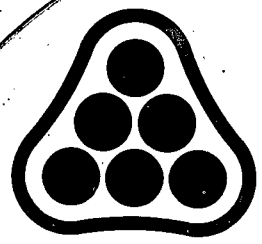


PLAT
FILE



PROFESSIONAL
ENGINEERING
CONSULTANTS
PROFESSIONAL ASSOCIATION

HYDROLOGY

STUDY

for

O'DELL-WHITE PLAT

in

SEDGWICK COUNTY, KANSAS

by

PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

1440 East English

Wichita, Kansas

JULY, 1975

Received AUG 8 1975

1440 EAST ENGLISH
WICHITA, KANSAS 67211
(316) 262-2691

HYDROLOGY

STUDY

for

O'DELL-WHITE PLAT

in

SEDGWICK COUNTY, KANSAS

by

PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

1440 East English

Wichita, Kansas

JULY, 1975

PURPOSE

The purpose of this report is to evaluate storm water runoff as it affects the O'Dell-White Plat; and, if required, to suggest modifications to accommodate the design year storm.

EVALUATION OF EXISTING DRAINAGE

The boundaries for the existing drainage area (71 acres) are shown on Map 1 and were established by field survey. This area was further subdivided into five (5) sub-drainage areas to define the existing drainage patterns. It should be noted that it was assumed that all contributing drainage to the O'Dell-White Plat was not retained or detained by any structure.

Two existing ponds lie within the O'Dell-White Plat. Each pond is contained by an earthen dam. Drainage from the west pond is accomplished by a 10" CMP and a by-pass channel around the pond. Drainage from the east pond is accomplished by a 12" CMP and a by-pass channel around the pond. The dam for the east pond lies to the east, outside the O-Dell-White Plat.

The method utilized to determine drainage flow for the design year storm was the rational method. The Sedgwick County Engineer has specified that the design year storm will be the 100 year return period for total Q, and a 25 year return period for culvert capacity across City View Street. A coefficient of runoff (c) of 0.5 has been specified by the Supervisor of the Wichita-Valley Center Flood Control.

Utilizing the above criteria the total estimated peak flow discharging into the west pond (see Figure 1) for the 100 year return period was determined to be 169 cubic feet per second (cfs). This flow exceeds the theoretical capacity of the 10" corrugated metal pipe and will overflow the west pond dam section.

The west pond will discharge through the 10" corrugated metal pipe when the water surface has risen above an elevation of 1367.3 MSL (see Figure 10). The rate of discharge through this pipe varies according to the water surface above the pipe as shown in Figure 2. When the water surface of this pond rises above an elevation of 1368.9 MSL excess water is by-passed around the dam. The rate of discharge for this by-pass channel versus water surface elevation is shown in Figure 3. A cross-section of the control section of the existing by-pass channel is shown in Figure 4.

From Figures 2 and 3 it was estimated that for the 100 year return period the pond would rise to a maximum elevation of 1369.7 MSL.

RECOMMENDATIONS

The proposed grade for City View extended south from Taft on the west side of the O'Dell-White Plat is shown in Figure 5. Cross-sections for this roadway are shown in Figure 6. The Q_{100} flow estimated for the west ditch of this road is 62 cfs from the north, and 63 cfs from the south. A total of 125 cfs for the 100 year return storm is thus required to be provided for crossing the road. The 25 year return storm runoff (Q_{25}) is estimated at 100 cfs total (or 50 cfs from north and 50 cfs from the south). To pass the Q_{25} through a culvert under the road will require four 24" diameter concrete pipe barrels with a cross-sectional area of 12.56 SF.

Because of the steep ditch slopes north of the culverts on the west side of the road ditch checks will be needed, as shown in Figure 5, to decrease the velocity of the flow to a value that will be non-eroding. The calculated maximum velocity through this ditch between checks is 4.3 feet per second.

The City View street profile has been sagged at the culvert location to provide for the difference between the Q₁₀₀ and the Q₂₅ runoff amounts (25 cfs). The maximum water depth over the roadway during the 100 year return storm is calculated at 0.4 foot.

To provide sufficient cross-sectional area for flow from the discharge of runoff west of City View, it is recommended that the present swale in the Floodway be regraded as shown on Map 2. Cross-sections for these improvements are shown in Figure 8 and 9. A profile drawing is shown in Figure 10.

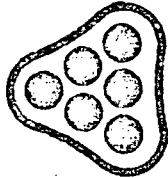
In order to provide for minimum fill around the pond and to maintain the boundaries of the pond within the property line of the O-Dell-White Plat during the 100 year return period, it is recommended that the flow line of the control section of the by-pass channel be lowered to elevation 1368.00 MSL, as shown in Figure 4. The rate of discharge from this improved by-pass channel versus water surface elevation is shown in Figure 11.

The control section for the east pond lies outside the O-Dell-White Plat. A cross-section of this spillway is shown in Figure 12. The maximum water surface for this spillway was determined to be 1362.1 MSL from Figure 13. There is a 12" CMP 110 feet north of the centerline of the by-pass channel

that can provide drainage flow from this east pond. However, at a design water surface elevation of 1362.1 MSL and a flow line of 1358.0 MSL the maximum flow of this pipe would be less than 5 cfs. Therefore it was considered insignificant with regard to the flow from the 100 year return period.

Backwater computations are shown in Figure 14. The backwater profile is shown in Figure 10.

The design water surface for the west and east ponds for the 100 year return period was calculated to be 1369.2 MSL and 1362.1 MSL respectively.



PROFESSIONAL
ENGINEERING
CONSULTANTS
PROFESSIONAL ASSOCIATION

1440 EAST ENGLISH
WICHITA, KANSAS 67211
(316) 262-2691

HYDROLOGY DATA SHEET

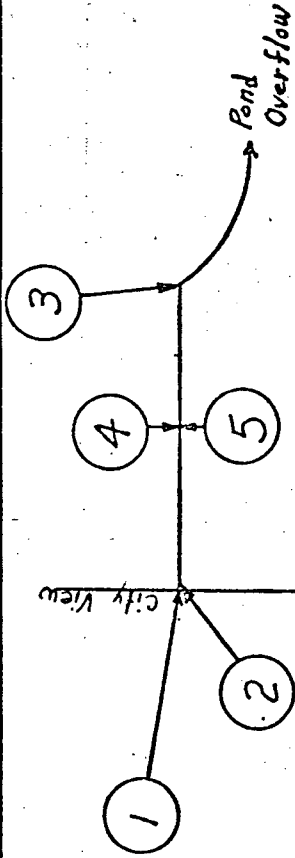
PAGE 1 OF 1

PROJECT: O'dell - White Hydrology Study Project NO. 30-75038-968

ITEM: Drainage Quantities DATE: 9 May 1975

RETURN PERIOD: 100 year COMPUTATIONS BY: RPM REVISIONS BY: _____

SCHEMATIC DIAGRAM:



TRIBUTARY AREA

HYDROLOGY SUMMATION

CONDUIT DATA

SUB-BASIN (1)	C (2)	AREA (acres) (3)	SLOPE (%) (4)	LENGTH (feet) (5)	T _c (minutes) (6)	I ₀ in./hr. (7)	Q ₀ (cfs) (8)	T _c (minutes) (9)	I in./hr. (10)	Q (cfs) (11)	Σ Q (cfs) (12)	PIPE (inches) (13)	SLOPE (%) (14)	VELOCITY (ft./sec.) (15)	LENGTH (feet) (16)	T _f (minutes) (17)	T _c + T _f (minutes) (18)
1	0.5	25.685	1.50	2400	46.22	4.85	62.29	46.22	4.85	62.29	62.29	As noted	~2.0%				
2	0.5	26.116	1.45	1600	38.17	5.62	73.39	46.22	4.85	63.33	125.62	✓	0.714	3.28	55	0.12	46.34
4	0.5	3.950	1.00	150	13.23	9.44	16.28	49.00	4.63	7.99	133.61						
5	0.5	5.230	1.85	200	12.44	9.67	25.29	49.00	4.63	12.11	145.72	✓	0.714	3.12	525	2.66	49.00
3	0.5	10.248	0.90	200	15.82	8.80	45.09	49.00	4.63	23.72	169.44						
Thru Pond												Pond					
3rd Overflow											169.44	✓	2.00	5.15	320	1.10	50.10

