

Reid Crowther

Please refer to 8849-c01-4

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February 2, 1995

Mr. Peter Mulyk, P. Eng.
Fairmont Hot Springs Resort Ltd.
#405, 1111 - 11 Avenue S.W.
Calgary, Alberta
T2R 0G5

FAIRMONT HOT SPRINGS RESORT AREA **Coldspring Creek - Highway 93 Crossing**

I have reviewed the contour information for the area immediately around the Coldspring Creek crossing of Highway 93 as a part of the determination of the possible risks associated with blockage of the highway culvert. One difficulty in assessing risk is the limited potential to assign a return period to such an event. Previous studies have determined that there is a potential risk in this area but stopped short of assigning a probability to such an event.

Debris flows which are defined to be extreme discharges of soil mixed with water as compared to the normal water flows carrying material from erosional processes involving the surface of the wetted perimeter.

In the event of a debris flow on Coldspring Creek one key to minimizing the risks is to maintain the upstream water reservoir to allow debris to be trapped within the confines of the reservoir. The operation and maintenance of this structure has been ongoing since its original construction and no variations in established procedures are seen to be necessary.

As the reaches of the creek below the reservoir become stabilized, as is the case below the highway, the risk of debris flows and the amount of eroded material available for erosion will be reduced. With the works to stabilize the creek completed, the risks become very small in this area.

Currently there exists a possibility that a debris flow would originate in the area below the reservoir. If this were to happen the flows would likely exceed the capacity of the existing culvert crossing. Given this factor I have projected a possible series of events. Shown on the attached plan are the overflow routes which would be open to the flows. Following the

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Consulting Engineers

#300, Atrium VII, 340 Midpark Way S.E., Calgary Alberta T2X 1P1, Phone: (403) 254-3301, Fax: (403) 254-3333

exceedence of the highway culvert debris would be deposited and block the culvert. The flows would then follow along the road ditch to a second culvert, shown as arrow 1 on the figure. The second culvert would block off and flows would continue along the ditch, shown as arrow 2. The slope is sufficiently shallow to allow deposition of material along the ditch. As material is deposited in the ditch it would become blocked and the flows would overtop the highway as shown with arrow 3. These flows would enter the secondary channel and return to Coldspring Creek. The scenario presented thus far would present no more than a minor inconvenience to highway traffic with no threat to downstream development..

