
Sec. 110-84. Specifications for drainage impact analyses and development regulations.

(a) *Specifications.* Every required drainage impact analysis shall comply with the following specifications:

- (1) An area drainage map shall be submitted which identifies:
 - a. The various drainage areas involved/affected.
 - b. The acreage in each drainage area.
 - c. The slope of each drainage area to the entry point and/or exit point of the development.
- (2) The drainage impact analysis shall indicate:
 - a. The cubic feet per second (cfs) of stormwater resulting at each development entry point from a designated storm. This determination shall be based on the existing land use of the upstream drainage areas.
 - b. The cubic feet per second of stormwater at each development exit point resulting from a design storm. This determination shall be based on the existing land use of the upstream drainage areas whether inside or outside the development. This calculation shall take into account expected construction within the development that will change the grades, direction of flow, runoff factors or other existing conditions.
 - c. The maximum capacity, expressed in cubic feet per second, of existing and proposed drainage structures within the development based on the storm event.
 - d. The capacity of all ditches, culverts, subsurface and surface drainage structures that will be utilized by new or relocated outfall points downstream of the development in allowing passage of stormwater to the first outfall, ditch, bayou, etc. In no case shall a developer be required to evaluate the capacity of first outfall, ditch, bayou, etc., in excess of 1,000 feet downstream of the development.
- (3) The drainage impact analysis shall consist of three distinct and designated parts as follows:
 - a. *Summary.* The effect of the proposed construction on upstream and downstream areas.
 - b. *Design criteria.* Description of methodology, data and assumptions used.
 - c. *Calculations.* Clear, concise, step-by-step calculations performed to support the drainage system design.

- (4) The drainage impact analysis and the development drainage design for the following categories, uses, and infrastructure shall be designed and evaluated for the following storm events: shall be based on a five-year storm event (minimum) for residential developments and a ten-year storm event (minimum) for commercial developments.

<u>Type</u>	<u>Design Event (min.)</u>	<u>Evaluated For</u>
<u>Site</u>	-	-
<u>Drainage system and outfalls for commercial or multi-use subdivision</u>	<u>10-year storm</u>	<u>100-year storm</u>
<u>Drainage system and outfalls for residential subdivision</u>	<u>10-year storm</u>	<u>100-year storm</u>
<u>System</u>	-	-
<u>Channel/system modification¹</u>	<u>10-year storm</u>	<u>25 and 100-year storms</u>
<u>Collector street crossings</u>	<u>10-year storm</u>	<u>25 and 100-year storms</u>
<u>Arterial street crossings</u>	<u>25-year storm</u>	<u>100-year storms</u>
<u>Channel crossings in excess of 100 square feet</u>	<u>25-year storm²</u>	<u>25 and 100-year storms</u>
<u>Relocated channel²</u>	<u>100 year storm</u>	<u>100 year storm</u>

¹Channels shall not be incorporated into a storm water management facility

²Or such lesser minimum design storm event as determined by the parish.

- (5) Subsurface drainage of drainage outfalls serving more than a single development shall be based on a ten-year storm event.
- (6) Open channel drainage serving more than a single development shall be based on a ten-year storm event with one foot of freeboard existing in the channel above the ten-year water surface elevation.
- (7) If the drainage impact analysis and/or development drainage design is based on rainfall intensity, the rainfall intensity shall be as published by the National Oceanic and Atmospheric Administration (NOAA). This information can be found at the NOAA National Weather Service Precipitation Frequency Data Server (PFDS) - <https://hdsc.nws.noaa.gov/hdsc/pfds/> by selecting "Data Type - Precipitation Intensity". data contained in the most recent edition of the state department of transportation and development's hydraulics manual shall be used.
- (8) Ponding, retention or detention of stormwater shall be evaluated in accordance with the standards and requirements contained herein.
- (9) All open ditch and subsurface drainage systems shall be designed in accordance with the most recent edition of the state department of transportation and development's hydraulic manual unless otherwise approved by the public works director.
- (10) The development drainage plans shall give the location, description and elevation of all permanent and temporary benchmarks used for the drainage study and proposed to be used for the development construction.

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- (11) Hydraulic calculations, plan profile sheets and area drainage maps shall be submitted for review and shall be approved by the public works director before any development improvement work begins.
 - (12) Subsurface storm sewers shall be designed for a ~~five~~ten-year storm event (minimum). Outfall structures and outfall channels shall be designed for a ten-year storm event (minimum). Collector street crossings shall be designed for a ten-year storm event (minimum). Arterial street crossing shall be designed for a 25-year storm event (minimum) unless otherwise approved by the public works director.
 - (13) Only drainage pipe constructed of materials approved by the public works director may be used in storm sewer construction in the public rights-of-way or servitudes.

