



**CITY OF CITRUS HEIGHTS
ADMINISTRATIVE POLICES
AND PROCEDURES**

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SUBJECT: DRAINAGE & DEVELOPMENT POLICY AND PROCEDURE

- I. Purpose
- II. Abbreviations & Definitions
- III. Guidelines for Building within a 100-year floodplain
- IV. Guidelines for Requiring a Drainage Study
- V. Scope of Drainage Study
- VI. Erosion, Overland Release, & Easements
- VII. Roadside Culverts
- VIII. Pipe Materials
- IX. Water Quality

I. PURPOSE

The purpose of the Drainage and Development Policy is to provide City employees with direction and guidance when reviewing an applicant's request for improvements affecting the existing land and drainage. This policy also provides guidance to the drainage study requirements for the various development projects.

II. ABBREVIATIONS & DEFINITIONS

- a. Best Available Data –County hydraulic studies, Federal Insurance Rate Map (FIRM), historical service requests for flood assistance, and historical flood data are available for most areas throughout the city. The applicant will be required to utilize all this data to determine the most restrictive flood elevation.
- b. FEMA – Federal Emergency Management Agency
- c. FIRM – Federal Insurance Rate Map
- d. HEC-1, HEC-2, HEC-RAS - flood hydrograph programs used by many hydrologic engineers to model the rainfall-runoff process. HEC-1 models the rainfall shed, HEC-2 models channel flows and water surface elevations in the channel, and HEC-RAS models channel flows and detention/retention basin flows into the channels.
- e. HGL – Hydraulic Grade Line. The surface or profile of water flowing in an open channel or a pipe flowing partially full. If a pipe is under pressure, the hydraulic grade line is at the level water would rise to in a small vertical tube connected to the pipe.
- f. LOMA – Letter of Map Amendment. A process used by FEMA to amend the FIRM to reflect current or proposed changes to the special flood hazard area (100-year flood plain).

- g. Q – Flow Rate, typically expressed in cubic feet per second. An increase in Q through a fixed channel will result in higher water surfaces.
- h. USGS – United States Geological Survey.

III. GUIDELINES FOR BUILDING WITHIN A 100-YEAR FLOODPLAIN

- 1) Citrus Heights has taken a more stringent approach to protecting the flood hazard area. In most circumstances, staff shall not permit new structures, garages, parking lots, swimming pools, road, driveways, re-construction of existing structures, placement of fill, or solid & chain-link fencing in the the 100-year floodplain (based on current Flood Insurance Rate Map (FIRM)).
- 2) Staff shall deny an applicant entitlement to build structures or fill within the floodplain except under the following conditions:
 - a) Applicant’s drainage study along with the County’s worst case scenario for the 100-year flood elevation indicate that the existing topography is actually outside the 100-year flood elevation and the applicant is proposing to elevate the finished floor elevation by 2 feet. The applicant will need an elevation certificate certified by a land surveyor. For a commercial application, the applicant will need a letter of map amendment (LOMA) to remove the land from the Flood Insurance Rate Map (FIRM) flood zone. The applicant may also need to show that the existing topography is not a result of illegal fill. Staff will consult the USGS map and other available resource to validate that the topography was not illegally filled.
 - b) Applicant is constructing a small bridge or culvert to provide access to both sides of the single piece of property. The design may need California Department of Fish & Game approval.
 - c) Applicant’s existing parcel has the minimal developable area above the 100-year flood plain. This may mean filling-in an area of the floodplain to access this developable area. Any filling would require removal of an equal volume of soil in the floodplain.
 - d) A parcel map may not split lots that will need access through the floodplain or will not meet the required lot size square footage above the flood hazard as given by the “Sacramento County Floodplain Management Guideline” (based on zoning, see a copy in Attachment A).
 - e) Applicant is adding a 2nd story and elevating the existing home above the 100-year flood hazard zone by a minimum of 2’.
- 3) Constructing a small bridge or culvert is permissible. Typically, these cases are on large parcels split by a creek or man-made channel. The recommended construction method for accessing undeveloped land and uninhabitable structures is a small culvert to maintain the low-flow within the channel and culvert. Large flows (greater than a 2-year event) should overtop the culvert without adversely impacting the water surface elevation on the upstream and downstream and adjacent creek side properties. For accessing habitable dwellings the bridge or culvert must carry the 100-year flows under the bridge or culvert without overtopping.

