

**ENGINEERING DESIGN STANDARDS**  
**OF THE**  
**CITY OF PONTIAC**  
**OAKLAND COUNTY, MICHIGAN**

**PREPARED BY THE**  
**CITY OF PONTIAC**  
**DEPARTMENT OF PUBLIC WORKS & UTILITIES**  
**ENGINEERING DIVISION**  
**55 WESSEN STREET**  
**PONTIAC, MI 48341**

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**CITY OF PONTIAC**  
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# CHAPTER ONE

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## INTRODUCTION AND GENERAL

### 1.1 SHORT TITLE

This document shall be known as the “City of Pontiac Design Standards” and shall hereinafter be referred to as “Standards”.

### 1.2 PURPOSE

To establish the minimum design standards for grading and surface drainage, parking lots and driveways, bike paths, water supply systems, sanitary sewer systems, storm sewer management systems, storm water detention/retention basins, soil erosion and sedimentation control and other engineering improvements for site plan and subdivision development plans. It is understood that these standards are not comprehensive and that the City of Pontiac and the Department of Public Works and Utilities reserve the right to impose further requirements as they deem necessary.

### 1.3 PROCEDURES

Procedures shall be in accordance with: Chapter 58 “Environment”, Chapter 66 “Floods”, Chapter 102 “Streets, Sidewalks and Other Public Places”, Chapter 106 “Subdivisions”, Chapter 114 “Traffic and Vehicles”, Chapter 118 “Utilities” of the Pontiac Municipal Code; regulations of the “City of Pontiac Zoning Ordinance” as amended; the State of Michigan “Land Division Act” being Public Act 288 of P.A. of 1967, as amended, the State of Michigan “Condominium Act” being Public Act 59 of P.A. of 1978 as amended, and State of Michigan “Mobile Home Commission Act” being Public Act 96 of P.A. of 1987, as amended.

### 1.4 CERTIFICATION

All subdivision plans, condominium plans, site plans and utility plans submitted to the City for review shall bear the signature and seal of a Licensed Professional Engineer currently registered to practice in the State of Michigan under whose supervision the plans were prepared. All boundary surveys, architectural surveys, topographic surveys, subdivision plans and condominium plans shall bear the signature and seal of a Land Surveyor currently registered to practice in the State of Michigan under whose supervision the plans were prepared.

### 1.5 EXCEPTION

Exceptions to these standards may be permitted provided, in the opinion of the Engineer, the substitute design is equal to or better than the requirements established by these standards.

### 1.6 PERMITS AND APPROVALS

All required permits and approvals shall be obtained by the contractor, project sponsor, or project designer and a copy provided to N&F prior to the scheduling of the preconstruction meeting. The City of Pontiac will assist the developer by processing and required water main or sanitary sewer permit applications. If, for some reason, an agency does not require or agrees to waive a permit, then said waiver shall be so stated in writing by a responsible person-in-charge from that agency with a copy furnished to the City.

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### 1.7 EASEMENTS

Easement must be granted to the City of Pontiac for public improvements over private property. Generally, these easements are to be 20 feet wide for a public water main, or 20 feet wide for public storm drain/sanitary sewers, centered on the utility or utilities. Actual easement width requirements are determined on an individual basis. Executed easements shall be furnished to the City of Pontiac prior to scheduling a preconstruction meeting. When work is performed on, or requires the use of, adjacent property, permission to do so must be obtained from that property owner in written form and filed with the City of Pontiac.

### 1.8 INSPECTION AND MATERIAL TESTING – ALL SITE IMPROVEMENTS

#### A. Inspections

The City shall perform inspections from time to time to ensure the health, safety and general welfare of the community, including, but not limited to the following:

##### 1. General

- a. The delivery and unloading of pipe and other appurtenances to water, sanitary sewer and storm sewer systems.
- b. Project clean-up operations.
- c. Mass grading / soil erosion.

##### 2. Roadway, Drives and Parking Lots

- a. Preparation of subgrade and subbase.
- b. All paving operations including roadways, driveways, parking areas, curb & gutter, drive aprons, walks, etc.

##### 3. Storm Sewers, Sanitary Sewers and Water Mains

- a. Installation of pipe, and all other appurtenances related to the construction of the complete utility system including excavation, bedding, backfill, encasement, tunneling, boring, jacking, etc.
- b. Service connections for sanitary sewer, storm sewer, and water.

#### B. Other Inspections

In subdivision or other developments when the roadways are not under the jurisdiction of the City, inspection shall be conducted to insure the health, safety and general welfare of the community on the following operations:

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1. Mass grading in existing or future right-of-way.
2. Preparation of the roadway subgrade and subbase.
3. Roadway paving operations.

### C. Material Testing

The proprietor of a project shall secure, at his expense, a geotechnical engineering consultant registered to practice in the State of Michigan, to provide testing for density of special backfill areas, pavement subgrade subbase, concrete and asphalt pavement. The geotechnical engineering consultant shall also provide written recommendations for special construction methods required as a result of poor or unusual ground conditions. The geotechnical engineer shall also be responsible for conducting the standard tests for concrete and asphalt pavement materials and “in place” construction.

### D. Pre-Construction Meeting

After all approvals and permits have been secured from the City and from all state and county agencies and prior to the start of construction, a pre-construction meeting shall be held with the contractor and the City and if the proprietor elects his engineers and representatives of the various public and privately owned utilities.

At this meeting, the contractor shall be prepared to submit a construction schedule of their proposed order of work and to indicate dates for the completion of the work.

### E. Fees

At the time of submittal of the detailed construction plans, all costs for plan review shall be deposited with the City. The fee shall be paid before the City Engineer shall review any part of the construction drawings. Prior to the start of construction all costs for inspection shall be deposited with the City. Fees or deposits for inspection shall be established by the City. At no time shall construction proceed when the proprietor’s escrow account for inspection is in an amount less than the estimated cost of inspection to complete all remaining site work.

### F. As Built Drawings

(SEE CHAPTER 13 OF THESE STANDARDS)

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### 1.9 INSURANCE

Prior to issuance of a permit for construction of any subdivision, professional, commercial, industrial, etc. project onsite or offsite improvements, the Contractor shall procure and maintain, during the term of the project, public liability and property damage insurance with an insurance company licensed to conduct business in the State of Michigan, meeting the requirements stated in attachment II, "Municipal Insurance Requirements". No preconstruction meeting will be scheduled until all of the Municipal insurance requirements are met.

### 1.10 BONDS

Prior to acceptance of improvements by the city, a Maintenance and Guarantee Bond shall be drawn in an amount equal to a hundred percent (100%) of the construction cost of improvements, payable to the City of Pontiac and running for a period of one (1) year from the date of final acceptance of installation..

### 1.11 VARIANCE

The City of Pontiac Water & Sewer Superintendent and/or City Engineer may recommend a variance from these standards when, in its opinion undue hardship may result from strict compliance. No variance shall be recommended unless the Superintendent/Engineer finds:

- A. That the variance does not conflict with a requirement of the Zoning Ordinance or the Subdivision Regulations.
- B. That there are special circumstances or conditions affecting said property such that the strict application of the provisions of these standards would deprive the proprietor of the reasonable use of his land.
- C. That the variance is necessary for the preservation and enjoyment of a substantial property right of the proprietor.
- D. That the recommendation of the variance will not be detrimental to the public welfare or injurious to other property in the area in which said property is situated.
- E. Cost of construction or other financial concerns are not considered a hardship for purposes of requesting a variance under this section.

### 1.12 CONFLICTS

These standards are not intended to repeal, abrogate, annul or in any manner interfere with existing regulations or laws of the City, nor to conflict with any statutes of the State of Michigan or Oakland County, except that these standards shall prevail in cases where these standards impose a greater restriction than is provided by the said existing statutes, laws or regulations. In the event that a difference of opinion shall arise between the Engineer and his designee, the City Engineer shall prevail in resolving the conflict.

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### 1.13 INTERPRETATION

Provisions of these standards shall be held to be the minimum requirements adopted for promotion and preservation of public health, safety and general welfare of the City. In the event the requirements of these construction standards are not clear, are in conflict with other parts of these standards, or are in conflict with County, State or Federal Standards or requirements, the engineer shall resolve the conflict and advise the proprietor of such decision.

### 1.14 REQUIRED PERMITS

#### A. Soil Erosion and Sedimentation Control Permit

This permit, issued by the City of Pontiac Engineering Division, is required prior to engineering approval, for all developments over one (1) acre in size or sites with 500' of a natural drainage course. An application has been provided within this package.

#### B. City of Pontiac Right-of-Way Permit

This permit, issued by the City of Pontiac Engineering Division, is required prior to final engineering approval, for all work proposed within City right-of-way areas. An application has been provided within this package.

#### C. Michigan Department of Transportation (MDOT) Right-of-Way Permit

This permit, issued by MDOT, is required prior to final engineering approval, for all work proposed within MDOT right-of-way areas.

#### D. City of Pontiac Water & Sewer Department

The City of Pontiac Water & Sewer Department will require permits for water main and sanitary sewer taps, hydrant use, etc. The developer shall contact the Water & Sewer Department directly @ (248) 758-3790, for permit information.

#### E. Michigan Department of Environmental Quality (MDEQ) Water Main Permit (Act 399)

All water main installations deemed public infrastructure will require approval and construction permit from the MDEQ. The Water & Sewer Division will directly request approval from the MDEQ during the engineering review process. This permit will be required prior to final engineering approval.

#### F. Michigan Department of Environmental Quality (MDEQ) Sanitary Sewer Permit (Act 451)

All sanitary sewer installations deemed public infrastructure will require approval and construction permit from the MDEQ. The Water & Sewer Division will directly request approval from the City of Detroit/MDEQ during the engineering review process. This permit will be required prior to final engineering approval.

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G. Oakland County Drain Commissioner's Office (OCDC)

All proposed work to or within an easement for, a drain or sanitary sewer under the jurisdiction of the OCDC will require a permit from their office. This permit shall be provided prior to final engineering approval.

H. Michigan Department of Environmental Quality (MDEQ) NPDES Permit

This permit, issued by the MDEQ, is required for all project sites greater than five (5) acres in size. Upon issuance of the City of Pontiac SESC permit, the developer may apply for the NPDES permit. This permit is required prior to final engineering approval.

I. City of Pontiac Building Department

All onsite improvements and building construction are permitted by the City of Pontiac Building & Safety Department. The developer shall coordinate permit applications (i.e. grading, foundation, building shell, etc.) with their office @ (248) 758-2800. Engineering plan approval is required prior to issuance of permits from the City's Building & Safety Department.



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### DEFINITIONS

#### 2.1 DEFINITIONS

The words, phrases and abbreviations used in these standards shall have the meanings set forth in this section and as set forth in the Municipal Code, as amended.

*AASHTO* - American Association of State Highway & Transportation Officials

*ADA* - Americans with Disabilities Act

*ANSI* - American National Standards Institute

*ASTM* - American Society for Testing Materials

*AWWA* - American Water Works Association

*DWSD* means Detroit Water and Sewerage Department.

*GLUMRB* - Great Lakes-Upper Mississippi River Board

*MDEQ OR DEQ* - Michigan Department of Environmental Quality.

*MDNR OR DNR* - Michigan Department of Natural Resources.

*MDOT* - Michigan Department of Transportation.

*MDPH* - Michigan Department of Public Health.

*MIOSHA* - Michigan Occupational Safety and Health Administration

*MMUTCD* - Michigan Manual of Uniform Traffic Control Devices

*NCPI* - National Clay Pipe Institute

*NFPA* - National Fire Protection Association

*NPDES* - National Pollutant Discharge Elimination System

*OCDC* - Oakland County Drain Commissioner

*OCDPW* - Oakland County Department of Public Works

*OCHD* - Oakland County Health Department

*RCOC OR OCRC* - Road Commission for Oakland County

*TSC* - Traffic Safety Committee of the City of Pontiac

*USGS* - United States Geological Survey

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*ACCELERATED SOIL EROSION* the increased loss of land surface that occurs as a result of man's activities.

*AS-BUILTS* shall be revised plans showing the as constructed conditions of the site, including utilities, grading, detention, etc.

*AUTHORIZED AGENT* a fiduciary relationship between the owner and the permittee, whereby the owner confides to the permittee the management of the earth change activity to be transacted in the owner's name and pursuant to this Chapter.

*BASE FLOOD* (100 year flood) shall mean the flood having a one (1) percent chance of being equaled or exceeded in any given year, or of a magnitude that may be equaled or exceeded once in any 100 year period.

*BEST MANAGEMENT PRACTICES (BMP)* means structural, vegetative, or managerial measures, activities, which help to achieve soil erosion and sedimentation control objectives or enhance water quality.

*BOULEVARD* a street developed with two one-way pavements separated by a median.

*BRANCH SEWER* is a sewer which receives sewage from a relatively small area, through two or more laterals, and discharges to a main sewer.

*BUFFER STRIPS* (1) are landscaped areas composed of living plant material, a wall or berm, or a combination thereof for the purpose of visual screening and/or noise reduction between conflicting land uses and/or between a thoroughfare and an existing land use. (2) are vegetative areas left in a native state or planted adjacent to water courses or storm water facilities which provide a transition between developed areas and these environmentally sensitive areas typically provided to provide soil erosion and sedimentation control (SESC) protection and enhance water quality.

*BUILDING DEPARTMENT* means Community Development Department, Building and Safety Engineering.

*BUILDING DRAIN* is that part of the lowest piping of the wastewater drainage system of a building which receives the sanitary sewage from soil pipes, waste pipes, and other drainage pipes inside the perimeter walls of the building and conveys it to the building sewer, which begins approximately 5 feet outside the building wall.

*BUILDING LEAD* is that portion of the building sewer extending from the public sewer main to the right-of-way line or easement.

*BUILDING SEWER* is the extension from the building drain, at a point adjacent to the building foundation, to the building lead.

*CERTIFICATION* a signed, written statement by the soil engineer that specific constructions, inspections, or tests, where required, have been performed and that such comply with the applicable requirements of this Chapter.

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*CHANNEL* shall mean the geographical area within the natural or artificial banks of a watercourse required to convey continuously or intermittently flowing water under normal or average flow conditions.

*CHECK DAM* means an earthen, stone, or manufactured structure placed perpendicular in a swale or channel or ditch which reduces water velocities. The design must follow very specific criteria.

*CITY* means City of Pontiac.

*CLEAN-OUT* is a pipe through which cleaning equipment can be pushed to unplug a sewer.

*CLEAR CUT* shall mean the removal of all existing vegetation and natural features on a site.

*CODE* means BOCA or CABO Standards.

*COLLECTOR STREET* means a street which carries traffic from minor residential streets to major urban thoroughfares, including principal entrance streets of a residential development.

*COMMERCIAL DEVELOPMENTS* are businesses or other such developments that are not intended for residential use.

*COMPACTION* is the densification of soil by mechanical means involving the expulsion of excess air.

*CONCRETE* is a mixture of Portland cement, fine aggregate, coarse aggregate, and water, with or without admixtures.

*CONTRACTOR* means any person(s) under written contract with the landowner, owner, developer, or applicant to perform the described work.

*CONTROL FACILITY* any facility or measure placed or constructed as necessary for the successful control or abatement of accelerated soil erosion and resultant sediments.

*CORNER* means the point of intersection of the lines of two streets or faces of curbs extended into the street until they intersect.

*COUNTY* refers to County of Oakland, State of Michigan.

*COUNTY DRAIN* refers to drains established and/or constructed pursuant to the Michigan Drain Code, Act 40 of the Public Acts of 1956, as amended.

*CUL-DE-SAC* a short minor residential street having one end open to traffic and being terminated at the other end by a permanent vehicular turnaround.

*CURB RETURN OR RADII* means that part or portion of a curb and/or curb and gutter constructed around a corner which includes the radius of curvature to the end of radius or to the point where same becomes tangent.

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*CURLINE OR CURB GUTTER LINE* means the face or line of curb and/or curb and gutter line constructed in any street farthest from the outermost edge of the street right-of-way; or where no curb and/or curb and gutter exist, a line in a public street right-of-way farthest from the outermost edge of the street right-of-way where curb and/or curb and gutter would be located as determined by the city engineer.

*DEPARTMENT* means the Water and Sewer Maintenance Division of the Department of Public Works and Utilities.

*DEPOSIT* shall mean to fill, place, or dump.

*DESIGNATED AGENT* is a person who has written authorization from the landowner, owner, development, or applicant to sign the application and secure a permit in the landowner's name.

*DETENTION PONDS* shall mean a facility designed for holding (or detaining) storm water runoff for a relatively short period of time and then releasing it at a controlled rate to the natural water course where it returns to the hydrologic cycle. The objective of a detention facility is to regulate the runoff from a given rainfall event and to reduce the impact on downstream drainage systems, natural or man-made.

*DEVELOPER* means a person, partnership or corporation building one building, for occupancy by other than the owner, or creating or developing any parcel of land for any use other than agricultural or form thereof.

*DEVELOPER/OWNER'S CONSULTING ENGINEER* shall mean the licensed engineer who has prepared the site plan for review and approval.

*DEVELOPMENT* (1) shall include a subdivision as defined by Act 288, Public Acts of 1967, as amended, a condominium pursuant to the provisions of Act 59, Public Acts of 1978, as amended, or any group of dwellings or structures which are proposed. (2) Shall mean any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation, or drilling operations.

