

## SECTION VIII

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## SECTION VIII

### FLOODPLAIN ENGINEERING REQUIREMENTS

#### A. GENERAL

##### 1. Conformance with Flood Hazard Overlay District

All proposed projects to be constructed within a floodway or floodplain area shall conform to the requirements of the Federal Emergency Management Agency (FEMA) National Flood Insurance Program (NFIP), statutes and regulations promulgated or administered by Illinois Department of Natural Resources - Office of Water Resources (IDNR-OWR) or the successor to its responsibilities, the Northbrook Zoning Code Flood Hazard Overlay District and the Northbrook Subdivision Code adopted by the Village. That portion of the project lying within the floodplain shall be delineated with spot elevations (NAVD 88 Datum) and the limits of both the floodway and floodplain shall be clearly indicated on the overall plans submitted to the Village.

##### 2. Floodway and Floodplain

(a) Floodway - The 100-year regulatory floodway channel, including on-stream lakes, and that portion of the floodplain adjacent to a stream or watercourse as designated by IDNR-OWR, which is needed to store or convey the 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 floodways for the Middle Fork and West Fork of the North Branch of the Chicago River are designated for the Village on the Cook County Flood Insurance Rate Map (FIRM), Map Number 17031C; panels 0088J, 0089J, 0093J, 0227J, 0231J and 0232J, effective date August 19, 2008. The regulatory floodway for the Techny Drain for the Village is designated on the Cook County Flood Insurance Rate Map (FIRM), Map Number 17031C; panel 0227J, effective date August 19, 2008.

(b) Floodplain - That land typically adjacent to a body of water or watercourse with ground surface elevations (FEMA datum) at or below the 100-year flood elevation. Floodplains may also include special flood hazard areas not adjacent to a body of water or watercourse and are depicted on Cook County Flood Insurance Rate maps (FIRMSs), Map Number 17031C; panels 0088J, 0089J, 0093J, 0226J, 0227J, 0231J and 0232J, effective date August 19, 2008; and panels 0069J and 0207J, effective date August 19, 2008.

##### 3. Base Flood Elevation and Limits

In reviewing engineering plan submittals, the Village will base its review on the high water elevations and limits of the 100-year flood as established by the most recent and best available data. The data which will be used by the Village is listed below in descending order of overall accuracy, completeness and currentness. When data of higher order becomes available, data of lower order will not be used.

- (a) Cook County Flood Insurance Study (FIS), effective date August 19, 2008.
- (b) Cook County Flood Insurance Rate Maps (FIRMS), Map Number 17031C, panels 0088J, 0089J, 0093J, 0226J, 0227J, 0231J and 0232J, effective date August 19, 2008; and panels 0069J and 0207J, effective date August 19, 2008.
- (c) Soil Conservation Service - Metropolitan Water Reclamation District of Greater Chicago (SCS-MWRGDC) Floodwater Management Plans, using the "without project" data shown therein.
- (d) Other detailed 100-year flood studies, if certified by IDNR-OWR.
- (e) The base flood or one hundred (100) year storm frequency flood elevation for each of the remaining SFHAs delineated as an "A Zone" on the appropriate Flood Insurance Rate Map for the subject property shall be according to the best existing data available from the Village Engineer and the Illinois State Water Survey Flood Plain Information Repository. When no base flood or one hundred (100) year frequency flood elevation exists, the base flood or 100-year frequency flood elevation for a riverine SFHA shall be determined from a backwater model, such as HEC-II, WSP-2, or a dynamic model such as HIP. The flood flows used in the hydraulic model shall be obtained from a hydrologic model, such as HEC-I TR-20, or HIP, or by IDNR/OWR approved techniques. Flood flows should be based on anticipated future land use conditions in the watershed as determined from adopted local and regional comprehensive and annexation land use plans. Along any watercourses draining more than one (1) square mile, the above floodplain analyses shall be submitted to IDNR/OWR and FEMA for approval; once approved it must be submitted to the Illinois State Water Survey Floodplain Information Repository for filing. For a non-riverine SFHA, the base Flood Elevation shall be the historic Flood of Record plus three (3) feet, unless calculated by a detailed engineering study acceptable to the Village Engineer.
- (f) Any party who disagrees with the best available data shall submit a detailed engineering study to replace existing data with better data and submit it to IDNR/OWR and FEMA for review and consideration prior to any development of the site.
- (g) For an unmapped extended SFHA (with a drainage area less than one square mile) which has been identified by the Village Manager pursuant to Subparagraph 11-403 D3(b) of the Zoning Code, and base flood elevation shall be determined by the applicant utilizing a method as approved in this Section.

