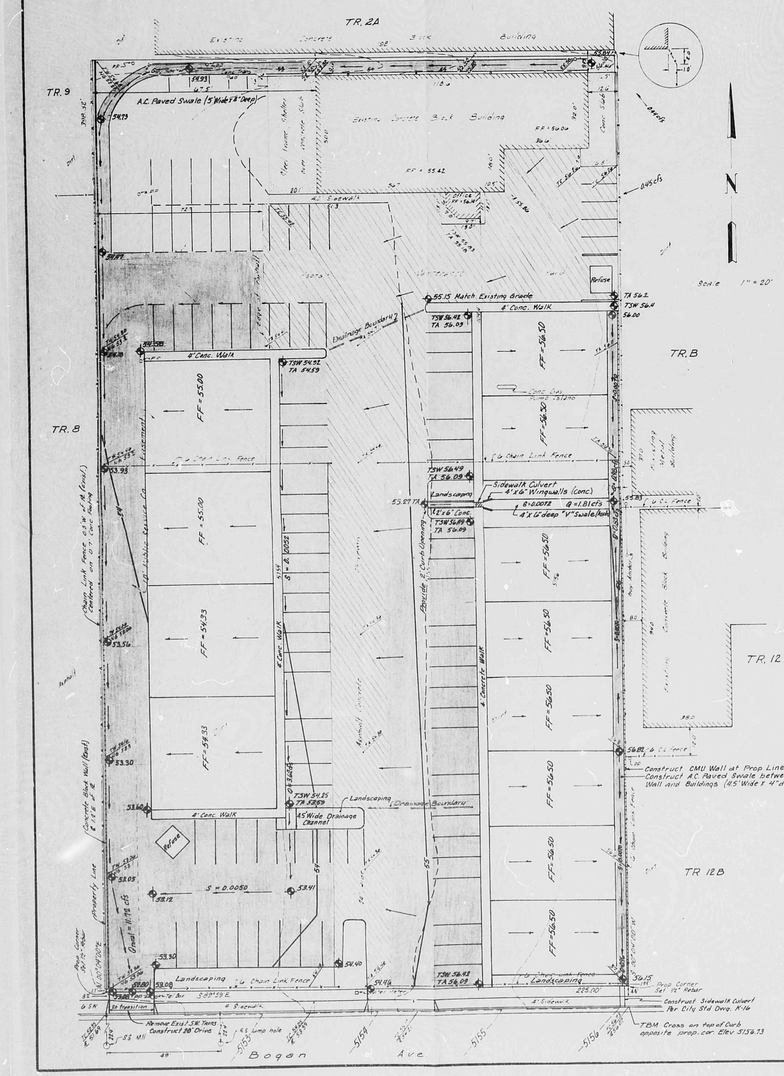
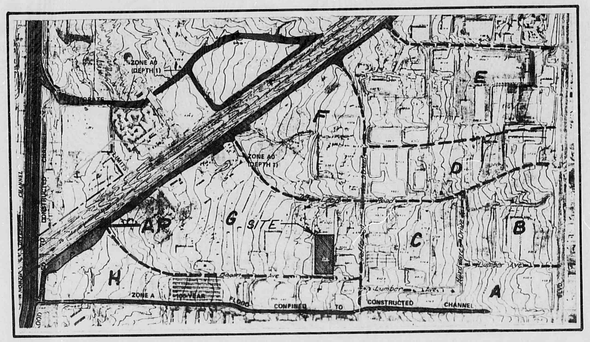
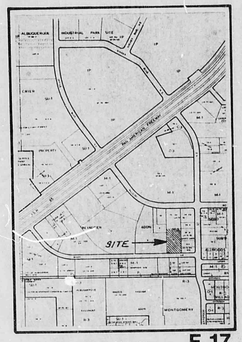
PUBLIC WORKS/HYDROLOGY

F17/D42





Floodway Map
Scale 1" = 500'



Vicinity Map
Scale 1" = 800'

F 17

LEGEND

	Existing	New
Flow Line		
Contour Line		
Spot Elevation	—	+
Asphalt Paving		
Fence		
Top of Ash TA		
Top of Sidewalk TSW		
Natural Ground NG		

BENCH MARK NOTES

Bench Mark (B-F17), located at the intersection of Montgomery Blvd. and Jefferson Street NE. A square chiseled on top of concrete curb at the NW/W stub. Elevation 5162.23

TBM - Temporary Bench Mark is located on the top of concrete curb of Bogan Ave, directly south of the SE property corner of the site.

