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DAMBREAK ANALYSIS

FOR

STONERIDGE AND FOUNTAIN LAKE DAMS

AT

FOUNTAIN HILLS, ARIZONA

February 1996

Prepared for

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FOR
STONERIDGE AND FOUNTAIN LAKE DAMS
FOUNTAIN HILLS, ARIZONA

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FOUNTAIN HILLS, ARIZONA

A. INTRODUCTION

In September 1995, Anderson-Nelson, Inc., a consultant to MCO Properties, Inc. (MCO), retained AGK Engineers (AGK) as a subconsultant to perform a dambreak analysis for Stoneridge and Fountain Lake Dams. Such an analysis is required by ADWR for jurisdictional dams under Arizona Revised Statutes 45-701 through 45-717 for jurisdictional dams.

B. PURPOSE AND SCOPE

The purpose of the dambreak analysis is to determine the area that would be at substantial risk of loss of life and property in the event of a failure of either Stoneridge or Fountain Lake Dams. The methodology, assumptions, results and limitations of the analysis are compiled in this report. The report also includes maps of the inundated area to assist in emergency planning. However, emergency planning is not a part of the scope for AGK Engineers.

C. STUDY AREA DESCRIPTION

1. Structure Location

Stoneridge and Fountain Lake Dams are located in Sections 22 and 14, respectively, Township 3 North, Range 6 East, Gila and Salt River Base and Meridian, Maricopa County. In addition, both lakes are situated in the watershed of Colony Wash, within the corporate limits of the Town of Fountain Hills.

2. Stoneridge Dam

Stoneridge Dam is located south of Cholla Drive between Fountain Hills Boulevard and Sycamore Drive. It has a runoff contributing area of 0.85 square mile. The dam is a flood control structure consisting of a compacted earth fill embankment to retain flood flows from Sycamore, Greystone and Sunburst Washes, which are tributaries to Colony Wash. The characteristics of the embankment and impoundment are summarized in **Table 1**.

The emergency spillway is located on the south side of the dam and consists of a trapezoidal cross section. The normal outlet from the structure is an uncontrolled 30-inch diameter reinforced concrete pipe at the bottom of the dam.

TABLE 1
CHARACTERISTICS OF STONERIDGE AND FOUNTAIN LAKE DAMS

CHARACTERISTICS	STONERIDGE	FOUNTAIN LAKE
Structure Type	Earthen Embankment	Earthen Embankment
Embankment Upstream Slope	3:1	3:1
Embankment Downstream Slope	3:1	3:1
Embankment Crest Width (ft)	20	150
Max. Embankment Height (ft)	40	15
Estimated Surface Area at Spillway Crest (Ac)	7.9	29
Estimated Capacity at Spillway Crest (Ac-ft)	66	227

3. Fountain Lake Dam

Fountain Lake is bounded by of Saguaro Boulevard on the west, Panorama Drive on the east and El Lago Boulevard on the south. The inflow to Fountain Lake is mainly the effluent from the sewage treatment plant. Storm runoff from the upstream watershed would normally be intercepted by Fountain Channel and Panorama Drive and diverted away from the lake. However, during an unusually large storm, neither channel would have enough capacity to divert the entire flow from the lake and a significant amount of flow would overtop the banks and find its way to the lake.

Fountain Lake Dam is also a compacted earthen embankment. The main characteristics of the embankment and lake are summarized in **Table 1**. The emergency spillway of Fountain Lake consists of a grassed earthen berm at the south end of the lake and the street curb along the north side of El Lago

Boulevard. Effluent is delivered to the lake through pumping. There is no other outlet in the lake besides the emergency spillway.

4. Downstream Area

Colony Wash downstream from Stoneridge Dam has a well defined natural channel which runs from west to east, crossing Fountain Hills Boulevard, Arroyo Vista Drive, Saguaro Boulevard and Panorama Drive. The existing crossings structures are as follows:

LOCATION OF CROSSING	TYPE OF CROSSING
Fountain Hills Boulevard	2-60 inch CMP w/ bottom 12 inches of one pipe blocked by concrete for sewer pipe installation
Arroyo Vista Drive	2-60 inch CMP
Saguaro Boulevard	1-72 inch CMP
Panorama Drive	4 - 6H X 8W RCB

After crossing Panorama Drive, the wash runs in the southeast direction and enters the Fort McDowell Indian Reservation at approximately 1/3 mile downstream from Panorama Drive. It continues in the southeast direction and joins Cereus Wash on the west side of the Fort McDowell Casino. After the confluence, the wash runs easterly along the north side of Beeline Highway (SR 87) and discharges to the Verde River near Fort McDowell Road.

A portion of the overflow from the Fountain Lake emergency spillway would be conveyed to Colony Wash through a small channel running south along a fully developed area. The other portion of the flow would be diverted along

El Lago Boulevard to Panorama Wash, which joins Colony Wash at the corporate boundary of Fountain Hills.

The majority of the land within the Colony Wash watershed downstream of the corporate boundary is still in its natural state. The Fort McDowell casino and the small commercial retail stores at the southwest corner of SR 87 and Fort McDowell Road are the only major structures in this area. Within the Town of Fountain Hills, Colony Wash watershed ranges from natural state, immediately downstream from Stoneridge Dam, to heavily developed areas between Saguaro Boulevard and Panorama Drive. Areas between Fountain Hills Boulevard and Saguaro Boulevard as well as between Panorama Drive and the corporate boundary are sparsely developed residential areas.

The location of Stoneridge and Fountain Lake Dams, as well as the downstream area, are shown on Plates 1A through 2B.

D. DESIGN INFLOW

According to ADWR criteria, both Stoneridge and Fountain Lake Dams are classified as small dams. However, they are considered to be high hazard due to the potential urban development in the downstream area. Therefore, the design flow for the dambreak analysis is determined to be one-half of the probable maximum flood (½ PMF). The detailed procedure for dam classification is presented in **Appendix A.**

The magnitudes of ½ PMF for both Stoneridge and Fountain Lake Dams were estimated by AGK and documented in **References 1** and **2** respectively. The estimation was performed by means of the HEC-1 computer program **(Reference**

3) in accordance with the guidelines set forth by the Flood Control District of Maricopa County **(Reference 4).** Results of the hydrologic analysis are summarized in **Table 2**.

TABLE 2
SUMMARY OF HYDROLOGIC STUDY RESULTS

DESCRIPTION	STONERIDGE	FOUNTAIN LAKE
Size Designation	Small	Small
Hazard Designation	High	High
Design Inflow magnitude	1/2PMF	1/2PMF
Peak Design Inflow (cfs)	4923	1646
Spillway Elevation 1702.66	? ~~1738.82~~	1573.24
Peak Stage	1707.15	1574.66
Peak Outflow (cfs)	2780	390
Top of Dam Elevation	1709.9	1577.14
Freeboard at ½ PMF (ft)	2.75	2.48

E. METHODOLOGY

1. Dambreak Modeling

The dambreak analyses were performed by use of the Boss Corporation's DAMBRK computer program (Version 3.0). This program is an enhanced version of the original DAMBRK program **(Reference 5)** written by Dr. D.L. Fread, Senior Hydrologist with the Hydrology Research Laboratory, National Weather Service, NOAA. The program consists of four main functional steps.

The first functional step is setting up initial conditions along the entire length of the downstream area. These initial conditions are used by the finite difference logarithm as the base for the next time step calculations. For this reason, the model requires a significantly large base flow to stabilize the computation. Whenever possible, the 100-year flow was used as the initial conditions flow. Rates of base flow for various reaches are shown in **Appendix E**.

The second functional step is to route the inflow hydrograph through the reservoir. This can be accomplished using the dynamic routing method or the level pool method. The dynamic routing method is more accurate for overtopping failures since it is able to simulate the positive and negative waves that would be expected to occur in a reservoir. For piping failure, wave action in the reservoir does not affect the outflow hydrograph, and hence, the level pool routing is more suitable for modeling this type of failure. The inflow hydrographs for both effluent lakes were obtained from the output of the HEC-1 computer program.

The third functional step is the development of the breach hydrograph, which is highly dependent upon the conditions existing at the time of the breach initiation, breach geometry and total time of breach formation. For this study, the water surface elevation in Fountain Lake was assumed to be at the maximum operation level when computation commenced. For Stoneridge Dam, the reservoir was assumed to be nearly empty. Breach formation was held until the lake surface reached the stage at which the outflow was at its maximum.

The fourth functional step in the DAMBRK modeling process is the routing of the breach hydrograph through the downstream valley and the determination of peak elevations and flood discharges at various points

downstream. The dynamic wave routing method was used to model the downstream valley flood wave. As opposed to other routing techniques available, only the dynamic wave routing accounts for the acceleration effects associated with dam-break waves and the influence of downstream unsteady backwater effects produced by channel constrictions and road embankments.

2. Breach Location and Scenarios

While countless numbers of scenarios can be conceived regarding the dam breach geometry, location and downstream effects, an exhaustive analysis for each of them is not feasible. The purpose of this study is to model the extent of flooding which would result from the "worst case" scenario. The following two scenarios were modeled:

Scenario 1 - Failure of Stoneridge Dam
Scenario 2 - Failure of Fountain Lake Dam

Since both structures are relatively short, only breach location was analyzed for each structure. The breach location was selected from contour maps prepared by Kenny Aerial Mapping, Inc. (**Reference 8**). For Stoneridge Dam, the middle of the dam was selected for the breach location because the maximum embankment height is at this point. Also, this is the area where the outlet structure is located. Therefore, this is the location where the dam is most likely to fail and it also produces the highest peak flow.

For Fountain Lake Dam, the breach location was selected at about 500 feet east from the spillway center. Just east of this location, the dam width increases, making it less likely to fail; while west of this location the elevation of the downstream toe of the dam increases rapidly, hence reducing the

possibility for dam breaching. Also, failure at this location would have the worst impact on the downstream structures south of El Lago Boulevard. Another breach location considered for this structure was the spillway itself. However, based on preliminary runs, it was found that the downstream effects would be less severe than the other one.

3. Parameters of Breach Geometry

The primary parameters that govern the breach formation are the failure time of breach and the bottom width of the breach. The selection of these parameters is a subjective process. Normally, earthen dams do not tend to fail completely or instantaneously. As indicated in **Reference 5**, the breach width tends to be between one and five times the depth of water behind the dam, with the middle portion of this range being the most common. The total time of failure may range from a few minutes to a few hours depending on the height of the dam, the type of material used in the construction, and the degree of compaction used **(Reference 5).** Since the purpose of this study is to model the extend of flooding which would result from the worse case scenario, the parameters such as time of failure were estimated on the conservative side of the range in order to produce maximum outflow. As the available information on the dam embankment is limited, to obtain these parameters from a numerical model as included in Boss Corporation's BREACH computer program (**Reference 6**) was unpractical. Instead, empirical formulas, developed by Froelich as presented in the Boss Corporation's DAMBRK User's Manual (**Reference 5**), were used for this study. These formulas were statistically derived based on observations of 43 actual breaches. Details of the calculations are included in **Appendix B.**

The following values were used for the parameters in this study:

PARAMETERS	STONERIDGE	FOUNTAIN LAKE
Time of Failure (hr)	0.29	1.00
Breach Bottom width (ft)	70.5	72
Breach Side slopes	Vertical	Vertical

The spillway and storage data were obtained from topographic maps prepared by Kenney Aerial Company (**Reference 8**) and Cooper Aerial Company (**Reference 7**), and supplemented by field survey provided by Anderson-Nelson, Inc. Pertinent information was reproduced and included in **Appendix B.**

4. Downstream Routing

The input data for routing the outflow hydrograph through the downstream valley contain the following parameters:

- Cross-sectional Data
- Hydraulic Resistance Coefficient (n-Value)
- Expansion and Contraction Coefficients.

The cross-sectional information within the corporate limits of Fountain Hills was obtained from a 1"=200', 2-foot contour interval aerial mapping (**Reference 8**). Outside the corporate limits, cross-sectional information was obtained from field survey provided by Anderson-Nelson. The determination of ineffective flow areas was largely based on professional judgment. The hydraulic resistance coefficients, which is virtually Manning's n value, was estimated in accordance with guidelines outlined in **Reference 10**. Details

of Manning's n value estimation are included in **Appendix C.** The estimated n values are subject to some degree of uncertainty. Fortunately, in terms of computed discharges and elevations, the DAMBRK program is not highly sensitive to this parameter. The expansion and contraction effects were considered to be negligible through the study area since the DAMBRK program is not very sensitive to expansion or contraction coefficients.

5. Internal Boundary Conditions

In modeling the downstream effect of the structure failures, it was assumed that the embankments of the roadways downstream from the dams would be able to withstand the flows without collapsing. These embankments are well constructed and maintained and the top of the embankments are protected from erosion. Therefore, it is unlikely that the embankments would fail under a short duration of overtopping. The roadway embankments were modeled as dams for internal boundary conditions. The bridge option of the DAMBRK program was not used in this study because it tends to be numerically unstable. Culvert and roadway data were obtained from field survey which was performed as part of the Town of Fountain Hills Flood Insurance Study performed by AGK Engineers for the Flood Control District of Maricopa County. Culvert rating curves and channel cross sections are presented in **Appendix D.**

F. ASSUMPTIONS AND LIMITATIONS

1. While any number of scenarios describing the failure of Stoneridge and Fountain Lake Dams can be conceived, an exhaustive analysis of each one is not feasible. Only the subjectively determined "most probable" and "worst case" scenarios were modeled in this study.

2. The initial water surface at Fountain Lake Dam was assumed to be at maximum operation level, while Stoneridge impoundment was assume to be empty.

3. According to the HEC-1 output, the emergency spillways for both Stoneridge and Fountain Lake Dams appeared to be capable of passing the ½ PMF without overtopping the structures (see **Table 2**). Therefore, the dambreak analysis due to overtopping was not necessary in this case.

4. In both scenarios, it was assumed that breach began at a time when the lake water surface was at a stage that would maximize the downstream effect during a ½ PMF event.

5. The roadway embankments at Fountain Hills Boulevard (DAMBRK Dam No.2), Arroyo Vista Drive (DAMBRK Dam No.3), Saguaro Boulevard (DAMBRK Dam No.4) and Panorama Drive (DAMBRK Dam No. 5) were assumed to be able to withstand the flows without collapsing.

6. The downstream impact areas for Fountain Lake breach were delineated based on the combined flow from the breach outflow and the flow over the spillway.

7. In addition to the breach analysis discussed above, the full spillway flow from Fountain Lake was routed through the spillway channel to obtain inundation limits in the spillway channel.

8. The downstream limits of the study was the Verde River. This limit was chosen because the maximum discharge of the flood water from dambreak would not likely exceed the river's capacity. However, the 100-year floodplain along this reach of the Verde River has not been mapped by any

agency. Therefore, the delineation of the inundation area was terminated at the location just upstream of Fort McDowell Road.

G. DISCUSSION OF RESULTS

As mentioned earlier, two different scenarios were analyzed. The results of each scenario is discussed in this section.

1. Failure of Stoneridge Dam (Scenario 1)

Table 3 presents the modeling results for the failure of Stoneridge Dam. The inundation area corresponding to this scenario is shown on Plates 1A and 1B. The output of the DAMBRK computer program for this scenario is presented in **Appendix F.**

As shown in **Table 3**, flood peaks would quickly be reduced in the downstream sections as the flow spreads laterally. The flow would further be attenuated by the available storage of the four roadway crossings upstream. At the Fountain Hills Boulevard crossing, in particular, the peak would be reduced by about one-third because of the amount of storage available in the upstream area.

TABLE 3
SUMMARY OF DAMBRK RESULTS FOR SCENARIO 1
(FAILURE OF STONERIDGE DAM)

DESCRIPTION OF LOCATION AND PARAMETERS	
Dam - Mile 0.00	
Water surface at time of failure	1707.26
Peak Outflow (cfs)	14205
Fountain Hills Boulevard - Mile 0.37	
Maximum Flow (cfs)	10473
Maximum Depth (ft)	19.04
Maximum Velocity	3.11
Travel Time (hr)	0.08
Arroyo Vista Drive - Mile 0.65	
Maximum Flow (cfs)	9943
Maximum Depth (ft)	17.72
Maximum Velocity	2.89
Travel Time (hr)	0.12
Saguaro Boulevard - Mile 1.00	
Maximum Flow (cfs)	9402
Maximum Depth (ft)	16.5
Maximum Velocity	6.46
Travel Time (hr)	0.18
Panorama Drive - Mile 1.41	
Maximum Flow (cfs)	8952
Maximum Depth (ft)	14.76
Maximum Velocity	2.75
Travel Time (hr)	0.25
Fort McDowell Casino - Mile 3.65	
Maximum Flow (cfs)	5804
Maximum Depth (ft)	4.51
Maximum Velocity	2.88
Travel Time (hr)	0.99

Cross Sections 0.12 through 0.37 were modified to designate portions of the cross sections as ineffective flow areas (storage). In addition, the area near Cross Section 3.04 (as shown on Plate 1B) was identified as being an

ineffective flow area also. This area is a local depression where a large tributary wash joins the main wash. It is expected that the flow velocity in this areas would be low even at the maximum flow stage.

As shown in **Appendix H**, the combination plotting of flow depth and velocity at each downstream section indicates that the impact of a breach on houses built within the first two miles downstream of Stoneridge Dam would be alarmingly significant. The impact of a breach to passenger vehicles would also be significant. The evaluation of flow depth and velocity was based on the criteria presented in **Reference 12**.

The major facilities that are expected to be damaged or have service interrupted due to failure of Stoneridge Dam are listed below:

1. Fountain Hills Boulevard crossing
2. Houses upstream from Arroyo Vista Drive
3. Arroyo Vista Drive crossing
4. Saguaro Boulevard crossing
5. Houses near Cross Section 1.20
6. Panorama Drive crossing
7. Houses between Cross Sections 1.54 and 1.80
8. Fort McDowell Casino
9. Fort McDowell Road crossing

The travel times for flooding from the breach location to various public facilities are indicated in **Table 3** and **Figure 1**. The flood warning time at various locations is less than one hour.

2. Failure of Fountain Lake Dam (Scenario 2)

Table 4 presents the modeling results for the failure of the Fountain Lake Dam. The inundation area corresponding to this scenario is shown on Plates 2A and 2B. The output of the DAMBRK computer program for this scenario is presented in **Appendix G.**

Since the peak flows at the Fountain Hills corporate boundary are very similar to those obtained under Scenario 1, the downstream effects of these two scenarios are nearly identical from this point on. Upstream from the corporate boundary, the breach of Fountain Lake Dam would mainly affect the Fountain Lake spillway channel and Panorama Channel. The major facilities that are expected to be damaged or have service interrupted due to failure of the Fountain Lake Dam are listed below:

1. El Lago Boulevard
2. Houses near Spillway Cross Section 1.1639
3. Houses south of El Lago Boulevard
4. Panorama Drive
5. Forth McDowell Casino
6. Fort McDowell Road crossing

The travel times for flooding from the breach location to various public facilities are indicated in **Table 4** and **Figure 2**. The flood warning time at various locations is less than one hour.

TABLE 4
SUMMARY OF DAMBRK RESULTS FOR SCENARIO 2
(FAILURE OF FOUNTAIN LAKE DAM)

DESCRIPTION OF LOCATION AND PARAMETERS	
Dam - Mile 1.269	
Water surface at time of failure	1574.55
Peak Outflow (cfs)	4453
El Lago Blvd. - Mile 1.32	
Maximum Flow (cfs)	4453
Maximum Depth (ft)	4.39
Maximum Velocity	5.5
Travel Time (hr)	0
Panorama Drive - Mile 1.42	
Maximum Flow (cfs)	4529
Maximum Depth (ft)	8.64
Maximum Velocity	5.3
Travel Time (hr)	0.05
Fort McDowell Casino - Mile 3.65	
Maximum Flow (cfs)	5058
Maximum Depth (ft)	4.26
Maximum Velocity	2.8
Travel Time (hr)	0.85

H. CONCLUSIONS

This report presents the methodology and results of an analysis for downstream flooding which could result from the failure of Stoneridge and Fountain Lake dams at Fountain Hills, Arizona. The analysis was performed using the DAMBRK computer program developed by Dr. D.L. Fread of the National Weather Service. The DAMBRK program is subject to the limitations of its governing equations, and also the uncertainty associated with some of the parameters used within the program. Limitations include: 1) the use of one-dimensional equations to describe flow velocity only in the direction of the downstream flow path without regard to

lateral velocities which occur where the flood path widens out from the previous constraints of narrow paths defined by steep side slopes, 2) Neglecting the consequences of scour (degradation), 3) the uncertainty associated with the selection of the roughness coefficient (Manning's n), 4) the accumulation of transported debris that may accumulate at constricted cross sections such as bridge openings, 5) uncertainty associated with certain breach parameters which affect flood peak elevation profile and arrival times, and 6) the uncertainty associated with volume losses incurred by the flood as it propagates downstream and inundates large floodplains where infiltration and detention storage losses may occur.

The areas of inundation presented in this report provide comprehensive information for assistance in emergency planning. Again, because of limitations of topographic mapping (20-ft contour intervals obtained from the USGS quadrangle sheets), the information on inundation areas should not be used as the substitute for floodplain study and delineation in floodplain management. The inundation areas have no relationship to a particular return frequency storm such as a 100-year flood event.

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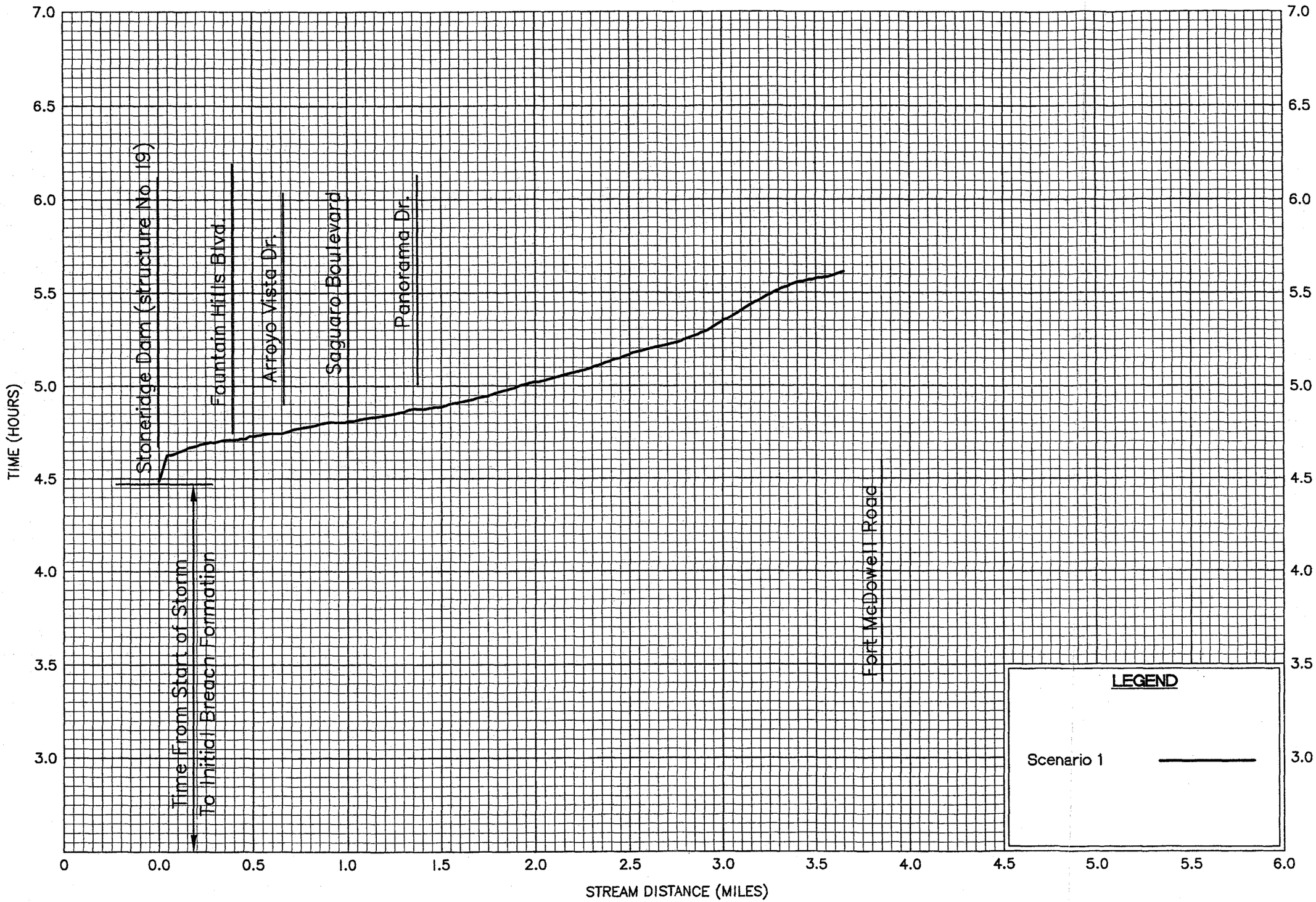


SCENARIOS 1

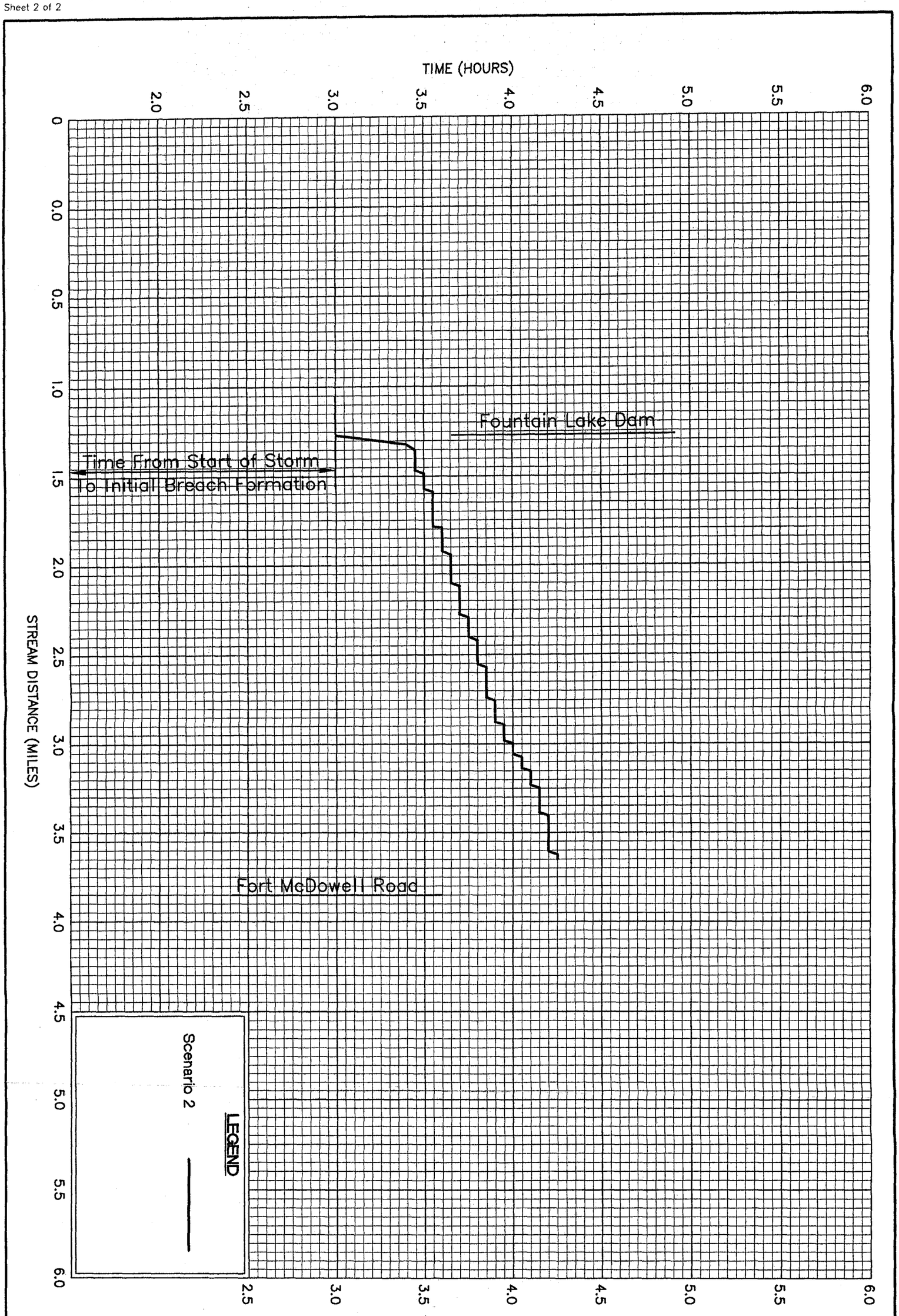
FLOW CREST TRAVEL TIME

DAMBREAK ANALYSIS FOR STRUCTURES AT
STONERIDGE AND FOUNTAIN LAKE DAMS
FOUNTAIN HILLS, ARIZONA

File: 19DBPROF.dwg Date: 2/16/96
Sheet 1 of 2

FIGURE 1

File: I9DBPROF.dwg Date: 2/16/96
Sheet 2 of 2



DAMBREAK ANALYSIS FOR STRUCTURES AT
STONERIDGE AND FOUNTAIN LAKE DAMS
FOUNTAIN HILLS, ARIZONA

SCENARIO 2

FLOW CREST TRAVEL TIME

FIGURE 2

APPENDIX A

STRUCTURE CLASSIFICATION AND HYDROLOGY

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SHEET _____ OF 5

BY HAA DATE 13-Feb-96

PROJECT: Fountain Hills Dambreak Analysis CHECK _____ DATE _____

LOCATION: Stoneridge and Fountain Lake Dams JOB NO. 470.95

DAM CHARACTERISTICS

Parameter Description	Stoneridge		Fountain Lake	
	F.H.	State	F.H.	State
ADWR CLASSIFICATION				
Max W.S.E.		1707.15	1575.92	1574.66
Bottom of the Dam Elevation		1678.90	1563.46	1562.2
Height of Dam		28.25	12.46	12.46
Rating Factor		1	0	0
Capacity		107	250	250
Rating Factor		0	0	0
Total Rating Factor		1	0	0
Size Classification		Small	Small	Small
Downstream Hazard Potential		High	High	High
Inflow Design Floods		1/2PMF	1/2PMF	1/2PMF
BREACH FAILURE TYPE				
Top of Dam Elevation		1709.85	1578.4	1577.14
Freeboard		2.7	2.48	2.48
Failure		Piping	Piping	Piping

TABLE 1. DOWNSTREAM HAZARD POTENTIAL CLASSIFICATION

CATEGORY	URBAN DEVELOPMENT	ECONOMIC LOSS
Low	No permanent structure for human habitation.	Minimal (undeveloped to occasional structures or agriculture).
Significant	No urban development and no more than a small number of habitable structures.*	Appreciable (notable agriculture, industry or other structures).
High	Urban development with more than a small number of habitable structures.*	Excessive (extensive community, industry, agriculture).

* Because this definition does not cite a specific number of lives that could be lost, some difficulty has been experienced in determining whether dams should be categorized as having 'significant' or 'high' downstream hazard potential. The issue is clarified by emphasizing that the downstream hazard potential classification should be based on the density of downstream development containing habitable structures. For example, dams located upstream of isolated farmhouses would be classified as having significant downstream hazard potential, and those located upstream of several houses or a residential development would be classified as having a high downstream hazard potential.

TABLE 2. SIZE CLASSIFICATION RATING CATEGORIES

Height (feet)	Rating Factor	Capacity (acre-feet)	Rating Factor
6-24	0	15-499	0
25-39	1	500-999	1
40-59	2	1,000-2,999	2
60-79	3	3,000-9,999	3
80-99	4	10,000-24,999	4
100+	5	25,000+	5

A numerical rating is computed for each dam by adding the corresponding rating factors for each of the two categories. For example, a dam that is 65 feet in height and has a reservoir capacity of 22,000 acre-feet would have a rating of (3+4=7). Small dams have a rating in the range 0-2, medium dams in the range of 3-7 and large dams, 8 or greater.

TABLE 3. RECOMMENDED SPILLWAY DESIGN FLOODS

HAZARD CLASS	SIZE CLASSIFICATION	INFLOW DESIGN FLOOD MAGNITUDE
Low	Small	100-year
	Medium	100-year to 0.5 PMF
	Large	0.5 PMF
Significant	Small	100-year to 0.5 PMF
	Medium	0.5 PMF
	Large	0.5 PMF to PMF
High	Small	0.5 PMF
	Medium	0.5 PMF to PMF
	Large	PMF

TABLE 1

ESTIMATED PEAK FLOWS

Location	Estimated Peak Flows (Cfs)	
	100 yr	½ PMF
Inflow to Stoneridge Dam	620	4923
Outflow from Stoneridge Dam	109	2919

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS

FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES

TIME TO PEAK IN HOURS

TO FLOWS OPERATION	STATION	AREA	PLAN		RATIOS APPLIED RATIO 1 1.00	RATIO 2 0.50
HYDROGRAPH AT +	182G	0.05	1	FLOW	469.	234.
				TIME	3.37	3.37
HYDROGRAPH AT +	182I	0.04	1	FLOW	422.	211.
				TIME	3.37	3.37
2 COMBINED AT +	FC1	0.09	1	FLOW	891.	445.
				TIME	3.37	3.37
DIVERSION TO +	DOC/P	0.09	1	FLOW	421.	211.
				TIME	3.37	3.37
HYDROGRAPH AT +	D-C/P	0.09	1	FLOW	470.	235.
				TIME	3.37	3.37
ROUTED TO +	R-FC1	0.09	1	FLOW	451.	226.
				TIME	3.43	3.43
			** PEAK STAGES IN FEET **			
			1	STAGE	1610.70	1610.58
				TIME	3.43	3.43
HYDROGRAPH AT +	182D	0.09	1	FLOW	1431.	715.
				TIME	3.33	3.33
ROUTED TO +	R182D	0.09	1	FLOW	1328.	646.
				TIME	3.43	3.47
			** PEAK STAGES IN FEET **			
			1	STAGE	1610.84	1610.72
				TIME	3.43	3.47
HYDROGRAPH AT +	182E	0.06	1	FLOW	942.	471.
				TIME	3.33	3.33

```
 HYDROGRAPH AT
+                    182F       0.01      1    FLOW          137.       68.
                                                TIME          3.37      3.37

  4 COMBINED AT
+                     FC2       0.26      1    FLOW         2696.     1306.
                                                TIME          3.40      3.43

 ROUTED TO
+                    SFC2       0.26      1    FLOW         2682.     1306.
                                                TIME          3.43      3.43

                                          ** PEAK STAGES IN FEET **
                                          1    STAGE      1599.69   1598.38
                                                TIME          3.43      3.43

 ROUTED TO
+                    RFC2       0.26      1    FLOW         2675.     1300.
                                                TIME          3.43      3.47

                                          ** PEAK STAGES IN FEET **
                                          1    STAGE      1585.83   1584.59
                                                TIME          3.43      3.47

 DIVERSION TO
+                   DOFC2       0.26      1    FLOW         2310.      948.
                                                TIME          3.43      3.47

 HYDROGRAPH AT
+                    DFC2       0.26      1    FLOW          365.      351.
                                                TIME          3.43      3.47

 HYDROGRAPH AT
+                    182A       0.05      1    FLOW          853.      426.
                                                TIME          3.30      3.30

 ROUTED TO
+                   R182A       0.05      1    FLOW          769.      371.
                                                TIME          3.40      3.43

                                          ** PEAK STAGES IN FEET **
                                          1    STAGE      1620.78   1620.69
                                                TIME          3.40      3.43

 HYDROGRAPH AT
+                    182B       0.04      1    FLOW          533.      267.
                                                TIME          3.33      3.33

  2 COMBINED AT
+                    FC3A       0.09      1    FLOW         1250.      598.
                                                TIME          3.40      3.40

 ROUTED TO
+                   SFC3A       0.09      1    FLOW         1229.      594.
                                                TIME          3.43      3.43

                                          ** PEAK STAGES IN FEET **
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```
                                        1   STAGE      1598.32  1597.70
                                            TIME          3.43     3.43

 HYDROGRAPH AT
+                   182C       0.02     1   FLOW          273.      136.
                                            TIME          3.33     3.33

   2 COMBINED AT
+                   FC3B       0.11     1   FLOW         1478.      712.
                                            TIME          3.40     3.43

 ROUTED TO
+                  RFC3B       0.11     1   FLOW         1475.      713.
                                            TIME          3.40     3.43

                                        ** PEAK STAGES IN FEET **
                                        1   STAGE      1582.43  1581.98
                                            TIME          3.40     3.43

   2 COMBINED AT
+                    FC3       0.37     1   FLOW         1840.     1064.
                                            TIME          3.40     3.43

 ROUTED TO
+                   RFC3       0.37     1   FLOW         1838.     1060.
                                            TIME          3.43     3.43

                                        ** PEAK STAGES IN FEET **
                                        1   STAGE      1585.30  1584.45
                                            TIME          3.43     3.43

 HYDROGRAPH AT
+                   182J       0.01     1   FLOW          162.       81.
                                            TIME          3.37     3.37

   2 COMBINED AT
+                    FC4       0.39     1   FLOW         1989.     1135.
                                            TIME          3.43     3.43

 DIVERSION TO
+                  DOFC4       0.39     1   FLOW          591.       99.
                                            TIME          3.43     3.43

 HYDROGRAPH AT
+                  D-FC4       0.39     1   FLOW         1398.     1037.
                                            TIME          3.43     3.43

 ROUTED TO
+                   SFC4       0.39     1   FLOW         1368.      968.
                                            TIME          3.50     3.57

                                        ** PEAK STAGES IN FEET **
                                        1   STAGE      1585.23  1584.61
                                            TIME          3.50     3.57

 HYDROGRAPH AT
+                   182H       0.03     1   FLOW          416.      208.
```

```
                                        TIME          3.30      3.30

 ROUTED TO
+                S182H      0.03    1   FLOW          411.      206.
                                        TIME          3.33      3.33

                                    ** PEAK STAGES IN FEET **
                                    1   STAGE      1608.02   1607.38
                                        TIME          3.33      3.33

 ROUTED TO
+                R182H      0.03    1   FLOW          402.      202.
                                        TIME          3.37      3.33

                                    ** PEAK STAGES IN FEET **
                                    1   STAGE      1598.67   1598.54
                                        TIME          3.37      3.33

 HYDROGRAPH AT
+                 190A      0.02    1   FLOW          294.      147.
                                        TIME          3.30      3.30

  2 COMBINED AT
+                PNR1A      0.05    1   FLOW          685.      344.
                                        TIME          3.33      3.33

 ROUTED TO
+               SPNR1A      0.05    1   FLOW          684.      345.
                                        TIME          3.33      3.33

                                    ** PEAK STAGES IN FEET **
                                    1   STAGE      1602.62   1602.27
                                        TIME          3.33      3.33

 DIVERSION TO
+               DRAIN0      0.05    1   FLOW          110.      110.
                                        TIME          3.13      3.20

 HYDROGRAPH AT
+               DPNR1A      0.05    1   FLOW          574.      235.
                                        TIME          3.33      3.33

 HYDROGRAPH AT
+                 D-C/P     0.00    1   FLOW          421.      211.
                                        TIME          3.37      3.37

  2 COMBINED AT
+                  C/P      0.05    1   FLOW          984.      441.
                                        TIME          3.33      3.33

 ROUTED TO
+               RPNR1A      0.05    1   FLOW          971.      431.
                                        TIME          3.40      3.40

                                    ** PEAK STAGES IN FEET **
                                    1   STAGE      1590.79   1590.65
                                        TIME          3.40      3.40
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```
 HYDROGRAPH AT
+                  190B      0.01      1   FLOW          101.       50.
                                           TIME          3.30      3.30

  2 COMBINED AT
+                  PNR1      0.05      1   FLOW         1055.      472.
                                           TIME          3.37      3.40

 DIVERSION TO
+                 DOPN-1     0.05      1   FLOW          568.      148.
                                           TIME          3.37      3.40

 HYDROGRAPH AT
+                 D-PNR1     0.05      1   FLOW          487.      324.
                                           TIME          3.37      3.40

 HYDROGRAPH AT
+                 DPNR1A     0.00      1   FLOW          110.      110.
                                           TIME          3.13      3.20

 ROUTED TO
+                 R-DRA0     0.00      1   FLOW          110.      110.
                                           TIME          3.17      3.23

  2 COMBINED AT
+                  PNR1      0.05      1   FLOW          597.      434.
                                           TIME          3.37      3.40

 DIVERSION TO
+                 DRAIN1     0.05      1   FLOW          160.      160.
                                           TIME          3.10      3.17

 HYDROGRAPH AT
+                  D-PN1     0.05      1   FLOW          437.      274.
                                           TIME          3.37      3.40

 ROUTED TO
+                  RPNR1     0.05      1   FLOW          433.      269.
                                           TIME          3.43      3.43

                                      ** PEAK STAGES IN FEET **
                                      1   STAGE      1588.71   1588.63
                                           TIME          3.43      3.43

 HYDROGRAPH AT
+                  190C      0.02      1   FLOW          352.      176.
                                           TIME          3.30      3.30

  2 COMBINED AT
+                  PNR2      0.08      1   FLOW          720.      402.
                                           TIME          3.37      3.37

 DIVERSION TO
+                 DOPN-2     0.08      1   FLOW           12.        1.
                                           TIME          3.37      3.37

 HYDROGRAPH AT
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+                D-PNR2      0.08     1   FLOW          708.      401.
                                          TIME          3.37      3.37

 HYDROGRAPH AT
+                DPNR2A      0.00     1   FLOW          160.      160.
                                          TIME          3.10      3.17

 ROUTED TO
+                R-DRA1      0.00     1   FLOW          160.      160.
                                          TIME          3.13      3.20

  2 COMBINED AT
+                 PNR2       0.08     1   FLOW          868.      561.
                                          TIME          3.37      3.37

 DIVERSION TO
+                DRAIN2      0.08     1   FLOW          180.      180.
                                          TIME          3.07      3.13

 HYDROGRAPH AT
+                 D-PN2      0.08     1   FLOW          688.      381.
                                          TIME          3.37      3.37

 ROUTED TO
+                 RPNR2      0.08     1   FLOW          668.      368.
                                          TIME          3.43      3.47

                                     ** PEAK STAGES IN FEET **
                                     1   STAGE      1578.77   1578.67
                                          TIME          3.43      3.47

 HYDROGRAPH AT
+                  190I      0.01     1   FLOW          208.      104.
                                          TIME          3.27      3.27

 HYDROGRAPH AT
+                  190J      0.01     1   FLOW          125.       63.
                                          TIME          3.30      3.30

  3 COMBINED AT
+                 *PNR3      0.10     1   FLOW          907.      475.
                                          TIME          3.37      3.40

 DIVERSION TO
+                DOPN-3      0.10     1   FLOW          432.      179.
                                          TIME          3.37      3.40

 HYDROGRAPH AT
+                 D-PN3      0.10     1   FLOW          475.      296.
                                          TIME          3.37      3.40

 HYDROGRAPH AT
+                  190D      0.00     1   FLOW          106.       53.
                                          TIME          3.23      3.23

 ROUTED TO
+                 R190D      0.00     1   FLOW          104.       52.
```

```
                                        TIME          3.27      3.27

                                  ** PEAK STAGES IN FEET **
                                  1   STAGE      1588.86   1588.43
                                      TIME          3.27      3.27

 HYDROGRAPH AT
+                   190E      0.00    1   FLOW          42.       21.
                                          TIME          3.30      3.30

 HYDROGRAPH AT
+                   190F      0.01    1   FLOW          88.       44.
                                          TIME          3.30      3.30

 HYDROGRAPH AT
+                   190G      0.01    1   FLOW          74.       37.
                                          TIME          3.30      3.30

  4 COMBINED AT
+                  PNR3A      0.02    1   FLOW         300.      150.
                                          TIME          3.27      3.27

 ROUTED TO
+                 RPNR3A      0.02    1   FLOW         286.      141.
                                          TIME          3.33      3.33

                                  ** PEAK STAGES IN FEET **
                                  1   STAGE      1576.93   1576.81
                                      TIME          3.33      3.33

 HYDROGRAPH AT
+                   190H      0.08    1   FLOW        1191.      595.
                                          TIME          3.30      3.30

 ROUTED TO
+                  R190H      0.08    1   FLOW        1165.      578.
                                          TIME          3.37      3.37

                                  ** PEAK STAGES IN FEET **
                                  1   STAGE      1577.15   1576.99
                                      TIME          3.37      3.37

  3 COMBINED AT
+                  PNR-3      0.19    1   FLOW        1911.     1007.
                                          TIME          3.37      3.37

 HYDROGRAPH AT
+                  D-PN2      0.00    1   FLOW         180.      180.
                                          TIME          3.07      3.13

 ROUTED TO
+                 R-DRA2      0.00    1   FLOW         180.      180.
                                          TIME          3.10      3.17

  2 COMBINED AT
+                   PNR3      0.19    1   FLOW        2091.     1187.
                                          TIME          3.37      3.37
```

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 DIVERSION TO
+                DRAIN3      0.19     1   FLOW          200.      200.
                                          TIME          2.87      3.10

 HYDROGRAPH AT
+                 D-PN3      0.19     1   FLOW         1891.      987.
                                          TIME          3.37      3.37

 ROUTED TO
+                 RPNR3      0.19     1   FLOW         1866.      965.
                                          TIME          3.40      3.43

                                       ** PEAK STAGES IN FEET **
                                       1   STAGE      1571.06   1570.90
                                          TIME          3.40      3.43

 HYDROGRAPH AT
+                  190K      0.01     1   FLOW          113.       57.
                                          TIME          3.30      3.30

 ROUTED TO
+                 R190K      0.01     1   FLOW          112.       56.
                                          TIME          3.33      3.33

                                       ** PEAK STAGES IN FEET **
                                       1   STAGE      1570.31   1570.21
                                          TIME          3.33      3.33

 HYDROGRAPH AT
+                  190L      0.01     1   FLOW          173.       87.
                                          TIME          3.30      3.30

  3 COMBINED AT
+                 *PNR4      0.21     1   FLOW         2096.     1073.
                                          TIME          3.40      3.40

 DIVERSION TO
+                DOPN-4      0.21     1   FLOW          272.      120.
                                          TIME          3.40      3.40

 HYDROGRAPH AT
+                D-PNR4      0.21     1   FLOW         1824.      954.
                                          TIME          3.40      3.40

 HYDROGRAPH AT
+                  190M      0.01     1   FLOW          121.       60.
                                          TIME          3.30      3.30

 HYDROGRAPH AT
+                  190N      0.02     1   FLOW          289.      145.
                                          TIME          3.30      3.30

  3 COMBINED AT
+                  PNR4      0.24     1   FLOW         2161.     1116.
                                          TIME          3.37      3.40

 HYDROGRAPH AT
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```
+                    D-FC2      0.00     1   FLOW        2310.      948.
                                             TIME         3.43      3.47

 HYDROGRAPH AT
+                    D-FC4      0.00     1   FLOW         591.       99.
                                             TIME         3.43      3.43

  2 COMBINED AT
+                      FL1      0.00     1   FLOW        2901.     1044.
                                             TIME         3.43      3.47

 HYDROGRAPH AT
+                    D-PN1      0.00     1   FLOW         568.      148.
                                             TIME         3.37      3.40

 HYDROGRAPH AT
+                    D-PN2      0.00     1   FLOW          12.        1.
                                             TIME         3.37      3.37

 HYDROGRAPH AT
+                    D-PN3      0.00     1   FLOW         432.      179.
                                             TIME         3.37      3.40

 HYDROGRAPH AT
+                    D-PN4      0.00     1   FLOW         272.      120.
                                             TIME         3.40      3.40

  4 COMBINED AT
+                     FL-2      0.00     1   FLOW        1280.      448.
                                             TIME         3.40      3.40

  2 COMBINED AT
+                     FL-3      0.00     1   FLOW        4124.     1469.
                                             TIME         3.43      3.43

 HYDROGRAPH AT
+                     LAKE      0.08     1   FLOW        1735.      868.
                                             TIME         3.20      3.20

  2 COMBINED AT
+                     FL-4      0.08     1   FLOW        4479.     1646.
                                             TIME         3.43      3.43

 ROUTED TO
+                   S-FL4       0.08     1   FLOW        2486.      389.
                                             TIME         3.67      3.87

