HYDROLOGY F18/D10 TWO PLAN

F 18-D10

2 PLANS

**City of Albuquerque**
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
*David Rusk*

April 24, 1979

F18-D10

Mr. Ron Roy Bohannan
Bohannan-Huston, Inc.
4125 Carlisle Blvd. N.E.
Albuquerque, New Mexico 87107

Re: Drainage Report for Lakeview Apartments

Dear Mr. Bohannan:

I have reviewed the drainage report for the captioned project and I am in general agreement with the proposal submitted. I am nevertheless disturbed by the lack of care exercised in the preparation of the report as is evident by a number of errors and inconsistencies.

For instance, the depth of flow in the 50 ft. utility drainage and roadway easement is shown on Plate 1 to be 15 ft. - 45 ft., where obviously it is meant 0.15 and 0.45 ft. respectively. On Plate 2., Q2 = 988cfs should read instead 98.8cfs. In the body of report it is indicated that no offsite flow enters the parcel while drawing 2 by Schlegel & Lewis (Plate 3 of the report?) shows a culvert under the entrance drive with the notation: ("divert culvert to landscaped area.") On Page 2 discussing the development drainage, the first sentence is inconsistent: either total retention is provided or only the difference between undeveloped and developed runoff. The text of the report does not include the recommendations included in the two sheets inserted between Sheet 3 of 4 and 4 of 4 of the computations, where a 3 ft. high wall at the south end of the property is suggested, etc. The site grading plan, Drawing 2 by Schlegel & Lewis is poorly legible and is an insufficient document to allow accurate construction, verification of the drainage provisions and field inspection of the same.

Similar problems have been encountered in a number of drainage reports and plans prepared by your firm which have resulted in a number of unnecessary repeated reviews of your proposals.

Since my office is already taxed beyond endurance by the regular flow of studies submitted I would greatly appreciate your cooperation in the form of quality control and supervision.

The above notwithstanding, I will approve the site development plan in the expectation that a corrected report will be submitted for the permananet record of this office and of AMAFCA.

Very truly yours,

Bruno Conegliano

Bruno Conegliano
Assistant City Engineer-Hydrology

BC/ms

cc - Gerald Davenport
Dick Heller
Rich Leonard
Drainage File
Reading File

SCHLEGEL AND WIS, ARCHITECTS 1620 Central SE
Albuquerque
87106
(505) 247-1529

June 21, 1979

RE: Lake View Apartments
4901 San Mateo Place N.E.
Albuquerque, New Mexico

Mr. Richard Heller, City Engineer
City of Albuquerque
Engineering Division
400 Marquette Avenue N. W.
Albuquerque, New Mexico 87102

Dear Mr. Heller:

Upon completion of the above named project, we will engage the Drainage Engineer to inspect said project and certify that it has been constructed in a manner consistent with the approved Drainage Report.

James C. Lewis

JCL/lks

I hereby release this plan for Building Permit:

Signed: (Mr. Richard Heller)

Title: Acting City Engineer

Date: 6/22/79

# DRAINAGE REPORT
# FOR
# LAKEVIEW APARTMENTS

Zone Atlas Sheet F-18

PREPARED FOR

Schlegel and Lewis Architects
1620 Central Avenue, S.E.
Albuquerque, New Mexico 87106

PREPARED BY

Bohannan–Huston, Inc.
4125 Carlisle Boulevard, N.E.
Albuquerque, New Mexico 87107

Michial M. Emery

Michial M. Emery, P.E.
N.M.P.E. No. 5194

STATE OF NEW MEXICO
MICHIAL M.
EMERY
No. 5194
REGISTERED PROFESSIONAL ENGINEER

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## PLATES

PLATE I — Location Map and Upland Drainage
PLATE II — Localized Drainage and Flow Paths
PLATE III — On-Site Drainage Paths

# DRAINAGE REPORT

# FOR

# LAKEVIEW APARTMENTS

## PURPOSE

The purpose of this report is to provide adequate storm water control of the developed project site without causing downstream or localized drainage hazards.

## PROJECT LOCATION AND DESCRIPTION

The Lakeview Apartments is Tract I of the Banker's Union Life Subdivision, as shown in Plate II. The tract of land lies west of the 50-foot easement for drainage utility and roadway, and north of San Mateo Lane, N.E. The parcel of land contains approximately 1.87 acres and slopes from north to south at approximately 1.38%.

## EXISTING DRAINAGE

The site, at present, has no upland drainage entering the project. Flows from upland basins, having any direct influence upon the project, are listed on Plate I.

