

City of Charleston

# Floodplain Ordinance

Adopted by City Council on December 17, 2007

REVISED  
1/3/2011

## **Article II. Floodplain Ordinance**

### **DIVISION 1. GENERAL PROVISIONS**

#### **Section 91-11. Intent.**

The intent of this ordinance is to:

- A. Promote the general health, welfare, and safety of the community.
- B. Encourage the utilization of appropriate construction practices in order to prevent or minimize flood damage in the future.
- C. Minimize danger to public health and safety by protecting water supply and sanitary sewage disposal in cooperation with the Charleston Sanitary Board, and to protect natural drainage.
- D. Assure the County Assessor obtains information concerning improvement of real property as required by WV State Code 11-3-3A.
- E. Assure E-911 addresses are obtained to maintain the currency of established emergency response dispatch systems.
- F. Reduce financial burdens imposed on the community, its governmental units, and its residents, by preventing the unwise design and construction of development in areas subject to flooding.

#### **Section 91-12. Abrogation and Greater Restrictions.**

This ordinance supersedes any ordinance currently in effect in flood prone areas. Any ordinance, however, shall remain in full force and effect to the extent that its provisions are more restrictive.

#### **Section 91-13. Applicability.**

It shall be unlawful for any contractor, person, partnership, business, or corporation to undertake or cause to be undertaken, any development, new construction, substantial improvement, repair of substantial damage, or the placement or relocation of any structure (including manufactured homes) within the City of Charleston, unless a permit application has been completed and a permit and certificate of compliance has been obtained from the Floodplain Administrator. In addition, where land is to be subdivided, utilized for a manufactured home park or subdivision or otherwise developed, a site plan must be submitted to, and approved by, the Floodplain Administrator prior to any development.

Provision of all other codes, ordinances, and regulations shall be applicable insofar as they are consistent with the provisions of this ordinance and the city's need to minimize the hazards and damage resulting from flooding.

#### **Section 91-14. Matters not provided for specifically.**

Where conditions are encountered that are not specifically provided for herein, the floodplain administrator shall determine the applicability of the provisions of this ordinance in accordance with its intent, and shall require the applicant to take appropriate measures pursuant to such determination.

**Sections 91-15—91-20. Reserved.**

## **DIVISION 2. INTERPRETATIONS AND DEFINITIONS**

### **Section 91-21. Interpretations.**

A. For the purpose of this ordinance, the following interpretations shall apply:

1. Words used in the present tense include the future tense
2. The singular includes the plural.
3. The plural includes the singular.
4. The Term “shall” or “will” is always mandatory.
5. The word “building” or “structure” shall be construed as if followed by the phrase “or part thereof”.
6. The word “Ordinance” shall refer to the Floodplain Ordinance.

### **Section 91-22. Definitions.**

#### General

Unless specifically defined below, words and phrases used in this ordinance shall be interpreted so as to give this ordinance it’s most reasonable application.

**Accessory Structure.** A structure on the same parcel of property as the principal structure and the use of which is incidental to the use of the principal structure. This does not include a gas or liquid storage tank.

**Base Flood.** The flood, which has been selected to serve as the basis upon which the floodplain management provisions of this and other ordinances have been prepared; for purposes of this ordinance, the one-hundred (100) year flood.

**Basement.** Any area of the building having its floor sub grade (below ground level) on all sides.

**Certificate of Compliance.** A certification that the entire development, including the elevation of fill or the lowest floor of a structure is in compliance with all of the provisions of this ordinance.

**Contractor.** - WV State Code 21-11-3(c) - A person who in any capacity for compensation, other than as an employee of another, undertakes, offers to undertake, purports to have the capacity to undertake, or submits a bid to construct, alter, repair, add to, subtract from, improve,

move, wreck or demolish any building, highway, road, railroad, structure or excavation associated with a project, development or improvement, or to do any part thereof, including the erection of scaffolding or other structures or works in connection therewith, where the cost of the undertaking is one thousand dollars or more. Contractor includes a construction manager who performs management and counseling services on a construction project for a professional fee.

Contractor does not include:

- (1) One who merely furnishes materials or supplies without fabricating or consuming them in the construction project.
- (2) A person who personally performs construction work on the site of real property which the person owns or leases whether for commercial or residential purposes;
- (3) A person who is licensed or registered as a professional and who functions under the control of any other licensing or regulatory board, whose primary business is real estate sales, appraisal, development, management and maintenance, who acting in his or her respective professional capacity and any employee of such professional, acting in the course of his or her employment, performs any work which may be considered to be performing contracting work
- (4) A pest control operator licensed under the provisions of section seven, article sixteen-a, chapter nineteen of this code to engage in the application of pesticides for hire, unless the operator also performs structural repairs exceeding one thousand dollars on property treated for insect pests; or
- (5) A corporation, partnership or sole proprietorship whose primary purpose is to prepare construction plans and specifications used by the contractors defined in this section and who employs full time a registered architect licensed to practice in this state or a registered professional engineer licensed to practice in this state. Contractor also does not include employees of such corporation, partnership or sole proprietorship.

**Development.** Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.

**Flood.** A general and temporary inundation of normally dry land areas.

**Floodplain.**

1. A relatively flat or low land area adjoining a river, stream, or watercourse which is subject to partial or complete inundation;
2. An area subject to the unusual and rapid accumulation or runoff of surface waters from any source.

**Floodplain Administrator.** The person charged with enforcing the provisions of this ordinance. The Floodplain Administrator may also be identified as the Floodplain Manager.

**Floodway.** The channel of a river or other watercourse and the adjacent land area that must be reserved to discharge the base flood without increasing the water surface elevation of that flood more than one foot at any point.

**Flood proofing.** Any combination of structural and non-structural additions, changes or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

**Freeboard.** A factor of safety usually expressed in feet above a flood level for purposes of floodplain management. Freeboard tends to compensate for unknown factors that may contribute uncertainty to flood heights of any given flood and floodway condition, such as wave action, blockage at stream crossings, and increased runoff from urbanization of the watershed.

