



October 25, 1977

RECEIVED

OCT 26 1977

CITY ENGINEERS

Mr. Bruno Conegliano
Assistant City Engineer - Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

RE: Drainage Report for Crestview Heights, Unit 5 and Casa Grande Park

Dear Mr. Conegliano:

In response to your letter of October 6, 1977, concerning the above-referenced drainage report, we have made the following changes to the construction drawings:

1. The Piedra Lisa Channel has been extended along the west side of the property from the north edge of Menaul Boulevard to the 20-foot drainage right-of-way, seven lots south of Candelaria Road. The Piedra Lisa Channel will be sloped to drain westward from near the middle of the west boundary line of Casa Grande Park. This portion of the Piedra Lisa Channel is considered temporary until its final configuration is determined with the improvements to Tramway Boulevard. The temporary channel will be earth lined with a 10-foot bottom width and 3:1 side slopes. Minimum depth will be 3.5'.

2. The 20-foot drainage easement which crosses Palo Verde Drive in Casa Grande Park will be fitted with four 18-inch reinforced concrete pipes under the roadway. The crossing will have a capacity of approximately 55 CFS, which is roughly equivalent to the anticipated runoff from a ten-year storm. Flows greater than this amount will travel over the roadway in a dip section.

3. Roof ponding will not be employed and runoff for undeveloped conditions will remain as shown in the report.

We hope that these items are satisfactory and will allow you to approve the drainage report.

If you have any questions concerning this matter, please feel free to call our office.

Sincerely,

Raymond W. Macy, P. E.
Design Engineer

cc: Mr. Chase Magnason

RWM/kb

Cremons
Inc.



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
Harry E. Kinney

CHIEF
ADMINISTRATIVE OFFICER
Frank A. Kleinhertz

October 6, 1977

Mr. Ray Macy
Bohannon-Huston Inc.
4125 Carlisle Blvd. N.E.
Albuquerque, N.M. 87107

SUBJECT: DRAINAGE REPORT FOR CRESTVIEW HEIGHTS, UNIT 5 AND
CASA GRANDE PARK

Dear Ray:

This is to detail my observations regarding the drainage report for the captioned subdivisions, expanding on our conversation.

The construction plans will have to include plan and profile for the Piedra Lisa Channel Improvements. Eventhough the final plans and grades for Tramway Blvd. south of Candelaria have not been set, a temporary dip section can be executed at this time to take the water across this thoroughfare and discharge it into the future westward extension of the Piedra Lisa. As an interim measure, after the construction of the improvements across Lynnwood Park which are imminent, City forces could excavate a temporary pilot channel west of Tramway Blvd. to provide an outfall to these subdivisions.

In regard to the flow coming from the east across Casa Grande, it is requested that a cattle guard or other structure be provided across Palo Verde in order to carry all the high frequency storm flows unto the 10 year discharges. Flows of greater magnitude can be allowed to overflow the street. Since any proposed development area does not coincide with a natural watershed and since after development the existing water courses are not used for water conveyance (except the major arroyos), the mode of flow and the distribution of the runoff are drastically altered. Therefore, to compare meaningfully the undeveloped and the developed runoff, it is necessary to use the same outlet point, path of travel and slope differential. Then through the use of either residential or total development ponding, achieve the goal of comparable flows and total volume of runoff.

Using these criteria, I find that the undeveloped flow for Crestview Heights amount to 24.7cfs (L=1800 ft. S=3.4% Tc=28.7' I=3.52"). In Casa Grande Park, considering the 4.78 ac between the two water blocks on Palo Verde Drive, the discharge amounts to 6.6cfs (L=960' S=2.71% Tc=22.8' I=3.95").

AN EQUAL OPPORTUNITY EMPLOYER

Mr. Massey

-2-

October 6, 1977

Certain consequences will follow from this approach and in your revision of the drainage report, you will have to assess whether the volume of ponding provided is sufficient to achieve the desired goal particularly in Casa Grande Park. In this area it appears to me that roof ponding may be indicated in preference over the parking lot detention approach because no infiltration or volume reduction are achieved. I also consider undesirable to allow the runoff to flow overbank to the arroyo because of potential erosion problems.