- 4) All parcels which have a portion of the lot within the 100-year flood plain shall complete an Elevation certificate and submit the application to Federal Emergency Management Agency (FEMA) and the City for approval. Copies of the certificate will be placed in the building permit file and engineering files of elevation certificates. Elevation certificates are valid only if stamped by a licensed surveyor or civil engineer.
- 5) Landscaping and specific fencing are the only development allowed within the 100-year floodplain. Fences may be wrought iron, post and cable, and rail fencing. Chain link and solid wood fences are not allowed within the flood hazard area.

IV. GUIDELINES FOR REQUIRING DRAINAGE STUDIES

- 1) Every project needs some type of drainage analysis. This is not to say that every drainage study needs a hydrologist or civil engineer. In many cases, the drainage study includes simple topographical analysis of the property and surrounding properties to assure staff that the development is not impeding existing drainage flows, or, if it is, the drainage is properly routed in channels.

If the project fits one or more of the following criteria, it will require a drainage study:

- a) From the best available data, a portion of the site is within a flood hazard. Many times only a portion of the property is within the 100-year FIRM flood plain.
 - b) Available historical information from operations personnel or citizens complaints indicates a localized flooding problem.
 - c) Existing topography indicates storm flows ingress and egress from the property from/to other private property or channels.
 - d) Developer is re-routing drainage channels and/or overland release for this project.
 - e) The existing storm drain easements on the property or adjacent property inexplicably appear to terminate. This may indicate incomplete data.
 - f) A storm drain used by the development is known to be undersized or inadequate.
 - g) Development of more than 1 acre or more into commercial or multiple subdivision lots.
- 2) If the parcel does not fit any of the above criteria and it is apparent that the drainage is contained within the site and channeled to a public street, no study is necessary. Redevelopment of a site with adequate existing drainage system is one example of not needing a drainage study.

V. SCOPE OF DRAINAGE STUDY

When required to perform a drainage study, the Drainage Engineer shall prepare a memo stating the criteria using one of three designated levels. The levels are progressive in that a level II study includes all the requirements of a level I plus the level two requirements. Level III study requires all the requirements be met from the level I & II study. Several variables are evaluated to determine the level of study. The following are brief descriptions of the three levels and what factors would trigger upgrading the study requirements to the next higher level. The applicable runoff design method may be found in the County of Sacramento Improvement Standards, Chapter 9 section 10 and the City/County Drainage Manual, Hydrology Standards.

1) Level I Drainage Study

A Level I drainage study does not require the services of a registered engineer or hydrologist but will require the services of a licensed surveyor to gather the topographical information. The following information must be provided in a Level I drainage study:

Prepare initial site plan exhibit in a 1" to 10' to a 1" to 200' scale showing the following:

- a) Existing 1' contours
- b) Proposed grades (topography)
- c) New & existing storm drainage infrastructure
- d) Drainage swales
- e) Drainage easements
- f) 100-year FEMA flood line or County 100-year projected flood line –the more stringent of the two(if applicable)
- g) Adjacent property and street drainage flows
- h) 100 year overland release point(s)

2) Level II Drainage Study

A Level II drainage study requires the applicant to contract the services of a civil engineer to size the drainage pipes and swales. Typically this level of detail is triggered by proposing a large commercial or residential project, projects that must utilize storm drain conduits and projects with existing storm easements and/or channels ingressing and egressing the property. The following information must be provided for a Level II drainage study:

- a) Complete Level I analysis
- b) Q flows in & out of the property (requires a complete drainage shed map)
- c) Calculations of swale capacities proving the 100 year event will be contained in the swale
- d) Calculations for storm drain conduit capacities
- e) The 10-year HGL at each storm appurtenance (catch basins, headwalls, pipe inlets, and manholes) within the drainage study area

