HYDROLOGY • F21/D5 • 2 PLANS

F21/D5

2 PLANS

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STORM DRAINAGE STUDY
FOR
ACADEMY PLACE
UNIT 4

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GENERAL

This report presents the calculated probable storm drainage runoff from a 100 year storm of this subdivision.

LOCATION

This report is concerned with the land bounded by Eubank Boulevard, N.E. on the Northwest; by Juan Tabo Boulevard, N.E. on the Northeast and Bear Canyon Arroyo on the South. Situated in Sections 28 and 33, Township 11 North, Range 4 East, N.M.P.M.

TOPOGRAPHY

This drainage area is located on an alluvial fan crossed by one large and several smaller arroyos. In general the flow direction is West Southwest at a 3% ± slope. The land is gentle rolling with sparse native grass cover.

EXISTING DRAINAGE

The land presently is drained by the Bear Arroyo, combining with the Bear Canyon Arroyo at the Western boundary. Several minor arroyos flow on to the West.

PROPOSED DRAINAGE PLANS

It is proposed to construct an interceptor ditch approximately one-half mile East of the Eastern boundary to divert the Bear Arroyo and two smaller arroyos to the Bear Canyon Arroyo. Juan Tabo Boulevard, N.E. will be graded to carry the flows from

the East to the Bear Canyon Arroyo on the South and to the Bear Tributary on the North. Utilizing the topography and street grading, the calculated runoffs can be safely handled.

RUNOFF QUANTITIES

The quantities of storm runoff to be expected from each drainage area were determined using the Rational Formula, Q=CIA, where Q=quantity of storm runoff in cubic feet per second; C=coefficient of runoff dependent upon the type of surface drained; I=intensity of rainfall in inches per hour for a duration equal to the total accumulation time in minutes; and A=area of contributing watershed in acres.

The area (A) of each separate contributing area was determined by outlining the watershed on the contour map and measuring the area (by planimeter) in acres.

Intensity Duration Frequency Curves (Chart 1) for the Albuquerque Area, "Master Plan of Drainage - City of Albuquerque, New Mexico and Environs," 1963, prepared by Gordon Herkenhoff and Associates, Consulting Engineers, together with the expected accumulation of runoff from each of the areas. The total accumulation times are determined by a combination of Yarnell's Method and probable future streets and drainage channel alignments and grades, as shown; assuming overland flows to cross grass surfaces, depending upon the probable type of development in each area and

estimating the probable type of grading to be done in each area. The coefficient of runoff (C) was determined by using percentage of area covered by grass, buildings and paving, using respective runoff factors from the Master Plan of Drainage.

RECOMMENDATIONS

1. That the interceptor ditch and dike be constructed along the proposed alignment of Chelwood Park Boulevard, N.E. and remain in place until such time that a more Easterly replacement be built.
2. That Juan Tabo Boulevard, N.E. be constructed from the Bear Canyon Arroyo to its intersection with Eubank Boulevard, N.E. to act as a North-South interceptor.
3. That Eubank Boulevard, N.E. be constructed to its intersection with Juan Tabo Boulevard, N.E. to act as a North-South interceptor.
4. That future units in this subdivision be graded to carry the runoff to Bear Canyon Arroyo at several locations.
5. That the treatment of the Bear Canyon Arroyo be held in abeyance until the Albuquerque Metropolitan Flood Control Authority determines flood-way widths and quantities.

CONCLUSIONS

If the recommendations are carried out, the streets and easements will satisfactorly carry the runoff.

Wm. J. McDermott
P.L. & L.S. No. 1855

EXHIBIT I
STREET CARRYING CAPACITIES
AT VARIOUS GRADES
IN CFS

n(conc)=.015

STREET WIDTH	TYPE CROWN	CURB HT	.0050	.0100	.0150	.0200	.0250	.0300	.0350	.0400
32'	8"	8"	18	25	31	36	40	44	47	50
	6"	8"	35	49	61	70	78	86	92	99
	4"	8"	56	80	98	113	126	138	149	160
	2"	8"	82	116	142	164	183	201	217	232
48'	8"	8"	27	38	47	54	60	66	71	76
	6"	8"	53	75	92	106	118	130	140	150
	4"	8"	85	121	148	171	191	209	226	241
	2"	8"	124	175	215	248	277	304	328	351

RUNOFF COMPUTATIONS

Sheet No. _____

Job No. ACADEMY PLACE

Drainage Area No. C 1

Area = 45.8 acres

Maximum Overland Flow: L = 1500 S = 5%

Maximum Channel Flow:

Channel No. 1 L = 2400 S = 5%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 15 min.

Channel No. 1 Flow:

Velocity= 4 ft/sec; Time= $\frac{2400}{4 \times 60}$ = 10 min.

Channel No. 2 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Total Accumulation Time: T = 25 min.