Sincerely,

Bruno Conegliano

Bruno Conegliano
Assistant City Engineer-Hydrology

BC/fs

cc - Jim Smith
V. M. Kimmick
Drainage File

BOHANNAN-HUSTON INC.



4125 CARLISLE BLVD., N.E. ALBUQUERQUE, NEW MEXICO 87107 505 881-2000

August 18, 1977

RECEIVED

AUG 19 1977

CITY ENGINEERS

Mr. V. M. Kimmick
City Engineer
City of Albuquerque
Albuquerque, NM 87103

Re: Drainage Report for Crestview Heights Unit 5 and Casa Grande Park

Dear Mr. Kimmick:

As agents for H. G. Pickard and Associates, we are submitting the above referenced drainage report for your review and approval.

If you should have any questions regarding this matter, please feel free to contact this office. We are looking forward to hearing from you in the near future.

Sincerely,

Michael J. Irwin
Design Engineer

Enclosure

cc: H. G. Pickard and Associates

MJI/dlh
Job No. 77-117

Cremins
Inc.



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR

Harry E. Kinney

CHIEF

ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

June 24, 1977

*Crestview
Heights Unit S*

Mr. Michael J. Irwin
Design Engineer
Bohannon-Huston Inc.
4125 Carlisle Blvd. N.E.
Albuquerque, N.M. 87107

SUBJECT: PARK PLACE, CRESTVIEW HEIGHTS UNIT 5
AND CASA GRANDE PARK

Dear Mr. Irwin:

Your letter of June 20, 1977 has been received, however, the enclosed material referred to in the letter was not received by this office.

There is no objection to your firm designing these subdivisions, however, regardless of the advance state of design, both procedures should be followed. Therefore, the next step should be C.I. as outlined in Procedures for Design of Water and Sanitary Sewer Line Extensions. Following this a design conference should be held with Engineering and other appropriate City agencies to answer other questions posed in your letter.

Sincerely,

V. M. Rimmick
V. M. Rimmick
City Engineer

VMK/fs
cc: Bill Otto
Bob Kielich
Bruno Conegliano
Dwayne Sheppard

BOHANNAN-HUSTON INC.



4125 CARLISLE BLVD., N.E. ALBUQUERQUE, NEW MEXICO 87107 505 881-2000

June 20, 1977

Mr. V. M. Kimmick
City Engineer
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

RECEIVED

JUN 23 1977

Re: Park Place, Crestview Heights Unit 5 and Casa Grande Park
C777 ENGINEERS

Dear Mr. Kimmick:

In accordance with the recent requirements of the City Engineering Division - Water Resources Department, we hereby request water and sewer extensions and approval to design the above referenced subdivisions.

Since approved preliminary plats are available, and much is already known about existing waterlines in these areas, reproducible copies of the preliminary plats will be supplied to the Water Resources Department with a copy of this letter showing an initial layout of the internal waterline.

Park Place will sewer to existing lines in Silver and Lead Avenue, and San Carlos Drive. Capacity of these existing lines should be analyzed.

Crestview Heights Unit 5 will sewer to Palo Verde Drive then west through a utility easement and discharges to the Sandia Main Trunk Sewer. Flows from Crestview Heights Unit 5 and Casa Grande Park were considered during the design of the Sandia Main Trunk Sewer.

Casa Grande Park lots 8 through 18, Blocks 1 and 2 will sewer to Palo Verde Drive then west through a utility easement and discharges to the Sandia Main Trunk Sewer. The remaining lots will sewer to the existing line in Candelaria Road. Capacity of this existing line should be analyzed.

The three referenced subdivisions are presently being designed by our office, and it is necessary that we determine the status of water and sewer utilities in these areas before designs can be completed. We hope the enclosed material will make your analysis easier.

If you should have any questions regarding this matter, please feel free to contact this office.