**B. SOIL EROSION AND SEDIMENTATION CONTROL PLAN REQUIRED**

A soil erosion and sedimentation control plan for disturbed areas shall be submitted as part of the final engineering drawing set. This plan shall include a description of the proposed sequence of grading activities and identify the temporary sediment and erosion control measures needed to mitigate the negative effects. This plan shall also include a description of final stabilization and landscape measures, the identification of a legally-bound, responsible party to ensure post-construction maintenance, and an adequate financial performance guarantee.

C. MINIMUM PROTECTION REQUIREMENTS

Within the regulatory floodway as identified on the regulatory floodway maps, the construction of an "Appropriate Use," will be considered permissible provided that the proposed project meets the following engineering and mitigation criteria, which shall be so stated in writing with supporting plans, calculations and data prepared by an Illinois registered professional engineer, and provided that any and all structures meet the minimum protection requirements of this Section:

1. Preservation of Flood Conveyance

For "Appropriate Uses" other than bridge or culvert crossings, on-stream structures or dams, all effective regulatory floodway conveyance lost due to the project will be replaced for all flood events up to and including the 100-year frequency flood and the historical Flood of Record. In calculating effective regulatory floodway conveyance, the following factors shall be taken into consideration:

- (a) Regulatory floodway conveyance,

$$"K" = \frac{1.486}{n} AR^{2/3}$$

where "n" is Manning's roughness factor, "A" is the effective area of the cross-section, and "R" is the ratio of the area to the wetted perimeter. (See Open Channel Hydraulics, Ven Te Chow, 1959, McGraw-Hill Book Company, New York)

- (b) The same Manning's "n" value shall be used for both existing and proposed conditions unless a recorded maintenance agreement with a federal, state, or local unit of government can assure the proposed conditions will be maintained or the land cover is changing from a vegetative to a nonvegetative land cover.
- (c) Transition sections shall be provided and used in calculations of effective regulatory floodway conveyance. The following expansion and contraction ratios shall be used unless an applicant's engineer can prove through engineering calculations or model tests that more abrupt transitions may be used with the same efficiency.
- (1) When water is flowing from a narrow section to a wider section, the water should be assumed to expand no faster than at a rate of one (1) foot horizontal for every four (4) feet of the flooded stream's length.
  - (2) When water is flowing from a wide section to a narrow section, the water should be assumed to contract no faster than at a rate of one (1) foot horizontal for every one (1) foot of the flooded stream's length.
  - (3) When expanding or contracting flows in a vertical direction, a minimum of one (1) foot vertical transition for every ten (10) feet of stream length shall be used.

- (4) Transition sections shall be provided between cross-sections with rapid expansions and contractions and when meeting the regulatory floodway delineation on the adjacent properties.
- (5) All cross-sections used in the calculations shall be located perpendicular to flood flows.

2. Preservation of Floodway Storage

Compensatory storage shall be provided for any regulatory floodway storage lost due to the proposed work from the volume of fill or structures placed and the impact of any related flood control projects. Compensatory storage provided for fill or structures shall be equal to 1 to 1 for existing structures and 1.5 to 1 for new structures for the volume of floodplain storage lost. Artificially created storage lost due to a reduction in head loss behind a bridge shall not be required to be replaced. The required compensatory floodway storage volume of the base flood, historical flood of record or which ever is greater shall be placed between the proposed normal water elevation and the proposed 100-year flood elevation. All designated floodway storage lost below the existing 10-year flood elevation shall be replaced below the proposed 10-year flood elevation. All designated floodway storage lost above the existing 10-year flood elevation shall be replaced above the proposed 10-year flood elevation. All such excavations shall be constructed to drain freely and openly to the watercourse. If the compensatory storage will not be placed at the location of the proposed construction, the applicant's engineer shall demonstrate to IDNR/OWR through a determination of flood discharges and water surface elevations that the compensatory storage is hydraulically equivalent. There shall be no reduction in floodway surface area as a result of a floodway modification, unless such modification is necessary to reduce flooding at existing structure.

3. Preservation of Floodway Velocities

For all Appropriate Uses, except bridges or culverts or on stream structures, the proposed work will not result in an increase in the average channel or regulatory floodway velocities or stage for all flood events up to and including the 100-year frequency. However, in the case of bridges or culverts or on stream structures built for the purpose of backing up water in the stream during normal or flood flows, velocities may be increased at the structure site if scour, erosion and sedimentation will be avoided by the use of rip-rap or other design energy absorption measures.