                                        ** PEAK STAGES IN FEET **
                                        1   STAGE     1577.59   1575.92
                                             TIME         3.67      3.87
1
```

1/2 PMF Inflow

1/2 PMF Outflow

1/2 PMF Stage
Fountain Hills
Local datum.

*** NORMAL END OF HEC-1 ***

APPENDIX B

DETERMINATION OF BREACH PARAMETERS

GK ENGINEERS, INC.
2255 N. 44th Street, Ste. 330, Phoenix, AZ 85008 Tel. (602) 244-2566

BY HHH DATE 10/11/93
CHECK _____ DATE _____

CLIENT Anderson-Nelson
JOB NAME Fountain Hills Dambreak Analysis Dam #19 JOB NO. 465-12

Breach Parameter Estimation

Average Breach Width (ft) $\bar{b} = 9.5\, k_o\, (V_r\, h_d)^{0.25}$

Time of Failure (hr) $\tau = 0.8\, (V_r / h_d^2)^{0.50}$

Where k_o = 1.0 (Piping), 1.4 (for overtopping)
V_r = Volume (Acre-ft)
h_d = height (ft) of water over the breach

Structure No. 19 Data

Maximun W.S.E.	=	1707.15	HEC-1 ½ PMF storm output
Final Breach Bottom Elev.	=	1678.86	
h_d	=	28.29 use 28.3 ft	
V_r	=	107 Acre-ft	Stage - Volume HEC-1
k_o	=	1.0	

$$\bar{b} = (9.5)(1.0)\left[(107)(28.3)\right]^{0.25}$$

$= \underline{70.47 \text{ ft}}$ use 70.5 ← Average Width $\bar{b}$

$$\tau = 0.8\left[\frac{(107)}{(28.3)^2}\right]^{0.5}$$

$= \underline{0.29 \text{ hr}}$ ← Failure time τ

GK ENGINEERS, INC.
2255 N. 44th Street, Ste. 330, Phoenix, AZ 85008 Tel. (602) 244-2566

CHECK _____ DATE _____

CLIENT Anderson-Nelson

JOB NAME Fountain Hills Dambreak Analysis Fountain Lake Location # 1 JOB NO. 465-12

Breach Parameter Estimation

Average Breach Width (ft) $\bar{b} = 9.5\, k_o\, (V_r\, h_d)^{0.25}$

Time of Failure (hr) $\tau = 0.8\, (V_r / h_d^2)^{0.50}$

Where k_o = 1.0 (Piping), 1.4 (for overtopping)

V_r = Volume (Acre-ft)

h_d = height (ft) of water over the breach

Fountain Lake Data

Maximum W.S.E.	=	* 1574.66	HEC-1 ½ PMF storm output
Final Breach Bottom Elev.	=	1562.2	
h_d	=	12.46	
V_r	=	250	
k_o	=	1.00	

$$\bar{b} = (9.5)(1.0)\left[(250)(12.46)\right]^{0.25}$$

$$= \underline{70.97 \text{ ft}} \quad \text{use } 72$$

← Average Width $\bar{b}$

$$\tau = 0.8\left[\frac{(250)}{(12.46)^2}\right]^{0.5}$$

$$= \underline{1.015 \text{ hr.}} \quad \text{use } 1.00$$

← Failure time τ

APPENDIX C

ESTIMATION OF RESISTANCE COEFFICIENTS

ACK ENGINEERS, INC.
2255 N. 44th St., Ste. 330, Phoenix, AZ 85008 Tel: (602) 244-2566

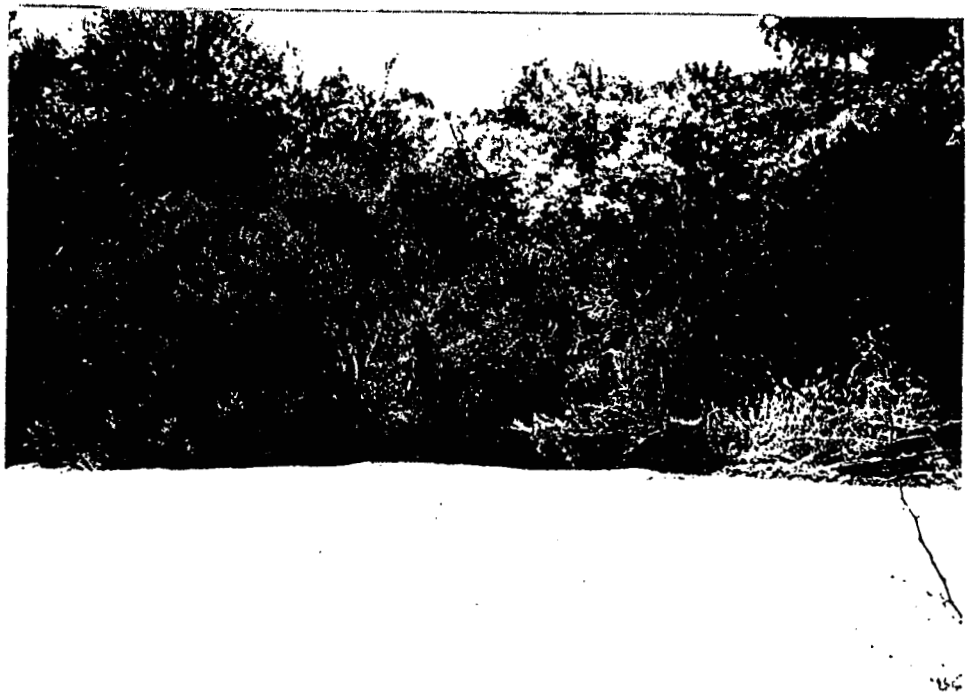
SHEET 1 OF 4
BY HAA DATE 5/12/95
CHECK _____ DATE _____

CLIENT Anderson - Nelson
JOB NAME Dambreak Analysis
JOB NO. 465.12

Determination of n Roughnes Coefficient.

Channel Material → Soarse Sand		n = 0.027
Degre of Irregularities → minor		Adjustment = 0.005
Effect of obstruction → Appreciable		Adjustment = 0.025
Vegetation → large		Adjustmat = 0.043
		n = 0.10

COL-P1



COL-P2

COLONY WASH

COL-P3

COL-P4

A common method of selecting the roughness coefficient, *n*, is to first select a base value of *n* for the bed material (table 1). The base values of *n* are for a straight uniform channel of a given bed material. Cross-section irregularities, channel alignment, obstructions, vegetation, and other factors that increase roughness are accounted for by adding increments of roughness to the base value of *n*. Ranges of adjustments for the factors that may add to channel roughness are shown in table 2.

Many alluvial channels in Maricopa County have bed material that moves during floodflow. In addition to the changing channel geometry of these channels, the roughness coefficient may change during floodflow because of the changing form of the channel bed in parts of the channel cross section (Davidian, 1984). Bedforms, such as dunes, antidunes, and plane bed have been observed during large floods. Within a few minutes, dunes can appear, disappear, and reappear at different locations across a large stream channel. The Manning roughness coefficient can double or triple when the bedform changes from plane to dunes. A method of defining reliable values of Manning's *n* for unstable alluvial channels is not available. A plane bedform is common during large floods, and for this report, plane-bed conditions are assumed where the roughness coefficient is related to the size of the channel material and not the form of the channel bed. Plane-bed conditions were assumed for nearly all indirect measurements of peak discharge where the slope-area method was used.

Table 1.--*Base values of Manning's n for stable channels*

[Modified from Aldridge and Garrett, 1973, table 1]

Channel material	Size of bed material		Base *n* values	
	Millimeters	Inches	Benson and Dalrymple (1967)[1]	Chow (1959)[2]
Concrete.....	-------	--------	0.012-0.018	0.011
Rock cut.....	-------	--------	----------	.025
Firm soil.....	-------	--------	.025- .032	.020
Coarse sand.....	1-2	--------	.026- .035	-----
Fine gravel.....	-------	--------	----------	.024
Gravel.....	2-64	0.08-2.5	.028- .035	-----
Coarse gravel.....	-------	--------	----------	.028
Cobble.....	64-256	2.5-10.0	.030- .050	-----
Boulder.....	>256	>10.0	.040- .070	-----

[1]Straight uniform channel.
[2]Smoothest channel attainable in indicated material.

Table 2.--*Adjustment factors for the determination of overall Manning's n values*

[Modified from Chow, 1959]

Channel conditions	Manning's n adjustment[1]	Example
Degree of irregularity:		
Smooth	0.000	Smoothest channel attainable in given bed material.
Minor	.001- .005	Channels with slightly eroded or scoured side slopes.
Moderate	.006- .010	Channels with moderately sloughed or eroded side slopes.
Severe	.011- .020	Channels with badly sloughed banks; unshaped, jagged, and irregular surfaces of channels in rock.
Effects of obstruction[2]:		
Negligible	.000- .004	A few scattered obstructions, which include debris deposits, stumps, exposed roots, logs, piers, or isolated boulders, that occupy less than 5 percent of the cross-sectional area.
Minor	.005- .015	Obstructions occupy 5 to 15 percent of the cross-sectional area and the spacing between obstructions is such that the sphere of influence around one obstruction does not extend to the sphere of influence around another obstruction. Smaller adjustments are used for curved smooth-surfaced objects than are used for sharp-edged angular objects.
Appreciable	.020- .030	Obstructions occupy from 15 to 50 percent of the cross-sectional area or the space between obstructions is small enough to cause the effects of several obstructions to be additive, thereby blocking an equivalent part of a cross section.
Severe	.040- .060	Obstructions occupy more than 50 percent of the cross-sectional area or the space between obstructions is small enough to cause turbulence across most of the cross section.
Vegetation:		
Small	.002- .010	Dense growths of flexible turf grass, such as Bermuda, or weeds where the average depth of flow is at least two times the height of the vegetation; supple tree seedlings such as willow, cottonwood, arrow weed, or saltcedar where the average depth of flow is at least three times the height of the vegetation.
Medium	.010- .025	Grass or weeds where the average depth of flow is from one to two times the height of the vegetation; moderately dense stemmy grass, weeds, or tree seedlings where the average depth of flow is from two to three times the height of the vegetation; moderately dense brush, similar to 1- to 2-year-old saltcedar in the dormant season, along the banks and no significant vegetation along the channel bottoms where the hydraulic radius exceeds 2 feet.
Large	.025- .050	Turf grass or weeds where the average depth to flow is about equal to the height of vegetation; small trees intergrown with some weeds and brush where the hydraulic radius exceeds 2 feet.

See footnotes at end of table.

Table 2.--*Adjustment factors for the determination of overall Manning's n values*--Continued

Channel conditions	Manning's n adjustment[1]	Example
Vegetation—Continued:		
Very large	.050- .100	Turf grass or weeds where the average depth of flow is less than half the height of vegetation; small bushy trees intergrown with weeds along side slopes of dense cattails growing along channel bottom; trees intergrown with weeds and brush.
Variations in channel cross section:		
Gradual	.000	Size and shape of cross sections change gradually.
Alternating	.001- .005	Large and small cross sections alternate occasionally, or the main flow occasionally shifts from side to side owing to changes in cross-sectional shape.
Alternating	.010- .015	Large and small cross sections alternate frequently, or the main flow frequently shifts from side to side owing to changes in cross-sectional shape.
Degree of meadering[3]:		
Minor	1.00	Ratio of the meander length to the straight length of the channel reach is 1.0 to 1.2.
Appreciable	1.15	Ratio of the meader length to the straight length of channel is 1.2 to 1.5.
Severe	1.30	Ratio of the meander length to the straight length of channel is greater than 1.5.

[1]Adjustments for degree of irregularity, variations in cross section, effect of obstructions, and vegetation are added to the base n value (table 1) before multiplying by the adjustment for meander.

[2]Conditions considered in other steps must not be reevaluated or duplicated in this section.

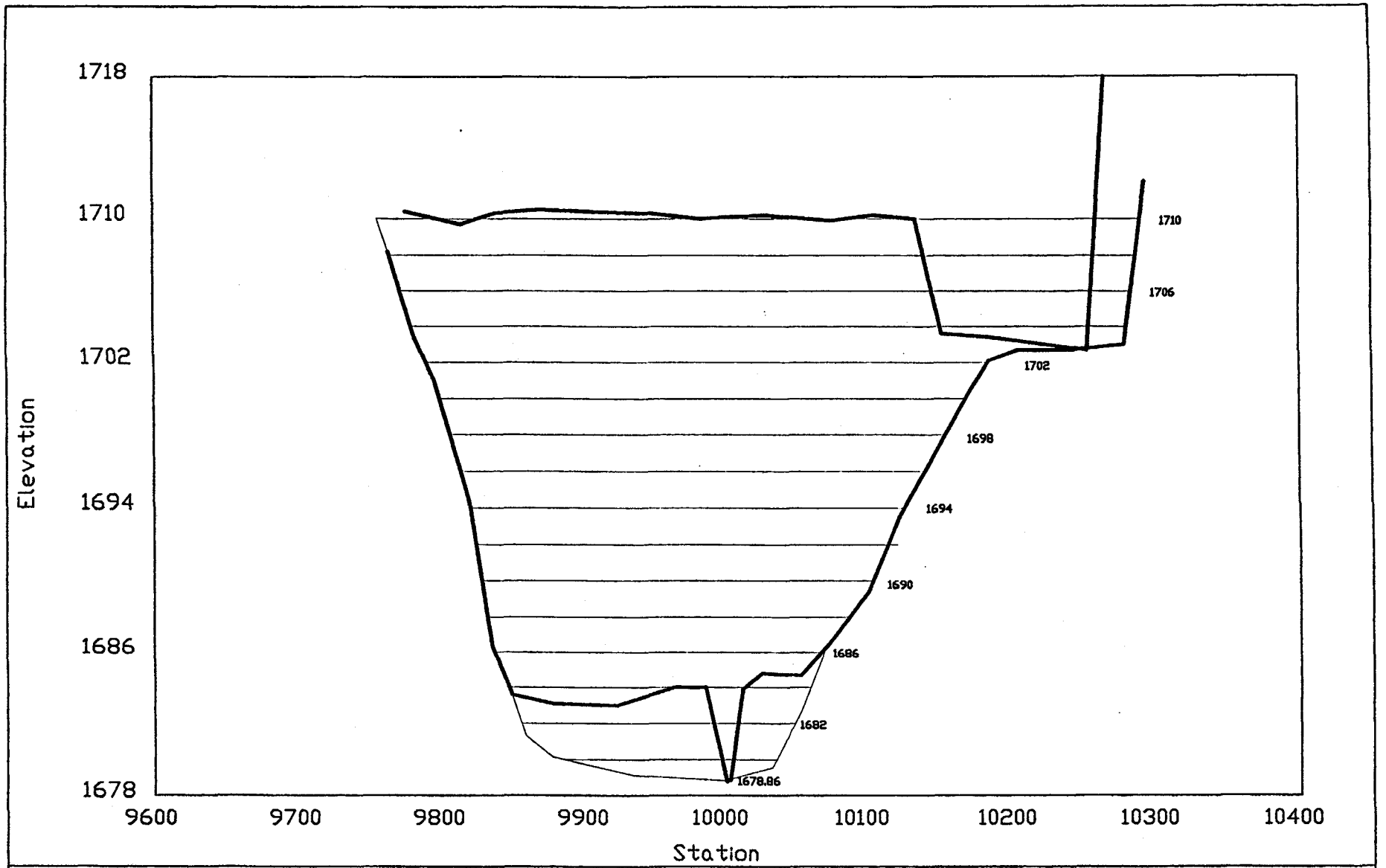
[3]Adjustment values apply to flow confined in the channel and do not apply where downvalley flow crosses meanders. The adjustment is a multiplier.

For floodflows in sand channels with moveable beds, roughness mainly is a function of the size of the bed material as shown in the following table (Benson and Dalrymple, 1967, p. 22).

Median grain size, in millimeters	Manning's *n*	Median grain size, in millimeters	Manning's *n*
0.2	0.012	0.6	.023
.3	.017	.8	.025
.4	.020	1.0	.026
.5	.022		

APPENDIX D

CROSS SECTIONS AND STAGE-DISCHARGE RELATIONS



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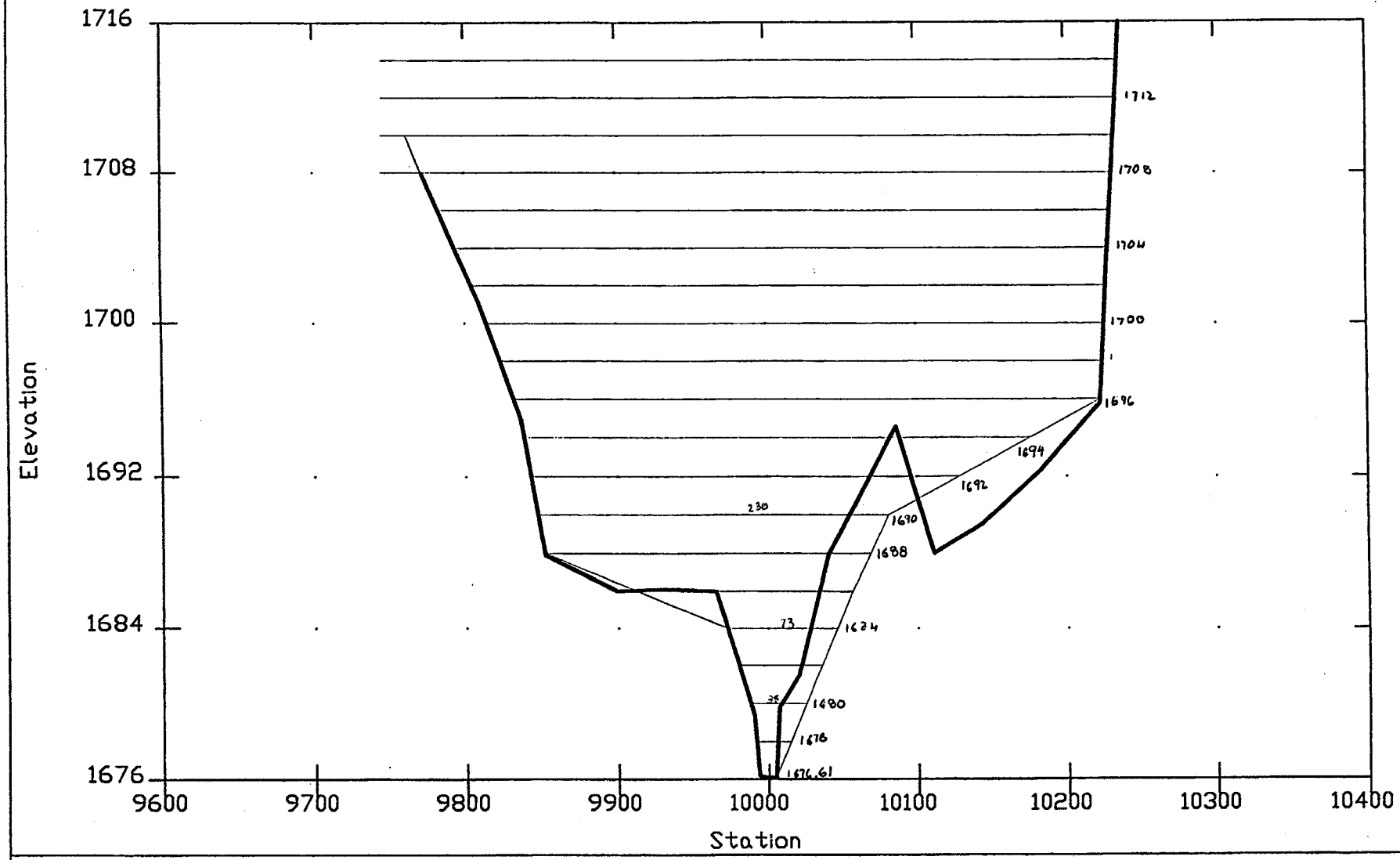
Dambreak Analysis



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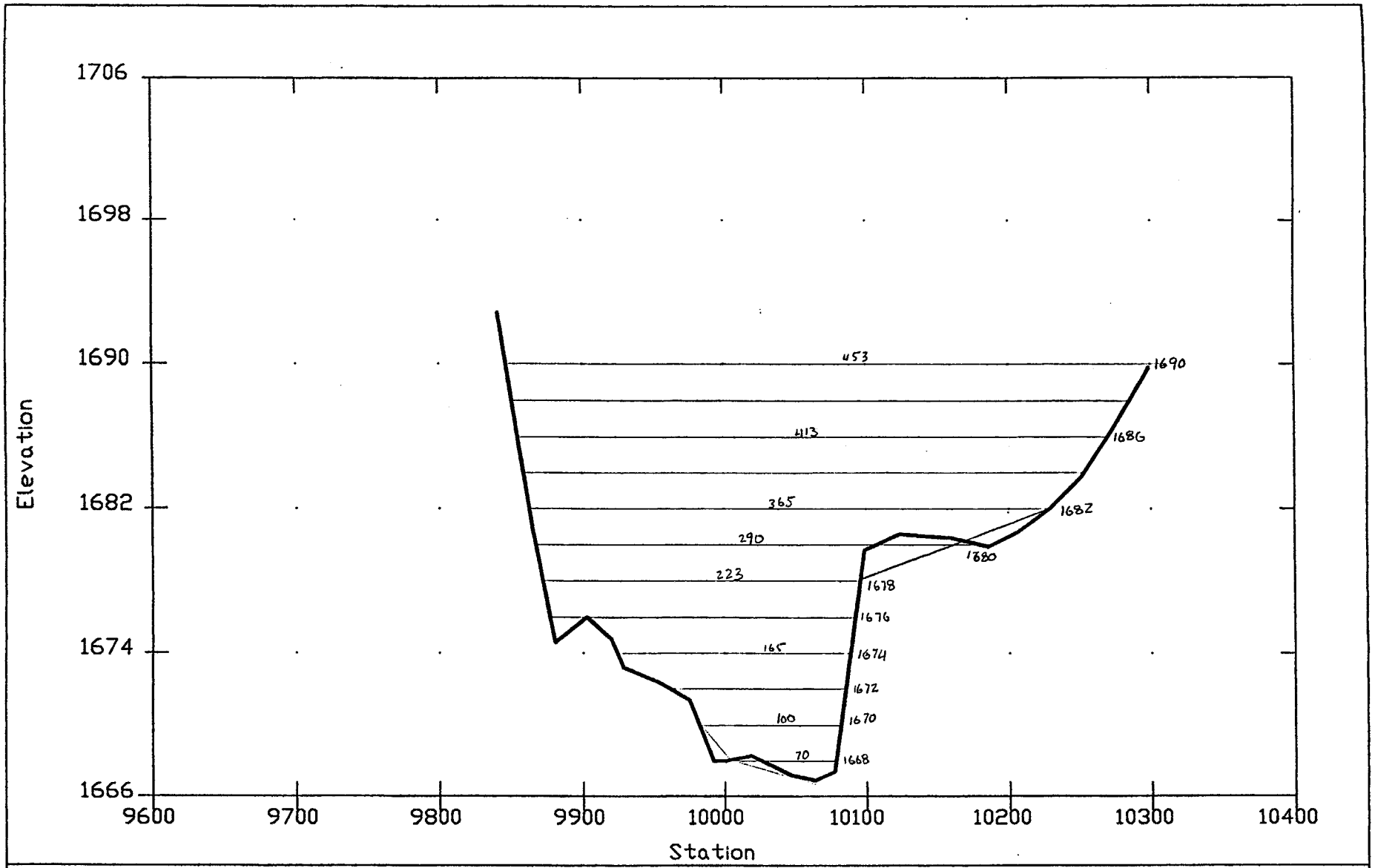

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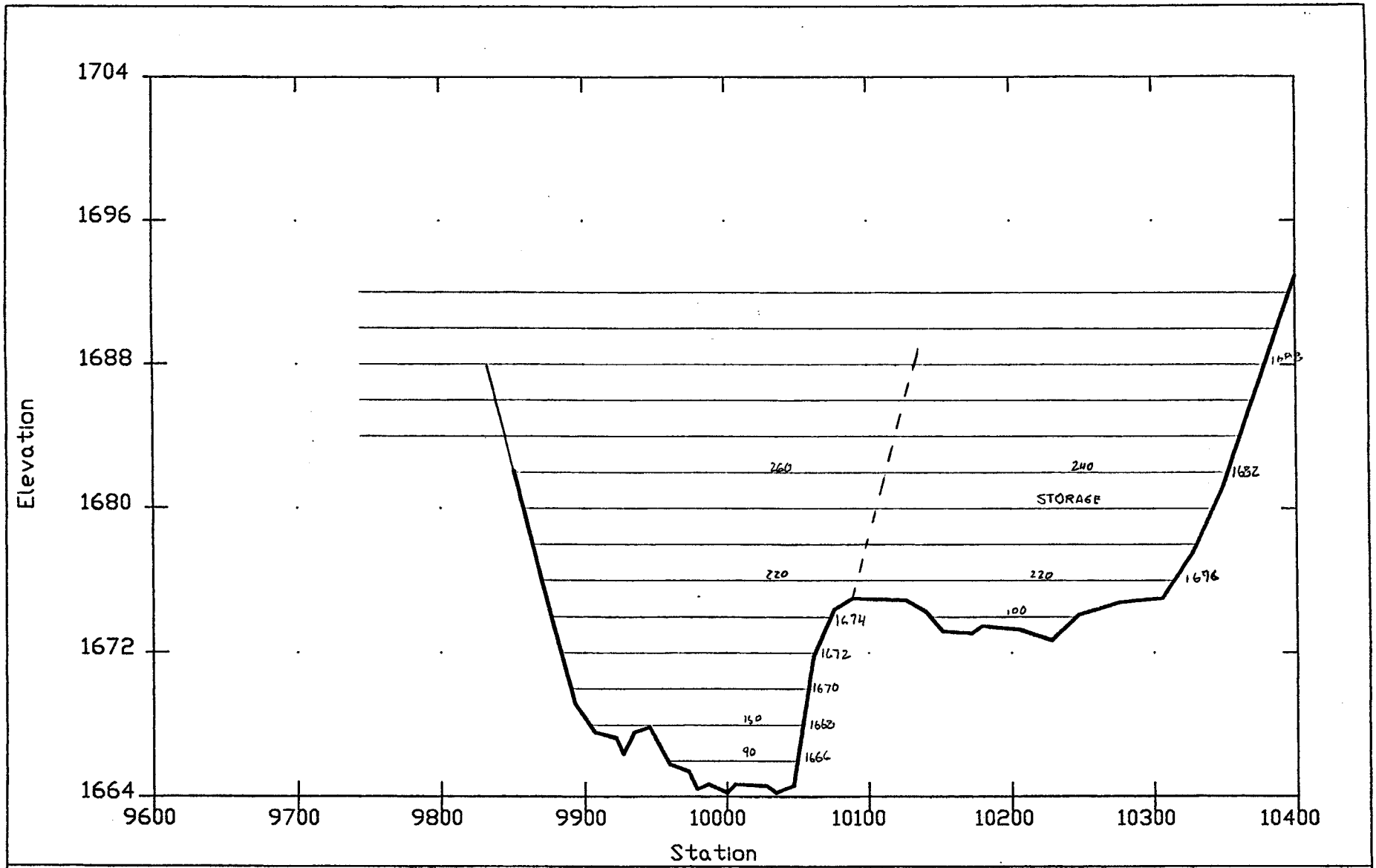

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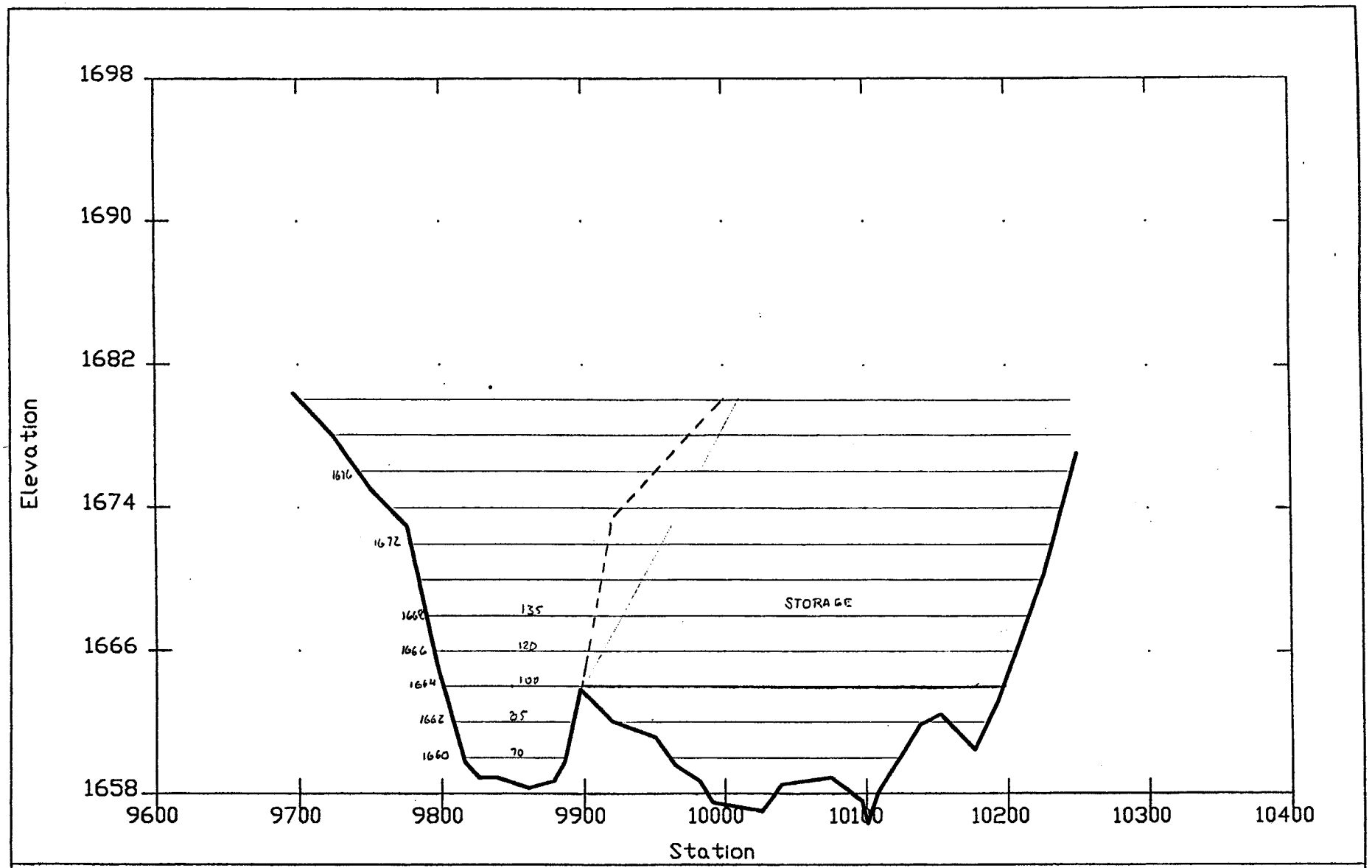

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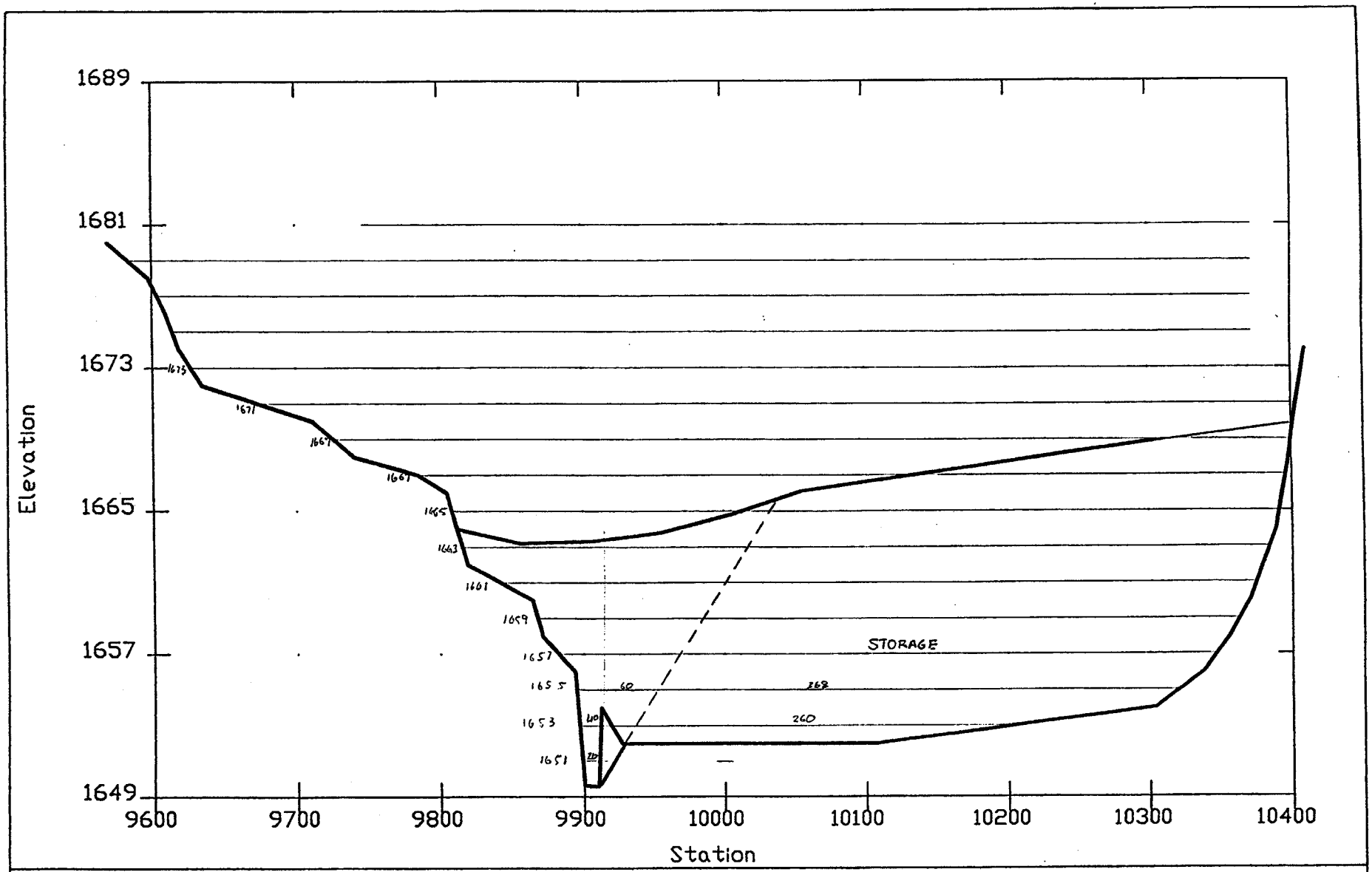

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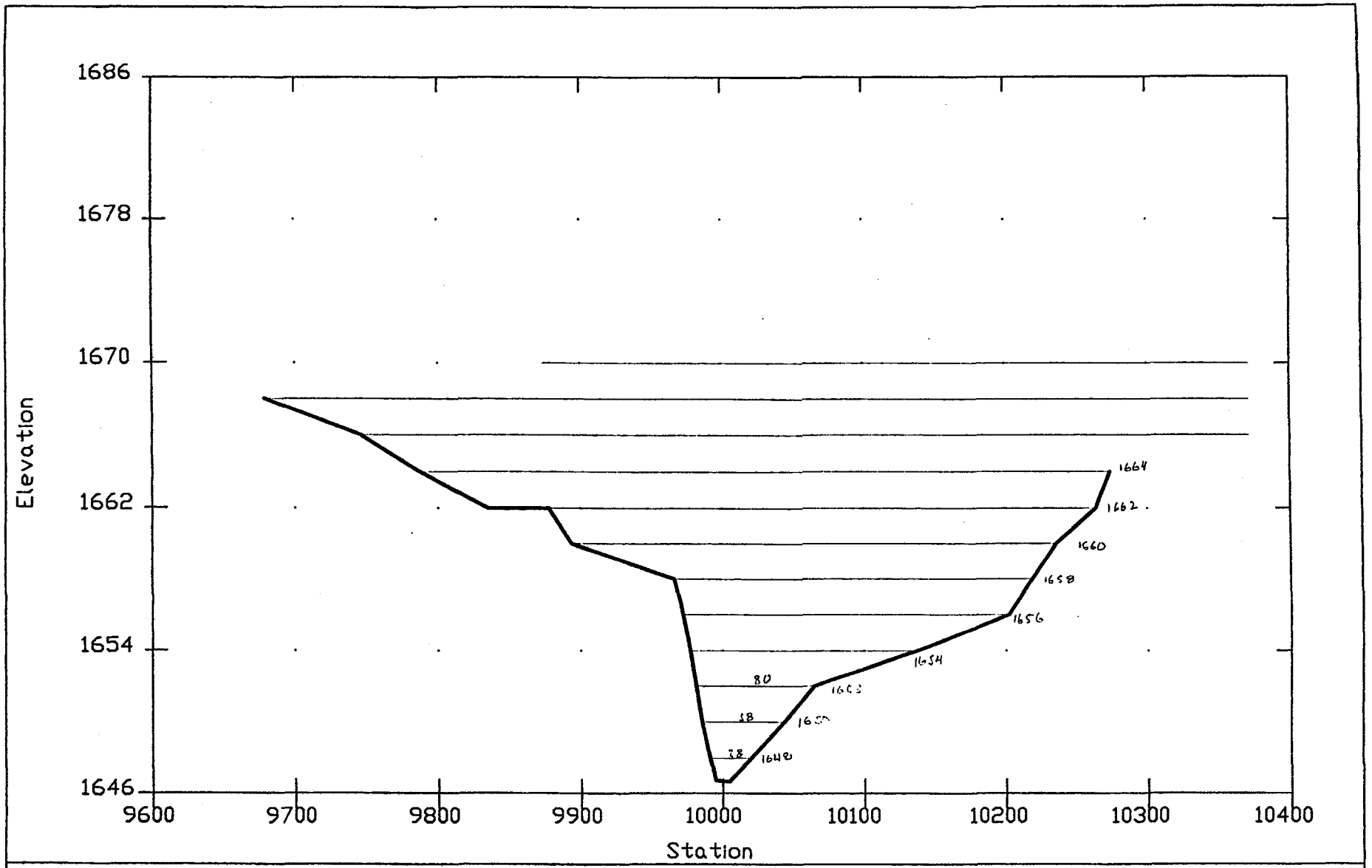

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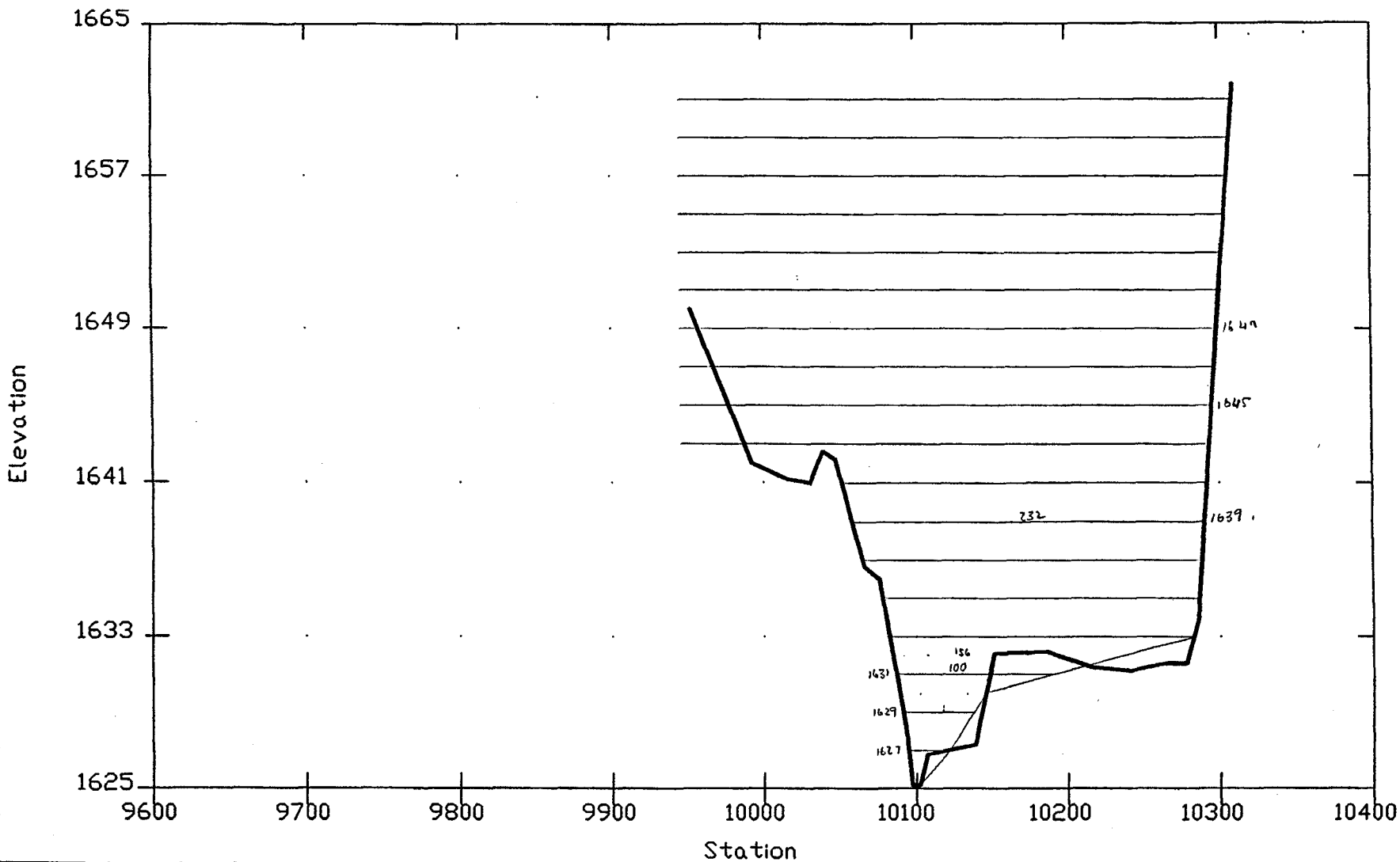

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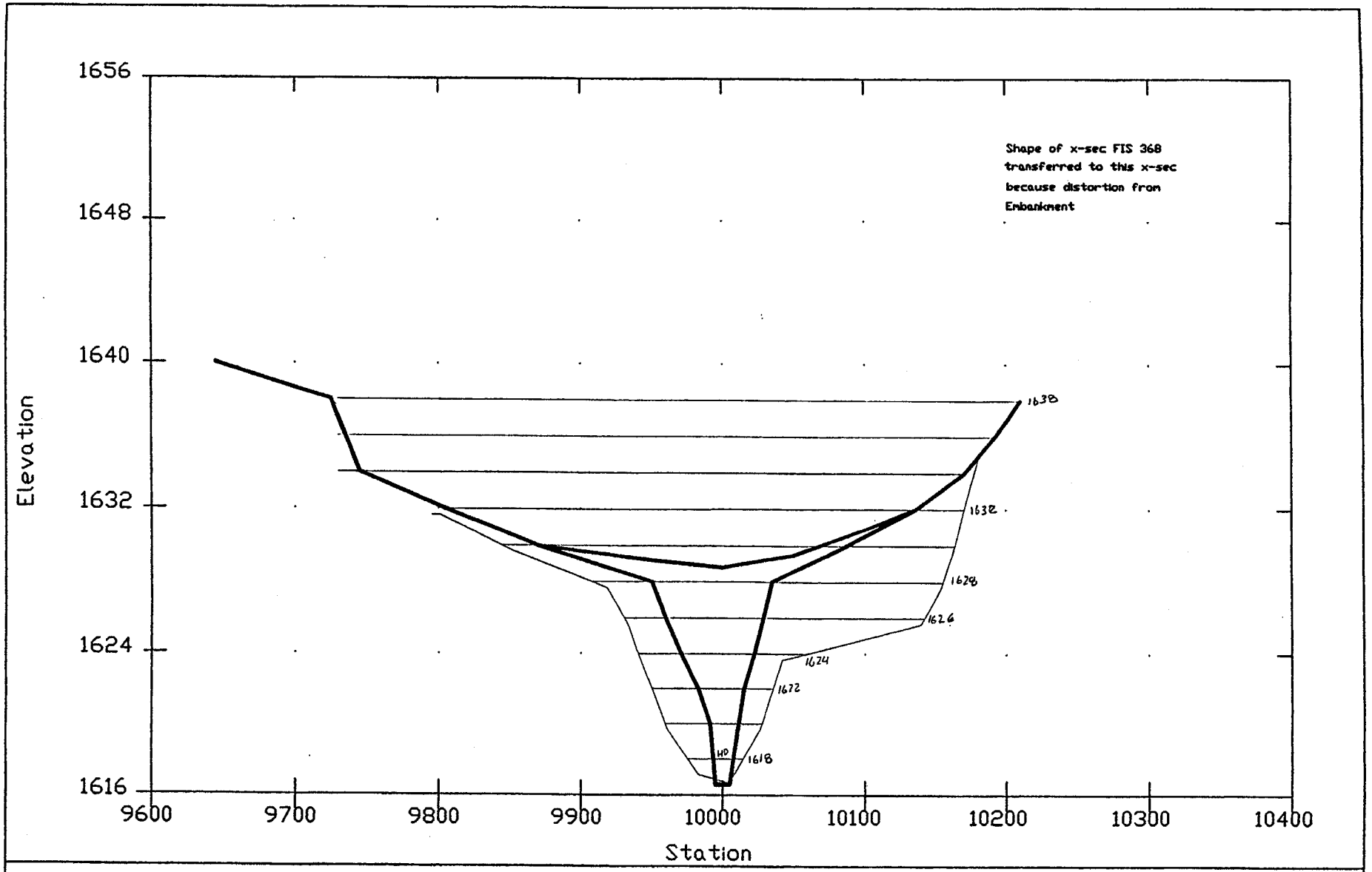

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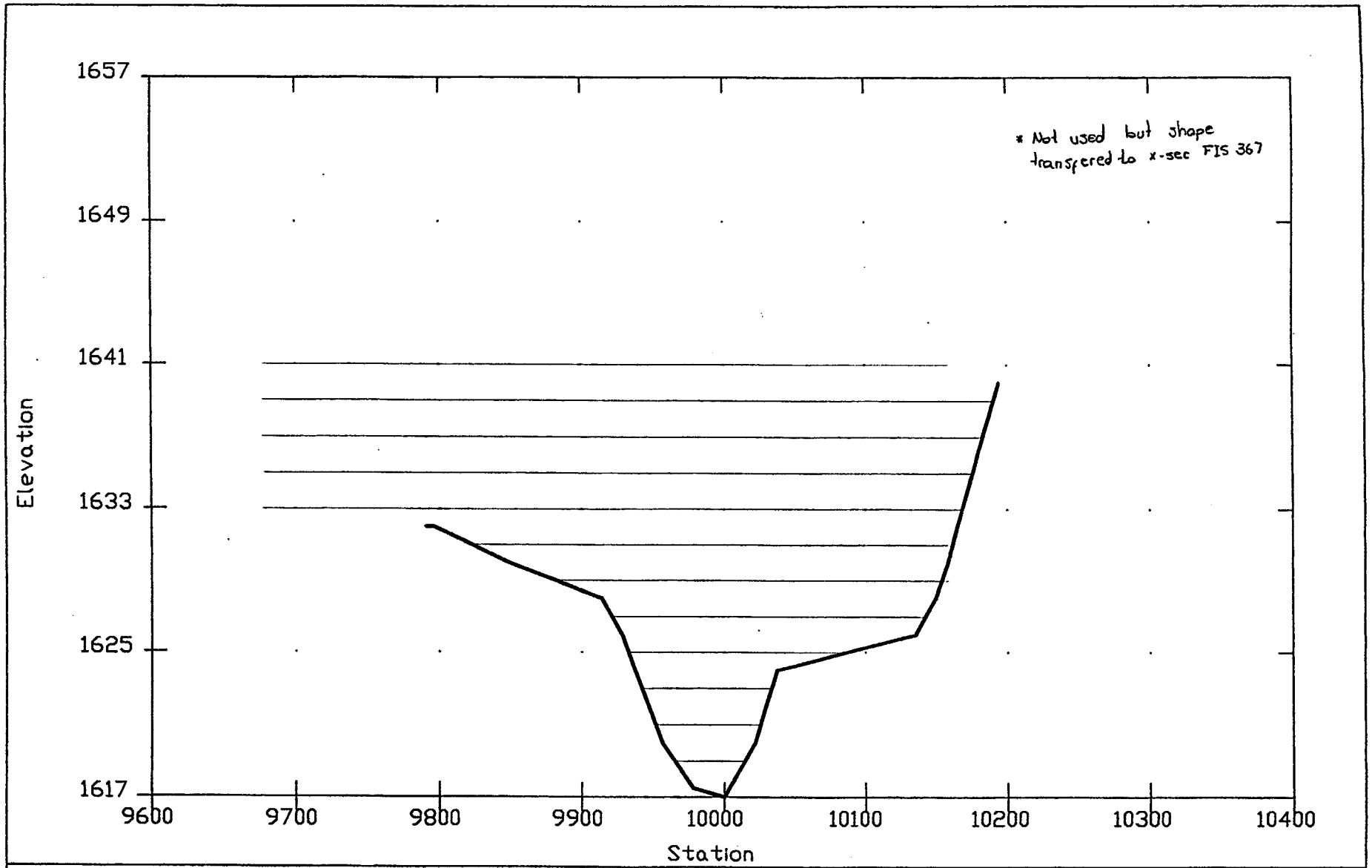

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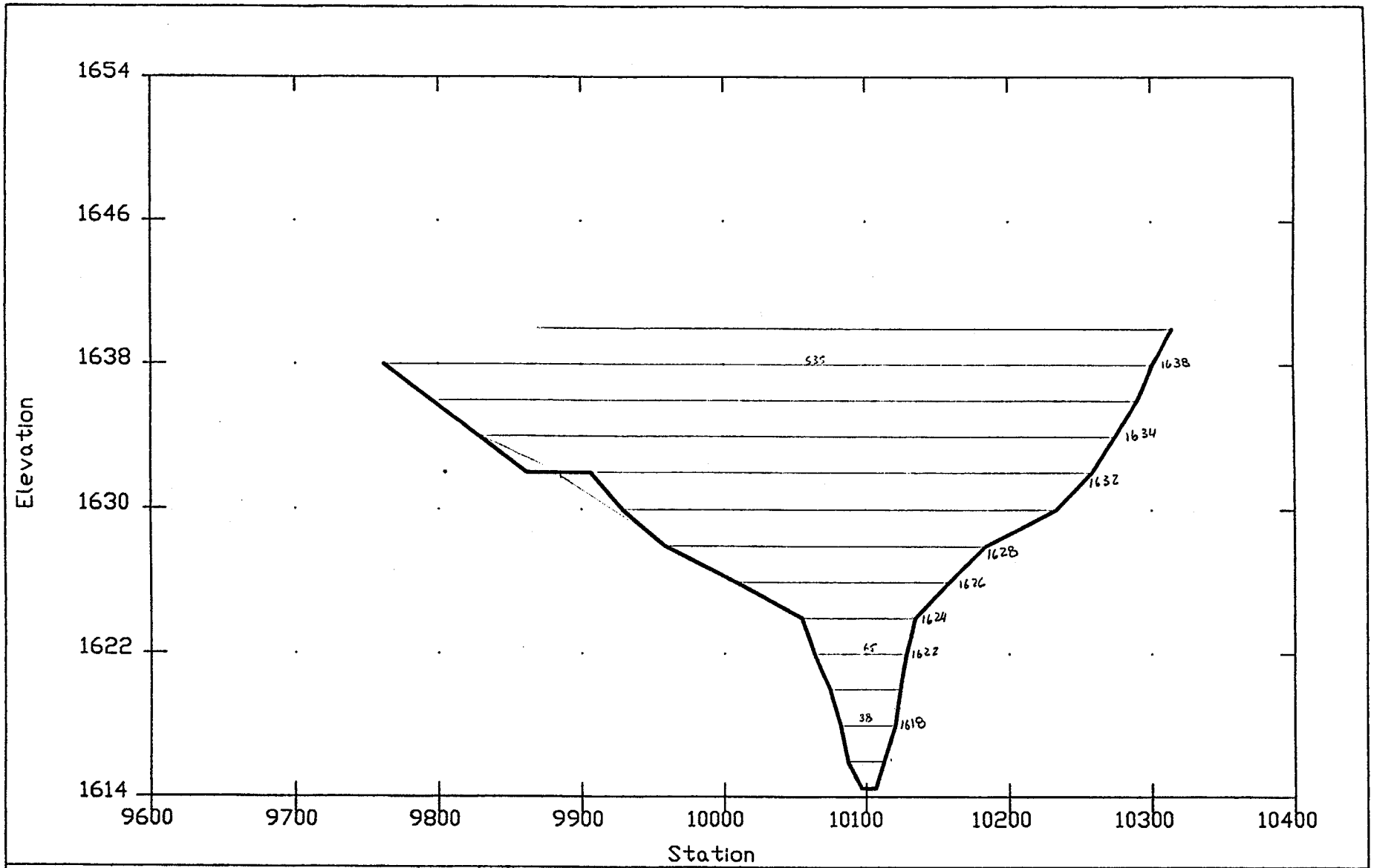

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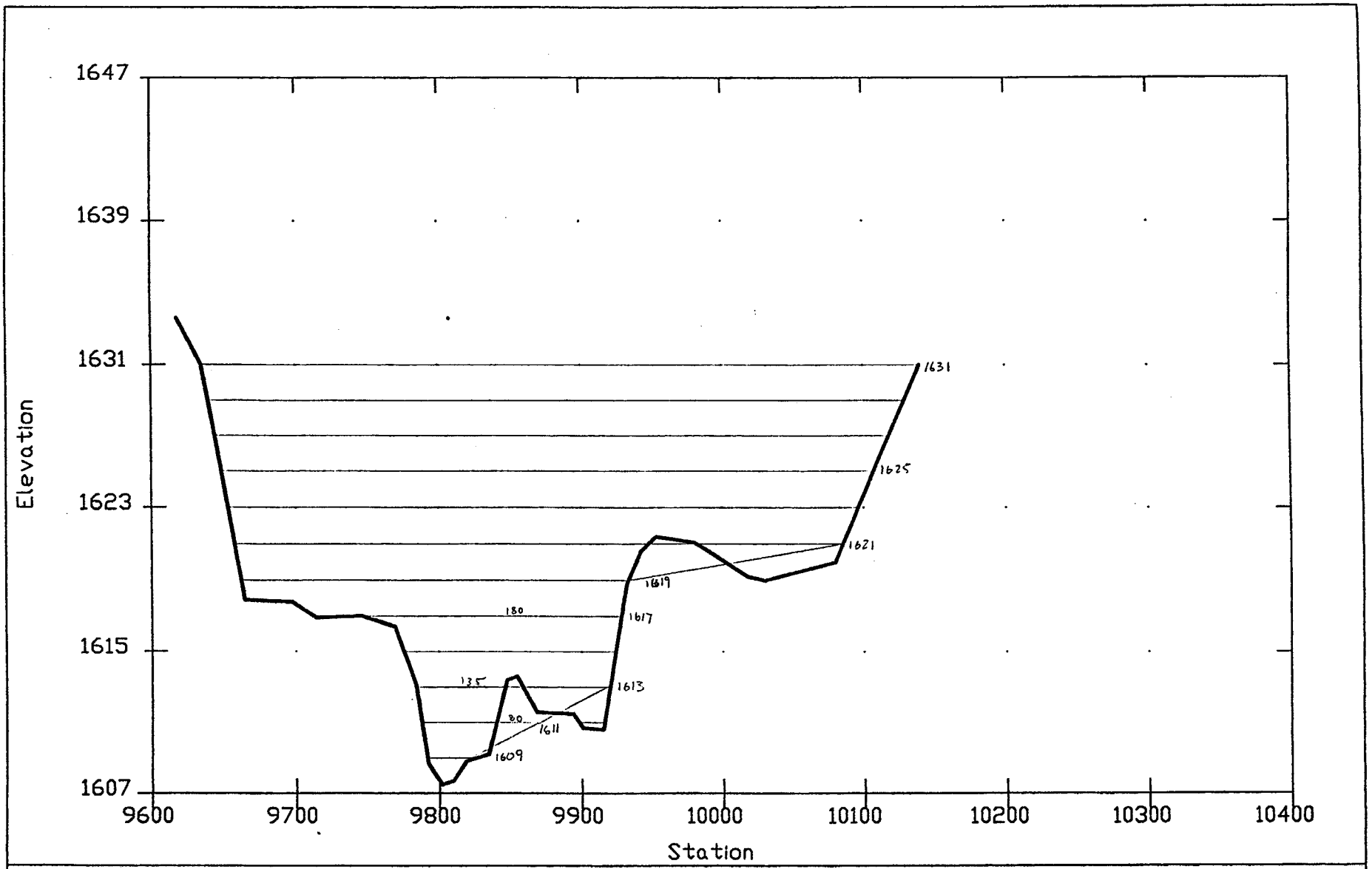

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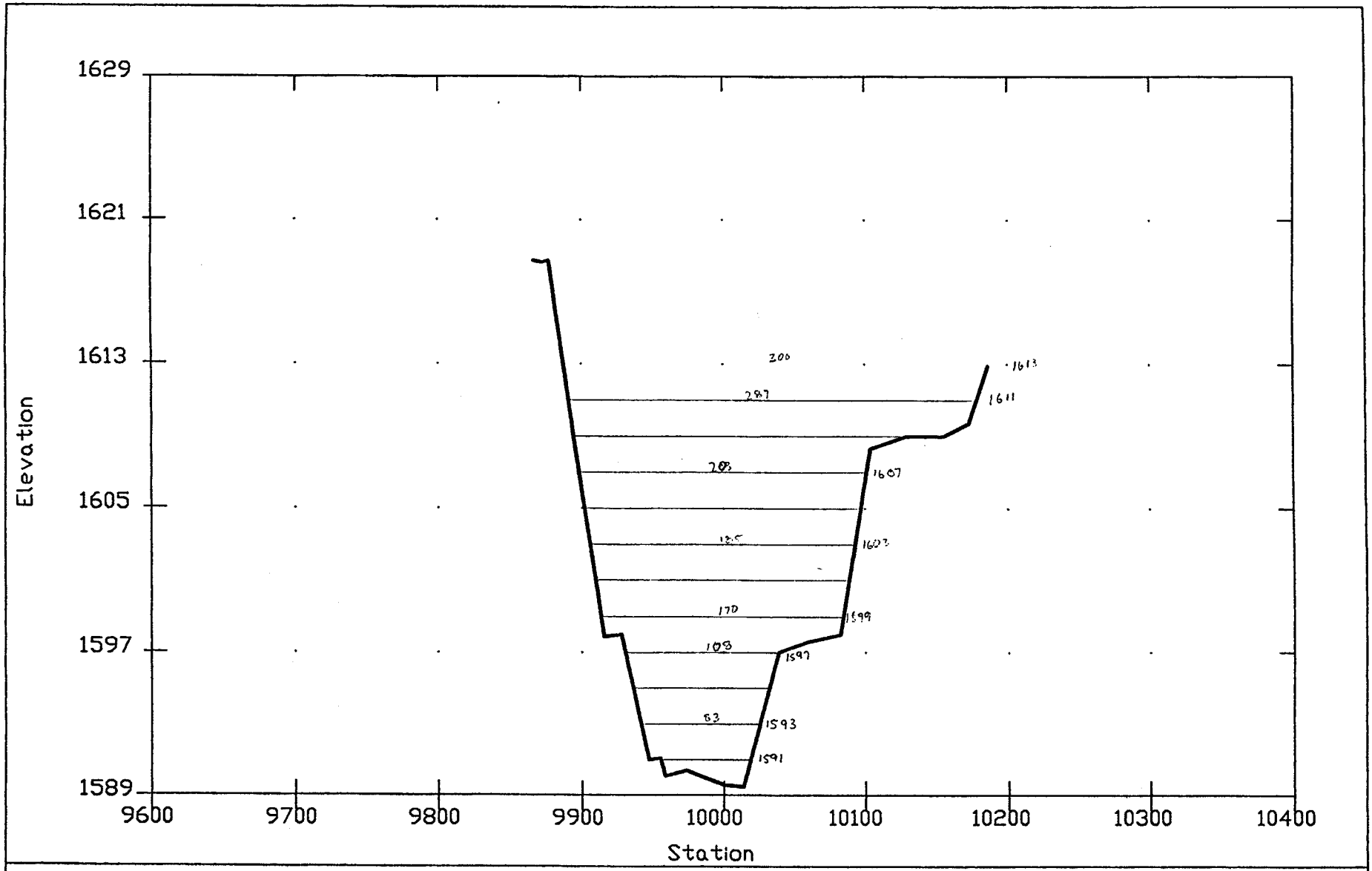

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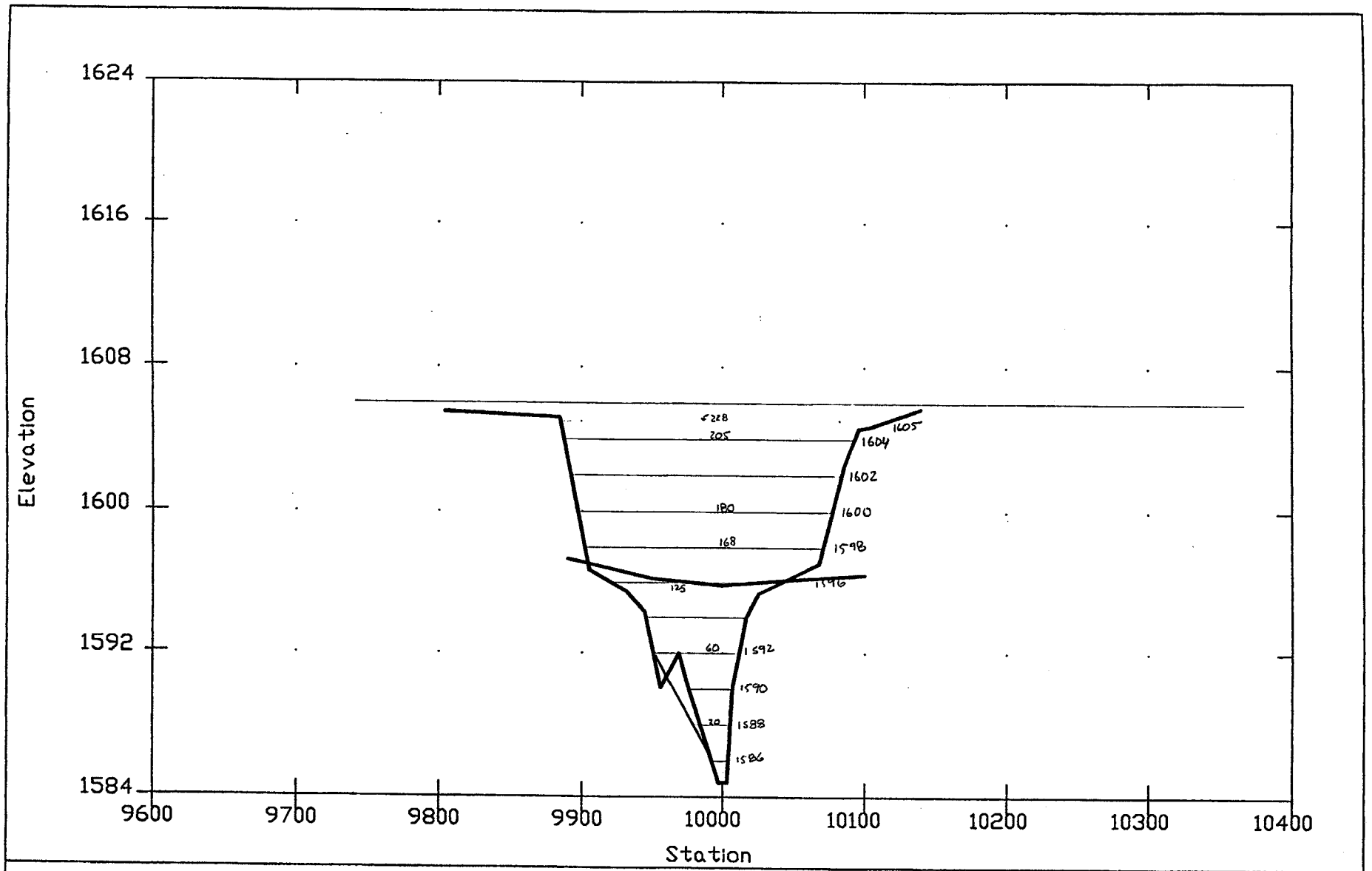

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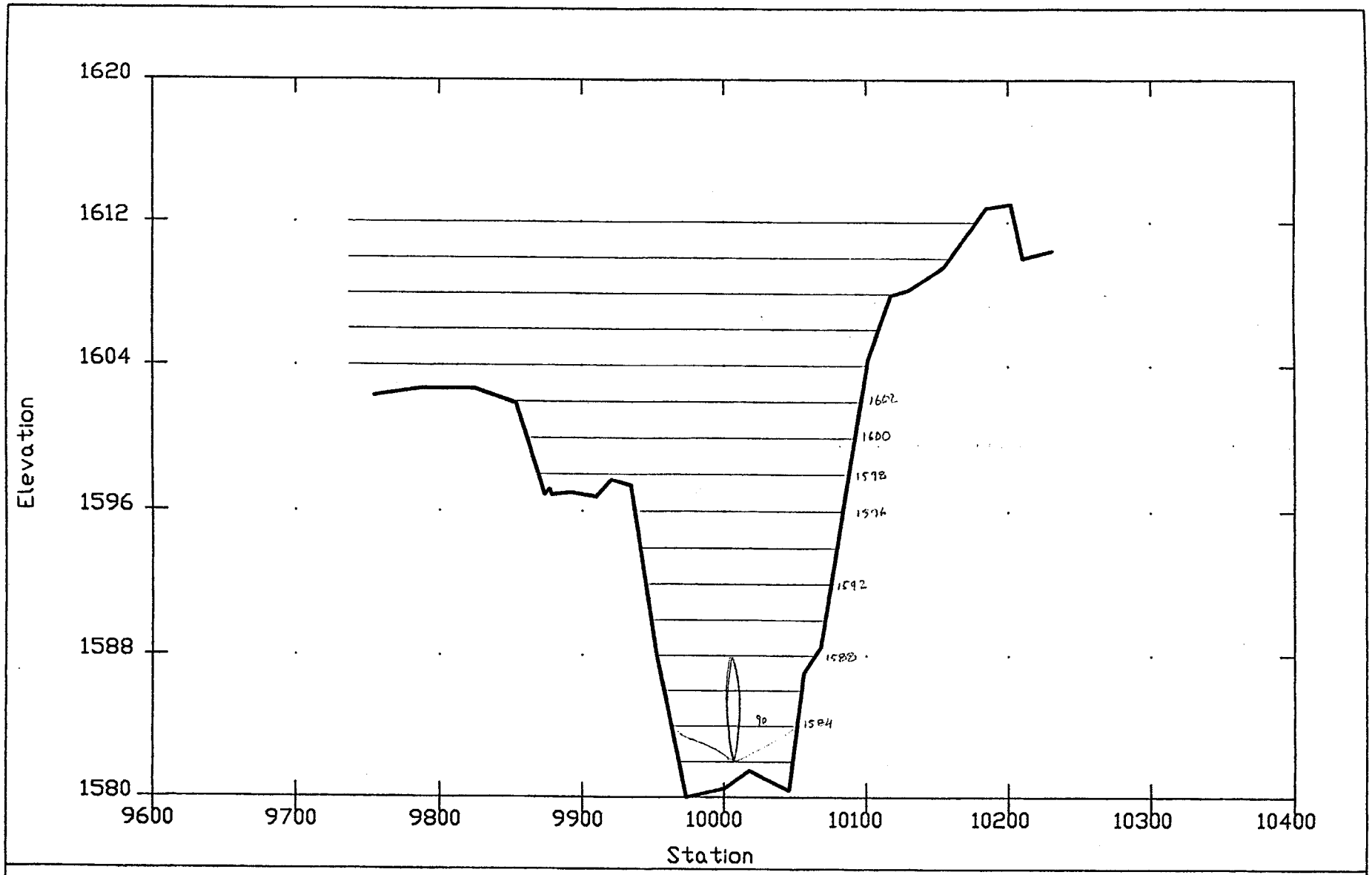

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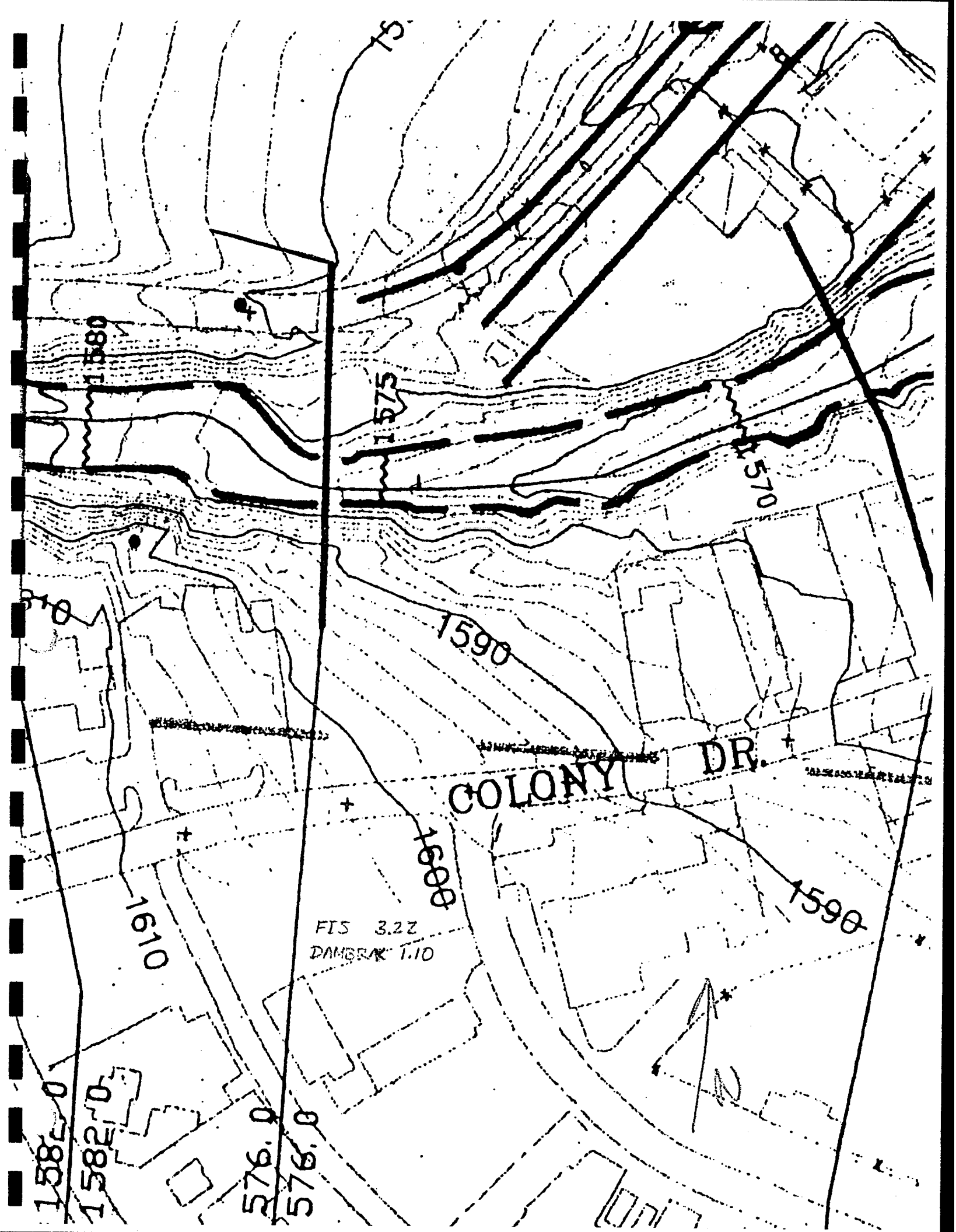
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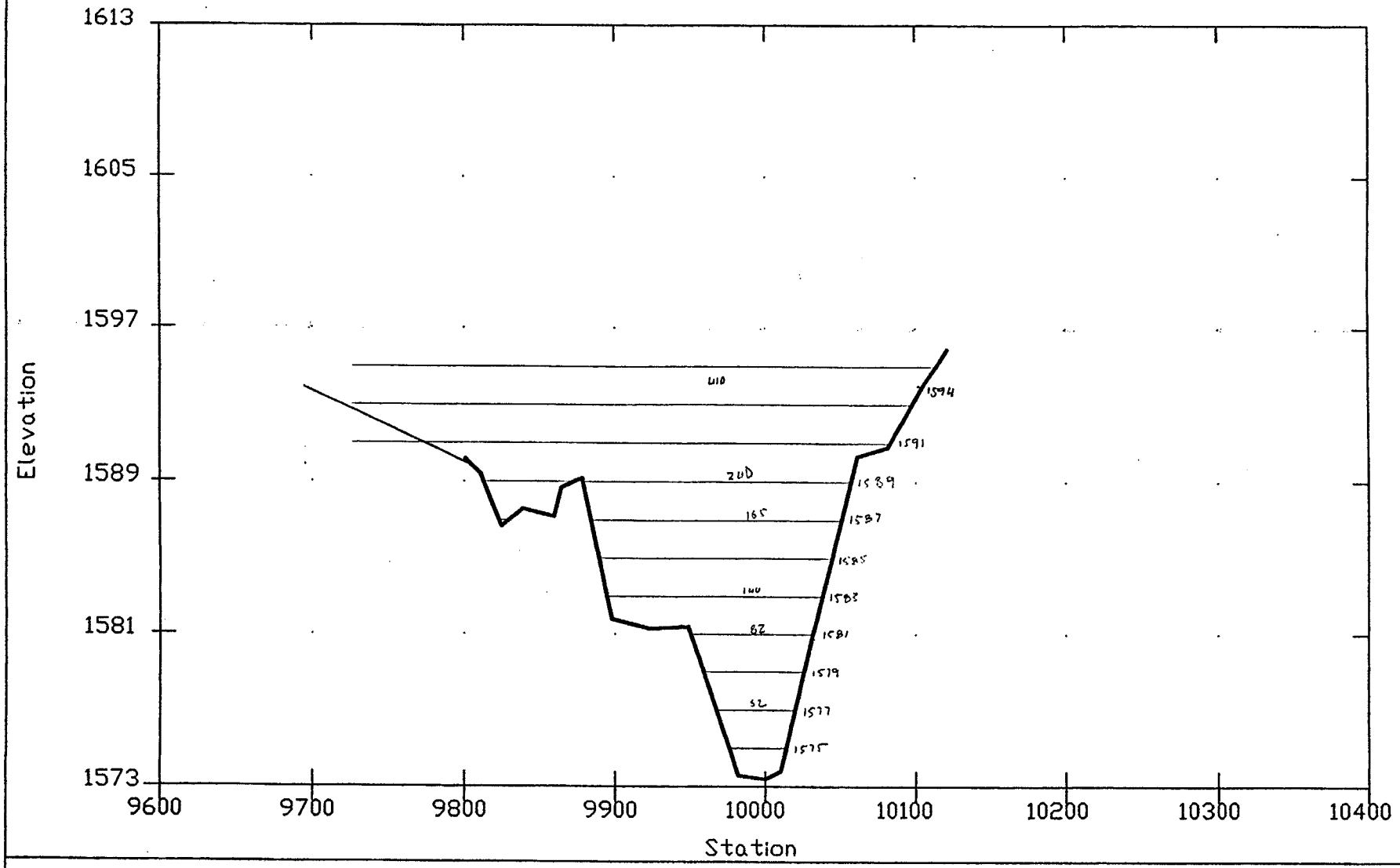

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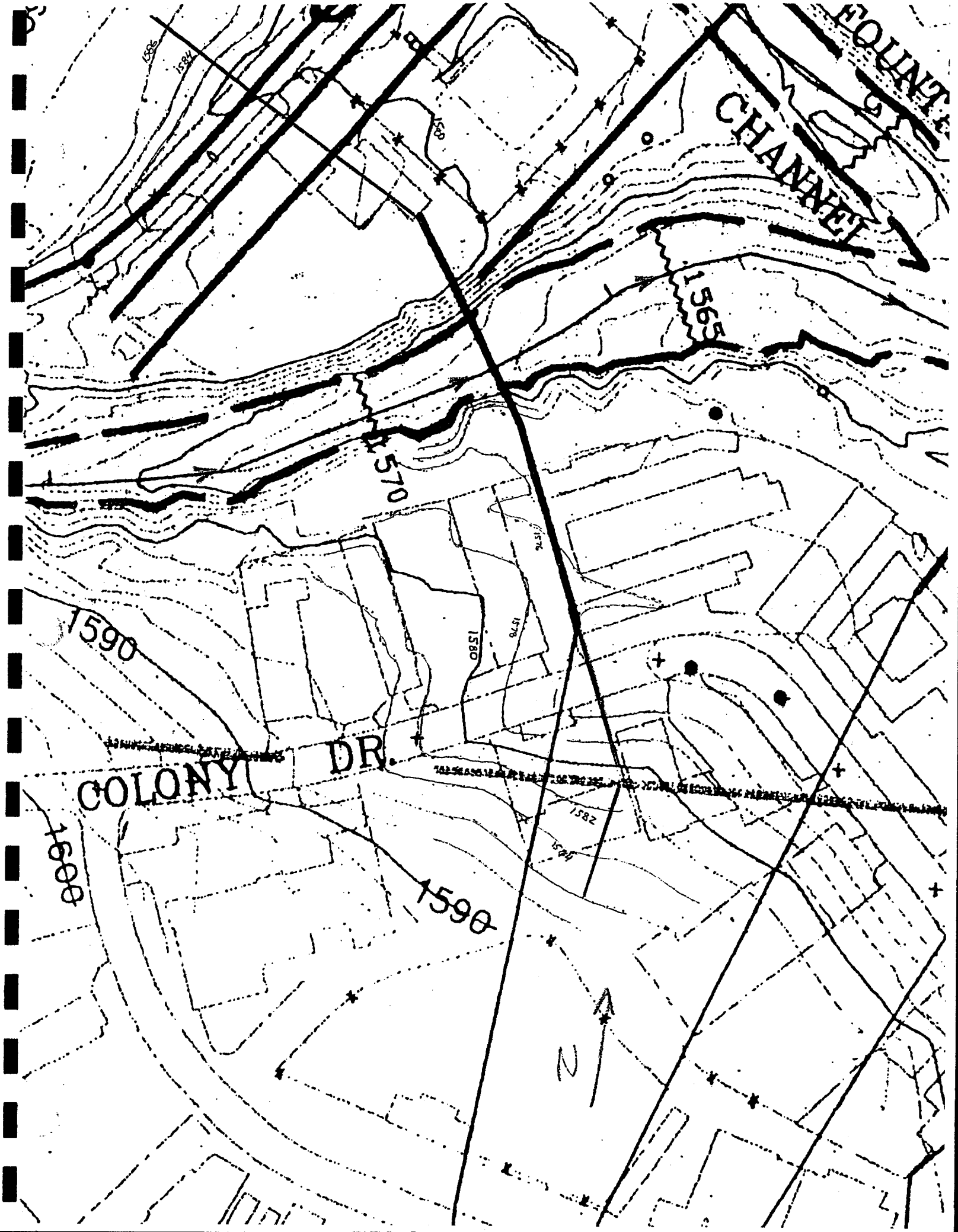
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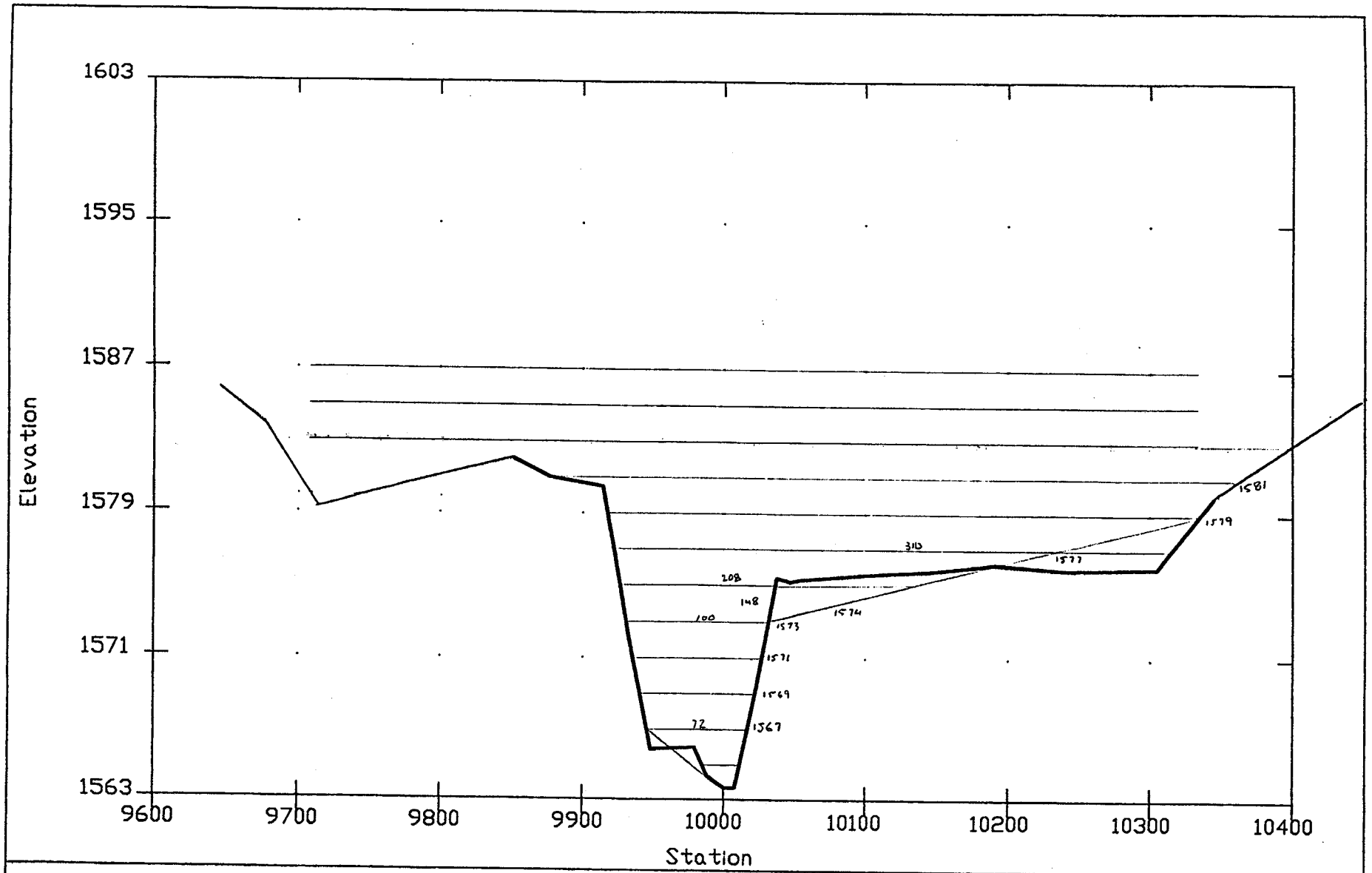

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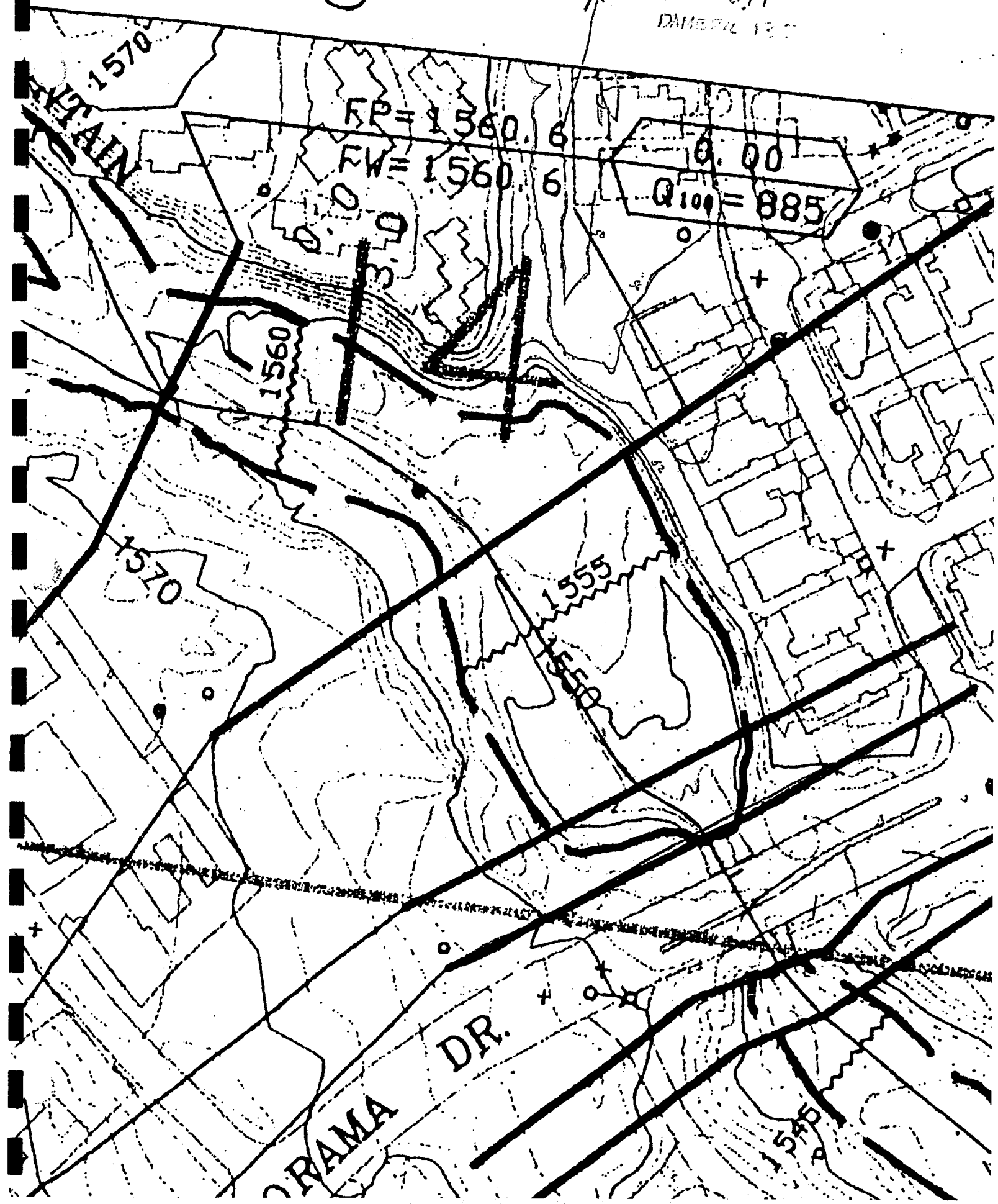

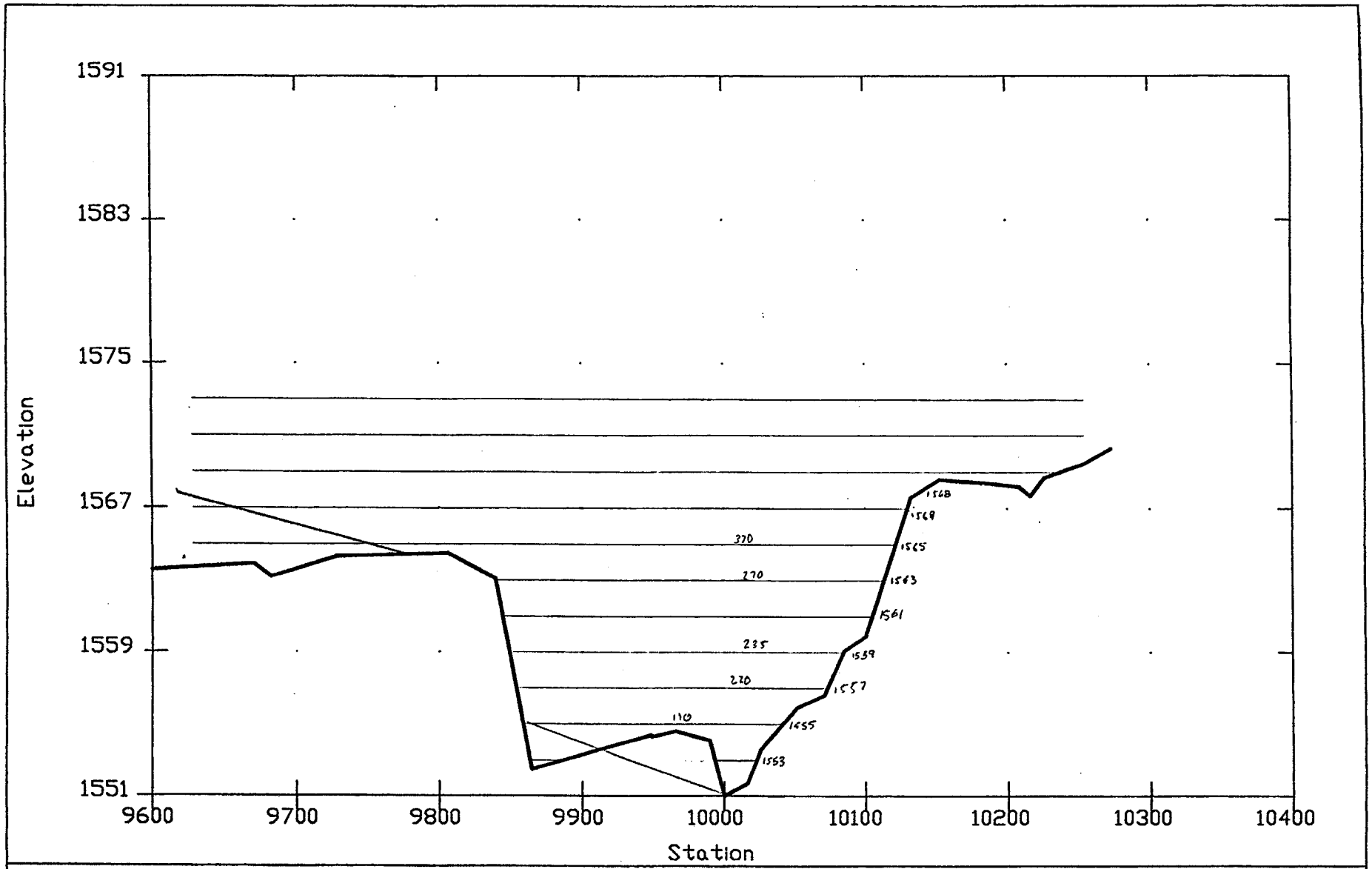

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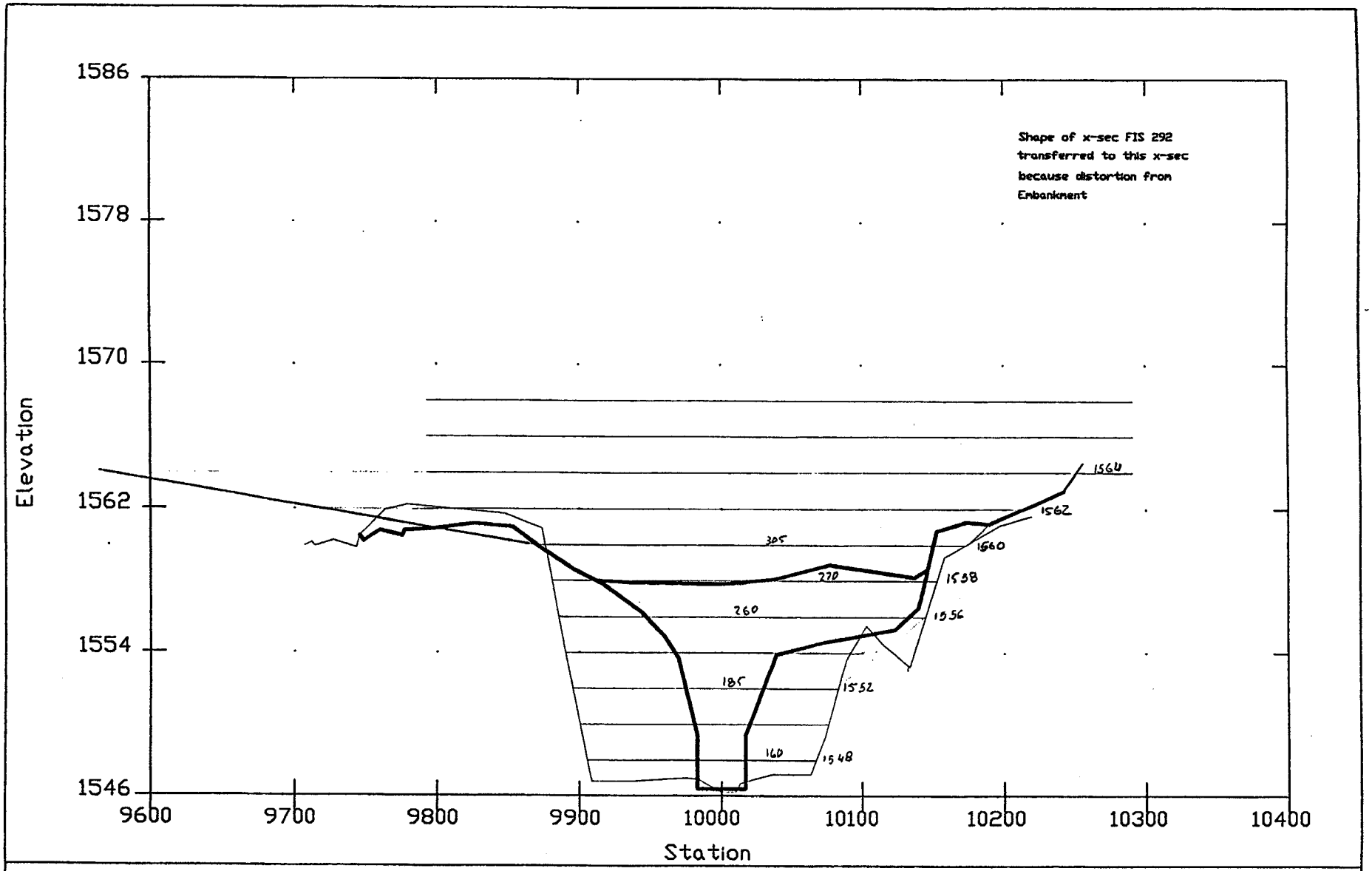

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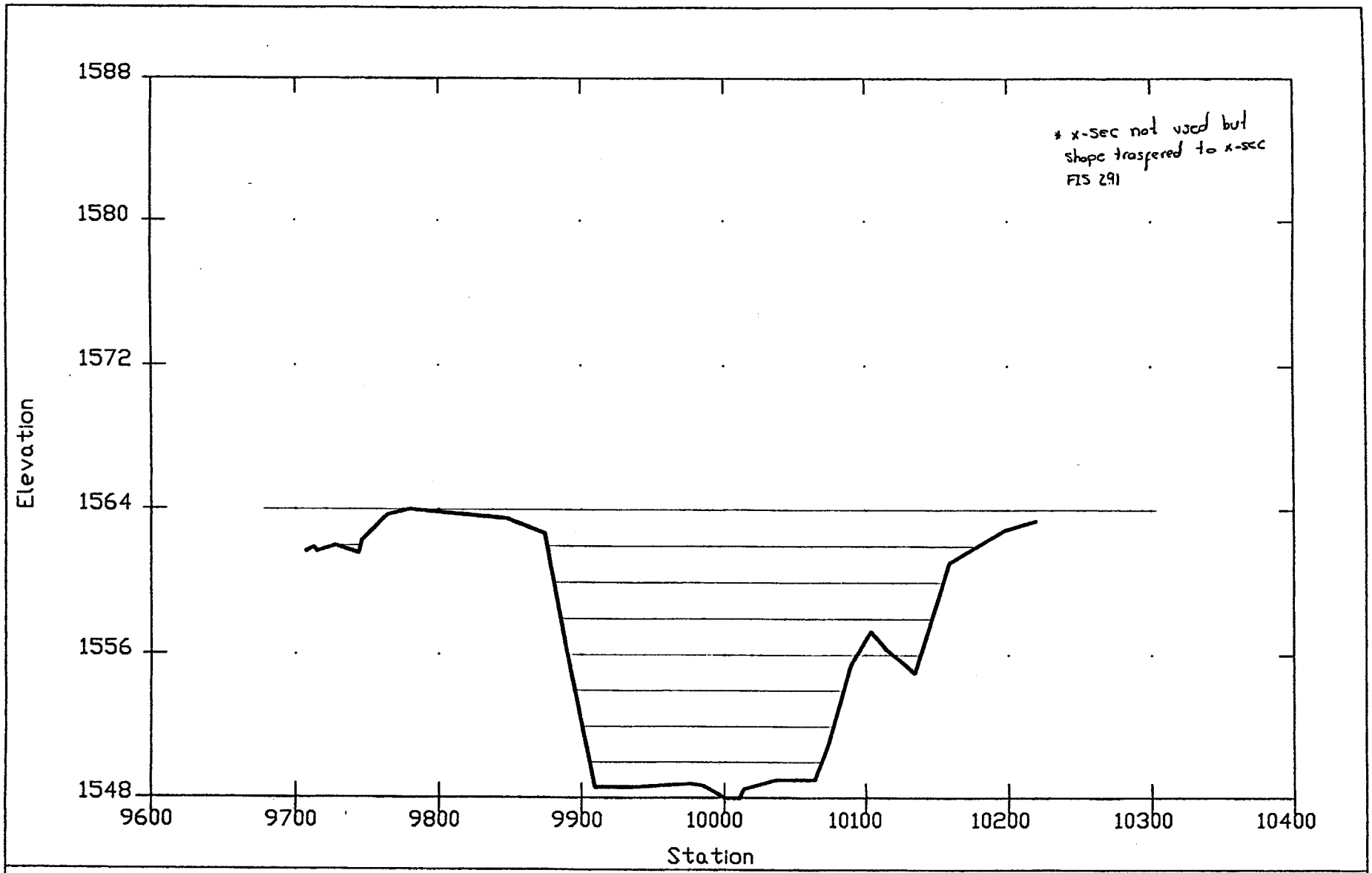

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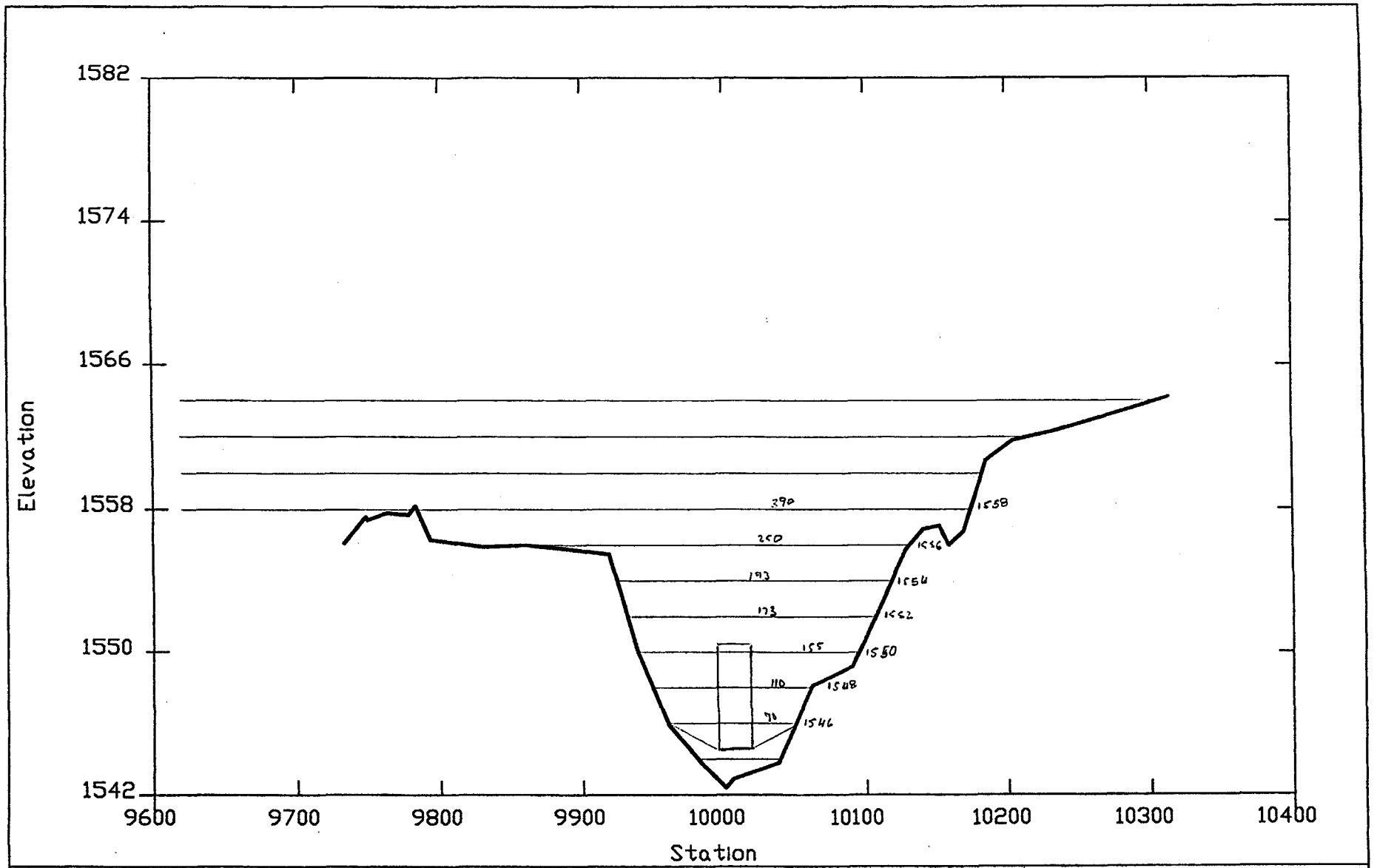

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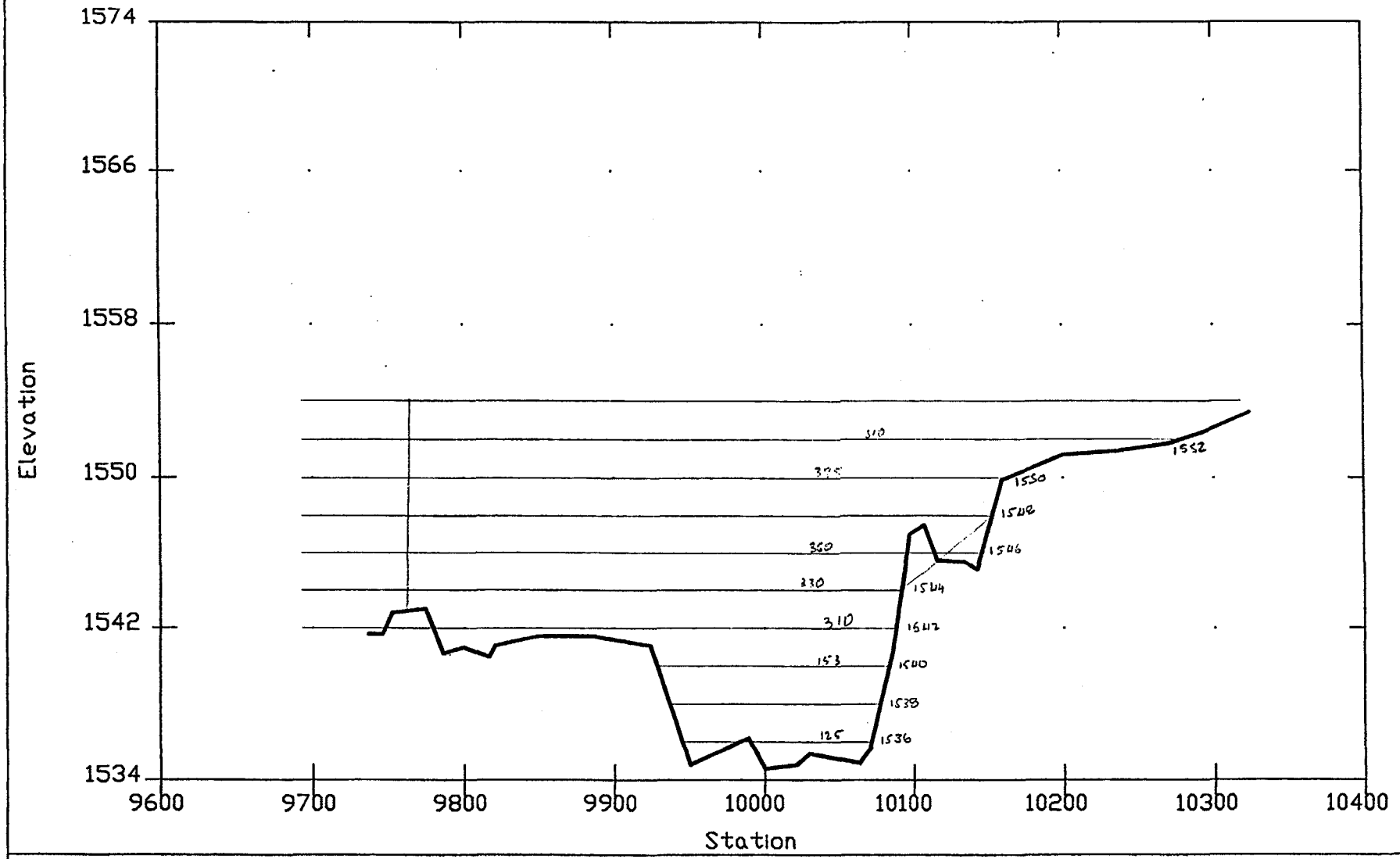

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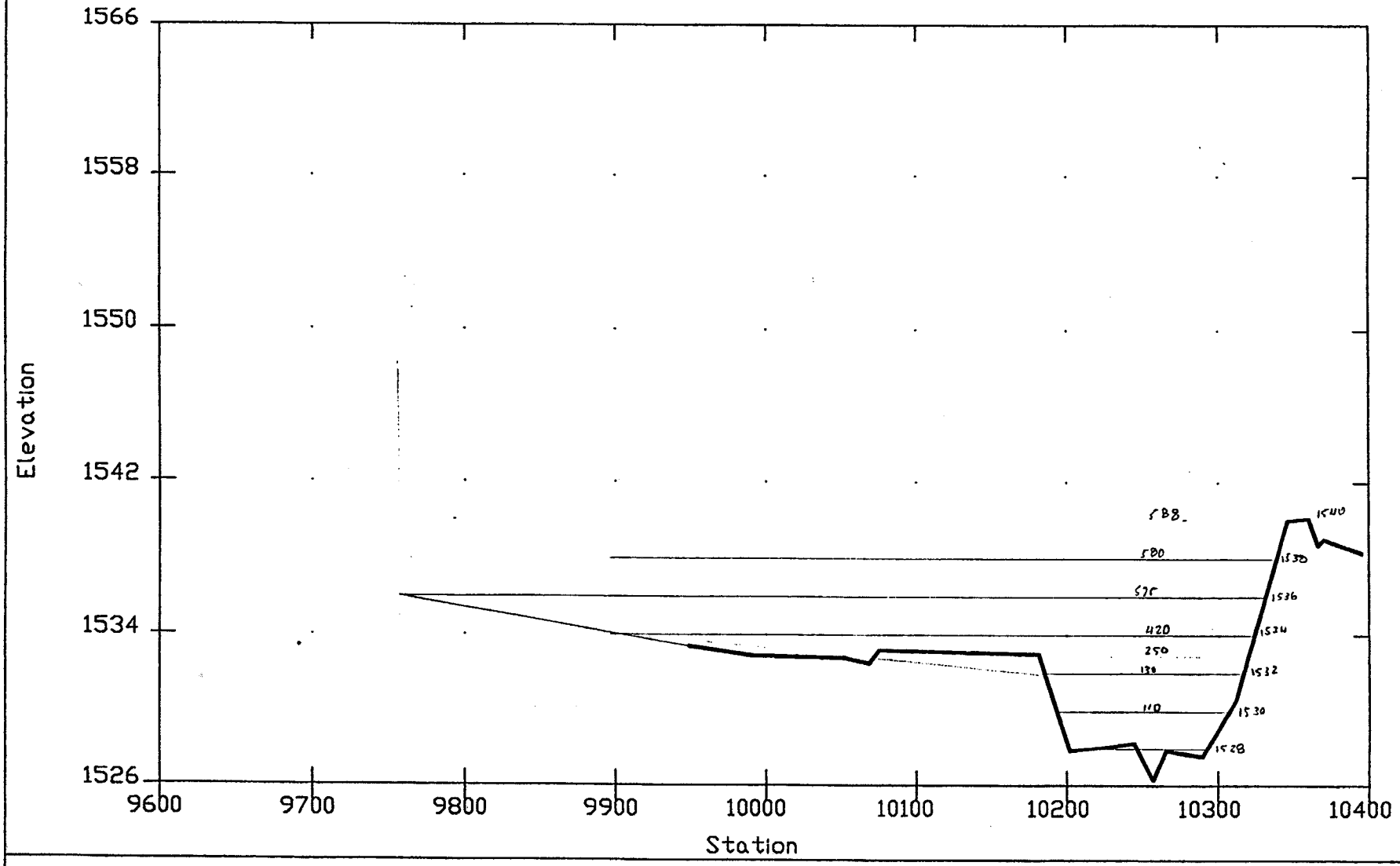

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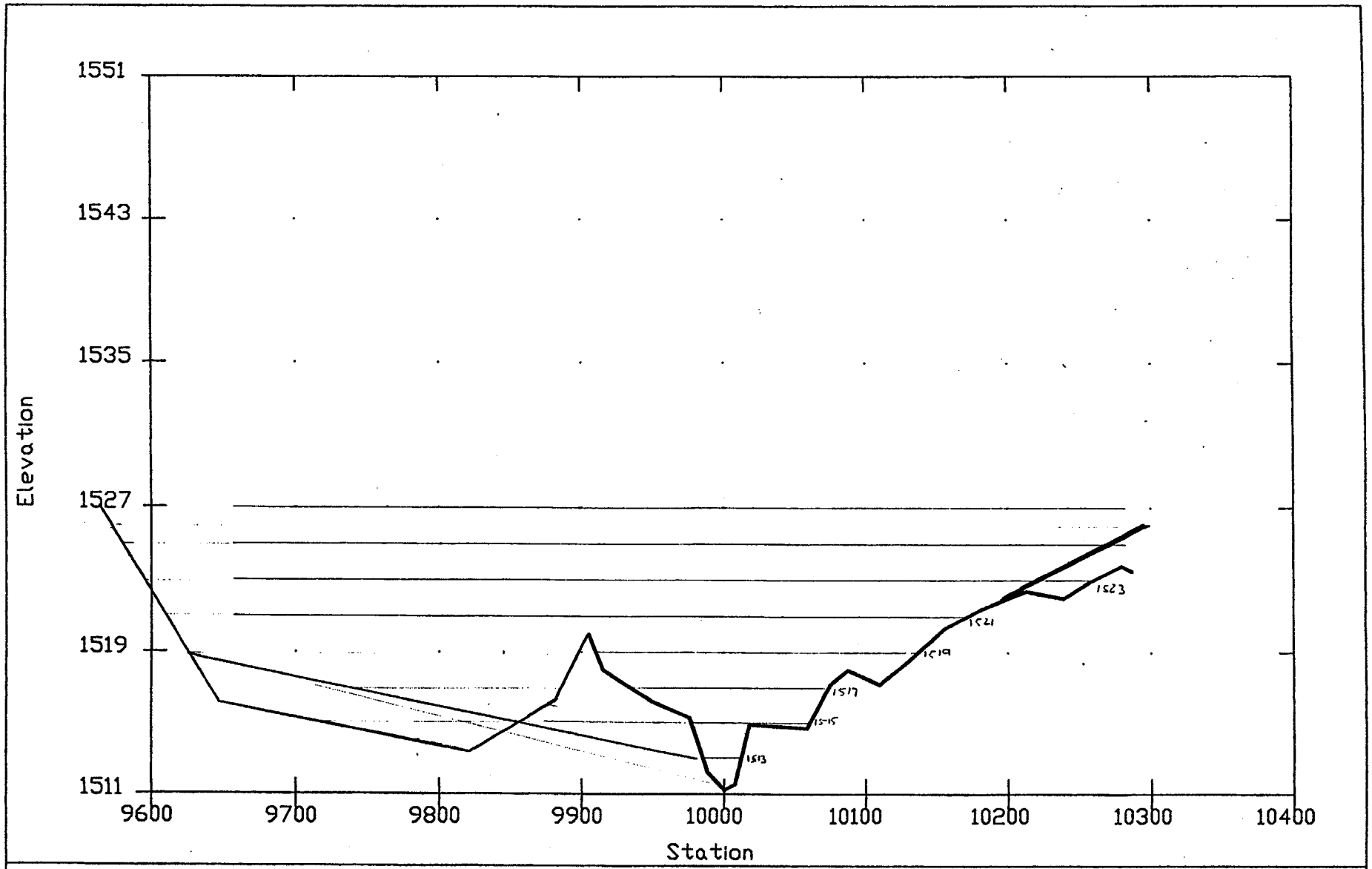

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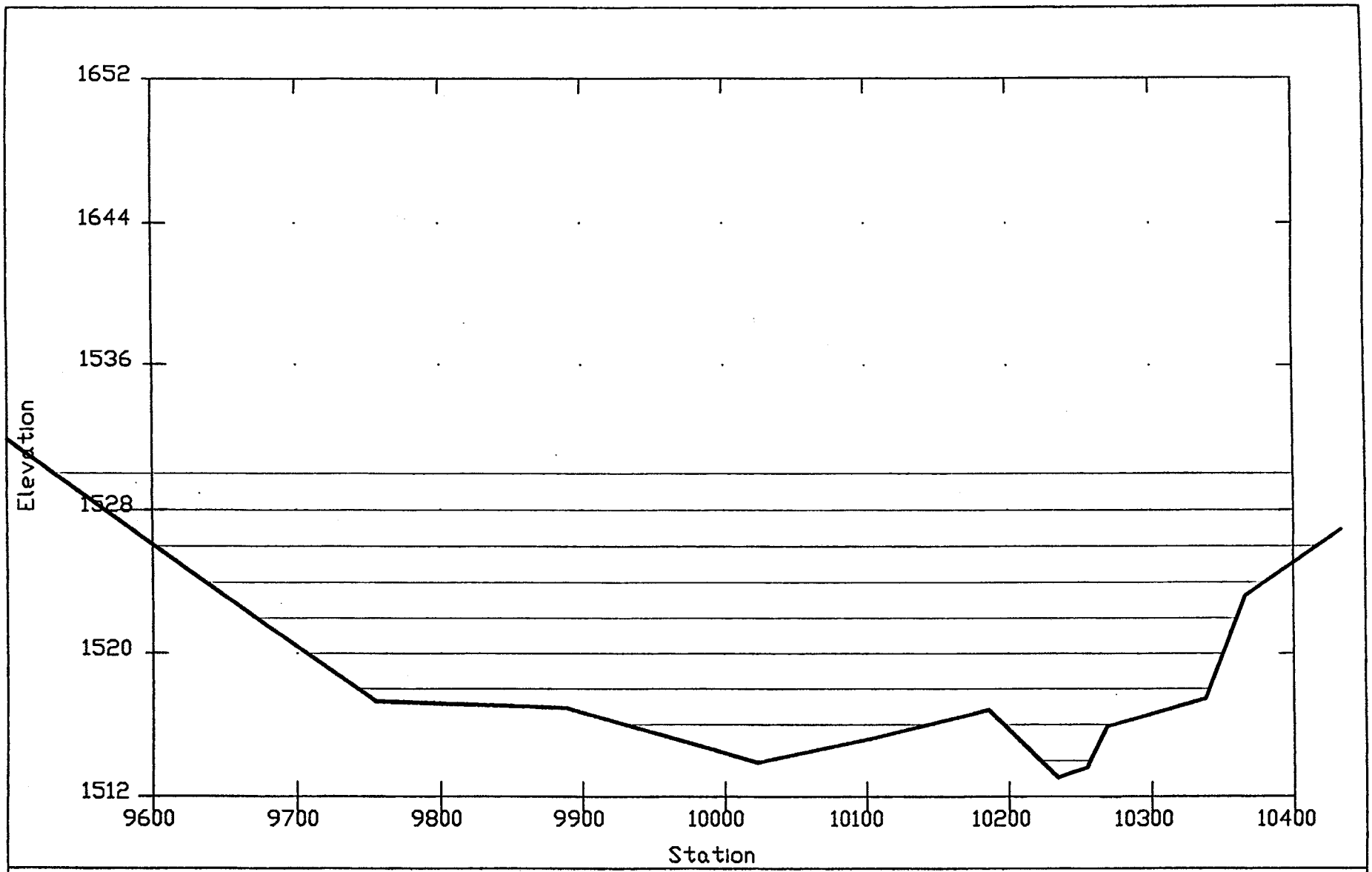

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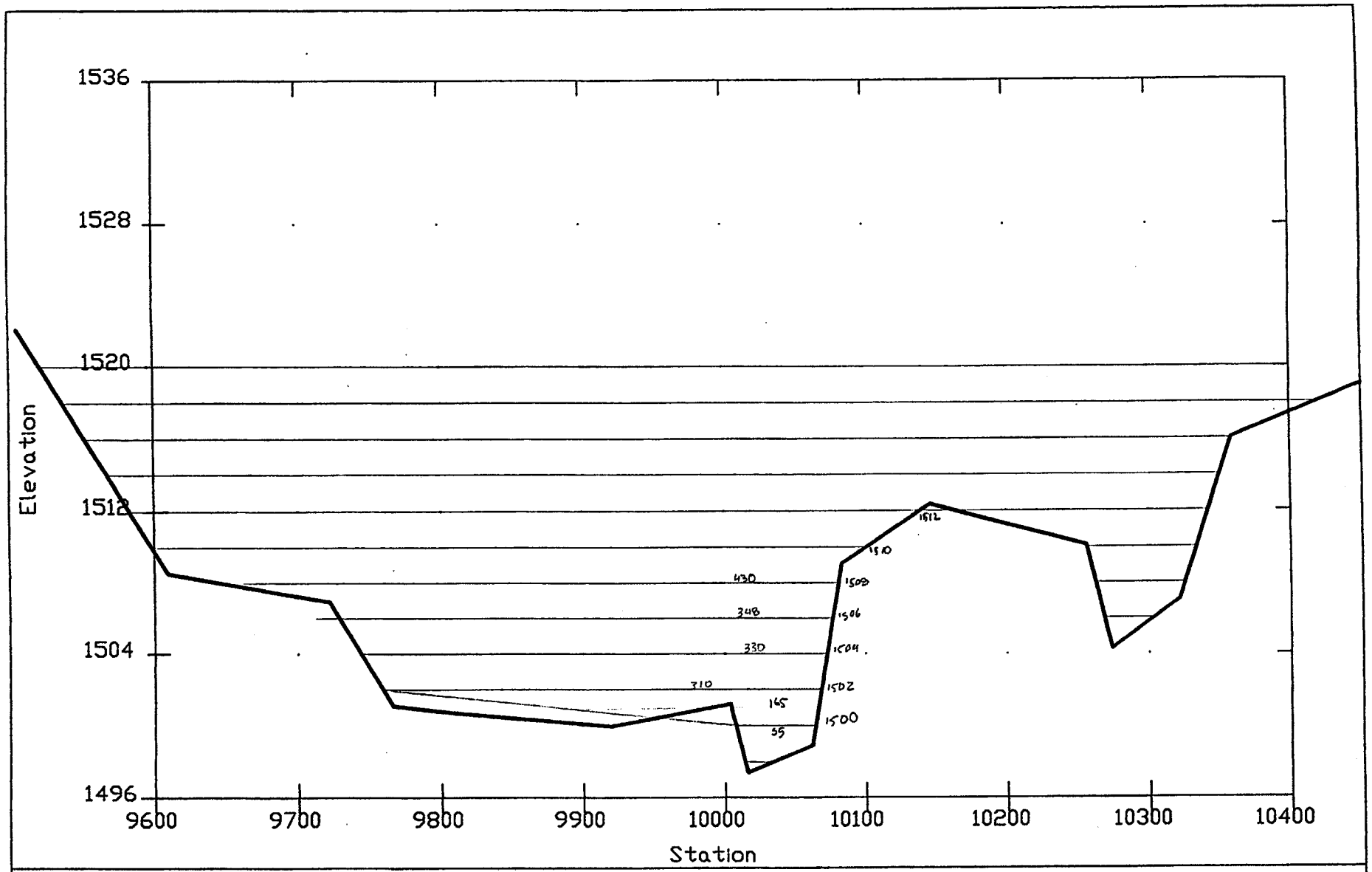
Dambreak Analysis



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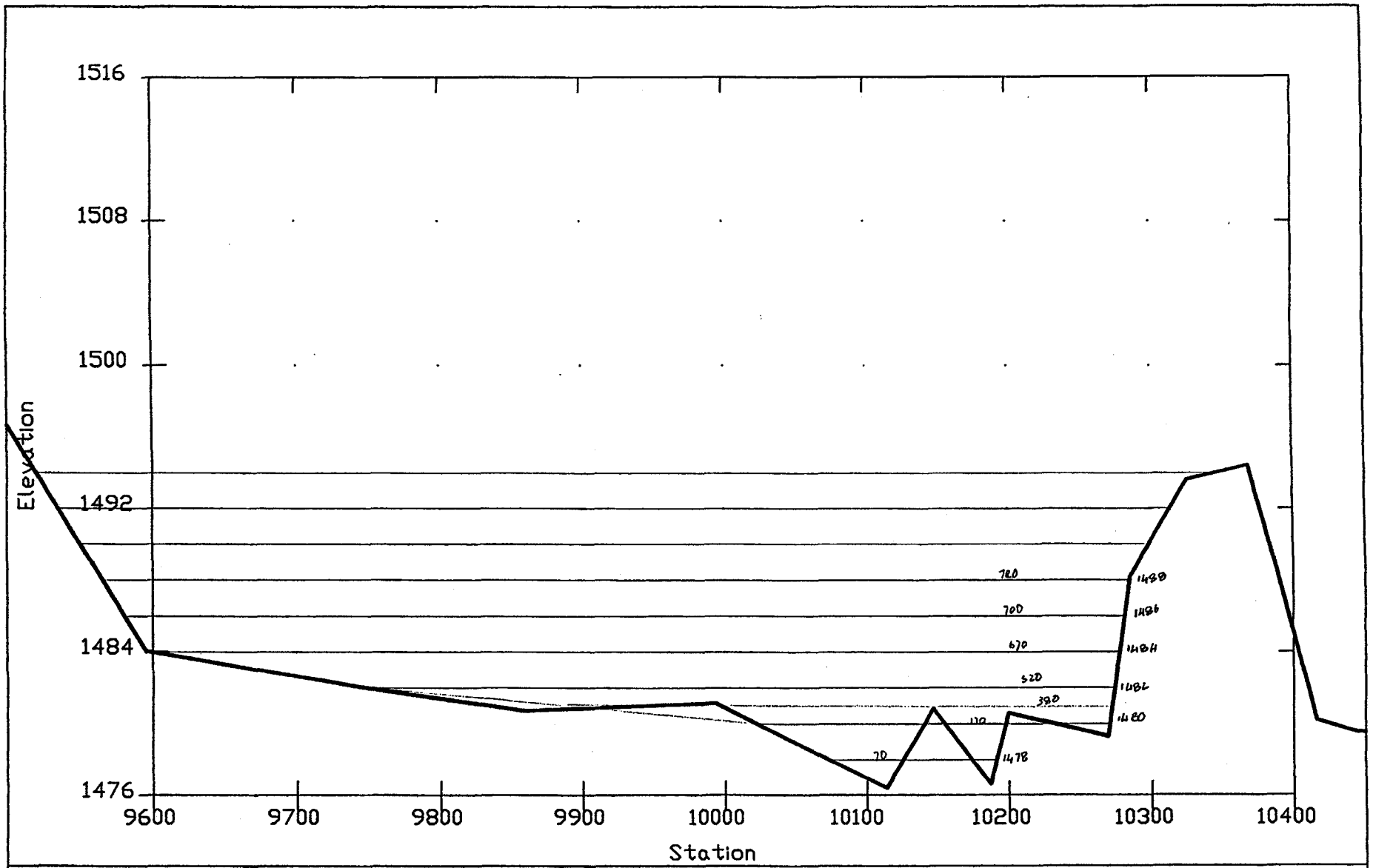

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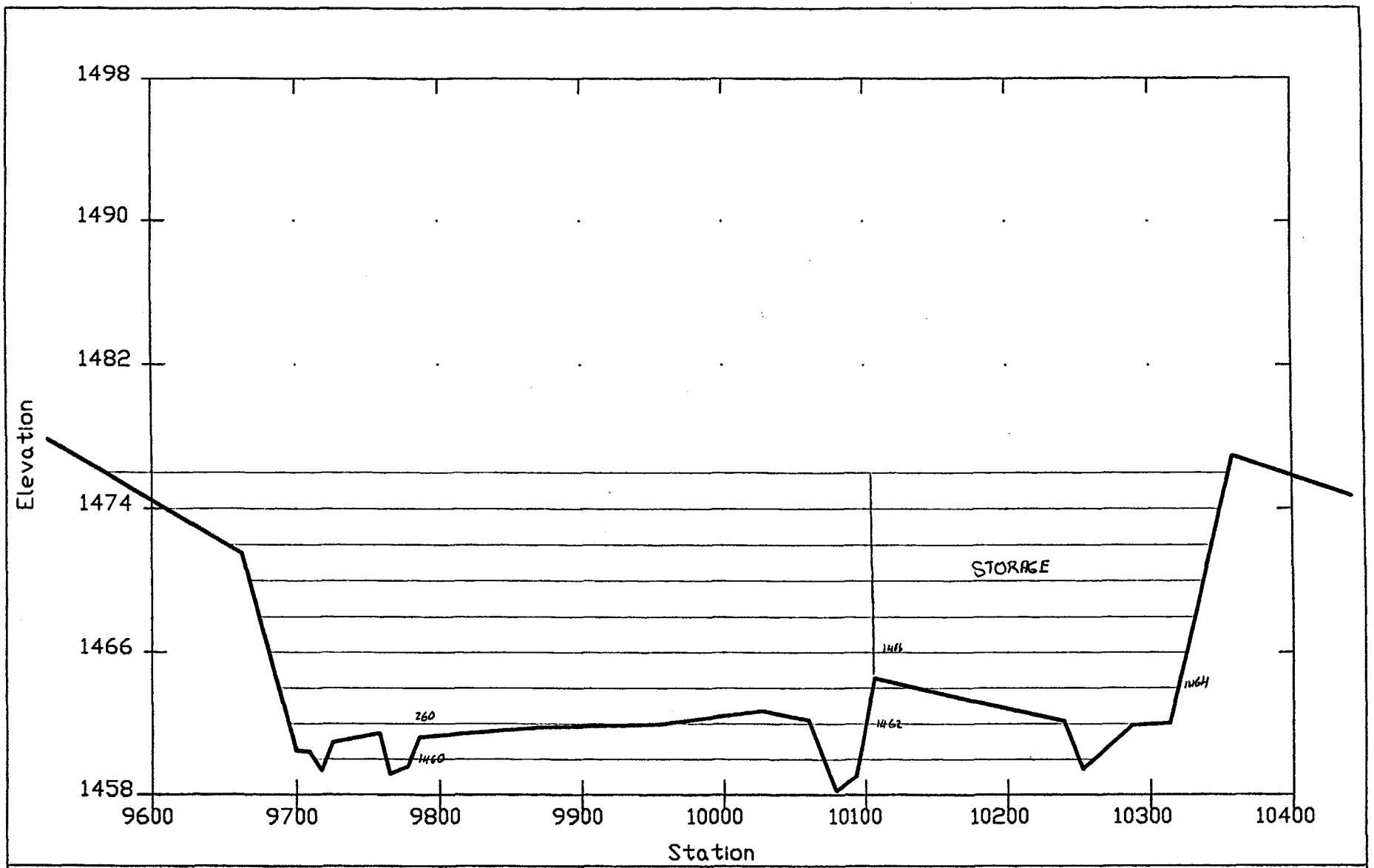

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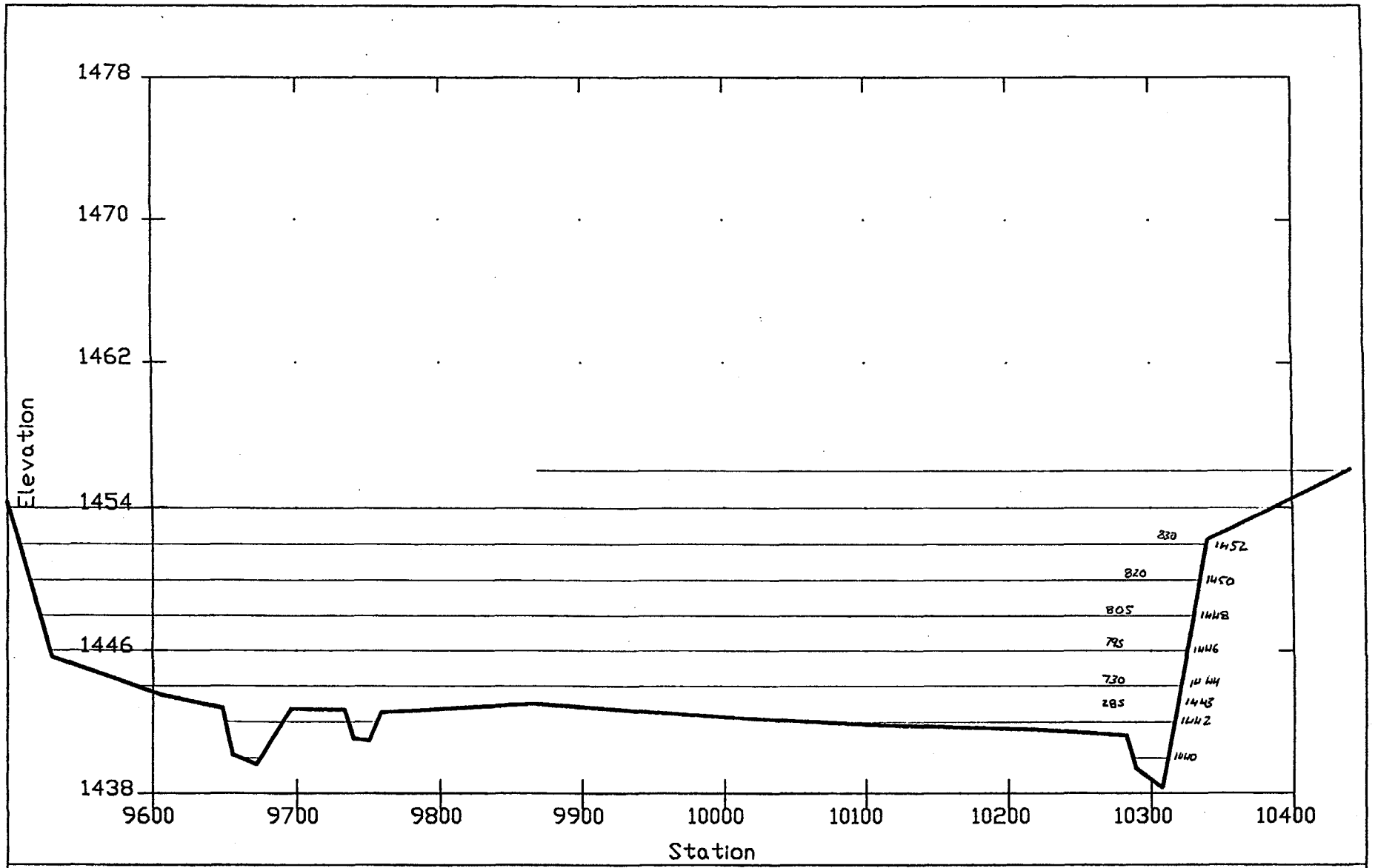

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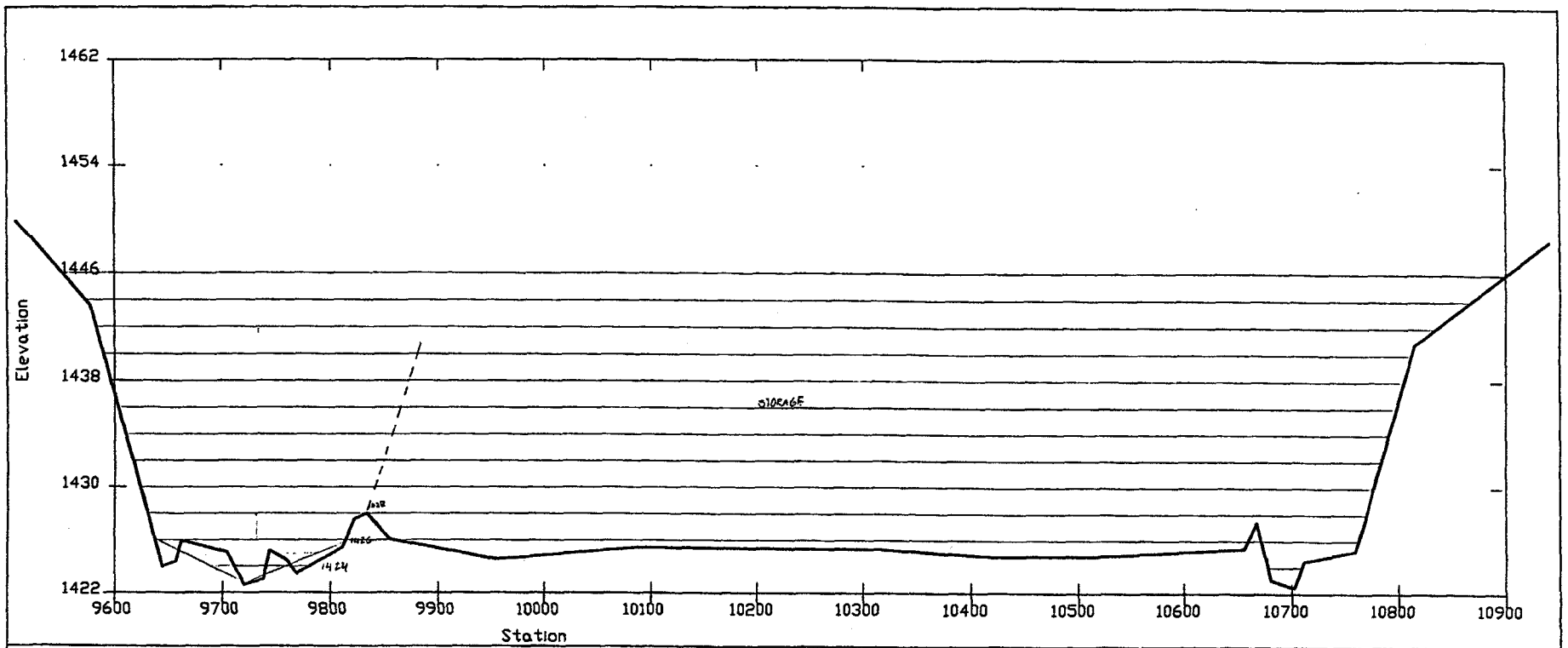

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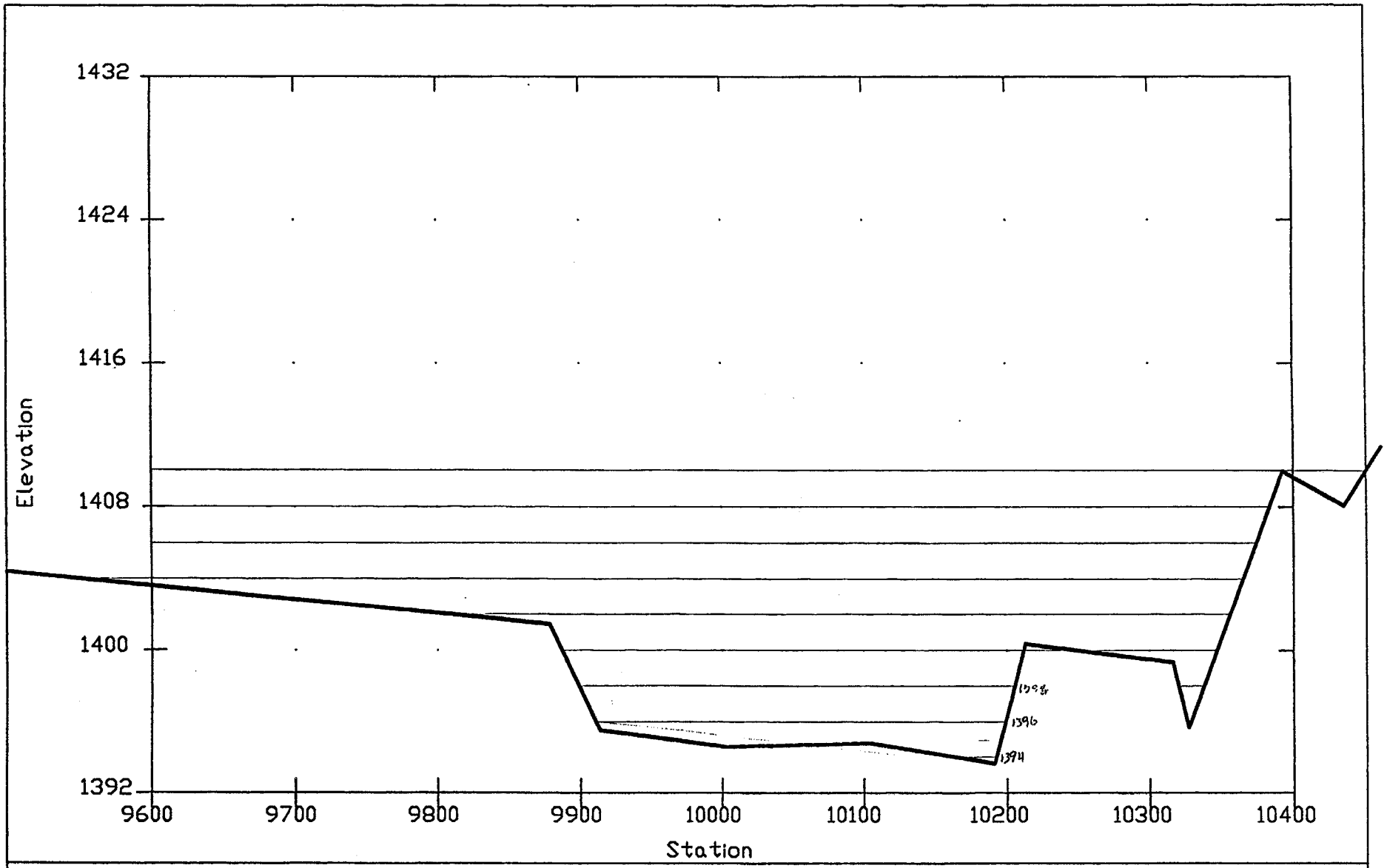

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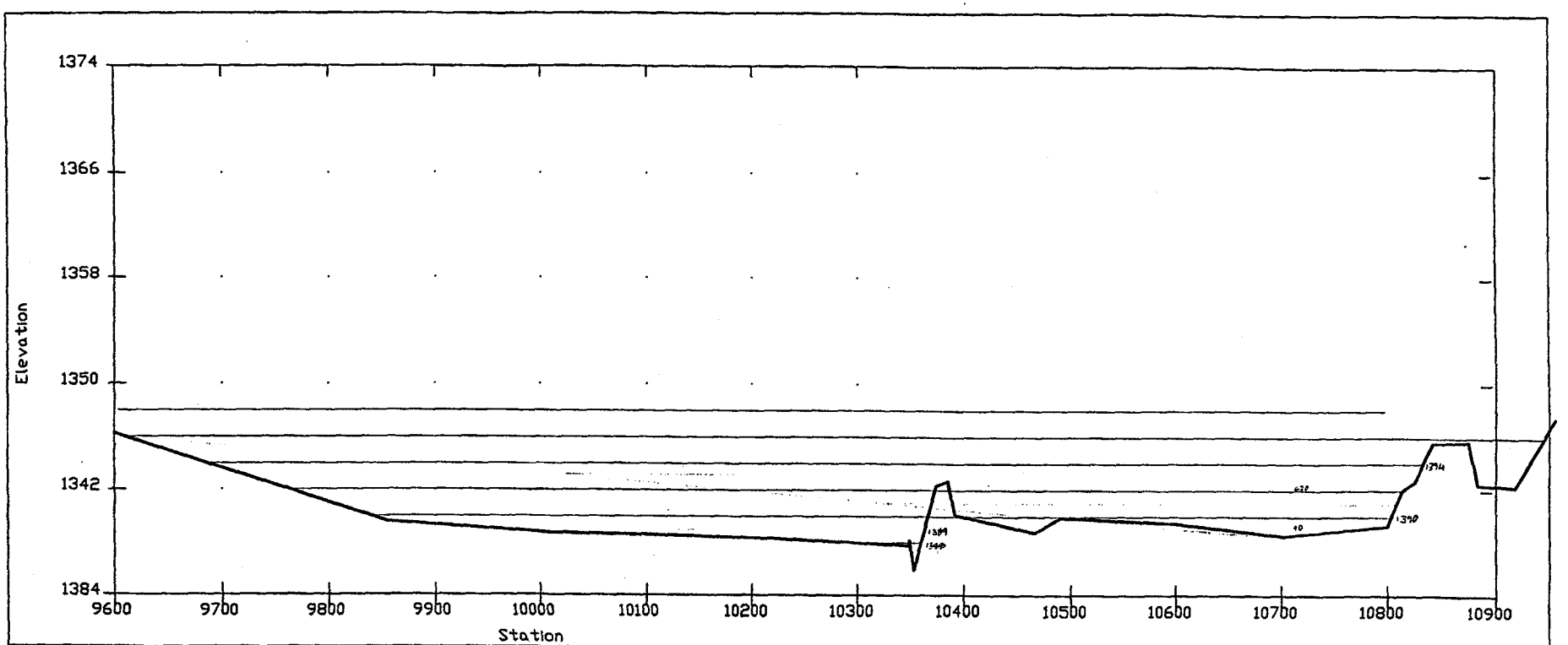

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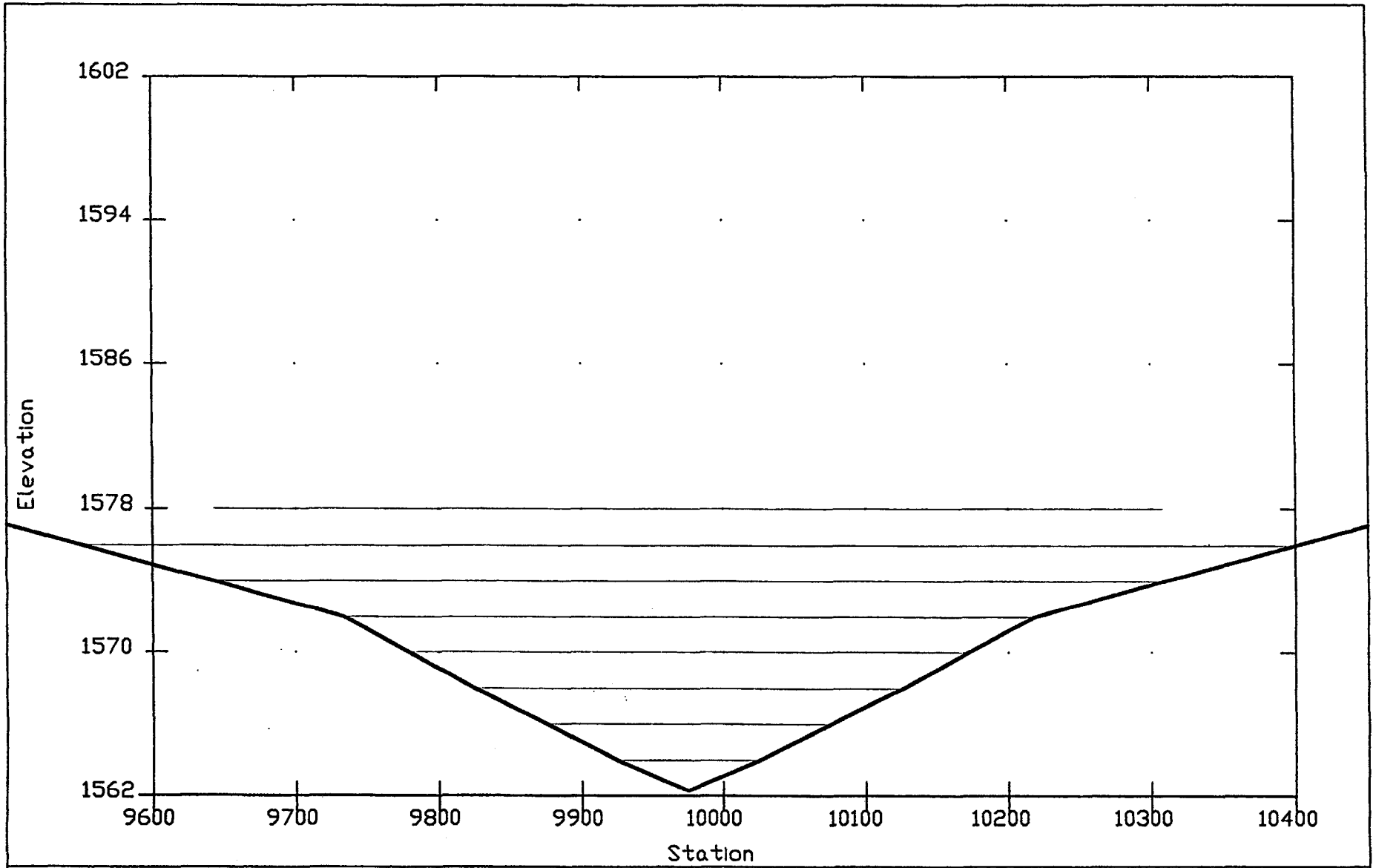

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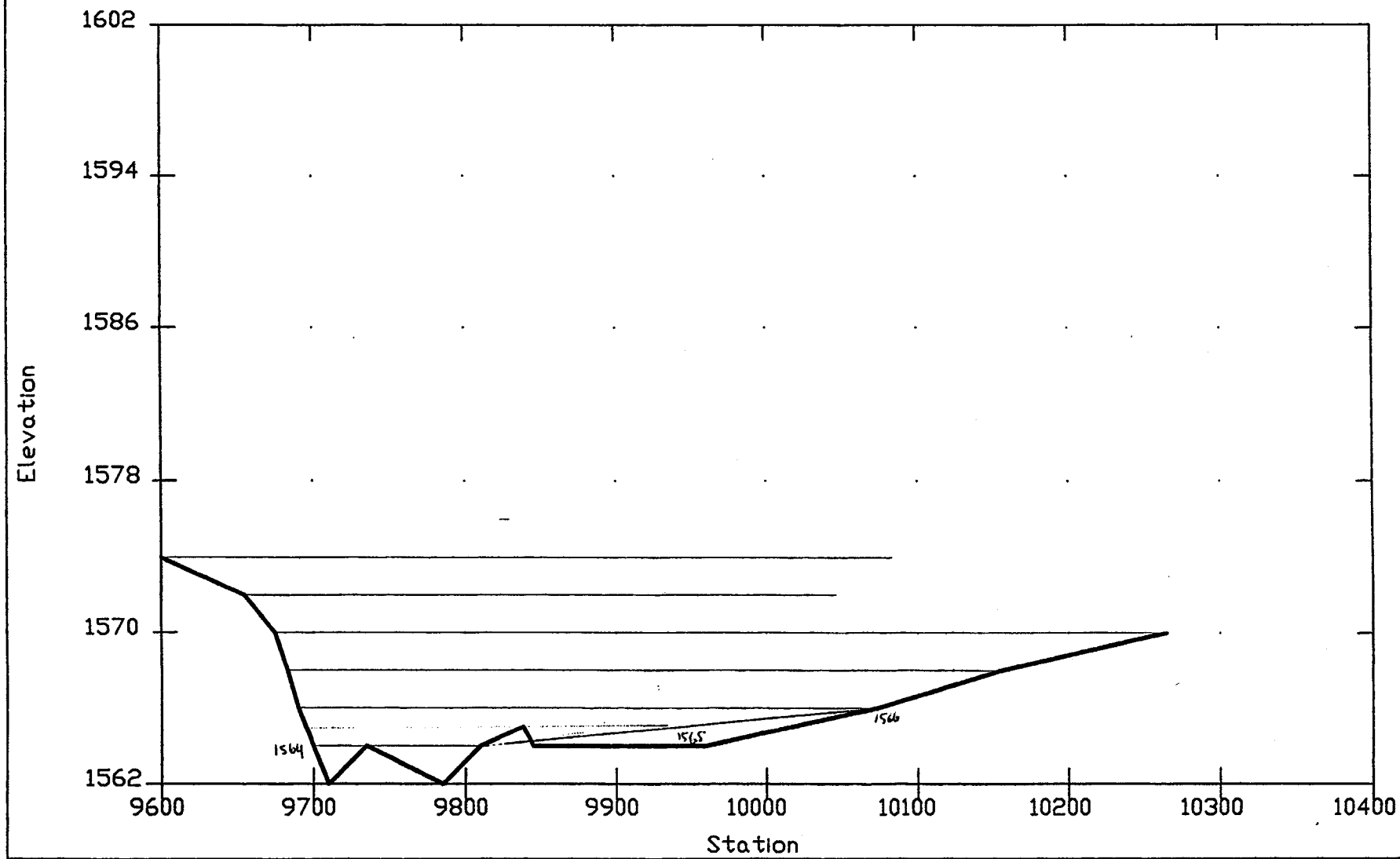

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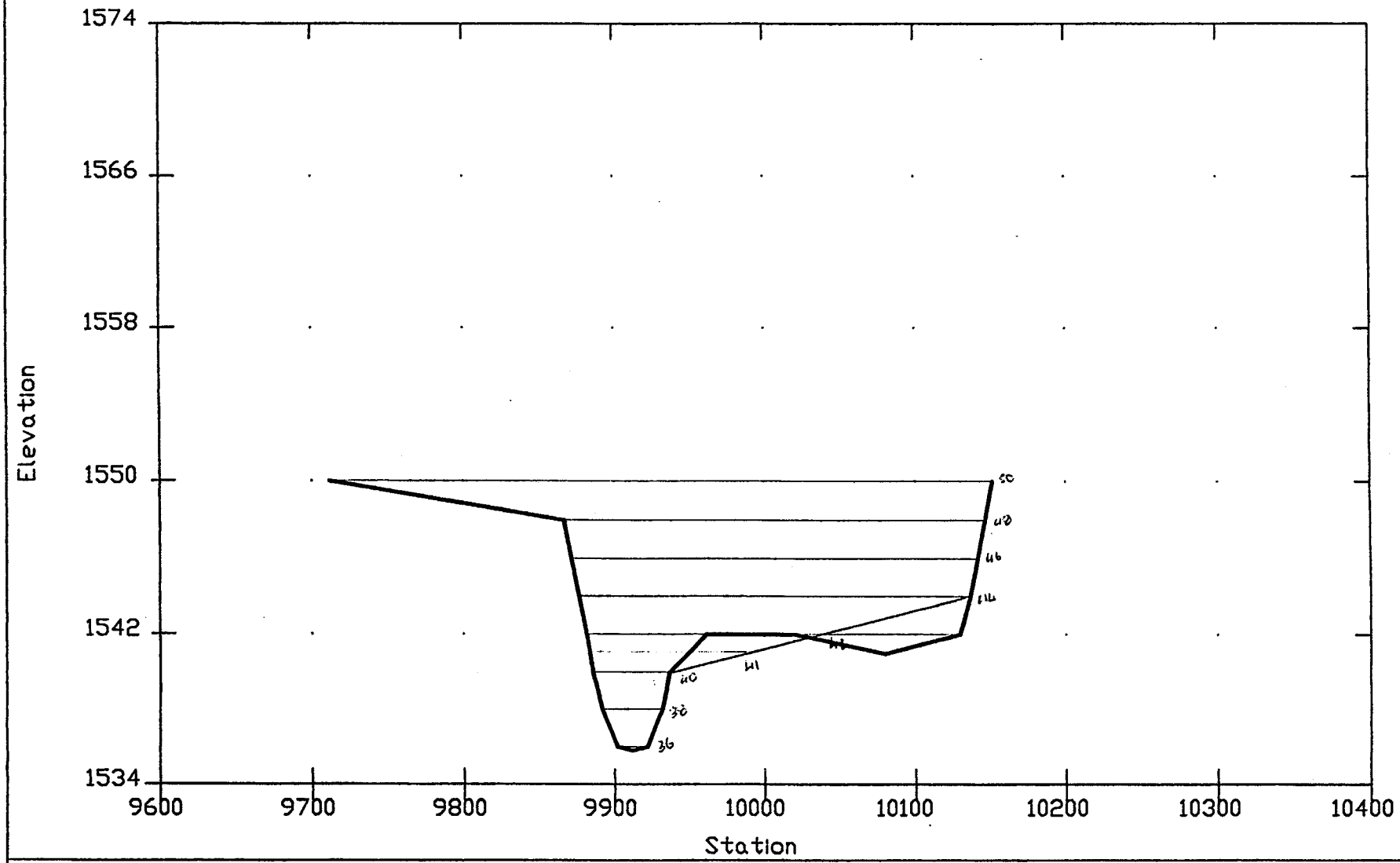

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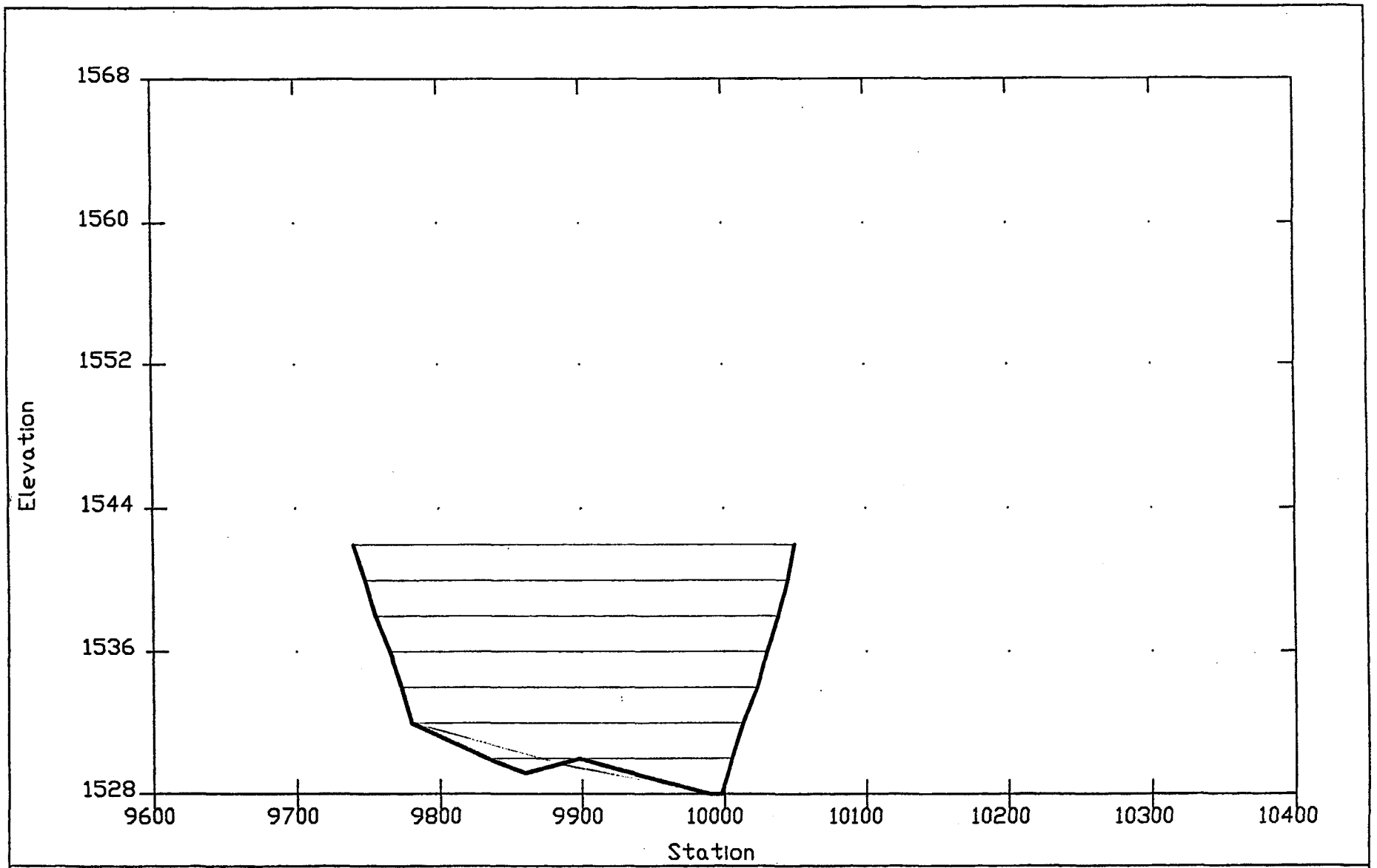

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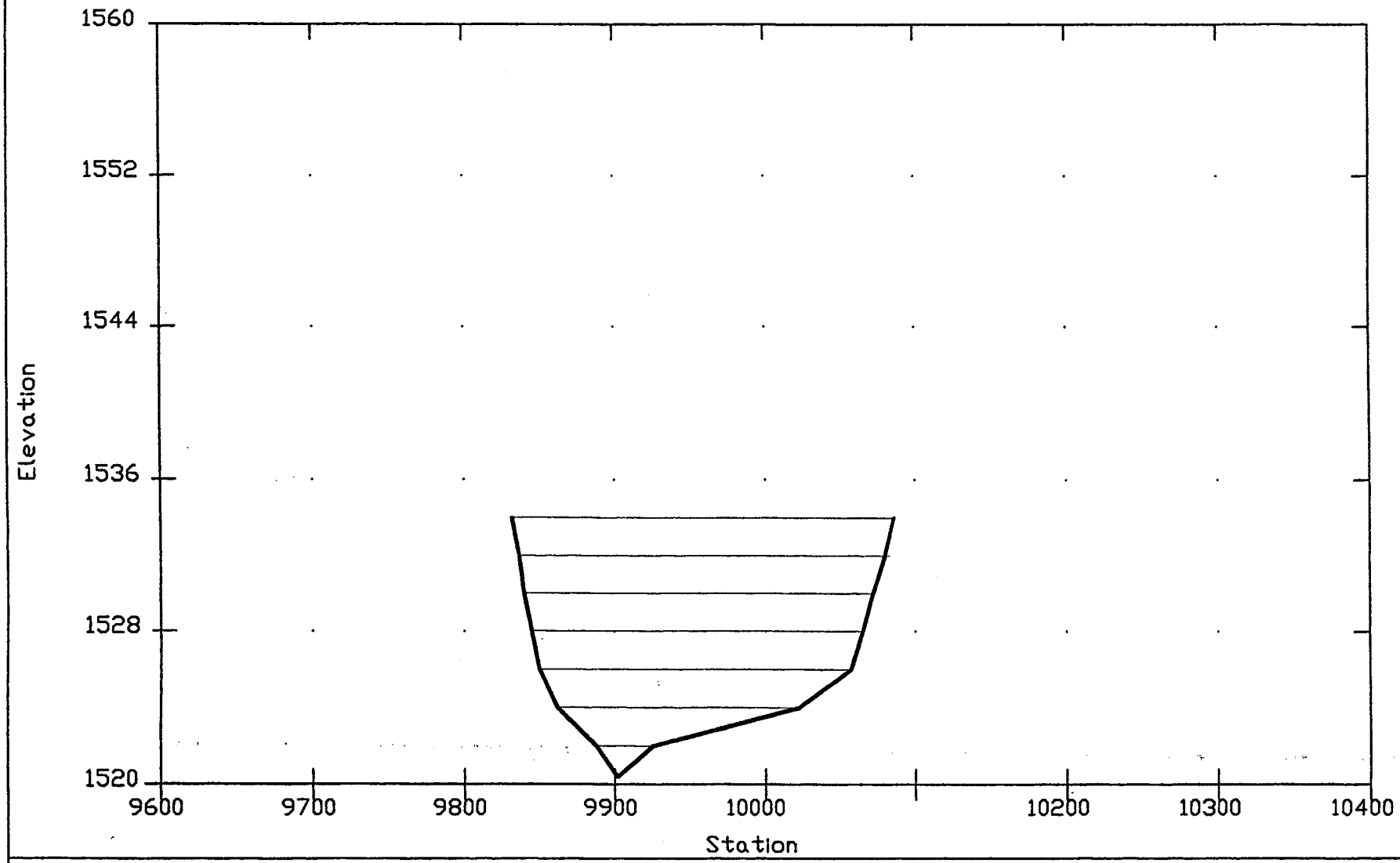

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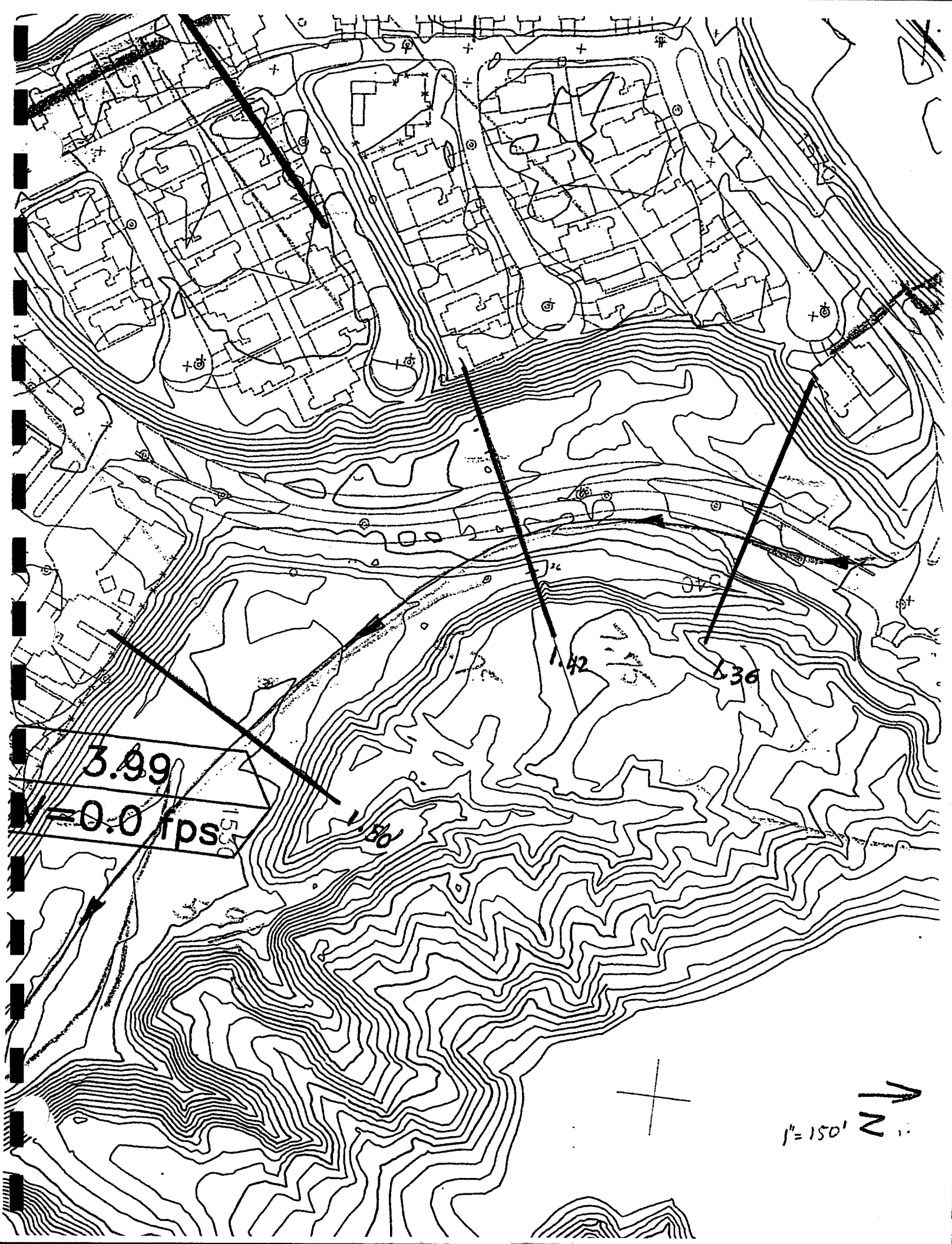
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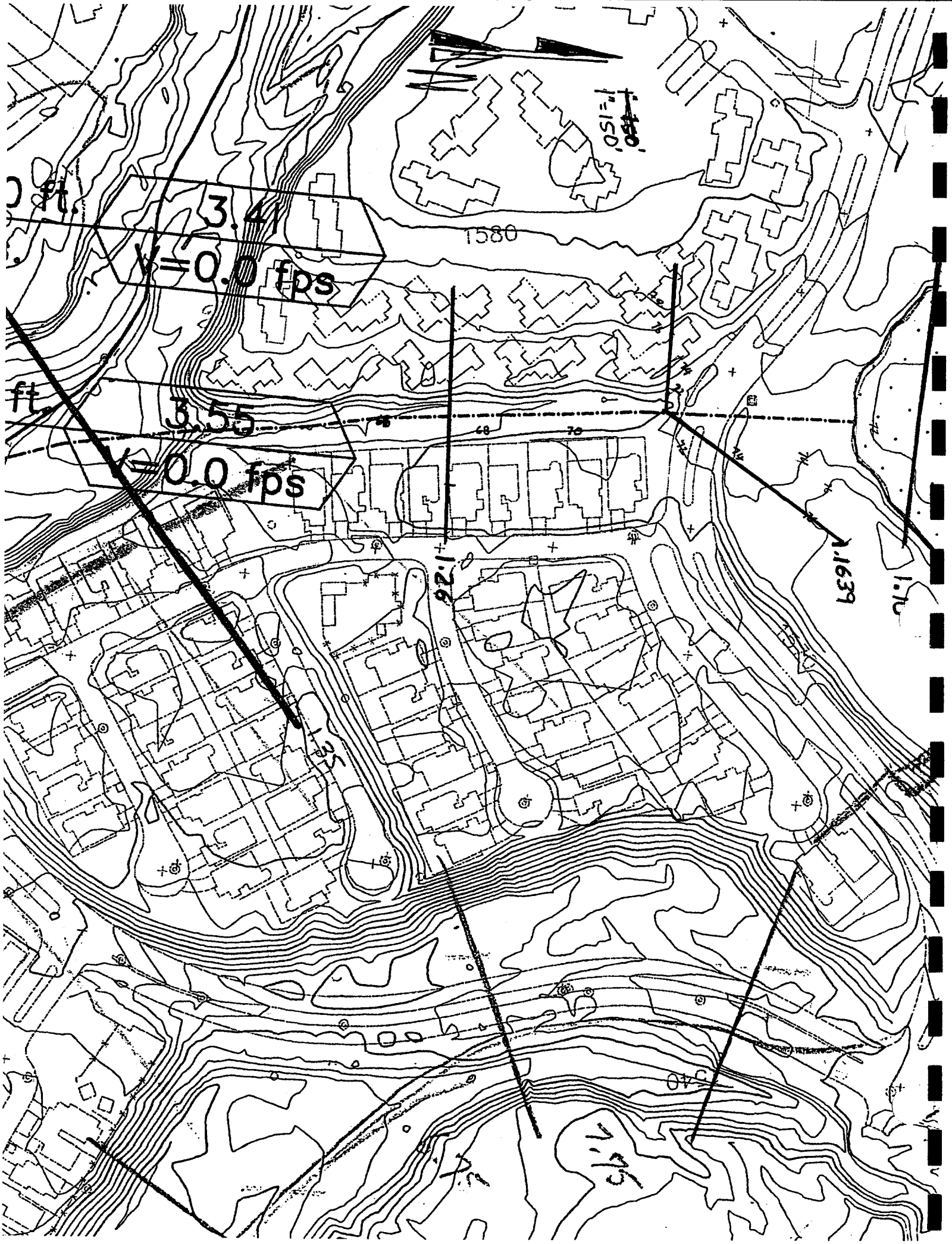
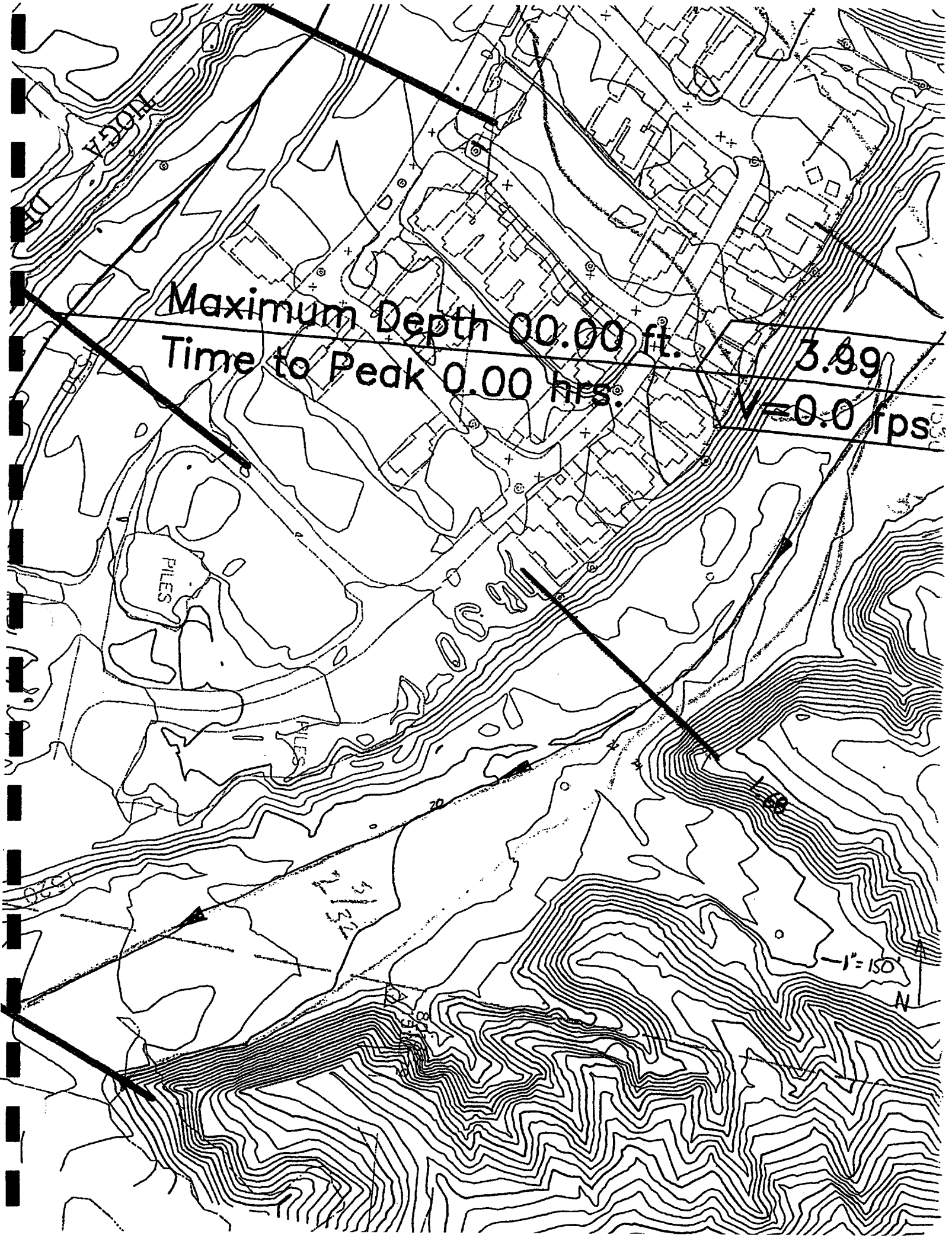
1.80
1.42
1.36
1"=150'
N


ft.
3.41
V=0.0 fps
1580
ft
3.55
V=0.0 fps
68
70
1639
1.26
1.16
1.50
1.50
540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Time to Peak 0.00 hrs.
3.99
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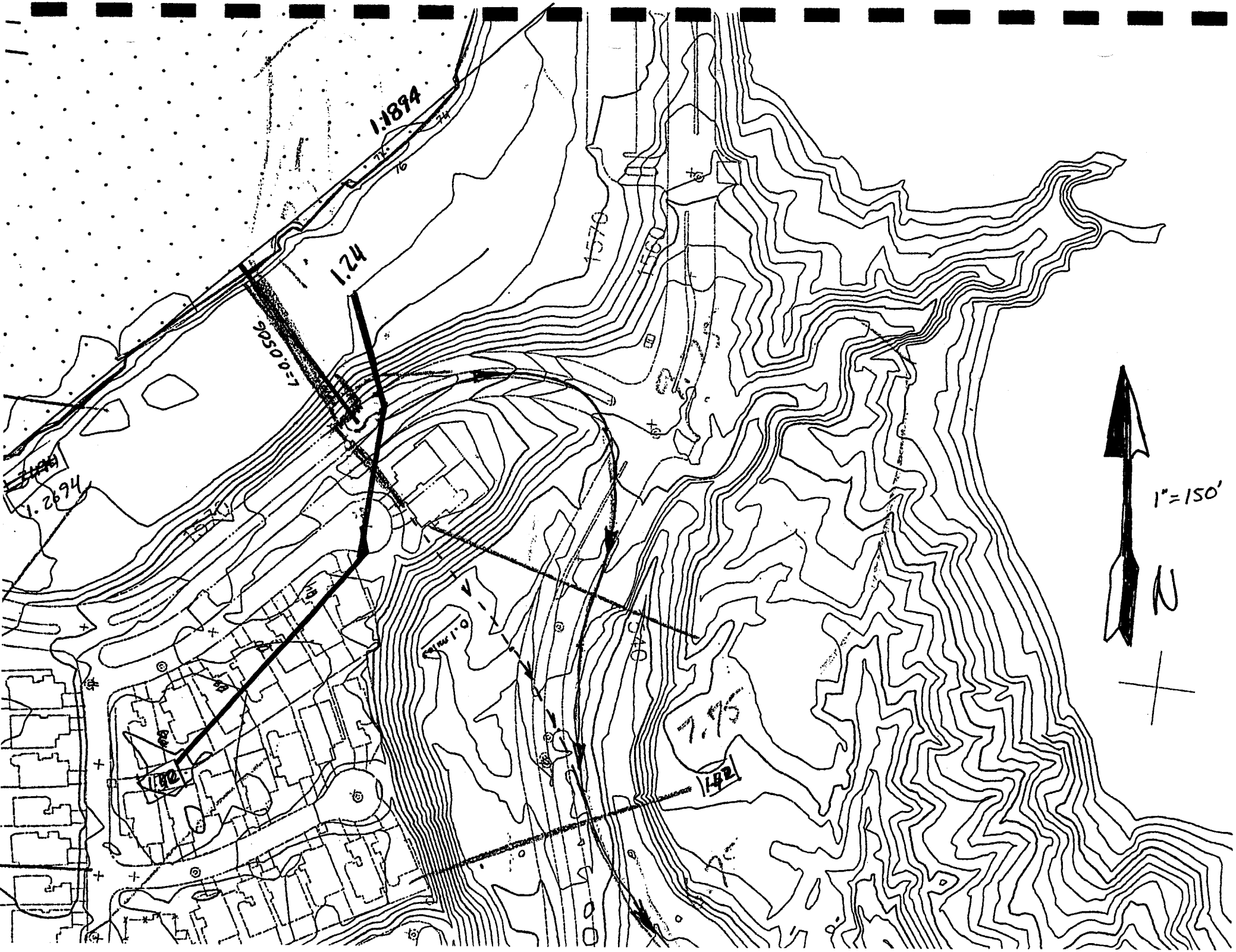
N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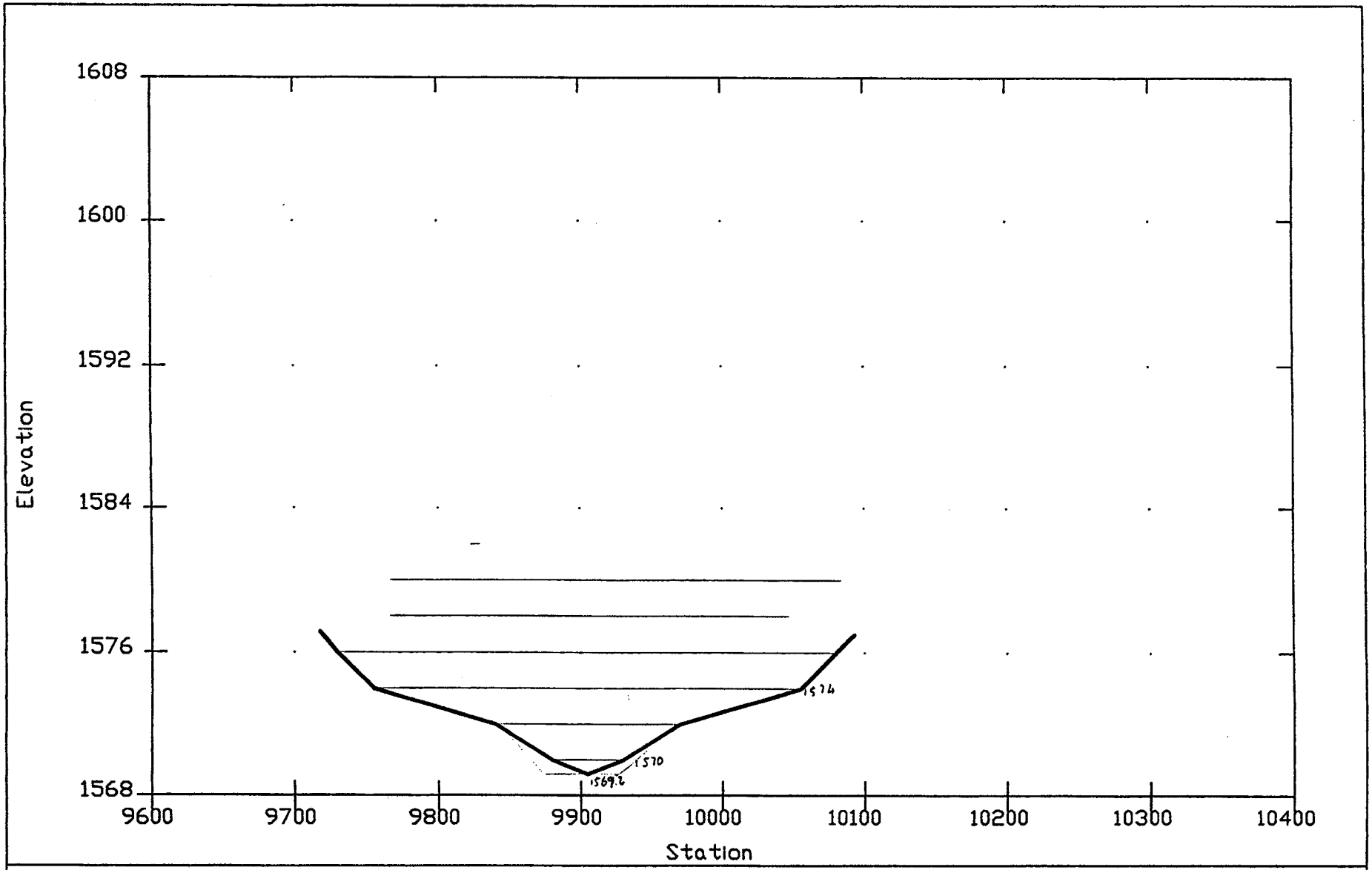
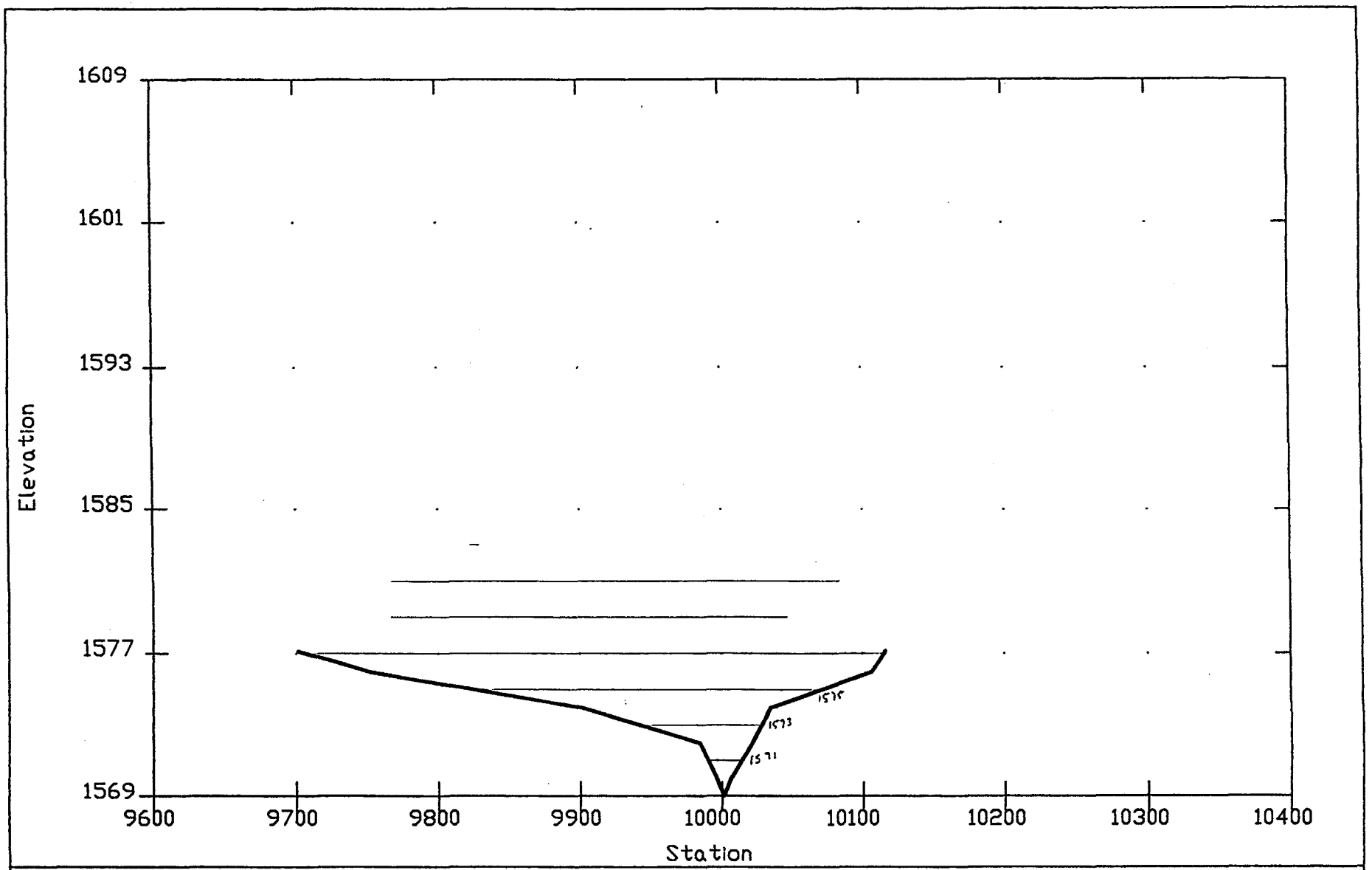
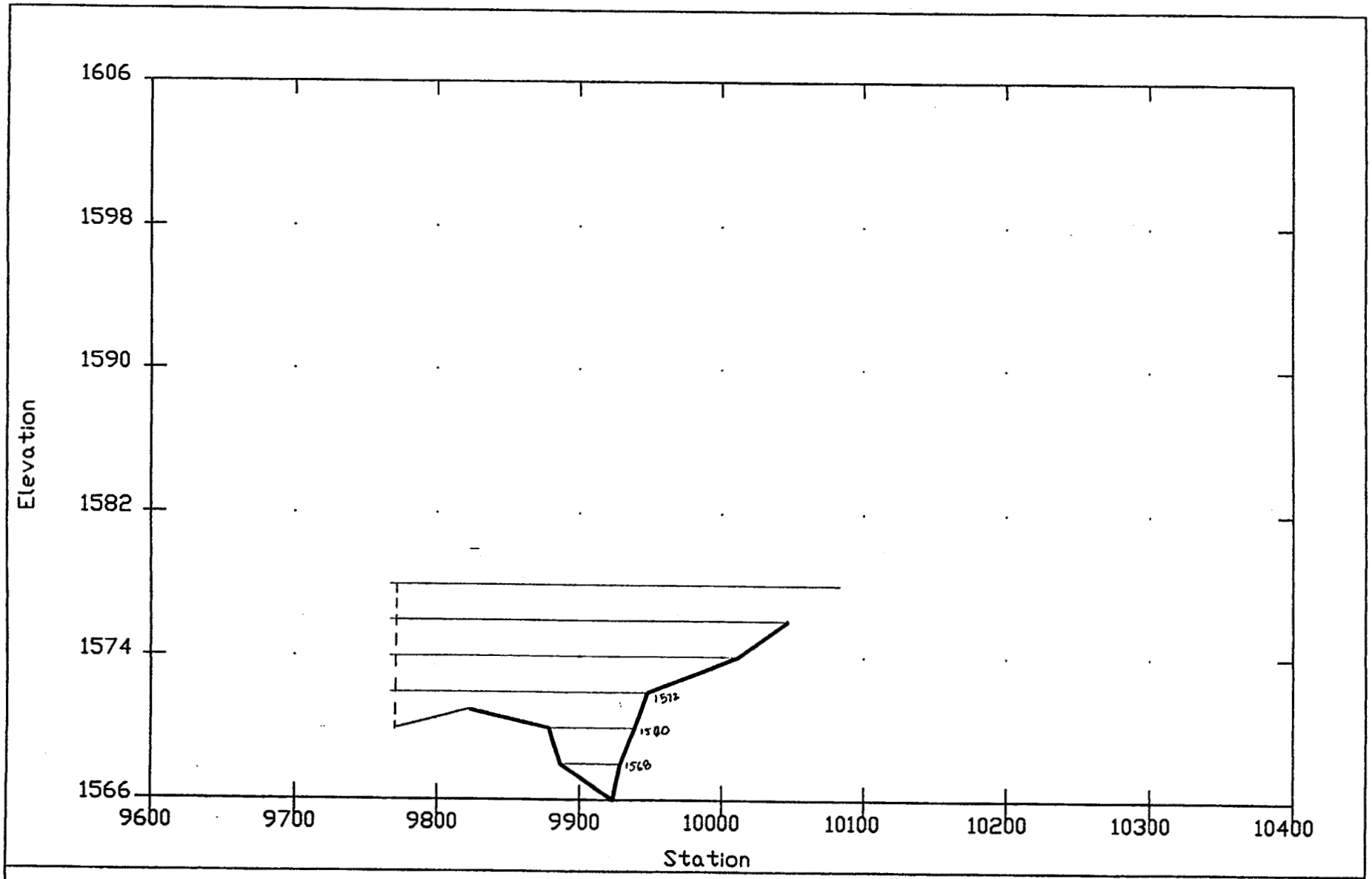


DAMBRK SECTION : 1-1.10
Dambreak Analysis



DAMBRK SECTION : 1-1.1639
Dambreak Analysis



DAMBRK SECTION : 1-1.26
Dambreak Analysis
Cereus wash

ACK ENGINEERS, INC.
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SHEET _____ OF 0

BY HAA DATE 13-Feb-96

CLIENT: Anderson-Nelson, Inc. CHECK _____ DATE _____

JOB: Structure #19. Culvert rating table (FOUNTAIN HILLS BLV JOB NO. 465.14

Location = Fountain Hills Blvd. Two 60" CMP, one with Sewer line in Bottom 1'
