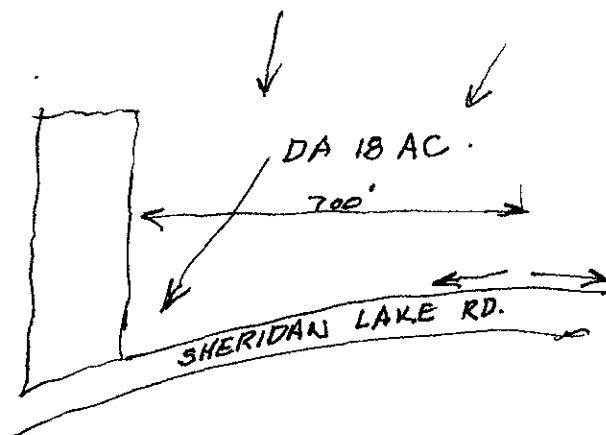


# Ditch Capacity - Sheridan Lake Road

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



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Rapid City Growth  
Management Department

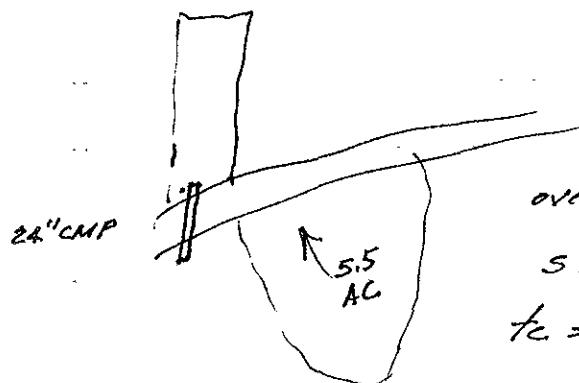
overland flow in sheet fashion  $l = 1100'$

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

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

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

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.



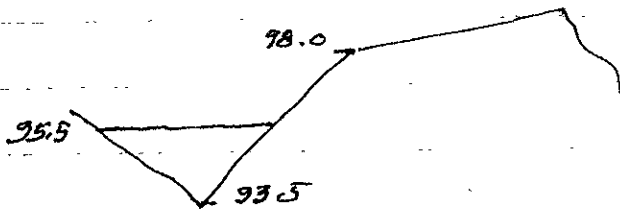
At the point where spillage would begin to cross the highway, the approach section is 43' wide with a mean depth of 0.46'

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.

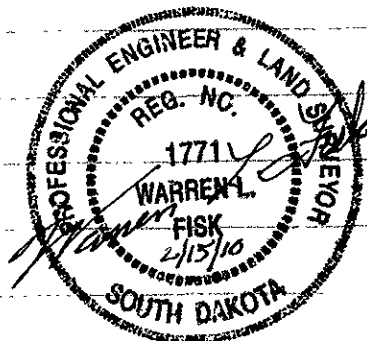
Considering that the contributing drainage areas are fairly small and that the peak flow is fairly quickly diminished, we consider the rare approach spillover to be an acceptable risk.