4. Construction of New Bridges or Culvert Crossings and Roadway Approaches

The proposed structure shall not result in an increase of upstream flood stages greater than 0.1 foot when compared to the existing conditions for all flood events up to and including the historical Flood of Record or the 100 year frequency event, whichever is greater or the upstream flood stage increases will be contained within the channel banks (or within existing vertical extensions of the channel banks) such as within the design protection grade of existing certified lawful levees or flood walls or within recorded flood/drainage easements. If the proposed construction will increase upstream flood stages greater than 0.1 feet, the developer must contact IDNR/OWR Dam Safety Section, for a Dam Safety permit or waiver.

- (a) The engineering analysis of upstream flood stages must be calculated using the flood insurance study flows, and corresponding flood elevations for tailwater conditions for the flood insurance study. Culverts must be analyzed using U.S. DOT, FHWA Hydraulic Chart for the Selection of Highway Culverts. Bridges must be analyzed using the U.S. DOT/Federal Highway Administration Hydraulics of Bridge Waterways calculation procedures. Copies of these booklets are on file in the Engineering Department.
- (b) Lost floodway storage must be compensated for as described in the previous section.
- (c) Velocity increases must be mitigated as described in the previous section.
- (d) If the crossing is proposed over public water that is used for recreational or commercial navigation, an Illinois Department of Natural Resources/Office of Water Resources (IDNR/OWR) permit must be received, an Illinois Environmental Protection Agency permit may be required and a U.S. Army Corps of Engineers permit may be required.
- (e) The hydraulic analysis for backwater conditions caused by the bridge/culvert showing the existing condition and proposed regulatory flood profile must be submitted to IDNR/OWR for concurrence that a CLOMR from FEMA is not required.
- (f) All excavations within the floodway for the construction of the bridge/culvert crossing shall be designed in accordance with Section VIII-C.8. of these Standards.

5. Reconstruction or Modification of Existing Bridges, Culverts, and Approach Roads.

- (a) The bridge or culvert and roadway approach reconstruction or modification shall be constructed with no more than 0.1 foot increase in backwater over the existing flood profile for all flood frequencies up to and including the historical Storm of Record or one hundred (100) year event, whichever is greater, if the existing structure is not a source of flood damage.
- (b) If the existing bridge or culvert and roadway approach is a source of flood damage to buildings in the upstream floodplain, the applicant's engineer shall evaluate the feasibility of redesigning the structure to improve the hydraulics and reduce the existing backwater, taking into consideration the effects on flood stages on upstream and downstream properties.
- (c) The determination as to whether or not the existing bridge/culvert crossing is a source of flood damage and should be redesigned must be prepared in accordance with the 17 Illinois Administrative Code 3708 (Floodway Construction in Northeastern Illinois) and submitted to the IDNR/OWR for review and concurrence before permit issuance.

6. On-Stream Structures Built for the Purpose of Backing Up Water.

Any increase in upstream flood stages greater than 0.0 foot when compared to the existing conditions, for all base flood events up to and including 100-year frequency event or the historical Flood of Record frequency event (whichever is greater) shall be contained within the channel banks (or within existing vertical extensions of the channel banks) such as within the design protection grade of existing levees or flood walls or within recorded flood/drainage/retention-detention easements. A statement must be obtained from IDNR/OWR, Dam Safety Section regarding whether a Dam Safety permit or waiver for any structure built for the purpose of backing up water in the stream during normal or flood flow is required. All dams and impoundment structures as previously defined shall meet the permitting requirements of 17 Illinois Administrative Code 3702 (Construction and Maintenance of Dams). If the proposed activity involves a modification of the channel or floodway to accommodate an impoundment, it shall be demonstrated that:

- (a) The impoundment is determined to be in the public interest by providing flood control, public recreation, or regional stormwater detention;
- (b) The impoundment will not prevent the migration of indigenous fish species, which require access to upstream areas as part of their life cycle, such as for spawning;
- (c) The impoundment will not cause or contribute to degraded water quality or habitat conditions. Impoundment design should include gradual landscaped bank slopes, appropriate bank stabilization measures, a submerged safety ledge, a defined emergency overflow route, and a pre-sedimentation basin; and
- (d) A nonpoint 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. If there is more than one municipality in the upstream watershed, the municipality in which the impoundment is constructed should coordinate with upstream municipalities to ensure comprehensive watershed control.

7. Floodproofing of Existing Habitable, Residential and Commercial Structures. If construction is required beyond the outside dimensions of the existing building, the outside perimeter of the floodproofing construction shall be placed no further than 10 feet from the outside of the building. Compensation of lost storage and conveyance will not be required for floodproofing activities.