(14) Freeboard requirements.

- a. All new residential, nonresidential, and manufactured home structures both within and outside of areas of special flood hazard, shall have the minimum lowest floor elevation be one (1) foot above the higher of the following four (4) measurements:
 - i. Base flood elevation as determined by the latest flood insurance rate map (FIRM) issued by FEMA or FEMA provided Base Level Engineering (BLE) data, or
 - ii. Center line of the nearest street across from or adjacent to the structure, or
 - iii. Elevation of the nearest sewer manhole cover, or
 - iv. Highest recorded historical or modeled (100-year) inundation levels
- b. All mechanical and electrical equipment must also comply with the minimum lowest floor elevation requirement.
- c. Should option ii. – iv. of the above freeboard calculation requirements result in an unreasonable elevation, a variance may be requested from the Planning & Zoning Commission through the Board of Adjustments.
- d. A licensed land surveyor or engineer will be required to certify that the standards of this subsection have been satisfied through the use of an elevation certificate.
- e. Manufactured homes to be placed on sites in an existing manufactured home park or subdivision must be elevated to meet freeboard requirements set forth in 110-84(14)(a), referenced from the bottom of the lowest longitudinal frame beam and securely anchored to a foundation system that resist flotation, collapse, and lateral movement.

- (b) *Residential subdivision drainage protection standards.* The following general standards shall apply in addition to any other stated provisions for proposed development:

- (1) Development drainage design. The developer's design engineer shall make provision in the drainage improvements for each development to accommodate potential runoff from its entire upstream drainage area, whether inside or outside of the development. Additionally, the design engineer shall study the effect of each development on existing downstream drainage facilities or roadside ditches outside the area of the development. This portion of the study shall be limited to the effluent channel only. Where it is anticipated that the runoff incident of the development will overload an existing downstream drainage facility or roadside ditch, the design engineer shall indicate this fact in the development drainage design, make provisions to prevent the overloading of downstream facilities or roadside ditch. Streets and lots of a proposed development shall be arranged so as to minimize artificial drainage channel relocation.

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- (2) Development drainage plan submittal requirements. The design engineer shall submit the development drainage plans detailing the runoff flowing into, through and exiting the development. The drainage plans shall contain the following information:
- The location, description and elevation of permanent or temporary benchmarks to be used in the construction of the improvements.
 - All elevations, which shall be NGVD, measured to at least second order accuracy or better. A note shall be placed on the drainage plan sheet indicating the benchmark, elevation, location, and description utilized in construction of the development.
 - The floodplain elevation, if applicable, and the areas within the 100-year flood boundary. A note shall be made on the drainage plan sheet and the final subdivision plat if any portion of the development, lot or street is within the 100-year flood area.
 - Culvert sizes for road crossing and for driveways (open ditch construction) with a notation of the flow rate shall be shown.
 - Hydraulic calculations, plan-profile sheets and drainage area maps may also be required to be submitted.
 - All developments reviewed by the planning commission shall be consistent with the ordinances or regulations of the parish.
- (3) A development designed with open ditch systems shall include the following statement on the final plat:
- "This development has been approved with an open ditch drainage system that provides the required stormwater retention/detention capacity. The development shall remain open ditch and only subsurface culverts required for driveways shall be permitted, unless otherwise approved by the Iberia Parish Public Works Director."
- (c) *Runoff determination methods.* For drainage areas less than 200 acres, the design engineer shall use the Rational Method ($Q = CIA$) procedure for determining runoff rates. For drainage areas between 200 and 2,000 acres, the design engineer shall use the most recent Soil Conservation Service (SCS) Method, as modified by the state DOTD procedure for determining runoff rates. For drainage areas greater than 2,000 acres, the design engineer shall use the most recent USGS Regression procedure for determining runoff rates.
- (d) *Drainage design criteria.* Subsurface storm sewer systems for developments shall be designed for a ~~fiveten~~-year storm event (minimum). Storm sewers for outfall channels shall be designed for a ten-year storm event (minimum). Developments with open ditch drainage systems shall be designed for a ~~fiveten~~-year storm event occurrence interval. ~~except that~~ Additionally, cross drains for drainage channels within developments shall be designed for a ten-year storm event. Channel crossings in excess of 1,000 square feet shall be designed, if feasible, for a 25-year storm event. Drainage designs shall be in conformance with the latest edition of the state department of transportation and development's hydraulics manual.
- (e) *Rainfall intensity.* Rainfall intensity and duration shall be as published by the National Oceanic and Atmospheric Administration (NOAA). This information can be found at the NOAA National Weather Service Precipitation Frequency Data Server (PFDS) - <https://hdsc.nws.noaa.gov/hdsc/pfds/> by selecting "Data Type - Precipitation Intensity". ~~taken from the latest edition of the state department of transportation and development's hydraulics manual.~~
- (f) *Runoff coefficients.* The runoff coefficients to be used in the Rational Method shall be those indicated in Tables 1 and 2.

