimum of 5-inches thick. Sidewalks shall be continuous through residential driveways with a minimum thickness of 6-inches through the driveway section. Sidewalk in non-residential areas shall be a minimum of 5-inches thick, except it shall be a minimum of 8-inches thick through non-residential driveways. Stone bedding should be provided for all sidewalks with a minimum compacted depth of 3". Sidewalk width shall be as specified in Section 6.03 or as determined by the Village Inspector when a greater width is justified on the basis of anticipated traffic.

6.14C MATERIALS

All materials shall meet the requirements of Section 424 of the "Standard Specifications for Road and Bridge Construction" of the Illinois Department of Transportation. Sidewalk shall be placed on a minimum of 2-inches of compacted CA-6 Crushed Stone.

6.14D EXCAVATION

If organic material is present at the proposed subgrade, the organic material shall be removed to a minimum of 5-inches below the subgrade and replaced with compacted CA-6 Crushed Stone.

6.14E EMBANKMENT

When necessary to construct sidewalk on fill, fill shall be placed in 6-inch lifts, and thoroughly compacted. Embankment shall extend 1-foot beyond edge of walk. Sideslopes shall not be steeper than 4 to 1, except as approved by the Village Engineer.

6.14F PLACING AND FINISHING

The subgrade shall be adequately moistened before placement. The concrete shall be thoroughly spaded along the edges, struck off to the true grade, and finished to a true and even surface. The surface shall be divided by grooves constructed at right angles to the centerline of the sidewalk and shall have rounded edges. No slab shall be longer than 6 feet or less than 4 feet unless otherwise approved by the Village Engineer. The side edges of the walk shall also have rounded edges. The surface shall be "broom" finished.

6.14G EXPANSION JOINTS

Premolded bituminous expansion joints one-half (1/2) inch thick shall be placed every 50 feet minimum and one-half (1/2) inch thick between the sidewalk and all driveways, approaches and curbs, and all structures such as light standards, traffic light standards, and traffic poles which extend through the sidewalk.

6.14H HANDICAP REQUIREMENTS

All sidewalk construction intersecting public or private roadways shall be ramped to meet a depressed curb and gutter section in conformance with State of Illinois Handicap Standards and Article 424.09 of IDOT Standard Specifications.

Sufficient elevation and/or contours shall be provided such that longitudinal and cross slopes are in compliance with the ADA Standards for Accessible Design (28 CFR Part 36).

6.14I BIKE PATHS

When bike paths are required by the Planning Department and/or indicated on the Bicycle Trail Plan, the minimum cross section shall be 3" asphalt and 6" aggregate bedding.

Bikepaths shall be designed in accordance with the AASHTO Guide for the Development of Bicycle Facilities, 1999, or current edition.

6.15 CONSTRUCTION REQUIREMENTS FOR DRIVEWAYS, APPROACHES AND SIDEWALKS

6.15A SUBGRADE PREPARATION

When the subgrade has been prepared and no later than 24-hours prior to placing concrete, the Contractor shall notify the Village Inspector that forms are in place and the subgrade is ready for inspection. Subgrade compaction tests at the Owner/Developer's expense may be required where deemed appropriate by the Village Inspector. No concrete shall be placed until the subgrade and forms have been inspected and approved in writing by the Village Inspector.

6.15B PLACING AND FINISHING

All forms shall be set true to line and elevation, substantially built and rigidly braced to prevent bulging. Forms shall be constructed of steel or clean lumber surfaced on four (4) sides and be uniform in width and thickness. Final surfaces shall have an appropriate sealant applied in accordance with the state "Standard Specifications".

All concrete surfaces shall have a light brush finish.

6.15C PROTECTION AND CURING

All exposed surfaces of concrete shall be protected against rain.

The concrete shall be cured for a minimum period of three days after placing by one of the following methods:

Wet burlap, Impervious paper, or Membrane curing compound

When the temperature of the air is expected to drop below 40 degrees F within 24-hours after placing, the concrete shall be protected with 9-inches of loose, dry straw and a layer of burlap, or other acceptable material, for a period of at least five days.

6.15D COLD WEATHER REQUIREMENTS

No concrete shall be placed when the air temperature is below 40 degrees F or is between 40 degrees and 45 degrees F and falling unless approved by the Village Engineer. The temperature of the concrete when placed shall be not less than 50 degrees F. In no case shall concrete be placed on frozen subgrade.

6.16 STREET LIGHTING

Street lighting facilities shall be provided at all street intersections and shall be located at spacing not-to-exceed 400 feet. Blocks over 500 hundred feet and less than 800 feet in length shall include one street light at mid-block. Street lighting shall also be required at the end of all cul-de-sacs and dead ends. The Village may elect to accept a cash deposit equal to the cost of the required improvements for the purpose of installing street lighting at a future date.

The Owner/Developer shall arrange for and pay any installation costs required by Commonwealth Edison Company for the erection of the required streetlights.

Street light standards may be single or double mast as shown in 'Exhibit 6A' or decorative lighting as approved by the Village of Frankfort. The height, material of construction and lighting level provided shall be as recommended by the Village Engineer and/or Commonwealth Edison Company in accordance with the applicable portions of "American National Standard Practice for Roadway Lighting".

6.17 CUL-DE-SACS

Cul-de-Sacs should be designed in accordance with the Minimum Pavement Requirements of Section 6.07 and the geometric criteria contained in Section 6.03.

All cul-de-sacs should allow a B-40 design vehicle (garbage truck or bus) to turn around in a single maneuver.

6.18 PARKING LOTS

6.18A GEOMETRY

Parking lot geometrics shall generally conform to the recommendation of the Institute of Transportation Engineers, Table 2

6.18B LIGHTING

A photometric plan and calculations shall be provided upon request by the Village.

6.18C CONCRETE CURB

The edge of pavement shall abut concrete curbs or combination concrete curb and gutter conforming to IDOT Highway Standard 606001.

6.18D STORM WATER INLETS

All storm water runoff shall be collected in storm structures. No curb cut shall be allowed for surface drainage.

6.18E SIDEWALKS

Sidewalks shall have 5' minimum width through parking lots, except for areas adjacent to parking stalls, which shall be increased to account for bumper overhang to 7' minimum. Curb stops will only be allowed where parking will be privately maintained and where deemed appropriate by the Village Plan Commission.

6.18F ACCESSIBLE SPACES

Accessible spaces shall be provided in compliance with the ADA Standards for Accessible Design (28 CFR Part 36) and Illinois Accessibility Code "1997", as may be amended by the State of Illinois.

6.19 STREET SIGNS

6.19A GENERAL

Wooden street signs shall be provided by the owner/developer, at all street intersections and located on a single, designated corner within the right-of-way. All signs, posts and hardware shall be furnished and installed by the owner/developer upon completion of the first overlay on any public roads.

6.19B STANDARD SIGNPOSTS AND SIGNS

Signposts shall be 6" x 6" cedar posts 14-feet (14') long with beveled top. Signs shall be Redwood, or similar material. Signs shall be two-faced, 60-inches (60") long x 7-inches (7") high. The sign face shall have a raised white border no larger than 7/8-inches (7/8") wide with 4-inches (4") raised white letters. See 'Exhibit 6C' for example of standards.

6.19C INSTALLATION

Signposts shall be set in an 18-inches (18") diameter x 42-inch (42") concrete foundation 6-inches (6") below finished grade. The bottom of the sign face shall be 9-feet (9') above finished grade. Proper mounting hardware shall be used for affixing the sign face to the cedar post as shown in 'Exhibit 6C.'

REFERENCES

"Standard Specifications for Road and Bridge Construction", as published by the Department of Transportation, State of Illinois, Bureau of Design, 2300 S. Dirksen Pkwy. Springfield, Il 62764 (217) 782-5597 and the various standard published material specifications prepared by associations such as the:

"American Society for Testing and Materials". ASTM, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. Phone (610) 832-9585. Fax (610) 832 – 9555.

"American Water Works Association". AWWA, 6666 W. Quincy Avenue, Denver, CO 80235. Phone (800) 926-7337. Fax (303) 347-0804.

"Illinois Urban Manual" as published by the Department of Agriculture, Natural Resources Conservation Service and Illinois Environmental Protection Agency (revised November 2002). NRCS, State Office: 2118 W. Park Court, Champaign, IL 61821. Phone: (217) 353-6600, Fax (217) 353-6676. http://www.il.nrcs.usda.gov/technical/engineer/urban/index.html

Association of Illinois Soil & Water Conservation Districts. 4285 North Walnut Street. Springfield, Il. 62707. Phone (217) 744-3414, Fax (217) 744-3420.

"Manual of Uniform Traffic Control Devices for Highway Control and Maintenance Operations" (MUTCD). 2003 Edition. Department of Transportation, Federal Highway Administration. 400 Seventh Street, SW. Washington, D. C. 20590.

Occupational Safety & Health Administration (OSHA). Safety and Health Standards (29CFR 1926/1910) 200 Constitution Avenue, NW. Washington, DC 20210.

"Guide for the Development of Bicycle Facilities" as published (1999) by the American Association of State Highway and Transportation Officials. AASHTO, 444 North Capitol Street, NW. Washington, DC 20001. Phone (202) 624-5800. Fax (202) 624-5806.

Illinois State Water Survey (ISWS). Bulletin 70, Bulletin 71. 2204 Griffith Drive Champaign, IL 61820. Phone (217) 333-2210, Fax (217) 333-6540. Attn: Gloria Marsh.

"Fire Suppression Rating Schedule" of the Insurance Services Office (ISO). Customer Service Division. 545 Washington Boulevard. Jersey City, NJ 07310-1686. Phone (800) 888-4476, Fax (201) 748-1472. (312) 930-0070.

-"Highway Standards," of the Department of Transportation, State of Illinois. See above.

Illinois Accessibility Code (April 24, 1997). Capital Development Board – State of Illinois. 401 South Spring Street. Springfield, IL 62706. Phone (217) 782-8530. Fax (217) 524-4208.

"Guidelines for Parking Facility Location and Design" Table 2. Institute of Transportation Engineers. 1099 14th Street, NW, Suite 300, West, Washington, DC 20005-3438. Phone (202) 289-0222 Ext. 130, Fax (202) 289-7722.

Streetlight Standards. The height, material of construction, and lighting level provided shall be as recommended by the Village Engineer and/or Commonwealth Edison Company in accordance with accepted

lighting practices. Exelon Corporation. 37th Floor, 10 South Dearborn Street. Post Office Box 805398. Chicago, IL 60680-5398. Phone (800) 483-3220.

Fire Hydrant threads shall conform to National Standard Specifications. Also see National Fire Protection Association. 1 Batterymarch Park Quincy, MA 02169-7471. Phone (617) 770-3000, Fax (617) 770-0700.

"Standard Specifications for Water and Sewer Main Construction in Illinois", Adopted by a joint committee of the Illinois Society of Professional Engineers, Consulting Engineers Council of Illinois, Illinois Chapter of the American Public Works Association, Illinois Municipal League and the Associated General Contractors of Illinois. IL Society of Professional Engineers 600 South Second Street, Suite 403. Springfield, IL 62704 Phone: (217) 544-7424. Fax: (217) 528-6545.

"Will County Stormwater Management Ordinance" (Countywide Stormwater Ordinance) amended March 18, 2004 with an effective date of January 1, 2004. Will County Land Use Department, Subdivision Engineering Division. 58 East Clinton Street – Suite 500 Joliet, IL 60433. Phone (815) 740-8140, Fax (815) 774-6327. http://willcountylanduse.com/SubEng/SubEngDocs/StormwaterOrd.pdf

Also these sources are recommended:

- 1. "Recommended Standards for Wastewater Facilities" (2004). Health Education Services, P.O. Box 7126 Albany, N.Y. 12224. Phone (518) 439-7286, Fax (518) 439-7022. www.hes.org
- 2. International Code Council 4051 W. Flossmoor Road. Country Club Hills, IL 60478-5795. Phone (888)422-7233, Fax (800)214-7167.
- 3. American Association of State Highway and Transportation Officials, (AASHTO). 444 North Capitol Street N.W., Suite 249 Washington D. C. 20001. Phone (202) 624-5800, Fax (202) 624-5806.
- 4. American Society of Civil Engineers (ASCE). 1801 Alexander Bell Drive. Reston, VA 20191. Phone (800) 548-2723. Fax (703) 295-6222.

APPENDIX A CADD/GIS REQUIREMENTS FOR DEVELOPERS

FILE FORMAT

The Village of Frankfort GIS is utilized on a Pentium PC with Windows XP Operating System. All files must be submitted to the Village on a Windows-formatted 3.5 diskette, CD-ROM, DVD, DVR or similar electronic file.

ATTRIBUTE INFORMATION REQUIREMENTS

All attribute ID tag data concerning manholes, valves, streets, etc. must be supplied on each block feature in each drawing. All attribute information for proposed infrastructure must also be in a Comma Delimited Text File Format (*.CDF). The template files are supplied on the diskette. You may rename the file to relate the file name to the project (Example Watproj.txt)

CATEGORY	TEMPLATE FILE	OUTPUT FILE EXAMPLE
Water	wattpl.txt	Watpro .txt
Sewer	sewtpl.txt	Sewpro.txt
Storm	stotpl.txt	Strpro.txt
Building	bldtpl.txt	Bldpro.txt

CADD REQUIREMENTS

All submissions made to the Village must be in a drawing file compatible with AutoCAD 2000 (or previous version) and follow the CADD standards that follow.

LAYERING

All layering in submission files must follow Frankfort Layering Standards. If there is not a definition for a layer that is required, new layers may be added, but must be noted in the documentation submitted to the Village.

DRAWING COORDINATES

All final drawing files submitted to the Village must be in a horizontal and vertical coordinates base system. The Village's GIS base coordinates system follows State Plane Projected Coordinate System: NAD 1983 State Plane Illinois East FIPS 1201 Feet. It is the responsibility of the developer to ascertain the proper State Plane Coordinates on any specific project. These coordinates can be obtained from the Village of Frankfort or Will County's benchmarks. Contact the Village of Frankfort for additional information on benchmark locations.

MODEL & DRAWING SHEET GUIDELINES

The model must be drafted at full scale in the Village's horizontal coordinates system. The model file shall contain all existing and proposed entities contained in the entire set of construction plans, and shall encompass the entire project area. Individual drawing sheet files shall be prepared at the appropriate plot scale, and contain reference to the model file. All text shall be labeled on the drawing file, not the model file.

HARD COPIES

A hard copy of the drawing and text files must be provided.

