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A. GENERAL

The arrangement, character, extent, width, grade and location of all streets to be dedicated to the public, parking lots, driveways and all private streets shall be compatible and complimentary to existing and planned streets, to reasonable circulation of traffic within any development and adjoining lands, to topographical conditions, to runoff of storm water, to public convenience and safety, and in their relations to the proposed uses of the area to be served. All traffic intersections, driveways and confluences must encourage safe and efficient traffic flow.

Regardless of size, all developments within the corporate limits or under the control of the Village shall include provisions for the construction of roadways and appurtenances in private, PUD and dedicated streets to serve each parcel of property within the development designed in accordance with this Section. 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. Shared driveways and/or frontage roads shall be encouraged along major roadways.

The design of all roadways and driveways proposed for construction as independent projects under the control of the Village shall also meet the technical requirements of this Standard. All traffic signal installations, both new and replacements, shall meet all Illinois Department of Transportation Standards for such signals and be equipped with the signal control preemption system with confirmation beacon. All systems of equal quality and performance may be considered with approval of the Northbrook Fire Chief.

The contractor and/or subcontractors who are engaged in the construction of improvements on dedicated street rights-of-way must be qualified for such work by the Village Engineer.

B. PUBLIC EASEMENTS AND UTILITIES (See Section II - Water Distribution System and Appurtenances - Page II-3)

C. STREET CLASSIFICATION

Certain variables in geometrics and structural design discussed in this Section are dependent on the functional classification of the street in question. For the purposes of this Section, all roadways on the Street Plan will be classified under one of the following categories:

1. Freeway/Tollway

A limited access facility which serves major traffic movements, including regional, state and interstate travel. The primary function of this facility is to carry major volumes of traffic at reasonably high speeds along controlled access corridors. Access to the freeway/tollway system is provided at selected interchange locations.

2. Regional Arterial

A major highway which is a link in the regional transportation system for both through and local traffic. Regional arterials provide access to the freeways, to other regional arterials and also connect communities and major land uses within a metropolitan area. This type of roadway has regional importance because of its alignment, continuity, capacity and its connections with other regional traffic carriers.
3. **Community Arterial**

A street or highway with direct access to abutting properties and on which geometric design and traffic control measures are used to expedite the safe movement of traffic. Its purpose is to connect different parts of the community. This type of street is continuous through the community and may extend into neighboring communities. Although these streets may handle large traffic volumes, the bulk of the trips are relatively short (less than five miles).

4. **Community Collector**

This type of street is intended to connect different activity areas within the community. The function of this type of street is to collect and distribute traffic between several neighborhood areas and/or major traffic generators.

A community collector carries less traffic than a community arterial. It provides direct access to abutting properties and connects to the arterial street system.

5. **Neighborhood Collector**

This type of street is intended to serve only vehicle trips generated to and from the neighborhood it serves. The function of this type of street is to collect and distribute traffic between a neighborhood and the community collector and arterial streets. It has direct access to abutting properties and connects local streets to the arterial street network.

6. **Local Street**

This street is intended to serve vehicle trips generated by land-use abutting the street. The function of this type of street is local access within a neighborhood.

7. **Frontage Road**

Where a development borders on or contains an existing or proposed major street, the Village Board may require a frontage road for protection of residential properties and to afford separation of through and local traffic. If a frontage road is required, then screening and landscaping, or both, shall be required in the strip of land reserved to prevent access to the major street between intersections and having a minimum width of ten (10) feet.

The functional category of the street under consideration shall be as set out on the Street Plan of the Village, a copy of which may be inspected in the office of the Village Engineer and, if not so set out on that plan, shall be provided an applicable classification by the Village Engineer.

The classification of new streets as well as variations to street classifications shown in the following Chart for a given street, must be submitted to the Village Engineer for his review prior to plan submittal to the Plan Commission.
The following Pavement Design and Right-of-Way Chart is intended to show minimum right-of-way widths and the minimum design standards for a particular street classification. If, in the opinion of the Village Engineer, traffic use or geometric considerations for a road or a part of a road warrant a greater right-of-way width, a wider pavement width and/or a greater structural number than listed on the Chart, the Village Engineer shall submit his written reasons to the Village Manager. Variation requests must follow the procedure outlined in Section I, Administration and Enforcement.

<table>
<thead>
<tr>
<th>TYPE OF STREET CLASSIFICATION</th>
<th>MINIMUM RIGHT-OF-WAY WIDTH</th>
<th>MINIMUM WIDTH (back of curb to back of curb)</th>
<th>MINIMUM CROWN</th>
<th>MINIMUM STRUCTURAL NUMBER</th>
<th>MINIMUM CURB REQUIREMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Arterial</td>
<td>80-120 feet* (100’ typical)</td>
<td>60 - 63 feet</td>
<td>Varies</td>
<td>4.5</td>
<td>B-6.24</td>
</tr>
<tr>
<td>Community Arterial</td>
<td>66-100 feet (80’ typical)</td>
<td>43 feet or 2 – 24 foot w/median strip 4-1/2&quot;</td>
<td>6&quot;</td>
<td>4.0</td>
<td>B-6.24</td>
</tr>
<tr>
<td>Community Collector</td>
<td>80 feet</td>
<td>43 feet</td>
<td>6&quot;</td>
<td>3.5</td>
<td>B-6.12</td>
</tr>
<tr>
<td>Neighborhood Collector</td>
<td>66-80 feet</td>
<td>43 feet</td>
<td>6&quot;</td>
<td>3.75</td>
<td>B-6.12</td>
</tr>
<tr>
<td>Local Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Cul-de-sac **</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400’ or less</td>
<td>60 feet</td>
<td>27 feet</td>
<td>4&quot;</td>
<td>3.0</td>
<td>B-6.12</td>
</tr>
<tr>
<td>401’ - 600’</td>
<td>60 feet</td>
<td>27 feet</td>
<td>4&quot;</td>
<td>3.0</td>
<td>B-6.12</td>
</tr>
<tr>
<td>- Dedicated (other than Cul-de-sac)</td>
<td>60 feet</td>
<td>27 feet</td>
<td>4&quot;</td>
<td>3.0</td>
<td>B-6.12</td>
</tr>
<tr>
<td>- Private (PUD)</td>
<td>---</td>
<td>24-27 feet</td>
<td>4&quot;</td>
<td>3.0</td>
<td>B-6.12</td>
</tr>
<tr>
<td>- Sub-Standard</td>
<td>60 feet</td>
<td>20 feet</td>
<td>3&quot;</td>
<td>2.5</td>
<td>B-6.12</td>
</tr>
<tr>
<td>Industrial</td>
<td>66 feet</td>
<td>43 feet (no parking)</td>
<td>5&quot;</td>
<td>3.75</td>
<td>B-6.12</td>
</tr>
<tr>
<td>Minor Business</td>
<td>60 feet</td>
<td>32 feet (no parking)</td>
<td>5&quot;</td>
<td>3.5</td>
<td>B-6.12</td>
</tr>
<tr>
<td>Frontage Road (Dedicated)</td>
<td>Varies</td>
<td>24 feet</td>
<td>3&quot;</td>
<td>3.0</td>
<td>B-6.12</td>
</tr>
</tbody>
</table>