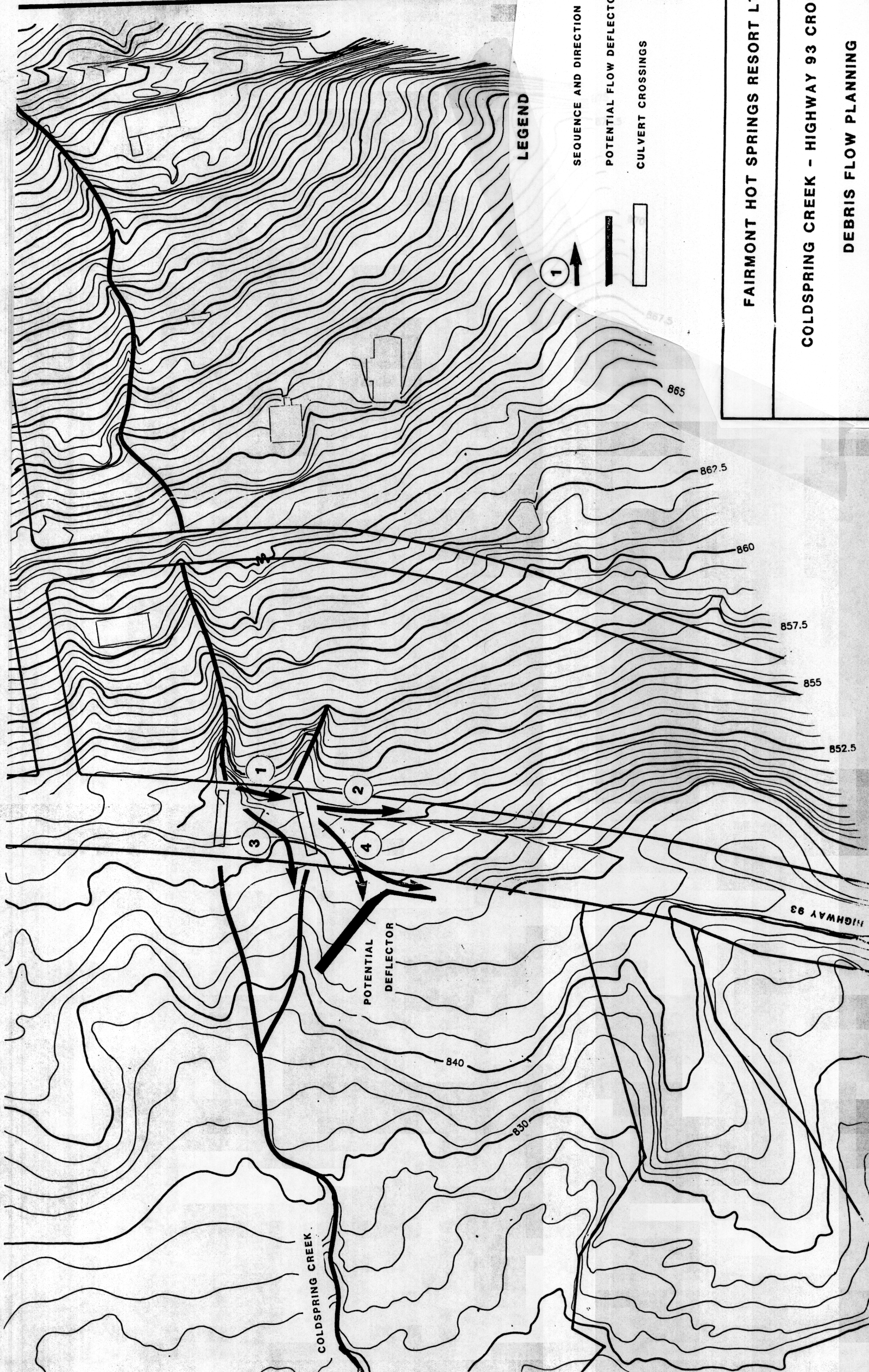
In the event of a sufficiently large flow there is a possibility that flows would be directed, by the deposited material, to an area as shown with arrow 4. This would allow the flows to depart from the constructed control works. We can prevent this occurrence by constructing a deflector to direct flows back into the channel or to confine them to the road ditch as shown. As discussed earlier the need for such a deflector structure will decrease as the channel between the highway and the reservoir is stabilized. ←

If you have any questions or comments please do not hesitate to contact this office.

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J. M. K. Dumont, P. Eng., P. Ag.