**Historic Structure.** Any structure that is:

1. Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;
2. Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district
3. Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of the Interior; or,
4. Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either:
  - a. By an approved state program as determined by the Secretary of the Interior; or,
  - b. Directly by the Secretary of Interior in states without approved programs.

**Licensed Manufactured Home Dealer.** A business licensed to sell Manufactured Homes in the state of WV as set forth in the WV state code.

**Licensed Manufacturing Home Installer.** A contractor licensed to install Manufactured Homes in WV as set forth in the WV State Code.

**Licensed Professional Surveyor.** Any person licensed by the WV state board of examiners of land surveyors to engage in the practice of land surveying as defined in WV state code.

**Lowest Floor.** The lowest floor of the lowest enclosed area (including basement). An unfinished enclosure constructed with flood resistant materials as defined in the FEMA Technical Bulletin 2-93 (FIA-TB-2) and usable solely for parking of vehicles, building access or storage in an area other than a basement area is not considered a building's lowest floor; Provided, that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of this ordinance.

**Manufactured Home.** A structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when

connected to the required utilities. The term “manufactured home” does not include a “recreational vehicle”.

**New Construction.** Structures for which the Start of Construction as herein defined commenced on or after June 15, 1983 and including any subsequent improvements to such structures.

**One-Hundred (100) Year Flood.** A flood that has one chance in one-hundred or a one percent chance of being equaled or exceeded in any given year.

**Practice of Engineering.** Any service or creative work, as described in WV state code Article 13, the adequate performance of which requires engineering education, training and experience in the application of special knowledge of the mathematical, physical and engineering sciences to such services or creative work as consultation, investigation, evaluation, planning and design of engineering works and systems; planning the use of land and water; teaching of advanced engineering subjects, engineering surveys and studies; and the review of construction for the purpose of assuring compliance with drawings and specifications any of which embraces such services or work, either public or private, in connection with any utilities, structures, buildings, machines, equipment, processes, work systems, projects and industrial or consumer products or equipment of a mechanical, electrical, hydraulic, pneumatic or thermal nature, insofar as they involve safeguarding life, health or property, and including such other professional services as may be necessary to the planning, progress and completion of any engineering services. Engineering surveys include all survey activities required to support the sound conception, planning, design, construction, maintenance and operation of engineered projects.

Any person who practices any branch of the profession of engineering or who, by verbal claim, sign, advertisement, letterhead, card or in any other way represents himself or herself to be a registered professional engineer, or by using another title implies that he or she is a registered professional engineer or that he or she is registered under WV state code, article 13 or who holds himself or herself out as able to perform, or who performs any engineering service or work or any other service designated by the practitioner which is recognized as engineering, is considered to practice or offer to practice engineering within the meaning and intent of WV state code article 13.

**Person.** Any individual or group of individuals, corporation, partnership, association or other entity, including State and local governments and agencies.

**Principally Above Ground.** Where at least 51 percent of the actual cash value of a structure, less land value, is above ground.

**Recreational Vehicle.** A vehicle which is:

- (a) Built on a single chassis;
- (b) 400 square feet or less when measured at the largest horizontal projection;
- (c) Designed to be self-propelled or permanently towable by a light duty truck; and
- (d) Designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

**Registered professional engineer.** A person who has been duly registered or licensed as a registered professional engineer by the West Virginia state board of registration for professional engineers as required under WV state code article 13 et seq.

**Remedy a Violation.** To bring a structure or other development into compliance with the requirements of this ordinance, or, if full compliance is not possible, to reduce the adverse impacts of the non-compliance to the greatest extent feasible.

**Reasonably Safe from Flooding.** Means base flood waters will not inundate the land or damage structures to be removed from the special flood hazard area and that any subsurface waters related to the base flood will not damage existing or proposed buildings.

**Start of Construction.** *(The definition for start of construction is to be used only when calculating the starting time of the 6 month expiration of a permit.)*

The date the permit was issued, including permits for substantial improvement or substantial damage, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond initial excavation, or the placement of a manufactured home on a foundation. Although a permit must be obtained prior to beginning, permanent construction does not include land preparation, such as clearing, grading and filling, nor does it include the installation of streets and/or walkways, nor does it include excavation for a basement, footings, piers or foundations or the erection of temporary forms, nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For an alteration, the actual start of construction means the first alteration of any wall, ceiling, floor or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

**State Coordinating Office.** The West Virginia Division of Homeland Security and Emergency Management

**Stream.** As defined in WV State Code 7-1-3U, any watercourse, whether natural or man-made, distinguishable by banks and a bed, regardless of their size, through which water flows continually or intermittently, regardless of its volume.

**Structure.** A walled and roofed building, including a gas or liquid storage tank that is principally above ground, as well as a manufactured home.

**Substantial Damage.** Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damage condition would equal or exceed 50 percent of the market value of the structure before the damage occurred. Substantial damage also means cumulative flood-related damages sustained by a structure on two separate occasions during a 10 year period for which the cost of repairs at the time of each flood event equals or exceeds 25 percent of the market value of the structure before the damage occurred. See “Substantial Improvement.”

**Substantial Improvement.** Any repair, reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the Start of Construction of the improvement.

This term includes structures, which have incurred “substantial damage”, as defined herein regardless of the actual repair work performed. The term does not, however, include any project for improvement of a structure to correct existing violation of state or local health, sanitary or

safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions.

Historic structures undergoing repair or rehabilitation that would constitute a substantial improvement as defined above, must comply with all ordinance requirements that do not preclude the structure's continued designation as a historic structure. Documentation that a specific ordinance requirement will cause removal of the structure from the National Register of Historic Places or the State Inventory of Historic places must be obtained from the Secretary of the Interior or the State Historic Preservation Officer. Any exemption from ordinance requirements will be the minimum necessary to preserve the historic character and design of the structure.

