





# FREMONT COUNTY – COLORADO

## DEPARTMENT OF PLANNING AND ZONING

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### STAFF REPORT

Project Name: Chapter 10: Drainage Plan & Report

Name(s) Planning and Zoning Director- Daniel Victoria

**Request: Adding a new chapter to the zoning regulations in reference to the drainage plan & report.**

Planning and Zoning has recognized the need for a review and update to the regulations. This addition is to reference the required drainage plan and report.

The proposal in front of you is a rewrite of the Subdivision Regulations section XXIII, to be added to the Fremont County Zoning Regulations. The Fremont County Engineer reviewed these regulations and made additional requirements, deletions, and recommendations.

**Intent.**

The intent of this rewrite is for the Fremont County Citizens, to easily find the Drainage Requirements in the Zoning Regulations and not be referred to our Subdivision Regulations. The Drainage Requirements will also stay in the Subdivision Regulations.

In the attached regulations you will see strike throughs, as well as yellow highlighting.

- Strike through details items that were deleted in the current regulations.
- Yellow details new verbiage and additional requirements.

**Proposed Timeline:**

Proposed rewrite if viewed as favorable will have an adoption date of April 2024. If any substantial changes are made to this draft, these sections will be presented to this commission for further recommendations.

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### Chapter 10: DRAINAGE PLAN AND REPORT:

1. The owner, applicant and / or developer shall provide a drainage plan and report that shall include necessary drainage facilities to control the surface water entering into the site, within the site, and exiting the site. The drainage plan and report shall contain and address at a minimum the following:
2. The drainage plan and report shall be prepared, signed, and sealed by a professional engineer licensed to practice in the State of Colorado, unless otherwise authorized in this section. The drainage report shall be acknowledged by the engineer in a statement in the report similar to the following:

"I hereby state that this Drainage Report for the (Name of Development) was prepared by me (or under my direct supervision) in accordance with the provisions of the Fremont County Zoning Regulations for the owners thereof. I understand that Fremont County does not, and will not, assume liability for drainage facilities designed by others."

\_\_\_\_\_  
Name

\_\_\_\_\_  
Licensed Professional Engineer

\_\_\_\_\_  
State of Colorado No. \_\_\_\_\_

(Affix Seal)

3. The peak flow exiting the developed site for the ten (10) year and one-hundred (100) year storm events shall not exceed the respective historic (undeveloped) peak flow of the same storm event.
  - a. The Board may require such drainage facilities as necessary to retain, detain, or infiltrate any flows of surface runoff above the historic flows during a storm event.
  - b. Off-site upstream and on-site storm water runoff shall be considered in the design of all storm water facilities. The storm water facilities within the site shall be designed large enough to handle potential storm water runoff from the entire upstream drainage area and on-site runoff.
  - c. Any drainage facility designed to detain storm water shall not release storm water at a rate higher than the historic rate.
  - d. A statement by the designing engineer supported by detention facility calculations shall be included in the report to show that 97% of the 5-year or smaller event drain within 72 hours and that 99% of the 100-year event drain within 120 hours per Colorado Water Law. Facilities that do not drain within these time periods require water rights, including plans for augmentation to

replace evaporative losses, and should be avoided. Detention facilities must undergo a notification process with the Colorado State Engineers Office (SEO) in conformance with CRS §37-92-602(8), as may be amended, and present documentation that drain times conform with the requirements of this statute. Any drainage facility designed to retain storm water, such as by creating a basin without a permanently open drain, shall obtain written approval from the Colorado State Engineer's Office prior to submitting the drainage plan and report to Fremont County.

