

- d. Pad elevation shall be a minimum of one (1) foot above the 100 year 10-day storm water surface elevation.
- e. The flow between the front yard and back yard cannot be obstructed. The storm water must be allowed to equalize to the same level between the front yard and back yard.
- f. A permanent perimeter wall or barrier around the development is required to contain the 100 year 10-day storm developed runoff.
- g. The high point of the street should be four inches above the 100 year 10-day storm water surface elevation.

22.5 Developing in or Adjacent to a Flood Zone

22.5.1 Grading

Grading will not be allowed within a FEMA Special Flood Hazard Area (flood zone) without an approved grading and drainage plan and a Floodplain Development Permit.

A letter of Map Revision will be required when development changes a mapped flood zone. The City Engineer may waive the LOMR requirement for projects involving one acre or less.

22.5.2 Compensatory Volume

1. Compensatory volume is a volume that is provided in the proposed condition that mitigates the displaced volume associated with development. This is most important in AH zones (areas of ponding 1 to 3 feet deep) and ponding AE zones.
2. In an AH or ponding AE Zone the drainage plan is to state the amount of displaced volume in the mapped flood zone and show where this volume is to be accommodated in the proposed condition.

22.5.3 When developing adjacent to or in an AO Zone, the cross-sectional area of the flow path is to be preserved. This is to be demonstrated in the drainage plan.

22.5.3.1 Determination of Base Flood Elevation (BFE) in an AO Zone:

If flooding is conveyed by the street, provide the highest top of curb or crown along the property line and add the AO Zone depth (e.g AO 1) to the higher of the two elevations; top of curb or crown.

If the entire property is inundated and the flow is not conveyed by the street, calculate an average grade for the site and add the AO zone depth to the average grade.

If the property is partially inundated and the street does not convey the flow, add the AO Zone depth to the lowest lot elevation.

22.5.4 For developing adjacent or in an unnumbered A Zone, the base flood elevation will be determined by best available data or if no data is available the BFE is 2 feet above the highest adjacent grade.

22.5.5 Floodplain Development Permit

A Floodplain Development Permit is required for any construction in a mapped flood zone as provided by FEMA. This requirement may be waived if the work is minor (e.g. drivepad) and will not result in a change to the water surface elevation or flow path.

22.5.6 Letters of Map Change (LOMC)

Map changes come in the form of Letters of Map Revision (LOMR), Letters of Map Amendment (LOMA), Letters of Map Amendment based on Fill (LOMR-F) and conditional LOMR and LOMR-F (CLOMR, CLOMR-F)

1. A LOMR, if approved by FEMA, will change/remove the mapped flood zone from the Flood Insurance Rate Map (FIRM).
2. A LOMA, if approved by FEMA, will not change the FIRM, but will remove the structure or property from the flood zone for insurance purposes.
3. A LOMR-F, if approved by FEMA, will not change the FIRM, but will remove the structure or property from the flood zone for insurance purposes. If fill was imported to raise the structure above the Base Flood Elevation (BFE), the LOMR-F and not the LOMA is to be submitted to FEMA.
4. A conditional map change (CLOMR, CLOMR-F) is submitted to FEMA prior to grading/building to obtain their approval or receive comments on the proposed project. A conditional map change is always recommended as it shortens the review time upon the completion of the project and minimizes unexpected review responses from FEMA. CLOMR and CLOMR-F's must demonstrate compliance with the Endangered Species Act.

For more information on the above mentioned letters of map change, refer to FEMA's website.

22.5.7 Project requirements:

1. If the project proposes any grading in a regulated floodway, an approved CLOMR is required prior to beginning grading operations or receiving project approval at the Development Review Board or prior to Building Permit approval.
2. The lowest finished floor elevation is to be a minimum of 1 foot above the Base Flood Elevation (BFE).

3. An elevation certificate is required to be submitted to the Floodplain Administrator and deemed acceptable prior to obtaining a Certificate of Occupancy for the building. It is advised to follow-up with a LOMR-F or LOMA to remove the building from the flood zone.

22.6 Downstream Capacity and Offsite Flows

Downstream capacity and offsite flows are the most important elements of a successful drainage report/plan. The engineer is expected to research adjacent projects, as-built storm drain construction plans and Drainage Master Plans to correctly identify downstream capacity. See the Valley Drainage Criteria section if the project is in the valley.

The engineer is also expected to perform a site visit, review topography and review adjacent drainage reports/plans to accurately identify offsite flows.

22.6.1 The drainage report/plan shall accurately state allowable downstream capacity. In the case, where the project is a small redevelopment project (less than 0.5 acres) and not in the valley, proposed flows not to exceed historic flows is most likely acceptable. Some small sites may have a history in which proposed flows may have to be less than historic flows.

22.6.2 The drainage report/plan is to show the location and quantify offsite flows. In general, sites are to except offsite flows and convey them safely to an acceptable outfall. A site may not have to accept offsite flows if a previously approved plan shows the outfall adjacent to the site and flows can be safely conveyed to an acceptable outfall.

22.6.3 If the only reasonable outfall for a proposed development is a historic flow path through an adjacent private property, the historic flow characteristics and path must be maintained.

22.7 Engineered Channels and Natural Arroyos

1. General Hydraulic Criteria

In general, all open channels should be designed with the tops of the walls or levees at or below the adjacent ground to allow for interception of surface flows. If it is unavoidable to construct the channel without creating a pocket, a means of draining the pocket must be provided on the drawings. All local drainage should be completely controlled. External flows must enter the channel at designated locations and through designated inlets unless specifically otherwise authorized by the City Engineer.

2. Sharp Curves

In making preliminary layouts for the routing of proposed channels, it is desirable to avoid sharp curvatures, reversed curvatures, and closely-spaced series of curves. If this is unavoidable, the design considerations in Section C-3 below must be followed to reduce superelevations and to eliminate initial and compounded wave disturbances.

3. Maximum Froude Number