LEGAL DESCRIPTION

Tract 11 Reinstear Addition City of Albuquerque Bernalillo County N.M. on Section 34, T11 N R3E, NMPM

GENERAL NOTES

1. Set every 15th block in first course of concrete block wall to allow flow to pass.
2. Existing (Gross-hatched) A.C paving to remain.
3. All conditions on the plan shall be field verified by the contractor. If discrepancies exist, they shall be brought to the attention of the Architect before work proceeds.

DRAINAGE CALCULATIONS

I. Soil Type
Soil - Ustalfs gravelly fine sandy loam, 0 to 5 percent slopes. Hydrologic soil group B.
II. Storm Type
Zone 1 (2 year precipitation from Plate 22.2 D-1 is 2.2 inches. Time of concentration is for the Virginia Equation.
$t_c = 0.0078 (L^{0.77}/S^{0.385})$ L = 400' Delta Elevation = 2.0 $t_c = 0.0200 = 0.0257$ V = 1.25 (Plate 22.2 B-1)
$t_c = 400/(1.25x60) = 6.35$ minutes. (Use 10 minutes.)
III. Areas
Total site area. 420 x 225 = 95,000 SF = 2.066 acres.
Building Area (Max) 4(48x54) + 4(30x54) + 2(96x54) = 19,440 SF
Building Area (Existing) (120x48) + (96x30) = 5,760 SF
Total Building Area = 25,200 SF
Landscaping 70% x 95,000 = 23,800 x 20% = 4,760 SF
Paving 95,000 - 25,200 - 4,760 = 62,040 SF
IV. Developed "C" Factor of Subarea
Existing Paving = 62,040 SF (Undeveloped C = 0.3) For Paving C = 0.90 For Buildings C = 1.0
$(0.90 \times 62{,}040 + 1.0 \times 25{,}200 + 0.3 \times 70{,}000)/95{,}000 = 0.81$ Developed Runo Discharge Q = CIA = 0.81x6.65x2.066 = 8.34 cfs.
V. Existing "C" Factor and Discharge
Existing Building = 120' x 30' = 3,600 SF
Existing Paving = 225' x 120' + 25 x 295 = (5,945) = 9,345 SF
Existing Permeable Surface = 95,000 - 12,945 = 5,945 = 82,055 SF
Weighted "C" Factor $C = (0.90 \times 9{,}345 + 0.3 \times 82{,}055)/95{,}000 = 0.33$
Q = CIA = 0.33 x 6.65 x 2.066 = 5.09 cfs
VI. New Runoff Generated by Development:
Q = 8.34cfs - 5.09cfs = 3.25 cfs
VII. Off-site Drainage
Tract B Adjacent to new construction
$(5x225)/5,280 = 0.4261$ acres Building 37'x80' = 0.1529 C = $(0.1529x0.9+0.2811)/0.4261 = 0.57$
Q = 0.57x6.65x0.4261 = 1.16 cfs (Developed) Q = 0.3x6.65x0.4261 = 0.85 cfs (Undeveloped)
Tract B Adjacent to Existing Facility
Area = (80x225)/43560 = 0.3903 Acres C = 0.3; Q = CIA = 0.3x6.65x0.3903 = 0.85 cfs
Tract 12A
Area 170x225/43560 = 0.3527 Acres Building = (96x30+54x30)/43560 = 0.2540 Acres Asphalt = 170x30/43560 = 0.1033
$C = (0.9x0.2540+0.3x0.1033)/0.3527 = 0.75$ Q = 0.75x6.65x0.3527 = 1.85 cfs (Developed)
Q = 0.3x6.65x0.3527 = 0.63 cfs (Undeveloped)
Tract 12B
Existing building and parking areas to Bogan Avenue and Jefferson Street, west and undeveloped.
Area = (170x225)/43560 = 0.8815 Acres Q = CIA = 0.3x 6.65 x 0.8227 = 0.35 cfs
Tract 2A Roof Drainage from the North
Assume 1/2 roof area drains to rear (108 x 10.5)/43560 = 0.0437 Acres Q CIA = 1.0x6.65x0.0437 = 0.22 cfs
VIII. Swale Drainage
1. East Boundary