3) Level III Drainage Study

A Level III drainage study is appropriate for a large site (5 acres and larger), sites partially located in the flood plain, or constructing a project that will directly impact the existing 25-year and 100-year water levels on one of the five creeks running through Citrus Heights. Normally, a hydrologist, civil engineer and land surveyor will work together to complete the modeling and analysis. The scope of work would include developing creek and channel cross-sections for modeling the water surface level at various storm levels (Qs). The following information must be provided for a Level III drainage study:

- a) Complete Level I & II analysis
- b) Creek impact study above, below, and adjacent to the proposed development - HGL impacts. Work may include a HEC-1, HEC-2, HEC-RAS and/or other acceptable methods of modeling. The model shall be approved by the City Engineer in concert with Sacramento County drainage modeling techniques.

VI. EROSION, OVERLAND RELEASE & EASEMENTS

a) CREEK & CHANNEL FLOODWAY EROSION

- 1) The City will not expend resources for creek or natural channel erosion control except in an emergency or when a public facility is threatened. An emergency is constituted when the expected resulting property damage will exceed \$5,000.
- 2) Property owners may obtain a permit to construct erosion protection improvements within a creek or natural channel. Permits are needed from three agencies – City, Fish & Game, and Corps of Engineers. The more restrictive construction requirements of the agencies will be used.
- 3) Construction of erosion protection projects shall be limited to the months of April through September.
- 4) Acceptable erosion control measures within a creek are engineered rock with jute fabric or filter fabric underneath, reconstruction of the embankment with well compacted native mixed with jute fabric and an organic vegetation, or as approved by the City Engineer.
- 5) No broken concrete or mortar may be placed within a creek channel or floodway.
- 6) Concrete, mortar, or concrete bricks may be used for erosion protection in the floodplain but outside the floodway, creek or channel.

b) CONSTRUCTION OF CONDUITS & OVERLAND RELEASE CHANNELS

- 1) The minimum size of a publicly owned storm conduit shall be 12” in diameter.
- 2) Conduits within a public easement or right-of-way (R.O.W.) shall be buried a minimum of 30” below existing or final grade.
- 3) New conduits within a street R.O.W. shall be reinforced concrete pipe (RCP).
- 4) Re-placement of existing conduits through side-yards may be PVC SDR-35 pipe.
- 5) To the maximum extent possible, the 100-year storm event shall be carried overland in channels or be detained within the street R.O.W. If the storm water for the 100-year is designed to be detained within the street R.O.W., the maximum depth of water shall not exceed 0.8’.

c) EASEMENTS

- 1) Storm drain easement dedications shall be a minimum of 15’ in width. Easements shall not straddle property lines. The City’s preference is all storm drain lines will be placed within the street R.O.W. under pavement.
- 2) If an overland release for the 100-year storm event is designed through private property, the easement and swale shall not be split perpendicular between two lots.
- 3) If possible, swales on private property shall be no deeper than 2’ with a 4:1 side slope. Grass, cobbles, concrete, or ground cover may be used within the swale. Trees or larger plants within a swale are discouraged.
- 4) A public easement through private property shall be marked with concrete marker or brass monument in the sidewalk at the edge of R.O.W. or back of sidewalk. The marker or monument shall indicate the size of pipe and have an arrow pointing into the parcel in the direction the pipe is laid.

VI. INSPECTION FOR DRAINAGE

Staff will inspect all development projects, large or small, for proper drainage. A minimum of two inspections will be required. The initial inspection will be made at the submittal stage with the site plot plan by the development review engineer. The next inspection will be conducted prior to building permit final. Interim inspections will be at the discretion of the engineer and may depend on the project size.

VII. ROADSIDE CULVERTS

The City will not construct new roadside culverts for residential driveway unless it is part of a project to widen the street or install sidewalks. Typically, the property owner will need an encroachment permit to install a culvert. With an application for an encroachment permit or a service request for a culvert, the drainage coordinator will evaluate the situation and recommend solutions to the property owner. If a culvert is acceptable, the new culvert must be a minimum of 12” in diameter. Acceptable materials are 12 gauge corrugated metal pipe (CMP) or reinforced concrete pipe (RCP).