For the purpose of this definition improvement is considered to occur when the first alteration of any wall, ceiling, floor or other structural part of the building commences whether or not that alteration affects the external dimensions of the structure.

**Top of Bank.** The lines depicted on the FIRM maps delineating each side of a stream indicate the top of bank. In the field a professional familiar with fluvial geomorphology should document the top of bank. When a professional is not employed the top of the bank will be considered to be the top of the first significant slope landward of the waters edge when it is followed by at least 50 feet of relatively flat land.

**Violation.** The failure of any structure or development to be fully compliant with all requirements of this ordinance.

**Sections 91-23—91-30. Reserved.**

### **DIVISION 3. ESTABLISHMENT OF THE FLOODPLAIN AREA**

#### **Section 91-31. Identification.**

- A. The identified floodplain area shall be those areas of the City of Charleston which are subject to the one hundred (100) year flood, as shown on the Flood Insurance Rate Map (FIRM) and described in the Flood Insurance Study (FIS) prepared for the City of Charleston by the Federal Emergency Management Agency (FEMA) dated February 6, 2008 or the most recent revision thereof.
- B. The identified floodplain area shall also be those areas of the City which have been identified as flood hazard areas by the City of Charleston by use of historic or other technical data and shown on the Charleston "Local Flood Hazards Map". These areas shall be designated as appropriate with the level of technical data described below and shall be managed accordingly.

#### **Section 91-32. Descriptions of Floodplain Areas.**

The identified floodplain shall consist of the following four specific areas:

- A. The Floodway area (F1) shall be those areas identified as such in the FIS and as shown on the floodway map or FIRM. In the Approximated floodplain area (F4) for which no

regulatory floodway is designated, the regulatory floodway is determined to be the channel of the river or other water course and the adjacent land areas to a distance of one-half the width of the floodplain as measured from the top of the bank of the channel to the upland limit of the floodplain. The term shall also include floodway areas identified in other studies for the approximated area discussed in Section D Below.

- B. The Floodway Fringe area (F2) shall be those areas for which specific one hundred (100) year flood elevations have been provided in the FIS but which lie beyond the floodway area.
- C. The AE Area without Floodway (F3) shall be those areas identified as an AE Zone on the FIRM included in the FIS prepared by FEMA for which 100-year flood elevations have been provided but no Floodway has been delineated.
- D. The Approximated area (F4) shall be those areas identified as an A Zone on the FIRM or floodway map included in the FIS prepared by FEMA and for which no one hundred (100) year flood elevations have been provided. For these areas, elevation and floodway information from other Federal, State, or other acceptable source shall be used when available. Where other acceptable information is not available the Floodplain Administrator shall require the applicant to determine the elevation with hydrologic and hydraulic engineering or other techniques. Only professional engineers or others of demonstrated qualifications shall undertake hydrologic and hydraulic analyses. The responsible Professional shall certify that the technical methods used correctly reflect currently accepted technical concepts. The resultant study shall include a cover letter, signed by the responsible professional, providing a statement of findings in basic terms. In addition, studies, analyses, computation, etc., used to determine base flood elevations and floodways shall be submitted in sufficient detail to allow a thorough technical review by the City of Charleston.

#### **Section 91-33. Changes in Designation of Area.**

- A. The delineation of the identified floodplain area may be revised by the City of Charleston where natural or man-made changes have occurred and/or more detailed studies conducted or undertaken by the U.S. Army Corps of Engineers, a River Basin Commission or other qualified agency or individual document the necessity for such changes. However, prior to any such change, approval must be obtained from the Federal Insurance Administration (FIA).
- B. The City of Charleston may identify and regulate new flood hazard or ponding areas. These areas may be delineated using locally derived technical information such as flood of record, historic high water marks and/or topographic data.

#### **Section 91-34. Elevations Prevail.**

- A. If the lowest natural grade adjacent to a proposed building site that is within an identified flood hazard area is at or above the Base Flood Elevation specified in the Flood Insurance Study, the structure shall not be required to conform to the flood prevention design and construction standards or flood-related development codes in Article VI. Topographic data certified by a registered professional engineer or surveyor shall be submitted in sufficient detail to allow a thorough review by the Floodplain Administrator. The applicant is advised to apply for a Letter of Map Amendment (LOMA) from FEMA to have the Special Flood Hazard Area designation removed from the parcel or structure.

- B. If the lowest natural grade adjacent to a proposed building site is below the Base Flood Elevation specified in the Flood Insurance Study, the site shall be considered to be within the floodplain area and the proposed structure shall be required to conform to all appropriate provisions of this ordinance.

**Section 91-35. Boundary Disputes.**

Should a dispute concerning any district boundary arise, an initial determination shall be made by the Floodplain Administrator and any party aggrieved by this decision may appeal to the Board of Zoning Appeals. The burden of proof shall be on the appellant/applicant.

**Sections 91-36—91-40. Reserved.**

**DIVISION 4. UTILIZATION OF THE FLOODPLAIN AREA**

**Section 91-41. Floodway (F1).**

- A. Within any floodway area (F1), no encroachments, including fill, new construction, substantial improvements, repair of substantial damage, or other development shall be permitted unless it has been demonstrated through hydrologic and hydraulic analysis performed in accordance with standard engineering practice that the proposed encroachment will not result in any increase in the Base Flood Elevation.
- B. The Floodway shall be preserved to the greatest extent possible to carry the discharge of the base flood. Because floodways present increased risk to human life and property because of their relatively faster and deeper flowing waters:
  - 1. New development shall not be permitted in the floodway where reasonable alternatives exist elsewhere. In addition to the requirements below the applicant shall demonstrate that there are no reasonable alternatives other than the floodway encroachment before a permit is issued.
  - 2. When the floodway is the only reasonable alternative the applicant shall demonstrate that the floodway encroachment is the minimum necessary to accomplish the project.
- C. All permitted uses, activities, and development shall be undertaken in strict compliance with the flood proofing and related provisions contained herein, and in all other applicable codes, ordinances and regulations.