Table 1—Rational Method Runoff Coefficients

Development/Subdivision Type	Runoff Coefficients
<i>Residential</i>	
Single-family detached	0.30 to 0.50
Two-family (duplex)	0.40 to 0.60
Single-family and multifamily attached	0.60 to 0.75
<i>Commercial, Retail and Other</i>	
Developed areas	0.70 to 0.95
Neighborhood and outlying areas	0.50 to 0.70
<i>Industrial</i>	
Light industry	0.50 to 0.80
Heavy industry	0.60 to 0.90
<i>Other</i>	
Parks and cemeteries	0.50 to 0.80
Playgrounds	0.20 to 0.40
Railroad yard areas	0.20 to 0.40
Vacant, open space, and unimproved areas	0.10 to 0.30

Table 2—Runoff Coefficients for Average Block Calculations	
Type	Runoff Coefficients
Asphalt surfaces	0.95
Concrete surfaces	0.95
Roof areas	0.85
Lawns:	
Flat (less than 2% grade)	0.20
Average (2% to 7% grade)	0.25
Steep (greater than 7%)	0.30

- (g) *Engineering requirements; predevelopment runoff/post-development runoff.* All residential and commercial development that results in a post-development runoff that exceeds the development area's pre-development runoff rate shall be required to mitigate the increase through drainage improvements. The drainage improvements shall be based on the design criteria of this section in addition to any other stated provision. The development drainage design shall be based on ~~a five-year storm event for residential developments and a ten-year storm event for commercial developments~~the criteria as outlined in [Section 110-84\(a\)\(4\)](#). Information to be submitted for development drainage design review is as follows:

- (1) Existing drainage area map.
- (2) Design drainage area map.
- (3) Hydraulic analysis of a ~~five~~ten-year storm event for residential development, a ten-year storm event for nonresidential and a 100-year storm event for both types of development.
- (4) Typical sections and stage/storage information of the detention facility.
- (5) The hydraulic analysis of the drainage system design for outlet discharged structures and/or outlet discharge culverts shall take into account the tailwater elevation of the outfall channel. The tailwater elevation of the outfall channel shall be set at one foot of freeboard from top bank unless otherwise determined through a hydraulic analysis for a 25-year design storm event to be lower. Tailwater (TW) is defined as the flow depth of the downstream channel measured from the flow line of the outlet structure or culvert. Tailwater is considered to be an important factor in outfall structure or culvert

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- hydraulic design because a submerged outlet may cause structures or culverts to flow full rather than partially full impacting the hydraulic efficiency of the drainage system.
- (6) If a detention facility is within a parking lot, parking lot grades, curb grades, areas identifying ponding limits and depths.
 - (7) Typical sections, cross sections, and other such details as required by the review engineer for review of the proposed development.
 - (8) All hydrographs and routing curves.
 - (9) Inflow/outflow results highlighted for the reviewer's ease of identification.
 - (10) All other applicable forms, tables, charts, etc.
 - (11) Detailed explanation of pre-development analysis, post-development analysis, routing conclusion, and engineer's evaluation of whether the development has satisfied all the hydraulic requirements.
 - (12) Detail of construction access entrance.
 - (13) Detail of construction silt fencing and erosion control plan. These items shall be in place prior to construction of the form work for the building improvements and/or site improvements.
 - (14) The above information shall be submitted in a bound booklet form with dividers separating pre-development and post-development outputs for each design storm event as well as the conclusion of the analysis.
- (h) *Detention requirements—Nonresidential developments.* Detention facilities shall be designed to contain the 25-year storm event for nonresidential developments.
- (1) *Permissible detention basins.*
 - a. Pond.
 - b. Parking lot depth of ponding not to exceed seven inches.
 - c. Underground storage.
 - d. Perimeter swale ditches.
 - e. Detention within required green areas.
 - f. Other methods only with prior approval of public works director.
 - (2) *Outlet structures.*
 - a. Design shall be based on a ten-year storm event and analyzed for a 100-year storm event.
 - b. Emergency spillways shall be in an area that will least affect traffic flow and not cause flooding of structures intended for occupancy.
 - (3) *Plan requirements.*
 - a. Existing topographic plan with elevations.
 - b. Grading plan with elevations.
 - c. Minimum of two grading sections of entire site (i.e., one east/west and one north/south). A sufficient number of grading sections shall be provided to adequately evaluate site drainage patterns as required by the public works department.
 - d. Profile of outlet structure connecting to existing outfall depicting utility crossings and identifying conflicts, if any.