VILLAGE OF FRANKFORT LAYERING STANDARDS

<u>Layer Name</u> O	Line Type
ADDRESS	
BIKE TRAIL	
BRIDGE	e
BSL	e
CERTS	
CONTROL	•
CULTURE	
DIM	
EBLDG	c c
ECL	Existing centerlines
ECON	Existing contours
ECURB	Existing curbs
EELEC	Existing electric
EEP	Existing edge of pavement
EGAS	Existing gas mains
EGRADE_ELEV	Existing spot elevations
ELTLINE	Existing lot or parcel line
ESAN	Existing sanitary sewer
ESMT	Easements
ESTORM	Existing storm sewer
ESW	Existing sidewalk
ETEL	Existing telephone
EWATER	Existing water
LEA	Leaders
LINE	Miscellaneous lines
LTDIM	Lot dimensions
LTNO	Lot numbers
MISCELLANEOUS TEXT	Miscellaneous text
OPAVEMENT	Other pavement items
PBLDG	•
PCL	
PCON	•
PCURB	•
1 0010	11000000 00100

<u>Layer Name</u>	Line Type
PEP	Proposed pipelines
PGRADE ELEV	Proposed spot elevations
PIPELINE	Pipeline
PLTLINE	Proposed lot or parcel line
PSAN	Proposed sanitary sewer
PSTORM	Proposed storm sewer
PSW	Proposed sidewalks
PWATER	Proposed water mains
RAILROAD	Railroads
SIGN	Signs
STREAM	Streams, rivers
STRNAME	Street name
TEXT	Miscellaneous text
VEGETATION	Trees, bushes, etc.
WETLAND	Wetlands
The following symbol blocks are included in the proto	otype drawing:
ECB	Existing catch basin
ECES	Existing culvert end section
EFH	Existing fire hydrant
EINLET	Existing inlet
ELB	Existing light pole
EPP	Existing power pole
ESAMH	Existing sanitary manhole
ESSC	Existing storm sewer clean out
ESTMH	Existing storm manhole
ETP	Existing telephone pole
EVV	Existing valve vault/water manhole
PCB	Proposed catch basin
PCES	Proposed culvert end section
PFH	Proposed fire hydrant
PINLET	Proposed inlet
PLP	Proposed light pole
PPP	Proposed power pole
PSAMH	Proposed sanitary manhole
PSSC	Proposed storm sewer clean out
PSTMH	Proposed storm manhole
PTP	Proposed telephone pole
PVV	Proposed valve vault/water manhole



SPECIFICATION TIME (min:sec) REQUIRED FOR PRESSURE DROP FROM 3 1/2 TO 2 1/2 PSIG (24 kPag - 17 kPag) WHEN TESTING ONE PIPE DIAMETER ONLY PIPE DIAMETER, INCHES (MILIMETERS)

Length of Sewer Pipe In Feet (Meters)	4 (100)	6 (150)	8 (200)	10 (250)	12 (300)	15· (380)	18 (450)	21 (525)	24 (600)
25 (7.62) 50 (15.24) 75 (22.87) 100 (30.5)	0:04 0:09 0:13 0:18	0:10 0:20 0:30 0:40	0:18 0:35 0:53 1:10	0:28 0:55 1:23 1:50	0:40 1:19 1:59 2:38	1:02 2:04 3:06 4:08	1:29 2:58 4:27 5:56	2:01 4:03 6:04 8:05	2:38 5:17 7:55 10:34
125 (38.1) 150 (45.7) 175 (53.35) 200 (61)	0:22 0:26 0:31 0:35	0:50 0:59 1:09 1:19	1:28 1:46 2:03 2:21	2:18 2:45 3:13 3:40	3:18 3:58 4:37 5:17	5:09 6:11 7:05	7:26 8:30	9:55	11:20 12:06
225 (68.6) 250 (76.2) 275 (83.84) 300 (91.5)	0:40 0:44 0:48 0:53	1:29 1:39 1:49 1:59	2:38 2:56 3:14 3:31	4:08 4:35 4:43	5:40		8:31 9:21 10:12	10:25 11:35 12:44 13:53	13:36 15:07 16:38 18:09
350 (106.7) 400 (122.0)	1:02 1:10	2:19 2:38	3:47		6:03	8:16 9:27	11:54 13:36	16:12 18:31	21:10 24:12
450 (137.2) 500 (152.5)	1:19 1:28	2:50		5:14	6:48 7:34	10:38 11:49	15:19 17:01	20:50 23:09	27:13 30:14

(4) Deflection Limits for Flexible Thermoplastic Pipes:

(a) Deflection of Polyvinyl Chloride (PVC) pipe shall not exceed 5.0% of the "Base I.D." (internal diameter) of the pipe. "Base I.D." shall be calculated in accordance with the following.

Avg ID = Avg OD - 2(1.06)tTolerance Package = $(A^2 + B^2 + B^2 + C^2)^{1/2}$ Where:

A = OD Tolerance (ASTM D3034)

B = Excess Wall Thickness Tolerance = 0.06t

C = Out-of-Roundness Tolerance = 0.015 (avg. OD)

t = Minimum Wall Thickness (ASTM D3034)

Base ID = Avg. ID - Tolerance Package

(b) Deflection of Composite pipe ("Truss" pipe) shall not exceed 3.0% of the average inside diameter (ID) of the pipe in accordance with ASTM D2680.

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pressure is defined as the maximum operating pressure of the section under test and is based or the elevation of the lowest point in the line or section under test corrected to the elevation of the test gauge. Applicable provisions of AWWA C-600 and C-603 shall apply. Duration of each leakage test shall be a minimum of one (1) hour in addition to the pressure test perior.

(2) Allowable leakage in gallons per hour for pipe line shall not be greater than that determined by the formula:

$$L = \frac{ND \sqrt{P}}{7400} \left\{ \begin{array}{c} ND \sqrt{P} \\ Lm = \frac{130,380}{} \end{array} \right\}$$

Note: L = Allowable leakage in gallons per hour (liters per hour).

N = Number of joints in length of pipeline tested.

D = Nominal diameter of the pipe in inches (milimeters).

P = Average test pressure during leakage test in pounds per square inch (kPa) gauge.

- (3) Leakage is defined as the quantity of water to be supplied in the newly laid pipe or any valved section under test, which is necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled.
 - (4) Flanged pipe shall be "bottle tight".

41-2.14 DISINFECTION OF WATER MAINS

Any of the methods stated in AWWA Standard C651-92 are accepted as a means of disinfection of water mains.

41-2.14A FLUSHING

Sections of pipe to be disinfected shall first be flushed to remove any solids or conteminated material that may have become lodged in the pipe. If no hydrant is installed at the end of the main, then a tap should be provided large enough to develop a velocity of at least two and five-tenths (2.5) feet per second (.762 meter per second) in the main. A two and one-half (2 1/2) inch (63.5 mm) hydrant opening will, under normal pressures, provide this velocity in pipe sizes up to and including twelve (12) inch (305 mm).

All taps two (2) inch (51 mm) size and smaller required for chlorination or flushing purposes, or for temporary or permanent release of air shall be provided for by the CONTRACTOR as a part of the construction of water mains. Taps larger than two (2) inch (51 mm) shall be paid for as a bid item or as Extra Work.

41-2.14B REQUIREMENT OF CHLORINE

Before being placed into service, all new mains and repaired portions of, or extensions to existing mains shall be chlorinated so that the initial chlorine residual is not less than fifty (50) mg/L and that a chlorine residual of not less than twenty-five (25 mg/L) remains in the water after standing twenty-four (24) hours in the pipe.

See Section 7-12 "Use of Fire Hydrants" regarding use of water for flushing and disinfection.

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FOR WATER AND SEWER MAIN CONSTRUCTION IN ILLINOIS



ILLINOIS SOCIETY OF PROFESSIONAL ENGINEERS
CONSULTING ENGINEERS COUNCIL OF ILLINOIS

"LINOIS MUNICIPAL LEAGUE

[HE ASSOCIATED GENERAL CONTRACTORS OF ILLINOIS

MAY 1986

TABLE 2 Allowable Leakage for Pipeline per 1,000 ft - gph

200 0.21 0.32 0.43 0.64 0.85 1.06 1.28 1.48 1.70 1.91 2.12 2.55 3.19 200 0.20 0.30 0.40 0.59 0.80 0.99 1.19 1.39 1.59 1.79 1.91 2.12 2.55 3.19 175 0.20 0.30 0.40 0.59 0.80 0.99 1.19 1.39 1.59 1.79 1.98 2.38 2.98 150 0.19 0.28 0.37 0.55 0.74 0.92 1.10 1.29 1.47 1.66 1.84 2.21 2.76 125 0.17 0.25 0.34 0.67 0.84 1.01 1.18 1.34 1.51 1.68 2.01 2.52 100 0.15 0.20 0.45 0.60 0.75 0.90 1.05 1.20 1.35 1.62 1.80 2.25 100 0.20 0.27 0.41 0.	9 4		17								
0.21 0.32 0.43 0.64 0.85 1.06 1.28 1.48 1.70 1.91 2.12 2.55 0.20 0.30 0.40 0.59 0.80 0.99 1.19 1.39 1.59 1.79 1.98 2.38 0.19 0.28 0.37 0.55 0.74 0.92 1.10 1.29 1.47 1.66 1.84 2.21 0.17 0.25 0.34 0.50 0.67 0.84 1.01 1.18 1.34 1.51 1.68 2.01 0.15 0.23 0.30 0.45 0.60 0.75 0.90 1.05 1.20 1.35 1.50 1.80 0.14 0.20 0.27 0.41 0.54 0.68 0.81 0.95 1.08 1.22 1.35 1.62		71	-	16	18	20	24	30	36	42	48
0.20 0.30 0.40 0.59 0.80 0.99 1.19 1.39 1.59 1.79 1.98 2.38 0.19 0.28 0.37 0.55 0.74 0.92 1.10 1.29 1.47 1.66 1.84 2.21 0.17 0.25 0.34 0.50 0.67 0.84 1.01 1.18 1.34 1.51 1.68 2.01 0.15 0.23 0.30 0.45 0.60 0.75 0.90 1.05 1.20 1.35 1.50 1.80 0.14 0.20 0.27 0.41 0.54 0.68 0.81 0.95 1.08 1.22 1.35 1.62	0.43 0.64	1.28	1.48	1.70	16.1	2.12	2.55	3.19	3.82	4.46	5.09
0.19 0.28 0.37 0.55 0.74 0.92 1.10 1.29 1.47 1.66 1.84 2.21 0.17 0.25 0.34 0.90 0.67 0.84 1.01 1.18 1.34 1.51 1.68 2.01 0.15 0.23 0.30 0.45 0.60 0.75 0.90 1.05 1.20 1.35 1.50 1.80 0.14 0.20 0.27 0.41 0.54 0.68 0.81 0.95 1.08 1.22 1.35 1.62	0.40 0.59	1.19	1.39	1.59	. 79	.98	2.38	2.98	3.58	4.17	1,7
0.17 0.25 0.34 0.90 0.67 0.84 1.01 1.18 1.34 1.51 1.68 2.01 0.15 0.23 0.30 0.45 0.60 0.75 0.90 1.05 1.20 1.35 1.50 1.80 0.14 0.20 0.27 0.41 0.54 0.68 0.81 0.95 1.08 1.22 1.35 1.62	0.37 0.55	01.1	1.29	1.47	99.	.84	2.21	2.76	-	3.86	7
0.15 0.23 0.30 0.45 0.60 0.75 0.90 1.05 1.20 1.35 1.50 1.80 0.14 0.20 0.27 0.41 0.54 0.68 0.81 0.95 1.08 1.22 1.35 1.62	0.34 0.50	1.61	81.	1.34	1.51	.68	2.01	2.52	3.02	3.53	1
0.14 0.20 0.27 0.41 0.54 0.68 0.81 0.95 1.08 1.22 1.35 1.62	0.30 0.45	0.30	1.05	1.20	.35	.50	.80	2.25	2.70	3.15	3.60
	0.27 0.41	0.81	0.95	.08	. 22	.35	1.62	2.03	2.44	2.84	3.25
0.12 0.18 0.23 0.35 0.47 0.59 0.70 0.82 0.94 1.06 1.17 1.41	0.23 0.35	0.70	0.82	0.94	90.	1.17	1.41	1.76	2.:1	2.46	2.82

TABLE 3
Allowable Leakage for Cement-Asbestos Pipe 13' Lengths per 100 couplings - gph

14 16 18 20 24 30 36 42	5.68 6.37 7.08 8.50 10.62 12.74	5.27 5.93 6.58 7.91 9.88 11.88 13.85	5.52 6.12 7.34 9.18 11.02	5.02 5.58 6.69 8.37 10.07	4.52 5.00 6.00 7.51 9.01	3.87 4.30 5.16 6.45 7.75	3.18 3.54 4.24 5.30 6.37
16 18 20 24 30	5.68 6.37 7.08 8.50 10.62	5.93 6.58 7.91 9.88	5.52 6.12 7.34 9.18	5.02 5.58 6.69 8.37	4.52 5.00 6.00 7.51	3.87 4.30 5.16 6.45	3.18 3.54 4.24 5.30
16 18 20 24	5.68 6.37 7.08 8.50	5.93 6.58 7.91	5.52 6.12 7.34	5.02 5.58 6.69	4.52 5.00 6.00	3.87 4.30 5.16	3.18 3.54 4.24
16 18 20	5.68 6.37 7.08	5.93 6.58	5.52 6.12	5.02 5.58	4.52 5.00	3.87 4.30	3.18 3.54
16 18	5.68 6.37	5.93	5.52	5.02	4.52	3.87	3.18
91	5.68						
		5.27	4.89	47	-	4	~
14				4	4.	3.4	2.8
	4.96	4.62	4.28	3.91	3.50	3.01	2.48
12	4.24	3.96	3.68	3.35	3.00	2.58	2.12
10	3.54	3.40	3.07	2.79	2.50	2.15	1.77
œ	2.84	2.64	2.45	2.24	2.00	1.72	1.42
9	2.12	1.98	1.84	1.68	1.51	1.29	1.06
4	1.42	1.32	1.23	1.12	00.1	0.87	0.71
	200	175	150	125	100	75	05
	9 4	200 1.42 2.12	200 1.42 2.12 175 1.32 1.98	1.42 2.12 1.32 1.98 1.23 1.84	200 1.42 2.12 175 1.32 1.98 150 1.23 1.84 125 1.12 1.68	200 1.42 2.12 175 1.32 1.98 150 1.23 1.84 125 1.12 1.68 100 1.51	200 1.42 2.12 2. 175 1.32 1.98 2. 150 1.23 1.84 2. 100 1.00 1.51 2. 75 0.87 1.29 1.

ALLOWABLE LEAKAGE PIPELINE & CEMENT-ASE

DIV. V/STANDARD DRAWING NO. 18 PAGE: 154

*The data are based on 150 psi and represent a leakage of approximately 30 gpd per mile of pipe per in. of pipe diameter for pipe in 13-ft lengths.

117

Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test¹

This standard is issued under the fixed designation C 1244; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers procedures for testing precast concrete manhole sections when using the vacuum test method to demonstrate the integrity of the installed materials and the construction procedures. This test method is used for testing concrete manhole sections utilizing mortar, mastic, or gasketed soints.

1.2 This test method is intended to be used as a preliminary est to enable the installer to demonstrate the condition of the concrete manholes prior to backfill. It may also be used to test manholes after backfilling; however, testing should be correlated with the connector supplier.

1.3 This standard does not purport to address all of the afety problems, if any, associated with its use. It is the sponsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

4 This test method is the companion to metric Test behod C 1244M; therefore, no SI equivalents are shown in test method.

Note 1—Vacuum test criteria presented in this test method are similar place in general use. The test and criteria have been widely and placesfully used in testing manholes.

2012 2—It should be understood that no correlation has been found

Referenced Documents

ASTM Standards:

22 Terminology Relating to Concrete Pipe and Related inducts²

4 Practice for Testing Concrete Pipe Sewer Lines by w-Pressure Air Test Method²

1969 Practice for Infiltration and Exfiltration Acceptance String of Installed Precast Concrete Pipe Sewer Lines²

Terminology

for definitions of terms relating to manholes, see

cioe is under the jurisdiction of ASTM Committee C13 on Concrete the direct responsibility of Subcommittee C13.06 on Manholes and

ion approved Aug. 15, 1993. Published October 1993.
Ok of ASTM Standards, Vol 04.05.

TABLE 1 Minimum Test Times for Various Manhole Diameters in

ST-03794 155			22/19/2017	Secon	ius				
Danie (m)	34			Di	ameter,	in.			
Depth (ft) -	30	33	36	42	48	54	60	66	72
(5-1950)		- S- S-		Time	, in seco	onds			
8	11	12	14	17	20	23	26	29	33
10	14	15	18	21	25	29	33	36	41
12	17	18	21	25	30	35	39	43	49
14	20	21	25	30	35	41	46	51	57
16	22	24	39	34	40	46	52	58	67
18	25	27	32	38	45	52	59	65	73
20	28	30	35	42	50	53	65	72	81
22	31	33	39	46	55	64	72	79	89
24	33	36	42	51	59	64	78	87	97
26	36	39	46	55	64	75	85	94	105
28	39	42	49	59	69	81	91	101	113
30	42	45	53	63	74	87	98	108	121

4. Summary of Practice

4.1 All lift holes and any pipes entering the manhole are to be plugged. A vacuum will be drawn and the vacuum drop over a specified time period is used to determine the acceptability of the manhole.

5. Significance and Use

5.1 This is not a routine test. The values recorded are applicable only to the manhole being tested and at the time of testing.

6. Preparation of the Manhole

6.1 All lift holes shall be plugged.

6.2 All pipes entering the manhole shall be temporarily plugged, taking care to securely brace the pipes and plugs to prevent them from being drawn into the manhole.

7. Procedure

7.1 The test head shall be placed at the top of the manhole in accordance with the manufacturer's recommendations,

7.2 A vacuum of 10 in. of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. The time shall be measured for the vacuum to drep to 9 in. of mercury.

7.3 The manhole shall pass if the time for the vacuum reading to drop from 10 in. of mercury to 9 in. of mercury meets or exceeds the values indicated in Table 1.

