

Chapter 32 - CITY STORMWATER DRAINAGE SYSTEM

ARTICLE 1. - GENERAL

Sec. 2.201. - Findings.

The Grand Rapids City Commission hereby finds the following:

- (1) That there is a need to improve the water quality of the stormwater currently discharged by the City Stormwater Drainage System (CSDS) to prevent the degradation of the Grand River and its tributaries,
- (2) That there is a need for the City to enhance its ability to regulate the discharge of stormwater into the CSDS to reduce pollutant levels and comply with Federal and State laws regarding pervasively regulated stormwater discharges from the CSDS;
- (3) That there is a need to reduce the frequency and severity of flooding, and limit the uses and activities within flood prone areas, thereby promoting the public health, safety and welfare;
- (4) That soil erosion results in sedimentation that obstructs storm drains and road ditches, muddies streams, silts-in lakes and reservoirs and is a water pollutant;
- (5) That there is a need for the City to more effectively manage the CSDS through the use of Best Management Practices, enhanced operation and maintenance and physical improvements.
- (6) That the Clean Water Act of 1987, and the subsequent EPA regulations require those cities which must obtain an NPDES permit for the discharge of stormwater, to have adequate authority to regulate discharges into their stormwater drainage systems in order to prevent the discharge of harmful pollutants into the waters of the State.
- (7) That the City of Grand Rapids is a participant in the National Flood Insurance Program, and that program requires the City to have adequate authority to regulate the development of land located in the floodplain.
- (8) That Part 91, Michigan Soil Erosion and Sedimentation Control, of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended (Act 451) requires the regulation of construction activities. The State of Michigan has authorized the City as a Local Enforcing Agency and an Authorized Public Agency to enforce and administer soil erosion control programs which are intended to avoid, reduce or mitigate the erosion and resultant sedimentation of soils from construction sites located within the City or under the control of the City.
- (9) That the Michigan Subdivision Control Act (MCL 560.101 et seq.) regulates the development and construction of platted subdivisions, and under this Act the City is charged with assuring proper drainage of such plats.
- (10) That the Michigan Drain Code (MCL 280.1 et seq.) regulates the establishment and maintenance of county drains, except those legally established drains constituting mainstream portions of certain natural watercourses identified in rules promulgated by the Michigan Department of Environmental Quality.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.202. - Purposes and Objectives.

- (1) The purposes of this Chapter are to establish standards with respect to use and operation of the CSDS, to mitigate flooding, reduce pollution and sedimentation of the CSDS, adjacent properties and the environment and to improve the water quality of our rivers, lakes and streams.

- (2) The standards established in or pursuant to this Chapter are determined to be necessary to preserve the public health, safety and welfare; reduce pollution and sedimentation; mitigate the hazards of flooding; and to fulfill the obligations of the City with respect to State and Federal law, rules and regulations applicable to these matters.
- (3) The objectives of this Chapter are:
 - (a) To improve the quality of stormwater and to prevent or reduce the introduction of pollutants and sediments into the CSDS which cause a degradation of the environment and interfere with the normal use of the CSDS and the water resources of the City;
 - (b) To mitigate the frequency and severity of flooding from stormwater from within the CSDS service area through proper planning and management.
 - (c) To provide for appropriate use and development of flood-prone areas, allowing beneficial use without increasing flood hazard potential.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.203. - Definitions.

For the purposes of this Chapter, the following words and phrases shall have the meanings respectively ascribed to them by this Section unless the context in which they are used specifically indicates otherwise:

- (1) *Base Flood*. A flood having a one (1) percent chance of being equaled or exceeded in any given year, which is also called the "100-year flood."
- (2) *Base Flood Elevation*. The high water elevation of the Base Flood and is commonly referred to as the "100-year flood elevation."
- (3) *Best Management Practices (BMPs)*. A schedule of activities, prohibition of practices, general good house keeping practices, pollution prevention and educational practices, maintenance procedures, and other management practices to prevent or reduce to the Maximum Extent Practicable (MEP) the discharge of pollutants directly or indirectly into the receiving waters of the State or City Stormwater Drainage System (CSDS). BMPs also include treatment practices, operating procedures, and practices to control site runoff, spillage or leaks, sludge or water disposal, or drainage from raw materials storage.
- (4) *City*. The municipal corporation that is the City of Grand Rapids, Michigan and includes all authorized agents of the City of Grand Rapids when acting within the scope of their authority.
- (5) *City Manager*. The City Manager of the City of Grand Rapids and any persons designated to act on behalf of the City Manager in the administration or enforcement of this Chapter.
- (6) *City Stormwater Drainage System (CSDS)*. Includes all wetlands, surface water bodies, and all public storm drainage structures used in connection with the collection, control, transportation, treatment, or discharge of stormwater runoff and exempted discharges within the City of Grand Rapids. The CSDS does not include sewers or other facilities connected to the Grand Rapids Sanitary Sewage Disposal System, nor does the CSDS include private stormwater drainage facilities, which receive or convey stormwater runoff exclusively from privately owned property.
- (7) *Clean Water Act*. The Federal Water Pollution Control Act, 33 USC Sec. 1251 et seq., as amended and applicable regulations promulgated thereunder.
- (8) *Compensatory Storage*. An excavation below the one hundred-year floodplain elevation to offset the losses of natural flood storage capacity, which results from and is equivalent in volume to the structures and/or fill that is placed within the floodplain.
- (9) *Design Engineer*. Registered and licensed professional engineer responsible for engineering approval of the site plan design.

- (10) *Detention Basin or Facility*. A drainage facility designed and constructed to temporarily store stormwater runoff for a period of time, commonly less than twenty-four (24) hours.
- (11) *Drainage*. The collection, conveyance or discharge of surface water and/or ground water.
- (12) *Drainage Area*. The land area above a given point that contributes stormwater at that point.
- (13) *Drainage-way*. The route and surface area by which surface water or ground water is carried overland from one (1) part of a lot, parcel, right-of-way or adjacent property to another lot, parcel, right-of-way or adjacent property.
- (14) *Driveway Approach*. Any area in which, because of topography, elevation, position or location, it is necessary to enclose the gutter or road ditch in a driveway culvert in order to have a proper and suitable entrance to any property abutting on any public right-of-way.
- (15) *Driveway Culvert*. A drain pipe or other structure of concrete, masonry, metal, vitrified tile or other materials or combination thereof used to convey or carry surface water across, under or through any driveway or road ditch and/or to connect two (2) or more sections of a gutter or road ditch.
- (16) *Earth Change*. Any human activity that removes ground cover, changes the slope or contours of the land, or exposes the soil surface to the actions of wind and rain. Earth change includes, but is not limited to, any excavating, surface grading, filling, landscaping or removal of vegetative roots.
- (17) *Environmental Protection Services Department (EPSD)*. A Department of the City of Grand Rapids responsible for the administration, compliance and enforcement activities associated with its NPDES permit(s).
- (18) *Erosion*. The process by which the ground surface is worn away by action of wind, water, gravity or a combination of those forces.
- (19) *Excavation or Cut*. Any act by which soil or rock is cut into, dug, quarried, uncovered, removed, displaced or relocated and the conditions resulting from such acts.
- (20) *Exempted Discharges*. Those discharges into the CSDS other than stormwater as specified in Article 3 of this Chapter.
- (21) *Federal Emergency Management Agency (FEMA)*. The federal agency of the executive branch of the federal government charged with federal emergency management and associated regulations (44 CFR 59-79).
- (22) *Flood or Flooding*. A general and temporary condition of partial or complete inundation of normally dry land areas resulting from the overflow of water bodies or the unusual and rapid accumulation of surface water runoff from any source.
- (23) *Flood Hazard Boundary Map (FHBM)*. An official map of a community, issued by FEMA, which shows the boundaries of the flood related areas having special flood hazards.
- (24) *Flood Insurance Rate Map (FIRM)*. An official map of a community, issued by FEMA, which delineates both the special hazard areas and the risk premium zones applicable to the community.
- (25) *Floodplain or Flood-prone Area*. Any land area susceptible to water inundation from any source as defined by Flooding. It would mean the base flood elevation, unless otherwise specified.
- (26) *Flood Protection Elevation (FPE)*. The Base Flood Elevation plus one (1) foot at any given location.
- (27) *Flood-proofing*. Any combination of structural and non-structural additions, changes or adjustments to structures or property which reduce or eliminate flood damage to real estate or improved real property, public and private utilities, structures and their contents.

- (28) *Floodway*. The channel of a river, or other watercourse, and the adjacent land areas that must be reserved to carry and discharge a base flood without cumulatively increasing the water surface elevation more than one-tenth (1/10) of a foot due to the loss of flood conveyance or storage.
- (29) *Floodway Fringe Area*. The area between the floodway and the floodplain limits.
- (30) *Grading*. Any stripping, excavating, filling, stockpiling of soil or any combination of such acts and the land in its excavated or filled condition.
- (31) *Gutter or Road Ditch*. A part of the public right-of-way that is shaped, crowned, sloped or graded for drainage purposes.
- (32) *Illicit Connection*. Any method or means for conveying an illicit discharge into the CSDS or water bodies of the State.
- (33) *Illicit Discharge*. Any discharge to the CSDS, or water bodies of the State, that is not composed entirely of stormwater, discharges pursuant to the terms of an NPDES permit or exempted discharges as defined in this Chapter.
- (34) *Impervious Surface*. Surface that does not allow runoff to percolate into the ground such as roads, parking lots, sidewalks and rooftops.
- (35) *Land Owner or Landowner*. Any person who owns real property, or who holds a recorded easement on the property, or who is engaged in construction in a public right-of-way in accordance with sections 13, 14, 15, and 16 of Act No. 368 of the Public Acts of 1925, as amended, (MCL 247.183, 247.184, 247.185, and 247.186) as defined in Administrative Rules, Part 17 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended (Act 451).
- (36) *Lowest Floor*. The lowest floor or the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, which is usable solely for parking of vehicles; building access; or storage in an area other than a basement area is not considered the building's lowest floor.
- (37) *Maximum Extent Practicable (MEP)* . This phrase refers to the effective implementation of BMPs. Effective BMPs remove pollutants identified at a site for reduction; comply with all applicable stormwater regulations; are compatible with the area's land use, character, facilities and activities; implementation costs should not normally exceed the benefits obtained from pollution reduction; and must be technically feasible (considering area soil, geography, water resources and other resources available).
- (38) *Non-conforming Structure*. Any structure that does not comply with the standards established in Article 6, Section 2.262, Standards for Floodway and Floodplain of this Chapter. These are usually structures built prior to the determination of the floodplains by FEMA and the enactment of the associated floodplain regulations, but could include structures for which a variance had been granted.
- (39) *NPDES Permit*. A National Pollution Discharge Elimination System permit issued pursuant to Section 402 of the Federal Water Pollution Control Act or Clean Water Act, as amended or successor legislation.
- (40) *One Hundred-Year Floodplain*. That area which would be inundated by storm runoff or flood water of one hundred (100) year recurrence frequency as determined by a flood insurance study or other more scientifically precise analysis accepted by the City Manager.
- (41) *Overland Flow-Way*. The surface area that conveys a concentrated flow of stormwater runoff.
- (42) *Person or Entity*. An individual, association of individuals, a public, private or not for profit corporation, a firm, partnership or instrumentality.
- (43) *Plan*. Written narratives, specifications, drawings, sketches, written standards, operating procedures or any combination of these, which contain information pursuant to this Chapter.