FIGURE 1

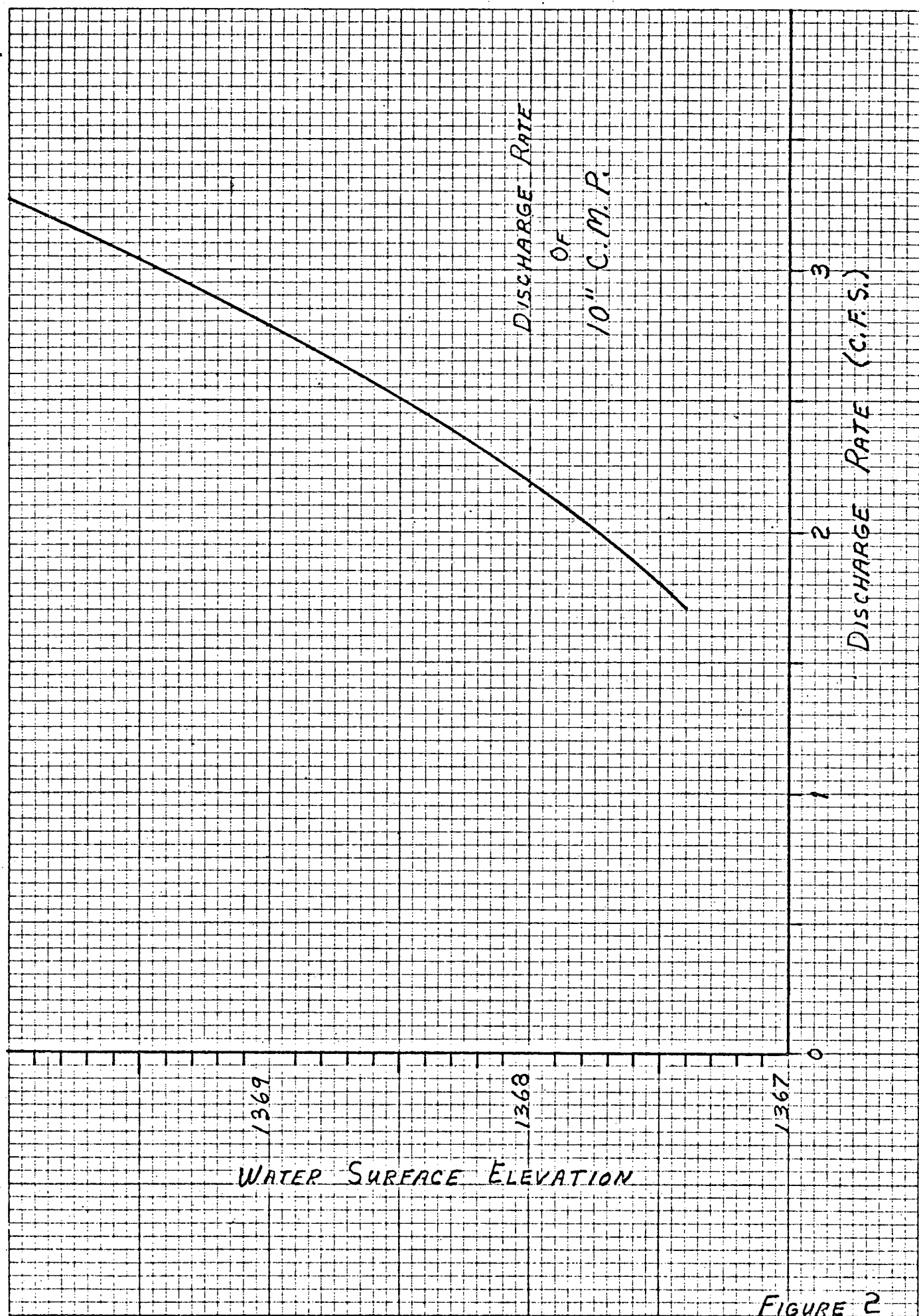


FIGURE 2

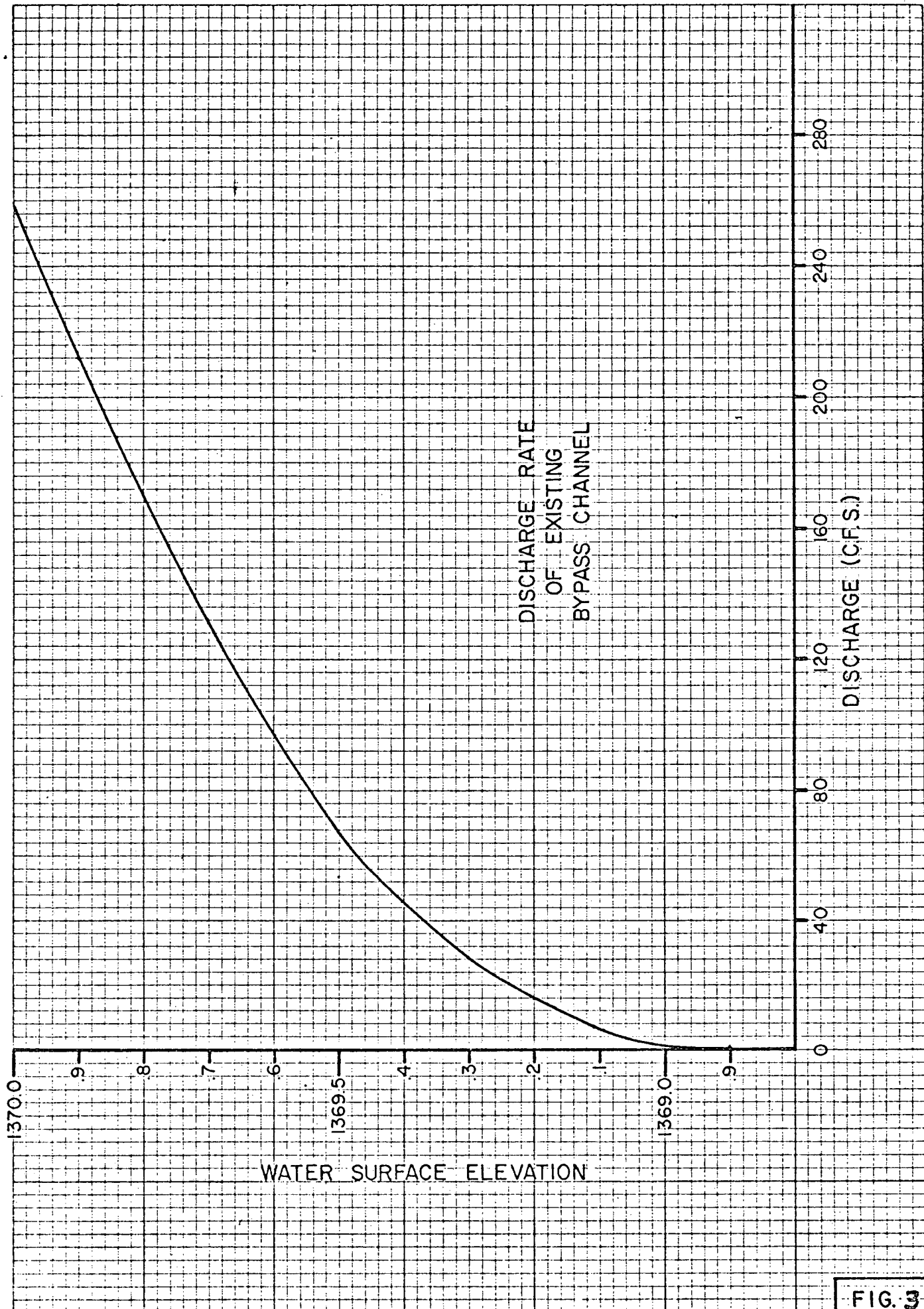


FIG. 3

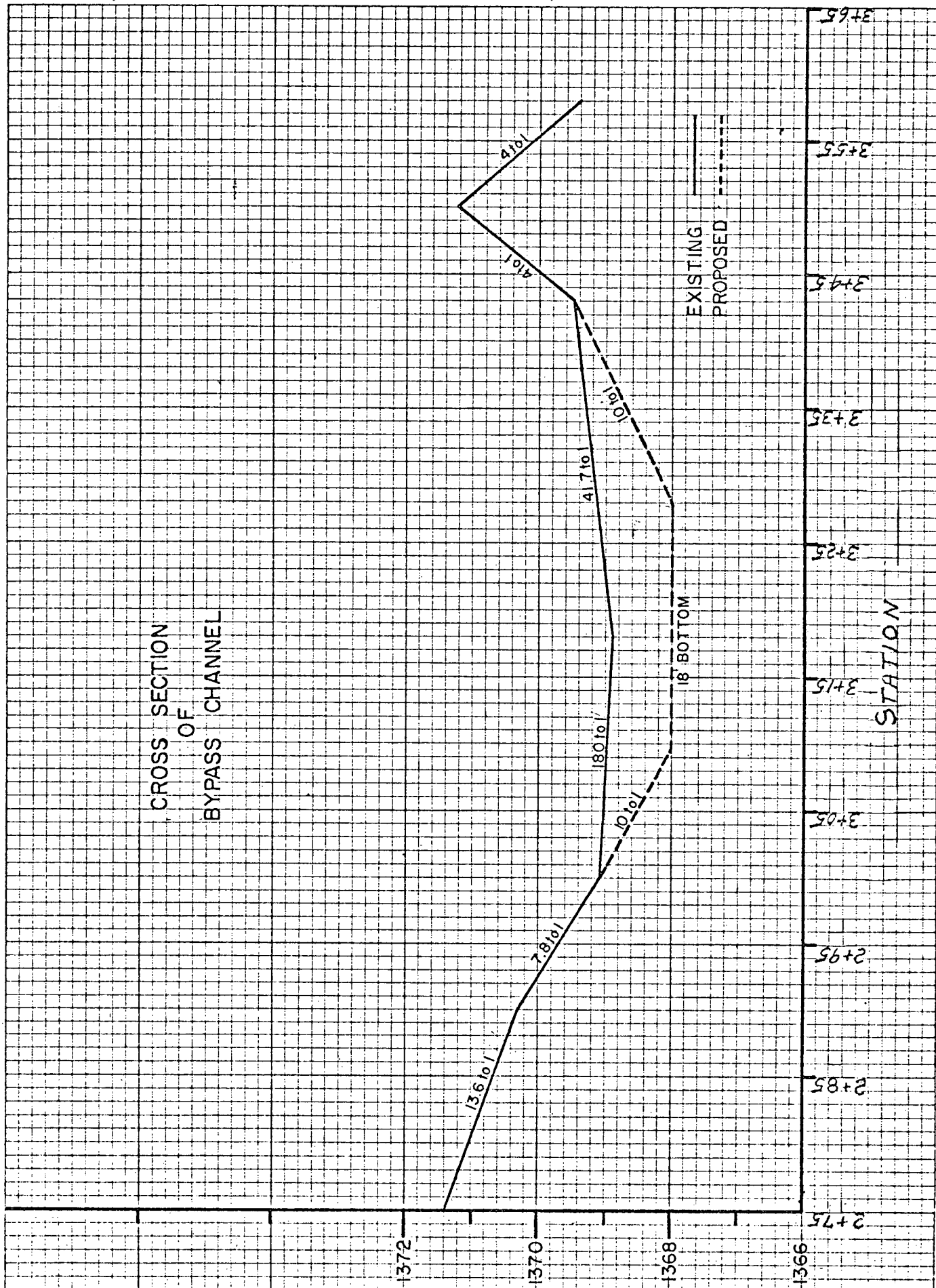


FIG. 4

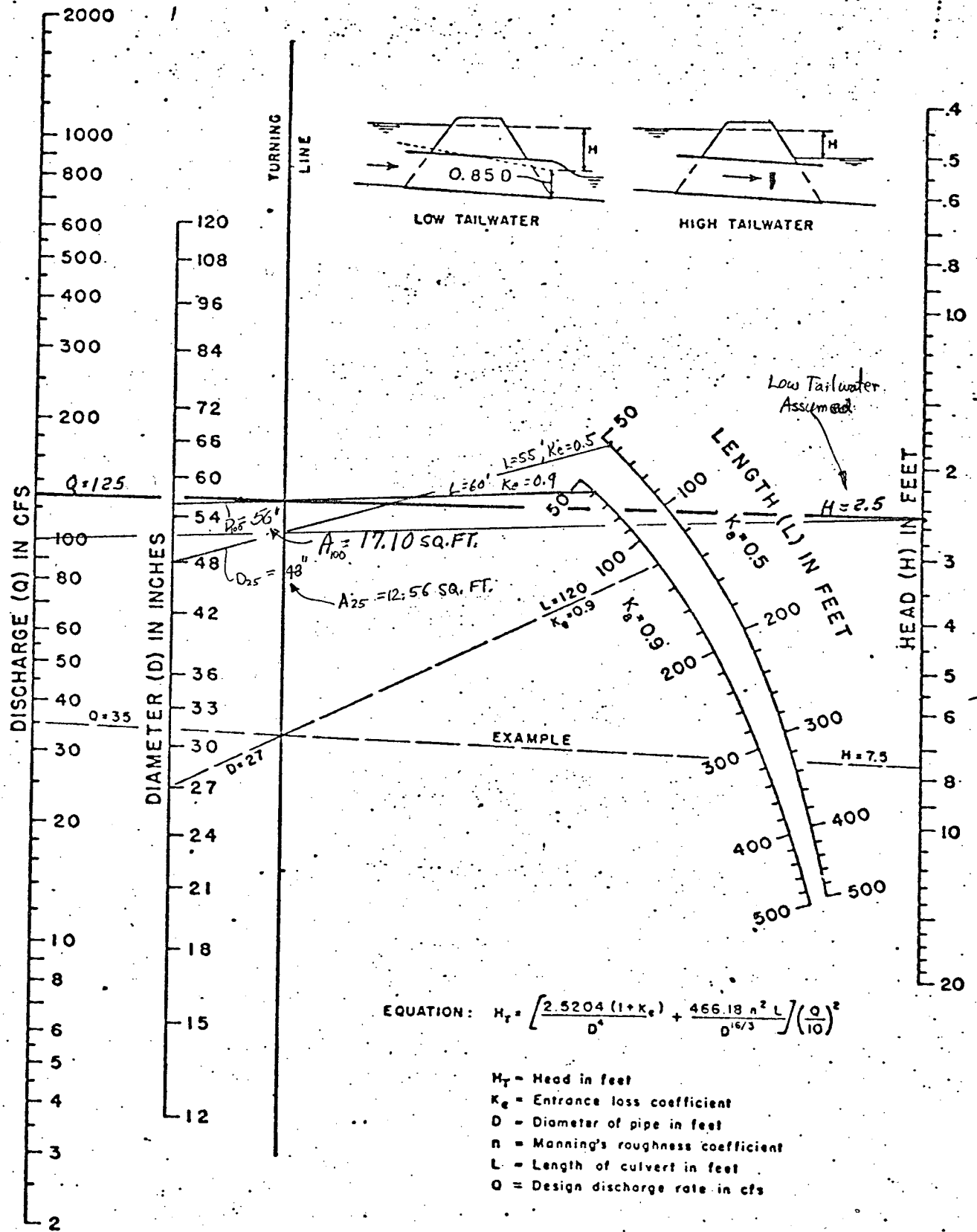


Figure B-11. Head for corrugated-metal pipe culverts flowing full, $n=0.024$. (U.S. Bureau of Public Roads.) 288-D-2911.
 NOTE: $n=0.024$ USED FOR CONCRETE PIPE TO ACCOUNT FOR SEDIMENTATION.

