DRAINAGE REPORT

DORADO VILLAGE, TRACT 4
AND
FOUR HILLS ESTATES

ZONE ATLAS SHEET L-22

FEBRUARY, 1976

BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.

1125 Carlisle Boulevard/NE Albuquerque, New Mexico 87107 Phone 881 2000

DRAINAGE REPORT

PROPOSED ROBERSON-PRESLEY DEVELOPMENTS

DORADO VILLAGE, TRACT 4

AND

FOUR HILLS ESTATES

ZONE ATLAS SHEET L-22

FEBRUARY, 1976

PREPARED FOR

ROBERSON CONSTRUCTION COMPANY
9212 Trumbull Avenue, S.E.
Albuquerque, New Mexico 87123

AND

THE PRESLEY COMPANY OF NEW MEXICO
P.O. Box 11152
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N.M.P.E. NO. 5194

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PROPOSED ROBERSON - PRESLEY DEVELOPMENTS

DORADO VILLAGE, TRACT 4 AND FOUR HILLS ESTATES

NARRATIVE

In September, 1974, our firm accomplished a drainage report entitled Drainage Master Plan for the Hanosh Shopping Center and Adjacent Lands to the South. In the referenced report, detailed concepts of the method of storm water runoff control for the Hanosh Shopping Center were advanced. Drainage Alternate 2 described in the referenced report provided for the moving of a portion of the flow from the shopping center south to Tijeras Canyon so that a portion of the area dedicated to ponding in the initial development stages of the shopping center could be reclaimed as usable building sites. This report assumes that Drainage Alternate 2 will, at some time in the future, be adopted. The adoption of Drainage Alternate 2 results in Drainage Area 2 (see Plates I and II in the back of this report) contributing flows to and through the proposed developments.

Also proposed in the referenced report was a conceptual drainage plan that provided for the movement of all storm water falling south of Singing Arrow and east of Dorado Place to Tijeras Canyon for ultimate discharge.

The purpose of this drainage report is to demonstrate the layouts of the proposed Roberson and Presley developments and the methods by which the concepts advanced in the original Drainage Master Plan for the area will be achieved.

DRAINAGE

Shown on Plate I are the drainage areas that will affect the proposed

developments. Shown on Plate II is the detailed street layout in the proposed developments, the resulting flow rates at critical points, the proposed street cross sections and flow depths for the major water carrying streets, and the proposed storm drainage facilities in the vicinity of Tomlinson and Piru that will collect storm water and discharge it to Tijeras Canyon. Given in the Appendix are the computations from which the flow rates were derived and graphs of water depth versus flow rate for typical major water carrying streets in the developments.

It should be noted that with the exception of the easterly portion of the Hanosh Shopping Center and the proposed subdivisions, all areas were analyzed in their existing condition as shown on Plate I.

REQUESTED REVIEWS

It is requested that the City staff review these proposals with particular attention to the following items:

Assistant City Engineer, Hydrology - Detailed review of drainage concepts and computations with particular attention being paid to flow depths in streets, recommended street cross sections, and proposed drainage facilities in the vicinity of Tomlinson and Piru. Review of City policy to determine if the drainage improvement may be eligible for City participation.

City Traffic Engineer - Detailed review of street cross sections with respect to width, crown slope, proposed flat sections for Dorado Place and Tomlinson, and proposed water blocks on Singing Arrow.

Liquid Waste Engineer - Detailed review of the proposed construction of storm drainage facilities in the vicinity of Tomlinson and Piru.

CONCLUSIONS

1. The adoption of the above drainage concepts will reduce to some extent the quantity of storm water flow onto Central Avenue via Western Skies Drive.

2. The adoption of the above drainage concepts will greatly reduce the quantity of storm water flow onto Juan Tabo Boulevard at its intersection with Singing Arrow.

3. The slightly elevated water depths experienced on Tomlinson during the 100 year frequency storm should present no problem if finished floors on residences facing this street are constructed a minimum of 1.7 feet above top of curb.

RECOMMENDATIONS

1. The consultant and referenced members of the City staff should meet and discuss in detail concepts proposed in this report. Through this meeting, any concepts requiring revisions can be discussed and resolved.

2. This drainage plan with the above revisions, if any, should be adopted for the proposed developments and dictate the preparation of final plats and the detailed design of improvement.

APPENDIX

COMPUTATIONS

AREAS A,

Paved = 12.64 acres

Apartments = 10.22

Subdivision = 5.05

Undeveloped = 55.45

Combined Total = 83.36 acres

A, RUNOFF COMPUTATIONS

Length = 4500 FT.

Slope = 01.62%

T_C = 19.31 min. (Time of Concentration)

I = 4.25 (Albq. Master Plan of Drainage - 1963)

$C_W = \left(\frac{12.64(.95) + 10.22(.80) + 5.05(.65) + 55.45(.35)}{12.64 + 10.22 + 5.05 + 55.45} \right)$ = .47

Q = 166.5 (.47 × 4.25 × 83.36)

BOHANNAN WESTMAN HUSTON

PROJECT NAME HANOSH PARCEL SHEET 1 OF 9

PROJECT NO. 76-024 BY JDJ DATE 2-10-76

SUBJECT DRAINAGE AREAS CH'D MME DATE 2-18-76

AREA A_2

Paved = 16.11 acres

Subdivision = 4.04

Subdivision (Lot Ponding) = .55

Undeveloped = 17.62

Combined Total = 38.32

− Lot Ponding = .55

37.77 (Net Total)

A_2 RUNOFF COMPUTATIONS

Length = 2500 FT.

Slope = 01.24 %

T_c = 16.23 min (Time of Concentration)

I = 4.50 (Albq. Master Plan of Drainage - 1963)

C_w = .64 $\left(\frac{16.11\,(.95) + 4.04\,(.65) + 17.62\,(.35)}{16.11 + 4.04 + 17.62}\right)$

Q = 108.8 (.64 × 4.50 × 37.77)

BOHANNAN WESTMAN HUSTON

PROJECT NAME HANOSH PARCEL SHEET 2 OF 9

PROJECT NO. 76-024 BY JDJ DATE 2-10-76

SUBJECT DRAINAGE AREAS CH'D MHE DATE 2-18-76

AREA A_4

Paved = 5.34 acres

Subdivision = 36.20

Subdivision = 3.16
(Lot Ponding)

Combined Total = 44.70 acres

Lot Ponding = 3.16

(Net Total) = 41.54 acres

A_4 RUNOFF COMPUTATIONS

Length = 3000'

Slope = 01.27%

T_c = 17.33 min. (Time of Concentration)

I = 4.40 (Albq. Master Plan of Drainage - 1963)

$C_w = .69 \left(\frac{5.34(.95) + 36.20(.65)}{5.34 + 36.20} \right)$

Q = 126.1 (.69 × 4.40 × 41.54)

BOHANNAN WESTMAN HUSTON

PROJECT NAME HANOSH PARCEL SHEET 3 OF 9

PROJECT NO. 76-024 BY JDJ DATE 2-10-76

SUBJECT DRAINAGE AREAS CH'D MME DATE 2-18-76

AREA A_5

Paved = 2.75

Subdivision = 1.38

Undeveloped = 5.83

Combined Total = 9.96 acres

A_5 RUNOFF COMPUTATIONS

Length = 2800 FT.

Slope = 01.54%

T_c = 16.24 (Time of Concentration)

I = 4.50 (Albq. Master Plan of Drainage - 1963)

$$C_w = .56 \left(\frac{2.75(.95) + 1.38(.65) + 5.83(.35)}{2.75 + 1.38 + 5.83} \right)$$

Q = 25.1 $(.56 \times 4.50 \times 9.96)$

PROJECT NAME HANOSH PARCEL SHEET 4 OF 9

PROJECT NO. 76-024 BY JDJ DATE 2-10-76

SUBJECT DRAINAGE AREAS CH'D MME DATE 2-18-76

AREA A_3

Paved = 2.28

Subdivision = 10.85

Subdivision (Lot Ponding) 4.49

Combined Total = 17.62 acres

− (Lot Ponding 4.49)

(Net Total) = 13.13 acres

Length = 1600 FT

Slope = 00.94 %

T_c = 14.43 (Time of Concentration)

I = 4.70 (Albq. Master Drainage Plan; 1963)

$C_w = .70 \left(\frac{2.28(.95) + 10.85(.65)}{2.28 + 10.85} \right)$

$Q = 43.2 \quad (.70 \times 4.70 \times 13.13)$

COMBINED FLOWS

$C_w = .52 \quad (C_{w_{1-2}})$ $\qquad \frac{A_1 + A_2}{}$

$A = 121.68 \quad (A_1 + A_2 = 83.36 + 38.32)$

$I = 4.25 \quad (\text{Min. of } \text{Area}_1 \text{ or } \text{Area}_2)$

$Q = 267.7 \quad (.52 \times 4.25 \times 121.68)$

$\frac{A_1 + A_2 + A_3 + A_4}{}$

$C_w = .57 \left(\frac{83.36(.47) + 38.32(.64) + 13.13(.70) + 41.54(.69)}{83.36 + 38.32 + 13.13 + 41.54} \right)$

$A = 176.35 \quad (A_1 + A_2 + A_3 + A_4)$

$T_c = 22.22$ min (Time of Concentration)

I = 3.90 (Albq. Master Plan of Drainage - 1963)

$Q = 392.0 \quad (.57 \times 3.90 \times 176.35)$

COMBINED FLOWS

$A_1 + A_2 + A_3 + A_4 + A_5$

$C_W = .575 \left(\frac{83.36(.47) + 38.32(.64) + 13.13(.70) + 41.54(.69) + 9.96(.56}{83.36 + 38.32 + 13.13 + 41.54 + 9.96} \right)$

$A = 186.31 \ (A_1 + A_2 + A_3 + A_4 + A_5)$

$T_c = 22.42$ min (Time of Concentration)

$I = 3.90$ (Alby. Master Plan of Drainage - 1963)

$Q = 417.8 \ (.575 \times 3.90 \times 186.31)$

AREA A_6

Paved	= .99
Apartments	= 8.44
Subdivision	= 2.27
Subdivision (Lot Ponding)	= .22
Undeveloped	= 2.28
Combined Total	= 14.20 acres
— (Lot Ponding)	= .22
Net Total	13.98 acres

Length = 1400 FT.

Slope = 1.04%

$T_c = 13.43$ min. (Time of Concentration)

$I = 4.90$ min. (Alby. Master Plan of Drainage - 1963)

$C_W = .61 \left(\frac{.99(.95) + 8.44(.80) + 2.27(.65) + 2.28(.35)}{.99 + 8.44 + 2.27 + 2.28} \right)$

$Q = 41.8 \ (.61 \times 4.90 \times 13.98)$

BOHANNAN WESTMAN HUSTON

PROJECT NAME HANOSH PARCEL SHEET 6 OF 9

PROJECT NO. 76-024 BY JDJ DATE 2-10-76

SUBJECT DRAINAGE AREAS CH'D MME DATE 2-18-76

COMBINED FLOWS

$$C_w = .54 \left(\frac{A_1 + A_2 + A_3}{83.36 + 38.32 + 13.13} \right) \quad \frac{83.36(.47) + 38.32(.64) + 13.13(.70)}{}$$

$A = 134.81 \quad (A_1 + A_2 + A_3)$

$T_c = 22.22$ min (Time of Concentration)

$I = 3.90$ (Alby Master Plan of Drainage - 1963)

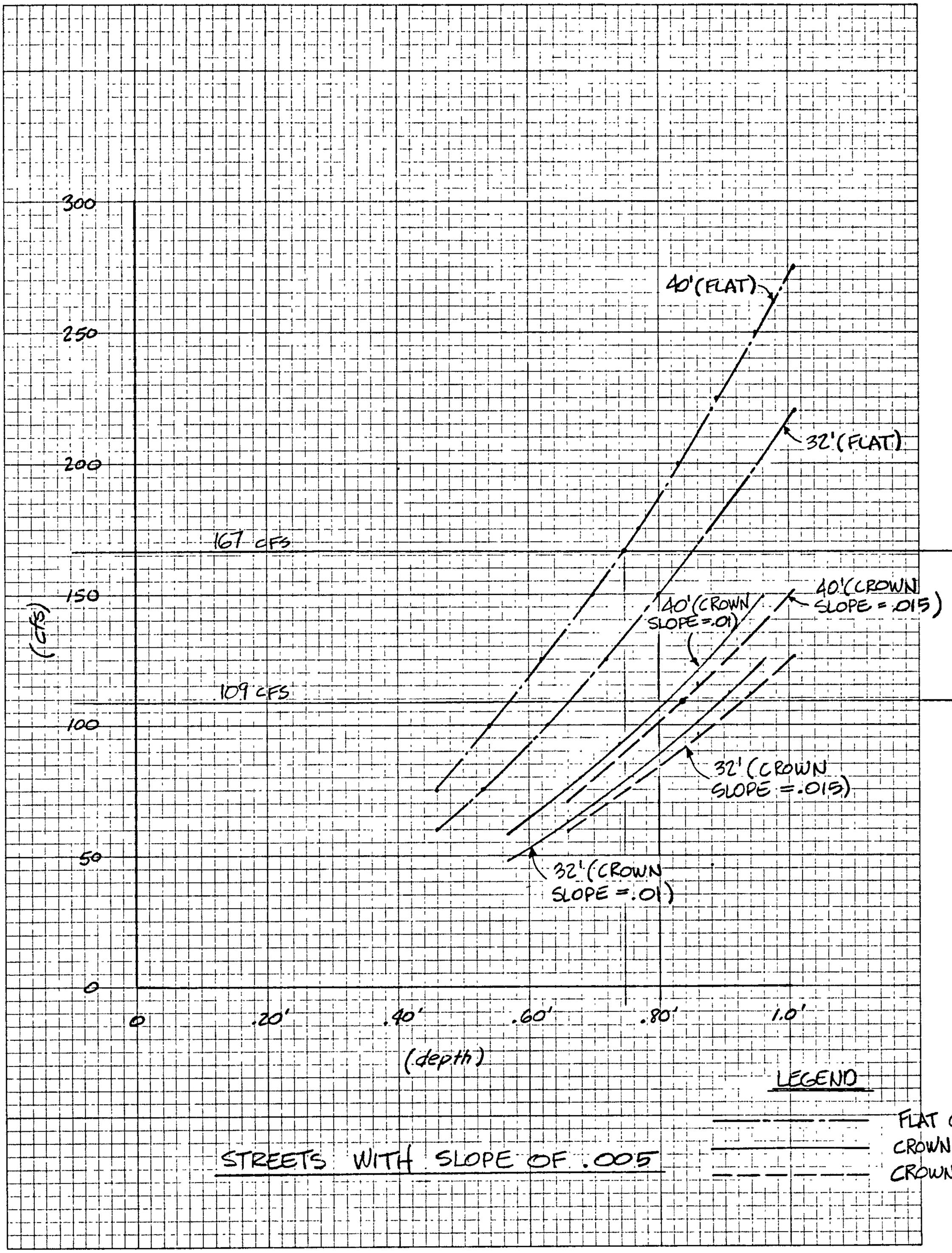
$Q = 283.9 \quad (.54 \times 3.90 \times 134.81)$