- (44) *Pollutant*. A substance (excluding sediment, silt, or substances which would enter the CSDS from a natural undeveloped watershed) discharged into the CSDS which includes, but is not limited to: any dredged spoil, solid waste, vehicle fluids, yard wastes, animal wastes, sediment, incinerator residue, medical waste, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, commercial and agricultural waste, fecal coliform, fecal streptococcus, enterococcus, volatile organic carbon surfactants, oil and grease, petroleum hydrocarbons, total organic carbon, lead, copper, chromium, cadmium, silver, nickel, zinc, cyanides, phenols, and any contaminant which can significantly degrade the quality of the receiving waters by altering pH, total suspended or settleable solids, biochemical oxygen demand, chemical oxygen demand, nutrients or temperature or any other organic or inorganic contaminant or other substance defined as a pollutant under the Clean Water Act and whose presence degrades the quality of water bodies of the State.
- (45) *Property Owner*. Any person having legal or equitable title to property or any person having or exercising care, custody, or control over any property. (See also Responsible Party). Property owner shall also mean:
- (a) Any person who is a Land Owner as defined, or
 - (b) Any person who in fact has been empowered to act on behalf of or as agent of the owner, or
 - (c) Any person who has or exercises care, custody, dominion or control over any property, or
 - (d) Any person who has received a Tax Deed from the State of Michigan for the property and the person has served a notice by persons claiming title under Tax Deed, and the six (6) month redemption period has expired or nine (9) months has lapsed since the person received the Tax Deed to the property, or
- (46) *Riparian Property Owner*. A person or entity owning land bordering on a stream, river or lake.
- (47) *Repetitive Loss Structure*. A building covered by a contract for flood insurance that has incurred flood-related damages on two (2) occasions during a ten (10) year period ending on the date of the event for which a second claim is made, in which the cost of repairing the flood damage, on the average, equaled or exceeded twenty-five (25) percent of the market value of the building at the time of each such flood event.
- (48) *Responsible Party*. Any discharger, property owner, tenant, employee, officer, director, partner, contractor or other person who participates in, or is legally or factually responsible for, any act or omission which is a violation of this Chapter or which results in a violation of this Chapter. It is intended that this definition be interpreted broadly to include anyone who participates in an act or omission that results in a violation of this Chapter.
- (49) *Retention Basin or Facility*. A drainage facility designed and constructed to permanently store stormwater runoff for an indefinite period of time.
- (50) *Sediment*. Any solid particulate matter that has been deposited in water, is in suspension in water, is being transported, and has been removed from its site of origin by the process of erosion.
- (51) *Show Cause Hearing*. A formal meeting with EPSD staff occasioned by a Show Cause Order requiring a responsible party(s) to appear and demonstrate why a proposed enforcement action should not be taken against them.
- (52) *Soil Erosion and Sedimentation Control Plan (SESCP)*. A plan to guide construction, maintenance or repair activities designed to prevent the discharge of sediments from the work site. The SESCO is a document that describes and specifies the soil erosion and sedimentation control measures that are to be used during and after the construction, maintenance, or repair operations. The SESCO may consist of one (1) or more of the following types of documents:

- (a) Scaled drawing of the site and the proposed soil erosion and sedimentation control measures
 - (b) Specifications (Standard and Special),
 - (c) Narrative descriptions of the scope and type of soil erosion and sedimentation control measures to be employed,
 - (d) Standard Operating Procedures for soil erosion and sedimentation control.
- (53) *Special Flood Hazard Area (SFHA)*. An area subject to flooding identified on the Flood Hazard Boundary Map or Flood Insurance Rate Map published by FEMA.
- (54) *State of Michigan Water Quality Standards*. All applicable State rules, regulations and laws related to water quality.
- (55) *Storm Drain*. A system of structures such as constructed flood control channels, ditches, aqueducts, storm drains, pipes, street gutters or catch basins intended to convey only stormwater runoff, street wash waters, groundwater drainage, and discharges allowed by State or Federal discharge permits.
- (56) *Stormwater*. The runoff and drainage of precipitation resulting from rainfall or snowmelt or other natural precipitation event and includes naturally occurring sediment, silt and substances present in undeveloped watersheds.
- (57) *Stormwater Pollution Prevention Plan*. Refers to a document which describes the Best Management Practices (BMPs) to be implemented as a condition for the issuance of an NPDES permit to reduce or eliminate the discharge of pollutants to the Maximum Extent Practicable (MEP).
- (58) *Stormwater System Manager (SSM)*. The EPSD Director or designated contact person in accordance with Article 3, Section B.3 of the NPDES Municipal Stormwater System permits.
- (59) *Streams*. A river, creek, or other surface watercourse which may or may not be serving as a drain as defined in Act No. 40 of the Public Acts of 1956, as amended, (MCL 280.1) and which has definite banks, a bed, and visible evidence of the continued flow or continued occurrence of water, including the connecting waters of the Great Lakes.
- (60) *Stripping*. Any activity which removes or significantly disturbs the vegetative surface cover of a property including, but not limited to, clearing and grubbing operations.
- (61) *Stormwater Drainage Facilities Easement Agreement*. An easement granted to the City of Grand Rapids by the developer of a parcel of land which enumerates the maintenance and liability responsibility of the developer and any successors and assigns for the stormwater drainage facilities located with the proposed development which have been constructed to mitigate the adverse impact of stormwater runoff from the site and to facilitate that development.
- (62) *Structure*. Any man-made thing, edifice or construction in or upon the ground and any man-made change to the land. Structure includes, but is not limited to, buildings, manufactured homes, and recreational vehicles installed or left on a site for more than one hundred eighty (180) days.
- (63) *Substantial Damage*. "Damage of any origin is sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed fifty (50) percent of the market value of the structure before the damage occurred", as defined in the NFIP Floodplain Management Regulations 44 CFR 59.1.
- (64) *Substantial Improvement*. The cost of any repair, reconstruction or improvement of an existing structure that equals or exceeds fifty (50) percent of the true cash value of the structure, either:
- (a) Before the improvement is started,
 - (b) Before the damage occurred if the structure has been damaged and is being restored,

Such improvements include structures which have incurred "repetitive loss" or "substantial damage", regardless of the actual repair work performed. Substantial Improvement is started when the first alteration of any structural part of the building commences.

(65) *Violation Types:*

- (a) *Isolated.* A Chapter 32 violation which occurs when a person or entity has failed to adequately comply with not more than two (2) specific requirements of the CSDS Ordinance or permit but otherwise would be considered to be in compliance, provided such failure is not a recurring or significant incident.
- (b) *Recurring.* A Chapter 32 violation which occurs when a person or entity exhibits a recurring pattern of compliance failures.
- (c) *Significant.* A Chapter 32 violation occurs when a person or entity has failed to adequately comply with the requirements of the CSDS Ordinance, State or Federal regulations, or the conditions of a permit, and the compliance failure has caused damage to the CSDS, other properties or the environment, or has caused the City's CSDS to violate its stormwater NPDES permit.

(66) *Water Body.* Defined under State Law; Public Act 451 of 1994, as amended (MCL 324.101 et seq.), Natural Resources and Environmental Protection Act.

(67) *Watershed.* All the land area which contributes runoff to a particular point along a waterway.

(68) *Wetlands.* Defined under State Law, Public Act 451 of 1994, as amended (MCL 324.101 et seq.), Natural Resources and Environmental Protection Act.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Secs. 2.204—2.210. - Reserved.

ARTICLE 2. - STORMWATER SYSTEM USE

Sec. 2.211. - The Stormwater System Extent, Limits and Description.

The CSDS is provided for the drainage of publicly owned properties and rights-of-way within the City limits. All natural and constructed open drainage channels, which receive, convey or store stormwater runoff from publicly owned properties and rights-of-way shall be considered to be part of the CSDS.

The CSDS is also intended to accommodate the discharge of surface water runoff and other approved discharges from adjacent privately owned properties, provided:

- (1) The surface water runoff from that property has historically discharged onto public property or rights-of-way;
- (2) The characteristics of the discharge are equivalent to the runoff generated by that property prior to any development;
- (3) The discharge does not contain pollutants or sediments harmful to the CSDS, the public health and safety or the environment.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.212. - Riparian Properties.

Riparian property owners may not interfere with beneficial public interests such as navigation, fishing, hunting, swimming or other lawful purposes inherently belonging to the people of the State of Michigan including the receiving, transporting and storage of upstream drainage or runoff.

Except in cases where there is an easement or agreement with the City of Grand Rapids or other governmental entity specifically for the maintenance of the stream, creek or lake, it shall be the riparian owner's responsibility to maintain the stream, creek or lake along their property such that the beneficial public interests are preserved. This maintenance responsibility shall include the removal of accumulated debris, fallen trees from their property that hinders the stream or creeks' proper drainage function as well as providing for erosion protection.

Riparian property owners must obtain all necessary Federal, State and local permits prior to initiating maintenance activities. Failure to comply with this section shall be considered a nuisance and a violation of this Chapter.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.213. - Private Property Drainage.

(1) *Building Openings.*

- (a) Any new construction or building undergoing substantial improvement in the base flood area of a swale, drainageway, floodway, ditch, culvert, or any other drainage facility or device shall strictly control the lowest building opening elevation so as to substantially limit flood damage to the building and its contents.
- (b) Except as provided herein, no building opening shall be constructed below the following elevations:
 - 1. Flood Protection Elevation
 - 2. The lowest building opening elevation established at the time of the plat or development approval
 - 3. One (1) foot above the top of any downstream culvert
- (c) Minimum elevation requirements described in Section (b) shall not apply to building openings that are outside the One Hundred-Year Floodplain, are not otherwise prohibited by any other federal, state, local regulation or law, and are:

located in an area east of the Grand River and bounded by South City limits (Hall Street extended); to Hall Street/Freeman Avenue intersection; to CSX railroad at Freeman Avenue; to Hayden Street/Woolsey Drive intersection; to Godfrey Avenue/B Street intersection; to Oakland Avenue/Rumsey Street intersection; to Oakland Avenue/CSX railroad crossing; to Wealthy Street/Ney Avenue; to Oakes Street/ Grandville Avenue intersection; to Ionia Avenue/Cherry Street intersection; to Oakes Street/Commerce Avenue intersection; to Fulton Street/Ionia Avenue intersection; to Ottawa Avenue/Pearl Street intersection; to Newberry Street/Ionia Avenue intersection; to N. Division Avenue/Taylor Avenue/Coldbrook Street intersection; to Graceland Street/Riverside Drive intersection; to Guild Street/Coit Avenue intersection; to Briggs Boulevard/Monroe Avenue/North Park Street intersection; to Briggs Boulevard/4 Mile Road intersection; to the Grand River along the North City limit; or

located in an area west of the Grand River and bounded by the south City limit near Veterans Memorial Drive; to Butterworth Street/West City Limit; to Butterworth Street/I-196 intersection; to Lake Michigan Drive/Fulton Street intersection; to Bridge Street/I-196 intersection; to Valley Avenue/6th Street intersection; to Van Buren Avenue/11th Street intersection; to Leonard Street/Lincoln Avenue intersection; to Webster Street/Powers Avenue intersection; to Tamarack Avenue/Richmond Street intersection; to Widdicomb Avenue/Thornapple Court intersection; to Ann Street/ Alpine Avenue intersection; to Nason Street/Turner Avenue along the North City Limit; to the Grand River along the North City limit.

These provisions do not exempt such building from any other applicable local, state, or federal regulation, law or requirement. Any substantial improvement or construction permitted does not create a liability on the part of the City or any officer or employee thereof for any flood damage that results from compliance with or reliance upon the provisions of this ordinance. Any

substantial improvement or construction is at the applicant's sole risk and the applicant shall defend, indemnify, protect, and hold harmless the City, its officers, agents, elected and appointed officials, departments, boards, and commissions from any and all claims, losses, liabilities, causes of action, demands, judgments, decrees, proceedings, and expenses of any nature (including, without limitation, attorneys' fees) arising out of or resulting from such substantial improvement or construction. Floods may occur at any time, and excessive flood water levels may be experienced due to manmade and natural causes, such as ice jams and accumulated debris in bridge openings. This provision does not imply that areas outside the One Hundred-Year Floodplain, or uses permitted within such areas, shall remain free from flooding or flood damages.

- (d) A waiver from complying with the lowest building opening elevation requirement in Section 2.213(1)(b) may be granted by the City Manager following receipt of a letter from a registered engineer, licensed with the State of Michigan, attesting that the proposed building opening elevation will not subject the building to a possible flood hazard from a base flood event.
- (e) Upon completion of construction of the structure's foundation and/or slab on grade, a registered land surveyor must certify any minimum building opening elevation specified by this ordinance. The certificate shall attest that the building opening elevation complies with the standards of this ordinance. The permittee for the building permit shall submit the certificate to the Building Inspections Supervisor prior to the commencement of framing and/or structural steel placement. If the surveyor should find that the minimum building opening elevation is below the elevation specified in Section 2.213(1)(b) and (d), that opening must be raised by using a method that meets with the approval of the City Manager. After reconstruction, a registered land surveyor or engineer must re-certify the minimum building opening elevation is compliant with the standards of this ordinance prior to the commencement of framing and/or structural steel placement.

(2) *Property Drainage.*

- (a) Any drainage situation not involving water from public property or right-of-way is the responsibility of the property owner.
- (b) Lot grading and private property drainage is a civil matter among the property owners affected.
- (c) The City will provide technical advice to the property owner on drainage matters limited to advice only.
- (d) The drainage review of plats and site plans by the City is for the purpose of assuring that the property can be drained in accordance with the standards of this Code. Regardless of City approvals, the owner remains responsible for the drainage of their property and any impacts it may have on neighboring properties or the environment.

(3) *Stormwater Permit Requirement.*

- (a) The property owner of any proposed development or redevelopment of commercial, industrial or multi-family residential property in the City that involves the drainage of surface runoff from impervious areas such as roofs, pavements, parking areas, and walks with a total surface area of one thousand (1,000) square feet or more shall apply for and obtain a stormwater discharge permit prior to the start of any construction, earth change, or other work on the project site.
- (b) An application fee, as set forth by resolution of the City Commission, shall be paid for the review and processing of design plans and documents for the proposed drainage facilities that are submitted for obtaining a stormwater permit.
- (c) A permit fee, as set forth by resolution of the City Commission, shall be paid for administering and inspecting the proposed drainage facilities.
- (d) This permit shall be administered and enforced as a component of a consolidated application and permit called the Land Use and Development Permit required by Chapter 67 of the Code.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2005-94, § 1, 12-6-05; Ord. No. 2007-13, § 1, 2-20-07; Ord. No. 2012-50, § 1, 9-11-12, eff. 9-16-12)

Sec. 2.214. - Driveway Culverts.

- (1) *Responsibility for Driveway Culverts.* The property owner is responsible for the initial installation of a driveway culvert in accordance with EPSD specifications.
- (2) *Permit Requirement.*
 - (a) Prior to the installation of a new culvert the owner, owner's contractor or authorized agent must submit an application and a plan for the new culvert to the City Manager for review and approval. It shall be unlawful for anyone to construct any driveway approach over, in or through any gutter or road ditch or to install or construct a driveway culvert through any road, street or public right-of-way without first having obtained a permit from the City Manager.
 - (b) *Surety Required.* A Building Permit shall not be issued for any construction in or on any property, where there is no driveway approach, or where a new driveway approach is deemed necessary because of the existing conditions. The applicant for a building permit shall provide surety in such amount as is reasonably necessary, based upon the current construction costs, as established by the City Manager.
 - (c) A fee shall be charged for the issuance of the permit in such sum as the City Commission may require, by resolution.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.215. - Roadside Ditch Maintenance and Improvements.