*DEVELOPMENT DOCUMENTS* shall mean: (a) a condominium project, the master deed, Exhibit B Drawings, and bylaws provided by Act 59, Public Acts of 1978, as amended; and (b) with regard to subdivisions or other developments, deed restrictions and/or restrictive covenants.

*DISTURBED AREA* means an area of land subject to erosion due to the removal of vegetative cover and/or earth moving activities, including filling.

*DIVERSION* means a ridge graded to divert water to a specific location. It is normally used to reduce the length of slope water runs over, thus reducing the erosive speed of the runoff.

*DRAIN* is either a City Drain, County Drain, or a private storm drain.

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*DRAINAGE COURSE* shall mean the location of existing surface water, i.e. lake, pond, river, stream, creek, wetland, etc.

*DRAINAGE WAY* means surface or subsurface drains that remove excess surface water or ground water from land.

*DRIVEWAY* means an area which provides vehicular ingress, egress, access or circulation to or from any public or private right-of-way for any building structure, parking area or loading area.

*DRIVEWAY APPROACH* means all that area of the driveway which is located between the roadway or curb of any public street and private property intended to provide access or egress and ingress for vehicles from the roadway or curbing of a public street to private property.

*DWELLING* shall mean a structure primary designated or used for residential purposes.

*EARTH CHANGE* a manmade change in the natural cover or topography of land, including cut and fill activities, which may result in or contribute to soil erosion or sedimentation of waters of the City.

*EASEMENT* a property right granted by the owner of the property to the public, a corporation or persons for specific uses and purposes, and which shall be designated as a “public” or “private” easement, depending on the nature of the usage.

*EFFLUENT* is the flow exiting a process.

*ENCROACHMENT* shall mean (1) any impact to a wetland or other natural feature, or (2) any unauthorized use, trespass, or alteration of areas designated on the plans for preservation, protection or not intended for such activities.

*ENGINEER* means City of Pontiac Engineering Division and/or their consultants.

*ENGINEERING PLANS* plans for water supply, sewage collection, surface drainage, street improvements and other engineering requirements under the city’s jurisdiction.

*EROSION CONTROL PERMIT* means a permit issued at the City of Pontiac Engineering Division.

*EXCAVATION* any act by which soil or rock is cut into, quarried, uncovered, removed, displaced or relocated and shall include the conditions resulting therefrom.

*EXISTING GRADE* means the vertical location of the existing ground surface or structure prior to excavating or filling.

*EXPANSION* shall mean any activity where by additional structures or users shall be added to an existing system.

*FILL* a manmade deposit of soil, rock or other materials.

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*FILLING* means the depositing or dumping of any matter onto or into the ground.

*FINISHED GRADE* means the final grade or elevation of the ground surface conforming to the proposed design.

*FIRE SUPPRESSION FACILITIES* are any facilities that are used to assist the fire department in fire fighting.

*FIRST FLUSH* shall mean the initial washing action that storm water has on impervious surfaces.

*FLOOD OR FLOODING* means a general and temporary condition of partial or complete inundation of normally dry land areas from: (1) the overflow of inland or tidal waters; (2) the unusual and rapid accumulation or runoff of surface waters from any source; (3) the collapse or subsidence of land along the shores of a lake or other body of water as a result of undetermining cause by waves or currents of water exceeding anticipated cyclical levels, or suddenly caused by an unusually high water level in a natural body of water, accompanied by severe storm, or by an unanticipated force of nature, such as a flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseen event which results in flooding.

*FLOOD HAZARD* area means land which, on the basis of available floodplain information, is subject to a one-percent or greater chance of flooding in any given year.

*FLOODPLAIN* that area which would be inundated by storm runoff or flood water equivalent to that which would occur with rainfall or flood of 100-year recurrence frequency after total development of the watershed.

*FLOODWAY* shall mean the channel of a river or other watercourse and the adjacent land areas which must be reserved in order to discharge the base flood.

*FLOODWAY FRINGE* shall mean the land area between the floodway and the boundary of the floodplain.

*FRANCHISED UTILITIES* shall mean utilities, such as electric, cable, gas, and telephone, which are not maintained by the City or the County.

*FREEBOARD* is (1) the vertical distance between the high water surface elevation and the crest of a dam, top of a channel side or the lowest elevation of a detention/retention pond embankment. (2) The distance the water surface can rise before it overflows.

*GRADE* any stripping, cutting, filling, stockpiling, or any combination thereof, and shall include the land in its cut or filled condition.

*GULLY* means a deep cut formation in the soil that is the result of erosive water velocity.

*HEADWALL* is the entrance to a culvert or sluiceway.

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*IMPROVEMENTS* grading, street surfacing, curbs and gutters, sidewalks, public walkways, water mains and lines, sanitary sewers, storm sewers, culverts, bridges, utilities and other additions to the natural state of the land which increases its values, utility or habitability.

*INFILTRATION* is the movement of water downward from the ground surface through the upper soil.

*LAKE* refers to the Great Lakes, and all natural and artificial inland lakes or impoundments that have definite banks, a bed, visible evidence of a continued occurrence of water, and a surface area of water that is equal to, or greater than, one acre, including any navigable tributaries. Lake does not include sediment basins and basins constructed for the sole purpose of storm water retention, cooling water, or treating polluted water.

*LANDOWNER* is the person who owns or 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.

*LAND USE* a use of land which may result in a land change.

*LATERAL SEWER* is a sewer which discharges into a branch or other sewer and has only building sewers tributary to it.

*LOADING SPACE* mean an off-street space on the same lot with a building, or a group of buildings, for the temporary parking of a commercial vehicle while loading and unloading merchandise or materials.

*LOOPED CONNECTION* shall mean a system that has more than one (1) connection to an existing system of streets, sewers, water mains, etc.

*LOT* a parcel of land separated from other parcels on a preliminary or recorded plat for purposes of sale, lease or separate use.

*LOT SPLIT* the division of a lot whose boundaries are fixed in a recorded plat, into more than two but not more than four parts or parcels.

*MAIN SEWER OR TRUNK SEWER* is a sewer which receives sewage from a relatively large area, through one or more branches.

*MAJOR THOROUGHFARE* means an arterial street of considerable continuity which is designed primarily to allow moderate to high levels of traffic flow for both the city and the region beyond.

*MANEUVERING LANE* means the area which provides adequate access to all parking spaces.

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*MASTER PLAN* the long range development plan for the city, including graphic and written proposals indicating the general locations recommended for the land uses, parks, schools, public facilities and all physical developments of the city, including any unit or part of such plan separately adopted, and any amendment to such plan or parts thereof adopted by the planning commission.

*MASTER THOROUGHFARE PLAN* that part of the city's master plan which is used for the location, alignment and dimensions of existing and proposed street and thoroughfare rights-of-way.

*MATERIAL* shall mean soil, sand, gravel, clay, peat, debris and refuse, or any other substance, organic or inorganic.

*MINOR RESIDENTIAL STREET* means a street of limited continuity which is used primarily for providing access to abutting residential properties including "Cul-de-sac", "Marginal Access", and "U or loop" streets.

*MITIGATION* shall refer to the replacement of an existing feature such as vegetation, wetlands, etc. lost or destroyed during development.

*MOBILE HOME* shall mean a structure that is transportable in one (1) or more sections, built on a permanent chassis, and designed to be used with or without a permanent foundation when connected to the utilities. It does not include recreational vehicles or travel trailers.

*MUNICIPALITY* is the City of Pontiac.

*MUNICIPALITY'S ENGINEER OR CITY ENGINEER* is the staff engineer or professional engineer employed by the City.

*NEW CONSTRUCTION* shall mean structures for which the start of construction commenced on or after the effective date of this section.

*NON-EROSIVE VELOCITY* that velocity of flow of water which is not conducive to accelerated soil erosion.

*NON-POINT SOURCE POLLUTION* means pollution that is washed off the surface of land and impervious surfaces.

*OFF-STREET LOADING SPACE* shall mean a facility or space which permits the standing, loading or unloading of trucks, and other vehicles other than on or directly from a public right-of-way.

*OFF-STREET PARKING LOT* shall be a facility other than for single or two-family dwellings providing vehicular parking spaces along with adequate drives and aisles for maneuvering, so as to provide access for entrance and exit for the parking of more than three vehicles.

*OPEN DRAINAGE FACILITIES* are means of storm water conveyance, such as ditches and swales, that are above ground.



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*OPERATION* shall mean the making of additions or deposits, performing any construction or excavation activity, removing, improving and/or developing land in any manner, or any combination thereof.

*ORDINARY HIGH-WATER MARK* shall mean the line between upland and bottom land which persists through successive changes in water levels, below which the presence and action of the water is so common or recurrent that the character of the land is markedly distinct from the upland and is apparent in the soil itself, the configuration of the surface of the soil and the vegetation. On an inland lake which has a level established by law, it means the high established level. Where water returns to its natural level as a result of a permanent removal or abandonment of a dam, it means the natural ordinary high-water mark.

*OWNER* shall mean any person who has dominion over, control of, title to and/or any other proprietary interest in designated wetland and/or watercourse areas, or title to an obstruction, natural or otherwise, to wetland and watercourse properties.

*OUTSIDE SIDEWALK LINE* means a line parallel to the property line lying along the edge of the sidewalk nearest the curb or street roadway; or where no sidewalk exists, a line in the street right-of-way parallel to and six feet from the outermost edge of the street right-of-way.

*PARCEL OR TRACT* a continuous area or acreage of land which can be described as provided for in the subdivision act.

*PARKING LOT* means all the area which includes parking spaces, loading space, and maneuvering lanes.

*PARKING SPACES* means an area of adequate length and width for the parking of vehicles. The area provided for each parking space shall be in accordance with Chapter X, Section 10.5 of the City of Pontiac Zoning Ordinance.

*PEDESTRIAN FACILITIES* shall be sidewalks, safety paths, and nature trails designed and constructed for non-motorized uses.

*PERCOLATION* is the movement of water through subsurface soil layers, usually continuing downward to the groundwater table.

*PERMANENT SOIL EROSION CONTROL MEASURES* those measures and facilities which are installed or constructed to control soil erosion and which are maintained after project completion.

*PERMITEE* means any person to whom a permit is issued pursuant to these rules.

*PLANNING COMMISSION* means the Planning Commission of the City of Pontiac.

*POTABLE DRINKING WATER* is water that is suitable for human consumption.

## CHAPTER TWO

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*PREMISES* a single dwelling or apartment occupied by one family only, together with the land connected therewith and such outbuildings as are used exclusively in connection therewith, or a single room or building occupied for business or other purposes by one person or entity.

*PRIVATE ROADS* are those which are to be maintained and operated by the Owner, Condominium/Subdivision Association, or adjacent property owners.

*PROPRIETOR* means owner and/or developer of a project being developed within the City.

*PUBLIC ROADS* shall be those which are to be dedicated to the City of Pontiac.

*PUBLIC SERVICE DRIVE OR ALLEY* a dedicated public way used primarily to provide secondary vehicular access to abutting properties and not intended for general traffic circulation.

*PUBLIC SEWERS* are all sanitary sewers which are designed to provide service to more than one parcel of land or more than one building shall be dedicated to the City of Pontiac and shall be a public sewer.

*PUBLIC WALKWAY* a dedicated right-of-way or easement through residential areas, used for the purpose of providing pedestrian access from one street to another or from a street to a public parcel.

*REGISTERED PROFESSIONAL OR LICENSED PROFESSIONAL* shall be a registered professional engineer (P.E.), surveyor (P.S.), architect (R.A.), or landscape architect (R.L.A.) who is registered in the State of Michigan and whose license is in good standing.

*REINFORCEMENT* is steel bars or tie bars placed in concrete structures for additional support and strength.

*REMOVE* shall include to dig, dredge, suck, pump, bulldoze, dragline, or blast.

*RETENTION PONDS* shall mean a facility without the ability for gravity drainage whereby water is held for a considerable length of time for aesthetic, agricultural, consumptive, holding of storm runoff, or other uses. The water may never be discharged to a natural water course, but it is intended to be dissipated by plants, evaporation, or percolation into the ground.

*REQUIRED IMPROVEMENTS* street grading and paving, curb and gutter, sidewalks, crosswalks, water mains and lines, sanitary and storm sewers, utilities and other appropriate items, with appurtenant construction.

*RIGHT-OF-WAY LINE* means the line which defines the boundary between private property and that land under control of the public agency having jurisdiction over the roadway. For the purpose of these standards the right-of-way line shall further be defined as the future right-of-way line as determined by the City or of any other agency having jurisdiction over the roadway.

## CHAPTER TWO

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*RUNOFF* shall mean the surface discharge of precipitation to a watercourse or low area.

*SANITARY SEWAGE OR WASTEWATER* shall mean wastewater discharged from homes, commercial establishments, and other structures, designated as sanitary flow because it is composed of used or spent water resulting from human use in so-called sanitary conveniences.

*SANITARY SEWER* shall mean a pipe or conduit, with appurtenances, that carries liquid and/or water-carried wastes from residences, commercial buildings, industrial plants, and institutions, together with minor quantities of storm, surface, and ground waters that are not admitted intentionally.

*SANITARY SEWER SYSTEM* shall mean a facility for the transportation, collection, processing, or treatment of sanitary sewage.

*SEASONAL* shall mean any intermittent or temporary operation which occurs annually and is subject to interruption from changes in weather, water level, or time of year, and may involve annual removal and replacement of an operation, obstruction, or structure.

*SEDIMENT* solid particulate matter, mineral or organic, that has been deposited in or by water, is in suspension in water, or is being transported or has been removed from its site of origin by the process of soil erosion.

*SEDIMENT BASIN* a silt or sediment basin formed as a result of barrier or dam being constructed across a waterway or at the other suitable locations.

*SEDIMENTATION* the depositing of sediment.

*SERVICE PIPE* the pipe extending from the curb cock into privately owned land for supplying the premises with water.

*SIDEWALK* means any sidewalk, crosswalk or driveway adjoining any public street or alley and abutting or adjoining any private property, except that on all sidewalks there shall be a space of one foot between the outermost edge of the street right-of-way and the sidewalk maintained at all times unless otherwise approved by the engineer.

*SITE* any plot or parcel of land or combination of contiguous lots or parcels of land where grading is performed or permitted.

*SITE CONDOMINIUMS* are the condominium projects wherein individual parcels of land constituting individual development sites are proposed for separate ownership and use, in a fashion similar to a subdivision.

*SITE IMPROVEMENTS* shall mean and grading, street surfacing, curb and gutter, sidewalks, crosswalks, water mains and lines, sanitary sewers, culverts, bridges, utilities, and other additions to the natural state of the land which increases its value, utility, or habitability.

## CHAPTER TWO

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*SITE WORK* any and all earth changes, excavations or related operations, to include, but not be limited to: Excavation, grading, site clearance, filling, construction of utilities, foundations and basements, drilling caissons and wells, paving, construction of berms and/or surface drainage ways, and landscaping.

*SOIL* all earth material of whatever origin that overlies bedrock and may include decomposed zones of bedrock which can be readily excavated by mechanical equipment.

*SOIL BORING* is a geotechnical investigation and analysis of soil conditions taken from digging, auguring, or other means of extracting soil from its place of origin.

*SOIL ENGINEER* the director of public works and service of the city or an authorized representative who has been appointed by him to enforce the provisions of this Chapter.

*SOIL EROSION* the process by which the ground surface is worn away by the action of wind, water, gravity or a combination thereof.

*STABILIZATION* the proper placing, grading and covering of soil or rock to ensure their resistance to erosion, sliding or other earth movement.

*STEEP SLOPE* means a slope over 15% grade, which is characterized by increase runoff, erosion, and sediment hazards.

*STORM DRAIN* is a conduit, pipe, natural channel, or human-made structure which serves to transport storm water runoff.

*STREAM* is 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, and which has defined banks, a bed, and visible evidence of the continued flow or continued occurrence of water.

*STREET* means any thoroughfare, avenue, boulevard, road, lane, parkway, viaduct, service drive, alley or other way which is an existing state, county or municipal roadway, or a street or way shown in a plat heretofore approved pursuant to law or approved by official action, or a street or way on a plat duly filed and recorded in the office of the county register of deeds. A street includes the land between the street right-of-way lines whether improved or unimproved and may be comprised of pavement, shoulders, gutters, sidewalks, parking areas, lawn areas, and other areas within the street right-of-way lines.

*STRIPPING* any activity which removes or significantly disturbs the vegetative surface cover, including clearing and grubbing operations.

*STRUCTURE* shall mean any walled and roofed building, a gas or liquid storage tank, or any facility that is principally above ground.

*SUBBASE* is the layer of aggregate placed on the existing soil as a foundation for the base.

*SUBCONTRACTORS* are workers hired by the general contractor for the purpose of completing a specific task.

## CHAPTER TWO

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*SUBDIVIDER OR PROPRIETOR* any natural person, firm, association, syndicate, partnership, corporation, trust, or combination thereof, which may hold any ownership interest in the land to be subdivided.

*SUBDIVISION* shall mean the partitioning or dividing of a parcel or tract of land by the proprietor thereof or by his heirs, executors, administrators, legal representatives, successors or assigns for the purpose of sale or lease for more than one year, or building development, where the act of division creates five (5) or more parcels of land, each of which is ten (10) acres or less in area; or five or more parcels of land, each of which are ten (10) acres or less in area; or five or more parcels of land, each of which are ten (10) acres or less, are created by successive divisions within a period of ten (10) years.

*SUBDIVISION ASSOCIATION* shall mean an association of owners organized pursuant to deed restrictions and/or restrictive covenants in a particular development.