* Per IDOT and CCHD Design Standards

** The pavement diameter (back-to-back) of circular-ended cul-de-sacs shall be 53.5' radius (107' diameter) for cul-de-sacs with normally a 140' diameter right-of-way.
D. DESIGN

1. General

Proposed new streets shall be designed and located in relation to existing and planned streets, to topographical conditions and natural terrain features such as streams and existing tree growth, to public convenience and safety, and in appropriate relation to the proposed uses of land to be served by such streets.

All streets shall be properly integrated with the existing and proposed system of thoroughfares and dedicated rights-of-way as established on the current Village Street Plan.

Pavement design shall relate to the street classification. All new streets, either public or private, within the corporate limits of the Village shall be improved with bituminous concrete, concrete pavement or interlocking paving blocks and bordered by Portland Cement concrete combination curbs and gutters. Driveways to individual residential buildings do not require curbs and gutters or concrete barrier curbs. Driveways to all other buildings may require combination concrete curbs and gutters or barrier curbs where deemed necessary by the Village Engineer.

All thoroughfares shall be properly related to special traffic generators such as industries, business districts, schools, churches and shopping centers; to population densities; and to the pattern of existing and proposed land uses.

Local and collector streets shall be laid out to conform as much as possible to the topography, to discourage use by through traffic, to permit efficient drainage and utility systems, and to require the minimum number of streets necessary to provide convenient and safe access to property.

The rigid rectangular gridiron street pattern need not necessarily be adhered to for collector streets, and the use of curvilinear streets may be acceptable. However, cul-de-sacs, U-shaped streets, and dead ends shall be discouraged.

Proposed streets shall be extended to the boundary lines of the tract to be subdivided, unless prevented by topography or other physical conditions, or unless in the opinion of the Plan Commission such extension is not necessary or desirable for the coordination of the layout of the subdivision with the existing layout or the most advantageous future development of adjacent tracts.

In business and industrial developments, the streets and other accessways shall be planned in connection with the grouping of buildings, location of rail facilities, truck loading and maneuvering areas, and walks and parking areas so as to minimize conflict of movement between the various types of traffic, including pedestrian.

Where adequate right-of-way is available or can be made available, turning bays, protected with barrier median or rumble strips, shall be provided on all community arterial streets at all major intersections and on community collector streets at their intersection with all regional and community arterial streets as deemed necessary by the Village Engineer.
2. **Pavement Cross-Section**

The following table of minimum pavement course thickness shall be utilized:

**Flexible and Rigid Pavement Table**

<table>
<thead>
<tr>
<th>FLEXIBLE PAVEMENTS</th>
<th>THICKNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Structural Number</td>
<td>Binder Course</td>
</tr>
<tr>
<td>2.50 to 3.00</td>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>3.01 to 3.99</td>
<td>2&quot;</td>
</tr>
<tr>
<td>4.00 and greater</td>
<td>2 1/2&quot;</td>
</tr>
</tbody>
</table>

**RIGID PAVEMENTS**

<table>
<thead>
<tr>
<th>THICKNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.50 to 3.99</td>
</tr>
<tr>
<td>4.00 to 4.99</td>
</tr>
</tbody>
</table>

Thickness shall be rounded up to the nearest one-half (1/2) inch.

(a) **Flexible Pavement and Medians**

The design of all flexible pavements shall be based on IDOT’s Highway Design Manual Pavement Computational Method. Traffic Factor and Minimum Structural Design Number for the type of street in question, determined by the Village Engineer.

(b) **Base Course**

Only BAM may be used. A pozzolanic base will not be allowed. Crushed aggregate base course can be used only with written permission of the Village Engineer.

(c) **Fabrics**

Woven paving fabrics with asphaltic cement tack coat may be used in overlaying existing pavements. Non-woven sub-grade fabrics may be used for sub-grade stabilization and to improve subsurface drainage.

(d) **Rigid Pavements and Medians**

The design of all concrete pavements shall be based on the minimum thickness as determined by multiplying the structural coefficient for reinforced concrete pavements (0.5) by the required structural number from the Flexible and Rigid Pavements Table above. The thickness shall be rounded up to the nearest one-half (1/2) inch. Concrete pavement shall be reinforced with rigid wire mesh (6" x 6", #6). The pavement shall have a longitudinal center line joint and transverse joint design subject to approval of the Village Engineer.
High Early Class X concrete with air entrainment may be used.

