

## 3.0 Planning and Submittal Requirements

### 3.1 Drainage Studies and Drawings

The City of Greenwood Village (Village) requires the planning and construction of adequate drainage facilities. This Chapter of the Drainage Criteria Manual sets forth the requirements for the studies and drawings submitted to the Village.

The applicant for each proposed land development project shall make submittals in accordance with Table 3-1 depending on the type of application or level of Development or Redevelopment for review and approval by the City Manager or designee.

**Table 3-1: Submittal Requirements**

Type of Development	Type of Drainage Study		
	Conceptual	Preliminary	Final
Rezoning/Master Plan	Yes	No	No
Preliminary Plat	Optional	Yes	No
Final Plat	Optional	Optional	Yes
Amended Plat	Optional	Optional	Yes
PUD/FDP/Site Plan	Optional	Optional	Yes
Major Development	Optional	Optional	Yes
Moderate Redevelopment	Optional	Optional	Yes
Major Redevelopment	Optional	Optional	Yes
Minor Dev/Redevelopment	No	No	No

The optional submittal of a Conceptual or Preliminary Drainage Study is allowed during the initial phases of the review by the Village for the types of application or level of Development or Redevelopment shown in Table 3-1. However, the land development project can not be approved until the Preliminary or Final Drainage Study has been submitted and approved.

Minor Development and Minor Redevelopment may use the Simplified Method to meet the requirements as described in Section 13.4.2. Major Development and Redevelopment that consists of a single family residential lot may use the Retention Method to meet the requirements as described in Section 13.4.5.

#### 3.1.1 Conceptual Drainage Study

The purpose of the Conceptual Drainage Study is to identify and define conceptual solutions to the problems which may occur on-site and off-site as a result of the development. In addition,

those problems that exist on-site prior to development must be addressed during the conceptual phase. The Conceptual Drainage Study shall include, as a minimum, the information shown in Table 3-2.

### 3.1.2 Preliminary Drainage Study

The purpose of the Preliminary Drainage Study is to identify and define solutions to the problems which may occur on-site and off-site as a result of the development. In addition, those problems that exist on-site prior to development must be addressed during the preliminary phase. When a Conceptual Drainage Study was previously approved, the Preliminary Drainage Study will update the information in the Conceptual Drainage Study. The Preliminary Drainage Study shall include, as a minimum, the information shown in Table 3-2.

### 3.1.3 Final Drainage Study

The purpose of the Final Drainage Study is to identify and define solutions and to present the design details for the drainage facilities. The final drainage design, erosion control measures, non-point source pollution control measures, and wetlands preservation and mitigation measures must be presented. When a Conceptual or Preliminary Drainage Study was previously approved, the Final Drainage Study will update the information in the Conceptual Preliminary Drainage Study. The Final Drainage Study shall include, as a minimum, the information shown in Table 3-2.

**Table 3-2: Drainage Study Checklist**

Item	Conceptual	Preliminary	Final
Engineer's Certificate	X	X	X
Owner's Certificate	X	X	X
1) General Location and Description	X	X	X
a. Location	X	X	X
i. Streets within and adjacent to the development.	X	X	X
ii. Township, range, section, and ¼ section.	X	X	X
iii. Major Drainageways, drainage facilities, and wetlands near the development.	X	X	X
iv. Names of surrounding developments.	X	X	X
b. Description of Property	X	X	X
i. Area in acres.	X	X	X
ii. Ground cover (type of trees, shrubs, and vegetation).	X	X	X