1. Adjacent to new construction except off-site undeveloped flow through CMU wall by blocks set with holes at bottom of interstices. Side 1.18 x 4 3/4. Assume 6" Square. In practice equation, assume water stands horizontal at interstices. Side 1.18 x 4 3/4. Assume 6" Square. In practice equation, assume water stands 7" above top of base (5 x 5 x 28" C = 0.6 x = 0.0278 SF Q = 0.6 x 0.0278 $\sqrt{2 \times 32.2 \times 0.5}$
= 0.20 cfs per hole or 0.14 cfs per block.
For Tract B 0.09 cfs over 96 feet. 0.09/0.14 = 4.75 Blocks in 96 feet or 1 block every 17 feet should be turned with holes placed horizontally. See every 12th block.
2. Adjacent to new existing facility: Flow to remain essentially as it presently is. Half is assumed to flow North of building and half South of building.
3. Asphalt swale adjacent to Tract B. Buildings 54 x 72/43560 = 0.0743 Acres
Swale 40 x 5/43560 = 0.0046 Acres
Q = CIA = 1.0 x 6.65 x 0.0743 = 0.29 cfs Tract B Undeveloped = 0.06 cfs Total Q = 0.38 cfs
4. Asphalt Swale adjacent to Tract 12A Buildings 42 x 96/43560 = 0.1396 Acres
Swale 187 x 5/43560 = 0.0215 Acres
Q = CIA = 1.0 x 6.65 x 0.1613 = 0.65 cfs Tract 12A Undeveloped = 0.09 cfs Total Q = 1.66 cfs
5. Asphalt Swale adjacent to Tract 12B. Buildings 42 x 96/43560 = 0.0928 Acres
Swale 187 x 5/43560 = 0.0215 Acres Total = 0.1143 Acres
6. Swale Capacity 6" deep x 5" wide "V" swale. By Manning's Equation (W-14 Program "S-Circle" depth = 0.35' Z = 0.75:1 n = 0.027 S = 0.0200 Q = 1.66 cfs The swale capacity is adequate.
B. Drainage from Eastern Swale between buildings to P.L. Q = 1.26 cfs
Try 2' wide by 6" deep channel. By Manning's Equation, (W-14 Program "S-Rect.")
depth 0 = 0.5' n = 0.027 S = 0.0200 Q = 1.26 cfs Capacity Q = 0.32 cfs 1.26 cfs (Adequate)
Try 3' wide by 6" deep. By Manning's Equation, (W-14 Program "S-Rect.")
depth 0 = 0.5' n = 0.0 n = 0.027 S = 0.0200 Capacity Q = 2.08 cfs 1.26 cfs (Adequate)
C. Drainage of parking lot between buildings. Sidewalk area = 5(84)/43560 = 0.0193 acres
Asphalt area = (480)/43560 = 0.0551 acres
Total = 0.0744 acres
C = (0.0193 x 0.9 x 0.2011)/0.427 = 0.38 Q = CIA = 0.38 x 6.65 x 0.427 = 1.08 cfs
Total discharge through parking lot outlet, a 4" wide by 4" deep cut in landscaping median.
Total Q = 1.08 + 1.26 = 2.32 cfs By Manning's Equation, S = 0.33 b = 4.0' z = 0 n = 0.015 Q = 0.035
Capacity = 3.30 cfs 2.32 cfs. Use a width of 4.5' as added safety factor.
D. Swale along North lot boundary. Existing building A = 108 x 25/43560 = 0.0372 Acres
Q = CIA = 1.0 x 6.65 x 0.0372 = 0.25 cfs
From Tract A = 0.09 cfs
From Tract B = 0.06 cfs
Total Q = 0.25 cfs
From A.C. above, Swale Capacity is 1.66 cfs. The swale is adequate.
E. Total Discharge from site (Develop plus Off-site) Site discharge = 8.34; Tract 2A = 0.22 cfs;
Tract B = 3.25 cfs; Tract 12A = 0.65 cfs; Tract 12B = 0.35 cfs
Total cfs = 11.72 cfs

ANALYSIS OF DOWNSTREAM CONDITIONS

According to Floodway Map Panel 16 of 50, flooding occurs along Interstate 25 East Frontage Road. The flood zone is designated AO which is defined as follows:

AO Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown but no flood hazard factors are determined.