**Section 91-42. Floodway Fringe (F2) and Approximated Floodplain (F4).**

- A. In the Floodway Fringe (F2) and Approximated Floodplain (F4), any development and/or use of land shall be permitted provided that all such uses, activities and/or development shall be undertaken in strict compliance with the flood-proofing and related provisions contained herein and in all other applicable codes, ordinances and regulations.
- B. All subdivision proposals and other proposed new developments which are proposed to take place either fully or partially within the Approximated Floodplain area (F4) and which are greater than ten (10) lots or two (2) acres, whichever is the lesser, shall include base flood elevation data.

1. This data may be available from an authoritative source, such as the U.S. Army Corps of Engineers, U.S. Geological Survey, Natural Resource Conservation Service, City of Charleston's aerial mapping, or state and local water resource department.
  2. If the required data is not available from other sources the applicant shall develop the technical data using detailed methodologies comparable to those contained in a Flood Insurance Study. This data shall be prepared and certified by a registered professional engineer or others of demonstrated qualifications, who shall certify that the technical methods used correctly reflect currently accepted technical concepts.
- C. All new or improved structures located in the Approximated Floodplain (F4) shall be elevated at least three (3) feet above the highest adjacent grade unless Base Flood Elevation data has been obtained from an authoritative source or developed by a qualified professional using a detailed methodology as described above.

**Section 91-43. AE area without floodway (F3).**

Within any AE area without floodway, no new construction or development shall be allowed unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the elevation of the 100-year flood more than one (1) foot at any point. This requirement can be satisfied by utilization of the floodway area where determined.

**Section 91-44. Alteration or relocation of a stream.**

- A. Whenever a developer intends to alter (including placement of bridges, culverts or other stream crossings) or relocate a stream within the Floodplain Area, the developer shall notify in writing, by certified mail, the City of Charleston's floodplain administrator,

City of Charleston  
Attn: Floodplain Administrator  
915 Quarrier Street, Suite 1  
Charleston, WV 25301

the State Coordinating Office,

The State Coordinating Office  
Building 1 Room EB-80  
1900 Kanawha Blvd.  
Charleston, WV 25305-0360

and any adjacent communities of all such intended activities prior to the alteration or relocation of the stream, and shall submit copies of such notification to the Federal Insurance Administration c/o FEMA Region III, One Independence Mall, Sixth Floor, 615 Chestnut Street, Philadelphia, PA 19106-4404. All applicants proposing to alter or relocate a stream must obtain all required permits including those set forth in the City of Charleston stream alteration/Stream Crossing administrative procedures. The Floodplain Administrator shall require copies of all necessary permits from those governmental agencies from which Federal or State Law requires approval prior to issuing the local permit.

- B. The developer shall also assure the City of Charleston in writing that the carrying capacity within the altered or relocated portion of stream will be maintained. The Floodplain Administrator may require the applicant to demonstrate that the altered or relocated portion of stream will provide equal or greater conveyance than the original stream segment. If hydrologic and hydraulic analyses are required, they shall only be undertaken by professional engineers or others of demonstrated qualifications, who shall certify that the technical methods used correctly reflect currently accepted professional practice. The resultant study shall include a cover letter, signed by the responsible professional, providing a statement of findings in basic terms. In addition, studies, analyses, computations, etc. shall be submitted in sufficient detail to allow a thorough technical review by the floodplain administrator.
- C. The floodplain administrator may require the use of certain “best practice” techniques in the construction of bridges, culverts or stream alterations to prevent damage or loss of stream crossings and localizing flooding caused by blockages. These techniques may include, but are not limited to, wing walls, trash grates or requiring openings to be of sufficient size to pass debris and carry future increases in flood heights.
- D. All new and replacement bridges, culverts and other stream crossings shall adhere to the relevant anchoring requirements contained in this ordinance.
- E. The developer is required to provide the community a legal agreement detailing all scheduled inspections and maintenance to be performed on altered or relocated watercourses including culverts and bridges. It shall be the responsibility of the applicant to transfer this agreement to the new owner when the land associated with the watercourse alteration is transferred. A copy of all new agreements shall be provided to the floodplain administrator.
- F. The applicant must submit any maps, computations or other material required by the Federal Emergency Management Agency (FEMA) to revise the Flood Insurance Study and/or Flood Insurance Rate Maps, when notified by the floodplain Administrator, and must pay any fees or other costs assessed by FEMA for this purpose.

**Sections 91-45—91-50. Reserved.**

## **DIVISION 5. CRITERIA FOR BUILDING AND SITE PLAN APPROVAL**

### **Section 91-51. General.**

Permits are required in order to determine whether all new construction or substantial improvements are:

- A. Located in the identified Floodplain or Floodway.
- B. Designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.
- C. Constructed with material and utility equipment resistant to flood damage as outlined in FEMA Technical Bulletin 2-93 (FIA-TB-2) or the most recent revision thereof.

- D. Constructed by methods and practices that minimize flood damage.
- E. Constructed with electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

**Section 91-52. Elevation and Flood Proofing Information.**

All applicants are encouraged to exceed the minimum elevation requirements contained herein. Flood insurance rates can be lowered significantly by increasing the elevation of the lowest floor above the freeboard height required by this ordinance.

