ARTICLE XV

DEVELOPMENT STANDARDS

15.1 DRAINAGE & STORMWATER MANAGEMENT STANDARDS

A. General Policy

The main objective of drainage design shall be the safety of the traveling public with the protection of City and private property consistent with good engineering practice.

B. Drainage and Storm Sewers

General Requirements: The responsible Design Engineer shall not submit for approval any plan which does not appear to make adequate provision for storm or flood water runoff channels or basins. The storm water drainage system shall be separate and independent of any sanitary sewer system. A copy of engineering plans and basic design computations shall be submitted as specified in Section 15.1.E.

1. Rain Event. The drainage structures along arterial roadways shall normally accommodate flows from at least a 25-year frequency design storm. All other areas shall normally accommodate flows from at least a 10-year frequency design storm.

2. Location. The applicant may be required by the Public Works Director to carry away by pipe or open ditch any spring or surface water that may exist either previously to, or as a result of, the development. Such drainage facilities shall be located in the road right-of-way where feasible, or in perpetual unobstructed easements of appropriate width, and shall be constructed in accordance with the ALDOT Standard and Specifications.

3. Accessibility to Public Storm Sewers. Where a public storm sewer is accessible, the applicant may be required to install storm sewer facilities, or, if no outlets are within a reasonable distance, adequate provision shall be made for the disposal of storm waters, subject to the requirements of the City of Robertsdale. Inspection of facilities shall be conducted by the Design Engineer.

   If a connection to a public storm sewer will eventually be provided, the developer shall make arrangements for future storm water disposal by a storm sewer system at the time the plat receives final approval. Provision for such connection shall be incorporated by inclusion in the performance surety required for any such subdivision plat.

4. Accommodation of Upstream Drainage Areas. A culvert or other drainage facility shall, in each case, be large enough to accommodate potential developed property runoff from its entire upstream drainage area, whether inside or outside the subdivision or development.

5. Effect on Downstream Drainage Areas. The Design Engineer shall also review the effect of each subdivision or development on existing downstream drainage facilities outside the area of the development. These drainage studies, together with such other studies as shall be appropriate, shall serve as a guide to needed improvements. Where it is anticipated that the differential runoff of a development or subdivision will overload an existing downstream drainage facility, the Planning Commission may withhold approval of the development or subdivision until provision has been made for the improvement of said potential condition in such sum as the Public Works Director shall determine. No subdivision or development shall be approved unless adequate drainage will be provided to the natural drainage watercourse or an existing facility.

C. Dedication of Drainage Easements.

1. General Requirements. Where a subdivision or development of land is traversed by a watercourse, drainage way, channel, or stream, there shall be provided a storm water easement or drainage right-of-way conforming substantially to the lines of such water course, and of such width and/or construction as will be adequate for the purpose.

2. Drainage Easements. Where topography or other conditions are such as to make impractical the inclusion of drainage facilities within road rights-of-way, perpetual unobstructed easements at least fifteen (15) feet in width for such drainage facilities shall be provided across property outside the road lines and with satisfactory access to the road. Easements shall be indicated on the record plat. Drainage easements shall be carried from the road to the natural watercourse or to other drainage facilities.

   The applicant may be required to dedicate, either in fee or by drainage or conservation easement, land on both sides of existing watercourses to a distance to be determined by the Public Works Director.

   Low-lying lands along watercourses subject to flooding or overflowing during storm periods, whether or not included in areas for dedication, shall be preserved and retained in their natural state as drainageways, except where improvements are warranted as may be deemed necessary by the Public Works Director. No floodways or wetlands shall be filled to create usable land for development.

D. Drainage, General Provisions

All subdivisions, commercial and industrial developments shall be provided with adequate storm drainage facilities. Any areas subject to periodic flooding caused by poor drainage facilities will not be approved for a development by the Planning Commission unless the developer or subdivider makes necessary provisions to eliminate such flooding.

