

VILLA LOMA NORTHWEST

A PLANNED DEVELOPMENT

DRAINAGE STUDY

Project Number 71301

Prepared For:

Villa Loma, a Limited Partnership
Colorado Springs, Colorado

Prepared By:

LEIGH WHITEHEAD & ASSOCIATES
Consulting Engineers
324 East Cucharas Street
Colorado Springs, Colorado

November 1971

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November 8, 1971

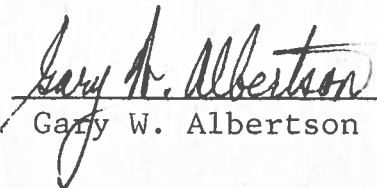
Director of Public Works
City of Colorado Springs
Colorado Springs, Colorado

Dear Sir:

Enclosed herewith is the engineering study of the drainage
for Villa Loma Northwest.

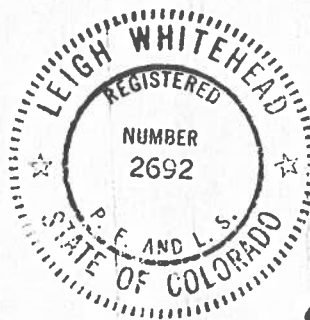
This report describes precipitation runoff as affected by
proposed planned development and the proposed method of conveying
subject runoff.