The applicant’s encroachment permit must include a plan and profile sketch of the installation on at least 8 ½ x 11 sized paper. The roadside ditch may have to be deepened to accept a 12” culvert pipe with a minimum of 6” of cover. If the applicant cannot do this because there is no existing ditch or the ditch is too shallow, then the city will analyze the situation and possibly provide assistance in carving ditches and depressing the driveway to allow flows over the driveway.

VIII. PIPE MATERIALS

CMP: Corrugated Metal Pipe is an acceptable culvert material for conduit distances **not to exceed 150’**. Distances exceeding this length have suffered substantial corrosion and will not last as long as RCP or PVC.

RCP: Re-inforced concrete pipe is acceptable for all applications and is the preferred material for its longevity. However, due to the substantial weight, it may be difficult to use in tight easements such as retrofits and replacements on private residential lots.

PVC: Polyvinyl Chloride Pipe is acceptable for tight easements such as retrofits and replacements on private residential lots where it is difficult to use heavier concrete pipe. This pipe may not be substituted under public streets.

IX. WATER QUALITY

Erosion and Sediment control standards shall be an integral part of every permit and project within Citrus Heights. Projects over 1 acre and projects with more than 5000 sf of pavement must submit a Storm Water Pollution Prevention Plan (SWPPP) prior to receiving a grading permit. The Development Review Engineer will use the “revised SWPPP checklist” located in the Engineering Directory. A copy of the SWPPP will be filed in engineering.

The construction inspector and drainage coordinator will be responsible to conduct on-site inspections of construction projects. All inspections will be documented and filed appropriately. Any required action by the contractor that will take more than a day will be documented with a follow-up inspection.

All projects required to construct a permanent Best Management Practices (BMPs) that includes a vault or manhole underground structure shall be required to execute a “Storm water Access Agreement”. This agreement will allow the City to inspect on private property for conformance to the maintenance standards required for the installed BMP facilities. Executed agreements will be filed and a copy placed in the Drainage Coordinator’s Inspection Log book. Inspections of these structures will be conducted at least once a year.

will prohibit such structures from being constructed. Specific minimum buildable areas are proposed to create areas where normal property uses will not be prohibited by policy.

1. Deny creation of parcels that do not have buildable areas outside the 100-year floodplain. The buildable area may be constructed by the placement of fill as long as it conforms to the other policies contained herein. The minimum buildable area per lot required for specific zoning is defined below. Note that for the purposes of this policy, "buildable area" only refers to the area above the 100-year floodplain. The entirety of this area may not be buildable due to setbacks or other requirements.

AR-5 or larger:	1.00 acre
AR-1, AR-2, RD-1:	0.50 acre
RD-2:	0.25 acre
RD-3, RD-4:	7,500 square feet
RD-5 to RD-7:	entire lot or 5,200 square feet, whichever is less
RD-10 and denser:	entire area except parking lots, streets, and open common areas
Commercial and Industrial	Entire area except parking lot, streets, and landscaping, unless pier foundations are approved.

2. For residential zoning, the area outside the 100-year floodplain must be contiguous or reasonably situated to provide buildable area for a residence and associated structures, such as pools, sheds, barns, and detached garages.
3. Buildable areas above the 100-year floodplain must be constructed prior to map recordation. Floodplain and/or floodway easement will be required over the floodplain outside the buildable area. Exceptions may be made for parcel maps provided a condition of approval is attached to the map requiring site plan review prior to issuance of building permits. Requirements including locations of excavation and fill, limitations on fill in the floodplain, etc. will be clearly indicated in the conditions of approval.

Access

Minimum access is required for all newly created parcels to allow ingress-egress during storm events. This is required for emergency access and to avoid creating "islands" during normal flooding. The idea is to provide "reasonable" access, but what is reasonable is highly subjective. At a minimum, access should be above the 10-year flood elevation, to minimize the occurrences of restricted access.

The least number of watercourse crossings are encouraged to minimize the impact to flood elevations, as well as to the riparian corridor.