A complete drainage plan and contour map showing the criteria outlined in Section 15.1.E, shall be submitted along with the profile grades and typical roadway section for approval.

All existing drainage structures shall be shown on the preliminary plat, contour map, and construction plans.

All off project drainage, draining onto a subdivision or other development, shall be shown on contour maps and/or construction plans showing the areas in acres that the subdivision or development will have to accommodate.

On any single drainage structure requiring 20 square feet or more of end area, a special design drawing will be required for approval.

Where the subdivider or developer has open ditches, a maximum of 3 to 1 front slopes and flat bottom ditch is required; the width of the ditch shall be determined by the required flows and the existing conditions and be approved by the Public Works Director. V-bottom ditches or other special designs will be permitted in special cases. Resulting 2-year peak flow rates in the natural system or open ditch drainage shall be less than the critical rates that would cause excessive channel scour.

These provisions shall apply to all commercial developments and subdivisions.

E. Engineering Plans

The developer or contractor shall submit detailed drainage plans and drainage calculations to the City for review and approval for all commercial developments and subdivisions. Said plans shall be prepared by a Professional Engineer registered in the State of Alabama and shall contain the following information.

1. Topography map of proposed developed areas.

2. Existing and proposed contours at sufficient intervals, usually 2 feet if not over 5%.

3. Existing drainage system, effecting the proposed development or subdivision.

4. Proposed drainage system, including onsite and offsite drainage areas.

5. Structure location, type and size, and slope, cfs, Inlet El., Outlet El., Velocity, Headwater El., Tailwater El.

6. Discharge quantities, pre and post runoff cfs.

7. Other pertinent information necessary for review of the drainage plans as may be required by the Public Works Director.

8. Erosion and sediment control plan.

9. Description of natural water body to receive the site runoff.

F. Inlets

1. Inlets shall be provided so that surface water is not carried across any intersection or for a distance of more than 600 feet in the gutter unless approved by the Public Works Director.

2. When calculations indicate that curb capacities are exceeded at a point, catch basins shall be used to intercept flow at that point.

G. Culverts

1. All roadway cross drain pipes shall be reinforced concrete and have a minimum size of 18 inches. Only pipe that meets specifications equaling ALDOT Specifications will be acceptable.

2. Culverts under arterial roadways shall normally accommodate a minimum of 25-year frequency design storm. Conditions may dictate that 100-year design storms must be accommodated.

3. Culverts under all other roadways shall normally accommodate a minimum of a 10-year storm.

4. Design storm criteria will be used by the Design Engineer based on the site-specific conditions that warrant life and property protection.

5. All types of culverts within the rights-of-way of public roads must be approved by the Public Works Director and shall conform to ALDOT Standards.

6. Culverts shall be placed in excavated trenches to the line and grade shown on

the plans. The maximum width of the excavated trenches shall not exceed the outside diameter of the pipe by more than 1.5 feet on either side of the pipe.

7. Material used for backfilling culvert trenches shall consist of small diameter uniform material and shall be free of large rock or other unsuitable material. The backfill material shall be placed in uniform 8-inch lifts and mechanically compacted to 95% of relative density. The backfill shall be placed uniformally on each side of the pipe and all pipes shall be laid in accordance with City Standards.

8. A minimum of 12 inches cover shall be placed over each culvert pipe 48 inches or less in diameter and 24 inches or more of cover shall be placed on all larger diameter pipes.

9. When a battery of pipes is used, a clear spacing of 1/2 the pipe diameter shall be provided between adjacent pipes.

10. The maximum cover allowed, pipe class, and strength requirements shall be in accordance with the manufacturer's recommendation.

11. The velocity of the flow in culverts shall be calculated using ranges from the latest edition of the ALDOT Hydraulics Manual.

H. Bridges

Bridges shall accommodate a minimum of a 50-year frequency design storm. Conditions may dictate that of a 100-year frequency design storm.