- (1) It shall be the adjacent property owner's responsibility to perform routine maintenance of the roadside ditch. Such maintenance shall include the grass cutting, the removal of leaves, litter, and grass clippings and other loose debris and obstructions.
- (2) The dredging or re-grading of a roadside ditch shall be done by the City as determined necessary by the City Manager.
- (3) The re-establishment of a roadside ditch that has been filled by past or present adjacent property owners shall be completed by the City in a manner as determined by the City Manager.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.216. - Private Stormwater Facilities.

The City is not responsible for providing stormwater drainage facilities on private property. It shall be the responsibility of the property owner to install, maintain, repair or replace private stormwater facilities serving the owner's property. Where stormwater facilities serve more than one (1) privately owned parcel of property, it shall be considered each property owner's joint and several responsibility to install, maintain, repair or replace the facilities serving all such properties. Any changes made to the existing private stormwater facilities that change its discharge characteristics into the CSDS need to be approved by the City Manager.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.217. - Easements for Drainage.

- (1) Easements recorded as part of a subdivision plat that are not specifically granted to or held by the City, and are created for the purpose of managing surface water runoff from private property, are deemed to be private stormwater facilities. The maintenance obligations of these easements belong, jointly and severally, to each of the owners of the lots within the plat that utilize the easement for the discharge and management of surface water runoff from their lots.
- (2) Proposed developments that have common private drainage facilities serving multiple users such as, but not limited to, subdivision plats and site condominiums shall establish county drains, under authority of the Michigan Drain Code (MCL 280.1 et seq.)

- (3) Proposed developments that include the construction of private drainage facilities necessary for the proposed development and to mitigate the adverse impacts of stormwater runoff and which also receive, convey, store, treat and discharge stormwater from other public and private properties, shall enter into a "Stormwater Drainage Facilities Easement Agreement" with the City of Grand Rapids before final approval of the proposed development. The Stormwater Drainage Facilities Easement Agreement must be in a form that is acceptable to the City Attorney.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.218. - Management of the City Stormwater Drainage System.

The CSDS shall be under the management, supervision and control of the City Manager.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.219. - Inspection.

- (1) Since the discharge of Stormwater runoff is a pervasively regulated activity under Federal and State Law and by this Chapter, the City has the right and obligation to inspect connections and discharges to its system in order to insure compliance with State and Federal Law.
- (2) The City Manager and other duly authorized employees of the City bearing proper credentials and identification shall be permitted to enter upon all properties at reasonable times for the purpose of inspection, observation, measurement, sampling and testing in accordance with the provisions of this Chapter. Any person who uses, applies to use or is connected to, or who discharges into the City's Stormwater Drainage System is hereby put on notice that inspections may be made in accordance with this Chapter and the Michigan and United States Constitutions.
- (3) A person who uses, applies to use, is connected to or who discharges into the CSDS does so with the knowledge that inspections provided for in this Chapter will be made to insure compliance with the law, ordinances and regulations in effect controlling the use of the CSDS. Users of the CSDS shall have no reasonable expectation of privacy with respect to discharges or potential discharges into the CSDS and that announced and unannounced inspections may be conducted to the full extent provided for by Federal and Michigan Law. Inspections pursuant to this Chapter will be conducted only for observation, sampling, monitoring and measuring in order to determine compliance with this Chapter.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.220. - Authority to Issue Administrative Orders.

Whenever the City Manager determines that any discharger has violated this Chapter, or any other related laws or regulations which the City is authorized to enforce, the City Manager may issue administrative orders of the type listed below. Multiple orders may be issued simultaneously or in combination as a single order with respect to a single discharger.

- (1) *Notice of Violation.* The Notice of Violation is an official communication from the City Manager to the responsible party(s), which informs them that a violation of this Chapter has occurred. The Notice of Violation is issued for relatively minor or infrequent violations of stormwater management standards and requirements. The Notice of Violation is an initial disciplinary action taken for a violation which is neither significant nor poses an immediate hazard to the health and welfare of the public, damage to the environment or the CSDS.
- (2) *Corrective Action Order.* The Corrective Action Order is an enforcement document that directs Responsible Party(s) to undertake or to cease specified activities. The first formal disciplinary level to a significant violation is a Corrective Action Order and may incorporate compliance schedules, cost recovery and corrective action directives. If the Responsible Party(s) fails to correct a violation within the time frame specified in a Notice of Violation, the City Manager shall issue a Corrective Action Order for correction of this violation. The Responsible Party(s) is not

relieved of the responsibility for unauthorized discharges that occur anytime before or after receiving a Notice of Violation or Corrective Action Order.

- (3) *Cease and Desist Order.* The Cease and Desist Order is an order that directs the discharger to cease illegal or unauthorized discharges immediately. The City Manager shall have the authority to enter the discharger's property and take such steps as necessary to eliminate the discharge should the discharger fail to comply with such order. Such order shall be final and remain in effect until a hearing, if requested by the discharger, is conducted and a final decision is made by the City Manager. A written request for such hearing shall be made within ten (10) calendar days after receiving the order.
- (4) *Consent Order.* The Consent Order is an order issued as a result of an agreement between the City Manager and the discharger containing three (3) elements; compliance schedules, reimbursement of the City for damages and costs incurred or remedial actions, signatures of the City Manager and the discharger. A consent order shall address every identified and potential deficiency in the discharger's compliance status at the time of the order.
- (5) *Show Cause Order.* The Show Cause Order is an order issued by the City Manager when there is a failure to comply with either a Cease and Desist Order or a Consent Order, or where the violation is not corrected by timely compliance. The City Manager may order any discharger who causes or allows prohibited conduct, to show why further enforcement action should not be taken.
- (6) *Compliance Order.* The Compliance Order is an order that directs the discharger to achieve compliance by a date specified in the order. Compliance orders require discharger to develop management practices, spill prevention programs and related stormwater BMPs, or obtain appropriate permits.
- (7) *Stop Work Order.* The Stop Work Order is an order that directs a discharger to stop work where there is work in progress that constitutes, causes or is causing a violation of any provision of this Chapter. The City Manager may issue a Stop Work Order to prevent further violations or damage.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.221. - Authority to Issue Appearance Tickets.

The City Manager is authorized to issue a court appearance ticket for any violation of this Chapter.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.222. - Emergency Authority.

When a necessary or advisable emergency protective measure or action is required to abate a nuisance, to prevent loss of human life, injury or damage to property or to otherwise protect the public health, safety or welfare, the City Manager is authorized to cause such measures and actions to be taken. The costs of such protective measures or actions shall be the property owner's and shall constitute a lien upon the property as provided for by law or in the City Charter. The costs shall also be a personal debt of the property owner that may be collected as other debts.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.223. - Responsibility or Liability.

The City, its officers, employees, agents and contractors shall have only that responsibility or liability provided for by Federal or State law for any action or inaction in connection with the activities covered by this Chapter. No additional responsibility or liability is, or shall be, created or assumed.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.224. - Appeal of Permit Denials.

Any denial of a permit based upon the review provided for in this Chapter may be appealed as provided for in Article 7 of this Chapter.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.225. - Plan Reviews and Document Submittals.

- (1) *General Review Requirements.* Plans submitted for review shall provide adequate detail of the hydrology and hydraulics of the existing site and proposed development. Plans and specifications shall be of sufficient scale and detail to facilitate the evaluation of the potential impact of the proposed development upon the City's Stormwater Drainage System, adjacent properties, water bodies, rivers, streams, creeks and drainage ways.
- (2) *Minimum Information Required.* Plans submitted to the EPSD for review must have sufficient information to enable a complete and thorough evaluation of site grading and drainage. A list of minimum information required for proper plan review can be obtained from the EPSD prior to submitting documents for review. Any project submitted for review by EPSD which does not contain the minimum information specified by the EPSD shall be considered incomplete and returned without a complete design review.
- (3) *Supplemental Requirements.* The EPSD may require additional information or design effort to address site specific conditions before issuing a permit or recommending approval by the Planning Commission, or the City Commission. The following site-specific conditions may require additional information and design effort beyond the minimums listed in the checklist:
 - (a) *Existing Site Conditions.* Additional site design considerations may be needed where there are steep slopes, floodplains, wetlands, or waterways associated with or adjacent to the site.
 - (b) *Proposed Development Intensity.* Additional site design considerations may be needed with higher intensity developments, which have limited remaining areas for managing the site's stormwater runoff.
 - (c) *Public Drainage System Capabilities.* Additional site design considerations may be needed where the public drainage system into which the site discharges has special limitations (e.g. a combined sewer, a history of downstream flooding or existence of downstream erosion problems).
 - (d) *Local Neighborhood Concerns.* Additional site design considerations may be needed to address neighborhood concerns concerning drainage and related impacts caused by the proposed project.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Secs. 2.226—2.230. - Reserved.

ARTICLE 3. - PROHIBITIONS AND EXEMPTIONS

Sec. 2.231. - Prohibited Discharges.

No person shall discharge or in any way contribute to or cause to be introduced, directly or indirectly, into the CSDS any substance or pollutant other than stormwater or an exempted discharge. Any person discharging stormwater into the CSDS shall effectively prohibit pollutants from being discharged with the stormwater to the Maximum Extent Practicable.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.232. - Exempted Discharges.

- (1) The following discharges may enter the CSDS provided the discharges do not result in a violation of State of Michigan Water Quality Standards:
 - (a) Water supply line flushing.
 - (b) Landscape irrigation.
 - (c) Diverted stream flows.
 - (d) Rising groundwater.
 - (e) Uncontaminated groundwater infiltration to storm drains (as defined at 40 CFR 35.205[20]).
 - (f) Uncontaminated pumped groundwater.
 - (g) Discharges from non-chlorinated potable water sources.
 - (h) Foundation drain discharges when clay soils limit on-site infiltration.
 - (i) Air conditioning condensate.
 - (j) Individual residential car washing.
 - (k) Flows from riparian habitats and wetlands.
 - (l) Dechlorinated swimming pool water.
 - (m) Street washwater.
 - (n) Discharges or flows from emergency fire-fighting activities.
 - (o) Discharges for which a specific Federal or State permit has been issued.
- (2) None of the above exemptions eliminates the need to provide appropriate pollution control or pollution prevention measures required under this Chapter or under any other Federal or State Law, rule or regulation.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.233. - Interference with Natural or Artificial Drains.

- (1) It shall be unlawful for any person to stop, fill, dam, confine, pave, alter the course of, or otherwise interfere with any natural or constructed drain, ditch, watercourse or drainage facility that is a part of the CSDS without first submitting a suitable plan and receiving a permit from the City Manager.
- (2) Nothing in this Section shall preclude emergency action taken to prevent or mitigate conditions that would be injurious to the environment, the public health, safety or welfare. Any emergency action taken, which interferes or modifies any natural or artificial drain, shall be reported to the City Manager upon occurrence and a detailed report of the actions taken shall be filed within five (5) days. The report shall include location, date and time thereof, type of action and corrective actions taken. Failure to notify the City Manager immediately and the failure to file a report shall be considered a separate violation of this Chapter.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.234. - Material Storage.

It shall be unlawful for any person to store, stockpile or dispose of any hazardous, toxic or non-toxic material including but not limited to chemicals, explosives, buoyant materials, yard wastes, log and brush piles, unsecured landscaping materials, play or work sheds, animal wastes, fertilizers, flammable liquids and pollutants within an overland flow-way, drainage system or a floodplain unless adequate protection and/or containment has been provided to prevent such materials from entering, diverting or blocking the CSDS, except as specifically permitted by State and Federal Law.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.235. - Basement Waterproofing.

- (1) Prior to the installation of a basement waterproofing system that discharges groundwater, the property owner, or the owner's contractor, must obtain a Plumbing Permit from the Building Inspections Division of the City's Neighborhood Improvement Department. Basement waterproofing systems shall not be connected into the sanitary sewer system or discharged in such a manner as to cause a public or private nuisance. The waterproofing system must be inspected and approved by the City's Plumbing Inspector prior to putting the system into operation. The City Manager may order the owner to take corrective actions or discontinue the discharge of water from a basement waterproofing system. Each day the owner fails to comply with such order shall constitute a separate violation of this Chapter.
- (2) Sump Pump Discharge.
 - (a) Structures requiring footing drains because of a high water table (within two (2) feet of footing drains) or impervious soils shall discharge to the CSDS only by direct connection through a sump pump equipped with a check valve system. Gravity drainage from footing drains to the CSDS is prohibited to preclude the possibility of stormwater backups into the footing drains.
 - (b) If a connection to the CSDS is not possible or is impractical, alternative discharge in a manner which does not create a public or private nuisance shall be allowed.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.236. - Stormwater Discharges to Public Streets or Rights-of-Way.

Discharge from roof drains, footing drains, sump pumps and surface drains, shall not cause a public or private nuisance, nor shall the discharge be conducted to the sanitary sewer system as prohibited in Chapter 27 of the Code. The City Manager may order the owner to discontinue the discharge. Each day the owner fails to comply with such order shall constitute a separate violation of this Code.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.237. - Catch Basin Connections.