$I = \frac{189}{T+25} = \frac{189}{50} = 3.78$

$Q = CIA = (.45)(3.78)(45.8) =$ 78 c.f.s.

Date: _____

Comp. by: _____

Checked by: _____

RUNOFF COMPUTATIONS

Sheet No. _____

Job No. ACADEMY PLACE

Drainage Area No. D 9

Area = 56.1 acres

Maximum Overland Flow: L = 1500 S = 5%

Maximum Channel Flow:

Channel No. 1 L = 2400 S = 5%

Channel No. 2 L = 1500 S = .5%

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 15 min.

Channel No. 1 Flow:

Velocity= 4 ft/sec; Time= $\frac{2400}{4 \times 60}$ = 10 min.

Channel No. 2 Flow:

Velocity= 3 ft/sec; Time= $\frac{1500}{3 \times 60}$ = 83 min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\text{_____}}{\text{X } 60}$ = _____ min.

Total Accumulation Time: T = 333 min.

$I = \frac{189}{T+25} = \frac{189}{583} = 3.24$

$Q = CIA = (.45)(3.24)(56.1) =$ 82 c.f.s.

Date: _____

Comp. by: _____

Checked by: _____

RUNOFF COMPUTATIONS

Sheet No. _____

Job No. _____

ACADEMY PLACE

Drainage Area No. D4E

Area = 99.9 ? acres

Maximum Overland Flow: L = 1500 S = 5%

Maximum Channel Flow:

Channel No. 1 L = 2400 S = 5%

Channel No. 2 L = 1500 S = .5%

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 15 min.

Channel No. 1 Flow:

Velocity= 4 ft/sec; Time= $\frac{2400}{4 \times 60}$ = 10 min.

Channel No. 2 Flow:

Velocity= 3 ft/sec; Time= $\frac{1500}{3 \times 60}$ = 8.3 min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 33.3 min.

$I = \frac{189}{T+25} = \frac{189}{58.3} = 3.24$

$Q = CIA = (.45)(3.24)(99.9) =$ 145 c.f.s.

Date: _____

Comp. by: _____

Checked by: _____

RUNOFF COMPUTATIONS

Sheet No. _____

Job No. _____

Drainage Area No. 1

Area = 42 acres

Maximum Overland Flow: L = 100 S = 2%

Maximum Channel Flow:

Channel No. 1 L = 3000 S = 5%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 20 min.

Channel No. 1 Flow:

Velocity= 4 ft/sec; Time= $\frac{3000}{4 \times 60}$ = 12.5 min.

Channel No. 2 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Total Accumulation Time: T = 32.5 min.

$I = \frac{189}{T+25} = \frac{189}{57.5} = 3.28$

$Q = CIA = (.65)(3.28)(42) =$ 90 c.f.s.

Date: _____

Comp. by: _____

Checked by: _____

RUNOFF COMPUTATIONS

Sheet No. _____

Job No. ACADEMY PLACE

Drainage Area No. 2

Area = 2.0 acres

Maximum Overland Flow: L = 100' S = 2%

Maximum Channel Flow:

Channel No. 1 L = 1800' S = 3%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 20 min.

Channel No. 1 Flow:

Velocity= 3 ft/sec; Time= $\frac{1800}{3 \times 60}$ = 10 min.

Channel No. 2 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Total Accumulation Time: T = 30 min.

$I = \frac{189}{T+25} = \frac{189}{55} = 3.42$

$Q = CIA = (.65)(3.42)(20) =$ 44 c.f.s.

Date: _____

Comp. by: _____

Checked by: _____

UNIT #3

RUNOFF COMPUTATIONS

Sheet No. _____

Job No. _____

Drainage Area No. 3

Area = 37.6 acres

Maximum Overland Flow: L = 1000 S = 5%

Maximum Channel Flow:

Channel No. 1 L = 2700 S = 5%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 10 min.

Channel No. 1 Flow:

Velocity= 4 ft/sec; Time= $\frac{2700}{4 \times 60}$ = 18.3 min.

Channel No. 2 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Total Accumulation Time: T = 21.3 min.

$I = \frac{189}{T+25} = \frac{189}{46.3} = 4.1$

$Q = CIA = (.45)(4.1)(37.6) =$ 69 c.f.s.

Date: _____

Comp. by: _____

Checked by: _____

Unit #4

RUNOFF COMPUTATIONS

Sheet No. _____

Job No. _____

Drainage Area No. 4

Area = 29 acres

Maximum Overland Flow: L = 500 S = 5%

Maximum Channel Flow:

Channel No. 1 L = 2700 S = 5%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 10 min.

Channel No. 1 Flow:

Velocity= 4 ft/sec; Time= $\frac{2700}{4 \times 60}$ = 11.25 min.

Channel No. 2 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Total Accumulation Time: T = 21.25 min.

$I = \frac{189}{T+25} = \frac{189}{46.25} = 4.09$

$Q = CIA = (.45)(4.09)(29) = 53$ c.f.s.