7.4 If the manhole fails the initial test, necessary repairs

100 Barr Harbor Drive, West Conshohooken, PA 19428-2959, United States.

TABLE X1.1 Minimum Test Times for Various Pipe Diameters (Practice C 924)

(Fia	Cuce C 324)
Nominal Pipe Size, in.	Time (7), min 100 ft.
4	0.3
6	0.7
8	1.2
4.6	1.5
10	1.8
15	2.1
18	2.4
21	3.0
24	3.6
27	. 42
30	4.8
33	5.4
, 36	6.0

TABLE X1.2 Allowable Air Loss for Various Pipe Diameters (Practice C 924)

			1 10 03/00	
N	ominal Pipe Size, in.	Ai	r Loss (<i>Q</i>), ft ³ /mi	n
	4		2	
	6		2 2	
	8			
	10		2.5	
	12		3	
	15		4	
	18		5	
	21		5.5	
	24		6	
	30		7	
	36		8	
	42		9	
	48		10	
	54		11	28
	60		12	
	66		13	
	72		14	

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APPENDIX C CERTIFICATIONS FOR FINAL PLAT

1. Survey Certification		
State of Illinois)		
County of) SS		
County of)		
of the owner thereof, I have surveyed,	subdivided and platted said p n, that part of the <u>(quarter se</u>	do hereby certify that under the direction roperty into lots and streets all of which ection, section, township, range) of the
(Legal Description)		
by me. 2. (Flood Hazard Statement) 3. The property or plat is situate 4. To the best of our knowledges complied with in the preparat 5. All dimensions are given in fectors 6. Exterior corners have been more thirty-six inches (36") deep, we	ed within the corporate limits ge, all regulations enacted be action of this plat. The eet and decimal. The content of the c	of said survey and subdivision as made of the Village of Frankfort. y the Village of Frankfort have been less than six inches (6") in diameter and ee inches (3") long cast in place, and all thin one year from date of recordation.
Dated at, Illinois this	day of	, 20, A.D.
Illinois Registered Land Surveyor No.		
innois Registered Land Surveyor 140.	·	(Seal)
2. Certificate of Ownership and Not	tary	
State of Illinois)) SS		
County of)		
indicated on the plat, for the uses	and purposes therein set for (s)lopt the same under the style :	
(Owner)		(Owner)

Notary

	State of Illinois)) SS			
	State of Illinois County of	_) 33			
	(and subscribed to the above signed the above cert	, A Notary Public in and, personally known we certificate appeared before nificate as his (their) own free aren under my hand and notarial	to me to be the ne this day in per nd voluntary act	same person(s) whose son and acknowledge and deed for the uses	se name(s) are d that he (they) s and purposes
3.	Planning and Zoning	g Commission Approval			
	State of Illinois)			
	State of Illinois County of) SS)			
	certify that on this	, Chairman of the Village day of, 20, A.I Commission of the Village of	D. this plat of su		
	Attest:		Ву:		
	Chair	man			
4.	Village Board Appro	val			
	State of Illinois County of)) SS			
	County of)			
		sident and the Board of Trustee day of	•		County.
	Attest:Villag		Ву:	Village Preside	
	Villag	ge Clerk		Village Preside	ent
			_		(Seal)
5.	County Clerk Certifi	cation			
	State of Illinois)) SS			
	County of)			
	I,	, County Clerk of	C	ounty, Illinois, do her	eby certify that
		121			

	in the foregoing certificates.			
	Given under my hand and seal at	, Illinois, this	day of	, 20, A.D
		(SEAL)	
	County Cle	rk		
6.	County Recorder Certification			
	State of Illinois)			
	County of)			
	This instrument NoCounty, Illinois, aforesaid on the			
		County Recorder		
7.	Tax Mapping and Platting Certific	cation		
	State of Illinois)			
	State of Illinois)			
	I,, Director of the			
	checked the property described on the true and correct. The property herein permanent real estate tax index num	n described is located on Tax	Map No	
	true and correct. The property herein	n described is located on Tax ber (pin)	Map No	
	true and correct. The property herein permanent real estate tax index num	n described is located on Tax ber (pin)	Map No	
8.	true and correct. The property herein permanent real estate tax index num Dated this day of	n described is located on Tax ber (pin), 20, A.D.	Map No	
8.	Dated this day of Director Mortgagee Certificate (If applicable)	n described is located on Tax ber (pin), 20, A.D.	Map No	
8.	true and correct. The property herein permanent real estate tax index num Dated this day of Director	n described is located on Tax ber (pin), 20, A.D.	Map No	
8.	Dated this day of Director Mortgagee Certificate (If applicable)	n described is located on Tax ber (pin), 20, A.D, as Mortgagee, under the Recorder's Office of	Map No the provisions of cer County, Illin	and identified as tain mortgage dated nois, on day

Date:	
Printed Name and Title:	
Attest:	
Attest:Printed Name and Title:	
Notary	
State of Illinois	
State of Illinois)	
) SS County of)	
County of	
I, , A Not	ary Public in and for said County and State, do hereby certify that
(and), r	personally known to me to be the same person(s) whose name(s) are
	appeared before me this day in person and acknowledged that he (they)
signed the above certificate as his	(their) own free and voluntary act and deed for the uses and purposes
therein set forth. Given under my	hand and notarial seal this day of A.D. 20
	(Seal)
O Highway Anthonity (if applicable)	
9. Highway Authority (if applicable)	
County Highway Certification	
County Inghway Continuation	
State of Illinois)	
) SS	
State of Illinois)	
Approved thisd	ay of, AD, 20 ghway, also
As to roadway access to County Hi	ghway, also
known as	·
	County Superintendent of Highways
	County Superintendent of Highways
State Highway Certification	
g,	
State of Illinois)	
) SS County of)	
County of)	
Approved thisd	ay of, AD, 20
	way, also
known as	·
	District Engineer IDOT District 1
	District Engineer (DOT District 1

APPENDIX D EASEMENT PROVISIONS

Public Utility and Drainage Easements

All easements indicated as public utility and drainage easements on the plat are reserved for and granted to the Village of Frankfort and to those public utility companies operating under franchise from the Village of Frankfort, including, but not limited to, Ameritech Telephone Company, Nicor Gas Company, Commonwealth Edison Electric Company, Comcast Television Company and their successors and assigns, for perpetual right, privilege and authority to construct, reconstruct, repair, inspect, maintain and operate various utilities, transmission and distribution systems including storm and/or sanitary sewers, water mains, valve vaults, and hydrants together with any and all necessary manholes, catch basins, connections, appliances and other structures and appurtenances as may be deemed necessary by said Village of Frankfort, over, upon, along, under, through said indicated easement, together with right of access across property for necessary men and equipment to do any of the above work; The right is also granted to cut down, trim, or remove trees, shrubs, or other plants on the easement that interfere with the operation of the sewers and other utilities. No permanent buildings, trees or other structures shall interfere with the aforesaid uses or rights. Where an easement is used for both sewer and/or water mains and other utilities, the other utility installations are subject to the ordinances of the Village of Frankfort.

The placement of any landscaping not in with the approved landscape plan or grading plan for a given property, or any accessory building or structure, swimming pool, fence or other improvement which in any way could cause an impediment to the overland flow of storm water within said drainage easement is hereby prohibited.

Surface Overland Flow Easement

All easements indicated as "SURFACE OVERLAND FLOW EASEMENT" on this plat are reserved for and granted to the Village of Frankfort. No buildings, other structures or landscaping shall be erected or maintained in the SURFACE OVERLAND FLOW EASEMENT areas that would adversely affect the free flow of storm water. Each owner or subsequent purchaser shall be equally responsible for maintaining the SURFACE OVERLAND FLOW EASEMENT areas and shall not destroy or modify grades or slopes without having first received prior written approval of the Village of Frankfort. In the event any owner or subsequent purchaser fails to properly maintain the SURFACE OVERLAND FLOW EASEMENT areas, the Village of Frankfort or any other unit of local government having jurisdiction over drainage, shall have the right to perform, or have performed on its behalf, any maintenance work to or upon the SURFACE OVERLAND FLOW EASEMENT area reasonably necessary to insure proper flow of storm water and charge the owner or subsequent purchaser for the maintenance work performed.

Detention Easement

All easements indicated as detention easements on this plat are reserved for and granted to the Village of Frankfort and to their successors and assigns. No buildings or structures shall be placed on said easement, but the easement may be used for others purposes that do not adversely affect the storage/free flow of storm water. Each owner or subsequent purchaser shall be equally responsible for maintaining the detention easement and shall not destroy or modify grades, slopes or approved landscaping without having first received prior written approval from the Village of Frankfort.

In the event any owner or subsequent purchaser fails to properly maintain the detention easements, the Village of Frankfort shall have the right, but not the obligation, to perform, or have performed on its behalf, any maintenance

work to or upon the water detention area reasonably necessary to insure adequate stormwater storage and free flow of stormwater through the detention easement area.

In the event the Village of Frankfort shall be required to perform, or have performed on its behalf, any maintenance work to or upon the water detention area easement, the cost together with an additional sum of ten percent (10%) of said cost completion of the work constitutes a lien against any lot or lots created by this Plat which may require maintenance. The lien may be foreclosed by an action brought by or on behalf of the Village of Frankfort.

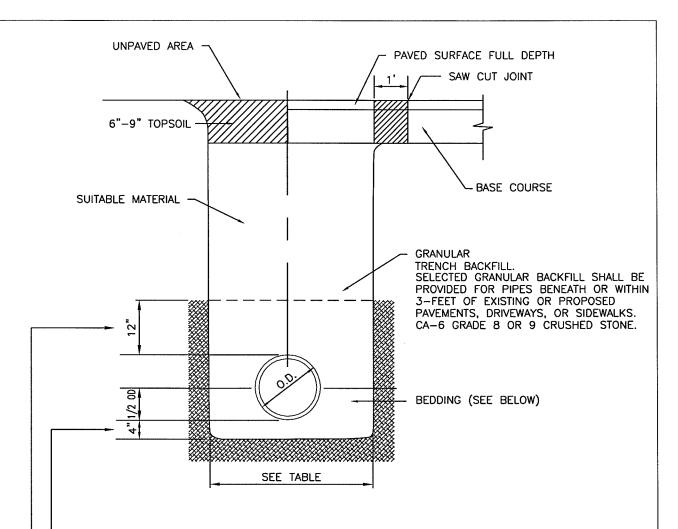
APPENDIX E EXHIBITS

ENVIRONME	ITAL IMPACT ASSESSMENT OR NATURAL RESOURCE INFORMATION REPORT.
PRELIMINAR PUBLICLY	PLAT LABELED AS SUCH (2 COPIES) SHOWING ALL LOTS, EASEMENTS, RIGHT-OF-WAY AND EDICATED AREAS.
FLOODPLAIN WETLAND, E	LINEATION REPORT AND CONSULTANT'S OPINION OF JURISDICTION (ALL PROPERTIES WITH DEPRESSIONAL STORAGE, USGS BLUE LINE, PRESENCE ON NWI OR NRCS, KNOWN ADJACENT IC.). WETLAND LIMITS AND REQUIRED VILLAGE BUFFER SHOWN. ALL WETLAND REPORTS UBMITTED TO THE USACOE FOR JURISDICTIONAL DETERMINATION.
AN EXISTIN	FLOOD STUDY OR FLOOD PLAIN DETERMINATION SHALL BE SUBMITTED FOR APPROVAL BY THE FRANKFORT/VILLAGE ENGINEER PRIOR TO THE PRELIMINARY ENGINEERING SUBMITTAL.
PROPOSED	FLOOD STUDY, INCLUDING TOPOGRAPHIC WORK MAP AND COMPENSATORY STORAGE CALCULATIONS.
PRELIMINAR (4 COPIES)	PLAN INCLUDING VILLAGE OF FRANKFORT BENCHMARK, SCALE, AND PROJECT CONTACT
PROJECT TO AND DRIVE	POGRAPHY EXTENDING 100' MINIMUM OFFSITE (INCLUDING ADJACENT T/FS, ENTRANCES AYS).
FLOODPLAIN 10- AND	LIMITS IDENTIFIED ON PLAN (SCALED ZONE A, AE, FLOODWAY, EXISTING AND PROPOSED 00-YEAR).
FLOODPLAIN IDENTIFIED.	CROSS SECTIONS, ELEVATIONS, CUT AND FILL AREAS LABELED. AFFECTED LOTS OR UNITS
	SEMENT THAT LOMC WILL BE OBTAINED FROM FEMA. BULLETIN 10-01 (SETBACKS, LEVATIONS).
EXISTING W	TER MAIN, VALVES, HYDRANTS, SANITARY SEWER AND STORM SEWER.
PROPOSED	WATER MAIN (LOOPING AND EXTENSIONS) AND SANITARY SEWER (DEPTH AND EXTENSIONS).
ROADWAY A	ND PARKING LOT GEOMETRY (ROW DEDICATIONS, CURVE RADII, AISLE AND STALL, BER OF STALLS, ETC.).
TURNING TE	MPLATES OR AUTOTURN ANALYSIS USING B-40 60' RADIUS THROUGH PARKING LOTS, CS, ENTRANCES AND ATYPICAL ROADWAY ALIGNMENTS.
SIDEWALK A	ND BIKEPATHS WHERE REQUIRED.
TRAFFIC ST	JDY, WHEN APPROPRIATE.
EXISTING TO	POGRAPHY AND DRAINAGE DIVIDES. PROPOSED DRAINAGE DIVIDES TO POND(S).
DEPRESSIO	AL STORAGE VOLUME CALCULATION AND COMPENSATION.
IDENTIFY TO	PE OF FACILITY PROPOSED (WET BOTTOM, WETLAND BOTTOM, OR DRY BOTTOM).
POND CON' SLOPE SEL	OURS (BOTTOM, NWL, HWL AND T/BERM) AND LOCATION OF POND OUTLET. IF VARIABLE SIDE CTED, PROVIDE 2-YEAR WATER LEVEL. LABEL PROPOSED SETBACK TO VILLAGE ROW.
CRITICAL DI STAGE-STO	RATION ANALYSIS (2- AND 100-YEAR STORMS) AND SUPPORTING DOCUMENTATION FOR TC, RCN, RAGE-DISCHARGE CALCULATIONS, RESTRICTOR SKETCH, ETC.
DRAWDOWN	CALCULATIONS FOR 2-, 5-, 10- AND 100-YEAR STORM (TIME-STAGE TABLE AND GRAPH).
DISCUSSION	CALCULATIONS AND EXHIBITS OF UNDETAINED AREAS AND/OR OVER-RESTRICTIONS.
FREEBOARD	' GRADING, INCLUDING EMERGENCY OVERLAND FLOW ROUTE LOCATION WITH 1' MINIMUM TO T/FS (CALCULATIONS FOR MULTI-FAMILY, COMMERCIAL AND PROJECTS WITH SIGNIFICANT BUTARY AREAS).
DELINEATIO	OF OFFSITE TRIBUTARY AREAS (ON USGS OR COUNTY TOPOGRAPHY).
PRELIMINAR (OR IDENTII DEPARTMEN	GRADING PLAN LOCATING WALLS AND VERIFICATION OF MATCHING GRADES AT PROPERTY LINES ICATION OF OFFSITE GRADING WORK). RETAINING WALLS WHERE PERMITTED BY THE PLANNING.

