CITY OF HEMET
HEMET, CALIFORNIA
RESOLUTION NO. 2024-085

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF HEMET, CALIFORNIA, ADOPTING THE STORM DRAIN AND DRAINAGE DESIGN MANUAL, A REPLACEMENT OF THE CURRENTLY ADOPTED STORM DRAIN DEVELOPMENT STANDARDS, STORM DRAIN CRITERIA AND DRAINAGE DESIGN MANUAL

The City Council of the City of Hemet, California (hereafter referred to as the "City Council") does resolve as follows:

WHEREAS, In 1996, The City of Hemet adopted the Storm Drain Development Standards, Storm Drain Criteria and Drainage Design Manual that established drainage policy for projects within the City; and

WHEREAS, Several sections within the currently adopted manual include outdated standards and policy; and

WHEREAS, City staff reviewed the current manual and has developed proposed revisions throughout the currently adopted manual; and

WHEREAS, Revisions to sections that include Hydrology, Hydraulics, and Retention Basin criteria are proposed in order to be consistent with RCFC&WCD criteria and to adopt more detailed policies related to increased runoff mitigation; and

WHEREAS, by updating the current drainage manual, the city can ensure that facilities meet current requirements, streamline the process for RCFC&WCD maintenance and operation, and provide detailed requirements for increased runoff mitigation requirements; and

WHEREAS, City Staff recommends adopting the Storm Drain and Drainage Design Manual, which is a replacement of the currently adopted Storm Drain Development Standards, Storm Drain Criteria and Drainage Design Manual.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF HEMET FINDS, DETERMINES, ORDERS AND RESOLVES AS FOLLOWS:

SECTION 1. FINDINGS – The above recitals are all true and correct.

SECTION 2. Adopt the Storm Drain and Drainage Design Manual, a Replacement of the Currently Adopted Storm Drain Development Standards, Storm Drain Criteria and Drainage Design Manual.

SECTION 3. This resolution shall take effect upon its adoption.

PASSED, APPROVED AND ADOPTED this 11th day of June, 2024.

Joe Males, Mayor

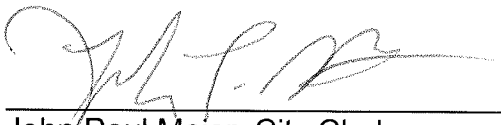
ATTEST:

John Paul Maier, City Clerk

State of California)
County of Riverside)
City of Hemet)

I, John Paul Maier, City Clerk of the City of Hemet, do hereby certify that the foregoing resolution was adopted by the Hemet City Council on the 11th day of June, 2024, and was passed by the following vote:

AYES:	Council Members: Kendrick, Krupa, Lilienthal, Mayor Pro Tem Peterson, Mayor Males.
NOES:	Council Members: None.
ABSTAIN:	Council Members: None.
ABSENT:	Council Members: None.



John Paul Maier, City Clerk

Storm Drain Criteria

And

Drainage Design Manual

ADOPTED JUNE 11, 2024

CITY OF HEMET

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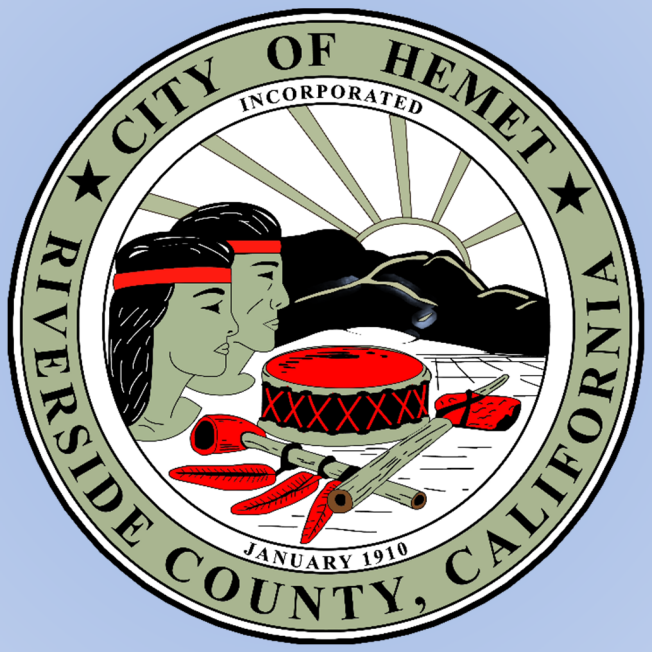


Section 1

GENERAL PROVISIONS

1
GENERAL PROVISIONS

1.1 SHORT TITLE

These regulations together with all future amendments shall be known as the "City of Hemet, Storm Drain Criteria and Drainage Design Manual" (hereafter called MANUAL) being part of and subject to the City of Hemet Municipal Code (hereafter called CODE).

1.2 JURISDICTION

This MANUAL shall apply to all land within the incorporated areas of the City, including any public lands. This MANUAL shall apply to all facilities constructed on City right-of-way easements dedicated for public use, and to all privately owned and maintained storm water drainage facilities.

1.3 PURPOSE

This MANUAL shall establish the minimum design and technical criteria for the analysis and design of all hydraulic structures and storm water drainage and detention facilities. All subdivisions, planned unit developments, building permit applications or any other proposed construction submitted for approval under the provisions of the CODE, shall include an adequate storm drainage system analysis and appropriate drainage system design. Such analysis and design shall meet or exceed the criteria set forth within this MANUAL. Options to the provisions of this MANUAL may be suggested by the applicant. The burden of proof that the options are equal to or better than the criteria in this MANUAL, is the responsibility of the applicant. Policies and technical criteria not specifically addressed in this document shall follow the provisions specified by the City of Hemet. Drainage facilities in place or under construction shall be accepted without regard to the provisions of this MANUAL.

1.4 ENACTMENT AUTHORITY

The MANUAL has been adopted pursuant to the authority conferred upon the City of Hemet through the *California Government Code.* As part of the authority provided to the City by the State and specified within the CODE, this MANUAL was adopted by resolution and is considered part of the CODE.

1.5 AMENDMENT AND REVISIONS

The policies and criteria contained in the MANUAL may be amended as new techniques are developed and/or if experience indicates a need for revision. Amendments and revisions to this MANUAL shall be made on a periodic basis, as needed, and shall be enacted by a resolution of the City Council.

1.6 ENFORCEMENT RESPONSIBILITY

It shall be the responsibility of the City of Hemet Public Works Director/City Engineer or their representative to enforce the provisions of this MANUAL.

1.7 REVIEW AND APPROVAL

The City of Hemet will review all drainage submittals for general compliance with this MANUAL. Project approval by the City of Hemet does not relieve the owner, engineer, or designer from the responsibility of ensuring that the calculations, plans, specifications, construction, and recorded drawings are in compliance with the criteria contained in the MANUAL.

The City of Hemet may request other responsible agencies to review any reports or plans to determine their consistency with the requirements of this MANUAL. '

1.8 INTERPRETATION

In the interpretation and application of the provisions of this MANUAL, the following provisions shall apply:

- In its interpretation and application, the provisions shall be regarded as the minimum requirements for the protection of the environment and the public health, safety, and welfare of the residents of the City of Hemet.

- Whenever the provisions of this MANUAL conflict with the CODE or other applicable law, the most restrictive standards or requirements shall apply.

- This MANUAL shall not abrogate or annul any permits or approved drainage reports or construction plans issued before the effective date of this MANUAL.

1.9 RELATIONSHIP TO OTHER STANDARDS

If the Riverside County Flood Control and Water Conservation District, State or Federal Government imposes stricter criteria, standards, or requirements, than those specified in this MANUAL, those criteria shall be incorporated into the MANUAL after appropriate due process and public hearing(s) are held.

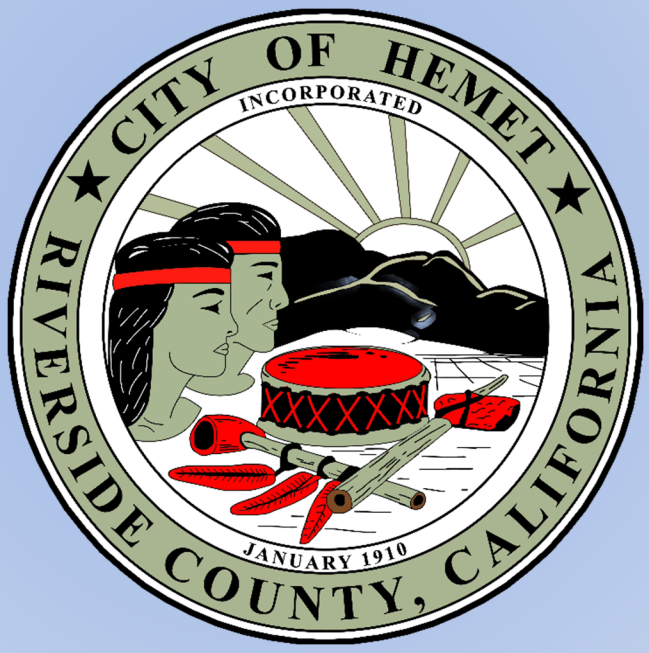
1.10 WAIVERS FROM THESE CRITERIA

Waivers from this MANUAL will be considered on a case-by-case basis by the Public Works Director/City Engineer or their representative. An appeal of a decision by the Public Works Director/City Engineer shall be prepared and processed consistent with the provisions of the CODE.

