

Volume1, Chapter 6 - Streets/Inlets/Storm Sewers

Users' Guidance:

If a UDFCD *Section* number in this chapter is **skipped**:

It was adopted as is; please refer to that Section in the **corresponding UDFCD Manual**, Volume, Chapter and *Section*.

If a UDFCD *Section* number in this chapter is **amended** or a new COFC *Section* in this **Chapter is added**:

It is **listed below**; please refer to it in **this document**.

If a UDFCD *Section* in this chapter is **deleted** then it was **not** adopted by the City of Fort Collins; The deleted UDFCD *Section* number will be **identified as deleted in the text below**.

(1) *Section 2.2* is amended to read as follows:

2.2 Design Requirements

(a) The Minor (or Initial) Storm is designated as the 2-year storm. The Major Storm is designated as the 100-year storm.

(b) The encroachment of gutter flow on the street for the 2-year storm runoff must not exceed the criteria set forth in Table ST-2. A storm drainage system must begin where the encroachment reaches the limits found in this table.

Table ST-2

Pavement Encroachment Standards for the Minor (i.e., 2-Year) Storm

Street Classification	Maximum Encroachment* **
Local (includes places, courts, and alleys)	No curb-topping. Flow may spread to crown of street.
Collector and Arterial (Without Median)	No curb-topping. Maximum six (6) inch flow depth at the gutter. Flow spread must leave at least a six (6) foot wide clear travel lane on the one-half street section
Arterial (with Median)	No curb-topping. Maximum six (6) inch flow depth at the gutter. Flow spread must leave at least a twelve (12) feet wide clear travel lane in each direction

*Where no curbing exists, encroachment must not extend over property lines.

** These criteria apply only to City streets where no floodplain has been designated. For areas with designated floodplains, please refer to Chapter 10 of the City Code for further guidance.

(c) Standards for the Major Storm and cross-street flows are also required. The Major Storm needs to be assessed to determine the potential for flooding and public safety. Cross-street flows also need to be regulated for traffic flow and public safety reasons.

The City has established street inundation standards during the Major Storm event and allowable cross-street flow standards for the Minor (2-year) Storm and the Major (100-year) Storm.

(d) Table ST-3 sets forth the allowable street encroachment for the 100-year storm runoff.

Table ST-3

Street Inundation Standards for the Major (i.e., 100-Year) Storm

Street Classification	Maximum Encroachment **
Local, Collector and Arterial (without Median)	The depth of water at the street crown shall not exceed six (6) inches to allow operation of emergency vehicles, the depth of water over the gutter flow line shall not exceed twelve (12) inches, and the flow must be contained within the right-of-way or easements paralleling the right-of-way. The most restrictive of the three criteria shall govern.
Arterial (with Median)	The depth of water must not exceed the bottom of the gutter at the median to allow operation of emergency vehicles, the depth of water over the gutter flow line shall not exceed twelve (12) inches, and the flow must be contained within the right-of-way or easements paralleling the right-of-way. The most restrictive of the three criteria shall govern.

** These criteria apply only to City streets where no floodplain has been designated. For areas with designated floodplains, please refer to Chapter 10 of the City Code for further guidance.

(e) Table ST-4 sets forth the allowable cross-street flow for the Minor (2-Year) and the Major (100-Year) Storm events.

Table ST-4

Allowable Cross-Street Flow

Street Classification	Minor (2-Year) Storm Flow	Major (100-Year) Storm Flow
Local	Six (6) inches of depth in cross pan.	Eighteen (18) inches of depth above gutter flow line.
Collector	Where cross pans are allowed, depth of flow should not exceed six (6) inches in cross pan	Twelve (12) inches of depth above gutter flow line.
Arterial	None.	No cross flow. Maximum depth at upstream gutter on road edge of twelve (12) inches.

(f) Once an allowable spread (pavement encroachment) has been established for the Minor Storm, the placement of inlets can be determined. The inlets will remove some or all of the excess stormwater and thus reduce the spread. The placement of inlets is covered in Section 3.0 of this chapter. It should be noted that proper drainage design utilizes the full allowable capacity of the street gutter in order to limit the cost of inlets and storm sewers.

(g) Another important design consideration is the frequency of occurrence of the Minor Storm. In other words, the design engineer must factor into his design how often the spread of stormwater will reach or exceed the maximum encroachment limit. This is addressed by assigning a frequency (or recurrence interval) for the Minor Storm for

various street classifications. The selection of a design frequency is based on many factors including street function, traffic load and vehicle speed. In the city of Fort Collins, the Minor Storm recurrence interval is the 2-year storm for all street classifications.

(h) For street sump locations, provisions must be included to carry the 100-year runoff in a pipe or an overflow channel to an acceptable outfall while the maximum water surface depth criteria as designated in Table ST-2 and in Table ST-3 are not violated.

(i) An access and maintenance easement for the overflow drainage facility must be provided if that facility is not contained within the public right-of-way.

(j) Two additional design considerations of importance in street drainage are gutter (channel) shape and street slope. Most urban streets contain curb and gutter sections. Various types exist including spill shapes, catch shapes, curb heads, and roll gutters. The shape is chosen for functional, economic, or aesthetic reasons and does not dramatically affect the hydraulic capacity. Swales are common along some urban and semi-urban streets, and roadside ditches are common along rural streets. Their shapes are important in determining hydraulic capacity and are covered in the next chapter.

- (2) *Table ST-2* Pavement Encroachment Standards for the Minor (i.e., 2-Year) Storm is amended
- (3) *Table ST-3* Street Inundation Standards for the Major (i.e., 100-Year) Storm is amended
- (4) *Table ST-4* Allowable Cross-Street Flow is amended
- (5) A new *Section 3.5* is added, to read follows:

3.5 Inlet Design and Construction Standards

(a) Storm inlets must be designed and installed where sump (low-spot) conditions exist or when allowable street capacities are exceeded. The outlet pipe of the storm inlet must be sized on the basis of the theoretical capacity of the inlet, with a minimum diameter of fifteen (15) inches, or a minimum dimension of twelve (12) inches if elliptical or arch pipe is used.

(b) All curb openings must be installed with the opening at least two (2) inches below the flow line elevation. The minimum transition length allowed is five (5) feet

(c) Any curb opening greater than six (6) inches in height must have a metal bar welded horizontally across the inlet for public safety purposes such that no opening height is greater than six (6) inches.

(d) All inlet covers must be stenciled or stamped with the following designation: NO DUMPING - DRAINS TO Poudre RIVER

- (6) A new *Section 4.5* is added, to read as follows:

4.5 Storm Sewer System Construction Standards

Construction of all stormwater facilities must be built in accordance the approved Water Utilities Development Construction Standards or the Water Utilities Capital Construction Standards as appropriate.