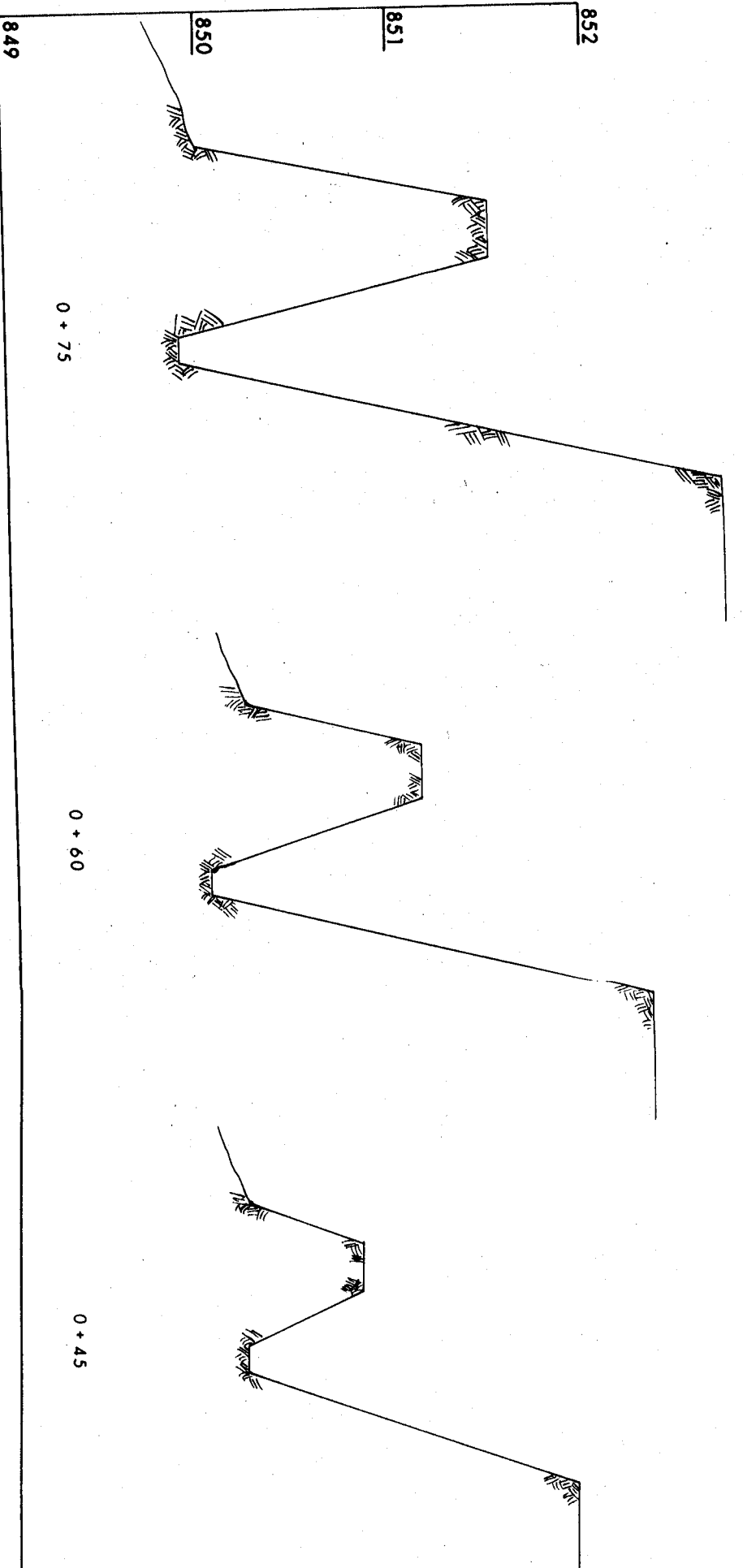
LEGEND

- SEQUENCE AND DIRECTION OF FLOW
- POTENTIAL FLOW DEFLECTOR
- CULVERT CROSSINGS

FAIRMONT HOT SPRINGS RESORT LTD.