1.11 ABBREVIATIONS

As used in these criteria, the following abbreviations shall apply:

FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
RCFC&WCD	Riverside County Flood Control and Water Conservation District
ROW	Right-of-Way
USDOT	United States Department of Transportation
USGS	United States Geological Survey



Section 2

DRAINAGE PLANNING SUBMITTAL REQUIREMENTS

2
DRAINAGE PLANNING SUBMITTAL REQUIREMENTS

2.1 REVIEW PROCESS

All subdivisions, planned unit developments, or other development proposals shall submit drainage reports, construction drawings/specifications, storm drain CAD files, and as-built information in accordance with the requirements of this section. Digital copies shall be submitted to the City of Hemet.

Photostatic copies of charts, tables, nomographs, calculations, or any other reference material shall be legible. Blurred or unreadable portions of the report are unacceptable and could warrant resubmittal of the report. The submittal shall include a declaration of the type of report submitted (i.e., Preliminary or Final). Incomplete or absent information may result in the rejection of the report.

A pre-application conference with a representative of the Public Works Department is recommended for all applicants prior to submittal of a Preliminary or Final Drainage Report. At this meeting, general information regarding development regulations, required procedures, possible drainage problems and solutions, and specific submittal requirements for the subject site will be discussed. When the only development approval required is a building permit, this conference will provide information as to whether or not a Preliminary and/or Final Drainage Report will be required by the Public Works Department.

2.2 PRELIMINARY DRAINAGE REPORT

A Preliminary Drainage Report, is the first step in the approval process. A preliminary Drainage Report is required to be submitted as part of any development project (unless specifically waived). This report is intended to determine the feasibility and design characteristics of the proposed development, at a conceptual level. However, those problems that exist on site prior to development must be addressed within the preliminary report.

The report shall include a cover sheet and shall be prepared or supervised by an engineer licensed in California. The report shall contain a certification which shall read as follows:

> "I hereby certify that this report (plan) for the Preliminary Drainage design of (Name of Development) was prepared by me (or under my direct supervision) in accordance with the provisions of the City of Hemet Storm Drain Development Standards, Storm Drain Criteria and Drainage Design Manual for the owners thereof. I understand that the City of Hemet does not

and will not assume liability for drainage facilities designed by others."

_____

Registered Professional Engineer

State of California No. _____
(Affix Seal)

2.2.1 Preliminary Report Contents

The Report shall be in accordance with the following outline and contain the applicable information listed:

I. Narrative
- A. Introduction
- B. Scope of project
- C. Site description
  1. General information
  2. Vegetative cover
  3. Prominent geographic features

II. Hydrological Parameters
- A. Hydrology Methodologies
- B. Rainfall Data and Source
- C. Soils Data and Source
- D. Runoff Index and Land Cover Assumptions
  1. Ground Cover Condition
  2. Impervious Area
- E. Approved Flow Rates/User Defined Conditions

III. System Schematic
- A. Proposed Surface Improvements
  1. Streets/roads
     - a) centerline
     - b) right-of-way
     - c) curb and gutter
  2. Grading
     - a) contours/spot elevations
     - b) slopes
     - c) retaining walls
- B. Proposed Flood Control Facilities
  1. Storm Drains
     - a) location/alignment
     - b) diameter
     - c) flow rate
     - d) right-of-way
     - e) outlet geometry

f) catch basin location
1) type
- curb inlet
- grated inlet
- riser
- size (length/depth)
- intercepted/flow-by

2. Open Channels
a) location/alignment
b) cross section
c) flow rate
d) velocity
e) lining (earthen, rock, grass, concrete, etc)
f) side inlets
1) geometry
2) flow rate
3) right-of-way

3. Detention/Retention Basins
a) Purpose of Basin
b) Basin Design Criteria
c) Mitigation Measure Requirements

C. FEMA Flood Hazards
1. Flood Hazard Zone
2. Impacts to Flood Hazard
3. Mitigation Measure

IV. References

All criteria, master plans, and technical information referenced in support of the drainage concept shall be identified or included as excerpts.

2.2.2 Drawing Contents

A. General Location Map: All drawings shall be 24" x 36" in size. A map shall be provided in sufficient detail to identify drainage flows entering and leaving the development and general drainage patterns. The map should be at a legible scale and show the path of all drainage from the upper end of any off-site basins to the nearest adequate outlet. The map shall identify any major facilities from the subject property along the flow path to the nearest adequate outlet, such as existing improved channel, regional detention facilities, culverts, and storm sewers. Basins and divides are to be identified and topographic contours are to be included.

B. Floodplain Information: An exhibit displaying the location of the

subject property shall be included with the report as outlined in Section 2.2.1. *All* major drainageways with a mapped floodplain or floodway shall have the limits of flooding shown and included in report drawings.

C. Hydrology Map and Drainage Plan: Map(s) of the proposed development at a scale of 1" = 20' to 1" = 200' on a 24" x 36" drawing shall be included. The plan shall show the following:

1. Existing topographic contours at 1 foot minimum intervals. In terrain where the slope exceeds 15%, the maximum interval is 10 feet. The contours shall extend a minimum of 100 feet beyond the property lines.
2. All existing drainage facilities.
3. Approximate flooding limits based on available information.
4. Conceptual drainage facilities including detention basins, storm drain, swales, riprap, and outlet structures in the detail consistent with the proposed development plan.
5. Major drainage boundaries and sub-boundaries.
6. Any off-site feature influencing development.
7. Proposed flow directions and, if available, proposed surface improvements and/or contours.
8. A legend to define map symbols.
9. A title block in lower right comer, north arrow and graphic scale.
10. Seal and signature of a professional engineer.

2.3 FINAL DRAINAGE REPORT

The purpose of the Final Drainage Report is to update the concepts, analysis, and design details discussed in the Preliminary Drainage Report. Also, any significant change to the Preliminary concept must be noted in the Final Report.

The Final Drainage Report shall be submitted with an application for a grading permit. The Final Drainage Report must be reviewed and accepted by the Public Works Department prior to accepting the final development application for approval.

All reports shall be submitted digitally to the public works department.

The report shall include a cover letter presenting the final design for review and shall be prepared by or under the direction of an engineer licensed in California and certified as shown above in Section 2.2, Preliminary Drainage Report. The report shall also contain a developer certification sheet as follows:

> "(Name of Developer) hereby certifies that the drainage facilities for (Name of Development) shall be constructed according to the design presented in this report. I understand

that the City of Hemet does not and will not assume liability for the drainage facilities designed and/or certified by my engineer. I understand that the City of Hemet reviews drainage plans but cannot, on behalf of (Name of Development), guarantee that final drainage design review will absolve (Name of Developer) and/or their successors and/or assigns of future liability of improper design. I further understand that approval of the final development application and/or final development plan does not imply approval of my engineer's drainage design."

_____

Name of Developer

_____

Authorized Signature

The Final Drainage Report shall be prepared in accordance with the following outline and include the material completed as part of the Preliminary Drainage Report.