Very truly yours,
LEIGH WHITEHEAD & ASSOCIATES



Gary W. Albertson

GWA/fcb

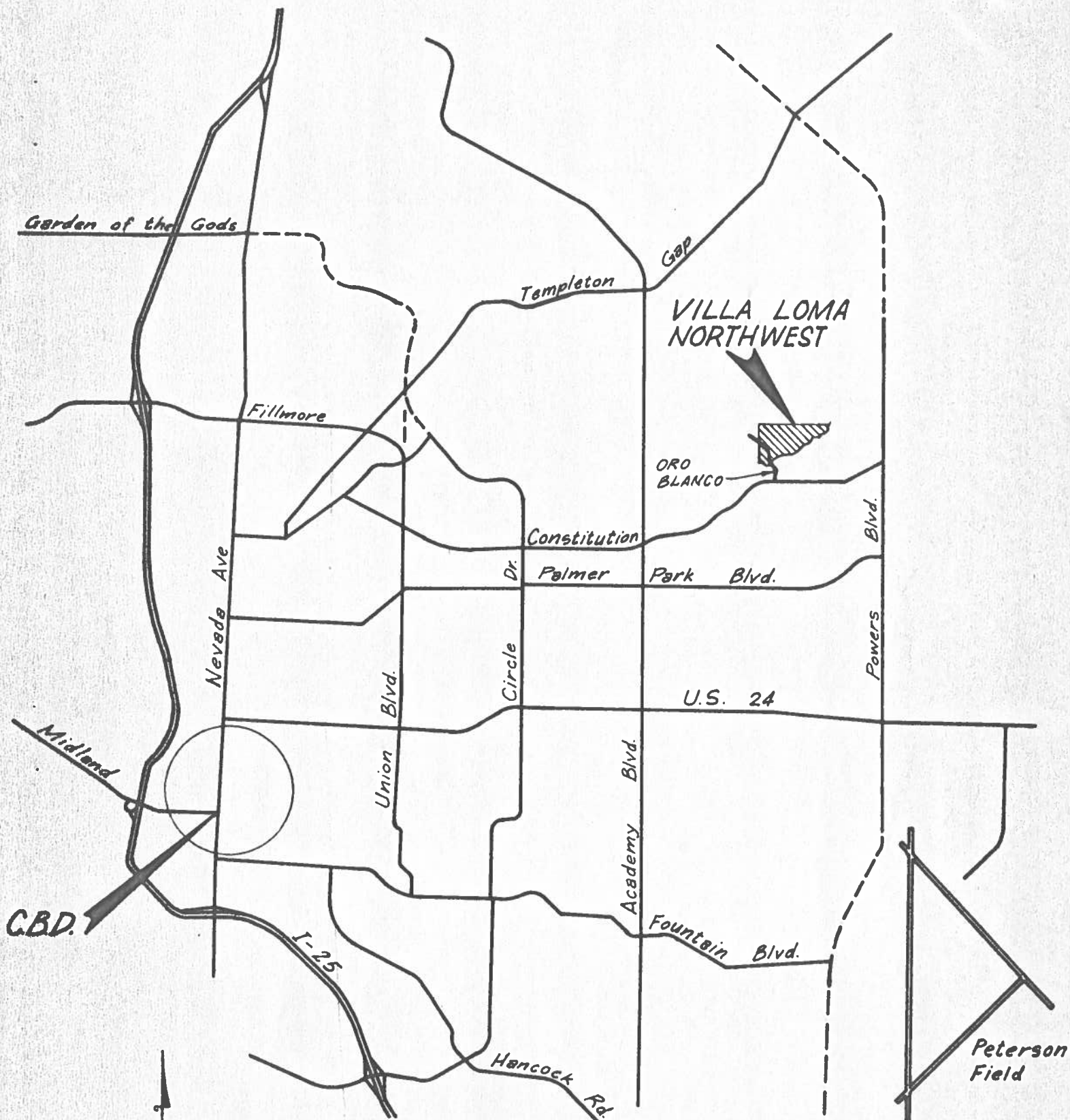




Leigh Whitehead, P.E., R.L.S., Colo. 2692

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Vicinity Map



GENERAL DESCRIPTION

Villa Loma Northwest lies in the Northeast portion of Colorado Springs and is a portion of the Sand Creek Drainage Basin. Villa Loma Northwest is located North of Constitution Avenue and is approximately one mile East of Academy Boulevard in the City of Colorado Springs.

The drainage area considered encompasses approximately 76 acres. This property will be developed similar to adjacent Villa Loma Subdivisions and Village Seven with about four living units per acre.

DETAILED REPORT

This report is based on the following:

Rainfall: 2 inch intensity, 1 hour duration, 50 year frequency.

Soil Type: The surface down to approximately ten (10) feet consists primarily of gravelly sand with some areas of silty sand and silty clay.

Area Grading: Grades will be close to indicated contours with no major changes in direction of water flow.

Method: Synthetic Hydrograph routing using $Q_p = \frac{484 \times A \times Q}{T_p}$, where "A" = area in square miles, " T_p " = time of peak in hours = $T \times 0.6 + 0.5$. " T_c " is by nomograph by U.S. Soil Conservation Service Method. "i" is taken at a theoretical 2.0 inches of rainfall and "c" is used as 0.6 in the calculation of Q. See Calculation Tabulations sheet. Since time of peak (T_p) is essentially the same for each sub-basin, accumulative totalling of the flow peak (Q_p) increments will yield data to construct a synthetic Hydrograph at any point of interest. These totals assume perfect peak time matching and are very slightly higher than true Hydrograph flows.

External Drainage:

There is no substantial external drainage entering the area of this study.

Internal Drainage:

Reference is made to the drainage plan included in this report for further explanation of the proposed method of handling storm runoff.

Outfall Points:

Oro Blanco Drive accumulates 39.6 c.f.s. from Southwest one-third of property. With two 4 foot catch basins, Oro Blanco Outfall discharges 19.6 c.f.s. See Calculation Tabulations and Synthetic Hydrograph.

West-Central-North Outfall discharges 60.1 c.f.s. from Central one-third of property. See Calculation Tabulations and Synthetic Hydrograph.

Other minor outfalls are Inspiration Drive Outfall with 20.9 c.f.s. and North Central Outfall with 12.1 c.f.s.

The sub-basins on the perimeter slope toward and therefore discharge across the property lines without concentrating.

RECOMMENDATIONS AND CONCLUSIONS

We have found from our analysis of the storm drainage in this study that the drainage facilities as shown on the Drainage Plan will provide proper drainage of the area and are consistent with adjacent drainage facilities.

The sizes of the outfall ditches are shown on the Detail Sheet of this report.

Dip slabs in this subdivision shall be constructed according to the City of Colorado Springs "Standard Details for Subdivision Developments". Standard widths will be satisfactory for all dip slabs.

