

## CHAPTER 6

### ENGINEERING SPECIFICATIONS

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6-6-1: **GENERAL REQUIREMENTS:** The owner or subdivider shall install storm and sanitary sewers, water supply system, street grading and pavement, alleys, cross walkways, sidewalks, public utilities, street lighting in accordance with applicable ordinances and standards of construction of the Village.

No subdivision of land shall be approved without receiving a statement signed by the Village Engineer certifying that the improvements described in the subdivider's plans and specifications, together with agreements, meet the minimum requirements of all engineering ordinances of the Village and that they comply with the following.

6-6-2: **SEWERS:** A sanitary sewer service shall be installed to serve all properties in the subdivision. Sanitary sewer material and construction shall be in conformance with the Specifications for Water and Sewer Construction in Illinois, latest edition.

A.

Storm Sewers:

1. Storm sewers shall be constructed throughout the entire subdivision to carry off water from all inlets and catch basins and shall be connected to an adequate outfall. Intercepting storm water structures shall be provided at intervals not in excess of four hundred feet (400'), as measured along the gutter line. The storm water drainage system shall be separate and independent of the sanitary sewer system. Storm sewer material and construction shall conform with the provisions of the "Standard Specifications for Water and Sewer Main Construction in Illinois, latest edition.

2. Storm sewer capacities shall be determined with the use of the rational formula. The intensity (I factor) used shall be a return frequency of no less than five (5) years. The runoff coefficient (F factor) shall be determined by the character of the land to be drained and shall conform to accepted standard engineering practices. Street grades and lot and block drainage shall be established so as to permit positive drainage. Provisions for retention or detention of increased runoff as a result of the proposed development may be required as indicated in the Storm Water Report, submitted with the preliminary plan.

6-6-3: **MANHOLES AND DRAINAGE APPURTENANCES:**

A.

Manholes: Manholes for sewers eighteen inches (18") and smaller shall have an inside diameter of forty eight inches (48") and a six inch (6") thick precast concrete base, in one piece, bedded in at least two inches (2") of gravel or crushed stone. The sidewalls shall be of precast concrete ring construction which shall have a five inch (5") minimum thickness. Manhole bases for sewers with an internal diameter forty two inches (42") and larger shall be constructed of reinforced concrete.

B.

Catch Basins and Inlets: Catch basin sidewall and base construction shall conform with the State of Illinois Highway Department Standards.

C.

Frames and Grates: Frames and grates for manholes, catch basins, inlets and valve vaults shall be similar to Neenah manufacture No. R-1015, with a combined weight of five hundred forty (540) pounds for Type B closed lid, and a combined weight of five hundred twenty five (525) pounds

for Type D open lid. Open curb casting may be used based on approval of the Village Board. The frames shall be set in a full mortar joint on each structure.

6-6-4: **WATER SUPPLY:** Water distribution facilities, including piping, fittings, hydrants, valves, valve basins, water services and all other needful appurtenances adequate for fire and domestic needs, shall be installed to serve all properties within the subdivision.

A.

Water mains shall be of a minimum six inches (6") internal diameter of Super Bell-Tile Push-on Joint Ductile Cast Iron Pipe, Cement Lined, conforming to American Standards Association Specifications of the classes specified therein. The minimum depth of water mains from the top of pipe to finished grade shall be five and one-half feet (5-1/2').

B.

Valves and Vaults: Valves shall be non-rising stem gate valves with operating nut, designed to take full pressure on either face, furnished in compliance with AWWA C500. All valves shall open by turning to the left. Valves shall operate at a working pressure of one hundred fifty (150) pounds per square inch. Valves up to and including eight inches (8") in diameter shall be housed in valve boxes with an internal diameter of forty eight inches (48"); valves over eight inches (8") shall be housed in vaults with an internal diameter of sixty inches (60"). Valve vault, sidewall and base construction shall conform to that required for catch basins.

C.