2.3.1 Final Report Contents

I. Narrative

- A. Introduction
- B. Scope of project
- C. Site description
  1. General information
  2. Vegetative cover
  3. Prominent geographic features
- D. Hydrology
  1. Methodology Used
  2. Input parameters
  3. Summary of calculations
- E. Hydraulics
  1. Methodology
  2. Input parameters (starting WSE, Manning's "n" values, etc.)
  3. Summary of calculations and facilities
- F. Conclusions/Recommendations

II. Hydrology Calculations

A. Soils map
B. Rainfall data
    1. Rational Method
        a) Time of concentration
        b) Runoff coefficients
        c) Initial subarea
            1) Area 10 acres
            2) Length 1000 feet
            3) Change in elevation
        d) Travel Time
            1) Street flow calculations
            2) Pipe flow calculations
            3) Channel flow calculations
    2. Synthetic Unit Hydrograph
        a) Lag time
            1) Length of longest watercourse
            2) Length to the centroid of the area
            3) Average roughness coefficient
            4) Slope along longest watercourse
        b) Unit time (25% to 40% of lag)
        c) Area adjustment
        d) Runoff index
            1) Vegetative cover
        e) Low loss rate calculation
        f) Storm duration

III. Hydraulic Calculations

A. Street Flow
B. Catch Basin Capacity
C. Storm Drains
D. Culverts Capacity
E. Open Channel
F. Inlet Capacity
G. Intercepted and Flow-by Summary Table (if applicable)

IV. Hydrology Map (One for Rational Method and One for Unit Hydrograph Separately)

A. Bar scale/north arrow
B. Legend
C. Title block
D. Watershed identification
    1. Sub-area delineation
    2. Sub-area in acres
    3. Flow path
    4. Centroid (hydrograph only)

5. Incremental flow

E. Proposed onsite improvements
   1. Streets
   2. Grading

F. Storm flows
   1. Entering project
   2. Leaving project
   3. Major intersections

V. Drainage Facilities Map

A. Bar Scale/North Arrow

B. Legend

C. Title Block

D. Proposed Surface Improvements
   1. Streets/roads
      a) centerline
      b) right-of-way
      c) curb and gutter
   2. Grading
      a) contours/spot elevations
      b) slopes
      c) retaining walls

E. Proposed Flood Control Facilities
   1. Storm drains
      a) location/alignment
      b) diameter
      c) flow rate
      d) right-of-way
      e) outlet geometry
      f) catch basin location
         1) type
            - curb inlet
            - grated inlet
            - riser
            - size (length/depth)
            - capacity
            - intercepted/flow-by
   2. Open Channels
      a) location/alignment
      b) cross-section
      c) flow rate
      d) velocity
      e) lining (earthen, rock, grass, concrete, etc.)
         1) side inlets:
            - geometry

- flow rate
- right-of-way

VI. Hydrologic Soils Map

VII. Land Use Map

A. Bar Scale/North Arrow
B. Legend
C. Title Block
D. Watershed boundaries
E. Proposed surface improvements

VIII. Rainfall Maps/Tables

IX. References

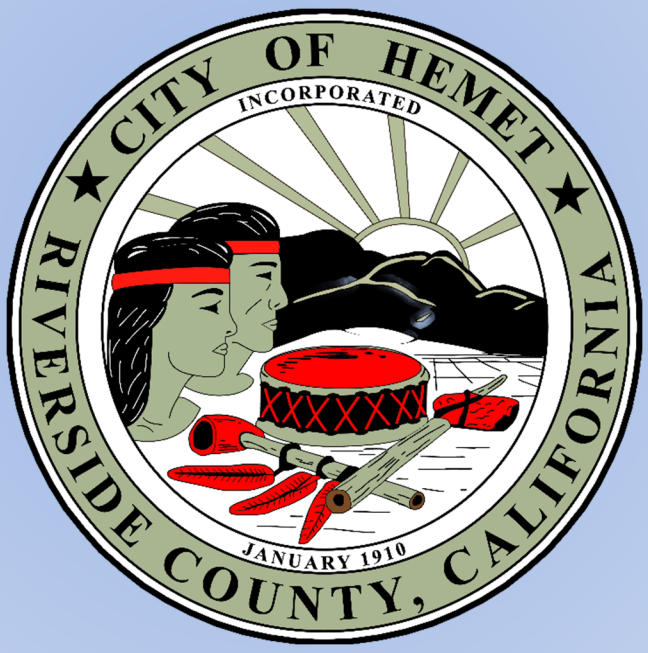
All criteria, master plans, and technical information referenced in support of the drainage plan shall be identified.

2.3.2 Drawing contents

A. General Location Map (See Section 2.2.2):
B. Floodplain Information (See Section 2.2.2):
C. Drainage Facilities Map; Map(s) of the proposed development at a legible scale on a 24" x 36" drawing shall be included. The plan shall show the following:

1. Existing and proposed contours at 1-foot maximum intervals. The contours shall extend a minimum of 100 feet beyond the property lines. The contour interval may be increased at the discretion of the City Engineer.
2. Property lines and easements with their intended use shall be noted.
3. Streets, indicating right-of-way width, flowline width, curb type, and approximate slopes.
4. Existing drainage facilities and structures, including irrigation ditches, roadside ditches, crosspans, drainageways, and culverts. All pertinent information such as material, size, shape, slope, and location shall also be included.
5. Overall drainage area boundary and drainage sub- area boundaries.
6. Proposed type of street flow, such as vertical or combination curb and gutter, roadside ditch, gutter, slope and flow directions, and crosspans.

7. Proposed storm drains and open drainageways, including outlets, manholes, culverts, and other appurtenances, including riprap protection.
8. Proposed outfall point for runoff from the developed area and facilities to convey flows to the final outfall point without damage to downstream properties.
9. Routing and accumulation of flows at various critical points for the initial storm runoff listed on the drawing.
10. Volumes and release rates for retention or detention storage facilities and information on outlet works.
11. The location and elevations, if available, of all existing floodplains affecting the property.
12. Routing of offsite drainage flow through the development.
13. The definition of flow path leaving the development through the downstream properties ending at a major drainageway or facility.
14. A legend to define map symbols.
15. A title block in lower right hand comer.



Section 3

DRAINAGE POLICY

3
DRAINAGE POLICY

Flooding is a significant concern which affects the use of property, the provision of public services and the health of City residents. Provision for adequate drainage in urban areas is necessary to preserve and promote the general health, welfare and economic well-being of the region. Drainage is a regional feature that affects all governmental agencies and all parcels of land, making it necessary to formulate a program that balances both public and private interests.

The City of Hemet has expended a significant amount of resources to plan and develop a drainage system that provides considerable benefit to the public. The long-term goal of the City is to complete the improvements specified in the City's Master Flood Control and Drainage Plan or any update thereto.

To achieve this goal, the following objectives have been established:

- Reduce the hazards to individuals and property caused by undertaking both short- and long-term improvements to protect the health, safety and welfare of area residents.
- Improve vehicular and pedestrian circulation.
- Improve the ability of emergency services to provide timely and necessary assistance.
- Control the quality of water that is either released onto downstream properties or allowed to percolate into groundwater basins.
- Ensure downstream properties are not adversely affected by upstream improvements.

These objectives can be made operational through a set of policy statements. The application of the policy is in turn facilitated by technical criteria and data. The following sections present policy statements to be enacted as part of the manual. Each statement is preceded by a brief discussion of the requirements or basis for the policy, followed by the actual policy statement.

3.1 FACILITIES PLANNING

3.1.1 Master Planning

As the City of Hemet continues to grow, drainage and flooding will remain significant concerns. The planning of drainage facilities must be included in the urbanization process. The first step is to include drainage planning with all regional and local development master plans.

Storm water management facilities, such as storm drains and channels provide both a conveyance and storage function. When a channel is planned as a conveyance feature, it requires an outlet as well as downstream storage space. When the space requirements are considered, the provision for adequate drainage becomes a competing use for space along with other land uses. If adequate provision is not made in a land use plan for drainage requirements, storm water runoff will conflict with either land uses and will result in storm water damage, and will impair or even disrupt the ability of other infrastructure systems to function.

The policy of the City shall be to require storm drainage planning, including allocation of space for drainage facilities, for all development and redevelopment.

In recognition that drainage boundaries are non-jurisdictional, Master Drainage Plans are recognized for regional boundaries and facilities. In order to implement an effective regional flood control system, development must consider the Riverside County Flood Control and Water Conservation District (RCFC&WCD) Master Drainage Plans.

The policy of the City shall be to encourage the development, and periodic update, of detailed regional drainage master plans which set forth requirements for new development and identify the required public improvements.

As a result of the planning process a fee structure shall be developed to provide funding for the public improvements. These Development Impact Fees (DIF) fees will be based upon the current approved Development Impact Fee Nexus Study. As fees are collected, they will be applied to the construction of master planned facilities, or the acquisition of facilities, on a priority basis.

The policy of the City shall be to apply DIF fees collected for the installation of master planned drainage facilities toward those locations or projects which exhibit the following characteristics:

A. The construction or purchase of downstream facilities/properties deemed to be of the highest importance.

B. Projects which are needed to alleviate a safety hazard.

C. Projects with the maximum benefit for the cost of improvements.

D. The purchase of vacant downstream property which does not have a strong likelihood for development and has been identified as important to the completion the master planned system.

E. The construction of storm water/drainage facilities within existing street or road rights-of-way.

F. The construction of storm water/drainage facilities on land which has been dedicated to the City for use as part of the master planned system and which is adjacent to or a logical extension of an existing master planned facility.

