Approved as to form only:
D. White
Date: 8/26/2015

ORDINANCE NO. 4087

ENTITLED: "AN ORDINANCE AMENDING SECTION 1.4.3, DEFINED TERMS, REPEALING AND RE-ENACTING CHAPTER 3.2, DRAINAGE IMPACT STUDIES, AND REPEALING APPENDIX H OF THE CHEYENNE UNIFIED DEVELOPMENT CODE (UDC)."

BE IT ORDAINED BY THE GOVERNING BODY OF THE CITY OF CHEYENNE, WYOMING:

Section 1. That Section 1.4.3, Defined Terms is amended by adding the following defined terms:

"Base Flood Elevation" refers to the elevation of the flood having a one percent chance of being equaled or exceeded in any given year.

"Best Management Practice (BMP)" means a technique, process, activity, or structure used to reduce pollutant discharges in stormwater. BMPs include source control practices (non-structural BMPs) and engineered structures designed to treat runoff. BMPs are most effective when used in combination and selected and designed based on site-specific characteristics.

"BMP Maintenance" refers to routinely scheduled activities, as well as non-routine repairs that may be required after large storms, or as a result of other unforeseen problems, as necessary to ensure proper BMP function.

"Channel" means a natural or artificial watercourse with a definite bed and banks that conveys continuously or periodically flowing water. Interchangeable terms include creek, drainageway, river, stream, and watercourse.

"City Engineer" means the City of Cheyenne City Engineer, his designated representative or the City Engineering Department.

"Detention" means the temporary storage of storm runoff in a stormwater management facility with the goals of controlling peak discharge rates and providing gravity settling of pollutants.

"Detention Facility" means a detention basin or alternative structure designed for the purpose of temporary storage of stream flow or surface runoff and gradual release of stored water at controlled rates.

"Freeboard" is a factor of safety usually expressed in feet above a flood level for purposes of floodplain management. Freeboard compensates for the many unknown factors that could contribute to flood heights greater than the height calculated for the design flood.

"Infill Development" for commercial and residential parcels shall be defined by the following criteria: 1) One parcel surrounded by urban development on at least three sides (does not have to be directly adjacent to); and 2) Served by existing underground sewer and water utilities.

"Infiltration" means the process of percolating stormwater into the subsoil.

"Land Disturbance Activity" means grading, digging, cutting, scraping, or excavating of soil, placement of fill materials, paving, construction, substantial removal of vegetation, or any activity which bares soil or rock or involves the diversion or piping of any natural or man-made watercourse.

"Low Impact Development" (LID) is an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible. LID emphasizes conservation and use of on-site natural features to protect water quality. This approach implements engineered small-scale hydrologic controls to mimic the pre-development hydrologic regime of watersheds through infiltrating, filtering, storing, evaporating, and detaining runoff. The term Green Infrastructure may also be used.

"Major Drainageway" means any drainage flow path mapped with an area of special flood hazard on the Flood Insurance Rate Map (FIRM).

"MS4 Permit" means a state or federal stormwater discharge permit to regulate discharges from municipal separate storm sewer systems (MS4s) for compliance with Clean Water Act regulations;used interchangeably with the term National Pollutant Discharge Elimination System (NPDES) permit and collectively referred to as federal stormwater discharge permit.

"Nonpoint Source Pollution" means pollution from any source other than from any discernible, confined, and discrete conveyances, and shall include, but not be limited to, pollutants from agricultural, silvicultural, mining, construction, subsurface disposal and urban runoff sources.

"Public drainage system" is the system of storm sewers, channels, culverts, creeks, flows within public streets, and associated detention and water quality structures owned and maintained by the City of Cheyenne, Laramie County, or the Wyoming Department of Transportation.

"Redevelopment" is the replacement of impervious surfaces on a developed site that is surrounded by urban development on at least three sides. Redevelopment occurs when the existing facilities are demolished and rebuilt or substantially changed through reconstruction. Resurfacing parking lots with no change in overall dimensions or drainage patterns is not considered redevelopment even if the pavement is completely replaced.

"Storm Sewer" refers to an underground pipe system that carries stormwater from streets and other surfaces and discharges directly to a pond, stream or river;used interchangeably with the term "storm drain".

"Stormwater Management" is anything associated with the planning, construction, maintenance, or regulation of facilities which collect, store, convey or treat stormwater.

"Storm Water Pollution Prevention Plan (SWPPP)" means a written plan required under state and federal stormwater discharge permits identifying measures that will be implemented to minimize the discharge of pollutants in stormwater. Requirements for SWPPPs are specified in state and federal discharge permits. Requirements vary depending on whether the discharge permit is associated with municipal, industrial, or construction activities.

"Stormwater Retrofit" means a stormwater management practice designed for an existing development site that previously had either no stormwater management practice in place or a practice inadequate to meet the stormwater management requirements of the site.

"Stormwater Runoff" or "Stormwater" means flow on the surface of the ground, resulting from precipitation. Interchangeable terms include drainage and runoff.

"Urban Drainage and Flood Control District (UDFCD)" refers to the metropolitan Denver drainage organization.