Date: _____

Comp. by: _____

Checked by: _____

RUNOFF COMPUTATIONS

Sheet No. _____

Job No. _____

Drainage Area No. 5

Area = 6.6 acres

Maximum Overland Flow: L = 100 S = 2%

Maximum Channel Flow:

Channel No. 1 L = 850 S = 3%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 20 min.

Channel No. 1 Flow:

Velocity= 1.4 ft/sec; Time= $\frac{850}{1.4 \times 60}$ = 10 min.

Channel No. 2 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Total Accumulation Time: T = 30 min.

$I = \frac{109}{T+25} = \frac{109}{55} = 3.42$

$Q = CIA = (.65)(3.42)(6.6) =$ 14.7 c.f.s.

Date: _____

Comp. by: _____

Checked by: _____

RUNOFF COMPUTATIONS

Sheet No. _____

Job No. _____

Drainage Area No. 6

Area = 6 acres

Maximum Overland Flow: L = 100 S = 2%

Maximum Channel Flow:

Channel No. 1 L = 850 S = 3%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 20 min.

Channel No. 1 Flow:

Velocity= 1.4 ft/sec; Time= $\frac{850}{1.4 \times 60}$ = 10 min.

Channel No. 2 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Total Accumulation Time: T = 30 min.

$I = \frac{189}{T+25} = \frac{189}{55} = 3.42$

$Q = CIA = (.65)(3.42)(6) =$ 13.3 c.f.s.

Date: _____

Comp. by: _____

Checked by: _____

RUNOFF COMPUTATIONS

Sheet No. _____

Job No. _____

Drainage Area No. 7

Area = 2.7 acres

Maximum Overland Flow: L = 100 S = 2%

Maximum Channel Flow:

Channel No. 1 L = 500 S = 3%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 20 min.

Channel No. 1 Flow:

Velocity= .83 ft/sec; Time= $\frac{500}{.83 \times 60}$ = 10 min.

Channel No. 2 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Channel No 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Total Accumulation Time: T = 30 min.

$I = \frac{109}{T+25} = \frac{189}{55} = 3.42$

Q = CIA = (.65)(3.42)(2.7) = 6 c.f.s.

Date: _____

Comp. by: _____

Checked by: _____

RUNOFF COMPUTATIONS

Sheet No. _____

Job No. _____

Drainage Area No. 8

Area = 8.6 acres

Maximum Overland Flow: L = 500 S = 2%

Maximum Channel Flow:

Channel No. 1 L = 1300 S = 3%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 20 min.

Channel No. 1 Flow:

Velocity= 2.16 ft/sec; Time = $\frac{1300}{2.16 \times 60}$ = 10 min.

Channel No. 2 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Total Accumulation Time: T = 30 min.

$I = \frac{189}{T+25} = \frac{189}{55} = 3.42$?

$Q = CIA = (.45)(3.42)(8.6) =$ 13 c.f.s.

Date: _____

Comp. by: _____

Checked by: _____

RUNOFF COMPUTATIONS

Sheet No. _____

Job No. _____

Drainage Area No. 9

Area = 12 acres

Maximum Overland Flow: L = 800 S = 2%

Maximum Channel Flow:

Channel No. 1 L = 1000 S = 4%

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 20. min.

Channel No. 1 Flow:

Velocity= 1.67 ft/sec; Time= $\frac{1000}{1.67 \times 60}$ = 10 min.

Channel No. 2 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\times 60}$ = _____ min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\times 60}$ = _____ min.

Total Accumulation Time: T = 30 min.

$I = \frac{189}{T+25} = \frac{189}{55} = 3.42$

$Q = CIA = (.45)(3.45)(12) =$ 18.6 c.f.s.

Date: _____

Comp. by: _____

Checked by: _____

RUNOFF COMPUTATIONS

Sheet No. _____

Job No. _____

Drainage Area No. 10

Area = 29.5 acres

Maximum Overland Flow: L = 100 S = 2%

Maximum Channel Flow:

Channel No. 1 L = 700 S = 3%

Channel No. 2 L = 2300 S = 5%

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow: 20 min.

Channel No. 1 Flow:

Velocity= 2.33 ft/sec; Time= $\frac{700}{2.33 \times 60}$ = 5 min.

Channel No. 2 Flow:

Velocity= 7.67 ft/sec; Time= $\frac{2300}{7.67 \times 60}$ = 5 min.

Channel No. 3 Flow:

Velocity= _____ ft/sec; Time= $\frac{\quad}{\quad \times 60}$ = _____ min.

Total Accumulation Time: T = 30 min.

$I = \frac{189}{T+25} = \frac{189}{55} = 3.42$

$Q = CIA = (.65)(3.42)(29.5) =$ 66 c.f.s.

Date: _____

Comp. by: _____

Checked by: _____