(e) **Testing and Acceptance**

Upon completion of all construction within any development, the Village will conduct pavement tests at the developer's expense. All deficiencies, as outlined in this report, shall be repaired as specified in the report and to the Village Engineer's satisfaction prior to the installation of the final surface course.

(f) The bituminous binder course for all flexible-type pavements must set for a minimum of nine (9) months, including a winter and a spring, unless otherwise waived by the Village Engineer. After this setting period has passed, one pavement core per nine hundred (900) lineal feet of measured pavement must be taken. A report shall be submitted to the Village Engineer listing thickness of base and binder courses and the type and condition of subgrade material as determined from the cores. If the results of the cores indicate pavement deficiencies, additional cores will be taken at intervals required by the Village Engineer. All cores taken shall be numbered and delivered to the Village Engineer. Upon receipt of this report and cores, the Village Engineer will review said report and will perform an inspection of the existing base and binder courses. All base and binder course failures will then be repaired to the Village Engineer's satisfaction.

3. **Street Intersections**

Streets shall be laid out so as to intersect as nearly as possible at right angles. A proposed intersection of two (2) new streets at an angle of less than seventy-five (75) degrees shall not be acceptable. Not more than two (2) streets shall intersect at any one point unless specifically approved by the Village Board.

Proposed new intersections along one side of an existing street shall, wherever practicable, coincide with any existing intersections on the opposite side of such street. Street jogs with centerline offsets of less than one-hundred fifty (150) feet shall not be permitted, except where the intersected street has separated dual drives without median breaks at either intersection. Where streets intersect major streets, their alignment shall be continuous.

Minimum curb radius at the intersection of two (2) local streets shall be at least twenty-five feet (25') and minimum curb radius at an intersection involving a collector street shall be at least thirty feet (30'). Alley intersections and abrupt changes in alignment within a block shall have the corners cut off in accordance with standard engineering practice to permit safe vehicular movement.

Intersections shall be designed with a minimum grade wherever practical. In hilly or rolling areas, at the approach to an intersection, a leveling area for vehicular storage shall be provided, having no greater than a two percent (2%) grade over a distance of sixty feet (60'), measured from the nearest right-of-way line of the intersecting street.

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

The cross-slopes (earth slopes) on all streets, including intersections, shall be two percent (2%) minimum.

4. **Alleys**

   New alleys shall not be allowed in residential, business, commercial and industrial districts. Existing residential gravel alleys shall be surfaced with a two (2) inch thick lift of bituminous concrete surface, providing the existing granular base is of sufficient thickness and in an acceptable condition.

5. **Grades**

   The vertical grades shall not be in excess of five (5) percent on arterial and collector streets nor in excess of six (6) percent on other streets, unless approved by the Village Engineer. Streets shall not have a grade of less than one-half of one (0.5) percent.

   Where the grade of the street warrants installation of vertical type curbs and other special design of improvements, such as double inlets, because of right-of-way and drainage conditions, the Village Engineer will have final authority.

6. **Vertical Curves**

   All changes in street grades shall be connected by vertical curves of a minimum length in feet as prescribed below:

   - Local - 100'
   - Neighborhood Collector - 150'
   - Community Arterial - 300'

   However, if the difference in street grade does not exceed one percent (1.0%), no vertical curve is necessary, and the pavement must be designed to drain satisfactorily. In addition, if the average running speed is projected to exceed forty miles per hour (40 mph), or if the algebraic difference in tangent grades so warrant, vertical curves in excess of those specified above may be required by the Village Engineer.

7. **Sight Distances**

   At the points of intersections of proposed roads with existing roads, the minimum stopping sight distance indicated below for the legal speed limits shall be provided on existing roads.

<table>
<thead>
<tr>
<th>Legal Speed Limit (MPH)</th>
<th>Minimum Stopping Sight Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 - 30</td>
<td>200 feet</td>
</tr>
<tr>
<td>35 - 40</td>
<td>275 feet</td>
</tr>
<tr>
<td>45 - 50</td>
<td>350 feet</td>
</tr>
<tr>
<td>55</td>
<td>475 feet</td>
</tr>
</tbody>
</table>
If in the opinion of the Village Engineer, the projected future legal speed limit established in accordance with the State of Illinois "Policy for Establishing and Posting Speed Limits" is higher than the existing legal speed limit, the higher speed shall be used to determine the minimum stopping sight distance.

8. Subgrade Preparation

The subgrade of all public and private roadways shall be graded and proof rolled. The removal and replacement of soft and unstable material with appropriate backfill must be approved by the Engineer in the field prior to placement of the base course.

Subgrade depth and crown should also be checked with stringline and witnessed by the Village.

At least one nuclear density test shall be taken in each fill section, with the maximum distance between tests of two hundred (200) feet on alternate sides. One modified Proctor Test shall be taken from each different source of borrowed material, if required by the Village Engineer. The Proctor and density tests must be submitted for review and approval by the Village Engineer. Upon approval of these tests, a reinspection of the subgrade will be made by the Village, and the subgrade must be approved prior to placing any type of curb and gutter or base material.

The Village Engineer may waive the requirement for material testing and soil reports for roadway paving projects less than 200 feet in length.

All subgrade material shall have a minimum Illinois Bearing Ratio (IBR) of 3.0. Subgrade material having an IBR less than 3.0 shall be removed and replaced with a suitable fill material or the pavement must be designed to compensate for the soil conditions. The soil support IBR values selected for use by the designer shall represent a minimum value for the soil to be used.

At the request of the Village Engineer, a copy of all pavement design and computations for the proposed pavement data shall be submitted.

Subgrade excavation shall be a minimum of one (1) foot wider than the proposed back of curb. The entire subgrade shall be thoroughly compacted.