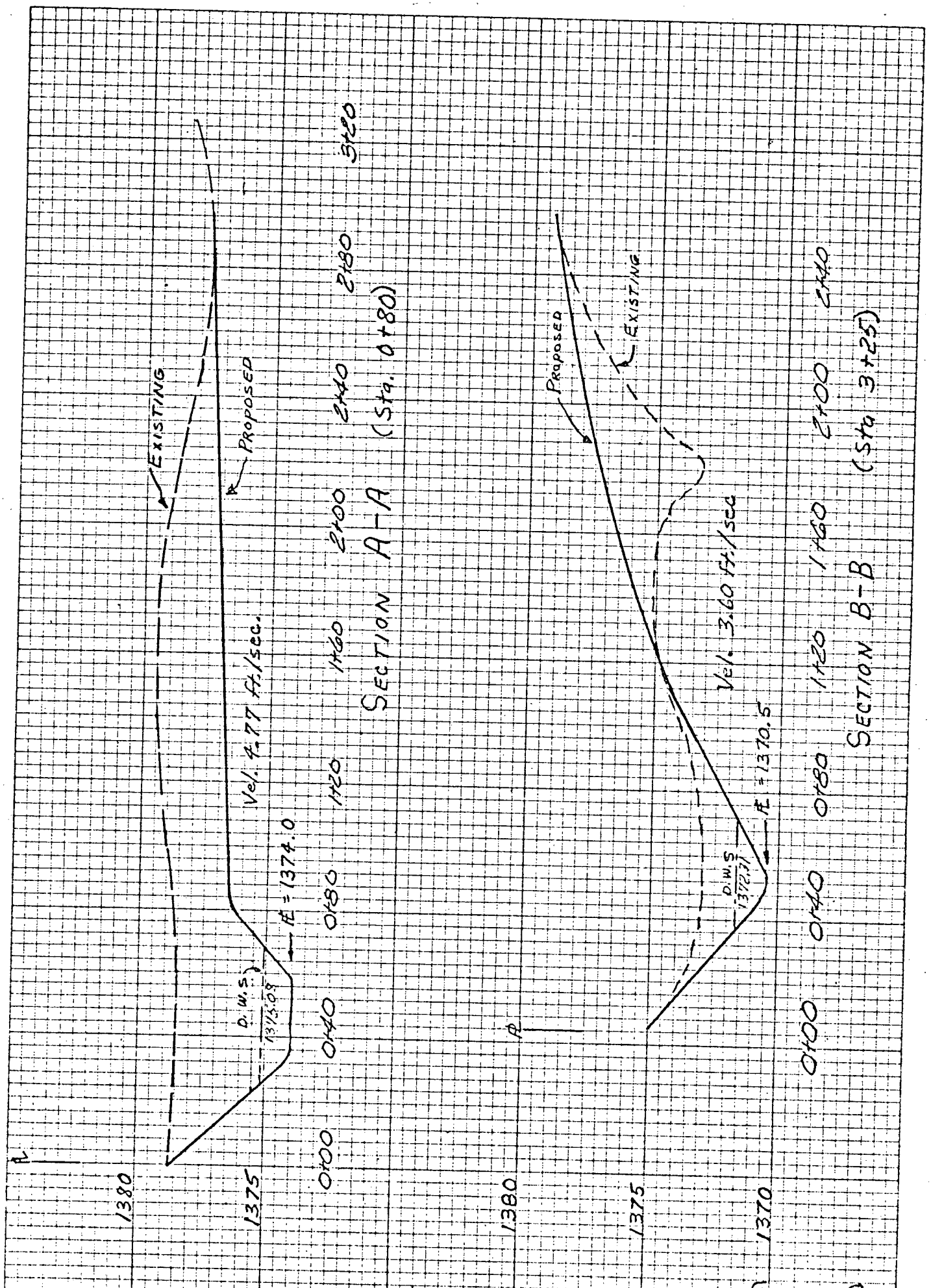


FIGURE 8

PHILIPPINE NATIONAL UNIVERSITY
A. O. ...
C. ...