G. The construction of storm water/drainage facilities on land which has been dedicated to the City, but is not a logical extension of an existing master planned facility.

Recognizing that the cost to construct drainage facilities is generally high and that drainage DIF fees are slow to accrue, it will be necessary for the City to rely on development to carry its fair share of the cost burden of the construction of master planned facilities.

The policy of the City shall be to require all development projects adjacent to master planned facilities to construct said facilities. Development projects shall bear the total cost of constructing a master planned facility excluding land costs. This cost shall be credited against the total amount of drainage impact fees due on the project. Dependent upon the area and the benefit provided, the City may use a recapture or reimbursement agreement to appropriately allocate construction costs based on benefit received.

Master planned facilities constructed for development projects shall also:

A. Provide for the retention of the increase in storm water runoff to the extent regional retention basins are added to the master plan.

B. Provide an inlet for tributary upstream runoff and a method of metering the downstream discharge.

Realizing that a master plan is a document used to guide the development of an adequate drainage system, provisions must be made for the introduction of alternate methods of controlling storm water. There must be enough flexibility in the plan that the creativity of the engineers and planners preparing development master plans is not stifled.

It **shall be the policy of the City to allow for the installation of drainage facilities which differ from the design characteristics contained in the City's Master Flood Control and Drainage Plan, provided such facilities have the same design capacity, function and purpose.** In **addition, the type of facility proposed shall be consistent with the types of facilities or improvements which exist in the area.**

3.1.2 Special Planning Areas

Currently, there are areas in the City where significant drainage problems exist. Any new development or redevelopment in these areas may compound the existing

drainage problems.

The policy of the City will be to condition development projects to construct the drainage facilities necessary to meet the needs and mitigate the impacts created by each development proposal. A project which is phased or constructed in an incremental manner shall either be designed to accommodate, or have in place, a mechanism to ensure that each portion of the project bears its proportionate cost of the project improvements.

In addition to these areas, there are areas in the City where presently no adequate outlet exists for drainage by gravity. In general, there are no major drainage facilities or natural water courses in these areas.

The policy of the City shall be to require development projects to construct additional drainage facilities to meet one or more of the following needs:

A. A development project exacerbates existing drainage problems.

B. A development project creates drainage problems downstream.

C. Facilities are necessary to protect downstream properties from storm water runoff caused by development.

D. Facilities are necessary to mitigate identified environmental impacts caused by development.

There also exist development projects which do not produce a significant impact on the environment. In these cases, it may be not necessary to provide a high level of analysis to arrive at measures which will adequately remove storm water from the project site.

It **shall be the policy of the City to require a hydrology study for all development projects, except the following:**

A. Single family home construction on existing lots.

B. Subdivisions that create more than two (2) separate parcels without any proposed improvements.

3.1.3 Floodplain Management

The City has adopted a floodplain ordinance which sets forth regulations for the development of mapped floodplains. The ordinance has been written in a manner which enforces federal regulations related to the development of floodplains. The designer is referred to the City's ordinance for guidance during the planning phase of development projects in flood-prone areas.

It shall be the policy of the City to have a development review process consistent with FEMA guidelines that includes the filing of the following documentation by the applicant:

A. A development permit consistent with FEMA criteria.

B. Certification of the lowest floor elevation by an engineer and/or architect depending upon the location of the property and its relationship to the floodplain.

3.2 STORM RUNOFF RETENTION

3.2.1 Storm Runoff Retention

The value of storm runoff retention as part of a master plan has been explored by many individuals, agencies and professional societies. Retention is considered a viable method to reduce the costs associated with the development of a drainage system. Temporarily retaining a few acre-feet of runoff can significantly reduce downstream flood hazards as well as downstream facility requirements. Storage also provides for sediment and debris collection which helps maintain the quality of water in streams and rivers. Thus, public health benefits may accrue from storage of storm runoff. However, all benefits can only be obtained through consistent administration of the retention policy.

The goal of the City is to require the installation of on-site retention facilities. The realization of this goal will allow for the development of land while producing no net increase in storm runoff. However, the implementation of retention basins must ensure adverse impacts affecting the public are not created, such as vector related issues.

The policy of the City requires all development projects to provide for the on-site retention of storm water runoff. In those cases where projects are not located adjacent to a master planned drainage facility, the City Public Works Director/City Engineer, or their representative, shall have the option of either:

A. Requiring the development to provide onsite retention, or;

B. Requiring the installation of drainage facilities which connect to Master Plan or other facilities.

As retention facilities increase in size, it may become reasonable to incorporate them into the existing master drainage plan.

3.2.2 Multi-Purpose Concept

Design development of retention facilities should not only consider their primary

function. During the early stages of design development consideration should be given to additional uses for these facilities. Considerable effort should be expended to develop a facility that can be used as a park, or integrated into the development such that additional uses can be identified and planned. This is not to say that the primary purpose of the facility should be overlooked; however, whenever possible these facilities should serve multiple purposes to the community.

The policy of the City shall encourage retention facilities to be designed as usable open space or formal park sites for complementary land uses, such as single family residential tracts. To implement this policy the following shall apply:

A. All facilities shall have appropriate pedestrian access, landscaping and irrigation systems.

B. Park development impact fees may be applied to those facilities which are specifically designed as park sites consistent with the City's General Plan.

In addition to those considerations noted above, thought should be given to the development patterns in the area. If development patterns and timing are such that a group of developments can utilize an appropriately located retention facility, every effort should be to develop a site agreeable to all concerns. These efforts will help reduce the number of minimally sized retention basins while respecting the intent of the City's policy decision.

It shall be the policy of the City to encourage property owners who are seeking to **develop adjacent parcels to join together to construct a single retention facility that will be of mutual benefit. The City will assist in providing a mechanism to equitably distribute the facility's development costs to all property owners benefiting from such an agreement. Such a mechanism could include:**

A. The reduction or elimination of development impact fees.

B. A recapture or reimbursement agreement.

C. A memorandum of understanding.

D. A combination of all the above.

3.2.3 Design Development Criteria

Previous discussion has centered on the usefulness of retention facilities as part of an overall drainage system, the goals of City, and general guidelines to be considered during design development of retention facilities. To further clarify the design development process, certain general criteria must be defined.

The policy of the City requires on-site retention facilities to meet the following criteria:

A. The facility shall be integrated into the project's design using one of the methods listed below, which may render certain portions of the property unusable for short periods after each storm. If the type of facility used is intended primarily to retain storm water runoff, then a method shall be employed to meter the discharge and ensure all water is removed within 72 hours after the storm.

   1. Facilities for single family subdivisions shall be constructed and deeded to the City on one or more parcels. The size of the property to be deeded shall be in conformance with the City development standards and subdivided consistent with the existing subdivision pattern. Upon completion of the necessary downstream drainage system, the property can be sold by the City for conversion to residential uses.

   2. Facilities for multiple family projects shall be integrated into on-site landscaping, parking or recreation areas, where feasible.

   3. Facilities for commercial or industrial projects shall be integrated into parking and/or landscape areas, where feasible.

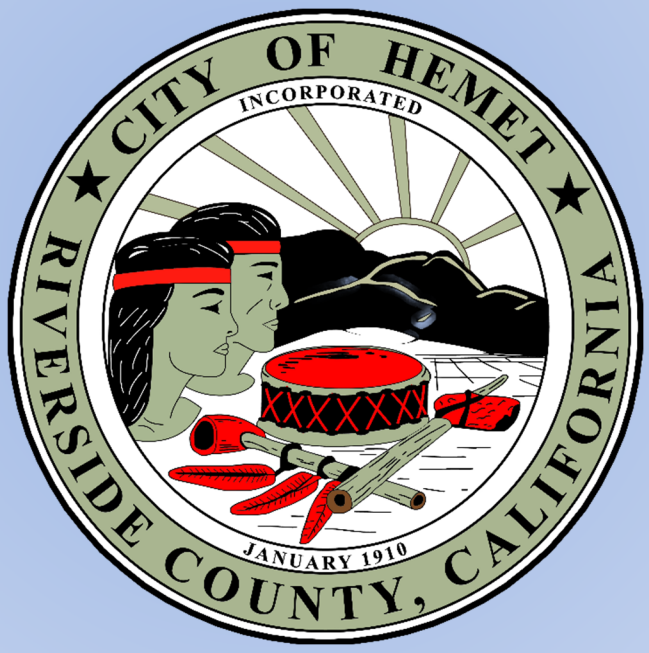
B. All facilities shall be constructed in accordance with the requirements of this manual.