Discharges from private property may not be connected into a public stormwater catch basin unless approved by the City Manager.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Secs. 2.238—2.240. - Reserved.

ARTICLE 4. - STORMWATER MANAGEMENT STANDARDS

Sec. 2.241. - NPDES Permit Holders.

Any person required by State or Federal law to obtain an NPDES permit for a discharge into the CSDS, shall provide the City with a copy of all current or proposed NPDES permits and applications, including any changes, addenda or amendments.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.242. - Limiting Pollutants in Stormwater Discharges.

The City Manager is authorized to require dischargers to implement pollution prevention measures, Best Management Practices, or other methods necessary to prevent or reduce the discharge of pollutants into the CSDS.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.243. - Limiting Discharge Rates and Volumes.

The City Manager is authorized to establish minimum design standards for stormwater discharge release rates and require dischargers to implement on-site retention, detention or other methods necessary to control the rate and volume of surface water runoff discharged into the CSDS when:

- (1) A parcel of property is being developed or redeveloped in a manner that increases the impervious surface area of the property; or
- (2) The discharge exceeds the City-calculated pre-development discharge characteristics for the subject property and the City Manager determines that the discharge contributes to an identified drainage, flooding or soil erosion problem.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.244. - Public Safety.

Protection of the public health, safety and welfare shall be a primary consideration in the design of all stormwater facilities.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.245. - Stormwater Drainage System Design Criteria.

- (1) *Design Storms.* The following design storm standards require that the design engineer confirm the adequacy of the downstream system capacity and the existence of an acceptable emergency overland flow-way.

Type of Facility	Design Storm
<i>Open Channel</i>	
Roadside swales, ditches	10 year
Temporary construction channel	5 year
Emergency overland floodway	100 year
<i>Enclosed Channels (Storm drain pipes and culverts)</i>	
Collector systems	10 year
Trunk systems	25—100 year
<i>Detention/Retention Facilities</i>	
Emergency overflow spillway capacity	10 year

<i>Storage Volumes</i>	
<i>With Adequate downstream floodways</i>	25 year
<i>Without Adequate downstream floodways</i>	100 year
Water Quality Volume (WQV)	First ½ inch of Runoff
Stream bank protection w/0.05 cfs/acre discharge rate	2 year

(2) *Standard Design Storm Data.*

- (a) Standard rainfall intensities for design storms used in the Rational Method, the Modified Chicago Method or similar methods are contained in Article 2.311. A graph of the data is provided in Article 2.312 "Rainfall Intensity-Duration-Frequency for the City of Grand Rapids".
- (b) A Detention Storage Graph is provided in Article 2.313 as a quick reference for determining the required stormwater storage per acre of development.
- (c) The Natural Resources Conservation Service formerly known as Soil Conservation Service (SCS) Type II Rainfall Distribution for the total volume for a 24-hour duration rain event shall be used as the standard hydrograph in modeling a stormwater drainage system's performance. Article 2.314 provides the standard data to be used for various return frequency rain events.

(3) *Guidelines for Management Practices.* The design and construction of drainage, soil erosion and sediment control facilities shall be based upon the standards contained in the MDEQ-SWQ Guidebook of Best Management Practices for Michigan Watersheds (GBMP), October 1998, as revised, the Kent County Drain Commissioner's Subdivision Drainage Rules, as revised, The City of Grand Rapids City Code, The City Of Grand Rapids Standard Construction Specifications, this Ordinance and/or project contract documents.

(4) *Runoff Reduction.* Site plans shall be designed to minimize increased runoff from the proposed development by preserving floodplains and wetland areas, minimizing impervious surfaces, conveying flows in open vegetated swales, infiltrating runoff into the ground and on-site storage for irrigation purposes.

(5) *Discharge Rate Limits:*

- (a) Sites discharging stormwater runoff into a drainage system, which includes sensitive downstream open channels that are susceptible to stream bank erosion shall have its discharge limited to a rate of 0.05 cubic feet per second per acre up to the two (2) year rain event.
- (b) Two (2) Acres or Larger. Developments, two (2) acres or larger shall have a maximum discharge rate of 0.13 cubic feet per second per acre.
- (c) Less Than Two (2) Acres. Developments, less than two (2) acres shall restrict discharge to the greatest extent feasible by using filtration basins or similar devices or means, provided the discharge rate does not exceed 0.26 cubic feet per second.
- (d) Redevelopment Sites. Site specific evaluation to determine appropriate discharge rates will be required. The appropriateness of the discharge rate shall be approved by the City Manager.

- (6) *Access to Drainage Structures.* Surface drainage structures must be accessible for maintenance. An access route must be provided which shall be at least twelve (12) foot wide, no steeper than a five (5) percent grade and capable of supporting a five (5) ton truck.
- (7) *Pipe/Culvert Inlet and Outlet Bar Screens.* The inlet or outlet to any pipe or culvert, which is greater than twelve (12) inches in diameter, shall be equipped with a bar screen or "critter grate". All inlet bar screens shall be designed to avoid trapping a person against the screen. Driveway culverts less than fifteen (15) feet in length are exempt from this requirement.
- (8) *Leaching or Infiltration Basins and Systems.*
 - (a) *Basic Soil Requirements.*
 1. Leaching basins may be used only in sandy pervious soils.
 2. Kent County Soil Survey Map is the basis for determining acceptability of soil type.
 3. Only those soils in a permeable range of six (6) inches to twenty (20) inches per/hour qualify.
 4. Marginal areas will require soil borings.
 - (b) *Determination of Number—Application of Short Method.*
 1. Soil type is suitable.
 2. Water table is nine (9) feet deep or more.
 3. Without further calculation, one (1) standard leaching basin accommodates five thousand (5,000) square feet of impervious area (parking lot, building roof).
 - (c) *Standard Detail of Construction.*
 1. Standard leaching basin detail may be obtained from the EPSD.
 2. Special attention must be given to having two (2) feet minimum of 6A stone prior to the filter fabric/sand interface.
 - (d) *Location.*
 1. The filter fabric/sand interface of a leaching basin must be a minimum of fifteen (15) feet from the nearest property line.
 2. Minimum distance between basins shall be fifteen (15) feet, measured from the filter fabric/sand interface.
 - (e) *Interconnections.*
 1. All basins must interconnect by means of a storm drainpipe.
 2. A connection can be made to the CSDS provided the invert is above the side well leaching area.
 - (f) *Determination of Number—Application of Long Method.* Instructions are available from the EPSD for designing a leaching system as an alternative to the short method described above.
- (9) *Stormwater Detention/Retention Facilities.*
 - (a) *Outfalls.* Stormwater outfalls from detention or retention facilities shall discharge to a defined downstream system with adequate capacity to handle the flow. When discharging to an open channel, an energy dissipater and/or other soil erosion protection must be provided.
 - (b) *Freeboard.* A minimum freeboard of one (1) foot above the design high water elevation shall be provided.
 - (c) *Minimum Pipe Size.* Single pipe outlets shall have a minimum inside pipe diameter of three (3) inches. When the design release rates call for more restrictive flows than can be achieved by a three (3) inch pipe, an alternate design must be provided to achieve the desired restriction.

Alternate designs may include structures such as perforated risers, restrictive orifices with debris control baffles, or some other facility such as a filtration basin.

- (d) *Buffer Zones.* Residential structures shall be constructed at least fifty (50) feet away from the design high water elevation of a detention basin, or twenty (20) feet from a floodway or areas subject to a base flood.
- (e) *Sediment and Debris Removal.* Drainage facilities designed for the settling of suspended materials and the skimming of floating materials shall be provided with adequate vehicular access to permit normal maintenance activities. The access shall be designed and constructed in accordance with Section 2.245(6) "Access To Drainage Structures." Appropriate easements shall be granted over the access route.
- (f) *Dewatering of Detention Facilities.* The bottom of a detention basin shall have at least a two (2) percent slope toward the outlet or be equipped with an adequate underdrain system to dewater the basin within twenty-four (24) hours after a rain event has ended.
- (g) *Safety.* Consideration shall be given to the protection of the general public in the design of stormwater detention or retention facility. The design shall identify public safety concerns relevant to the proposed facility. Slope conditions, enclosures, screening or other measures shall be incorporated into the design of such facilities to reasonably minimize potential hazards to the public. Enclosures shall be provided and maintained in accordance with Section 421.0 "Swimming Pools" and particularly Subsections 421.1 "General", 421.9 "Enclosures for Public Swimming Pools", and 421.10 "Enclosures for Private Swimming Pools, Spas and Hot Tubs" of the National BOCA Code, as revised.
 - 1. Detention or retention facilities that exceed two (2) feet in depth shall be constructed with side slopes not to exceed twenty-five (25) percent in grade unless the slope is existing.
 - 2. Detention facilities shall be provided with a permanent enclosure (fence) when its side slopes exceed seventeen (17) percent grade, or the average depth exceeds three (3) feet. The average depth is determined by the maximum design volume divided by the water surface area of the basin at the design high water elevation.
 - 3. Retention facilities which have maximum depths exceeding two (2) feet shall either be enclosed or shall be surrounded by a dense wetland type vegetative barrier which is a minimum of twenty (20) feet wide and the water depth within the barrier does not exceed two (2) feet.
 - 4. The above slope parameters apply strictly to slopes that are created with the construction of the detention or retention facility. Proposed facilities with existing slopes with a well established vegetative cover shall be evaluated for the need of an enclosure or barrier on a site specific basis.
- (10) *BMP Requirement For Paved Areas.* Paved parking, loading and driveway areas, other than roadways, greater than two thousand five hundred (2,500) square feet, shall discharge through a filtration trench or other approved BMP which is designed to remove a minimum of seventy (70) percent of the pollutants which commonly include oils, greases, metals, sediment and debris which is likely to be washed off of the paved surface area.
- (11) *Emergency Floodways.* Whenever a stormwater facility is constructed for a design storm less than the one hundred (100) year storm, an emergency overland flow way and easements shall be provided to convey or store that portion of the one hundred (100) year runoff which the facility does not manage. Any easements are to be on a form approved by the City Attorney and recorded with the Kent County Register of Deeds.
- (12) *Stormwater Conveyance Systems.*
 - (a) *Connections.*

1. Stormwater discharges shall not be directed into a sanitary sewer. Exceptions may be granted by the EPSD for developments located within a combined sewer area, once all other alternatives for managing the stormwater have been exhausted.
2. Roof drains, which are to be connected to the public underground drainage system, shall pass through a pressure relief structure or catch basin before connecting to the public drainage system.

(13) *Storm Drain Pipes.*

- (a) *Pipe Size.* A minimum pipe diameter of twelve (12) inches is standard for public systems and three (3) inches for private systems.
- (b) *Slopes and Hydraulic Gradient.* The standard recommended minimum slope for storm drains shall produce a velocity of two and one-half (2.5) feet per second when the storm drain is flowing full. For pipe less than eighteen (18) inches in diameter, the minimum grade shall be one-half (0.5) of one (1) percent.
- (c) *Spacing of Manhole Structures.* Manhole spacing shall not exceed three hundred fifty (350) feet for pipes less than or equal to seventy-two (72) inches in diameter and shall not exceed seven hundred (700) feet for those greater than seventy-two (72) inches.
- (d) *Minimum Clearances for Storm Sewer Pipe Shall Comply With the Following Criteria:*
 1. *Road Base.* A minimum of one (1) foot is required between the bottom of the road base material and the outside crown of the storm drain.
 2. *Utility Conflicts.* For utility conflicts that involve crossing a storm drain, the minimum design clearance between the outside of the pipe and the outside of any conflicting utility shall be 0.5 foot.
 3. *Utility Placement.* Storm drain systems shall not be placed parallel to and below existing utilities, which could cause utility support problems. The recommended clearance is two (2) feet extending from each side of the storm drain and one (1) on one (1) side slopes from the trench bottom.
 4. *Manholes.* Utility lines shall not, as a rule, pass through any manhole or pipe. The utility line (e.g., gas, water, electrical conduit, etc.) shall be offset in such a way as to provide adequate clearance between the crossing. When a sanitary line or other utility must pass through a manhole, the greatest possible clearance from the bottom of the flow channel shall be provided with a minimum of one (1) foot clearance. When utilities are run through a manhole, they shall be installed in such manner as to avoid impeding maintenance access.

(14) *Open Channels.*

- (a) Natural stream and channel systems shall be preserved.
- (b) Streams and channels shall be designed and constructed to avoid streambank erosion in accordance with the guidance provided in the Guidebook for Best Management Practices.
- (c) Manning's "n" Values For Constructed Open Channels can be found in Article 11, Section 2.315
- (d) Channel side slopes shall be stable throughout the length.
- (e) `V' or Triangular shaped channels are not allowed.
- (f) The design of artificial open channels shall be consistent with the velocity limitations found in the Guidebook for Best Management Practices for various "Runoff Conveyance and Outlets".
- (g) Channel slopes shall be stabilized against erosion by either adequate vegetation or protective armoring.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Secs. 2.246—2.249. - Reserved.

ARTICLE 5. - SOIL EROSION AND SEDIMENTATION CONTROL

Sec. 2.250. - Enforcement Authority.

The City of Grand Rapids is designated as the Municipal Enforcing Agent for this Article to enforce these provisions as well as those of Part 91, Soil Erosion and Sedimentation Control (SESC), of the Natural Resources and Environmental Protection Act, 1994 PA 451 as amended (Part 91) and the administrative (rules) promulgated under Part 91.

(Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.251. - Responsibility to Prevent Soil Erosion and Discharge of Sediments.

- (1) It shall be the responsibility of the property owner and all other persons participating in, causing or being factually or legally responsible for any earth change to provide soil erosion and sedimentation control to adequately prevent soil from being eroded and discharged onto adjacent properties, or into a CSDS, a public street or right-of-way, wetland, creek, stream, water body or floodplain.
- (2) During any earth change that exposes soil to an increased risk of erosion, the property owner and any other person participating in such an earth change shall, at a minimum:
 - (a) Prevent damage to any public utilities or services within the limits of grading and along any routes of travel of the equipment,
 - (b) Prevent damage to or impairment of any wetland, creek, stream or water body on or near the site,
 - (c) Prevent damage to adjacent property,
 - (d) Determine, apply for and receive, all applicable approvals or permits prior to the commencement of work,
 - (e) Implement the proposed work in accordance with the approved plans and in compliance with all the requirements of this Chapter and any permits issued pursuant to this Code,
 - (f) Maintain all necessary or required soil erosion and sediment control measures including, but not limited to, measures required to comply with the provisions of this Chapter,
 - (g) Promptly remove all soil, sediment, miscellaneous debris or other materials applied, dumped or otherwise deposited on any other properties, public streets, highways, sidewalks, or other public thoroughfares including catch basins, storm sewers, ditches, drainage swales, creeks or other bodies of water. Removal within twenty-four (24) hours shall be considered prima facie compliance with this requirement, unless such materials present an immediate hazard to public health and safety or the environment,
 - (h) Refrain from grading on land so close to the property line as to endanger any adjoining public street, sidewalk, alley or any public or private property without supporting and protecting such property or structures from settling, cracking or other damage which might result,
 - (i) The owner shall have the soil erosion and sediment control measures inspected weekly and within twenty-four (24) hours of a rain event of sufficient quantity to cause runoff. The inspection for sites one (1) acre or greater shall be conducted by a MDEQ certified Construction Site Stormwater Operator who shall maintain written inspection logs on forms approved by the City Manager.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.252. - Permit or Authorization Requirement.

- (1) A Soil Erosion and Sedimentation Control (SESC) Permit must be obtained by the Land Owner, prior to beginning the earth change. An Authorization to Proceed with Earth Change must be obtained by any entity or contractor performing work on behalf of the City. Failure to obtain an SESC Permit, or Authorization to Proceed with Earth Change as applicable, prior to beginning any earth change requiring a permit or authorization is a violation of this Chapter.
- (2) The Land Owner shall obtain an SESC Permit, or the entity performing work on behalf of the City shall obtain an Authorization to Proceed with Earth Change as applicable, when the earth change activity is associated with any of the following conditions unless exempted in Section 2.253
 - (a) A commercial or industrial development project with some type of earth change involving areas greater than two thousand five hundred (2,500) square feet,
 - (b) A plat, subdivision, Planned Unit Development, Planned Industrial Development, or multi-residential unit developments,
 - (c) A parking area greater than one thousand (1,000) square feet,
 - (d) Any earth change within five hundred (500) feet of a wetland, creek, stream, lake, water body or floodplain,
 - (e) A requirement of a Corrective Action Notice, Consent Order, or Compliance Order,
 - (f) A condition of approval by the Planning Commission, Board of Zoning Appeals, or City Commission,
 - (g) A condition of a building permit to assure that the proposed earth change will have adequate soil erosion and sedimentation controls to protect the neighborhood, the CSDS and the environment,
 - (h) Any earth change involving an area greater than or equal to, one (1) acre,
 - (i) A Soil Erosion and Sedimentation Control (SESC) Permit or Authorization to Proceed with Earth Change as applicable, shall be obtained by the property owner, or any other person participating in any earth change requiring a permit or authorization, prior to the start of any construction, earth change, or any other work which could cause soil to be exposed to potential erosion. The SESC permit application and permit, or Authorization to Proceed with Earth Change as applicable, shall be administered and enforced as a component of a consolidated application and permit called the Land Use and Development Permit required by Chapter 67 of the Code. Failure to obtain an SESC permit, or Authorization to Proceed with Earth Change as applicable, prior to beginning any earth change requiring a permit or authorization is a violation of this Chapter.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2005-94, § 2, 12-6-05; Ord. No. 2007-13, § 1, 2-20-07; Ord. No. 2013-21, § 1, 5-28-13)

Sec. 2.253. - Exemptions From Obtaining an SESC Permit.

- (1) Earth changes undertaken by Authorized Public Agencies designated under the Natural Resources and Environmental Protection Act, MCL 324.101 et seq., Part 91, Soil Erosion and Sedimentation Control are exempted from obtaining soil erosion control permits. However, such entities performing work on behalf of the Authorized Public Agency, must obtain an Authorization to Proceed with Earth Change and comply with all control design requirements found in Section 2.259
- (2) Exemptions provided for in Sections 9115 and 9115a of Part 91 and Rule 323.1705.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07; Ord. No. 2013-21, § 2, 5-28-13)

Sec. 2.254. - Permit or Authorization Application.

- (1) A permit or authorization application along with the SESC Plan and a non-refundable application fee as established by the City Commission shall be submitted to the City Manager by the Land Owner or designated agent for the earth change for each SESC Permit or Authorization to Proceed with Earth Change. The SESC plans shall be prepared and signed by a Michigan licensed professional engineer or a Michigan licensed architect.
- (2) In addition to issues that are directly related to the viability of a proposed project for which the application is being made, an applicant may be denied a permit or authorization when the applicant has a documented history of non-compliance with this Chapter or previously issued permits or authorizations.
- (3) A permit holder or authorization holder may request in writing, from the City Manager, an extension of time for the completion of the project no later than ten (10) days prior to the expiration of the permit or authorization. Such requests shall state the reason for the extension and new completion date. The City Manager may grant additional time for the completion of the project. The terms and conditions of bonding remain in effect.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07; Ord. No. 2013-21, § 3, 5-28-13)

Sec. 2.255. - Application Review Fee.

- (1) A non-refundable application review fee shall be paid by the property owner for the review and processing of the SESC permit or by the Authorization to Proceed with Earth Change application, plans, and pertinent documents.
- (2) The application review fee shall be established by City Commission resolution.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2005-94, § 3, 12-6-05; Ord. No. 2007-13, § 1, 2-20-07; Ord. No. 2013-21, § 4, 5-28-13)

Sec. 2.256. - Permit or Authorization Fee.

- (1) A non-refundable permit or authorization fee shall be paid by the property owner for the permit, or the entity performing work on behalf of the City for the authorization, administration and site inspection.
- (2) If the site work at the applicant's site is not completed and the site stabilized by the time the permit or authorization expires, the applicant shall request a permit or authorization extension and pay an additional permit or authorization fee for the extension period.
- (3) Failure to request a permit or authorization extension shall be a violation of this section, and may result in forfeiture of the applicant's surety and other possible enforcement action against the applicant.
- (4) The permit or authorization fee and permit or authorization extension fee shall be established by City Commission resolution.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2005-94, § 4, 12-6-05; Ord. No. 2007-13, § 1, 2-20-07; Ord. No. 2013-21, § 5, 5-28-13)

Sec. 2.257. - Surety Requirements.

- (1) The property owner or the owner's agent shall post an acceptable surety bond, without an expiration date, with the City Manager, payable to the City. In lieu of a surety bond, an acceptable, irrevocable letter of credit or cash deposit, of equal value, shall be filed with the City Manager. The termination date on a letter of credit shall be at least one (1) year beyond the permit's or authorization's expiration date. A new letter of credit shall be required with an Applicant's permit or authorization extension request unless the existing letter of credit has a termination date that is at least one (1) year past the permit or authorization extension's expiration date. The bond or letter of credit shall be in a form acceptable to the City's Risk Manager.

- (2) The bond, letter of credit or cash deposit is for the purpose of:
 - (a) Undertaking work to protect all areas subject to accelerated soil erosion should development discontinue; and
 - (b) Implementing and maintaining soil erosion and sedimentation control measures necessary to protect the work specified in the approved SESC Plan as authorized by the permit or authorization. The bond shall provide for compliance with all applicable laws, rules, regulations, ordinance and permit or authorization requirements. The bond shall include penalty provisions for failure to properly complete the work on schedule or comply with the requirements, conditions and terms specified in the SESC Plan and associated permit or authorization requirements.
- (3) Upon completion of the permitted or authorized project, the Applicant may request the return of the surety. However, the City Manager may retain such surety for up to one (1) year past the completion of the project to assure that the site remains stabilized and all permanent drainage control measures are maintained and functioning properly.
- (4) The surety shall be in the amount of:
 - (a) Five thousand dollars (\$5,000.00) for the first acre of disturbed area.
 - (b) Two thousand dollars (\$2,000.00) for each additional acre of disturbed area rounded up to the next whole acre.
- (5) This surety requirement may be waived at the sole discretion of the City Manager, only after the review of sound scientific or engineering data by the City Manager that has determined that the potential risk of soil eroding from the site and causing damage to the environment, adjacent properties or the CSDS is negligible.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07; Ord. No. 2013-21, § 6, 5-28-13)

Sec. 2.258. - Modifications to Approved Plan, Permit, or Authorization.

- (1) All modifications to, or deviations from, the permit, authorization, or the proposed earth change as shown on the approved SESC Plan must be submitted to and approved by the City Manager. Failure to obtain approval by the City Manager prior to beginning such work is a violation of this Chapter.
- (2) Nothing in this Section shall preclude emergency action being taken to prevent or mitigate conditions that would be injurious to the environment, the public health, safety or welfare. Any emergency action taken, which interferes or modifies any natural or artificial drain, shall be reported by the property owner or the applicant on behalf of the property owner to the City Manager upon occurrence. The owner or applicant shall prepare a detailed report including appropriate drawings and shall file these with the City Manager within five (5) days. The report shall include location, date, and time thereof, type of emergency action and follow-up corrective actions taken. Failure to notify the City Manager at the time of the occurrence and failure to file a detailed report shall be separate violations of this Chapter. Every day the permittee or authorization holder fails to comply with this section shall constitute a separate violation of this Chapter.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07; Ord. No. 2013-21, § 7, 5-28-13)

Sec. 2.259. - Soil Erosion and Sedimentation Control Design.

- (1) *Soil Erosion and Sedimentation Control Plan Requirements.* The plan shall include, but not be limited to, all of the following:
 - (a) A map or maps at a scale of not more than 100 feet to the inch or as otherwise determined by the county or local enforcing agency. A map shall include a legal description and site location sketch that includes the proximity of any proposed earth change to lakes or streams, or both; predominant land features; and contour intervals or slope description.

- (b) A soils survey or a written description of the soil types of the exposed land area contemplated for the earth change.
- (c) Details for proposed earth changes, including all of the following:
 1. A description and the location of the physical limits of each proposed earth change.
 2. A description and the location of all existing and proposed
 3. The timing and sequence of each proposed earth change.
 4. The location and description for installing and removing all proposed temporary soil erosion and sediment control measures.
 5. A description and the location of all proposed permanent soil erosion and sediment control measures.
 6. A program proposal for the continued maintenance of all permanent soil erosion and sediment control measures that remain after project completion, including the designation of the person responsible for the maintenance. Maintenance responsibilities shall become a part of any sales or exchange agreement for the land on which the permanent soil erosion control measures are located.

(2) *Basic Design Principles and Construction Methods.*

- (a) The design of soil erosion and sedimentation control systems involve the application of planning, scheduling and control actions that will minimize the adverse impacts of erosion, transport and deposition of soil. The following five (5) basic principles are essential elements that must be incorporated in a sound soil erosion and sedimentation control plan prior to the disturbance of the site.
 1. The project shall be, to the greatest extent possible, planned to harmonize with the natural topography, soil types, waterways and existing vegetation found at the site.
 2. Soils shall be exposed for the shortest possible time and involve the smallest area possible.
 3. On-site erosion control measures shall be utilized to prevent erosion from the site to the greatest extent possible.
 4. Sedimentation control measures shall be utilized to prevent soils from being washed off the site.
 5. An ongoing inspection and maintenance program shall be developed and approved by the EPSPD prior to any disturbance of soil on the site.
- (b) In practice, these principles shall be used together in the planning process. The planning process shall identify potential soil erosion and sedimentation control problems before soils on the site are disturbed. Vegetative control measures are required for all disturbed areas and generally shall include filter strips, temporary or permanent seeding, sodding, mulching and erosion-control blankets. Structural control measures are required when runoff leaves a disturbed site and generally include sediment traps, diversions, sediment basins and permanent drainage facilities.
- (c) The soil erosion and sedimentation control plan shall include appropriate construction specifications for all control measures. These specifications shall be developed by the design engineer as required to address site-specific conditions. Typical specifications may be obtained from the *Guidebook of Best Management Practices for Michigan Watersheds*, available from the Michigan Department of Environmental Quality.
- (d) Construction Sequencing (TREATMENT TRAIN). Soil erosion and sedimentation control measures shall start with erosion protection where soil is disturbed and follow with proper conveyance and filtering measures and placing sediment basins/traps at low points before runoff leaves the site.

- (e) Removal. All temporary soil erosion and sedimentation control measures shall be removed after the final site stabilization is achieved or after the temporary measures are no longer needed.