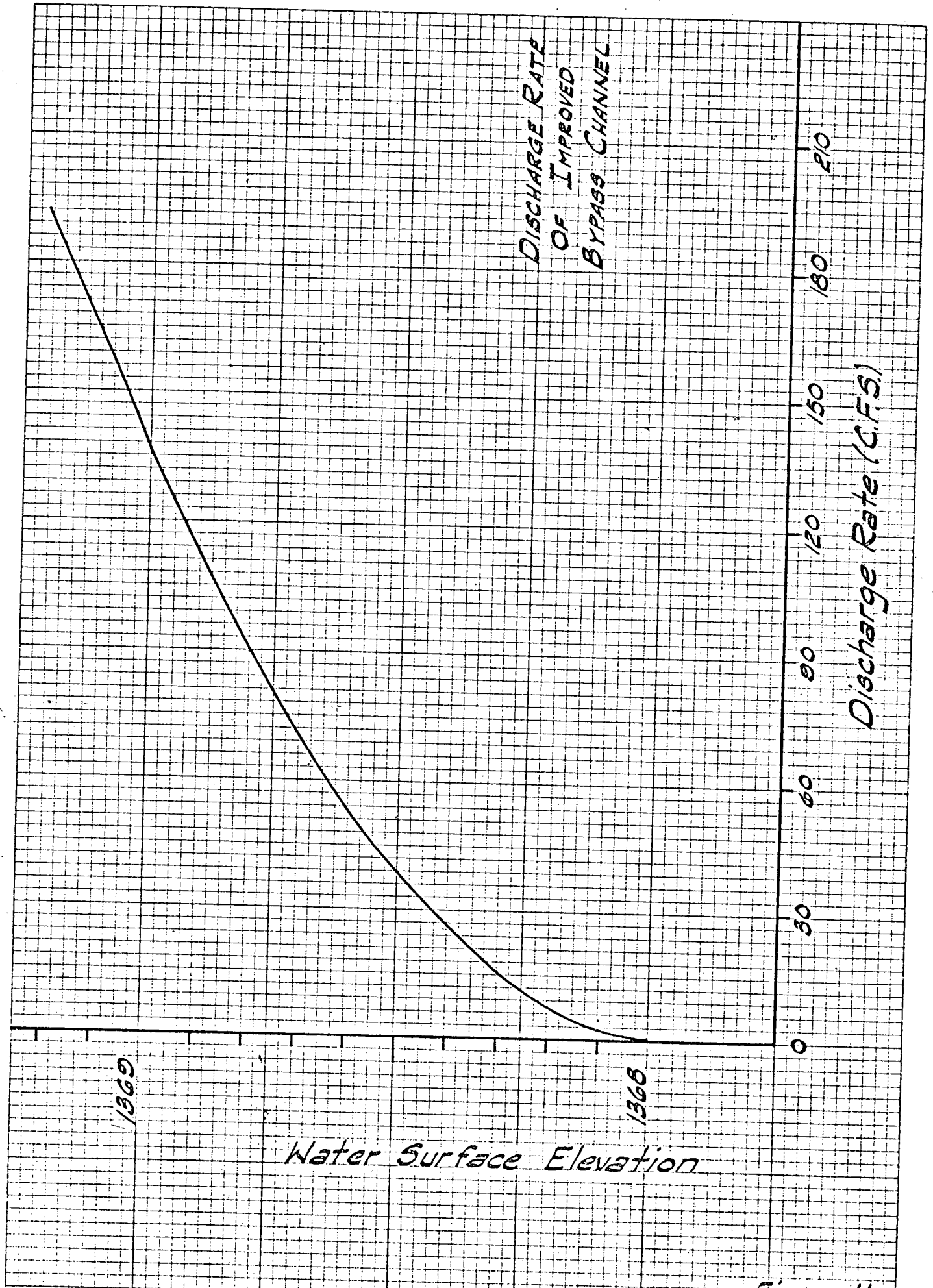


FIGURE 11

Cross Section
of
BYPASS CHANNEL
FOR
EAST POND

1364

1362

1360

D.W.S.
1362.07

Vel. 2.35 ft./sec.

$A = 1360.20$

80 60 40 20 0 20 40 60 80

FIGURE 12

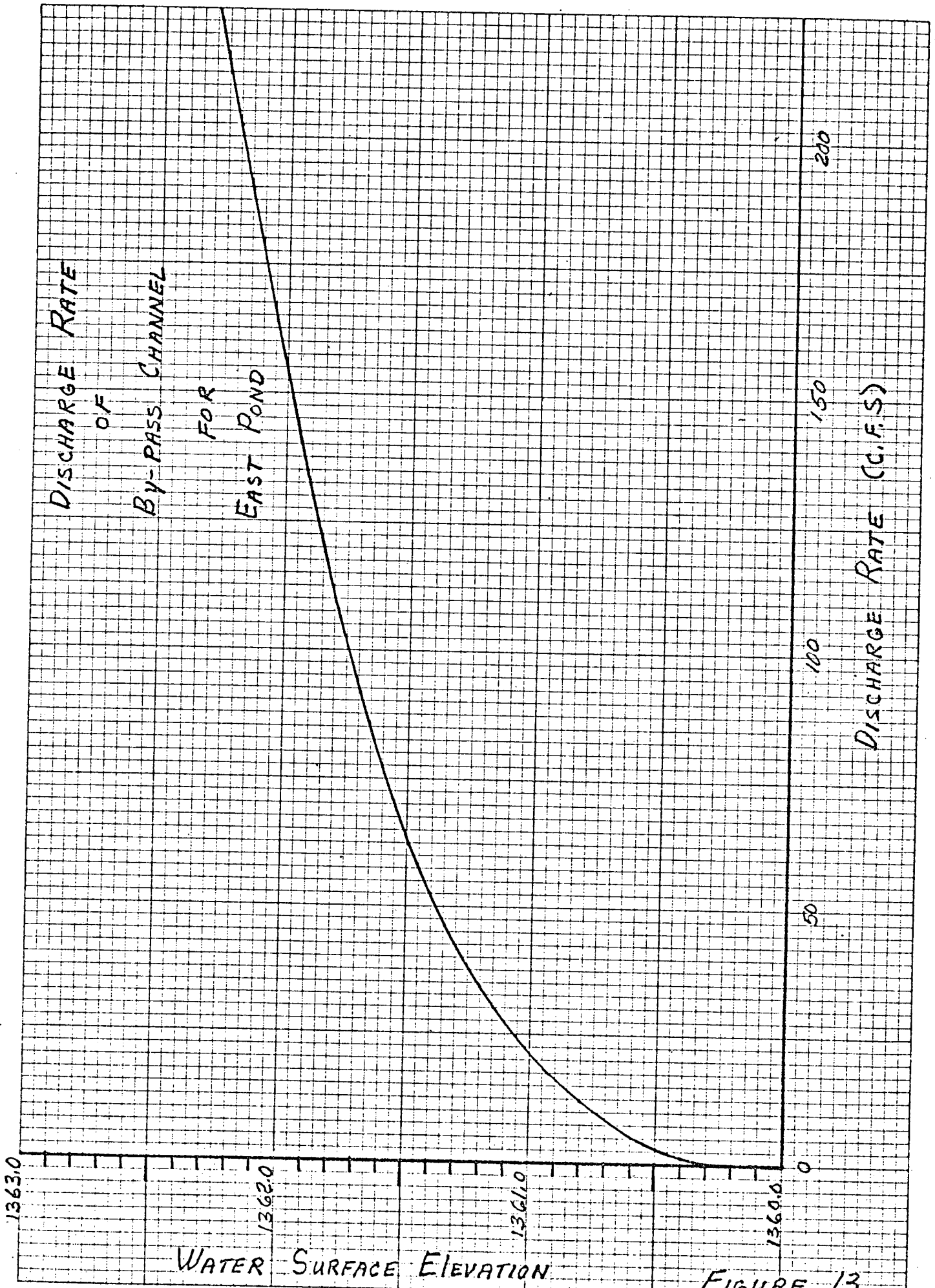
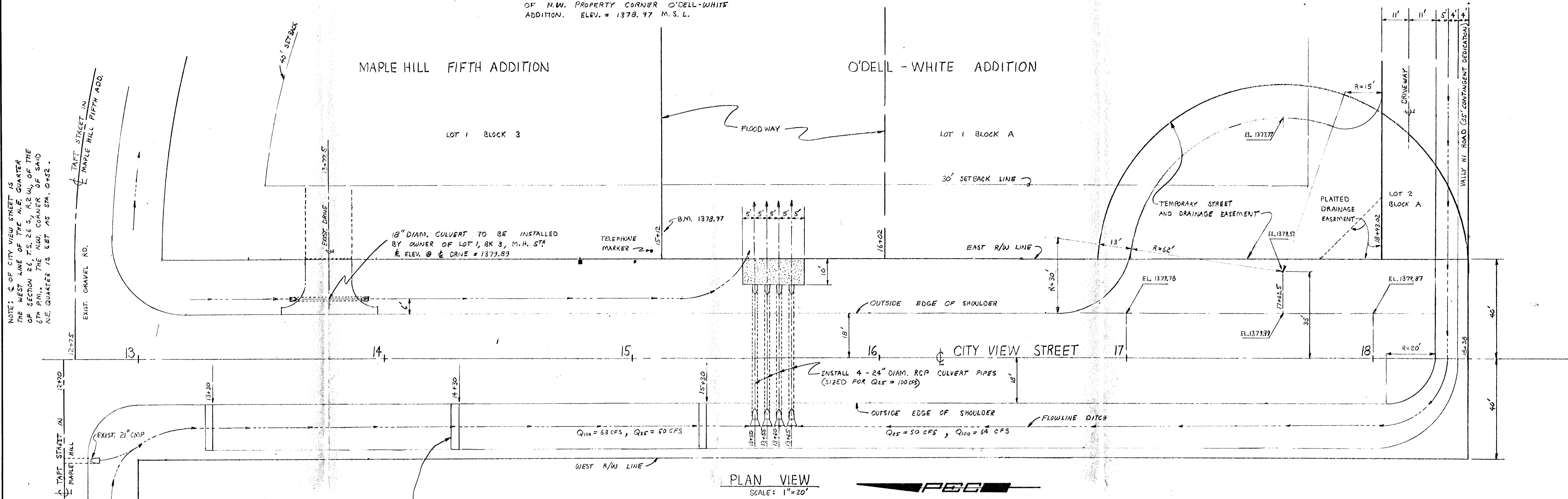


FIGURE 13

DATE	
BY	
REVISIONS	
NO.	
PLAN	
NOTE BOOK	
NO.	