PRELIMINARY SUBMITTAL REQUIREMENTS

FINAL PLAT LABELED AS SUCH (2 COPIES) SHOWING LOTS, EASEMENTS, RIGHT-OF-WAY AND PUBLICLY DEDICATED AREAS. IDENTIFICATION OF LOTS WITHIN FLOODPLAIN WHICH BUILDING PERMITS WILL NOT BE ISSUED PENDING LOMCS FROM FEMA.
SITE IMPROVEMENT PLANS INCLUDING VILLAGE OF FRANKFORT BENCHMARK, SCALE, PROJECT CONTACT, DRAINAGE CERTIFICATE, SIGNATURE AND SEAL, VILLAGE DETAILS AND SPECIFICATION (4 COPIES).
WETLAND LIMITS, REQUIRED VILLAGE BUFFER AND MITIGATION AREAS ON ALL PLAN SHEETS. USACOE APPROVAL/ACKNOWLEDGMENT.
FLOODPLAIN LIMITS ON ALL SHEETS (SCALED ZONE A, AE, FLOODWAY, EXISTING AND PROPOSED 10- AND 100-YEAR).
FLOODPLAIN CROSS SECTIONS, 10 AND 100-YEAR ELEVATIONS, CUT AND FILL AREAS.
EXISTING AND PROPOSED WATER MAIN, VALVES, HYDRANTS, SANITARY SEWER, STORM SEWER, DIAMETERS, SLOPES, ELEVATIONS, SERVICES, SUMP PUMP AND DOWN SPOUT CONNECTIONS.
UTILITY CROSSING ELEVATIONS AND LOCATIONS REQUIRING ALTERNATE MATERIALS.
ROADWAY PROFILES SHOWING CENTERLINE SLOPES, CURVE CALCULATIONS, WATER MAIN, SANITARY SEWER AND STORM SEWER.
OFFSITE ROADWAY PLANS (WIDENING, TURN LANES, STREET LIGHTING, ETC.) WHERE REQUIRED BY THE VILLAGE.
STREET LIGHT LOCATIONS.
SIDEWALK AND BIKE PATHS WHERE REQUIRED, WITH SPOT ELEVATIONS TO CONFIRM ADA SLOPE REQUIREMENTS.
DAM SAFETY DETERMINATION FOR PROPOSED POND(S).
RESTRICTOR SIZING ANALYSIS, INCLUDING AN EXHIBIT (INDICATING AREAS THAT ARE UNDETAINED OR BYPASSED), DESCRIPTION OR SUMMARY TABLE AND CRITICAL DURATION MODELS (WITH SUPPORTING DOCUMENTATION FOR TC, PERCENT IMPERVIOUS, RCN, STAGE—AREA—STORAGE—DISCHARGE CALCULATIONS, SOIL DATA, ETC.). RESTRICTOR DETAIL AND ACCESS ROUTE INCLUDED ON THE PLANS. DRAWDOWN CALCULATIONS FOR 2—, 5—, 10— AND 100—YEAR STORM BASED ON FINAL RESTRICTOR SIZES.
FINAL GRADING PLAN INCLUDING PROPOSED TOP OF FOUNDATION, WALKOUT AND LOOKOUT ELEVATIONS, DRIVEWAY AND PARKING LOT SLOPES, TOP AND BOTTOM OF RETAINING WALL ELEVATIONS (WHERE APPLICABLE) AND MATCHING GRADES AT PROPERTY LINES (OR IDENTIFICATION OF OFFSITE GRADING WORK).
STORM SEWER CALCULATIONS (SEWER CAPACITY AND RUNOFF UTILIZING COEFFICIENTS REQUIRED BY DESIGN STANDARDS).
STORM SEWER EXHIBIT (ONSITE AND OFFSITE AREAS TRIBUTARY TO EACH STRUCTURE AND DRAINAGE DIVIDES TO POND(S) BASED ON FINAL GRADING).
MAJOR DRAINAGE SYSTEM CALCULATIONS (USING HYDRAULIC GRADELINE, 100—YEAR RUNOFF, AND 10—YEAR TAILWATER IN LOCATIONS WHERE THE 100—YEAR STORM IS NOT CONVEYED OVERLAND TO THE APPROPRIATE POND).
MAJOR DRAINAGE SYSTEM EXHIBIT (ONSITE AND OFFSITE AREAS TRIBUTARY TO EACH STRUCTURE AND DRAINAGE DIVIDES TO POND(S) BASED ON FINAL GRADING, 100-YEAR PONDING LOCATIONS AND DEPTHS (CALCULATED FOR 100-YEAR CONVEYANCE), POTENTIAL PONDING LOCATIONS AND DEPTHS (OCCURRING BY ELEVATION) AND DIRECTION OF OVERFLOW).
EMERGENCY OVERLAND FLOW ROUTE CALCULATIONS (SWALE AND/OR WEIR CONVEYING 100—YEAR FLOW OVERLAND FROM MULTIPLE LOTS OR PROPERTY OWNERS). CROSS SECTION LOCATIONS AND GEOMETRY PROVIDED ON PLANS.
EMERGENCY OVERLAND FLOW ROUTE EXHIBIT (BUILDING ELEVATIONS (TF, FF, FGF, WO, LO, ETC.), ONSITE AND OFFSITE AREAS TRIBUTARY TO EACH STRUCTURE AND DRAINAGE DIVIDES TO POND(S) BASED ON FINAL GRADING, POTENTIAL PONDING LOCATIONS (OCCURRING BY ELEVATION), DIRECTION OF OVERFLOW, CALCULATED DEPTH OF FLOW AND LABELED OVERFLOW CROSS SECTION).
LOCATION AND EVALUATION OF AGRICULTURAL DRAINAGE SYSTEMS (FIELD TILES).
STORM WATER POLLUTION PREVENTION PLAN (EROSION CONTROL PLAN).
FINIAL CURNITTAL DECLUDENTALITO

FINAL SUBMITTAL REQUIREMENTS



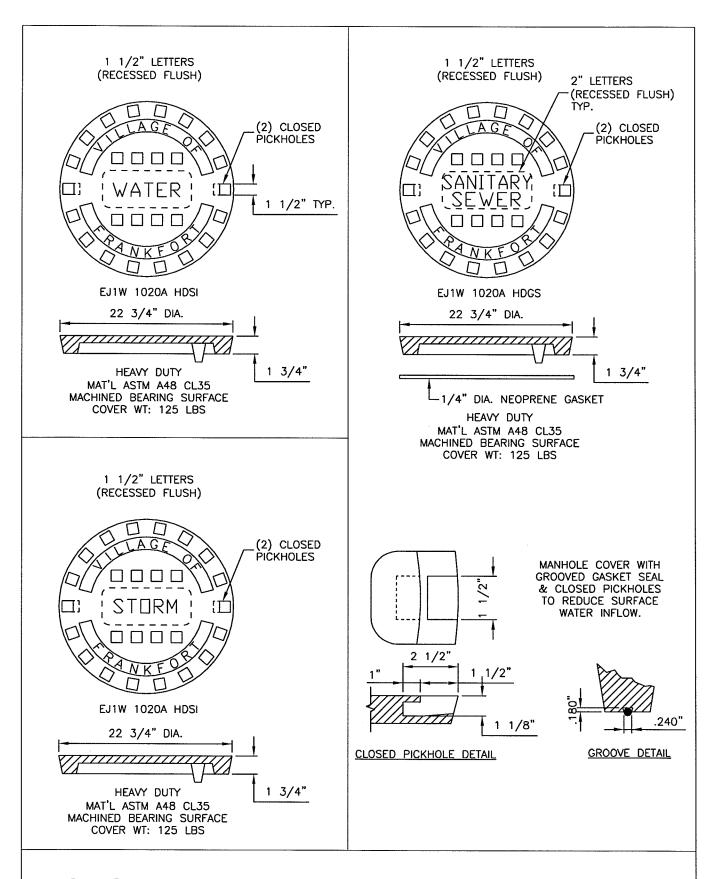
BEDDING SHALL BE REQUIRED TO BE A MINIMUM THICKNESS EQUAL TO 1/4 OF THE OUTSIDE DIAMETER OF THE PIPE BUT SHALL NOT BE LESS THAN 4". AS A MINIMUM, BEDDING AND HAUNCHING MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF THE "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION." THE GRADATIONS SHALL CONFORM TO CA-7 OR CA-11.

FOR NONRIGID (PVC) PIPE THE BEDDING MATERIAL SHALL BE PLACED A MINIMUM 12" OVER THE TOP OF THE PIPE AND SHALL BE GRADE EITHER CA 11 OR CA 13 AND SHALL BE CAREFULLY PLACED SO AS TO FILL THE SPACE UNDER AND AROUND THE PIPE.

NOMINAL PIPE SIZES (INCHES)	TRENCH WIDTHS* (INCHES)
12 OR SMALLER	30
14-18	36
20-24	48
27-30	55
33 OR LARGER	1 1/3 TIMES PIPE O.D.

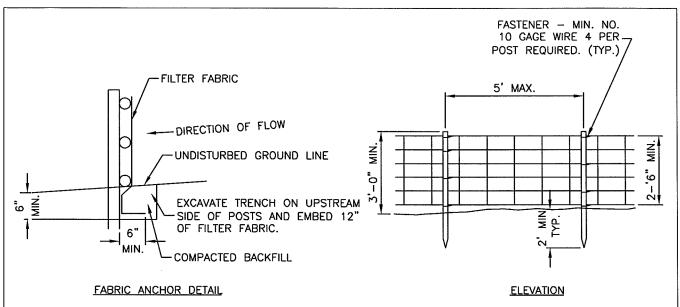
^{*}TO COMPLY WITH OSHA REQUIREMENTS.

TRENCH BACKFILL DETAIL



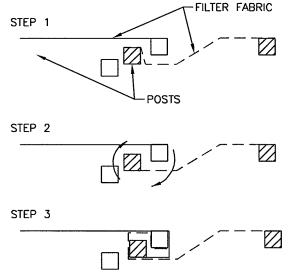
SPECIAL LETTERED MANHOLE COVER

EXHIBIT 2B JUNE 2007



NOTES:

- 1. TEMPORARY SEDIMENT FENCE SHALL BE INSTALLED PRIOR TO ANY GRADING WORK IN THE AREA TO BE PROTECTED. THEY SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD AND REMOVED IN
- CONJUNCTION WITH THE FINAL GRADING <u>AND SITE STABILIZATION.</u>
 2. FILTER FABRIC SHALL MEET THE REQUIREMENTS OF IDOT GEOTEXTILE MATERIAL SPECIFICATIONS WITH EQUIVALENT OPENING SIZE OF AT LEAST 30 FOR NONWOVEN AND 50 FOR WOVEN.
- 3. FENCE POST SHALL BE EITHER STANDARD STEEL OR WOOD POST WITH A MINIMUM SECTIONAL AREA 3.0
- 4. INSTALL ON UPHILL SIDE OF TREE PROTECTION FENCE. SILT FENCE, TYPE A, SHALL BE CONSTRUCTED ALONG THE CREEK SIDE EASEMENT BOUNDARY FOR THE ENTIRE LENGTH OF PROJECT.



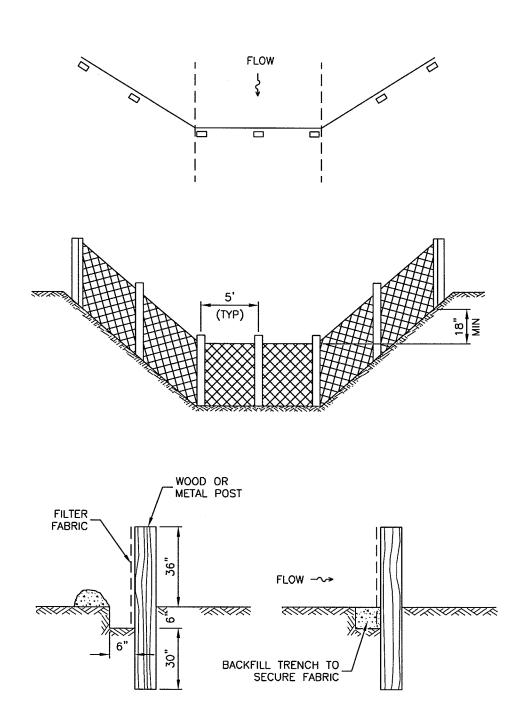
ATTACHING TWO SILT FENCES:

- 1. PLACE THE END POST OF THE SECOND FENCE INSIDE
- THE END POST OF THE FIRST FENCE.

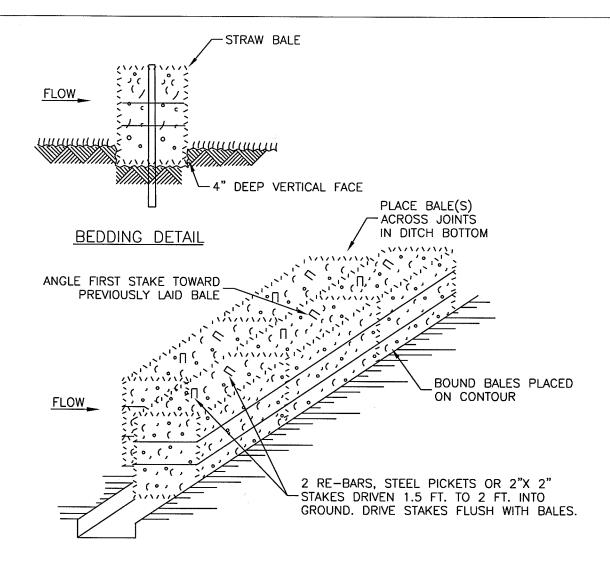
 2. ROTATE BOTH POSTS AT LEAST 180 DEGREES IN A CLOCKWISE DIRECTION TO CREATE A TIGHT SEAL WITH
- THE FABRIC MATERIAL.

 3. DRIVE BOTH POSTS A MINIMUM OF 2 FEET INTO THE GROUND AND BURY THE FLAP.

SILT FENCE



SILT FILTER FENCE DITCH CHECK

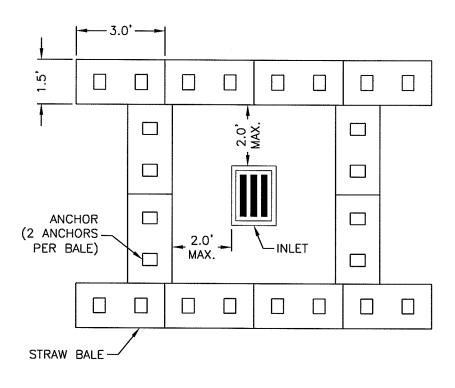


ANCHORING DETAIL

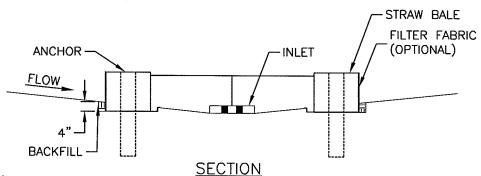
NOTES:

- 1. BALES SHALL BE PLACED AT THE TOP OF SLOPE OR ON THE CONTOUR AND IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
- 2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF 4", AND PLACED SO THAT BINDINGS ARE HORIZONTAL.
- 3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY EITHER TWO STAKES OR RE-BARS DRIVEN THROUGH THE BALE. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE AT AN ANGLE TO FORCE THE BALES TOGETHER. STAKES SHALL BE DRIVEN FLUSH WITH THE BALE.
- 4. INSPECTION SHALL BE FREQUENT AND REPAIR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
- 5. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

STRAW BALE BARRIER



PLAN

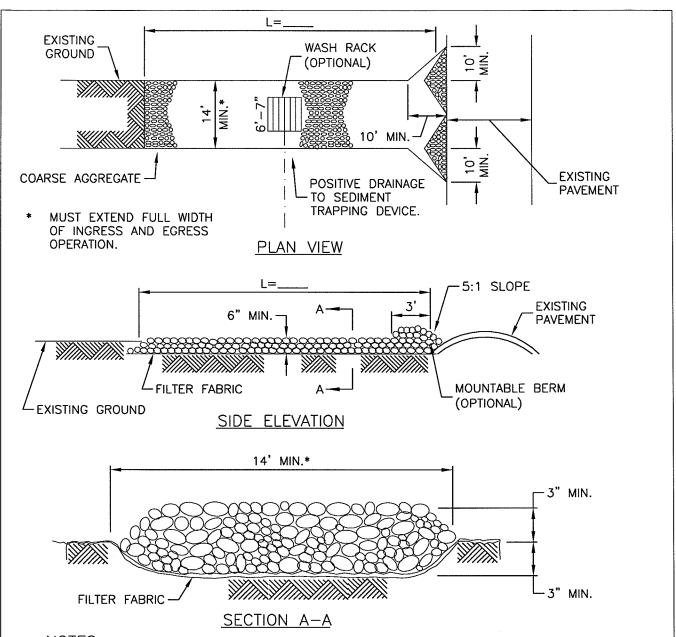


NOTES:

- 1. THE IMMEDIATE LAND AREA AROUND THE INLET SHOULD BE RELATIVELY FLAT (LESS THAN 1% SLOPE) AND LOCATED SO THAT THE ACCUMULATED SEDIMENT CAN BE EASILY REMOVED.
- 2. THE INSIDE EDGE OF THE BALES SHALL BE A MAXIMUM OF 2 FEET FROM THE EDGE OF THE INLET.
- FILTER FABRIC SHALL MEET THE REQUIREMENTS OF IDOT GEOTEXTILE MATERIAL SPECIFICATIONS WITH AOS OF AT LEAST 30 FOR NONWOVEN AND 50 FOR WOVEN.
- 4. ANCHORS SHALL BE REBAR, STEEL PICKETS OR 2" X 2" STAKES, AND SHALL BE LONG ENOUGH TO EXTEND AT LEAST 1.5 TO 2.0 FEET INTO THE GROUND WHEN THE TOP IS FLUSH WITH THE BALE.