BOHANNAN WESTMAN HUSTON

PROJECT NAME HANOSH PARCEL SHEET 7 OF 9

PROJECT NO. 76-024 BY JOJ DATE 2-10-76

SUBJECT DRAINAGE AREAS CH'D MHE DATE 2-18-76

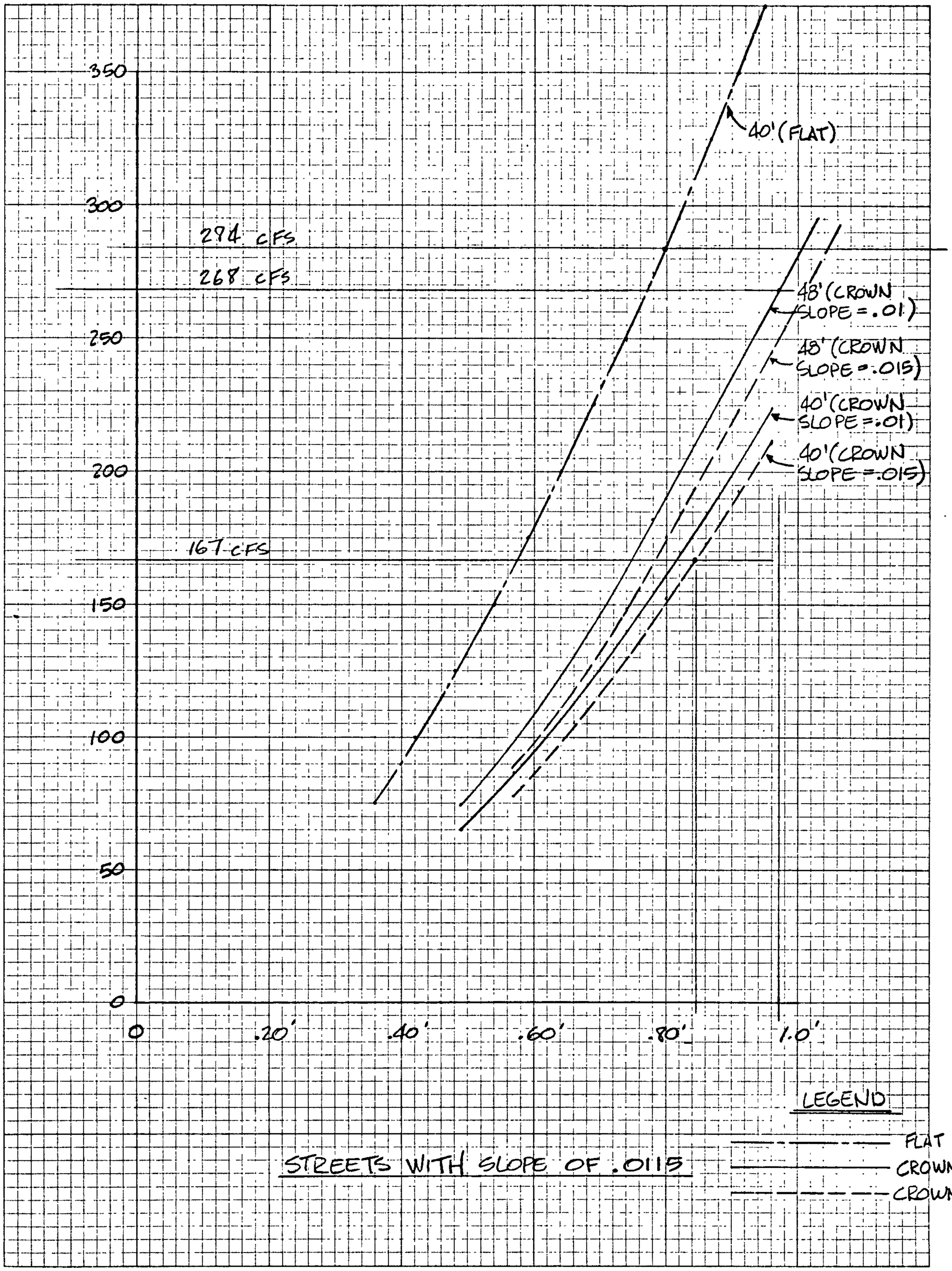


BOHANNAN WESTMAN HUSTON

PROJECT NAME HANOSH PARCEL SHEET 8 OF 9

PROJECT NO. 76-024 BY JDJ DATE FEB. 1976

SUBJECT STREET FLOWS and DEPTHS CH'D MME DATE FEB. 1976



BOHANNAN WESTMAN HUSTON

PROJECT NAME HANOSH PARCEL SHEET 9 OF 9

PROJECT NO. 76-024 BY JDJ DATE FEB. 1976

SUBJECT STREET FLOWS and DEPTHS CH'D MME DATE FEB. 1976

BOHANNAN WESTMAN HUSTON & ASSOCIATES, INC.

Developed Flows

Area Draining to Street

Impervious Area

House	30 x 70	=	2100
Driveway	18 x 30	=	540
Street and Sidewalk	20 x 100	=	2000
			4640 s.f. = 58%

Pervious Area

(80 x 100) − 4640 = 3360 s.f. = 42%

Total Area

8000 s.f. = 100%

Composite 'C' Factor

(0.95)(0.58) = 0.55
(0.35)(0.42) = 0.15
0.70

Area #1 Draining to Piru:

Area: 965 x 80 = 1.77 acres
I = 4.40 inches/hour
Q = (0.70)(4.40)(1.77) = 5.4 cfs

Area #2 Draining to Piru:

Area = 1990' x 80' = 3.65 acres
I = 4.40 inches/hour
Q = (0.70)(4.40)(3.65) = 11.2 cfs

DRAINAGE REPORT
PROPOSED ROBERSON-PRESLEY DEVELOPMENTS
DORADO VILLAGE, TRACT 4
AND
FOUR HILLS ESTATES

OCTOBER 1976

BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.

4125 Carlisle Boulevard/NE, Albuquerque, New Mexico 87107 Phone 881 - 2000

ADDENDUM TO
DRAINAGE REPORT
PROPOSED ROBERSON–PRESLEY DEVELOPMENTS
DORADO VILLAGE, TRACT 4
AND
FOUR HILLS ESTATES

OCTOBER 1976

PREPARED FOR

ROBERSON CONSTRUCTION COMPANY
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MICHIAL M. EMERY
N.M.P.E. NO. 5194

ADDENDUM TO
DRAINAGE REPORT
PROPOSED ROBERSON–PRESLEY DEVELOPMENTS

PURPOSE

The purpose of this report is to define modifications to the drainage plan for the proposed Roberson–Presley developments accomplished by this firm in February 1976. Modifications to flow values at critical points were reduced due to a decision by the owners to incorporate lot ponding into their respective developments. To further reduce flow through their developments, it was also recommended to use the drainage plan of on-site ponding for the Hanosh Shopping Center, as proposed by our firm in a drainage report entitled Drainage Master Plan for the Hanosh Shopping Center and Adjacent Lands to the South completed in September 1974.

CONDITIONS IN ORIGINAL DRAINAGE PLAN

In the original drainage plan, flows for Area 1 and Area 2 were channeled in a 40-foot street. Where the two flows intersected, a 48-foot street (Tomlinson) was recommended due to the increased flow. The flow was then combined with flow from Area 3 and emptied into a cattle guard inlet with a 72-inch RCP outlet pipe and discharged into the Tijeras Arroyo. Area 4 flow was emptied into a separate cattle guard inlet with a 42-inch RCP outlet and tied into the 72-inch RCP on Tomlinson with a junction manhole. The small amount of flow discharged from Area 5 was picked up by two Double C inlets with 18-inch RCP outlet pipes and also discharged into the 72-inch RCP. Approximately 42 cfs was also experienced at the intersection of Singing Arrow and the east boundary of Four Hills Mobile Home Park. This represents the discharge from Area 6.

CONDITIONS IN MODIFICATION TO DRAINAGE PLAN

Area 1 will remain the same as proposed in the original drainage plan.

Size of Drainage Area 2 was decreased after the decision to pond runoff of the Hanosh Shopping Center, and we assumed the flows from the adjacent land to the south of the Hanosh Shopping Center to be held to their existing levels. (Ponding will be required when developed.) These two modifications greatly reduced the flows discharged from Area 2.

Drainage Area 3 flows were reduced slightly by routing some of the flow to Drainage Area 6. This slightly increased the flow from Area 6, which discharges through Four Hills Mobile Home Park via Singing Arrow.

The cattle guard inlet originally proposed on Tomlinson to intercept the flow from Areas 1, 2, and 3 will be moved south on Tomlinson to the intersection of Piru; and the combined flow from Areas 1, 2, and 3 will empty into it at that point. A 60-inch RCP outlet pipe will carry the water from here to a manhole in Piru and eventually to the Tijeras Arroyo. The width of Tomlinson was reduced to a 40-foot crowned street.

Lot ponding, now being proposed for Four Hills Estates Subdivision, greatly reduced the flows discharged from Area 4. Dorado Village, also in Area 4, will not employ lot ponding. The flow now experienced will empty into a Type B drainage channel, 2 feet deep and 10 feet wide. This flow will discharge at the street surface onto Piru and join the runoff from Area 5. The combined flow will empty into a cattle guard inlet on Piru near the Four Hills Mobile Home Park, then join the 60" RCP in a manhole just west of Tomlinson. The total flow from Areas 1 through 5 will be carried to an impact stilling basin in the Tijeras Arroyo bottom via the 60" RCP.

Included with this Addendum are the revised plates and their respective changes. Also attached is an Appendix showing our calculations.

APPENDIX

Area A_1

Total Area = 90.71 acres

Paved = 14.06 acres

Apartments = 10.22 acres

Undeveloped = 63.45 acres

Lot Ponding = 2.98 acres

A_1 Runoff Computations

4500 ft. = Length

1.62% = Slope

19.31 min. = T_c (Time of Concentration)

4.25 in/hr = I (Allg. Master Plan of Drainage - 1963)

$$.50 = C_W \left(\frac{14.06(.95) + 10.22(.80) + 63.45(.35)}{14.06 + 10.22 + 63.45} \right)$$

186.4 cfs = Q (.50 × 4.25 × 87.73)

PROJECT NAME Addendum to Drainage Report SHEET 1 OF 8

PROJECT NO. 76-064 BY JDJ DATE 4-22-76

SUBJECT _____ CH'D _____ DATE _____

Area A_2 (revised - using Lot Ponding & Hanosh Shopping Center does not contribute to flow.

Total Area = 21.13 acres

Paved = 1.46 acres

Undeveloped = 17.27 acres

Lot Ponding = 2.40 acres

A_2 Runoff Computations

1830 ft. = Length

1.15% = Slope

14.7 min. = T_c (Time of Concentration)

4.8 in/hr. = I (Albq. Master Plan of Drainage)

.40 = C_w $\dfrac{1.46(.95) + 17.27(.35)}{1.46 + 17.27}$

36.0 cfs = Q (.40 × 4.80 × 18.73)

COMBINED FLOWS (AREAS 1 & 2)

AREA = 106.43 ACRES (EFFECTIVE)

C_w = $\dfrac{0.5(87.7) + 0.4(18.73)}{106.43}$ = 0.48

I = 4.25 IN/HR (ALBUQ. MASTER PLAN OF DRAINAGE - 1963)
MINIMUM OF AREAS 1 & 2

Q = CiA = 0.48 (4.25)(106.43) = 217.1 CFS

BOHANNAN WESTMAN HUSTON

PROJECT NAME Addendum to Drainage Report SHEET 2 OF 8

PROJECT NO. 76-064 BY JDJ DATE 4-22-76

SUBJECT _____ CH'D _____ DATE _____

Area 3

Total Area
6.2 ac. = 173.2 cm² × 1550 = 269,460 ft²
2.74 ac. = paved (.95)
3.46 ac. = grassed (.35)

Cw .62 = $\frac{2.74(.95) + 3.46(.35)}{2.74 + 3.46}$

i 4.7 = (Alb. Master Plan of Drainage - 1963)

Q 18.0 cfs = Aic (6.2 × 4.7 × .62)

Combined Flows (Areas 1, 2 & 3)

Area 112.66 = $A_1 + A_2 + A_3$

Cw .49 = $\frac{87.73(.50) + 18.73(.10) + 6.2(.62)}{87.73 + 18.73 + 6.2}$

i 4.0 = (Alb. Master Plan of Drainage - 1963)

Q 220.8 cfs = Aic (112.66 × 4.0 × .49)

Runoff Computations

Area A (Dorado Village & Four Hills Estates)

Dorado Village - Tract 4

Area 13.90 ac. = 390.5 cm² × 1550.0 = 605,275 ft²

C 0.65 = coefficient for subdivisions w/o lot ponding.

$i = \frac{189}{t+25} = \frac{189}{12+25}$ 5.10

Q 46.1 cfs = AiC (13.90 × 5.10 × .65)

Combined Runoff from Area A

Areas Total = 21.9 ac.

- 13.90 ac. = Dorado Village (.65)
- 4.1 ac. = Paved - Four Hills Estates (.95)
- 3.9 ac. = grassed - Four Hills Estates (.35)

$C_w = \frac{13.90(.65) + 4.1(.95) + 3.9(.35)}{13.90 + 4.1 + 3.9}$ .65

$i = \frac{189}{t+25} = \frac{189}{16.5+25}$ 4.5

Q 64.0 cfs = AiC (21.9 × 4.5 × .65)

BOHANNAN WESTMAN HUSTON

PROJECT NAME Addendum to Drainage Report SHEET 4 OF 8

PROJECT NO. 76-064 BY JDJ DATE 4-22-76

SUBJECT _____ CH'D _____ DATE _____

Area 5

Total Area 11.77 ac. = 330.7 cm² × 1550 = 512,585 ft²

2.90 ac. = paved (.95)

8.87 ac. = grassed or natural (.35)

$$C_w = \frac{2.90(.95) + 8.87(.35)}{2.90 + 8.87} = .50$$

$$i = \frac{189}{t+25} = \frac{189}{17+25} \quad 4.5$$

Q 26.5 cfs = A i C (11.77 × 4.50 × .50)

Combined Flows (Area 4 & 5)

Area 33.67 ac. = $A_4 + A_5$

$$C_w = \frac{11.77(.50) + 21.9(.65)}{} = .60$$

$$i = \frac{189}{t+25} = \frac{189}{16.5+25} \quad 4.5$$

Q 90.9 cfs = A i C (33.67 × 4.5 × .60)

BOHANNAN WESTMAN HUSTON

PROJECT NAME Addendum to Drainage Report SHEET 5 OF 8

PROJECT NO. 76-064 BY JDJ DATE 4-22-76

SUBJECT _____ CH'D _____ DATE _____

Combined Flows (A_1 A_2 A_3 A_4 & A_5)

A = 146.33 = Areas 1, 2, 3, 4 & 5

C_w = .52 $= \frac{112.66\,(.49) + 33.67\,(.60)}{112.66 + 33.67}$

i = 4.0 = Alb. Master Plan of Drainage - 1963)

Q = 304.4 cfs = Acc. (146.33 × 4.0 × .52)

PROJECT NAME Addendum to Drainage Report SHEET 6 OF 8

PROJECT NO. 76-064 BY JDJ DATE 4-22-76

SUBJECT _____ CH'D _____ DATE _____

Area A_6 (revised - enlarged and used lot ponding)

Total Area = 19.52 acres

Paved	=	2.76
Undeveloped	=	3.65
Apartments	=	8.44
Lot Ponding	=	4.67

A_6 Runoff Computations

1400 ft. = Length

1.04% = Slope

13.43 min. = T_c (Time of Concentration)

4.90 in/hr = I (Alleg. Master Plan of Drainage - 1963)

$$.72 = C_w \frac{2.76(.95) + 8.44(.80) + 3.65(.35)}{2.76 + 8.44 + 3.65}$$

52.4 cfs = Q (.72 × 4.90 × 14.85)

PROJECT NAME Addendum to Drainage Report SHEET 7 OF 8

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NARRATIVE

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It should be noted that with the exception of the easterly portion of the Hanosh Shopping Center and the proposed subdivisions, all areas were analyzed in their existing condition as shown on Plate I.