This analysis shows that runoff from the site discharges into the North Diversion Channel prior to the peak of the hydrograph for the entire drainage basin. From field investigation, the area in question lies South of Lincoln Avenue, West of Eva Mates Boulevard, North of the drainage channel that is adjacent to the Elena Gallegos Grant Boundary and East of Interstate 25.

An analysis point was selected at the intersection of Bogan Avenue and Interstate 25 East Frontage Road. Drainage data for determination of hydrograph data is shown in Tables I and II. Table I gives discharge and time of concentration for each basin.

TABLE I

Basin	Area	N	L	Slope	V	T_c	q_{100}	Q_{100}
A	16.1	44	2000	0.022	2.0	16.7	3.6	41.7
B	23.0	32	1300	0.027	2.2	10.0	4.7	77.1
C	23.0	14	1300	0.010	1.4	15.5	3.7	61.3
D	52.0	44	2500	0.022	2.0	20.8	3.3	94.3
E	54.5	44	2300	0.027	2.2	17.4	3.5	137.3
F	36.4	28	1500	0.019	1.8	13.9	3.9	85.4
G	53.7	50	2650	0.019	1.8	24.5	2.9	118.3
H	34.4	54	3200	0.016	1.7	32.4	2.6	64.4
						Total		643.8 cfs

Assume 72% impervious for Industrial areas (Plate 22.2 C-1)
For Soil Type A, C = 0.72 (See Plate 22.2 C-1)

The flow time in the street between the individual basin and the analysis point is based on Figure 22.2 B-1 and is tabulated in Table II.

TABLE II

Area	L	H	S	V	Time	T_c + Street flow time
A	2800	50	0.018	3.5	13.0	29.7
B	4200	68	0.016	3.4	20.6	30.6
C	2800	50	0.018	3.6	13.0	28.5
D	3200	46	0.014	3.2	16.9	33.6
E	3000	39	0.013	3.1	16.1	33.5
F	1600	21	0.013	3.1	8.6	23.5
G	—	—	—	—	—	24.5

Time of concentration for the site and street flow time between the site and the analysis point are calculated as follows:

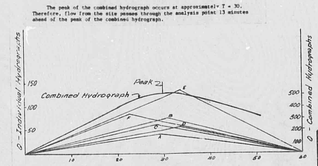
Time of Concentration —

Site Flow: Length = 400'
Elevation difference = 2'
Slope = 0.005 ft/ft
Velocity* = 1.25 fps (Plate 22.2 B-1)
Street Flow: Length* = 2400'
Ele. difference = 30'
Slope = 30/2400 = 0.0200 ft/ft
Velocity = 3.8 fps (See Plate 22.2 B-2)

Street flow time is 2400/(3.8 x 60) = 10.5 min.

Total time for peak site discharge to reach the analysis point is 8.35 + 10.5 = 18.85 min. Say 17.

The peak of the combined hydrograph occurs at approximately T = 30. Therefore, flow from the site passes through the analysis point 13 minutes ahead of the peak of the combined hydrograph.



Hydrographs For Downstream Analysis

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8466
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Richard Hall
Aug 17, 1984
Revised Sept 20, 1984

SEP 20 1984
HYDROLOGY SECTION

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ONCE ON LIGHT
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PLANS/PLATS ON FILE