*SUBGRADE* is the portion of a roadbed surface that has been prepared as specified, upon which a subbase, base, base course, or pavement is to be constructed.

*SUPERINTENDENT* means the superintendent of the Water and Sewer Division of the Department of Public Works and Utilities.

*SUPPLY PIPE* is a pipe tapped into the main and extending thence to and including the curb cock or valve at a point normally seven feet outside the property line.

*SURFACE DRAINAGE* refers to all water flow across the surface of land.

*SURFACE WATER* is any water including ponds, lakes, streams, rivers, drains, and wetlands.

*SWALE*: (a) a low lying portion of land, below the general elevation of the surroundings; (b) a natural ditch or long, shallow depression through which accumulated water from adjacent watersheds drains to lower areas.

*TEMPORARY SOIL EROSION CONTROL MEASURES* those control measures which are essential for soil erosion control during construction and which will have served their purpose when permanent soil erosion is effected.

*TIME OF CONCENTRATION* is the time required for water to flow from the most distant point on a runoff area to the measurement or collection point.

*TREATMENT SYSTEMS* shall be defined as methods and facilities used to cleanse wastewater before disposal.

*U OR LOOP STREET* a minor street of short length having two openings to traffic beginning from the same street and projecting parallel to each other and connecting at their termination by a loop.

## CHAPTER TWO

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*UPLAND* shall mean the land area adjoining a lake, stream, or watercourse, above the ordinary high water mark, uses for which are essentially non-aquatic.

*URBAN THOROUGHFARE* means an arterial street similar in function to a major thoroughfare, but which is intended to provide for moderate levels of traffic flow and greater access to abutting properties.

*VARIANCE* means a modification of these standards as given by the City Engineer.

*VEGETATIVE COVER* means grasses, shrubs, trees, and other vegetation which hold and stabilize soils.

*WATERCOURSE OR WATERWAY* shall mean any waterway or other of water having well defined banks, including rivers, streams, creeks, and brooks, whether continually or intermittently flowing, and lakes and ponds, or as otherwise shown on an official watercourse and/or wetland map.

*WATER MAIN* shall mean a facility for the transportation, and distribution of potable water

*WETLANDS* shall mean land characterized by the presence of water or a frequency and duration sufficient to support and that under normal circumstances does support wetland vegetation or aquatic life and is commonly referred to as a bog, swamp, or marsh. A wetland will be regulated by the state if (1) it is greater than five (5) acres in size and located in a county with a population greater than 100,000, (2) is of any size and is contiguous (within 500 feet) of an inland lake, stream, or pond, or within 1,000 feet of the Great Lakes, or (3) is of any size if MDEQ determines that protection of the area is essential to the preservation of the natural resources of the state from pollution, impairment, or destruction.

*ZONING ORDINANCE* shall mean the City of Pontiac's Zoning Ordinance.

## CHAPTER THREE

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### GENERAL PLAN REQUIREMENTS

#### 3.1 PLAN REQUIREMENTS

All construction plans shall be submitted to the City for engineering approval and shall contain, but not be limited to, the following information:

##### A. Sealed Plans

All subdivision plans, condominium plans, site plans and utility plans submitted to the City for review shall bear the signature and seal of a Licensed Professional Engineer currently registered to practice in the State of Michigan under whose supervision the plans were prepared. All boundary surveys, architectural surveys, topographic surveys, subdivision plats and condominium plats shall bear the signature and seal of a Land Surveyor currently registered to practice in the State of Michigan under whose supervision the plans were prepared.

##### B. Plan Contents

Plans shall consist of a title sheet showing a plan view of the complete job, split plan and profile sheets, and standard detail sheets. The maximum sheet size shall be 24" x 36".

##### 1. Title Sheet

A title sheet, or the first sheet of a set of plans including fewer than three sheets, shall show:

- a. Project Title.
- b. Location map with north arrow and scale, scale shall be not greater than 1" = 100' nor smaller than 1" = 2000'. Relationship of general project area to the surrounding area shall be shown.
- c. Overall layout of the utility system with manhole numbers.
- d. Sheet index.
- e. Symbol legend.
- f. Name, address and phone number of proprietor.
- g. Plan completion date and all revision dates.
- h. A statement that the work shall conform to the City's current standards and specifications.
- i. North arrow and scale.
- j. District limits of sewers.

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### 2. Plan and Profile Sheets

- a. Scale of plan portion of sheet shall be 1" = 50' or larger with scale of profile portion of sheet 1" = 50' horizontal and 1" = 5' vertical or proportionally larger.
- b. Plan portion of sheet shall include at least:
  - (1) Existing topography extending 100 feet past the site boundaries including all existing and proposed improvements. Elevation contours at a minimum of 1-foot intervals based on City of Pontiac datum shall be shown.
  - (2) Street names, street and easement widths, subdivision names, lot numbers and lot dimensions.
  - (3) Locations, length, size of each section of proposed sewer between manholes.
  - (4) Locations of all manholes and other sewer appurtenances and special structures.
  - (5) All proposed building leads and wyes. Length, size, end of lead invert elevations, and length of riser shall be shown.
  - (6) Dimensions to manholes and sewers from property lines, right-of-way lines or buildings.
  - (7) "Miss Dig" note.
  - (8) Limits of special backfill requirements.
- c. Profile portion of sheet shall appear below the corresponding plan portion, generally projected vertically, and shall show at least the following:
  - (1) Size, slope, length, type and class of pipe.
  - (2) Invert of each pipe and top of casting elevations at each manhole.
  - (3) Limits of special backfill requirements.
  - (4) Profiled elevations over centerline of proposed sewer of existing and proposed ground, and pavement surfaces. Existing profile shall be obtained from actual field survey data.
  - (5) Location, by station, or coordinate, of every proposed manhole with manhole number, top of casting elevation, and manhole type.
  - (6) Location by station, or coordinate, of all building sewers, and wye branches.



## CHAPTER THREE

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- d. Reference bench marks established at intervals not greater than 1200 feet shall be noted on the Plan and Profile Sheets with description and established elevation listed. Each sheet shall show at least two bench marks.
- e. List of quantities.

### 3. Detail Sheets

Standard details shall include the standard sheet and notes as provided by the City. A standard mylar reproducible drawing of these details may be obtained from the City. The following is a listing of standard detail sheets available:

• Standard Water Main Details	1 of 2
• Standard Water Main Details	2 of 2
• Standard Sanitary Sewer Details	1 of 2
• Standard Sanitary Sewer Details	2 of 2
• Standard Storm Sewer Details	1 of 2
• Standard Storm Sewer Details	2 of 2
• Standard Paving Details	1 of 2
• Standard Paving Details	2 of 2
• Standard SESC Details	1 of 1

### C. Additional Plan Requirements for Grading and Surface Drainage

In addition to those requirements, as set forth in Chapter 3 of these standards, the following minimum information shall be included within plans for Grading and Surface Drainage:

1. All existing utilities showing invert elevations and rim elevations at all structures.
2. All proposed utilities showing the rim elevations of all structures.
3. Centerline of street stationing with centerline elevations at 50-foot intervals.
4. Top of curb elevations opposite each lot corner. All grades shall be shown to hundredths of a foot.
5. Proposed ground elevation at each lot corner.
6. Drainage flow arrows indicating the direction of surface water drainage.
7. Elevation of high point changes of grade, and low point of all swales and ditches.

## CHAPTER THREE

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8. Finish grade elevations for each building. If the finish grade for a house is uniform on all sides the finish grade elevation shall be placed inside a rectangular box situated in the lot according to the required front and side yard setback. Proposed finish building grades for site plan developments shall be shown at all corners and other locations requested by the Engineer.
9. Proposed elevations for sidewalks, top of curb and other locations as may be required to establish drainage patterns.

### D. Additional Plan Requirements for Parking Lot and Sidewalk Pavements

In addition to those requirements, as set forth above, the following minimum information shall be shown on all plans proposing the construction of driveways and parking lots:

#### 1. Dimensions

- a. Typical parking space.
- b. Maneuvering lanes and driveway width.
- c. Radii of driveways and all curves.
- d. Cross sectional view of the pavement showing thickness of surface and sub-base material.

#### 2. Existing Elevations

- a. Contour elevations shown at a minimum of two (1) foot intervals.
- b. Centerline of ditches or swales at a minimum of 50 foot intervals.
- c. Centerline and edge of existing roads at a minimum of 50 foot intervals.
- d. Top of casting and invert elevations of all existing drainage structures.

#### 3. Proposed Elevations

- a. All radii points.
- b. All building corners (existing and proposed).
- c. Pavement elevation at all corners and at 50 foot intervals along the edge of the pavement.
- d. All high points and ridgelines. (Ridge line and flow arrows must be shown)
- e. Invert at each drainage control point including swales, ditches, manholes, catch basins, detention/retention system, etc.

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### 4. Proposed and Existing Drainage Structures

- a. Culverts showing length diameter and type.
- b. Type of culvert end treatment.
- c. All existing and proposed drainage structures.

### E. Additional Plan Requirements for Water Supply System

In addition to those requirements, as set forth in Chapter 3 of these Standards, the following minimum information shall be included within all construction plans submitted to the City for water main approval:

1. Dimensions to property lines, right-of-way lines, and buildings from the water mains shall be shown.
2. Service line location and diameter shall be shown to all buildings other than single-family detached dwellings. Water shutoff valves shall be located as specified in the standard detail sheets (1' off face of walk - 7' into the public right-of-way).
3. The plans shall indicate the finish grades of all fire hydrants, gatewell rims and all other water structures. Hydrants and gatewells shall be consecutively numbered on the plans.
4. A water main quantity list shall be provided on the cover sheet of the detailed engineering plans.
5. The following information must be shown in the plan view of the proposed water supply system improvements:
  - a. Type, class and size of pipe;
  - b. Length between fittings and/or appurtenances;
  - c. Water service location and sizes;
  - d. Where required, a dedicated water main easement must be shown on the plans. The easement width shall be a minimum of twenty (20) feet centered atop the pipe, unless otherwise directed by the engineer.
6. For all water main 12-inch diameter and larger a profile view must be submitted with the plan. The profile sheet shall contain at least the following information:
  - a. Existing and proposed ground profile elevation at the centerline of the pipe.
  - b. Top of pipe elevations at all deflection points in the slope of the pipe.

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- c. Slope (percent of grade) and distance between each vertical deflection point.
  - d. Finish grade elevations for all gatewell castings.
  - e. The location of all horizontal deflection points.
- F. Additional Plan Requirements for Storm Water Management Systems, Storm Water Detention and Storm Water Retention Facilities

1. General

For each site an effective storm water management plan must be included within the plan set (on a separate plan sheet or included on another plan sheet) submitted for review. Components of an Effective Stormwater Management Program shall consist of the following as applicable to the particular site:

- a. Runoff Source Control by the following:
  - 1) Preserve the Natural Environment
  - 2) Site Design
  - 3) Vegetative Practices (Filter Strips, Stream Buffers)
  - 4) Grading and Soil Erosion and Sedimentation Control
- b. Runoff Conveyance using:
  - 1) Vegetated Swales w/Checkdams
  - 2) Level Spreaders
- c. Runoff Pretreatment in:
  - 1) Trapped Catch Basins
  - 2) Oil Grit Separators
  - 3) Sediment Basins
- d. Runoff Treatment by:
  - 1) Infiltration Devices
  - 2) Retention/Detention Basins
  - 3) First Flush Capture
  - 4) Mechanical Cleaning Devices (e.g. Vortechinics, Stormceptor)
- e. System Maintenance such as:
  - 1) Inspection
  - 2) Sediment Disposal
  - 3) Access
- f. Secondary Impact Mitigation
  - 1) Stream Restoration
  - 2) Downstream Wetland Protection

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### G. Additional Plan Requirements for Soil Erosion and Sedimentation Control

A soil erosion and sedimentation control plan shall be prepared for any earth change identified in Section 12.2.B. The plan shall be designed to effectively reduce accelerated soil erosion and sedimentation and shall identify factors which may contribute to soil erosion or sedimentation or both. The plan shall include but not be limited to the following data:

1. A location map at the scale of one inch to 200 feet indicating the site location as well as the adjacent properties within 500 feet of the site boundaries.
2. A boundary line survey of the site on which the work is to be performed.
3. A soils survey or a written description of the soil types of the land area contemplated to be exposed during the earth change.
4. Details of proposed earth changes in a plan of the site at a scale of one inch to 100 feet showing:
  - a. Name, address and telephone number of the owner, developer and applicant.
  - b. A timing schedule indicating the anticipated starting and completion dates of the development sequence and the time of soil exposure of each area prior to the completion of effective erosion and sediment control measures.
  - c. A certified statement of the quantity of excavation and fill involved.
  - d. Existing topography at a maximum of one-foot contour intervals.
  - e. Proposed topography at a maximum of one-foot contour intervals.
  - f. Location of any structures or natural features on the site.
  - g. Location of any structures or natural features on the land adjacent to the site within 50 feet of the site boundary line.
  - h. Location of any proposed additional structures or developments on the site.
  - i. Elevations, dimensions, location, extent and the slope of all proposed grading (including building and driveway grades).
  - j. The estimated total cost of the required temporary and permanent soil erosion control measures. This shall be an itemized unit price estimate.

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- k. Plans of all drainage provisions, retaining walls, cribbing planting, antierosion devices, or other temporary or permanent soil erosion control measures to be constructed in connection with, or as a part of, the proposed work. A map showing the drainage area of land tributary to the site and estimated runoff of the area served by any drains may be required if deemed necessary by the soil engineer.
- l. A program proposal for the continued maintenance of all permanent soil erosion control facilities which 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.

## CHAPTER FOUR

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### DESIGN STANDARDS FOR GRADING AND SURFACE DRAINAGE

#### 4.1 GENERAL

For all new subdivision and site plans within the City, a detailed grading plan shall be submitted for review and approval. Procedures shall be in accordance with: Chapter 58 “Environment”, Chapter 66 “Floods”, Chapter 102 “Streets, Sidewalks and Other Public Places”, Chapter 106 “Subdivisions”, of the Pontiac Municipal Code; regulations of the “City of Pontiac Zoning Ordinance” as amended, and the MDOT Standard Specifications for Construction and Standard Plans.

#### 4.2 DESIGN STANDARDS

##### A. Drainage Patterns

1. In general, each residential subdivision lot shall drain from the front of the house to the road and from the rear of the house to the rear of the lot. Rear to front surface drainage should be avoided and will be permitted only under extreme conditions.
2. Drainage drain for each site or lot must be self-contained so that drainage across adjacent sites is avoided, unless easements are provided for that purpose.
3. Drainage for subdivision lots must be directed to the side lot lines, rear lot lines, front yard line, or a swale located a minimum of 10 feet from the house.

##### B. Minimum Slopes

Minimum ground slope for any part of the site, shall be one percent (1%) except that the minimum ground slope away from any building shall be five percent (5%) for the first 10 feet away from the building.

##### C. Maximum Slopes

Generally the maximum ground slope for any part of the site shall be twenty-five percent (25%) (1 vertical to 4 horizontal). Slopes exceeding thirty-three percent (33%) (1 vertical to 3 horizontal) shall be protected with grouted concrete riprap, an approved geotextile fabric, or retaining wall or other approved soil erosion preventative.

##### D. Landscape Berms

The maximum side slope of landscape berms shall be thirty-three percent (33%) (1 vertical to 3 horizontal) with a 4-foot wide crest area.

## CHAPTER FOUR

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### E. Other

1. The high point of a swale located 10 feet from a building shall be a minimum of 0.5 feet below the proposed finished ground elevation of the building.
2. Generally, the ground elevation at a building shall be elevated above the centerline elevation of the road on which it fronts.
3. Generally, surface drainage generated from areas larger than 0.3 acres shall not drain across walkways at a point discharge. At no time shall building or paved areas drain across walkways (except in single family detached unit residential areas).
4. A minimum of 0.6 feet of vertical drop shall be provided from the front (and side on corner lots) property line to the top of curb.
5. In no case shall the surface drainage be directed to footing drains and discharged by pump.



## CHAPTER FIVE

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### DESIGN STANDARDS FOR PARKING LOT AND SIDEWALK PAVEMENTS

#### 5.1 GENERAL

For all new developments and site plans within the City, a detailed site plan shall be submitted for review and approval. Procedures shall be in accordance with: Chapter 58 “Environment”, Chapter 102 “Streets, Sidewalks and Other Public Places”, Chapter 106 “Subdivisions”, Chapter 114 “Traffic and Vehicles” of the Pontiac Municipal Code; regulations of the “City of Pontiac Zoning Ordinance” as amended; the City of Pontiac Standard Detail Sheets; and the MDOT Standard Specifications for Construction and Standard Plans. The City engineer will resolve and is the final authority on any conflicts between said codes and standards.

#### 5.2 DESIGN STANDARDS

Where the city’s Zoning Ordinance, Planning Commission, or standards requires hard surfacing of parking lots and driveways, the following minimum standards shall apply:

##### A. Parking Lots Surface – Commercial and Multiple

###### 1. Asphalt Surface

A thickness of three (3”) inches of bituminous pavement placed in two 1½” lifts over eight (8) inches of 21AA crushed aggregate base compacted in place. Subgrade shall be proof rolled using an 8-10 ton roller or approved mechanical compaction device.

###### 2. Concrete Surface

A thickness of seven (7) inches of concrete pavement placed on a prepared subgrade.