Item	Conceptual	Preliminary	Final
iii. Major Drainageways, drainage facilities, and wetlands within the development.	X	X	X
iv. General project description.	X	X	X
2) Major Drainage Basins and Sub-basins	X	X	X
a. Major Basin Description	X	X	X
i. Reference to major drainageway planning studies such as flood hazard delineation reports, major drainageway planning reports, and flood insurance rate maps.	X	X	X
ii. Major drainage basin characteristics.	X	X	X
iii. Identification of all nearby irrigation facilities within 100-feet of the property boundary, which will influence or will be influenced by the local drainage.	X	X	X
b. Sub-basin Description	X	X	X
i. Discussion of historic drainage patterns of the property.	X	X	X
ii. Discussion of off-site drainage flow patterns and impact of development.	X	X	X
3) Drainage Design Criteria	X	X	X
a. Regulations	X	X	X
i. Discussion of compliance with or deviation from this Drainage Criteria Manual.	X	X	X
b. Development Criteria Reference and Constraints.	X	X	X
i. Discussion of previous drainage studies (i.e., project master plans or other approved drainage study) that influence or are influenced by the drainage design and how the previous drainage study will affect drainage design for the site.	X	X	X
ii. Discussion of the drainage impact of site constraints such as streets, utilities, light rail rapid transit, existing structures, and development or site plans.	X	X	X
c. Hydrological Criteria	X	X	X
i. Identify the source of design rainfall information for all storm events.	X	X	X
ii. Identify runoff calculation method.	X	X	X

Item	Conceptual	Preliminary	Final
iii. Identify flood attenuation discharge and storage calculation method.	X	X	X
iv. Identify design storm recurrence intervals.	X	X	X
v. Discussion and justification of other criteria or calculation methods used that are not presented in or referenced by this Drainage Criteria Manual.	X	X	X
d. Hydraulic Criteria	X	X	X
i. Identify capacity references.	X	X	X
ii. Identify facility outlet design method.	X	X	X
iii. Identify hydraulic structure criteria used.	X	X	X
iv. Discussion of other drainage facility design criteria used that is not presented in or referenced by this Drainage Criteria Manual.	X	X	X
4) Drainage Facility Design	X	X	X
a. General Concept	X	X	X
i. Discussion of existing drainage patterns.	X	X	X
ii. Discussion of proposed drainage patterns.	X	X	X
iii. Discussion of compliance with off-site runoff considerations.	X	X	X
iv. Discussion of the content of tables, charts, figures, or drawings.	X	X	X
b. Specific Details	X	X	X
i. Discussions of drainage problems encountered and solutions.	X	X	X
ii. Discussion of detention storage and outlet design.	X	X	X
iii. Discussion of maintenance access to facilities.	X	X	X
iv. Discussion of impacts of concentrating the discharge from facilities on the downstream properties.	X	X	X
5) Environmental Protection Criteria	X	X	X
a. Stormwater Quality Management Plan	X	X	X
i. Include items in the Table 16-1 from Chapter 16.0, if a separate Stormwater Quality Management Plan is not prepared.	X	X	X

Item	Conceptual	Preliminary	Final
b. Wetlands Preservation	X	X	X
i. Complete Wetlands Impact Report, if necessary, in accordance with Chapter 14.0 or discuss no impact on wetlands within or adjacent to the property.	X	X	X
6) Maintenance Plan	X	X	X
a. Maintenance Activities	X	X	X
i. Description of routine maintenance activities, including frequency, to maintain flood attenuation of the facilities.	X	X	X
ii. Description of extraordinary maintenance activities following minor and major storm to maintain the flood attenuation functions of the facilities.	X	X	X
b. Estimated Maintenance Costs	X	X	X
i. Cost estimate for each routine and extraordinary maintenance activity.	X	X	X
ii. Description of the methods by which maintenance costs will be paid, including assurances that sufficient funds will be available at all times.	X	X	X
7) Conclusions	X	X	X
a. Compliance with Standards	X	X	X
i. Drainage Criteria Manual.	X	X	X
ii. Major Drainageway Planning Studies or other previously approved drainage studies.	X	X	X
iii. UDFCD Drainage Criteria Manuals.	X	X	X
b. Drainage Concept	X	X	X
i. Effectiveness of drainage design and facilities to control damage from storm runoff to either public and private improvements or adjacent property.	X	X	X
ii. Influence of proposed development on the recommendations from the Major Drainageway Planning Studies or other previously approved drainage studies.	X	X	X
8) References	X	X	X

