



planners · consultants · engineers

Suite 200
4525 Northpark Drive
Colorado Springs, Colo. 80907

(303) 598-3222

January 4, 1972

Mr. DeWitt Miller
City Hall
P.O. Box 1575
Colorado Springs, Colorado

Subject: Vista Grande Terrace North Master Drainage Plan.

Dear Deke:

Transmitted herewith is the master drainage study on that portion of the Vista Grande Terrace development lying North of filing numbers 5, 6 and 8.

Included is descriptive information, calculations, and cost estimates for the respective drainage basins.

If you have any questions, please do not hesitate to call.

Sincerely,

O. E. Watts
Project Engineer

OEW/cel

George Jury
City Engineer

Date

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Detailed Drawing

Drainage Plan

LOCATION:

The Vista Grande Terrace North Subdivision lies within a portion of the Southwest quarter of Section 15, Township 13 South, Range 66 West in El Paso County. It lies immediately North of the Vista Grande Terrace Filing Numbers 5, 6 and 8. It lies West of the Sunset Ridge Filing No. 1 and lies East of an area soon to be submitted which will be known as the Vista Grande Terrace Northwest Area. Included within this master plan is the Vista Grande Terrace No. 10 and other future subdivisions as yet unnumbered.

The total subdivision comprises 234.0 acres of which 28.7 acres lies within the North Shooks Run - Templeton Gap Drainage Basin and 169.1 acres lies within the Cottonwood Creek Drainage Basin.

Detailed cost estimates for the two drainage basins are included.

SOIL TYPES:

This subdivision lies completely within the SCS soil type known as the Blakeland Loamy Sand. This soil type has a hydrologic soil series grouping of 'A', for which the appropriate runoff parameters have been assigned as shown in the attached calculations.

METHOD:

The basis of the computations in this report is the soil conservation service synthetic hydrograph method of hydrology. No major greenbelts are encountered within the development and the standard Colorado Springs storm of duration 1 hour and intensity of 2 inches is used.

Runoff is handled within the streets of the development which are supplemented when necessary by storm drain facilities. The major streets within the development, Union Boulevard, Vickers Drive, and Flintridge Drive are limited to 30 CFS of surface runoff. Other streets are allowed to contain runoff to the capacity shown on the Colorado Springs street capacity chart. These street capacities are modified in some instances when sudden alignment changes will not permit this quantity of runoff.

All storm drainage culverts are designed to flow full under no head. All catch basins are designed of the capacity shown on Colorado Springs standard drawing number D-10 R.

These capacities have been lowered in some instances where street slopes are such to prevent full efficiency of the catch basins.

Included are detailed computation sheets for the various facilities designed as well as our hydrologic computation sheets.

DESCRIPTIVE INFORMATION:

Several unusual features in this development necessitate special provisions to adequately handle the runoff.

It is necessary to divert the 43.6 CFS entering the subdivision from the Sunset Ridge Filing No. 1 to prevent a transbasin diversion of storm runoff. This water is diverted from Cortina Drive to Onion Circle West.

We have computed 53.9 CFS to be entering the subdivision crossing Flintridge Drive at Garmish Road. Because of the street alignment, it is necessary to provide storm drainage facilities to the intersection of Garmish Road and Tirol Drive to prevent substantial damage to home sites. This series of storm drainage facilities continues to the intersection of Del Paz Drive and Vickers Drive.

Total of 468 CFS exists from the development near the intersection of Union Boulevard and Vickers Drive. It is anticipated that this flow will be accommodated in a concrete channel which will be submitted in the near future as part of the Vista Grande Terrace Northwest development area.

Included is our detailed calculations, by the SCS synthetic hydrograph method, which size the respective facilities. Since the flow onto Del Rey Drive is 13.5 CFS greater than on the Vista Grande Terrace Master Plan, approved on September 23, 1971, we have also included calculations substantiating the adequacy of the existing facilities. All facilities in the Garden Ranch Boulevard basin are adequate except the catch basins at Academy Boulevard, which will be changed to a 10 foot throat to accommodate the flow. As you know, the street will be widened at this point and special inlets are being designed to accommodate ditch inflows along Academy Boulevard.