Hydrants:

1. Hydrants shall be of the compression or gate type conforming to AWWA C 502 and shall be of a make that has been adopted by the Village as standard. Hydrants shall be designed for a three hundred (300) pound test pressure and a one hundred fifty (150) pound working pressure.

2. Hydrants shall be furnished with two (2) two and one-half inch (2-1/2") hose nozzles and one four inch (4") steamer nozzle. Threads on nozzles and caps, and operating nuts, shall be National Standard Threads. Hydrants shall open only by turning to the left and shall be so marked.

3. Hydrants shall have a six inch (6") pipe connection, a

five inch (5") valve opening and shall be equipped with auxiliary valves. Auxiliary valve shall be attached to hydrant with one hundred twenty five (125) pound Standard flanges. Joint for joining the auxiliary valve shall be of the same type as specified for the piping system. All hydrants shall be painted to conform with the State of Illinois specifications.

D.

Water Services: All water services shall be constructed of Type K copper pipe, having a minimum internal diameter of three-fourths inch (3/4"). Such services shall be equipped with corporation cock, curb stops and other necessary fittings in accordance with Village standards.

6-6-5: **TRENCH BACKFILL:** All trenches caused by the construction of sewers, water mains, water service pipes and in excavation around catch basins, manholes, inlets and other appurtenances which occur within the limits of existing or proposed pavements, sidewalks and curb and gutters shall be backfilled with trench backfill. Trench backfill shall consist of sand or fill sand and shall be compacted in place to ninety five percent (95%) of maximum density at optimum moisture as determined by the Standard Proctor Test.

Trench and excavations occurring within five feet (5') of the limits of proposed or existing pavements, sidewalks and curb and gutters shall be backfilled with trench backfill to an elevation equal to the intersection of a two to one (2:1) slope line from the top of the pavement, sidewalk or curb edge, with a vertical line through the nearest edge of the trench or excavation.

6-6-6: **STREET IMPROVEMENTS:**

A.

All street construction shall comply with the applicable provisions of the "Standard Specifications for Road and Bridge Construction, Illinois Department of Transportation", as amended. The full width of the right of way shall be graded to the required section.

B.

All unsuitable subbase material shall be removed and shall be replaced with stable, compacted material in conformance with generally accepted engineering practices.

C.

The center line grade shall be not less than zero point

four percent (0.4%), and shall not exceed six percent (6%) on primary and secondary streets and eight percent (8%) on minor streets and cul-de-sacs.

D.

Vertical curves shall be used whenever a change in center line gradient occurs, except where the algebraic difference in gradients is one percent (1%) or less. The length of vertical curve on minor streets shall be forty feet (40') for each one percent (1%) of algebraic difference of grade, but in no case shall such length be less than forty feet (40'). The length of vertical curve on collector streets shall be fifty feet (50') for each one percent (1%) of algebraic difference of grade, but in no case shall such length be less than fifty feet (50').

E.

All pavement thickness, including surface, base courses and subbase courses, shall be designed in accordance with either the "Manual of Instructions for the Structural Design of Bituminous Pavements" or the "Manual for the Structural Design of Portland Cement Concrete Pavements", as applicable, and all subsequent revisions thereto, as published by the State of Illinois Department of Public Works and Buildings, Division of Highways. The minimum thicknesses for residential streets shall be as specified therein. Design data shall be submitted to the Village Engineer together with copies of soils test reports, at the time of plan submittal.

F.

Pavements in or bordering industrial and/or commercial areas shall be of the following minimum thicknesses and materials:

1. Standard reinforced Portland cement concrete pavement having a uniform thickness of ten inches (10"). Concrete for such pavement shall have a minimum fourteen (14) day compressive strength of three thousand five hundred (3,500) pounds per square inch, shall contain not less than six (6) bags of cement per cubic yard of concrete and shall contain not less than three percent (3%) nor more than six percent (6%) entrained air. Slump shall be not less than two inches (2") nor more than four inches (4").

2. Eight inch (8") thick Pozzolanic base course and a wearing surface of bituminous concrete binder and surface course having a minimum compacted thickness of three inches (3").

