



DRAINAGE REPORT

City Of Orange

REQUIRED FORMAT AND CONTENTS

Department of Public Works

July 2019

The requirements presented in this handout shall be used in conjunction with Orange County Hydrology Manual and Orange County Local Drainage Manual to aid the design engineer or applicant in the preparation of drainage reports and drainage studies. The requirements presented are the minimum necessary and will be used to evaluate the adequacy of all submittals.

The Drainage Report shall be a stand-alone document. When references are made or assumptions are based on previously submitted studies or reports, the Drainage Report must include the appropriate excerpts, pages, tables, and maps containing the referenced information. Assumptions made in previous reports must be verified and substantiated in all new reports. All submitted reports should be clearly and cleanly reproduced. Photocopies of charts, tables, nomographs, calculations, or any other referenced material must be legible. If reports are unreadable, resubmittal of readable copies shall be required.

Any submittal with incomplete or absent information may result in the report being returned to the author without review. City of Orange reserves the right to require additional information with any submittal.

The following is an outline of the minimum drainage report requirements:

- I. COVER SHEET**
 - A. Name of Project
 - B. Tract number, project number, or planning permit number
 - C. Site Address
 - D. Owner contact information
 - E. Developer contact information
 - F. Engineer contact information
 - G. Submittal date and revision dates as applicable
 - H. Engineer's stamp and wet signature
- II. TABLE OF CONTENTS**
- III. GENERAL LOCATION AND DESCRIPTION**
 - A. Site Location
 1. A brief description of the project with reference to the minor or major streets and waterways within immediate vicinity
 2. Legal Description
 3. Site Vicinity Map
 4. Names of surrounding or adjacent properties
 5. Watershed
 - B. Description of Property
 1. Area in Acres
 2. Ground Cover, vegetation, site topography and slopes
 3. Soils classification
 4. Major and minor drainageways
 5. Flood zone (per FEMA FIRM Maps)
 6. Significant geologic features
 7. Proposed land use
- IV. OBJECTIVES AND PROCEDURES**
 - A. A brief description of the purpose of the report in relationship to development of the project, codes, and regulations.

- B. A brief description of the methodology and assumptions used in preparation of the report. Methodology shall follow Orange County Hydrology Manual and Orange County Local Drainage Manual.
- C. A discussion of the Design Storm Frequency which shall follow Orange County Local Drainage Manual criteria (25-year storm in sump condition and 10-year storm otherwise, providing that the buildings are not inundated in a 100 year storm).
- D. Software programs that are used for hydrology and hydraulic modeling. Advanced Engineering Software (AES) and Water Surface Pressure Gradient (WSPG) are preferred. Hand calculations are acceptable for small projects. If a different method or software is selected, the reason should be explained and approved prior to submitting the report.

V. HYDROLOGY AND HYDRAULICS

A. Existing Condition

- 1. Hydrology Map at a scale of no smaller than 1"=100' which clearly delineates and labels areas (acres) and flow rates (cfs) for all concentration points and drainage areas. Contours must be shown at an appropriate interval (generally 1' and maximum 2'). All existing on-site and off-site drainage facilities (pipes, inlets, structural BMPs, etc.) must be shown and labeled in a way that facilitates review of the hydrology and hydraulic analysis.
- 2. Hydrology calculations steps and results, including reference to relevant data from Orange County Hydrology Manual (rainfall data, soil group, etc.).
- 3. Hydraulic capacity of the existing structures based on the record drawings and previous reports and/or hydraulic calculations.
- 4. Explanation of existing site drainage patterns and means (sheet flow, drains to stormdrain, out to street, etc).

B. Proposed Condition

- 1. Hydrology Map, similar to the section V.A.1, with addition of the proposed contours and improvements.
- 2. Hydrology calculations steps and results, similar to section V.A.2, considering the proposed flow paths and drainage facilities.
- 3. Hydraulic analysis of the existing structures that are being utilized in the developed condition, and hydraulic calculations of the proposed drainage improvements such as inlets, pipes, ditches, and gutters.
- 4. An evaluation of the overflow path during a 100-year storm event confirming that the building pad is protected in such events, even if the onsite inlets are completely plugged.
- 5. Overall discussion of proposed site drainage patterns and means and how they compare to existing.

C. Summary Tables

- 1. Hydrology summary table showing existing and proposed flow rates for each sub-area/total for the design storm events.
- 2. Hydraulic summary table for existing drainage facilities that are utilized in the design, providing a comparison of the hydraulic characteristics (flow rate, velocity, Hydraulic Grade Line (HGL), etc.)

VI. WATER QUALITY BEST MANAGEMENT PRACTICES

- A. A reference to the WQMP (priority or non-priority) as well as a brief discussion of the structural post-construction BMPs. WQMP is a separate document and providing the reference here is only intended to ensure that it has been prepared and it matches the drainage design.
- B. A reference to the Construction General Permit, and SWPPP (if applicable).

VII. FLOODPLAIN

- A. Discuss floodplain zone and base elevation, and provide a reference to the appendix that contains the FEMA FIRM Map.
- B. Discuss flood plain issues and regulations.
- C. Discuss the scope of floodplain modifications, if proposed, including justification of why they are necessary.
- D. Discuss Conditional Letter of Map Revision (CLOMR) and Letter of Map Revision (LOMR) requirements (if applicable).

VIII. POTENTIAL PERMITTING REQUIREMENTS

Identify other local, State and Federal permitting requirements.

IX. REFERENCES

Reference all criteria, master plans, reports, or other technical information used in development of the concepts discussed in the Drainage Report.

X. APPENDICES

Provide Hydrology Maps, Hydrology and Hydraulics calculations and supporting documents, record drawings, previous studies and reports, and copies of all other pertinent information from referenced materials.