8. Crawlspaces Below Flood Protection Elevation. A building may be constructed with a crawlspace located below the flood protection elevation provided that the following conditions are met:

- a) The building must be designed and adequately anchored to resist flotation, collapse, and lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.
- b) Any enclosed area below the flood protection elevation shall have openings that equalize hydrostatic pressures by allowing for the automatic entry and exit of

floodwaters. A minimum of one opening on each wall having a net area of not less than one square inch per one square foot of enclosed area. The openings shall be no more than one (1) foot above grade.

- c) The interior grade of the crawlspace below the flood protection elevation must not be more than 2 feet below the lowest adjacent exterior grade.
- d) The interior height of the crawlspace measured from the interior grade of the crawl to the top of the foundation wall must not exceed 4 feet at any point.
- e) An adequate drainage system must be installed to remove floodwaters from the interior area of the crawlspace within a reasonable period of time after a flood event.
- f) Portions of the building below the flood protection elevation must be constructed with materials resistant to flood damage.
- g) Utility systems within the crawlspace must be elevated above the flood protection elevation.

9. Protecting Buildings. All buildings located within the Flood Hazard Overlay District meeting the following standards shall be protected from flood damage below the flood protection elevation in accordance with provisions of Sections 8-206 and 8-207 of the Zoning Code:

- (a) Construction or placement of a new building or alteration or addition to an existing building valued at more than one thousand dollars (\$1,000) or seventy (70) square feet.
- b) Substantial improvements or structural alterations made to an existing building that increase the floor area by more than twenty percent (20%) or equal or exceed the market value by fifty percent (50%). Alteration shall be figured cumulatively subsequent to the adoption of this ordinance. If substantially improved, the existing structure and the addition must meet the flood protection standards of this section.
- c) Installing a travel trailer or recreational vehicle on a site for more than one hundred eighty days per year.

Repairs made to a substantially damaged building shall be calculated cumulatively subsequent to May 8, 2007. If substantially damaged, the entire structure must meet the applicable flood protection standards.

10. Excavation in the Floodway. When floodway excavation is proposed in the design of bridges and culvert openings, including the modifications to and replacement of existing bridge and culvert structures, or to compensate for lost conveyance for other Appropriate Uses, transition sections shall be provided for the excavation. The flood carrying capacity of any watercourse shall be maintained. The following expansion and contraction ratios shall be used unless an applicant's engineer can demonstrate to the IDNR/OWR through engineering calculations or model flow tests that more abrupt transitions may be used with the same efficiency:



- (a) When water is flowing from a narrow section to a wider section, the water should be assumed to expand no faster than at a rate of one (1) foot horizontal for every four (4) feet of the flooded stream's length.
  - (b) When water is flowing from a wide section to a narrow section, the water should be assumed to contract no faster than at a rate of one (1) foot horizontal for every one (1) foot of the flooded stream's length.
  - (c) When expanding or contracting flows in a vertical direction, a minimum of one (1) foot vertical transition for every ten (10) feet of stream length shall be used.
  - (d) Adequate erosion/scour protection shall be provided inland upstream and downstream of the transition sections.
11. Proposed Channel Modification. If the proposed activity involves a channel modification, it shall be demonstrated that:
- (a) The flood carrying capacity of the channel shall be maintained.
  - (b) There are no practicable alternatives to the activity which would accomplish its purpose with less impact to the natural conditions of the body of water affected. Possible alternatives include levees, bank stabilization, flood proofing of existing structures, removal of structures from the floodplain, clearing the channel, high flow channel, or the establishment of a stream side buffer strip or green belt. Channel modification is acceptable if the purpose is to restore natural conditions and improve water quality and fish and wildlife habitat.
  - (c) Water quality, habitat, and other natural functions would be significantly improved by the modification and no significant habitat area may be destroyed, or the impacts are offset by the replacement of an equivalent degree of natural resource values.
  - (d) The activity has been planned and designed and will be constructed in a way which will minimize its adverse impacts on the natural conditions of the body of water affected, consistent with the following criteria:
    - (1) The physical characteristics of the modified channel shall match as closely as possible those of the existing channel in length, cross-section, slope and sinuosity. If the existing channel has been previously modified, restoration of more natural physical conditions should be incorporated into channel modification design, where practical.
    - (2) Hydraulically effective transitions shall be provided at both the upstream and downstream ends of the project, designed such that they will prevent erosion.
    - (3) One-sided construction of a channel shall be used when feasible. Removal of streamside (riparian) vegetation should be limited to one side of the channel, where possible, to preserve the shading and stabilization effects of the vegetation.