REQUESTED REVIEWS

It is requested that the City staff review these proposals with particular attention to the following items:

Assistant City Engineer, Hydrology - Detailed review of drainage concepts and computations with particular attention being paid to flow depths in streets, recommended street cross sections, and proposed drainage facilities in the vicinity of Tomlinson and Piru. Review of City policy to determine if the drainage improvement may be eligible for City participation.

City Traffic Engineer - Detailed review of street cross sections with respect to width, crown slope, proposed flat sections for Dorado Place and Tomlinson, and proposed water blocks on Singing Arrow.

Liquid Waste Engineer - Detailed review of the proposed construction of storm drainage facilities in the vicinity of Tomlinson and Piru.

CONCLUSIONS

1. The adoption of the above drainage concepts will reduce to some extent the quantity of storm water flow onto Central Avenue via Western Skies Drive.

2. The adoption of the above drainage concepts will greatly reduce the quantity of storm water flow onto Juan Tabo Boulevard at its intersection with Singing Arrow.

3. The slightly elevated water depths experienced on Tomlinson during the 100 year frequency storm should present no problem if finished floors on residences facing this street are constructed a minimum of 1.7 feet above top of curb.

RECOMMENDATIONS

1. The consultant and referenced members of the City staff should meet and discuss in detail concepts proposed in this report. Through this meeting, any concepts requiring revisions can be discussed and resolved.

2. This drainage plan with the above revisions, if any, should be adopted for the proposed developments and dictate the preparation of final plats and the detailed design of improvement.

APPENDIX

COMPUTATIONS

AREAS A,

Paved = 12.64 acres

Apartments = 10.22

Subdivision = 5.05

Undeveloped = 55.45

Combined Total = 83.36 acres

A, RUNOFF COMPUTATIONS

Length = 4500 FT.

Slope = 01.62%

T_C = 19.31 min. (Time of Concentration)

I = 4.25 (Albq. Master Plan of Drainage - 1963)

C_W = .47 $\left(\frac{12.64(.95) + 10.22(.80) + 5.05(.65) + 55.45(.35)}{12.64 + 10.22 + 5.05 + 55.45}\right)$ ✓

Q = 166.5 (.47 × 4.25 × 83.36)

PROJECT NAME HANOSH PARCEL SHEET 1 OF 9

PROJECT NO. 76-024 BY JDJ DATE 2-10-76

SUBJECT DRAINAGE AREAS CH'D MME DATE 2-18-76

AREA A_2

Paved = 16.11 acres

Subdivison = 4.04

Subdivision (Lot Ponding) = .55

Undeveloped = 17.62

Combined Total = 38.32

− Lot Ponding .55

37.77 (Net Total)

A_2 RUNOFF COMPUTATIONS

Length = 2500 FT.

Slope = 01.24 %

T_c = 16.23 min (Time of Concentration)

I = 4.50 (Alog. Master Plan of Drainage - 1963)

C_W = .64 $\left(\frac{16.11\ (.95) + 4.04\ (.65) + 17.62\ (.35)}{16.11 + 4.04 + 17.62}\right)$

Q = 108.8 (.64 × 4.50 × 37.77)

PROJECT NAME HANOSH PARCEL SHEET 2 OF 9

PROJECT NO. 76-024 BY JDJ DATE 2-10-76

SUBJECT DRAINAGE AREAS CH'D MHE DATE 2-18-76

AREA A_4

Paved = 5.34 acres

Subdivision = 36.20

Subdivision (Lot Ponding) = 3.16

Combined Total = 44.70 acres

Lot Ponding = 3.16

(Net Total) = 41.54 acres

A_4 RUNOFF COMPUTATIONS

Length = 3000'

Slope = 01.27%

T_c = 17.33 min. (Time of Concentration)

I = 4.40 (Altg. Master Plan of Drainage - 1963)

C_w = .69 $\left(\frac{5.34(.95) + 36.20(.65)}{5.34 + 36.20}\right)$

Q = 126.1 (.69 × 4.40 × 41.54)

BOHANNAN WESTMAN HUSTON

PROJECT NAME HANOSH PARCEL SHEET 3 OF 9

PROJECT NO. 76-024 BY JDJ DATE 2-10-76

SUBJECT DRAINAGE AREAS CH'D MME DATE 2-18-76

AREA A_5

Paved = 2.75

Subdivision = 1.38

Undeveloped = 5.83

Combined Total = 9.96 acres

A_5 RUNOFF COMPUTATIONS

Length = 2800 FT.

Slope = 01.54%

T_c = 16.24 (Time of Concentration)

I = 4.50 (Albq. Master Plan of Drainage - 1963)

$C_w = \left(\frac{2.75(.95) + 1.38(.65) + 5.83(.35)}{2.75 + 1.38 + 5.83} \right)$ = .56

Q = 25.1 $(.56 \times 4.50 \times 9.96)$

BOHANNAN WESTMAN HUSTON

PROJECT NAME HANOSH PARCEL SHEET 4 OF 9

PROJECT NO. 76-024 BY JDJ DATE 2-10-76

SUBJECT DRAINAGE AREAS CH'D MME DATE 2-12-76

AREA A_3

Paved = 2.28

Subdivision = 10.85

Subdivision (Lot Ponding) 4.49

Combined Total = 17.62 acres

− (Lot Ponding 4.49

(Net Total) = 13.13 acres

Length = 1600 FT

Slope = 00.94 %

T_c = 14.43 (Time of Concentration)

I = 4.70 (Albq. Master Drainage Plan. 1963

$C_w = .70 \left(\frac{2.28(.95) + 10.85(.65)}{2.28 + 10.85} \right)$

$Q = 43.2 \quad (.70 \times 4.70 \times 13.13)$

COMBINED FLOWS

$C_w = .52 \quad (C_{w_{1-2}})$ $\frac{A_1 + A_2}{}$

$A = 121.68 \quad (A_1 + A_2 = 83.36 + 38.32)$

$I = 4.25 \quad (\text{Min. of Area}_1 \text{ or Area}_2)$

$Q = 267.7 \quad (.52 \times 4.25 \times 121.68)$

$\frac{A_1 + A_2 + A_3 + A_4}{}$

$C_w = .57 \left(\frac{83.36(.47) + 38.32(.64) + 13.13(.70) + 41.54(.69)}{83.36 + 38.32 + 13.13 + 41.54} \right)$

$A = 176.35 \quad (A_1 + A_2 + A_3 + A_4)$

$T_c = 22.22$ min (Time of Concentration)

I = 3.90 (Albq. Master Plan of Drainage = 1963)

$Q = 392.0 \quad (.57 \times 3.90 \times 176.35)$

PROJECT NAME HANOSH PARCEL SHEET 5 OF 9

PROJECT NO. 76-024 BY JDJ DATE 2-10-76

SUBJECT DRAINAGE AREAS CH'D MME DATE 2-18-76

COMBINED FLOWS

$A_1 + A_2 + A_3 + A_4 + A_5$

$C_w = .575 \left(\frac{83.36(.47) + 38.32(.64) + 13.13(.70) + 41.54(.69) + 9.96(.5$

$83.36 + 38.32 + 13.13 + 41.54 + 9.96$

$A = 186.31 \left(A_1 + A_2 + A_3 + A_4 + A_5 \right)$

$T_c = 22.42$ min (Time of Concentration)

$I = 3.90$ (Alby. Master Plan of Drainage - 1963)

$Q = 417.8 \quad (.575 \times 3.90 \times 186.31)$

AREA A_6

Paved	= .99
Apartments	= 8.44
Subdivision	= 2.27
Subdivision (Lot Ponding)	= .22
Undeveloped	= 2.28
Combined Total	= 14.20 acres
— (Lot Ponding)	= .22
Net Total	13.98 acres

Length = 1400 FT.

Slope = 1.04 %

T_c = 13.43 min. (Time of Concentration)

$I = 4.90$ min. (Alby. Master Plan of Drainage - 1963)

$C_w = .61 \left(\frac{.99(.95) + 8.44(.80) + 2.27(.65) + 2.28(.35)}{.99 + 8.44 + 2.27 + 2.28} \right.$

$Q = 41.8 \quad (.61 \times 4.90 \times 13.98)$

BOHANNAN WESTMAN HUSTON

PROJECT NAME HANOSH PARCEL SHEET 6 OF 9

PROJECT NO. 76-024 BY JDJ DATE 2-10-76

SUBJECT DRAINAGE AREAS CH'D MME DATE 2-18-76

COMBINED FLOWS

$$C_w = .54 \left(\frac{A_1 + A_2 + A_3}{83.36 + 38.32 + 13.13} \right)$$

$$C_w = .54 \left(\frac{83.36(.47) + 38.32(.64) + 13.13(.70)}{83.36 + 38.32 + 13.13} \right)$$

$A = 134.81 \quad (A_1 + A_2 + A_3)$

$T_c = 22.22$ min (Time of Concentration)

$I = 3.90$ (Albq. Master Plan of Drainage – 1963)

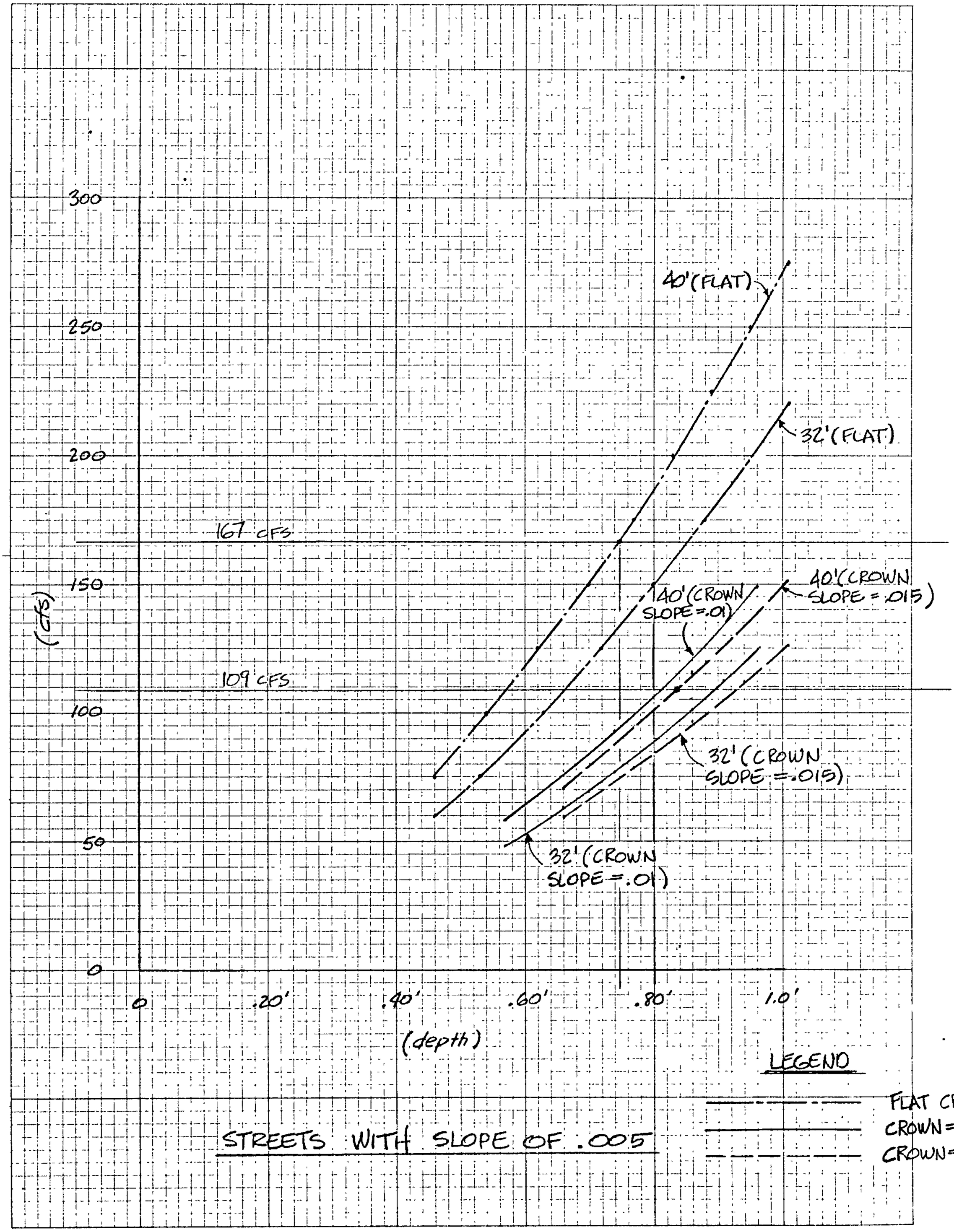
$Q = 283.9 \quad (.54 \times 3.90 \times 134.81)$