Basin 1 discharges into McLeod Street, and is presently a 44-foot wide collector street with a 5-inch crown in the street. The average slope of Basin 1 is approximately 1.23%. The flow reaching the point at the intersection of McLeod Road and the 50-foot easement for drainage utility and roadway carries 86.0 cfs running approximately .55-feet deep. A conservative assumption was made that the flows in the south gutter of McLeod Street, entered the 50-foot easement, bordering the east of the project, at approximately 43 cfs, and the other 43 cfs continued down McLeod Street.

The street that presently exists in the 50-foot drainage, utility and roadway is approximately 32-feet, face-to-face with an inverted 4-inch crown, and 4-foot wide concrete valley gutter running down the middle of the street. The 43-foot cfs runs down the easement, where it joins the 98 cfs coming from Basin 2 (see Plate I). The combined flow of 141.8 cfs proceeds down the easement at a depth .45-feet at a velocity of 18.2 fps. This flow never leaves the easement and continues on toward Topke Place and the 50-foot easement.

At the intersection of the 50-foot easement and Topke Place, at the southeast corner of the project, another 158 cfs flows into the easement. This water turns south with the existing 141.8 cfs, due to the water block on San Mateo Lane (see Plate II), and then to a concrete lined channel which runs west. At this point, the water is beyond the project and since a total on-site retention solution is proposed, there is no need to analyze any downstream structures for capacity.

**DEVELOPED DRAINAGE**

The solution proposed, as mentioned above, is to have a total retention basin and utilize the existing pond that lies between Tracts M, I, and L—R (see Plate II).

Using only the area that could be drained under natural slopes, the land being able to drain to the pond is approximately 5.55 acres. This, coupled with a "c" factor of .70 for fully developed conditions, resulted in a volume for six hour rainfall of .91 acre—feet of storage required. It has been the desire of the owners to have the pond filled to a depth that would leave adequate storage for the storm water volume and freeboard. If the pond is filled to a contour level of 5227.0, the excess storage would equal 1.14 acre feet, or .23 acre-feet in excess of the volume required.

The local on-site drainage would drain to the pond (see plate III), allowing positive drainage away from all building locations. In addition, the two driveway entrances will have water blocks established to insure that the flow, in the 50-foot easement, will continue in the 50-foot easement.

**CONCLUSIONS AND RECOMMENDATIONS**

It is our recommendation that the localized flow from the 5.55 acres be allowed to pond in the existing pond with the permanent pool elevation set at 5227.0, resulting in zero discharge from the property, and that the upland flows be allowed to continue flowing south down the existing drainage easement.

COMPUTATIONS

UPLAND DRAINAGE

Conditions

From plate 1 UPLAND developed flow rates and depths.

Area 1

$L_c = 4200'$ $A = 41.99$ acres

$\Delta h = 52'$ Over entire area

$S_{avg} = \frac{52}{4200} = .0123$ avg

Slope at discharge

$S_{dis} = \frac{10'}{1050'} = .0095$ ft/ft.

$V_c = 2.0$ fps from fig 2-3 Peak Rates of Discharge for small water sheds

$T_c = \frac{L}{3600 V_c} = \frac{4200'}{3600(2.0)} = 35$ min

$I = \frac{189}{25 + T_c} = \frac{189}{25+35} = 3.15$ in/hr. Master Plan Drainage 1963

$Q = CIA$

$Q = (.65)(3.15)(41.99)$

$Q = 86.0$ cfs

Assumption on McCleod Street that only half that flow enters down the easement (Future Road that boarders the West side of the project.

The street depth on McCleod Road from hp 85 street flow capacity program is .55' Therefore 43cfs is running onto new street.

PROJECT NAME Lakeview Apts. SHEET 1 OF 4

PROJECT NO 79-035 BY RRB DATE 2/19/79

SUBJECT Drainage Report.

UPLAND DRAINAGE
[redacted] Conditions (Cont.)

Area 2.

$L_c = 3800'$ Area = 40.5 acres

$\Delta h = 76'$

$Slope_{avg} = \frac{76}{3800'} = .0200\ ft/ft.$

$Slope_{ds} = \frac{6}{400'} = .0150\ ft/ft.$

$V_c = 2.5\ fps$ fig 2-3 Peak Rates of Discharge for small Water Sheds.

