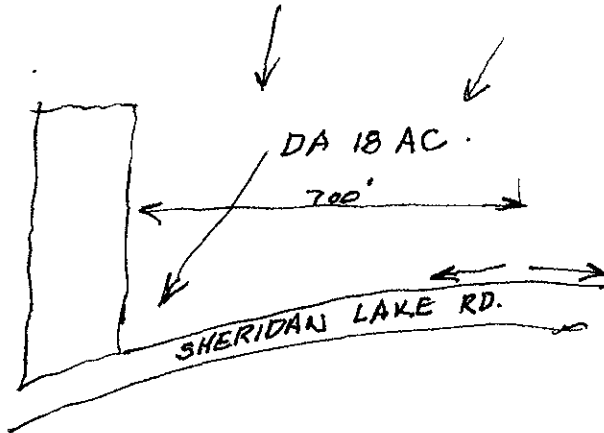


# Ditch Capacity - Sheridan Lake Road

Area north of S.L.R. & East of Johnson.



## RECEIVED

APR 21 2010

Rapid City Growth  
Management Department

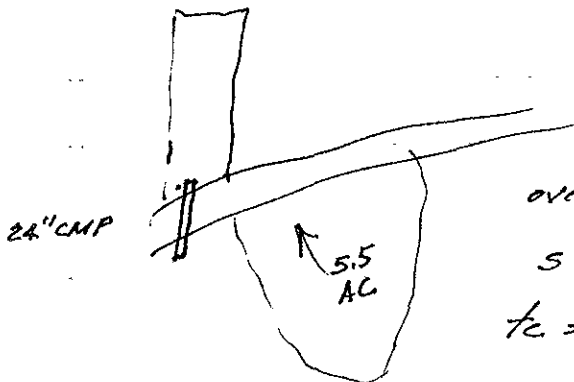
overland flow in sheet fashion  $l = 1100'$

$$s = 100/1100 = .09 \quad 9.1\% \quad v = 0.75 \text{ fps}$$

$$t_c = \frac{1100}{.75 \times 60} = 24 \text{ Min.} \quad i_{100} = 5.03 \quad c = 0.37$$

$$Q = .37 \times 5.03 \times 18 = 33.5 \text{ cfs.}$$

Area South



overland flow  $l = 650'$

$$s = 85/650 = 13\% \quad v = .9 \text{ fps}$$

$$t_c = \frac{650}{.9 \times 60} = 12' \quad i_{100} = 7.01$$

$$c = 0.37$$

$$Q = .37 \times 7.01 \times 5.5 = 14.2 \text{ cfs.}$$

## North Ditch

As flow enters our site from the east, the ditch section widens on to this lot.



At elev 95.5,

$$A = 61, P = 65, R = 0.94, R^{2/3} = 0.96$$

$$S = 2/33 = .0606, S^{1/2} = 0.24, n = 0.37$$

$$V = 0.67 \text{ fps}, Q = 56 > 33.5 \text{ cfs.}$$

We widen the drainage easement to cover this area.

At the common approach that will serve the two lots, the combined flows (33.5 cfs ditch & 37 cfs site) of 70.5 cfs are directed south across Sheridan Lake Road in a 24" Dia. CMP culvert. With inlet control of 2 Dia. head, the pipe will carry 30 cfs., leaving 40 cfs to spill over the approach. This approach acts as a broad crested weir.



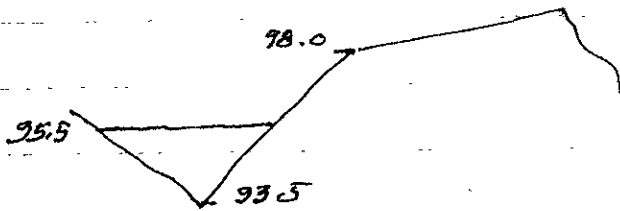
At the point where spillage would begin to cross the highway, the approach section is 43' wide with a mean depth of 0.46'

③

At  $q = 3h^{3/2}$ ,  $q = 0.93$  cfs per ft. and  
 $Q = .93 \times 43 = 40$  cfs = to the spill rate.  
 The highway will not be inundated.

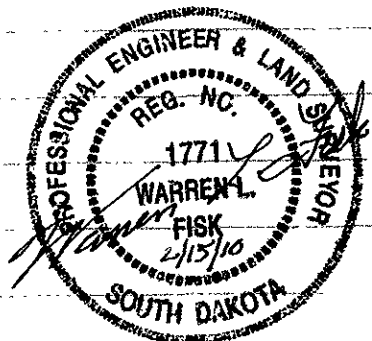
Considering that the contributing drainage areas are fairly small and that the peak flow is fairly quickly diminished, we consider the rare approach spillover to be an acceptable risk.