PROJECT NAME HANOSH PARCEL SHEET 7 OF 9

PROJECT NO. 76-024 BY JDJ DATE 2-10-76

SUBJECT DRAINAGE AREAS CH'D MHE DATE 2-18-76

BOHANNAN WESTMAN HUSTON

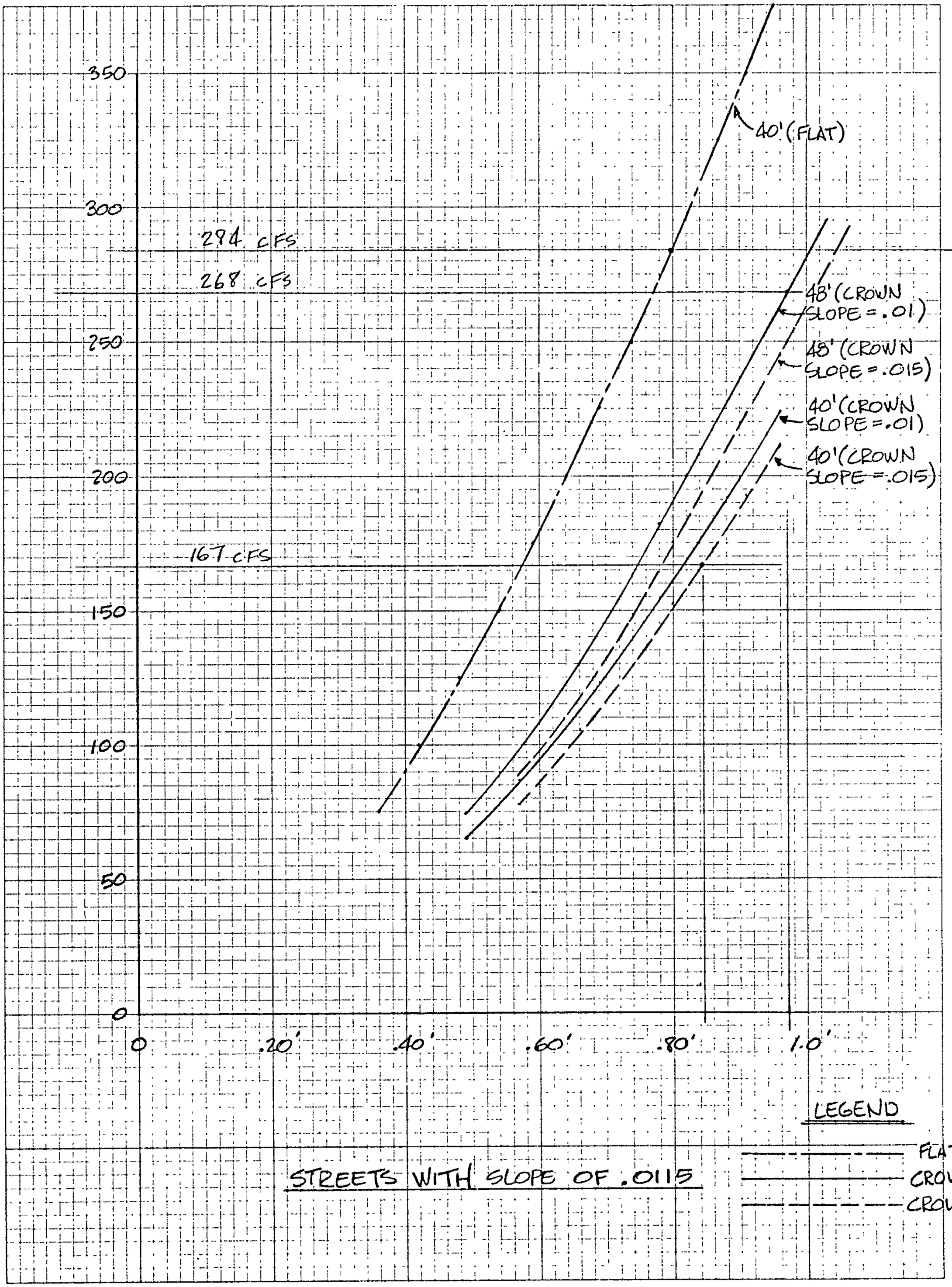


BOHANNAN WESTMAN HUSTON

PROJECT NAME HANOSH PARCEL SHEET 8 OF 9

PROJECT NO. 76-024 BY JDJ DATE FEB. 1976

SUBJECT STREET FLOWS and DEPTHS CH'D MME DATE FEB. 1976



BOHANNAN WESTMAN HUSTON

PROJECT NAME HANOSH PARCEL SHEET 9 OF 9

PROJECT NO. 76-024 BY JDJ DATE FEB. 1976

SUBJECT STREET FLOWS and DEPTHS CH'D MME DATE FEB. 1976

LEVERTON ENGINEERING

4022-I RIO GRANDE BLVD., N.W.
ALBUQUERQUE, NEW MEXICO 87107
(505) 345-5479

September 9, 1977

Mr. Bruno Conegliano
Ass't. City Engineer--Hydrology
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico

Re: Tract 4, Unit 2
Dorado Village Addition

Dear Mr. Conegliano,

The subject addition was changed from R-1 to RT zoning by action of the EPC on August 18, 1977.

The change of zoning was conditioned upon your acceptance of a revised drainage plan which is the substance of this letter.

The development was first planned for 106 units. The developer, Roberson Construction Co., now proposes to build 143 units under the provisions of the RT zone.

Please refer to the Bohannan-Westman-Huston & Associates drainage report on Dorado Village, Tract 4 and Four Hills Estates dated February 1976 and revised by that firm by addendum dated October 1976. These reports were approved by the City Engineer and were predicated on the 106 units mentioned above.

The increase of 37 units has the following effect with respect to drainage:

Please refer to calculation sheet 4 of the above mentioned "Addendum" for run-off from Dorado Village.

The proposed increase in number of units from 106 to 143 has the effect of increasing the coefficient of run-off from Dorado Village from 0.65 to 0.72.

The revised coefficient was calculated by assigning a "C" of 1.0 to the area added by the proposed 37 unit increase and using an area of 1850 square feet for each unit which includes roof, flat work, and driveways.

The added total area with the assigned value of C=1.0 was then combined with the calculations of the reference Addendum to arrive at a revised "Q" which is 51 cfs.

This compares with 46 cfs in the 106 lot configuration. An increase of 5 cfs.

The hydraulic capacities of the downstream facilities which will be required to convey this run-off are adequate.

On the basis of the foregoing we respectfully request your approval of the subdivision as revised which will be titled "Second RePlat of Tract 4, Dorado Village, Unit 2."

A copy of the incomplete Second Replat is attached for reference.

John G. Leverton
PE No. 1874
New Mexico

Attachments

BOHANNAN WESTMAN HUSTON & ASSOCIATES, INC.

January 10, 1977

Mr. Kleston H. Laws
Vice President
Presley Co. of N.M.
P. O. Box11152
Albuq. N.M. 87112

SUBJECT: FOUR HILLS ESTATES

Dear Kleston:

The five proposals obhtained in your letter of January 6, 1977 are approved, subject to the approval of the Sidewalk Design Team of the variance requested.

Sincerely,

V. M. Kimmick
City Engineer

VMK/fs

Presley Company Of New Mexico

January 6, 1977

RECEIVED
JAN 10 1977
CITY ENGINEERS

Mr. V. M. Kimmick, City Engineer
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

RE: Four Hills Estates

Dear Mr. Kimmick:

This letter is to confirm our conversation on January 4, 1977, and direct our engineer to proceed with the plans and changes we discussed.

It was decided we should:

1. Change the grade on Tomlinson Drive to 0.50 percent from Piru Blvd. to about station 8 + 50 and have the right of way elevation 0.33 foot above top of curb.

2. Place the 4 ft. sidewalk next to the curb on a 2 percent transverse slope. A variance has been requested.

3. Design Parkside Place with slopes of 0.40 percent grade to have a high point about halfway between Singing Arrow Avenue and Tomlinson Drive.

4. Parkside Place could have 0.16 foot crossfall with the east side higher than the west side.

5. Eliminate the wheelchair ramp at the southwest curb return of Parkside Place and Tomlinson Drive.

If you do not agree with the above conclusions, please notify me so I can change the directions to my engineer.

Very truly yours,
PRESLEY CO. OF N. M.

Kleston H. Laws

Kleston H. Laws
Vice President

KHL/rh
cc: Ralph K. Hicks

P.O. Box 11152 Albuquerque, New Mexico 87112 (505) 821-2727

I have reviewed the Plans for Dorado Village Tract 4 a Four Hills Estates. The original Dr. report called for 2 cattle guards to intercept the 220 + cfs coming south to the Chuck spill way a 90 + cfs coming west from PIRU Dr. Somehow in the design phase the two cattle guard interceptors were foreporn in favor of a drop. I Think we will have trouble at that intersection but what the Developer asked is to change Tract 4 from R1 TO RT. in the process the flow is increased by 5 cfs / which is not much but since On PIRU Dr there is no provision to catch the 70 ± cfs Coming down the dr. reserve make a 90° turn on the ~~temporary~~ Piru. I requested a ditch on the So side of Piru with Riprap to make the water flow west and not go over the bank into Fejeras Canyon

ENGINEERS & PHOTOGRAMMETRISTS

BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.

4125 CARLISLE BLVD., N.E.
ALBUQUERQUE, NEW MEXICO 87107
PHONE 505 881-2000

March 2, 1976

Mr. Kleston Laws
Assistant City Engineer - Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

Re: Drainage Report for Dorado Village Tract 4 and Four Hills Estates

Dear Mr. Laws:

Enclosed for your review is the drainage report for the subject parcel. If you should desire a meeting with the consultant and appropriate City staff members, please advise me of the time and place and I will be happy to attend to discuss the concepts proposed in this report.

I will be anxious to receive your comments. Review of the two projects by the E.P.C. is scheduled for March 18, 1976; and if possible, I would like to have the drainage problems resolved or at least identified at that time.

Sincerely yours,

Michial M. Emery
Chief Design Engineer

Enclosure

MME/rak
Job No. 76-024

January 10, 1977

Mr. C. A. Coonce
Consulting Engineer
3939 San Pedro N.E.
Albuq. N.M. 87110

SUBJECT: FOUR HILLS ESTATES, DRAINAGE OUTFALL STRUCTURE FOR:

Dear Mr. Coonce:

This undated study has been reviewed and is approved.

Sincerely,

V. M. Kimmick
City Engineer

VMK/fs

RALPH K. HICKS and Associates, Inc.

REGISTERED LAND SURVEYORS
LAND PLANNING CONSULTANTS

4000 SAN PEDRO DRIVE, N.E. • PHONE (505) 881-0012 • ALBUQUERQUE, NEW MEXICO 87110

SEPT. 14, 1976

CITY OF ALBUQUERQUE
P.O. BOX 1293
ALBUQUERQUE, NEW MEXICO
87103

ATTN: MR. V.M. KIMMICK

RE: FOUR HILLS ESTATES (S-76-3)

DEAR MR. KIMMICK,

WE ARE ENCLOSING (2) COPIES OF CAPTIONED MASTER PLAN TOGETHER WITH (1) COPY OF PLANNING DEPT. COMMENTS FOR A MEETING HELD CONCERNING THE CAPTIONED SUBDIVISION ON MARCH 18, 1976.

PRESLEY DEVELOPMENT CO., TOGETHER WITH ROBERSON CONSTRUCTION CO. INC. HAS FINALIZED THEIR PURCHASE OF THESE LANDS AND ARE DESIROUS OF HAVING THE COMMENTS OF THE CITY ENGINEERS OFFICE TOGETHER WITH THAT OF THE CITY PLANNING DEPT. RELATIVE TO DEVELOPING THIS TRACT.

WE HAVE SCHEDULED A MEETING WITH YOUR STAFF AND THOSE SHOWN BELOW FOR WEDNESDAY SEPTEMBER 22, 1976 AT 3:00 P.M. TO DISCUSS ANY PROBLEMS THAT MIGHT ARISE.

WE ARE SENDING COPIES OF THE MASTER PLAN AND PLANNING DEPT. COMMENTS TO THOSE SHOWN BELOW SO THEY MAY BE CONVERSANT WITH THE SUBJECT TRACT.

FONDEST REGARDS:

Ralph K. Hicks

RALPH K. HICKS

CC: W/ENCL.
V.M. KIMMICK
Q.R. KEILICK
R.P. LOWE
W.H. OTTO
R.A. FOUSNAUGH
S.P. GARCIA
K.H. LAWS
M.M. EMERY
C. COOK
C. ROBERSON

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
Harry E. Kinney

CHIEF ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

March 22, 1976

RECEIVED MAR 24 1976

Presley Co. of New Mexico
7301 Beck Drive, N.E.
Albuquerque, New Mexico 87111

Gentlemen:

Re: S-76-3

On March 18, 1976, the Administrative Review Board approved the proposed plat of Four Hills Estates Subdivision (S-76-3), subject to the following conditions:

1. Eliminating the double frontage lots on the north side of Piru.
2. The dedication of 12 ft. of additional right of way for Singing Arrow, which is proposed as a Collector Street requiring a total of 84 ft. of right of way.
3. Decreasing the right of way for Piru to 50 ft., with the understanding that Piru may be relocated southerly as needed.

If you have any questions regarding this matter, please do not hesitate to contact me.

Sincerely,

S. Phil Garcia
Principal Planner

SPG:bg

cc: Ralph K. Hicks & Association, Inc., 4000 San Pedro, N.E.; 87110

PLANNING DEPARTMENT

George L. Carruthers, Director

Telephone: (505) 766-7422

PLANNING DEPARTMENT
CITY OF ALBUQUERQUE

ADMINISTRATIVE REVIEW BOARD
March 18, 1976
S-76-3

S-76-3 Ralph K. Hicks & Assoc., Inc., agent for Presley Co. of New Mexico, requests approval of proposed Four Hills Estates Subdivision, located on the west side of Dorado Place SE between Singing Arrow Avenue and Piru Boulevard, containing approximately 55 acres.

PL Map No.: L-22 Material: Report, Plat

COMMENTS FROM OTHER DEPARTMENTS:

City Engineer: "Require drainage study. This drainage needs to be conveyed to Tijeras Arroyo. If not, the runoff must flow thru the southeast heights which already experience runoff problems. Require all drainage improvements to be at developer's expense."

Liquid Waste Engineer: "The proposed development is satisfactory based on the existing City's liquid waste engineering standards and criteria and will not create a need for major expenditures by the City for new facilities.
No objection provided the area is connected to sanitary sewer at northwest corner of the property. This was covered in previous submittals on this item."

Water Engineer: "No objections."

Traffic Engineer: "This site is in the Gibson Corridor Study area. Tomlinson Drive and all other 64' internal streets should be reduced to 50'; the 14' width reduction on Tomlinson should be added to Piru for a total width of 78'."

COG: "The proposed routing of the Tramway-Gibson connection is undetermined in this area and could affect this property (see attached letter from the Highway Department in reference to properties to the immediate east).
In a previous case (S-1335-4) concerning properties to the immediate north, it was recommended that irrespective of the Gibson alignment, Western Skies Drive and Singing Arrow Avenue should have right-of-way widths of 84 ft. to provide proper access to this area because of the prominence of C-2 and R-2 zoning. The 84 ft. width on Singing Arrow would facilitate general circulation by providing access to Central Avenue via Western Skies Drive.
It should also be noted that the platting creates an offset on the southwest corner of Dorado Place and Singing Arrow Avenue."

AMAFCA: "Drainage report showing compliance with AMAFCA 1972-2 and approved master plan of drainage prepared by Bohannan, Westman required before final plat approval."

Dept. of Transportation: "This area could be affected by the Gibson Boulevard project which is under study. It is recommended that approval be withheld until study is further along."

Parks & Recreation: "Because of the date of the application, we do not expect compliance under the new Park Dedication Policy, however, we do expect compliance under the old Park Dedication Policy. We would expect the applicant to meet with us to arrive at a method of compliance."

Environmental Health: "A top soil permit required prior to excavation and dust control measures must be continued throughout duration of construction activities or sale of properties which ever occurs last.
Any generators used for air conditioning purposes must be installed so as not to violate noise control ordinance.
City water and sewer is available for connections."

Fire Dept.: "Will not affect our operation."