4. Where a public storm sewer is available within 500 feet, the applicant shall connect to the storm sewer facilities. If there are no physically or legally accessible storm sewers within five hundred (500) feet, or if the cost of the connection to the storm sewer exceeds 10% of the project construction cost, other acceptable provisions shall be considered for the disposal of storm water runoff. Written approval from the owner of the storm sewer must be obtained. Such written approval must include assurance from the storm sewer owner that the system has adequate capacity to handle the proposed flow.
5. The Board may require the owner, applicant and/or developer to carry away by pipe or open ditch, any spring or surface water that may exist previous to or as a result of the proposals in the application.
6. Any Federal Emergency Management Agency (F.E.M.A.) 100-year Special Flood Hazard Area shall be analyzed for impact in accordance with F.E.M.A. regulations. All FEMA designated Special Flood Hazard Areas should be noted on the final plan.
  - a. A copy of the F.E.M.A. Flood Insurance Rate Map or FIRMette of the general area of the subject property shall be provided with the site location indicated on it.
7. A determination of the presence of wetlands on the property must be completed and a statement of findings included in the drainage report. Wetlands located on-site or near the property should be noted with locations shown. Proper wetlands permitting must be completed if applicable.
8. All improvements and drainage facilities shall be designed to convey runoff from the one-hundred (100) year design frequency storm, without damage to permanent facilities and structures.
  - a. Site grading shall be shown on the plan drawings and grading shall be accomplished in such a way that surface drainage from rainstorms, snow melt, or groundwater is directed away from buildings and is controlled in a manner that eliminates or minimizes impact on adjacent properties.
  - b. Refer to the County adopted building code for minimum slopes surrounding structures.
9. All improvements and drainage facilities shall be designed using the precipitation values provided by the U.S. Department of Commerce National Oceanographic and Atmospheric Administration (NOAA) Precipitation Frequency Atlas, or approved equivalent.
10. All drainageways, watercourses, channels, or streams that traverse the site shall be designated as a drainage easement or drainage right-of-way. The easement or right-of-way shall conform to the width of construction plus sufficient additional width to facilitate maintenance and replacement or the width of the drainageway, watercourse, channel, irrigation ditch or stream, whichever is adequate.
11. An operation and maintenance (O&M) plan for all drainage facilities and easements/rights-of-way shall be included by the engineer in the final drainage report. The O&M plan should also be transmitted to the property owner who is responsible for operations and maintenance of the drainage facilities and to subsequent owners upon sale of the property. The O&M plan should include instructions for the property owner on safe and correct operations, repair and maintenance of all installed equipment and

facilities, and recommended inspection schedules. Maintenance for stormwater storage facilities should follow the recommendations in the (Urban Storm Drainage Criteria Manual (USDCM) Volume 3 Chapter 6,(or newest version of USDCM) unless otherwise specified by the design engineer. Areas designated for stormwater drainage, detention, or stormwater infiltration, are not to be used for materials storage, building, or parking, and should not be modified without approval from Fremont County. Access also must be provided to the drainage facilities for long-term maintenance.

12. Hydrologic methods used:

- a. For catchment areas less than twenty (20) acres, the Rational Method or Modified Rational Method shall be used;
- b. For catchment areas greater than twenty (20) acres, the U.S.D.A. Natural Resources Conservation Service publication "Technical Release 55" (TR-55), published in June, 1986, or successor publication, shall be used unless otherwise justified by a Colorado Registered Professional Engineer.

## 10.1 Drainage Map

1. The site drainage map shall contain at a minimum the following:

- a. A drainage basin map that indicates the subject property site location, site perimeter boundary, and off-site contributing drainage areas;
- b. Appropriate title, North Arrow, and indication of scale;
- c. The location of any irrigation ditches, natural water courses or dry gulches;
- d. The location and size, by dimension, of any existing and proposed improvements on the property to remain after development;
- e. The location and size, by dimension, of any existing and proposed drainage easements on the property;
- f. The location and size, by dimension, of any existing and proposed drainage structures on the property;
- g. The direction of on-site drainage flows (grading plan) that indicates location and directions of flow patterns of storm water flow by means of arrows and elevation contour lines that direct flows to existing or proposed stormwater management features;
- h. The cumulative on-site drainage peak flows including clear numerical indications of the quantity of storm water flow at key locations on the property, in cubic feet per second, for the ten (10) year and one-hundred (100) year design frequency storms;
- i. The location, surface area in acres or square feet, the volume in cubic feet, and the inlet, discharge, and spillway flow rate in cubic feet per second for each detention, infiltration, or retention facility for the ten (10) year and one-hundred (100) year design frequency storms;
- j. The slope, size, type of pipe, details of the pipe inlet and outlet, orifice size and location, and rip-rap or headwall details for all detention, infiltration, and retention facilities;
- k. A clear numerical indication of the quantity of storm water flow leaving the property, in cubic feet

per second, at the appropriate site discharge locations for the ten (10) year and one-hundred (100) year design frequency storms;