9. Composite Pavement Strength

The pavement shall be designed and constructed so as to obtain a twenty (20) year service life with an increasing traffic factor with only minimal maintenance before a resurfacing is required.

Prior to the installation of the bituminous surface course, but after the installation of the binder course, the developer shall notify the Village Engineer that he intends to surface the street. The Village Engineer may elect to obtain a Dynaflect Pavement Evaluation Program Report of the completed pavement improvements at the developer's cost.
The Dynaflect Pavement Evaluation Program shall be performed according to the Dynaflect Pavement Evaluation Specification on file in the office of the Village Engineer.

The program shall evaluate the existing condition of the base and binder course in two hundred (200) foot sections. It shall determine whether or not the pavement section with the addition of the surface course of design thickness will be projected to meet a twenty (20) year pavement life or greater.

If the pavement section is projected to meet a life expectancy of twenty (20) years or more, then the developer shall proceed with the placement of the final surface.

If the pavement section is not projected to meet a life expectancy of twenty (20) years or more, then the report shall propose asphalt overlays in excess of the surface course design thickness or pavement reconstruction so as to bring the new pavement section to a twenty (20) year life expectancy. The Village Engineer shall evaluate the results of the report and inform the developer of any required pavement repair for each section. These repairs shall be completed before the final surface is applied.

10. Design References

All pavement shall be designed and constructed in accordance with one or more of the following references as they apply:


E. CONSTRUCTION MATERIALS

Pavement materials approved for street construction shall comply with the minimum requirements as tabulated in IDOT's current Table of Coefficients for New Pavement Structure Materials.

F. SPECIAL REQUIREMENTS FOR BITUMINOUS PAVEMENT

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

1. No construction required by this Section shall be done after November 1 or before May 1 without authorization by the Village Engineer.

2. Minimum allowable roadway pavement design structural number is 2.5.
3. In new construction, surface course shall be placed no earlier than the construction season following the season in which the binder course was placed.

4. Minimum acceptable Illinois Bearing Ratio for subgrade is 3.0.

5. Where IBR for underlying soil is less than 3.0 it shall be removed or otherwise modified as required to meet this minimum.

6. Minimum granular subbase thickness shall be four inches (4''). Granular subbase shall extend a minimum one-foot (1') beyond the combination curb and gutter.

7. Minimum base course thickness is 7 inches.

G. SPECIAL REQUIREMENTS FOR CONCRETE PAVEMENT

The following qualifications and requirements shall apply to Portland Cement concrete pavement regardless of design method used:

1. No Portland Cement concrete pavement shall be constructed in any year after November 1st without the approval of the Village Engineer and in no case when frost is present in the subgrade.

2. In all roadways, Portland Cement concrete pavement shall be designed and reinforced in accordance with IDOT's Standard Design for Rigid Pavement.

3. A minimum four-inch (4'') granular subbase shall be provided. Granular subbase shall extend a minimum one-foot (1') beyond the combination curb and gutter.

H. CURBS AND GUTTERS

Combination curbs and gutters shall be constructed on both sides of all street pavements.

Two (2) No. 4 reinforcing bars shall be placed continuously between expansion joints. Expansion joints shall be doweled and spaced no more than sixty (60) feet on center and at tangent points of all radii. Control joints shall be provided at fifteen (15) feet intervals on center and shall consist of an actual saw cut at least one and one-half (1 1/2) inches deep.

Unless otherwise directed by the Village Engineer pursuant to IDOT Standards, a barrier curb shall be provided on all major streets. All collector streets shall be provided with six (6) inch barrier curbs, except the Village Engineer may approve the installation of mountable curbs in cases where future driveway locations cannot be precisely determined at the time of construction. In all cases, depressed curb sections shall be provided at all driveways whose locations are known at the time of curb installation. Depressed curbs shall also be provided at all sidewalk crossings.

I. SIDEWALKS

Concrete sidewalks shall be constructed along both sides of all public and private streets unless exempted by the Village Board. Such sidewalks shall have a minimum width of five (5) feet and a minimum thickness of five (5) inches, with a three (3) inch thick stone base (CA-6), except the sidewalk thickness shall be six (6) inches where passing across an existing
or proposed driveway. The length of the thickened slab where passing over public utility lines shall be constructed so as to meet the grade of such sidewalks or as may be directed by the Village Engineer or his representative.

1. **Material**

   All materials shall meet the requirements of the *Specifications for Road and Bridge Construction*. Concrete sidewalks shall be Class X concrete, 5-8% air-entrained, shall have a slump of not less than 2 inches nor more than 4 inches, and a minimum 14 day compressive strength of 3500 psi.

2. **Excavation**

   If organic material is present at the proposed subgrade, same shall be removed and replaced with compacted crushed aggregate.

   Excavation shall include trimming or removal of all trees, roots and brush that interfere with the installation of the sidewalk.

3. **Embankment**

   When necessary to construct sidewalk on fill, the fill shall be placed in six (6) inch lifts, thoroughly compacted. A level shoulder shall extend one (1) foot beyond each edge of the walk. Side slopes shall not be steeper than 4:1 except as approved by the Village Engineer.

4. **Subgrade Preparation**

   If material has been excavated below the subgrade it shall be replaced with gravel or crushed stone. The subgrade shall then be tamped or rolled until thoroughly compacted.

   When the subgrade has been finished and no later than 24 hours prior to placing concrete, the contractor shall notify the Village Engineer that the subgrade is ready for inspection. No concrete shall be placed until the subgrade has been inspected and approved by the Engineering Department.

5. **Grades**

   Public sidewalks or pedestrian pathways shall not exceed eight (8) percent grade. For grades in excess of ten percent (10%), steps of an approved design shall be constructed as part of the sidewalk or pathway system.