APS: "There are no elementary schools adjacent to that area and students will be bussed to available classroom space approximately 2 1/2 to 4 miles west."

Police Dept.: no reply received

PLANNING DEPARTMENT COMMENTS, 3-18-76:

This is a request for approval of a subdivision plat for a 55 acre tract situated west of Dorado Place SE and north of Singing Arrow Avenue. Although the property is zoned R-2, the plat indicates a single-family, R-1 type subdivision lot arrangement. The property east of the subject property is currently under plat review.

The 222 lot subdivision is satisfactorily arranged with respect to internal street pattern and intersection clearances. The cul-de-sac radius, however, are not clearly indicated on the proposed plat.

The Traffic Engineer recommends that Piru Boulevard be a 50 ft. wide right of way since the future development to the east along this plat tend to de-emphasize Piru Boulevard as an arterial street. Although the Traffic Engineer has commented that Piru Boulevard should be a 78' right of way, further discussion has led to a change in right of way requirements in view of the predominance of R-1 platting in the area. The platting of double frontage lots on Piru Boulevard should be revised to avoid future double paving assessment problems. Singing Arrow Avenue is required to serve as an arterial street with an 84' right of way. Tomlinson Drive, although originally required to have a 50' right of way must remain at the requested 64' width due to drainage considerations. The Traffic Engineer recognized this situation after his comments were released for the plat.

The slight off-set created at the Dorado Place/Singing Arrow Avenue intersection should be corrected prior to final plat sign-off.

The applicant is instructed to contact the Parks and Recreation Department so that compliance with the Park Dedication Policy is agreed to under the old Park Dedication Policy.

ADMINISTRATIVE REVIEW BOARD
March 18, 1976
S-76-3

RECOMMENDATION:

Approval of S-76-3 is recommended subject to the reduction in width of Piru Boulevard, correction of the off-set at the Singing Arrow/Dorado Place intersection, indication of all cul-de-sac radii, and elimination of the double frontage lots on Piru Boulevard.

Theodore Pochter, Planner

TP:jd

cc: Presley Co. of New Mexico, 7301 Beck Dr. NE; 87111

Ralph K. Hicks, & Assoc., Inc., 4000 San Pedro Dr. NE; 87110

RALPH K. HICKS and Associates, Inc.

REGISTERED LAND SURVEYORS
LAND PLANNING CONSULTANTS

4000 SAN PEDRO DRIVE, N.E. • PHONE (505) 881-0012 • ALBUQUERQUE, NEW MEXICO 87110

SEPT. 14, 1976

CITY OF ALBUQUERQUE
P.O. BOX 1293
ALBUQUERQUE, NEW MEXICO
87103

ATTN: MR. V.M. KIMMICK

RE: FOUR HILLS ESTATES (S-76-3)

DEAR MR. KIMMICK,

WE ARE ENCLOSING (2) COPIES OF CAPTIONED MASTER PLAN TOGETHER WITH (1) COPY OF PLANNING DEPT. COMMENTS FOR A MEETING HELD CONCERNING THE CAPTIONED SUBDIVISION ON MARCH 18, 1976.

PRESLEY DEVELOPMENT CO., TOGETHER WITH ROBERSON CONSTRUCTION CO. INC. HAS FINALIZED THEIR PURCHASE OF THESE LANDS AND ARE DESIROUS OF HAVING THE COMMENTS OF THE CITY ENGINEERS OFFICE TOGETHER WITH THAT OF THE CITY PLANNING DEPT. RELATIVE TO DEVELOPING THIS TRACT.

WE HAVE SCHEDULED A MEETING WITH YOUR STAFF AND THOSE SHOWN BELOW FOR WEDNESDAY SEPTEMBER 22, 1976 AT 3:00 P.M. TO DISCUSS ANY PROBLEMS THAT MIGHT ARISE.

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FONDEST REGARDS:

RALPH K. HICKS

CC: W/ENCL.
V.M. KIMMICK
Q.R. KEILICK
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C. ROBERSON

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
Harry E. Kinney

CHIEF ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

March 22, 1976

RECEIVED MAR 24 1976

Presley Co. of New Mexico
7301 Beck Drive, N.E.
Albuquerque, New Mexico 87111

Gentlemen:

Re: S-76-3

On March 18, 1976, the Administrative Review Board approved the proposed plat of Four Hills Estates Subdivision (S-76-3), subject to the following conditions:

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3. Decreasing the right of way for Piru to 50 ft., with the understanding that Piru may be relocated southerly as needed.

If you have any questions regarding this matter, please do not hesitate to contact me.

Sincerely,

S. Phil Garcia
Principal Planner

SPG:bg

cc: Ralph K. Hicks & Association, Inc., 4000 San Pedro, N.E.; 87110

PLANNING DEPARTMENT
CITY OF ALBUQUERQUE

ADMINISTRATIVE REVIEW BOARD
March 18, 1976
S-76-3

S-76-3 Ralph K. Hicks & Assoc., Inc., agent for Presley Co. of New Mexico, requests approval of proposed Four Hills Estates Subdivision, located on the west side of Dorado Place SE between Singing Arrow Avenue and Piru Boulevard, containing approximately 55 acres.

PL Map No.: L-22 Material: Report, Plat

COMMENTS FROM OTHER DEPARTMENTS:

City Engineer: "Require drainage study. This drainage needs to be conveyed to Tijeras Arroyo. If not, the runoff must flow thru the southeast heights which already experience runoff problems. Require all drainage improvements to be at developer's expense."

Liquid Waste Engineer: "The proposed development is satisfactory based on the existing City's liquid waste engineering standards and criteria and will not create a need for major expenditures by the City for new facilities.
No objection provided the area is connected to sanitary sewer at northwest corner of the property. This was covered in previous submittals on this item."

Water Engineer: "No objections."

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Parks & Recreation: "Because of the date of the application, we do not expect compliance under the new Park Dedication Policy, however, we do expect compliance under the old Park Dedication Policy. We would expect the applicant to meet with us to arrive at a method of compliance."

Environmental Health: "A top soil permit required prior to excavation and dust control measures must be continued throughout duration of construction activities or sale of properties which ever occurs last.
Any generators used for air conditioning purposes must be installed so as not to violate noise control ordinance.
City water and sewer is available for connections."

Fire Dept.: "Will not affect our operation."

APS: "There are no elementary schools adjacent to that area and students will be bussed to available classroom space approximately 2 1/2 to 4 miles west."

Police Dept.: no reply received

PLANNING DEPARTMENT COMMENTS, 3-18-76:

This is a request for approval of a subdivision plat for a 55 acre tract situated west of Dorado Place SE and north of Singing Arrow Avenue. Although the property is zoned R-2, the plat indicates a single-family, R-1 type subdivision lot arrangement. The property east of the subject property is currently under plat review.

The 222 lot subdivision is satisfactorily arranged with respect to internal street pattern and intersection clearances. The cul-de-sac radius, however, are not clearly indicated on the proposed plat.

The Traffic Engineer recommends that Piru Boulevard be a 50 ft. wide right of way since the future development to the east along this plat tend to de-emphasize Piru Boulevard as an arterial street. Although the Traffic Engineer has commented that Piru Boulevard should be a 78' right of way, further discussion has led to a change in right of way requirements in view of the predominance of R-1 platting in the area. The platting of double frontage lots on Piru Boulevard should be revised to avoid future double paving assessment problems. Singing Arrow Avenue is required to serve as an arterial street with an 84' right of way. Tomlinson Drive, although originally required to have a 50' right of way must remain at the requested 64' width due to drainage considerations. The Traffic Engineer recognized this situation after his comments were released for the plat.

The slight off-set created at the Dorado Place/Singing Arrow Avenue intersection should be corrected prior to final plat sign-off.

The applicant is instructed to contact the Parks and Recreation Department so that compliance with the Park Dedication Policy is agreed to under the old Park Dedication Policy.

ADMINISTRATIVE REVIEW BOARD
March 18, 1976
S-76-3

RECOMMENDATION:

Approval of S-76-3 is recommended subject to the reduction in width of Piru Boulevard, correction of the off-set at the Singing Arrow/Dorado Place intersection, indication of all cul-de-sac radii, and elimination of the double frontage lots on Piru Boulevard.

Theodore Pochter, Planner

TP:jd

cc: Presley Co. of New Mexico, 7301 Beck Dr. NE; 87111

Ralph K. Hicks, & Assoc., Inc., 4000 San Pedro Dr. NE; 87110

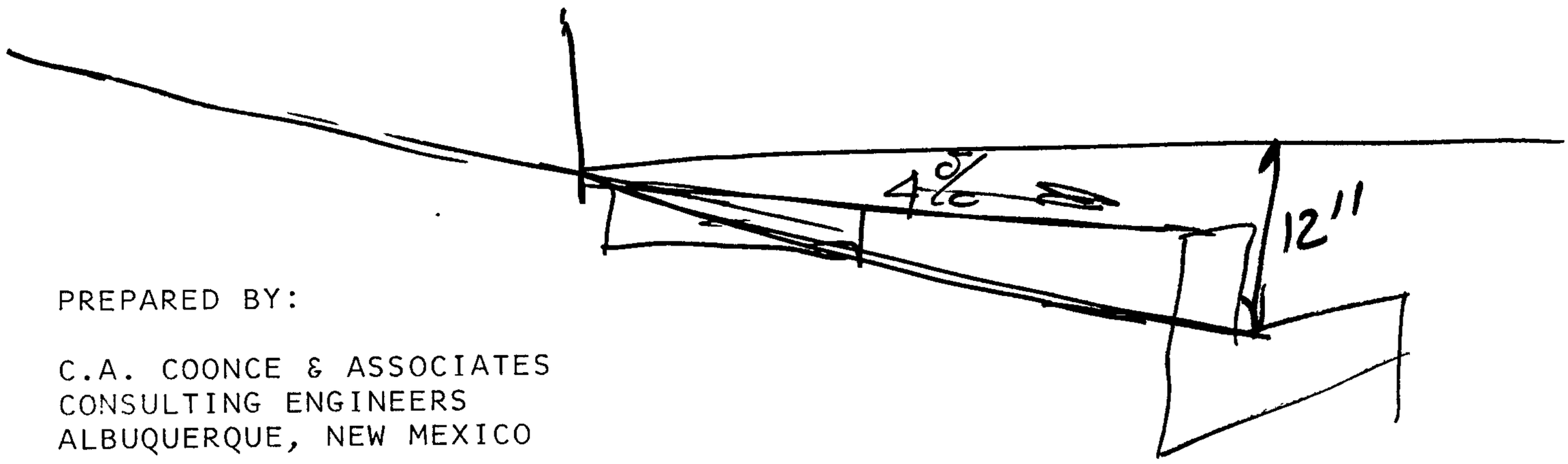
L22/D7

DRAINAGE OUTFALL STRUCTURE
FOR
FOUR HILLS ESTATES
ALBUQUERQUE, NEW MEXICO

Dorado Village

PROPOSED FOR:

PRESLEY COMPANY OF NEW MEXICO
7301 BECK DR. N.E.
ALBUQUERQUE, NEW MEXICO 87112



PREPARED BY:

C.A. COONCE & ASSOCIATES
CONSULTING ENGINEERS
ALBUQUERQUE, NEW MEXICO

C.A. COONCE
N.M.P.E. NO. 2934

INTRODUCTION

THIS ADDENDUM IS NOT INTENDED TO SUPPLANT THE DRAINAGE STUDY ALREADY COMPLETED AND APPROVED BY THE APPROPIATE AUTHORITIES. THE PREVIOUS STUDIES WERE PERFORMED BY BOHANNON, WESTMAN & HOUSTON AND ASSOCIATES, INC. AND WERE CONDUCTED IN ACCORDANCE WITH STANDARD PRACTICE FOR DRAINAGE.

THIS ADDENDUM IS ONLY TO CHANGE THE METHOD OF DISCHARGING THE RUNOFF FROM THE POINT OF CONVEYANCE TO THE TIJERAS ARROYO; I.E. FROM CATTLE GUARD INLET AND R.C.P. TO AN OPEN CHANNEL.

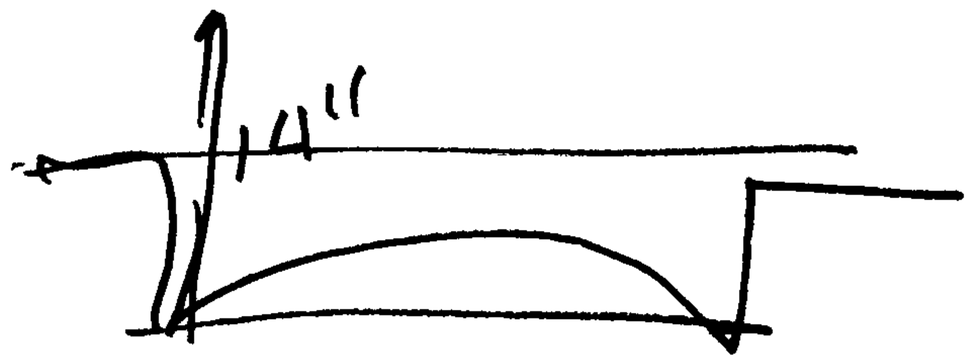
THE CHANNEL AS PROPOSED HAS APPROXIMATELY 100% FREEBOARD ON THE FIRST SECTION TO ALLOW FOR THE TURBULENCE ENCOUNTERED AT THE ENTRANCE SECTION IN ALLIGNING THE FLOW. HOWEVER THE MOMENTUM EXCHANGE BETWEEN THE TWO FLOWS ARRIVING AT THE POINT OF ENTRANCE FROM TOMLINSON AND PIRU ARE SUCH AS TO AID IN ALLIGNING THE FLOW PROPERLY INTO THE ENTRANCE SECTION.

THE ENERGY DISSIPATION METHOD IS BY A HYDRAULIC JUMP, WHICH IS A NATURAL OCCURANCE WHENEVER A HIGHLY SUPER-CRITICAL FLOW INTERCEPTS AN ADVERSE SLOPE AND KINETIC ENERGY IS CONVERTED INTO POTENTIAL ENERGY.

CONCLUSIONS & RECOMMENDATIONS

ANALYSIS OF THE REMOVAL OF STORM WATERS FROM THE FOUR HILLS ESTATES SUBDIVISION AND DISCHARGING THEM INTO TIJERAS ARROYO INDICATE THAT IT CAN BE ACCOMPLISHED BY THE USE OF AN OPEN CHANNEL. THE ACCOMPANYING DESIGNS WILL SUFFICE AND THEY IMPOSE NO ADVERSE EFFECTS UPON THE SURROUNDING PROPERTY.

IT IS NECESSARY THAT THE PAVING OF THE STREETS BE CONSTRUCTED IN ACCORDANCE WITH THE DESIGN GRADES IN ORDER TO ADEQUATELY BRING THE STORM WATERS TO THE ENTRANCE OF THE CHANNEL.