VISTA GRANDE TERRACE NORTH
MASTER DRAINAGE COST ESTIMATE

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Cost</u>
6' Catch Basin	3 ea	\$ 400.00	\$ 1200.00
8' Catch Basin	6 ea	450.00	2700.00
10' Catch Basin	9 ea	600.00	5400.00
12' Catch Basin	8 ea	700.00	5600.00
16' Catch Basin	2 ea	775.00	1550.00
21" CMP	100 LF	9.00	900.00
24" CMP	420 LF	10.00	4200.00
27" CMP	340 LF	11.00	3740.00
30" CMP	2357 LF	12.00	28284.00
36" CMP	3180 LF	17.00	54060.00
42" CMP	420 LF	20.00	8400.00
48" CMP	200 LF	25.00	5000.00
54" CMP	550 LF	30.00	16500.00
60" CMP	670 LF	37.50	25125.00
72" CMP	250 LF	50.00	12500.00

Subtotal \$175159.00
10% Engr & Cont 17515.90
TOTAL ----- \$192674.90

All facilities are in the Cottonwood Creek Drainage Basin.

Drainage Fees:

1971 Fees:

Filing No. 10

North Shooks Run - Templeton Gap

28.7 acres x 467.00 = 13,402.90

Cottonwood Creek

36.2 acres x 583.00 = 21,104.60 34,507.50

1972 Fees:

Remaining Acreage

Cottonwood Creek

169.1 acres x 635.00 = 107,378.50 107,378.50

TOTAL FEES: \$141,886.00

COTTONWOOD CREEK OVER-RUN: \$ 64,191.80

TOTAL AREA OVER-RUN: \$ 50,788.90

Street and Storm Sewer Calculations

STREET	LOCATION	DIST	ELEVATION & SLOPE	TOTAL RUNOFF	STREET FLOW CAPACITY	PIPE FLOW	TYPE PIPE, CATCH BASIN & SLOPE %
GARMISH ROAD (362)	Flintbridge Dr.		6748	58.9	58.9/83.4 @ 4%	0	2-7' D. pipe 8" curb
		340	4.1%	63.2	63.2/84.5	0	8" curb
Tivol Drive (361)	Tivol Dr.		6734	68.8	19.2	+44	2-12' CB @ 30" CMP
		450	2.4%		32.9/64.6	44	36" CMP @ 2.4% 8" curb
Wolf Creek Dr (36)	Wolf Creek Dr.		6723	76.9	0.9/64.1	+32	2-10' CB @ 27" CMP
		560	4.8%		167/328 R @ 4%	76	36" CMP @ 4.8% 12" curb
Del Rey Drive	Del Rey Dr.		6696	92.7	16.7/37.8		
	200' South	200	SAYS=1.0%		22.0/47=8"	76	48" CMP @ 1.0% 18" curb
		460	6.3%	98.0	22.0		
Del Pas Trail			6665	103.8	11.0/32.8 @ 4%	+16.8	2-6' CB @ 21" CMP Ramp
		520	7.1%		23.3/48.7 @ 7.1%	92.8	36" CMP @ 7.1% Ramp
			6632	116.1	23.3	92.8	
Vickers Drive	Flintbridge		6750	0			
Vickers Dr		1120	7.1%	26.9	26.9/30	0	
	Red Onion Cir W.		6671	88.2	12.6/30	+43.6+32	2-10' CB @ 27" CMPs
Vickers Dr.		810	4.9%	106.5	30.9/30	75.6	36" CMP @ 4.9%
	Del Rey Dr.		6631	222.6	0/30	+307+120	2-10' CB @ 27" CMPs
60' Int		550	5.6%	228.9	29.6/30	199.3	54" CMP @ 5.6%
	El Dora Dr.		6600	297.1	0.2/30	29.6+13.0	2-10' CB = 2-12' CB
		270	5.5%		0.2/30	296.9	60" CMP @ 5.5%
	Del Rey Drive		6585	366.8	350/30	+44.9	Del Rey Pipe Input
		400	6.3%		29.1/30	341.8	60" CMP @ 6.3%
	100' E of Union		6560	385.9	29.1+5/30	+44.1	2-12' CB @ 30" CMP
Outlet Pipe		250'	3.2%			385.9	72" CMP @ 3.2%
		70'	8.6%	462.8	0	+76.9	2-10' CB @ 27" CMP
	W. Edge of Union		6546	462.8	0	462.8	72" CMP @ 4.0% min. CMP outlet to Conc. Channel

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Project VISTA GRANDE TERRACE
 Calc. by KFA
 Checked by _____
 date 1-3-72
 Page 1 of 3
 ALOPMT-DCA/TKG/GB