6. **Forms and Backfill**

   Side forms shall be of lumber with a nominal thickness of 2 inches and a minimum depth of 6 inches or of steel of equal rigidity. 2" x 4" forms will **not** be allowed. Forms shall be held securely in place by stakes or braces with the top edges true to grade. The forms shall be lightly coated with oil prior to placing concrete.
The forms shall remain undisturbed for at least 24 hours after the concrete has been placed. Upon removal of the forms, the contractor shall backfill to the required elevation between the side of the sidewalk and the ground using salvaged top soil as approved by the Village Engineer. The material shall then be compacted until firm and the surface evenly graded. Side slopes outside the level one (1) foot shoulder limits shall also be graded so that a cut slope does not exceed 1:2 and a fill slope does not exceed 1:4.

7. Weather Requirements

No concrete shall be placed from November 1 through May 1 or when the air temperature is below 40 degrees Fahrenheit or is between 40 and 45 degrees and falling unless authorized by the Village Engineer. The temperature of the concrete when placed shall be not less than 50 degrees Fahrenheit nor greater than 90 degrees. In no case shall concrete be placed on frozen subgrade.

8. Placing and Finishing

The subgrade shall be adequately moistened and compacted just before the concrete is placed. The six (6) inch thick concrete shall be placed in successive batches for the entire width of the slab, struck off from one-half to three-fourths inch higher than the finished slab, tamped until all voids are removed and free mortar appears at the surface, thoroughly spaded along the edges, struck off to the true grade, and finished to a true and even surface with suitable floats and trowels. The surface shall be divided by grooves constructed at right angles to the centerline of the sidewalk. These grooves shall be no less than 1 inch in depth nor more than one-fourth inch wide and shall have the edges rounded one-fourth inch. Each slab shall be five (5) feet unless otherwise approved by the Village Engineer. The side edges of the walk shall also be edged with an edging tool having a one-quarter inch radius. A hair broom shall be drawn transversely across the finished surface so as to produce a lightly rough, gritty, non-skid surface.

9. Expansion Joints

Expansion joints shall consist of preformed joint filler. The top of the joint shall be placed one-fourth inch below the surface of the sidewalk.

Expansion joints one-half inch thick shall be placed between the sidewalk and all structures such as light standards, traffic light standards and traffic poles which extend into the sidewalk.

Expansion joints shall be placed at intervals of not more than fifty (50) feet in the sidewalk. Where the sidewalk is constructed adjacent to pavement or curbs having expansion joints, the expansion joints in the sidewalk shall be placed opposite the existing expansion joints as nearly as practicable. Expansion joints shall also be placed where the sidewalk abuts existing sidewalks, between driveway pavement and sidewalk, and between sidewalk and curbs where the sidewalk abuts a curb. The sidewalk at the curb shall be raised 1/2” to allow for settlement.
10. **Handicap Ramps**

All sidewalks at intersections shall be ramped with a depressed curb and gutter. Sidewalks to conform to IDOT detail for handicap ramps.

11. **Protection and Curing**

All exposed surfaces of newly poured concrete shall be protected against rain with a plastic burlap cover.

The concrete shall be cured by one of the following methods:

a. wet burlap  
b. impervious paper  
c. membrance curing compound

When the temperature of the air is expected to drop below 40 degrees Fahrenheit within 24 hours after placing, the concrete shall be protected with 9 inches of loose, dry straw and a layer of burlap, styrofoam or an insulating blanket.

All concrete placed later than October 1 of the year shall have protective coat applied.

12. **Disposal of Surplus Material**

Surplus or waste material resulting from the sidewalk or driveway apron excavation shall be properly and legally disposed of by the developer.

13. **Control of Materials**

The developer shall, at his expense, have a soil and material consultant or commercial testing laboratory prepare and test samples of delivered concrete. One (1) set of test cylinders shall be taken for the first twenty-five (25) cubic yards, or fraction thereof, and one (1) set of tests shall be taken for each additional fifty (50) cubic yards. A set of tests shall consist of: four (4) standard cylinders of which two (2) shall be broken at seven (7) days and two (2) shall be broken at fourteen (14) days, (minimum 3,500 psi), one (1) slump test and one (1) air content test (5%). The laboratory shall perform tests in accordance with recognized ASTM standards and shall submit written reports of such tests to the Village Engineer.

J. **DRIVEWAYS & DRIVEWAY APRONS**

1. **Driveways**

In developments, driveways meeting these requirements shall be provided at all locations approved by the Village Engineer where vehicular traffic is intended to leave the roadway and move onto private property.

(a) **Residential:**

Driveways for residential buildings must be constructed of a minimum flexible paving of 2" bituminous concrete surface, Class I over 6" aggregate
base course (crushed) Type B or rigid paving 6" thick concrete pavement over a 4" aggregate base course or 4" thick concrete with wire mesh on 4" aggregate base course. The grade or pitch of driveways shall be positive (1% minimum) and drained away from the residence. Brick paver aprons or decorative concrete in the right-of-way are only allowed with a recorded covenant that states the owner is responsible for added cost above normal concrete should the Village need to remove any of it for utility or street repairs.

(b) Commercial/Industrial/Institutional Driveways:

Driveways for commercial or industrial buildings shall be constructed of eight (8) inch thick reinforced (6x6 wire mesh) PCC concrete on a six (6) inch granular base.

The Village Engineer shall approve all driveway locations in accordance with standard IDOT and Traffic Engineering guidelines. Standard “Shared Driveway Easement Agreement” forms are on file in the Village Engineering Department.

Where property has frontage on a County, State or Federal highway, the spacing and design of the points of ingress and egress to the major street shall be subject to the approval of the District Engineer, Illinois Department of Transportation, or the Superintendent of Highways, Cook or Lake County Highway Departments. This approval must be obtained prior to the signature of the Village Engineer on the final plat.