$T_c = \frac{3800'}{(3600)(2.5)} = 25.3\ min$

$I = \frac{189}{25+25.3} = 3.75\ in/hr.$

$Q = (.65)(3.75)(40.5) = 98.8\ cfs$

This discharges at a drainage easement between overland street and northland street then south alongside the west boundary of the project.

Total flow at this point is 98.8+43cfs or a discharge of 141.8 cfs. Depth of flow at these two points. Upstream depth with 43cfs and slope of s=.0114 ft/ft. 32 ft face to face using hp 65 program depth = .015 ft V= 10.4 fps. Downstream with flow of 141.8 cfs depth: .45 ft. and velocity of 18.2 fps with a PRODUCT of V x depth

PROJECT NAME Lakeview Apts SHEET 2 OF 4
PROJECT NO 78-035 BY RRB DATE 2/19/79
SUBJECT Drainage Report. CHK'D DATE

18.2 fps x .45 ft = 8.2 The street at its (San Mateo) present condition is 32 ft face to face with an inverted crown, concrete line valley gutter 4' wide, running the entire length from McLeod to the drainage channel.

At topke place the flow is 158 cfs, from the Wilson and company 1970 drainage report for 6000 Topke place. This flow turns south and reaches a depth of .75 ft. Then discharges into the concrete lined channel.

Developed Drainage. (ON SITE)

The flow from the project is proposed to flow into the pond that exists between the adjoining property owners. No flow will be discharged from the project to the surrounding streets. This will not complicate the present drainage problem and provide a total retention solution.

Exsiting Pond Capacity

| Contour | Area. | Avg Area. | Vol (ac-ft.) |
|---|---|---|---|
| 25 | - | 4,775 s.f. | .11 |
| 26 | 9550 s.f. | 12,450 s.f. | .57 |
| 28 | 15,350 s.f. | 18590 s.f. | .85 |
| 30 | 21,826 s.f. | | |
| | | Total | 1.53 ac.ft. |

PROJECT NAME Lake view Apts SHEET 3 OF 4
PROJECT NO 79-035 BY RRB DATE 2/19/79
SUBJECT Drainage Report CHK'D BY DATE

The pond will only be able, due to the slope of the land, be able to store water from approximately 5.55 acres. Using a fully developed condition and a C factor of .70 the total volume entering into the pond would be:

$L_c = 700'$

$\text{slope} = \frac{8'}{700'} = .01143 \text{ ft/ft.}$

$V = 2.2 \text{ fps}$ fig 2-3 Peak Rates of Discharge For Small Water Sheds.

$T_c = \frac{700'}{(3600)(2.2)} = 5.3 \text{ min.}$ use $T_c = 10 \text{ min}$

$I = \frac{189}{25+10} = 5.40 \text{ in/hr.}$

$Q = (5.40)(5.55)(.70) = 20.98 \text{ cfs.}$

$Vol = \frac{2.8 \text{ in}}{12 \text{ in/ft.}}(5.55)(.70) = .91 \text{ ac-ft.}$

The existing pond has capacity to handle all of the runoff from the site and be half full with water for aesthetics of the area. Proposed Water flood surface elevation, 5227.0 leaving the permanent pool elevation at 5230.0 The onsite drainage of the project will be taken care of by Plate III with Plate II showing the existing contours and localized drainage

| | | | |
|---|---|---|---|
| PROJECT NAME | Lakeview Apt | SHEET 4 | OF 4 |
| PROJECT NO | 79-035 | BY RRD | DATE 2/19/79 |
| SUBJECT | Drainage Report | CH'D | DATE |

AGREEMENT OF HOME OWNERS

ENGINEER'S REPORT

ON

DRAINAGE AFFECTING IMPERIAL HOUSE APARTMENTS

6000 TOPKE PLACE NE, ALBUQUERQUE, NEW MEXICO

WILSON & COMPANY

ALBUQUERQUE, NEW MEXICO

18 NOVEMBER 1970

ENGINEER'S REPORT
ON
DRAINAGE AFFECTING IMPERIAL HOUSE APARTMENTS
6000 TOPKE PLACE NE, ALBUQUERQUE, NEW MEXICO

PURPOSE: The purpose of this report is to analyze the amount of run-off entering the study area and the carrying capacities of the existing and proposed streets, ditches and structures. A 100-year design rainfall was used to determine the run-off.