"Water Quality Capture Volume (WQCV)" represents runoff from frequent storm events such as the 80th percentile storm. The volume varies depending on local rainfall data. The WQCV is based on runoff from 0.6 inches of precipitation (approximately 0.5 inches of runoff).

"WyDEQ" refers to the Wyoming Department of Environmental Quality.

Section 2. That Chapter 3.2, Drainage Impact Studies is hereby repealed in its entirety and reenacted as follows:

3.2 Drainage Impact Studies

3.2.1 General Provisions

a. ***Purposes.*** In addition to the general purposes of these regulations, this Section establishes minimum stormwater management requirements and controls to protect the general health, safety, and welfare of the public residing in watersheds within the City. These regulations:
   1. Assure stormwater facilities are planned and designed to minimum criteria.
   2. Minimize increases in nonpoint source runoff and pollution caused by stormwater runoff from development to reduce flooding, erosion, increases in stream temperature and maintain the integrity of existing stormwater systems.

3. Treat stormwater runoff at the source by preserving or enhancing natural flow paths and vegetative cover, preserving or enhancing natural open spaces and riparian areas, disconnecting impervious surfaces, and other measures that replicate pre-development hydrologic conditions to preserve the natural hydrologic functions, stream characteristics and groundwater recharge to the maximum extent practical.
4. Mitigate increases in stormwater runoff rates and volumes due to development, wherever possible, through stormwater management controls.
5. Ensure that stormwater management controls pose no threat to public safety and are properly maintained.

b. ***Applicability.*** This Sub-article 3.2 applies to all land development activities, including platting, re-platting, zoning, re-zoning, site plan applications, grading permit applications, and other development activities. This Sub-article is not applicable to the maintenance of existing pavement (streets, parking lots, etc.).

c. ***Waiver.*** A request for a waiver of the requirement to submit a drainage impact study shall be made in writing to the City Engineer. The City Engineer shall review the request and either: grant the waiver; specify the level of drainage impact study necessary for approval of a particular proposed development action; or deny the request for waiver. The City Engineer may waive the requirement to submit a drainage impact study based on the following:
1. Information is provided to substantiate there are no potential drainage problems at the site or downstream of the site (including impacts to downstream floodplains).
2. The development or redevelopment will not create drainage problems.
3. The development or redevelopment will not result in an increase in the impervious area.
4. The development or redevelopment of an area is immediately adjacent to a major drainageway that is capable of conveying the fully developed basin 100-year flood without impact to the base flood elevation.

d. ***Applicant Responsibilities.***
1. All responsibilities for the planning, design and construction of drainage improvements required in conjunction with land development shall be vested in the person or party who is developing the land (developer).
2. The developer shall be responsible for obtaining all required approvals and permits from regulatory entities (i.e. City, County, State, and Federal agencies) and shall comply with all applicable statutes pertaining to water quality and water pollution control.
3. The developer shall be responsible for securing approval of a final drainage report and approval of construction plans prior to City issuance of a Grading Permit and prior to construction of any drainage improvements. The requirement for approval of a drainage report will not apply to proposed land disturbance activities or projects where the requirement for a drainage impact study has been waived.

e. ***City Responsibilities.***

1. The City and its engineering staff serve in a review capacity. The City may use the findings of the impact studies to suggest or require drainage improvements, changes to site design, and operational improvements. The applicant shall revise and resubmit the study as necessary to address review comments provided to the applicant by the City or other affected agencies.
2. The City shall have the right to designate surface water storage areas to serve large land areas, which may include multiple subdivisions, developments and land owners. This right may be exercised when the applicable Drainage Master Plan has designated areas for storage as part of the overall surface water plan, or when, in the opinion of the City Engineer, a single storage facility serving a large area is more efficient to construct, less expensive to maintain, or more easily adapted to multiple land uses.
3. In such cases, the City Engineer may initiate an Improvement District or utilize the reimbursement provisions of Chapter 1.16 of the Cheyenne City Code as a means of constructing the required improvements. When the Developer constructs these improvements that directly benefit other areas or properties, the Developer may utilize the reimbursement provisions of Chapter 1.16 of the Cheyenne City Code.

3.2.2 Levels of Study

The following levels of analysis apply.

a. ***Less than 20,000 square feet (sf).*** For new, infill, or re-development with a total area of the project site less than 20,000 sf when all phases are complete the Developer shall complete the Drainage Worksheet. Drainage Impact Studies and detention and water quality requirements are waived, except as provided by Subsection e. of this Section.

b. ***Infill or re-development 20,001 sf to 40,000 sf.*** A Drainage Impact Study shall be completed and the Water Quality Capture Volume (WQCV) shall be treated in a post-construction BMP. Detention requirements to control the peak discharge are waived, except as provided by Subsection e. of this Section.

c. ***Infill or re-development 40,001 sf to 75,000 sf.*** A Drainage Impact Study shall be completed, the WQCV shall be treated in a post-construction BMP, and detention for the 10-year storm shall be provided. Detention requirements to control the 100-year peak discharge are waived, except as provided by Subsection e. of this Section.

d. ***Infill or re-development greater than 75,000 sf or new development greater than 20,000 sf.*** A Drainage Impact Study shall be completed and all water quality and detention requirements shall be complied with to the maximum extent feasible.

e. A waiver may not be available if: 1) the site is located in an area of known drainage problems; 2) the site is located within a floodplain; 3) there is a channel, swale, or other drainage conveyance on the site; or 4) the topography immediately downstream from the site obstructs the run-off in a way that may cause risk to buildings or roadways.