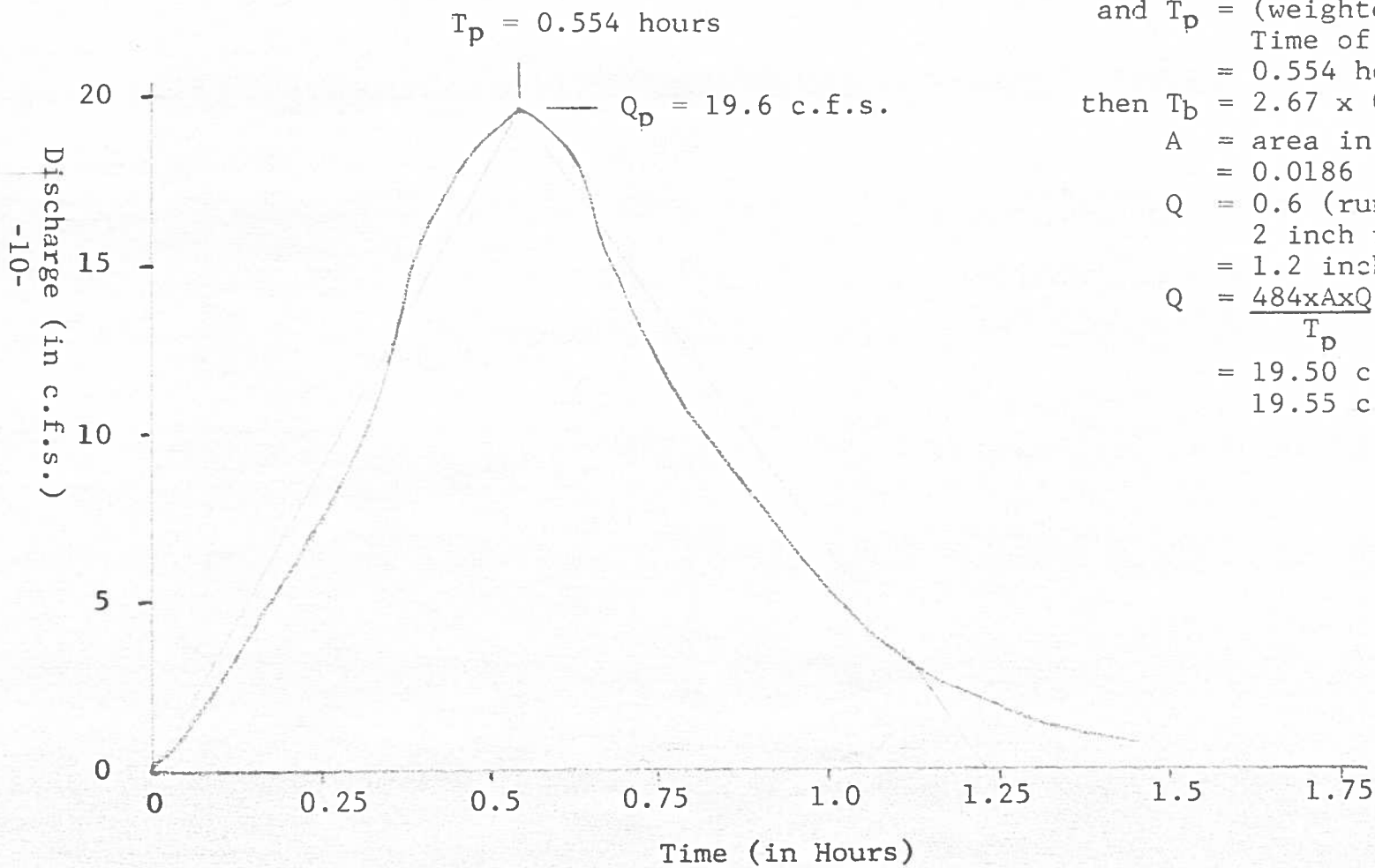
Ramp curb and gutter has a high enough drainage capacity for all streets shown except any explicitly designated 8" curb.