South Ditch

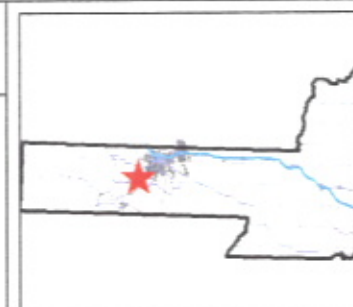
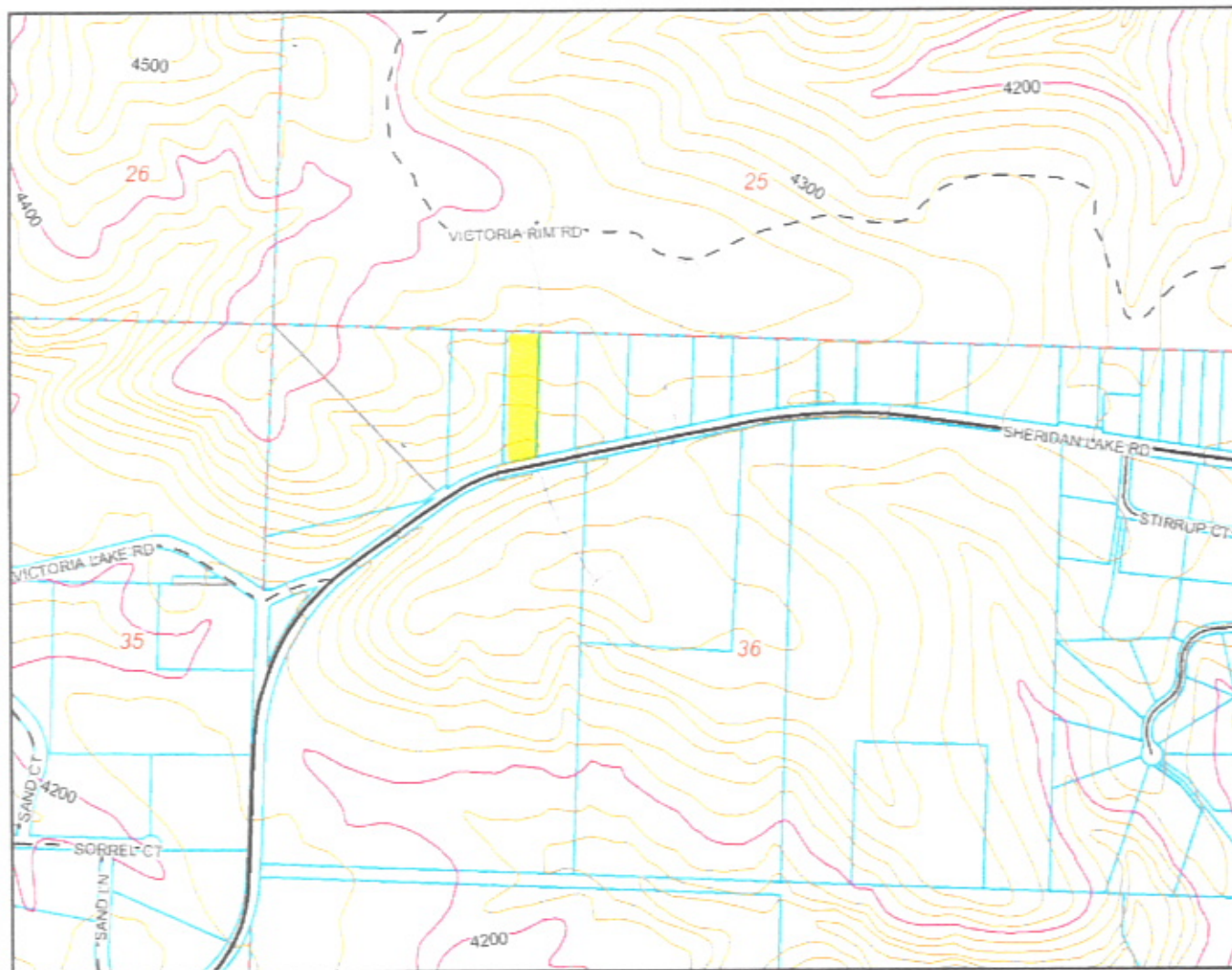


At 95.5,  $A = 24$ ,  $P = 28$ ,  $R = 0.86$ ,  $R^{4/3} = 0.90$ ,  
 $S = 2/52 = 0.38$ ,  $S^{1/2} = 0.19$ ,  $n = 0.37$ ,  
 $V = 0.7$  fps,  $Q = 19.7$  cfs  $> 14.2$

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



10SV005



**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

0 1000 2000 3000 ft.

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



Scale: 1:10,098

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