Street and Storm Sewer Calculations

STREET	LOCATION	DIST	ELEVATION & SLOPE	TOTAL RUNOFF	STREET FLOW CAPACITY	PIPE FLOW	TYPE PIPE, CATCH BASIN & SLOPE %
EL DORA DRIVE (36 Res)	Jaguar Drive		6714	25.7			
	Bell Mtn Court	660	4.2%	33.9	33.9/3316	0	Ramp
	el Dora Court	460	4.8%	46.8	46.8/914	0	8" Curb
	El Dora Way	250	6.8%	55.3	55.3/108.8	0	8" Curb
	Oslo Court	530	6.4%	65.2	61.8/102.2	0	8" Curb
	Vickers Drive	240	4.6%	68.2	21.2/89.5	+24	2-8'CS ^w /24" CMP
						24	24" CMP @ 4.6%
					0.2/30	+44	2-12'CS ^w /30" CMP
						68	
Del Rey Drive (36 Res)	Sigant Valley Drive			42.4		+24	2-8'CS ^w /24" CMP
	Vickers Drive	320	S=0.5%	44.9	20.9/29.5-8"	24	26" CMP @ 0.5%, 8" Curb
					0/30	+20.9	2-8'CS ^w /24" CMP
						44.9	
Del Rey Drive (36 Res)	Keystone Cir. N		6632				
	Vickers Drive	920	5.0%	21.6	21.6/36.7	0	Ramp Curb
UNION (60' Art)	Keystone Cir. N		6630	44.9	12.9/30	+32	2-12'CS ^w /30" CMP @ 5%
	Del Rey Drive	570	2.1%	56.1	24.1/30	32	30" CMP @ 2.1%
	Catch Basins	500	5.2%	62	30/30	-	30" CMP @ 5%
	100' N of Vickers	460	5.2%	76.7	27.9/30	+16.8	2-6'CS ^w /21" CMP @ 5%
						48.8	30" CMP @ 5%
						48.8	

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WESTERN
ENGINEERS

Project _____
 Calc. by WKA
 Checked by _____
 date 1-3-72

Street and Storm Sewer Calculations

STREET	LOCATION	DIST	ELEVATION & SLOPE	TOTAL RUNOFF	STREET FLOW CAPACITY	PIPE FLOW	TYPE PIPE, CATCH BASIN & SLOPE %
Red Onia (Civ)	DNG East		6696	52.1			
	Grade Break	350	6.87%		8.5/42.82	43.6	30" CMP @ 6.8%
	at Vickers	420	0.7%		17.7/34.98	43.6	42" CMP @ 0.7%
Squaw Valley Ln N (36' Res)	Siguan Valley Drs		6633				
	Del Paz Dr	300	5.13%	22.9	22.9/37.8	0	Ramp Curb
	Del Rey Dr	910	3.89%	35.2	35.2/81.3	0	8" Curb
Cortina Drive (36' Res)	Cortina Place		6623				
	Del Paz Drive	280	3.99%	26.8	26.8/32.4	0	Ramp Curb
	Del Rey Drive	970	1.99%	38.3	38.3/57.5	0	8" Curb
Del Rey Drive (36' Res)	Del Rey Drive		6594				
	Mantabello	280	3.6%	46.3	46.3/79.1	0	8" Curb
FOR CONTINUATION TO ACADEMY - SEE SEPARATE CALC. SHEET							
Cortina Drive (36' Res)	Cortina		6704	43.6	—	+43.6	2-16' CB ^w /36" CMP
	Red Onia (Civ)	207	3.99%		—	43.6	30" CMP @ 3.99%
			6696	43.6	—	43.6	—

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Project _____
 Calc. by DA
 Checked by _____
 date 1-3-72
 Page 3 of 3

Street and Storm Sewer Calculations

Flows From VISTA GRANDE TERRACE #10 TO ACADEMY BLVD

STREET	LOCATION	DIST	ELEVATION & SLOPE	TOTAL RUNOFF	STREET FLOW CAPACITY	PIPE FLOW/ CAPACITY	TYPE PIPE, CATCH BASIN & SLOPE %
DEL REY DR (36' RES.)	END VGT #8			46.3	46.3		
	Montebello Dr		7 1/2% 4%				Type B Curb
	END VGT #6 @ El Capitan		min 5.28% 3.68%	66.3	66.3 / 96.0		
	Del Paz Dr		5.87%	38.0	66.3 - 24 = 42.3 / 24.0	+24.0	2-8' CB's 24" CMP @ 6.5% min
DEL PAZ DR (40' RES.)	DEL REY DR			118.4	-0-	+30.4	2-10' CB's 42" CMP @ 2.99% min
	GARDEN RANCH ABOVE DEL PAZ		0.67% min 6.00%	131.6	13.2 - 13.2 = 0 / 35.7	+13.2	2-8' CB's (58% efficient)
Garden Ranch (78' ART.)	DEL PAZ DR			35.3	35.3 / 30.0	-0-	Previously approved
	TOMAH DR				35.3 - 24 = 11.3 / 30	+118.2 / 120.7	2-8' CB's 42" CMP @ 4.91% min ✓
	ACADEMY BLVD				113.2 + 34 = 27.9 / 30	+73.0	54" CMP @ 6.88% min
	@ Academy				+33 = 31.2 / 30	191.2 / 279.3	Proc Designed @ 2.67% but built @ 6%+ to allow Inlet pipe to go under existing water main Need 2-10' CB's - designed for 8' CB's but will be changed per letter.