##### B. Parking Lots Surface – Industrial

###### 1. Asphalt Surface

A thickness of nine (9”) inches of bituminous pavement placed in three lifts over eight (8) inches of 21AA crushed aggregate base compacted in place. Subgrade shall be proof rolled using an 8-10 ton roller or approved mechanical compaction device.

###### 2. Concrete Surface

A thickness of nine (9) inches of concrete pavement placed on a prepared subgrade.

*NOTE: These minimums are based on adequate subgrade and drainage. Soil borings for each site and additional thickness for the pavement or sub-base may be required.*

##### C. Parking Lot Layout

The parking lot layout shall conform to the requirements of Chapter X, Section 10.5 of the City of Pontiac Zoning Ordinance and be approved by the Planning Commission.

## CHAPTER FIVE

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### D. Driveway Surface

All vehicular access lanes excluding driveways in parking lots which are for the exclusive use of passenger cars.

#### 1. Commercial

##### a. Asphalt Surface

A thickness of four (4") inches of bituminous pavement placed in two 2" lifts over eight (8) inches of 21AA crushed aggregate base compacted in place. Subgrade shall be proof rolled using an 8-10 ton roller or approved mechanical compaction device.

##### b. Concrete Surface

A thickness of eight (8) inches of concrete pavement placed on a prepared subgrade.

#### 2. Industrial

##### a. Asphalt Surface

A thickness of eight (8") inches of bituminous pavement placed in three lifts over eight (8) inches of 21AA crushed aggregate base compacted in place. Subgrade shall be proof rolled using an 8-10 ton roller or approved mechanical compaction device.

##### b. Concrete Surface

A thickness of nine (9) inches of concrete pavement placed on a prepared subgrade.

#### 3. Multiple

a. A thickness of four (4) inches of bituminous pavement placed in two 2" lifts over eight (8) inches of 21AA crushed aggregate base compacted in place. Subgrade shall be proof rolled using an 8-10 ton roller or approved mechanical compaction device.

b. A thickness of seven (7) inches of plain concrete placed over a prepared subgrade.

### E. Curb and Gutter

Concrete curb and gutter, where proposed, shall be MDOT Detail F1 or F1 modified with a reverse slope gutter plan where appropriate.

## CHAPTER FIVE

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### F. Pavement Drainage

#### 1. Minimum Grades

- a. Asphalt pavement – 1.00 percent
- b. Concrete pavement – 0.60 percent
- c. Concrete curb with gutter – 0.60 percent

#### 2. Maximum Grades

- a. Driveways – 8.00 percent
- b. Parking lot – 4.00 percent
- c. Driveway approach – 10.00 percent

#### 3. General

- a. The disposal of storm water and the design of the storm sewer system shall conform to the requirements as established by these standards.
- b. The point discharge of storm waters from a parking lot or other paved areas onto a lawn or landscaped area is not permitted. Sheet flow from parking lots or driveways will be permitted only for the most extenuating of circumstances. Construction cost is not an extenuating circumstance.
- c. The drainage of unrestricted water from paved areas to adjacent property is not permitted without a written, executed and recorded drainage easement which runs with the land. The required easement (s) must be recorded prior to the start of construction of the site improvements.
- d. Storm water disposal to a roadside ditch or any other drainage system shall receive approval from the agency having jurisdiction over the drainage course prior to final site plan approval.

### G. Driveway Approaches

#### 1. Location

- a. No portion of a driveway approach shall be constructed, except the curb return, within four feet of the end of any street curb return or radii, or closer than three feet to any property line extended. Where more than one driveway approach serves a single parcel of land or street frontage, there shall be at least 20 feet between the nearest edges of approaches as measured along the face of the curb.

## CHAPTER FIVE

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- b. No driveway approach shall be constructed nearer than four (4) feet to any of the following street structures: street lighting poles, utility poles, traffic signal stands, street sign poles, catch basins, fire hydrants, cross walks, loading zones, trees, or other necessary street structures.

### 2. Width

- a. No driveway approach for business purposes shall exceed 40 feet as measured along the face of curb, or exceed 25 feet as measured along the outside sidewalk line, except that, in exceptional cases due to street corners where streets intersect at acute or obtuse angles, the engineer may permit some variation of the maximum widths.
- b. No driveway approach for residential purposes shall exceed 20 feet as measured along the face of curb and ten feet as measured along the outside sidewalk line.
- c. No more than two driveway approaches shall be allowed to one parcel of ownership of land, nor shall more than two driveway approaches be allowed for one street frontage unless such frontage exceeds 200 feet.
- d. The sides, edges or curbs of driveway approaches shall be at right angles to the street curb or curblines. Curbs on each side of the driveway shall have a perpendicular face varying in height from zero inches at the outside walk line to the height of existing or future curb at curblines.

### 3. Cross Section and Permits

All driveway approaches to be constructed or reconstructed within a road right-of-way under the jurisdiction of the City, RCOC or MDOT shall be constructed under a permit from that agency. Evidence of the approval of the proposed construction shall be obtained from City, RCOC or MDOT prior to final Engineering approval. For drive approaches to be constructed or re-constructed within a road right-of-way under the jurisdiction of the City, the following minimum requirements shall apply:

#### a. Residential

A thickness of six (6) inches of plain concrete placed over four (4) inches of MDOT Class II sand sub-base and a prepared subgrade.

#### b. Commercial

A thickness of eight (8) inches of plain concrete placed over four (4) inches of MDOT Class II sand sub-base and a prepared subgrade.

#### c. Industrial

A thickness of nine (9) inches of plain concrete placed over four (4) inches of MDOT Class II sand sub-base and a prepared subgrade.

## CHAPTER FIVE

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### H. Sidewalks

#### 1. Location

The locations of Sidewalks shall be as established in accordance with Chapter 102 “Streets, Sidewalks and Other Public Places”, Chapter 106 “Subdivisions”, or as established by the Planning Commission for the City of Pontiac.

#### 2. General

a. Sidewalks shall have a width specified as follows:

- 1) Five (5) foot in width for sidewalks within the public right-of-way of collector streets and minor residential streets.
- 2) Ten (10) foot in width for sidewalks within the public right-of-way of urban thoroughfares or major thoroughfares.

b. In general, sidewalks should be located within the public right-of-way one foot from property lines. Where not in public right-of-ways, a permanent easement shall be provided to the City.

c. Sidewalks shall be designed to provide a minimum of eight (8) feet vertical clearance and four (4) feet horizontal clearance from any obstructions.

d. Surface material shall be concrete pavement having a thickness of 4-inches placed over approved subgrade. Drive crossings shall be designed per Section 3.3.3(F) of these standards.

e. Barrier-free ramps shall be constructed at all curb crossings. Barrier-free ramps shall have installed EJIW 7005 dipped truncated dome detectable warning plates as specified on the standard details.

f. Sidewalk grades shall generally follow the existing topography with a maximum longitudinal grade of 5%. Transverse grades shall also be provided to accommodate adequate surface drainage. A maximum transverse grade of 2% shall be provided.

g. Signs for sidewalk traffic shall be provided, as directed by the engineer.

#### 3. Cross Section and Permits

All sidewalks to be constructed or reconstructed within a road right-of-way under the jurisdiction of the City, RCOC or MDOT shall be constructed under a permit from that agency. Evidence of the approval of the proposed construction shall be obtained from the City, RCOC or MDOT prior to final Engineering approval. For sidewalks to be constructed or re-constructed within a road right-of-way under the jurisdiction of the City, the following minimum requirements shall apply:

## CHAPTER FIVE

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a. Residential

A thickness of six (6) inches of plain concrete placed over four (4) inches of MDOT Class II sand sub-base and a prepared subgrade through all drive approach areas, and four (4) inches of plain concrete placed over four (4) inches of MDOT Class II sand sub-base outside of drive approach areas.

b. Commercial

A thickness of eight (8) inches of plain concrete placed over four (4) inches of MDOT Class II sand sub-base and a prepared subgrade through all drive approach areas, and four (4) inches of plain concrete placed over four (4) inches of MDOT Class II sand sub-base outside of drive approach areas.

c. Industrial

A thickness of nine (9) inches of plain concrete placed over four (4) inches of MDOT Class II sand sub-base and a prepared subgrade through all drive approach areas, and four (4) inches of plain concrete placed over four (4) inches of MDOT Class II sand sub-base outside of drive approach areas.

I. Specifications and Materials

1. All pavements and sub-base material shall meet the current requirements of the City of Pontiac Standard Details, MDOT Standard Specifications for Construction and MDOT Standard Plans. In case of conflict between said standards, the City of Pontiac Standards shall prevail.
2. Bituminous surface courses shall be constructed of MDOT No. 4C. Bituminous base course shall be MDOT No. 3C.
3. Aggregate sub-base shall be constructed of MDOT 21AA crushed aggregate.
4. Concrete surfaces shall be MDOT 35P, or approved alternate.

## CHAPTER SIX

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### DESIGN STANDARDS FOR PUBLIC STREETS

#### 6.1 GENERAL

For all new developments and site plans within the City, a detailed site plan shall be submitted for review and approval. Procedures shall be in accordance with: Chapter 58 “Environment”, Chapter 66 “Floods”, Chapter 102 “Streets, Sidewalks and Other Public Places”, Chapter 106 “Subdivisions”, Chapter 114 “Traffic and Vehicles”, Chapter 118 “Utilities” of the Pontiac Municipal Code; regulations of the “City of Pontiac Zoning Ordinance” as amended; State of Michigan “Land Division Act” being Public Act 288 of 1967, as amended, State of Michigan “Condominium Act” being Public Act 59 of 1978, State of Michigan “Mobile Home Commission Act” being Public Act 96 of 1987, the City of Pontiac Standard Detail Sheets; and the MDOT Standard Specifications for Construction and Standard Plans. The City engineer will resolve and is the final authority on any conflicts between said codes and standards.

#### 6.2 DESIGN STANDARDS

##### A. General

##### 1. Streets

- a. The subdivider shall provide streets constructed according to plans, profiles, cross-sections and specifications prepared by or for him and approved by the City engineer in accordance with current City specifications.
- b. All streets shall be graded to the full width of right-of-way, as shown on plans and profiles approved by the City engineer, in accordance with specifications on file in that office.
- c. All streets shall be paved in accordance with cross-sections and detailed specifications on file in the City engineer’s office, and as otherwise specified in this chapter.
- d. Permanent concrete curb and gutter shall be installed on all streets in accordance with standard detail sheets on file in the City engineer’s office.

##### 2. Sidewalks

- a. Concrete sidewalks shall be constructed in all subdivisions along all minor residential streets, collector streets and along all abutting urban thoroughfares and major thoroughfares.
- b. In those instances where the subdivider can show that no good purpose would be served, this requirement may be waived by act of the Planning Commission.

## CHAPTER SIX

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- c. Sidewalks shall be continuous in nature and shall be provided on both sides of all minor residential streets, collector streets, urban thoroughfares and major thoroughfares.
  - d. All sidewalks shall have a minimum width of five feet and shall be located one foot from the property line.
3. Public Walkways/Crosswalks

When required by the Planning Commission, public walkways/crosswalks through blocks shall be constructed to a line and grade as determined by the City engineer and in accordance with specifications on file in the City engineer's office.

4. Bicycle Pathways

- a. Separated, protected bicycle lanes shall be provided by the subdivider in all subdivisions along urban thoroughfares or major thoroughfares where bicycle pathway is shown as being required or desirable in the City master plan or adopted bicycle pathway plan of a public agency.
- b. When required, bicycle lanes shall be constructed according to the cross section standards and specifications of the City engineer or other public agency requiring such bicycle lane.

5. Street Lighting

Street lights shall be provided in all subdivisions by the subdivider and shall be constructed according to current City specifications and under the supervision of the transportation division of the City. Street lights shall be placed a maximum of 300 feet apart, except that at least one street light shall be located at each street intersection or public walkway/crosswalk.

B. Street Right-of-Way and Pavement Width

1. Street right-of-way and pavement widths shall not be less than those indicated on the master thoroughfare plan of the City and shall be determined in detail by the City engineer. The master thoroughfare plan and this chapter's standards, at present, are as follows:

<u>Street Type</u>	<u>Right-of-Way</u> <i>(feet)</i>	<u>Pavement Width</u> <i>(feet)</i>
a. Expressway of super highway	200 to 250	As determined by the City engineer
b. Major thoroughfare (major arterial)	90 to 120	As determined by the City engineer



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Street Type	Right-of-Way (feet)	Pavement Width (feet)
c. Urban thoroughfare (minor arterial)	90	As determined by the City engineer
d. Collector street	86 to 90	48 to 50
e. Minor residential street	60	30, parking allowed on one side
f. Multiple-family residential street	60	30, parking allowed on one side
g. Cul-de-sac turnaround	60 minimum outside radius	30 minimum 47 outside pavement
h. Loop street	60	30
i. Marginal access service drive	50	30
j. Alley	25	18 minimum

2. Maximum length for residential cul-de-sac streets shall be 500 feet. Maximum length for industrial cul-de-sac may exceed 500 feet, subject to Planning Commission approval.

### C. Street Geometrics

1. Major thoroughfares, urban thoroughfares and collector streets shall not have a grade greater than five percent (5%), or as approved by the City engineer. Minor residential streets shall not have a grade greater than six percent (6%), or as approved by the City engineer.
2. Major or urban thoroughfares shall have a minimum stopping sight distance and passing sight distance as established by American Association of State Highway and Transportation Officials' Standards based on the design speed. Such standards are on file with the City engineer.
3. Collector streets shall have a minimum stopping sight distance of 200 feet for a design speed of 30 miles per hour measured between an observer at a height of 3.75 feet and an object at a height six inches. Appropriate minimum increases shall conform to American Association of State Highway and Transportation Officials' Standards.

Minor residential streets shall have a minimum stopping sight distance of 200 feet, measured between an observer at 3.75 feet and an object at six inches.

4. Horizontal alignment: When tangent centerlines deflect from each other, a minimum stopping sight distance based on American Association of State Highway and Transportation Officials' Standards and Design Speed shall be maintained. There shall be a sufficient tangent distance to allow acceptable transition from one curve to the adjacent curve.

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5. A 25-foot area of clear vision at intersecting curblines on each street in subdivisions shall be provided. This area shall be kept clear of all structures and vegetation exceeding a height of three feet above the curbline.
6. Streets shall be laid out so as to intersect as nearly as possible to 90 degrees. In no instance shall streets intersect at an angle less than 70 degrees.
7. Curved minor residential streets intersecting a collector, major or urban thoroughfare shall do so with a tangent section of centerline not less than 50 feet in length measured from the right-of-way line of the collector, major or urban thoroughfare. This requirement may be waived, however, when the curve of the minor residential street has a radius greater than 400 feet, with the center of the curve located on the right-of-way line of the collector, major or urban thoroughfare.
8. Street corners on minor residential streets shall have a minimum radius of 20 feet at the curbline.
9. Street corners on collector streets shall have a minimum radius of 25 feet at the curbline. Street intersections involving major or urban thoroughfares shall have a minimum radius of 25 feet at the curbline or as determined by the City engineer.
10. Acceleration, deceleration and passing lanes shall be provided as determined by the traffic safety committee, according to normal traffic engineering practice, in order to prevent the obstruction of the free flow of moving traffic on all thoroughfares.

### D. Street Construction and Dedication

1. All streets will be dedicated to the City and shall be built to City specifications under direct City inspection.
2. Construction and inspection of streets shall be at the expense of the developer. Street construction shall include adequate storm drainage.

## CHAPTER SEVEN

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### DESIGN STANDARDS FOR WATER SUPPLY SYSTEM

#### 7.1 GENERAL

For all new subdivisions and site plans within the City, a detailed site plan shall be submitted for review and approval. Procedures shall be in accordance with: Chapter 58 “Environment”, Chapter 102 “Streets, Sidewalks and Other Public Places”, Chapter 106 “Subdivisions”, Chapter 114 “Traffic and Vehicles”, Chapter 118 “Utilities” of the Pontiac Municipal Code; regulations of the “City of Pontiac Zoning Ordinance” as amended; the City of Pontiac Standard Detail Sheets; and the MDOT Standard Specifications for Construction and Standard Plans. The city engineer will resolve and is the final authority on any conflicts between said codes and standards.

Water distribution system improvements shall be designed in accordance with the requirements of the Michigan Safe Drinking Water Act, Act 399 of the public Acts of 1976, as amended; as well as the latest revisions of the standards prescribed by the American Water Works Association (AWWA), the Detroit Water and Sewerage Department (DWSD), and as specified herein.

The design engineer shall demonstrate the ability to provide fire flows of at least 1500 gpm in single-family detached residential zoning; 2500 gpm in apartment, cluster residential zoning, similar complexes, institutional and school areas; and at least 4000 gpm in office, industrial and shopping center zoning. A minimum of 20-psi residential pressure shall be maintained throughout the entire system during these flows.

#### 7.2 DESIGN STANDARDS

##### A. Water Mains

##### 1. Location

- a. The general location of the water mains shall conform to the City’s water supply distribution system Master Utility Plan or as determined by the Engineer. Minor location changes may be considered acceptable provided the Engineer has determined that the intent of the master plan has been met.
- b. Generally, water mains shall be installed in a public right-of-way line or in easements reserved for such use. All easements shall be a minimum of 20-feet wide. All easements and water mains shall be dedicated to the authority having jurisdiction over the system. A barrel-to-barrel horizontal separation of at least 10-feet shall be maintained between water main and sewers.
- c. All water mains shall be installed from property line to property line of all new developments along all abutting roads, streets and at other locations where the Engineer has determined that future extension will be necessary.