## 10.2 Drainage Report

1. The project or site drainage report shall contain at a minimum the following:
  - a. General Information – Provide general project description, names of adjacent subdivisions or developments, area affected by the development in acres, types of soil and ground cover correlated to National Resources Conservation Service (NRCS) types, description of major drainage ways that impact or are impacted by the development, existing utilities that may impact or may be impacted by proposed drainage facilities, general topography, erosion characteristics, F.E.M.A. floodplain, and obstructions.
  - b. Drainage Areas– Discuss major drainage areas and sub-area drainage characteristics that affect the proposed development.
  - c. Upstream Drainage Conditions – Discuss upstream drainage patterns and their impact on the proposed development. Provide detailed hydrologic analysis using both the ten (10) year design frequency storm and the one-hundred (100) year design frequency. Conclusions must describe the appropriate site entry locations for the ten (10) year and one-hundred (100) year design frequency storms.
  - d. On-site Drainage Considerations – Discuss existing and proposed drainage patterns within the development site, and how upstream drainage entering the site will be conveyed through the site. Demonstrate through detailed hydrologic and hydraulic analysis that sufficient right-of-way or easement is provided to convey all drainage through the development. Provide detailed engineering calculations and copies of all design charts, tables and figures used in the design of streets, inlets, culverts, storm sewers, channels, detention, infiltration, and retention facilities, and other facilities to be constructed in the development. Discuss maintenance and maintenance responsibilities for drainage facilities, including right-of-way and easement requirements. Discuss floodplain management, wetlands, and channel erosion issues.
  - e. Detention, **infiltration**, and Retention Facilities – Discuss the location, surface area in acres or square feet, the volume in cubic feet, and the inlet, discharge, and spillway flow rate in cubic feet per second for each detention, **infiltration**, or retention facility for the ten (10) year and one-hundred (100) year design frequency storms. Discuss the slope, size, type of pipe, details of the pipe inlet and outlet, orifice size and location, and rip-rap or headwall requirements for all detention and retention facilities. **Show supporting design calculations.**
  - f. Downstream Drainage Considerations – Identify locations and peak flow rates of drainage leaving the site, and discuss their impact on downstream facilities and properties. Provide recommended mitigation measures needed to adequately protect downstream receiving facilities. Include a clear numerical indication of the quantity of storm water flow leaving the property, in cubic feet per second, at the appropriate site discharge locations for the ten (10) year and one-hundred (100) year design frequency storms.
  - g. Conclusions and Recommendations – Provide a clear synopsis of significant drainage facility requirements, including lengths and sizes of pipelines and channels, location and volume of **detention, infiltration**, and retention facilities, and flow rates of storm water entering and leaving the property. Clearly state the historical flow rate in cubic feet per second at each site discharge point. Computer generated printouts provided with the drainage report must be accompanied by

clearly identified descriptions of procedures, data input values, data sources, relationship of printout sheets to drainage basins, and applicability of answers provided.

### 10.3 Deferments

Deferments of Drainage Plan and Report Requirements - A deferment from requirements of **Chapter ten of this resolution** may be authorized by the Board for Commercial development applications until the Commercial Development Plan or Building Permit Application for each lot is submitted.

