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Ditch Capacity - Sheridan Lake Road
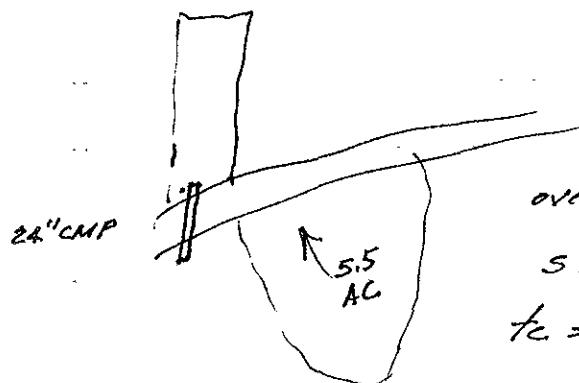
Area north of SL.R. & East of Johnson.

DA 18 AC.
700'
SHERIDAN LAKE RD.
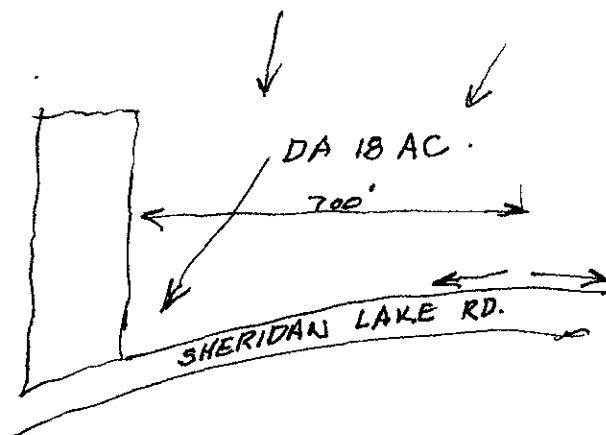
overland flow in sheet fashion $l = 1100'$

$s = 100/1100 = .09$ 9.1% $V = 0.75$ fps

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

$Q = .37 \times 5.03 \times 18 = 33.5$ cfs.

Area South

24" CMP

5.5 AC

overland flow $l = 650'$

$s = 85/650 = 13\%$ $V = .9$ fps

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

$c = 0.37$

$Q = .37 \times 7.01 \times 5.5 = 14.2$ cfs.

North Ditch

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

At elev 95.5,

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

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

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

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'

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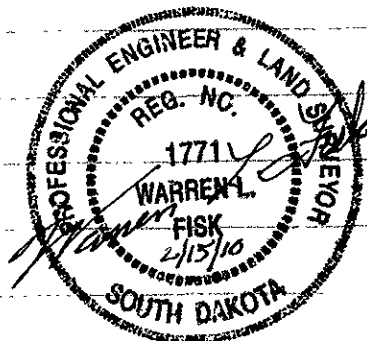The highway will not be inundated.