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- d. A minimum horizontal distance of 10-feet shall be provided from any building wall line or footing line to the centerline of the water main.
- e. Water mains shall be located outside of paved areas whenever possible.
- f. Interconnected Water Mains
  - 1) All water mains exceeding a maximum length of 600 feet shall have a minimum of two connections to source of supply.
  - 2) The maximum length may be exceeded provided that future service will eliminate the dead end. Future service will be as defined in the City's water distribution master plan.

### 2. Size

- a. Water main sizes shall conform to the City's water supply distribution system Master Utility Plan, or as directed by the superintendent.
- b. Unless specified otherwise in the above-mentioned Master Utility Plan, feeder mains 12-inches or larger in diameter shall be provided along collector streets, Major\_Thoroughfares, Urban Thoroughfare and elsewhere as design dictates.
- c. All water mains for new development shall have the following minimum sizes:

<u>Type of Development</u>	<u>Minimum Sizes*</u>
Residential	8-inch
Commercial-Office	12-inch
Industrial	12-inch

\* *NOTE – The ability to provide fire flows of at least 1500 gpm in single-family detached residential zoning; 2500 gpm in apartment, cluster residential zoning and similar complexes and in institutional, and school areas; and at least 4000 gpm in office, industrial and shopping center zoning shall be demonstrated by the design engineer. A minimum of 20-psi residential pressure shall be maintained throughout the entire system during these flows.*

- d. The minimum pipe sizes for all fire hydrant leads shall be 6-inches. Maximum length for all 6-inch water mains is 50-feet. No service connection shall be made to a fire hydrant lead.

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### 3. Easements

- a. All water mains, fire hydrants, valves, service valve boxes and other appurtenances shall be located within a 20-foot wide easement, centered on the water main, and dedicated to the City.
- b. Easements for possible extensions shall be provided to the property lines at locations designated by the engineer.
- c. Easements shall be extended to a point 10-foot beyond all hydrant leads.
- d. All easements shall be granted to the City prior to the issuance of a final occupancy permit.
- e. All grant of easement shall have the following documents attached:
  - 1) Bill of sale conveying the water main and all appurtenances to the City for a nominal amount.
  - 2) As-Built drawings in accordance with Chapter 13 of these standards.

### 4. Soil Conditions

- a. When required by the Engineer, exploratory borings shall be provided by the developer. Boring locations shall be indicated on the plans. Boring logs and soil analysis shall be submitted to the City.
- b. Water main design, relative to pipe bedding and locations, shall reflect the proper selection of materials and construction method compatible with the field conditions. Areas which show unsatisfactory ground material for pipe bearing or possible chemical deterioration due to soils shall be avoided, or the pipe shall be suitably installed on adequately designed bedding and in protective wrap and coating.

### 5. Materials

- a. Pipe and Fittings. Water main shall be designed for 125 psi minimum working pressure, plus a 100 psi surge pressure. Pipe shall be ductile iron or concrete.

## CHAPTER SEVEN

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### 1) Ductile Iron

Ductile iron pipe water main shall meet all the requirements of the latest revision of the ANSI Specifications, A21.51 and the AWWA Specification C151. The pipe shall meet the thickness class requirements shown in the table below.

<u>Size Nominal Inside Diameter (Inches)</u>	<u>Thickness Class (Minimum)</u>
6	54
8	54
10	54
12	54
14	54
16	54
20	55
24	56

### 2) Concrete

Pre-stressed concrete cylinder pipe (P.L.L.P.) pipe water main shall meet all the requirements of the latest revision of AWWA C301, steel cylinder type standards for sized larger than 24”.

### 3) All water mains shall be wrapped with 8 mil polyethylene wrap. Joints for ductile iron water main shall be James B. Clow and Sons, Inc’s “Belltite Joint”, U.S. Pipe and Foundry Company’s “Tyton Joint” or approved equal.

## B. Valves

### 1. Location

- a. A tapping sleeve, valve and well shall be provided at every connection to existing water mains unless otherwise approved by the Engineer. All such connections shall be provided so as not to disrupt the existing water services.
- b. In general, valves shall be arranged so that no single line failure will require more than 800 feet of main to be out of service, and on feeder mains, valves shall be spaced not more than one-quarter mile apart. Valves shall be so arranged that any section can be isolated by closing not more than four valves. The isolated section shall not include service to more than:
  - 1) Twenty (20) detached single-family dwelling units.
  - 2) Thirty (30) multiple units (apartments, condominium units, duplex units, etc.)
  - 3) Two (2) fire hydrants.

## CHAPTER SEVEN

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- c. A full size valve in a gatewell shall be provided at every dead end where required by the Engineer for future extension.
  - d. Water supply system improvements shall be designed to include adequate valves to properly isolate sections of water main without adversely impacting significant portions of the system. Valves on water mains 12” and smaller shall be gate valves and valves on water mains 16” and larger shall be butterfly valves, unless otherwise approved by the Water Department.
2. Pressure Reducing Valves
- a. In systems where two or more pressure districts are to be interconnected the plans shall include a pressure-reducing valve near the point of connection to the higher-pressure district to balance pressures across the new water system. Pressure reducing valves shall be of the design and manufacture of the city’s standards for such facilities.
  - b. A line gate valve shall be installed both upstream and downstream of each pressure reducing valve to permit isolation of the pressure reducing valve for maintenance or repair. A bypass line of equivalent size pipe as the water main and an additional bypass gate valve and well shall be provided.

3. Materials

Gate valves shall be designed for 150 psi working pressure and meet the requirements of AWWA C500. The valve shall be cast iron body, fully bronze mounted, bronze stem, O-ring stem seal, non-rising stem, double disc parallel seat type, opening counterclockwise with a 2” square operating nut. All gate valve nuts at a distance greater than 5’ below ground surface shall be provided with an extension stem. The length of the extension shall be such that it will be within 5’ of ground surface when an extension stem is used. It shall be held in place by an extension stem guide suitably fastened to the wall of the gate well. The extension stem shall be mechanically attached to the operating nut. Details of the extension stem and method of installation shall be approved by the engineer.

C. Gatewells

1. General

- a. All pre-cast concrete gate well sections shall be manufactured to conform with ASTM C478 standard specifications for pre-cast reinforced concrete manhole sections, except wall thickness shall be as shown on the standard details. All joints for pre-cast concrete gate well sections shall be “modified grooved tongue” with gasket manufactured to conform with ASTM C443 standard specification for joints for circular concrete sewer and culvert pipe using rubber gaskets. All gate well covers shall be EJIW #1040 (or approved equal) and have the words “CITY OF PONTIAC WATER DEPARTMENT” on raised letters on the frame cover.

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- b. Riser sections shall be pre-cast reinforced concrete sized as follows:

Nominal I.D. of Water Main	Size of Well (I.D.)	
	<u>Straight Through</u>	<u>Tee</u>
6" through 10"	5'-0"	6'-0"
Over 10"	6'-0"	6'-0"

- c. A gatewell shall be provided for valves 6 inches and larger (excluding hydrant valves).
- d. Extension stems and stem guides shall be provided in each gate well wherein the valve operating nut is more than 5-feet below the top of the gate well cover. Extension stems shall extend to within 5-feet of the top-of-cover elevation.

### D. Fire Hydrants and Appurtenances

#### 1. Location

- a. Fire hydrants in subdivisions composed of detached single-family dwelling units shall have a maximum spacing of 250-feet.
- b. Fire hydrants in all multiple, commercial, office, and industrial developments shall have a maximum spacing of 150-feet and shall further be subject to the following requirements:
- 1) In general, no part of a building shall be more than 250-feet from a fire hydrant as measured by the unobstructed hose length.
  - 2) Hydrants shall be located for double coverage in multiple housing developments, but in no case shall they be located less than 40-feet from a single-family residence or 50-feet from any other structure.
  - 3) Spacing of hydrants around commercial and/or manufacturing establishments shall be considered as individual cases and shall be determined by the Engineer.
  - 4) All hydrant spacings shall be subject to review and approval by the City of Pontiac Fire Department.
- c. Fire hydrants shall be located at street intersections were feasible. In subdivisions, hydrants shall generally be located on the extended side yard property lines.
- d. A hydrant shall be installed at the end of every dead-end main.
- e. In general, hydrants shall be located in the road right-of-way not more than 5 feet from back of curb.



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- f. Fire hydrants in parking areas shall be protected by 4 steel guard posts or a 6-inch high curb.
- g. A hydrant must be located no less than 50 feet and no more than 100 feet from a fire department connection (FDC) unless otherwise approved by the Fire Marshall.
- h. All hydrants shall be constructed with a companion gate valve and box.
- i. No parking will be allowed within ten (10) feet of a hydrant. No trash receptacles shall be located within fifteen (19) feet of a hydrant.
- j. Hydrants shall not be located downstream of any check valve used for automatic sprinkler prevention. Where hydrants are necessary, separate mains shall be installed for fire sprinkler services and hydrant protection.

### 2. Materials

All hydrants shall be EJIW 5BR traffic Model and shall conform to AWWA C-502 specification as amended with two 2 ½ hose nozzles with Detroit Standard Thread, one 3 ¾" (I.D.) pumper nozzle with Detroit Standard Thread, 6" hydrant shoe, 5'6" bury depth and drains to be plugged. The operating nut shall be 1 5/8" pentagon opening left (counter clockwise). Hydrants shall be painted chrome yellow.

Valve boxes shall be of cast iron construction. They shall be of three piece, screw type adjustment design. All valve boxes shall be installed flush with the top of the proposed site grade. Covers shall be designed to be removed easily to provide access to the valve. Valve boxes shall be Series 6860 as manufactured by Tyler Pipe, or equal.

### A. General

- 1. Special Crossings - Ductile iron pipe, Class 54, shall be used for water mains as follows:
  - a. Railroad Crossing – within an encasement pipe specified by the railroad for the entire width of the right-of-way, plus 20-feet. Details shall include encasement pipe thickness and diameter, water main bedding, and complete blown in fill of the encased water main as detailed on the standard detail sheets.
  - b. Stream Crossing – Ball joint river pipe shall be used unless otherwise approved by the Engineer.
  - c. Road-Crossings – Beneath and 10 feet beyond the edges of the pavement or traveled road.
  - d. Filled Areas – Throughout the full length, and extending 10-feet beyond each end of the fill area into undisturbed soil.

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### B. Water Service

#### 1. General

The basis of design for size shall be considered using a flow rate of 20 gpm per residential dwelling unit. The basis of size other than for residential use shall be determined by the developer's engineer and submitted for approval by the City prior to submittal of final plans. Minimum size of service shall be 1-inch. Service connections must be made to a City owned and maintained water main.

Water leads shall be not more than 100-feet in length for multiple type uses, the following minimum sizes shall apply:

<u>Number of Units Per Building</u>	<u>Water Service Size (inches)</u>
4	1 ½
12	1 ½
16	2
24	2
32	4

Service leads shall not be connected to hydrant leads or fire lines.

#### 2. Service Connection Materials

##### a. Copper Service Pipe

Service pipe 2-inch and smaller shall be copper, conform to the requirements of the Standard Specifications for Seamless Copper Water Tube, ASTM Designation: B 88, Type K, annealed. Connections in copper service pipe, if necessary, shall be made with copper to copper union fittings, Mueller No. H-15404 or approved equal.

##### b. Ductile Iron Service Pipe

Service pipe greater than 2-inches shall be Ductile iron pipe, Class 54 and shall meet all the requirements of the latest revision of the ANSI Specifications, A21.51 and the AWWA Specification C151.

## CHAPTER EIGHT

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### DESIGN STANDARDS FOR SANITARY SEWER SYSTEMS

#### 8.1 GENERAL

For all new subdivisions and site plans within the City, a detailed site plan shall be submitted for review and approval. Procedures shall be in accordance with: Chapter 58 “Environment”, Chapter 102 “Streets, Sidewalks and Other Public Places”, Chapter 106 “Subdivisions”, Chapter 114 “Traffic and Vehicles”, Chapter 118 “Utilities” of the Pontiac Municipal Code; regulations of the “City of Pontiac Zoning Ordinance” as amended; the City of Pontiac Standard Detail Sheets; and the MDOT Standard Specifications for Construction and Standard Plans. The Director of Public Works and Utilities will resolve and is the final authority on any conflicts between said codes and standards.

All sanitary sewer shall be designed to the latest City of Pontiac standards. The design engineer shall undertake sufficient research to determine if the proposed sanitary sewer and the existing outlet sewer has adequate capacity to handle the anticipated volumes. Such research will be provided to the City with the submission of plans for review by the City engineer.

Sanitary sewers shall be designed to serve all naturally tributary areas at full development. Topography, the master sanitary sewer plan, current zoning and the City of Pontiac’s master land use plans shall be considered when determining the required capacity.

#### 8.2 DESIGN STANDARDS

##### A. Location

##### 1. In Streets

Sanitary sewers shall generally be located along the centerline of right-of-ways for new residential construction and on opposite sides of streets from water mains, on the south side or the west side of a street for commercial and industrial applications.

##### 2. In Easements

Easements for sanitary sewers shall have a minimum width of 20 feet centered upon the sewer. Such easements shall be granted to the City with restrictions against use or occupation of building structures and by other utilities in any manner, which would restrict sewer maintenance or repair operations.

##### 3. Top of pipe elevations at all deflection points in the slope of the pipe.

##### 4. Slope (percent of grade) and distance between each vertical deflection point.

##### 5. Finish grade elevations for all manhole castings.

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6. The location of all horizontal deflection points.
  - a. Easements for possible extensions of the sanitary sewer shall be provided to the property lines or subdivision boundary line, at locations designated by the City.
  - b. Sewers shall preferably be constructed outside of paved parking areas, streets and drives.

### B. Sewer Capacity

#### 1. Tributary Area

Sanitary sewers shall be designed to serve all naturally tributary areas at full development. Topography, the master sanitary sewer plan, current zoning, and the City's master land use plans shall be considered when determining the required capacity.

#### 2. Populations

For design purposes, population shall be based on a minimum of 3.2 persons per detached single-family home site, and 2.5 persons for each multiple-family dwelling unit. Submissions for review shall include a tabulation of occupancy (usage) types and the conversion of these into terms of equivalent single-family units. The unit factors as established by the OCDC shall be used to convert the different usage types to equivalent single-family units.

#### 3. Sewage Quantities for Pipe Design

- a. For service areas with design populations of 500 or less, sewer design capacity shall be 400 gallons per capita per day, as specified under the Ten State Standards of GLUMRB.
- b. For service areas with design populations greater than 500 but less than 28,400, sewer design capacity shall be based on the following formula:

$$Q = 100x \frac{18 + \sqrt{P}}{4 + \sqrt{P}} \text{ where}$$

Q = Design capacity in gallons per capita per day

P = Design population expressed in thousands

- c. For service areas with design populations exceeding 28,400, sewer design capacity shall be 250 gallons per capita per day.

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### C. Minimum Pipe Size

Minimum Pipe size for sanitary mains shall be 8-inch diameter.

### D. Hydraulics

#### 1. Calculations

Kutter's or Manning's formula, with  $n= 0.013$  for concrete or  $n= 0.008$  for PVC, shall be used.

#### 2. Minimum and Maximum Velocities

Minimum design velocity shall be 2 feet per second. The maximum design velocity shall be 10 feet per second with pipe flowing full. The minimum slope of the sewer between the last two manholes at the upper end of any lateral shall be 1.0 percent. Whenever additional slopes are available, 1 percent minimum grades shall be utilized on lateral sewer lines.

#### 3. Allowable Pipe Slopes

<u>Pipe Diameter (inches)</u>	<u>Minimum Slope (ft. per 100 ft.)</u>	<u>Maximum Slope (ft. per 100 ft.)</u>
6	1.0	10.00
8	0.40	10.00
10	0.28	7.00
12	0.22	5.30
15	0.15	3.90
18	0.12	2.90
21	0.10	2.32
24	0.080	1.92
27	0.067	1.64
30	0.058	1.44
36	0.046	1.12

#### 4. Allowances for Changes in Pipe Direction

Maximum flow velocity for full pipe flow shall be maintained by a 0.10 foot difference in invert elevations between the inlet and outlet pipes whenever the direction change exceeds 30 degrees.

#### 5. Allowance for Pipe Size Changes

At manholes where a change in the pipe size occurs, the grades for the pipe shall be established by matching 0.8 of the diameters of each pipe above inverts.

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### 6. Depth of Sewers

- a. Minimum Depth: Unless specifically otherwise approved by the City, no sanitary sewer shall have less than 4 feet of cover over the top of the pipe. In general, sanitary sewers shall have a minimum of 10 feet of cover below finished road surface grade. The minimum depth of force mains shall be 6 feet (to top of pipe).
- b. Depth Below Building Grade: Unless otherwise approved by the City, the top of any sanitary sewer shall be at least 11 feet below finished building grade elevation of each fronting property which the sewer is designed to serve.

### E. Material

#### 1. PVC Truss Pipe

Sanitary sewers eight (8) inch to fifteen (15) inch in diameter shall be PVC Truss Pipe as described under ASTM designation D2680-72 for polyvinyl chloride (PVC) composite sewer piping.

#### 2. Concrete Pipe

Sanitary sewers eighteen (18) inch and larger in diameter shall be reinforced concrete circular sewer pipe conforming to the current ASTM specification C-76 (Wall C) Class IV pipe. All reinforced concrete sewer pipe shall be cast with reinforcing steel extending into bells and spigots.

