

CHAPTER 2.0 DRAINAGE REPORT SUBMITTAL REQUIREMENTS

2.1 Introduction

This chapter outlines the requirements and procedures for submittal of drainage plans and reports in the County. A general description of items to be included in the drainage report follows. Please refer to the detailed Submittal checklists in the Appendices of the Standards and on the County's website for a comprehensive list of required items. The requirements for submittal shall include a Preliminary Drainage Report, a Final Drainage Report and construction plans for drainage improvements. Under certain circumstances, an abbreviated Drainage Letter may be allowed, with approval from the County Engineer. All storm drainage plans shall be checked for conformance to the design criteria set forth in the Standards. Written approval of drainage plans must be obtained before any construction begins.

2.2 Drainage Letter

A Drainage Letter may be considered for sites that fall within a project boundary with a previously approved drainage report or for minor changes to existing properties. The Letter usually consists of an abbreviated narrative and simplified drainage plan, which the County may require to be signed and sealed by a qualified professional engineer licensed in the State of Colorado. All the following criteria must be met to substitute a Drainage Letter for a full drainage report:

- Prior approval must be obtained from the County Engineer.
- Any off-site drainage through the property must be adequately conveyed.
- The project does not alter the existing drainage pattern.
- The adjacent and downstream surface drainage system will hydraulically accommodate post-development runoff.
- No additional drainage infrastructure is required or proof of no injury to downstream properties is provided.

The following sections describe some of the submittal requirements for a drainage letter.

2.2.1 Drainage Narrative

The Letter must identify the project location, the project land use, any minor drainage changes to previously approved drainage studies and describe how it will be in general conformance with any previously approved drainage studies, if applicable.

For those sites without a previously approved drainage study, include a discussion of on- and off-site drainage patterns, list any drainage features on-site or nearby, and describe any drainage easements on the property.

Describe the approximate area of land disturbance and discuss sediment and erosion control during and after construction.

2.2.2 Drainage Features

Identify drainage features that are on-site and/or adjacent to the site such as culverts, drainages, lakes or reservoirs, rivers, irrigation ditches, low ponding areas and wetlands. Provide photos of any existing drainage features.

2.2.3 Drainage Plan

Provide a map of the site that includes property and project boundaries, contours, existing and proposed drainage patterns and facilities, and other relevant site characteristics.

2.3 Preliminary Drainage Report

A Preliminary Drainage Report (PDR) shall be submitted prior to a Final Drainage Report. The overall intent of the PDR and the County's review of the PDR is to demonstrate the proposed project is technically feasible (from a stormwater management perspective) and to identify potential drainage issues that should be addressed prior to moving to final design. The PDR shall include a complete evaluation of current drainage conditions and a preliminary, conceptual plan for handling drainage prior to actual sizing of facilities.

The following sections describe some of the submittal requirements for a PDR.

2.3.1 General Report Requirements

The report shall be typed on 8-1/2" x 11" paper and submitted electronically in pdf format or equivalent. A professional engineer's certification statement is required with stamps and signatures on reports and plans. The PDR Checklist shall be filled out by the design engineer and submitted along with the report.

2.3.2 Drainage Narrative

The drainage report must include a narrative description of the project location and any existing and proposed characteristics that influence drainage on the site. A preliminary design of the drainage facility and criteria used shall be included, as well as a discussion of how the proposed design will comply with all standards and adequately control runoff from the site.

2.3.2.1 Introduction

The introduction section of the narrative shall include a general project description and include proposed land use(s).

2.3.2.2 General Location and Description

A description of the project location should include general spatial information, such as adjacent streets; township, range, and section; and the names of any surrounding developments. A location map should accompany this section.

The property description shall include all characteristics relevant to stormwater drainage, including ground cover and soils, groundwater, any existing stormwater and irrigation facilities and easements, as well as any history of flooding on the site or the adjacent properties.