STREET CAPACITIES

TOMLINSON

DESIGN: 48' WIDE, FLAT CROWN; S=.0085

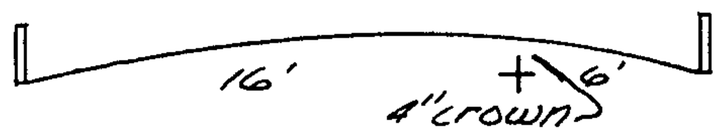
$$Q = \frac{1.49}{.015}(.67)(48)\quad\frac{(.67)(48)^{2/3}}{49.34}\quad(.0085)^{1/2}$$

Q= 220.7 C.F.S.

REQUIRED Q= 220.8 C.F.S.

PIRU

PIRU IS APPROVED FOR 16' OF PERMANENT PAVING ON THE NORTH SIDE AND 6' OF TEMPORARY PAVING ON THE SOUTH SIDE.



NORTH SIDE:

$$Z = \frac{1}{\text{CROWN SLOPE}} = \frac{16}{.33} = 48$$

$$Z/N = \frac{48}{.015} = 3200$$

FROM NOMOGRAPH IF WATER IS ALLOWED TO FLOW TO 9" DEPTH; NOT SPREADING BEYOND THE SIDEWALK.

Q= 85-10=75 C.F.S. FOR NORTH SIDE.

SOUTH SIDE:

$$Z = \frac{6}{.33} = 18; \quad Z/N = \frac{18}{.015} = 1200$$

Q= 25-4=21 C.F.S. SOUTH SIDE

TOTAL Q = 75 + 21 = 96 C.F.S.

REQUIRED Q = 90.9 C.F.S.

CHANNEL HYDRAULICS:

USING THE ELEVATION AT THE INTERSECTION AT THE CENTERLINE OF TOMLINSON & PIRU AS 5562 AND A CONSTANT SLOPE ALONG THE CENTER-LINE OF THE CHANNEL TO 5556 AT 315'.

$S = \frac{6}{315} = .019$

USING A CHANNEL WIDTH OF 20', AND N=0.015

$V = \frac{1.49}{N} \; R^{2/3} \; S^{1/2}$

$Q = VA; \quad Q = 304.4$

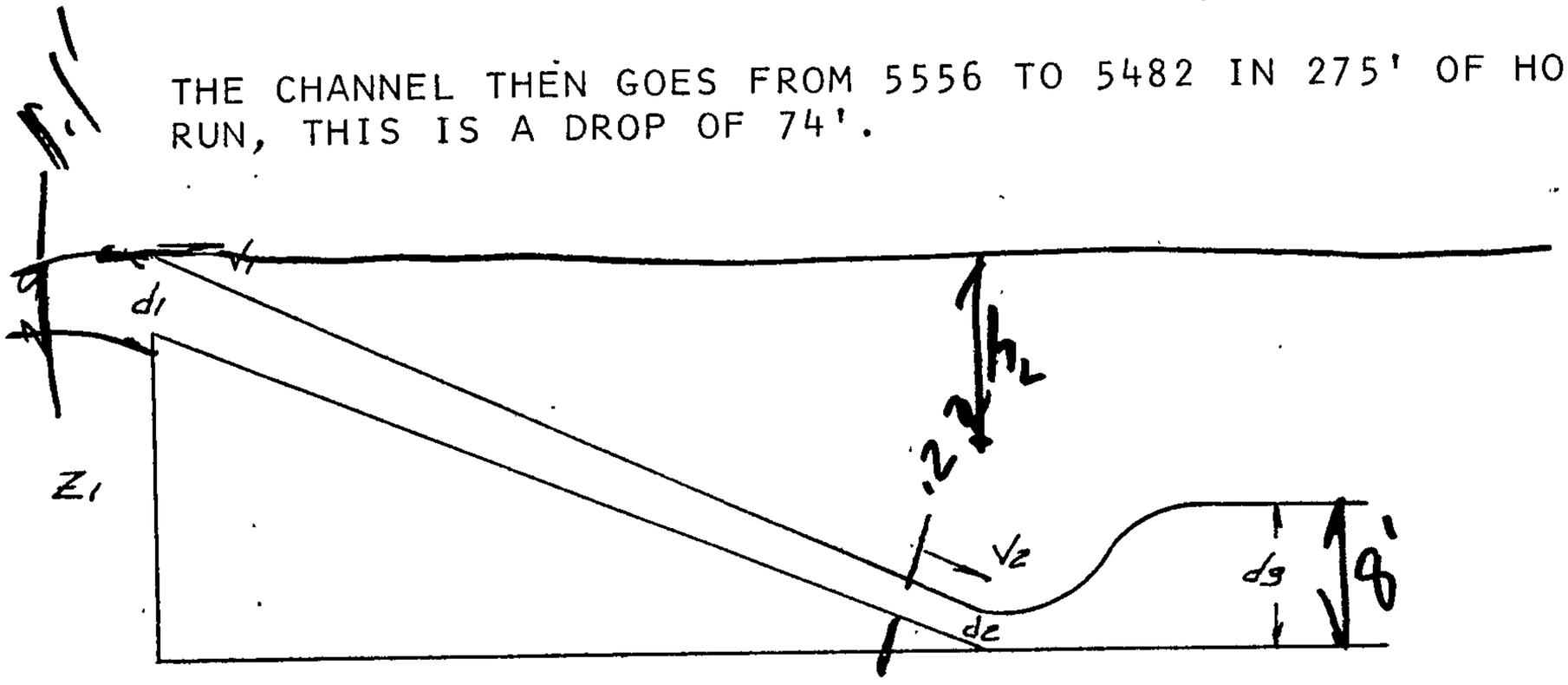
$Q = \frac{1.49}{0.015} (DW) \left(\frac{DW}{2D+W}\right)^{2/3} (.019)^{1/2} = \frac{1.49}{0.015} (20D) \left(\frac{20D}{2D+20}\right)^{2/3} (.019)^{1/2}$

$\frac{(304.4)(.015)}{(1.49)(/019)^{1/2}} = 20D \left(\frac{20D}{2D+20}\right)^{2/3} = 22.23 = F(D)$

USE D= 1.1 FT.

D	F(D)
1	18.76
1.25	26.82
1.1	21.86
1.15	23.48

THE CHANNEL THEN GOES FROM 5556 TO 5482 IN 275' OF HORIZONTAL RUN, THIS IS A DROP OF 74'.



NEGLECTING FRICTION THE ENERGY EQUATION FOR SECTIONS 1 & 2

BECOMES $Z_1 + D_1 + \frac{V_1^2}{29} = D_2 + \frac{V_2^2}{29} + h_L$

$74 + 1.1 = h$

$$304 = \frac{1.486}{.015} 20D\left(\frac{20}{20+2D}\right)^{2/3}(.269)^{1/2}$$

$$= .477 \quad (96)\ (.97)$$

$$\frac{304\,(.015)}{20^{2/3}\,(.269)^{1/2}} = k' =$$

$$\frac{D}{b} = .02$$

$$D = .4$$

$V = Q/A$, $A = DW$; WHERE W IS THE WIDTH.

$$V_1 = Q/D,W = \frac{304.4}{(1.1)(20)} = 13.84 \text{ F.P.S.; } Z, = 74', \ D,=1.1'$$

$$V_2 = Q/A = \frac{304.3}{20D2} = \frac{15.22}{D_2}$$

$$74 + 1.1 + \frac{13.84^2}{64.2} = D_2 + \frac{(15.22)^2}{64.4} \qquad 1/2 \qquad D_2$$

$$78.07 = D_2 + \frac{3.6}{D_2^2} = F(D)$$

D	F(D)
.2	90.2
.25	60.0
.22	74.6

USE $D_2 = 0.22$ FT.

$$V_2 = \frac{15.22}{D_2} = 69.18 \text{ F.P.S.}$$

AT THE TOE OF THE OUTFALL AN ADVERSE CHANGE IN SLOPE IS ENCOUNTERED AND A HYDRAULIC JUMP IS FORMED. THE EQUATION FOR THE DEPTH AFTER THE HYDRAULIC JUMP IS:

$$D_3 = -\frac{D_2}{2} \pm \sqrt{\frac{D_2^2}{4} + \frac{2V_2^2 D_2}{G}}$$

$$D_3 = -\frac{.22}{2} + \sqrt{\frac{.22^2}{4} + \frac{2(69.18)^2 (.22)}{32.2}}$$

$D_3 = 8$ FT.

$$V_3 = Q/A = \frac{304.4}{(8)(20)} = 1.9 \text{ F.P.S.}$$

IN ORDER FOR THIS TO TAKE PLACE NEAR THE TOE A NEAR ZERO OR SLIGHTLY NEGATIVE SLOPE MUST BE MAINTAINED IN THE SECTION AT THE END OF THE OUTFALL SO THAT THE NORMAL DEPTH OF FLOW IS EQUAL TO D_3.

STORM PLUS
OUTFLOW FROM
DETENTION POND

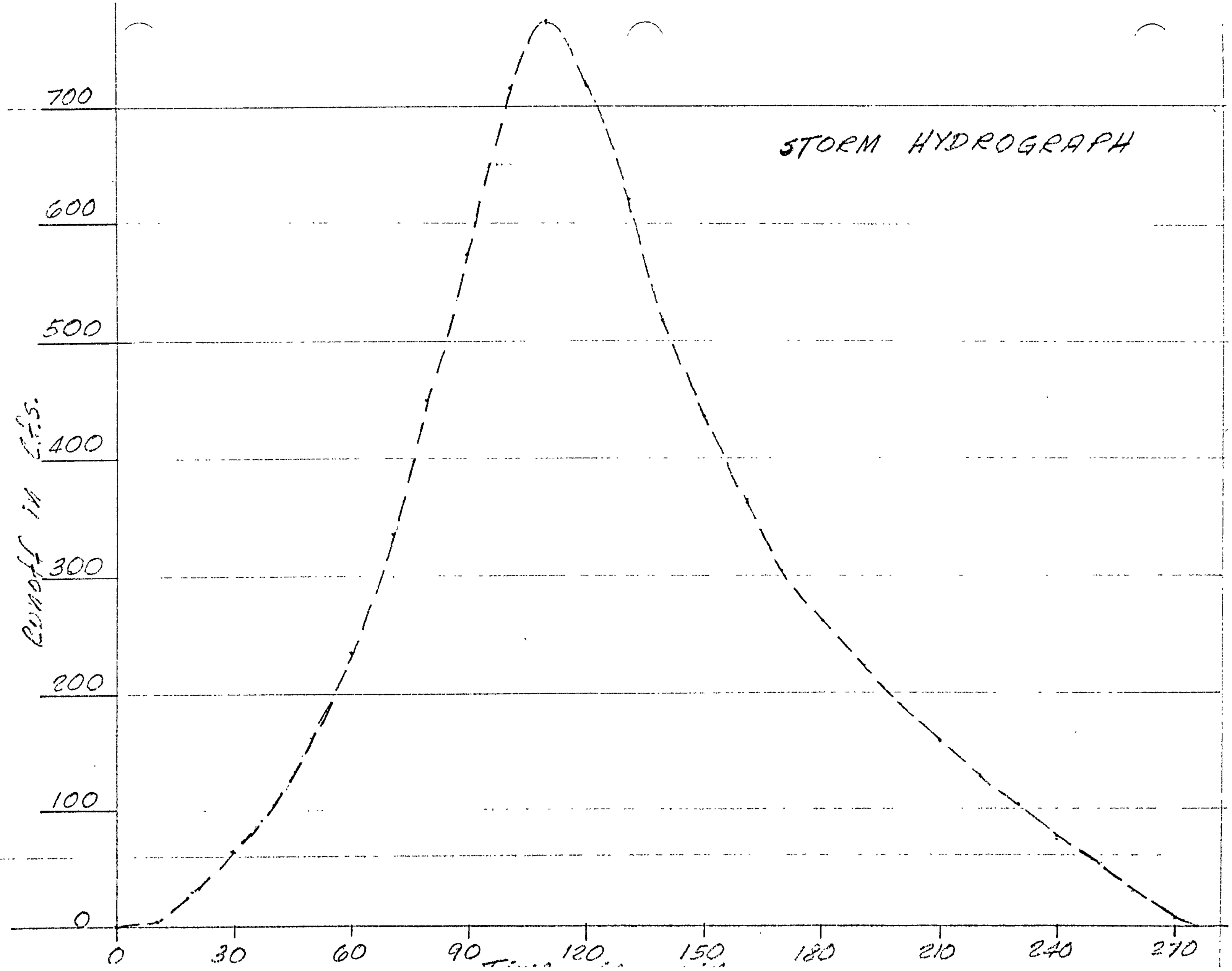
700
600
500
400
300
200
100
0

0 30 60 90 120 150 180 210 240 270

Total Flow in Ditch including outflow from detention pond.

Time in min.	Storm Hydrograph c.f.s.	Outflow from Det. Pond	Total Flow c.f.s.	
0	0	0	0	
10	2	33	35	
20	30	50	80	
30	63	50	113	
40	105	35	140	
50	162	30	192	
60	235	26	261	
70	338	23	361	
80	453	20	473	
90	578	17	595	
100	715	15	730	
110	776	10	786	
120	721	5	726	
130	622	0	622	
140	518	0	518	
150	437	0	437	
160	363	0	363	
170	304	0	304	
180	263	0	263	
190	226	0	226	
200	189	0	189	
210	160	0	160	
220	128	0	128	
230	103	0	103	
240	77	0	77	
250	56	0	56	
260	28	0	28	
270	8	0	8	
280	0	0	0	

STORM HYDROGRAPH



Original

TABLE 4-2

DETERMINATION OF STORM HYDROGRAPH

Time (min.) (1)	Unit Hydrograph (cfs) (2)	Excess Precipitation in Inches														Storm Hydrograph (cfs) (17)
		0.08 (3)	1.35 (4)	0.40 (5)	0.08 (6)	0.05 (7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	
0	0	0	0	0	0	0										0
10	20	2	0	0	0	0										2
20	37	3	27	0	0	0										30
30	60	5	50	8	0	0										63
40	92	7	81	15	2	0										105
50	130	10	124	24	3	1										162
60	170	15	176	37	5	2										235
70	240	20	256	52	7	3										338
80	315	25	337	76	10	5										453
90	390	31	425	100	15	7										578
100	470	33	526	126	20	10										715
110	560	29	553	156	25	13										776
120	600	24	486	164	31	16										721
130	545	20	405	144	33	20										622
140	510	17	331	120	29	21										518
150	472	14	283	98	24	18										437
160	445	12	232	84	20	15										363
170	427	10	196	69	17	12										304
180	415	9	171	58	14	11										263
190	390	7	148	51	12	8										226
200	377	6	122	44	10	7										189
210	360	5	104	36	9	6										160
220	348	4	81	31	7	5										128
230	335	3	65	24	6	5										103
240	325	2	47	19	5	4										77
250	310	1	34	14	4	3										56
		0	13	10	3	2										28
				4	2	2										8

- Unit Hydrograph -

Vol. of Unit Hydrograph =

$639^{Acres} \times \frac{1}{12}^{inch} = 53.25$ Acre-ft.

A of Hydrograph =

$\frac{53.25 \times 43560}{100 \times 30 \times 60} = 12.88$ $^{0''}$

$Q_p = 417$ C.F.S.