3.2.3 Drainage Design

a. ***General.***

1. Design shall preserve existing natural features, drainage features and historical flow patterns to the extent they can be incorporated into the site development plan and fit the context and urban design principles for the general area.
2. Drainage facilities shall be designed and constructed in accordance with accepted engineering practices. Primary resources include the City Construction Specifications, the current adopted City Stormwater Management Manual and the current UDFCD Urban Storm Drainage Criteria Manual (UDFCD Manual).
3. Provisions shall be made in the planning and development of land to provide for the mitigation of surface water run-off increases due to development. Mitigation shall be provided to the extent that the peak rate of flow from the project area after development exceeds the specified peak rate of flow prior to development, in accordance with the design standards as established herein.
   (a) The City Engineer is authorized to require a lower allowable discharge rate in specific basins or sub-basins if, in the exercise of professional judgment, a lower allowable discharge rate is required to prevent additional adverse impacts on downstream properties. A lower allowable discharge rate shall be documented in writing and be supported by reproducible engineering calculations, referenced to the Drainage Master Plan.
   (b) An individual development will not be required to provide mitigation, or may provide partial mitigation if it can be demonstrated, subject to City approval, that: (1) the increased volume and rate of runoff caused by a proposed development, when considered in combination with other existing or planned developments or land uses, will not cause the design criteria specified in this Sub-article 3.2 to be exceeded; or (2) the required mitigation is provided in an off-site facility.
4. City rainfall Intensity-Duration-Frequency information is presented in Table 1 and Figure 1.

TABLE 1: Rainfall Intensity – Duration – Frequency

Duration (Minutes)	Rainfall Intensity (inches per hour)					
	(2 Year)	(5 Year)	(10 Year)	(25 Year)	(50 Year)	(100 Year)
5	3.42	4.75	5.70	6.98	8.00	9.07
10	2.64	3.66	4.38	5.40	6.12	6.90
15	2.20	3.04	3.60	4.36	4.96	5.56
30	1.34	1.96	2.42	3.06	3.56	4.12
60 (1 hr.)	0.73	1.10	1.41	1.87	2.27	2.73
120 (2 hr.)	0.41	0.63	0.83	1.16	1.46	1.84
1440 (24 hr.)	0.06	0.08	0.10	0.13	0.15	0.18

Data Source: USGS Water Resources Investigation (WRI) 87-4225 Precipitation Records and Flood-Producing Storms Cheyenne, Wyoming.

5. Drainage planning and design shall evaluate rainfall event frequencies of a 5-Year, 10-Year, 50-Year, and 100-Year peak runoff. Design rainfall events from drainage master plans, Federal Emergency Management Agency (FEMA) Flood Insurance Studies, and subsequent references to those documents shall generally be accepted. Engineers, designers and developers should contact the City Engineer for appropriate design parameters early in the planning stages of a project.
6. Drainage planning shall provide for conveyance from areas upstream of, and within, a project to be sized for a 100-Year frequency storm event.
7. All drainage improvements shall be designed to convey a minimum of the Minor Storm, with provisions for the conveyance of the Major Storm as outlined in Table 2 below.

TABLE 2: Design Storm Frequency

Zoning District/Land Use	Minor	Major
Parks/Open Public Lands	2-Year	100-Year
Agricultural/Rural Residential	5-Year	100-Year
Urban Residential	5-Year	100-Year
Commercial	10-Year	100-Year
Industrial	10-Year	100-Year

8. Drainage facilities shall be designed to minimize mosquito breeding.
9. Potential impacts of groundwater or sub-surface water shall be quantified, to the extent possible, and considered during drainage planning and design.
10. The developer shall be responsible for obtaining approvals for new bridges and large span culverts from the Wyoming Department of Transportation.

11. To ensure proper construction, maintenance, and access to the drainage system, drainage easements shall be provided in all areas traversed by channels, storm sewers and detention or storage areas.
12. Existing stormwater management facilities on redevelopment sites are not required to be retrofitted to meet the current design standards if the existing facilities remain hydraulically isolated from the redevelopment area.
13. The City encourages the use of LID principles.