2.3.2.3 Drainage Basins and Sub-Basins

The report narrative shall include a description of the major drainage basin in which the project site is located. Any previous basin studies should be referenced and the applicable FEMA Flood Insurance Rate Map. Include a discussion of any discharge or detention requirements identified in previous basin studies and relevant to the project. Nearby irrigation facilities, reservoirs, or emergency spillways that may affect drainage or be affected by drainage from the site should be included, as well as an identification of all outfalls to the major drainageways. A statement must be made as to the effect of the development on hazard ratings of any reservoirs in the area.

The report narrative should also include a description of the sub-basin(s) delineated for the project site. The narrative should include the sub-basin name, proposed imperviousness, major and minor peak discharge rates, and discharge location or design point. Assumptions for upstream development must take into account planned development upstream and be based on information and discussions with adjacent property owners and the Larimer County Planning Department. These assumptions should be clearly stated and justifications for the assumptions must be presented. A description of all parameters used in calculations should be included.

2.3.2.4 Drainage Design Criteria

Development must meet criteria established in previous drainage studies if any exist, and reference should be made to any drainage studies of the site or adjacent properties. Any site constraints impacting drainage should be described.

The drainage design must follow the hydrologic and hydraulic criteria as established in these Standards. All criteria used for calculations shall be described, including rainfall and design storm recurrence intervals, soil classification, and imperviousness. All methods used for calculating runoff and detention discharge and storage should be indicated, as well as any other criteria or methods used in the preliminary drainage design.

A brief description of how the drainage design meets the hydraulic criteria as established in these Standards shall be included in the PDR. Include preliminary capacity analysis of all existing and proposed drainage infrastructure. Perform floodplain analysis, if required.

Describe how the project will satisfy the requirements of the County's MS4 permit, if applicable.

2.3.2.5 Drainage Facility Design

Include a discussion of the general drainage concepts of the project site. Any upstream or downstream runoff considerations should be described, as well as anticipated and proposed drainage patterns. Discuss any tables, charts, figures, or drawings included in the report, and reference plans for bordering developments as applicable.

Provide a preliminary discussion of drainage problems on-site and possible solutions. Include design flows and storage volumes needed. Describe any existing stormwater facilities and a general description of proposed stormwater conveyance and storage facilities. Details of the relationship of proposed drainage facilities to existing or planned drainage facilities in surrounding properties or developments shall be included in the report. In cases where the point of outfall or peak flow from the property is other than historic, binding agreements from affected property owners or a letter of intent permitting such discharge shall be submitted.

Discuss any variances requested from the County and how the project will meet the intent of the criteria.

2.3.2.6 Conclusions

Discuss how the project complies with all the County's stormwater and floodplain criteria, as well as FEMA floodplain regulations, if applicable. Describe how the drainage design will control runoff from the site. Include any impacts to upstream or downstream properties. If applicable, discuss how the drainage design complies with the County's MS4 permit and which post-construction design standard will be met.

2.3.2.7 References

Include references to any criteria and technical information used in preparation of the report.

2.3.2.8 Appendices

Appendices should include the following information:

- All existing and proposed runoff calculations, as well as all assumptions and parameters used.
- Preliminary hydrologic and hydraulic calculations for water quality and flood control facilities should be included.
- A copy of the relevant Flood Insurance Rate Map (FIRM) panel and any Letters of Map Revision (LOMRs) that have changed mapping since the effective date of the FIRM.
- A map of hydrologic soil groups. The map downloaded from the Natural Resource Conservation Service (NRCS) is sufficient. Include the accompanying soils report.
- Other supporting information, calculations, mapping, etc. that the applicant relied upon to prepare the report.

2.3.3 Drainage Plan

The Drainage Plan includes supporting maps and drawings of existing and proposed site conditions and drainage facilities. The drainage plan shall include a statement such as “These plans are not to be used for construction or final record” (or similar).

2.3.3.1 Overall Drainage Map

The overall drainage map should include a map of the project that includes basin and project boundaries, flow paths and drainage patterns entering, leaving, and traversing the site, as well as any major constriction such as other development along the path of drainage. Floodplain boundaries and elevations should be shown, if applicable. Include any existing or proposed stormwater facilities.

2.3.3.2 Detailed Drainage Plan

The detailed drainage plan should be of large enough scale to show all site conditions, constraints, and the design of existing and proposed drainage facilities. The plan should include contours, flow paths, design points, property lines and easements, and locations and footprints of all facilities. The County’s checklist provides additional details regarding required items to be included in the detailed drainage plan.