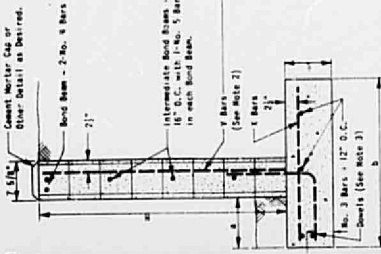
Sincerely,

Michael J. Irwin
Design Engineer

Enclosure

cc: Mr. Bill Otto

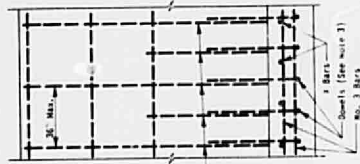
MJI/dlh
Job No. 77-117
77-021



CROSS SECTION

REINFORCED CONCRETE MASONRY - 8" WALLS

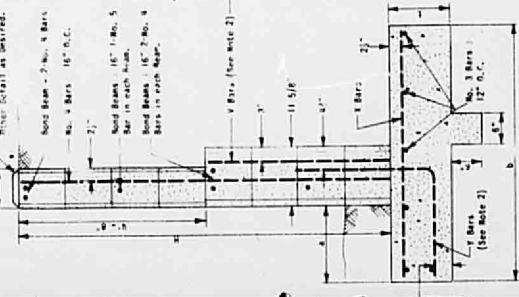
ELEVATION



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GENERAL NOTES:

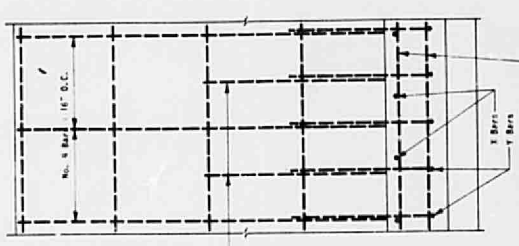
1. Reinforcement of a size and spacing other than indicated above may be used, provided such other reinforcement will develop the same area of steel at least equal to that indicated in the table.
2. Alternate # bars may be spaced at the weight of the wall (112) if the spacing of the bars extending to the top of the wall is at least equal in size and spacing to the # bars.
3. # bars shall project a minimum of 30 bar diameters into the filled block core and shall extend to the top of the wall.
4. Walls designed for level backfill only.