(3) *Soil Stabilization.*

- (a) *Soil Erosion Protection.* The surface of stripped areas shall be protected from soil erosion immediately after the final grade is reached. Temporary erosion protection shall be provided over stripped areas that are not at final grade. Temporary protection shall be maintained until permanent protective cover is established and the site is stabilized.
- (b) *Vegetative Measures.* For vegetative soil stabilization measures, plants shall be selected which are appropriate to the season and site conditions. Adequate seedbed preparation shall be provided for plants to germinate and grow.
- (c) *Earth Structures.* Stabilization measures shall be applied to earthen structures such as dams, dikes and diversions immediately after installation.
- (d) *Watercourses.* The bed and banks of a watercourse shall be continuously stabilized as work progresses along the watercourse.
- (e) *Stockpiles.* If a stockpile of soil is to remain in place more than three (3) days, soil erosion and sedimentation control measures shall be provided such as a tarp cover, sediment trap around the stockpile or seed and mulch.
- (f) *Area Limitation.*
 - 1. Disturbed areas draining one (1) acre or less are to be protected by a flow barrier such as silt fences or straw bales to control runoff. Vegetated filter strips shall not be used as a primary device but can be used as a backup in conjunction with other control measures.
 - 2. Disturbed areas larger than one (1) acre shall have sediment controls, such as a sediment basin, in addition to flow barriers.
- (g) *Concentrated Flows.* Concentrated runoff shall not be allowed to flow down cut or filled slopes. Runoff shall be contained within an adequate temporary or permanent channel, flume or slope drain structure.
- (h) *Velocity Control.* Stormwater conveyance facilities that are either temporary or permanent in nature shall be designed to prevent erosive velocities.
- (i) *Storm Drain Protections.* Storm drain inlets shall be protected with sediment trapping and filter control devices during construction.
- (j) *Construction Site Ingress and Egress.* A stabilized mat of aggregate, underlain with filter fabric material, shall be located at any point where vehicular traffic will be entering and leaving a construction site. When the tracking of soil offsite becomes a particular problem, a wash station(s) and/or street sweeping shall be required to reduce soil tracked offsite.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

ARTICLE 6. - FLOODPLAIN STANDARDS

Sec. 2.261. - Application of Standards.

- (1) This Article is to protect the public and the environment from flood losses or damage.
- (2) These Floodplain Standards shall apply to all land within the City that has been identified as a floodway, floodplain or flood prone area by one (1) or more of the following National Flood Insurance Studies or local watershed plans:

- (a) National Flood Insurance Study with accompanying *Flood Insurance Rate Maps* dated November 5, 1982 and *Flood Boundary and Floodway Map* dated January 17, 1979, and any further editions or minor revisions of said study and maps as may be issued by the FEMA.
 - (b) The City of Grand Rapids' *Stormwater Management Master Plan - Watershed Studies*, December 1994.
 - 1. Comstock-Sligh Watershed
 - 2. Graceland-Lacey Watershed
 - 3. Hogadone Watershed
 - 4. Lamberton Watershed
 - (c) *Indian Mill Creek Watershed, Stormwater Management Plan*, February 1994.
 - (d) *Stormwater Management Plan for the Buck Creek and Plaster Creek Watersheds*, January 1991.
 - (e) *Stormwater Management Plan for Coldbrook Creek Drainage District*, June 1985.
- (3) The City Clerk shall maintain a master copy of each of the above plans and studies, associated maps and revisions for public inspection. The City Manager shall make a determination which resolves any conflict between the National Flood Insurance Study and associated maps and the local watershed plans in a manner which best protects the interests of the public and its health, safety and welfare of the residents of the City of Grand Rapids.
- (4) Where applicable, the provisions and restrictions of this Chapter shall supersede other provisions of the building regulations of Title V and Title VIII of the Code.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.262. - Standards for Floodway and Floodplain.

- (1) All new or existing buildings undergoing substantial improvements (defined in Section 2.203(63)) shall be protected from flood damage up to the Flood Protection Elevation (FPE).
 - (a) Residential buildings for all new construction or existing buildings undergoing substantial improvement shall have their floor elevation above the FPE. If placed on fill, the top of the fill shall be above the FPE. The fill shall be placed at that elevation for a distance of thirty (30) feet out from the nearest edge of the building unless the building design is certified by a Michigan licensed professional engineer to be protected from damages due to hydrostatic pressures. The fill must not settle below the FPE and must be protected against erosion, scour and differential settlement.
 - (b) Buildings elevated by means of support structures such as walls, pilings or other foundations which are permanently closed to flood waters, shall have support structures protected from hydrostatic damage up to the FPE.
 - (c) Buildings elevated by means of support structures such as walls, pilings or other foundations which are permanently open to flood waters, shall have the supporting structures protected from hydrodynamic damage resulting from a base flood event. The permanent openings shall be no more than one (1) foot above grade and shall consist of a minimum of two (2) openings. The openings shall have a total net area of not less than one (1) square inch for every one (1) square foot of enclosed area subject to flooding below the FPE. The foundation and supporting members shall be anchored and aligned in relation to flood flows and adjoining structures so as to minimize exposure to known hydrodynamic forces such as current, waves, ice and floating debris. All areas below the FPE shall be constructed of materials resistant to flood damage. The floor (including basement) and all electrical, heating, ventilating, plumbing and air conditioning equipment and utility meters shall be located at or above the FPE. Water pipes, sewer pipes, electrical lines and telephone lines, submersible pumps and other waterproofed service facilities

may be located below the flood protection elevation. No area below the FPE shall be used for storage of items or materials.

- (d) Non-residential buildings, including basements for all new construction or buildings undergoing substantial improvement, shall have their floor elevation above the FPE. A non-residential building may be structurally dry flood-proofed, in lieu of elevation, provided a Michigan licensed professional engineer certifies that the building has been structurally dry flood-proofed below the FPE and that the building and attendant utility facilities are watertight and capable of resisting the effects of the base flood. The building design shall take into account flood velocities, duration, rate of rise, hydrostatic and hydrodynamic forces and the effects of buoyancy and impacts from debris or ice. Flood proofing measures shall be operative without human intervention and without an outside source of electricity. Levees, berms, floodwalls and similar works are not considered flood proofing for the purposes of these rules and regulations.
 - (e) Manufactured homes and recreational vehicles to be placed on a site more than one hundred eighty (180) days shall be elevated above the FPE and shall be anchored to resist flotation, collapse or lateral movement by being tied down in accordance with State regulations.
- (2) A non-conforming structure damaged by flood, fire, wind or other natural or man-made disaster may be restored unless the damage exceeds fifty (50) percent of its market value before it was damaged.
 - (3) Substantial improvements to a non-conforming building or a building with a non-conforming use shall not be allowed or permitted unless the entire building is permanently changed to a conforming building and the use is in compliance with the applicable requirements of this ordinance.
 - (4) New and replacement utilities such as water supply systems, wells and sanitary sewer lines may be permitted, provided all manholes or other aboveground openings located below the FPE are watertight.
 - (5) Compensatory storage shall be provided to mitigate the displacement of floodwaters whenever fill or buildings are placed within a floodplain. The mitigated hydraulically equivalent compensatory storage volume shall equal one point two (1.2) times the volume of floodplain storage lost. Such compensation areas shall be designed to drain freely and openly to and from the watercourse and located opposite or adjacent to fill areas. The mitigated hydraulically compensatory storage volume shall be documented through calculations at the following elevation intervals:
 - (a) Between the normal water elevation and the ten-year flood elevation;
 - (b) Between the ten-year and fifty-year flood elevation, and
 - (c) Between the fifty-year and the base flood elevation (one hundred-year flood elevation).
 - (6) Refer to Chapter 61, Sections 5.134, Floodway Area and 5.135, Special Flood Hazard Area of the City Code for permitted, prohibited and specially approved uses within the floodway areas.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.263. - Variance Provision.

A variance from the requirements of Article Six of this Chapter may be granted by the City Manager for an existing building listed in the *National Register of Historic Places* or the *State Inventory of Historic Places* or any existing building controlled by the provisions of Chapter 68 "Historic Preservation Commission" of the Grand Rapids City Code, which is to be restored or reconstructed. The provisions of Article 7 of this Chapter shall control the variance procedure. Conditions may be included in any variance so granted, to protect the public health, safety and welfare and to comply with the intent and spirit of this Chapter.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.264. - Special Conditions.

Upon reviewing all data and materials and before issuing any permit, the City Manager may attach conditions to the issuance of said permit which relate to floodplain management and flood-proofing, which are reasonably necessary to further the intent and spirit of this Chapter and protect the general public health, safety and welfare.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.265. - Advisability of Additional Flood Protection.

The degree of flood protection required by this Chapter is hereby found to be the minimum necessary and reasonable for regulatory purposes. Larger floods may occur and higher floodwater heights may occur than will be mitigated or controlled by compliance with these requirements. This Chapter shall not be interpreted to imply or guarantee that areas outside the Floodway Fringe or Floodway Areas, or uses permitted within such areas, shall remain free from flooding or flood damage. Compliance with the terms of this Chapter will not guarantee freedom from damage, injury or loss of life. This Chapter shall not create liability for the City of Grand Rapids or any officer, agent or employee of the City for any flood or flood related damage.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Secs. 2.266—2.270. - Reserved.

ARTICLE 7. - ADMINISTRATIVE APPEALS AND PROCEDURES

Sec. 2.271. - Right of Appeal.

The City Manager shall conduct hearings or may appoint an impartial Hearing Officer to conduct hearings related to orders provided for in this Chapter and to hear appeals of decisions to deny a permit, plan approval or request for variance related to stormwater issues. The appeal to the City Manager should be an appeal of right.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.272. - Appeal Procedures for Administrative Orders.

- (1) Any person, receiving a Cease and Desist Order, Compliance Order or Stop Work Order may request a hearing regarding such order. A written request for such a hearing shall be made to the designated person and address indicated on the order within ten (10) business days after receiving the order. A hearing date, time and place shall be set as soon as is practical but not later than thirty (30) business days after receipt of the request for a hearing.
- (2) Once the requested hearing has been conducted, a person shall have the right to appeal the results of that hearing except for any matter disposed of by a consent order, stipulation, agreement or mutual waiver. A written notice of appeal shall be filed with the City Clerk within ten (10) business days from the closing of the hearing. The Clerk shall refer a copy of this notice to the City Manager or the designated Hearing Officer. The City Clerk shall also confer with the City Manager or the designated Hearing Officer to set a hearing time as soon as is practical but not later than thirty (30) business days after the filing of the notice of appeal with the City Clerk. The hearing shall be conducted by the designated Hearing Officer. The issue to be determined is whether the denial of the permit, plan approval or variance was consistent with provisions of this Chapter. The designated Hearing Officer shall render a written decision within a reasonable time stating the factual basis for the decision and the reasons for the decision.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.273. - Appeal Procedures for Permit or Variance Denials.

Where proper application is made for a permit, plan approval or a variance, and such permit, plan approval or variance is denied by the City for stormwater related reasons, the applicant shall have the right to appeal such a denial as elsewhere provided for by law or in this Chapter. For purposes of this Article, denial of a permit, plan approval or variance shall include refusal to issue an original permit or variance, the refusal to renew or reissue an existing permit or variance, or the refusal to approve an original or modified plan. Within ten (10) business days of notification of denial, applicant shall file with the City Clerk a written notice of appeal. The Clerk shall refer a copy of this notice to the City Manager or the designated Hearing Officer. The City Clerk shall also confer with the City Manager or the designated Hearing Officer to set a hearing time as soon as is practical but not later than thirty (30) business days after the filing of the notice of appeal with the City Clerk. The hearing shall be conducted by the designated Hearing Officer. The issue to be determined is whether the denial of the permit, plan approval or variance was consistent with provisions of this Chapter. The designated Hearing Officer shall render a written decision within a reasonable time stating the factual basis for the decision and the reasons for the decision.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.274. - Hearing Procedure.

Any hearing conducted pursuant to the provisions of this Chapter shall be conducted in substantial compliance with the following provisions:

- (1) The appellant to an administrative order or an applicant of a denied permit or variance shall be notified of the time, date and place of the hearing;
- (2) The appellant to an administrative order or an applicant of a denied permit or variance shall be entitled to be represented by legal counsel, to submit evidence, to cross-examine testifying witnesses, and to make arguments concerning the factual and legal issues;
- (3) The City Manager or Hearing Officer may direct the City or another party to disclose relevant information, statements, reports or data to the other party or to the City Manager or Hearing Officer;
- (4) If the party requesting a hearing or appeal fails to appear or to present evidence or arguments, the City Manager or Hearing Officer may enter a decision in favor of the City or another party by virtue of this default. The City Manager or Hearing Officer may also, in his or her discretion, proceed with the matter at hand and make a decision in the absence of the party;
- (5) In any hearing, the rules of evidence shall be followed as far as practicable, however, the Hearing Officer may admit and give probative effect to evidence of a type commonly relied upon by reasonably prudent people in the conduct of their affairs. Notice may be taken of facts within the general knowledge of the community;
- (6) The City Manager or Hearing Officer may limit the presentation of evidence, arguments or other material to those matters relevant, material and pertinent to the issue or issues at hand. The City Manager or Hearing Officer may accept an agreement or stipulation by the parties as to facts, conclusions or other matters, which agreement or stipulation, once accepted shall be binding;
- (7) The Hearing Officer shall review the City's decision to determine whether the permit denial or administrative order is in violation of the law, has been procured by fraud, is an abuse of discretion, and whether the decision is supported by competent, substantial and material evidence on the record as a whole or should otherwise be reversed or modified to accomplish the goals of this Chapter. The City shall have the responsibility for demonstrating the City's basis for the original action or order, or the denial of the permit, plan approval or variance. It is the responsibility of the appealing party to demonstrate that the administrative order should be reversed or modified, or the permit or variance should be issued.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.275. - Right to Further Appeal.