#### 3. PVC SDR 23.5 Lead

Sanitary sewer leads six (6) inch diameter shall be PVC SDR 23.5 ES solid wall pipe and shall be extruded from PVC meeting the minimum cell classification 2-2-3 as defined in ASTM D1788-68.

#### 4. Force Main

Force main pipe (Sanitary Sewer Pressure Pipe) shall be Class 54 Ductile Iron Pipe and shall meet all the requirements of the latest revision of the ANSI Specifications, A21.51 and the AWWA Specification C151.

## CHAPTER EIGHT

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### F. Building Leads

#### 1. General

- a. A separate and independent building sewer shall be provided for every building; except where one nonresidential building stands at the rear of another nonresidential building on an interior lot and no private sewer is available or can be constructed to the rear building through an adjoining alley, court, yard or driveway, the front building sewer may be extended to the rear building and the whole considered as one building sewer, but the city does not and will not assume any obligation or responsibility for damage caused by or resulting from any such single connection aforementioned.

A single connection to the public system may be provided for several nonresidential building sewers collected by a privately owned interceptor. All provisions of this Chapter shall apply to the privately owned interceptor.

- b. Old building sewers may be used in connection with new buildings only when they are found on examination and test, to meet all requirements of these Standards. Abandoned sewers or openings shall be plugged to prevent dirt or fill material from entering the sewer system.
- c. Whenever possible, the building sewer shall be brought to the building at an elevation below the basement floor. In all buildings in which any building drain is too low to permit gravity flow to the public sewer, sanitary sewage carried by such building drain shall be lifted by an approved means and discharged to the building sewer.
- d. All new construction building sewers must have a sewer backup prevention device, to be installed by the individual responsible, as required by the city's plumbing code. All connections, tappings or openings shall be made under the supervision of the building and safety engineering division. The holder of the permit shall notify the building and safety engineering division when the connection is ready for inspection.
- e. Building service leads shall be connected to and discharge into a grease/oil interceptor to pretreat sanitary sewage prior to discharge into the public system as required by the Building and Safety Engineering Division or by code.

#### 2. Inclusion with Sewer Construction

Unless otherwise approved by the city, construction of building leads from the public sewer to a point 5 feet inside the property line or 5 feet outside the sewer easement for each fronting parcel which the sewer is designed to serve shall be included with the construction of each sanitary sewer.

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### 3. Wyes and Tees

Where the construction of building leads to the property line is required, a wye branch with riser is required. Said Wye and riser shall be provided with a watertight stopper or plug with type of joint used for the sewer pipe and shall be installed for every lot or building site which the sewer is designed to serve. Solvent weld caps are not permitted for ABS and PVC service leads. Tees will not be permitted.

### 4. Size and Length

Minimum size for building sewer and building lead shall be 6-inch nominal internal diameter. Generally the maximum length of building sewer and building lead shall be 100 feet as measured from the main sewer to the building. Clean out shall be installed at maximum intervals of 75 feet.

### 5. Minimum Slope

Minimum slope for building leads shall be 1/8 inch per foot (1.00%).

## G. Manholes

### 1. Manhole Locations

Manholes shall be constructed at every change in sewer grade, alignment and pipe size, and at the end of each sewer line. Maximum distance between manholes shall be 350 feet.

### 2. Types of Manholes

Manholes shall be constructed of precast reinforced concrete sections.

### 3. Drop Manholes

Whenever an inlet sewer pipe enters manhole at an invert elevation 18 inches or more above the invert elevation of the outlet sewer pipe, a drop manhole shall be constructed. Drops between 6 inches and 24 inches will not be permitted.

### 4. Stubs

Stubs or blind drop connections with watertight plugs shall be provided where future connections to a manhole are anticipated.



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### 5. Material

Materials shall be constructed of precast reinforced concrete sections conforming to ASTM C478. Joints between precast sections shall be modified tongue and groove type using o-ring synthetic rubber gaskets.

- a. All manholes shall contain a bottom precast section of flexible-joints and shall consist of a base integrally cast with a riser section. The base shall be a minimum of 8-inches thick and contain reinforcement at least equal to, and which shall be adequately tied to, the reinforcement in the riser section.
- b. The joint between the pipe and a section of a precast flexible-joint manhole shall be a mechanically compressed joint such as the Res-Seal, Link-Seal, Press Wedge II, or Kor-N-Seal flexible-rubber manhole joint. The joint shall be capable of meeting infiltration requirements and shall permit a deflection of at least 6 degrees in all directions as measured from the centerline of the pipe. Resilient connections between manhole and pipe shall conform to ASTM C443 and ASTM C923, except that only synthetic rubber gaskets shall be permitted. Natural rubber will not be acceptable.
- c. Cone section shall be eccentrically constructed precast reinforced concrete.
- d. A one inch diameter capped PVC test pipe shall be installed through the manhole wall and extend 2-inches into the manhole at an elevation equal to the top of the lowest sewer pipe.
- e. Manhole frames and covers shall be EJIW #1040 (or approved equal) and have the words "CITY OF PONTIAC - SANITARY" on raised letters on the frame cover.

### H. Special Structures and Appurtenances

#### 1. General Requirements

Where special appurtenances or structures are required in the sanitary sewer system, preliminary plans shall be submitted for review and comments.

#### 2. Inverted Siphons

Inverted siphon design shall provide at least two independent parallel pipes, with minimum diameter of 6 inches each, sized to provide a minimum velocity of 3 feet per second for the average flow condition.

#### 3. Pumping Stations

Sewage pumping stations shall be designed in accordance with the engineer's requirements for the specific installation. Pumping station design shall conform to the requirements of the city.

## CHAPTER NINE

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### DESIGN STANDARDS FOR STORM SEWER SYSTEM

#### 9.1 GENERAL

For all new subdivisions and site plans within the City, a detailed site plan shall be submitted for review and approval. Procedures shall be in accordance with: Chapter 58 “Environment”, Chapter 102 “Streets, Sidewalks and Other Public Places”, Chapter 106 “Subdivisions”, Chapter 114 “Traffic and Vehicles”, Chapter 118 “Utilities” of the Pontiac Municipal Code; regulations of the “City of Pontiac Zoning Ordinance” as amended; the City of Pontiac Standard Detail Sheets; and the MDOT Standard Specifications for Construction and Standard Plans. The city engineer will resolve and is the final authority on any conflicts between said codes and standards.

#### 9.2 DESIGN STANDARDS

##### A. Storm Sewer Piping

##### 1. Location

##### a. Within Street Right-of-Way

Storm sewers shall generally be located on the same side of the road as the water main.

##### b. Within Easement

Storm sewer easements shall generally be centered on the sewer and have a minimum width of 20-feet. Permanent structures which will restrict the maintenance of the sewer shall not be located within the easement area. Storm sewers to be located within easements which are established at the time land is platted shall be located and sized in accordance with the requirements of the subdivision ordinance and/or the Plat Act.

Easements for possible extensions shall be provided as required by the engineer.

##### c. General

Storm sewers shall be constructed no closer than 10-feet to any water mains, sanitary sewers or building structures.

##### 2. Size

The minimum pipe size for all non-residential on-site plan developments shall be 10-inch diameter. A minimum pipe size of 12-inch diameter shall be used for all subdivision and residential site plans, and in all road rights-of-way.

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### 3. Sewer Capacity

#### a. Tributary Drainage Areas

The sewers shall be designed to accommodate offsite tributary drainage. The upstream topography with existing and proposed developments and conformance with the Master Utility Plans shall be considered.

#### b. Hydrologic Consideration

Storm sewers shall be designed for a 10 year storm by means of the rational method formula:  $Q = CIA$ ; where “Q” is the peak rate of runoff in cubic feet per second, “A” is the area in acres, “C” is the runoff co-efficient for the drainage area and “I” is the average rainfall intensity in inches per hour for a given time of concentration. The rainfall intensity shall be determined by using the formula  $I = 175 / (25 + T)$  with (T) equal to the time of concentration in minutes. Generally, an initial time of concentration of 20 minutes shall be used.

In general the following runoff co-efficients (C) are considered the acceptable minimums:

- 1) Lawn and field areas – 0.20
- 2) Pavement and roof areas – 0.90
- 3) Residential:

R-1B	0.25
R-2A	0.30
R-1 & R2	0.35
Multiple Housing	0.55
- 4) Overall area of commercial development - .70
- 5) Overall area of industrial development - .75

The above runoff coefficients are minimum. Actual site or plat design may require an increase in the above runoff coefficients (land slope, intensity of use, materials, etc.) In no event will a reduction in the above runoff coefficient(s) be permitted. Provisions for an overland flood routing for a 100-year storm event shall be included in the storm sewer design. A minimum free board of twelve (12) inches (1.0 feet) shall be provided from any building structure finish grade to the 100-year flood elevation.

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### c. Hydraulics

#### 1) Allowable Pipe Slopes (n=0.013)

Pipe Diameter (inches)	Minimum Slope (feet per 100 feet)	Maximum Slopes (feet per 100 feet)	
		<u>Pipe Slope</u>	<u>H.G. Slope*</u>
10	0.42	5.2	6.80
12	0.32	3.9	4.88
15	0.24	2.8	3.60
18	0.18	2.1	2.84
21	0.14	1.7	2.32
24	0.12	1.4	1.92
27	0.10	1.2	1.64
30	0.09	1.05	1.44
36	0.067	0.80	1.12
42	0.054	0.65	0.92
48	0.045	0.54	0.76
54	0.038	0.46	0.64
60	0.034	0.40	0.56

\* *Hydraulic Gradient*

Generally, all catch basin and inlet leads shall be laid on a slope not less than 1 percent.

#### 2) Design Velocities

Minimum design velocity shall be 2-1/2 feet per second with pipe flowing full.

Maximum design velocity shall be 10 feet per second.

#### 3) Calculations

Kutter's or Manning's formulas shall be used for hydraulic calculations.

##### (a) Allowances for Changes in Pipe Size

The hydraulic gradient shall generally be maintained by matching the 0.80 diameter depth above invert for pipe size increases.

##### (b) Allowances for Direction Changes

A drop of 0.10 feet shall be provided in the downstream sewer invert for direction changes in excess of 30 degrees to compensate for the hydraulic head losses.

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### (c) Surcharging

Surcharging under design conditions is allowed. However, the hydraulic gradient should not exceed an elevation higher than one (1) foot below any structure cover elevation.

### B. Future Connections

A stub with a watertight bulkhead of brick and mortar shall be provided at all manholes and catch basins where future connections are anticipated.

### C. Minimum Depth of Sewers

A minimum cover to top of pipe of 3 feet shall be provided for all storm sewer pipe unless otherwise approved by the engineer.

### D. Plunge Pools

Wherever differences in manhole pipe invert elevations exceed 2 feet, a plunge pool (sump) 2 feet in depth shall be provided to prevent channel erosion.

### E. Manhole Locations

Manholes shall be provided at every change of pipe size, change in grade, change in direction, or at all junction points. The maximum spacing shall be established by pipe sizes as follows.

Pipe Size (inches)	Maximum Spacing (feet)
10 - 12	300
15 - 21	350
24 - 30	400
36 - 42	450
48 and larger	500

### F. Catch Basin and Inlet Locations

The following design criteria shall be used when establishing catch basin and inlet locations.

1. Low points in gutters and in swales and ditches, where applicable.
2. Upstream curb return, if more than 200 feet downstream of high point in gutter or of intercepting structure.
3. At maximum intervals of 400 feet along a continuous slope.

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4. Inlets shall only be allowed in pavement areas, and then, only as a high end structure and when followed by a catch basin within 50 feet of inlet.
5. Generally, the flows to be accommodated shall not exceed the intake capacity of the cover. Catch basin cover capacities shall be determined by assuming a value of 0.011 cfs per square inch of opening.
6. Catch basin and inlet leads may be tapped directly (blind tap) into storm sewer pipes larger than 42 inches, subject to the approval of the engineer. The appropriate MDOT standard detail shall be referenced.

### G. Ditches

1. Maximum side slope: 33% (1 on 3)
2. Minimum centerline slope: 1.00%
3. Maximum centerline slope:
  - a. Seeded ditch: 2.00%
  - b. Sodded ditch: 3.00%
  - c. Reinforced ditch: 5.00%  
(erosion control ECRM)

All ditch centerline slopes exceeding 5.00% shall receive hard armor limestone rock fragment over geotextile fabric or be paved to the hydraulic grade line for a 10-year storm.

### H. Open Drains

1. Open drains will be permitted only upon special approval from the engineer.
2. Slope protection may be required at locations designated by the engineer.

### I. Materials

1. Pipe
  - a. Storm sewer pipe shall be reinforced concrete or ductile iron.

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- 1) Reinforced concrete pipe and manhole tees shall conform to the latest revision of ASTM C76, with the class designation as follows:

<u>Cover Over Pipe</u>	<u>Class of Concrete Pipe</u>
Less than 4'	IV
4.1' to 10'	III
10.1' to 18'	IV
18.1' and deeper	V

- 2) Pipe located in any pavement areas shall be not less than Class IV.
  - 3) All pipe within the public right-of-way shall be not less than Class IV pipe.
- b. Ductile Iron (Pipe) shall meet current requirements of ANSI A21.50.
  - c. Concrete pipe shall have premium joints in all pipe from structure to structure.

### 2. Structures

Storm structures shall be constructed of precast concrete pipe, brick or block.

#### a. Precast Concrete

Reinforced concrete structures and grade rings shall conform to the current ASTM Specifications for Precast Reinforced Concrete Manhole Sections, Serial Designation C478. Manhole section joints shall be made with mortar. Dome sections shall be straight side type.

#### b. Brick and Block

- 1) Brick for brick and mortar structures shall conform to the current ASTM Specification C32. Block for block and mortar structures shall conform to the current ASTM Specification C135. Mortar for plastering drainage structures shall be made of one part Portland cement and two parts of fine aggregate.

### 3. Castings

- a. Castings shall conform to the latest revision of the ASTM Specification A48, Gray Iron Castings and be coated by the manufacturer with coal tar pitch, varnish or other asphaltum coating as approved by the city.
- b. Frames and covers shall be as follows:
  - 1) For use on drainage structures in paved areas: East Jordan Frame 5105 with type MI grate, or equal.

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- 2) For use in curb and gutter line: East Jordan Frame 7045 with type MI grate, or equal.
- 3) For use on drainage structures in grassed areas: East Jordan Frame 1040 with type 02 Beehive Grate or equal.
- 4) For use on drainage structure manholes: East Jordan 1040 with type B perforated cover, or equal.

#### 4. Headwalls

Headwalls shall be constructed of concrete in accordance with the current MDOT specifications.

#### J. Footing Drain Sewers

Storm sewers for footing drains shall be provided in all subdivision developments. All lots shall be provided with a house lead connecting to the storm sewers or a sewer constructed for the sole purpose of collecting waters discharged from footing drains. Connections to storm sewer within the road right-of-way is not permitted.

##### 1. Footing Drain Collector Sewer

- a. Minimum pipe diameter shall be 8-inches with an inlet provided at the upstream end with a manhole or catch basin at all changes in size and/or any change in horizontal or vertical alignment.
- b. The following pipe types are allowed.
  - 1) Reinforced concrete pipe ASTM C76 CL IV.
  - 2) Polyvinyl chloride (PVC) ASTM D-3034, SDR 35.
- c. Minimum slope shall be 0.50%.

##### 2. House Lead

- a. Minimum size shall be 3-inch diameter laid at a minimum 1.00% slope.
- b. House lead shall be Schedule 40 PVC.

##### 3. Clean Out Structures

- a. Clean out structures shall be installed at the upstream end of all footing drain collector sewers.
- b. Clean outs shall be 2 foot diameter concrete block or precast concrete structures.
- c. Castings shall be East Jordan Iron Works 1040 with Type "02" covers.



# CHAPTER TEN

## DESIGN STANDARDS FOR BORED AND JACKED CASINGS

### 10.1 GENERAL

For all new subdivisions and site plans within the City, a detailed site plan shall be submitted for review and approval. Procedures shall be in accordance with: Chapter 58 “Environment”, Chapter 102 “Streets, Sidewalks and Other Public Places”, Chapter 106 “Subdivisions”, Chapter 114 “Traffic and Vehicles”, Chapter 118 “Utilities” of the Pontiac Municipal Code; regulations of the “City of Pontiac Zoning Ordinance” as amended; the City of Pontiac Standard Detail Sheets; and the MDOT Standard Specifications for Construction and Standard Plans. The city engineer will resolve and is the final authority on any conflicts between said codes and standards.

### 10.2 DESIGN STANDARDS

#### A. Requirement

Steel casings shall be bored and jacked in any areas, which in the opinion of the engineer, are considered to be detrimentally affected by open cut construction. The open cutting of public paved roadways will not be permitted unless otherwise approved by the engineer.

#### B. Materials

##### 1. Casing Pipe

Steel casing pipe shall be electric-fusion welded pipe, conforming to the requirements of ASTM A-39, Grade B, with minimum wall thickness indicated below. Pipe ends shall be prepared for field welding of circumferential joints.