C. All retention facilities shall have an inlet for tributary runoff and a method of ensuring the basin discharge is metered to drain the basin within 72 hours. The characteristics of such facilities shall be determined based upon the following general criteria, in order of priority:

   1. The facility shall be consistent with the needs of the RCFC&WCD Master Drainage Plans.

   2. The facility will not have adverse affects upon the health, safety or welfare of area residents.

   3. The facility shall provide for dual use, such as open space or park facilities.



Section 4

FLOODPLAIN REQUIREMENTS

4
FLOODPLAIN REQUIREMENTS

The regulation of flood plains is necessary to preserve public safety and general health and welfare and to promote the economic well being of the region. The general intent of current floodplain regulations is summarized below:

- To reduce the hazard of floods to life and property;
- To preserve the hydraulic characteristics of water courses used for conveyance of flood waters; and
- To protect the public from excessive financial expenditures for the development of flood control facilities.

The City of Hemet's Floodplain Ordinance is Chapter 14, Article V. It is the Engineer's responsibility to utilize the most current adopted floodplain ordinances and regulations.

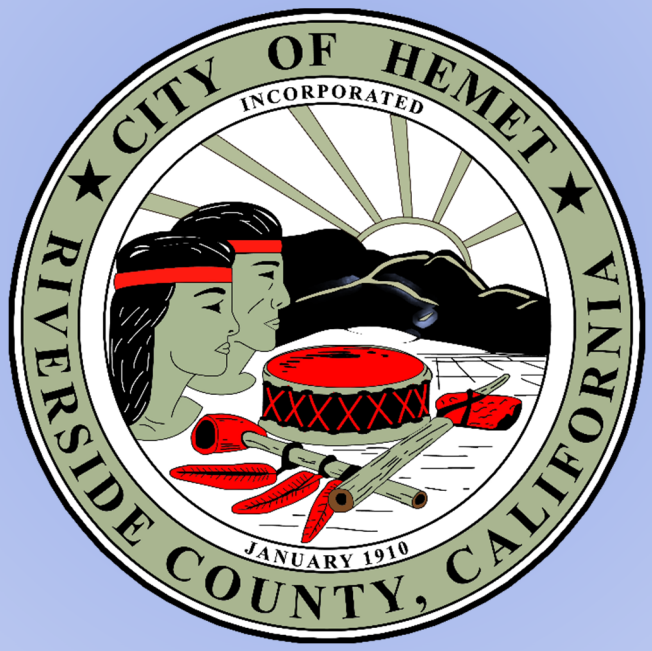
4.1 NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

The City is a participant in the National Flood Insurance Program which is administered by the Federal Emergency Management Agency (FEMA). This program's basic function is to designate flood-prone areas throughout the City of Hemet, and the County of Riverside, and subsequently make available to the general public varying degrees of flood insurance. FEMA develops certain floodplain designations by first completing a Flood Insurance Study and later identifies these designations on related Flood Insurance Rate Maps.

A Flood Insurance Study for the City of Hemet was originally completed in September, 1977 with several revisions completed up to the current approved study from March 22, 2022. In addition, the associated Flood Insurance Rate Maps were also revised in 2008..

Issues involving FEMA should be identified and addressed during the conceptual development and in the Preliminary Drainage Report. It is considered the responsibility of the developer, or the developer's representative, to fulfill all of FEMA's rules and regulations and to prepare any appeals or revisions that may be required as a result of a proposed development. If a Letter of Map Revision (LOMR) or a Letter of Map Amendment (LOMA) is required by FEMA prior to the removal of a special flood hazard

zone (100-year floodplain), it will be the responsibility of the developer to obtain any and all such documents prior to issuance of any permits.



5

HYDROLOGY AND HYDRAULICS

5
HYDROLOGY AND HYDRAULICS

The purpose of this section of this manual is to establish the design hydrology methods and procedures currently in use in the City of Hemet and Riverside County.

The materials contained in this section are intended for the use of both City staff and engineers submitting hydrologic and hydraulic computations to the City. The methods presented are considered to produce hydrologic design parameters acceptable for use during the planning and design of underground storm drains, open channels, retention and detention facilities and debris basins, as well as subdivision revision and floodplain mapping.

Prior to continuing with this section, the engineer should become thoroughly familiar with the Riverside County Flood Control and Water Conservation District Hydrology Manual and the Riverside County Flood Control and Water Conservation District.

5.1 HYDROLOGY

The City of Hemet utilizes the Riverside County Flood Control and Water Conservation District's Hydrology Manual, which is located here: https://rcflood.org/engineering-tools. The manual documents the design methods and criteria currently used by RCFC&WCD.

RCFC&WCD utilizes two primary methods to determine design discharges: the Rational Method and the Synthetic Unit Hydrograph Method. Both of these methods are described in the RCFC&WCD Hydrology Manual, and the approved software for modeling is also provided at the link above.

5.1.1 RATIONAL METHOD

Rational Method calculations are utilized for the sizing of storm drain facilities, including catch basins, inlets, and storm drains, as well as determining storm drain inlet locations based upon street design criteria. The calculations must be performed utilizing the Riverside County Flood Control and Water Conservation District Hydrology Manual methodology and input parameters. Software utilized for performing rational method calculations must be one of the District Approved Softwares listed on the rcflood.org website.

5.1.2 SYNTHETIC UNIT HYDROGRAPH

The Synthetic Unit Hydrograph is utilized for flood control facilities in excess of 300 to 500 acres, sizing retention basins and other facilities used to address increased runoff mitigation (see Section 7). Additionally, unit hydrograph calculations are utilized for addressing the Hydrologic Conditions of Concern

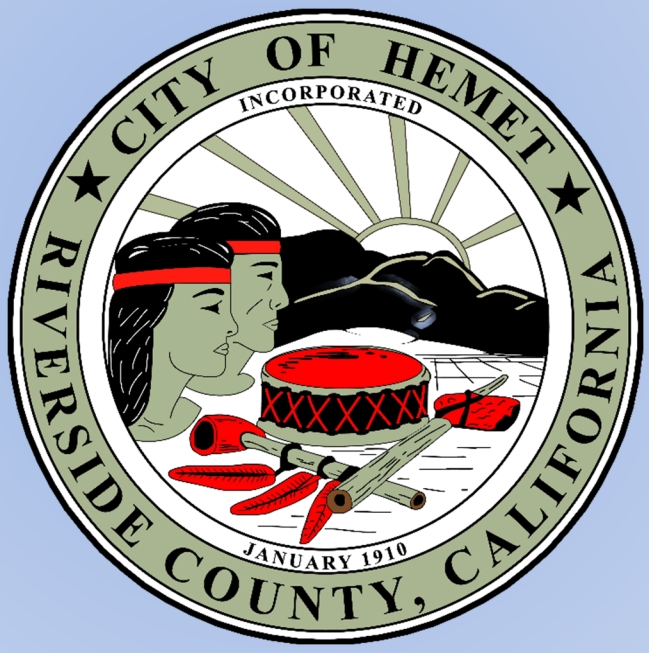
(HCOCs) for the current Water Quality Management Plan requirements (this may be subject to change pending updates to the MS4 Permit). The unit hydrograph calculations must be prepared per the Riverside County Flood Control and Water Conservation District Hydrology Manual methodology and input parameters. Software utilized for performing unit hydrograph calculations must be one of the District Approved Softwares listed on the rcflood.org website.

5.2 HYDRAULICS

Hydraulic calculations are performed to demonstrate that proposed facilities have been designated to adequately convey, retain, or intercept the design flow rate tributary to the system. District Approved Software on the rcflood.org website include programs currently accepted for hydraulic modeling. The following are typical calculations required:

1. Inlet calculations need to be provided that include interception, flow-by and upstream tributary flows.
2. Storm drain calculations need to be performed, typically with the WSPG (Water Surface Profile Gradient) program.
3. Any other hydraulic calculations necessary to demonstrate that facilities have been designed appropriately.

Hydraulic calculations must be performed per the Riverside County Flood Control and Water Conservation District Hydraulic Design Manual.



6

STREET DRAINAGE

6
STREET DRAINAGE

Urban streets with curb and gutter serve an important and necessary drainage service, even though their primary function is for the movement of traffic. Traffic and drainage uses are compatible up to a point, beyond which drainage is, and must be, subservient to traffic needs.

Gutter flow in streets is necessary to transport runoff water to storm drain catch basins and to major drainage channels. Good street planning can substantially help in reducing the size of, and sometimes eliminate the need for, a storm drain system in newly urbanized areas.