CLIMATOLOGICAL INFORMATION: The City of Albuquerque has adopted a drainage master plan which gives the following formula for calculating the intensity of rainfall that is probable for a 100-year design storm:

$$i_{100} = \frac{189}{t_c + 25}$$

$i_{100}$ = rainfall inches per hour

$t_c$ = time of concentration in minutes

RUN-OFF CALCULATION: The Rational Method was used to calculate the run-off from the study area. The Rational formula is as follows:

$Q = CiA$

Q = Quantity of run-off in cubic feet per second

C = Coefficient of run-off expressed in a ratio of rainfall to run-off

i = Rainfall expressed in inches per hour

A = Drainage area expressed in acres

The value used for the coefficient C was 0.55.

DISCUSSION: Three distinct drainage areas enter or parallel the site of the proposed improvements.

Area $A_1$ has a drainage area of 94 acres. This drainage will be handled by an earth ditch along the south side of the property. The flow at the east line of the property is 228 cfs. The capacity of the proposed ditch is 617 cfs.

Area $A_2$ has a drainage area of 61 acres. This drainage enters the property on Topke Place NE. The flow at this point is 158 cfs. The existing street is 40 feet wide, face of curb to face of curb, and has a crown of 6 inches. The capacity of the existing improvement is 142 cfs. The 100-year flow exceeds the capacity of the street, curb full. The surrounding property is built above the street, and the extra flow will not cause a serious flooding condition of the improvements. The proposed section for Topke Place to be constructed on the site of the improvements is 40 feet wide, face of curb to face of curb, and will have an inverted crown of 4 inches. The capacity of the designed section is 455 cfs.

Area $A_3$ has a drainage area of 64 acres and enters the property at the northwest corner. The flow at this point is 158 cfs. This flow can either be discharged into the proposed improvement of Topke Place NE or diverted to the west into the grassed waterway along the east boundary of the golf course.

The flow from area $A_2$ will be discharged into the grassed waterway along the east boundary of the golf course which is a graded swale with a dike along the west side of the swale which drains the water to the south boundary of the golf course at which point the flow discharges into the ditch

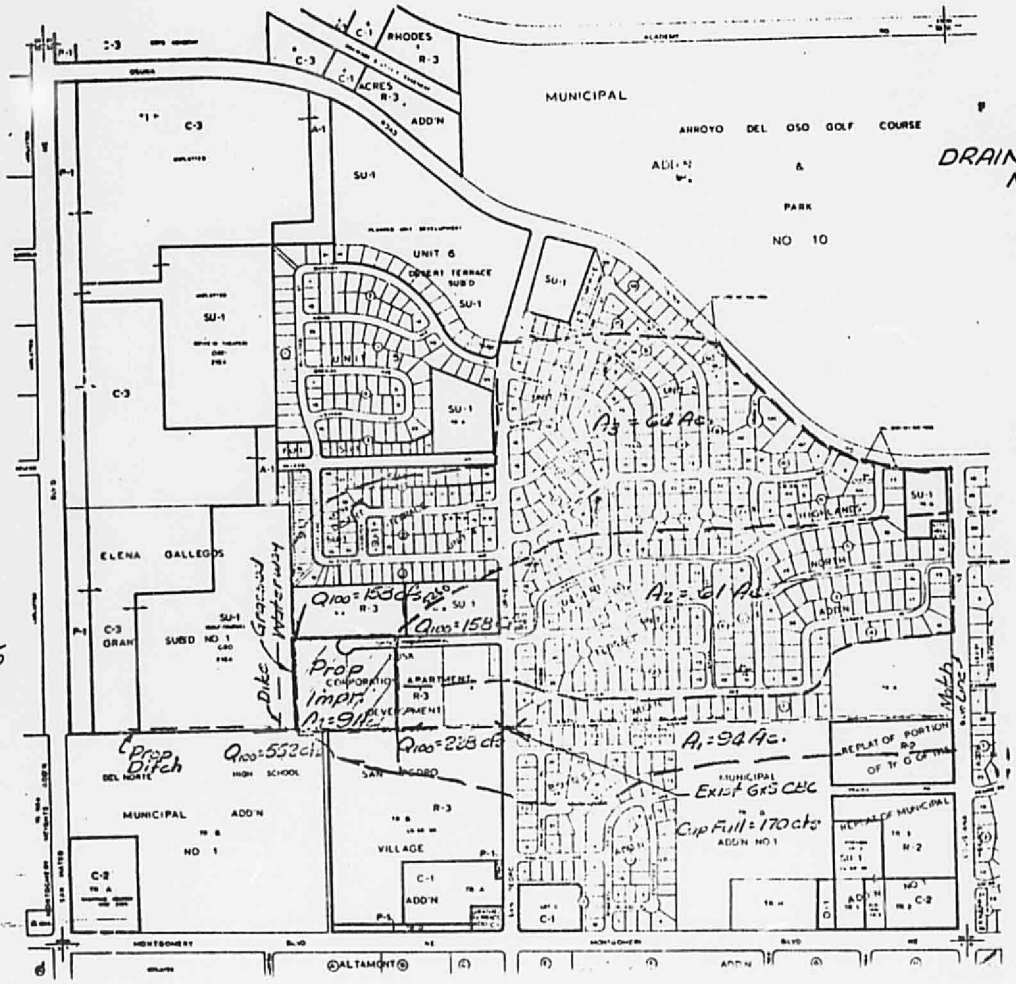
along the south boundary of the property. A toe wall should be constructed at the west end of Topka Place to prevent undercutting and erosion of the proposed street improvements.