2.4 Final Drainage Report

The Final Drainage Report (FDR) shall be submitted for approval along with the final plat and the construction drawings. The purpose of the FDR is to update the concepts discussed in the PDR and to present design details for all proposed drainage facilities. When approved, the report will be signed by the County Engineer and shall constitute final approval of the drainage plan. The report shall include the information submitted in the PDR, with any additions, modifications, or corrections required.

The following sections describe some of the submittal requirements for an FDR.

2.4.1 Drainage Narrative

The narrative of the FDR shall include all items from the PDR, as well as the following:

2.4.1.1 Drainage Design Criteria

A detailed description of how the drainage design meets the hydraulic criteria as established in these Standards shall be included in the FDR. Provide the results of capacity analysis of existing and proposed drainage infrastructure, floodplain analyses if required, and any other drainage facility design criteria that were used.

2.4.1.2 Drainage Facility Design

The FDR shall include specific details of the drainage facility design. All final design flows and storage volumes should be included. Discuss maintenance access and aspects, as well as easements and compliance with all state, local, and federal requirements.

2.4.1.3 Appendices

In addition to the hydrologic calculations included in the PDR, the FDR shall include detailed hydraulic computations for all stormwater facilities included in the drainage design. Include capacity calculations, HGL and EGL, water surface profiles, and design details for storage and conveyance facilities.

2.4.2 Drainage Plan

The final drainage plan shall include a detailed presentation of drainage facilities. A detailed checklist including all necessary items is available in the Appendices.

2.4.3 Erosion Control Plan

This plan should indicate methods to be used during and after construction to control erosion and sediment in the development. The Erosion Control Plan shall be developed based on the guidance and criteria provided in CHAPTER 16.0 of the Standards. (As a supplement to the report, 24" x 35" drawings may be necessary to illustrate the methods and control measures to be used.)

2.4.4 Construction Plans

All storm drainage plans shall be checked for conformance with the minimum design criteria set forth in these Standards prior to approval. Prior to submittal of the final construction drawings, one complete set of prints shall be submitted for review and comment and will be returned if changes are required or recommended. Two complete sets of revised prints shall then be submitted for final approval along with the original review print.

A checklist detailing required items to be included on construction plans is available in the Appendices. Construction drawings should be completed in both plan and profile and show both existing and planned utilities and structures. All drawings must include the following statement, signed by the professional engineer:

All work shall be constructed in accordance with Larimer County Standard Specifications as provided by the County Engineer, except as noted.

APPROVED: _____

DATE: _____

2.5 As-Builts and Site Certification

All new developments within the County are required to submit for review and approval an overall site certification of the constructed drainage facilities. The overall site certification must specify the proposed and the as-built conditions of the site's drainage facilities. Engineers are required to certify that as-constructed pond volumes meet or exceed the design standards for WQCV, EURV, and detention. Any variation from the approved plans must be noted and proven to function properly within standards as in the Stormwater Design Standards. Supporting calculations to justify any variation from the approved plans shall be provided including but not limited to detention volumes, pipe capacities, and swale capacities. It is the responsibility of the owner or professional engineer to prepare and submit all required information to the State Engineers Office for any water quality SCMs.

2.5.1 Lot-Grading Certification

Individual lot or building certification may be required depending on the site design, prior to the release of a certificate of occupancy by the County Building Department. Certification of drainage facilities shall be submitted to the County Engineer at least two weeks prior to release of collateral or the release of a certificate of occupancy.

2.6 Variances

Please refer to Section 1.7 of these Standards for variance request requirements.

2.7 Certification

All drainage reports and plans must be certified that they were prepared under the direct supervision of a licensed professional engineer in the State of Colorado using the following certification:

I hereby certify that this report (plan) for the _____ (preliminary/final) drainage design of _____ was prepared by me (or under my direct supervision) for the owners thereof and meets or exceeds the criteria in the Larimer County Stormwater Design Standards.

Licensed Professional Engineer
State of Colorado No. _____
(Seal)