Drainage design for the collection and conveyance of storm water on public streets is based on a reasonable frequency and magnitude of traffic interference. That is, depending on the character of the street, certain traffic lanes can be fully inundated once during the design storm return period. However, during less intense storms, runoff will inundate traffic lanes but to a lesser degree. Therefore, one of the primary functions of streets is to convey nuisance flows quickly and efficiently to a storm drain or other drainage facility without obstructing traffic movement. During a major storm event, the function of streets is to provide an emergency escape for flood flows with minimal damage to urban environment.

6.1 STREET CLASSIFICATION

The streets in the City are classified for drainage purposes as Local, Collector or Arterial according to the average daily traffic (ADT) for which the street is designed. The larger the ADT, the more restrictive the allowable drainage encroachment into driving lanes. Traffic classifications and typical cross sections of the three drainage classifications are presented in Table 6.1 and Figure 6.1, respectively.

TABLE 6.1
TRAFFIC AND DRAINAGE CLASSIFICATION

TRAFFIC CLASSIFICATION	STANDARD DRAWING NO.	DRAINAGE CLASSIFICATION
Arterial Highway	ST-100	Arterial
Arterial Highway	ST-l00A	Arterial
Major Highway	ST-101	Arterial
Divided Secondary Highway	ST-102	Arterial
Secondary	ST-102A/ST102B	Arterial
Express Collector	ST-103	Collector
Collector	ST-104	Collector
Local Street	ST-106	Local

6.2 DESIGN CRITERIA FOR STREETS

6.2.1 Design Frequency

Storm drainage within a street system serves two primary objectives:

1. Removes nuisance flows from pavement during frequent return period storms to maintain safe and efficient movement of traffic.

2. Protects adjacent properties from damage caused by large, infrequent storms.

The function of removing storm flows from pavement is based on providing storm drain catch basins at points where maximum depth or driving lane inundation criteria are reached.

Storm drain system design is generally based on the concept of a design storm. The design storm is the storm associated with the governing return period for longitudinal street flow from Table 6.2. In some locations, along Local and Collector streets, physical improvements may prohibit the water surface from spreading to the building setback line, such as a street lined with block walls constructed at the right-of-way line. In this situation, the depth of flow at the centerline of the street, assuming flood waters are spread between the building setback lines, will define the design storm. In the upper reaches of a system the 10-year criteria will govern. Farther downstream in the system, the storm drain system design for the 10-year event may not meet the street flow criteria stated for the 100-year storm. In this case, the storm drain will need to be upsized to meet the appropriate criteria. Both return periods need to be checked to determine which condition governs. In other words, the greatest storm condition governing design at any point is the design storm.

TABLE6.2
DESIGN STORM FREQUENCIES FOR STREET DRAINAGE

DRAINAGE CLASSIFICATION	LIMITS OF LONGITUDINAL STREET FLOW BY DESIGN STORM FREQUENCY	
	10-YEAR	**100-YEAR**
Local and Collector	Flows contained with top of curb	Flow contained within right-of-way
Arterial	One 12-foot driving lane in each direction, with flows contained within curb	Flow contained between right-of-way lines.

6.2.2 Pavement Encroachment

The following sections present specific design requirements for storm drainage on urban streets for the design storm. Determination of street carrying capacity for the design storm shall be based upon the requirements outlined in Table 6.2:

The storm drain system should begin at or prior to the point where the maximum encroachment and/or depth is reached, and should be designed on the basis of the design storm. The final design must meet both the 10-year and 100-year criteria established in Table 6.2.

6.3 CATCH BASINS

Proper surface drainage of streets and highways may require intercepting excess flows with stormwater catch basins. The most upstream catch basin in the system should be placed as far downstream as possible, because as soon as the runoff enters the pipe system, it is carried rapidly downstream which tends to reduce the time of concentration. Locating catch basins is dictated by encroachment into the traveled way and flow depth criteria (see Table 6.2).

6.4 DESIGN CRITERIA

6.4.1 General

Catch basins shall be located within street rights of way unless otherwise approved by the City Engineer. All catch basins which must be located outside street right of way lines in order to intercept storm waters under existing conditions are acceptable only when other provisions can not be made to intercept these flows. Right of way for such catch basins, or inlets, will be offered for dedication on the tract or parcel map for the project or acquired prior to final approval of the storm drain system.

Catch basins to be constructed off the paved portion of the roadway but within the street right of way lines shall be made operable by grading the roadway to permit storm water to flow to the basin. Street remodeling of this nature shall be performed as soon as possible after construction of the drainage facilities.

If, during the design of the project, it is determined that storm water cannot be adequately collected by a catch basin to be constructed off the paved portion of the roadway, the designer should consider using alternate methods of collecting storm runoff Alternatives and recommendations shall be reviewed and approved by the City Engineer prior to preparation of final construction drawings.

6.4.2 Limitations

Grated catch basins shall be used where street slopes are five percent or greater, grated basins should generally not be used in sump conditions because of the possibility of debris clogging the grates.

6.4.3 Length Requirements

The construction of catch basins over 28 feet in length should be avoided. In lieu thereof, two shorter equivalent length basins should be designated.

6.4.4 Series Catch Basins

The number of catch basins to be connected in a series should normally not exceed two. If the connection of more than two catch basins in a series is unavoidable, consideration should be given to designing a lateral drain.

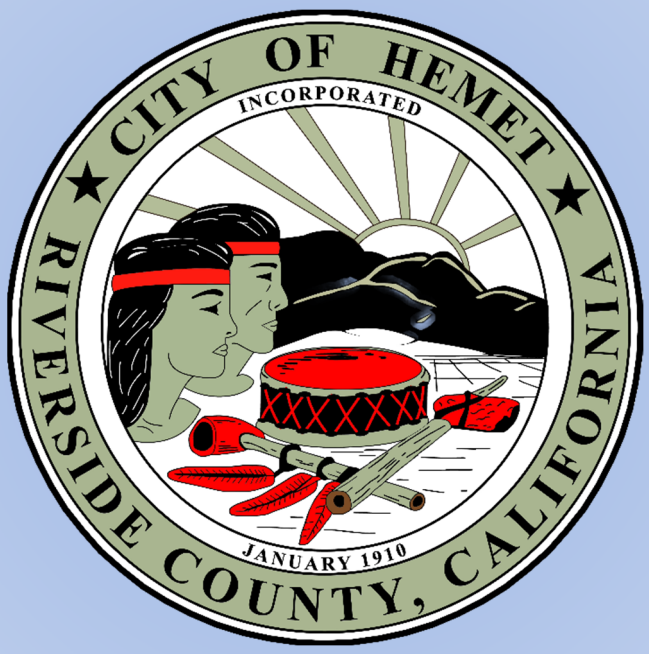
6.4.5 Local Depressions

The Local Depression has a drop of 4 inches and produces a curb face at the catch basin opening equal to the existing curb face plus 4 inches.

A Local Depression of 2 inches can be used with side inlet or combination catch basins.

6.4.6 Connector Pipe

- The minimum diameter of connector pipe shall be 18 inches.
- The horizontal alignment of connector pipes shall contain no angle points or bends, unless approved by the City Engineer.
- The minimum length of connector pipe to be installed between catch basins shall be 12 feet, unless prevented by field conditions.



Section 7

DETENTION/RETENTION

7
DETENTION/RETENTION

As part of a total system of urban stormwater management, detention and retention facilities are man-made storage measures intended to mitigate the negative impacts of urbanization, which include:

- Increased peak flow rates.
- Loss of natural depression storage.
- Reduction of infiltration capacity in a drainage basin.
- Reduction of natural vegetation.
- Increased pollutant load in surface runoff.

This section presents the methods associated with the planning, analysis and design of detention and retention facilities. The guidelines herein are intended to achieve the following goals:

I. Design of detention/retention facilities that satisfy the ordinance provisions of the City;
2. Design of detention/retention facilities that are amenities and, where possible, incorporate multiple-use concepts; and
3. Design of facilities that will not jeopardize the quality of surface water or groundwater resources.

7.1 LIMITATIONS ON USE OF DETENTION/RETENTION FACILITIES

The requirements for a development to provide storage of excess runoff by detention or retention facilities shall not be waived.

In general, storage facilities are to be located so they can intercept the flow from the entire development area. The objective is to provide storage for excess runoff with a minimum number of detention/retention facilities located at optimum points within a developed area. Whenever possible, the facilities shall be designed for multiple uses, such as parks or other recreational facilities, to offset the cost of open space and to encourage improved maintenance.

7.1.1 Regional Detention/Retention Facilities

Regional detention/retention facilities are large storage sites within a drainage basin provided to control excess runoff and to achieve the most cost-effective drainage system. Advantages of this type of facility include the following:

- The siting and design of regional storage facilities are normally incorporated as part of an overall drainage master plan.
- Operation and maintenance costs are reduced.
- Regional facilities are more effective and reliable because they are planned, designed and maintained as part of a total drainage system.