I. Open Channels and Ditches

1. Open channels and ditches shall be designed so as not to create a traffic hazard or create hazardous erosion.

2. The minimum flow line slope for paved ditches shall be 0.3% and shall be a maximum of 1% for unpaved ditches.

3. The recommended maximum flow velocities shall be in accordance with the ranges recommended in the latest edition of the ALDOT Hydraulics Manual.

4. Cleanout accesses shall be provided at least every 300 feet for continuous pipes of 24 inches in diameter or less and at least every 400 feet for larger continuous pipes if required. Clean out accesses are also required at each angle point and at each change in grade in the pipe.

J. Storm Runoff Estimates

1. Basic design data and calculations shall be prepared, sealed and submitted by a registered professional engineer in the State of Alabama for the developer, contractor or owner.

2. The method of determining storm runoff shall be based on acceptable engineering practice and/or these standards.

For small basins, up to 200 acres, the Rational Method (Q=cia) may be used.

Q = estimated peak discharge in cubic feet per second.
c = runoff coefficient (to be taken from the table below).
I = rainfall intensity in inches per hour for a design storm derived from the time of concentration
a = runoff area in acres

3. Recommended "C" Values

1. Flat or Rolling Terrain

Farmland	0.20 to 0.40
Barren	0.40 to 0.65
Irrigated	0.40 to 0.55

2. Streets and Parking Lots

Unpaved	0.60 to 0.80
Paved	0.80 to 1.00

3. Improvements

Buildings	0.80 to 0.95
Lawns	0.25 to 0.40

K. Special Construction

1. Concrete Box Culverts. Concrete box culverts used as culverts shall be designed and constructed according to the latest edition of the Standards and Specifications for Road and Bridge Construction, ALDOT.

3. Headwalls and Riprap. Concrete headwalls shall be required on all culverts, and head walls shall have a minimum slope of 3 to 1. Special types of headwalls may be required by the City when deemed necessary for erosion control. Riprap may be required at the upstream and downstream ends of

culverts and shall be placed at these locations based on the velocities at these locations. Culverts placed within the state of Alabama's right-of-way shall be permitted by ALDOT.

15.2 EROSION AND SEDIMENTATION

A. General. Erosion and sedimentation shall be effectively controlled, both during active construction and after stabilization, from both a technical and an economic standpoint. Effectiveness of erosion and administrative methods shall be determined by the Public Works Director.

The following provisions impose requirements on persons engaged in land disturbing activities, which require planning, and implementation of effective sedimentation controls for subdivision and other development sites.

1. Construction Requirements. An erosion and sedimentation control plan shall be a part of the construction plans and shall be filed with the City prior to the commencement of any land-disturbing activity.

2. Protection of Property. Persons engaged in land-disturbing activities shall take all necessary measures to protect all public and private property, from damage by such activities.

3. More Restrictive Rules Shall Apply. Whenever there is a conflict between Federal, State, or Local Laws, Ordinances, Rules and Regulations, Orders, and Decrees the more restrictive provision shall apply.

B. Basic Control Objectives. The basic control objectives which should be considered in developing and implementing an erosion and sedimentation control plan are to:

1. Identify Critical Areas. On-site areas, which are subject to severe erosion, and off-site areas, which are especially vulnerable to damage from erosion and/or sedimentation, are to be identified and receive special attention.

2. Limit Exposed Areas. All land-disturbing activities should be planned and conducted to minimize the size of the area to be exposed at any one time.

3. Limit Time of Exposure. All land-disturbing activities should be planned and conducted to limit exposure to the shortest feasible time.

4. Control Surface Water. Surface water runoff originating upgrade of exposed areas should be controlled to reduce erosion and sediment loss during the period of exposure.

5. Control Sedimentation. All land-disturbing activities should be planned and conducted so as to minimize off-site sedimentation damage.

6. Manage Stormwater Runoff. When the increase in the peak rates and velocity of storm water runoff resulting from a land-disturbing activity is sufficient to cause damaging accelerated erosion of the receiving ditch or channel stream, plans should include measures to control both the velocity and rate of release so as to minimize accelerated erosion and increased sedimentation of the ditch or stream channel.