- (4) Clearing of stabilizing vegetation shall be limited to that which is essential for construction of the channel.
  - (5) Channel banks shall be constructed with a side slope no steeper than 3:1 horizontal to vertical, wherever practicable. Native vegetation and gradual side slopes are the preferred methods for bank stabilization. Where high velocities or sharp bends necessitate the use of alternative stabilization measures, soil bioengineering techniques, natural rock or rip-rap are preferred approaches. Artificial materials such as concrete, gabions, or construction rubble should be avoided unless there are no practicable alternatives.
  - (6) All disturbed areas associated with the modification shall be seeded or otherwise stabilized as soon as possible upon completion of construction. Erosion blanket or an equivalent material shall be required to stabilize disturbed channel banks prior to establishment of the vegetative cover.
  - (7) If the existing channel contains considerable bottom diversity such as deep pools, riffles, and other similar features, such features shall be provided in the new channel. Spawning and nesting areas and flow characteristics compatible with fish habitat shall also be established, where appropriate.
  - (8) A sediment basin shall be installed at the downstream end of the modification to reduce sedimentation and degradation of downstream water quality.
  - (9) New or relocated channels should be built in the dry and all items of construction, including vegetation, should be completed prior to diversion of water into the new channel.
  - (10) There shall be no increases in stage or velocity as the channel enters or leaves the project site for any frequency flood unless necessitated by a public flood control project or unless such an increase is justified as part of a habitat improvement or erosion control.
  - (11) Unless the modification is for a public flood control project, there shall be no reduction in the volume of floodwater storage outside the floodway as a result of the modification.
12. Construction on Fill. All construction on fill materials in the flood plain or floodway shall be subject to the following:
- (a) Compensatory storage shall be provided per Section 8-206 and 207 of the Zoning Code.
  - (b) The elevation of the lowest opening in the basement (i.e., window wells, access ways) shall be at or above the Flood Protection Elevation (FPE).

- (c) The earth fill shall be placed in layers no greater than six (6) inches deep before adequate compaction, shall extend at least ten (10) feet beyond the foundation of the building before sloping down to the base flood elevation and shall be protected against erosion and scour. The top of the fill shall be at or above the FPE. The fill shall be inspected and certified by a registered professional engineer. The Village Manager is authorized to waive the above ten (10) foot perimeter standard if an Illinois Registered Professional Engineer certifies that an alternative method to protect the building from damage due to hydrostatic pressures has been met. The certifications shall be in the form of a detailed soils and structural design analysis, which shall be submitted to the Village Manager for review. The Village Manager may require such additional documentation as necessary to prove that the proposed shorter setback distance will keep the structure reasonable safe. In no case shall the setback distance be less than four (4) feet.
- (d) The grade around the perimeter of the structure, measured at a distance of twenty (20) feet from the structure, shall be above the BFE. However, if site conditions are such that this requirement cannot be obtained, the Village Manager may waive the twenty (20) foot minimum setback distance if an Illinois Registered Professional Engineer certifies that an alternative method to protect the building from damages due to hydrostatic pressures have been met. A detailed soils analysis and structural design proving that a shorter setback distance will keep the structure reasonable safe from flooding, shall be submitted to the Village for review. In no case shall the setback distance be less than four (4) feet.
- (e) The ground around the building shall be compacted fill that meets all requirements of this subsection and is at least five (5) feet thick under the basement floor slab. Nothing in this subsection shall be interpreted to require the removal or replacement of fill that was placed as part of a LOMR-F, if such fill consists of material, including soils of similar classification and degree of permeability, such as those classified as CH, CL, SC or ML according to ASTM standard D-2487, Classification of Soils for Engineering Purposes.
- (f) The fill material must be homogeneous and isotropic; this is, the soil must be all of one material and the engineering properties must be in the same direction.
- (g) The fill material and compaction shall be designed, certified and inspected by an Illinois Registered Professional Engineer, as warranted by the site conditions.
- (h) The basement floor shall be at an elevation that is no more than five (5) feet below the BFE.
- (i) There shall be a granular drainage layer beneath the floor slab, and minimum of  $\frac{1}{4}$  horsepower sump pump with a backup power supply shall be provided to remove seepage flow. The pump shall be rated at four (4) times the estimated seepage rate and shall discharge above the BFE and away from the building in order to prevent flooding of the basement or uplift of the floor under the effect of the seepage pressure.
- (j) The drainage system shall be equipped with a positive means of preventing backflow.