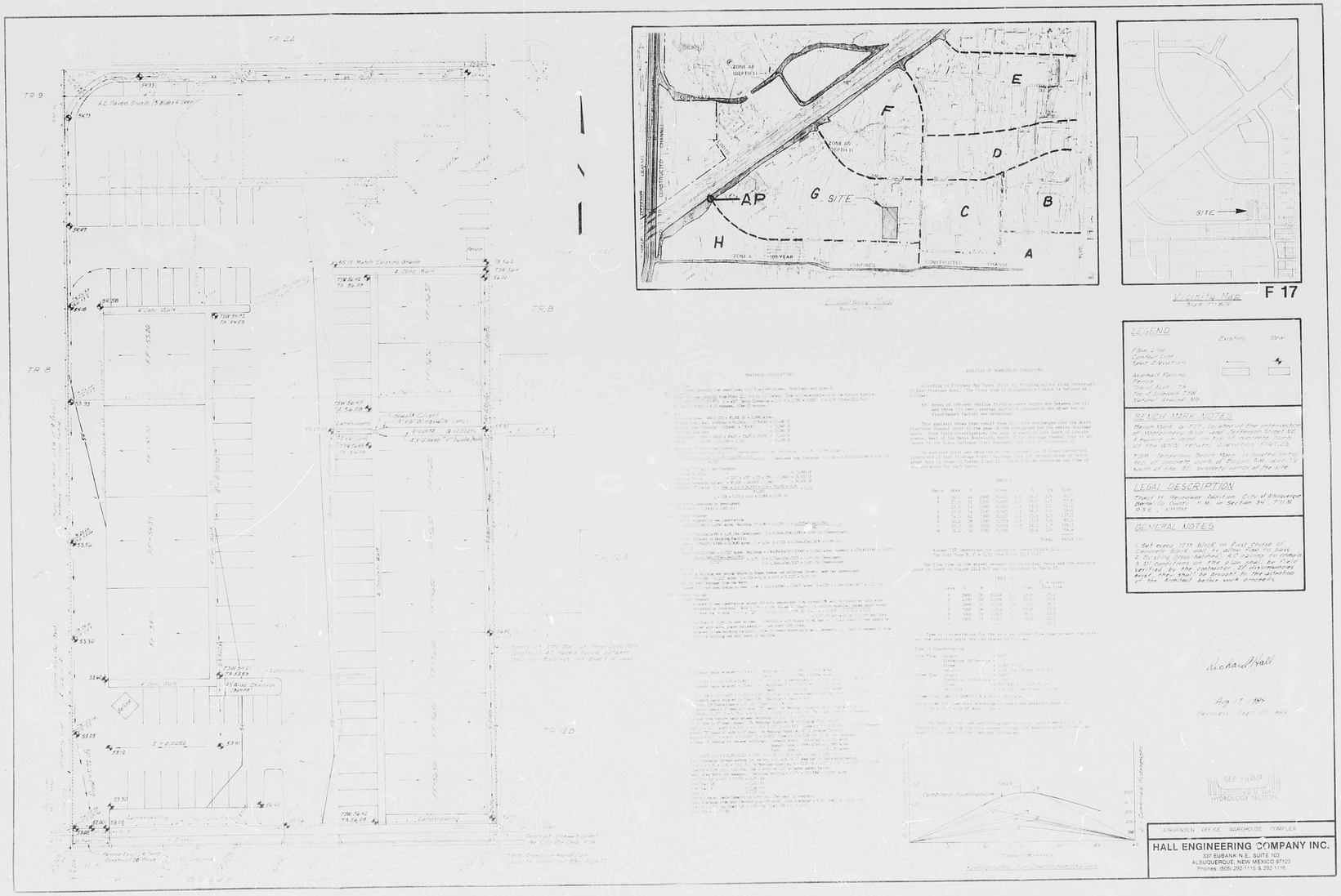
FILE DESC: F17/D42

PLANS/PLATS 1

E 30 D 24 C 20 B 16 A 12

CITY OF ALBUQUERQUE

C D F


TR 2A
TR 9
TR B
TR 12A
TR 12B
A.C. Paved Swale (5 Alleys & Gate)
Sidewalk Culvert
Landscaping
Parking
Drainage Flow
Existing Drainage Flow
Construct 2.0' Wide Flat Swale Between Building & Curb
Construct 4.0' Paved Swale Between Curb and Building
Construct 2.0' Wide Flat Swale
Construct 4.0' Paved Swale
Construct 18" Culvert
Construct Drainage Swale Per Plan Dwg. 14
Construct Drainage Swale Per Plan Dwg. 15
Construct 18" Culvert
Construct 18" Culvert
Construct 18" Culvert