7. Mandatory Standards. No land-disturbing activity subject to these provisions and requirements shall be undertaken except in accordance with the following mandatory requirements.

    a. No land-disturbing activity shall be permitted in proximity to a lake, natural watercourse, or adjacent property where applicable unless a buffer zone is provided along the boundary of sufficient width to confine visible siltation and/or prevent erosion, provided that the land-disturbing activity is not in connection with the construction of facilities to be located on, over, or under a lake, natural watercourse, or adjacent property.

    b. The angle for graded slopes and fills shall be no greater than the angle, which can be retained by vegetative cover or other adequate erosion control devices or structures. Any exposed slopes shall be graded, planted or otherwise stabilized with ground cover, devices, or structures, sufficient to eliminate erosion as soon as possible.

8. Design and Performance Standards. Erosion and sedimentation control measures, structures, and devices shall be so planned, designed, and constructed as to provide control from the calculated peak rates of runoff from a 25-year storm event. Runoff rates may be calculated using the procedures in the USDA, Soil Conservation Service's "National Engineering Field Manual for Conservation Practices", or other acceptable calculation procedures. Runoff computations shall be based on rainfall data published by the National Weather Service for this area.

9. Permanent Downstream Protection of Stream Banks and Channels. Provision may be required for the permanent protection of on-site or adjacent stream banks and channels from the erosive effects of increased velocity and volume of storm water runoff resulting from certain land-disturbing activities.

10. Stormwater Control. A combination of storage and controlled release of storm water runoff shall be required for roadway and highway construction; commercial, industrial, educational, institutional, and subdivision

developments of one acre or more; for multi-family residential developments of five acres or more; and, for single-family developments of ten acres or more.

11. Post development release rates shall not exceed pre-development rates. Provisions shall be made to address 100-year storm events to ensure that detention facilities survive such events. Detention facilities shall be owned, operated and maintained by development entities and shall not be accepted for maintenance by the City of Robertsdale.

12. Detention storage and controlled release will not be required in those instances where the person planning to conduct the activity can demonstrate that the storm water release will not cause an increase in accelerated erosion or sedimentation of the receiving ditch, stream channel, or other drainage facility, taking into consideration any anticipated development of the watershed in question.

13. Borrow and Waste Areas. When the person conducting the land-disturbing activity is also the person conducting the borrow or waste disposal activity, areas from which borrow is obtained shall be considered a part of the land-disturbing activity where the borrow material is being used or from which the waste material originated. When the person conducting the land-disturbing activity is not the person obtaining the borrow and/or disposing of the waste, these areas shall be considered a separate land-disturbing activity.

14. Access and Haul Roads. Temporary access and haul roads, other than public roads, constructed or used in connection with land-disturbing activity shall be considered a part of such activity.

15. Operations in Lakes or Natural Watercourses. Land-disturbing activity in connection with construction, in, on, over, or under a lake or natural water course shall be planned and conducted in such a manner as to minimize the extent and duration of disturbance of the stream channel. The relocation of a stream, where relocation is an essential part of the proposed activity, shall be planned and executed so as to minimize changes in the stream flow characteristics, except when justification for significant alteration to flow characteristic is provided. Any project such as this shall be approved by the U.S.C.O.E. and any other local, state, or federal agency that may have jurisdiction over such activity.

16. Responsibility for Maintenance. The person engaged in or conducting the land-disturbing activity shall be responsible for maintaining all temporary and permanent erosion and sedimentation measures and facilities during the development of a site. The responsibility for maintaining all permanent erosion and sedimentation control measures and facilities after site

development is completed shall lie with the landowner, until such time adequate vegetative cover and site stabilization is achieved. Maintenance of these facilities lies with the landowner until assumed by other parties.