Pipe size (d) = 60 in
Number of pipes (N) = 2
Type of Pipe = RPC
Culvert inlet flow-line = 1649.63
Spillway elevation = 1663.17
Opening Area = 19.63 sq-ft

Q = C A HW^(2/3) * N

Water Surface Elevation	Height of Water HW (ft)	HW/D	Coefficient Orfice/weir C	Flow Rate Q (cfs)
Orifice flow only				
1649.63	0.00	0.00	0.00	0.0
1650.63	1.00	0.20	0.41	16.1
1652.13	2.50	0.50	0.94	68.0
1654.63	5.00	1.00	1.87	214.7
1655.00	5.37	1.07	2.28	274.6
1655.77	6.14	1.23	2.28	300.2
1661.00	11.37	2.27	2.28	452.7
Orifice and weir flow				
1663.17 Orifice	13.54	2.708	2.28	508.6
weir	0.00	L=	2.7	0.0
			Total =	508.6
1664.00 Orifice	14.37	2.874	2.28	529.2
weir	0.83	L=	2.7	0.0
			Total =	529.2
1665.00 Orifice	15.37	3.074	2.28	553.5
weir	1.83	L=	2.7	0.0
			Total =	553.5
1667.00 Orifice	17.37	3.474	2.28	600.5
weir	3.83	L=	2.7	0.0
			Total =	600.5
1668.00 Orifice	18.37	3.674	2.28	623.4
weir	4.83	L=	2.7	0.0
			Total =	623.4
1670.00 Orifice	20.37	4.074	2.28	667.8
weir	6.83	L=	2.7	0.0
			Total =	667.8
1671.00 Orifice	21.37	4.274	2.28	689.5
weir	7.83	L=	2.7	0.0
			Total =	689.5
1673.00 Orifice	23.37	4.674	2.28	731.9
weir	9.83	L=	2.7	0.0
			Total =	731.9

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SHEET _____ OF _____
BY _____ DATE _____
CHECK _____ DATE _____

CLIENT _____
JOB NAME _____ JOB NO. _____

Fountain Hills Blvd.

Top of Road lenghts

Elev	measured lenght (ft)	Interpolated lenghts (ft
1663.17	0	
1664	120	
65		220
1666	320	
67		380
1668	440	
69		480
1670	520	
71		570
1672	620	
73		685
1674	750	
75		840
1680	930	

STI

~~North~~ Colony Wash

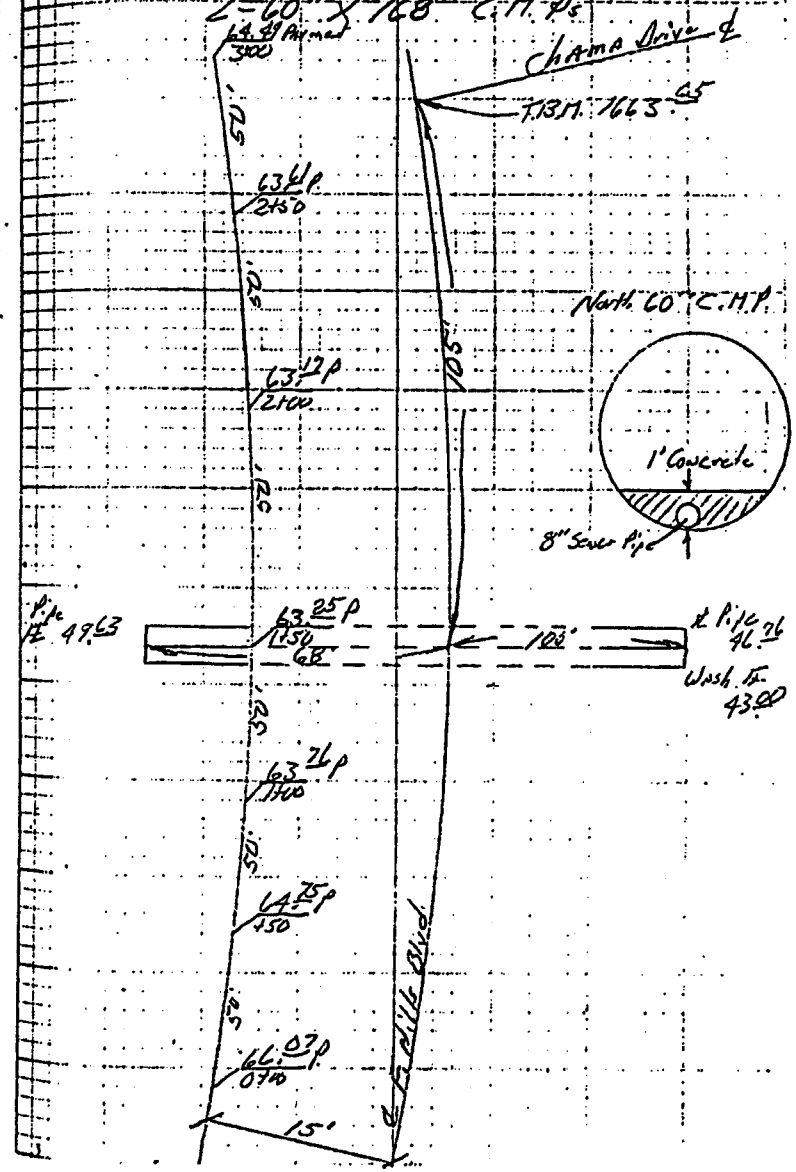
COL4

[illegible]	63.6
[illegible]	63.2
10000	63.3
[illegible]	63.8
[illegible]	64.8
[illegible]	66.1
1.0450	30

1450 2-60"X 168' C.M.P.'s 68' L1 & 100' L2

"As built"

Colony Wash Crossing Fountain Hills Blvd
± 105' South of Chama Drive
2-60" X 168' C.M.P.'s



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SHEET _____ OF _____

BY HAA DATE 06/30/93

CHECK _____ DATE _____

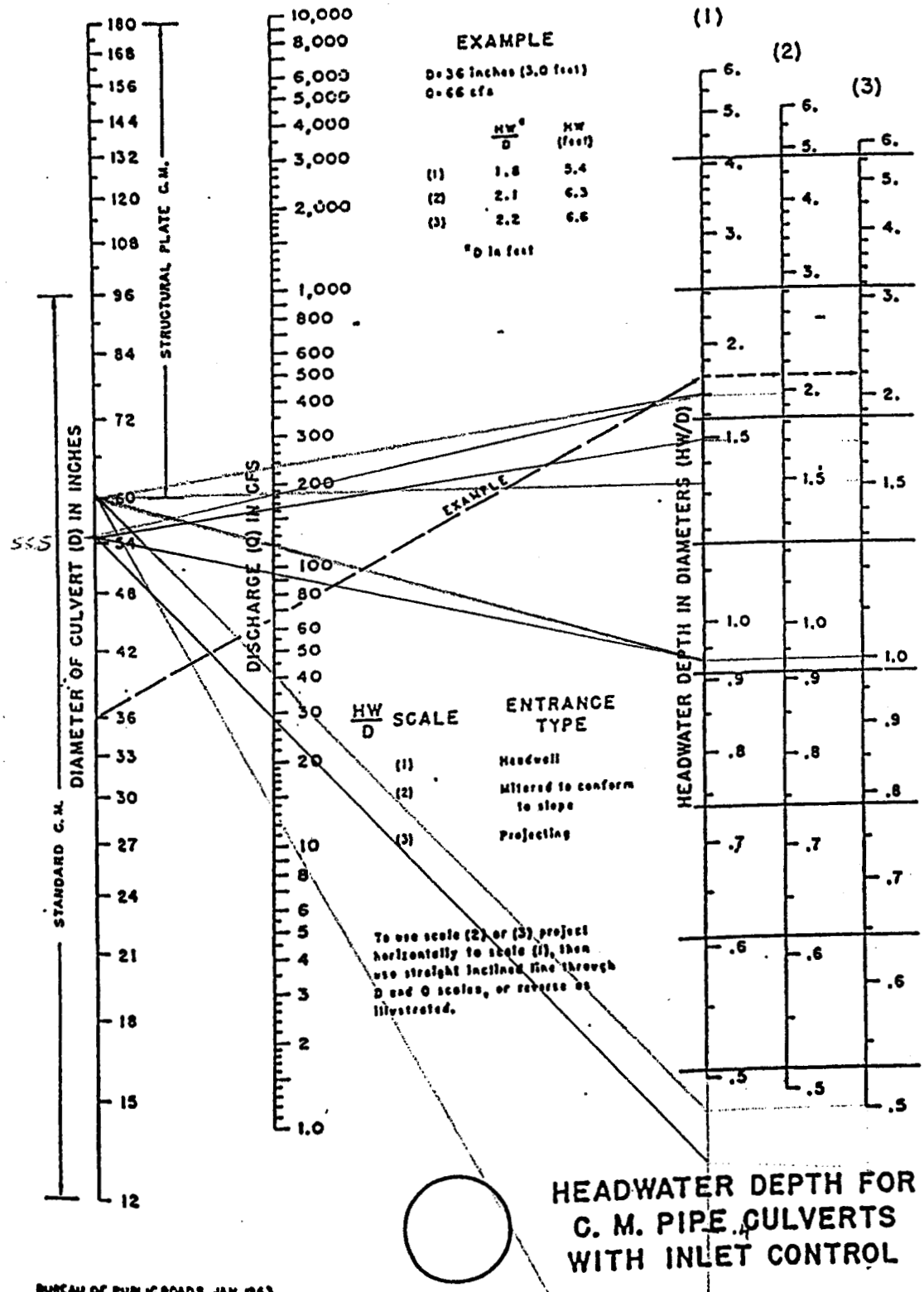
CLIENT FCDMC Fountain Hills

JOB Colony wash @ Fountain Hills Blvd.

JOB NO. 310.43

180F

CHART 5



HEADWATER DEPTH FOR C. M. PIPE CULVERTS WITH INLET CONTROL

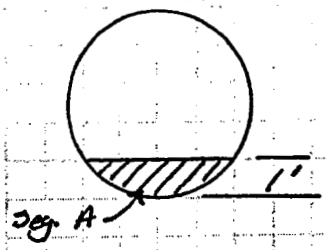
BUREAU OF PUBLIC ROADS JAN. 1963

ACK ENGINEERS, INC.
2255 N. 44th St. • Phoenix, Az. 85008 • Phone (602) 244-2566

SHEET _____ OF _____
BY JDS DATE 5-25-93
CHECK _____ DATE _____

CLIENT FCDMC Fountain Hills
JOB Colony Wash @ Fountain Hills Blvd. JOB NO. 310.43

60" Pipe



60" DIA = 19.63 Sq Ft.

19.63 - 2.80 = 16.83 Sq Ft

Effective Area = 16.83 Sq. Ft.

Seg. A = 2.80 Sq Ft
(AREA From ACAD)

Equivalent Pipe Size

πR^2 $\frac{16.83}{\pi} = 5.36$

$\sqrt{5.36} = 2.31$

2.31(2) = 4.63' DIA

4.63 x 12 = 55.5" Pipe

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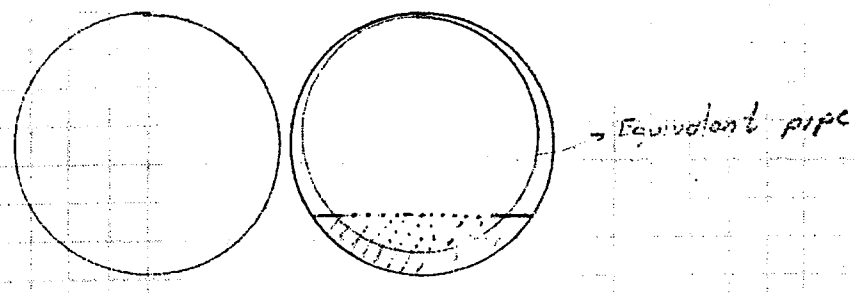
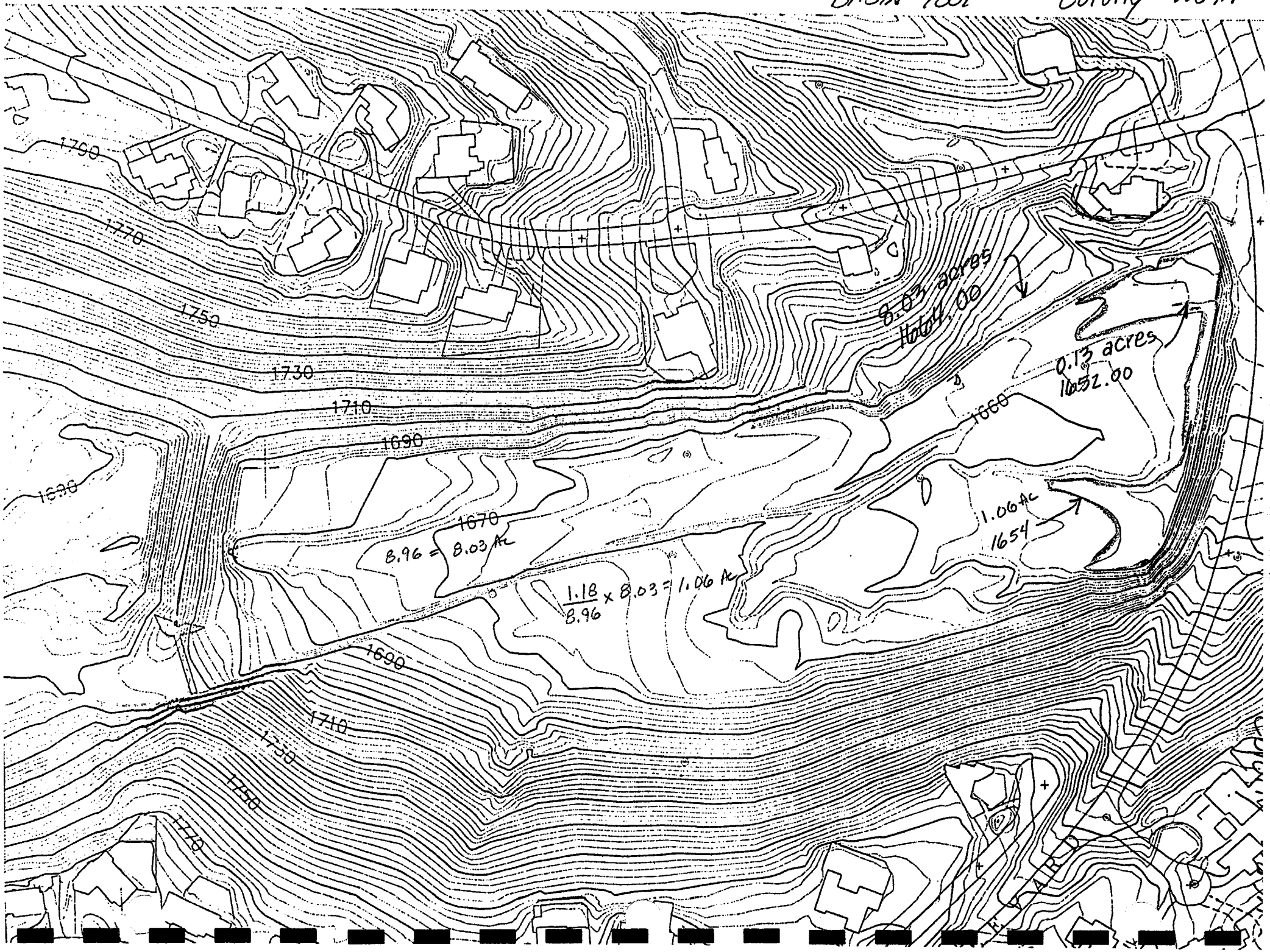
SHEET _____ OF _____
BY HAA DATE 06/30/93
CHECK _____ DATE _____
JOB NO. _____

CLIENT FCDMC Fountaine Hills
JOB Colony wash @ Fountain Hills Blvd



	Elevation	Height of Water ft	HW/D		Q
P 6.5	1649.6	0 0	0 0	0 0	0
60 60-6.5	1650.6	1 0	0.2 0	16 0	16
	1652.1	2.5 2.125	0.5 0.46	40 28	68
60 60-6.5	1654.6	5 4.6	1 1	120 95	215
	1657.1	7.5 7.125	1.5 1.54	185 160	345
	1659.1	10 9.625	2 2.08	230 185	415

BASIN 180F Colony Wash



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SHEET _____ OF _____
BY _____ DATE _____
CHECK _____ DATE _____

CLIENT _____

JOB NAME _____ JOB NO. _____

ARROYO VISTA DR

Top of Road (Weir) lenght.

Elev.	Length	Av Lenght	Interpolated Av. Lenght
1628.78	0	0	
1630.0	160	107	
1631			163
1632	330	220	
1633			244
1634	400	267	
1635			293
1636	480	320	
1637			340
1638	540	360	
1639			373
1640	580	387	

Colony Wash

COL3

5(1)

2+00

14+03.50 1-60"x 94' C.M.P. @ 90°

0+96.50 1-60"x 94' C.M.P. @ 90°

0+00

99.0	9.7
980	9.23
	78
100	9.08
1100	9.4

CULVERT L ADJUSTED
NEW 4 X-SECTIONS
ADDED OLD - REMOVED

"As Built"

Colony Wash Crossing Arroyo Vista Drive
2-60" x 94' C.M.P.

Intersection
T.B.M. 1631.57

Chaina

29.22 TC / 2+00 — 29.12 P

29.23 TC / 1+50 — 28.57 P

50 — 46' — 48'

E 16.64 — E 14.53

29.78 TC / 1+00 — 28.85 P

Colony Wash

E 16.64 — E 14.53

29.18 TC / 150 — 28.73 P

30.21 TC / 0+00 — 30.50 P

50

16' — 16'

Arroyo Vista Drive

℄

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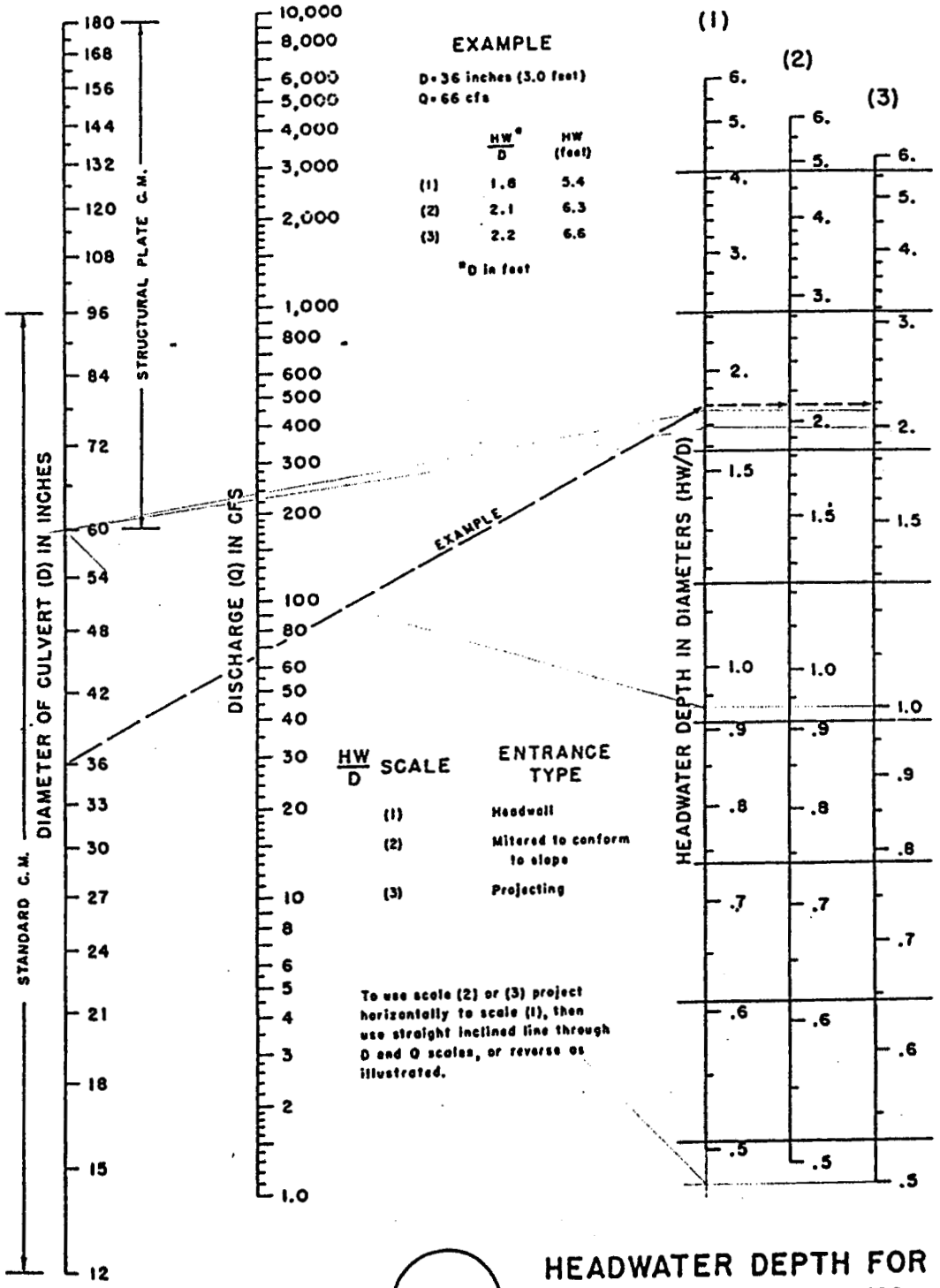
SHEET 19 OF 24
BY LDS DATE 5-12-93
CHECK _____ DATE _____

CLIENT FCDMC FOUNTAIN HILLS
JOB Colony Wash @ Arroyo Vista Dr.
2-60" CMP 180G
JOB NO. 310.43

CHART 5



HEADWATER DEPTH FOR C. M. PIPE CULVERTS WITH INLET CONTROL

BUREAU OF PUBLIC ROADS JAN. 1963

ACK ENGINEERS, INC.
2255 N. 44th St. • Phoenix, Az. 85008 • Phone (602) 244-2566

BY JDB DATE 5-12-93

CHECK _____ DATE _____

CLIENT FCDMC Fountain Hills

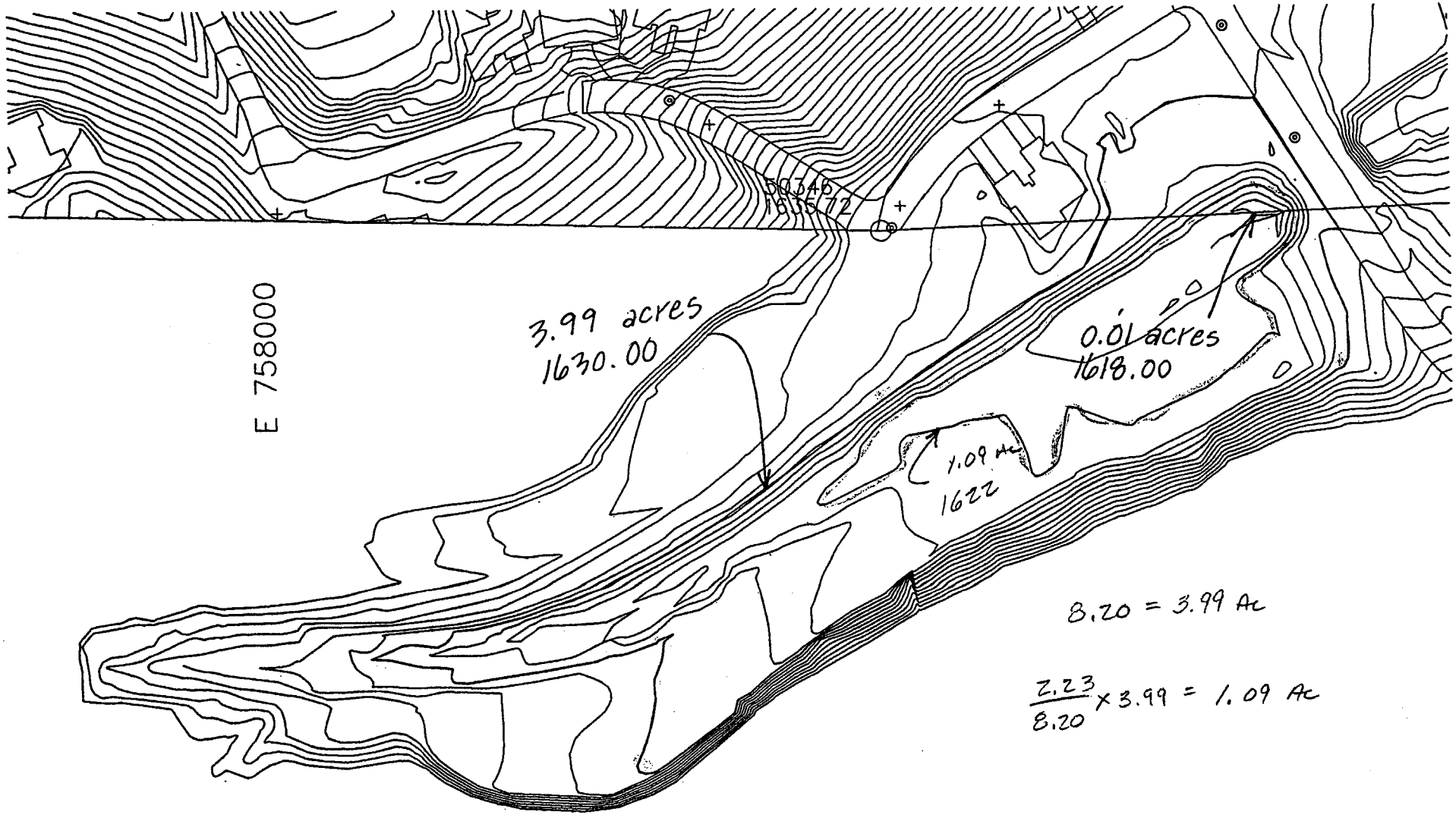
JOB Colony Wash @ Arroyo Vista Dr.

JOB NO. 310.43

Pipe Size (D) = ~~60~~ Two 60" CMP = 5'

upstream Invert Elev. = ~~1616~~ 1616.64 (Based on Field Survey)

WATER SURFACE ELEVATION	HEIGHT OF WATER, HW	HW/D	FLOW RATE (cfs)
1616.6	0	0	0
1619.1	2.5	.5	2 x 37 = 74
1621.6	5	1	2 x 115 = 230
1626.6	10	2	2 x 222 = 444
1628.8	12.15	2.43	2 x 235 = 470



8.20 = 3.99 Ac

$\frac{2.23}{8.20} \times 3.99 = 1.09$ Ac

"Colony Wash"
Basin 180 G

ACK ENGINEERS, INC.
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SHEET _____ OF 0

BY HAA DATE 13-Feb-96

CLIENT: Anderson-Nelson, Inc. CHECK _____ DATE _____

JOB: Structure #19. Culvert rating table (Saguaro Blvd.) JOB NO. 465.14

Location = Saguaro Blvd. 72" CMP
Pipe size (d) = 72 in
Number of pipes = 1
Type of Pipe = RPC
Culvert inlet flow-line = 1584.83
Spillway elevation = 1595.86
Opening Area = 28.27 sq-ft

Q = C A HW^(2/3) * N

Water Surface Elevation		Height of Water HW (ft)	HW/D	Coefficient Orfice/weir C	Flow Rate Q (cfs)
Orifice flow only					
1584.83		0.00	0.00	0.00	0.0
1587.33		2.50	0.42	0.86	44.8
1589.83		5.00	0.83	1.75	144.7
1594.83		10.00	1.67	2.40	315.0
1595.33		10.50	1.75	2.40	325.4
1595.50		10.67	1.78	2.40	328.9
1595.70		10.87	1.81	2.40	333.0
Orifice and weir flow					
1595.86	Orifice	11.03	1.838333	2.4	336.2
	weir	0.00	L=	2.7	0.0
				Total =	336.2
1596.00	Orifice	11.17	1.861667	2.4	339.1
	weir	0.14	L=	2.7	0.0
				Total =	339.1
1597.00	Orifice	12.17	2.028333	2.4	359.0
	weir	1.14	L=	2.7	0.0
				Total =	359.0
1598.00	Orifice	13.17	2.195	2.4	378.4
	weir	2.14	L=	2.7	0.0
				Total =	378.4
1599.00	Orifice	14.17	2.361667	2.4	397.4
	weir	3.14	L=	2.7	0.0
				Total =	397.4
1601.00	Orifice	16.17	2.695	2.4	433.9
	weir	5.14	L=	2.7	0.0
				Total =	433.9
1603.00	Orifice	18.17	3.028333	2.4	469.0
	weir	7.14	L=	2.7	0.0
				Total =	469.0
1605.00	Orifice	20.17	3.361667	2.4	502.8
	weir	9.14	L=	2.7	0.0
				Total =	502.8

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SHEET _____ OF _____
BY _____ DATE _____
CHECK _____ DATE _____

CLIENT _____

JOB NAME _____ JOB NO. _____

Saguaro Blvd

Top of Road (Weir) Lenght

Elev	Lenght L (ft)	Av Lenght 2/3 L (ft)	Interpolated Lenght (ft)
1595.86	0		
1596	10	6	
1597			81
1598	235	157	
1599			203
1600	380	250	
1601			300
1602	520	345	
1603			390
1604	650	430	

Colony Wash

TC	move CL of	333		330
	move CL of	and 2 pts		
	deleted	332		
				83

COL2

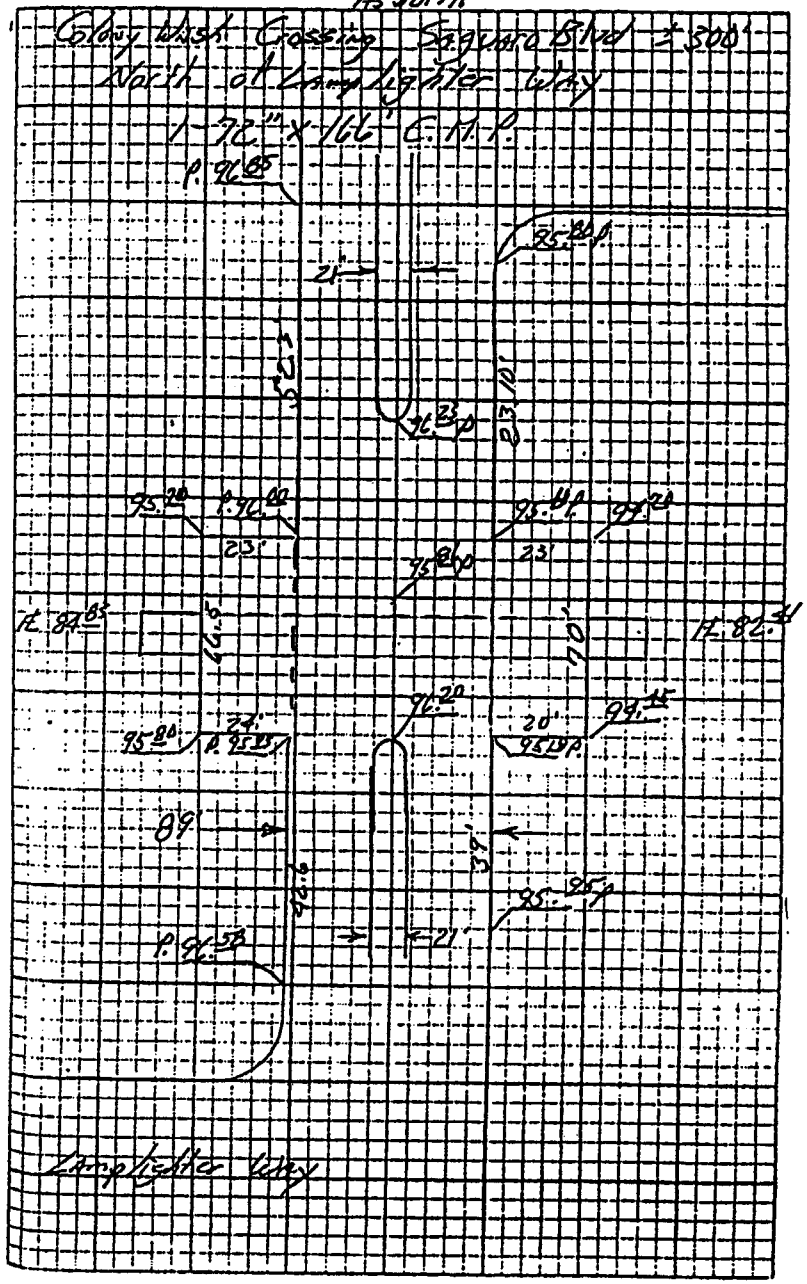
1-72" X 166' C.M.P.
w/ Concrete Apron Spillway on
Both sides of Roadway

1[illegible]	[illegible]
9[illegible]	[illegible]
10[illegible]	9[illegible]
1[illegible]	9[illegible]
10[illegible]	98.45

1595.0

"As Built"

Colony Wash Crossing Saguaro Blvd ± 300' North of Lamplighter Way
1-72" X 166' C.M.P.



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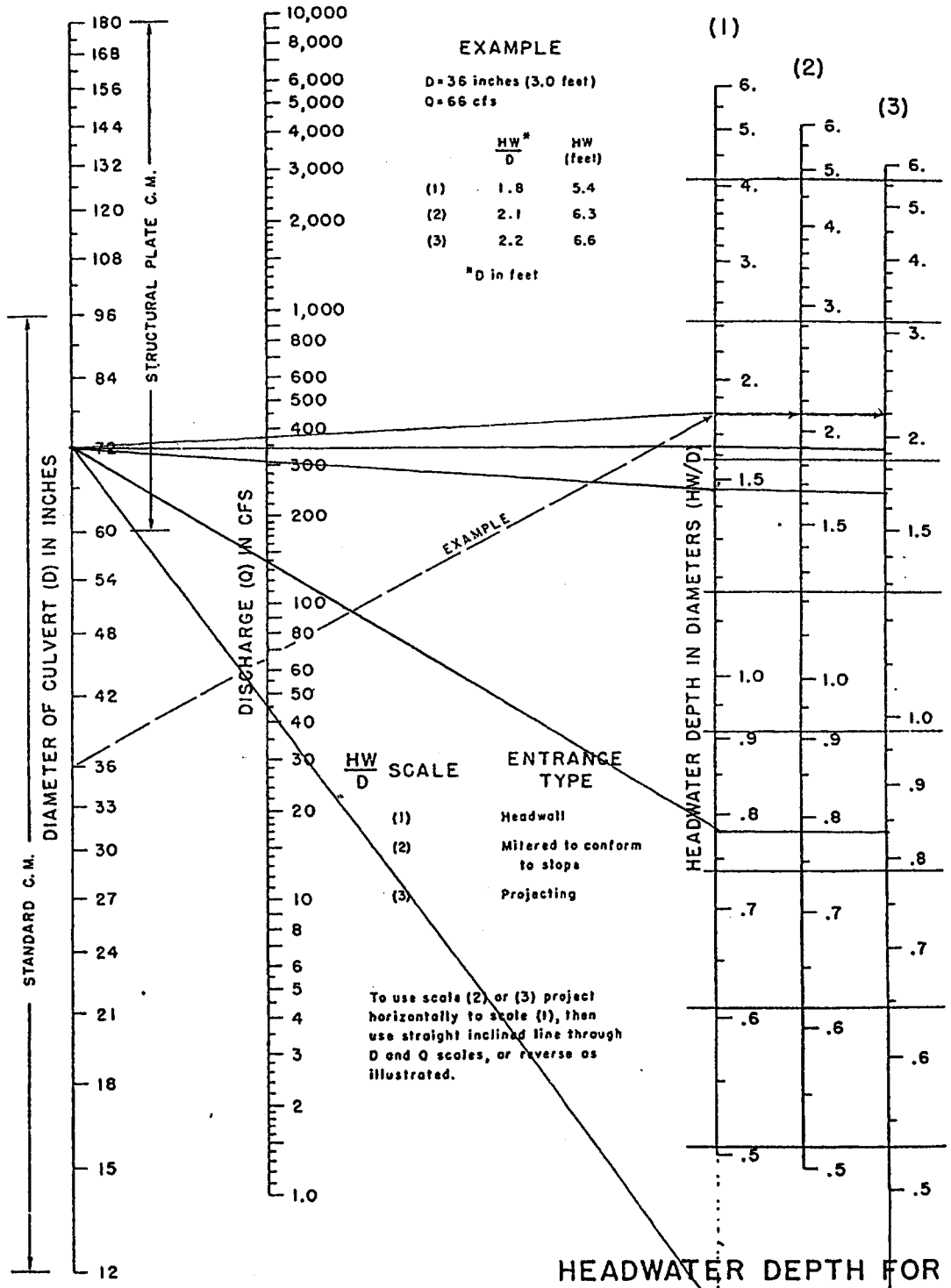
SHEET 1 OF 3
BY HAA DATE 8-5/93
CHECK _____ DATE _____
JOB NO. 310-43

CLIENT FCDMC Fountain Hills (South)
JOB Colony wash under Saguaro Blvd.
one 72" CMP 180 N

CHART 5



HEADWATER DEPTH FOR
C. M. PIPE CULVERTS
WITH INLET CONTROL

BUREAU OF PUBLIC ROADS JAN. 1963

ACK ENGINEERS, INC.
2255 N. 44th St. • Phoenix, Az. 85008 • Phone (602) 244-2566

SHEET 2 OF 3
BY HAA DATE Aug. 5/93
CHECK _____ DATE _____

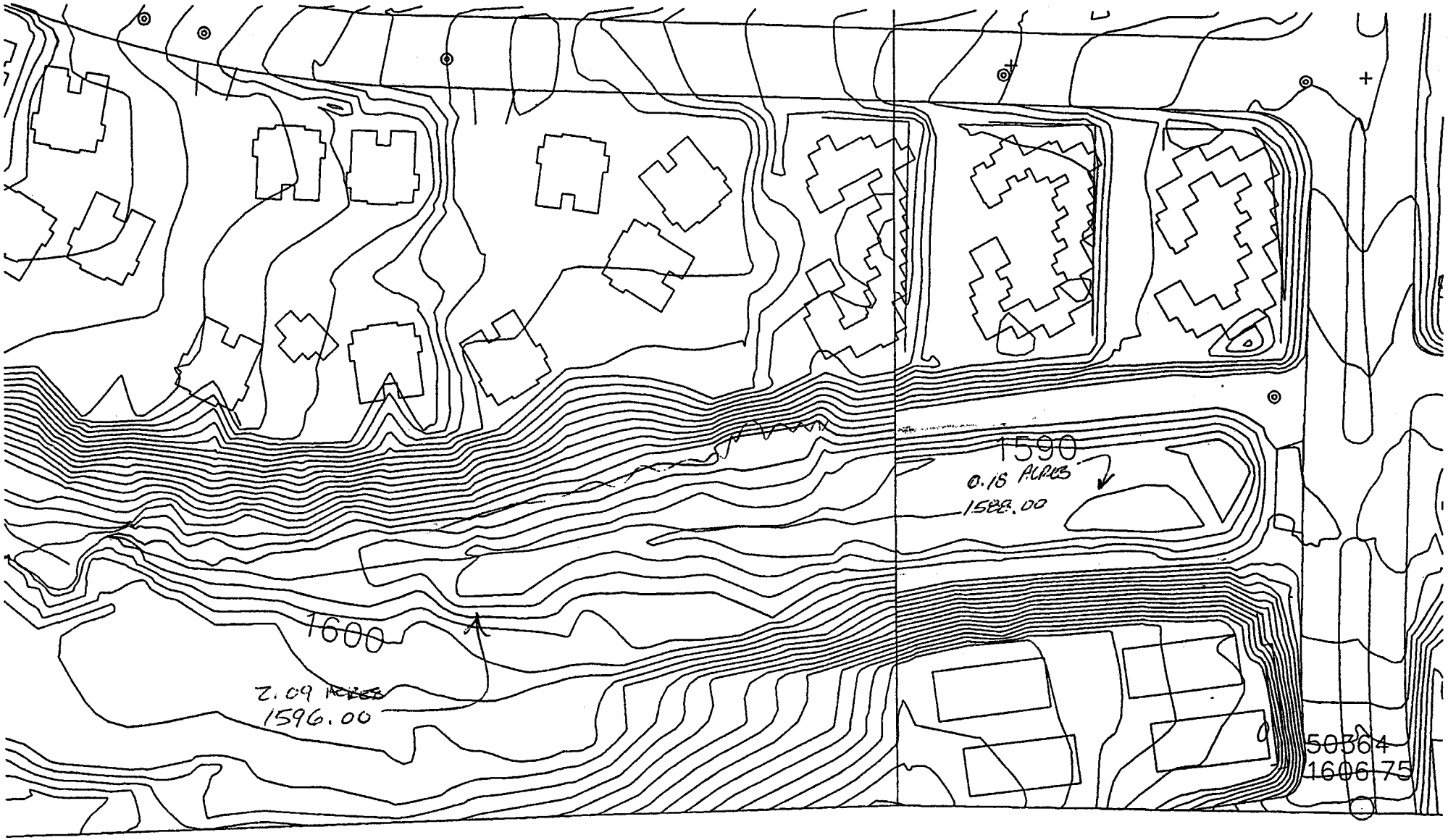
CLIENT FCDMC Fountain Hills (South)
JOB Colony Wash under Saguaro Blvd
JOB NO. 310.43

Pipe size = One 72" CMP = 5'

Upstream Invert Elev. = 1584.83 (from field survey)

Water Surface Elevation	Height of Water HW	HW/D	Flow Rate (cfs)
1584.8	0	0	0
1587.3	2.5	0.4	45
1589.8	5	0.83	145
1594.8	10	1.67	310
1595.9	11	1.83	345
Culvert over Road 1598	13.2 2/3(2.1)	2.2 L = 80	355 400 } 755

COLONY WASH
BASIN 180 N



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SHEET _____ OF 0

BY HAA DATE 13-Feb-96

CLIENT: Anderson-Nelson, Inc. CHECK _____ DATE _____

JOB: Structure #19. Culvert rating table (PANORAMA DR.) JOB NO. 465.14

Location = Panorama Dr. 4 - 6 X 8 RBC
Pipe size (d) = 6 ' 8 '
Number of pipes = 4
Type of Pipe = RBC
Culvert inlet flow-line = 1546.44
Spillway elevation = 1557.84
Opening Area = sq-ft

Q = C A HW^(2/3) * N

Water Surface Elevation		Height of Water HW (ft)	HW/D	Coefficient Orfice/weir C	Flow Rate Q (cfs)
Orifice flow only					
1546.44		0.00	0.00	0.00	0.0
1551.00		4.56	0.76	2.31	928.0
1552.14		5.70	0.95	2.20	1280.0
1552.44		6.00	1.00	2.60	1648.3
1554.00		7.56	1.26	2.60	1922.9
1555.00		8.56	1.43	2.60	2088.9
1556.00		9.56	1.59	2.60	2248.6
Orifice and weir flow					
1557.84	Orifice	11.40	1.90	2.6	2528.6
	weir	0.00	L=	2.7	0.0
					Total = 2528.6
1558.00	Orifice	11.56	1.93	2.6	2552.2
	weir	0.16	L=	2.7	0.0
					Total = 2552.2
1559.00	Orifice	12.56	2.09	2.6	2697.3
	weir	1.16	L=	2.7	0.0
					Total = 2697.3
1560.00	Orifice	13.56	2.26	2.6	2838.7
	weir	2.16	L=	2.7	0.0
					Total = 2838.7
1561.00	Orifice	14.56	2.43	2.6	2976.6
	weir	3.16	L=	2.7	0.0
					Total = 2976.6
1562.00	Orifice	15.56	2.59	2.6	3111.3
	weir	4.16	L=	2.7	0.0
					Total = 3111.3
1563.00	Orifice	16.56	2.76	2.6	3243.3
	weir	5.16	L=	2.7	0.0
					Total = 3243.3
1564.00	Orifice	17.56	2.93	2.6	3372.5
	weir	6.16	L=	2.7	0.0
					Total = 3372.5

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SHEET _____ OF _____
BY _____ DATE _____
CHECK _____ DATE _____

CLIENT _____

JOB NAME _____ JOB NO. _____

Panorama Dr.

Top of Road (Weir) Lenght

Elev	Lenght L (ft)	Av. Lenght 2/3 L (ft)	Int. lenght
1557.84	0	0	
1558	300	200	
1559			230
1560	400	260	
1561			280
1562	460	305	
1563			340
1564	700	470	
1565			500
1566	800	530	

STA					
	291	Mark ℄ point			
	290-91	Deleted			
	new	292 - 290-	91		
			9877	[illegible]	
			9737	[illegible]	
			10:50	[illegible]	
			10:57	[illegible]	
			10:77	[illegible]	
			10:37	1500.09	

COL 1

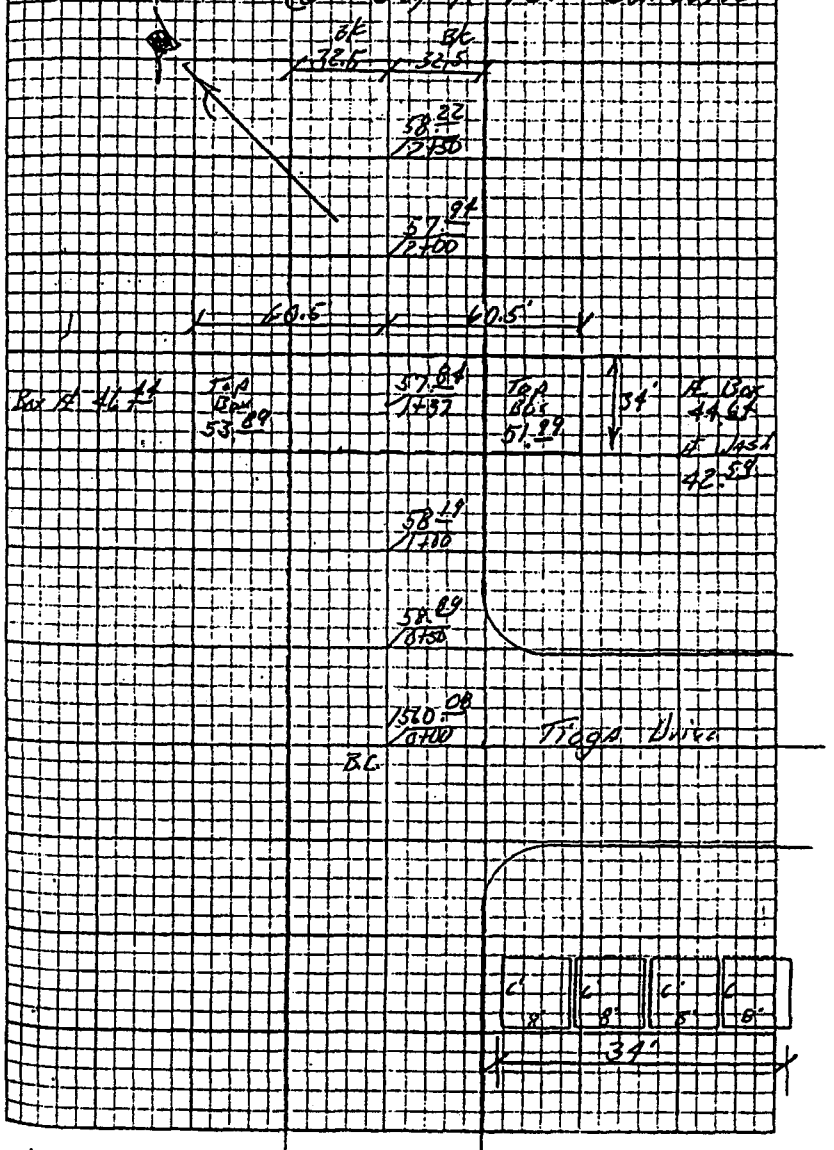
Colony Wash

1+37	℄ Box Culvert	4-Barrel	(6'x8') x 121'		
0+00	B. Cap @ ℄ Intr.	Panorama Dr. &			
	Tioga Drive				

"As Built"

Colony Wash Crossing Panorama Drive
N.E. of Tioga Drive

1-4 Barrel (6'x8') x 121' Box Culvert



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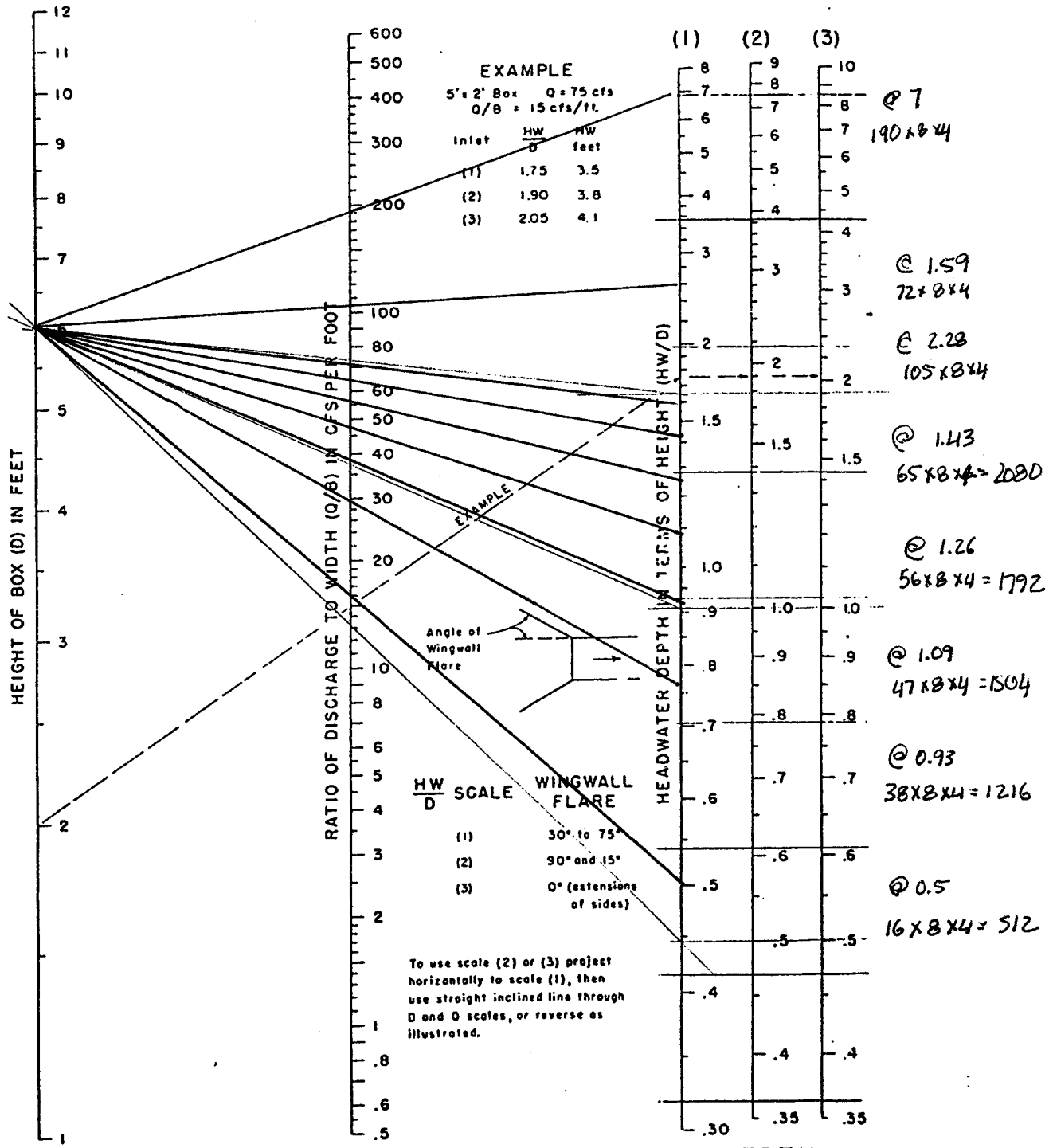
SHEET 3 OF 6
BY JDS DATE 5-18-93
CHECK _____ DATE _____

CLIENT FCDMC FOUNTAIN HILLS
JOB COLONY WASH @ PANORAMA DRIVE
4- 6'x8' BOXES 180P
JOB NO. 310.43

CHART I



HEADWATER DEPTH FOR BOX CULVERTS WITH INLET CONTROL

BUREAU OF PUBLIC ROADS JAN. 1963

ACK ENGINEERS, INC.
2255 N. 44th St. • Phoenix, Az. 85008 • Phone (602) 244-2566

BY JDS DATE 5-18-93

CHECK _____ DATE _____

CLIENT FCDMC Fountain Hills

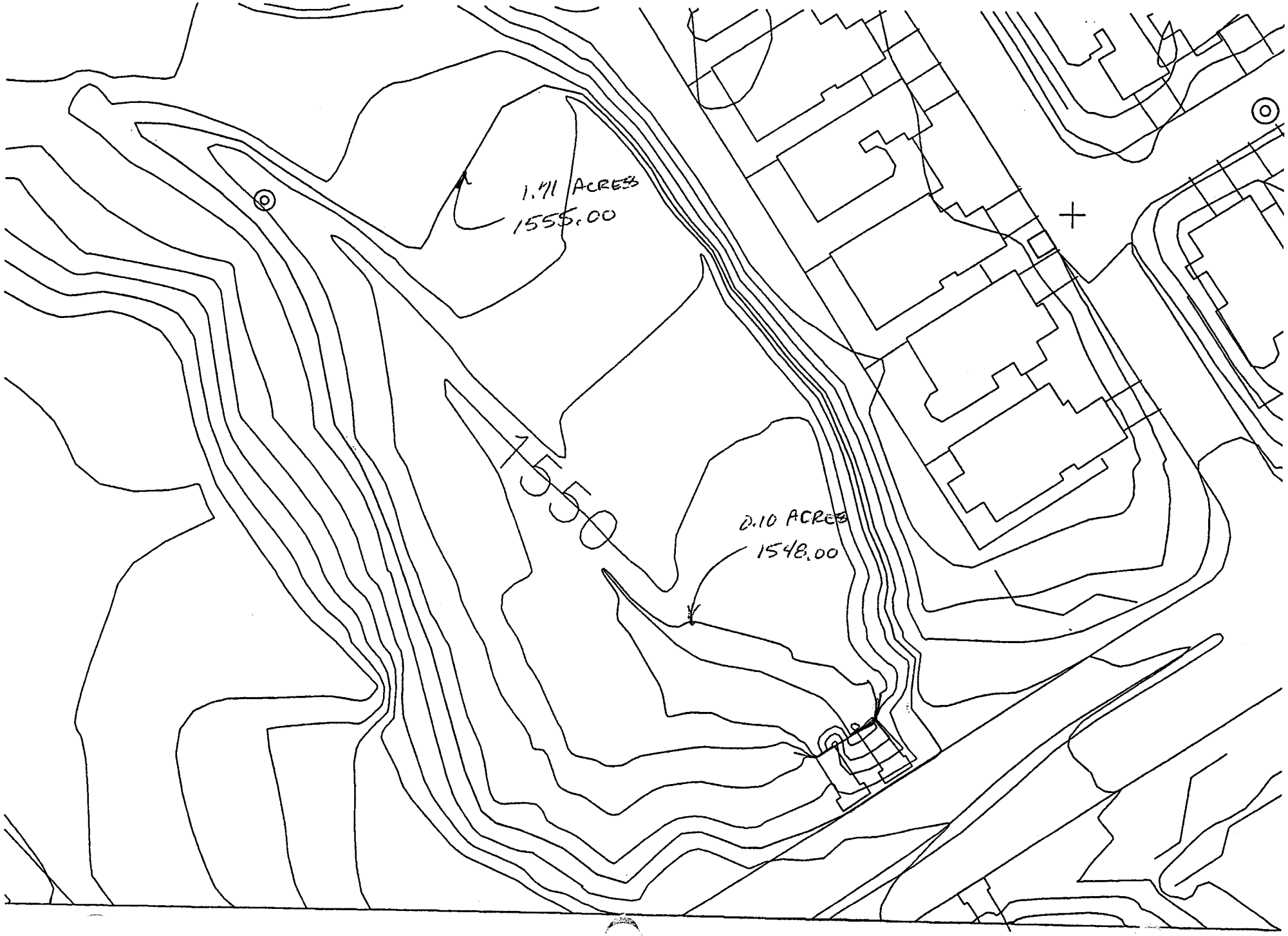
JOB Colony Wash @ Panorama Drive JOB NO. 310.43

BARREL Height = Four 6'x8' = 6'

Upstream Invert Elev. = 1546.44 (Based on Field Survey)

Water Surface Elevation	Height of Water, HW	HW/D	Flow Rate (CFS)
1546.4	0	0	0
1549.4	3	.5	4 x 104 = 416
1552.4	6	1	4 x 296 = 1,184
1558	11.6	1.9	4 x 592 = 2,368

COLONY WATER
BASIN 180P



APPENDIX E

BASE FLOWRATES FOR DAMBRK MODEL

ACK ENGINEERS, INC.
2255 N. 44th Street, Ste. 330, Phoenix, AZ 85008 Tel. (602) 244-2566

SHEET _____ OF _____
BY RAA DATE _____
CHECK _____ DATE _____

CLIENT Anderson - Nelson
JOB NAME Stoneridge Dam Dambreak Analysis
JOB NO. _____

Initial conditions Flows Colony Wash

Sta	Flow	Lateral Inflow
0	300	–
0.73	620	320
1.20	1300	680
Spillway channel	100	
1.35	1300	1200
Panorama channel	100	
1.68	1300	1200

* NOTE : All flows are expressed in cfs.

ACK ENGINEERS, INC.
2255 N. 44th Street, Ste. 330, Phoenix, AZ 85008 Tel. (602) 244-2566

SHEET _____ OF _____
BY MAP DATE _____
CHECK _____ DATE _____

CLIENT Anderson Nelson
JOB NAME Stoneridge Dam Dambreak Analysis
JOB NO. _____

Base flows

FIS x-sec	Q_{100}		DAMBRK x-sec
429	217		0
3.95	289		0.37
3.92	313	300	0.4018
3.90	354		
3.67	303		0.65
3.65	367		0.6678
			(3.59) 0.73
3.52	655		
3.32	613	620	1.00
3.28	635		1.0314
3.23	643		
			(3.12) 1.20
3.02	1276		
2.92	1312	1300	
2.91	1295		1.41
2.84	1333		

* NOTE : All flows are expressed in cfs.

FOUNTAIN HILLS SOUTH
Colony Wash

X-Sec	HEC-1 Conc. Point	100-Yr Discharge (cfs)	Left Overbank Lenght (ft)	Rigth Overbank Lenght (ft)	Channel Lenght (ft)	COMMENT
2.52	*CLN10	1333	250	250	247	Confluence PAN-COL
2.54			85	110	81	
2.59			290	310	298	
2.68			475	525	491	
2.78			510	490	499	
2.84			300	290	298	
2.87			185	200	196	
2.88	CLN9	1327	60	65	57	Culvert outlet
2.91	SCLN8	1295	130	130	121	Culvert inlet
2.92	CLN8	1312	90	125	74	
2.97	*CLN8	1276	260	290	238	Confluence spillway
3.02			390	293	309	Confluence Fountain Channel
3.12	*CLN7	643	550	460	519	
3.22			460	500	490	
3.27			295	280	295	
3.28	CLN6	635	75	80	67	Culvert Oulet
3.32	SCLN5	613	200	205	166	Culvert inlet
3.33	CLN5	655	60	65	58	
3.41			480	460	466	
3.47			310	275	312	
3.52			290	250	249	Confluence COL-NCL
3.56	CLN4	367	230	225	231	
3.59			140	135	139	
3.64			260	250	258	
3.65			60	60	50	Culvert outlet
3.67	SCLN3	303	100	100	94	Culvert inlet
3.68	CLN3	354	75	75	47	
3.77			490	550	488	
3.83			300	375	309	
3.90			331	410	377	
3.92	CLN2	313	125	225	114	Culvert outlet
3.95	SCLN1	289	170	170	168	Culvert inlet
3.98	*CLN1	217	180	190	158	
4.05			390	350	385	
4.15			475	512	485	
4.20			320	305	307	
4.24			210	200	198	
4.29			250	290	246	Culvert outlet
4.32	SSNB6	94	160	160	157	Culvert inlet (Dam)
4.37	SNB6	569	300	310	291	Confluence SYC-COL
4.41	GRS3	461	150	260	201	
4.44			200	170	175	
4.45			40	50	35	Culvert outlet
4.47	SGRS2	396	90	90	80	Culvert inlet

APPENDIX F

DAMBRK OUTPUT FOR SCENARIO 1
FAILURE OF STONERIDGE DAM

==========
B O S S D A M B R K (tm)
==========

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Version : 3.00
Serial Number : 20533

Licensed to AGK Engineers, Inc.

PROGRAM ORIGIN :

Boss Dambrk (tm) is an enhanced version of Professor D. L. Fread's 1991 NWS DAMBRK program.

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PROJECT DESCRIPTION :

PROJECT TITLE : Structure #19 Stoneridge Dam