STRAW BALE BARRIER

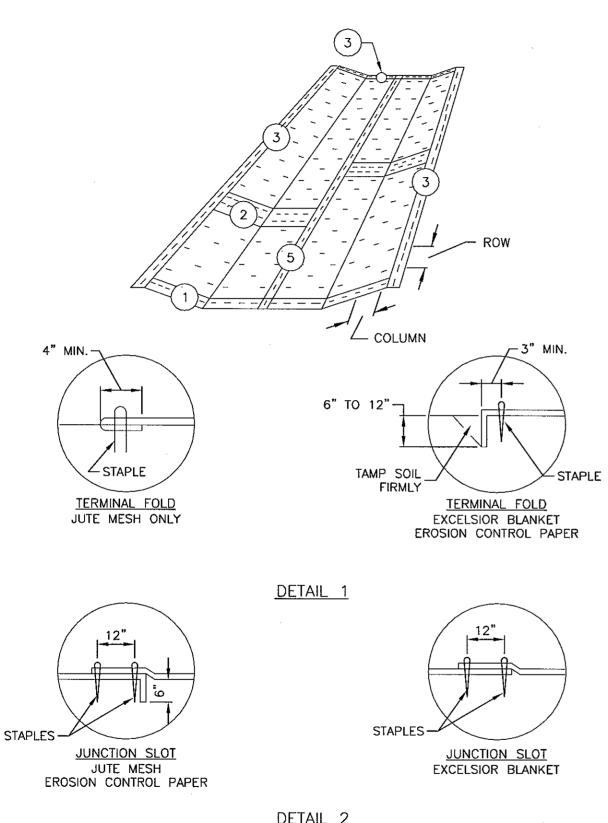
INLET PROTECTION



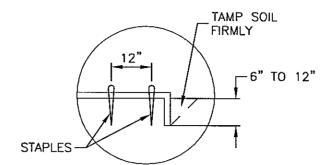
NOTES:

- 1. NO VEHICLES SHALL BE DRIVEN OR MOVED ON ANY STREET UNLESS SUCH VEHICLE IS FREE FROM MUD OR OTHER FOREIGN SUBSTANCE.
- 2. FILTER FABRIC SHALL MEET THE REQUIREMENTS OF IDOT GEOTEXTILE MATERIAL SPECIFICATIONS AND SHALL BE PLACED OVER THE CLEARED AREA PRIOR TO THE PLACING OF ROCK.
- 3. ROCK OR RECLAIMED CONCRETE SHALL MEET ONE OF THE FOLLOWING IDOT COARSE AGGREGATE GRADATION, CA-1, CA-2, CA-3 OR CA-4 AND BE PLACED ACCORDING TO CONSTRUCTION SPECIFICATION 25 ROCKFILL USING PLACEMENT METHOD 1 AND CLASS III COMPACTION.
- 4. ANY WASH RACKS OR DRAINAGE FACILITIES REQUIRED BECAUSE OF WASHING SHALL BE CONSTRUCTED ACCORDING TO MANUFACTURERS SPECIFICATIONS.

STABILIZED CONSTRUCTION ENTRANCE

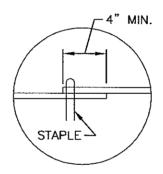


DETAIL 2



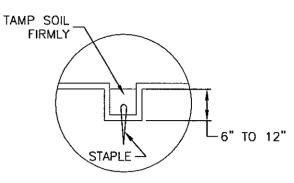
ANCHOR SLOT JUTE MESH EXCELSIOR BLANKET EROSION CONTROL PAPER

DETAIL 3



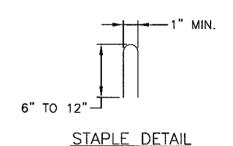
LAP JOINT JUTE MESH EROSION CONTROL PAPER EXCELSIOR BLANKET SHAL BE BUTTED TOGETHER.

DETAIL 5



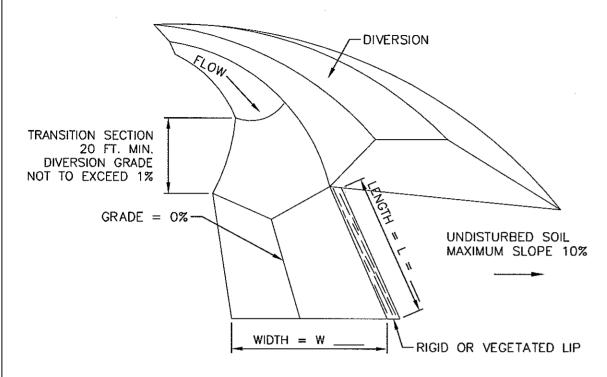
CHECK SLOT EROSION CONTROL PAPER

DETAIL 4



NOTES:

- 1. ON EROSION CONTROL PAPER, CHECK SLOTS, IN DITCH CHANNEL SHALL BE SPACED SO THAT ONE OCCURS WITHIN EACH 50' ON SLOPES OF MORE THAN 4% AND LESS THAN 6%. ON SLOPES OF 6% OR MORE, THEY SHALL BE SPACED SO THAT ONE OCCURS WITHIN EACH 25',
- 2. STAPLES ARE TO BE PLACED ALTERNATELY, IN COLUMNS APPROXIMATELY 2' APART AND IN ROWS APPROXIMATELY 3' APART. APPROXIMATELY 175 STAPLES ARE REQUIRED PER 4'X 225' ROLL OF MATERIAL AND 125 STAPLES ARE REQUIRED PER 4'X 150' ROLL OF MATERIAL.
- 3. EROSION CONTROL MATERIAL SHALL BE PLACED LOOSELY OVER GROUND SURFACE.
- 4. DO NOT STRETCH. ALL TERMINAL ENDS AND TRANSVERSE LAPS SHALL BE STAPLED AT APPROXIMATELY 12" INTERVALS.

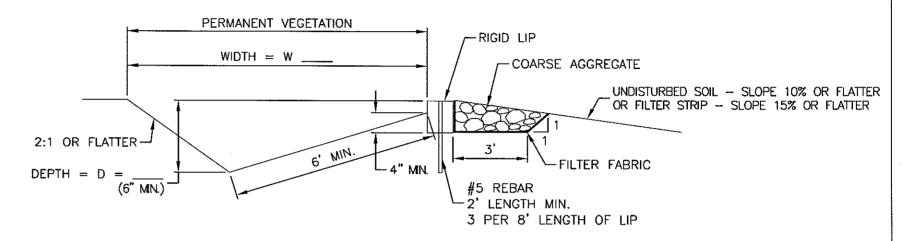


LEVEL SPREADER FOR DIVERSION OUTLET

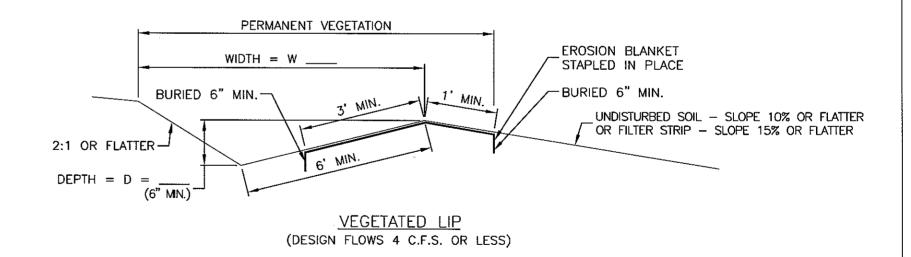
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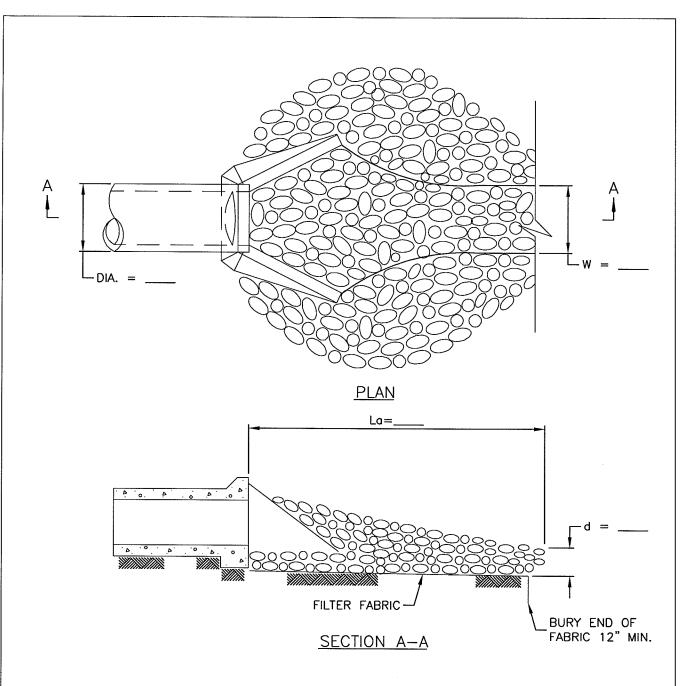
- 1. ENDS OF SPREADER SHALL BE TIED INTO HIGHER GROUND TO PREVENT FLOW AROUND THE LEVEL SPREADER.
- 2. COARSE AGGREGATE SHALL MEET ONE OF THE FOLLOWING IDOT GRADATIONS: CA-1, OR CA-3.
- 3. FILTER FABRIC SHALL MEET THE REQUIREMENTS OF IDOT GEOTEXTILE MATERIAL SPECIFICATIONS.
- 4. SEE SHEET FILTER STRIP-GRASSED IL-535 FOR FILTER STRIP REQUIREMENTS.
- 5. SEE SHEET EROSION BLANKET IL-530 FOR BLANKET MATERIAL AND INSTALLATION REQUIREMENTS.
- 6. SEE PLANS FOR PERMANENT SEEDING REQUIREMENTS.
- 7. SEE PLANS FOR L, D, AND W DIMENSIONS.

LEVEL SPREADER



RIGID LIP WITH TIMBER (DESIGN FLOWS 4 C.F.S. TO 30 C.F.S.)

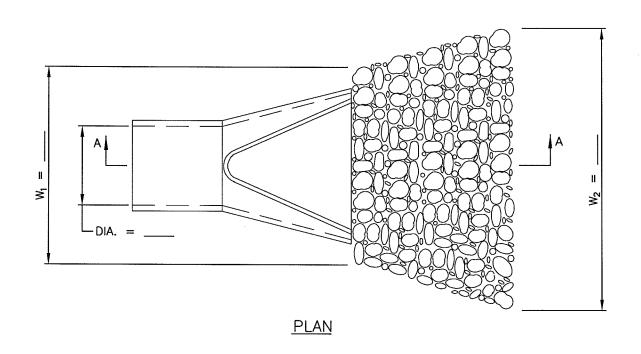


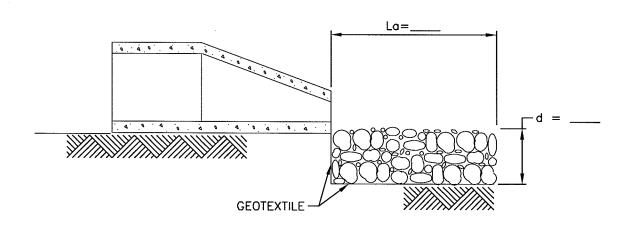


NOTES:

- 1. THE FILTER FABRIC SHALL MEET THE REQUIREMENTS IN IDOT GEOTEXTILE MATERIAL SPECIFICATIONS.
- 2. THE ROCK RIPRAP SHALL MEET THE IDOT REQUIREMENTS FOR THE FOLLOWING GRADATION ______.
- 3. THE RIPRAP SHALL BE PLACED ACCORDING TO IDOT LOOSE ROCK RIPRAP CONSTRUCTION SPECIFICATIONS. THE ROCK MAY BE EQUIPMENT PLACED.

PIPE OUTLET TO CHANNEL





SECTION A-A

NOTES:

- 1. THE FILTER FABRIC SHALL MEET THE REQUIREMENTS IN IDOT GEOTEXTILE MATERIAL SPECIFICATIONS.
- 2. THE ROCK RIPRAP SHALL MEET THE IDOT REQUIREMENTS FOR THE FOLLOWING GRADATION ________.
- 3. THE RIPRAP SHALL BE PLACED ACCORDING TO IDOT LOOSE ROCK RIPRAP CONSTRUCTION SPECIFICATIONS. THE ROCK MAY BE EQUIPMENT PLACED.

PIPE OUTLET TO FLAT AREA

PERSON(S) RESPONSIBLE FOR EROSION & SEDIMENT CONTROL COMPANY NAME & ADDRESS CONSTRUCTION (INSTALLATION & REPAIR) CONSTRUCTION (SWPPP UPDATES)

CONTRACTOR CERTIFICATION STATEMENT:

POST-CONSTRUCTION (INSTALLATION & REPAIR)

POST-CONSTRUCTION (SWPPP UPDATES)

"I CERTIFY UNDER PENALTY OF LAW THAT I UNDERSTAND THE TERMS AND CONDITIONS OF THE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT (ILR-10) THAT AUTHORIZES THE STORM WATER DISCHARGES ASSOCIATED WITH ACTIVITY FROM THE CONSTRUCTION SITE IDENTIFIED AS PART OF THIS CERTIFICATION."

V			
Λ			

OWNER CERTIFICATION STATEMENT:

"I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERTY GATHERED AND EVALUATED THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM, OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS."

V			
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SWPPP CERTIFICATIONS

NPDES II NOTES:

- 1. THE OWNER IS RESPONSIBLE FOR SUBMITTING THE NOTICE OF INTENT (NOI) TO THE IEPA AFTER THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) IS COMPLETE.
- 2. THE CONTRACTOR IS RESPONSIBLE FOR INSURING THAT PERMIT IS OBTAINED BEFORE COMMENCEMENT OF ANY WORK ON SITE. SAID PERMIT SHALL BE POSTED ON SITE IN A PROMINENT LOCATION.
- 3. PRIOR TO COMMENCEMENT OF CONSTRUCTION, THE OWNER SHALL PROVIDE A COPY OF THE IEPA LETTER OF NOTIFICATION OF COVERAGE TO THE VILLAGE OF FRANKFORT.
- 4. THE CONTRACTOR IS RESPONSIBLE FOR HAVING THE SWPPP ON SITE AT ALL TIMES.
- 5. INSPECTION OF CONTROLS WILL BE COMPLETED BY THE OWNER AT LEAST ONCE EVERY 7 DAYS AND WITHIN 24 HOURS OF A STORM 0.5" OR GREATER.
- 6. AN INCIDENT OF NON-COMPLIANCE (ION) MUST BE COMPLETED AND SUBMITTED BY THE OWNER TO THE IEPA AND COPIED TO THE VILLAGE IF, AT ANY TIME, AN EROSION OR SEDIMENT CONTROL DEVICE FAILS.
- 7. A NOTICE OF TERMINATION (NOT) SHALL BE COMPLETED BY THE OWNER IN COMPLIANCE WITH NPDES PHASE II REQUIREMENTS WHEN ALL PERMANENT EROSION CONTROL MEASURES ARE IN PLACE WITH A 70% ESTABLISHMENT RATE OF VEGETATION. THE NOT SHALL BE SENT TO THE IEPA AND THE VILLAGE.
- 8. THE CONTRACTOR SHALL TAKE THE NECESSARY STEPS TO CONTROL WASTE SUCH AS DISCARDED BUILDING MATERIALS, CONCRETE TRUCK WASHOUT, CHEMICALS, LITTER AND SANITARY WASTE AT THE CONSTRUCTION SITE THAT MAY CAUSE ADVERSE IMPACTS TO WATER QUALITY.

CONTROL MEASURES NOTES:

- 1. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE ILLINOIS URBAN MANUAL AND THE VILLAGE OF FRANKFORT DESIGN STANDARDS.
- 2. IN ADDITION TO SILT FENCE SHOWN ON THE SWPPP, SILT FENCE SHALL BE PROVIDED FOR AREAS DRAINING 200' AND GREATER IN ACCORDANCE WITH NRCS CODE 920.
- 3. SOIL STOCKPILES MUST BE STABILIZED OR COVERED AT THE END OF EACH WORKDAY.
- 4. THE ENTIRE SITE MUST BE STABILIZED, USING A HEAVY MULCH LAYER OR ANOTHER METHOD AT THE CLOSE OF THE CONSTRUCTION SEASON.
- 5. TECHNIQUES SHALL BE EMPLOYED TO PREVENT THE BLOWING OF DUST OR SEDIMENT FROM THE SITE.
- 6. TECHNIQUES THAT DIVERT UPLAND RUNOFF PAST DISTURBED SLOPES SHALL BE EMPLOYED.
- 7. THE APPLICANT AND/OR CONTRACTOR SHALL CONTACT THE VILLAGE AT LEAST 2 WORKING DAYS BEFORE THE START OF CONSTRUCTION, INSTALLATION OF SEDIMENT AND EROSION MEASURES AND COMPLETION OF FINAL LANDSCAPING.

SWPPP NOTES

PRIOR TO PIPE LAYING AND JOINTING, THE TRENCH SHALL BE SUFFICIENTLY DEWATERRED TO MAINTAIN THE WATER LEVEL IN THE TRENCH AT OR BELOW THE BASE OF THE BEDDING. STATE/FEDERAL PERMITS, LICENSE AGREEMENTS, OR OTHER REQUIRED APPROVALS SHALL BE OBTAINED PRIOR TO DEWATERING.

