ydrology G15/D19 American Furniture

G15 / D19

AMERICAN FURNITURE

2 PLANS

I. UNDEVELOPED ONSITE DRAINAGE

Site: American Furniture Warehouse tract at NW corner of Griegos, Comanche Road and the west I-25 Frontage Road.

Legal: Tract 3 of the summary plat of lands of J.R. Hance. Area = 19.892 acres.

B.M.: Top rebar SW corner of site. Elevation = 5,035.27

Soil: BKD (SCS Soils Map #21). Hydrologic Soil Group "A".

Southern Basin: Area drains to Griegos, Comanche

Area = 1.4 acres
C = 0.10 for 0% impervious (Plate 22.2 C-1)
T_c = 10 minutes
I = (2.13)(2.2) = 4.73 (Plate 22.2 D-2)
Q = CIA = (0.10)(4.73)(1.4 Ac) = 1 cfs

Northern Basin: Majority of site drains runoff against railroad spur located along west boundary, with eventual outfall to west through 2-36" CMP's located at the north-west corner of site.

Area = 18.5 acres

C = 0.10 for 0% impervious (Plate 22.2 C-1)

$$T_c = 0.0078 \frac{L^{0.77}}{S^{0.385}} \quad \text{where } L = 1100'$$

$$S = \frac{\Delta H}{L} = \frac{5050-5025}{1100} = 0.0227$$

$$T_c = 0.0078 \frac{(219.72)}{(0.333)}$$

T_c = 7.4 (inches) 10

Q = CIA = (0.10)(4.73)(18.5 Ac) = 8.8 cfs

Outlet pipes at NW Corner of Site: Capacity of 2-36" CMP's from Hydrograph 1&2 (HP's with inlet control (projecting ends, head = 6')) total capacity = 120 cfs

II. OFFSITE DRAINAGE BASINS AND DRAINAGE STRUCTURES

Offsite drainage basins are comprised of 5 areas, "A" through "E", situated between the site and the AMAFCA diversion channel to the east.

- Area "E" lies west of the I-25 and immediately adjacent to the site.
- Areas "A - D" lie east of the I-25.
- All areas discharge runoff through an existing dirt channel/arroyo located along the north side of the site.
- These flows, plus the onsite runoff from the north basin, back up at the 2-36" pipes located through the railroad spur embankment at the northwest corner of the site.

Offsite Drainage Basin Calc's

From soil survey, soils are:
EmB - Soil Group B
WeB - Soil Group B
BKD - Soil Group A
From map, 100 year - 6 hour rainfall = 2.1 inches

Hydrograph for Area A (drains to Area "E")

$Area_A$ = 44.3 acres

L = 2270 feet

$$S = \frac{\Delta H}{L} = \frac{5092-5050}{2270} = \frac{42}{2270} = 0.0185$$

$$T_c = 0.0078 \frac{L^{0.77}}{S^{0.385}}$$

$$= 0.0078 \frac{303.83}{0.2152}$$

= 13.9 minutes, say 14 minutes

Rainfall = 2.2 inches

CN = 88

R = 1.2 inches

T_p = 14 minutes

$$Q_p = \frac{45.4(A)}{T_p} = 143.8 \text{ cfs/inches}$$

$(R)(Q_p) = Q_p$ = 172.6 cfs.

Because of limited capacity of inlets at Pt. A, only about 40 cfs is routed to Area E. Remainder drains down Griegos Road to the west.

Hydrograph for Area "B" (drains to Area "C")

$Area_B$ = 33.8 Acres

L = 2170 feet

$$S = \frac{5105-5064}{2170} = \frac{41}{2170} = 0.0189$$

$$T_c = 0.0078 \frac{2170^{0.77}}{0.0189^{0.385}}$$

= 13.3 minutes, say 13 minutes

Rainfall = 2.2 inches

CN = 1/2(79) + 1/2(88) = 83.5

R = 0.9 inches

$$Q_p = \frac{45.4(A)}{T_p} = 118.04 \text{ cfs/inches}$$

$(R)(Q_p) = Q_p$ = 106.2 cfs

Hydrograph for Area "C" (drains to Area "E")

$Area_C$ = 58.7 acres

L = 2330 feet

$$S = \frac{5110-5052}{2330} = \frac{58}{2330} = 0.0249$$

$$T_c = 0.0078 \frac{2330^{0.77}}{0.0249^{0.385}}$$

= 12.66 minutes, say 13 minutes

CN = 80

R = 0.7 inches

$$Q_p = \frac{45.4(A)}{T_p} = 205.0 \text{ cfs/inches}$$

$(R)(Q_p) = Q_p$ = 143.5 cfs.