PROJECT NUMBER : 465.12
DESCRIPTION : Pipping failure, FIS baseflow
ENGINEER : Survey reservation
DATE OF RUN : 2/06/1996
TIME OF RUN : 9:10 am

INPUT DATA SUMMARY :

INPUT CONTROL PARAMETERS :

Problem Specification Option	14	
Number of Dynamic Routing Reaches (KKN)	1	
Type of Reservoir Routing (KUI)	1	(dynamic routing)
Number of multiple dams/bridges (MULDAM)	5	
No. of Reservoir Inflow Hydrograph Points (ITEH)	45	
No. of Informational Cross-Sections (NPRT)	0	
Flood-Plain Routing (KFLP)	0	(no)

CROSS-SECTION NUMBERS COINCIDENT
WITH UPSTREAM DAM FACE (IDAM) :

1
6
9
13
18

RESERVOIR VOLUME DESCRIPTION :

Elevation vs. Surface Area Table

Elevation HSA(K) (ft MSL)	Surface Area SA(K) (acres)
1708.00	11.380
1706.00	10.450
1704.00	8.550
1702.00	7.460
1694.00	3.470
1686.00	0.930
1680.00	0.010
1678.86	0.000

DAM NUMBER : 1 (Stone Ridge Dam)

RESERVOIR AND BREACH PARAMETERS :

Initial Elevation of Water Surface (YO, ft MSL)		1678.87
Breach Side Slope (Z)	1:	0.00
Breach Bottom Elevation (YBMIN, ft MSL)		1678.86
Breach Base Width (BB, ft)		70.50
Time of Breach Formation (TFH, hr)		0.29

RESERVOIR DESCRIPTION :

Water Surface Elevation at Time of Breach (HF, ft MSL)	1707.15
Top of Dam Crest Elevation (HD, ft MSL)	1709.96
Uncontrolled Spillway Crest Elevation (HSP, ft MSL)	1678.87
Spillway Gate Center Elevation (HGT, ft MSL)	0.00
Uncontrolled Spillway Discharge Coefficient (CS)	0.00
Spillway Gate Discharge Coefficient (CG)	0.00
Piping Centerline Elevation (CDO, ft MSL)	1678.87
Turbine Discharge (QT, cfs)	300.00

DAM NUMBER : 2 (Fountain Hills Blvd. Crossing)

RESERVOIR AND BREACH PARAMETERS :

Initial Elevation of Water Surface (YO, ft MSL)		1655.77
Breach Side Slope (Z)	1:	1.00
Breach Bottom Elevation (YBMIN, ft MSL)		1649.63
Breach Base Width (BB, ft)		100.00
Time of Breach Formation (TFH, hr)		1.00

RESERVOIR DESCRIPTION :

Water Surface Elevation at Time of Breach (HF, ft MSL)	1673.00
Top of Dam Crest Elevation (HD, ft MSL)	1663.17
Uncontrolled Spillway Crest Elevation (HSP, ft MSL)	1649.63
Spillway Gate Center Elevation (HGT, ft MSL)	0.00
Uncontrolled Spillway Discharge Coefficient (CS)	0.00
Spillway Gate Discharge Coefficient (CG)	0.00
Dam Overtopping Discharge Coefficient (CDO)	2.70
Turbine Discharge (QT, cfs)	0.00

DAM NUMBER : 3 (Arroyo Vista Dr. crossing)

RESERVOIR AND BREACH PARAMETERS :

Initial Elevation of Water Surface (YO, ft MSL)		1622.81
Breach Side Slope (Z)	1:	1.00
Breach Bottom Elevation (YBMIN, ft MSL)		1616.64
Breach Base Width (BB, ft)		100.00
Time of Breach Formation (TFH, hr)		1.00

RESERVOIR DESCRIPTION :

Water Surface Elevation at Time of Breach (HF, ft MSL)	1638.00
Top of Dam Crest Elevation (HD, ft MSL)	1628.78
Uncontrolled Spillway Crest Elevation (HSP, ft MSL)	1616.64
Spillway Gate Center Elevation (HGT, ft MSL)	0.00
Uncontrolled Spillway Discharge Coefficient (CS)	0.00
Spillway Gate Discharge Coefficient (CG)	0.00
Dam Overtopping Discharge Coefficient (CDO)	2.70
Turbine Discharge (QT, cfs)	0.00

DAM NUMBER : 4 (Saguaro Blvd. Crossing)

RESERVOIR AND BREACH PARAMETERS :

Initial Elevation of Water Surface (YO, ft MSL)		1597.16
Breach Side Slope (Z)	1:	1.00
Breach Bottom Elevation (YBMIN, ft MSL)		1584.82
Breach Base Width (BB, ft)		100.00
Time of Breach Formation (TFH, hr)		1.00

RESERVOIR DESCRIPTION :

Water Surface Elevation at Time of Breach (HF, ft MSL)	1605.00
Top of Dam Crest Elevation (HD, ft MSL)	1595.86
Uncontrolled Spillway Crest Elevation (HSP, ft MSL)	1584.83
Spillway Gate Center Elevation (HGT, ft MSL)	0.00
Uncontrolled Spillway Discharge Coefficient (CS)	0.00
Spillway Gate Discharge Coefficient (CG)	0.00
Dam Overtopping Discharge Coefficient (CDO)	2.70
Turbine Discharge (QT, cfs)	0.00

DAM NUMBER : 5 (Panorama Dr. crossing)

RESERVOIR AND BREACH PARAMETERS :

Initial Elevation of Water Surface (YO, ft MSL)		1552.20
Breach Side Slope (Z)	1:	1.00
Breach Bottom Elevation (YBMIN, ft MSL)		1546.44
Breach Base Width (BB, ft)		100.00
Time of Breach Formation (TFH, hr)		1.00

RESERVOIR DESCRIPTION :

Water Surface Elevation at Time of Breach (HF, ft MSL)	1564.00
Top of Dam Crest Elevation (HD, ft MSL)	1557.84
Uncontrolled Spillway Crest Elevation (HSP, ft MSL)	1546.44
Spillway Gate Center Elevation (HGT, ft MSL)	0.00
Uncontrolled Spillway Discharge Coefficient (CS)	0.00
Spillway Gate Discharge Coefficient (CG)	0.00
Dam Overtopping Discharge Coefficient (CDO)	2.70
Turbine Discharge (QT, cfs)	0.00

SPILLWAY/GATE RATING CURVE :

Head HEAD(1) (ft)	Flow QSPILL(1) (cfs)
0.00	0.0
4.00	36.0
16.00	91.0
23.81	119.0
26.00	939.0
27.00	1624.0
29.00	3458.0
30.99	5736.0

SLOPING DAM CREST GEOMETRY :

Elevation HSBR(K,L) (ft MSL)	Accumulated Dam Crest Length BSBR(K,L) (ft)
1663.170	0.000
1664.000	120.000

1665.000	220.000
1666.000	320.000
1667.000	380.000
1668.000	440.000
1671.000	570.000
1673.000	685.000

SPILLWAY/GATE RATING CURVE :

Head HEAD(2) (ft)	Flow QSPILL(2) (cfs)
0.00	0.0
5.00	215.0
6.14	300.0
11.37	453.0
15.37	554.0
17.37	601.0
21.37	690.0
23.37	732.0

SLOPING DAM CREST GEOMETRY :

Elevation HSBR(K,L) (ft MSL)	Accumulated Dam Crest Length BSBR(K,L) (ft)
1628.780	0.000
1630.000	160.000
1631.000	245.000
1632.000	330.000
1634.000	400.000
1635.000	440.000
1636.000	480.000
1638.000	540.000

SPILLWAY/GATE RATING CURVE :

Head HEAD(3) (ft)	Flow QSPILL(3) (cfs)
0.00	0.0
5.00	230.0
6.17	300.0
7.86	352.0
12.14	471.0
14.36	527.0
17.36	598.0
21.36	686.0

SLOPING DAM CREST GEOMETRY :

Elevation HSBR(K,L) (ft MSL)	Accumulated Dam Crest Length BSBR(K,L) (ft)
1595.860	0.000
1596.000	10.000
1597.000	122.000

1598.000	235.000
1600.000	380.000
1602.000	520.000
1604.000	650.000
1605.000	700.000

SPILLWAY/GATE RATING CURVE :

Head HEAD(4) (ft)	Flow QSPILL(4) (cfs)
0.00	0.0
11.17	340.0
12.17	359.0
13.17	378.0
14.17	397.0
16.17	434.0
18.17	469.0
20.17	503.0

SLOPING DAM CREST GEOMETRY :

Elevation HSBR(K,L) (ft MSL)	Accumulated Dam Crest Length BSBR(K,L) (ft)
1557.840	0.000
1558.000	300.000
1559.000	350.000
1560.000	400.000
1561.000	430.000
1562.000	460.000
1563.000	570.000
1564.000	680.000

SPILLWAY/GATE RATING CURVE :

Head HEAD(5) (ft)	Flow QSPILL(5) (cfs)
0.00	0.0
4.56	928.0
5.76	1300.0
6.00	1648.0
11.40	2529.0
13.56	2839.0
15.56	3111.0
17.56	3373.0

BOUNDARY CONDITIONS :

Hydrograph Time Intervals (DHF, hr)	0.00
Routing Period (TEH, hr)	8.00
Breach Development Exponent (BREX)	1.00
Mud/Debris Flow Parameter (MUD)	0
Dry Bed Routing Parameter (IWF)	0
Hydraulic Radius Computation Parameter (KPRES)	0 (R=A/B)
Landslide Simulation (KSL)	0 (none)
Critical Flow Froude Number (DFR)	0.950

INFLOW HYDROGRAPH DESCRIPTION :

Time Elapsed TI(K) (hr)	Upstream Inflow QI(K) (cfs)
0.00	300.0
0.25	300.0
0.50	300.0
0.75	300.0
1.00	300.0
1.25	300.0
1.50	302.0
1.75	307.0
2.00	311.0
2.25	316.0
2.50	321.0
2.75	326.0
3.00	334.0
3.25	350.0
3.50	394.0
3.75	474.0
4.00	982.0
4.25	5224.0
4.50	3583.0
4.75	2210.0
5.00	1464.0
5.25	1057.0
5.50	835.0
5.75	735.0
6.00	593.0
6.25	502.0
6.50	462.0
6.75	408.0
7.00	352.0
7.25	318.0
7.50	300.0
7.75	0.0
8.00	0.0
8.25	0.0
8.50	0.0
8.75	0.0
9.00	0.0
9.25	0.0

9.50	0.0
9.75	0.0
10.00	0.0
10.25	0.0
10.50	0.0
10.75	0.0
11.00	0.0

SUMMARY OF PROGRAM CONTROL PARAMETERS :

Problem Specification Option (KKN, KUI, MULDAM, IDAM)	14	
Number of Cross-Sections Entered (NS)	30	
Number of Top Widths Entered (NCS)	8	
Number of Cross-Sectional Hydrographs to Plot (NTT)	6	
Flow Type Parameter (KSUPC)	3	(mixed flow)
Number of Lateral Inflow Hydrographs (LQ)	2	
Number of Points in Gate Control Curve (KCG)	0	

CROSS-SECTIONS WHERE HYDROGRAPH REQUESTED :
(maximum allowed = 6)

1 2 6 9 11 13

CHANNEL-VALLEY BOUNDARY CONDITIONS :

Max Discharge at Downstream End (QMAXD, cfs)	0.0
Max Lateral Outflow due to Flood Wave (QLL, cfs/ft)	0.0000
Initial Time-Step Size (DTHM, hr)	0.0050
Time at which Dam Starts to Fail (TFI, hr)	0.0000
Theta Weighting Factor (F1I)	0.000
Stage Convergence Criterion (EPSY, ft)	0.000
Downstream Boundary Type Paramter (YDN)	0.00
Slope of Channel Downstream of Dam (SOM, ft/mi)	0.0000

CROSS-SECTION NUMBER : 1 Flood Control Structure #

Cross-Section Location (XS(I), mi) 0.000

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 1

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.042

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1678.86	2.0	0.1000	0.0
1682.00	190.0	0.1000	0.0
1686.00	230.0	0.1000	0.0
1690.00	275.0	0.1000	0.0
1694.00	300.0	0.1000	0.0
1702.00	390.0	0.1000	0.0
1706.00	510.0	0.1000	0.0
1710.00	538.0	0.1000	0.0

CROSS-SECTION NUMBER : 2 Flood Control Structure #

Cross-Section Location (XS(I), mi) 0.042

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 2

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1676.61	11.0	0.1000	0.0
1680.00	38.0	0.1000	0.0
1684.00	73.0	0.1000	0.0
1690.00	230.0	0.1000	0.0
1696.00	390.0	0.1000	0.0
1700.00	410.0	0.1000	0.0
1704.00	435.0	0.1000	0.0
1710.00	470.0	0.1000	0.0

CROSS-SECTION NUMBER : 3

Cross-Section Location (XS(I), mi) 0.120

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 3

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1666.90	2.0	0.1000	0.0
1668.00	70.0	0.1000	0.0
1670.00	100.0	0.1000	0.0
1674.00	165.0	0.1000	0.0
1678.00	223.0	0.1000	0.0
1680.00	290.0	0.1000	0.0
1682.00	365.0	0.1000	0.0
1690.00	453.0	0.1000	0.0

CROSS-SECTION NUMBER : 4

Cross-Section Location (XS(I), mi) 0.170

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 4

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1664.20	0.0	0.1000	0.0
1666.00	90.0	0.1000	0.0
1668.00	150.0	0.1000	0.0
1672.00	178.0	0.1000	0.0
1674.00	195.0	0.1000	100.0
1676.00	220.0	0.1000	220.0
1682.00	260.0	0.1000	240.0
1688.00	300.0	0.1000	245.0

CROSS-SECTION NUMBER : 5

Cross-Section Location (XS(I), mi) 0.270

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 5

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1658.20	0.0	0.1000	0.0
1660.00	70.0	0.1000	0.0
1662.00	85.0	0.1000	0.0
1664.00	100.0	0.1000	300.0
1666.00	118.0	0.1000	300.0
1668.00	120.0	0.1000	310.0
1672.00	140.0	0.1000	315.0
1676.00	210.0	0.1000	300.0

CROSS-SECTION NUMBER : 6 Fountain Hills Blvd. Upst

Cross-Section Location (XS(I), mi) 0.370

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 6

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.032

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1649.63	10.0	0.1000	0.0
1651.00	20.0	0.1000	0.0
1653.00	40.0	0.1000	260.0
1655.00	60.0	0.1000	368.0
1659.00	115.0	0.1000	375.0
1665.00	225.0	0.1000	355.0
1667.00	580.0	0.1000	70.0
1673.00	781.0	0.1000	0.0

CROSS-SECTION NUMBER : 7 Fountain Hills Blvd. Down

Cross-Section Location (XS(I), mi) 0.402

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 7

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1646.76	13.0	0.1000	0.0
1648.00	28.0	0.1000	0.0
1650.00	58.0	0.1000	0.0
1652.00	80.0	0.1000	0.0
1654.00	160.0	0.1000	0.0
1658.00	250.0	0.1000	0.0
1660.00	340.0	0.1000	0.0
1664.00	485.0	0.1000	0.0

CROSS-SECTION NUMBER : 8

Cross-Section Location (XS(I), mi) 0.490

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 8

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1625.20	5.0	0.1000	0.0
1630.00	65.0	0.1000	0.0
1631.00	100.0	0.1000	0.0
1632.00	152.0	0.1000	0.0
1633.00	200.0	0.1000	0.0
1639.00	232.0	0.1000	0.0
1645.00	320.0	0.1000	0.0
1649.00	340.0	0.1000	0.0

CROSS-SECTION NUMBER : 9 Arroyo Vista Dr. Upstream

Cross-Section Location (XS(I), mi) 0.650

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 9

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.018

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1616.64	0.0	0.1000	0.0
1618.00	40.0	0.1000	0.0
1622.00	85.0	0.1000	0.0
1624.00	120.0	0.1000	0.0
1626.00	210.0	0.1000	0.0
1628.00	250.0	0.1000	0.0
1632.00	370.0	0.1000	0.0
1638.00	485.0	0.1000	0.0

CROSS-SECTION NUMBER : 10 Arroyo Vista Dr. Downstre

Cross-Section Location (XS(I), mi) 0.668

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 10

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1614.53	28.0	0.1000	0.0
1618.00	38.0	0.1000	0.0
1622.00	65.0	0.1000	0.0
1624.00	80.0	0.1000	0.0
1626.00	148.0	0.1000	0.0
1628.00	225.0	0.1000	0.0
1632.00	370.0	0.1000	0.0
1638.00	535.0	0.1000	0.0

CROSS-SECTION NUMBER : 11

Cross-Section Location (XS(I), mi) 0.730

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 11

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1607.50	0.0	0.1000	0.0
1611.00	80.0	0.1000	0.0
1613.00	135.0	0.1000	0.0
1617.00	180.0	0.1000	0.0
1619.00	270.0	0.1000	0.0
1621.00	428.0	0.1000	0.0
1625.00	457.0	0.1000	0.0
1631.00	505.0	0.1000	0.0

CROSS-SECTION NUMBER : 12

Cross-Section Location (XS(I), mi) 0.910

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 12

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1589.50	4.0	0.1000	0.0
1593.00	83.0	0.1000	0.0
1597.00	108.0	0.1000	0.0
1599.00	170.0	0.1000	0.0
1603.00	185.0	0.1000	0.0
1607.00	203.0	0.1000	0.0
1611.00	287.0	0.1000	0.0
1613.00	300.0	0.1000	0.0

CROSS-SECTION NUMBER : 13 Saguaro Blvd. Upstream X-

Cross-Section Location (XS(I), mi) 1.000

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 13

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.031

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1584.82	6.0	0.1000	0.0
1588.00	20.0	0.1000	0.0
1592.00	60.0	0.1000	0.0
1596.00	125.0	0.1000	0.0
1598.00	168.0	0.1000	0.0
1600.00	180.0	0.1000	0.0
1604.00	205.0	0.1000	0.0
1605.00	228.0	0.1000	0.0

CROSS-SECTION NUMBER : 14 Saguaro Blvd. Downstream

Cross-Section Location (XS(I), mi) 1.031

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 14

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1582.40	6.0	0.1000	0.0
1584.00	90.0	0.1000	0.0
1588.00	110.0	0.1000	0.0
1592.00	130.0	0.1000	0.0
1596.00	145.0	0.1000	0.0
1598.00	217.0	0.1000	0.0
1600.00	230.0	0.1000	0.0
1602.00	240.0	0.1000	0.0

CROSS-SECTION NUMBER : 15

Cross-Section Location (XS(I), mi) 1.100

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 15

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1573.40	25.0	0.1000	0.0
1577.00	52.0	0.1000	0.0
1581.00	82.0	0.1000	0.0
1583.00	140.0	0.1000	0.0
1587.00	165.0	0.1000	0.0
1589.00	240.0	0.1000	0.0
1591.00	310.0	0.1000	0.0
1594.00	410.0	0.1000	0.0

CROSS-SECTION NUMBER : 16

Cross-Section Location (XS(I), mi) 1.200

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 16

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1563.70	8.0	0.1000	0.0
1567.00	72.0	0.1000	0.0
1573.00	100.0	0.1000	0.0
1574.00	148.0	0.1000	0.0
1575.00	208.0	0.1000	0.0
1577.00	310.0	0.1000	0.0
1581.00	480.0	0.1000	0.0
1586.00	790.0	0.1000	0.0

CROSS-SECTION NUMBER : 17

Cross-Section Location (XS(I), mi) 1.350

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 17

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1551.00	2.0	0.1000	0.0