SANITARY SEWER PIPE, SERVICE LINES AND THE JOINT SPECIFICATION SHALL BE AS FOLLOWS:

<u>PIPE</u>	<u>PIPE MATERIAL</u>	JOINT MATERIAL
DUCTILE IRON PIPE	ANSI A-21.51 CL50	ASA A-21.11
PVC SDR 26 (24" DIA. OR LESS)	ASTM D-3034	ASTM D-3212
PVC PROFILE PIPE (OVER 24" DIAMETER)	ASTM F-1803	ASTM D-3212
VYLON	ASTM D-1784	ASTM D-3212

WHERE SEPARATION FROM WATER MAIN CANNOT BE MAINTAINED AS REQUIRED BY IL RS, SANITARY SEWER SHALL BE MECHANICAL JOINT PVC PRESSURE PIPE MEETING C-900 OR C-905.

SEWERS SHALL BE LAID STRAIGHT IN BOTH HORIZONTAL AND VERTICAL PLANES BETWEEN MANHOLES WITH A MINIMUM COVER OF 4'.

SANITARY SEWERS SHALL BE LOCATED A MINIMUM OF 10' FROM ANY BUILDING AND MEETING SEPARATION REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR WATER & SEWER MAIN CONSTRUCTION IN ILLINOIS.

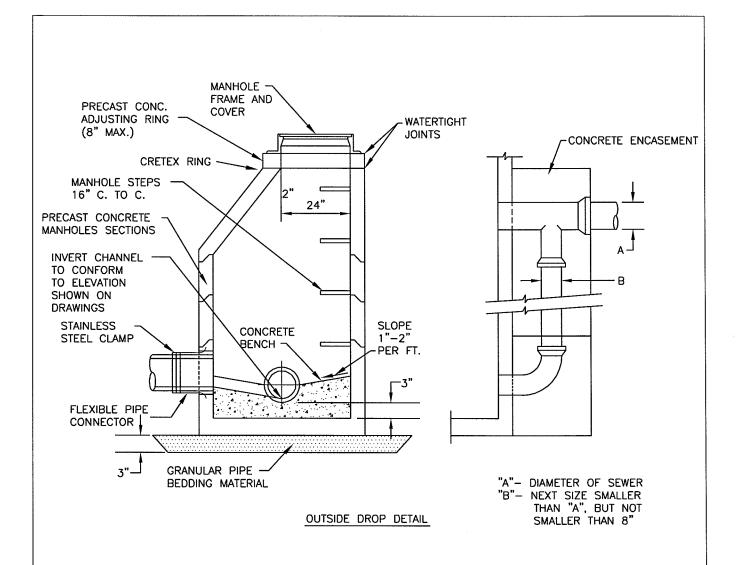
SERVICE LINES SHALL BE CONNECTED TO THE SEWER USING A WYE AT THE 10:00 AND 2:00 POSITIONS. SERVICE LINES NOT IMMEDIATELY CONNECTED TO THE BUILDING TO BE SERVED SHALL BE TIGHTLY PLUGGED, USING A PLUG PROVIDED BY THE PIPE MANUFACTURER FOR SUCH USE.

ALL SEWERS SHALL BE PRESSURE AND DEFLECTION TESTED IN ACCORDANCE WITH THE LATEST EDITION OF STANDARD SPECIFICATIONS FOR WATER & SEWER MAIN CONSTRUCTION IN ILLINOIS.

VACUUM TESTING OF EACH MANHOLE SHALL BE CARRIED OUT IMMEDIATELY AFTER ASSEMBLY, AFTER ALL CONNECTIONS ARE MADE, AND PRIOR TO BACKFILLING. ALL LIFT HOLES SHALL BE PLUGGED WITH AN APPROVED NON—SHRINK GROUT. 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. THE TEST HEAD SHALL BE PLACED AT THE INSIDE OF THE TOP OF THE FRAME AND THE SEAL INFLATED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATION. IF USING A "PLATE" STYLE MANHOLE TESTER, POSITION THE PLATE ON THE FRAME. A VACUUM OF 10 INCHES OF MERCURY SHALL BE DRAWN AND THE VACUUM PUMP SHUT OFF. WITH THE VALVES CLOSED, THE TIME SHALL BE MEASURED FOR THE VACUUM TO DROP TO 9 INCHES. THE MANHOLE SHALL PASS IF THE TIME IS GREATER THAN 60 SECONDS FOR A 48" DIAMETER MANHOLE, 75 SECONDS FOR A 60" MANHOLE AND 90 SECONDS FOR A 72" MANHOLE. IF THE MANHOLE FAILS THE TEST, MAKE NECESSARY REPAIRS AND REPEAT TEST PROCEDURES UNTIL A SATISFACTORY TEST IS OBTAINED.

ALL PUBLIC SANITARY SEWER EXTENSIONS SHALL BE INTERNALLY VIDEO TAPED BY REMOTE CAMERA. TAPES SHALL BE IN COLOR USING VHS OR CD-ROM FORMAT AND SUBMITTED WITH WRITTEN REPORTS TO THE VILLAGE ENGINEER FOR HIS REVIEW AND APPROVAL PRIOR TO ACCEPTANCE OF THE SEWER IMPROVEMENTS BY THE VILLAGE.

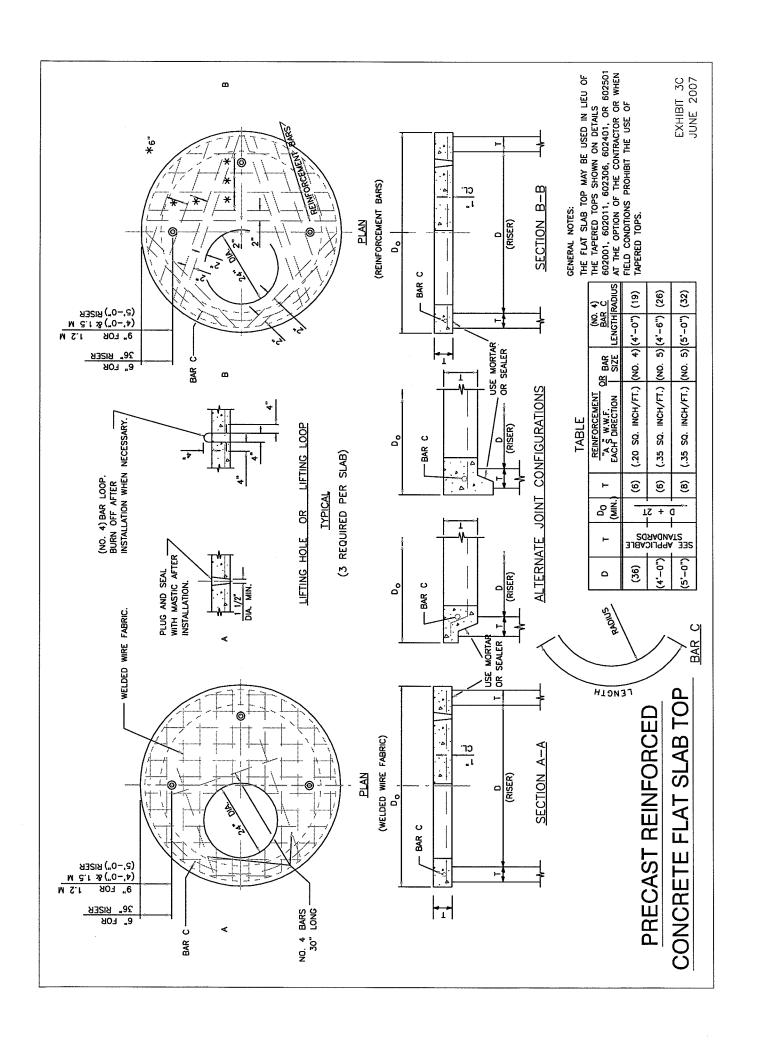
SANITARY SEWER SPECIFICATIONS



NOTES:

- 1. ALL MANHOLES SHALL BE PRECAST, REINFORCED CONCRETE SECTIONS PER ASTM C-478.
- 2. USE 4'-0" INTERNAL DIAMETER FOR SEWER SIZES 8" THRU 21", 5'-0" DIAMETER FOR SEWER SIZES 24" THRU 33" UNLESS OTHERWISE NOTED.
- 3. ECCENTRIC CONES REQUIRED, FLAT SLAB TOPS PERMITTED ONLY FOR MANHOLES TOO SHALLOW FOR CONES.
- 4. ALL MANHOLES SHALL CONTAIN EPOXY COATED CAST IRON STEPS.
 5. ALL JOINTS BETWEEN MANHOLE SECTIONS SHALL BE SEALED WITH MASTIC JOINT MATERIAL, ALL SANITARY MANHOLES SHALL BE PROVIDED WITH AN EXTERNAL ADAPTOR SEAL OR EQUAL, WITH A RUBBER SLEEVE TO SEAL THE OUTSIDE OF THE CHIMNEY FROM THE MANHOLE FRAME DOWN TO THE CORBEL, INSTALLED PER MANUFACTURERS INSTRUCTIONS.
- 6. USE OUTSIDE DROP WHEN ANY ENTERING SEWER INVERT DIFFERS BY 2'-0" OR MORE FROM INVERT OF MANHOLE.
- 7. MANHOLES SHALL BE VACCUUM TESTED.

SANITARY MANHOLE DETAIL



STORM SEWERS SHALL BE REINFORCED CONCRETE PIPE CONFORMING TO ASTM C76 MINIMUM CLASS III WITH O-RING JOINTS CONFORMING TO ASTM C443.

ALL STRUCTURE CONNECTIONS SHALL BE CONCRETE SEWER PIPE, ASTM C14 FOR EXTRA STRENGTH PIPE.

SUMP PUMP SERVICE CONNECTIONS SHALL BE 4" PVC SDR 26 UNLESS OTHERWISE NOTED.

CORRUGATED METAL PIPE SHALL BE HOT-DIPPED GALVANIZED STEEL OR ALUMINUM STEEL CONFORMING TO AASHTO M36.

- FOR 21" DIAMETER PIPE AND SMALLER, PROVIDE 16 GAUGE CMP.
 FOR 24" DIAMETER PIPE AND LARGER, PROVIDE 12 GAUGE CMP.

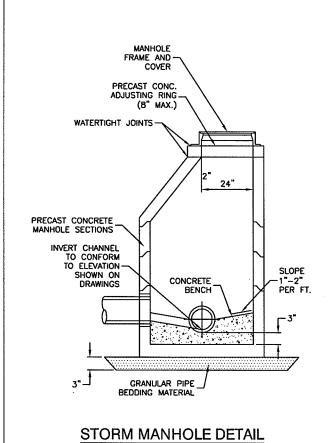
MINIMUM COVER SHALL BE 3' MINIMUM UNLESS SPECIAL PRECAUTIONS ARE SPECIFIED.

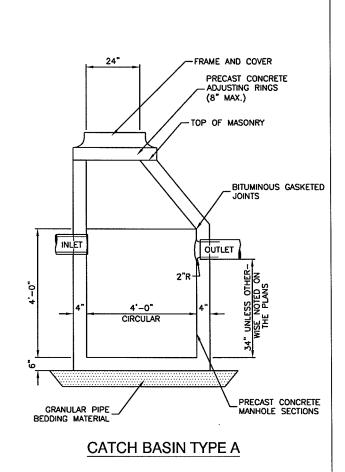
ALL FLARED END SECTIONS LESS THAN 48" (EFFECTIVE DIAMETER) REQUIRE GRATES IN ACCORDANCE WITH IDOT SPECIFICATIONS.

ALL CASTINGS SHALL BE MADE IN THE U.S.A. WITH U.S.A. MATERIALS. CLOSED COVERS SHALL BE STAMPED PER EXHIBIT 2B. OPEN COVERS SHALL HAVE THE GRATES AS SPECIFIED:

STRUCTURE LOCATION	STRUCTURE LABEL	MANUFACTURER NUMBER	MINIMUM OPEN AREA
BARRIER CURB			
MOUNTABLE CURB			
PAVED AREAS			
GRASSED AREAS			

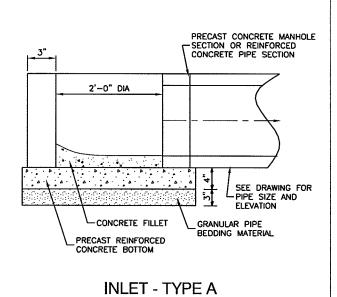
STORM SEWER SPECIFICATIONS

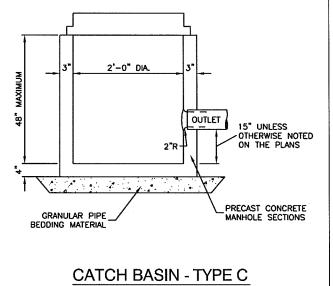




- ALL CATCH BASINS SHALL BE 4'-0" DIAMETER UNLESS OTHERWISE NOTED ON THE PLANS.
- 2. USE ECCENTRIC CONES UNLESS OTHERWISE INDICATED ON THE DRAWINGS. FLAT SLAB TOPS PERMITTED ONLY FOR MANHOLES TO SHALLOW FOR CONES.
- 3. USE THE TYPE OF FRAME AND COVER INDICATED ON THE DRAWINGS AND/OR EXHIBIT 4A.
- 4. A 2" WIDE NON-HARDENING BUTYL RUBBER MASTIC OF 1/4" MINIMUM THICKNESS SHALL BE INSTALLED BETWEEN ALL MANHOLE SECTIONS AND ADJUSTING RINGS FOR ALL STRUCTURES LYING IN PAVEMENT.

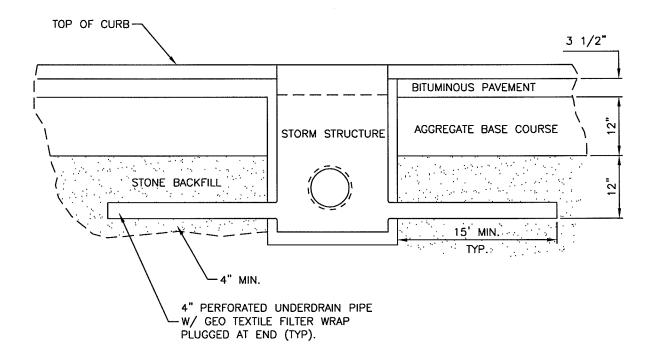
STORM MANHOLE & CATCH BASIN





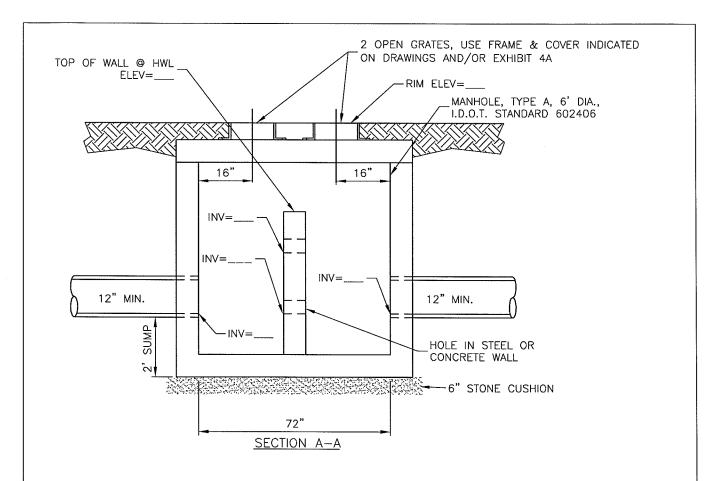
- USE THE FRAME & COVER INDICATED ON DRAWINGS AND/OR EXHIBIT 4A.
- 2. A 2" WIDE NON-HARDENING BUTYL RUBBER MASTIC OF 1/4" MINIMUM THICKNESS SHALL BE INSTALLED BETWEEN ALL MANHOLE SECTIONS AND ADJUSTING RINGS FOR ALL STRUCTURES LYING IN PAVEMENT.