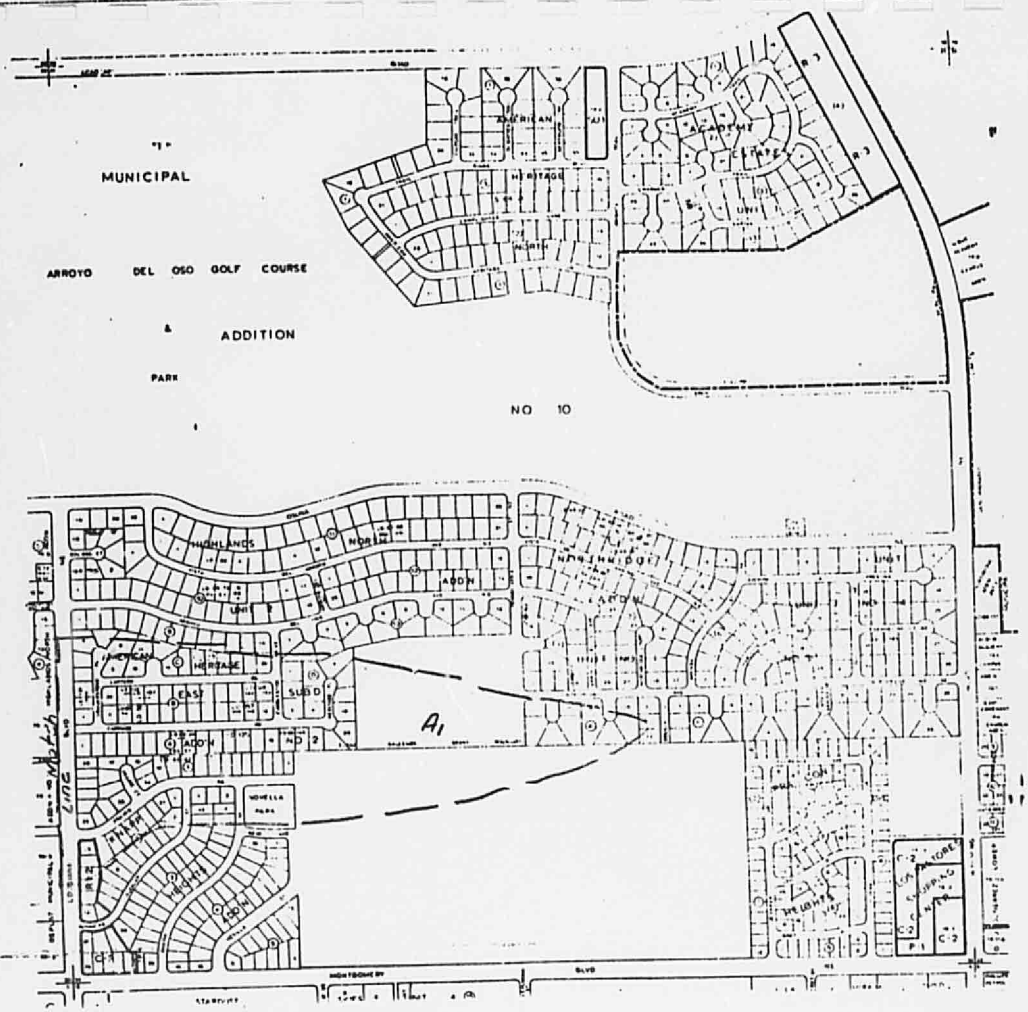
The site will be graded with a ridge running east and west in the middle of the property. The north half will drain to the northwest and the south half will drain to the southwest.