Hydrograph for Area "D" (drains to Area "E")

$Area_D$ = 33.3 Acres

L = 2900 feet

$$S = \frac{5095-5050}{2900} = \frac{45}{2900} = 0.0155$$

$$T_c = 0.0078 \frac{2900^{0.77}}{0.0155^{0.385}}$$

= 17.78 minutes, say 18 minutes

CN = 80

R = 0.7 inches

$$Q_p = \frac{45.4(A)}{T_p} = 83.99 \text{ cfs/in.}$$

$(R)(Q_p) = Q_p$ = 58.8 cfs.

Hydrograph for Area "E" (drains through site)

Area E = 25 ± acres (contributing)

L = 1750 feet

$$S = \frac{5079-5028}{1750} = \frac{51}{1750} = 0.0291$$

$$T_c = 0.0078 \frac{1750^{0.77}}{0.0291^{0.385}}$$

= 9.6 minutes, say 10 minutes

CN = 82

R = 0.8 inches

$$Q_p = \frac{45.4(A)}{T_p} = 158.4 \text{ cfs/in.}$$

$(R)(Q_p) = Q_p$ = 126.7 cfs

Check Capacity of Box Culverts and Grated Openings

11' x 10' Box Culvert @ Freeway - Area "D"

$$Q = \frac{1.486}{n} AR^{2/3} S_f^{1/2} \text{ where } n = 0.014$$

$$S_f = \frac{h_f}{L} = \frac{8}{500} = 0.016$$

$$R = \frac{A}{P_w} = \frac{100}{30} = 3.33$$

$$Q = \frac{1.486}{0.014} 100(3.33)^{2/3}(0.016)^{1/2}$$

Q = 2994 cfs

5' x 10' Box Culvert @ Freeway - Area "C"

$Q = 1.486/n\ AR^{2/3}\ sf^{1/2}$ where n = 0.014

$$S_f = \frac{10}{350} = 0.029$$

$$R = \frac{A}{P_w} = \frac{50}{20} = 2.50$$

$$Q = \frac{1.486}{0.014} 50(2.50)^{2/3}(0.029)^{1/2}$$

Q = 1665 cfs

15' x 6' Grated Opening @ Freeway - Area "D" 10' x 10' box entrance

$Q = CA\sqrt{2gh}$ where A = 90ft², h = 2', C = 0.7

Q = 0.7(90) 64.4x2

Q = 715 cfs (0.5 for clogging)
Q = 358 cfs

Other grating @ bottom of Area "C"

$Q = CA\sqrt{2gh}$ where A = 1000 ft², h = 2', C = 0.7

Q = 0.7(100) 128.8
Q = 794(0.5 for clogging)
Q = 397 cfs

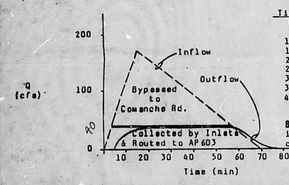
Four Combination Inlets and 3 Sump Inlets Near Study Point A

Field examination indicates that because of placement and slopes near structures, flows of more than 40 cfs will bypass to Comanche Road.

III. ROUTING OF OFFSITE HYDROGRAPHS TO N.W. CORNER OF SITE & COMBINATION WITH ONSITE DRAINAGE (3 STEPS)

STEP 1: Computation & Routing of Hydrographs A,B,&C to AP603

HYDROGRAPH A → AP603 (Cr = 0.7)

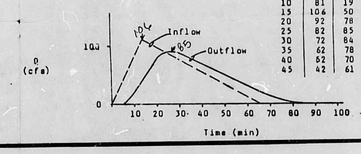


Computation of Outflow Hydrograph

Time	I	O	Time	I	O
0	0	0	65	40	40
5	40	0	50	40	40
10	40	28	55	40	40
15	40	36	60	30	33
20	40	39	65	15	20
25	40	40	70	0	6
30	40	40	75	-	2
35	40	40	80	-	1
40	40	40	85	-	0