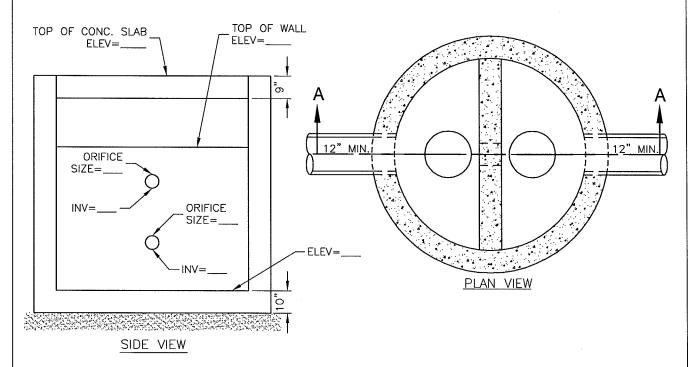
STORM INLETS



1. UNDERDRAINS SHALL BE INSTALLED AT ALL STREET SAG AND UNDERCUT LOCATIONS.

UNDERDRAIN DETAIL

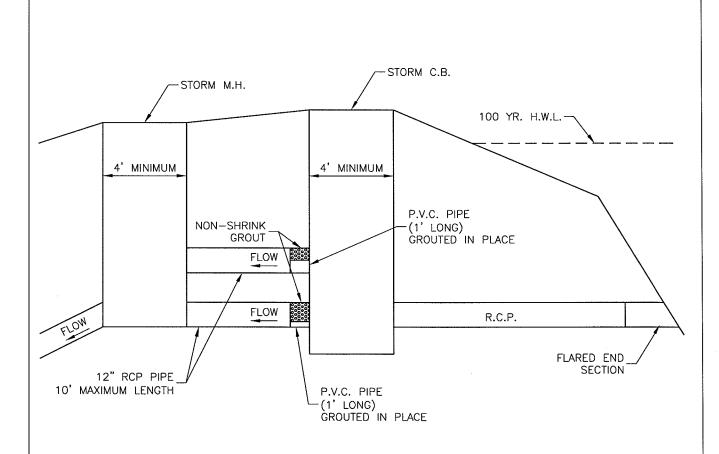




TYPICAL OUTLET CONTROL STRUCTURE

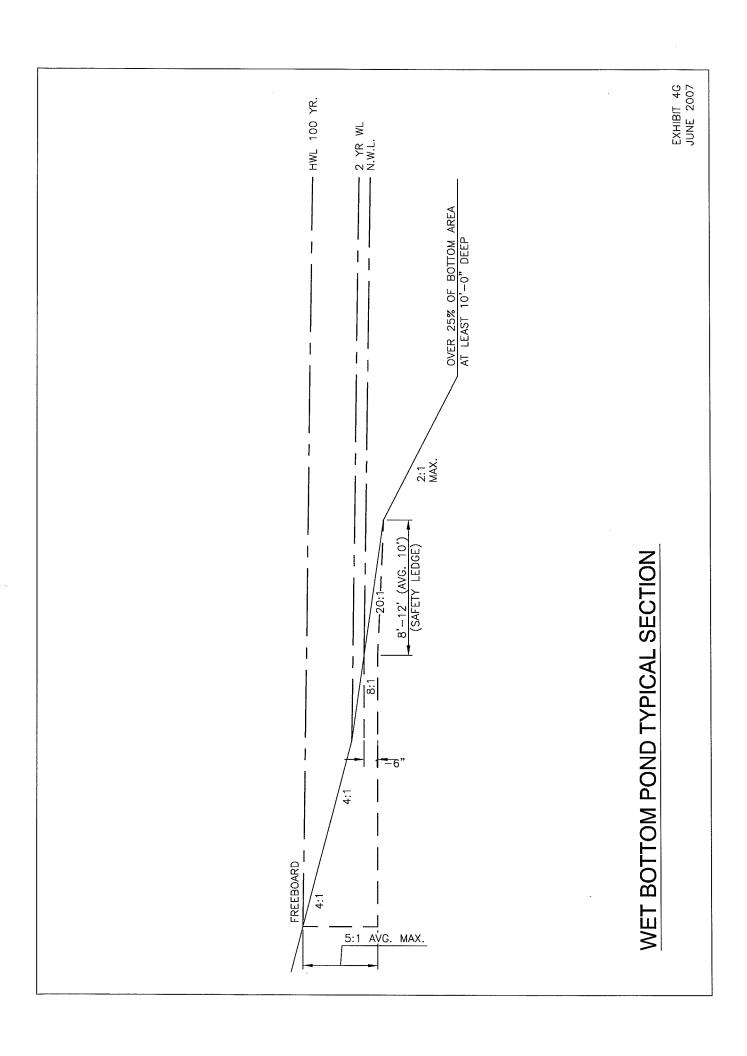
(RECOMMENDED)

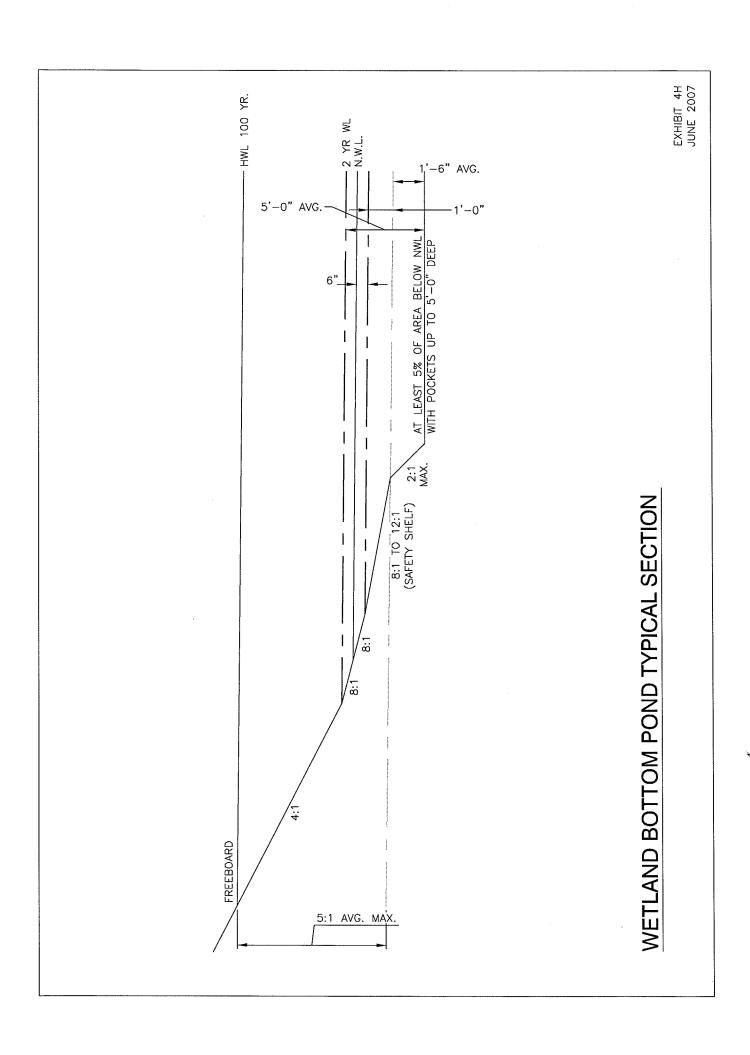
EXHIBIT 4E JUNE 2007

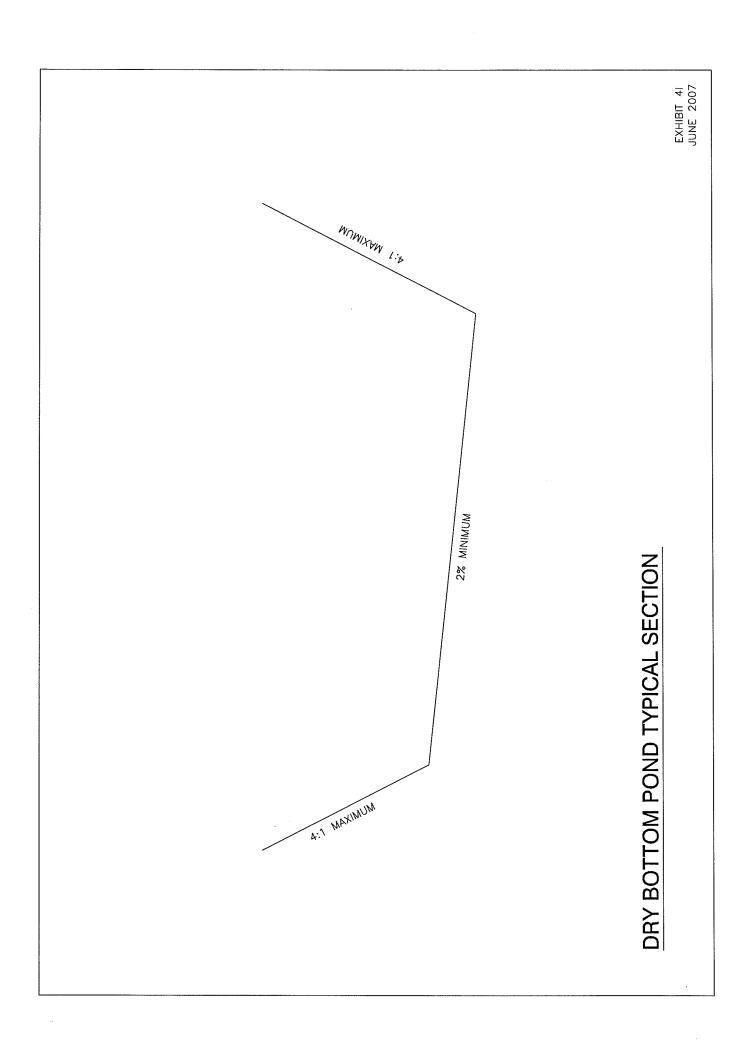


TYPICAL OUTLET CONTROL STRUCTURE

(ALTERNATE)







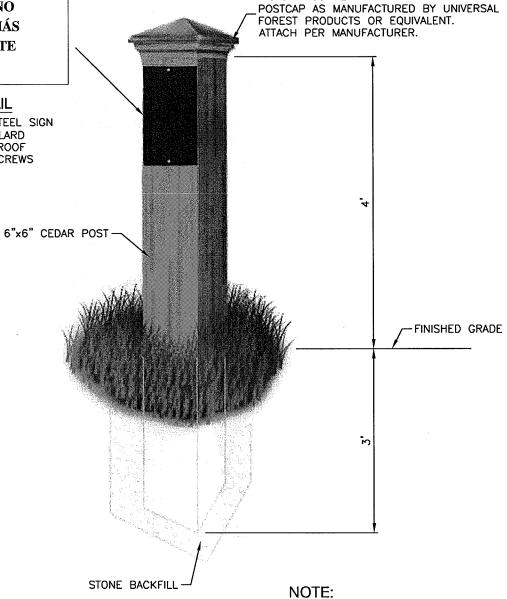


DO NOT MOW, SPRAY, OR DISTURB BEYOND THIS POINT

NO CORTAR, NO ROCIAR, Y NO DISTURBE MÁS ALLÁ DE ESTE PUNTO

SIGN DETAIL

4.5"x5.5" CUSTOM STEEL SIGN ATTACH TO BOLLARD WITH TAMPER PROOF NON-FERROUS SCREWS



VICTORIA COPPER HIGH POINT WRC 6"x6"

ENVIRONMENTALLY SENSITIVE AREA BOLLARD

EXHIBIT 4J JUNE 2007

ALL POSTS TO BE INSTALLED PLUMB.

VAULTS AND BOXES SHALL NOT BE ALLOWED UNDER STREETS, SIDEWALKS OR DRIVEWAYS.

ALL CASTINGS SHALL BE MADE IN THE U.S.A. WITH U.S.A. MATERIALS.

DUCTILE IRON PIPE SHALL COMPLY WITH ANSI A21.51, CLASS 52, WITH JOINTS COMPLYING WITH ANSI A21.11.

- DUCTILE IRON FITTINGS SHALL BE USED WITH MECHANICAL JOINT RETAINER GLANDS COMPLYING WITH ANSI A21.10 OR A21.53.
- EXTERNAL COATING SHALL BE STANDARD, AS SPECIFIED FOR GENERAL USE IN ANSI A21.51 OR ASPHALITIC COATING PER AWWA C-151.
- INTERNAL CEMENT LINING SHALL COMPLY WITH ANSI A21.4 OR AWWA C205, STANDARD THICKNESS.
- WATER MAIN SHALL BE ENCASED IN 8-MILLIMETER POLYWRAP.

POLYVINYL CHLORIDE PIPE SHALL COMPLY WITH AWWA C-900 FOR CLASS 150 PRESSURE PIPE (SDR 18).

- PVC PIPES SHALL BE INSTALLED WITH MAGNETIC TRACER WIRE & WARNING TAPE 2' ABOVE PIPE.
- TRENCH BEDDING MATERIAL SHALL EXTEND 12" OVER THE TOP OF THE PIPE FOR ALL PVC PIPE.
- 14"-18" DIAMETER: USE 235 PSI PRESSURE RATED PIPE AND SDR 18.
- 20"-24" DIAMETER: USE 165 PSI PRESSURE RATED PIPE AND SDR 25.

THE DEPTH BETWEEN FINISHED GRADE AND TOP OF THE WATER MAIN BE BETWEEN 5' AND 7'.

ALL BENDS OF 22-1/2 DEGREES OR GREATER, AND ALL TEES AND PLUGS SHALL BE THRUST PROTECTED TO PREVENT MOVEMENT OF THE LINE UNDER PRESSURE. THRUST PROTECTION MAY ALSO BE ATTAINED BY THE USE OF A COMBINATION OR RETAINING GLANDS AND THREADED RODS.

CONNECTIONS TO VILLAGE WATER SYSTEM SHALL BE MADE UNDER FULL WATER SERVICE PRESSURE.

- TAPPING SLEEVES SHALL INCLUDE TWO-PIECE BOLTED SLEEVE TYPE WITH MECHANICAL JOINTS, MUELLER - H615, OR EQUAL, WITH JOINT ACCESSORIES.
- TAPPING VALVES SHALL INCLUDE FLLY PORTED GATE VALVES COMPLYING WITH AWWA C500 AND MECHANICAL JOINTS TYPE, MUELLER H667, OR EQUAL. TAPPING VALVES SHALL BE PLACED IN PRECAST CONCRETE VAULTS.

HORIZONTAL AND VERTICAL SEPARATION SHALL MEET REQUIREMENTS OF THE "STANDARD SPECIFICATIONS FOR WATER AND SEWER MAIN CONSTRUCTION IN ILLINOIS". LOCATIONS REQUIRING ALTERNATIVE MATERIALS ARE NOTED ON THE PLANS.

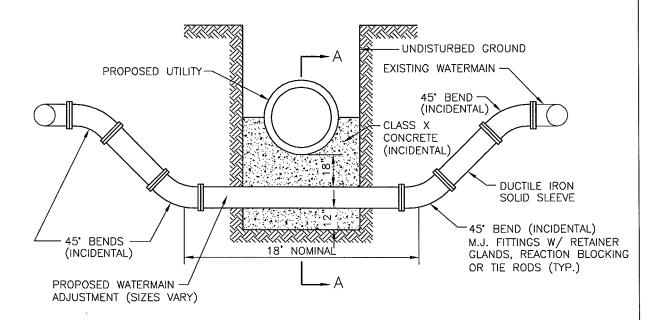
WATERMAIN SHALL BE PRESSURE TESTED AND DISINFECTED IN ACCORDANCE WITH REQUIREMENTS OF THE ILLINOIS ENVIRONMENTAL PROTECTION AGENCY AND THE "STANDARD SPECIFICATIONS FOR WATER AND SEWER MAIN CONSTRUCTION IN ILLINOIS".

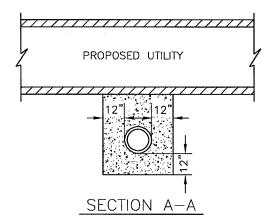
- THE CONTRACTOR SHALL PROVIDE 48 HOURS ADVANCED NOTICE TO THE VILLAGE UTILITY OR ENGINEERING DEPARTMENT FOR ALL TESTING.
- REQUESTS FOR VALVE OPERATIONS ARE TO BE MADE THROUGH THE UTILITY DEPARTMENT AT LEAST 24 HOURS PRIOR TO ANY SCHEDULED OPERATIONS OR TESTS.

THE CONTRACTOR SHALL PRESSURE TEST ALL NEW WATER MAIN BEFORE WATER SERVICES HAVE BEEN INSTALLED. THE CONTRACTOR SHALL PERFORM A PRELIMINARY TEST TO INSURE THAT ALL SEGMENTS OF THE SYSTEM MEET THE LEAKAGE RATES AS SET FORTH HEREIN.