The total drainage area at the point of discharge is 228 acres with a design discharge of 552 cfs. The capacity of the proposed ditch is 617 cfs.

The only point of flooding that might occur is on Topka Place NE as it enters the development site. This flooding is minor, and the proposed section of Topka Place is capable of taking care of this flooding condition.

All on-site parking lots should be constructed with an inverted crown with the low point in the center of the parking lot. The two parking areas on the west should drain to the west to the grassed waterway on the golf course. The northeast lot should drain east and then north to Topka Place. The center lot on the east should drain east and then south to the southeast parking lot. The southeast lot should drain west and then south to the proposed ditch. See attached site layout sketch for general drainage pattern.


DRAINAGE AREA MAP
MUNICIPAL
ARROYO DEL OSO GOLF COURSE
PARK
NO 10
RHODES ACRES ADD'N
UNIT 6
DESERT TERRACE SUBD
ELENA GALLEGOS
SUBD NO 1
MUNICIPAL ADD'N NO 1
VILLAGE
ADD'N
MONTGOMERY BLVD
ALTAMONT
PCN 75
Dike
Grassed Waterway
Prop Ditch
Prop Impr.
Q100=158 cfs
Q100=552 cfs
Q100=228 cfs
A3 = 6.2 Ac.
A2 = 6.1 Ac.
A1 = 9.4 Ac.
Exist Grs Chl
Cap Full = 170 cfs
5330
4.72
4.72
4.48
4.71
F-18-Z


MUNICIPAL
ARROYO DEL OSO GOLF COURSE
&
ADDITION
PARK
NO 10
HIGHLANDS
NORTH
ADDN
NORTHWOOD
ADDN
HERITAGE
EAST
SUBD
ADDN
NO 2
A1
HOWELL PARK
HIGHTS
ADDN
NORTHCOVE BY
BLVD
STARCREST

F-19-Z

COMP. RFS.
CK.
DATE 12 Nov 70

WILSON COMPANY
ENGINEERS & ARCHITECTS
BOX 3305
ALBUQUERQUE NEW MEXICO

LOC. Albuquerque FILE 70-531
PROJ. Imperial House SHEET 1
SUBJ. Drainage OF 6

Drainage Area A Along So. Boundary =

Rational Method ... Q = CiA

C = coef. of runoff = 0.55

i = intensity of rainfall inches/hr

$i_{100} = \frac{189}{t_c + 25}$ City manual for drainage

PCA handbook (page 43)

$K = \frac{L}{\sqrt{S}}$ $S = \frac{10}{500} = .0200$ ft/ft

$L = 4200$ ft

$K = \frac{L}{\sqrt{S}} = \frac{4200}{.141} = 24,200$

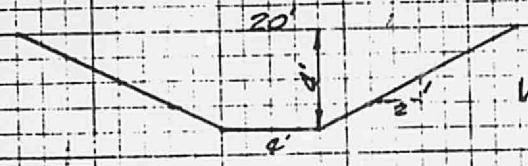
$t_c = 18$ min

$i_{100} = \frac{189}{t_c + 25} = \frac{189}{18+25} = \frac{189}{43} = 4.4$ in/hr

Area = A = 94 Acres (City Map)

$Q_{100} = CiA = .55 \times 4.4 \times 94 = 228$ cfs

Proposed Ditch By City




Area = $\left(\frac{20+4}{2}\right) \times 4 = 48$ sq. ft.

Velocity = $\frac{1.486}{n} \times r^{1/3} s^{1/2}$

n = 0.03 dirt channel

$V = \frac{1.486}{.03} \times 1.686 \times .148 = 12.36$ ft/sec $r = \frac{\text{Area}}{\text{Wet Per}} = \frac{48}{21.88} = 2.19$

$Q = AV = 48 \times 12.36 = 617$ cfs $r^{2/3} = 1.686$

S = .0218 city plan

$S^{1/2} = .148$

COMP. RFS
CK.
DATE 12 Nov 70

WILSON & COMPANY
ENGINEERS & ARCHITECTS
BOX 3308
ALBUQUERQUE
NEW MEXICO

LOC. Albuquerque FILE 70-55
PROJ. Imperial House SHEET 2
SUBJ. Drainage OF 6

Drainage Area $A_2$ Entering on Topka Place:

$Q = CiA$

$C = 0.55$

$i_{100} = \frac{189}{t_c + 25}$

$K = \frac{L}{\sqrt{S}} =$ $\quad S = \frac{10}{500} = .0200$ ft/ft

$L = 3100$ ft

$K = \frac{L}{\sqrt{S}} = \frac{3100}{\sqrt{.02}} = \frac{3100}{.173} = 17{,}900$

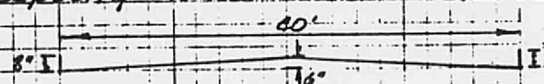
$t_c = 15$ min

$i_{100} = \frac{189}{15+25} = \frac{189}{40} = 4.7$ in/hr.