Depending on the type of structure involved, the following information shall also be included in the application for work within the Floodplain Area:

- A. For structures to be elevated two feet above the Base Flood Elevation:
  - 1. A plan showing the size of the proposed structure and its relation to the lot where it is to be constructed.
  - 2. A determination of elevations of the Base Flood, existing ground, proposed finished ground and lowest floor, certified by a Registered Professional Engineer, Surveyor, or Architect.
  - 3. Plans showing the method of elevating the proposed structure including details of proposed fills, pile structures, retaining walls, foundations, erosion protection measures, etc. When required by the Floodplain Administrator, a Registered Professional Engineer or Architect shall prepare these plans.
  - 4. Plans showing the methods used to protect utilities (including sewer, water, telephone, electric, gas, etc.) from flooding to two feet above the Base Flood Elevation at the building site.
  - 5. During the course of construction, as soon as the basic elements of the lowest floor are in place and before further vertical construction, the applicant shall submit elevation data certifying the height of the lowest floor completed by a Licensed Surveyor.
  - 6. A Nonconversion Agreement shall be signed by the applicant whenever the community determines that the area below the first floor could be converted to a non-conforming use (generally applies to areas below base flood elevation that are 5 ft. high or more). This agreement shall be recorded with the office of the County Clerk and shall state:
    - (i) The area below Base Flood Elevation shall not be converted for use other than for parking, building access or for allowable storage as detailed in this ordinance.
    - (ii) The applicant agrees to notify prospective buyers of the existence of this agreement. It shall be the responsibility of the applicant to transfer the agreement at closing to the new owner via notarized signature, a copy of all new agreements shall be provided to the Floodplain Administrator.

B. For structures to be flood proofed to two feet above the Base Flood Elevation (nonresidential structures only):

All applicants are encouraged to exceed the minimum flood proofing requirements contained herein. Flood insurance rates can be lowered significantly by increasing the level of flood proofing above the height required by this ordinance. In order to obtain an “elevation credited” flood insurance rate on dry flood proofed buildings, flood proofing must extend at least one foot above the Base Flood Elevation.

1. Plans showing details of all flood proofing measures, prepared by a Registered Professional Engineer or Architect, showing the size of the proposed structure and its relation to the lot where it is to be constructed.
2. A determination of elevations of the Base Flood, existing ground, proposed finished ground, lowest floor, and flood proofing limits; certified by a Registered Professional Engineer, Surveyor, or Architect.
3. A Flood proofing Certificate, FEMA 81-65, as revised by FEMA, shall be prepared by the Registered Professional Engineer or Architect who prepared the plans in (1) above, stating the structure in question, together with attendant utility and sanitary facilities is designed so that:
  - (i) The structure is water tight with walls substantially impermeable to the passage of water from the lowest structural element to two feet above the Base Flood Elevation.
  - (ii) The structure will withstand the hydrostatic, hydrodynamic, buoyant, impact, and other forces resulting from the flood depths, velocities, pressures, and other factors associated with the Base Flood.

C. For structures constructed of flood resistant materials – used solely for parking of vehicles, or storage, (Accessory Structures only)

1. Plans showing details of all flood proofing measures and showing the size of the proposed structure and its relation to the lot where it is to be constructed.
2. A completed Elevation Certificate showing elevation of existing ground, proposed finished ground, and lowest floor.
3. A certificate must be prepared by the Floodplain Administrator, that confirms that the structure in question, together with attendant utilities is designed so that:
  - (i) Flood resistant materials are used from two feet above the Base Flood Elevation down and that all utilities are located at least two feet above the Base Flood Elevation.
  - (ii) Hydrostatic flood forces on exterior walls are equalized by allowing for automatic entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a Registered Professional Engineer or Architect or meet or exceed the following minimum criteria:

- a) A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided.
- b) The bottom of all openings shall be no higher than one foot above grade.
- c) Openings may be equipped with screens, louvers, valves or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.
- d) The applicant shall sign a Non-conversion Agreement and notify prospective buyers of the existence of the agreement. It shall be the responsibility of the applicant to transfer the Non-conversion Agreement to any new owner at closing via notarized signature. A copy of the signed agreement shall be provided to the floodplain administrator.

**Section 91-53. Site Plan Criteria .**

The owner or developer of any proposed development, including Subdivisions and Manufactured Home Parks, shall submit a preliminary site plan to the Floodplain Administrator that includes the following information:

- A. Name of engineer, surveyor, or other qualified person responsible for providing the information required in this section.
- B. A map showing the location of the proposed subdivision and/or development with respect to the town's floodplain areas, proposed lots sites, and fills. In addition, it is required that all subdivision proposals and other proposed new developments which are proposed to take place either fully or partially within the approximated floodplain (F4) and which are greater than ten (10) lots or two (2) acres, whichever is the lesser, shall include base flood elevation data using the Flood Insurance Study (FIS) data. This data shall be prepared and certified by a registered professional engineer or others of demonstrated qualifications, who shall certify that the technical methods used correctly reflect currently accepted technical concepts.
- C. Where the subdivision and/or development lies partially or completely in the floodplain areas, the plan map shall include detailed information giving the location and elevation of proposed roads, public utilities and building sites. All such maps shall also show contours at intervals of two (2) or five (5) feet depending upon the slope of the land and identify accurately the boundaries of the floodplain areas.
- D. Where the subdivision lies partially in the floodplain area and all proposed development will take place on natural grade a significant vertical distance above the floodplain area, development of detailed Base Flood Elevation data may not be necessary. In these cases the site plan for the proposed development must clearly delineate the area to be developed and the location of the floodplain areas as depicted on the FEMA map. A registered professional engineer, licensed professional surveyor or others of demonstrated qualifications must certify the site plan.

**Section 91-54. Restrictions to Subdivision of land in floodplain areas.**

Subdivision of land in the floodplain area must result in lots that include a buildable portion outside of the identified flood hazard area and to every extent practical shall be served by streets within the proposed subdivision having surfaces not lower than 1 foot below the elevation of the line defining the floodplain limits. All new structures must be sited on the portion of the subdivided lot that is located outside of the identified flood hazard area.

**Sections 91-55—91-60. Reserved.**

## **DIVISION 6. SPECIFIC REQUIREMENTS**

### **Section 91-61. Design and Construction Standards.**

In order to prevent excessive damage to buildings, structures, and related utilities and facilities, the following restrictions apply to all development, subdivision proposals, manufactured home parks, new construction and to construction of substantial improvements, and the repair of substantial damage, to existing structures occurring in the Floodplain Area.

#### **A. Basements and Lowest Floors**

1. Residential structures

All new construction, relocation, substantial improvements, including repair of substantial damage, of residential structures must have the lowest floor, including basement, ductwork and utilities, elevated to two feet above the Base Flood Elevation.