b. *Design Criteria and Parameters.*

1. Storm Sewers
   (a) Storm sewers shall not be designed to surcharge in the minor storm (surcharge is a depth of flow greater than 80 percent of the height). The maximum hydraulic head shall be 0.5 feet below the lip of drop inlets for the minor storm. Hydraulic grade lines (HGLs) shall be shown on design profiles.
   (b) Minimum velocity is 3 feet per second (fps) at 25 percent of height. Maximum velocity is 18 fps, or in accordance with manufacturer specifications.
   (c) Manholes shall be placed at junctions, or wherever there is a change in size, direction, or grade. Maximum spacing is 350 feet.
   (d) Minimum clearance between adjacent pipes within manholes or inlets is 12 inches (measured outside to outside).
   (e) All conduits 54" and greater shall have headwalls and wingwalls. Smaller conduits shall have headwalls and wingwalls or flared-end sections. Flared-end sections shall require joint fasteners and toe walls extending 3 feet below the invert.
   (f) Headwalls and wingwalls shall have guardrails, handrails, or fencing in conformance with local building codes and roadway safety requirements. Handrails shall be required in areas frequented by pedestrians or bicycles. Handrail heights shall be 42 inches for pedestrian walkways or open areas, and 54 inches for bicycle traffic.
   (g) Maximum headwater depth is 1.5 times the storm sewer height for the design storm (HW/D = 1.5). This criteria does not apply to stormwater detention pond outlets.
   (h) Storm sewer flows exceeding 5 fps velocity or 5 feet of depth shall provide outlet protection. Outlets shall be protected with riprap, concrete or a stilling basin in accordance with the UDFCD Manual.
   (i) Storm sewers and appurtenant structures within anticipated drive areas shall be designed to withstand HS-20 loading.
2. Channels
   The following criteria apply to proposed channels with a 100-year discharge exceeding 100 cfs.
   (a) Channels shall be designed for the 100-year flood assuming a fully developed watershed, with freeboard of 1.0 foot. The freeboard is measured vertically from the design water surface elevation to the top of bank. Freeboard requirements do not apply to swales designed in accordance with the UDFCD Manual.

(b) Grass-lined channels are desirable. A low-flow channel with a minimum capacity of 1/3 the 2-year flood shall be provided. Low-flow channel requirements do not apply to swales designed in accordance with the UDFCD Manual.
(c) Maximum velocities are 5 fps for erosive soils and 7 fps for non-erosive soils.
(d) The centerline radius shall be a minimum of 2 times the 100-year flood topwidth.
(e) Bank slopes a minimum of 4:1 (horizontal to vertical) are desirable; steeper slopes require review and approval. Riprap bank protection is required for bank slopes steeper than 4:1 and to stabilize channels along the outside of bends. Riprap bank protection shall consist of soil riprap, buried with 6 inches of topsoil and revegetated. Riprap bank protection shall extend to the depth of the 2-year flood, or as approved by the City Engineer.
(f) A 15 foot maintenance access shall be provided along one side, adjacent to the top. Maintenance access requirements do not apply to swales designed in accordance with the UDFCD Manual.

3. Detention
(a) Detention of stormwater shall be based on the more restrictive of: 1) no increases in peak discharge rates; 2) 100-year post-project peak rate no greater than the 50-year pre-project peak rate; 3) the downstream conveyance capacity of a project; or 4) as provided for in Section 3.2.3.a.3(a). Drainage facilities shall be designed to, at a minimum, not adversely impact downstream properties. Proposals to increase downstream conveyance capacity of an area may be considered in-lieu of over-detention on a project, with justification.
(b) Drainage planning shall not include the use of right-of-way or road embankments as detention storage areas unless approved by the City Engineer.
(c) Drainage planning and design shall provide for stormwater detention based on a design storm up to a 100-Year frequency. The design shall maintain post-development runoff rates to pre-development rates for return periods up to the 50-year frequency. The 100-year post-development rate shall be held to the 50-year pre-development rate, or as provided for in Section 3.2.3.a.3(a).
(d) The 10-year peak discharge and volume for infill or re-development project sites of 40,001 sf to 75,000 sf shall be based on the following equations:

Q_{10} = Area * 0.23

$Volume_{10}$ = Area * [(0.95 * I – 1.90) / 1000]

where Area is the project area, in acres
I is the project imperviousness, in percent
Q_{10} is the allowable 10-year peak release rate, in cfs
$Volume_{10}$ is the 10-year detention volume, in acre-feet

(e) A waiver for any detention storage requirements shall include all information necessary to substantiate the detention waiver request.
(f) Minimum longitudinal slopes are 0.5 percent for concrete and 2 percent for grass. Minimum cross slope is 2 percent. Detention facilities designed with underdrains may reduce the longitudinal and cross slopes to 1 percent.

(g) Outlet structures shall be functional for controlling the design release rates, provided with oversized safety/debris grates to reduce the potential for debris plugging, to promote ease of maintenance, and designed with favorable aesthetics. Grate sizing shall be in accordance with the UDFCD Manual.
(h) Embankments shall be no steeper than 4:1 below the 100-year water surface elevation and no steeper than 3:1 above the 100-year water surface elevation. Embankment top width shall be 40 percent of the maximum dam height plus 4 feet, consistent across the entire dam. Earthen slopes shall be covered with 6 inches of topsoil and vegetated.
(i) Emergency spillways shall be included in the design planning for detention facilities. The emergency overflow spillway shall be sized to convey the 100-year inflow peak. Spillway design velocities exceeding 5 fps shall require buried soil riprap.
(j) A 15 foot maintenance access with an 8 foot all weather surface shall be provided as needed to assure access to all pond components.
(k) Retaining walls within ponds are generally discouraged.
(l) Two signs, with a minimum area of 3 sf shall be provided. The signs shall be fabricated using red lettering on a white background with the following message:

WARNING
THIS AREA IS A STORMWATER FACILITY
AND IS SUBJECT TO PERIODIC FLOODING

(m)Parking lot detention criteria include:
(1) The maximum allowable design depth above pavement surfaces is 3 inches for the water quality volume, and 9 inches for the 100-year flood.
(2) All parking lot detention areas shall have a minimum of two signs posted identifying the detention pond area. The signs shall have a minimum area of 1.5 sf and contain the following message:

WARNING
THIS AREA IS A DETENTION POND AND
IS SUBJECT TO PERIODIC FLOODING
TO A DEPTH OF 9 INCHES OR MORE

(n) Detention certification is required prior to occupancy, and includes at a minimum:
(1) The volume at the design elevation;
(2) Size and elevations of the inflow and outflow structures;
(3) Spillway and top of dam elevations;
(4) Size and elevations of other structures, if applicable; and
(5) Embankment compaction meets or exceeds the requirements of Section 2210 of the City of Cheyenne Construction Specifications.

4. Water Quality
(a) Construction projects meeting any of the following criteria are required to submit for review and approval 1 copy (signed) of the applicable Construction Activity WyPDES Permit and 1 copy of the SWPPP in conjunction with the grading permit application pursuant to Title 15 of City Code:

(1) Any project required to submit site construction plans to the City for review and approval, excluding building permit plans;
(2) Any project that disturbs 1.0 acre or more;
(3) Installation or repair of utility lines in excess of 1000 linear feet (outside of the City Right-of-Way);
(4) Installation of utilities for a new development exceeding one single-family residence and appurtenant structures, prior to the start of overlot clearing or grading;
(5) Any clearing, grubbing, grading or filling operations located within 100 feet of a major drainageway or designated flood hazard area;
(6) Fill or excavation of 50 or more cubic yards of material, not related to building of a detached single family residential unit;
(7) Any building demolition project; or
(8) Any project that the City Engineer determines to have a potential impact to the health, safety and welfare of people or the environment.

(b) Post-construction BMPs are required to treat a minimum of the WQCV as defined in the UDFCD Manual. The WQCV shall be added to the detention volumes up to the 50-year, and may be incorporated within the 100-year detention volume.

(c) Reducing Directly Connected Impervious Area (DCIA) is required. At least 20 percent of the upstream impervious area shall be disconnected and drain through a receiving pervious area comprised of at least 10 percent of the upstream disconnected impervious area. The receiving pervious area shall consist of some combination of grass buffers, swales or porous pavement, designed in accordance with the UDFCD Manual.

(d) Exemptions from Post-Construction BMP Requirements may be granted for: 1) Single-family residential lots with a disturbed area less than 0.5 acres, not part of a larger subdivision; 2) Projects with a total imperviousness less than 10 percent for any given acre; 3) Roadway improvement projects that add less than 1.0 acre of new pavement; 4) Subwatershed areas less than 0.5 acre draining off a site; or 5) Other projects determined by the City to have negligible effect on stormwater quality.

5. Roads

(a) General. New culverts shall not impound runoff to cause inundation of surrounding properties unless associated with a designed stormwater detention facility. Crossings in floodplains shall meet the City Floodplain and Surface Water Management Regulations and FEMA National Flood Insurance Program requirements. The major storm shall be contained within the public right-of-way or easements.

(b) Urban

(1) Local Street Storm Sewer/Street Networks:
Minor Storm – No curb overtopping. Maximum depth of 6" in cross pans.
Major Storm – Maximum depth 12" above gutter flowline.

(2) Collector/Minor Arterial Street Storm Sewer/Street Networks:
Minor Storm – No curb overtopping and one 10 foot interior drive lane clear of spread. Maximum depth of 6" in cross pans, where allowed.

Major Storm – Maximum depth 12" above gutter flowline. Maximum depth of 12" at cross street intersections.

(3) Major Arterial Street Storm Sewer/Street Networks:
Minor Storm – No curb overtopping and two 10 foot interior drive lanes clear of spread. No cross street flows allowed.
Major Storm – Maximum depth 12" above gutter flowline. Maximum depth of 6" at cross street intersections.

(c) Rural
(1) Public Roads: Culverts - Minor Storm; Roadside ditches - Major Storm.
(2) Drainage Channels or Swales (Major Storm within easement).

6. Easements. Permanent drainage easements shall be provided in any scenario whereby drainage from one property must cross another property prior to entering the public drainage system. Permanent drainage easements shall also be provided in all areas traversed by a creek, channel, public storm sewer or storage area. Easements shall be accessible from the public right-of-way and shall be useable for maintenance vehicles. Drainage easements shall be shown in the drainage impact study, and platted, dedicated, established by affidavit or otherwise recorded prior to the issuance of a Certificate of Occupancy. Drainage easements shall be kept clear of impediments to the flow.
(a) Storm Sewers

TABLE 3: Minimum Acceptable Storm Sewer Easement Widths

Pipe Size	Easement Width
Less than 36-inch diameter	25 feet*
36-inch diameter and larger	30 feet*

*Or as required to meet Occupational Safety and Health Administration (OSHA) and construction requirements