Area = 61 Ac.

$Q_{100} = CiA = .55 \times 4.7 \times 61 = 150$ cfs.

Capacity 40' face-face street with 6" crown.




Area = $.167 \times 40 + 0.5 \times 20 = 6.68 + 10 = 16.68$ sq. ft.

Wetted Perimeter = $40 + 1.67 = 41.67$

R = Hydraulic Radius = $\frac{A}{WP} = \frac{16.68}{41.67} = .40$ $\quad R^{2/3} = .543$

S = slope = .0250 ft/ft. $\quad S^{1/2} = .158$

$V = \frac{1.486}{n} \times R^{2/3} \times S^{1/2}$ $\quad n = .015$

$V = \frac{1.486}{.015} \times .543 \times .158 = 8.5$ ft/sec

$Q = AV = 16.68 \times 8.5 = 142$ cfs.

COMP. RFS
CK.
DATE 13 Nov 70

WILSON & COMPANY
ENGINEERS & ARCHITECTS
BOX 3388
ALBUQUERQUE
NEW MEXICO

LOC. Albuquerque FILE 70-531
PROJ. Imperial House SHEET 3
SUBJ. Drainage OF 6

Drainage Area $A_3$ Entering at NW cor. Property.

$Q = CiA$ $C = 0.55$ Area = 64 Acres

$i_{100} = \frac{189}{t_c + 25}$

$K = \frac{L}{\sqrt{S}}$ $S = \frac{10}{500} = .0200$ ft

$L = 4000$

$\therefore K = \frac{L}{\sqrt{S}} = \frac{4000}{\sqrt{.02}} = \frac{4000}{.173} = 23{,}100$

$t_c = 17$ min

$i_{100} = \frac{189}{t_c + 25} = \frac{189}{17+25} = \frac{189}{42} = 4.5$ in/hr

$Q = CiA = .55 \times 4.5 \times 64 = 158$ cfs.

Discharge Leaving Property

Area = $A_1 + A_2 + A_3$ + Area Development + Area to South

Area = 70 + 50 + 70 + 6 + 9 = 205 Acres

$Q = CiA$ $C = 0.55$, $i = 4.5$ for 15 min

$Q = CiA = .55 \times 4.5 \times 205 = 509$ cfs.

Q Proposed Ditch = 617 cfs (sheet 1)

Ditch is adequate.

COMP. RFS

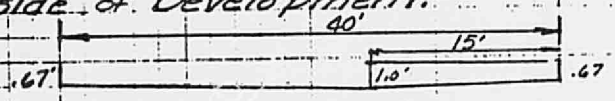
CK.

DATE 13 Nov 70

WILSON & COMPANY
ENGINEERS & ARCHITECTS
BOX 3308
ALBUQUERQUE
NEW MEXICO

LOC Albuquerque FILE 70-531
PROJ Imperial House SHEET 4
SUBJ Drainage OF 6

Proposed Section Topke Place along North side of Development.




Proposed Section

Area = (40 x .67) + (33 x 20) = 26.8 + 6.7 = 33.5 sq. ft.

Hyd Rad. (full) = $R = \frac{A}{WP} = \frac{33.5}{41.34} = .81$

$R^{2/3} = .869$

S = Design Slope = .025 ft/ft

$S^{1/2} = .158$ use $n = .015$

Velocity = $V = \frac{1.486}{n} \times R^{2/3} S^{1/2} = \frac{1.486}{0.015} \times .869 \times .158$

V = 13.60 ft/sec

Q = AV = 33.5 x 13.6 = 455 cfs.

Capacity required if drainage from NW enters.

$Q_{reqd} = \underset{A_2}{158} + \underset{A_3}{158} = 316$ cfs.

Capacity Design Section is adequate.

COMP. RFS

CK.