ORO BLANCO DRIVE OUTFALL
VILLA LOMA NORTHWEST DRAINAGE STUDY

SUB-BASIN	Ac.	SQUARE MILE	LENGTH IN FEET	HEIGHT IN FEET	T _c HOURS	T _p HOURS	Q _p c.f.s.	STREET INTER.	ACCUM. TOTAL
						.6 x T _c + .5 =	Q _p = $\frac{484 \times A \times Q}{T_p}$		c.f.s.
III-C-8	5.78	0.0090	960	6	0.180	0.608	8.63	8 63	8.63
III-C-7	5.50	0.0086	880	33	0.083	0.550	9.07	17.70	17.70
III-B-4	4.93	0.0077	450	23	0.044	0.526	8.51		
III-B-3	5.79	0.0090	900	50	0.074	0.544	9.66	18.17	
III-A-2	2.15	0.0034	550	30	0.050	0.530	3.68	39.55	39.55
Flow to West-Central-North Outfall	Est. -12.21	-0.0191					-20.00		-20.00
TOTALS	11.94	0.0186				* 0.544	19.55		19.55

* = Weighted Average

ORO BLANCO DRIVE OUTFALL
 SYNTHETIC UNIT HYDROGRAPH
 VILLA LOMA NORTHWEST DRAINAGE STUDY



Where $T_b = 2.67 T_p$
 and $T_p =$ (weighted average) Peak
 Time of Hydrograph
 $= 0.554$ hours
 then $T_b = 2.67 \times 0.554 = 1.48$ hours
 $A =$ area in basin (sq. miles)
 $= 0.0186$
 $Q = 0.6$ (runoff coefficient) \times
 2 inch rainfall
 $= 1.2$ inch runoff
 $Q = \frac{484 \times A \times Q}{T_p}$
 $= 19.50$ c.f.s.; however use
 19.55 c.f.s.