Item	Conceptual	Preliminary	Final
a. Reference all criteria and technical information used.	X	X	X
9) Appendices	X	X	X
a. Hydrologic Calculations	X	X	X
i. Runoff coefficients.	X	X	X
ii. Times of concentration.	X	X	X
iii. Pre-developed and post-developed runoff for both the minor and major storm events at specific design points.	X	X	X
iv. Hydrographs for both the minor and major storm events at specific design points, if required.	X	X	X
b. Hydraulic Calculations	X	X	X
i. Culvert capacity.		X	X
ii. Storm sewer capacity, including hydraulic grade line (HGL) and energy grade line (EGL).		X, No HGL & EGL	X
iii. Street capacity.		X	X
iv. Storm inlet capacity.		X	X
v. Open channel design.		X	X
vi. Hydraulic structure design.		X	X
vii. Flood attenuation facility volume capacity and outlet configuration.	X	X	X
c. Water Quality Computations	X	X	X
i. Include calculations in the Table 16-1 from Chapter 16.0, if a separate Stormwater Quality Management Plan is not prepared.	X	X	X
10) Maps	X	X	X
a. General Location Map	X	X	X

Item	Conceptual	Preliminary	Final
i. A general location map showing the general drainage patterns around the property. The map should be at a scale of 1" = 1000' or 2000' and show the path of all drainage to and from any off-site basins. The map shall identify any development or drainage facilities (i.e., irrigation ditches, existing flood attenuation and water quality facilities, culverts, and storm sewers) along the entire path of the off-site and on-site drainage.	X	X	X
b. Drainage Plan	X	X	X
i. Plan of the proposed development shall be provided at a scale of 1" = 20' to 1" = 200' on 24" x 36" sheets.	X	X	X
ii. A topographic map shall be provided with two-foot existing and proposed contours tied to the Greenwood Village "Control Diagram" (Figure 2-1). The topographic map shall extend a minimum of 50-feet beyond the property lines.	X	X	X
iii. Property lines, easements and purposes of easements.	X	X	X
iv. Streets.	X	X	X
v. Existing drainage facilities and structures, irrigation ditches, Major Drainageways, and existing wetlands. All pertinent information such as materials, size, shape, slope, and location shall also be included.	X	X	X
vi. Overall drainage area and sub-area boundaries.	X	X	X
vii. Proposed type of street flow, roadside ditch, gutters, and cross pans.	X	X	X
viii. Proposed drainage structures and open channels.	X	X	X
ix. Proposed outfall point for runoff from the development and facilities to convey flows without damage to downstream properties.	X	X	X
x. Routing and accumulation of flows at specific design points for the minor storm.	X	X	X
xi. Routing and accumulation of flows at specific design points for the major storm.	X	X	X

Item	Conceptual	Preliminary	Final
xii. Details of storage facilities and outlet works.	X	X	X
xiii. Location and elevations of all floodplains affecting the property.	X	X	X
xiv. Location and elevations of all existing and proposed utilities affected by or affecting the drainage design.	X	X	X
xv. Routing of off-site drainage flow through the development.	X	X	X

### 3.1.4 Submittal Requirements

All studies shall be typed on 8-1/2" x 11" paper and bound. The drawings, figures, and tables shall be bound with the study or included in a pocket attached inside the study. The study shall be certified by a professional engineer licensed in the State of Colorado using the following form:

I hereby certify that this (type of study) for (name of site) was prepared by me or under my direct supervision in accordance with the Greenwood Village Drainage Criteria Manual.

\_\_\_\_\_  
 Signature

\_\_\_\_\_  
 Colorado License Number

\_\_\_\_\_  
 Seal and Date

The study shall also be certified by Owner of the property using the following form:

I hereby certify that the drainage facilities proposed for (name of site) shall be constructed and maintained in accordance with the design presented in this (type of study). I understand that the City of Greenwood Village does not and will not assume liability for the proposed drainage facilities.

\_\_\_\_\_  
 Signature

\_\_\_\_\_  
 Date

### 3.1.5 Construction Drawings

The construction drawings shall be submitted on paper and submitted with the permit application for review and approval prior to construction. The construction plans shall be certified by a

professional engineer licensed in the State of Colorado using the following form:

I hereby certify that these construction drawings for (name of site) were prepared by me or under my direct supervision in accordance with the approved Final Drainage Study and the Greenwood Village Drainage Criteria Manual.