17. Standards for Erosion and Sediment Control Practices. Persons engaged in planning, designing, installing and maintaining sedimentation control measures may use generally accepted references on the subject following standard engineering and/or practices such as the Alabama Soil Conservation Service manual for standards and specifications for erosion control. All plans will be subject to review by the City.

18. Additional Measures. Whenever the City determines that significant sedimentation is occurring as a result of a land-disturbing activity, despite application and maintenance of protective practices, the person conducting the land-disturbing activity or the person responsible for maintenance will be required to take additional protective action.

C. Plan Requirement. Whenever the area to be disturbed comprises more than one acre, a copy of the plan shall be filed with the City a minimum of 30 days prior to beginning any land-disturbing activity. A copy of the plans shall also be on file at the job site. If the City determines, either upon review of such plan or on inspection of the job site, that a significant risk of off-site sedimentation or erosion exists, it will require a revised plan to be prepared. Pending the preparation of the revised plan, the work shall be either suspended or continued under conditions outlined by the City.

Erosion and sediment control plans shall contain architectural and engineering drawings, maps, assumptions, calculations, and narrative statements as needed to describe adequately the proposed development of the site and the measures planned to meet the Basic Control Objectives. Plan content may vary to meet the needs of specific site conditions.

15.3 STORM WATER MANAGEMENT

A. General. Developments which produce an increase in the amount of storm water runoff will be required to construct storm water management facilities.

The design engineer shall submit, detailed engineering plans to the City including historical runoff, developed runoff, detention pond details, method of discharge, and other information as required for review. The developer shall also include the method of maintenance for the detention pond after the development is completed.

B. Minimum Requirements for Storm Water Detention and Design Criteria

Among the consequences of growth and development, are two elements of great relevance to storm water management. Increased runoff created by the change of the

nature and properties of the surface of the ground and velocity of discharge of this increased runoff.

The natural condition of the land before development is in relative balance with the natural capacity of the receiving streams. The undeveloped conditions provide greater permeability and longer times of concentration. It is the intent of this section to alert the developers to possible harmful effects from any land development project on properties downstream and provide a guideline for evaluation and control of the elements related to stormwater, which affect the welfare and safety of City of Robertsdale citizens.

In order to provide some control of these possible harmful elements of development and to reduce economic losses due to erosion and flooding, the criteria of differential runoff and stormwater detention are hereby established. Post-development release rates shall NOT exceed pre-development rates, and the differential runoff should be less.

The terms of these design criteria shall become effective for all projects under direct jurisdiction of the City.

1. Jurisdiction. All projects which fall under the inspection, permitting, or plan review jurisdiction of the City, on items related to storm water management and site development.

2. Liability. The design criteria establish minimum elements of design, which must be implemented with good engineering and good workmanship. Use of the information contained herein for placement of any structure or use of land, shall not constitute a representation, guarantee, or warranty of any kind by City of Robertsdale, its offices or employees, of the practicability, adequacy or safety and shall not create liability upon or cause action against any such public body, office, or employee for any damage that may result pursuant thereto.

3. Engineer's Seal. All plans and specifications submitted for review and/or approval shall be prepared by, or under the direct supervision of a registered professional engineer, licensed in the State of Alabama, and shall meet the minimum standards and requirements of the City of Robertsdale, and other applicable authorities. Each of the plan, profile and special drawing sheets for a project shall bear a signature and legible stamp of the Professional Engineer in charge. It is imperative that the professional design engineer be qualified in the area of drainage per the State of Alabama Engineering laws.

4. Pre-design Conference. The developer and the consulting engineer are encouraged to contact the City for a pre-design conference at the conceptual stage of the project. Such conference would be mutually beneficial to outline

the complexity and scope of design, applicability of criteria and elimination of possible items of conflict during the review process. Subsequent conferences, during the preparation of plans may be arranged by the consulting engineer or the developer to obtain preliminary, informal decisions on items in need of clarification.