### South Ditch

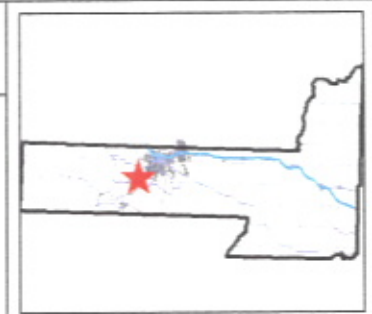
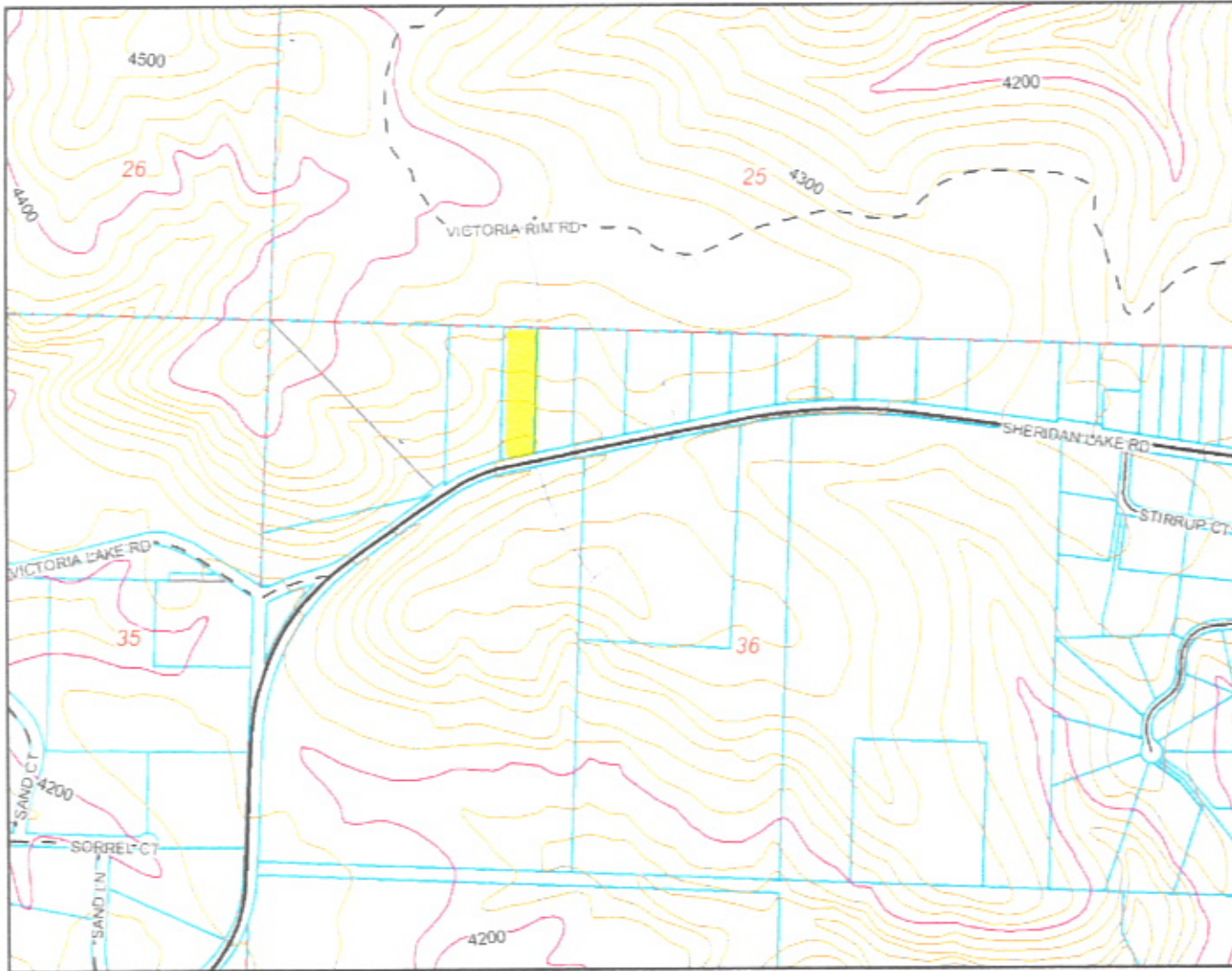


At 95.5,  $A = 24$ ,  $P = 28$ ,  $R = 0.86$ ,  $R^{4/3} = 0.90$ ,  
 $S = 2/52, = 0.38$ ,  $S^{1/2} = 0.19$ ,  $n = 0.37$ ,  
 $v = 0.7$  fps,  $Q = 19.7$  cfs  $> 14.2$

The freeboard of 2.5 ft will easily the 30 cfs added by the cross-culvert.



10PL014



**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
- County Contour Lines**
  - Y
  - N
- 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



Map center: 44° 0' 27" N, 103° 20' 43" W



Scale: 1:10,098

DISCLAIMER: This map is provided 'as is' without warranty of any representation of accuracy, timeliness, or completeness. The burden for determining accuracy, completeness, timeliness, merchantability, and fitness for or the appropriateness 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 is in 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 distribution of printed Rapid City/Pennington County maps, other than the City of Rapid City copyright/credit 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.