An appeal of the City Manager's decision shall be to the Kent County Circuit Court.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Secs. 2.276—2.280. - Reserved.

ARTICLE 8. - INSPECTION, MONITORING AND MANDATORY REPORTING

Sec. 2.281. - Inspection and Sampling.

The City Manager or designee may inspect and/or obtain stormwater samples from the stormwater facilities of any discharger to determine compliance with the requirements of this Chapter, or other State and Federal regulations. Upon request, the discharger shall allow the City Manager to enter upon the premises of the discharger at all hours necessary for the purposes of such inspection or sampling. The City Manager shall provide the discharger reasonable advance notice of such inspection and/or sampling. The City Manager shall have the right to set up on the discharger's property devices to conduct such sampling or inspection.

(Ord. No. 2001-26, § 1, 7-31-01)

Sec. 2.282. - Stormwater Monitoring Facilities.

- (1) When deemed necessary by the City Manager, each industrial or commercial entity discharging stormwater runoff to the CSDS shall provide and operate at the entity's expense, a stormwater monitoring and sampling facility for each discharge. Monitoring facilities shall be situated on the discharger's premises, except where such a location would be impractical or cause undue hardship on the discharger. The City Manager may concur with the facility being constructed in the public right-of-way providing that the facility is located so that landscaping or parked vehicles will not obstruct it.
- (2) There shall be ample room in or near such sampling facilities to allow accurate sampling and preparation of samples for analysis. The facility, sampling and measuring equipment shall be maintained at all times in a safe and proper operating condition, at the expense of the discharger.
- (3) All required monitoring facilities shall be constructed and maintained in accordance with all applicable local construction standards and specifications (non-permitted confined space structure where feasible).

(Ord. No. 2001-26, § 1, 7-31-01)

Sec. 2.283. - Accidental Discharges.

- (1) Any accidental discharge into the CSDS, of a substance other than an exempted discharge, shall be reported to the City Manager immediately upon occurrence. A detailed report shall be filed within five (5) days. The report shall include location of discharge, date and time thereof, type of substance, concentration, volume and corrective actions. Failure to file a report shall be a violation of this Chapter. Every day the discharger fails to comply with this Section shall constitute a separate violation of this Code.
- (2) Any discharger who wishes to establish the affirmative defense of accidental discharge shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that:
 - (a) An accidental discharge occurred and the discharger can identify the cause,
 - (b) If applicable, the facility was, at the time, being operated in a prudent and appropriate manner and in compliance with applicable operation and maintenance procedures,

- (c) The discharger notified the City Manager immediately upon becoming aware of the accidental discharge,
- (d) A written submission, containing the following information, was provided within five (5) days of commencement of the accidental discharge:
 - 1. A description of the discharge and cause of noncompliance with this Chapter;
 - 2. The period of noncompliance, including exact dates and times or, if not corrected, the anticipated time the noncompliance was expected to continue;
 - 3. Steps taken to reduce, eliminate and prevent recurrence of the noncompliance.

(Ord. No. 2001-26, § 1, 7-31-01)

Secs. 2.284—2.290. - Reserved.

ARTICLE 9. - VIOLATIONS, PENALTIES AND LIABILITIES

Sec. 2.291. - Violations.

- (1) Any of the following shall, in addition to violations already defined in this Chapter, constitute a violation of this Code:
 - (a) Failure to comply with any provision of this Chapter or any applicable State or Federal law relating to the collection, conveyance or discharge of stormwater;
 - (b) Failure to comply with the specifications, limitations, conditions or time limits of a permit or variance issued pursuant to one (1) of the provisions of this Chapter;
 - (c) Failure to comply with an Administrative Order issued pursuant to the provisions of this Chapter.
- (2) Any person or entity found to be in violation of any provision of this Chapter including any condition, restriction or limitation of any permit, specification, order, directive, regulation or rule promulgated pursuant to the authority granted in this Chapter shall be subject to the penalties provided for in Section 1.13 of this Code. Each day that a violation occurs or continues shall be deemed a separate violation, as provided for in this Code.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.292. - Recovery of Costs Incurred by the City.

Any discharger violating any of the provisions of this Chapter, or who discharges or causes a discharge producing a deposit or obstruction, or causes damage to or impairs the City's CSDS shall be liable to the City for any expense, loss or damage caused by such violation or discharge. This shall include, but not be limited to, penalties levied upon the City by the EPA or MDEQ for violation of its NPDES permit caused by any violation by a discharger.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.293. - Falsifying Information.

No person shall knowingly make any false statement, representation or certification in any application, record, report, plan or other document filed or required to be maintained pursuant to this Chapter, nor shall any person falsify, tamper with, interfere with, or knowingly render inaccurate any monitoring device or method used pursuant to this Chapter.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.294. - Criminal and Civil Liability.

- (1) Any discharger in violation of this Chapter, or of any permit issued pursuant to it, or the rules and regulations of the CSDS adopted pursuant to this Chapter, or any order of the City Manager issued pursuant to those rules and regulations or this Chapter, may be subject to a penalty of not less than five hundred dollars (\$500.00) per day, or not to exceed penalties imposed by the Home Rule Cities Act, or if convicted of violating this Chapter, by imprisonment for not more than ninety (90) days or both such penalty and imprisonment. Each act of violation and every day upon which any violation is permitted or suffered to exist, shall constitute a separate violation and shall be punished separately. In the case of a conviction pursuant to this Section of a discharger who is not a natural person, any officer or director of a corporation, any officer or partner of a Partnership, or any officer or owner of a Proprietorship is hereby deemed to be a proper person to serve any term of imprisonment imposed by the court as a result of the conviction.
- (2) In addition to, and expressly not in lieu of, the foregoing criminal penalties which may be imposed, any discharger who violates this Chapter, or any permit issued pursuant to it, or the rules and regulations of the CSDS adopted pursuant to this Chapter, or any order of the City Manager issued pursuant to those rules and regulations of this Chapter, shall be subject to civil penalties, and to the payment of any damages and costs which may be awarded, by any court of competent jurisdiction.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Sec. 2.295. - Enforcement Procedures.

- (1) *Nature of the Violation.* Once an investigation finds that a violation has occurred and the suspected responsible parties have been identified, enforcement action is to be initiated. A progressive approach to enforcement will be used to achieve compliance with the CSDS ordinance. The specific enforcement action(s) taken will consider the nature of the violation using the following criteria:
 - (a) *Magnitude of the Violation.*
 1. Generally, an isolated instance of noncompliance can be addressed with a response such as a NOV. Violations, which meet one (1) or more of the following criteria, may subject the responsible party to escalated enforcement actions:
 2. Any person or organization that receives three (3) or more NOV within a one (1) year period shall be considered a chronic violator.
 3. Any discharge of a pollutant or sediment that has caused or is likely to cause imminent endangerment to human health and welfare or the environment and has resulted in the EPSD exercising emergency authority to halt or prevent such a discharge.
 4. Violations of any Administrative Orders for starting construction, completing construction, or attaining final compliance.
 5. Failure to report or accurately report an accidental illicit discharge into the Stormwater System, nearby properties, wetlands or natural watercourses or water bodies.
 - (b) *Duration of the Violation.* Violations, regardless of the severity, which continue over prolonged periods of time shall subject the responsible party to escalated enforcement actions. Escalated actions shall include monitoring and assessment of penalties. The additional costs incurred by the City for inspections and compliance enforcement will be assessed against the responsible party.
 - (c) *Effect of the Violation on the Receiving Waters.* One (1) of the primary objectives of the Federal Clean Water Act and associated stormwater regulations is to keep pollutants from "passing through" the CSDS and entering the receiving waters of the State. Consequently, any violation that results in environmental harm shall be met with a more severe disciplinary action. Environmental harm will be presumed whenever there is a discharge of a harmful pollutant or sediment into the Stormwater Drainage System which:
 1. Passes through the Grand Rapids CSDS.
 2. Causes a violation of the City's NPDES Municipal Stormwater System permit.

3. Has a toxic effect on the receiving waters (i.e., fish kill).

(d) *Violation History of the Responsible Party(s).*

1. Progressively more severe enforcement actions shall be utilized against responsible parties exhibiting recurring violation problems until consistent compliance is achieved. Compliance history is an important factor for deciding which of the remedies to apply to a particular violator.
2. Consistent with the general principle of layered and progressive disciplinary action, first time violators that are acting in good faith to comply with the ordinance and regulations, should be dealt with on a more cooperative level than violators that are not complying in a good faith effort.

(2) *Levels and Types of Enforcement Actions.*

- (a) The City may initiate various levels and types of enforcement action, which have different degrees of severity. The following descriptions of various enforcement actions are intended to guide City staff in selecting the most appropriate enforcement action, given the nature and circumstances of a particular violation.
- (b) These levels of progressive enforcement action can be taken to achieve compliance with the City's stormwater regulations or any associated approved plans. An overview is provided in this Section. The level of enforcement action initiated depends on the violation's severity, its duration; its effect on the environment, the City's CSDS and the responsible party(s) violation history, as well as the good faith used in taking corrective action.
- (c) It is the intent of the city to clearly inform the responsible party of its expectations for compliance.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Secs. 2.296—2.300. - Reserved.

ARTICLE 10. - RECORD RETENTION

Sec. 2.301. - Record Keeping Requirement.

- (1) Any person or entity subject to this Chapter shall retain and preserve, for no less than three (3) years, any and all books, drawings, plans, prints, documents, memoranda, reports, correspondence and records. This includes, but is not limited to, records on magnetic or electronic media and any and all summaries of such records, relating to monitoring, sampling and chemical analysis of any discharge, stormwater, runoff, or other liquids leaving the confines of a property upon which work is being or has been done, whether made by or on behalf of a discharger.
- (2) Any and all records which pertain to matters which are the subject of a Notice of Violation, Administrative Order, Show Cause Hearing, or any other enforcement or litigation activities brought by the City pursuant to this Chapter, shall be retained and preserved for five (5) years, or until all enforcement activities have concluded and all periods of limitation with respect to any and all appeals have expired, whichever is later.

(Ord. No. 2001-26, § 1, 7-31-01; Ord. No. 2007-13, § 1, 2-20-07)

Secs. 2.302—2.310. - Reserved.

ARTICLE 11. - RESOURCE DOCUMENTS

Sec. 2.311. - Rainfall Data.

RAINFALL DATA
for the
CITY of GRAND RAPIDS

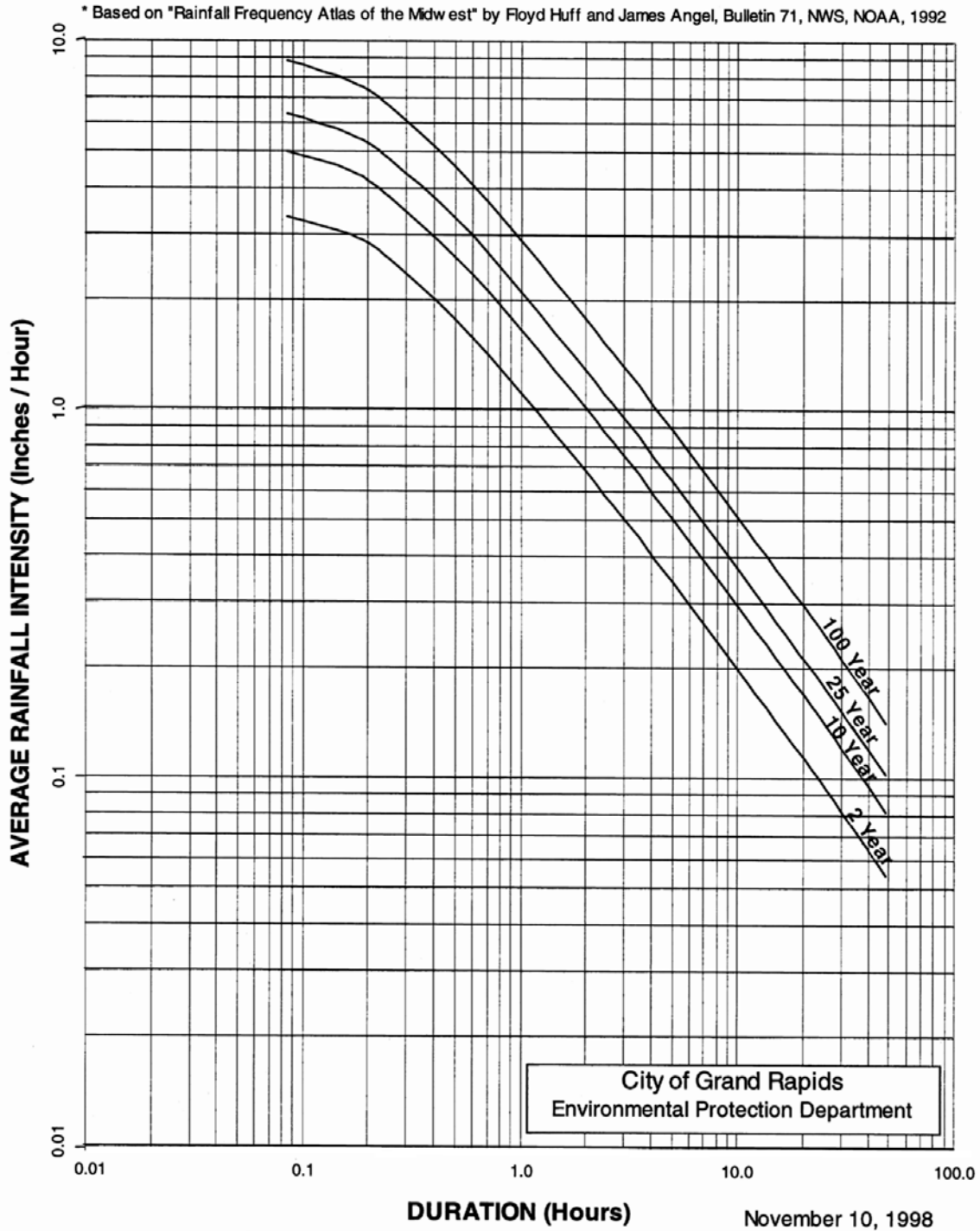
*Data from "Rainfall Frequency Atlas of the Midwest" by Floyd A. Huff and James R. Angel, Bulletin 71, Midwestern Climate Center, National Weather Service, NOAA, 1992