DATE 17 Nov 70

WILSON & COMPANY
ENGINEERS & ARCHITECTS
BOX 3305
ALBUQUERQUE
NEW MEXICO

LOC. Albuquerque FILE 70-531

PROJ. Imperial House SHEET 5

SUBJ. Drainage OF 6

Total Discharge Leaving Property

$A = A_1 + A_2 + A_3 + A_4$

$A = 94 + 61 + 64 + 9 = 228 Ac$

$i = \frac{189}{18+25} = 4.4$

$C = 0.55$

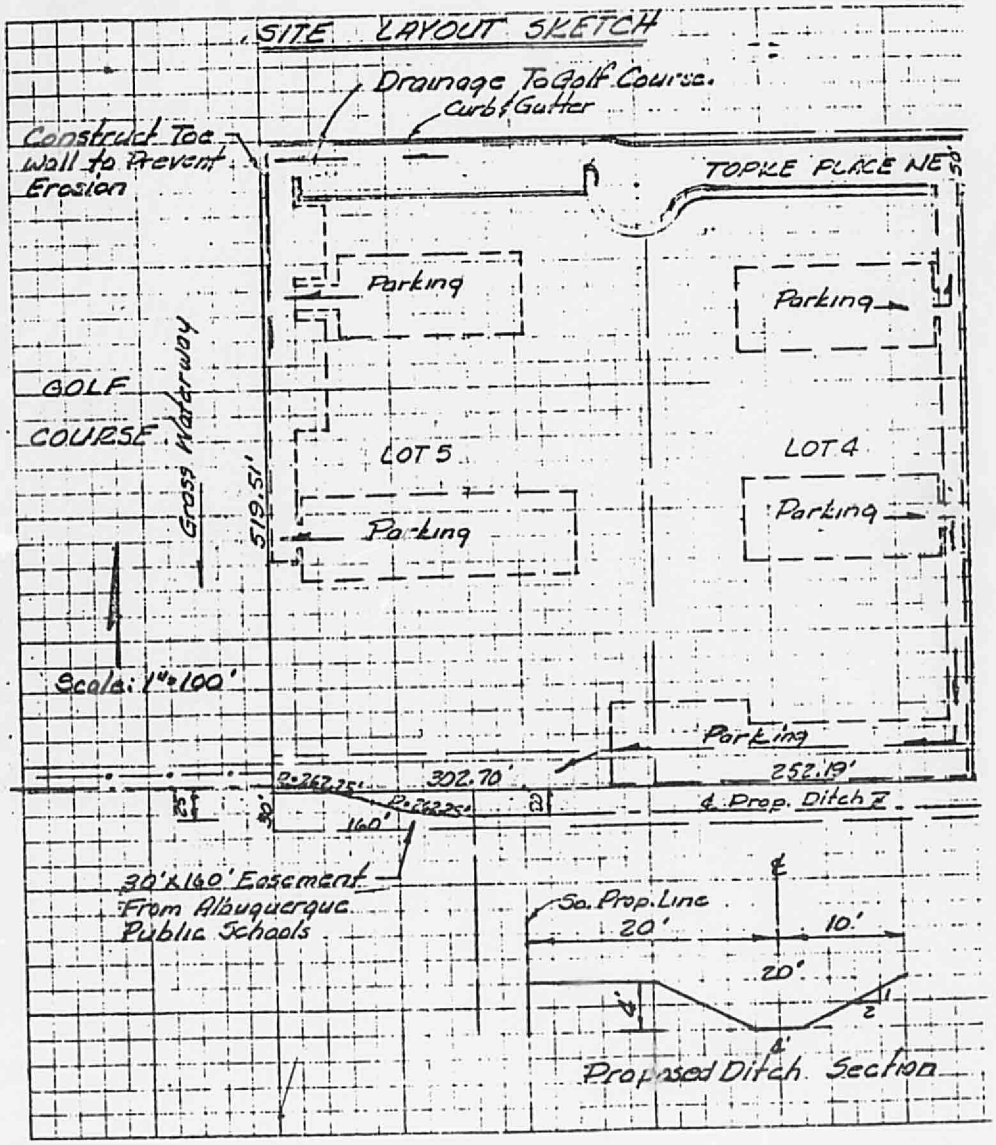
$Q = CiA = .55 \times 4.4 \times 228 = 552$ cfs

Capacity Ditch = 617 cfs.

WILSON & COMPANY
ENGINEERS & ARCHITECTS
BOX 3305
ALBUQUERQUE
NEW MEXICO

COMP. RFS
CK.
DATE 17 Nov 70

LOC Albuquerque FILE 70-531
PROJ. Imperial House SHEET 6
SUBJ. Drainage OF 6



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