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Project VISTA GRANDE TERRACE
 Calc. by GLE WATTS
 Checked by _____
 date 12-13-71
 Page 1 of 1
 MASTER

"2100"
PF: .00 387

$$T_{PO} = 0.5 + 0.6 T_c$$

$$Q_p = \frac{484 A Q}{P_o}$$

MAJOR BASIN	SUB BASIN	AREA		BASIN		T _c	DITCH		V	TPO	FLOW		T _b
		Planim. Read	MILE	LENGTH	HEIGHT		LENGTH	SLOPE			Q	q _p	
I	A	12.8	.0046	540	22	.056				.534	1.25	5.20	
	B	18.2	.0065	850	44	.075				.545	1.25	7.24	
	C	27.1	.0097	810	20	.095				.557	1.70	14.35	
	CI	7.0	.0025	360	12	.046				.528	0.02	0.04	
	D	13.2	.0047	550	32	.050				.530	1.25	5.40	
	E	9.1	.0032	390	25	.038				.523	1.25	3.77	
	F	11.4	.0041	680	20	.077				.546	1.25	4.53	
	G	22.3	.0079	970	64	.075				.545	1.25	8.87	
	H	10.7	.0038	420	28	.038				.523	1.25	4.43	
	I	5.4	.0019	300	20	.030				.518	1.25	2.26	
	J	43.1	.0154	960	60	.075				.545	1.5	20.59	
II	A	4.8	.0017	300	10	.038				.523	0.02	0.03	
	B	26.4	.0094	1000	58	.077				.546	1.25	10.49	
	C	15.0	.0053	500	30	.046				.528	1.25	6.16	
	D	11.9	.0042	600	36	.051				.531	1.25	4.86	

HYDROLOGIC COMPUTATION - BASIC DATA PROJ: VISTA GRANDE TERRACE NORTH MASTER DRAINAGE By: KFA Date: 12-7-71			planners · consultants · engineers Suite 200 4525 Northpark Drive Colorado Springs, Colo. 80907	Page 2 of 5 Pages
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MAJOR BASIN	SUB BASIN	AREA		BASIN		Tc	DITCH		V	TPO	FLOW		Tb
		Planim. Read	MILE	LENGTH	HEIGHT		LENGTH	SLOPE			Q	qp	
III.	A	10.0	.00358	620	30	.059				.535	1.25	4.05	
	B	6.1	.0021	550	5	.102				.561	1.25	2.35	
	C	14.7	.0052	630	31	.060				.536	1.25	5.95	
	D	9.3	.0033	360	19	.038				.523	1.25	3.25	
	E	23.6	.0034	920	32	.088				.553	1.25	9.26	
	F	9.5	.0034	400	22	.039				.523	0.02	0.06	
	G	9.6	.0031	490	30	.045				.527	1.25	3.95	
	H	9.9	.0035	410	24	.040				.524	1.25	4.10	
	I	18.7	.0067	710	27	.070				.542	1.25	7.48	
	J	13.5	.0048	560	18	.063				.538	1.25	5.44	
	K	12.9	.0046	560	23	.057				.534	1.25	5.24	
	L	7.9	.0028	400	27	.037				.522	1.25	3.28	
	M	16.0	.0057	620	35	.055				.533	1.25	6.51	
	N	15.6	.0055	630	41	.053				.532	1.25	6.36	

HYDROLOGIC COMPUTATION - BASIC DATA

PROJ:

By:
Date:

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Colorado Springs, Colo. 80907