7.2 DESIGN CRITERIA

7.2.1 Criteria for Detention/Retention Facilities

FOR PROJECTS IN WHICH DOWNSTREAM FACILITES DO NOT EXIST:

Preliminary/Entitlement Studies: For preliminary approval, the volume associated with the difference between pre-project and post-project volume of the 2-year, 24-hour and 10-year, 24-hour storm durations shall be added together. This volume shall be utilized for the preliminary volume required in the detention/retention facility, in addition to 1 foot of freeboard.

Final Engineering Permits: For final engineering and permit approval, detention/retention facilities must meet the Riverside County Interim Criteria for Sizing Increased Runoff Detention Facilites. This criteria requires that basins mitigate increased runoff for the 2-year, 5-year, and 10-year, 1-hour, 3-hour, 6-hour and 24-hour storm durations. Flow rates in the post-project condition must not exceed pre-project levels.

Basins must provide an overflow/emergency outlet sized for the peak 100-year, 1-hour flow rate, and provide a conveyance for these emergency flows that protect adjacent buildings/residences (see Appendix C of the LID BMP Design Manual for additional basin sizing criteria).

Pumps may be utilized for facilities without positive drainage so long as it meets the aforementioned criteria, and is approved by the City Engineer.

FOR PROJECTS WITH EXISTING DOWNSTREAM STORM DRAIN FACILITIES:

The capacity of the existing downstream facility must be determined. If the facility cannot accept the fully developed 100-year flow rate from the project site, increased runoff mitigation shall be provided in accordance with the requirements for the existing downstream facilities. All projects are required to validate and demonstrate that existing downstream facilities have the capacity to intercept the design flows discharging from the site. If no existing studies exist or can be located for the downstream facilities, calculations for the total tributary area to the facility must be prepared to demonstrate feasibility.

Geometry: Basic requirements regarding facility shape, side slopes, depth and bottom configuration are provided below.

- Shape: As a general rule, curvilinear, irregularly shaped facilities will have the most natural character. A wide range of shapes can be considered and utilized to integrate the detention facility with the surrounding site development.

- Side Slopes: Where grass is intended to be established, side slopes shall not be

steeper than 4 horizontal to 1 vertical. Where slopes abut the street right-of-way, the minimum slope shall be 4 horizontal to 1 vertical regardless of surface treatment.

- Depth and Bottom Configuration: With respect to grading, deep facilities should be avoided, if possible. For facilities in excess of eight feet deep, consideration should be given to the use of flatter side slopes or the provision of intermediate benches along the side slopes.

  The bottom shall be designed to drain to a low flow channel for a detention facility.

Drain Time: The design of all detention/retention facilities shall be such that the stored runoff shall be discharged completely from the facility within 72 hours of the storm event.

Lining/Surface Treatment: As a general rule, grass and plant species used for landscape development and revegetation should be native to Riverside County.

The use of inert materials is appropriate for stabilization and erosion control where steep slopes are unavoidable, along channels, at points of inflow, at the outlet control structure and any other location where flowing water may threaten stability. Inert materials for erosion control include:

- Loose rock riprap with a specific, engineered gradation.
- Loose or grouted boulders (minimum dimension 18 inches or larger).
- River stone.

Low Flow Channels: A low flow channel is required in the bottom of a detention basin to provide positive routing of drainage to the primary outlet structure. An example of a rectangular concrete low flow channel is provided in Figure 10.2. The channel shall have a 0.5 percent maximum longitudinal slope.

Inlet and Outlet Structures: The design of an inlet structure shall be such that inflow is directed into the facility in a non-erosive manner and without adverse impacts to the retention facility or to upstream areas.

Outlet structures are classified as: 1) primary outlet structures that provide hydraulic control for the specific design event(s), and 2) emergency spillways that provide safe routes, typically via surface overflow, for storm events in excess of the design frequency or in the case of debris blockage or malfunction of the primary outlet structure.

The minimum allowable pipe size for primary outlet structures shall be 18 inches in diameter.

If the capacity of an outlet pipe must be further reduced, an orifice plate may be installed, as shown on Figure 10.3(a). The orifice plate may be constructed of heavy,

galvanized steel and attached with tamper-proof bolts or by forming a smaller diameter opening in the concrete headwall at the outlet structure.

Energy Dissipation at Outlet: Adequate energy dissipation measures shall be provided at the downstream end of primary outlet structures. Such measures shall be designed to control local scour at the pipe outlet and to reduce velocities to pre-development conditions prior to exiting onto downstream properties.

Emergency Spillways: Emergency spillways are normally surface overflow weirs, channels, or combinations thereof, provided for the safe overflow and routing of floodwaters under unusual circumstances.

Consideration must be given to the layout of the emergency spillway so that excess flow is routed in the same manner and direction as would have occurred under pre-development or historic conditions. Emergency spillways must be designed to convey the unattenuated 100-year peak discharge at non-erosive velocities.

Additional criteria for basin design shall utilize the Appendix C – Basin Design Criteria of the Riverside County LID BMP Design Handbook.

7.2.2 Criteria for Special Detention/Retention Methods

Special methods for stormwater detention/retention include, roadway embankment storage and storage in parking lots and greenbelt areas.

The use of underground storage facilities, for detention/retention of excess runoff is permitted, subject to review and approval by the City Engineer.

Since the following methods often result in facilities near buildings, it should be emphasized that the pad elevations adjacent these structures shall be a minimum of one foot above the 100-year water surface of the detention/retention facility at the maximum point over the overflow spillway/outlet.

Conveyance Storage: During the period that channels and floodplains are filling with runoff, the stormwater is being stored in transient form. This type of storage is known as conveyance storage. Construction of low velocity channels with large cross sectional areas assists in the accomplishment of such storage. Conveyance storage systems are usually feasible only on large projects, and require detailed dynamic modeling for analysis.

Embankment design shall be consistent with the Riverside County Flood Control and Water Conservation District Hydraulic Design Manual.

7.3 MULTIPLE-USE CONCEPTS

Flood control functions and other uses in detention/retention facilities are generally compatible. Rationale for multiple-use facilities includes decreased facility maintenance costs and an increased community acceptance. Combining flood storage with recreation use or other community facilities on a single site decreases total costs for land acquisition and site

development. The development of detention/retention facilities as parks or urban green space increases the acceptance by area residents and encourages better overall maintenance.

7.3.1 Potential Uses

Appropriate uses for detention/retention facilities include active and passive recreation and urban green space. Uses in addition to flood control should address specific community needs and be clearly identified before the facility is designed.

Active Recreation: Active recreation includes a wide range of activities that involves some type of physical movement. This type of recreational activity - both individual and group - generally requires larger areas than passive recreation uses. Because of their size, regional detention/retention facilities can provide more opportunities for group sports with large space requirements.

Passive Recreation: Passive recreation generally involves individuals or small groups and a minimal amount of physical activity. Typically, passive recreation does not require large open space and is, therefore, appropriate for both large and small detention/retention facilities.

Urban Green Space: Urban green space provides a visual resource within the community. As urbanization continues, the value of green space will increase. Green space provides visual breaks from the urban environment, acts as a filter to clean air and can reduce erosion from wind and rain. Landscape materials in a detention/retention facility should respond to the recessed nature of the land form, the scale of the facility and the occurrence of frequent flooding.

The use of native and non-native species for landscape planting is highly recommended. The following basic zones should be considered in the landscape design for a detention/retention facility.

- Channels: Planting in these areas should be limited to grasses, groundcovers and low growing shrubs, with preference given to vegetation with flexible branching and resilient growth habits.

- Basin Areas: There may be inundation and standing water in basin areas at some time during the year. Choice of plant materials should reflect these conditions. Trees, shrubs and grasses can be planted judiciously in these areas.

- Elevated Areas: These areas may be occasionally inundated. The choice of plant material will depend on the use assigned to the area. Trees, shrubs and grasses can be planted and more easily maintained in areas of higher ground elevation.