AFTER ALL MAINS HAVE BEEN PRESSURE TESTED, THE CONTRACTOR SHALL DISINFECT THE MAINS IN ACCORDANCE WITH AWWA STANDARD C-651. THE CONTRACTOR WILL SAMPLE THE CHLORINATED DISINFECTING SOLUTION. AFTER FINAL FLUSHING, AND AS WITNESSED BY THE VILLAGE UTILITY DEPARTMENT, THE CONTRACTOR SHALL OBTAIN TWO SAMPLES OF WATER FROM THE MAIN FOR BACTERIOLOGICAL TESTING. A SECOND SERIES OF SAMPLES SHALL BE COLLECTED NO LESS THAN 24 HOURS AFTER THE FIRST SET OF SAMPLES HAS BEEN COLLECTED. THE CONTRACTOR AND THE VILLAGE WILL BE FURNISHED WITH COPIES OF THE BACTERIOLOGICAL REPORT FOR THEIR RECORDS.

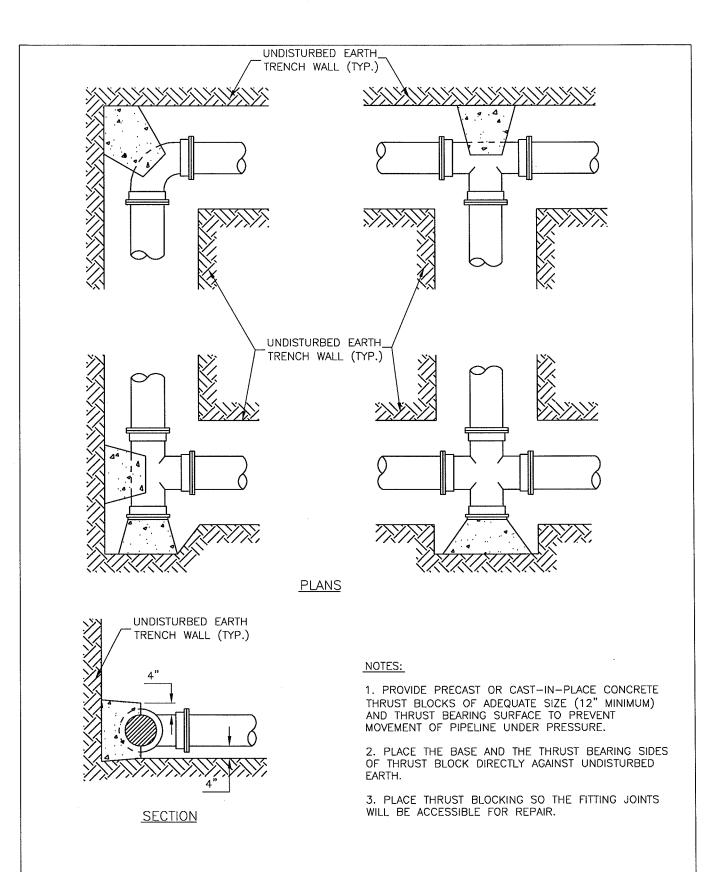
WATER MAIN SPECIFICATIONS



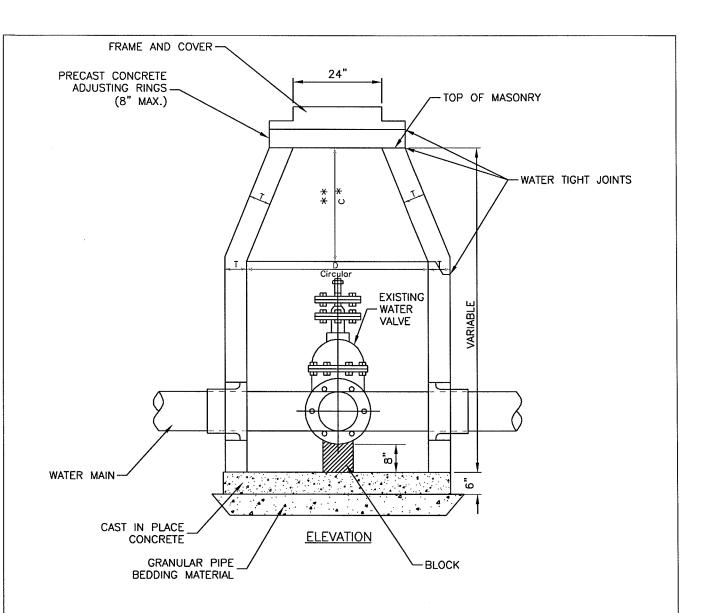


- 1. WATER MAIN RELOCATIONS ARE SUBJECT TO INSPECTION AT NORMAL SYSTEM PRESSURE BEFORE BURIAL.
- 2. USE ONLY 45 DEGREE BENDS UNLESS OTHERWISE PERMITTED BY THE VILLAGE ENGINEER.

WATERMAIN ADJUSTMENT



TYPICAL THRUST BLOCK INSTALLATIONS

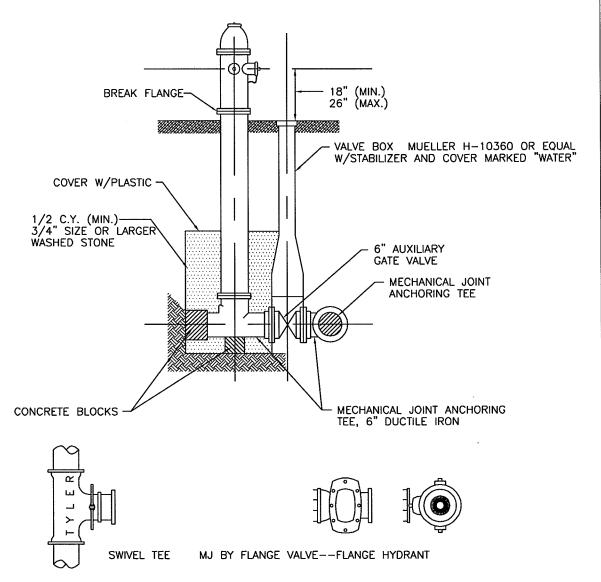


DIAMETER OF WATER MAIN	D
10" AND UNDER	4'-0"
12" AND OVER	5'-0"

- 1. CONCENTRIC CONE REQUIRED.
- 2. USE 4'-0" DIAMETER FOR WATER MAIN SIZES 4" THRU 10".5'-0" FOR SIZES 12" THRU 20". 6'-0" FOR 20" OR GREATER.
- 3. VALVE VAULT TO CONFORM TO ASTM C478.

 4. ALL VALVES SMALLER THAN 12" SHALL BE AWWA C509, CAST IRON BODY, BRONZE FITTED, MODIFIED WEDGE DISC, RESILIENT SEAT TYPE WITH NON-RISING STEM AND O-RING PACKING DESIGNED FOR 200 POUND WORKING PRESSURE, MUELLER A2360-20.
- 5. ALL VALVES 12" AND LARGER SHALL BE BUTTERFLY VALVES MUELLER 3211-20. ALL VALVES SHALL OPEN COUNTER CLOCKWISE WITH NON-RISING STEM (EXCEPT HAND VALVES).
- 6. ALL COVERS SHALL BE STAMPED "VILLAGE OF FRANKFORT" PER EXHIBIT 2B.

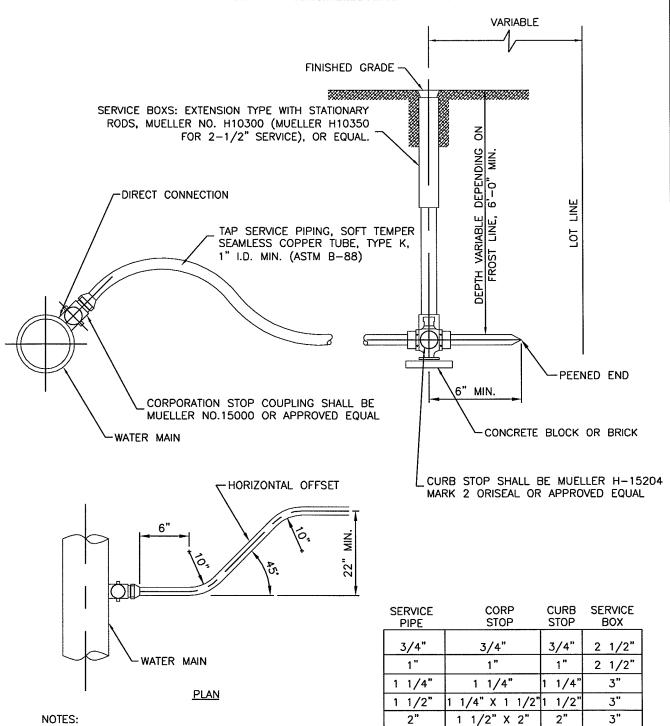
VALVE VAULT DETAIL



SWIVEL TEE - HYDRANT CONNECTION

- 1. ALL CASTINGS SHALL BE MADE IN THE U.S.A. WITH U.S.A. MATERIALS. FIRE HYDRANTS SHALL MEET AWWA C-502 AND SHALL BE MUELLER "CENTURION" A-423, OR APPROVED EQUAL WITH A 5-1/4" VALVE OPENING, TWO 2-1/2" HOSE NOZZLES AND ONE 4-1/2" PUMPER NOZZLE. THREADS SHALL CONFORM TO NATIONAL STANDARD SPECIFICATIONS.
- 2. HYDRANTS SHALL BE INSTALLED NO CLOSER THAN THREE FEET NOR FARTHER THAN 8 FEET FROM THE BACK OF CURB. NO HYDRANT SHALL BE INSTALLED WITHIN 48" OF ANY OBSTRUCTION NOR SHALL ANY OBSTRUCTION BE PLACED WITHIN 48" OF A HYDRANT.
- 3. THE HYDRANTS SHALL BE PAINTED RED BY THE MANUFACTURER.

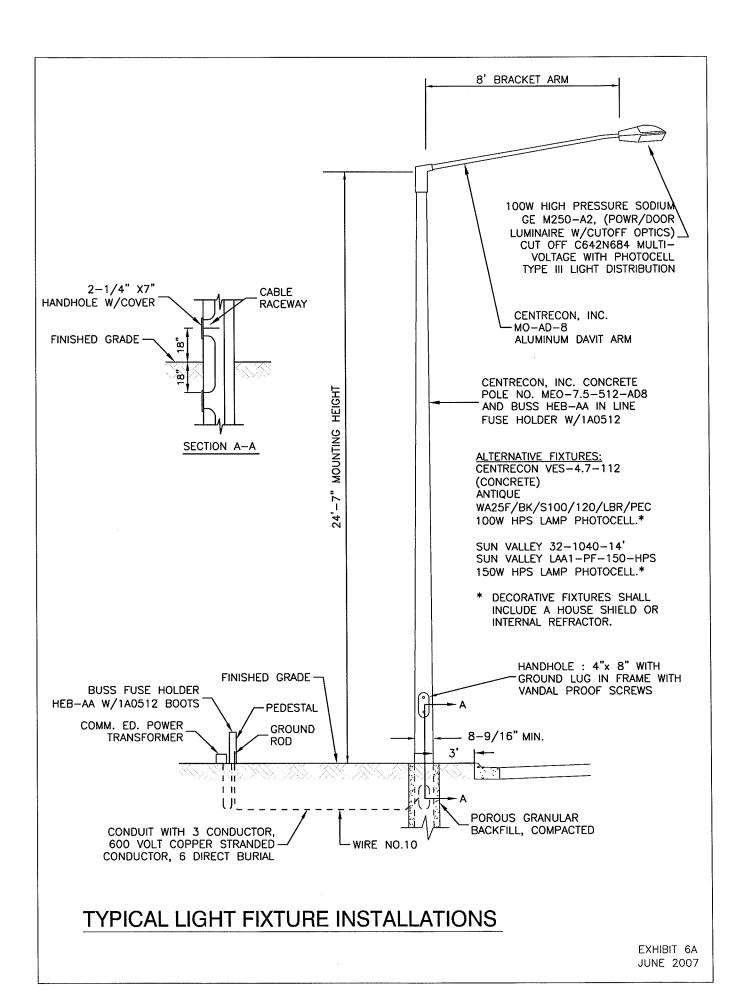
FIRE HYDRANT INSTALLATION

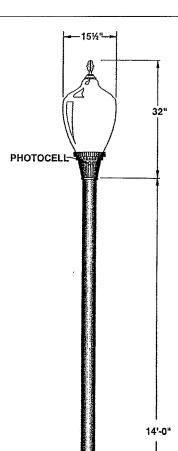


- SERVICE BOXES MAY NOT BE INSTALLED IN OR WITHIN 2' OF ANY PAVEMENT OR WALK.
- 2. ALL SERVICE TAPS SHALL BE FULL STAINLESS STEEL OR WITH A MANUFACTURED TAP COUPLING.
- 3. PROVIDE FULL SLEEVE STAINLESS STEEL SERVICE SADDLES FOR CONNECTIONS TO PVC PIPES, McDONALD SERIES NO. 3805 OR MUELLER SERIES NO. H16000, OR EQUAL.

TYPICAL WATER SERVICE INSTALLATION

EXHIBIT 5F JUNE 2007





LUMINAIRE:

ONE PIECE HIGH IMPACT CLEAR PATTERNED POLYCARBONATE DIFFUSER PROVIDED WITH DECORATIVE FINIAL, AND CAST ALUMINUM FITTER.

LAMP HOLDER: MOGUL BASE PORCELAIN

LAMP:

150 W. H.P.S.

BALLAST:

H.P.F./C.W.A. AUTOTRANSFORMER, -20° STARTING

TEMPERATURE. (MULTI-TAP VOLTAGE.)

SHAFT:

4" DIA. EXTRUDED FROM 6063 ALLOY ALUMINUM. SHAFT IS HEAT TREATED TO PRODUCE A T6 TEMPER,

.25 WALL THICKNESS.

BASE:

ONE PIECE CORROSION RESISTANT, DURABLE CAST ALUMINUM CONSTRUCTION. MINIMUM .220 WALL THICKNESS. BASE CONSISTS OF A SMOOTH, STEPPED BOTTOM SECTION WITH FLUSH HAND HOLE AND A DECORATIVE TAPERED FLUTED SECTION CONSISTING OF EVENLY SPACED, HIGHLY DETAILED RAISED VERTICAL FLUTES. HAND HOLE COVER SUPPLIED WITH TAMPER RESISTANT HARDWARE. GROUNDING LUG PROVIDED INSIDE BASE OPPOSITE HAND HOLE.

ANCHORAGE:

(4) 3/4"x18" FULLY GALVANIZED ANCHOR BOLTS, EACH BOLT SUPPLIED WITH TWO NUTS AND TWO WASHERS.

FINISH:

ELECTROSTATICALLY APPLIED BAKED ON TEXTURED

ACRYLIC ENAMEL. (COLOR: BLACK)

*INCLUDE HOUSE SHIELD OR INTERNAL REFRACTOR.



EXHIBIT 6B JUNE 2007

38' NOM.

ANCHOR

RING 1" ABOVE GRADE

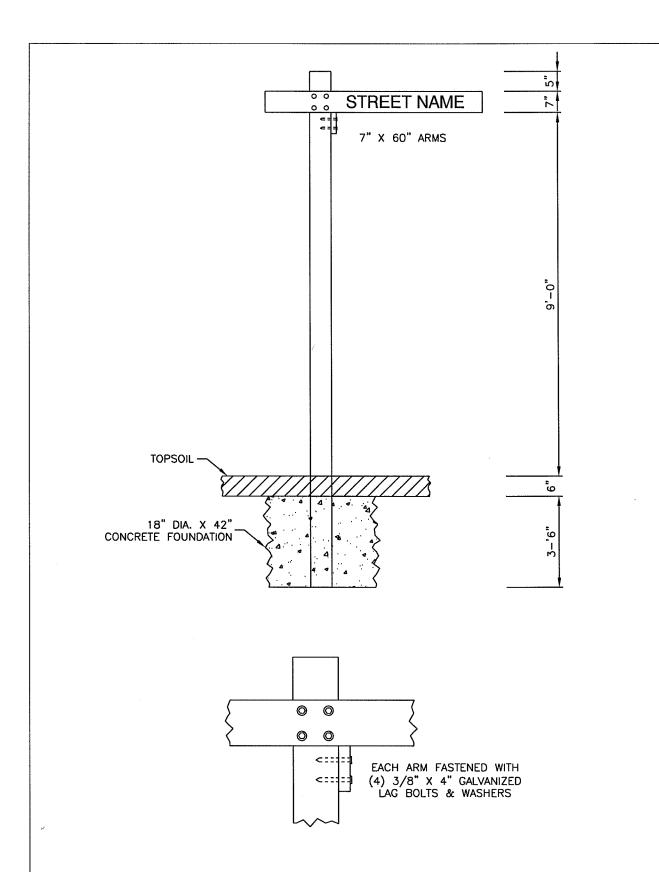
HAND

-12"--

NOM.

7 " DIA. BOLT

CIRCLE



STREET SIGN DETAIL