



# CITY OF RAPID CITY

RAPID CITY, SOUTH DAKOTA 57701

## Public Works Department Engineering Services Division

300 Sixth Street

Telephone: (605) 394-4154 FAX: (605) 355-3083

Web: [www.rcgov.org](http://www.rcgov.org)

June 8, 2010

Sam J. Bice  
1210 Creek Drive  
Rapid City, SD 57701

Ref: Perrine Drainage Basin Design Plan  
Creek Drive Area South of Centre Street

Dear Mr. Bice:

The Perrine Drainage Basin Design Plan (DBDP), 1999 for the drainage east of your property describes the open channel as Element 8 from Centre Street south to Rapid Creek.

See the attachments for the following:

1. DBDP description of Element 8 and recommended improvements,
2. DBDP estimated costs, 1999,
3. GIS map of drainage elements, and
4. Pictures of open channel.

The estimated cost for the element 8 drainage improvements, accounting for three percent inflation, is approximately \$80,000.

Sincerely,

City of Rapid City - Engineering Services

Steven D. Schelske, P.E., CFM

Attachments

SDS/sds



EQUAL OPPORTUNITY EMPLOYER

## Element 8

Element 8 represents an existing and proposed conveyance system beginning at the Element 7 discharge point and ending at Rapid Creek. Improvements are recommended. A small channel west of the main channel is also recommended as discussed under MISCELLANEOUS AREA IMPROVEMENTS.

Improvements to Element 8 should be designed for about 365 cfs which is the flow at Element 104.

It is recommended that the existing channel between Centre Street and the abandoned rail line be regraded. The existing channel has a steep grade and is susceptible to erosion. It is recommended the channel be regraded with a 10 foot bottom, 3:1 side slopes, and an invert slope of 0.0090 ft/ft. Much of the invert slope flattening will occur as a result of grading required to install the Element 7 storm sewer. Depending upon final design drop structures may be necessary. Normal depth for the recommended channel using 365 cfs is 3.0 feet at a velocity of 6.4 fps. The Froude Number is 0.78.

The existing 48" pipes through the railroad right of way should be removed and the embankment open cut to allow for the Element 8 flows. The existing pipes are plugged with the existing downstream channel being at approximate top of pipe elevation. Under existing conditions the railroad pipes will cause a flow split with most of the flow directed to the east where Kennel Drive will be overtopped.

The railroad open cut should be to the same approximate elevation as the top of pipes. Excavating the channel down to pipe flow line would lower the downstream channel such that the irrigation ditch will back into the channel. It is suggested the open cut be lined with riprap to lessen erosion. It may be possible to line the channel invert immediately upstream of the open cut to serve as a channel drop.

The channel section between the railroad and the Hawthorn Irrigation Ditch is adequate with only minor shaping required. Significant improvements are not recommended since the existing channel grade is flat and the channel is a wetland. Minor shaping as necessary can be completed with the Hawthorne Irrigation Ditch improvements discussed below.

The channel will discharge into the Hawthorne Irrigation Ditch which does not have capacity for additional flow. It is recommended that an overflow weir system and outfall channel to Rapid Creek be constructed to carry the entire storm water discharge. The weir system would allow irrigation flows to continue in the ditch and divert the storm water to the outfall channel. It will be necessary to secure an easement or right of way for the outfall channel.

The recommended minimum size of the outfall channel to Rapid Creek is the same 10 foot channel described for the area upstream of the railroad. Consideration should be given to increasing the weir and channel size to account for other flows that may be entering the irrigation ditch west of the Perrine Basin.

Other alternates are available for the irrigation ditch and outfall channel. One option would be to increase the size of the irrigation ditch and Kennel Drive crossing. The storm water would then follow the irrigation ditch until it reaches the railroad tracks. At this point an overflow weir and channel would be constructed to carry the flow along the railroad east to the City recreation complex. The flow would then enter an existing drainage system that drains to Rapid Creek. Other options are (1) convey the storm water under the irrigation ditch to the Creek with a pipe system, (2) enclose the irrigation ditch with a pipe and/or siphon and build a channel over the pipe, and (3) carry the stormwater eastward along the south side of the tracks, including a Kennel Drive crossing, through the irrigation ditch to the City recreation complex.