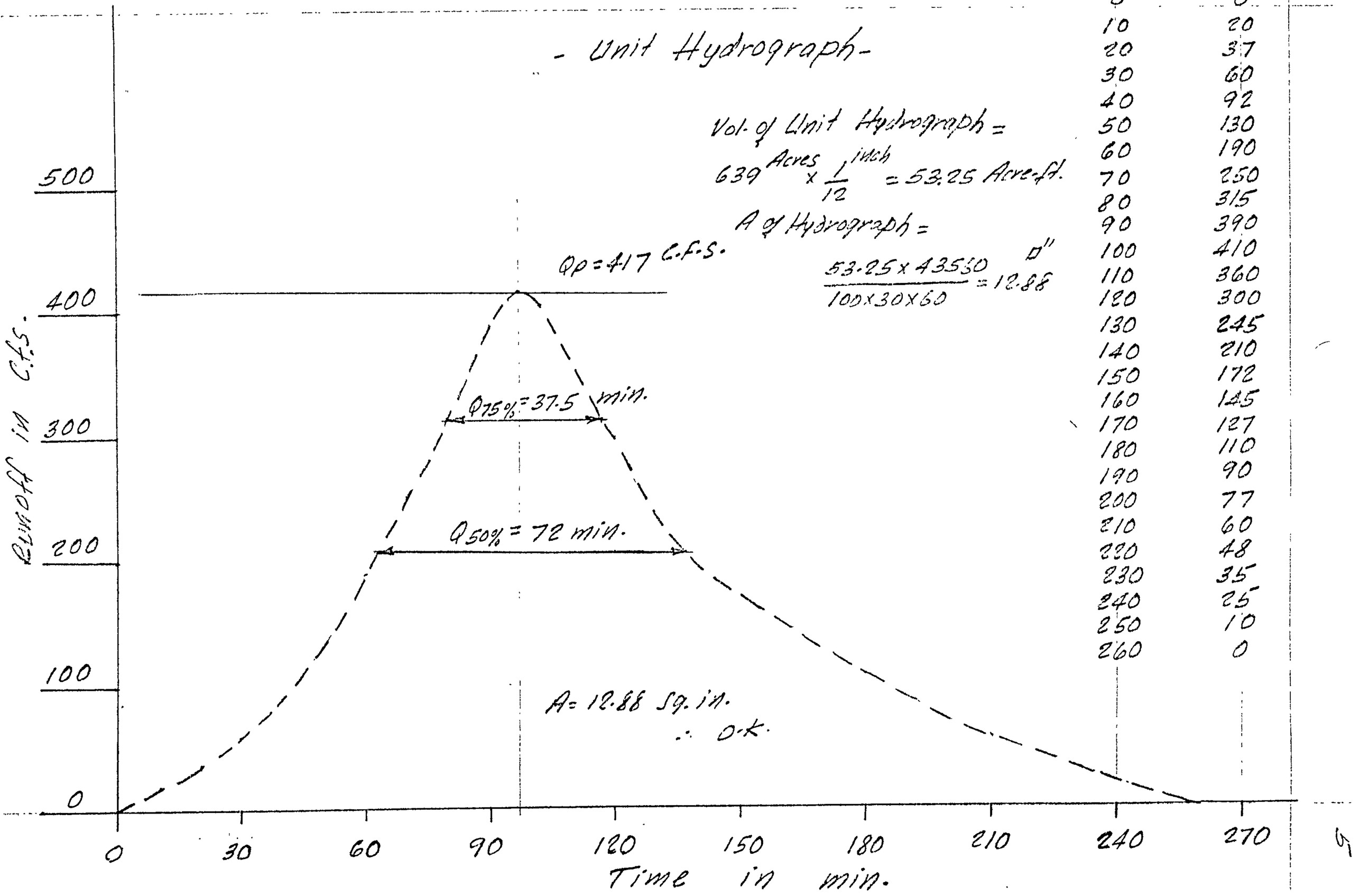
$Q_{75\%} = 37.5$ min.

$Q_{50\%} = 72$ min.

A = 12.88 Sq. in.

∴ O.K.

Time	CFS
0	0
10	20
20	37
30	60
40	92
50	130
60	190
70	250
80	315
90	390
100	410
110	360
120	300
130	245
140	210
150	172
160	145
170	127
180	110
190	90
200	77
210	60
220	48
230	35
240	25
250	10
260	0



Time min.	Total Precipitation Inches	Incremental Precipitation Inches	Rearranged Incremental Precip. Inches.	PERVIOUS AREA. 90%				IMPERVIOUS AREA 10%				Total Av. Effective Precip Inches.
				Maxm. Infiltr. Inches	Detn. & Depression storage-in.	Effective Precip. Inches.	90% Eff. Precipi- Inches.	Detn. & Depression Storage Inch.	Loss in	Effective Precip. Inches	10% Eff. Precipi- Inches.	
1	2	3	4	5	6	7	8	9	10	11	12	13
0	0	0	0	0	0	0	0	0	0	0	0	0
10	1.43	1.43	0.08	0.08	0	0	0	0.05	0	0	0	0
20	1.90	0.47	0.10	0.08	0.02	0	0	0.05	0	0.05	0	0
30	2.30	0.40	0.40	0.08	0.28	0.04	0.04	0	0.02	0.38	0.04	0.08
40	2.45	0.15	1.43	0.08	0	1.35	1.22	0	0.07	1.36	0.13	1.35
50	2.57	0.12	0.47	0.08	0	0.39	0.35	0	0.02	0.45	0.05	0.40
60	2.67	0.10	0.15	0.08	0	0.07	0.06	0	0	0.15	0.02	0.08
70	2.72	0.05	0.12	0.08	0	0.04	0.04	0	0	0.12	0.01	0.05
80	2.75	0.03	0.05	0.08	0	0	0	0	0	0.05	0	0
90	2.77	0.02	0.03	0.08	0	0	0	0	0	0.03	0	0
100	2.79	0.02	0.02	0.08	0	0	0	0	0	0.02	0	0
110	2.80	0.01	0.01	0.08	0	0	0	0	0	0.01	0	0
120	2.81	0.01	0.01	0.08	0	0	0	0	0	0.01	0	0

$\therefore Q_p = Q_p \times A$

$Q_p = 417 \times 0.998$

$Q_p = 416$ C.f.s.

A = Area in sq. mile of basin.

$= \frac{639}{640} = 0.998$ sq. mi.

Now for constructing unit hydrograph

$W_{50\%}\ Q_p = \frac{500}{(Q_p/A)} = \frac{500}{417} = 1.199$ hrs

$= 72$ min.

$W_{75\%}\ Q_p = \frac{260}{(Q_p/A)} = \frac{260}{417} = 0.6235$ hrs

$= 37.5$ min.

Time of peak $T_p = 60\ t_p + \frac{t_u}{2}$ $t_u = 10$ min. increment

$= 92 + 5 = 97$ min.

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Volume of Unit hydrograph should be

639 Acres × 1 inch/12 = 53.25 Acre-ft.

Area of hydrograph = $\frac{53.25 \times 43560}{100 \times 30 \times 60} = 12.886$ sq. in.

= 322 squares

CALCULATIONS FOR UNIT HYDROGRAPH.

$$t_p = C_t (L \cdot L_{ca})^{0.3}$$

where t_p = time to peak of hydrograph from midpoint of unit rainfall in hours.

L = Length along stream from study point to upstream limits of the basin in miles.

L_{ca} = Distance from study point along stream to the centroid of the basin in miles

C_t = a coefficient reflecting time to peak.

$L = 1.60$ miles, $L_{ca} = 1.10$ miles.

$$C_t = \frac{7.81}{(la)^{0.78}}$$ where la = impervious percent of watershed = 10%

$$C_t = \frac{7.81}{(10)^{0.78}} = 1.296$$

Substituting all values

$$t_p = 1.296 (1.60 \times 1.10)^{0.3} = 1.5355 \text{ hrs}$$

$= 92$ min. (+10% sparcely sewered − 10% for steep basin)

$$q_p = \frac{640\, C_p}{t_p}$$ where q_p = peak rate of runoff/sq.mile

C_p = Coeff. related to peak rate of runoff

t_p = Time of peak in hrs.

$$C_p = 0.89 (C_t)^{0.46}$$

$$= 0.89 (1.296)^{0.46}$$

$$= 1.00$$

$$\therefore q_p = \frac{640 \times 1.00}{1.5355} = 417 \text{ c.f.s./sq.mile}$$

5/20/17

Drainage Study for 12 ~~th~~ Installment Point.

The drainage basins that are larger than 200 acres in area, it is recommanded that the design storm runoff be analyzed by deriving synthetic unit hydrographs.

A unit hydrograph is a hydrograph of one inch of direct runoff from the tributary area resulting from a unit storm. A unit hydrograph represents the integrated effects of factors such as tributary area, shape, channel capacities, land slope etc.

Total Flow in Ditch including Outflow from Detention Pond.

Time in min.	Storm Hydrograph in C.f.s.	Outflow from Det. Pond	Total Flow in C.f.s.	
0	0			
10	2			
20	30			
30	63			
40	105			
50	153			
60	555			
70	538			
80	453			
90	578			
100	715			
110	776			
120	721			
130	622			
140	518			
150	437			
160	363			
170	304			
180	263			
190	226			
200	189			
210	160			
220	128			
230	103			
240	77			
250	56			
260	28			
270	8			
280	0			

Flow Calculations for Ditch.

Sta. 1+00

Maximum flow = 776 + 70 = 846 c.f.s.

Av. slope of Ditch = $\left(\frac{5900-5783}{2200}\right) \times 100$

$S = 5.32\ \%$

$\therefore S = 0.0532$ ft/ft or

$S^{1/2} = 0.2307$

$n = 0.04$ Assumed.

By Manning's Eqn.

$V = \frac{1.486}{n} R^{2/3} S^{1/2}$ ft/sec and

$Q = V \times A$ c.f.s.

From Ditch Cross section at 1+00

bottom width = 100 ft.

Depth D = 1.5 ft. Area A = 168 sq.ft.

: also El. 93.00 Wetted Perimeter P = 127 ft.

Hyd. Radius $R = A/P = \frac{168}{127} = 1.344$

$R^{2/3} = 1.2178$

$\therefore V = \frac{1.486}{.04} \times 1.2178 \times 0.2307$

$V = 10.44$ ft/sec and $A = \frac{846}{10.44} = 81$ sq.ft.

For D = 1.2 ft, A = 112 sq.ft, P = 125 ft.

$R = A/P = 0.896$ $R^{2/3} = 0.9294$

Vel $V = \frac{1.486}{0.04} \times 0.9294 \times 0.2307 = 8$ ft/sec

and Area = $Q/V = \frac{846}{8} = 106$ sq.ft O.K.

$\therefore$ Depth of Flow @ 1+00 = 1.2 ft. El = 94.00

Sta. 5+00 Q_{max} = 846 + 4 C.F.S. (Side runoff adds.)
= 850 C.F.S.

Assume D = 2.0 ft, (above El. 72.0) A = 122 Sq.ft. P = 125 ft.

$R = A/P = 0.976$ $R^{2/3} = 0.9839$

Hence $V = \frac{1.486}{0.04} \times 0.9839 \times 0.2307 = 8.43$ ft/sec

$\therefore A_{req} = \frac{Q}{V} = \frac{850}{8.43} = 100.8$ Sq.ft.

Hence D = 2' above El. 72.00 & O.K

El = 72.00

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Sta. 10+00 Q_{max} = 850 C.F.S.

Assume D = 2.0 ft A = 100 S.ft. P = 93 ft.
above El. 46

$R = A/P = 100/93 = 1.075$ $R^{2/3} = 1.0495$

Hence $V = \frac{1.486}{.04} \times 1.0495 \times 0.2307$

V = 8.99 ft/sec.

$\therefore A = \frac{Q}{V} = \frac{850}{8.99} = 95$ S.ft.

Hence D = 2.0 ft above El. 46.00 & O.K.

— × — × —

Sta. 14+00 Q_{max} = 850 + 100
= 950 C.F.S.

Assume D = 2.0 ft. A = 140 Sq.ft. P = 112 ft.
above El = 23.5

$R = A/P = 1.25$ $R^{2/3} = 1.16$

$\therefore V = \frac{1.486}{.04} \times 1.16 \times 0.2307 = 9.94$ ft/sec

Hence $A = Q/V = \frac{950}{9.94} = 95.5$ S.ft. O.K.

Maximum flow in ditch = 786 C.f.s.

Slope of ditch $= \left(\frac{5900 - 5783}{2200}\right) \times 100$

$= 5.32\ \%$ $\qquad S = 0.0532$ ft/ft.

$S^{1/2} = 0.2307$

By Manning's Eqn.

$V = \frac{1.486}{n} R^{2/3} S^{1/2}$ $\qquad n = 0.03$

For $S = 5.32\ \%$ and grassed waterway

Vel. of flow = 3.5 ft/sec.

Hence Area reqd $= \frac{786}{3.5} = 225$ Sq. ft.

(1) Assume $d = 1.5'$ $\qquad A = 168$ Sq. ft

$P = 125$ ft.

$R = \frac{A}{P} = \frac{168}{125} = 1.344$

$R^{2/3} = 1.2178$

$V = \frac{1.486}{.04} \times 1.2178 \times .2449$ $\qquad S = 6\ \%$.

$= 11.08$ ft/sec.

$A\ reqd = \frac{Q}{V} = \frac{846}{11.08} = 76.34$ Sq. ft $\qquad$ O.K.

$d = 1.25$ ft. $\qquad A = 112$ Sq. ft. $\qquad P = 125$

$R = A/P = (.896)^{2/3} = 0.9294$

$V = \frac{1.486}{.04} \times 0.9294 \times 0.2307 = 8$ ft/sec.

$A = \frac{Q}{V} = \frac{846}{8} = 105$ Sq. ft $\qquad$ O.K.

Sta. 15+00 $Q_{max} = 950$ C.f.s.

Assume D = 3.5 ft above El = 19.0 $A = 110$ S.ft. $P = 66$ ft.

$R = A/P = 1.67$ $R^{2/3} = 1.4057$

Hence $V = \frac{1.486}{.04} \times 1.4057 \times 0.2236$ $(S = .05)$

$V = 11.67$ ft/sec.

$A_{req'd} = \frac{Q}{V} = \frac{950}{11.67} = 81.3$ S.ft.

Try D = 3.0 ft. $A = 80$ S.ft $P = 51$ ft.
above El = 19.0

$R = \frac{A}{P} = 1.568$ $R^{2/3} = 1.35$

Hence $V = \frac{1.486}{.04} \times 1.35 \times 0.2236$

$V = 11.21$ ft/sec.

and $A = Q/V = \frac{950}{11.21} = 84.71$ S.ft.

Hence D = 3.1 ft above El. $19^{00} = 22.1$ ℄ O.K.

—x —x—

Sta. 17+00 $Q_{max} = 950$ C.f.s.

Assume D = 3' above El = 9.5 $A = 112$ S.ft. $P = 66$ ft.