Because of limited capacity of inlets at Pt. A, only about 40 c.f.s. is routed to Area E

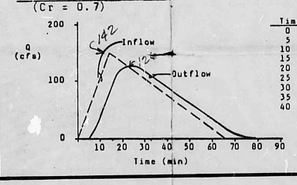
HYDROGRAPH B → AP603 (Cr = 0.5)



Computation of Outflow Hydrograph

Time	I	O	Time	I	O
0	0	0	50	32	52
5	38	0	55	22	42
10	81	19	60	12	32
15	104	50	65	2	22
20	92	78	70	-	12
25	82	85	75	-	6
30	72	84	80	-	3
35	62	78	85	-	2
40	62	70	90	-	1
45	42	61	55	-	0

HYDROGRAPH C → AP603 (Cr = 0.7)

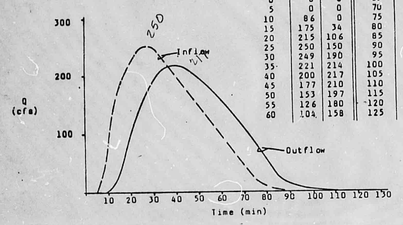


Computation of Outflow Hydrograph

Time	I	O	Time	I	O
0	0	0	45	55	76
5	56	0	50	42	61
10	110	39	55	28	48
15	142	89	60	15	34
20	125	126	65	-	21
25	112	125	70	-	6
30	97	116	75	-	2
35	85	103	80	-	1
40	70	90	85	-	-

STEP 2: Computation & Routing of Hydrographs from AP603 to Study Point E

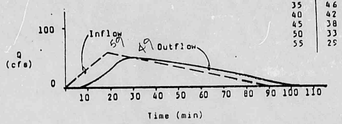
COMPOSITE AT AP603 → STUDY PT. E (Cr = 0.4)



Computation of Outflow Hydrograph

Time	I	O	Time	I	O
0	0	0	65	75	136
5	0	0	70	38	112
10	86	0	75	14	82
15	175	34	80	6	55
20	215	106	85	2	35
25	250	150	90	1	22
30	249	190	95	-	14
35	221	214	100	-	8
40	200	217	105	-	5
45	177	210	110	-	3
50	153	197	115	-	2
55	126	180	120	-	1
60	104	158	125	-	0

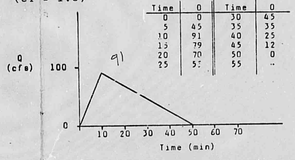
HYDROGRAPH D → STUDY PT. E. (Cr = 0.4)



Computation of Outflow Hydrograph

Time	I	O	Time	I	O
0	0	0	60	25	35
5	16	0	65	21	31
10	33	6	70	17	27
15	50	16	75	12	23
20	59	38	80	8	19
25	53	46	85	4	15
30	50	46	90	-	12
35	46	49	95	-	5
40	42	48	100	-	3
45	38	46	105	-	2
50	33	43	110	-	1
55	29	39	115	-	-

HYDROGRAPH E AT STUDY PT. E (Cr = 1.0)



Time	O	Time	O
0	0	30	45
5	45	35	35
10	91	40	25
15	79	45	12
20	70	50	0
25	57	55	-

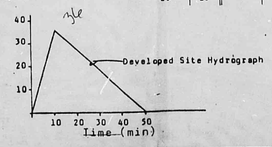
STEP 3: Computation & Routing of Hydrographs from Pt. E to N.W. Corner of Site

DEVELOPED SITE HYDROGRAPH AT N.W. CORNER (Cr = 1.0)

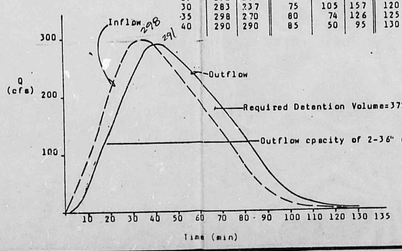
Developed Onsite Qp

Area = 18.0 (contributing)
I = 4.73
Tc = 10 min.
C = 0.1 (.35)+ 0.7 (.65) = 0.42
Qp = 0.42 (4.73)(18) = 36 cfs