(1) Major Commercial and Industrial Driveway Location and Design:

Driveways serving commercial, industrial and high-density residential developments represent an important element in the efficiency and safety of the street onto which the traffic enters and exists. In order to properly handle traffic from such entrances, the anticipated traffic volumes must be accurately estimated and sized and locations established in accordance with the Guidelines for Driveway Design and Location as published by the Institute of Traffic Engineers (ITE). This information may be requested by the Village Engineer for review as well as other critical factors as follows:

- Peak hour flow
- Number of entrances
- Internal circulation pattern
- Parking area size
- Storage lane length
- Traffic signal timing
- Pedestrian counts

(2) Driveway aprons on county or state routes shall meet the minimum required pavement cross-section established by the respective agency.
(c) Permeable Pavers

Permeable pavers for driveways, patios and walks for residential and commercial/industrial/institutional properties are allowed, but shall consist of the following materials: Interlocking or enlarged permeable joint paver with a minimum thickness of 3-1/8 inches and spacing (void) between 1/4 to 1/2 inch. The aggregate setting bed, base and sub-base shall consist of the following: 2-inch ASTM No. 8 aggregate setting bed; 4-inch ASTM No. 57 aggregate base; and 15-inch ASTM No. 2 aggregate sub-base. ASTM No. 8 aggregate shall be used for filling the joints between the pavers. 4-inch perforated underdrain pipe (PVC SDR 26), which will outfall to a storm sewer or drainage swale (if approved by the Village Engineer), will be required directly below the aggregate sub-base. Geotextile filter fabric will be required on the bottom and sides of the aggregate sub-base and base for all driveway installations. The perimeter surrounding the permeable pavers shall be supported with edge restraint (steel for vehicular and plastic for non-vehicular areas). The grade (pitch) of the pavers shall be 1% minimum and drained away from the building structure. For driveway and other surfaces that will be subject to vehicle loadings, the paver installation must support H-20 loadings.

In installations where the fee in lieu of detention is applicable, the impervious coverage fee will be reduced by 50% for the square foot (surface area) of the permeable pavers.

In installations where on-site stormwater detention is required, a volume credit will be given for the void space (33-1/3%) in the aggregate setting bed, base and sub-base. A maintenance plan to be approved by the Village Engineer will be required.

A recorded covenant will also be required for permeable pavers that are installed in the right-of-way.

2. Materials

All materials shall comply with the applicable applications in the Illinois Standard Specifications for Road and Bridge Construction.

3. Concrete Quality

Use of ready-mixed concrete is required. It shall comply with ASTM C94 and supplied by an approved ready-mixed source, which is inspected by the Illinois Department of Transportation. Delivery tickets shall note the mix designation, time dispatched, date, project and contractor, and shall be available for review by the Village Engineer or his representative.

4. Placing and Finishing Concrete

A request for an Engineering inspection must be made 24 hours prior to the scheduled placing of concrete. No concrete shall be placed until the subgrade has been inspected and approved by the Engineering Department.
The subgrade may be moistened just before the concrete is placed. The concrete shall be placed in successive batches for the entire width of the slab, struck off from one-half (1/2) to three-fourth (3/4) inch higher than the finished slab, tamped until all voids are removed and free mortar appears on the surface, thoroughly spaded along the edges, struck off to the true grade, and finished to a true and even surface with floats and trowels. The final troweling shall be done with a steel trowel, leaving a smooth, even surface. After the water sheen has disappeared, the surface shall be given final finish by brushing with a fine-hair broom. The broom shall be drawn across the sidewalk or driveway apron at right-angles to the edges of the slab, with adjacent strokes slightly overlapping, producing a uniform, slightly roughened surface with parallel marks.

Control joints shall be constructed so as to divide the driveway apron into sections, which are approximately square, and having no side longer than fifteen (15) feet. The control joints shall be not less than one-eighth (1/8) inch or more than one-fourth (1/4) inch in width, and shall be edged with an edging tool having a one-fourth (1/4)-inch radius.

All PCC aprons placed after October 1 shall have protective coat.

K. PARKING LOTS

1. General

All parking lots shall conform to both the Zoning Code and these Standards.

2. Design

The design, material and layout of all parking lots shall be subject to the review of the Village Engineer and the Director of Development.

Parking lots with detention shall be designed to allow for a 1 1/2" overlay without reducing detention volume or increasing depth of ponding above 1 foot maximum.

The minimum pavement cross-section shall have a structural number of 2.16 generally consisting of 1 1/2" thick bituminous concrete surface and 1 1/2" bituminous concrete binder course over 3.5" BAM.

All main or aisle circulation areas shall be designed and constructed with a minimum structural number of 2.40 (1 1/2" bituminous concrete surface, 1 1/2" binder, 4" BAM).

Loading and truck docks and fire lane pavement areas shall be 8" thick PCC (reinforced 6x6 wire mesh) over a 4" thick compacted granular base or 1 1/2" bituminous concrete surface over 1 1/2" bituminous concrete binder over 7" BAM.

Use of geotechnical fabrics will be considered.
Permeable pavers in accordance with Section V.J.1.(c) of this Standard and decorative paving blocks (interlock concrete, granite, cobblestone, etc.) may be used if approved by the Village Engineer.

3. **Striping and Signs**

   Signs and striping of the pavement surface to define each parking space, aisle, direction of traffic flow and cross walks are required and shall be a minimum of four (4) inches in width for the length of each space and directional arrow.

4. **Curbs and Gutters**

   Concrete curbs are required around the perimeter of all parking lots and around all landscaped islands. Fire hydrants shall be protected by a minimum four- (4) foot curb clearance.