(1) When relatively large diameter pipes are proposed or when design depths are excessive, greater easement widths will be required, as determined by the City Engineer.
(2) The pipe shall be constructed at one-third of the easement width to allow for stockpiling of material on one side of the storm sewer trench.
(3) Storm sewer easements should be designed to convey above ground flows in the event the storm sewer or inlet becomes clogged or full. It is therefore necessary to limit uses within the easement to ensure that surface conveyance redundancy and maintenance access is not impaired. Minor landscaping, such as rock or shrubs, may be appropriate where it can be demonstrated that the function of the easement is not compromised by the presence of the materials. Pavement over a storm sewer easement is allowable, providing the property owner assumes responsibility for replacement in the event it is necessary to remove it to access the pipe. Improvements that are not allowed on storm sewer easements include structures of any kind, retaining walls, permanent fencing, trees and other objects if determined by the City to be

inconsistent with the design intent of the easement or costly to replace. Surface treatments on drainage easements shall be shown in the drainage impact study, and accepted by the City.

(4) Storm sewer easements shall not be required for pipes collecting and transporting water solely within a single parcel.

(b) Channels

(1) To ensure that drainageways and the associated conveyances are adequately preserved and properly maintained, all drainageways that convey flows from other properties should be placed on tracts of land owned by a public entity (e.g. special district, City, or other regional agency), by a homeowner's association, or by approval by the City Engineer. Easements are allowed for drainage swales between individual lots.

(2) Required easement widths for natural drainageways need to provide for conveyance of design flow rates, required freeboard, and access for maintenance. Any banks allowed to remain in place at a slope steeper than 4 to 1 shall have the easement line set back from the top of the bank to allow for some lateral movement or future grading improvements to the bank. The easement line shall be no closer than the intersection of a 4 to 1 line extending from the toe of the slope to the proposed grade at the top of the bank, plus an additional width of 15 feet for an access bench, if access is not feasible within the floodplain.

(c) Ponds. The minimum easement requirements for detention basins are as required to contain storage and WQCV including freeboard, associated facilities, and adequate maintenance access around the perimeter.

c. ***Special Flood Hazards.*** The drainage requirements and regulations for the development of land located in and adjacent to permanent or periodic streams subject to flooding, and identified and designated as potential flood areas by FEMA, or the City's Special Flood Hazard Area map, shall also be in accordance with Chapter 13.24 of the Cheyenne City Code – FLOODPLAIN AND SURFACE WATER MANAGEMENT.

d. ***Alternative Compliance Measures.*** The developer may propose and the City Engineer may approve alternative compliance measures. Alternative compliance measures include new technologies, overall system improvements, innovative procedures, and new materials. It shall be the developer's responsibility to demonstrate that alternative compliance measures meet these criteria and meet the Purposes of this Sub-article 3.2. The review of alternative compliance measures shall be based upon:

1. Whether the alternative compliance proposed is part of a plan to improve stormwater management on a larger scale beyond the immediate site.
2. The extent that alternative site design strategies construct all or a portion of the larger-scale improvements in the chain of treatment and comply with this Sub-article 3.2 standards to the fullest extent possible.

3. Data and calculations, studies, industry publications, or additional evidence such as successful use in other jurisdictions to demonstrate any of these criteria.

e. ***Exceptions.*** Where, due to the physical limitations of the project site, topography or ground slopes, soil or rock conditions or other physical or context limitations, meeting the mitigation Standards and Design Criteria is not feasible, the City Engineer may grant exceptions to the standards. Review of requested exceptions shall be based upon:
   1. Whether the situation giving rise to the requested exception is due to the developer's actions.
   2. Whether the alternative compliance proposed will cause temporary or permanent harm to offsite properties.
   3. Whether the requested exception complies with this Sub-article 3.2 to the fullest extent possible.

   The City may condition any exception in any way that ensures the above criteria are met, including participation in the funding of any off-site improvements, the formation of a local improvement district, or other stormwater master planning strategies and facilities that ensure the Purposes of this Sub-article 3.2 are met.

3.2.4 Study Reports

The primary purpose of a drainage impact study is to identify drainage related issues and outline a plan to mitigate all potential negative impacts resulting from the proposed development action. Developers and design representatives are encouraged to contact the City Engineer early in the design process to discuss drainage related issues and potential mitigation alternatives.

Final drainage reports will be valid for two years from the date of City Engineer's approval. If construction drawings have not been developed and accepted by the City Engineer within two years, the final drainage report must be submitted for re-acceptance. Review and re-acceptance will be based upon any new criteria or standards adopted since the drainage report was initially accepted.

a. ***General Requirements.***
   1. A cover sheet with project name and location, type of report (Conceptual, Preliminary, or Final), name of firm or agency preparing the report, date of the report, table of contents, and page numbers.
   2. A certification sheet with the following statement, and appropriate signatures:

      "I hereby attest that this report for the (Conceptual, Preliminary or Final) drainage design of (Name of Development) was prepared by me, or under my direct supervision, in accordance with the provisions of City of Cheyenne Unified Development Code for the responsible parties thereof. I understand that the City of Cheyenne does not and shall not assume liability for drainage facilities designed by others.