Element 8 was UDSWM2 modeled with a 10 foot wide bottom, 3:1 side slopes, an n value of 0.044, and an invert slope of 0.0090 ft/ft. Peak routed flow is 304 cfs.

#### Element 100

Element 100 is direct flow element. It is used to summarize flows from sub-basin 2 and Element 3. The flow calculated at this element is the total inflow to Detention Pond 201. Peak discharge is 657 cfs.

#### Element 101

Element 101 is a direct flow element. It summarizes flows from sub-basin 3 and Element 4 to provide an inflow hydrograph to Detention Pond 300. Peak discharge is 414 cfs.

#### Element 102

Element 102 is a direct flow element. It summarizes flows from sub-basin 4 and Element 5 to provide an inflow hydrograph to Detention Pond 202. Peak discharge is 374 cfs.

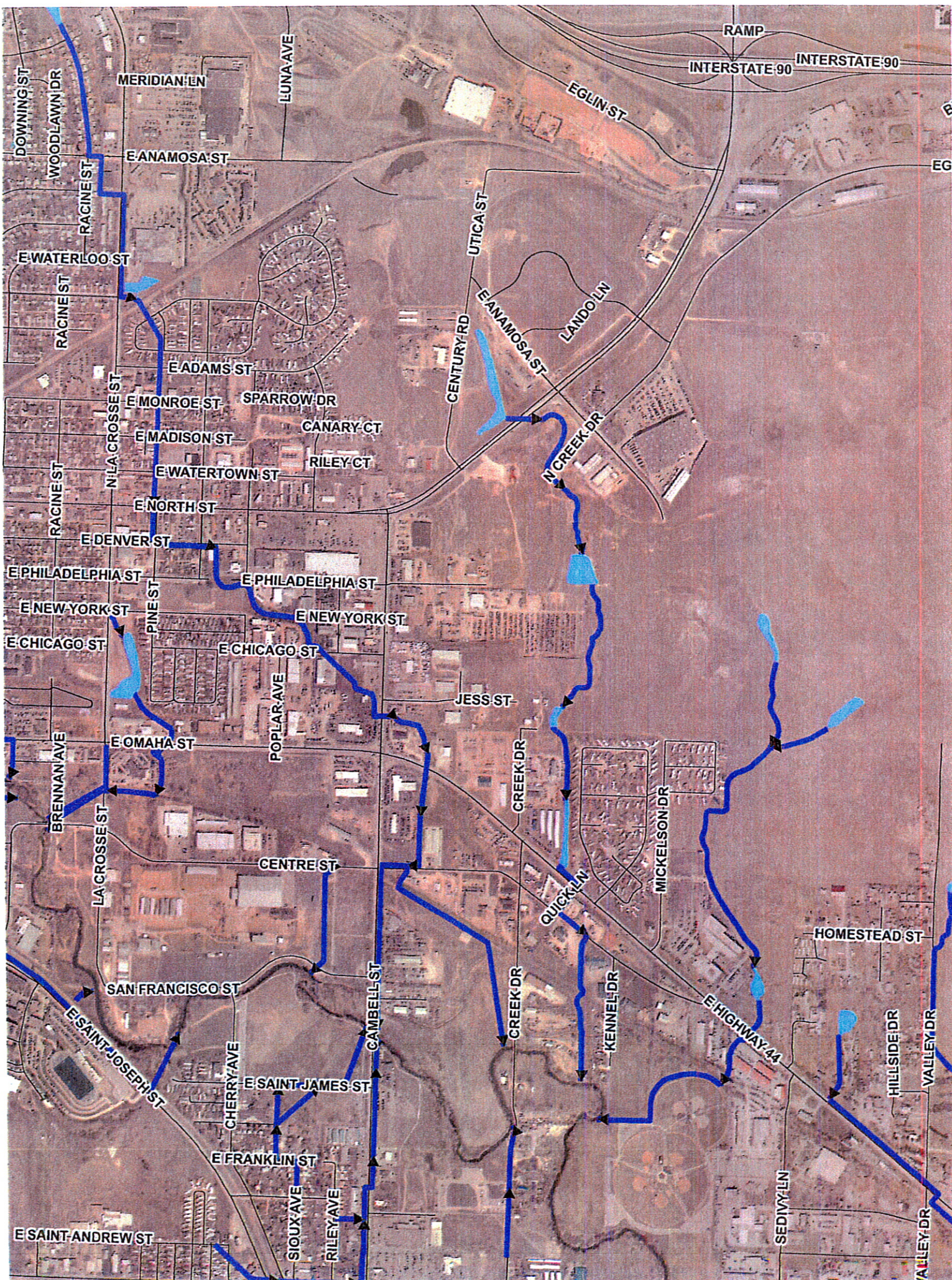
#### Element 103

Element 103 is a direct flow element. It summarizes flows from sub-basin 5 and Detention Pond 202. Peak discharge is 305 cfs.

TABLE I  
SUMMARY OF DESIGN PLAN  
RECOMMENDED IMPROVEMENTS AND ESTIMATED COSTS

ELEMENT NUMBER	RECOMMENDED IMPROVEMENT	ESTIMATED COST
<u>"WEST TRIBUTARY"</u>		
1	Install outlet erosion control.	\$1,000.00
2	Construct stock dam spillway.	\$2,000.00
3	No improvements.	NA
4	Improve channel including drop structures	\$70,000.00
5	Improve channel.	\$30,000.00
6	Install 54" RCP pipe bends.	\$35,000.00
7	Construct new 66" RCP storm sewer.	\$140,000.00
