

Section 7 – Storm Water System

A. Capital Facilities Plan

1. SERVICE STANDARD

Kanab City has chosen to implement the following standard.

- For the 10-year storm, all storm water must be contained in the street with one dry emergency lane in each direction twelve feet in width.
- For the 100-year storm, all storm water must be contained within the streets with a maximum depth of one foot above the low top of curb.
- All water not contained as described above must be conveyed in a storm drain system
- The city engineer may modify the above items (to be either more or less restrictive) for special conditions.

Responsibility for construction of required facilities shall be as follows.

- The landowner or developer will be responsible for all storm water facilities within his property, including natural flows originating off-site which cross the development.
- Kanab City will be responsible for all off-site storm water facilities included in the Capital Facilities Plan.
- The landowner will be responsible for all off-site storm water facilities not included in the Capital Facilities Plan imposed by the city after review of a hydrology study prepared by the owner's engineer and approved by the city engineer.

2. INVENTORY OF EXISTING FACILITIES

With Kanab Creek flowing through the middle of Kanab City, the main objective of the storm drain system is to convey street flow to Kanab Creek. There are several basins that have storm drain lines currently in use. In

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addition there are some existing and proposed detention basins that have been designed to detain storm water runoff. These systems are summarized below (Refer to the Storm Drain Maps in Appendix E.).

- A 27" corrugated metal pipe (CMP) conveys runoff from Basins 17 and 19. The Kanab Creek outlet is located between Center and 100 North Streets.
- Runoff from Basin 20 is conveyed from 100 East to Kanab Creek along 200 South through two 24" pipes that transition to a 36" pipe that conveys water to a 27" pipe which outlets to the Creek.
- Runoff from Basin 21 is conveyed from 100 East to Kanab Creek along 400 South through an 18" pipe that transitions to a 24" pipe that conveys water to a 27" CMP which outlets to the Creek.
- Runoff from Basins 1, 18, 22, 23, 24, 25, 26, 28, and 29 flows to a ditch that is located on the south side of 400 south from 400 to 200 east. This ditch conveys storm water runoff to a 48" storm drain pipe located at approximately 500 south 100 east. The 48" storm drain pipe transitions to a 36" pipe on the north end of the high school. West of the high school the 36" pipe transitions to a 27" pipe that conveys the water to Kanab Creek. A portion of the storm water runoff from Basin 28 is collected by a 36" pipe located southwest of the high school. It should be noted that storm water runoff from the Basins mentioned above that is not collected by the 48" storm drain pipe will flow to a borrow ditch that parallels the highway.
- Kanab Creek Ranchos detention basin will detain flow from the upper portion of Basin 11. The maximum discharge from the detention basin will be 1.6 cfs.
- Savage Point detention basin detains flow from Basins 25 and 26. The maximum discharge from the detention basin will be 16 cfs.
- There are a number of storm drain facilities located in the La Estancia subdivision. Included are a detention basin above the subdivision, trapezoidal channels and storm drain pipe located throughout the

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subdivision, and a 6' box culverts designed to convey water from the subdivision to "Town Wash" at approximately 200 North and 250 East. The calculated flows for the 10-year and 100-year storms at Town Wash from La Estancia are 416 and 805 cfs, respectively (Murphy, 2005)

In addition to the mentioned detention basins and storm drain pipe there are a number of culverts that convey water under Highway 89. It is assumed that these culverts do not restrict flow.

3. METHOD OF FINANCING OF EXISTING FACILITIES

Existing facilities have been financed by various means with the greatest share being financed through the *general fund*.

4. EXCESS CAPACITY

Existing storm water facilities are being used at or near capacity. There is no excess capacity available for development.

5. ADDITIONAL FACILITIES NEEDED AT PRESENT

Although there are many areas of the city where additional storm drain facilities would be desirable, this study has focused on areas of major concern. These areas tend to have significant amounts of runoff and require storm water facilities that would be cost prohibitive if not undertaken on a large scale.

- At the present time, one of the areas of greatest concern near existing development is along 200 North Street (60 foot row). The estimated 100-year flow (of which 805 cfs originates in the La Estancia subdivision and the area known as Toms Canyon, and the remaining flow originates in the areas north of Kanab) is 1,015 cfs. The flow capacity of 200 North Street at one foot above the top of curb is approximately 800 cfs which leaves 215 cfs which should be carried in a storm drain to reduce the danger and risk of damage during periods of high runoff.