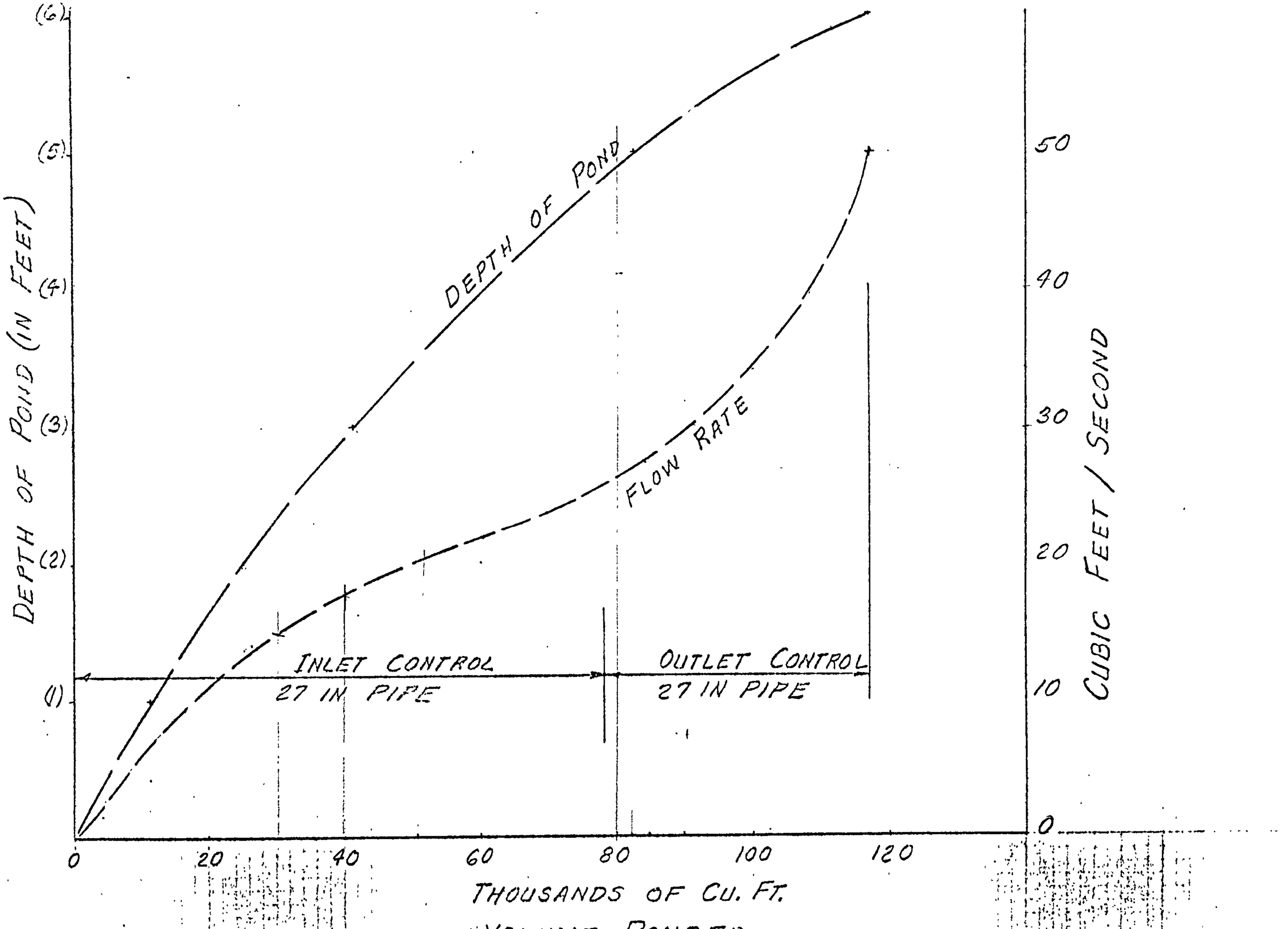
$R = A/P = 112/66 = 1.69$ $R^{2/3} = 1.422$

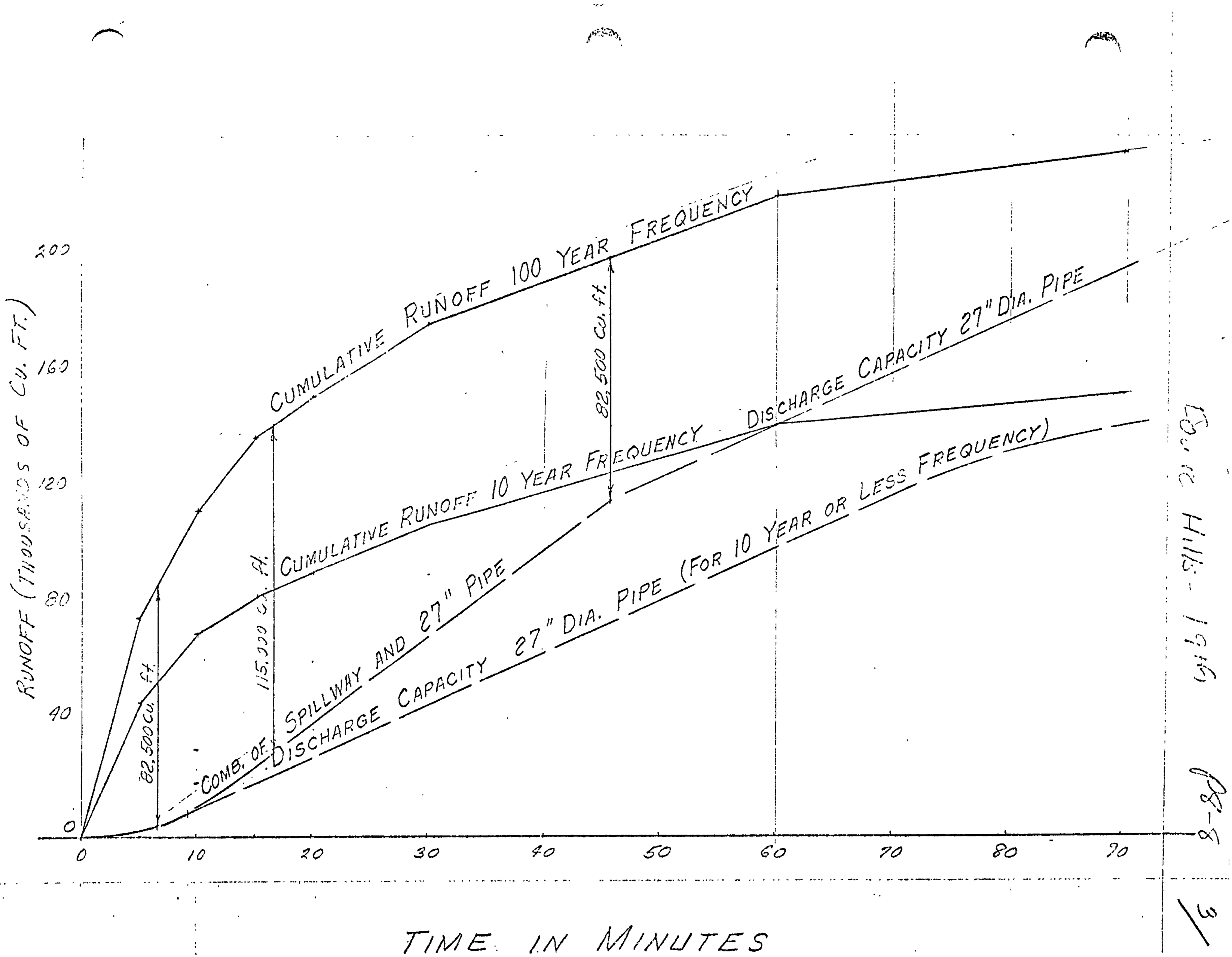
Hence $V = \frac{1.486}{.04} \times 1.422 \times 0.2449$ $S = .06$

$= 12.9$ ft/sec.

and $A = \frac{Q}{V} = \frac{950}{12.9} = 73.4$ S.ft. O.K.

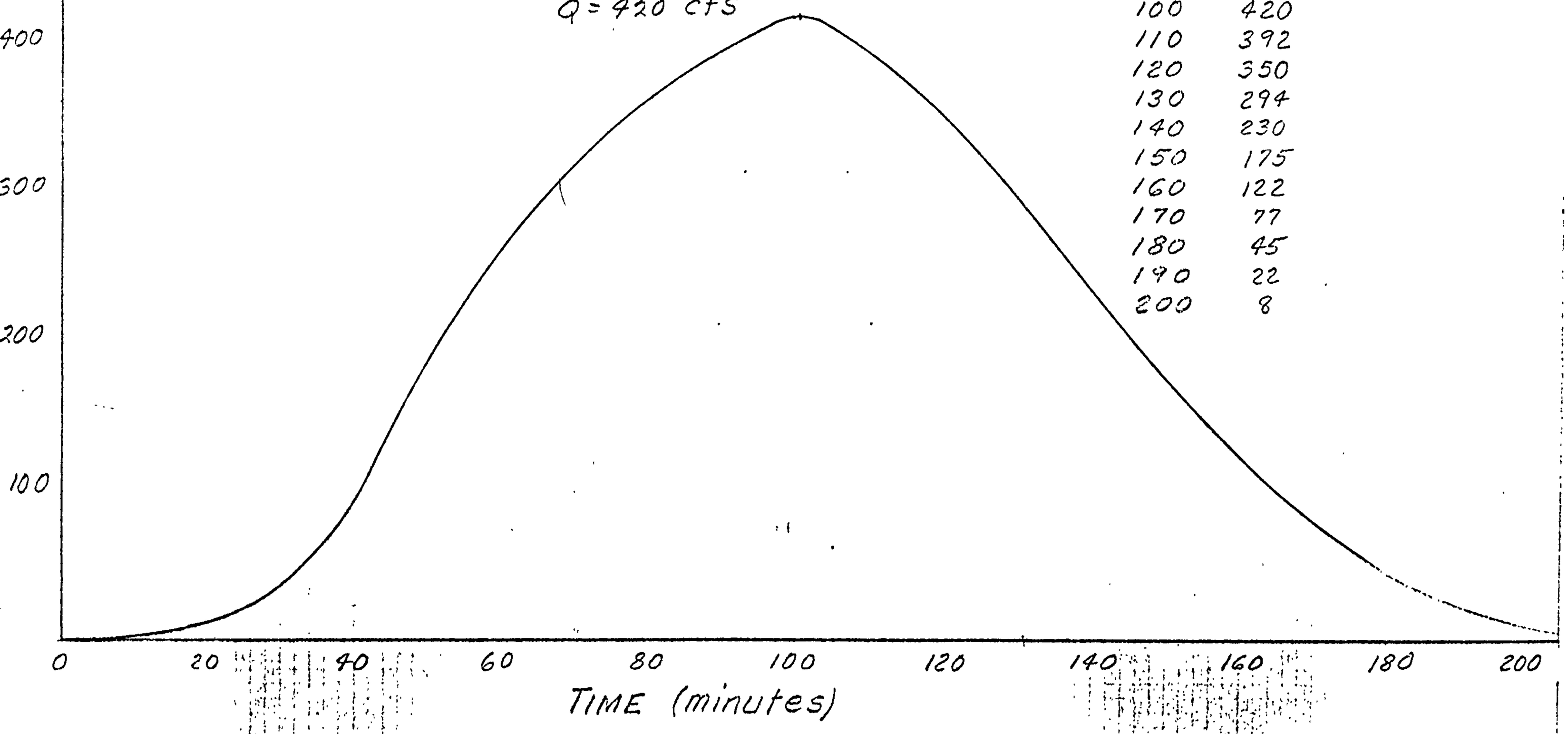
Hence D = 3' above El = 9.5 ℄ O.K. El = 12.5


DEPTH OF POND (IN FEET)
(6)
(5)
(4)
(3)
(2)
(1)
DEPTH OF POND
FLOW RATE
INLET CONTROL
27 IN PIPE
OUTLET CONTROL
27 IN PIPE
0
20
40
60
80
100
120
THOUSANDS OF CU. FT.
VOLUME PONDED
50
40
30
20
10
0
CUBIC FEET / SECOND


CUMULATIVE RUNOFF 100 YEAR FREQUENCY
82,500 Cu. Ft.
RUNOFF 10 YEAR FREQUENCY
DISCHARGE CAPACITY 27" DIA. PIPE
OR LESS FREQUENCY)
115,000 Cu. Ft.
CUMULATIVE RUNOFF 10
82,500 Cu. Ft.
COMB. OF SPILLWAY AND 27" PIPE
DISCHARGE CAPACITY 27" DIA. PIPE (FOR 10 YEAR OR LESS FREQUENCY)
RUNOFF (THOUSANDS OF CU. FT.)
200
160
120
80
40
0
0
10
20
30
40
50
60
70
80
90
TIME IN MINUTES

UNIT HYDROGRAPH O.P. (12)

EFFECTIVE RAINFALL =
1 inch in 10 minutes



TIME (MIN.)	Q (CFS)
0	0
10	5
20	12
30	38
40	95
50	190
60	265
70	325
80	365
90	397
100	420
110	392
120	350
130	294
140	230
150	175
160	122
170	77
180	45
190	22
200	8

THE VOLUME OF THE UNIT HYDROGRAPH:

639 ACRES x 1 inch / 12 = 53.3 AC. ft.

USE 53 AC. ft.

AREA = 0.998 Square Miles = 639 Acres

L = 1.61 Miles

Lca = 1.10 Miles

90% = pervious area

10% = impervious area

to use a Unit duration of 10 minutes

$$Ct = \frac{7.81}{(10)^{0.78}} = 1.3$$

$$tp = Ct\,(L\,Lca)^{.3} = 1.3(1.61 \times 1.10)^{.3}$$

$$= 1.3(1.187) = 1.543 \text{ hour} = 92.6 \text{ minutes}$$

$$cp = 0.89\,Ct^{0.46} = .89(1.3)^{.46} = 1.004$$

$$qp = \frac{640\,cp}{tp} = \frac{640\,(1.004)}{1.543} = 416.4 \text{ cfs/sq.mi.}$$

$$Qp = qp\,A = 417\,(0.995) = 416 \text{ cfs}$$

Say 420 cfs

$$W50\%\,qp = \frac{500}{(420)} = 1.19 \text{ hours} = 71.4 \text{ Min.}$$

$$W75\%\,qp = \frac{750^{.26}}{(420)} = 1.226 \text{ hours} = 107.1 \text{ min.}$$

$$Tp = 60\,tp + \frac{tu}{2} = 93 + \frac{12}{2} = 98 \text{ minutes}$$

ALBUQUERQUE
Tijeras
Canyon
CANON
DE CARNUE
Carnue
Santo Nino Ch
Santo Nino Cem
Spring
Well
BM 5765
Valero 5962
2 LANE
Prospect
12th INSTALLMENT
11th INSTALLMENT
19th INSTALLMENT
cabra dr.
camino cerrito
wagontrain drive
Prospects
1
2
10
19
24
25
26
30
31
35
36
6887
6927
6231
6101
5892
5947
6317
6149
5979
5982
6046
6461
6514
6445
6205
6152
6024
6200
6481
6958
6307
6674
6500
6227
6364
6338
5950
JEEP TRA
N A