COLDSPRING CREEK - HIGHWAY 93 CROSSING

DEBRIS FLOW PLANNING



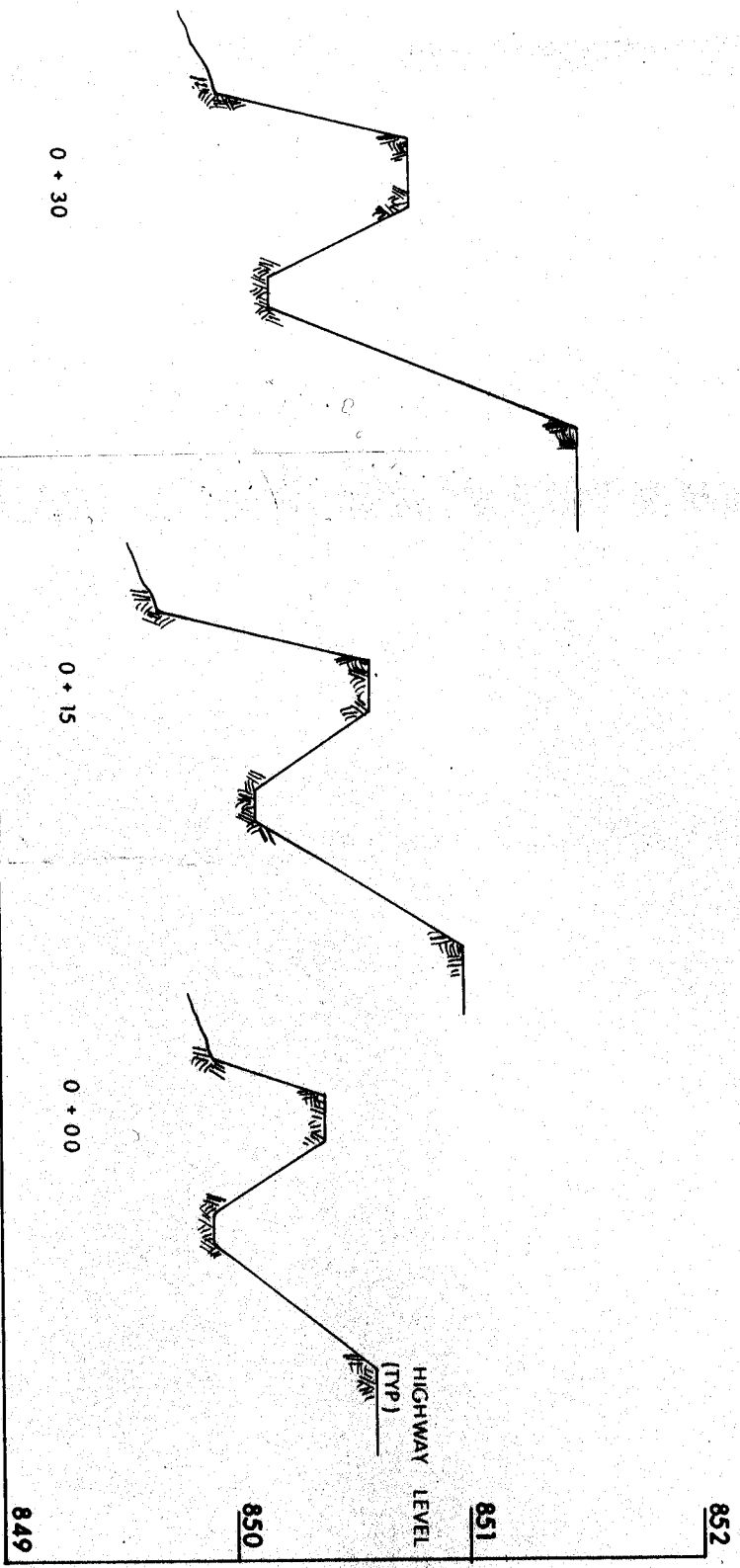
BERM CROSS SECTIONS

SCALE: HOR 1:250
 VER 1:25

| | | | |
|------------|--------|------|--|
| CONSULTANT | PERMIT | SEAL | |
| | | | SURVEYED BY _____ DESIGNED BY _____ DRAWN BY _____ CHECKED BY _____ APPROVED BY _____ MICROFILMED _____ |

PLAN VIEW

SCALE 1:500



| | |
|------------------|--------|
| DRAWING STATUS | ISSUED |
| PRELIMINARY | |
| FOR INFORMATION | |
| FOR APPROVAL | |
| FOR TENDER | |
| FOR CONSTRUCTION | |
| AS BUILT | |

FAIRMONT HOT SPRINGS RESORT LTD.