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- The city proposes to install a 48" diameter storm drain for approximately 4,850 feet along 200 North street. The capacity of the 48" storm drain pipe will be approximately 221 cfs. Therefore, the additional 794 cfs discharged from Basins 1 and 18 (1,015 cfs – 221 cfs) will either flow to the streets or down Town Wash. The 200 North Street storm drain estimated cost is approximately \$128 per foot (including pipe, catch basins, labor, street repair, and traffic control) for a total estimated cost of \$620,800.
- Navajo and Willow Drives appear to have homes built below the elevation of the roadways. Because of this, flooding has occurred and will likely occur again. Therefore, it is proposed that storm drain be installed on each of these roads from the intersection of the roadways with Powell Drive. It is recommend that 2,150 feet of 24" storm drain (estimated capacity = 32 cfs) be installed on Navajo Drive and 1,800 feet of 48" storm drain (estimated capacity = 153 cfs) be installed on Willow Drive. The cost for the 24" and 48" storm drain lines is approximately \$109,650 (@\$51/ft) and \$230,400 (@\$128/ft), respectively.
- The storm water runoff from Basin 9 flows directly toward the sewer lagoons. A temporary ditch has been installed around the facility to divert the storm water runoff away from the ponds. We recommend that a 32" pipe be installed to intercept and convey the storm water runoff away from the lagoons to Kanab Creek. The length of this pipe would need to be 2,650 feet and the diameter 30" (estimated capacity = 41 cfs). The pipe is sized to carry the 10 year storm (41 cfs) and would cost approximately \$178,875 (@\$67.50/ft).

6. ADDITIONAL FACILITIES NEEDED AT BUILDOUT

As with *additional facilities needed at present*, only those storm drain facilities of major concern, which would be difficult if not impossible to construct without large-scale participation, are included in this analysis. Smaller facilities will be constructed by individual developments as required by the city.

After careful analysis of future development, the area of greatest concern is that covered by Basins 2-4 (see map) which are generally located East and

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Northeast of the airport. Of these three basins, Basin 2 (draining Pugh Canyon) has the highest runoff (1,788 cfs). A summary of storm drain facilities needed in this area is given below.

TABLE 29 – STORM WATER SYSTEM ADDITIONAL FACILITIES NEEDED AT BUILDOUT

Basin(s)	Runoff	Conveyance (cfs)		Channel Dimensions (feet)			Estimated Cost ¹	
		Streets	Channel	Width	Depth	Length		
2	1,788	800	988	10	5	16,400	\$4,329,600	
3	2,377	589	988	10	5	1,300	\$343,200	
2,3,4	3,028	651	988	10	5	8,800	\$2,323,200	
Total								\$6,996,000

¹ The cost of the channel is \$400 per C.Y. of concrete assuming a thickness of 6". Please note that for basins 2, 3, and 4 the cost has an additional \$100,000 to pay for the crossing of the existing highway so that the water can be routed to Kanab Creek.

7. METHOD OF FINANCING NEEDED FACILITIES

Owners of new developments will be required to construct and finance planned storm water facilities adjacent to their respective projects as a condition of development, except for those facilities included in the table above.

Facilities needed at present (The 200 North, Willow Drive, Navajo Drive, and Lagoon storm drain systems) will be financed through a *Special Improvement District* (SID) or with a *grant* if such becomes available. Facilities needed at build-out will be financed through impact fees.

B. Development Impact Fee Analysis

1. SERVICE AREA

All of Kanab City has been included in one service area because of the difficulty in defining benefits and collecting different impact fees in various areas of the city.

2. PROPORTIONATE SHARE

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In the areas of greatest concern, runoff will not significantly increase during development. Planned storm water facilities are needed in these areas not because runoff will be increased, but because development will place individuals in areas where there is a significant danger to life and property if expected flood waters are not controlled. Although there are many possible ways of determining the proportionate share of costs for different types of development, none seem to be more equitable than assessing impact fees based upon the area developed.

3. CREDITS FOR PAST AND FUTURE CONTRIBUTIONS

Most of the existing storm drain facilities have been financed through the general fund. As shown in section IV, it is estimated that approximately 0.24% of general fund revenues come from undeveloped property. As a result, a credit of 0.24% will be applied when calculating the maximum impact fee. There is no long term debt attributable to existing storm drain facilities so no credit for future contributions is applicable.

4. IMPACT FEE CALCULATION

The storm water impact fee is calculated using a total value equivalent to the proportionate share directly attributable to growth less credits for past and future contributions. The proportionate share (\$6,996,000) multiplied by \$1.605 to account for bonding at 5% for 20 years is equal to \$11,228,580, subtracting credits of \$26,949 ($= 0.24\% \times \$11,228,580$) gives a maximum allowable expense that can be paid for by impact fees of \$11,201,631. There are an estimated 5,980 acres yet to be developed within existing city limits including the 250 acres proposed to be annexed within the city limits resulting in a maximum allowable impact fee of \$1,873 per acre.