8	Improve channel including drop structures, open cut railroad, construct irrigation ditch overflow system, construct new outfall channel from irrigation ditch to Rapid Creek.	\$55,000.00
200	Modify detention pond discharge pipe.	\$5,000.00
201	Improve existing detention pond. Raise embankment and grade to increase storage. Raise and modify stand pipe.	\$60,000.00
202	Improve existing detention pond. Raise embankment and grade to increase storage, modify pipe inlet, construct spillway.	\$25,000.00
300	Construct new detention pond with roadway embankment and pool excavation. Twin 36" RCP with roadway overflow.	\$55,000.00
SUBTOTAL FOR WEST TRIBUTARY		\$478,000.00
<u>"MIDDLE TRIBUTARY"</u>		
10	Shape channel and install geotextile lining.	\$14,000.00
11	Shape channel and install geotextile lining.	\$12,000.00
12	Grade and shape channel and install geotextile lining.	\$75,000.00
13	Install 36" RCP.	\$15,000.00
14	Install 42" RCP and construct irrigation overflow.	\$105,000.00
15	Grade and berm portions of channel. Outlet protection.	\$10,000.00
210	Improve existing detention pond. Raise embankment and grade to increase storage. Raise and modify stand pipe.	\$55,000.00
310	Construct new detention pond with roadway embankment. 24" RCP outlet pipe.	\$33,000.00
311	Construct new detention pond with roadway embankment. 18" RCP outlet pipe reduced to 12" orifice.	\$27,000.00
SUBTOTAL FOR MIDDLE TRIBUTARY		\$346,000.00