5. **Slope**

   No area of any parking lot or garage excluding access ramps shall have a slope in excess of five (5) percent. No ramp shall have a slope in excess of eight (8) percent.

6. **Lighting**

   Fixed lighting shall be provided for all parking lots and garages accommodating more than 10 vehicles. Such lighting shall be so arranged as to prevent direct glare of beams onto or visible from any public or private property or streets. All lighting shall be reduced to security levels at all times of non-use.

7. **Island and Tree Pits**

   Landscape islands shall be bordered by a 6" high concrete curb designed to protect the landscape feature and backfilled with clean clay or trench backfill for a width of 2 feet. Islands shall be located and constructed in accordance with accepted engineering standards. Trees located in paved areas shall be provided with adequate tree pits and drain tile bedded in washed stone to permit proper watering, drainage and growth.

   The central portion of the island where trees and shrubs are to be planted shall be filled with a mixture of 1/3 sand, 1/3 compost and 1/3 topsoil to a minimum depth of 3 feet. For larger tree balls, the mixture must extend a minimum of 18" below the bottom of the ball.

8. **Car Stops**

   Every parking lot and garage, except parking lots and garages accessory to a single family dwelling, shall be bordered by a six inch high concrete curb and shall be provided with curbs, car wheel stops, guard rails, barrier fences or other suitable devices designed and located to protect required screening devices, landscaping, structure and other vehicles from damage by vehicles using such lot or garage. This provision shall not be construed to require car wheel stops for every parking space,
but only in those cases where the Village Engineer determines that such stops are necessary or desirable.

9. Circulation Aisles

All parking lots shall be designed in accordance with the Village's Zoning Ordinance.

<table>
<thead>
<tr>
<th>Parking Angle</th>
<th>One-Way Aisle Width</th>
<th>Two-Way Aisle Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel</td>
<td>14</td>
<td>24</td>
</tr>
<tr>
<td>45 degrees</td>
<td>14</td>
<td>24</td>
</tr>
<tr>
<td>60 degrees</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td>75 degrees</td>
<td>20</td>
<td>24</td>
</tr>
<tr>
<td>90 degrees</td>
<td>24</td>
<td>24</td>
</tr>
</tbody>
</table>

L. BIKE PATHS

Bike paths shall be constructed in locations designated by the Village Manager and to standards acceptable to the Village Engineer.

Bike path signs, street name signs and other signs shall be provided where required or warranted pursuant to the Manual on Uniform Traffic Control Devices, published by the Illinois Department of Transportation. These signs and their installation shall be provided through purchase from the Village as deemed necessary by the Village Engineer and Director of Public Works.
1. **Bike Path Design and Construction Standards**

   Three classes of bicycle paths are permitted. These classes are defined in the Bikeways Element of the Comprehensive Plan. Design dimensions for each class are as follows:

<table>
<thead>
<tr>
<th>Class</th>
<th>Width of Pavement</th>
<th>Width of Right-of-Way or Public Easement</th>
</tr>
</thead>
<tbody>
<tr>
<td>I - off street; 2-way</td>
<td>8 feet</td>
<td>10 feet</td>
</tr>
<tr>
<td></td>
<td>off street; 1-way</td>
<td>4 feet</td>
</tr>
<tr>
<td>II - on street; 2-way</td>
<td>8 feet</td>
<td>8 feet, 6 inches</td>
</tr>
<tr>
<td></td>
<td>on street; 1-way</td>
<td>4 feet</td>
</tr>
<tr>
<td>III - on street unprotected; 2-way</td>
<td>bike lane shared with street</td>
<td>bike lane shared with street</td>
</tr>
<tr>
<td></td>
<td>on street unprotected; 1-way</td>
<td>bike lane shared with street</td>
</tr>
</tbody>
</table>

2. **Minimum Bikeway Pavement Requirements**

   Developers may choose between two (2) pavement types:

   **Type A**

   Two inch thick bituminous concrete (Class I) surface with a 6" granular base and compacted subgrade.

   **Type B**

   Four inch thick Portland cement concrete surface, with a 3" thick granular base and compacted subgrade.

3. **Bikeway Signs**

   Appropriate bikeway signs must be installed with all bikeways by the developer of the bikeway at locations approved by the Village Engineer.
M. MAINTENANCE AND RESPONSIBILITY

The maintenance and responsibility for private roadways shall be the responsibility of the developer until the time of final Maintenance Bond release, when the homeowner's association shall accept the responsibility for maintenance.

All streets, curbs and gutters to be dedicated to the Village shall be under warranty for any and all defects and failures in either the surface course or the base course for a period of one (1) year after the date of initial acceptance.

N. CONSTRUCTION TRAFFIC CONTROL

All construction work within public rights-of-way shall conform to the requirements of the Manual on Uniform Traffic Control Devices and an approved traffic control plan. The provisions of this Manual will be enforced when:

- An opening is made into the existing pavement.
- Construction takes place adjacent to the edge of the existing pavement.
- A utility crossing is made beneath the existing pavement.
- It is necessary to close a lane of traffic due to construction operations.

A full lane closure on Village roads will be required whenever construction is underway or whenever a vehicle is parked in the lane normally used for through traffic, (even if this facility is on a four-lane roadway). Permission for such a lane closure must be obtained from the Village Engineer or Director of Public Works prior to commencing construction. Signing will be required in conformance to the "Manual on Uniform Traffic Control Devices." No construction operation is to commence until such time that all required signs and barricades have been erected.

All openings in any pavement or traveled way shall be backfilled prior to the end of the working day. All roadway-crossing excavations shall be backfilled with crushed stone and a temporary bituminous patch of at least two (2) inches in thickness. In lieu of a bituminous patch, a bolted down steel plate (minimum of one (1) inch of thickness) over the excavation may be used.