- (k) The fill shall not adversely affect the flow or surface drainage from or onto neighboring properties, and when necessary, stormwater management techniques such as swales or basins shall be incorporated.
  - (l) All foundation elements shall be designed to withstand hydrostatic pressure in accordance with accepted engineering practices.
  - (m) If the applicant is unable to meet all the requirements set forth in the preceding paragraphs of this subsection, the Village Manager may allow the construction of a basement below the BFE only if the applicant demonstrates that the proposed fill and structure meet the guidelines and requirements set forth in FEMA Technical Bulletin 10-01 and are reasonably safe from flooding. In order to demonstrate that the proposed structure is reasonable safe from flooding, the applicant shall submit a detailed engineering analysis of the proposed fill and foundation wall. The engineered basement study shall be completed in accordance with the latest edition of FEMA Technical Bulletin 10-01, with the analysis of the fill being prepared by an Illinois Registered Professional Engineer.
  - (n) In order to provide the required compensatory storage on site, in no case shall the depth of excavation in the front and side yards of the lot exceed eighteen (18) inches, as measured from the previously existing natural grade. The rear yard shall be permitted to have a greater depth of excavation, if necessary. All such excavation shall be constructed to drain freely and openly to the watercourse or storm sewer system. The use of mechanical means to drain the compensatory storage area will not be permitted.
13. Seeding and Stabilization Plan. For all proposed construction/restoration activities located in a floodway, a landscape restoration seeding and stabilization plan shall be submitted by the applicant.
14. Soil Erosion and Sedimentation Measures. For all construction activities in the floodway, including grading, filling, and excavation, in which there is potential for soil erosion, specific erosion and sediment control measures shall be employed and inspected by the Engineering Department staff. The following minimum criteria shall be met:
- (a) The construction area disturbed shall be minimized to preserve the maximum vegetation possible. Construction shall be scheduled to minimize the time soil is exposed and unprotected. In no case shall the existing natural vegetation be destroyed, removed, or disturbed more than 15 days prior to the initiation of improvements.
  - (b) Temporary and/or permanent soil stabilization methods shall be applied to denuded areas, as soon as possible. As a minimum, soil stabilization shall be provided within 15 days after final grade is reached on any portion of the site, and within 15 days to denuded areas which may not be at final grade but will remain undisturbed for longer than 60 days.
  - (c) Sedimentation control measures shall be installed before any significant mass grading or land filling is initiated on the site to prevent the movement of eroded

soils off site or into the channel. Potential sediment control devices include, but are not limited to, filter fences, straw bale fences, check dams, diversion ditches, and sediment basins.

- (d) A vegetated buffer strip of at least twenty-five (25) feet in width should be preserved and/or re-established, where possible, along existing channels. Construction vehicle use of channels shall be minimized. Temporary stream crossings may be constructed utilizing low flow culverts, where necessary, with the Village Engineer's approval to minimize erosion. Necessary construction in or along channels shall be restabilized as soon as practical.
  - (e) Soil erosion and sedimentation control measures shall be designed and implemented consistent with "Procedures and Standards for Urban Soil Erosion and Sedimentation Control in Illinois" (1988) also known as the "Green Book".
15. Public Flood Control Projects. For public flood control projects, the joint floodway permitting requirements of this Section will be considered met if the applicant can demonstrate to IDNR/OWR through detailed Engineering Plans which include hydraulic and hydrologic calculations which indicate that the proposed project will not singularly or cumulatively result in increased flood heights outside the project right-of-way or easements for all flood events up to and including the 100-year frequency event.
16. General Criteria for Analysis of Flood Elevations.
- (a) The flood profiles, flows and floodway data in the FEMA regulatory floodway study, must be used for analysis of the base conditions. If the study data appears to be in error or conditions have changed, IDNR/OWR shall be contacted for approval and concurrence on the appropriate minor modifications to the base conditions data used.
  - (b) If the 100-year regulatory floodway elevation at the site of the proposed construction is affected by backwater from a downstream receiving stream with a larger drainage area, the proposed construction shall be shown to meet the requirements of this Section for the 100-year frequency flood elevations of the regulatory floodway conditions and conditions with the receiving stream at normal water elevations.
  - (c) If the applicant learns from IDNR/OWR, local governments, or a private owner that a downstream restrictive bridge or culvert is scheduled to be removed, reconstructed, modified, or a regional flood control project is scheduled to be built, removed, constructed or modified within the next five years, the proposed construction shall be analyzed and shown to meet the requirements of this Section for the following:
    - (1) the existing conditions; and
    - (2) the expected flood profile conditions when the bridge, culvert or flood control project is built.
17. Conditional Letter of Map Revision. If the "Appropriate Use" would result in a change in the regulatory floodway location or the 100-year frequency flood elevation, the