<u>Nominal Size (in.)</u>	<u>Nominal Outside Diameter (in.)</u>	<u>Wall Thickness (in.)</u>
6	6.625	0.188
8	8.625	0.188
10	10.750	0.188
12	12.750	0.375
14	14.000	0.375
16	16.000	0.375
18	18.000	0.375
20	20.000	0.375
24	24.000	0.406
30	30.000	0.532
36	36.000	0.532
42	42.000	0.563
48	48.000	0.625
54	54.000	0.688

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### 2. Minimum Boring Distances

All work shall be performed from boring and jacking pits adequately sheeted to prevent damage to the roadway, railway, etc. The minimum distance from the edge of the pavement to the trench or boring and jacking pit for dual-highway routes shall be 30 feet. For curb or guardrail section, railway track, or 2-lane highway, the minimum distance will vary from shoulder point to the top of slope as shown on the plans or directed by the engineer.

## CHAPTER ELEVEN

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### DESIGN STANDARDS FOR STORMWATER MANAGEMENT SYSTEMS, STORMWATER DETENTION AND STORMWATER RETENTION FACILITIES

#### 11.1 GENERAL

For all new subdivisions and site plans within the City, a detailed site plan shall be submitted for review and approval. Procedures shall be in accordance with: Chapter 58 “Environment”, Chapter 66 “Floods”, Chapter 102 “Streets, Sidewalks and Other Public Places”, Chapter 106 “Subdivisions”, Chapter 118 “Utilities” of the Pontiac Municipal Code; regulations of the “City of Pontiac Zoning Ordinance” as amended; the City of Pontiac Standard Detail Sheets; and the MDOT Standard Specifications for Construction and Standard Plans. The city engineer will resolve and is the final authority on any conflicts between said codes and standards.

This section sets forth specific design and construction standards that will be used by the City in the review process of proposed storm water management systems; in accordance with the objectives of managing both the quantity and quality of stormwater runoff.

Where feasible, applicants are encouraged to combine stormwater management facilities with adjacent developments. This approach is intended on reducing the number of small individual facilities and saving natural features by combining them into regional facilities.

#### A. Intent

The applicant must evaluate the impact of their project over the long term, and on a watershed scale. This approach requires the consideration and use of Best Management Practices (BMPs) that function together as a system to ensure that the volume, rate, timing and pollutant load of runoff remains similar to or improve upon that which occurred under natural conditions. This can be achieved through a coordinated network of structural and nonstructural methods, designed to provide both source and site control.

#### 1. Source Controls

Source controls reduce the volume of runoff generated on-site, and eliminate initial opportunities for pollutants to enter the drainage system. By working to prevent problems, source controls are the best option for controlling stormwater, and include the following key practices which are strongly encouraged by the City.

- a. Preservation of existing natural features that perform stormwater management functions, such as depressions, wetlands and vegetation.
- b. The minimization of impervious surface area through site planning that makes efficient use of paved, developed areas and maximizes open space.
- c. Directing storm water discharges to open, grassed areas such as swales rather than allowing stormwater to run off from impervious areas directly into an enclosed storm water conveyance system.

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- d. Careful design and installation of erosion control mechanisms and rigorous maintenance throughout the construction period. Effective erosion control measures include minimizing the area and length of time that a site is cleared and graded, and the immediate vegetative stabilization of disturbed areas.

1. Site Controls

After the implementation of source controls, site controls are then required to convey, pre-treat, and treat (e.g., detain, retain or infiltrate) the stormwater runoff generated by development. The range of engineering and design techniques available for these objectives is dictated by site configuration, soil type, and the receiving drainage course. While each site is unique, some universal guidelines for controlling stormwater quality and quantity can be stated as follows:

- a. In general, the most effective stormwater quality controls are infiltration practices, which reduce both the runoff peak and volume. Sediment clogging can potentially reduce infiltration in structural devices if not properly maintained. Therefore, an aggressive maintenance program and extensive upstream pre-treatment measures (such as oil/grit separators, trapped catch basins, sedimentation basins and grass filter strips) must be incorporated into any stormwater management system.
- b. The next most effective stormwater site controls reduce the runoff peak, and involve storage facilities such as retention and detention ponds. In the selection of an appropriate stormwater pond design, dry ponds are preferable to wet detention ponds. Ponds should be designed to provide extended detention of stormwater to promote increased settling of particulates.
- c. Once all possible methods of reducing and treating stormwater on-site have been implemented, any excess runoff may be discharged into a conveyance system and carried off-site to a suitable outlet. For this purpose, vegetated swales with check dams, where appropriate, are encouraged.
- d. Also of primary importance to water quality, is the capture and treatment of the “first flush”, a term used to describe the initial washing action that stormwater has on impervious surfaces. Pollutants that have accumulated on these surfaces are flushed clean by the early stages of runoff, which then carries a shock loading of these pollutants into receiving waterways. By capturing and treating the first 0.5 inch of runoff, most of the pollutants that are washed off of the land can be removed from stormwater before it enters the drainage system.
- e. Preferred Best Management Practices
  - 1) Preservation of the natural environment
  - 2) Minimization of impervious surfaces
  - 3) Use of vegetated swales and natural storage
  - 4) Non-Structural (Source) Controls

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- 5) Structural (Site) Controls
  - (a) Infiltration of runoff on-site (trenches, etc.)
  - (b) Stormwater retention ponds
  - (c) Stormwater detention structures
  - (d) Conveyance off-site

### B. Discharge and Outlet Constraints

1. In no event shall the maximum design rate of discharge exceed the rate of existing discharge at the outlet point. For new sites, the rate of discharge shall not exceed 0.20 CFS per acre.
2. The Applicant shall be solely responsible to determine the feasibility of the discharge point and downstream conditions from the outlet. The proposed outlet to the stormwater management facility shall, in every way feasible, respect and conform to the natural drainage patterns within the site and the watershed in which it is located.
3. A description of the off-site outlet, evidence of its adequacy and a detailed description of the effects of said outlet on downstream properties shall be included in the plans submitted for review.

## 11.2 DESIGN STANDARDS

### A. General

All runoff generated by proposed impervious surfaces for the entire site (all acreage), should be contained on-site. If off-site discharge is permitted by the City, it must be conveyed into a storm water management system for water quality treatment and detention/retention prior to being discharged from the site. The following criteria will apply to the design of all storm water retention and detention facilities.

1. In general, dry ponds providing extended storage will be accepted. Wet ponds and storm water marsh systems may be required.
2. Pond designs will incorporate gradual side slopes, vegetative and barrier plantings, and safety shelves where warranted or as determined by the City. Where further safety measures are required, the Applicant is expected to include them within the proposed development plans.
3. Basin side slopes shall generally not exceed one foot (1') vertical to five feet (5') horizontal. Slopes steeper than one foot (1') vertical to five feet (5') horizontal, will be permitted only with the installation of a five foot (5') high chain link fence (or alternate material approved by the City Planning Commission) completely surrounding the basin including the buffer strip. In such cases, where the perimeter fencing is required, a twelve (12') foot wide access gate shall be provided.
4. Storm water management systems incorporating pumps shall generally not be permitted.

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5. Storm water facilities, and associated buffer strips, are preferred to be completely located on common-owned property (e.g. parks, outlots, etc.) in multi-ownership developments such as site condominiums and subdivisions, and not on private lots or condominium units.
6. The use of underground retention/detention on a new and existing developments is strongly discouraged. Exceptions may be granted if each of the following conditions exist:
  - a. The need to rebuild an existing commercial facility or on pre-existing nonconforming parcels that were not previously equipped with retention/detention, and the installation of an above-ground retention/detention facility would significantly reduce the available square footage for a replacement structure.
  - b. Regional retention/detention is not available.
  - c. The provision of above-ground retention/detention on an existing commercial parcel less than 2 acres in size would preclude development of the property for any use allowed under its current zoning.
7. All basins will have provisions for a defined emergency overflow. The emergency overflow will be set at an elevation six inches (6") below the design freeboard elevation and be able to handle the capacity of a 100-year design storm event.
8. Adequate maintenance access from public or private rights-of-way to the basin will be provided. The access will be on a slope of five on one (5:1) or less, stabilized to withstand the passage of heavy equipment, and will provide direct access to both the facility and the riser/outlet.
9. The placement of retention/detention basins within a floodplain of a stream, creek, or lake is strictly prohibited.
10. No in-line stormwater management facilities will be permitted on existing water courses.
11. New in-line facilities will be permitted only as designed and constructed for the subject project (i.e. flow through adjoining basins) provided all control structures can safely pass excess storm events and each basin has overflow provisions.
12. Storm water management facilities must be maintained by the owner of the development and the City Engineer may establish provisions for perpetual maintenance of the facilities, including detention/retention facilities.
13. The City Engineer shall have authority to waive detention/retention requirements based on the practicality of storm water management with respect to site improvements of less than one (1) acre in size.

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### B. Detention Facility

#### 1. Type of Detention Facilities

- a. Basin *see figure 10.01 and figure 10.2)*
- b. Parking lot detention (*see figure 10.3)*
- c. Other detention facilities shall be considered for special circumstances.

#### 2. Design Requirements

- a. The dewatering of detention basins by pump will only be allowed upon approval by the engineer and special requirements will apply.
- b. Detention basin volume shall be indicated by computing the volume provided above the invert elevation of the lowest outlet pipe.
- c. A 1% minimum slope falling toward the outlet shall be provided at the bottom of all detention basins.
- d. Volume must be provided for all developed on-site area. The storm drainage system must be sized to adequately serve off-site drainage tributary to the site. Off-site drainage may pass through the project unrestricted.
- e. The side slopes shall not be steep than 1 vertical to 5 horizontal (1 on 5). The City Engineer may waive this requirement provided the applicant can demonstrate that strict compliance would restrict the reasonable use of the property and creates an undue hardship. If a slope steeper than 1 on 5 is permitted by the City Engineer, the entire basin shall be enclosed with a 6-foot high chain link fence with a 12-foot wide two part locking gate with an approved anchor for the inactive part.
- f. A detention basin which contains a permanent water surface below the outlet pipe shall be subject to the following requirements:
  - 1) A minimum water surface area of 10,000 square feet.
  - 2) A maximum bank slope of 1 on 5 extending to 5 feet below the water surface.
  - 3) A minimum depth of 8-feet measured from low water.
  - 4) A maximum slope of 1 on 3 from 5-feet below the water surface to the bottom of the pond.

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### g. Design Criteria

- 1) The required storm water detention volume is based on the following formulas as developed by the Oakland County Drain Commission's Office for gravity outlet detention basin.

The design process is outlined as follows:

The allowable outflow = capacity of receiving drainage course at peak flow using the rational method for a 10 year storm event or 0.2 CFS/acre (whichever is less).

Calculate maximum outflow per acre ( $Q_o$ )

$$Q_o = \frac{\text{Allowable outflow (Qa)}}{\text{Acreage (A) x developed runoff coeff. (Cd)}}$$

$$\text{Calculate Maximum Storage Time: } T = -25 + \frac{\sqrt{10,313}}{Q_o}$$

$$\text{Calculate the maximum storage: } V = \frac{16,500T}{T + 25} - 40 Q_o T$$

Total volume of storage required  $V = V \times Cd \times A$ , in cubic feet

- 2) The cross-sectional area of the outflow pipe shall be determined through the use of the following orifice formula:

$Q_a$  = allowable outflow

$$A = \frac{Q_a}{.62x\sqrt{2gh}}, \text{ where}$$

$g$  = acceleration due to gravity  
32.2 ft. /sec<sup>2</sup>

$h$  = Total amount of static head over the centerline of the orifice in feet.

- 3) The maximum outlet size shall be 6-inches in diameter. Should it be found that a single 6-inch diameter pipe under the head condition prevailing at the design highwater elevation does not provide the allowable outflow rate, then an additional orifice(s) will be permitted. However, at no time will the total outflow rate at the design high water elevation be allowed to neither exceed the allowable outflow nor exceed the capacity of the downstream drainage course receiving outflow from the basin.



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- 4) Additional orifice(s) shall be located such that the top of pipe(s) is no higher than the high water elevation of the basin and the invert(s) is (are) no lower than the 6-inch pipe invert elevation at the bottom of the basin plus one half of the depth of the basin.
- 5) Additional orifice(s) shall have a minimum size of 6-inches.

### C. Retention Facilities

#### 1. Design

- a. Retention ponds will be permitted only if no drains or natural drainage course for discharging of a detention pond is available to the development. Such use of the retention pond shall be considered a temporary measure and last resort and shall be discontinued as soon as an outlet drain becomes available to the development. Retention ponds shall only be permitted upon approval by the engineer.
- b. The volume of retention ponds shall be adequate to hold runoff from two consecutive 100-year frequency storms of infinite duration over the entire tributary area (i.e.  $V = 33,000 \times A \times C$  where  $V$  = required storage volume (cu. ft.),  $A$  = total tributary acreage, and  $C$  = developed runoff coefficient).
- c. Retention basin volume shall not include volumes below the existing groundwater table. A comprehensive soil investigation including determination of groundwater levels shall be furnished for all retention basins.
- d. All requirements governing the detention ponds, unless specifically revised or waived, shall be applicable to retention ponds.

### D. Control Structure

1. Outlet control structures shall generally be designed in accordance with OCDC Standard Details, including the sediment filter, or other BMP's as approved by the Engineer.
2. Engineered velocity dissipation measures based on discharge flow rates and velocities shall be incorporated into basin designs to minimize erosion at inlets and outlets, to minimize the resuspension of pollutants, and to create sheet flow conditions where feasible.
3. The outlet must be well protected from clogging.
4. The use of a perforated standpipe-type riser or other similar structure as approved by the Engineer to assure an appropriate detention time for all storm events is required.
5. Hoods or trash racks shall be installed on the riser to prevent clogging. Grate openings shall be a maximum of four (4") inches.

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6. The riser shall be placed near the pond embankment to provide for ready maintenance access.
7. The riser pipe shall be a minimum of 36" in diameter for riser pipes up to four feet in height. Riser pipes greater than four feet in height shall be 48" in diameter. Riser pipes will be constructed with concrete bottoms.

### E. Outlet Design

1. All outlets will be designed to be easily accessible for equipment required for maintenance purposes.
2. All outlets will be designed to discharge at an elevation within close proximity to the normal high water of the receiving water lanes. Discharging at the "crest" of slopes or submerged outlets will not generally be permitted.
3. Backwater on the outlet structure from the downstream drainage system shall be evaluated when designing the outlet.

### F. Parking Lot Detention

1. Commercial parking lot detention of storm water will be permitted on pre-existing non-conforming parcels and only when no reasonable alternative exists and provided it does not adversely affect the functioning of the facility or business which it serves, adjacent property, or create a public nuisance.
2. The required storage volume shall be determined in the same manner as it is done for dry detention basin.
3. The discharge from the parking lot may be controlled by means of restricted outlets.
4. Commercial sites must be equipped with structural BMP's for storm water quality enhancement. BMP's include oil/grease separators, entrapped catch basins, grit chambers, storm water quality structures (Stormceptor Units / Vortechnic Units), etc.

### G. Underground Storage

1. Underground detention will only be permitted by the Engineer.
2. The volume of underground storage facilities shall meet the requirements of dry detention basins without any credit reductions.

## CHAPTER TWELVE

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### DESIGN STANDARDS FOR SOIL EROSION AND SEDIMENTATION CONTROL

#### 12.1 GENERAL

For all new subdivision and site plans within the City, a detailed soil erosion and sedimentation control plan shall be submitted for review and approval. Procedures shall be in accordance with: Chapter 58 “Environment”, Chapter 66 “Floods”, Chapter 102 “Streets, Sidewalks and Other Public Places”, Chapter 106 “Subdivisions”, of the Pontiac Municipal Code; regulations of the “City of Pontiac Zoning Ordinance” as amended; the City of Pontiac Standard Detail Sheets; and the MDOT Standard Specifications for Construction and Standard Plans.

#### 12.2 DESIGN STANDARDS

##### A. General

1. It shall be unlawful for any person to engage in an earth change activity in such a manner as to allow any accelerated soil erosion on the site of the work or to allow sedimentation of the eroded soil off of or away from the site of his work
2. All persons engaged in earth change activities shall design, implement and maintain acceptable soil erosion and sedimentation control procedures and measures which effectively reduce accelerated soil erosion and sedimentation.
3. Soil erosion and sedimentation control procedures and measures for earth change activities shall be set forth on plans for the project; these plans shall be approved by the soil engineer before work is begun and the approved plans shall be available for inspection on the site of the work.
4. It shall be unlawful for any person to engage in any earth change activity for which a permit is required without first applying for and securing such a permit from the Department of Public Works and Utilities, Engineering Division. The permit shall be made available for inspection on the site of the work.
5. Plans for soil erosion and sedimentation control shall be included with site and project plans for projects proposed for construction within the City. Plan review shall be accomplished concurrently with other reviews, as required by the City.
6. No site plan, plot plan or plat will be approved under other requirements of the city unless such plan, plot plan or plat includes soil erosion and sediment control measures consistent with the requirements of this section.