O. STREET NAME SIGNS

Upon completion of the public improvement, the Village Engineer shall request the Department of Public Works to install reflectorized street name signs (post top/pole mount) in sufficient number, type, size and location and other regulatory signs. This cost shall be born by the developer.

Bike path signs, street name signs, stop signs and other signs shall be provided where required by the Village Engineer or warranted pursuant to the Manual on Uniform Traffic Control Devices, published by the Illinois Department of Transportation. These signs and their installation shall be provided through purchase from the Village is deemed necessary by the Village Engineer and Director of Public Works or through a private vendor. All signs shall use the latest materials to provide high reflectivity at night.
P. MATERIAL TESTING AND EVALUATIONS

Concurrent with the construction of any public improvement within the Village limits, the developer shall furnish the Village Engineer with Illinois Department of Transportation Certificates of Testing and/or from an approved testing laboratory. These tests and evaluations, as requested by the Village Engineer and paid for by the developer, shall include but not be limited to Soil Borings, IBR Determination, Field Density Tests, DIPRA Reports, Concrete Cylinder Tests, In-Place Density Bituminous Concrete Density Tests and Plant Inspection.

Q. PAVEMENT MARKING

Arterial and collector streets street channelization and intersection retroreflective markings shall be installed at the locations required by the Village Engineer.

1. Materials

(a) Purpose:

General purpose high durability retroreflective pliant polymer film for preformed longitudinal, transverse and word/symbol markings subjected to high traffic volumes and severe wear conditions such as repeated shear action from crossover or encroachment on edge and channelization lines, and stop, start or turn movements shall be required.

The preformed markings shall consist of white or yellow films with pigments selected and blended to conform to standard highway colors through the expected life of the film. Glass beads shall be incorporated to provide immediate and continuing retroreflection.

The preformed markings shall be capable of being adhered to asphalt concrete or portland cement by a pre-coated pressure sensitive adhesive. A primer may be used to precondition the pavement surface. The preformed marking film shall mold itself to pavement contours by the action of traffic. The pavement marking films also shall be capable of application on new, dense and open graded asphalt concrete wearing courses during the paving operation in accordance with the manufacturer's instructions. After application the markings shall be immediately ready for traffic.

(b) Composition:

The retroreflective pliant polymer pavement marking film shall consist of a mixture of high quality polymeric materials, pigments and glass beads distributed throughout its base cross-sectional area, with a reflective layer of beads bonded to the top surface.

(c) Reflectance:

The white and yellow films shall have the following initial minimum reflectance values at 0.2 degree and 0.5 degree observation angles and 86.0
degree entrance angle as measured in accordance with the testing procedures of ASTM D 4061.

(d) Acid Resistance:

The beads shall show resistance to corrosion of their surface after exposure to a 1-% solution (by weight) of sulfuric acid.

(e) Reflectivity Retention:

To have a good, effective performance life, the glass beads must be strongly bonded and not be easily removed by traffic wear.

(f) Skid Resistance:

The surface of the retroreflective pliant polymer film shall provide an initial minimum skid resistance value of 45 RPN when tested according to ASTM E 303-74.

(g) Tensile Strength and Elongation:

The film shall have a minimum tensile strength of 150 pounds per square inch of cross-section when tested according to ASTM D 638-76, except that a sample 6" x 1" shall be tested at a temperature between 70 degrees Fahrenheit and 80 degrees Fahrenheit using a jaw speed of 10 to 12 inches per minute. The sample shall have a minimum elongation of 75% at break when tested by this method.

(h) Patchability:

The pavement marking film shall be capable of use for patching worn areas of the same type of film in accordance with manufacturer's instructions.

(i) Thickness:

The film without adhesive shall have a minimum thickness of 0.06 inch.

(j) Effective Performance Life:

The film, when applied according to the recommendations of the manufacturer, shall provide a neat, durable marking that will not flow or distort due to temperature if the pavement surface remains stable.

2. Installation

All markings shall be applied in accordance with the manufacturer's recommendations. Marking configurations shall be in accordance with the "Manual on Uniform Traffic Control Devices."

When markings are specified in the contract for newly paved asphalt concrete surfaces, markings shall be applied before public traffic is allowed on the freshly
paved surface - preferably, the markings should be inlaid in the fresh surface during final rolling of the mat, but in any case they shall be applied before the close of the shift on which the surface is paved. These markings can also be overlaid on existing pavement surfaces.

R. SUB-STANDARD STREETS

1. Definition

A sub-standard street is defined as a Village roadway, typically a bituminous concrete pavement (chip & seal) which currently has one or more of the following deficiencies:

1) a surface and base width of less than 20 feet;
2) lack of curb/gutter;
3) an exaggerated crown;
4) poor roadway drainage;
5) poor or weak base strength; and/or
6) poor cross section and surface conditions.

2. Design Considerations

The following bituminous concrete paving improvements shall be considered where construction to a standard street is determined by the Village Engineer to be impractical.

1) base correction of obvious failures;
2) widening of the roadway to a minimal width of 20 feet;
3) provision of a crown sufficient for drainage;
4) correction of cross section deficiencies;
5) strengthening of roadway edges and/or shoulder work;
6) application of asphalt surface at least 2-inches in depth;
7) use of paving and sub-grade fabrics;
8) driveway culvert replacement and ditch enclosure;
9) detention provisions;
10) sump pump connections;
11) structure adjustment;
12) parkway restoration; and/or
13) owner(s) providing a restrictive covenant committing to a future Special Assessment or Special Service Area for a full standard street improvement.

3. Financial Participation

The developer or homeowners, upon the recommendation of the Village Engineer, shall be requested to contribute toward the upgrading and improvement of the existing pavement and/or drainage system. The developer shall participate in a percentage to be determined by the Village Manager with the concurrence of the Village Board of Trustees.