applicant shall submit transitional sections to the Village Engineer for review and approval prior to submittal to IDNR/OWR and FEMA. Sections must include all technical engineering information including calculations necessary to secure a conditional letter for regulatory floodway map revision. An IDNR/OWR conditional approval of the regulatory floodway change must be secured before a permit is issued. However, the final regulatory floodway map will not be changed by FEMA and IDNR/OWR until "as-built" plans or "record drawings" with fill compaction certification are submitted and approved by the Village Engineer and accepted by FEMA and IDNR/OWR. In the case of non-government projects, the municipality in unincorporated areas shall concur with the proposed conditional regulatory floodway map revision before IDNR/OWR approval can be given. No filling, grading, dredging or excavating shall take place until a conditional approval is issued. No further development activities (building permit, foundation installations, etc.) shall take place until a final Letter of Map Revision (LOMR) is issued by FEMA and IDNR/OWR.

18. Professional Engineer's Supervision. All engineering analyses shall be performed by or under the supervision of an Illinois registered professional engineer experienced in floodplain development methods and practices.
19. Construction Near Channel. For all activities in the floodway involving construction within twenty-five (25) feet of the channel, the following criteria shall be met:
  - a. A natural vegetation buffer strip shall be preserved within at least twenty-five (25) feet of the ordinary high water mark of the channel where possible.
  - b. Where it is impossible to protect this buffer strip during construction of an Appropriate Use, a vegetated buffer strip shall be established upon completion of construction.
  - c. The use of native riparian vegetation is preferred in the buffer strip. Access through this buffer strip shall be provided, when necessary, for stream maintenance purposes.
20. Proceeding with Construction. After receipt of conditional approval for the regulatory floodway change and issuance of a permit and a Conditional Letter of Map Revision, construction as necessary to change the regulatory floodway designation may proceed but no buildings or structures or other construction that is not an "Appropriate Use" may be placed in that area until the regulatory floodway map is changed and a final Letter of Map Revision is received. The regulatory floodway map will be revised upon acceptance and concurrence by the Village Engineer, IDNR/OWR, and FEMA of the "as built" certified plans with soil fill compaction certification.

D. DAM SAFETY PERMITS AND REQUIREMENTS

Any work involving the construction, modification or removal of a dam as defined in Section 12-206 of the Zoning Code per 17 Ill. Adm. Code 3702 (Rules for Construction of Dams) shall obtain an Illinois Division of Water Resources Dam Safety permit prior to the start of construction of a dam. If the Village Engineer finds a dam that does not have an IDNR/OWR permit, the Village Engineer shall immediately notify the IDNR/OWR Bartlett Office. If the Village Engineer finds a dam which is believed to be in unsafe condition, the Village Engineer shall immediately notify the owner of the dam, the

IDNR/OWR Bartlett Office, Dam Safety Section in Springfield and the Illinois Emergency Management Agency (IEMA). The following rules and guidelines should be used for the classification all dams:

1. Dams are classified as to their size and their hazard/damage potential in the event of failure.
2. The construction or major modification of all Class I (high hazard) and Class II (moderate hazard) dams require an IDNR/OWR dam safety permit.
3. Some Class III (low hazard) dams require an IDNR/OWR dam safety permit, depending on the drainage area to the demand the impounding capacity behind the dam. Most off-channel detention basins that have an embankment are non-jurisdictional Class III dam. It is not required that IDNR/OWR "sign-off" on all non-jurisdictional Class III dams.
4. A consulting engineer with dam safety knowledge can estimate a hazard classification and determine if an IDNR/OWR dam safety permit is required.
5. A permit submittal application must be made to IDNR/OWR for the construction or major modification of jurisdictional dams.
6. Regulated dams may include weirs, restrictive culverts or impoundment structures.