2. Nonresidential structures

All new construction, relocation, substantial improvements, including repair of substantial damage, of nonresidential structures must have the lowest floor, including basement, ductwork and utilities, elevated to two feet above the Base Flood Elevation; or, together with attendant utility and sanitary facilities, be designed so that below the Base Flood Elevation the structure is flood proofed in accordance with the requirements detailed in this ordinance.

3. Fully enclosed structures below the lowest floor

For all new construction, relocation, substantial improvements, and repair of substantial damage, those fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a Registered Professional Engineer or meet or exceed the following minimum criteria:

- (i) A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided.
- (ii) The bottom of all openings shall be no higher than one foot above grade.
- (iii) Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

#### **B. Manufactured Home Placement**

The unique characteristics of pier-supported structures installed in flood hazard areas pose an elevated risk of bodily harm and substantial damage to property. Thus all manufactured homes to be sited within the identified flood hazard areas in the City of Charleston shall be installed by a contractor possessing a valid WV Manufactured Home Installer's license. The installer shall use an installation design engineered to withstand flood hazards specific to the particular home site. The installation design shall incorporate the following floodplain management requirements.

- (i) Elevation so that the lowest floor, ductwork and utilities including HVAC/heat pump are elevated two feet above the Base Flood Elevation.
- (ii) Reinforced piers or other foundation elements of at least equivalent strength engineered for use in a flood hazard area and attached to a permanent foundation.
- (iii) The frame of the unit shall be anchored to an adequately anchored permanent foundation system to resist flotation, collapse and lateral movement.
- (iv) Installation designs incorporating dry stacked block shall not be used in flood hazard areas.
- (v) Ground anchors shall not be considered permanent foundation systems.

A contractor possessing a valid WV Manufactured Home Installer's license shall perform a site inspection and certify in writing that the manufactured home has been installed to the standards set forth above.

#### C. Accessory Structures

1. Except as provided in subsection 2 below, Accessory structures shall be located out of the floodplain area or elevated to two feet above the Base Flood Elevation.
2. Where accessory structures not connected to the principal structure are to be located on sites below the Base Flood Elevation, the following flood damage reduction provisions apply:
  - (i) Structures shall be no more than 600 square feet in size and valued at less than \$10,000.00.
  - (ii) Floors shall be at or above grade on at least one side.
  - (iii) Structures shall be located, oriented and constructed to minimize flood damage.
  - (iv) Structures shall be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.
  - (v) Flood resistant materials as detailed in FEMA Technical Bulletin 2-93 (FIA-TB-2) shall be used in the construction of the structure from the lowest structural element to two feet above the Base Flood Elevation.

- (vi) Machinery, electric devices or appliances, and all utilities shall be located at least two feet above the Base Flood Elevation.
  - (vii) The venting requirements contained in Section 91-61 (A) are applicable and shall be strictly adhered to.
  - (viii) Shall not be used for human habitation.
3. A Nonconversion Agreement shall be signed by the applicant, and recorded with the office of the County Clerk, stating that the use of the accessory structure or detached or attached garage shall not be changed from the use permitted, acknowledging that the structure may be subject to greater flood risk and that higher flood insurance premiums may be possible, and that a change in use may require full compliance with this ordinance. The applicant agrees to notify prospective buyers of the existence of this agreement. It shall be the responsibility of the applicant to transfer the agreement at closing to the new owner via notarized signature, a copy of all new agreements shall be provided to the floodplain administrator.

#### D. Recreational Vehicle Placement

Recreational vehicles to be placed within any floodplain area shall either:

- (i) Be on site for fewer than 180 consecutive days and be fully licensed and ready for highway use or
- (ii) Meet the provision of Section 91-61 of this ordinance.
- (iii) A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect utilities and security devices, and has no permanently attached additions.

#### E. Fill

The City of Charleston officially recognizes the beneficial functions the floodplain serves in storage and transportation of water during floods. The placement of fill in floodplains has undesirable and detrimental effects on velocity, erosion and sedimentation rates causing increased flooding.

The City of Charleston officially recognizes the beneficial functions the floodplain serves in storage and transportation of water during floods. Placement of fill in the floodplain area is discouraged and should be minimized. In the floodway, no fill shall be permitted unless it meets the requirements of Section 91-41 of this ordinance. All fill placed in the floodplain area shall meet or exceed the following standards:

1. Fill shall be used only to the extent to which it does not adversely affect adjacent properties. The City of Charleston may require the applicant to show through hydrologic and hydraulic engineering techniques that proposed fill would not adversely affect adjacent properties. Hydrologic and hydraulic analyses shall be undertaken only by professional engineers or others of demonstrated qualifications, who shall certify that the technical methods used correctly reflect currently accepted technical concepts. The

resultant study shall include a cover letter, signed by the responsible professional, providing a statement of findings in basic terms. In addition, studies, analyses, computations, etc., shall be submitted in sufficient detail to allow a thorough technical review by the City of Charleston.

2. Fill shall be used only to the extent to which it does not adversely affect the capacity of channels or floodways of any tributary to the main stream, drainage ditch, or any other drainage facility or system.
3. Fill shall extend beyond a structure for a sufficient distance to provide acceptable access. For residential structures, fill shall extend laterally fifteen (15) feet beyond the building line from all points before the start of sloping required in following subsection. For nonresidential structures, fill shall be placed to provide access acceptable for intended use. At grade access, with fill extending laterally fifteen (15) feet beyond the building line shall be provided to a minimum of twenty-five (25) percent of the perimeter of a nonresidential structure.
4. Fill shall consist of soil or rock material only. Sanitary landfills shall not be permitted
5. Fill material shall be compacted to provide the necessary stability and resistance to erosion, scouring or settling.
6. Fill slopes shall be no steeper than one (1) vertical on two (2) horizontal, unless substantiating data justifying steeper slopes are submitted to and approved by the Floodplain Administrator.
7. Fill slopes exposed to flood waters with expected velocities during the occurrence of the base flood of five feet per second or less must be protected from erosion by covering them with grass, vines, weeds, or similar vegetative undergrowth.
8. Fill slopes exposed to flood waters with expected velocities during the occurrence of the base flood of greater than five feet per second must be protected from erosion by armoring them with stone or rock slope protection.
9. The applicant must submit any maps, computations or other material required by the Federal Emergency Management Agency (FEMA) to revise the Flood Insurance Study and/or Flood Insurance Rate Maps, when notified by the Floodplain Administrator, and must pay any fees or other costs assessed by FEMA for this purpose.