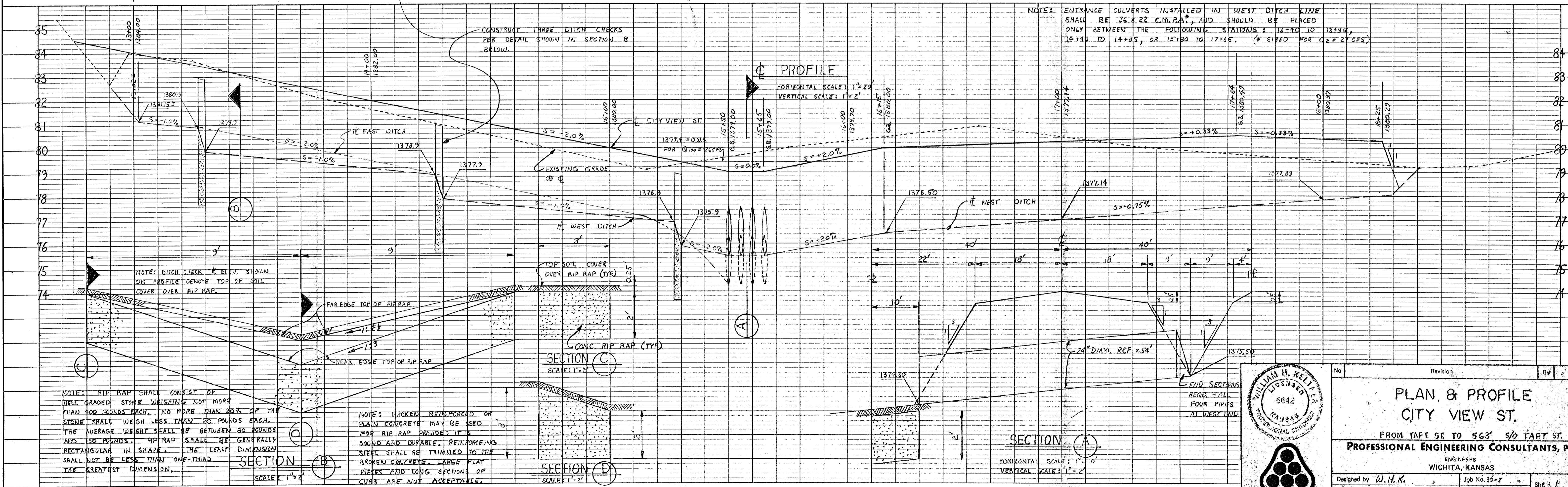
NOTE: Q. OF CITY VIEW STREET IS THE WEST LINE OF THE A.E. QUARTER OF SECTION 26, T.5, R.2 S., R.2 W., OF THE 6TH P.M. THE N.W. CORNER OF SAID A.E. QUARTER IS SET AS STA. 0+52.

BENCH MARK: 1/2" φ PIPE 1.0' SOUTH & 11.0' EAST OF N.W. PROPERTY CORNER O'DELL-WHITE ADDITION. ELEV. = 1378.97 M.S.L.



PLAN VIEW
SCALE: 1" = 20'

DATE	
BY	
REVISIONS	
NO.	
PROFILE	
NOTE BOOK	
NO.	

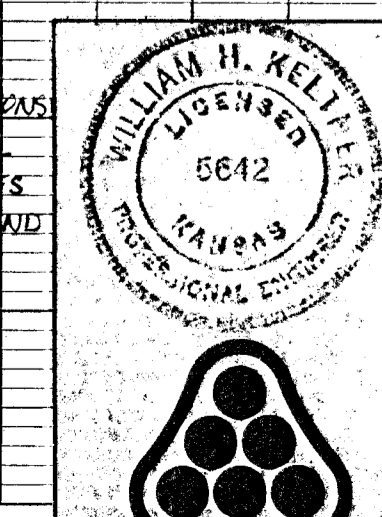


NOTE: ENTRANCE CULVERTS INSTALLED IN WEST DITCH LINE SHALL BE 36" x 22" C.M.P.A., AND SHOULD BE PLACED ONLY BETWEEN THE FOLLOWING STATIONS: 13+10 TO 13+35, 14+40 TO 14+55, OR 15+30 TO 17+65. (# SIZED FOR Q₂ = 27 CFS)

NOTE: DITCH CHECK # ELEV. SHOWN ON PROFILE DENOTE TOP OF SOIL COVER OVER RIP RAP.

NOTE: RIP RAP SHALL CONSIST OF WELL GRADED STONE WEIGHING NOT MORE THAN 100 POUNDS EACH, NO MORE THAN 20% OF THE STONE SHALL WEIGH LESS THAN 20 POUNDS EACH. THE AVERAGE WEIGHT SHALL BE BETWEEN 60 POUNDS AND 80 POUNDS. RIP RAP SHALL BE GENERALLY RECTANGULAR IN SHAPE. THE LEAST DIMENSION SHALL NOT BE LESS THAN ONE-THIRD THE GREATEST DIMENSION.

NOTE: BROKEN REINFORCED OR PLAIN CONCRETE MAY BE USED FOR RIP RAP PROVIDED IT IS SOUND AND DURABLE. REINFORCING STEEL SHALL BE TRIMMED TO THE BROKEN CONCRETE. LARGE FLAT PIECES AND LONG SECTIONS OF CURB ARE NOT ACCEPTABLE.