### 10.4 Drainage Facilities

1. Any proposed drainage facilities and / or structures shall be designed by a professional engineer licensed to practice in the State of Colorado, and such design plans submitted, unless otherwise authorized in this section.
  - a. The location, placement and construction shall be in accordance with and approved by the engineer who designed the drainage facilities and / or structures.
  - b. A written final inspection report and as-built or record drawings for all drainage improvements are to be submitted to Fremont County Planning & Zoning, the department will forward to the Fremont County Engineer for acceptance. Submission shall include an electronic copy in pdf format including the engineer's statement, engineer or surveyor's stamp, signature, and date. A professional engineer or land surveyor registered in the State of Colorado shall undertake such investigation as may be necessary to determine or confirm the as-built detention basin contours, volume, and surface area; outlet structure size and elevations; emergency spillway size and elevations; riprap area and elevations; pipe sizes and invert elevations at inlets and discharge locations; representative open channel cross-sections; and dimensions of all drainage structures. The engineer or surveyor shall verify and state in writing that the pond as-built volume meets the design volume requirements. All appurtenances and related features will be located horizontally and vertically.

"As-built" surveys must include a "red-line" design set that verifies the as-constructed project matches the intent of the original design drawings and which indicates any changes which were made to the original design drawings during construction. If the improvements for a project are constructed in phases, as-built drawings may be required at the completion of each phase. Drawings shall be properly scaled and sized to clearly show the work that was done through construction.

Acknowledgment of the record drawings is required as follows:

"To the best of my knowledge, belief, and opinion, the drainage facilities were constructed in accordance with the design intent of the approved drainage report and plan sheet(s)."

Name \_\_\_\_\_  
Licensed Professional Engineer or Land Surveyor  
State of Colorado No. \_\_\_\_\_  
(Affix Seal)

2. All drainage plans and related reports shall be reviewed and approved by the Fremont County Engineer.

3. The County Engineer, the Department, the Commission or the Board may require any other information necessary to adequately assess the impacts of drainage by the proposed development.

#### DRAINAGE PLAN AND REPORT:

13. The owner, applicant and / or developer shall provide a drainage plan and report that shall include necessary drainage facilities to control the surface water entering into the site, within the site, and exiting the site. The drainage plan and report shall contain and address at a minimum the following:
  - e. The Board may require such drainage facilities as necessary to retain or detain any flows of surface runoff ~~over and~~ above the historic flows during a storm event.
  - f. Off-site upstream and on-site storm water runoff shall be considered in the design of all storm water facilities. The storm water facilities within the site shall be designed large enough to handle potential storm water runoff from the entire upstream drainage area and on-site runoff.
  - g. Any drainage facility designed to detain storm water shall not release storm water at a rate higher than the historic flows.
  - ~~h. Any drainage facility designed to retain storm water, such as by creating a pond without a permanently open drain, shall obtain written approval from the Colorado State Engineer's Office prior to submitting the drainage plan and report to Fremont County.~~
14. The drainage plan and report shall be prepared, signed, and sealed by a professional engineer licensed to practice in the State of Colorado, unless otherwise authorized in this section.
15. The Peak flow exiting the developed site for the ten (10) year and one-hundred (100) year storm events shall not exceed the respective historic (undeveloped) peak flow of the same storm event.
  - e. The Board may require such drainage facilities as necessary to retain or detain any flows of surface runoff ~~over and~~ above the historic flows during a storm event.
  - f. Off-site upstream and on-site storm water runoff shall be considered in the design of all storm water facilities. The storm water facilities within the site shall be designed large enough to handle potential storm water runoff from the entire upstream drainage area and on-site runoff.
  - g. Any drainage facility designed to detain storm water shall not release storm water at a rate higher than the historic flows.
  - ~~h. Any drainage facility designed to retain storm water, such as by creating a pond without a permanently open drain, shall obtain written approval from the Colorado State Engineer's Office prior to submitting the drainage plan and report to Fremont County.~~
16. Where a public storm sewer is available, the applicant shall connect to the storm sewer facilities, unless there are no outlets within five hundred (500) feet. If there are no outlets within five hundred (500) feet, other acceptable provisions shall be made for the disposal of storm water runoff over historic flows. Written approval from the owner of the storm sewer must be obtained. Such written approval must include assurance from the storm sewer owner that the system has adequate capacity to handle the proposed flow.
17. The Board may require the owner, applicant and/or developer to carry away by pipe or open ditch, or to ~~retain or detain~~, any spring or surface water that may exist previous to or as a result of the proposals in the application.
18. Any drainage that has been designated by the Federal Emergency Management Agency (F.E.M.A.) as a one-hundred (100) year floodplain shall be analyzed for impact in accordance with F.E.M.A. regulations. The one-hundred (100) year floodplain line should be noted on the final plan.
  - b. A copy of the F.E.M.A. Flood Insurance Rate Map of the general area of the subject property shall be provided with the site location indicated on it.
19. All improvements and drainage facilities shall be designed to convey runoff from the one-hundred (100) year design frequency ~~six (6) hour duration~~ storm, without damage to permanent facilities and structures.
  - c. Site ~~and lot~~ grading shall be accomplished in such a way that surface drainage from rainstorms, snow melt, or groundwater is directed away from buildings and is controlled in a manner that eliminates or minimizes impact on adjacent properties.
  - d. Refer to the County adopted building code for minimum slopes surrounding structures.