5. Letter of Transmittal. In order to facilitate review of plans, all projects shall be submitted with a letter of transmittal which shall include the name of the project, name and address of the owner or developer, name, address and telephone number of the engineer, and clarification as to the purpose of submittal.

   Documents left in the office without a letter of transmittal will be returned to the owner or engineer (if proper identification can be made).

6. Differential Runoff. The difference in rate and volume of storm water runoff from a parcel or project in its undeveloped natural condition, and its developed condition is known as the Differential Runoff.

7. Developments Affected. Detention requirements are directly related to permitted land use of City of Robertsdale where it exists. The permitted densities and minimum lot areas are important factors in the anticipated runoff. Projects of small acreage may be required to provide detention if conditions in the receiving system are inadequate, or harmful effects can be anticipated if detention is not implemented.

8. Phasing and Platting. The effective acreage for a project is not limited to a fractional part of the total concept, rather if a project is developed in phases of small plats, the total acreage of the conceptual project will be considered.

9. Method of Evaluation. Differential runoff evaluation consists of determination of rates of runoff before and after development, determination of required volume of detention and verification of adequacy of discharge and control structures. Design should be based on a 25-year storm, a 24-hour event, or greater for industrial, commercial, and multi-family residential. This shall be based on sound engineering criteria and computations shall be submitted to the City for review.

10. Method of Detention. The following conditions and limitations should be observed in selection and use of method of detention.

11. General Location. Detention facilities shall be located within the parcel limits of the project under consideration. No detention or ponding will be permitted within public road rights-of-way. Location of detention facilities

immediately upstream or downstream of the project will be considered by special request if proper documentation is submitted with reference to practicality, feasibility and proof of ownership or right-of-use of the area proposed.

12. Common Ground Projects. It is preferred that detention facilities be always located in common ground. Projects developed under these procedures shall establish (in the recorded plat or other related document) maintenance and access easements for the detention facilities and include provisions for perpetual maintenance.

13. Ditch Stabilization. The entire reservoir area of the open channel shall be seeded, fertilized and mulched, sodded, paved, or lined prior to final plat approval by the City.

14. Hydraulic Elevations. The hydraulic elevations resulting from channel detention shall not adversely affect adjoining properties.

15. Permanent Lakes. Permanent lakes with fluctuating volume controls may be used as detention areas provided that the limits of maximum ponding elevations are no closer than thirty (30) feet horizontally from any building and less than two (2) feet below the lowest sill elevation of any building.

    a. Maximum side slopes for the fluctuating area of permanent lakes shall be one (1) foot vertical to three (3) feet horizontal (3:1) unless proper provisions are included for safety, stability and ease of maintenance.

    b. Maximum fluctuation from permanent pool elevation to maximum ponding elevation shall be three (3) feet.

    c. Special consideration is suggested to safety and accessibility for small children in design of permanent lakes in residential areas.

    d. Viability of the permanent impoundment shall be considered. An acceptable guideline is to make the area of the permanent pool no greater than one-tenth the size of the tributary drainage area. It is suggested that the minimum depth of twenty-five percent (25%) of the permanent pool area be no less than eight (8) feet. Allowances for silting under denuded soil conditions (during construction) for a period no less than one year is also recommended.

    e. The entire fluctuating area of the permanent reservoir shall be seeded, fertilized and mulched, sodded or paved prior to release of surety if

required by the City. Any area susceptible to or designed as overflow by higher design intensity rainfall, as indicated previously, shall be sodded or paved.

16. Parking Lots. Detention is permitted in parking lots to maximum depth of 8 inches. In no case should the maximum limits of ponding be designed closer than ten (10) feet from a building unless water proofing of the building pedestrian accessibility is properly documented.

    a. The minimum freeboard from the maximum ponding elevation to the lowest sill elevation shall be one (1) foot.

17. Other Methods. Other methods of detention such as seepage pits, french drains, etc. are discouraged. If other methods are proposed, proper documentation of soils data, percolation, geological features, etc. will be needed for review and consideration. Infiltration controls (including grass-lined ditches) will be needed if the project runoff volume, for the set of 1 year, exceeds the pre-development runoff volume.