#### F. Placement of Buildings

1. All buildings and structures shall be constructed and placed on the lot so as to offer the minimum obstruction to the flow of water and shall be designed to have a minimum obstruction effect upon the flow and height of floodwater.
  - (i) Whenever possible, structures shall be constructed with the longitudinal axis parallel to the direction of flood flow and,
  - (ii) So far as practicable, structures shall be placed approximately on the same flood-flow lines as those of adjoining structures.

## G. Anchoring

1. All buildings and structures shall be firmly anchored in accordance with accepted engineering practices to prevent flotation, collapse, and lateral movement, thus reducing the threat to life and property and decreasing the possibility of the blockage of bridge openings and other restricted sections of the watercourse.
2. All air ducts, large pipes, and storage tanks located at or below the Base Flood Elevation shall be firmly anchored to resist flotation.
3. All manufactured homes shall be anchored in compliance with the requirements of 42 CSR Series 19, Sections 10.1, 10.2, and 10b et seq. Anchoring shall be adequate to resist flotation, collapse, or lateral movement. Methods of anchoring may include but are not limited to the over-the-top and frame ties, attached to foundation elements, such as the following:
  - (i) Over-the-top ties shall be provided at each of the four corners of the manufactured home, with two additional ties per side for manufactured homes less than 50 feet long.
  - (ii) Frame ties shall be provided at each corner of the home with five additional ties per side at intermediate points, with manufactured homes less than 50 feet long requiring four additional ties per side.
  - (iii) All components of the anchoring system shall be capable of carrying a force of 4,800 pounds.
  - (iv) Any additions to a manufactured home shall be similarly anchored. This requirement is in addition to applicable State and local anchoring requirements for resisting wind forces.

## H. Flood Protection Setback

1. A Flood Protection Setback equal to twice the width of the watercourse channel measuring from the top of one bank to the top of the opposite bank or 25 feet, whichever is less, shall be maintained from the top of the banks of all watercourses. To reduce erosion, natural vegetation shall be maintained in this area. Where natural vegetation does not exist along the watercourse and conditions for replanting are suitable, high priority shall be given to planting vegetation in the setback area to stabilize banks and enhance aquatic resources. The Kanawha and Elk Rivers shall be exempt from the setback provision due to the large flood carrying capacity of the rivers.
2. Necessary public works and temporary construction may be exempted from this subsection.
3. The Floodplain Administrator may consider an appeal to the Flood Protection Setback requirement if the applicant demonstrates that it is impossible to allow any development without encroachment into the Flood Protection Setback area. The appeal conditions shall be the minimum necessary and shall be made only after due consideration is given to varying other siting standards, such as side, front and back lot line setbacks.

I. Storage

1. No materials that are buoyant, flammable, explosive, or in times of flooding could be injurious to human, animal or plant life, shall be stored below Base Flood Elevation.
2. Storage of other material or equipment may be allowed if not subject to major damage by floods and firmly anchored to prevent flotation or readily removable from the area within the time available after flood warning.
3. Due to the potential of masking the natural elevation and making it more difficult to enforce this ordinance, material that resembles “fill” material shall not be considered “storage” material for purposes of this subsection.

J. Utility and Facility Requirements

1. All new or replacement water systems whether public or private, shall be designed to minimize or eliminate infiltration of floodwaters into the systems.
2. All new or replacement sanitary disposal systems, whether public or private, shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharges from the systems into floodwaters.
3. All other new or replacement public and/or private utilities and facilities shall be located and constructed to minimize or eliminate flood damage.
4. Onsite waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

K. Drainage

Adequate drainage shall be provided to reduce exposure to flood hazard.

L. Backflow Preventers

Back flow prevention valves should be used for all enclosed structures with sewage or drainage facilities located in the floodplain.

**Sections 91-62—91-70. Reserved.**

## **DIVISION 7. ADMINISTRATION**

### **Section 91-71. Designation of Floodplain Administrator.**

The Plans Reviewer is hereby appointed as Floodplain administrator to administer and implement this local law by granting or denying floodplain development permits in accordance with its provisions.

### **Section 91-72. Development Permits and Site Plan Approvals Required.**

It shall be unlawful for any person, partnership, business, or corporation to undertake or cause to be undertaken, any development or the new construction, substantial improvement, repair of substantial damage, the placement or relocation of any structure (including manufactured homes) within the City of Charleston, unless a permit application and standard site plan has been completed, and a permit has been obtained from the Floodplain Administrator. In addition, where land that is either partially or fully in the regulatory floodplain is to be subdivided, utilized for a manufactured home park or subdivision or otherwise developed, a detailed site plan must be submitted to, and approved by, the Floodplain Administrator prior to any development.

#### **Section 91-73. Approval of Permits and Plans.**

The Floodplain Administrator shall review, or shall cause to be reviewed; all permit applications and plans in order to determine whether proposed building sites are reasonably safe from flooding.

All permits and plans shall be approved only after it has been determined that the proposed work to be undertaken will be in conformance with the requirements of the state and all other applicable codes and ordinances.

The Floodplain Administrator shall require copies of all necessary permits from those governmental agencies from which Federal or State Law requires approval.

The City of Charleston shall keep on file in perpetuity, in a location safe from natural hazards, all information supplied to the Floodplain Administrator.