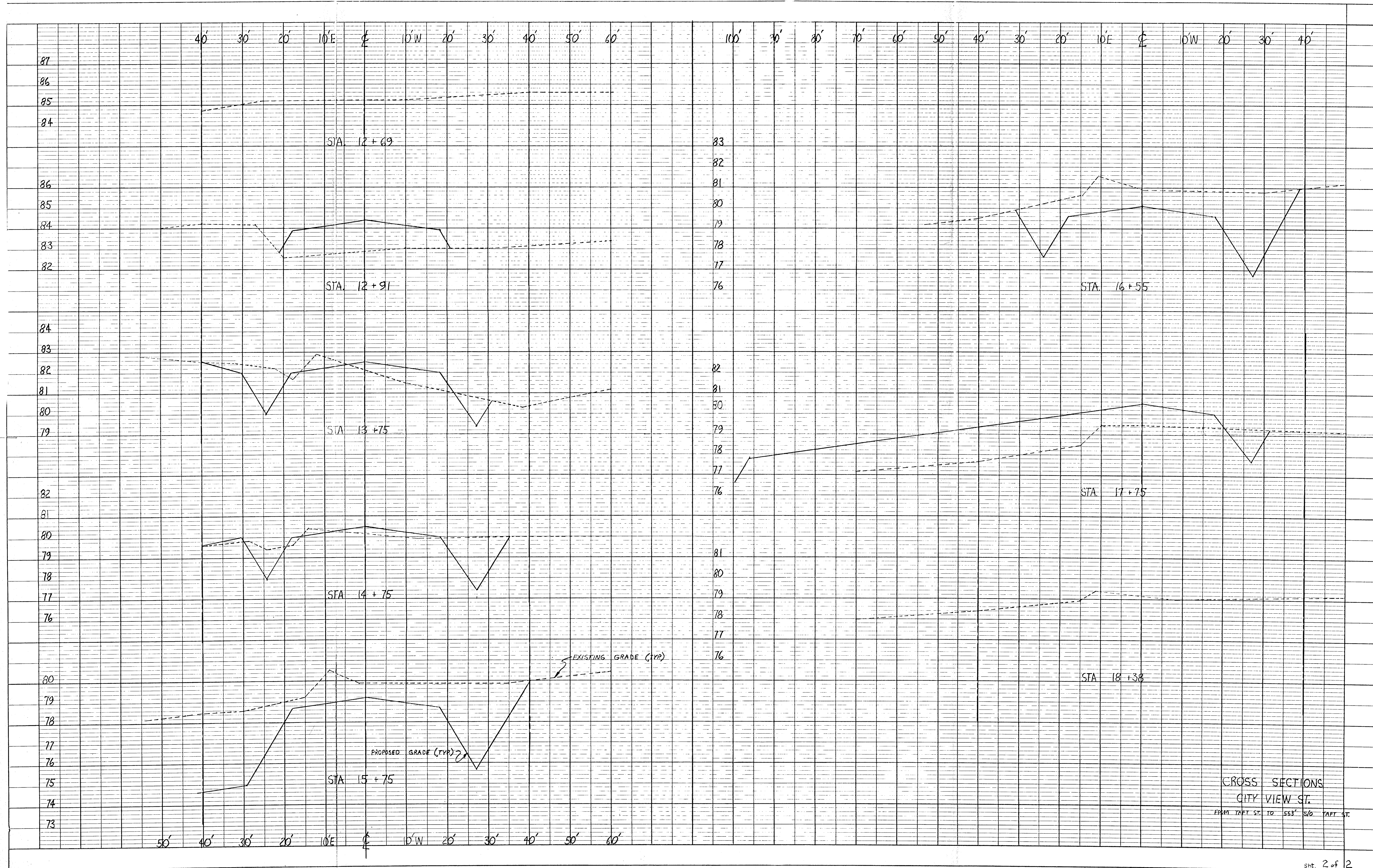


PLAN & PROFILE
CITY VIEW ST.
FROM TAFT ST TO 563' S/O TAFT ST.
PROFESSIONAL ENGINEERING CONSULTANTS, P.A.
ENGINEERS
WICHITA, KANSAS

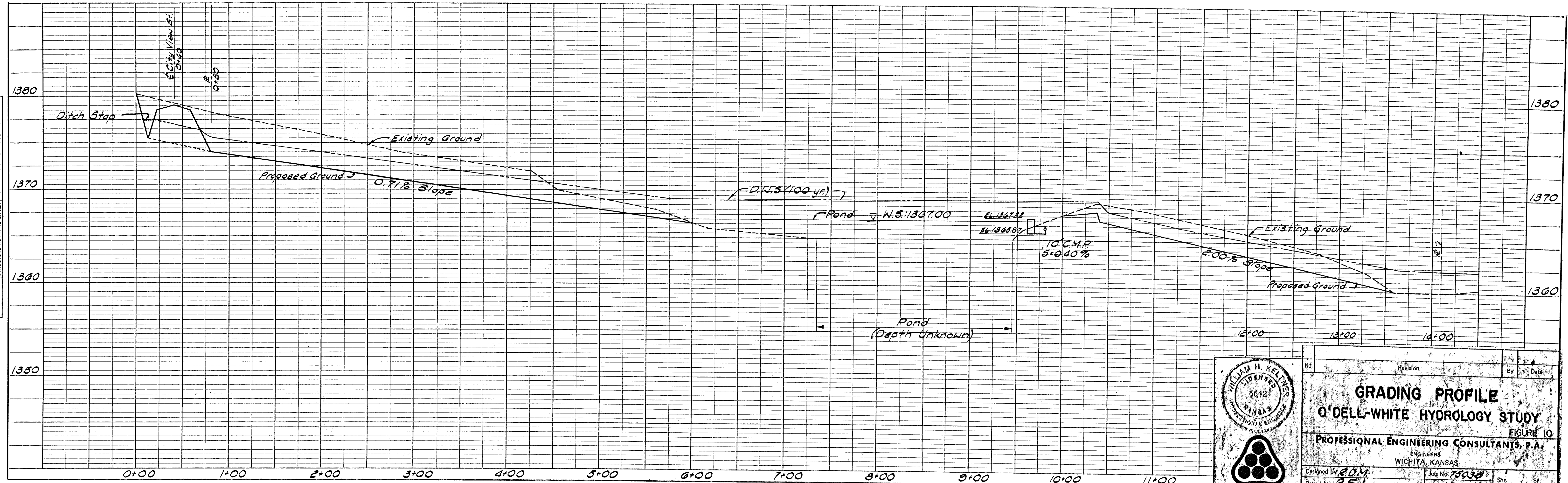
Designed by W.H.K. Job No. 30-7
Drawn by W.H.K. Date 7-23-75

Revision: _____
By: _____
Date: _____

Sheet 1 of 2

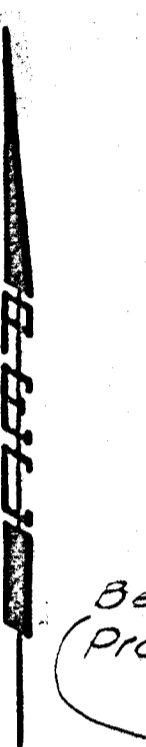


SURVEYED _____
 PLOTTED _____
 GRADES CHECKED _____
 B. M.'S NOTED _____
 STRUCTURE NOTATIONS CHECKED _____
 NO. _____
 PROFILE _____
 BY _____ DATE _____



No.	Revision	By	Date
GRADING PROFILE O'DELL-WHITE HYDROLOGY STUDY FIGURE 10 PROFESSIONAL ENGINEERING CONSULTANTS, P.A. ENGINEERS WICHITA, KANSAS			
Designed by	R.O.M.	Job No.	75038
Drawn by	R.F.U.	Date	May, 1975
		Sht.	9

SCALE 1"=100'