18. Verification of Adequacy. Analysis of all elements of design shall always be performed by the registered professional engineer. The following outline is provided to ascertain that certain critical elements of design are in workable compliance with the aims of design:

    a. Volume of retention for the total project
    b. Tributary (Q) peak runoff to basin
    c. Balanced maximum outflow rate from the low-flow structure
    d. Ratios of inflow to outflow
    e. Sizing of the overflow facilities
    f. Stability of dikes
    g. Safety features
    h. Maintenance features

    For projects up to 200 acres, routing calculations shall be submitted in legible tabulated form. Proof of adequacy of volume of retention and sizing computations for low-flow structures shall also be submitted. Features of stability and safety may also need to be documented if the scope of the project requires special attention in this area of design.

    Projects over 200 acres in area shall provide documented verification of adequacy according to scope and complexity of design.

19. Control Structures. Detention facilities shall be provided with obvious and effective control structures. Plan view and sections of the structure with adequate detail shall be included in plans.

a. Sizing the low-flow discharge shall be the surface overflow rate method to provide trapping of sediment less than ten inches in size, or 90% of the suspended sediment load. At least three feet of standing water is to be provided in all ponds to allow permanent trapping of sediment.

b. Low-flow pipes shall not be smaller than eight (8) inches in diameter to minimize maintenance and operating problems, except in parking lot and roof retention where minimum size of opening shall be designed specifically for each condition.

c. The maximum overflow opening or emergency spillway shall be designed to accept the total peak runoff of the improved tributary area during the 100-year storm.

d. Proper engineering judgement shall be exercised in analysis of secondary routing of discharge of greater intensity than the basic design storm in order to avoid economic losses or damage downstream. Review with the maximum probable precipitation event is recommended.

e. When existing downstream pipe sizing, outside the developers control jurisdiction, is inadequate, an evaluation for undersizing of pipes may be undertaken by the City upon receipt of written request from the engineer specifying the run or runs desired to be undersized.

f. Requests for undersizing shall be accompanied by plans and profiles of the entire undersized system downstream if less than five hundred (500) feet in length or a minimum of five hundred (500) feet.

g. Require hydrograph routing evaluation of entire system (such as using HydroCad) before allowing downstream undersizing.

h. When hydraulic gradients of the proposed undersize system affect the performance or capacity of structures maintained by the City, no undersizing will be allowed.

C. Easements. Two types of easements shall be provided in plans for detention facilities.

1. Maintenance Easement. All detention reservoirs with the exception of parking lot and roof detention shall be enclosed by a maintenance easement. The limits of the easement shall extend ten (10) feet beyond the maximum anticipated ponding area.

2. Drainage Easement. A minimum fifteen (15) foot wide drainage easement shall be provided within the reservoir area connecting the tributary pipes and the discharge system along the best possible routing of a piping system for possible future elimination of detention.

D. Maintenance.

Detention facilities when mandatory, are to be built in conjunction with the storm sewer installation and/or grading. Since these facilities are intended to control increased runoff, they must be partially or fully operational soon after the clearing of the vegetation. Silt and debris connected with early construction shall be removed periodically from the detention area and control structure in order to maintain close to full storage capacity.

The responsibility for maintenance of the detention facilities in subdivision projects, if such has been required, shall remain with the developer until such time as applicable escrows are released. Upon release of escrows the maintenance responsibility shall be vested in the Trustees of the subdivision, by virtue of the trust indenture. The indenture of trust shall clearly indicate resident responsibility for maintenance in cases of projects without common ground. These maintenance requirements do not imply that any drainage structures or systems are or will become the maintenance responsibility of City of Robertsdale. A letter from the owner/developer indicating responsibility for maintenance of all drainage structures or systems shall be submitted and will become part of the official record that will run with the land.

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