



**CITY OF OXNARD – ENGINEERING DIVISION  
REQUIRED FORMAT AND CONTENTS  
HYDROLOGIC AND HYDRAULIC DRAINAGE REPORTS**

This report will provide a basis for design of the drainage system for the subject project. 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 format 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 that results in the finished construction plans. When finished plan sheets are used in lieu of design sketches in the report, provide appropriate titles and clear cross-references in the report and on the plan sheets to enable a reviewer to follow the design/calculation process. Each Hydrologic and Hydraulic Report submitted in conjunction with improvement plans for parcels of land which require drainage analysis, shall be 8½" x 11" size, bound between stiff paper covers, and shall contain the following:

1. A "Cover Sheet," which includes:
  - a. Title of Report  
Example:  
Final Hydrologic and Hydraulic Drainage Report  
For Tract ##### (or Planning and Zoning Permit ##-###-###)
  - b. Approximate location. A brief description of the project with reference to the minor and major street system.
  - c. Seal and Signature of a California Registered Professional Civil Engineer.
  - d. Name and address of client for which, or whom, the report was prepared
  - e. Report date (with revision dates when applicable).
2. Table of Contents organized in format shown herein with identical headings and subheadings. Show page numbers on all pages of report including calculation sheets.
3. An "Introduction" in a narrative form with properly objective syntax and which includes:
  - a. 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.
  - b. A description of existing development within the watersheds affecting the project itself.

- c. A description of future development anticipated within the watersheds affecting the project, including the use(s) planned for the project.
  - d. 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.
  - e. 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.
  - f. 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.
4. A "References" section, which contains all sources and dates of information used to compile the report. Examples:
- a. "Modified Cook's Method for Stormwater Runoff Calculations," City of Oxnard, Public Works Department, Standard Plan Plate #59.
  - b. "Ventura County Hydrology Manual," Ventura County Flood Control and Water Resources Department, Revised 1978.
  - c. "Master Plan of Drainage," City of Oxnard, June 1979.
  - d. "Street and Highway Drainage Volume I—Design Principles and Methods," Institute of Transportation and Traffic Engineering," University of California, 1969.
  - e. Others ... e.g., "Handbook of Hydraulics," 6th Ed., H.W. King and E.F. Brater, McGraw-Hill, New York, 1983.
5. An "Objectives" section, which includes a brief description of the purpose of the report in relationship to development of the project. Objectives must be consistent with the City of Oxnard "Master Plan of Drainage."
6. 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., "The LACFCD Water Surface Profile").

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

7. A "Hydrology" section, which includes:
  - a. A drainage-basin map over a City of Oxnard base 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.
8. 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 sideslope 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 Ventura 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 Oxnard.
9. A "Computations" section, which includes:

- a. 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.
- b. 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.
- c. 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.

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

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.

10. 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.
11. 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 of the Stormwater Quality Urban Impact Mitigation Plan ("SQUIMP") and the Technical Guidance Manual for Stormwater Quality Control Measures ("TGMSQCM"). This section must include completed copies of all "Design Procedure Forms" from the TGMSQCM applicable to the BMPs implemented. This shall include a discussion of pollutants of concern anticipated from the proposed use and why the chosen BMPs are the appropriate solution.
12. 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.
13. 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 Oxnard 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= \_\_\_\_\_ )

14. 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.

14 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. ( $WSE_{10} = \#\#\#\#$  cfs and  $V_{10} = \#\#\#$  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 " $WSE_{100} = \#\#\#\#$ "

Please note the following:

1. Owners of projects with detention basins shall complete and execute a "Declaration of restrictive covenant for detention basin perpetual maintenance."
2. Owners of projects subject to post-construction stormwater quality best management practices shall complete and execute a "Declaration of restrictive covenant for stormwater quality control measures maintenance and access."