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Registered Professional Engineer

State of Wyoming No._____ (Affix Seal)

3. A vicinity map (if not included with a plat map) along with applicable addresses, Township, Range, and Sections and Quarter (¼) Sections. Identify adjacent existing and proposed streets and subdivision names.
4. Discussion of the major drainage basin and subbasins, if applicable.
5. Discussion of the existing property and adjacent rights-of-way impacted by the project and predevelopment drainage characteristics. This shall include identifying current floodplain and flood hazard areas.
6. Discussion of any upstream properties and existing upstream drainage characteristics.
7. Discussion of existing conveyance downstream of project to nearest major drainageway. This shall include identifying potential downstream conveyance and capacity issues.
8. Discussion of proposed stormwater management plan to mitigate post-development drainage impacts. This shall include outlining a plan to maintain conveyance from upstream projects and proposed stormwater detention systems on the site.
9. Other items of discussion may be included to provide additional background information or substantiate the proposed drainage plan.
10. For projects anticipated to be sold off for future development by others, the conceptual drainage report shall outline a conceptual drainage plan (anticipated surface and storm drain conveyances along with detention requirements) for the entire development. This shall include accounting for all initially anticipated improvements.
11. An overall drainage plan map is required for projects larger than 2 acres or at the request of the City Engineer. Drainage map(s) shall be a minimum of 11" x 17" in size with a scale of 1"=20' to 1"=100' as required to show sufficient detail. The overall drainage plan map(s) shall include the following:
    (a) Outline of upstream area including existing and proposed inflow points;
    (b) Outline of overall project area, including property lines, street right-of-ways, and all easements;
    (c) Outline of downstream conveyance path to nearest major drainageway;
    (d) Outline of proposed drainage features;
    (e) Existing and proposed drainage patterns. Contours shall be at 2 foot intervals unless otherwise approved by the City Engineer, with proposed elevations sufficient to analyze drainage patterns extending 100 feet beyond property limits. Contour elevations shall be referenced to USGS vertical datum where contours are taken from USGS maps, or referenced to the most current aerial mapping of the City and County. Locate and label all drainage basins, sub-basins and floodplains;
    (f) Proposed outfall location of point discharges and ultimate receiving drainageway.

12. References to master plans or other relevant local studies shall be included in the conceptual report narrative.
13. For hydrology computations, include and clearly identify the following, if applicable:
    (a) Any computer modeling software and version used with an analysis;
    (b) Precipitation/runoff methodology/model used for analysis on the project (i.e. Rational Method, Kinematic Wave, SCS Unit Hydrograph, EPA SWMM, CUHP, etc.). Rational Method may be used for tributary acres of 30 acres or less;
    (c) Rainfall data or design storm source references;
    (d) Rainfall loss method (i.e. runoff coefficient(s), curve number, Horton, Green-Ampt, etc.) and input parameters;
    (e) All other input parameters and calculations (area, timing, connectivity, rating curves, etc.);
    (f) Summarized results with complete computer modeling (hard copy and digital).
14. For hydraulic computations, include and clearly identify the following, if applicable:
    (a) Any computer modeling software and version used with an analysis;
    (b) Parameters (materials, lengths, size, roughness, rating curves, etc.);
    (c) Summarized results with complete computer modeling (hard copy and digital).
15. Geotechnical investigations and reports are required.

b. ***Conceptual Plan.*** Conceptual drainage reports are primarily for development projects which are being developed before or during a preliminary plat or preliminary development plan stage and anticipated to evolve into final drainage plans with future development action submittals. The intent of the Conceptual Drainage Report is to outline drainage planning for the project in narrative and visual format for review by the City Engineer prior to preparing more detailed studies and designs. The conceptual report shall include all the above general requirements.

c. ***Preliminary Plan.*** Preliminary drainage reports are primarily for projects which are being developed before or during a final plat or final development plan stage. The Preliminary Drainage Report is an intermediate drainage planning report to provide sufficient detail required for projects anticipated to evolve into future construction plans or site plans. The intent of the Preliminary Drainage Report is to finalize drainage planning for the project in narrative, visual, and computational format for review by the City Engineer. For large development or multi-stage, multi-lot projects, the preliminary drainage plan shall serve as a reference document for future drainage planning when improvements are not fully completed by the developer requesting the development action.

The Preliminary Drainage Report shall contain the following information:
1. All the above general requirements as provided in Subsection a., of this Section.
2. Overall drainage map and plans with increased detail.
3. Detailed runoff computations from the pre-development area (on-site, upstream).

4. Detailed computations on existing downstream conveyance systems to be utilized with the project.
5. Preliminary computations on proposed street and drainage conveyance systems.
6. Preliminary computations on proposed detention systems and outlet controls, including time of total evacuation. Volume computations shall include a detention systems storage volume in cubic feet or acre-feet and the proposed volume in terms of inches of storage for gross tributary area. For areas being platted specific for detention, the preliminary design of the detention facility shall be included showing preliminary design contours.
7. Computations and computer modeling results to substantiate findings and recommendations.
8. For projects being approved without final details such as a Final Plat, a letter shall be submitted with the drainage report which includes the following:

   "<Name of Developer/Property Owner> hereby acknowledges that the stormwater management planning outlined in <drainage report title & date> was prepared for <development action> without final design details or construction plans. I understand that acknowledgement of receipt of this drainage plan by the City of Cheyenne does not constitute any formal endorsement of a final drainage plan until final designs and details can be reviewed and approved. I also acknowledge that future final drainage design reports and details shall be required by the City prior to construction or acceptance of drainage facilities for the < subdivision or project name>.