1555.00	170.0	0.1000	0.0
1557.00	220.0	0.1000	0.0
1559.00	235.0	0.1000	0.0
1561.00	260.0	0.1000	0.0
1563.00	270.0	0.1000	0.0
1565.00	370.0	0.1000	0.0
1568.00	520.0	0.1000	0.0

CROSS-SECTION NUMBER : 18 Panorama Dr. Upstream X-s

Cross-Section Location (XS(I), mi) 1.410

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 18

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.023

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1546.40	34.0	0.1000	0.0
1548.00	160.0	0.1000	0.0
1552.00	185.0	0.1000	0.0
1556.00	260.0	0.1000	0.0
1558.00	270.0	0.1000	0.0
1560.00	305.0	0.1000	0.0
1562.00	490.0	0.1000	0.0
1564.00	680.0	0.1000	0.0

CROSS-SECTION NUMBER : 19 Panorama Dr. Downstream X

Cross-Section Location (XS(I), mi) 1.433

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 19

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1544.60	34.0	0.1000	0.0
1546.00	90.0	0.1000	0.0
1548.00	110.0	0.1000	0.0
1550.00	155.0	0.1000	0.0
1552.00	173.0	0.1000	0.0
1554.00	193.0	0.1000	0.0
1556.00	250.0	0.1000	0.0
1558.00	390.0	0.1000	0.0

CROSS-SECTION NUMBER : 20

Cross-Section Location (XS(I), mi) 1.540

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 20

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1534.60	0.0	0.1000	0.0
1536.00	125.0	0.1000	0.0
1540.00	153.0	0.1000	0.0
1542.00	310.0	0.1000	0.0
1544.00	330.0	0.1000	0.0
1546.00	360.0	0.1000	0.0
1550.00	395.0	0.1000	0.0
1552.00	510.0	0.1000	0.0

CROSS-SECTION NUMBER : 21

Cross-Section Location (XS(I), mi) 1.640

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 21

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1526.30	4.0	0.1000	0.0
1530.00	110.0	0.1000	0.0
1532.00	130.0	0.1000	0.0
1533.00	250.0	0.1000	0.0
1534.00	420.0	0.1000	0.0
1536.00	575.0	0.1000	0.0
1538.00	580.0	0.1000	0.0
1540.00	588.0	0.1000	0.0

CROSS-SECTION NUMBER : 22 Last Photogrametric X-sec

Cross-Section Location (XS(I), mi) 1.800

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 22

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1511.19	0.0	0.1000	0.0
1515.00	200.0	0.1000	0.0
1517.00	280.0	0.1000	0.0
1519.00	495.0	0.1000	0.0
1521.00	560.0	0.1000	0.0
1523.00	620.0	0.1000	0.0
1525.00	680.0	0.1000	0.0
1526.00	720.0	0.1000	0.0

CROSS-SECTION NUMBER : 23

Cross-Section Location (XS(I), mi) 2.030

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 23

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1497.42	2.0	0.1000	0.0
1500.00	55.0	0.1000	0.0
1501.00	165.0	0.1000	0.0
1502.00	310.0	0.1000	0.0
1504.00	330.0	0.1000	0.0
1506.00	384.0	0.1000	0.0
1508.00	430.0	0.1000	0.0
1510.00	500.0	0.1000	0.0

CROSS-SECTION NUMBER : 24

Cross-Section Location (XS(I), mi) 2.310

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 24

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1476.42	2.0	0.1000	0.0
1478.00	70.0	0.1000	0.0
1480.00	170.0	0.1000	0.0
1481.00	380.0	0.1000	0.0
1482.00	520.0	0.1000	0.0
1484.00	670.0	0.1000	0.0
1486.00	700.0	0.1000	0.0
1488.00	720.0	0.1000	0.0

CROSS-SECTION NUMBER : 25

Cross-Section Location (XS(I), mi) 2.570

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 25

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1459.36	2.0	0.1000	0.0
1460.00	40.0	0.1000	0.0
1462.00	260.0	0.1000	0.0
1464.00	420.0	0.1000	0.0
1466.00	425.0	0.1000	220.0
1468.00	430.0	0.1000	225.0
1470.00	438.0	0.1000	232.0
1472.00	450.0	0.1000	240.0

CROSS-SECTION NUMBER : 26

Cross-Section Location (XS(I), mi) 2.790

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 26

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1438.33	2.0	0.1000	0.0
1440.00	35.0	0.1000	0.0
1442.00	285.0	0.1000	0.0
1444.00	730.0	0.1000	0.0
1446.00	795.0	0.1000	0.0
1448.00	805.0	0.1000	0.0
1450.00	820.0	0.1000	0.0
1452.00	830.0	0.1000	0.0

CROSS-SECTION NUMBER : 27

Cross-Section Location (XS(I), mi) 3.040

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 27

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1422.60	2.0	0.1000	0.0
1424.00	70.0	0.1000	0.0
1425.00	120.0	0.1000	0.0
1426.00	178.0	0.1000	0.0
1428.00	200.0	0.1000	0.0
1430.00	228.0	0.1000	500.0
1432.00	230.0	0.1000	600.0
1434.00	245.0	0.1000	700.0

CROSS-SECTION NUMBER : 28

Cross-Section Location (XS(I), mi) 3.560

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 28

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1393.66	4.0	0.1000	0.0
1395.00	160.0	0.1000	0.0
1396.00	288.0	0.1000	0.0
1398.00	305.0	0.1000	0.0
1400.00	320.0	0.1000	0.0
1401.00	470.0	0.1000	0.0
1402.00	530.0	0.1000	0.0
1404.00	800.0	0.1000	0.0

CROSS-SECTION NUMBER : 29

Cross-Section Location (XS(I), mi) 3.650

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 29

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1388.54	30.0	0.1000	0.0
1389.00	90.0	0.1000	0.0
1390.00	400.0	0.1000	0.0
1391.00	480.0	0.1000	0.0
1392.00	630.0	0.1000	0.0
1393.00	800.0	0.1000	0.0
1394.00	930.0	0.1000	0.0
1395.00	1170.0	0.1000	0.0

CROSS-SECTION NUMBER : 30 Forth McDowell Road

Cross-Section Location (XS(I), mi) 3.850

Flooding Elevation (FSTG(I), ft MSL) 0.000

CROSS-SECTION DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Storage Top Width BSS(K,I) (ft)
1378.36	20.0	0.0
1379.00	150.0	0.0
1380.00	690.0	0.0
1381.00	950.0	0.0
1382.00	1030.0	0.0
1383.00	1120.0	0.0
1384.00	1180.0	0.0
1385.00	1250.0	0.0

DISTANCE BETWEEN INTERPOLATED CROSS-SECTIONS
(DXM) THAT WILL BE USED IN COMPUTATIONS :

Down Stream Reach Number I=1,NS1	Interp. Cross Section Distance DXM(I) (mi)
1	101.0000
2	0.0259
3	0.0167
4	0.0216
5	0.0200
6	101.0000
7	0.0074
8	0.0145
9	101.0000
10	0.0207
11	0.0280
12	0.0150
13	101.0000
14	0.0279
15	0.0289
16	0.0245
17	0.0200
18	101.0000
19	0.0263
20	0.0225
21	0.0238
22	0.0185
23	0.0182
24	0.0192
25	0.0186
26	0.0154
27	0.0161
28	0.0136
29	0.0130

LATERAL INFLOW DESCRIPTION :

Cross-Section Reach Number (LQX(I)) 11

Hydro-Graph Entry I	Lateral Inflow QL(I) (cfs)
1	320.
2	320.
3	320.
4	320.
5	320.
6	320.
7	320.
8	320.
9	320.
10	320.
11	320.
12	320.
13	320.
14	320.
15	320.
16	320.
17	320.
18	320.
19	0.
20	0.
21	0.
22	0.
23	0.
24	0.
25	0.
26	0.
27	0.
28	0.
29	0.
30	0.
31	0.
32	0.
33	0.
34	0.
35	0.
36	0.
37	0.
38	0.
39	0.
40	0.
41	0.
42	0.
43	0.
44	0.
45	0.

LATERAL INFLOW DESCRIPTION :

Cross-Section Reach Number (LQX(I)) 16

Hydro-Graph Entry I	Lateral Inflow QL(I) (cfs)
1	680.
2	680.
3	680.
4	680.
5	680.
6	680.
7	680.
8	680.
9	680.
10	680.
11	680.
12	680.
13	680.
14	680.
15	680.
16	680.
17	680.
18	680.
19	680.
20	0.
21	0.
22	0.
23	0.
24	0.
25	0.
26	0.
27	0.
28	0.
29	0.
30	0.
31	0.
32	0.
33	0.
34	0.
35	0.
36	0.
37	0.
38	0.
39	0.
40	0.
41	0.
42	0.
43	0.
44	0.
45	0.

Total number of cross-sections (original+interpolated) 207

Maximum number of cross-sections allowed 300

FLOOD CREST SUMMARY :

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Flood Elevation (ft MSL)	Time To Flood Elevation (hr)	Flood Wave Arrival Time (hr)
0.000	1707.26	14205	4.485	29602.89	0.00	0.00	4.00
0.042	1691.41	14205	4.625	9.30	0.00	0.00	4.30
0.068	1686.68	14096	4.630	9.24	0.00	0.00	4.25
0.094	1682.32	13876	4.640	9.16	0.00	0.00	4.35
0.120	1680.24	13535	4.650	6.71	0.00	0.00	4.00
0.137	1679.11	13304	4.655	6.76	0.00	0.00	4.00
0.153	1678.15	13060	4.665	6.74	0.00	0.00	4.00
0.170	1677.39	12760	4.670	6.50	0.00	0.00	4.00
0.195	1676.34	12268	4.675	6.58	0.00	0.00	4.00
0.220	1675.29	11765	4.685	6.70	0.00	0.00	4.00
0.245	1674.14	11317	4.690	6.94	0.00	0.00	4.00
0.270	1672.63	10999	4.695	7.65	0.00	0.00	4.00
0.290	1671.70	10830	4.695	6.11	0.00	0.00	4.00
0.310	1670.75	10694	4.700	5.15	0.00	0.00	4.00
0.330	1669.89	10583	4.705	4.40	0.00	0.00	4.00
0.350	1669.19	10505	4.710	3.73	0.00	0.00	4.00
0.370	1668.67	10473	4.710	3.11	0.00	0.00	4.00
0.402	1657.27	10473	4.710	9.24	0.00	0.00	4.00
0.409	1655.42	10473	4.710	9.32	0.00	0.00	4.00
0.417	1653.58	10471	4.710	9.39	0.00	0.00	4.00
0.424	1651.75	10467	4.710	9.44	0.00	0.00	4.00
0.431	1649.92	10463	4.715	9.48	0.00	0.00	4.00
0.439	1648.11	10458	4.715	9.50	0.00	0.00	4.35
0.446	1646.31	10459	4.715	9.51	0.00	0.00	4.40
0.453	1644.51	10459	4.715	9.52	0.00	0.00	4.40
0.461	1642.73	10458	4.715	9.51	0.00	0.00	4.40
0.468	1640.95	10455	4.720	9.52	0.00	0.00	4.45
0.475	1639.68	10441	4.725	8.83	0.00	0.00	4.45
0.483	1639.16	10414	4.730	7.23	0.00	0.00	4.00
0.490	1638.96	10391	4.730	5.75	0.00	0.00	4.00
0.505	1638.31	10337	4.730	5.61	0.00	0.00	4.00
0.519	1637.70	10282	4.735	5.43	0.00	0.00	4.00
0.534	1637.13	10227	4.735	5.22	0.00	0.00	4.00
0.548	1636.60	10175	4.740	4.99	0.00	0.00	4.00
0.563	1636.12	10123	4.740	4.73	0.00	0.00	4.00
0.577	1635.69	10078	4.745	4.44	0.00	0.00	4.00
0.592	1635.32	10033	4.745	4.14	0.00	0.00	4.00
0.606	1635.00	10001	4.745	3.82	0.00	0.00	4.00
0.621	1634.74	9969	4.745	3.50	0.00	0.00	4.00
0.635	1634.53	9956	4.745	3.19	0.00	0.00	4.00
0.650	1634.36	9943	4.745	2.89	0.00	0.00	4.00
0.668	1628.83	9943	4.750	8.89	0.00	0.00	4.00
0.689	1625.30	9918	4.755	8.27	0.00	0.00	4.00
0.709	1621.88	9869	4.765	8.28	0.00	0.00	4.35
0.730	1619.58	9806	4.770	6.43	0.00	0.00	4.00
0.760	1616.50	9732	4.775	6.58	0.00	0.00	4.55
0.790	1613.50	9691	4.780	6.76	0.00	0.00	4.60
0.820	1610.56	9655	4.785	6.94	0.00	0.00	4.65

FLOOD CREST SUMMARY :

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Flood Elevation (ft MSL)	Time To Flood Elevation (hr)	Flood Wave Arrival Time (hr)
0.850	1607.88	9603	4.795	6.90	0.00	0.00	4.70
0.880	1606.02	9533	4.800	6.11	0.00	0.00	4.70
0.910	1605.06	9471	4.805	4.98	0.00	0.00	4.60
0.925	1604.62	9446	4.805	5.05	0.00	0.00	4.60
0.940	1604.15	9431	4.805	5.16	0.00	0.00	4.60
0.955	1603.63	9415	4.805	5.31	0.00	0.00	4.60
0.970	1603.02	9410	4.805	5.53	0.00	0.00	4.65
0.985	1602.28	9405	4.805	5.87	0.00	0.00	4.65
1.000	1601.32	9402	4.810	6.46	0.00	0.00	4.65
1.031	1593.40	9402	4.810	8.24	0.00	0.00	4.00
1.066	1590.15	9381	4.820	8.05	0.00	0.00	4.00
1.100	1587.07	9334	4.825	7.60	0.00	0.00	4.00
1.133	1584.00	9279	4.830	7.11	0.00	0.00	4.00
1.167	1580.70	9243	4.835	7.12	0.00	0.00	4.65
1.200	1576.88	9199	4.840	8.01	0.00	0.00	4.00
1.225	1573.67	9169	4.845	7.32	0.00	0.00	4.00
1.250	1570.58	9141	4.850	7.11	0.00	0.00	4.00
1.275	1567.69	9116	4.855	7.03	0.00	0.00	4.00
1.300	1565.05	9091	4.860	6.80	0.00	0.00	4.70
1.325	1563.06	9055	4.870	5.99	0.00	0.00	4.70
1.350	1562.06	9012	4.875	4.68	0.00	0.00	4.70
1.370	1561.64	8982	4.875	3.95	0.00	0.00	4.75
1.390	1561.37	8959	4.875	3.24	0.00	0.00	4.75
1.410	1561.16	8952	4.875	2.75	0.00	0.00	4.00
1.433	1553.82	8952	4.880	7.40	0.00	0.00	4.75
1.460	1551.08	8940	4.885	6.79	0.00	0.00	4.80
1.486	1548.46	8926	4.885	6.34	0.00	0.00	4.80
1.513	1545.94	8907	4.890	5.95	0.00	0.00	4.80
1.540	1543.91	8881	4.900	5.19	0.00	0.00	4.80
1.565	1542.12	8853	4.905	5.03	0.00	0.00	4.80
1.590	1540.21	8827	4.910	4.82	0.00	0.00	4.80
1.615	1538.19	8801	4.915	4.59	0.00	0.00	4.80
1.640	1535.88	8774	4.920	4.84	0.00	0.00	4.85
1.667	1533.14	8746	4.925	4.76	0.00	0.00	4.85
1.693	1530.37	8722	4.935	4.85	0.00	0.00	4.85
1.720	1527.57	8695	4.940	4.94	0.00	0.00	4.90
1.747	1524.78	8670	4.945	4.94	0.00	0.00	4.90
1.773	1521.94	8644	4.955	5.03	0.00	0.00	4.90
1.800	1519.94	8592	4.965	4.10	0.00	0.00	4.90
1.819	1518.76	8547	4.970	4.12	0.00	0.00	4.90
1.838	1517.59	8504	4.975	4.15	0.00	0.00	4.90
1.857	1516.42	8464	4.980	4.17	0.00	0.00	4.90
1.877	1515.25	8424	4.985	4.20	0.00	0.00	4.90
1.896	1514.08	8382	4.990	4.23	0.00	0.00	4.90
1.915	1512.93	8341	5.000	4.26	0.00	0.00	4.90
1.934	1511.78	8299	5.005	4.29	0.00	0.00	4.90
1.953	1510.64	8258	5.010	4.32	0.00	0.00	4.90
1.972	1509.50	8220	5.015	4.36	0.00	0.00	4.95

FLOOD CREST SUMMARY :

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Flood Elevation (ft MSL)	Time To Flood Elevation (hr)	Flood Wave Arrival Time (hr)
1.992	1508.34	8187	5.020	4.41	0.00	0.00	4.95
2.011	1507.12	8160	5.020	4.54	0.00	0.00	4.95
2.030	1505.69	8140	5.025	4.93	0.00	0.00	4.95
2.049	1504.22	8122	5.030	4.83	0.00	0.00	4.95
2.067	1502.75	8103	5.035	4.74	0.00	0.00	5.00
2.086	1501.28	8083	5.040	4.65	0.00	0.00	5.00
2.105	1499.81	8062	5.045	4.57	0.00	0.00	5.00
2.123	1498.34	8041	5.050	4.50	0.00	0.00	5.00
2.142	1496.87	8020	5.055	4.42	0.00	0.00	5.00
2.161	1495.41	7999	5.060	4.35	0.00	0.00	5.00
2.179	1493.94	7978	5.065	4.28	0.00	0.00	5.00
2.198	1492.48	7957	5.070	4.22	0.00	0.00	5.00
2.217	1491.02	7936	5.075	4.16	0.00	0.00	5.00
2.235	1489.55	7914	5.080	4.10	0.00	0.00	5.00
2.254	1488.09	7893	5.085	4.04	0.00	0.00	5.05
2.273	1486.63	7871	5.090	3.99	0.00	0.00	5.05
2.291	1485.19	7845	5.095	3.92	0.00	0.00	5.05
2.310	1483.88	7813	5.105	3.69	0.00	0.00	5.05
2.330	1482.52	7778	5.110	3.75	0.00	0.00	5.05
2.350	1481.16	7743	5.115	3.82	0.00	0.00	5.05
2.370	1479.78	7705	5.125	3.88	0.00	0.00	5.05
2.390	1478.40	7670	5.130	3.95	0.00	0.00	5.05
2.410	1477.01	7634	5.140	4.01	0.00	0.00	5.05
2.430	1475.61	7597	5.145	4.07	0.00	0.00	5.10
2.450	1474.20	7562	5.150	4.13	0.00	0.00	5.10
2.470	1472.78	7525	5.160	4.19	0.00	0.00	5.10
2.490	1471.36	7492	5.165	4.24	0.00	0.00	5.10
2.510	1469.94	7458	5.175	4.28	0.00	0.00	5.10
2.530	1468.51	7428	5.180	4.31	0.00	0.00	5.10
2.550	1467.06	7406	5.185	4.37	0.00	0.00	5.10
2.570	1465.33	7391	5.190	4.76	0.00	0.00	5.10
2.590	1463.45	7379	5.195	4.61	0.00	0.00	5.15
2.610	1461.57	7368	5.200	4.49	0.00	0.00	5.15
2.630	1459.70	7356	5.205	4.37	0.00	0.00	5.15
2.650	1457.83	7346	5.210	4.27	0.00	0.00	5.15
2.670	1455.96	7336	5.215	4.17	0.00	0.00	5.15
2.690	1454.09	7326	5.220	4.08	0.00	0.00	5.15
2.710	1452.23	7317	5.225	4.00	0.00	0.00	5.15
2.730	1450.37	7308	5.230	3.92	0.00	0.00	5.20
2.750	1448.51	7299	5.235	3.84	0.00	0.00	5.20
2.770	1446.62	7289	5.240	3.84	0.00	0.00	5.20
2.790	1445.12	7270	5.250	3.31	0.00	0.00	5.20
2.806	1444.12	7252	5.255	3.36	0.00	0.00	5.20
2.821	1443.13	7234	5.260	3.41	0.00	0.00	5.20
2.837	1442.15	7215	5.265	3.46	0.00	0.00	5.20
2.853	1441.18	7195	5.270	3.52	0.00	0.00	5.20
2.868	1440.22	7175	5.275	3.58	0.00	0.00	5.25
2.884	1439.28	7155	5.285	3.64	0.00	0.00	5.25

FLOOD CREST SUMMARY :

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Flood Elevation (ft MSL)	Time To Flood Elevation (hr)	Flood Wave Arrival Time (hr)
2.899	1438.34	7133	5.290	3.71	0.00	0.00	5.25
2.915	1437.43	7107	5.295	3.79	0.00	0.00	5.25
2.931	1436.54	7075	5.305	3.88	0.00	0.00	5.25
2.946	1435.69	7033	5.315	3.97	0.00	0.00	5.25
2.962	1434.87	6980	5.325	4.06	0.00	0.00	5.25
2.978	1434.08	6913	5.335	4.17	0.00	0.00	5.25
2.993	1433.32	6832	5.345	4.29	0.00	0.00	5.25
3.009	1432.56	6744	5.355	4.44	0.00	0.00	5.25
3.024	1431.76	6661	5.360	4.69	0.00	0.00	5.25
3.040	1430.79	6587	5.370	5.24	0.00	0.00	5.25
3.056	1429.80	6518	5.380	5.12	0.00	0.00	5.25
3.073	1428.81	6456	5.390	5.02	0.00	0.00	5.25
3.089	1427.83	6400	5.400	4.92	0.00	0.00	5.30
3.105	1426.84	6350	5.410	4.84	0.00	0.00	5.30
3.121	1425.87	6304	5.420	4.76	0.00	0.00	5.30
3.137	1424.89	6261	5.430	4.68	0.00	0.00	5.30
3.154	1423.92	6221	5.440	4.62	0.00	0.00	5.30
3.170	1422.94	6184	5.450	4.56	0.00	0.00	5.30