## CHAPTER TWELVE

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### B. Jurisdiction

1. A person who proposes an earth change solely within the city and not subject to the jurisdiction of another authorized public agency shall obtain a permit from the Department of Public Works and Utilities prior to commencement of an earth change which is connected with any of the following land use activities which disturb one or more acres of land, or if the earth change is within 500 feet of a lake or stream:
  - a. Transportation facilities, including streets, highways, railroads, airports, common carrier pipe lines, and mass transit facilities, except those normal maintenance procedures such as earth or gravel road leveling, and minor repairs and alterations to rights-of-way not affecting a lake or stream.
  - b. Subdivision or lot development, mobile home park and multiple housing development, and preparation of a site for a single-family residence which is not part of a larger building project, except normal landscaping or maintenance activities or both.
  - c. Industrial, commercial and regional center development, except normal landscaping or maintenance activities or both.
  - d. Service facilities, including but not limited to shopping centers, parking lots and schools, except normal maintenance and landscaping activities or both.
  - e. Recreational facilities, including but not limited to parks, campgrounds and trails, except normal maintenance or landscaping activities or both.
  - f. Utilities, including but not limited to sanitary sewers, water mains, storm drains, electric, telephone, gas, oil and other product transmission facilities, except pole installations, service lines and other earth changes of a minor nature, or normal maintenance or emergency repairs or both.
  - g. Oil, gas and mineral wells, except the installation for those wells under permit from the supervisor of wells and wherein the owner-operator is found by the supervisor of wells to be in compliance with the conditions of this Chapter.
  - h. Water impoundments and waterway construction improvements.

### C. Earth Change Requirements

1. The soil erosion and sedimentation control procedures prescribed in this chapter shall be appropriately incorporated into the control plan and all earth change activities unless the designer of the soil erosion and sedimentation control plan shows to the satisfaction of the soil engineer that any alteration of these procedures and measures will prevent accelerated soil erosion and sedimentation during the earth change.

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- a. All earth change activities shall be designed, constructed and completed in such a manner as to limit the exposed area of any disturbed land to the smallest extent practical and to limit time of exposure of any disturbed land to the shortest time possible as determined by the soil engineer.
  - b. Sediment caused by accelerated soil erosion shall be removed from runoff water before it leaves the site of the earth change activity by installation of sediment basins, silt traps or other appropriate means such as increasing the size and designing the outlet of a storm water detention pond to serve also as a sediment basin.
  - c. All temporary and permanent facilities constructed for the conveyance of water around, through or from the earth change area shall be designed to limit the water flow to a non-erosive velocity.
  - d. Permanent soil erosion control measures for all slopes, channels, ditches or any disturbed land area shall be completed in accordance with the schedule of timing and sequence approved by the soil engineer, but in no case more than 15 calendar days after final grading or final earth change has been completed.
  - e. Where it is not possible to permanently stabilize a disturbed area after an earth change has been completed or where the activity ceases for more than 15 calendar days, temporary erosion control measures shall be initiated within five calendar days of expiration of the initial 15-day period and shall be completed within ten calendar days of initiation. All temporary measures shall be maintained until permanent stabilization is effected.
  - f. Upon completion of permanent stabilization of disturbed land, all temporary erosion control facilities shall be removed and the disturbed land in these areas shall be graded and permanently stabilized with permanent soil erosion control measures in accordance with approved standards and specifications.
2. Current local soil conservation district soil erosion and sedimentation control standards and specifications or revisions thereof, as approved by the soil engineer in consultation with the local soil conservation district, shall be followed and utilized as they apply to an individual earth change which requires an erosion and sedimentation control plan, and are hereby adopted by reference.

### D. Performance Requirements

1. All work required under the soil erosion and sedimentation control plan for the project for which a permit under this chapter is issued shall be carried out in accordance with the plans and construction schedule and shall be completed in a timely fashion, within the time limit on the permit.

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2. If the permittee under this chapter is unable to complete the work within the specified time, he may, at least ten days prior to the expiration of the permit, present in writing to the soil engineer a request for an extension of time, setting forth the reasons for the requested extension and a revised schedule of timing and sequence. If, in the opinion of the soil engineer, such an extension is warranted, he may grant additional time for the completion of the work but no such extension shall release the owner or the surety on the bond or the person furnishing the instrument of credit or cash bond.
3. All modifications of the approved grading plans must be submitted to and approved by the soil engineer. All necessary substantiating reports shall be submitted with the proposal to modify the approved grading plan. No grading work in connection with any proposed modification shall be permitted without the approval of the soil engineer.
4. In the event of failure to complete the work or failure to comply with all the requirements, conditions and terms of the permit under this section, the soil engineer may, where in his opinion it is necessary to eliminate any dangerous conditions, to leave the site in a safe condition, and to control soil erosion and sedimentation, order the permittee to complete the work or install temporary control measures. He shall allow sufficient time for the permittee to complete the ordered work but shall require that the work be started within five days of the date of the order, be prosecuted diligently and completed in a reasonable length of time. Should the permittee fail to comply with the order, the soil engineer shall cause temporary soil erosion or sedimentation controls to be installed on the site by City forces or by a private contractor. The permittee and surety on the bond or person issuing the instrument of credit or making the cash deposit shall continue to be firmly bound under a continuing obligation for the payment of all necessary costs and expenses that may be incurred or expended by the City in causing any and all such work to be done. In the case of a cash deposit, any unused portion thereof shall be refunded to the permittee.
5. Individuals or developers carrying out soil erosion and sediment control measures under this chapter, and all subsequent owners of property on which such measures have been installed, shall adequately maintain all permanent antierosion control measures, devices and plantings in effective working condition. A program proposal shall be submitted by the permittee for continued maintenance of all permanent soil erosion control facilities which remain after project completion, including the designation of the person responsible for maintenance. The program shall include permission for right of entry onto the site by the soil engineer. The soil engineer shall maintain a file of such programs and shall from time to time, as he deems necessary, inspect the facilities. Maintenance responsibility and right of entry shall become a part of any sales or exchange agreement for the land on which the permanent soil erosion control measures are located.

## CHAPTER THIRTEEN

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### AS-BUILT REQUIREMENTS

#### 13.1 SCOPE

Prior to the City's approval of a final subdivision plat or the acceptance or approval of any public utility, or other improvements, acceptable "as-built" drawings must be submitted to the city.

#### 13.2 GENERAL REQUIREMENTS

- A. Initially, two sets of blue line as-built prints shall be submitted for review to the city. After the blue-line as-built prints have been approved two sets of black line prints and one complete set drawn on reproducible mylar (minimum of 3 mils thick) shall be submitted, including detail sheets. Also a complete set of CAD drawings of the development shall be submitted with the mylars.
- B. All as-built elevations shall be based on City of Pontiac Datum.
- C. All as-built information shall be clearly identified as such.
- D. All location changes in excess of 5-feet horizontal or 0.5 feet vertical shall be "lined out" and redrawn.

#### 13.3 PLAN REQUIREMENTS

"As-built" drawings shall contain all the information shown on the approved construction drawings with the addition of, but not limited to, the following "as-built" information:

##### A. Sanitary Sewers and Storm Sewers

- 1. A minimum of two witnesses (dimensions) to each manhole and all force main bends.
- 2. Length of sewer as measured between manholes shown on both plan and profile sheets.
- 3. Length of manhole stubs.
- 4. Manhole, inlet, and catch basin cover as-built elevations.
- 5. As-built invert elevations of pipes within each structure.
- 6. As-built percent of grade between manholes
- 7. Any changes to the total quantities shall be shown.

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### B. Retention and Detention Ponds

1. “As-built” dimensions and sufficient additional information to calculate final volume. A statement of final computed volume of the pond as measured from high water elevation to the invert of the outlet pipe shall also be provided.
2. “As-built” location and all dimensions of the overflow structure and other physical improvements including fence and gate sizes & locations.
3. The following “as-built” elevations:
  - a. Overflow spillway
  - b. Inlet and outlet pipe inverts
  - c. Outlet structure cover
  - d. Spillway elevations at 50-foot intervals
  - e. Outlet and inlet ditch elevations at 50-foot intervals.
  - f. Top and bottom of bank elevations at 50 foot maximum intervals
  - g. Field measured contours shall be generated and provided on the drawing

### C. Water Mains

1. As-built location of all water mains with respect to property lines.
2. Rim elevations on gatewells.
3. Top of pipe elevations at gatewells.
4. Finish grade of all fire hydrants.
5. Distances between gatewells, fittings, and fire hydrants.
6. A minimum of three witnesses (dimensions) to each gatewell and fitting (bends, tees, plugs, etc.) installed.
7. Type of materials used.

### 13.4 Certification

All “as-built” plans shall contain a statement by an engineer or land surveyor, who is currently registered in the State of Michigan, certifying the drawings to be “as-built”. All plans shall be sealed and signed by the certifying registered engineer or surveyor.



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### 13.4 Electronic Requirements for Record Set Data

A. Contractor to submit the Proposed Site Plan on a Compact Disc (CD) as follows:

1. Labeled with Project Name, Contractor Name and Date
2. Contain all as-built pages in .TIF format
3. Contain the Proposed Site Plan in AutoCAD format (v14 or higher)
  - a. Files should be geo-referenced accordingly:
    - i. All utility structures require Global Satellite Positioning (GPS) survey with Base Station correction for an accuracy of +/- 1 meter
    - ii. Site to be on State Plan Michigan South 1983 coordinate system
    - iii. Units should be in international feet.
  - b. AutoCAD files should NOT contain the following:
    - i. Splines
    - ii. X references
    - iii. Images
    - iv. Inserted blocks
  - c. Utility pipes should be drawn in the following manner:
    - i. Direction of flow (from upstream node to downstream node)
    - ii. A single line for each pipe (not a polyline)
    - iii. Lines should be snapped to the center of each utility structure
  - d. All lines, points and corresponding text should be organized on their own individual layer. For example:
    - i. Water main pipe
    - ii. Water valve
    - iii. Water hydrant
    - iv. Water mh
    - v. Water pump station
    - vi. Storm pipe
    - vii. Storm mh
    - viii. Storm cb
    - ix. Storm culvert
    - x. Storm water edge
    - xi. Sanitary pipe
    - xii. Sanitary mh
    - xiii. Sanitary pump station
    - xiv. Sidewalk
    - xv. Edge of pavement
    - xvi. Contours
    - xvii. Building outline
    - xviii. Parcel boundaryAn AutoCAD file with all layer names is available upon request.

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4. The CD shall also contain a Microsoft Excel Spreadsheet detailing utility information. Please contact the Engineering Division at 248-758-3640 to obtain a copy of the spreadsheet described below. The structure ID number in AutoCAD must match the ID in the table. As much applicable data should be included in the provided table, such as:
  - a. Pipe (sanitary, water main, storm pipes):
    - i. Pipe ID number
    - ii. Upstream Node ID
    - iii. Downstream Node ID
    - iv. Upstream Invert Elevation
    - v. Downstream Invert Elevation
    - vi. Diameter (in.)
    - vii. Length (ft.)
    - viii. Slope, %
    - ix. Material
    - x. Year of Installation
    - xi. Project Name
    - xii. Description - Gravity, Pressure, etc.
    - xiii. As-Built Page Number
  - b. Structure (sanitary manhole, fire hydrant, gate valve, water manhole, catch basin, storm manhole, etc.):
    - i. Structure ID number
    - ii. X Coordinate (as required above in 3ai)
    - iii. Y Coordinate (as required above in 3ai)
    - iv. Rim Elevation
    - v. Bottom Elevation
    - vi. Description - Manhole, Catch Basin, etc.
    - vii. Year of Installation
    - viii. As-Built Page Number

## CHAPTER THIRTEEN

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### CITY OF PONTIAC DEPARTMENT OF PUBLIC WORKS & UTILITIES ENGINEERING DESIGN STANDARDS

#### Boundary/Topographic Survey Requirements

- A. A complete Topographical survey is required for all sites. The Topographical survey shall cover a minimum of 100 feet off-site. Existing elevations on a maximum 50 foot cross section and locations, and/or elevations, of the following shall be included:
1. Elevations at all property corners and along all property lines.
  2. Elevations at any sudden grade change.
  3. Existing drainage courses including upstream and downstream.
  4. All utilities including sanitary, water main, storm, gas, telephone, electrical, etc. Pipe sizes, inverts, casting elevations and finish grades are required where applicable.
  5. Finished grades of all adjacent buildings.
  6. All easements and restriction of record.
  7. Trees and other landmark vegetation as required by City ordinance.
- B. Road topography shall extend across the entire site with elevations shown on both sides of the street for:
1. Property line or sidewalk
  2. Top of Bank
  3. Ditch centerline
  4. Edge of shoulder
  5. Edge of pavement or top of curb
  6. Crown of centerline.
- C. Property lines must be indicated by distances and bearings. Existing Right-of-Way of adjacent roads must be indicated.
- D. A Metes and Bounds legal description of the project site shall be provided on the plans.
- E. The completed boundary and topographic survey shall be signed and sealed by a State of Michigan Registered Land Surveyor.

## APPENDIX B

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### CITY OF PONTIAC DEPARTMENT OF PUBLIC WORKS & UTILITIES ENGINEERING DESIGN STANDARDS

#### Easement Document Procedure

- A. Indicate the subject parcel number (if acreage), lot number(s), and subdivision name. If parcel is within a platted area, indicate the sidwell (parcel tax i.d.) number.
- B. The date the document is executed.
- C. The current property owner's name (grantor); if an individual, male, and single, then his marital status shall be stated. If he is married and his wife has an interest in the property, she shall be identified and her signature shall appear as one of the grantors. If owned by a corporation, partnership, limited liability company, etc., must show the state where the entity was created, i.e., a Michigan corporation. (party of the first part).
- D. Grantor's complete current address.
- E. Provide parcel description and permanent easement description. These are legal descriptions for the easement and parcel or lot(s) in which the easement is located. If descriptions are too lengthy, place description on an "Exhibit A" sheet and enter in this space "see attached exhibit a for parcel and/or easement description."
- F. The property owner's signature(s) with name(s) typewritten or printed, as signed, below signature(s). The spouse (if married and having an interest in the property) must also sign. If a partnership or corporation, an executive officer must sign with name and title typewritten or printed as signed, below signature.
- G. The date the document is notarized.
- H. The name of the person(s) granting the easement.
- I. An Oakland County notary public's signature, the name of notary shall be legibly printed, typewritten, or stamped immediately with the date their commission expires.
- J. Name and complete address of the individual responsible for drafting the easement document.

The minimum type size shall be 10 point, legibly printed in black ink on white paper that is not less than 20 pound weight (this is the weight of regular copy paper). Document shall not be less than 8½ inches wide and 11 inches long or more than 8½ inches wide and 14 inches long. The instrument shall not contain more than one recordable event.

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Provide a copy of the current title policy dated within 90 days of submittal and/or a copy of a recorded deed, proving that the grantor holds title to the property and therefore has authority to grant the easement. Complete all of the necessary information on the forms provided you, then forward the executed forms to Nowak & Fraus with a copy of title policy or recorded deed for further processing.

After construction is completed, Nowak & Fraus will re-review the easement description, comparing it to the final measure plans. If revisions are required, the document will be returned to the individuals who submitted the easement. The areas of concern will be noted. If no revisions are required the document will be recorded by the developer. The developer shall forward the original recorded document to the City of Pontiac with a copy to Nowak & Fraus, PLLC.

## APPENDIX B

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### City of Pontiac Department of Public Works & Utilities Engineering Design Standards

#### Residential Plot Plan Requirements

- A. The plot plan and specifications shall be prepared under the supervision of a Licensed Professional Engineer or Licensed Professional Surveyor registered in the State of Michigan. The plot plan drawing shall contain the signature and seal of the professional responsible for preparing the document.
- B. Plot plans shall be on legal size paper (8-1/2" x 14"), drawn to a maximum engineering scale. Applicable building elevations shall also be provided with the drawing submittal.
- C. Proposed site address, as assigned by the City of Pontiac shall be provided.
- D. A minimum of two (2) benchmarks shall be noted, corresponding to the City of Pontiac Datum.
- E. Show proposed driveway and approach location, indicating type (concrete/asphalt), thickness and elevation. Note, all approaches within a public right-of-way shall be 6" non-reinforced concrete (including sidewalk areas through the approach).
- F. All proposed sidewalk located within the Right-of-way (outside drive approach areas) shall be shown. (Five (5) feet wide, 4" concrete).
- G. Indicate Right-of-Way and roadway width across the frontage of the proposed development.
- H. Descriptive callouts shall be provided for all work within the public Right-of-way areas. This shall include, but not be limited to: Pavement Removal / Replacement, Curb and Gutter Removal / Replacement, Utility Connections and Restoration.
- I. Plot Plans shall contain a north arrow, scale and legend.
- J. Existing and proposed utility information (i.e., water main, sanitary sewer, storm drain, gas main, Edison lines, etc.) shall be clearly indicated.
- K. Proposed sanitary sewer and water main connections to both the public main and connection to the residence shall be shown. Also, the location of the proposed water shut-off box shall be indicated (1' off face/walk).
- L. A legal description of the parcel, prepared by a land surveyor/engineer shall be provided along with all existing or proposed easements. The boundary survey shall be certified utilizing the following certification:

## APPENDIX B

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- M. Name, address and phone/fax numbers of the proprietor and surveyor/engineer shall be identified.
- N. The following notes are required within the Plot Plan:
1. Contact the City of Pontiac Water & Sewer Department for information concerning existing utility leads and connection fees @ (248) 758-3790.
  2. Contact the City of Pontiac Engineering Division, a minimum of 48 hours prior to any work performed within the right-of-way (Mr. Lito Gener @ (248) 758-3616 or main office @ (248) 758-3640).
  3. A Right-of-way Permit is required for all proposed work within the (roadway name) right-of-way.
  4. Sidewalk along the parcel frontage that is in disrepair, as determined by the field engineer, shall be removed / replaced at owner's expense.
  5. A Soil Erosion Control Permit is not required for this project. However, soil erosion control measures will be required to contain eroded soils within the property boundary. The field engineer may require additional soil erosion control measures at any time.