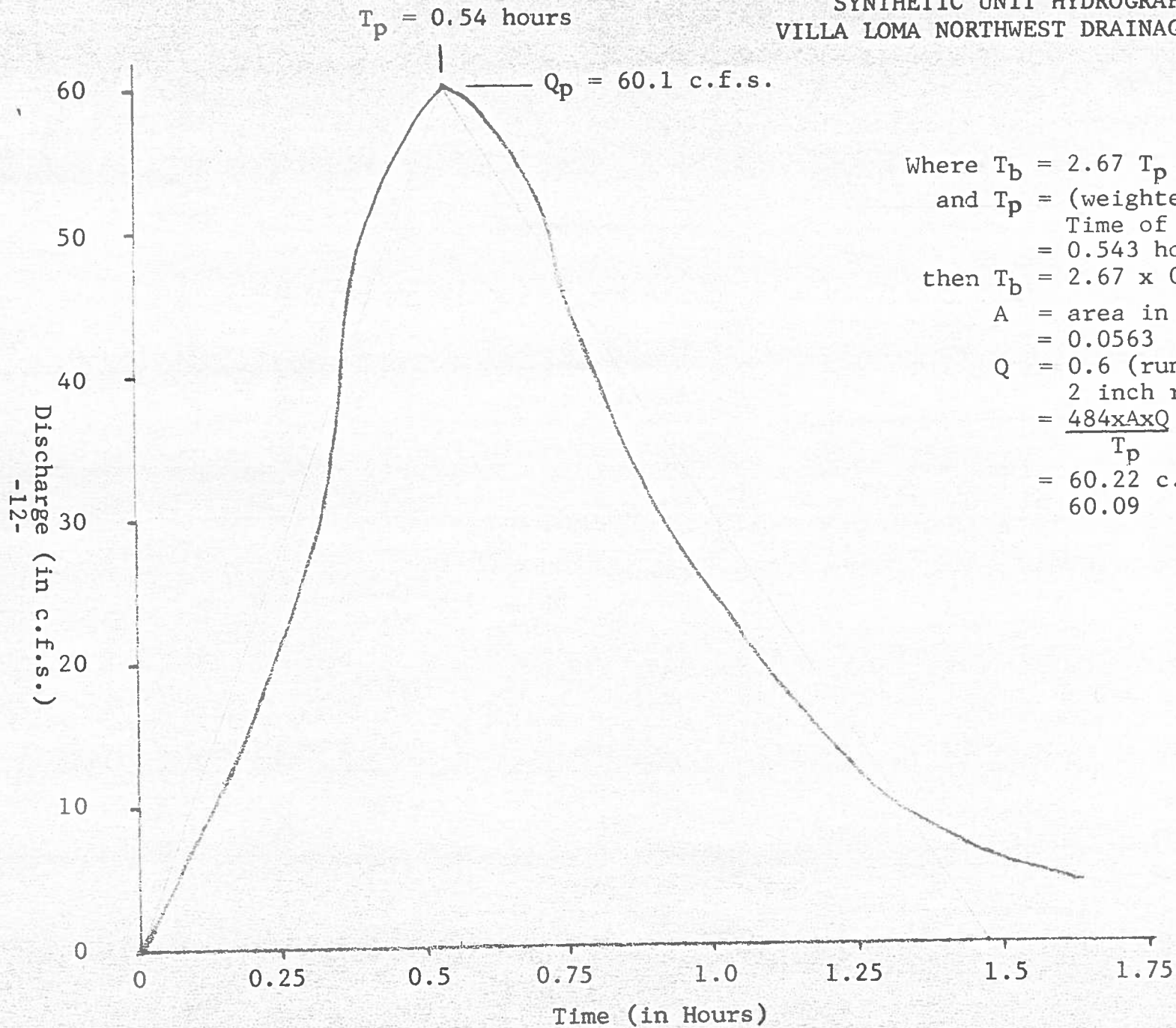
WEST-CENTRAL-NORTH OUTFALL
VILLA LOMA NORTHWEST DRAINAGE STUDY

SUB-BASIN	Ac.	SQUARE MILE	LENGTH IN FEET	HEIGHT IN FEET	T _c HOURS	T _p HOURS	Q _p c.f.s.	STREET INTER.	ACCUM. TOTAL
						.6 x T _c + .5 =	Q _p = $\frac{484 \times A \times Q}{T_p}$		c.f.s.
III-D-4	1.65	0.0026	450	20	0.047	0.528	2.84	2.84	2.84
III-D-3	1.40	0.0022	400	10	0.054	0.532	2.39	5.23	5.23
III-C-5	3.11	0.0049	750	54	0.057	0.534	5.29	10.52	
III-C-6	4.50	0.0070	950	55	0.075	0.545	7.49	18.01	18.01
III-C-4	1.97	0.0031	900	56	0.069	0.541	3.30		21.31
III-B-2	5.45	0.0085	880	40	0.077	0.546	9.06	30.37	30.37
III-B-1	5.71	0.0089	1030	42	0.088	0.553	9.72		40.09
Flow from Oro Blanco Drive Outfall	+12.21	+0.0191					+20.00		+20.00
TOTALS	36.00	0.0563				* 0.543	60.09		60.09

* = Weighted Average

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WEST-CENTRAL-NORTH OUTFALL
 SYNTHETIC UNIT HYDROGRAPH
 VILLA LOMA NORTHWEST DRAINAGE STUDY



Where $T_b = 2.67 T_p$
 and $T_p =$ (weighted average) Peak
 Time of Hydrograph
 $= 0.543$ hours
 then $T_b = 2.67 \times 0.543 = 1.45$ hours
 $A =$ area in basin (sq. miles)
 $= 0.0563$
 $Q = 0.6$ (runoff coefficient) \times
 2 inch rainfall
 $= \frac{484 \times A \times Q}{T_p}$
 $= 60.22$ c.f.s.; however use
 60.09

MISCELLANEOUS OUTFALLS
AND
NON-ACCUMULATING SUB-BASINS
VILLA LOMA NORTHWEST DRAINAGE STUDY

SUB-BASIN	Ac.	SQUARE MILE	LENGTH IN FEET	HEIGHT IN FEET	T _c HOURS	T _p HOURS	Q _p c.f.s.	STREET INTER.	ACCUM. TOTAL
						.6 x T _c + .5 =	Q _p = $\frac{484xAxQ}{T_p}$		c.f.s.
INSPIRATION DRIVE OUTFALL									
III-E-2	2.38	0.0037	400	40	0.032	0.519	4.16		4.16
III-E-1	4.39	0.0069	750	54	0.057	0.534	7.46	11.62	11.62
III-D-2	5.59	0.0087	960	52	0.077	0.545	9.29	20.91	20.91
TOTALS	12.36	0.0193				* 0.536	20.91		
NORTH CENTRAL OUTFALL									
III-C-3	2.41	0.0038	540	28	0.050	0.530	4.13	4.13	4.13
III-C-2	4.99	0.0078	1300	46	0.117	0.570	7.94	12.07	12.07
TOTALS	7.40	0.0116				* 0.556	12.07		
NON ACCUMULATING SUB-BASINS									
III-A-1	1.50	0.0023	400	25	0.037	0.522	2.61		
III-C-1	0.80	0.0013	300	12	0.036	0.522	1.39		
III-D-1	0.85	0.0013	300	24	0.027	0.516	1.51		
III-F-1	4.94	0.0077	650	34	0.058	0.535	8.38		