RAINFALL IN INCHES								
		Recurrence Intervals						
Duration	Hours	1-year	2-year	5-year	10-year	25-year	50-year	100-year
5-min.	0.08	0.23	0.28	0.36	0.42	0.53	0.63	0.74
10-min.	0.17	0.41	0.50	0.63	0.74	0.93	1.11	1.29
15-min.	0.25	0.53	0.64	0.81	0.95	1.20	1.42	1.66
30-min.	0.50	0.72	0.88	1.11	1.30	1.65	1.95	2.28
1-hr.	1.00	0.92	1.11	1.41	1.65	2.09	2.48	2.89
2-hr.	2.00	1.13	1.37	1.74	2.04	2.58	3.06	3.57
3-hr.	3.00	1.25	1.52	1.92	2.25	2.85	3.37	3.94
6-hr.	6.00	1.46	1.78	2.25	2.64	3.34	3.95	4.61
12-hr.	12.00	1.70	2.06	2.61	3.06	3.87	4.58	5.35
18-hr.	18.00	1.83	2.23	2.82	3.31	4.18	4.95	5.78
24-hr.	24.00	1.95	2.37	3.00	3.52	4.45	5.27	6.15
48-hr.	48.00	2.15	2.63	3.32	3.91	4.93	5.83	6.82

RAINFALL INTENSITIES IN INCHES PER HOUR
--

		Recurrence Intervals						
Duration	Hours	1-year	2-year	5-year	10-year	25-year	50-year	100-year
5-min.	0.08	2.76	3.36	4.32	5.04	6.36	7.56	8.88
10-min.	0.17	2.46	3.00	3.78	4.44	5.58	6.66	7.74
15-min.	0.25	2.12	2.56	3.24	3.80	4.80	5.68	6.64
30-min.	0.50	1.44	1.76	2.22	2.60	3.30	3.90	4.56
1-hr.	1.00	0.92	1.11	1.41	1.65	2.09	2.48	2.89
2-hr.	2.00	0.57	0.69	0.87	1.02	1.29	1.53	1.79
3-hr.	3.00	0.42	0.51	0.64	0.75	0.95	1.12	1.31
6-hr.	6.00	0.24	0.30	0.38	0.44	0.56	0.66	0.77
12-hr	12.00	0.14	0.17	0.22	0.26	0.32	0.38	0.45
18-hr.	18.00	0.10	0.12	0.16	0.18	0.23	0.28	0.32
24-hr.	24.00	0.08	0.10	0.13	0.15	0.19	0.22	0.26
48-hr.	48.00	0.04	0.05	0.07	0.08	0.10	0.12	0.14

Sec. 2.312. - Rainfall Intensity-Duration-Frequency Curves Chart.

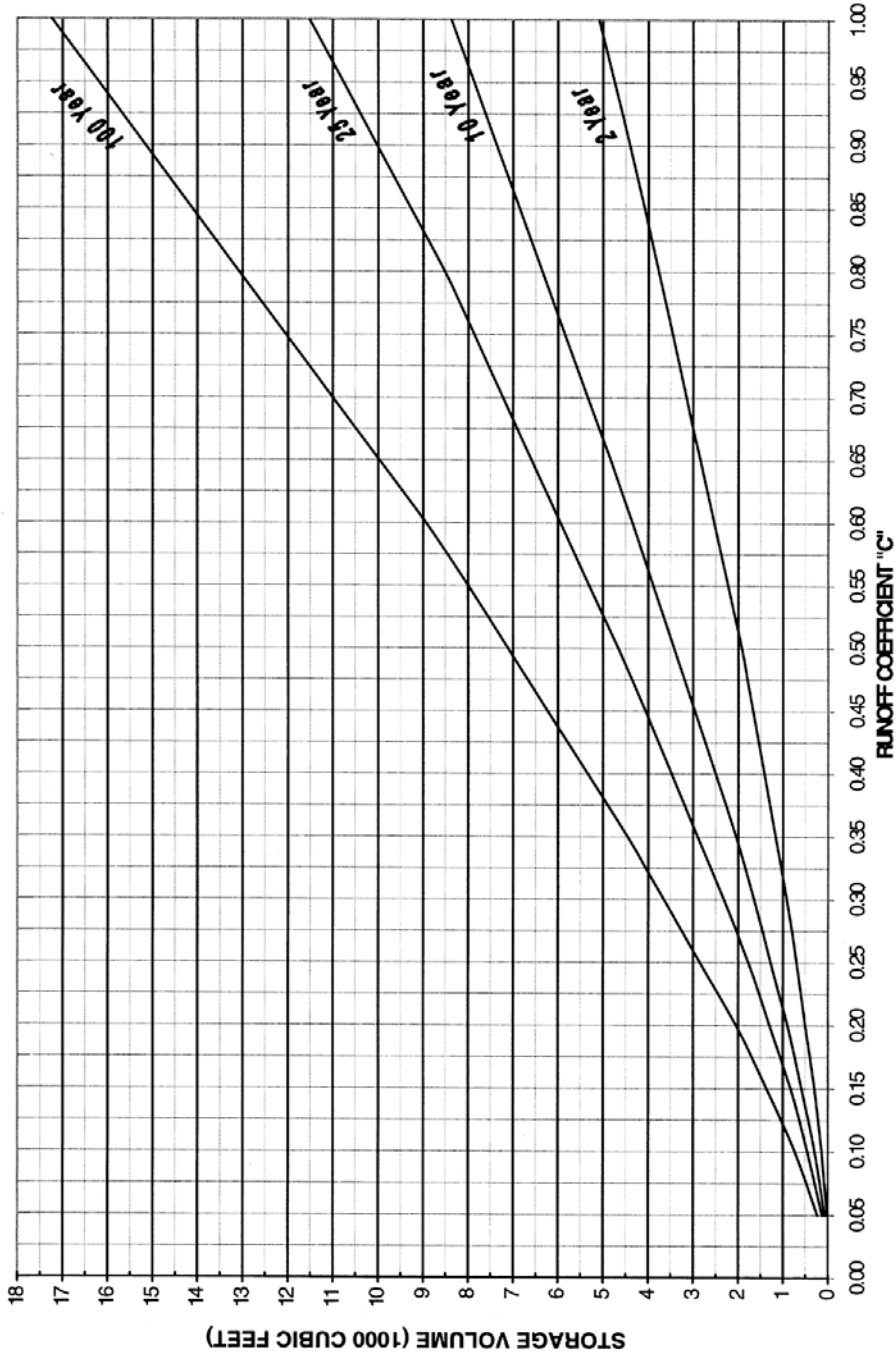


Average Rain Fall Intensity

(Ord. No. 2001-26, § 1, 7-31-01)

Sec. 2.313. - Design Storage Chart.

DESIGN STORAGE per DEVELOPMENT ACRE



March 12, 2001

Design Storage

(Ord. No. 2001-26, § 1, 7-31-01)

Sec. 2.314. - SCS Type II Rainfall Distribution.

SCS Type II Rainfall Distribution

Rainfall at Time (t) = (total 24 hour rainfall) × (cumulative Rainfall Ratio)

Time (t) (hours)	Cumulative Rainfall Ratio
0	0.0000
0.17	0.0017
0.33	0.0033
0.50	0.0050
0.67	0.0070
0.83	0.0090
1.00	0.0110
1.17	0.0130
1.33	0.0150
1.50	0.0170
1.67	0.0187
1.83	0.0203
2.00	0.0220
2.17	0.0243
2.33	0.0267
2.50	0.0290
2.67	0.0310

2.83	0.0330
3.00	0.0350
3.17	0.0373
3.33	0.0397
3.50	0.0420
3.67	0.0440
3.83	0.0460
4.00	0.0480
4.17	0.0507
4.33	0.0533
4.50	0.0560
4.67	0.0587
4.83	0.0613
5.00	0.0640
5.17	0.0667
5.33	0.0693
5.50	0.0720
5.67	0.0747
5.83	0.0773
6.00	0.0800

6.17	0.0833
6.33	0.0867
6.50	0.0900
6.67	0.0933
6.83	0.0967
7.00	0.1000
7.17	0.1033
7.33	0.1067
7.50	0.1100
7.67	0.1133
7.83	0.1167
8.00	0.1200
8.17	0.1247
8.33	0.1293
8.50	0.1340
8.67	0.1383
8.83	0.1427
9.00	0.1470
9.17	0.1523
9.33	0.1577

9.50	0.1630
9.67	0.1690
9.83	0.1750
10.00	0.1810
10.17	0.1887
10.33	0.1963
10.50	0.2040
10.67	0.2143
10.83	0.2247
11.00	0.2350
11.17	0.2510
11.33	0.2670
11.50	0.2830
11.67	0.4097
11.83	0.5363
12.00	0.6630
12.17	0.6870
12.33	0.7110
12.50	0.7350
12.67	0.7473

12.83	0.7597
13.00	0.7720
13.17	0.7810
13.33	0.7900
13.50	0.7990
13.67	0.8060
13.83	0.8130
14.00	0.8200
14.17	0.8250
14.33	0.8300
14.50	0.8350
14.67	0.8400
14.83	0.8450
15.00	0.8500
15.17	0.8550
15.33	0.8600
15.50	0.8650
15.67	0.8700
15.83	0.8750
16.00	0.8800

16.17	0.8830
16.33	0.8860
16.50	0.8890
16.67	0.8920
16.83	0.8950
17.00	0.8980
17.17	0.9010
17.33	0.9040
17.50	0.9070
17.67	0.9100
17.83	0.9130
18.00	0.9160
18.17	0.9190
18.33	0.9220
18.50	0.9250
18.67	0.9280
18.83	0.9310
19.00	0.9340
19.17	0.9370
19.33	0.9400

19.50	0.9430
19.67	0.9460
19.83	0.9490
20.00	0.9520
20.17	0.9540
20.33	0.9560
20.50	0.9580
20.67	0.9600
20.83	0.9620
21.00	0.9640
21.17	0.9660
21.33	0.9680
21.50	0.9700
21.67	0.9720
21.83	0.9740
22.00	0.9760
22.17	0.9780
22.33	0.9800
22.50	0.9820
22.67	0.9840

22.83	0.9860
23.00	0.9880
23.17	0.9900
23.33	0.9920
23.50	0.9940
23.67	0.9960
23.83	0.9980
24.00	1.0000

<i>Design Storm Recurrence Interval</i>	1 Year	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Total 24 hour Rainfall	1.95	2.37	3.00	3.52	4.45	5.27	6.15

(Ord. No. 2001-26, § 1, 7-31-01)

Sec. 2.315. - Manning's 'n' Values.

MANNING'S 'n' VALUES

RECOMMENDED MANNING'S 'n' VALUES FOR ARTIFICIAL OPEN CHANNELS

Lining Category	Lining Type	'n' Value for Depth of Flow Range		
		0—0.5 ft.	0.5—2.0 ft.	> 2.0 ft.
Rigid	Concrete (Broom or Float Finish)	0.015	0.013	0.013

	Gunite	0.022	0.020	0.020
	Grouted Riprap	0.040	0.030	0.028
	Stone Masonry	0.042	0.032	0.030
	Soil Cement	0.025	0.022	0.020
	Asphalt	0.018	0.016	0.016
Unlined	Bare Soil	0.023	0.020	0.020
	Rock Cut	0.045	0.035	0.025
Temporary	Woven Paper Net	0.016	0.015	0.025
	Jute Net	0.028	0.022	0.019
	Fiberglass Roving	0.028	0.021	0.019
	Straw with Net	0.065	0.033	0.025
	Curled Wood Mat	0.066	0.035	0.028
	Synthetic Mat	0.036	0.025	0.021
Gravel Riprap	1-inch (2.5-cm) d50	0.044	0.033	0.030
	2-inch (5-cm) d50	0.066	0.041	0.034
Rock Riprap	N/A	n=0.0395 (d50) ¹ /6 d50 = Diameter of stone for which 50 percent, by weight, of the gradation is finer, in feet		

Secs. 2.316—2.400. - Reserved.