E. SPECIAL FLOOD HAZARD AREA STANDARDS

Within all riverine SFHAs where the floodway has not been determined, the following standards shall apply:

1. The developer shall have an Illinois Registered Professional Engineer state in writing and show through supporting plans, engineering calculations, and topographic and computer model data that the project meets or exceeds the engineering minimum requirements of these standards for the entire floodplain. As an alternative, the developer should have an engineering drainage and flood study performed to determine a 100/500 year floodway and submit that engineering study to IDNR/OWR for acceptance as a regulatory floodway. Upon acceptance of their floodway by the IDNR/OWR, the developer shall then demonstrate that the project meets the Village floodplain requirements for regulatory floodway. The floodway shall be defined according to the definition in the Zoning Code.
2. A development permit shall not be issued unless the applicant first obtains a permit from IDNR/OWR or written documentation that a permit is not required from IDNR/OWR.
3. No permit from IDNR/OWR shall be required but only their review and approval of detailed hydraulic calculations and Base Flood Elevations when IDOT has delegated to the Village and the Village has formally accepted the administrative responsibilities for their issuance per Section 19 Ill. Adm. Code Part 3708.
4. Dam Safety Permits. Any work involving the construction, modification, or removal of a dam or on-stream structure to impound water as defined in Section 12-206 of the Zoning

Code shall obtain an Illinois Division of Water Resources Dam Safety permit or letter indicating a permit is not required prior to the start of construction of a dam. If the Director of Development finds a dam which is believed to be in unsafe condition, he shall immediately notify the owner of the dam, the Illinois Emergency Services Disaster Agency (ESDA), and the IDNR/OWR Dam Safety Section in Springfield, Illinois.

5. The following activities may be permitted without an Illinois Registered Professional Engineer's review or calculation of a base flood elevation and regulatory floodway. Such activities shall still meet the other requirements of this Section, the Subdivision Code and the Zoning Code:
  - a. Underground and overhead utilities that:
    - (1) Do not result in any increase in existing ground elevations.
    - (2) Do not require the placement of above ground structures in the floodway.
    - (3) In the case of underground stream crossings, the top of the pipe or encasement is buried a minimum of three (3) feet below the existing streambed.
    - (4) In the case of overhead utilities, no supporting towers are placed in the watercourse and are designed in such a fashion as not to catch debris.
  - b. Storm sewer outfalls that:
    - (1) Do not extend riverward or lakeward of the existing adjacent natural bank slope.
    - (2) Do not result in an increase in ground elevation.
    - (3) Are designed so as not to cause stream bank erosion at the outfall location.
  - c. Construction of shoreline and streambed protection that:
    - (1) Does not exceed 1,000 feet in length or two (2) cubic yards per lineal foot of streambed.
    - (2) Materials are not placed higher than the existing top of bank.
    - (3) Materials are placed so as to reduce the cross-sectional area of the stream channel by more than 10%.
    - (4) Vegetative stabilization and gradual side slopes are the preferred mitigation methods for existing erosion problems. Where high channel velocities, sharp bends or wave action necessitate the use of alternative stabilization measures, natural rock or grouted in place rip-rap are preferred materials. Artificial materials such as concrete, construction



rubble, and gabions should be avoided unless there are no practicable alternatives.

- d. Temporary stream crossings in which:
  - (1) The approach roads will be 0.5' (1/2 foot) or less above natural grade.
  - (2) The temporary crossing will allow stream flow to pass without backing up the water above the stream bank vegetation line or above any drainage tile or storm sewer outfall invert.
  - (3) The top of the roadway fill in the channel will be at least two (2) feet below the top of the lowest bank. Any fill in the channel shall be stable, nonfloatable, nontoxic, and nonerosive material, such as rip-rap or gravel.
  - (4) All disturbed stream banks will be seeded perennially or otherwise stabilized as soon as possible upon installation and again upon removal of the construction crossing.
  - (5) The access road and temporary crossings will be removed within one (1) year after authorization.
- e. The construction of light poles, sign posts and similar structures:
- f. The construction of sidewalks, driveways, athletic fields (excluding fences), patios, and similar surfaces which are built at grade.
- g. The construction of properly anchored, unwallled, open structures such as playground equipment, pavilions, and carports built at or below existing grade that would not obstruct the flow of flood waters.
- h. The placement of property anchored buildings not exceeding seventy (70) square feet in size, nor ten (10) feet in any one dimension (e.g., animal shelters and tool sheds).
- i. The construction of additions to existing buildings which do not increase the first floor area by more than twenty (20) percent, which are located on the upstream or downstream side of the existing building, and which do not extend beyond the sides of the existing building that are parallel to the flow of flood waters.
- j. Minor maintenance dredging of a stream channel where:
  - (1) The affected length of stream is less than 1,000 feet.
  - (2) The work is confined to reestablishing flows in natural stream channels.
  - (3) The cross-sectional area of the dredged channel conforms to that of the natural channel upstream and downstream of the site.

6. The flood carrying capacity within any altered or relocated watercourse shall be maintained.