COST ESTIMATE

<u>ITEM</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>TOTAL COST</u>
Catch Basins (D-10-R)	2 Each	\$ 950.00	\$1,900.00
Curb Inlets	2 Each	300.00	600.00
Concrete Lined Ditch (10.5' wide x 250' long)	2630 Sq. Ft.	1.00	2,630.00
21" R.C.P.	220 Lin. Ft.	13.50	<u>2,970.00</u>
SUB-TOTAL COST			\$8,100.00
Engineering (10%)			<u>810.00</u>
TOTAL COST			<u>\$8,910.00</u>

Area (Net Area Northwest of Ridge)(In Acres)

76

Cost Per Acre (Northwest of Ridge)

\$117.24

76 x 690

Drainage Fee 52,440⁰⁰

Mantra # 2 1749

4/10/71

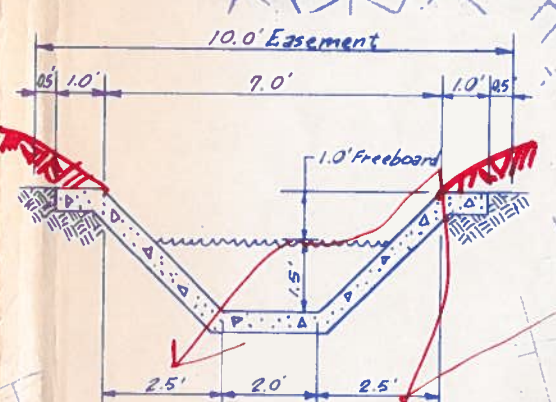


15.7
7.00
20 CFS IN 21" R.C.P.
41% (27 CFS) 100 FPS
Tomaback 1

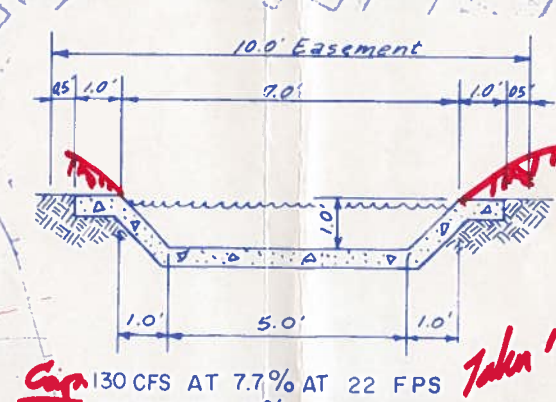
what happens here

City Approval _____ Date _____

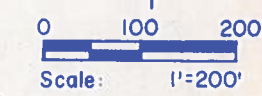
STREET NAME	R.O.W.	STREET MAT FC. TO F.C.
SANTIAGO PL.	50'	36'
BAHIA PL.	50'	36'
ORO BLANCO PL.	50'	36'
VILLA LOMA DR.	60'	40'
INSPIRATION DR.	60'	40'
ORO BLANCO DR.	60'	40'
ALL OTHERS	60'	36'



DETAIL "A"
No Scale



DETAIL "B"
No Scale



LEGEND

- RIDGE LINE
- PROPERTY LINE
- SUBBASIN LINE
- CURB INLET
- CATCH BASIN
- 21" R.C.P.
- CONC. LINED DITCH
- 2" SOD LINED DITCH

Cap 130 CFS AT 7.7% AT 22 FPS
66 CFS AT 2% AT 11 FPS
Taken 12/4/71

VILLA LOMA NORTHWEST DRAINAGE PLAN
 Leigh Whitehead & Associates
 Consulting Engineers
 324 E. Cucharras, Colorado Springs, Colorado
 Drawn By: F.W.B. Designed By: G.W.A.
 Project No: 71303 Date: 11-11-71

VILLA LOMA

Scale: 1" = 1000'
0 500 1000

LEGEND
RIDGE LINE
PROPERTY LINE
SUBBASIN LINE
PROPOSED STREETS

CONTOUR INTERVAL = 20'
FROM U.S.G.S. MAP
DATED 1961.