3.186	1421.97	6148	5.455	4.50	0.00	0.00	5.30
3.202	1421.00	6113	5.465	4.46	0.00	0.00	5.30
3.219	1420.02	6079	5.475	4.41	0.00	0.00	5.30
3.235	1419.05	6047	5.485	4.38	0.00	0.00	5.30
3.251	1418.07	6019	5.490	4.35	0.00	0.00	5.30
3.267	1417.09	5993	5.500	4.32	0.00	0.00	5.30
3.284	1416.11	5969	5.510	4.31	0.00	0.00	5.35
3.300	1415.13	5948	5.515	4.29	0.00	0.00	5.35
3.316	1414.15	5927	5.525	4.29	0.00	0.00	5.35
3.332	1413.17	5909	5.530	4.29	0.00	0.00	5.35
3.349	1412.17	5892	5.535	4.29	0.00	0.00	5.35
3.365	1411.18	5877	5.545	4.30	0.00	0.00	5.35
3.381	1410.18	5863	5.550	4.31	0.00	0.00	5.35
3.397	1409.17	5852	5.555	4.32	0.00	0.00	5.35
3.414	1408.16	5844	5.560	4.33	0.00	0.00	5.35
3.430	1407.15	5837	5.560	4.34	0.00	0.00	5.35
3.446	1406.17	5834	5.565	4.33	0.00	0.00	5.35
3.462	1405.20	5831	5.570	4.32	0.00	0.00	5.40
3.479	1404.24	5829	5.570	4.30	0.00	0.00	5.40
3.495	1403.28	5827	5.575	4.28	0.00	0.00	5.40
3.511	1402.32	5825	5.580	4.27	0.00	0.00	5.40
3.527	1401.34	5823	5.580	4.28	0.00	0.00	5.40
3.544	1400.33	5822	5.585	4.31	0.00	0.00	5.40
3.560	1399.22	5820	5.585	4.46	0.00	0.00	5.40
3.575	1398.19	5818	5.590	4.22	0.00	0.00	5.40
3.590	1397.16	5816	5.595	3.97	0.00	0.00	5.40
3.605	1396.12	5813	5.600	3.73	0.00	0.00	5.40
3.620	1395.05	5811	5.605	3.51	0.00	0.00	5.45
3.635	1393.97	5807	5.610	3.28	0.00	0.00	5.45
3.650	1393.05	5804	5.615	2.88	0.00	0.00	5.45

FLOOD CREST SUMMARY :

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Flood Elevation (ft MSL)	Time To Flood Elevation (hr)	Flood Wave Arrival Time (hr)
3.663	1392.28	5800	5.620	2.86	0.00	0.00	5.45
3.677	1391.51	5796	5.625	2.85	0.00	0.00	5.45
3.690	1390.75	5793	5.630	2.83	0.00	0.00	5.45
3.703	1390.00	5789	5.635	2.81	0.00	0.00	5.50
3.717	1389.25	5786	5.640	2.79	0.00	0.00	5.50
3.730	1388.51	5783	5.645	2.77	0.00	0.00	5.50
3.743	1387.77	5779	5.650	2.74	0.00	0.00	5.50
3.757	1387.03	5776	5.655	2.72	0.00	0.00	5.50
3.770	1386.30	5773	5.660	2.69	0.00	0.00	5.50
3.783	1385.58	5769	5.665	2.67	0.00	0.00	5.50
3.797	1384.85	5766	5.670	2.64	0.00	0.00	5.55
3.810	1384.13	5763	5.675	2.61	0.00	0.00	5.55
3.823	1383.41	5760	5.680	2.59	0.00	0.00	5.55
3.837	1382.70	5757	5.685	2.56	0.00	0.00	5.55
3.850	1381.98	5754	5.690	2.54	0.00	0.00	5.55

END OF OUTPUT

APPENDIX G

DAMBRK OUTPUT FOR SCENARIO 2
FAILURE OF FOUNTAIN LAKE DAM

==========
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PROJECT DESCRIPTION :

PROJECT TITLE : Fountain Lake Dam Scenario No.2 (Breach)
PROJECT NUMBER : 465.12
DESCRIPTION : Pipping failure, FIS baseflow
ENGINEER : Survey reservation
DATE OF RUN : 2/08/1996
TIME OF RUN : 11:13 am

INPUT DATA SUMMARY :

INPUT CONTROL PARAMETERS :

Problem Specification Option	13	
Number of Dynamic Routing Reaches (KKN)	1	
Type of Reservoir Routing (KUI)	1	(dynamic routing)
Number of multiple dams/bridges (MULDAM)	1	
No. of Reservoir Inflow Hydrograph Points (ITEH)	37	
No. of Informational Cross-Sections (NPRT)	0	
Flood-Plain Routing (KFLP)	0	(no)

CROSS-SECTION NUMBERS COINCIDENT
WITH UPSTREAM DAM FACE (IDAM) :

1

RESERVOIR VOLUME DESCRIPTION :

Elevation vs. Surface Area Table

Elevation HSA(K) (ft MSL)	Surface Area SA(K) (acres)
1577.14	34.500
1575.74	32.700
1574.74	30.700
1573.74	24.400
1572.74	28.800
1571.74	27.500
1569.74	24.100
1562.20	0.000

DAM NUMBER : 1 (Fountain Lake DAM)

RESERVOIR AND BREACH PARAMETERS :

Initial Elevation of Water Surface (YO, ft MSL)		1572.23
Breach Side Slope (Z)	1:	0.00
Breach Bottom Elevation (YBMIN, ft MSL)		1562.20
Breach Base Width (BB, ft)		72.00
Time of Breach Formation (TFH, hr)		1.00

RESERVOIR DESCRIPTION :

Water Surface Elevation at Time of Breach (HF, ft MSL)	1574.00
Top of Dam Crest Elevation (HD, ft MSL)	1577.14
Uncontrolled Spillway Crest Elevation (HSP, ft MSL)	1573.24
Spillway Gate Center Elevation (HGT, ft MSL)	0.00
Uncontrolled Spillway Discharge Coefficient (CS)	0.00
Spillway Gate Discharge Coefficient (CG)	0.00
Piping Centerline Elevation (CDO, ft MSL)	1562.20
Turbine Discharge (QT, cfs)	100.00

SPILLWAY/GATE RATING CURVE :

Head HEAD(1) (ft)	Flow QSPILL(1) (cfs)
0.00	0.0
0.40	17.0
0.60	56.0
0.90	120.0
1.30	290.0
1.80	758.0
2.10	1160.0
3.90	6000.0

BOUNDARY CONDITIONS :

Hydrograph Time Intervals (DHF, hr)	0.00
Routing Period (TEH, hr)	7.00
Breach Development Exponent (BREX)	1.00
Mud/Debris Flow Parameter (MUD)	0
Dry Bed Routing Parameter (IWF)	0
Hydraulic Radius Computation Parameter (KPRES)	0 (R=A/B)
Landslide Simulation (KSL)	0 (none)
Critical Flow Froude Number (DFR)	0.950

INFLOW HYDROGRAPH DESCRIPTION :

Time Elapsed TI(K) (hr)	Upstream Inflow QI(K) (cfs)
0.00	101.0
0.25	101.0
0.50	105.0
0.75	106.0
1.00	107.0
1.25	110.0
1.50	111.0
1.75	115.0
2.00	121.0
2.00	329.0
2.25	127.0
2.50	142.0
2.75	156.0
3.00	1137.0
3.25	1745.0
3.50	945.0
4.00	152.0
4.25	123.0
4.50	118.0
4.75	115.0
5.00	113.0
5.25	109.0
5.50	101.0
5.75	100.0
6.00	100.0
6.25	100.0
6.50	100.0
6.75	100.0
7.00	100.0
7.25	100.0
7.50	100.0
7.75	100.0
8.00	100.0
8.25	100.0
8.50	100.0
8.75	100.0
9.00	100.0

SUMMARY OF PROGRAM CONTROL PARAMETERS :

Problem Specification Option (KKN, KUI, MULDAM, IDAM)	13	
Number of Cross-Sections Entered (NS)	14	
Number of Top Widths Entered (NCS)	8	
Number of Cross-Sectional Hydrographs to Plot (NTT)	6	
Flow Type Parameter (KSUPC)	3	(mixed flow)
Number of Lateral Inflow Hydrographs (LQ)	1	
Number of Points in Gate Control Curve (KCG)	0	

CROSS-SECTIONS WHERE HYDROGRAPH REQUESTED :
(maximum allowed = 6)

1 2 4 5 6 7

CHANNEL-VALLEY BOUNDARY CONDITIONS :

Max Discharge at Downstream End (QMAXD, cfs)	0.0
Max Lateral Outflow due to Flood Wave (QLL, cfs/ft)	0.0000
Initial Time-Step Size (DTHM, hr)	0.0050
Time at which Dam Starts to Fail (TFI, hr)	3.2500
Theta Weighting Factor (F1I)	0.000
Stage Convergence Criterion (EPSY, ft)	0.000
Downstream Boundary Type Paramter (YDN)	0.00
Slope of Channel Downstream of Dam (SOM, ft/mi)	0.0000

CROSS-SECTION NUMBER : 1 Fountain Lake Dam Upstrea

Cross-Section Location (XS(I), mi) 1.269

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 1

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.051

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1562.20	70.0	0.1000	0.0
1564.00	95.0	0.1000	0.0
1566.00	200.0	0.1000	0.0
1568.00	300.0	0.1000	0.0
1570.00	390.0	0.1000	0.0
1572.00	480.0	0.1000	0.0
1576.00	660.0	0.1000	0.0
1577.14	945.0	0.1000	0.0

CROSS-SECTION NUMBER : 2 Fountain Lake Dam Downstr

Cross-Section Location (XS(I), mi) 1.320

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 2

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1562.00	75.0	0.1000	0.0
1564.00	110.0	0.1000	0.0
1565.00	230.0	0.1000	0.0
1566.00	380.0	0.1000	0.0
1568.00	460.0	0.1000	0.0
1570.00	585.0	0.1000	0.0
1572.00	610.0	0.1000	0.0
1574.00	665.0	0.1000	0.0

CROSS-SECTION NUMBER : 3

Cross-Section Location (XS(I), mi) 1.420

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 3

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1535.80	10.0	0.1000	0.0
1540.00	50.0	0.1000	0.0
1541.00	103.0	0.1000	0.0
1542.00	155.0	0.1000	0.0
1544.00	255.0	0.1000	0.0
1546.00	268.0	0.1000	0.0
1548.00	278.0	0.1000	0.0
1550.00	440.0	0.1000	0.0

CROSS-SECTION NUMBER : 4

Cross-Section Location (XS(I), mi) 1.500

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 4

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1528.00	10.0	0.1000	0.0
1530.00	150.0	0.1000	0.0
1532.00	230.0	0.1000	0.0
1534.00	250.0	0.1000	0.0
1536.00	265.0	0.1000	0.0
1538.00	285.0	0.1000	0.0
1540.00	300.0	0.1000	0.0
1542.00	310.0	0.1000	0.0

CROSS-SECTION NUMBER : 5

Cross-Section Location (XS(I), mi) 1.680

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 5

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1520.40	4.0	0.1000	0.0
1522.00	33.0	0.1000	0.0
1523.00	90.0	0.1000	0.0
1524.00	155.0	0.1000	0.0
1526.00	205.0	0.1000	0.0
1530.00	230.0	0.1000	0.0
1532.00	240.0	0.1000	0.0
1534.00	253.0	0.1000	0.0

CROSS-SECTION NUMBER : 6 Last Photogrametric X-sec

Cross-Section Location (XS(I), mi) 1.800

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 6

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1511.19	0.0	0.1000	0.0
1515.00	200.0	0.1000	0.0
1517.00	280.0	0.1000	0.0
1519.00	495.0	0.1000	0.0
1521.00	560.0	0.1000	0.0
1523.00	620.0	0.1000	0.0
1525.00	680.0	0.1000	0.0
1526.00	720.0	0.1000	0.0

CROSS-SECTION NUMBER : 7

Cross-Section Location (XS(I), mi) 2.030

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 7

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1497.42	2.0	0.1000	0.0
1500.00	55.0	0.1000	0.0
1501.00	165.0	0.1000	0.0
1502.00	310.0	0.1000	0.0
1504.00	330.0	0.1000	0.0
1506.00	384.0	0.1000	0.0
1508.00	430.0	0.1000	0.0
1510.00	500.0	0.1000	0.0

CROSS-SECTION NUMBER : 8

Cross-Section Location (XS(I), mi) 2.310

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 8

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1476.42	2.0	0.1000	0.0
1478.00	70.0	0.1000	0.0
1480.00	170.0	0.1000	0.0
1481.00	380.0	0.1000	0.0
1482.00	520.0	0.1000	0.0
1484.00	670.0	0.1000	0.0
1486.00	700.0	0.1000	0.0
1488.00	720.0	0.1000	0.0

CROSS-SECTION NUMBER : 9

Cross-Section Location (XS(I), mi) 2.570

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 9

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1459.36	2.0	0.1000	0.0
1460.00	40.0	0.1000	0.0
1462.00	260.0	0.1000	0.0
1464.00	420.0	0.1000	0.0
1466.00	425.0	0.1000	220.0
1468.00	430.0	0.1000	225.0
1470.00	438.0	0.1000	232.0
1472.00	450.0	0.1000	240.0

CROSS-SECTION NUMBER : 10

Cross-Section Location (XS(I), mi) 2.790

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 10

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1438.33	2.0	0.1000	0.0
1440.00	35.0	0.1000	0.0
1442.00	285.0	0.1000	0.0
1444.00	730.0	0.1000	0.0
1446.00	795.0	0.1000	0.0
1448.00	805.0	0.1000	0.0
1450.00	820.0	0.1000	0.0
1452.00	830.0	0.1000	0.0

CROSS-SECTION NUMBER : 11

Cross-Section Location (XS(I), mi) 3.040

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 11

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1422.60	2.0	0.1000	0.0
1424.00	70.0	0.1000	0.0
1425.00	120.0	0.1000	0.0
1426.00	178.0	0.1000	0.0
1428.00	200.0	0.1000	0.0
1430.00	228.0	0.1000	500.0
1432.00	230.0	0.1000	600.0
1434.00	245.0	0.1000	700.0

CROSS-SECTION NUMBER : 12

Cross-Section Location (XS(I), mi) 3.560

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 12

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1393.66	4.0	0.1000	0.0
1395.00	160.0	0.1000	0.0
1396.00	288.0	0.1000	0.0
1398.00	305.0	0.1000	0.0
1400.00	320.0	0.1000	0.0
1401.00	470.0	0.1000	0.0
1402.00	530.0	0.1000	0.0
1404.00	800.0	0.1000	0.0

CROSS-SECTION NUMBER : 13

Cross-Section Location (XS(I), mi) 3.650

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 13

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1388.54	30.0	0.1000	0.0
1389.00	90.0	0.1000	0.0
1390.00	400.0	0.1000	0.0
1391.00	480.0	0.1000	0.0
1392.00	630.0	0.1000	0.0
1393.00	800.0	0.1000	0.0
1394.00	930.0	0.1000	0.0
1395.00	1170.0	0.1000	0.0

CROSS-SECTION NUMBER : 14 Forth McDowell Road

Cross-Section Location (XS(I), mi) 3.850

Flooding Elevation (FSTG(I), ft MSL) 0.000

CROSS-SECTION DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Storage Top Width BSS(K,I) (ft)
1378.36	20.0	0.0
1379.00	150.0	0.0
1380.00	690.0	0.0
1381.00	950.0	0.0
1382.00	1030.0	0.0
1383.00	1120.0	0.0
1384.00	1180.0	0.0
1385.00	1250.0	0.0

DISTANCE BETWEEN INTERPOLATED CROSS-SECTIONS
(DXM) THAT WILL BE USED IN COMPUTATIONS :

Down Stream Reach Number I=1,NS1	Interp. Cross Section Distance DXM(I) (mi)
1	101.0000
2	0.0308
3	0.0160
4	0.0180
5	0.0050
6	0.0170
7	0.0170
8	0.0179
9	0.0172
10	0.0145
11	0.0158
12	0.0149
13	0.0142

LATERAL INFLOW DESCRIPTION :

Cross-Section Reach Number (LQX(I)) 5

Hydro-Graph Entry I	Lateral Inflow QL(I) (cfs)
1	1200.
2	1200.
3	1200.
4	1200.
5	1200.
6	1200.
7	1200.
8	1200.
9	1200.
10	1200.
11	1200.
12	1200.
13	1200.
14	1200.
15	1200.
16	1200.
17	1200.
18	1200.
19	1200.
20	1200.
21	1200.
22	1200.
23	1200.
24	1200.
25	1200.
26	1200.
27	1200.
28	1200.
29	1200.
30	1200.
31	1200.
32	1200.
33	1200.
34	1200.
35	1200.
36	1200.
37	1200.

Total number of cross-sections (original+interpolated) 169

Maximum number of cross-sections allowed 300

OUTPUT DATA SUMMARY :

CROSS-SECTION and REACH SUMMARY :

Cross Section Number	Cross Section Location (mi)	Bottom Elevation (ft MSL)	Reach Number	Reach Length (mi)	Reach Slope (ft/mi)
1	1.269	1562.200			
2	1.320	1562.000	1	0.051	3.952
3	1.420	1535.800	2	0.100	262.000
4	1.500	1528.000	3	0.080	97.501
5	1.680	1520.400	4	0.180	42.222
6	1.800	1511.190	5	0.120	76.751
7	2.030	1497.420	6	0.230	59.869
8	2.310	1476.420	7	0.280	75.000
9	2.570	1459.360	8	0.260	65.616
10	2.790	1438.330	9	0.220	95.591
11	3.040	1422.600	10	0.250	62.920
12	3.560	1393.660	11	0.520	55.654
13	3.650	1388.540	12	0.090	56.889
14	3.850	1378.360	13	0.200	50.900

FLOOD CREST SUMMARY :

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Flood Elevation (ft MSL)	Time To Flood Elevation (hr)	Flood Wave Arrival Time (hr)
1.269	1574.55	4453	3.500	4.28	0.00	0.00	3.15
1.320	1566.39	4453	3.900	5.49	0.00	0.00	3.75
1.353	1558.90	4496	3.950	5.15	0.00	0.00	3.75
1.387	1550.84	4531	3.950	6.65	0.00	0.00	3.75
1.420	1544.44	4529	3.950	5.30	0.00	0.00	3.75
1.436	1542.16	4511	3.950	5.49	0.00	0.00	3.75
1.452	1539.81	4484	3.950	5.67	0.00	0.00	3.75
1.468	1537.48	4456	3.950	5.73	0.00	0.00	3.75
1.484	1535.73	4433	4.000	5.08	0.00	0.00	3.75
1.500	1535.08	4441	4.000	3.49	0.00	0.00	3.75
1.518	1534.48	4445	4.000	3.50	0.00	0.00	3.75
1.536	1533.87	4442	4.000	3.51	0.00	0.00	3.75
1.554	1533.25	4432	4.000	3.54	0.00	0.00	3.75
1.572	1532.61	4417	4.000	3.58	0.00	0.00	3.75
1.590	1531.95	4396	4.050	3.62	0.00	0.00	3.75
1.608	1531.30	4372	4.050	3.67	0.00	0.00	3.75
1.626	1530.62	4344	4.050	3.72	0.00	0.00	3.75
1.644	1529.91	4354	4.050	3.80	0.00	0.00	3.75
1.662	1529.14	4362	4.050	3.92	0.00	0.00	3.75
1.680	1528.27	4367	4.050	4.14	0.00	0.00	3.75
1.685	1527.53	5568	4.050	5.40	0.00	0.00	3.75
1.690	1527.10	5569	4.050	5.23	0.00	0.00	3.75
1.695	1526.67	5570	4.050	5.07	0.00	0.00	3.75
1.700	1526.25	5570	4.050	4.92	0.00	0.00	3.75
1.705	1525.84	5571	4.050	4.80	0.00	0.00	3.75
1.710	1525.44	5571	4.050	4.68	0.00	0.00	3.75
1.715	1525.04	5571	4.050	4.58	0.00	0.00	3.75
1.720	1524.64	5571	4.050	4.49	0.00	0.00	3.75
1.725	1524.25	5571	4.050	4.41	0.00	0.00	3.75
1.730	1523.86	5570	4.050	4.33	0.00	0.00	3.75
1.735	1523.48	5569	4.050	4.27	0.00	0.00	3.75
1.740	1523.09	5568	4.050	4.21	0.00	0.00	3.75
1.745	1522.72	5567	4.050	4.15	0.00	0.00	3.75
1.750	1522.34	5565	4.050	4.09	0.00	0.00	3.75
1.755	1521.97	5562	4.050	4.04	0.00	0.00	3.75
1.760	1521.60	5560	4.050	3.99	0.00	0.00	3.75
1.765	1521.24	5557	4.050	3.94	0.00	0.00	3.75
1.770	1520.88	5553	4.050	3.89	0.00	0.00	3.75
1.775	1520.53	5549	4.050	3.83	0.00	0.00	3.75