3. Eight inch (8") thick Bituminous Aggregate Mixture base course and a wearing surface of bituminous concrete binder and surface course having a minimum compacted thickness of three inches (3").

4. Ten inch (10") thick gravel or crushed stone base course (Aggregate Base Course, Type B) having a wearing surface of Bituminous Concrete Binder and Surface Course, Class 1, having a minimum compacted thickness of three inches (3").

G.

Curbs and gutters shall be constructed on all streets and shall be combination (integral) concrete of the mountaineable type not less than eighteen inches (18") in overall width. Curbs may be constructed integrally with the Portland cement concrete pavement. Concrete for curb and gutter shall conform to that hereinafter required for concrete sidewalks. Half streets of a permanent nature shall be constructed with a concrete retainer curb at the centerline, except for concrete base construction. Three (3) five-eighths inch (5/8") reinforcing bars ten feet (10') long shall be installed in all curb and gutter, centered over each sewer and water trench crossed by the curb and gutter.

1. The dimensions of curb and gutter on residential streets shall be a roll type two and three-fourths inches (2-3/4") in height above the gutter line. The width of the combined curb and gutter shall be eighteen inches (18"). The width of curb from gutter line to back of curb shall be eight inches (8"). The gutter shall be three-fourths inch (3/4") below the edge of the gutter flag. The thickness of the gutter flag shall equal the thickness of the adjacent street pavement.

2. The dimensions of curb and gutter on commercial or industrial streets shall be in conformance with the following specifications of the State of Illinois Standard Design, Combination Concrete Curb and Gutter, Type B-6.12: the curb shall be a vertical face type six inches (6") in height above the gutter line. The width of the combined curb and gutter shall be eighteen inches (18"). The width of curb from gutterline to back of curb shall be six inches (6"). The gutter shall be three-fourths inch (3/4") below the edge of the gutter flag. The thickness of the gutter flag shall be equal to the thickness of the adjacent street pavement.

6-6-7: **ALLEYS:** Alley pavement shall conform with specifications as set out in Section 6-6-6E herein.

6-6-8: **CROSS WALKWAYS:** Cross walkways shall be constructed of Portland cement concrete conforming to the requirements set forth under Village ordinance.

6-6-9: **STREET LIGHTING IMPROVEMENTS:** Street lighting improvements shall be installed to serve all properties within the subdivision. Such improvements shall be of the individual service or of the multiple circuit type and shall consist of standards, luminaries, cable conduit under driveways and/or streets, controllers, handholes and all other miscellaneous work and equipment necessary for an integrated system of street lights.

A.

Location: There shall be at least one standard luminary at each intersection and interior of each cul-de-sac, and spacing of standards shall not exceed three hundred feet (300') in residential areas. In commercial and/or manufacturing areas, spacing and location of standards shall be as approved by the Village Board.

B.

Specifications: Lighting standards shall be prestressed and centrifugally cast concrete, complete with butt base, and shall have a water polish finish, complete with bracket and handhold. Heights of standard and length of bracket shall be as follows:

1. Residential areas-standard twenty three feet (23'); bracket arm, eight feet (8').

2. Commercial, industrial and manufacturing areas-standard thirty feet (30') with the length of the bracket arm as approved by the Village Board.

C.

Luminaries shall be of the mercury vapor type or high pressure sodium lights or other light approved by the Village with constant wattage type ballasts. Size and life shall be as follows:

1. Residential areas-one hundred seventy five (175) watt with average life of three thousand (3,000) hours.

2. Commercial, industrial and manufacturing areas-two hundred fifty (250) watt or four hundred (400) watt with average life of three thousand (3,000) hours, as approved

by the Village Board.

D.

Cable on multiple circuit systems shall be not less than No. 8 wire and shall be buried at least thirty inches (30") below finished grade. Cable shall be installed in a two inch (2") galvanized rigid steel conduit with two inch (2") fibre bushings where such cable crosses beneath existing or proposed pavements, driveways or sidewalks. No underground cable splices will be permitted.