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Signature

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Colorado License Number

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Seal and Date

The construction drawings for the site shall address all the improvements required by the approved Final Drainage Study, including, but not limited to:

- 1) Storm sewers, inlets, and outlets.
- 2) Culverts, end sections, and inlet/outlet protection.
- 3) Channels, ditches, and swales.
- 4) Checks, structures, channel drops, and other hydraulic facilities.
- 5) Stormwater facility grading, trickle channels, outlets, and landscaping.
- 6) Other drainage related structures and facilities.
- 7) Maintenance access considerations.
- 8) Erosion control measures.
- 9) Water quality control facilities.
- 10) Wetland mitigation measures.
- 11) Floodplain boundaries.
- 12) Drainage easements.

### 3.1.6 Record (As-Built) Drawings

One reproducible set of as-constructed drawings for all drainage improvements shall be certified by a professional engineer licensed in the State Colorado using the following form and submitted to the Village before the Village will accept the improvements:

I hereby certify that these record drawings for (name of site) were prepared by me or under my direct supervision. The changes in the as-constructed conditions will not materially adversely affect the performance of the drainage facilities approved in the construction drawings and as required by the Greenwood Village Drainage Criteria Manual.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Colorado License Number

\_\_\_\_\_  
Seal and Date

Red-line or cloud mark-ups of the approved construction drawings are the preferred method for the initial submittal of the record drawings. All changes shall be legible and representative of actual as-built conditions. After the record drawings have been approved by the City Manager or designee, corrected electronic versions shall be submitted.

### **3.2 Village Review and Approval**

The City Manager or designee will review the studies, construction drawings, record drawings, and applications for waivers and provide written review comments or approval.

It should be specifically noted that the review comments or approval of any studies or drawings shall not relieve the applicant of their responsibility to comply with the requirements and regulations of the federal government, the state of Colorado, or the Village. The review and approval by the Village is offered only to assist the applicant's understanding of the applicable requirements.

### **3.3 Waivers of Requirements**

The City Manager or designee may waive one or more requirements of this Drainage Criteria Manual. The applicant shall initiate the waiver procedure by submitting an application for a waiver to the City Manager or designee. The application shall include a description of the waiver with specific reference to the applicable Sections of this Drainage Criteria Manual. The applicant shall also provide an analysis, certified by a professional engineer licensed in the State of Colorado, in accordance with the following:

- 1) Cumulative impacts of the proposed waiver and similar potential waivers for similar properties on the achievement of the water quality protection and flood attenuation requirements of this Drainage Criteria Manual in the same Major Drainage Basin and within the Village.
- 2) Availability and cost of off-site and/or regional drainage facilities to meet the water quality protection, wetland protection, and flood attenuation requirements of this Drainage Criteria Manual.
- 3) Potential adverse impacts of the proposed waiver on the Major Drainageways and downstream public and private property.
- 4) Potential advantages of regional drainage facilities to achieve the goals and

requirements of this Drainage Criteria Manual where the retrofit of drainage facilities could be disruptive and expensive.

- 5) Enforceable commitment from the applicant to pay for the pro rata share of the construction and maintenance costs of the off-site or regional drainage facilities required to mitigate the adverse water quality, wetlands and flood discharge impacts of the proposed waiver.

Upon receipt of a complete application for a waiver, the City Manager or designee shall prepare a rationale statement recommending approval or disapproval of the proposed waiver. The rationale statement shall consider the analysis of the above required items. The City Manager or designee shall then approve, disapprove, or request modifications of the proposed waiver.

### **3.4 Appeals**

The applicant or any citizen of the Village materially affected by the proposed waiver may appeal the decision of the City Manager or designee. Any appeal from an order, requirement, decision, or determination of the City Manager or designee made pursuant to this Drainage Criteria Manual shall be taken within (10) ten days following the date of such order, requirement, decision, or determination by the filing of a written notice of appeal with the City Manager or designee . The notice of appeal shall state in detail the action appealed from, the grounds for the appeal, and the relief sought. The City Manager or designee shall forward the notice of appeal to the Planning and Zoning Commission (Commission). The Commission shall, within thirty (30) days following the filing of the notice of appeal, review the record of the action taken by the City Manager or designee, and make any recommendation to the City Council in writing. The matter shall thereupon be placed on a City Council agenda for action. The City Council may either review the matter on the record or schedule a public hearing, at its discretion. At the conclusion of the review or hearing the City Council may reverse or affirm wholly or partly the order, requirement, decision or determination appealed from and shall enter such order as it deems appropriate under the circumstances.

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