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MAJOR BASIN	SUB BASIN	AREA		BASIN		Tc	DITCH		V	TPO	FLOW		Tb
		Planim. Read	MILE	LENGTH	HEIGHT		LENGTH	SLOPE			Q	qp	
IV	A	6.5	.0023	450	5	.082				.549	1.25	2.56	
	B	13.9	.0049	500	16	.060				.536		5.62	
	C	10.4	.0037	430	18	.048				.529		4.26	
	D	5.9	.0021	410	11	.056				.534		2.39	
	E	20.2	.0072	670	27	.066				.540		8.11	
	F	17.3	.0062	800	44	.070				.542		6.92	
	G	11.0	.0039	520	27	.053				.532		4.48	
	H	10.8	.0038	510	24	.053				.532		4.40	
	I	12.9	.0046	530	39	.044				.526		5.32	
	J	14.4	.0051	700	29	.070				.542		5.76	
	K	18.3	.0065	810	38	.075				.545		7.28	
	L	12.1	.0043	470	32	.042				.525		5.0	
V	A	22.9	.0082	550	44	.044				.527	1.50	11.31	
	B	13.9	.0049	620	40	.052				.531	1.25	5.68	
	C	12.6	.0045	480	37	.040				.524	1.25	5.21	

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5 Pages

MAJOR BASIN	SUB BASIN	AREA		BASIN		Tc	DITCH		V	TPO	FLOW		Tb
		Planim. Read	MILE	LENGTH	HEIGHT		LENGTH	SLOPE			Q	qp	
V	D	11.6	.0041	470	14	.058				.535	1.25	4.70	
	E	20.4	.0073	630	41	.052				.531	1.25	8.33	
	F	25.1	.0090	810	44	.070				.542	1.25	10.0	
	G	15.6	.0055	610	32	.056				.534	1.25	6.33	
	H	7.65	.0027	410	24	.040				.524	1.25	3.16	
	I	8.30	.0029	400	20	.040				.524	1.5	4.12	
VI	A	20.9	.0074	570	28	.055				.533	1.25	8.50	
	B	23.6	.0084	1120	52	.090				.554	1.25	9.24	
VII	A	28.0	.010	1170	72	.085				.551	1.25	11.0	
	B	16.7	.0059	800	54	.062				.537	1.25	6.74	
	C	12.5	.0044	380	22	.038				.523	1.25	5.18	
	D	30.7	.0110	760	35	.070				.542	1.25	12.29	
	E	18.1	.0064	610	17	.075				.545	1.25	7.20	
	F	6.1	.0021	350	9	.050				.530	1.25	2.47	

HYDROLOGIC COMPUTATION - BASIC DATA

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MAJOR BASIN	SUB BASIN	AREA		BASIN		Tc	DITCH		V	TPO	FLOW		Tb
		Planim. Read	MILE	LENGTH	HEIGHT		LENGTH	SLOPE			Q	qp	
VII	G	30.6	.0109	600	44	.050				.530	1.50	15.03	
VIII	A	28.6	.0102	700	56	.052				.531	1.25	11.64	
	B	28.3	.0101	670	36	.060				.536	1.25	11.45	
	C	8.9	.0031	400	22	.040				.524	1.25	3.68	
	D	29.9	.0107	1090	33	.110				.566	1.25	11.46	
	E	16.7	.0057	500	10	.07				.542	1.50	5.02	
IX	A	12.7	.0045	600	50	.046				.528	1.25	5.21	
	(1"=100')												
	SCHOOL	16.2	.0058	750	19	.086				.522	1.70	5.6	
	Sullivan Circle Sullivan Pk.	34.3	.0122	1000	54	.085				.552	1.25	13.4	
INFLOW FROM EAST	NE Covner	19.6	.0070	600	16	.075				.545	1.25	7.8	
	(1"=100')	11.85	.03825	1800	68	.14				.584	1.42	45.0	

Drainage to North

Inflow from East

SOULF R7-BD
TYPE A

HYDROLOGIC COMPUTATION - BASIC DATA

PROJ:

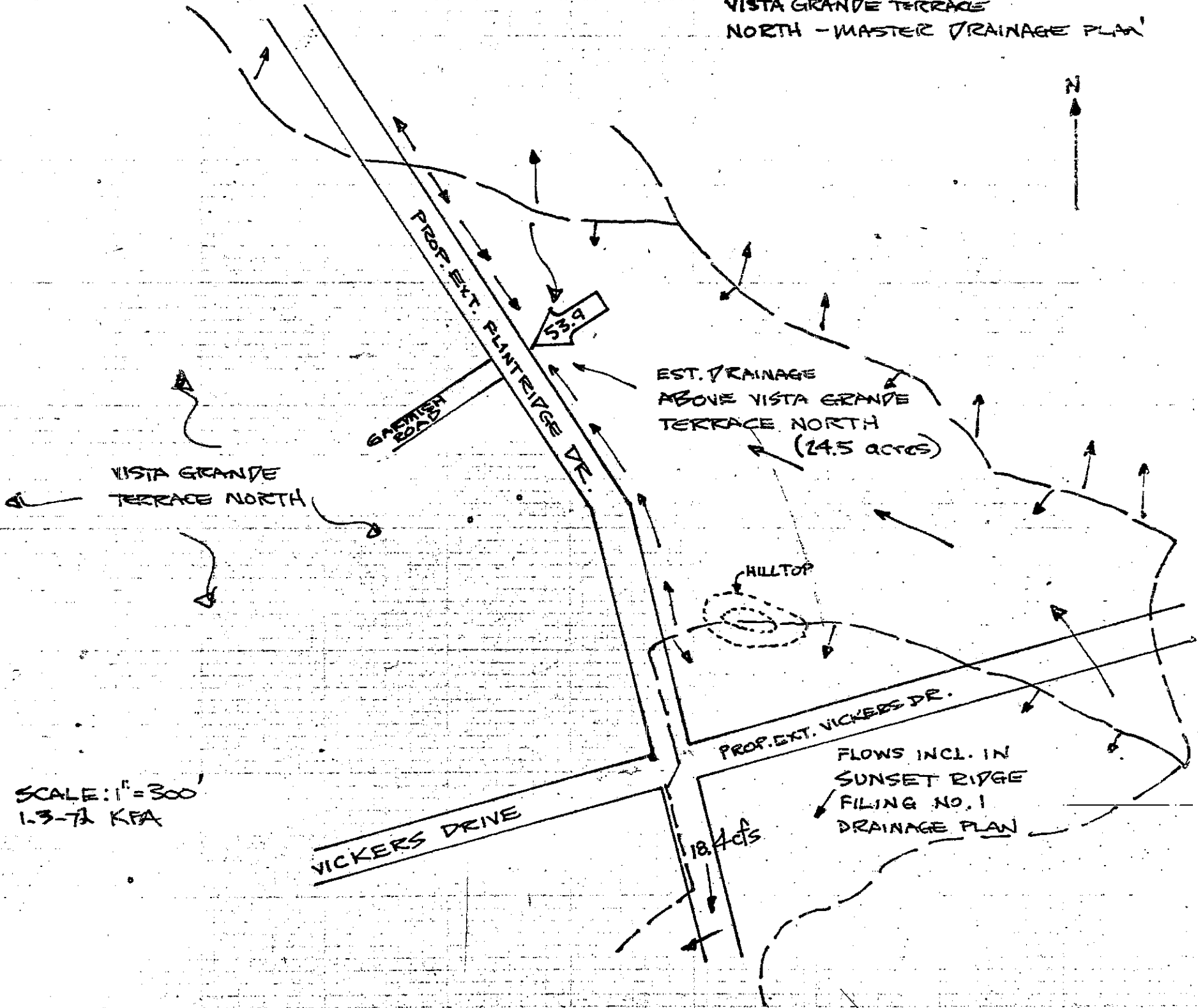
By:
Date:



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5 Pages

VISTA GRANDE TERRACE
NORTH - MASTER DRAINAGE PLAN



VISTA GRANDE
TERRACE NORTH

GARRISON
ROAD

PROP. EXT. PLANT RIDGE DR.

EST. DRAINAGE
ABOVE VISTA GRANDE
TERRACE NORTH
(24.5 acres)

HILLTOP

PROP. EXT. VICKERS DR.

FLOWS INCL. IN
SUNSET RIDGE
FILING NO. 1
DRAINAGE PLAN

VICKERS DRIVE

18.4 acs

SCALE: 1" = 300'
1.3-72 KFA

MAJOR BASIN	SUB BASIN	AREA		BASIN		Tc	DITCH		V	TPO	FLOW		Tb
		Planim. Read.	MILE	LENGTH	HEIGHT		LENGTH	SLOPE			Q	qp	
INFLOW FROM EAST	1"=500'	11.85 (24.5 acres)	.03825	1800	68	0.14		30"=27-60 TYPE A		0.584	1.70	53.9	

HYDROLOGIC COMPUTATION - BASIC DATA
 PROJ: **VISTA GRANDE TERRACE**
NORTH-MASTER DRAINAGE
 By: **KPA**
 Date: **1-3-72**



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