- ~~20. All improvements and drainage facilities shall be designed to convey runoff from the ten (10) year design frequency storm, without damage to permanent facilities and structures, and without inundation of facilities or ponding water outside of the boundaries of designed drainage channels and drainage piping.~~
21. All improvements and drainage facilities shall be designed using the precipitation values provided by the U.S. Department of Commerce National Oceanographic and Atmospheric Administration (NOAA) Precipitation Frequency Atlas, or approved equivalent.
22. All drainageways, watercourses, channels, or streams that traverse the site shall be designated as a drainage easement or drainage right-of-way. The easement or right-of-way shall conform to the width of construction plus sufficient additional width to facilitate maintenance and replacement or the width of the drainageway, watercourse, channel, irrigation ditch or stream, whichever is adequate.
- ~~a. The maintenance of all drainage facilities, easements, rights of way, etcetera shall be addressed.~~
- ~~b. Fremont County will not accept or assume maintenance of any of these items.~~
23. Hydraulic methods used:
- c. For areas less than twenty (20) acres, the Rationale Method or Modified Rational Method shall be used;
- d. For areas greater than twenty (20) acres, the U.S.D.A. Natural Resources Conservation Service publication "Technical Release 55" (TR-55), published in June, 1986, or successor publication, shall be used unless otherwise justified by a Colorado Registered Professional Engineer.
24. The site drainage map shall contain at a minimum the following:
- l. A drainage basin map that indicates the subject property site location shall be provided.
- m. Appropriate title;
- n. The perimeter boundary of the subject property;
- o. North Arrow;
- p. Indication of scale;
- q. The location of any irrigation ditches, natural water courses or dry gulches;
- r. The location and size, by dimension, of any improvements currently on the property that are proposed to remain after development;
- s. The location and size, by dimension, of any proposed improvements on the property;
- t. The location and size, by dimension, of any existing drainage easements contained on the property;
- u. The location and size, by dimension, of any existing drainage structures located on the property;
- v. The location and size, by dimension, of any proposed drainage easements on the property;
- w. The location and size, by dimension, of any proposed drainage structures on the property;
- x. The location of any off-site upstream drainage entering the property;
- y. A clear numerical indication of the quantity of storm water flow entering the property, in cubic feet per second, at the appropriate site entry locations for the ten (10) year and one-hundred (100) year design

frequency storms;