   <Developer/Property Owner>

   _____ _____
   Authorized Signature *Date*

d. ***Final Plan.*** Final drainage reports are primarily for projects in the Construction Plan or Site Plan review state. The intent of the Final Drainage Report is to outline final drainage design details for review by the City Engineer. The Final Drainage Report shall include all information to substantiate the final design. If no substantial changes are required to a Preliminary Drainage Report, the Final Drainage Report may be submitted as an amendment to the Preliminary Drainage Report. Final Drainage Reports shall be submitted to the City Engineer's Office in digital format.

The Final Drainage Report shall contain the following information:

1. All requirements of the Preliminary Drainage Report, with the exception that final design computations shall be included for all proposed drainage facilities.
2. Detailed Drainage, Grading and Site Plans including finalized:
   (a) Proposed storm sewer improvements locations and all details;
   (b) Proposed channel improvements with typical cross-sections and major flow limits;
   (c) Proposed culvert locations and all details;
   (d) Permanent drainage easements.
3. Comparison tables and graphs of pre-development and post-development runoff rates for major and minor storms events.

4. Detention area(s) summary table(s) and curve(s) showing the following:
   (a) Stage vs. Area;
   (b) Stage vs. Volume;
   (c) Stage vs. Discharge (or outflow).
5. The report shall include the following certification:

   "I, <Name of Developer/Property Owner> hereby certify that the drainage facilities <name of development> shall be constructed according to the design presented in this report. I understand that the City of Cheyenne does not and will not assume liability for the drainage facilities designed and certified by my engineer. I understand that the City of Cheyenne reviews drainage plans but cannot, on behalf of <Name of Developer/Property Owner>, guarantee that final drainage design review will absolve <Name of Developer/Property Owner> or their successors or assigns, of future liability for improper design. I further understand that approval of the <Final Plat or Final Site Plan> does not imply approval of my engineer's drainage design.

   <Developer/Property Owner>

   _____ _____
   Authorized Signature *Date*

3.2.5 Final Acceptance of Drainage Improvements.

A request for final acceptance of drainage improvements shall be made to the City Engineer. Final acceptance requires the submittal of construction drawings clearly labeled as "Record Drawings", "As-built Drawings", or "As-Constructed Drawings". The drawings shall be made by a Wyoming Licensed Professional Engineer or Professional Land Surveyor and include the following notation:

"I hereby attest that the installed drainage facilities as shown on <construction plan name, date> have been constructed in accordance with the approved drainage design for the <name of development>. The stormwater drainage facilities installed at this location conform to the approved design plans. Stormwater detention facilities constructed for this project facility meet or exceed storage volumes requirements outlined in the <Final Drainage Report> dated <date of final report> by <firm preparing Final Drainage Report>. Detention pond volumes for <name of detention facility or number> is <volume>. Deviations from the approved plan include < outline list of changes >."

_____
Registered Professional Engineer/Land Surveyor
State of Wyoming No._____ (Affix Seal)
<Date>

3.2.6 Maintenance

a. ***Private Maintenance.*** All components of the drainage system constructed on private property shall be maintained by the property owner or a representative of the owner. Maintenance responsibilities shall be defined on final plats and site/construction plans. Such maintenance shall include periodic cleaning, weed and grass cutting, repairs to pipe and underground structures and all else which is reasonably expected of a publicly owned and operated utility system.

   In the event the owner fails to inspect, report, or properly maintain the system within 30 days after written notice by the City to the owner of such deficiencies, the City may enter upon the property and take whatever steps it deems necessary to maintain or repair the system and bill the owner for such expense. However, if the owner's failure to properly maintain the system could cause damage to property, loss of life or a violation of a NPDES MS4 Permit, the City may take immediate action, without notice to the owner, to maintain or repair the Facilities.

   It is expressly understood and agreed that the City is under no obligation to maintain or repair the system.

b. ***Public Maintenance.*** The City shall maintain those components of drainage systems that are constructed within the City right-of-way or on land owned by the City. The City shall maintain components of drainage facilities located on private property in areas within drainage easements only when said systems are constructed to manage stormwater for a broad area that extends beyond the confines of the property where the facility is located and only when said systems have been formally accepted for public maintenance pursuant to a written instrument executed by the Mayor or other authorized official of the City.

3.2.7 Grading and Erosion Control Permit [Reserved]

Section 3. That Appendix H is hereby repealed in its entirety.

Section 4. This ordinance shall be in full force and effect upon its passage and publication.

FIRST READING: July 27, 2015

SECOND READING: August 10, 2015

THIRD AND FINAL READING: August 24, 2015

Richard L. Kaysen, Mayor

(SEAL)

ATTEST:

Carol Intlekofer, City Clerk

Published: Wyoming Tribune-Eagle
September 2, 2015