Time	O	Time	O
0	0	30	18
5	17	35	13
10	36	40	9
15	32	45	5
20	27	50	0
25	23		

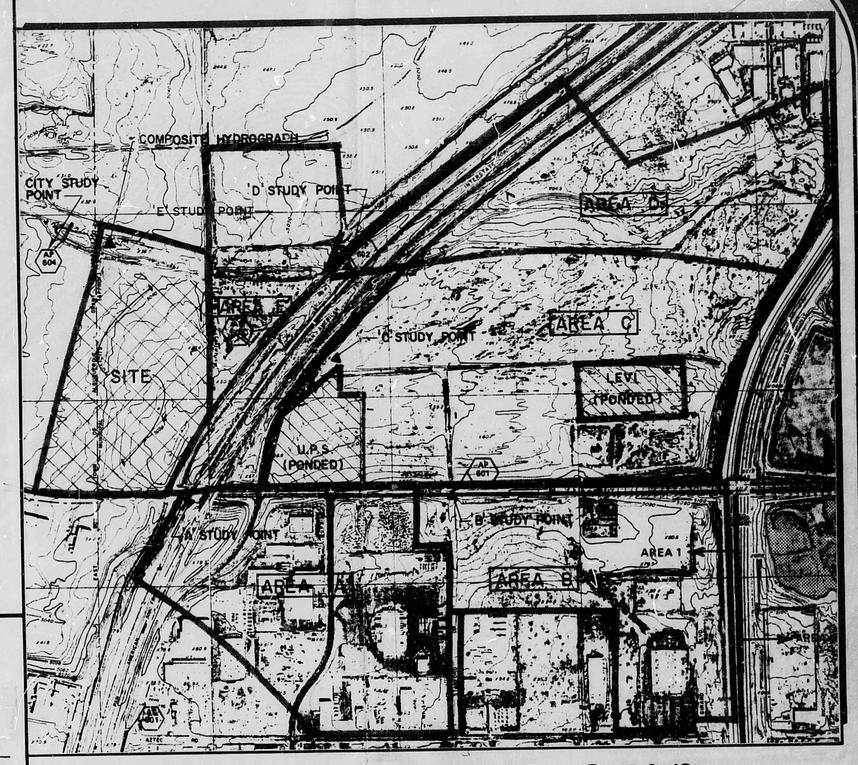


FINAL COMPOSITE HYDROGRAPH AT N.W. CORNER (Cr = 0.6)

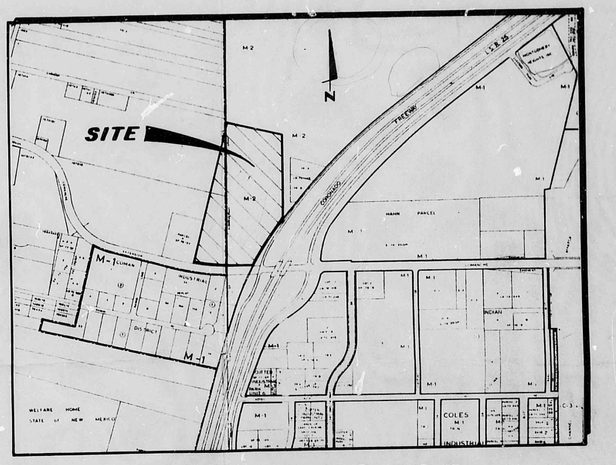


Computation of Outflow Hydrograph

Time	I	O	Time	I	O	Time	I	O
0	0	0	45	298	291	90	34	68
5	45	10	50	240	275	95	19	48
10	97	63	55	219	254	100	11	30
15	129	101	60	193	233	105	7	19
20	206	132	65	167	209	110	4	12
25	251	189	70	139	184	115	2	7
30	283	237	75	105	157	120	1	4
35	298	270	80	74	126	125	-	3
40	290	290	85	50	95	130	-	1



FLOOD HAZARD BOUNDARY MAP G-15 & 16



LOCATION MAP G-15 & 16

IV. DETENTION POND SIZE REQUIREMENTS

Offsite volume to detain = 329,000 ft³

Onsite volume to detain = 43,000 ft³

Total volume to be provided = 372,000 ft³

Pond size = 5' deep x 200' wide x 560' long (Top dimensions with 5:1 side slope)