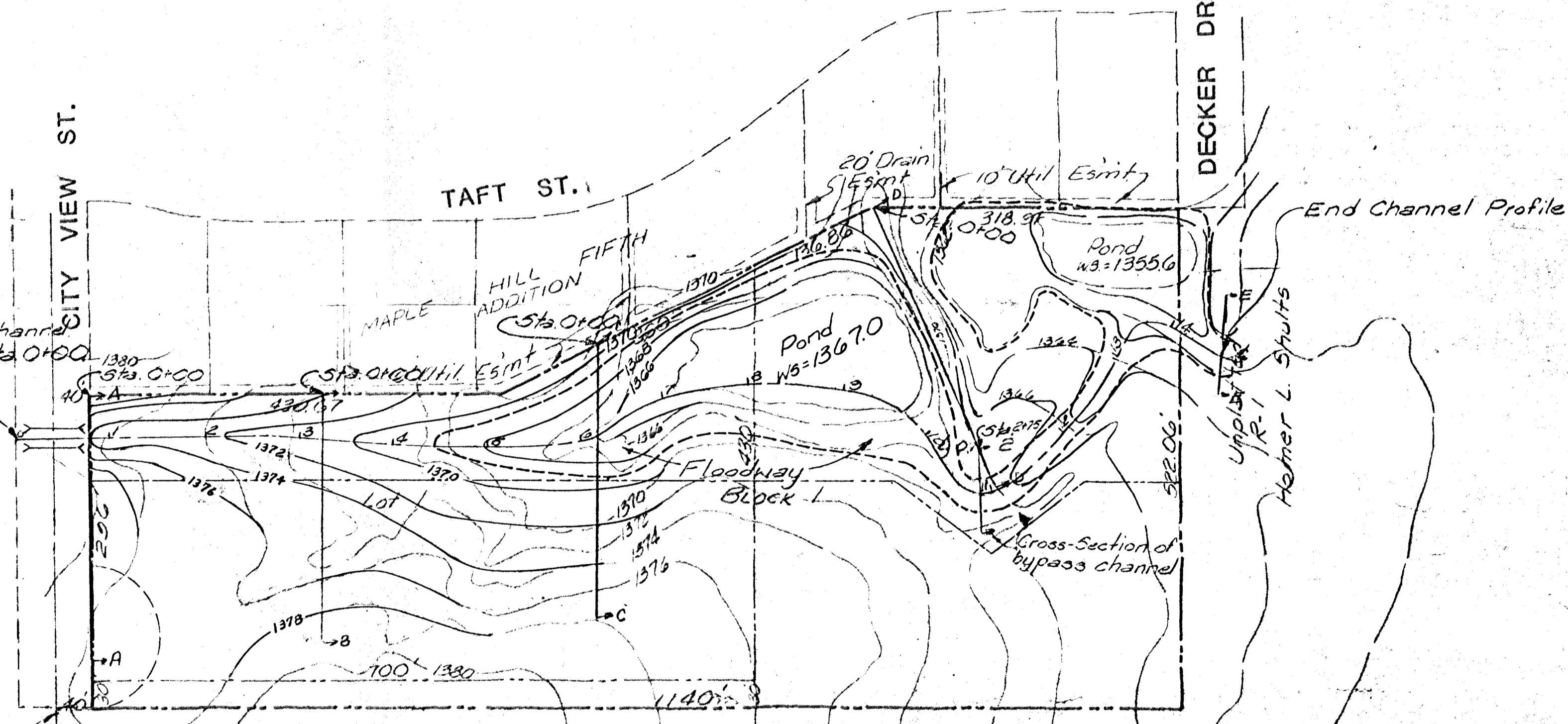
1786 S. of NW Cor.
NE 1/4 Sec. 26, T21S,
R2W.

Unplatted
R-1
Wm T. Mauck

CITY VIEW ST.

TAFT ST.

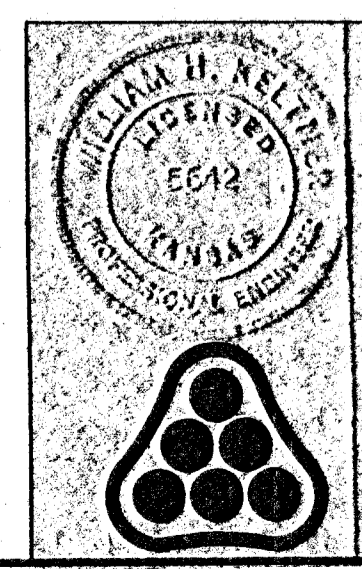
DECKER DRIVE



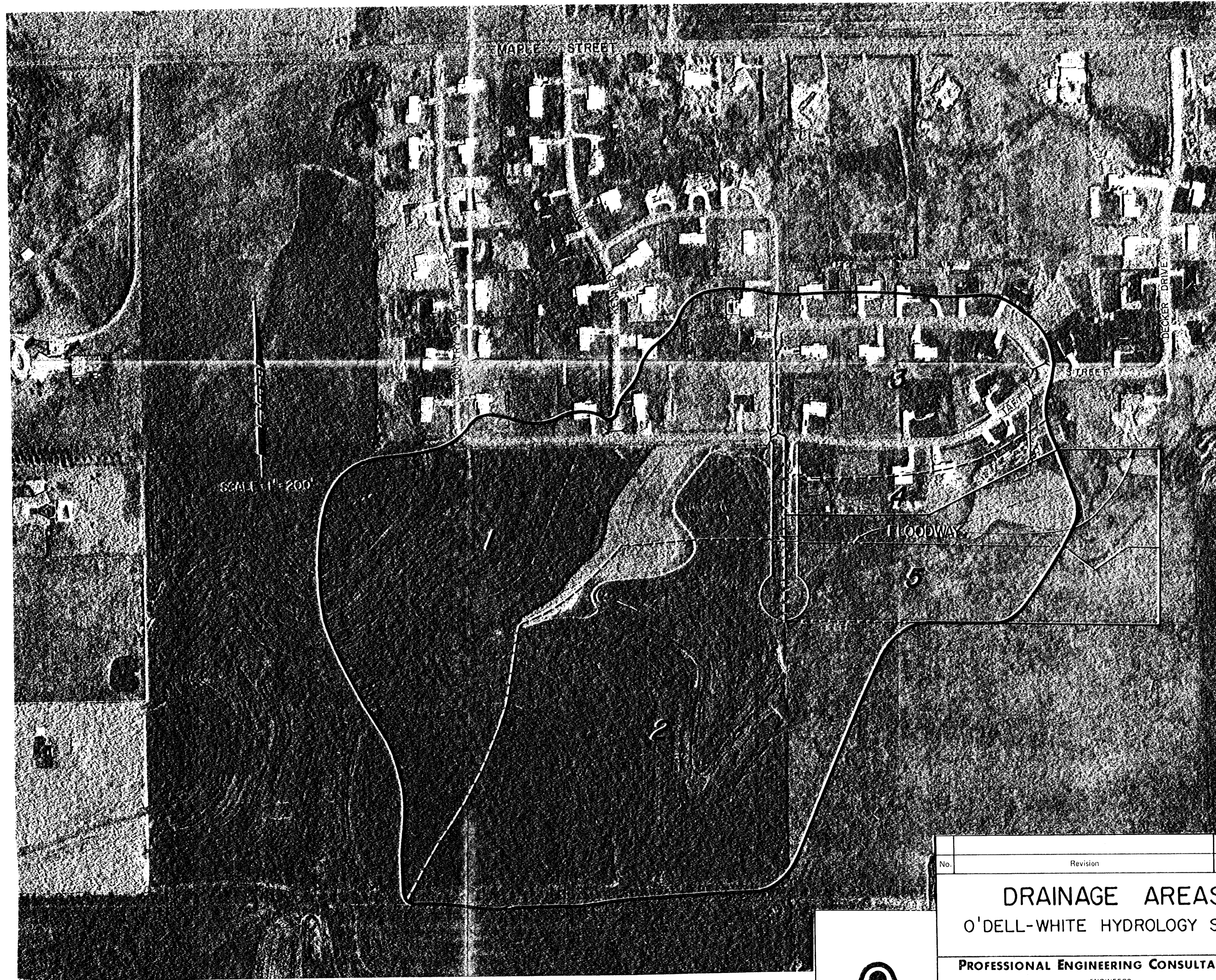
Unplatted
R-1
Carl Sterling

LEGEND

- Proposed Contours
- - - 100 year Max. Calculated Water Surface



No.	Revision	By	Date
GRADING PLAN			
O'DELL-WHITE HYDROLOGY STUDY			
MAP 2			
PROFESSIONAL ENGINEERING CONSULTANTS, P.A.			
ENGINEERS WICHITA, KANSAS			
Designed by <i>R.D.M.</i>	Job No. <i>7503B</i>	Sht. of	
Drawn by <i>R.F.J., R.D.M.</i>	Date <i>APRIL, 1973</i>		



No.	Revision	By	Date

DRAINAGE AREAS
 O'DELL-WHITE HYDROLOGY STUDY
 MAP 1

PROFESSIONAL ENGINEERING CONSULTANTS, P.A.
 ENGINEERS
 WICHITA, KANSAS

Designed by <i>R.D.M.</i>	Job No. <i>75038</i>	Sht. of
Drawn by <i>R.F.J.</i>	Date <i>APRIL, 1975</i>	