(4) *Waivers.*

- a. ~~In areas where existing and/or development conditions will not accommodate equivalent discharge rates, as determined solely by the public works department director, a maximum increase of the pre-developments discharge rate of five percent of said rate, not to exceed five cubic feet per second, shall be allowed.~~
- ba. No detention ~~is requirement required shall be allowed~~ for developments of three-fourths acre or less. Runoff to the adjacent roadway, outfall or other properties for these sized developments shall not be allowed as a single point discharge unless approved by the public works department director. A drainage site and grading plan shall be submitted for review and approval. Additionally, detention is not required if the proposed development is at or below the following thresholds:
 - i. The development is a single residential lot development with a total impervious area of 15,000 square feet or less.
 - ii. Development in which the area of impervious surface does not exceed twenty percent (20%) of the development area at the point of discharge from the site. The total impervious area shall include all buildings, driveways, sidewalks, streets, parking lots, lakes, basins, etc. All undeveloped open space, common area, etc. must be clearly identified.
 - iii. Additions or modifications to existing developments which result in no more than a ten percent (10%) increase in existing impervious area and which have existing public storm drainage facilities design to accommodate runoff from the existing site.
 - iv. The site is located within an existing developed area served by a regional public storm drainage system designed for the ultimate buildout of the drainage area, and the applicant demonstrates, to the satisfaction of the Parish Engineer, that the proposed development does not exceed the runoff attributed to the subject site in the approved regional drainage analysis.
 - v. Utility improvements with disturbed areas resulting in impervious conditions of less than 5,000 square feet. If the disturbed area is greater than 5,000 square feet, the first 5,000 square feet is exempt from detention requirements.
- b. Construction of new parish roadways, including associated roadside drainage improvements, shall not be required to provide a dedicated stormwater detention pond or regional detention facility, provided the roadway drainage system is designed in accordance with applicable parish drainage criteria and the Parish determines that the proposed drainage conveyance system adequately

manages stormwater runoff and the project will not adversely impact adjacent or downstream properties.

- c. Other methods of detention/retention may be utilized with prior approval of the public works department director.

(5) *Maintenance of stormwater management facility.*

- a. The owner of the proposed development or any successor who acquires title to the stormwater management facility shall at all times maintain the design section of the stormwater management facility as indicated on the site drainage plan and in the drainage impact analysis.
- b. In the event the public works department determines that the stormwater management facility has not been maintained, the owner shall make the necessary modifications to conform to the original approved design sections, requirements, etc. within a 30-day period from written notification from the public works department.
- c. If the owner does not act within this timeframe to remedy the situation, the public works department may perform the necessary modification, improvements, etc., and bill the owner for the work at its operating cost with an additional administrative charge of 500 percent. Compliance with this section shall be mandatory and the requirements of this section shall be included on the site drainage plan as well as within the drainage impact analysis report and shall be acknowledged in writing by the owner and/or developer, if different from the owner. The developer shall provide the public works department with an agreement or other contractual arrangement evidencing that adequate provision has been made for future maintenance of the facility in those instances where the facility is to be transferred by the developer or is to be acquired by an owners' association or other similar entity.

(6) *Detention requirements; residential subdivision developments.* Detention facilities shall be designed to contain the 25-year storm event for residential developments.