Outflow pipe = 2-36" CMP's (existing) Flow Rate - 120 cfs

WALTER G. HINES NEW MEXICO 9053 REGISTERED PROFESSIONAL ENGINEER

W.G. Hines A-23-78

G15/D 19

CONSULTANTS: TERRA SOL INC.
ALBUQUERQUE OFFICE - 1100 B ALVARADO N.E. 266-5444 ALBUQUERQUE, N. MEX., 87110
SANDIA PARK OFFICE - P.O. BOX 148 281-1991 SANDIA PARK, N. MEX., 87047

Revisions	Date

Designed C.L.W. 5-83
Drawn M.W. 5-83
Checked C.L.W. 5-83

DRAINAGE PLAN FOR American Furniture Company

CHRISTOPHER L. WEES NEW MEXICO 9055 REGISTERED PROFESSIONAL ENGINEER

SHEET 2 OF 2

AS-BUILT CONDITIONS SHOWN IN BRACKETS-
THIS PLAN IS IN SUBSTANTIAL COMPLIANCE
WITH THE APPROVED PLAN. VARIATIONS
TO CONSTRUCTED IMPROVEMENTS NOTED
"AS-BUILT"

CHRIS WEBB — 10853 — REGISTERED PROFESSIONAL ENGINEER

3-6-85
DATE

RESUBMITTAL 7-6-84
- SERVICE STATION AT ENTRANCE CHANGED TO DIFFERENT BUILDING CONFIGURATION
- LOADING DOCKS ON EAST SIDE OF AMERICAN FURNITURE CHANGED - ELEVATIONS ADDED.
- TWO TYPO ERRORS IN SPOT ELEVATIONS ON REAR ACCESS STREET CHANGED

SERVICE STATION & ENTRANCE CHANGED TO DIFFERENT BUILDING CONFIGURATION 7-15-84

SCALE: 1" = 50'

LEGEND
- ASPHALT PAVING
- LANDSCAPED AREA
- PROPERTY LINE
- FUTURE CURB & GUTTER W/SIDEWALK
- 12.7 EXISTING SPOT ELEVATION
- 12 EXISTING CONTOUR
- 12.7 PROPOSED SPOT ELEVATION
- 12 PROPOSED FINISHED CONTOUR
- SURFACE FLOW DIRECTION
- BUILDING STRUCTURE

TOP OF PIPE - 32.44

Q100 = 300 c.f.s.

EXISTING 2-36" C.M.P. ENDS HERE

YALE

(UNPAVED)

PROPOSED C&G

EXISTING EDGE OF PAVEMENT

(C.L. FENCE)

INSTALL 18" DEEP DUMPED RIP-RAP RUNDOWNS

CARMONY ROAD (UNPAVED)

PROPOSED C&G

INSTALL 70' OF 24" RCP DRAIN UNDER RR SPUR (C.M.P.)

EXIST. PIPE

Q100 290 c.f.s.

EXIST. R.R. SPUR

SPILLWAY AREA (HISTORIC OUTLET)

EXIST. 2-36" R.C.P. LOCATED UNDER R.R. TRACKS

Q PIPES = 120 c.f.s.

EXISTING BUILDING

AMERICAN FURNITURE WAREHOUSE
F.F. = 5043.16
(43.19)

ROOF RIDGE

LOW ROOF AREA

DOORS

NEW TRACK STRUCTURE (CONSTRUCTED)

EXISTING FENCE (TYPICAL)

EXISTING BUILDING

GRIEGOS & COMANCHE EXTENSION

10'

#4 at 18" O.C.

3000 PSI CONCRETE - PLACE TRANSVERS JOINTS AT 20' INTERVALS.

RUNDOWN SECTION A-A

AS-BUILT-
1) RAIL TRACK NOT CONST/ SLOPE TRANSITION WITHIN PROPERTY
2) ACCESS ROAD NOT PAVED / GRADED TO DRAIN AS SHOWN

G15/D19

RECEIVED
MAR 06 1985
HYDROLOGY SECTION

CONSULTANTS, TERRA SOL INC.
ALBUQUERQUE OFFICE - 1900 B ALVARADO S.E.
ALBUQUERQUE, N.M. 87108
268-2544

Date
Revisions

Grading Plan for
American Furniture

5. Upon completion and acceptance of the subgrade, the embankment shall be constructed to the