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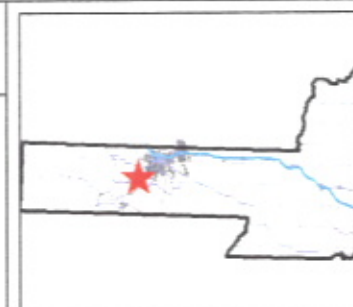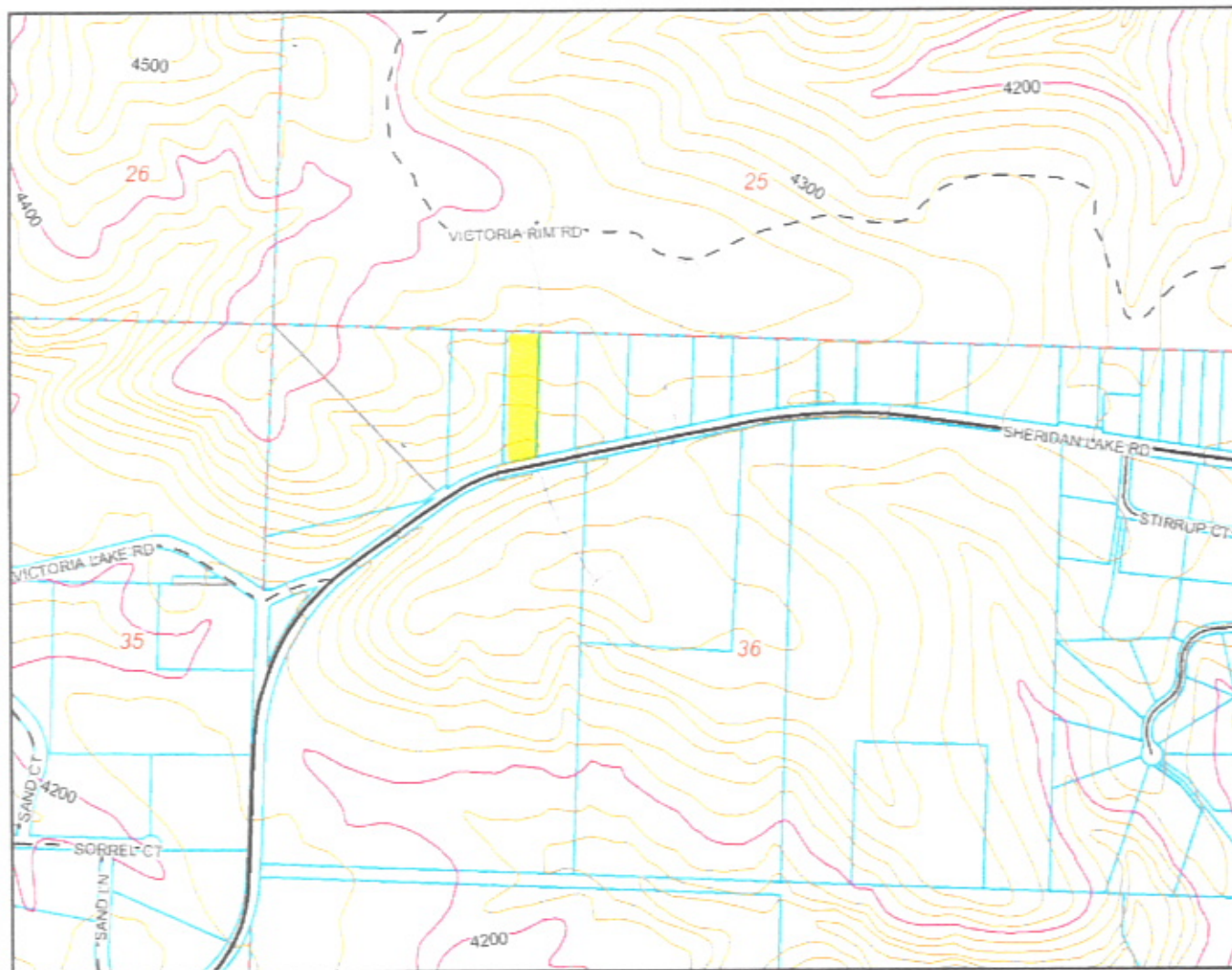to be an acceptable risk.

South Ditch
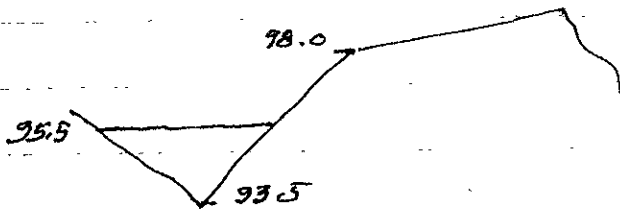
At 95.5, $A = 24$, $P = 28$, $R = 0.86$, $R^{4/3} = 0.90$,
$S = 2/52 = 0.38$, $S^{1/2} = 0.196$, $n = 0.37$,
$v = 0.7$ fps, $Q = 19.7$ cfs > 14.2

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

Rapid City-Pennington County GIS

1'=870'

10SV005

4500

4200

4400

26

25 4300

VICTORIA RIM RD

SHERIDAN LAKE RD

STIRRUP CT

VICTORIA LAKE RD

35

36

SAND CT 4200

SAND LN

SORREL CT

4200

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