



CITY of CALABASAS

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*Public Works Policy Number 225*

*Approved By:*

**Robert Yalda - Public Works Director/City Engineer**

## **“HYDROLOGIC AND HYDRAULIC DRAINAGE REPORT REQUIREMENTS”**

The following items are required as the basis for design of the project’s drainage system. The construction plans, showing configuration of surface facilities and sizing of hydraulic conveyance structures, result from the information derived in preparation of this report. The content of the report is intended to develop the necessary information in a logical, cogent manner and with appropriate cross-references in the report and notes on the plans in order that a plan review can be readily conducted. Calculations, sketches, and plan notes provided by the report writer/designer must clearly show the design process which results in completion of the construction plans. When finished plan sheets are used in lieu of design sketches, appropriate titles and clear cross-references must be provided in the report and on the plan sheets to enable a reviewer to follow the design/calculation process.

Each project is generally required to prepare and submit two reports:

1. Preliminary Hydrologic and Hydraulic Drainage Report at the conceptual level submittal. The purpose of the Preliminary Drainage Report is to conceptually define the nature of the proposed development or project, describe all existing conditions, and identify drainage impacts on the site and other properties, particularly down slope properties, as a result of proposed vegetation removal or change in natural grades, drainage, and impervious surface. The report shall identify pre-developed vs. post-developed runoff volumes and patterns based on preliminary site plan layout. Water quantity and water quality impacts shall be identified, and mitigations provided. Feasibility approval will be based on adequate documentation that the project will adequately mitigate all potential drainage impacts due to the development.
2. Final Hydrologic and Hydraulic Drainage Report at the final design level submittal. The Final Drainage Report shall be a detailed study and analysis of the proposed development. The report shall include, without limitation, the hydrologic and hydraulic analysis for the sizing of the required storm drain system. Construction plans for all drainage structures, grading plans, and street grades where applicable, shall be considered part of the Final Drainage Report.

Each Hydrologic and Hydraulic Drainage Report submitted in conjunction with improvement plans for parcels of land which require drainage analysis, shall be 8<sup>1</sup>/<sub>2</sub>" x 11" size, bound between stiff paper covers. Should the drainage concept change between preliminary and final design level submittals, the Final Hydrologic and Hydraulic Drainage Report shall address those changes in a separate section of the report. The following outline is a structured format, including the contents, of the report which the applicant is required to follow to provide information applicable at each level of project submittal, i.e. conceptual or final design level. Sections that are not applicable should be noted as "N/A".

Cover Sheet, which includes:

1. Title of Report

Example: Final Hydrologic and Hydraulic Drainage Report

a. For Tract/Parcel

b. Project Address

2. Project Location. A brief description of the project with reference to the minor and major street system.

3. Seal and Signature of a California Registered Professional Civil Engineer.

4. Name and address of client for which, or whom, the report was prepared.

5. Report date (with revision dates when applicable).

6. Table of Contents-

Show page numbers on all pages of report including calculation sheets.

7. An "Introduction" in a narrative form with properly objective syntax and which includes:

i) Legal description of project, along with a Location Plan at appropriate scale to show the physical relationship of the project to nearby properties, as well as major streets and waterways within the immediate vicinity.

ii) A description of existing development within the watersheds affecting the project itself.

iii) A description of future development anticipated within the watersheds affecting the project, including the use(s) planned for the project.

iv) When submitting a subdivision map, include a recent aerial photo of the project area, at a scale no smaller than 1" = 1,000' extending at least 300 feet outside the project boundaries.

v) Description of any physical features within the project, or contributing watersheds, which might be noteworthy from the standpoint of hydrologic and/or hydraulic considerations, such as natural watercourses, ground cover, soil types, etc.

vi) A brief summary of any historical hydrologic and/or hydraulic information known to be available for the project. The source and date of information should be included.

8. A "References" section, which contains all sources and dates of information used to compile the report.

Examples:

- a) "Los Angeles County Hydrology Manual," Los Angeles County Department of Public Works, Water Resources Department, Revised January 2006.
- b) "Los Angeles County Sedimentation Manual", Los Angeles County Department of Public Works, Water Resources Department, Revised March 2006
- c) "Low Impact Development Standards Manual", Los Angeles County Department of Public Works, February 2014
- d) "Highway Drainage Guidelines," AASHTO, 2007 Others ... e.g., " Handbook of Hydraulics", 8th Edition,", James E. Lindell, Wade P. Moore, Horace W. King.

9. An "Objectives" section, which includes a brief description of the purpose of the report in relationship to development of the project.

10. A "Procedure" section in narrative form, which briefly describes the methodology and assumptions used in preparing the report and includes a statement of the applicable detention/retention requirements (if any) to which the proposed development must adhere.

- a) Describe the problem (identify each major part thereof).
- b) Describe the generalized solution—include pertinent input data and significant results, references to computer programs utilized (e.g., "Rational or Modified Rational Method")

11. Identify key points on drainage maps (points of concentration, inflow from offsite and points of discharge). Show that the "objectives" have been achieved.

Identify point of connection (watercourse, flood control facility (storm drain, channel) by name, designation, size and ownership.