- z. The direction of on-site drainage flows (grading plan) that indicates location and directions of flow patterns of storm water flow by means of arrows and elevation contour lines that direct flows to existing or proposed stormwater management features;
  - aa. The cumulative on-site drainage volumes including clear numerical indications of the quantity of storm water flow at key locations on the property, in cubic feet per second, for the ten (10) year and one-hundred (100) year design frequency storms;
  - bb. The location, surface area in acres or square feet, the volume in cubic feet, and the inlet, discharge, and spillway flow rate in cubic feet per second for each detention or retention facility for the ten (10) year and one-hundred (100) year design frequency storms;
  - cc. The slope, size, type of pipe, details of the pipe inlet and outlet, orifice size and location, and rip-rap or headwall details for all detention facilities;
  - dd. A clear numerical indication of the quantity of storm water flow leaving the property, in cubic feet per second, at the appropriate site discharge locations for the ten (10) year and one-hundred (100) year design frequency storms;
25. The project or site drainage report shall contain at a minimum the following:
- h. General Information – Provide general project description, names of adjacent subdivisions or developments, area affected by the development in acres, types of soil and ground cover correlated to National Resources Conservation Service (NRCS) types, description of major drainage ways that impact or are impacted by the development, existing utilities that may impact or may be impacted by proposed drainage facilities, general topography, erosion characteristics, F.E.M.A. floodplain, and obstructions.
  - i. ~~Major Drainage Basins and Sub-basins~~ – Discuss major basin and sub-basin drainage characteristics that affect the proposed development.
  - j. Upstream Drainage Conditions – Discuss upstream drainage patterns and their impact on the proposed development. Provide detailed hydrologic analysis using both the ten (10) year design frequency storm and the one-hundred (100) year design frequency. Conclusions must include a clear numerical indication of the quantity of storm water flow entering the property, in cubic feet per second, at the appropriate site entry locations for the ten (10) year and one-hundred (100) year design frequency storms.
  - k. On-site Drainage Considerations – Discuss existing and proposed drainage patterns within the development site, and how upstream drainage entering the site will be conveyed through the site. Demonstrate through detailed hydrologic and hydraulic analysis that sufficient right-of-way or easement is provided to convey all drainage through the development. Provide detailed engineering calculations and copies of all design charts, tables and figures used in the design of streets, inlets, culverts, storm sewers, channels, detention and retention facilities, and other facilities to be constructed in the development. Discuss maintenance and maintenance responsibilities for drainage facilities, including right-of-way and easement requirements. Discuss floodplain management and channel erosion issues.
  - l. Detention and Retention Facilities – Discuss the location, surface area in acres or square feet, the volume in cubic feet, and the inlet, discharge, and spillway flow rate in cubic feet per second for each detention or retention facility for the ten (10) year and one-hundred (100) year design frequency storms. Discuss the slope, size, type of pipe, details of the pipe inlet and outlet, orifice size and location, and rip-rap or headwall requirements for all detention and retention facilities.
  - m. Downstream Drainage Considerations – Identify locations and peak flow rates of drainage leaving the site, and discuss their impact on downstream facilities and properties. Provide recommended mitigation measures needed to adequately protect downstream receiving facilities. Include a clear numerical indication of the quantity of storm water flow leaving the property, in cubic feet per second, at the appropriate site discharge locations for the ten (10) year and one-hundred (100) year design frequency storms.

- n. Conclusions and Recommendations – Provide a clear synopsis of significant drainage facility requirements, including lengths and sizes of pipelines and channels, location and volume of detention and retention facilities, and flow rates of storm water entering and leaving the property. Clearly state the historical flow rate in cubic feet per second at each site discharge point. Computer generated printouts provided with the drainage report must be accompanied by clearly identified descriptions of procedures, data input values, data sources, relationship of printout sheets to drainage basins, and applicability of answers provided.
26. ~~Waivers~~ and Deferment of Drainage Plan and Report Requirements – ~~Waiver~~ from requirements of this Section may be authorized by the Board for development applications for projects that will require future Commercial Development Plans to be submitted and/or minor subdivision applications. If waiver is granted, requirements of this Section will be deferred until submittal of the Commercial Development Plan. If justified, the Board may agree to defer the requirements of this Section until submittal of the building permit application.
27. Any proposed drainage facilities and / or structures shall be designed by a professional engineer licensed to practice in the State of Colorado, and such design plans submitted, unless otherwise authorized in this section.
- c. The location, placement and construction shall be in accordance with and approved by the engineer who designed the drainage facilities and / or structures.
  - d. A written final inspection report by the design engineer (or design engineer’s firm) shall be provided upon completion of the site drainage facilities accompanied by as built drawings.
28. All drainage plans and reports shall be reviewed and approved by the Fremont County Engineer.
29. The County Engineer, the Department, the Commission or the Board may require any other information necessary to adequately assess the impacts of drainage by the proposed development.