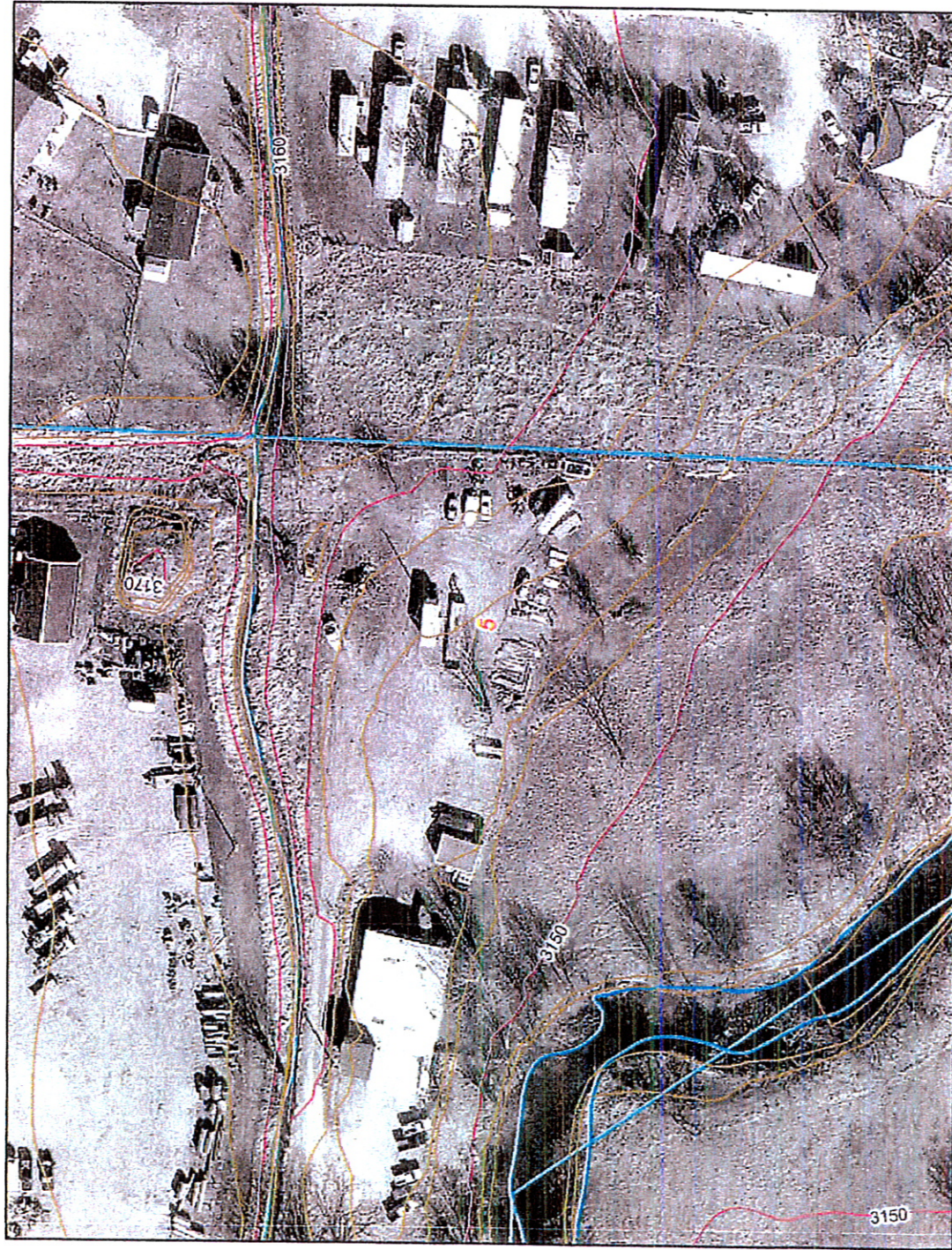








# Bice Lot



0 120 240 360 ft.

Map center: 44° 4' 25.8" N, 103° 11' 4.1" W

DISCLAIMER: This map is provided "as is" without warranty of any representation of accuracy, timeliness, or completeness. The burden for determining accuracy, timeliness, completeness, and fitness for use rests solely on the user. Rapid City and Pennington County make no warranties, express or implied, as to the use of the map. There are no implied warranties of merchantability or fitness for a particular purpose. The user acknowledges and accepts the limitations of the map, including the fact that the data used to create the map is dynamic and it is a constant state of maintenance, correction, and update. This document does not represent a legal survey of the land. There are no restrictions on the use of the map for any purpose other than the City of Rapid City copyright notice must be legible on the print. The user agrees to recognize and honor in perpetuity the copyrights and other proprietary claims for the map(s) established or produced by the City of Rapid City or the vendors furnishing said items to the City of Rapid City.

## Legend

- Roads**
  - Not classified
  - Interstate
  - US Highway
  - SD Highway
  - County Highway
  - Main Road
  - Minor Arterial
  - Collector
  - Ramp
  - Paved Road
  - Unpaved Road
  - Unimproved Road
  - Trail
  - other
  - Not yet coded
- City Contour Lines**
- INDEX**
- INTERMEDIATE**
- Township/Section lines**
- SECTION**
- TOWNSHIP**
- Parcel Boundary**
- Lot Lines**
- COUNTY**
- LOT LINE**
- PARCEL LINE**
- ROAD ROW**
- RR ROW**
- SECTION**
- TOWNSHIP**
- WATER LINE**
- PLSS Sections**
- County Line**

Scale: 1:1,200







DIVISION OF HEAVY CONSTRUCTORS, INC.