1.780	1520.18	5544	4.050	3.78	0.00	0.00	3.75
1.785	1519.84	5539	4.050	3.73	0.00	0.00	3.75
1.790	1519.50	5533	4.100	3.67	0.00	0.00	3.75
1.795	1519.18	5526	4.100	3.60	0.00	0.00	3.75
1.800	1518.89	5519	4.100	3.51	0.00	0.00	3.75
1.818	1517.82	5521	4.100	3.51	0.00	0.00	3.75
1.835	1516.73	5528	4.100	3.53	0.00	0.00	3.75
1.853	1515.65	5532	4.100	3.56	0.00	0.00	3.75
1.871	1514.57	5532	4.100	3.59	0.00	0.00	3.75

FLOOD CREST SUMMARY :

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Flood Elevation (ft MSL)	Time To Flood Elevation (hr)	Flood Wave Arrival Time (hr)
1.888	1513.48	5528	4.100	3.62	0.00	0.00	3.75
1.906	1512.40	5520	4.100	3.65	0.00	0.00	3.75
1.924	1511.32	5508	4.100	3.69	0.00	0.00	3.75
1.942	1510.24	5493	4.150	3.73	0.00	0.00	3.75
1.959	1509.18	5478	4.150	3.76	0.00	0.00	3.75
1.977	1508.12	5485	4.150	3.80	0.00	0.00	4.25
1.995	1507.04	5490	4.150	3.86	0.00	0.00	4.25
2.012	1505.93	5492	4.150	3.98	0.00	0.00	4.25
2.030	1504.64	5492	4.150	4.30	0.00	0.00	4.25
2.048	1503.28	5490	4.150	4.23	0.00	0.00	4.25
2.065	1501.93	5486	4.150	4.16	0.00	0.00	4.25
2.082	1500.57	5479	4.150	4.10	0.00	0.00	4.25
2.100	1499.21	5470	4.150	4.04	0.00	0.00	4.25
2.117	1497.86	5457	4.200	3.98	0.00	0.00	4.25
2.135	1496.51	5449	4.200	3.92	0.00	0.00	4.25
2.152	1495.16	5455	4.200	3.86	0.00	0.00	4.25
2.170	1493.81	5460	4.200	3.81	0.00	0.00	4.25
2.187	1492.46	5462	4.200	3.76	0.00	0.00	4.25
2.205	1491.11	5462	4.200	3.71	0.00	0.00	4.25
2.222	1489.75	5460	4.200	3.67	0.00	0.00	4.25
2.240	1488.40	5454	4.200	3.62	0.00	0.00	4.25
2.257	1487.05	5445	4.200	3.58	0.00	0.00	4.25
2.275	1485.69	5433	4.200	3.53	0.00	0.00	4.25
2.292	1484.36	5420	4.250	3.47	0.00	0.00	4.25
2.310	1483.12	5427	4.250	3.29	0.00	0.00	4.25
2.329	1481.86	5431	4.250	3.34	0.00	0.00	4.25
2.347	1480.59	5432	4.250	3.39	0.00	0.00	4.25
2.366	1479.31	5428	4.250	3.45	0.00	0.00	4.25
2.384	1478.03	5422	4.250	3.50	0.00	0.00	4.25
2.403	1476.73	5410	4.250	3.55	0.00	0.00	4.25
2.421	1475.44	5394	4.300	3.60	0.00	0.00	4.25
2.440	1474.14	5391	4.300	3.64	0.00	0.00	4.25
2.459	1472.84	5396	4.300	3.68	0.00	0.00	4.25
2.477	1471.53	5398	4.300	3.72	0.00	0.00	4.25
2.496	1470.22	5395	4.300	3.76	0.00	0.00	4.25
2.514	1468.91	5390	4.300	3.78	0.00	0.00	4.25
2.533	1467.59	5382	4.300	3.81	0.00	0.00	4.25
2.551	1466.26	5371	4.300	3.84	0.00	0.00	4.25
2.570	1464.70	5359	4.350	4.17	0.00	0.00	4.25
2.588	1463.00	5363	4.350	4.06	0.00	0.00	4.25
2.607	1461.30	5368	4.350	3.96	0.00	0.00	4.25
2.625	1459.60	5370	4.350	3.88	0.00	0.00	4.25
2.643	1457.90	5372	4.350	3.80	0.00	0.00	4.25
2.662	1456.20	5372	4.350	3.72	0.00	0.00	4.25
2.680	1454.50	5370	4.350	3.65	0.00	0.00	4.25
2.698	1452.80	5367	4.350	3.59	0.00	0.00	4.25
2.717	1451.11	5360	4.350	3.52	0.00	0.00	4.25
2.735	1449.41	5350	4.350	3.47	0.00	0.00	4.25

FLOOD CREST SUMMARY :

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Flood Elevation (ft MSL)	Time To Flood Elevation (hr)	Flood Wave Arrival Time (hr)
2.753	1447.73	5341	4.400	3.39	0.00	0.00	4.25
2.772	1445.99	5348	4.400	3.41	0.00	0.00	4.25
2.790	1444.60	5352	4.400	2.95	0.00	0.00	4.25
2.805	1443.65	5352	4.400	3.00	0.00	0.00	4.25
2.819	1442.71	5350	4.400	3.04	0.00	0.00	4.25
2.834	1441.77	5346	4.400	3.09	0.00	0.00	4.25
2.849	1440.84	5341	4.400	3.14	0.00	0.00	4.25
2.864	1439.92	5335	4.400	3.19	0.00	0.00	4.25
2.878	1439.00	5327	4.400	3.25	0.00	0.00	4.25
2.893	1438.10	5318	4.450	3.30	0.00	0.00	4.25
2.908	1437.22	5314	4.450	3.36	0.00	0.00	4.25
2.922	1436.36	5317	4.450	3.42	0.00	0.00	4.25
2.937	1435.51	5318	4.450	3.48	0.00	0.00	4.25
2.952	1434.70	5317	4.450	3.55	0.00	0.00	4.25
2.966	1433.92	5313	4.450	3.61	0.00	0.00	4.25
2.981	1433.18	5305	4.450	3.69	0.00	0.00	4.25
2.996	1432.47	5291	4.500	3.78	0.00	0.00	4.25
3.011	1431.77	5270	4.500	3.93	0.00	0.00	4.25
3.025	1431.02	5253	4.500	4.18	0.00	0.00	4.25
3.040	1430.14	5248	4.500	4.66	0.00	0.00	4.25
3.056	1429.19	5237	4.500	4.59	0.00	0.00	4.25
3.072	1428.25	5219	4.550	4.53	0.00	0.00	4.25
3.087	1427.31	5196	4.550	4.48	0.00	0.00	4.25
3.103	1426.37	5189	4.550	4.43	0.00	0.00	4.25
3.119	1425.43	5184	4.550	4.39	0.00	0.00	4.25
3.135	1424.48	5174	4.550	4.35	0.00	0.00	4.25
3.150	1423.54	5161	4.600	4.31	0.00	0.00	4.25
3.166	1422.60	5145	4.600	4.27	0.00	0.00	4.25
3.182	1421.66	5139	4.600	4.25	0.00	0.00	4.25
3.198	1420.72	5137	4.600	4.22	0.00	0.00	4.25
3.213	1419.78	5132	4.600	4.20	0.00	0.00	4.25
3.229	1418.83	5125	4.600	4.19	0.00	0.00	4.25
3.245	1417.88	5116	4.650	4.18	0.00	0.00	4.25
3.261	1416.94	5105	4.650	4.17	0.00	0.00	4.25
3.276	1415.99	5099	4.650	4.17	0.00	0.00	4.75
3.292	1415.03	5099	4.650	4.17	0.00	0.00	4.75
3.308	1414.07	5097	4.650	4.18	0.00	0.00	4.75
3.324	1413.10	5094	4.650	4.19	0.00	0.00	4.75
3.339	1412.14	5090	4.650	4.20	0.00	0.00	4.75
3.355	1411.17	5086	4.650	4.20	0.00	0.00	4.75
3.371	1410.22	5081	4.650	4.20	0.00	0.00	4.75
3.387	1409.28	5078	4.650	4.19	0.00	0.00	4.75
3.402	1408.36	5074	4.700	4.17	0.00	0.00	4.75
3.418	1407.43	5072	4.700	4.15	0.00	0.00	4.75
3.434	1406.50	5074	4.700	4.13	0.00	0.00	4.75
3.450	1405.58	5075	4.700	4.11	0.00	0.00	4.75
3.465	1404.65	5075	4.700	4.09	0.00	0.00	4.75
3.481	1403.73	5075	4.700	4.07	0.00	0.00	4.75

FLOOD CREST SUMMARY :

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Flood Elevation (ft MSL)	Time To Flood Elevation (hr)	Flood Wave Arrival Time (hr)
3.497	1402.80	5075	4.700	4.06	0.00	0.00	4.75
3.513	1401.87	5075	4.700	4.05	0.00	0.00	4.75
3.528	1400.93	5074	4.700	4.05	0.00	0.00	4.75
3.544	1399.96	5072	4.700	4.08	0.00	0.00	4.75
3.560	1398.90	5070	4.700	4.21	0.00	0.00	4.75
3.575	1397.87	5068	4.700	4.00	0.00	0.00	4.75
3.590	1396.84	5066	4.700	3.80	0.00	0.00	4.75
3.605	1395.80	5062	4.700	3.60	0.00	0.00	4.75
3.620	1394.76	5056	4.750	3.39	0.00	0.00	4.75
3.635	1393.72	5056	4.750	3.16	0.00	0.00	4.75
3.650	1392.80	5058	4.750	2.77	0.00	0.00	4.75
3.664	1391.98	5058	4.750	2.76	0.00	0.00	4.75
3.679	1391.16	5058	4.750	2.74	0.00	0.00	4.75
3.693	1390.36	5056	4.750	2.72	0.00	0.00	4.75
3.707	1389.56	5053	4.750	2.69	0.00	0.00	4.75
3.721	1388.76	5049	4.750	2.67	0.00	0.00	4.75
3.736	1387.97	5044	4.750	2.64	0.00	0.00	4.75
3.750	1387.19	5038	4.800	2.61	0.00	0.00	4.75
3.764	1386.41	5038	4.800	2.58	0.00	0.00	4.75
3.779	1385.63	5039	4.800	2.55	0.00	0.00	4.75
3.793	1384.86	5040	4.800	2.53	0.00	0.00	4.75
3.807	1384.09	5040	4.800	2.50	0.00	0.00	4.75
3.821	1383.33	5038	4.800	2.47	0.00	0.00	4.75
3.836	1382.56	5036	4.800	2.44	0.00	0.00	4.75
3.850	1381.80	5033	4.800	2.42	0.00	0.00	4.75

END OF OUTPUT

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B O S S D A M B R K (tm)
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Serial Number : 20533

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PROJECT DESCRIPTION :

PROJECT TITLE : Fountain Lake Dam Scenario No.2 (spill)
PROJECT NUMBER : 465.12
DESCRIPTION : Pipping failure, FIS baseflow
ENGINEER : Survey reservation
DATE OF RUN : 2/08/1996
TIME OF RUN : 4:57 pm

INPUT DATA SUMMARY :

INPUT CONTROL PARAMETERS :

Problem Specification Option	14	
Number of Dynamic Routing Reaches (KKN)	1	
Type of Reservoir Routing (KUI)	1	(dynamic routing)
Number of multiple dams/bridges (MULDAM)	2	
No. of Reservoir Inflow Hydrograph Points (ITEH)	37	
No. of Informational Cross-Sections (NPRT)	0	
Flood-Plain Routing (KFLP)	0	(no)

CROSS-SECTION NUMBERS COINCIDENT
WITH UPSTREAM DAM FACE (IDAM) :

1
5

RESERVOIR VOLUME DESCRIPTION :

Elevation vs. Surface Area Table

Elevation HSA(K) (ft MSL)	Surface Area SA(K) (acres)
1577.14	34.000
1575.74	32.700
1574.74	30.700
1573.74	29.400
1572.74	28.800
1571.74	27.500
1569.74	24.100
1567.74	0.000

DAM NUMBER : 1 (Fountain Hills Dam)

RESERVOIR AND BREACH PARAMETERS :

Initial Elevation of Water Surface (YO, ft MSL)		1572.25
Breach Side Slope (Z)	1:	0.00
Breach Bottom Elevation (YBMIN, ft MSL)		1569.20
Breach Base Width (BB, ft)		60.00
Time of Breach Formation (TFH, hr)		1.56

RESERVOIR DESCRIPTION :

Water Surface Elevation at Time of Breach (HF, ft MSL)	1574.50
Top of Dam Crest Elevation (HD, ft MSL)	1577.14
Uncontrolled Spillway Crest Elevation (HSP, ft MSL)	1573.24
Spillway Gate Center Elevation (HGT, ft MSL)	0.00
Uncontrolled Spillway Discharge Coefficient (CS)	0.00
Spillway Gate Discharge Coefficient (CG)	0.00
Piping Centerline Elevation (CDO, ft MSL)	1569.20
Turbine Discharge (QT, cfs)	100.00

DAM NUMBER : 2 (Panorama Drive Crossing)

RESERVOIR AND BREACH PARAMETERS :

Initial Elevation of Water Surface (YO, ft MSL)		1552.20
Breach Side Slope (Z)	1:	1.00
Breach Bottom Elevation (YBMIN, ft MSL)		1546.44
Breach Base Width (BB, ft)		100.00
Time of Breach Formation (TFH, hr)		1.00

RESERVOIR DESCRIPTION :

Water Surface Elevation at Time of Breach (HF, ft MSL)	1564.00
Top of Dam Crest Elevation (HD, ft MSL)	1557.84
Uncontrolled Spillway Crest Elevation (HSP, ft MSL)	1546.44
Spillway Gate Center Elevation (HGT, ft MSL)	0.00
Uncontrolled Spillway Discharge Coefficient (CS)	0.00
Spillway Gate Discharge Coefficient (CG)	0.00
Dam Overtopping Discharge Coefficient (CDO)	2.70
Turbine Discharge (QT, cfs)	0.00

SPILLWAY/GATE RATING CURVE :

Head HEAD(1) (ft)	Flow QSPILL(1) (cfs)
0.00	0.0
0.40	17.0
0.60	56.0
0.90	120.0
1.30	290.0
1.80	758.0
2.10	1160.0
3.90	6000.0

SLOPING DAM CREST GEOMETRY :

Elevation HSBR(K,L) (ft MSL)	Accumulated Dam Crest Length BSBR(K,L) (ft)
1557.840	0.000
1558.000	300.000

1559.000	350.000
1560.000	400.000
1561.000	430.000
1562.000	460.000
1563.000	570.000
1564.000	680.000

SPILLWAY/GATE RATING CURVE :

Head HEAD(2) (ft)	Flow QSPILL(2) (cfs)
0.00	0.0
4.56	928.0
5.76	1300.0
6.00	1648.0
11.40	2529.0
13.56	2839.0
15.56	3111.0
17.56	3373.0

BOUNDARY CONDITIONS :

Hydrograph Time Intervals (DHF, hr)	0.00
Routing Period (TEH, hr)	7.00
Breach Development Exponent (BREX)	1.00
Mud/Debris Flow Parameter (MUD)	0
Dry Bed Routing Parameter (IWF)	0
Hydraulic Radius Computation Parameter (KPRES)	0 (R=A/B)
Landslide Simulation (KSL)	0 (none)
Critical Flow Froude Number (DFR)	0.950

INFLOW HYDROGRAPH DESCRIPTION :

Time Elapsed TI(K) (hr)	Upstream Inflow QI(K) (cfs)
0.00	100.0
0.25	100.0
0.50	106.0
0.75	106.0
1.00	108.0
1.25	110.0
1.50	112.0
1.75	115.0
2.00	121.0
2.00	115.0
2.00	100.0
2.25	127.0
2.50	141.0
2.75	156.0
3.00	1137.0
3.25	1746.0
3.50	945.0
3.75	328.0
4.00	152.0
4.25	123.0
4.50	118.0
5.00	113.0
5.25	109.0
5.50	101.0
5.75	100.0
6.00	100.0
6.25	100.0
6.50	100.0
6.75	100.0
7.00	100.0
7.25	100.0
7.50	100.0
8.00	100.0
8.25	100.0
8.50	100.0
8.75	100.0
9.00	100.0

SUMMARY OF PROGRAM CONTROL PARAMETERS :

Problem Specification Option (KKN, KUI, MULDAM, IDAM)	14	
Number of Cross-Sections Entered (NS)	9	
Number of Top Widths Entered (NCS)	8	
Number of Cross-Sectional Hydrographs to Plot (NTT)	6	
Flow Type Parameter (KSUPC)	3	(mixed flow)
Number of Lateral Inflow Hydrographs (LQ)	1	
Number of Points in Gate Control Curve (KCG)	0	

CROSS-SECTIONS WHERE HYDROGRAPH REQUESTED :
(maximum allowed = 6)

1 2 3 4 5 6

CHANNEL-VALLEY BOUNDARY CONDITIONS :

Max Discharge at Downstream End (QMAXD, cfs)	0.0
Max Lateral Outflow due to Flood Wave (QLL, cfs/ft)	0.0000
Initial Time-Step Size (DTHM, hr)	0.0100
Time at which Dam Starts to Fail (TFI, hr)	0.0000
Theta Weighting Factor (F1I)	0.000
Stage Convergence Criterion (EPSY, ft)	0.000
Downstream Boundary Type Paramter (YDN)	0.00
Slope of Channel Downstream of Dam (SOM, ft/mi)	0.0000

CROSS-SECTION NUMBER : 1 Fountain Lake Dam Upstrea

Cross-Section Location (XS(I), mi) 1.100

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 1

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.064

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1569.20	50.0	0.1000	0.0
1570.00	75.0	0.1000	0.0
1571.00	93.0	0.1000	0.0
1572.00	125.0	0.1000	0.0
1573.00	200.0	0.1000	0.0
1574.00	300.0	0.1000	0.0
1576.00	350.0	0.1000	0.0
1577.14	373.0	0.1000	0.0

CROSS-SECTION NUMBER : 2 Fountain Lake Dam Downstr

Cross-Section Location (XS(I), mi) 1.164

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 2

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1569.00	4.0	0.1000	0.0
1571.00	23.0	0.1000	0.0
1572.00	37.0	0.1000	0.0
1573.00	83.0	0.1000	0.0
1574.00	130.0	0.1000	0.0
1575.00	240.0	0.1000	0.0
1576.00	340.0	0.1000	0.0
1577.00	405.0	0.1000	0.0

CROSS-SECTION NUMBER : 3

Cross-Section Location (XS(I), mi) 1.260

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 3

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1566.00	4.0	0.1000	0.0
1567.00	20.0	0.1000	0.0
1568.00	40.0	0.1000	0.0
1569.00	50.0	0.1000	0.0
1570.00	60.0	0.1000	0.0
1571.00	120.0	0.2000	0.0
1572.00	178.0	0.2000	0.0
1574.00	240.0	0.2000	0.0

CROSS-SECTION NUMBER : 4

Cross-Section Location (XS(I), mi) 1.350

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 4

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1551.00	2.0	0.1000	0.0
1553.00	85.0	0.1000	0.0
1555.00	170.0	0.1000	0.0
1557.00	220.0	0.1000	0.0
1559.00	235.0	0.1000	0.0
1561.00	260.0	0.1000	0.0
1563.00	270.0	0.1000	0.0
1565.00	370.0	0.1000	0.0

CROSS-SECTION NUMBER : 5 Panorama Dr. Upstream X-s

Cross-Section Location (XS(I), mi) 1.410

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 5

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.023

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1546.40	34.0	0.1000	0.0
1548.00	160.0	0.1000	0.0
1552.00	185.0	0.1000	0.0
1556.00	260.0	0.1000	0.0
1558.00	270.0	0.1000	0.0
1560.00	305.0	0.1000	0.0
1562.00	490.0	0.1000	0.0
1564.00	680.0	0.1000	0.0

CROSS-SECTION NUMBER : 6 Panorama Dr. Downstream X

Cross-Section Location (XS(I), mi) 1.433

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 6

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1544.60	34.0	0.1000	0.0
1546.00	90.0	0.1000	0.0
1548.00	110.0	0.1000	0.0
1550.00	155.0	0.1000	0.0
1552.00	173.0	0.1000	0.0
1554.00	193.0	0.1000	0.0
1556.00	250.0	0.1000	0.0
1558.00	390.0	0.1000	0.0

CROSS-SECTION NUMBER : 7

Cross-Section Location (XS(I), mi) 1.540

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 7

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1534.60	0.0	0.1000	0.0
1536.00	125.0	0.1000	0.0
1540.00	153.0	0.1000	0.0
1542.00	310.0	0.1000	0.0
1544.00	330.0	0.1000	0.0
1546.00	360.0	0.1000	0.0
1550.00	395.0	0.1000	0.0
1552.00	510.0	0.1000	0.0

CROSS-SECTION NUMBER : 8

Cross-Section Location (XS(I), mi) 1.640

Flooding Elevation (FSTG(I), ft MSL) 0.000

DOWNSTREAM REACH NUMBER : 8

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
1526.30	4.0	0.1000	0.0
1530.00	110.0	0.1000	0.0
1532.00	130.0	0.1000	0.0
1533.00	250.0	0.1000	0.0
1534.00	420.0	0.1000	0.0
1536.00	575.0	0.1000	0.0
1538.00	580.0	0.1000	0.0
1540.00	588.0	0.1000	0.0

CROSS-SECTION NUMBER : 9 Last Photogrametric X-sec

Cross-Section Location (XS(I), mi) 1.800

Flooding Elevation (FSTG(I), ft MSL) 0.000

CROSS-SECTION DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Storage Top Width BSS(K,I) (ft)