- a. Permissible residential subdivision detention basins; open ditch subdivisions that will remain open ditch.
 - 1. Roadside ditch.
 - 2. Pond.
 - 3. Perimeter ditches.
 - 4. Other design options formulated by the developer and approved by the public works department.
- b. Permissible residential subdivision detention basins; curb and gutter subdivisions.
 - 1. Curb side detention area shall be curb to curb but flood depth not to exceed three inches about the centerline of the roadway.
 - 2. Curb to curb and underground storm drainage system.
 - 3. Curb to curb, underground storm drainage system and detention pond.
 - 4. Pond.
 - 5. Other design options formulated by the developer and approved by the public works department.
- c. Outlet structures.
 - 1. Design shall be based on a ~~five~~ten-year storm event and analyzed for a 100-year event.

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2. Emergency spillways shall be in an area that will least affect traffic flow and not cause flooding of structures intended for occupancy.
- d. Plan requirements.
 1. Existing topographic plan with elevations grading plan with elevations.
 2. Minimum of two grading sections of entire site (i.e., one east/west and one north/south). A sufficient number of grading sections shall be provided to adequately evaluate site drainage patterns as required by the public works department.
 3. Profile of outlet structure connecting to existing outfall depicting utility crossings and identifying conflicts, if any.
 - e. Waivers.
 - ~~1. In areas where existing and/or development conditions will not accommodate equivalent discharge rates, as determined solely by the public works department, a maximum increase of the pre-development's discharge rate of five percent of said rate, not to exceed five cubic feet per second, shall be allowed.~~
 - ~~21.~~ No detention is required ~~ment shall be allowed~~ for developments of three-fourths acre or less. Runoff to the adjacent roadway, outfall or other properties for these sized developments shall not be allowed as a single point discharge unless approved by the public works director. Additionally, detention is not required if the proposed development is at or below the following thresholds:
 - i. The development is a single residential lot development with a total impervious area of 15,000 square feet or less.
 - ii. Development in which the area of impervious surface does not exceed twenty percent (20%) of the development area at the point of discharge from the site. The total impervious area shall include all buildings, driveways, sidewalks, streets, parking lots, lakes, basins, etc. All undeveloped open space, common area, etc. must be clearly identified.
 - iii. Additions or modifications to existing developments which result in no more than a ten percent (10%) increase in existing impervious area and which have existing public storm drainage facilities design to accommodate runoff from the existing site.
 - iv. The site is located within an existing developed area served by a regional public storm drainage system designed for the ultimate buildout of the drainage area, and the applicant demonstrates, to the satisfaction of the Parish Engineer, that the proposed development does not exceed the runoff attributed to the subject site in the approved regional drainage analysis.
 - v. Utility improvements with disturbed areas resulting in impervious conditions of less than 5,000 square feet. If the disturbed area is greater than 5,000 square feet, the first 5,000 square feet is exempt from detention requirements.
 - ~~32.~~ A drainage site and grading plan shall be submitted for review and approval.

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43. Other methods of detention/retention may be utilized with prior written approval of the public works director, including a waiver of the requirement for a detention/retention facility by the public works director.
- f. Maintenance of stormwater management facility.
1. The owner of the proposed development or any successor who acquires title to the stormwater management facility shall at all times maintain the design section of the stormwater management facility as indicated on the site drainage plan and in the drainage impact analysis.
 2. In the event the public works department determines that the stormwater management facility has not been maintained, the owner shall make the necessary modifications to conform to the original approved design sections, requirements, etc., within a 30-day period from written notification from the public works department.
 3. If the owner does not act within this timeframe to remedy the situation, the public works department may perform the necessary modification, improvements, etc., and bill the owner for the work at its operating cost with an additional administrative charge of 500 percent.
 4. Compliance with this section shall be mandatory and the requirements of this section shall be included on the site drainage plan as well as within the drainage impact analysis report and shall be acknowledged in writing by the owner and/or developer, if different from the owner. The developer shall provide the public works department with an agreement or other contractual arrangement evidencing that adequate provision has been made for future maintenance of the facility in those instances where the facility is to be transferred by the developer or is to be acquired by an owners' association or other similar entity.
- g. Access in favor of the parish government shall be provided from a public dedicated road to the stormwater management facility. The access shall be no less than a clear 20-foot-wide travel way (graded to accommodate use by equipment) and sufficient area proximate to such travel ways to allow desiltation activities. A note shall be placed on the final recorded plat indicating that this access shall be provided to the parish government. A note shall be placed on the final recorded plat indicating that maintenance of the stormwater management facility is not the responsibility of the parish government.
- (i) *Features reducing maintenance problems and costs.* Features that ease maintenance problems and reduce maintenance costs shall be included in the design of the stormwater management facility to the greatest extent practicable. These features include, but may not be limited to, the following:
- (1) A forebay to capture a greater part of incoming sediments;
 - (2) A reinforced maintenance platform alongside the forebay to facilitate sediment removal;
 - (3) Ponds greater than five acres in surface area should include a device to temporarily lower and to raise the elevation of the permanent pool;
 - (4) Incoming flow diversion alongside the maintenance platform to facilitate sedimentation along the maintenance platform rather than in the middle of the facility;
- a. In the event the parish government determines that any stormwater detention facility requires desilting to ensure proper performance of such facility, then the parish government may perform on behalf of the owner of such facility the desiltation and other required remedial measures as determined necessary by the parish government. In no event, however, shall the parish government be obligated to perform such desiltation if the parish government determines that the owner of the facility has not properly maintained such facility.