May 27, 2010

B & B Foundation Service  
1210 Creek Drive  
Rapid City, SD 57703

Re: Creek Drive Water Damage

Dear Sam:

Following is the scope of work required to repair the flood damage to the property on Creek Drive:

Demolish the wood retaining wall  
Saw cut edge of broken asphalt at the retaining wall  
Furnish and install fill at the old wall location  
Furnish and install riprap to protect the new fill  
Retrieve gravel and debris washed into the grass area  
Regrade the north gravel road  
Furnish and install gravel at the north road  
Regrade the back lot  
Furnish and install gravel at the back lot.

Our lump sum price for the above noted scope of work is \$11,000.00

Please call with any questions.

Sincerely,

Bob Heibult, PE  
Building Division Manager



Flooding Problems Related to Hawthorne Ditch and Perrine Drainage Basin  
1220 Creek Drive, Rapid City, South Dakota

**History:**

- A. Property at 1220 Creek Drive was purchased by Stanley E. and Fay E. Bice in 1968.
- B. Flooding first occurred from the Hawthorne irrigation ditch on June 9<sup>th</sup>, 1972 during the Rapid City flood.
- C. In 1999 the Engineering Division of the Public Works Department, City of Rapid City identified a problem with the Perrine Drainage Basin located to the north of this property. It recommended that an overflow weir system and outfall channel to Rapid Creek be built which would allow irrigation flows to continue in the ditch and would divert storm water runoff to the outfall channel. This plan was never implemented.
- D. In 1999 the owner of the property, Fay E. Bice, granted an easement to the City of Rapid City in order for the outfall channel to be constructed. The City of Rapid City did not file this easement and cannot find record of it. She is still willing to grant this easement.
- E. Since 2006, flooding has become more frequent and damaging. Flooding occurred in the spring of 2006, spring of 2007, on May 25, 2009 and again on May 25, 2010. During these events there were locally heavy thunderstorms with rapid accumulations of precipitation. The result was a rapid build up of storm water runoff in the Hawthorne ditch which subsequently overflowed onto this property causing damage to the parking lot, the driveway and allowing water to enter the building on more than one occasion.
- F. Increasing development of property located in the Perrine Drainage Basin has resulted in increased storm water runoff into Hawthorne Ditch beyond its capacity. This has created the overflow situations listed in E. above.
- G. In 2007 the Hawthorne Ditch company built an overflow weir on the west side of Creek Drive in response to Fay E. Bice's complaints regarding the recurring problems with the ditch overflowing onto her property. The overflow weir has improved the situation as it does control the flows from the west as long as the headgate to the ditch is closed. The ditch normally flows from west to east. When there is significant runoff from the Perrine Drainage Basin the ditch fills and flows from east to west. The overflow weir can not control the flows in this scenario.
- H. On May 25<sup>th</sup>, 2010 the ditch master, Harold Bies, closed the headgate at approximately 1:00 pm in anticipation of a significant rainfall as predicted by weather reports. Prolonged heavy rain for the next 2 ½ to 3 hours resulted in storm water runoff from the Perrine Drainage Basin flowing into Hawthorne ditch. This caused the ditch to flow backwards from east to west, overflowing its banks and causing damages in excess of \$11,000.00 to the property at 1220 Creek Drive.

**Conclusions:**

- A. Storm water runoff from the Perrine Drainage Basin into the Hawthorne ditch is the responsibility of the City of Rapid City.
- B. Damages caused by the City's lack of implementation of the Perrine Drainage Basin Design Plan are the responsibility of the City.
- C. Owner of the property at 1220 Creek Drive, Fay E. Bice, requests that damages of \$11,000 be remitted to her.
- D. The property owner also requests that the Perrine Drainage Basin Design Plan be implemented at the earliest possible time in order to avoid future damages. She is willing to provide an easement across her property in order to facilitate the implementation of the plan.