7.4 WATERQUALITY

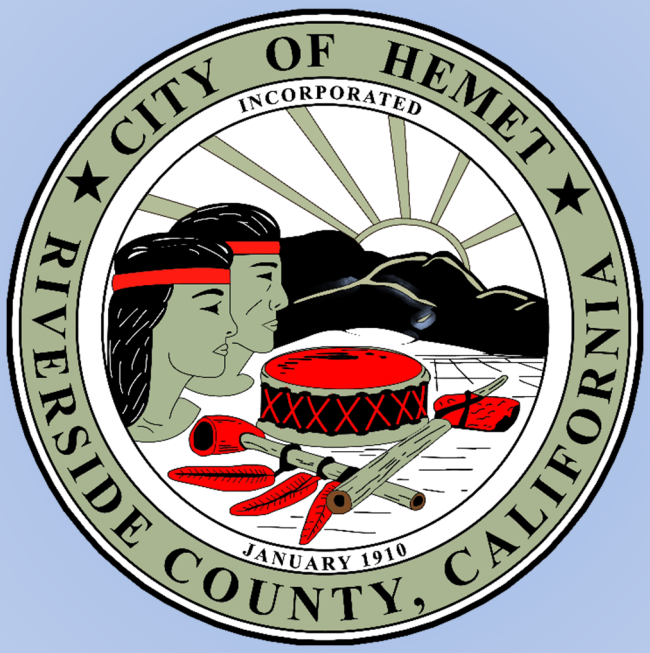
Urban runoff is distinguished from undeveloped area runoff in two principal ways: it occurs at greater discharge rates and volumes, and it contains varying but commonly higher concentrations of toxic substances, bacteria, and dissolved organic matter. Detention/Retention facilities can play a significant role in mitigating the pollution problems associated with urban runoff.

Projects are required to adhere to the National Pollution Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for the Santa Ana River Watershed. A guidance document has been developed for preparation of Water Quality Management Plans within the Santa Ana Region, and is located here: https://rcwatershed.org/watersheds/middle-santa-ana-river-watershed/#83-350-exhibits-1612321337 . A Design Handbook for Low Impact Development Best Management Practices was developed by Riverside County Flood Control and Water conservation district (located here: https://rcwatershed.org/watersheds/middle-santa-ana-river-watershed/#83-438-lid-bmp-design-handbook) to help in the design and implementation of Low Impact Development principles.

7.5 FLOOD ROUTING

Characteristically, the storage of a reservoir is closely related to its outflow rate. In reservoir routing methods, the storage-discharge relation is used for repeatedly solving the continuity equation; each solution is a step delineating the outflow hydrograph.

Basin routing analyses shall be performed per the Riverside County Flood Control and Water Conservation District Hydraulic Design Manual.



Section 8

Erosion and Sediment Control

8
EROSION AND SEDIMENT CONTROL

The clearing and stripping of land for development can cause high localized erosion rates with subsequent deposition and damage to off-site properties. Whereas erosion and sedimentation is a natural process, the intensity is increased by development which can destroy the aesthetic and practical value of other properties, streams and lakes. The purpose of implementing an erosion and sedimentation control plan is to reduce the process to an acceptable level without placing undue burdens on the homeowner, builder or community.

The California State Water Resources Control Board's National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (General Permit) regulates stormwater discharges associated with construction activities, and is issued to projects based upon certain criteria and associated risk levels. Projects that disturb one acre or more of area, or disturb less than one acre but are part of a larger common plan of development, are subject to the General Construction Permit requirements.

All projects, regardless of size, are required to submit erosion control plans as part of their grading permit approval process, which identifies temporary construction best management practices (BMPs) that reduce erosion, sediment control, illicit discharges, and other issues related to stormwater runoff during construction activities.

8.1 Erosion and Sedimentation Process

Soil erosion is the process by which soil particles are removed from the land surface by wind, water or gravity. Most natural erosion occurs at slow rates; however, the rate of erosion increases when land is cleared or altered and left disturbed. The five most common types of erosion include erosion from rainfall impact, sheet erosion, rill or gully erosion, stream and channel erosion, and wind erosion.

Sedimentation is defined as the settling out of soil particles transported by water. Sedimentation occurs when the velocity of water in which soil particles are suspended is slowed sufficiently to allow particles to settle out. Larger particles, such as gravel and sand, settle more rapidly than fine particles such as silt and clay.

Effective construction site management first minimizes excessive soil erosion by keeping the soil stabilized as long as possible, and second directs runoff from remaining disturbed areas to locations where sediments are removed prior to discharge to water courses.

8.1.1 Factors Influencing Erosion

There are four primary factors that influence erosion: soil characteristics,

vegetative cover, topography and climate.

Soil characteristics which determine the erodibility of the soil are particle size and gradation, organic content, soil structure and soil permeability. Soils with a high proportion of silt and very fine clays are generally the most erodible. Organic matter creates favorable soil structure, improving its stability and permeability. This increases infiltration capacity, delays the start of erosion and reduces the amount of runoff Soil characteristics that affect soil stability include permeability and infiltration capacity the less permeable the soil, the higher the likelihood of erosion.

Vegetative cover plays an extremely important role in controlling erosion by shielding the soil surface from the impacts of falling rain, slowing the velocity of runoff, maintaining the soil's capacity to absorb water and holding soil particles in place.

Topography, slope length and steepness are key elements in determining the volume and velocity of runoff As slope length and/or steepness increase, the rate of runoff increases and the potential for erosion is magnified.

Rainfall frequency, intensity and duration are fundamental factors in determining the amount of erosion produced. When storms are fre- quent, intense or of long duration, erosion risks are high. In California, the erosion risk period is typically high in the winter rainy season (Oc- tober through April) except in and near the Sierra Nevada Mountains and southern deserts, where summer thunderstorms may occur.

8.2 Storm Water Programs

The State construction general permit prohibits discharges which do not result from rainfall. However, certain *non-storm water* discharges are allowed if they do not cause a significant pollution problem. Table 11.1 provides examples of *non-storm water* discharges allowable under current law.

The need to protect the environment has resulted in a number of laws and subsequent regulations/programs. At times this has resulted in overlap and ambiguity between programs. This situation is true for storm water programs. The Federal Clean Water Act (CWA), as amended in 1987, is the principal vehicle for the control of storm water pollutants. There are, however, other programs that directly or indirectly deal with the control of storm water pollutants.

8.2.1 Federal NPDES Program

In 1972, the Federal CWA was amended to provide that the discharge of pollutants to waters of the United States from any point source is effectively prohibited, unless the discharge is in compliance with the National Pollutant Discharge Elimination System (NPDES) permit. On November 16, 1990, U.S. Environmental Protection Agency (EPA) published final regulations that establish application requirements for storm water permits for specific categories

of industries. Construction activities of five (5) acres or more (or less than 5 acres if part of a common plan of development or sale) are defined in the regulations as an industrial activity.

8.2.2 State NPDES Program

In California, the NPDES storm water permitting program is administrated by the State Water Resources Control Board (SWRCB) through nine Regional Water Quality Control Boards. The SWRCB has established a construction general permit that can be applied to most construction activities in the State.

8.2.3 Municipal NPDES Program

Municipalities with a population of over 100,000, drainage systems interconnected with these municipalities' systems or municipalities determined to be significant contributors of pollutants are required to obtain an NPDES storm water permit. In California, most of the major urbanized counties have already obtained an NPDES storm water permit.

Municipalities with NPDES storm water permits for their own municipal separate storm sewer system are responsible for developing a management program for construction activities in their jurisdiction. The program addresses appropriate planning and construction procedures; ensures the implementation, inspection and monitoring of construction sites which discharge storm water into their systems; and provides for education and training for construction site operators.

8.3 Storm Water Pollution Prevention Plans

The following discussion provides guidelines for the development and implementation of a storm water pollution prevention plan (SWPPP) for a construction project.

Stormwater Pollution Prevention Plans shall be prepared per the current Order WQ in effect at the time of construction of the project. The current order, and instruction for preparing a Stormwater Pollution Prevention Plan, including Risk Determination and monitoring/reporting requirements can be found on the State Water Resources Control Board website at the following location: https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html .

Stormwater Pollution Prevention Plans must be prepared by a Qualified Stormwater Pollution Prevention Plan Developer (QSD), and projects are required to submit the SWPPP on the SMARTS website and apply for a Notice of Intent (NOI), in which they will receive a WDID number. This WDID number must be included on the grading plans/erosion control plans for the project.

8.4 City Erosion Control Plan (ECP) Requirements

The Stormwater Pollution Prevention Plan is a state-wide requirement, however, Erosion Control Plans must be submitted to the City for review and approval as part of the grading permit application. Plans must be consistent with the City's municipal code related to Erosion and Sediment Control.

The California Stormwater Quality Association (CASQA) has developed BMP Handbooks (located here: https://www.casqa.org/resources/bmp-handbooks) which include BMP Factsheets for development of the erosion control plan.

The ECP must be consistent with the proposed grading plan for the project site. The ECP shall identify the construction BMPs utilized for the project site, including location, applicable CASQA reference number.

Additional resources can be found on the City's website in the Grading and Erosion Control Standards, dated June 11, 2013.