#### **Section 91-74. Application Procedures.**

Application for a permit and/or site plan approvals shall be made, in writing, on the forms supplied by the Planning Department and shall include all information stipulated under Article V of this ordinance.

#### **Section 91-75. Changes.**

After the issuance of a permit or site plan approval by the Floodplain Administrator, no changes of any kind shall be made to the application, permit, or any of the plans, specification or other documents submitted with the application without the written consent or approval of the Floodplain Administrator.

#### **Section 91-76. Stop Work Orders, Inspections and Revocations.**

##### **A. Stop-Work Orders**

1. The Floodplain Administrator shall issue, or cause to be issued, a “Stop Work Order Notice” for any development found ongoing without having obtained a permit. Disregard of a stop work order shall subject the violator to the penalties described in Section 91-83 of this local law.
2. The Floodplain Administrator shall issue, or cause to be issued, a “Stop Work Order Notice” for any development found non-compliant with the provisions of this law and/or the conditions of the permit. Disregard of a stop work order shall subject the violator to the penalties described in Section 91-83 of this local law.

**B. Inspections and Revocations**

1. During the construction period, the Floodplain Administrator or other authorized official may inspect the premises to determine that the work is progressing in compliance with the information provided on the permit application and with all applicable laws and ordinances.
2. If the Floodplain Administrator discovers that the work does not comply with the permit application or any applicable laws and ordinances or that there has been false statement or misrepresentation by any applicant, the Floodplain Administrator shall issue a “Stop Work Order Notice” revoke the permit and request a temporary injunction.

**Section 91-77. Certificate of Compliance.**

- A. In areas of flood hazard it shall be unlawful to occupy, or to permit the use or occupancy, of any building or premises, or both, or part thereof hereafter created, erected, installed, changed, converted or wholly or partly altered or enlarged in its use or structure until a certificate of compliance has been issued by the Local Floodplain Administrator stating that the building or land conforms to the requirements of this local law.
- B. In areas of flood hazard it shall be unlawful to install a permanent utility connection to any building or premises, or both, or part thereof hereafter created, erected, installed or rebuilt until a certificate of compliance has been issued by the Local Floodplain Administrator stating that the development conforms to the requirements of this local law.
- C. A certificate of compliance shall be issued by the Local Administrator upon satisfactory completion of all development in areas of special flood hazard.
- D. Issuance of the certificate shall be based upon the inspections conducted as prescribed in this ordinance or local administrative procedures, and any finished construction elevation certificate, hydraulic data, flood proofing certificate, or encroachment analyses which may have been required as a condition of permit approval.

**Sections 91-78—91-80. Reserved.**

**DIVISION 8. APPEALS AND PENALTIES**

**Section 91-81. Appeals.**

Whenever any person is aggrieved by a decision of the Floodplain Administrator with respect to the provision of this ordinance, it is the right of that person to appeal to the Board of Zoning Appeals, which shall be known as the BZA. Such appeal must be filed in accordance with article 30 of the Zoning Ordinance of the City of Charleston.

**Section 91-82. Appeal Review Criteria.**

- A. All appeals contesting only the cumulative substantial damage requirement, the flood protection setback requirement, or the freeboard requirements, may be handled at the discretion of the Appeals Authority.

- B. All decisions on appeals to all other provisions of this ordinance shall adhere to the following criteria:
1. Affirmative decisions shall only be issued by the Appeals Authority upon (i) a showing of good and sufficient cause, (ii) a determination that failure to grant the appeal would result in exceptional hardship to the applicant, and (iii) a determination that the granting of an appeal will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public or conflict with existing local laws or ordinance.
  2. An affirmative decision shall be issued only upon determination that it is the minimum necessary, considering the flood hazard, to afford relief. Financial hardship, as a sole criterion, shall not be considered sufficient justification to grant an appeal.
  3. An affirmative decision shall be issued for the repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.
  4. The Appeals Authority shall notify the applicant in writing over the signature of a community official that (i) the issuance of a decision to allow construction of a structure below the Base Flood Elevation will result in increased premium rates for flood insurance, (ii) such construction below the Base Flood Elevation increases risk to life and property. Such notifications shall be maintained with a record of all decisions as required in paragraph (4) of this section; and
  5. The Appeals Authority shall (i) maintain a record of all decisions including justification for their issuance, and (ii) report such decisions issued in its biannual report to the Federal Insurance Administration.
  6. An affirmative decision shall not be granted for any construction, development, use or activity within any floodway area that would cause any increase in the Base Flood Elevation.

**Section 91-83. Penalties.**

Any person who violates any of the provisions of this ordinance is guilty of a misdemeanor, and upon conviction, shall be fined not less than fifty (50) dollars or more than five hundred (500) per violation. Each day may be considered a separate offense. The City of Charleston may seek an injunction in the Circuit Court of Kanawha County to restrain a person or unit of government from violating the provisions of this ordinance. The City of Charleston may also seek a mandatory injunction in the Circuit Court of Kanawha County directing a person or unit of government to remove a structure erected in violation of the provisions of this ordinance. If the City of Charleston is successful in any such suit, the respondent shall bear the costs of the action.

**Sections 91-83—91-91. Reserved.**

**DIVISION 9. SEVERABILITY AND MUNICIPAL LIABILITY**

**Section 91-91. Severability.**

If any section, subsection, paragraph, sentence, clause, or phrase of this ordinance shall be declared invalid for any reason whatever, such decision shall not affect the remaining portions of this ordinance which shall remain in full force and effect and for this purpose the provisions of this ordinance are hereby declared to be severable.

**Section 91-92. Liability.**

The granting of a permit or approval of a subdivision or development plan in an identified flood-prone area, shall not constitute a representation, guarantee, or warranty of any kind by the City of Charleston, or by any official or employee thereof of the practicability or safety of the proposed use, and shall create no liability upon the City of Charleston. The City of Charleston urges all applicants proposing development in or near a flood hazard area to locate all development as far away from, and as high above, all flooding sources as possible.