12. A "Hydrology" section, which includes:

- a) A drainage map for the project at a scale of no less than 1" = 100' which clearly delineates and labels, and shows Q in (cfs) and A (acres) for all concentration points and drainage areas which may affect the project. Contours at an appropriate interval (generally 1' and maximum 2') and clearly outlined drainage areas will be shown.
- b) Hydrologic data sheets for concentration points being considered. These sheets must be clearly labeled such that a correlation may easily be made between the data sheets and the corresponding concentration points on the drainage-basin map. For micro sub-areas, a calculation for an upstream tributary area of up to 50 acres may be performed and the run-off yield (cfs/Ac) applied to the indicated micro sub-area.
- c) A summary table with a listing of all concentration points and corresponding drainage areas. Where temporary detention is required, include the calculated peak discharge rates for both pre-development and post-development conditions.

13. A Detention/Retention section (if required), which includes:

- a) A site plan which clearly shows the location of all proposed detention and/or retention systems, including the location, size, and type of inflow and outflow structures. Flow arrows and drainage divides shall also be labeled on the site plan, as well as  $Q_{100}$  W.S. elevation, design detention volume and secondary outlet overflow elevation.
- b) A description of how the detention/retention scheme will comply with landscaping requirements and grading criteria. Basin shape, depths, and side slope variations shall be shown both on the site plan and on typical cross sections. Provide inflow and outflow hydrographs (where necessary) for design of project drainage system.
- c) For cases where the required detention volume is established by the Los Angeles County Flood Control District, the detention basin and outlets shall be designed for maximum allowable discharge in accordance with conditions of the development as required by the City of Calabasas.

14. A "Computations" section, which includes: All hydraulic data sheets prepared to determine the depth of flow, velocity of flow, Froude number, pertinent x-sectional data, street capacity calculations, catch basin and pipe sizing, freeboard hydraulic calculations for detention inlets and outlets, energy and hydraulic grade line calculations (show results on plans) including all losses and show critical and normal depths. Show that finished floor elevations are above  $Q_{100}$  W.S. elevation.

- a) If computer analysis is employed, the reproduced sheets must be legible and must be prominently labeled for ready identification of all critical points, anomalies and/or points used as reference in the descriptive materials.
- b) All hydraulic calculation sheets prepared in analyzing the influence upon the drainage, within and/or adjacent to the project, from existing and/or proposed structures to include, but not limited to, levees, culverts, inlet/outlet structures, bridges, and roadways which act as weirs.

15. Provide detailed sketches to identify hydraulic structures with data labeled for expeditious review.

16. Include: Generic formulae with all variables identified and defined with applicable dimensional units, and page number and reference material identified from "References" section of report.

17. A copy of a contour map or, if the project involves subdivision of land or commercial/industrial development, a copy of the tentative map and/or site plan.

18. A "Stormwater Quality" section, which discusses the long-term post-construction Best Management Practices ("BMPs") that are being implemented within the project. This section shall include all calculations required to demonstrate that the proposed BMPs meet the design criteria based on the required volume of treatment. The hydraulic effects of structural measures on the proposed storm drain system shall be considered in the "Computations" section.

**NOTE: THE STORMWATER QUALITY BMP'S SELECTED, SHALL BE SUBMITTED TO AND APPROVED BY THE ENVIRONMENTAL SERVICES DIVISION, CITY OF CALABASAS PUBLIC WORKS DEPARTMENT.**

19.A "Results" section, which briefly discusses or displays clearly the findings of the report or calculations. Included would be table-labeling data and results of any hydraulic analyses at a minimum. Summarize the results with respect to objectives. Make specific statements. Explain implication of calculations and other findings to show that the conceptual design resolves the hydrologic and hydraulic problems identified.

20.A "Conclusions and/or Recommendations" section which describes in detail how the drainage affecting the project will be controlled in a manner which will allow the development to occur as intended without conflicting with any applicable State and County or City of Calabasas regulations or without adversely affecting adjacent properties and/or the project itself. Conclusion shall include a definitive statement regarding the protection of adjacent structures (proposed or existing) from inundation during a 100-year event. (Include a statement that all adjacent structures are protected from a  $Q_{100}$  WSEL= )

21. Appendix to include:

- a) Letters from adjacent owners regarding easements to be granted (permanent, temporary, construction, flowage, etc.).
- b) Erosion/sedimentation analysis results with qualified analysis engineer identified.
- c) Other applicable correspondence.
- d) Copies of any material not widely published used as reference in the body of the report.

22. Map Pockets

Pockets to accommodate maps folded to 8" x 11" size to fit report without overlap of edges.

Additional items:

Improvement plans are required to include the following information:

1. For all public storm drain and larger private storm drain improvements, the design hydraulic grade line and velocity information shall be included on the profile portion of the improvement plans. ( $WSE_{10} = /WOW$  cfs and  $V_{10-44.}$  fps)
2. Improvement plans shall indicate the maximum design Water Surface Elevation (WSE) of detention basins within parking lots by a dashed outline on the improvement plans and shall be labeled with " $WSE_{100} = XX.XX$ "

**Please note the following:**

Owners of projects with detention basins shall complete and execute a "Declaration of restrictive covenant for detention basin perpetual maintenance."

Owners of projects subject to post-construction stormwater quality best management practices shall complete and execute a stormwater quality maintenance covenant as provided by the Environmental Services Division, City of Calabasas Public Works Department. Where the project is conditioned to provide Covenants, Conditions and Restrictions (CC&R's), the maintenance covenants, provisions, declarations and remedies associated with these agreements shall be reflected therein.