1511.19	0.0	0.0
1515.00	200.0	0.0
1517.00	280.0	0.0
1519.00	495.0	0.0
1521.00	560.0	0.0
1523.00	620.0	0.0
1525.00	680.0	0.0
1526.00	720.0	0.0

DISTANCE BETWEEN INTERPOLATED CROSS-SECTIONS
(DXM) THAT WILL BE USED IN COMPUTATIONS :

Down Stream Reach Number I=1,NS1	Interp. Cross Section Distance DXM(I) (mi)
1	101.0000
2	0.0137
3	0.0060
4	0.0184
5	101.0000
6	0.0169
7	0.0197
8	0.0190

LATERAL INFLOW DESCRIPTION :

Cross-Section Reach Number (LQX(I)) 4

Hydro-Graph Entry I	Lateral Inflow QL(I) (cfs)
1	1200.
2	1200.
3	1200.
4	1200.
5	1200.
6	1200.
7	1200.
8	1200.
9	1200.
10	1200.
11	1200.
12	1200.
13	1200.
14	1200.
15	1200.
16	1200.
17	1200.
18	1200.
19	1200.
20	1200.
21	1200.
22	1200.
23	1200.
24	1200.
25	1200.
26	1200.
27	1200.
28	1200.
29	1200.
30	1200.
31	1200.
32	1200.
33	1200.
34	1200.
35	1200.
36	1200.
37	1200.

Total number of cross-sections (original+interpolated) 47

Maximum number of cross-sections allowed 300

FLOOD CREST SUMMARY :

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Flood Elevation (ft MSL)	Time To Flood Elevation (hr)	Flood Wave Arrival Time (hr)
1.100	1574.96	610	3.630	0.64	0.00	0.00	3.00
1.164	1574.78	610	3.650	1.90	0.00	0.00	3.40
1.178	1574.29	609	3.660	1.89	0.00	0.00	3.40
1.191	1573.81	608	3.670	1.88	0.00	0.00	3.40
1.205	1573.32	608	3.680	1.91	0.00	0.00	3.40
1.219	1572.80	608	3.690	1.98	0.00	0.00	3.40
1.233	1572.22	607	3.690	2.15	0.00	0.00	2.10
1.246	1571.44	607	3.700	2.54	0.00	0.00	3.40
1.260	1569.67	607	3.700	4.96	0.00	0.00	0.00
1.266	1568.50	607	3.700	4.62	0.00	0.00	0.00
1.272	1567.38	607	3.700	4.35	0.00	0.00	0.00
1.278	1566.32	608	0.000	4.09	0.00	0.00	0.00
1.284	1565.34	628	0.000	3.87	0.00	0.00	0.00
1.290	1564.36	676	0.000	3.85	0.00	0.00	0.00
1.296	1563.39	724	0.000	3.83	0.00	0.00	0.00
1.302	1562.43	772	0.000	3.82	0.00	0.00	0.00
1.308	1561.46	820	0.000	3.82	0.00	0.00	0.00
1.314	1560.50	868	0.000	3.82	0.00	0.00	0.00
1.320	1559.54	916	0.000	3.82	0.00	0.00	0.00
1.326	1558.58	964	0.000	3.82	0.00	0.00	0.00
1.332	1557.62	1012	0.000	3.83	0.00	0.00	0.00
1.338	1556.66	1060	0.000	3.84	0.00	0.00	0.00
1.344	1556.30	1108	3.740	3.78	0.00	0.00	0.00
1.350	1556.22	1156	3.760	2.94	0.00	0.00	2.10
1.370	1555.59	2105	3.770	4.21	0.00	0.00	2.10
1.390	1555.33	2104	3.770	3.15	0.00	0.00	2.10
1.410	1555.24	2104	3.780	1.77	0.00	0.00	2.10
1.433	1549.47	2104	3.770	4.45	0.00	0.00	2.10
1.451	1547.75	2104	3.800	4.40	0.00	0.00	2.10
1.469	1545.93	2104	3.790	4.49	0.00	0.00	0.00
1.486	1544.09	2104	3.780	4.59	0.00	0.00	0.00
1.504	1542.33	2104	3.770	4.57	0.00	0.00	0.00
1.522	1540.62	2104	3.780	4.47	0.00	0.00	0.00
1.540	1539.26	2104	3.800	3.95	0.00	0.00	0.00
1.560	1537.92	2104	3.810	3.97	0.00	0.00	2.10
1.580	1536.64	2104	3.830	3.98	0.00	0.00	2.10
1.600	1535.36	2104	3.840	4.00	0.00	0.00	2.10
1.620	1533.88	2104	3.850	4.08	0.00	0.00	2.10
1.640	1531.93	2104	3.840	4.76	0.00	0.00	0.00
1.660	1529.88	2104	3.830	4.52	0.00	0.00	0.00
1.680	1527.84	2104	3.840	4.33	0.00	0.00	0.00
1.700	1525.82	2104	3.840	4.18	0.00	0.00	0.00
1.720	1523.81	2104	3.850	4.05	0.00	0.00	0.00
1.740	1521.82	2104	3.860	3.94	0.00	0.00	0.00
1.760	1519.83	2104	3.870	3.84	0.00	0.00	0.00
1.780	1517.85	2104	3.870	3.75	0.00	0.00	0.00
1.800	1515.88	2104	3.860	3.68	0.00	0.00	0.00

END OF OUTPUT

APPENDIX H

ANALYSIS OF DOWNSTREAM EFFECTS

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SHEET _____ OF _____

BY HAA DATE 14-Feb-96

CLIENT: Anderson-Nelson, Inc. CHECK _____ DATE _____

JOB: Dambreak Analysis, Scenario I (Stoneridge Dam) JOB NO. 465.12

Scenario I

Breach of Stoneridge Dam

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Warning Time (hr)	Minimum Wash Elevation (ft MSL)	Maximum Depth (ft)
0.000	1707.26	14205	4.485		0.00	1678.82	28.44
0.042	1691.41	14205	4.625	9.30	0.00	1676.61	14.80
0.120	1680.24	13535	4.650	6.71	0.03	1666.90	13.34
0.170	1677.39	12760	4.670	6.50	0.04	1664.20	13.19
0.270	1672.63	10999	4.695	7.65	0.07	1658.20	14.43
0.370	1668.67	10473	4.710	3.11	0.08	1649.63	19.04
0.402	1657.27	10473	4.710	9.24	0.08	1646.76	10.51
0.490	1638.96	10391	4.730	5.75	0.11	1625.20	13.76
0.650	1634.36	9943	4.745	2.89	0.12	1616.64	17.72
0.668	1628.83	9943	4.750	8.89	0.13	1614.53	14.30
0.730	1619.58	9806	4.770	6.43	0.14	1607.50	12.08
0.910	1605.06	9471	4.805	4.98	0.18	1589.50	15.56
1.000	1601.32	9402	4.810	6.46	0.18	1584.82	16.50
1.031	1593.40	9402	4.810	8.24	0.18	1582.40	11.00
1.100	1587.07	9334	4.825	7.60	0.20	1573.40	13.67
1.200	1576.88	9199	4.840	8.01	0.21	1563.70	13.18
1.350	1562.06	9012	4.875	4.68	0.25	1551.00	11.06
1.410	1561.16	8952	4.875	2.75	0.25	1546.40	14.76
1.433	1553.82	8952	4.880	7.40	0.25	1544.60	9.22
1.540	1543.91	8881	4.900	5.19	0.28	1534.60	9.31
1.640	1535.88	8774	4.920	4.84	0.29	1526.30	9.58
1.800	1519.94	8592	4.965	4.10	0.34	1511.19	8.75
2.030	1505.69	8140	5.025	4.93	0.40	1497.42	8.27
2.310	1483.88	7813	5.105	3.69	0.48	1476.42	7.46
2.570	1465.33	7391	5.190	4.76	0.57	1459.36	5.97
2.790	1445.12	7270	5.250	3.31	0.63	1438.33	6.79
3.040	1430.79	6587	5.370	5.24	0.75	1422.60	8.19
3.560	1399.22	5820	5.585	4.46	0.96	1393.66	5.56
3.650	1393.05	5804	5.615	2.88	0.99	1388.54	4.51

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BY HAA DATE 14-Feb-96

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JOB: Dambreak Analysis, Scenario I (Firerock dam break) JOB NO. 465.12

DANGER LEVEL FOR FOUNDATION STRUCTURES

House upstream from Arroyo Vista Dr. (x-sec 0.65)

Water Surface Elevation	1634.36	(DAMBRK)
Building Elevation	- 1633.00	(2' contour map)
Depth	1.36	
Velocity	2.89	(DAMBRK)
Danger Level	Low Danger	(Figure)

Houses upstream from Fountain channel confluence (x-sec 1.20)

Water Surface Elevation	1576.88	(DAMBRK)
Building Elevation	- 1576.00	(2' contour map)
Depth	0.88	
Velocity	8.01	(DAMBRK)
Danger Level	Low Danger	(Figure)

Houses at 1.54 (x-sec 1.54)

Water Surface Elevation	1543.91	(DAMBRK)
Building Elevation	- 1541.90	(2' contour map)
Depth	2.01	
Velocity	5.19	(DAMBRK)
Danger Level	Low Danger	(Figure)

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BY HAA DATE 14-Feb-96

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JOB: Dambreak Analysis, Scenario I (Firerock dam break) JOB NO. 465.12

Houses between 1.54 and 164 (x-sec 1.54-1.64)

Water Surface Elevation	1539.90	(Average DAMBRK)
Building Elevation	- 1537.80	(2' contour map)
Depth	2.10	
Velocity	5.01	(Average DAMBRK)
Danger Level	Low Danger	(Figure)

Fort McDowell Casino (x-sec 3.85)

Water Surface Elevation	1393.05	(DAMBRK)
Building Elevation	- 1389.31	(2' contour map)
Depth	3.74	
Velocity	3.41	(DAMBRK)
Danger Level	Moderted Danger	(Figure)

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BY HAA DATE 14-Feb-96

CLIENT: Anderson-Nelson, Inc. CHECK _____ DATE _____

JOB: Dambreak Analysis, Scenario I (Firerock dam break) JOB NO. 465.12

DANGER LEVEL FOR PASSENGER VEHICLES

Fountain Hills Blvd. (x-sec 0.37)

Water Surface Elevation	1668.67	(DAMBRK)
Road Elevation	- 1663.17	(2' contour map)
Depth	5.50	
Velocity	3.11	(DAMBRK)
Danger Level	High Danger	(Figure)

Arroyo Vista Dr. (x-sec 0.65)

Water Surface Elevation	1634.36	(DAMBRK)
Road Elevation	- 1628.78	(2' contour map)
Depth	5.58	
Velocity	2.89	(DAMBRK)
Danger Level	High Danger	(Figure)

Saguaro Blvd. (x-sec 1.00)

Water Surface Elevation	1601.32	(DAMBRK)
Road Elevation	- 1595.86	(2' contour map)
Depth	5.46	
Velocity	6.46	(DAMBRK)
Danger Level	High Danger	(Figure)

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JOB: Dambreak Analysis, Scenario I (Firerock dam break) JOB NO. 465.12

Panorama Dr. (x-sec 1.41)

Water Surface Elevation	1561.16	(DAMBRK)
Road Elevation	- 1557.84	(2' contour map)
Depth	3.32	
Velocity	2.75	(DAMBRK)
Danger Level	High Danger	(Figure)

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CLIENT: Anderson-Nelson, Inc. CHECK _____ DATE _____

JOB: Dambreak Analysis, Scenario I (Firerock dam break) JOB NO. 465.12

DANGER LEVEL FOR ADULTS

Fountain Hills Blvd. (x-sec 0.37)

Water Surface Elevation	1668.67	(DAMBRK)
Road Elevation	- 1663.17	(2' contour map)
Depth	5.50	
Velocity	3.11	(DAMBRK)
Danger Level	High Danger	(Figure)

Arroyo Vista Dr. (x-sec 0.65)

Water Surface Elevation	1634.36	(DAMBRK)
Road Elevation	- 1628.78	(2' contour map)
Depth	5.58	
Velocity	2.89	(DAMBRK)
Danger Level	High Danger	(Figure)

Saguaro Blvd. (x-sec 1.00)

Water Surface Elevation	1601.32	(DAMBRK)
Road Elevation	- 1595.86	(2' contour map)
Depth	5.46	
Velocity	6.46	(DAMBRK)
Danger Level	High Danger	(Figure)

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SHEET _____ OF _____

BY HAA DATE 14-Feb-96

CLIENT: Anderson-Nelson, Inc. CHECK _____ DATE _____

JOB: Dambreak Analysis, Scenario I (Firerock dam break) JOB NO. 465.12

Panorama Dr. (x-sec 1.41)

Water Surface Elevation	1561.16	(DAMBRK)
Road Elevation	- 1557.84	(2' contour map)
Depth	3.32	
Velocity	2.75	(DAMBRK)
Danger Level	High Danger	(Figure)

Fort McDowell Casino (x-sec 3.85)

Water Surface Elevation	1393.05	(DAMBRK)
Building Elevation	- 1389.31	(2' contour map)
Depth	3.74	
Velocity	3.41	(DAMBRK)
Danger Level	High Danger	(Figure)

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CLIENT Anderson-Nelson, Inc.
JOB NAME Dambreak Analysis (Stonerdge Dam)

SHEET ___ OF ___
BY HAA DATE 2/14/95
CHECK ___ DATE ___
JOB NO. 465.12

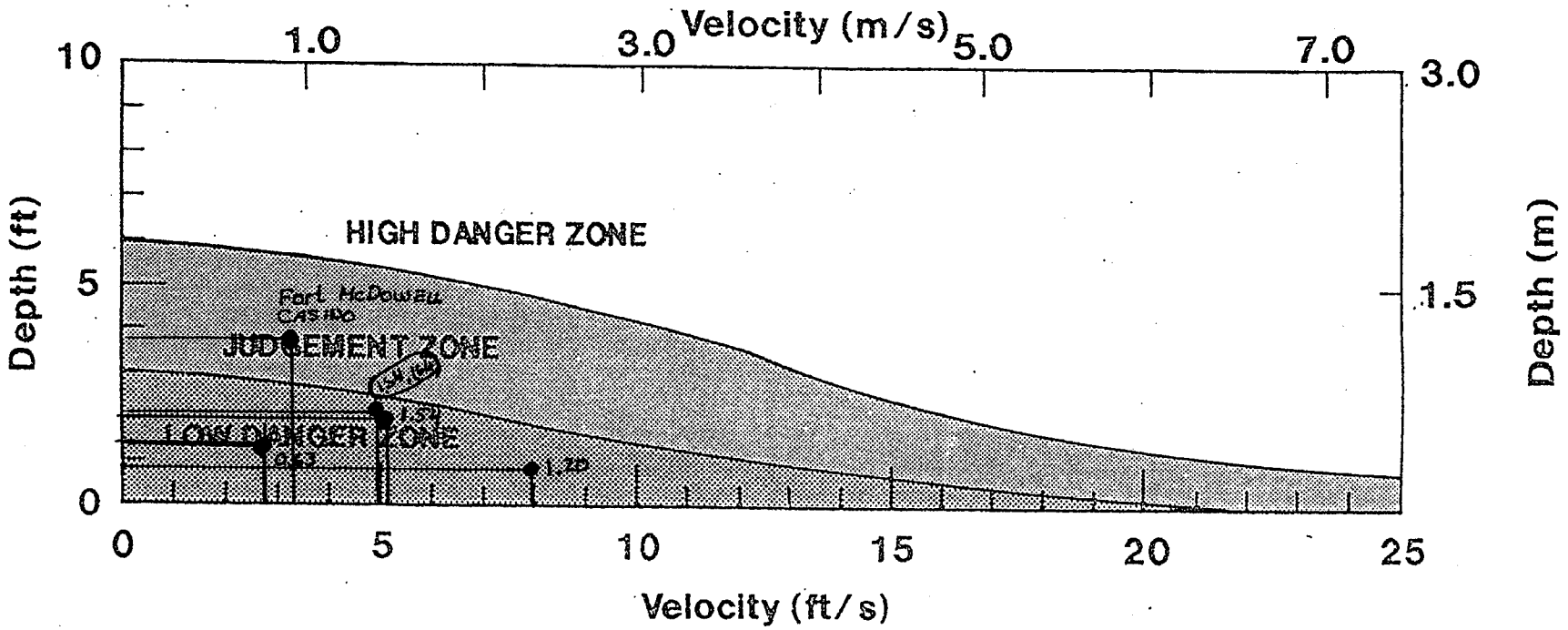

Figure 2. – Depth–velocity flood danger level relationship for houses built on foundations.

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CLIENT Anderson-Nelson, Inc.
JOB NAME Dambreak Analysis (Stonebridge Dam)

SHEET ___ OF ___
BY HAP DATE 7/14/86
CHECK ___ DATE ___
JOB NO. 465.12

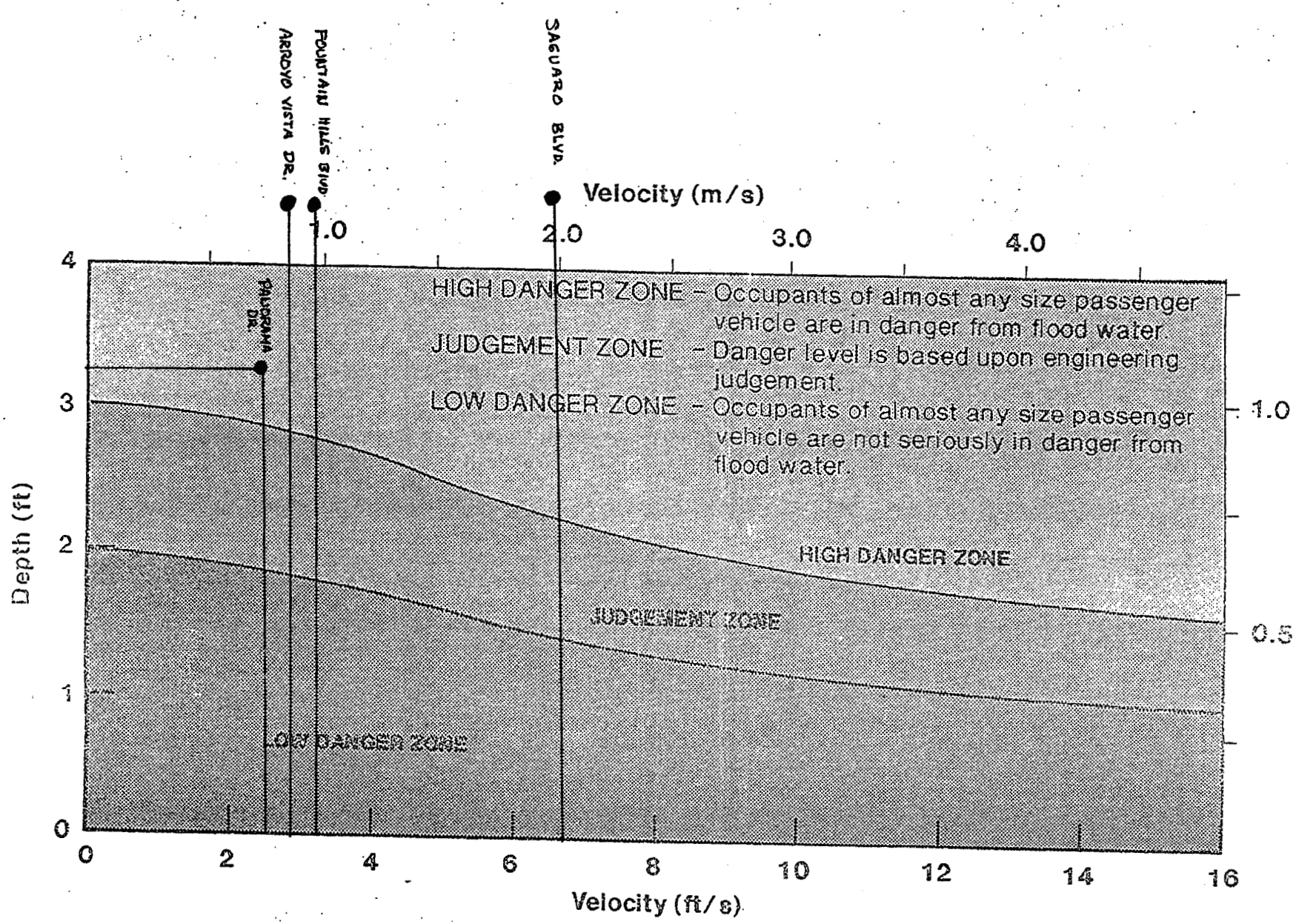

Figure 4. – Depth–velocity flood danger level relationship for passenger vehicles.

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CHECK _____ DATE _____

CLIENT Anderson-Nelson, Inc.
JOB NAME Dambreak Analysis (Stonerdge Dam)
JOB NO. 465.12

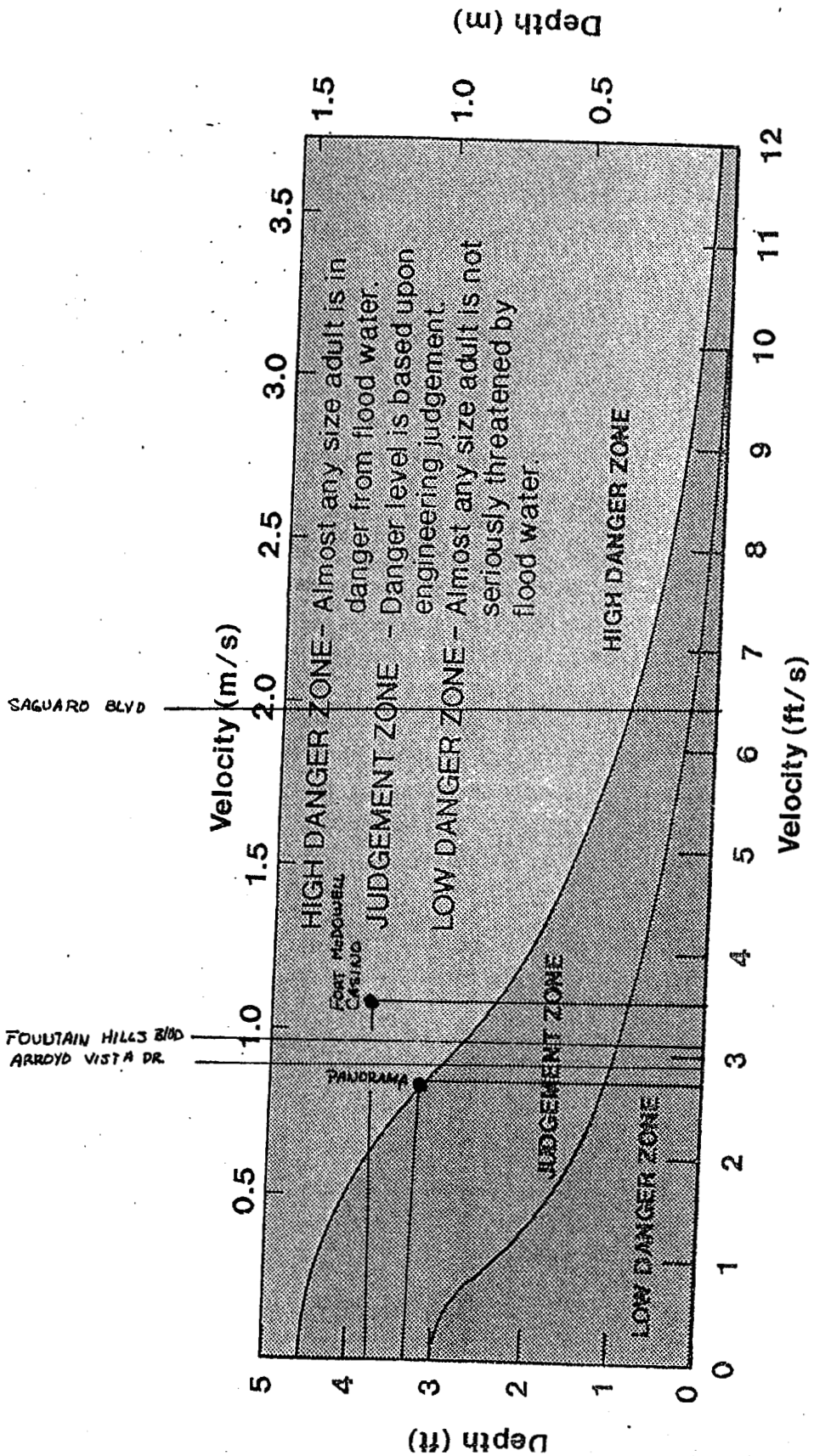

Figure 5. – Depth–velocity flood danger level relationship for adults.

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SHEET _____ OF _____

BY HAA DATE 14-Feb-96

CLIENT: Anderson-Nelson, Inc. CHECK _____ DATE _____

JOB: Dambreak Analysis, Scenario II (Fountain Lake Dam) JOB NO. 465.12

Scenario II
Breach of Fountain Lake Dam

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Warning Time (hr)	Minimum Wash Elevation (ft MSL)	Maximum Depth (ft)
1.269	1574.55	4453.0	3.500	4.3	0.00	1562.20	12.35
1.320	1566.39	4453.0	3.900	5.5	0.00	1562.00	4.39
1.420	1544.44	4529.0	3.950	5.3	0.05	1535.80	8.64
1.500	1535.08	4441.0	4.000	3.5	0.10	1528.00	7.08
1.680	1528.27	4367.0	4.050	4.1	0.15	1520.40	7.87
1.800	1518.89	5519.0	4.100	3.5	0.20	1511.19	7.70
2.030	1504.64	5492.0	4.150	4.3	0.25	1497.42	7.22
2.310	1483.12	5427.0	4.250	3.3	0.35	1476.42	6.70
2.570	1464.70	5359.0	4.350	4.2	0.45	1459.36	5.34
2.790	1444.60	5352.0	4.400	3.0	0.50	1438.33	6.27
3.040	1430.14	5248.0	4.500	4.7	0.60	1422.60	7.54
3.560	1398.90	5070.0	4.700	4.2	0.80	1393.66	5.24
3.650	1392.80	5058.0	4.750	2.8	0.85	1388.54	4.26

Scenario II
Spill from Fountain Lake Dam

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Warning Time (hr)	Minimum Wash Elevation (ft MSL)	Maximum Depth (ft)
1.100	1574.96	610.0	3.630	0.6	0.00	1569.20	5.76
1.164	1574.78	610.0	3.650	1.9	0.00	1569.00	5.78
1.260	1569.67	607.0	3.700	5.0	0.00	1566.00	3.67
1.350	1556.22	1156.0	3.760	2.9	0.00	1551.00	5.22
1.410	1555.24	2104.0	3.780	1.8	0.00	1546.40	8.84
1.433	1549.47	2104.0	3.770	4.5	0.00	1544.60	4.87
1.540	1539.26	2104.0	3.800	4.0	0.00	1534.60	4.66
1.640	1531.93	2104.0	3.840	4.8	0.00	1526.30	5.63

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BY HAA DATE 14-Feb-96

CLIENT: Anderson-Nelson, Inc. CHECK _____ DATE _____

JOB: Dambreak Analysis, Scenario II (Fountain Lake dam break) JOB NO. 465.12

DANGER LEVEL FOR FOUNDATION STRUCTURES

Houses near spillway (x-sec 1.164)

Water Surface Elevation	1574.78	(DAMBRK)
Building Elevation	- 1573.00	(2' contour map)
Depth	1.78	
Velocity	1.90	(DAMBRK)
Danger Level	Low Danger	(Figure)

Houses south of El Lago Blvd (x-sec 1.32)

Water Surface Elevation	1566.39	(DAMBRK)
Building Elevation	- 1564.00	(2' contour map)
Depth	2.39	
Velocity	5.50	(DAMBRK)
Danger Level	Low Danger	(Figure)

Fort McDowell Casino (x-sec 3.65)

Water Surface Elevation	1392.80	(DAMBRK)
Building Elevation	- 1389.31	(2' contour map)
Depth	3.49	
Velocity	2.80	(DAMBRK)
Danger Level	Moderated Danger	(Figure)

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BY HAA DATE 14-Feb-96

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JOB: Dambreak Analysis, Scenario II (Fountain Lake dam break) JOB NO. 465.12

DANGER LEVEL FOR PASSENGER VEHICLES

El Lago Blvd. (s-sec 1.32)

Water Surface Elevation	1566.39	(DAMBRK)
Road Elevation	- 1562.00	(2' contour map)
Depth	4.39	
Velocity	5.50	(DAMBRK)
Danger Level	High Danger	(Figure)

Panorama Dr. (x-sec 1.42)

Water Surface Elevation	1544.44	(DAMBRK)
Road Elevation	- 1543.00	(2' contour map)
Depth	1.44	
Velocity	5.30	(DAMBRK)
Danger Level	Low Danger	(Figure)

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JOB: Dambreak Analysis, Scenario II (Fountain Lake dam break) JOB NO. 465.12

DANGER LEVEL FOR ADULTS

El Lago Blvd. (s-sec 1.32)

Water Surface Elevation	1566.39	(DAMBRK)
Road Elevation	- 1562.00	(2' contour map)
Depth	4.39	
Velocity	5.50	(DAMBRK)
Danger Level	High Danger	(Figure)

Panorama Dr. (x-sec 1.42)

Water Surface Elevation	1544.44	(DAMBRK)
Road Elevation	- 1543.00	(2' contour map)
Depth	1.44	
Velocity	5.30	(DAMBRK)
Danger Level	High Danger	(Figure)

Fort McDowell Casino (x-sec 3.65)

Water Surface Elevation	1392.80	(DAMBRK)
Building Elevation	- 1389.31	(2' contour map)
Depth	3.49	
Velocity	2.80	(DAMBRK)
Danger Level	High Danger	(Figure)

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CLIENT Anderson-Nelson, Inc.
JOB NAME Dambreak Analysis (Fountain Lake)

SHEET ____ OF ____
BY HRB DATE 2/14/96
CHECK ____ DATE ____
JOB NO. 465.12

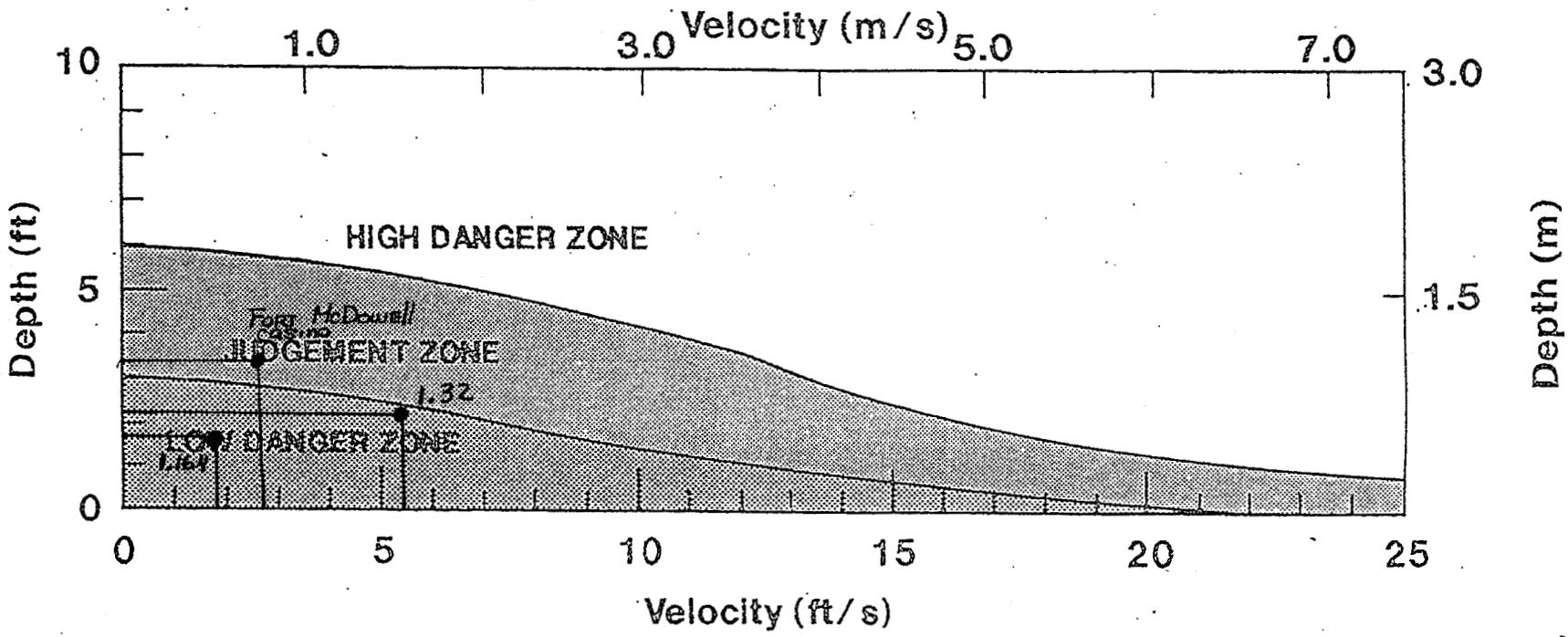

Figure 2. – Depth–velocity flood danger level relationship for houses built on foundations.

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CLIENT Anderson-Nelson, Inc.
JOB NAME Dambrook Analysis (Fountain Lake)

SHEET ___ OF ___
BY HAA DATE 2/14/96
CHECK ___ DATE ___
JOB NO. 46.5.12

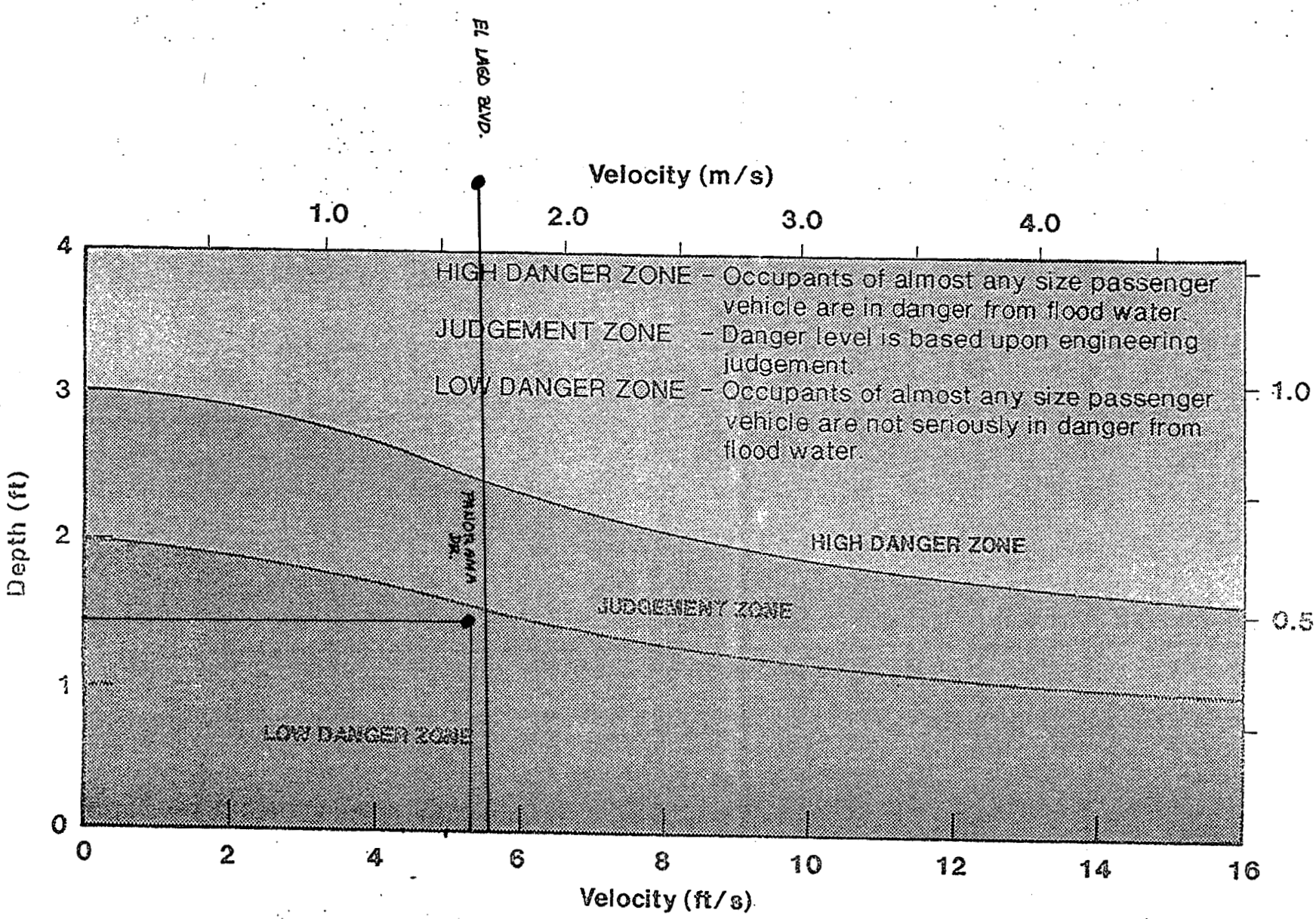

Figure 4. – Depth–velocity flood danger level relationship for passenger vehicles.

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BY HAA DATE 2/14/96
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CLIENT Anderson - Nelson, Inc.
JOB NAME DAMBREAK - Analysis (FOUNTAIN LAKE DAM)
JOB NO. 465.12

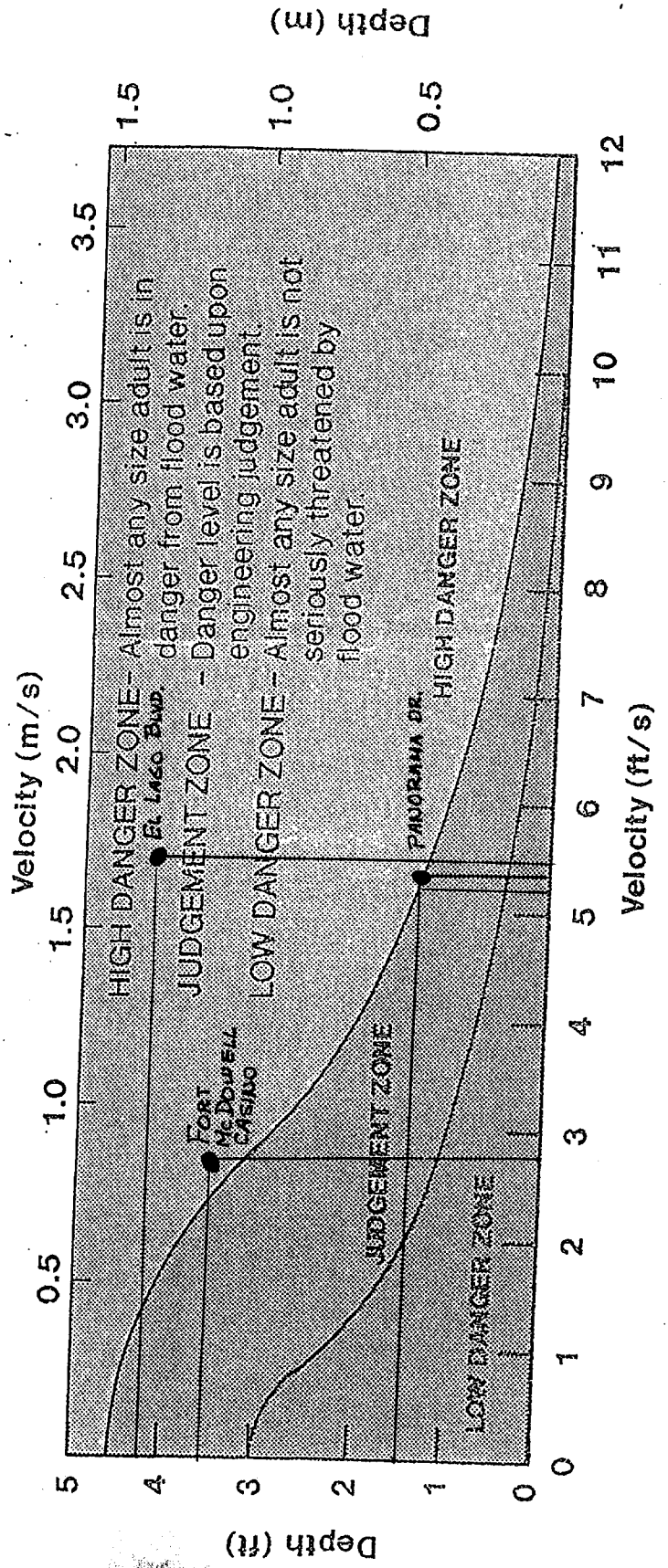

Figure 5. – Depth-velocity flood danger level relationship for adults.