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- b. Maintenance (such as mowing, bank or bulkhead repairs, and removing debris and trash that occurs on a regular basis, etc.) of all other public or private areas, access areas, or privately owned lots, which are part of or adjacent to the facility shall be the responsibility of the owner of the stormwater management facility.
 - c. In areas where existing and/or development conditions will not accommodate equivalent discharge rates, as determined by the public works department, a maximum increase of the pre-development's discharge rate of five percent of said rate, not to exceed five cubic feet per second, shall be allowed.
- (j) *Standards of construction of drainage systems.*
- (1) Areas disturbed between the back of curb or edge of pavement and any right-of-way shall be either sodded or hydro-mulched upon completion of the pavement for roadway construction.
 - (2) Silt fencing or other pre-approved erosion control measures shall be mandatory along backs of curbs of back sides of roadside ditches along the entire length of roadway. The developer shall be responsible for maintaining streets and roadside ditches clean and free of large silt deposits.
 - (3) Any construction/excavation adjacent to a natural watercourse, coulee, ditch, or other drainage facility shall include silt fencing installed along the full length of the watercourse within the confines of the property being developed.
 - (4) Should it become necessary to realign or relocate an existing outfall, the developer shall utilize erosion control methods approved by the public works director to ensure stabilization of the disturbed soils. This may include, but not be limited to, the use of hydro-mulch or soil stabilization blankets.
 - (5) Embankment slopes of coulees and drainage ditches shall have slopes which are not in excess of 2:1 (H:V) and shall have appropriate erosion control as approved by the public works department. End of pipe treatments shall be for both the upstream and downstream end of pipe. Utilization of filter fabric in conjunction with riprap may be required. Slope requirements around pipe terminus shall be the same as side slope of channel. Side slopes shall be protected.
 - (6) Pipe joints shall be wrapped with an approved filter fabric and banded on each end with a non-corroding plastic strap secured by self-sealing buckles.
- (k) *Certifications.* The engineer of record responsible for design of the site plan, drainage plan, or detention facility for any development shall provide a letter of certification to the public works department prior to granting final plat approval. The letter shall certify that the improvements were constructed in accordance with the approved construction plans and specifications.
- (l) *Drainage culverts.*
- (1) *Size and type.* The minimum size pipes for any culvert shall be 15 inches in diameter, unless otherwise approved by the public works department. Pipe shall be concrete or other material approved by the public works department.
 - (2) *Additional requirements.* Culverts shall be designed and installed in accordance with the state department of transportation and development EDSM II 2.1.1 and II 2.1.6 except as follows:
 - a. The minimum design service life shall be:
 - 1. 20 years for all side drains.
 - 2. 50 years for all cross drains.
 - 3. 75 years for all subsurface sewer systems.

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- b. Metal culverts may only be used upon approval of the public works department and will only be approved for driveways and outfall termini at channels or as otherwise approved by the public works department. The predicted design service life for metal culverts if approved for use by the public works department shall be determined by calculating the net effects of corrosion from both interior and exterior conditions concurrently.
 - c. Storm sewers shall be constructed in accordance with public works design standards and with approved materials.
 - d. Lateral drainage ditches from the street to an outfall channel which traverse lots shall be provided by subsurface pipe drain with a minimum 20-foot permanent drainage servitude. Actual width of drainage servitude required will be determined by the public works department based upon pipe diameter, invert elevations, and maintenance issues.
 - e. All roadway cross drains shall be reinforced concrete. No other material (i.e., plastic, metal, etc.) will be accepted unless approved by the public works department.