COLDSPRING CREEK DEFLECTION BERM

| | |
|-------------|-----------|
| DATE | JUNE / 95 |
| JOB NO | |
| SHEET NO | 1 OF 1 |
| REVISION NO | AS BUILT |
| SCALE | AS NOTED |
| DRAWING NO | |

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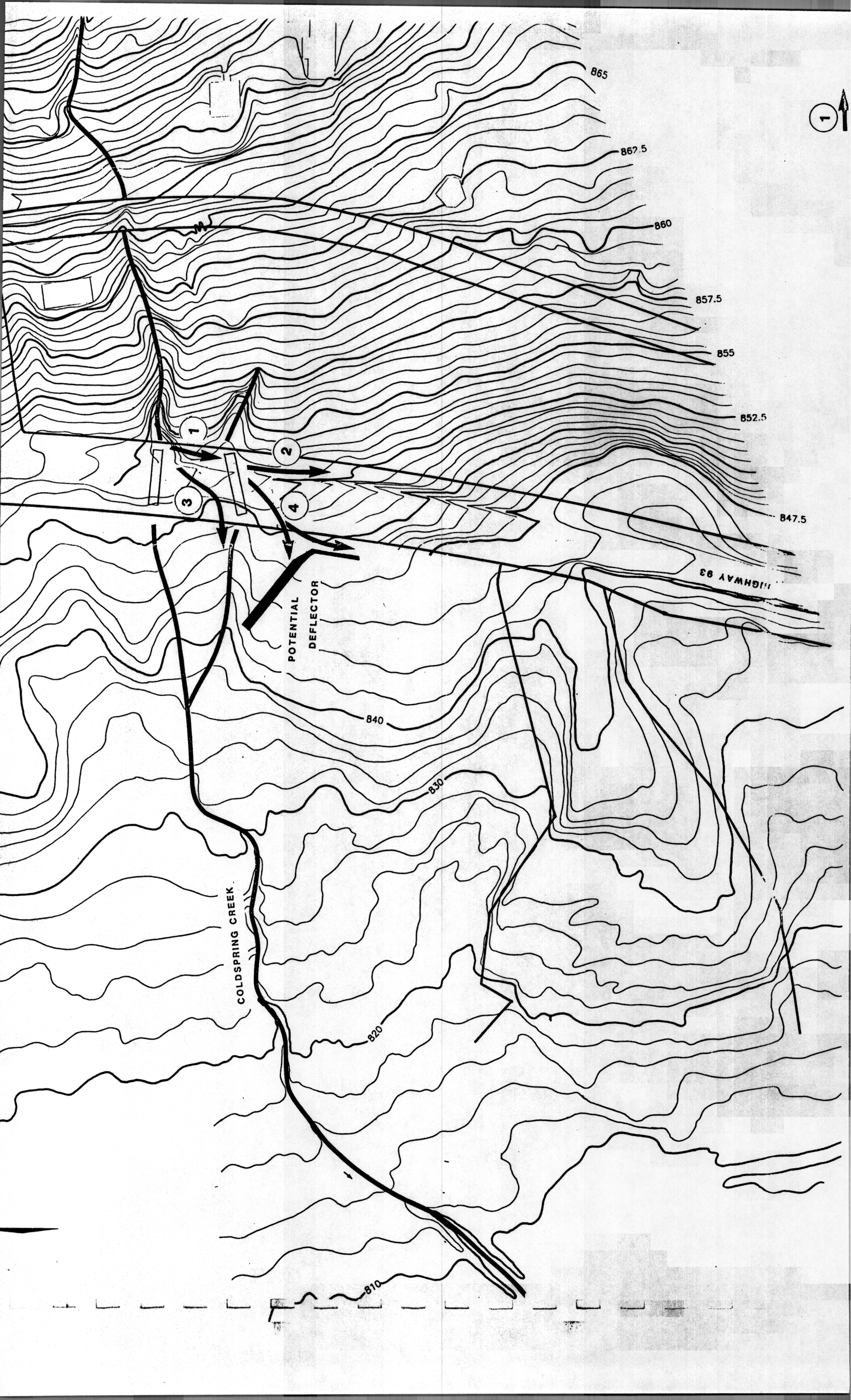
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865

862.5

860

857.5

855

852.5

847.5

HIGHWAY 93

POTENTIAL
DEFLECTOR

840

830

COLDSPRING CREEK

820

810