CROSS SECTION

REINFORCED CONCRETE MASONRY - 8" & 12" WALLS

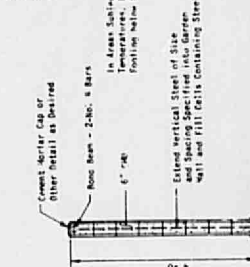
ELEVATION



h	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa	ab	ac	ad	ae	af	ag	ah	ai	aj	ak	al	am	an	ao	ap	aq	ar	as	at	au	av	aw	ax	ay	az	ba	bb	bc	bd	be	bf	bg	bh	bi	bj	bk	bl	bm	bn	bo	bp	bq	br	bs	bt	bu	bv	bw	bx	by	bz	ca	cb	cc	cd	ce	cf	cg	ch	ci	cj	ck	cl	cm	cn	co	cp	cq	cr	cs	ct	cu	cv	cw	cx	cy	cz	da	db	dc	dd	de	df	dg	dh	di	dj	dk	dl	dm	dn	do	dp	dq	dr	ds	dt	du	dv	dw	dx	dy	dz	ea	eb	ec	ed	ee	ef	eg	eh	ei	ej	ek	el	em	en	eo	ep	eq	er	es	et	eu	ev	ew	ex	ey	ez	fa	fb	fc	fd	fe	ff	fg	fh	fi	fj	fk	fl	fm	fn	fo	fp	fq	fr	fs	ft	fu	fv	fw	fx	fy	fz	ga	gb	gc	gd	ge	gf	gg	gh	gi	gj	gk	gl	gm	gn	go	gp	gq	gr	gs	gt	gu	gv	gw	gx	gy	gz	ha	hb	hc	hd	he	hf	hg	hh	hi	hj	hk	hl	hm	hn	ho	hp	hq	hr	hs	ht	hu	hv	hw	hx	hy	hz	ia	ib	ic	id	ie	if	ig	ih	ii	ij	ik	il	im	in	io	ip	iq	ir	is	it	iu	iv	iw	ix	iy	iz	ja	jb	jc	jd	je	jf	jj	jk	jl	jm	jn	jo	jp	jq	jr	js	jt	ju	jv	jw	jx	ky	kz	la	lb	lc	ld	le	lf	lg	lh	li	lj	lk	ll	lm	ln	lo	lp	lq	lr	ls	lt	lu	lv	lw	lx	ly	lz	ma	mb	mc	md	me	mf	mg	mh	mi	mj	mk	ml	mm	mn	mo	mp	mq	mr	ms	mt	mu	mv	mw	mx	my	mz	na	nb	nc	nd	ne	nf	ng	nh	ni	nj	nk	nl	nm	nn	no	np	nq	nr	ns	nt	nu	nv	nw	nx	ny	nz	oa	ob	oc	od	oe	of	og	oh	oi	oj	ok	ol	om	on	oo	op	oq	or	os	ot	ou	ov	ow	ox	oy	oz	pa	pb	pc	pd	pe	pf	pg	ph	pi	pj	pk	pl	pm	pn	po	pp	pq	pr	ps	pt	pu	pv	pw	px	py	pz	qa	qb	qc	qd	qe	qf	qg	qh	qi	qj	qk	ql	qm	qn	qo	qp	qq	qr	qs	qt	qu	qv	qw	qx	qy	qz	ra	rb	rc	rd	re	rf	rg	rh	ri	rj	rk	rl	rm	rn	ro	rp	rq	rr	rs	rt	ru	rv	rw	rx	ry	rz	sa	sb	sc	sd	se	sf	sg	sh	si	sj	sk	sl	sm	sn	so	sp	sq	sr	ss	st	su	sv	sw	sx	sy	sz	ta	tb	tc	td	te	tf	tg	th	ti	tj	tk	tl	tm	tn	to	tp	tq	tr	ts	tt	tu	tv	tw	tx	ty	tz	ua	ub	uc	ud	ue	uf	ug	uh	ui	uj	uk	ul	um	un	uo	up	uq	ur	us	ut	uu	uv	uw	ux	uy	uz	va	vb	vc	vd	ve	vf	vg	vh	vi	vj	vk	vl	vm	vn	vo	vp	vq	vr	vs	vt	vu	vv	vw	vx	vy	vz	wa	wb	wc	wd	we	wf	wg	wh	wi	wj	wk	wl	wm	wn	wo	wp	wq	wr	ws	wt	wu	wv	ww	wx	wy	wz	xa	xb	xc	xd	xe	xf	yg	yh	yi	yj	yk	yl	ym	yn	yo	yp	yq	yr	ys	yt	yu	yv	yw	yx	yy	yz	za	zb	zc	zd	ze	zf	zg	zh	zi	zj	zk	zl	zm	zn	zo	zp	zq	zr	zs	zt	zu	zv	zw	zx	zy	zz
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GENERAL NOTES:

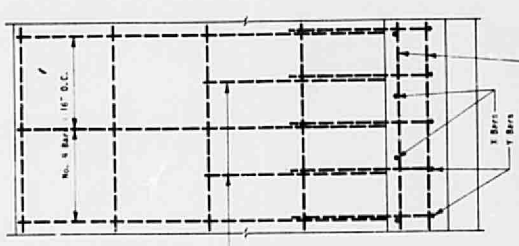
1. Reinforcement of a size and spacing other than given in the table may be used, provided such other reinforcement will develop the same area of steel at least equal to that indicated in the table.
2. # bars shall project at least 30 bar diameters into filled cells in the wall.
3. # bars may be extended to the top of the 12" wall section and the # bars omitted.
4. Walls designed for level backfill only.



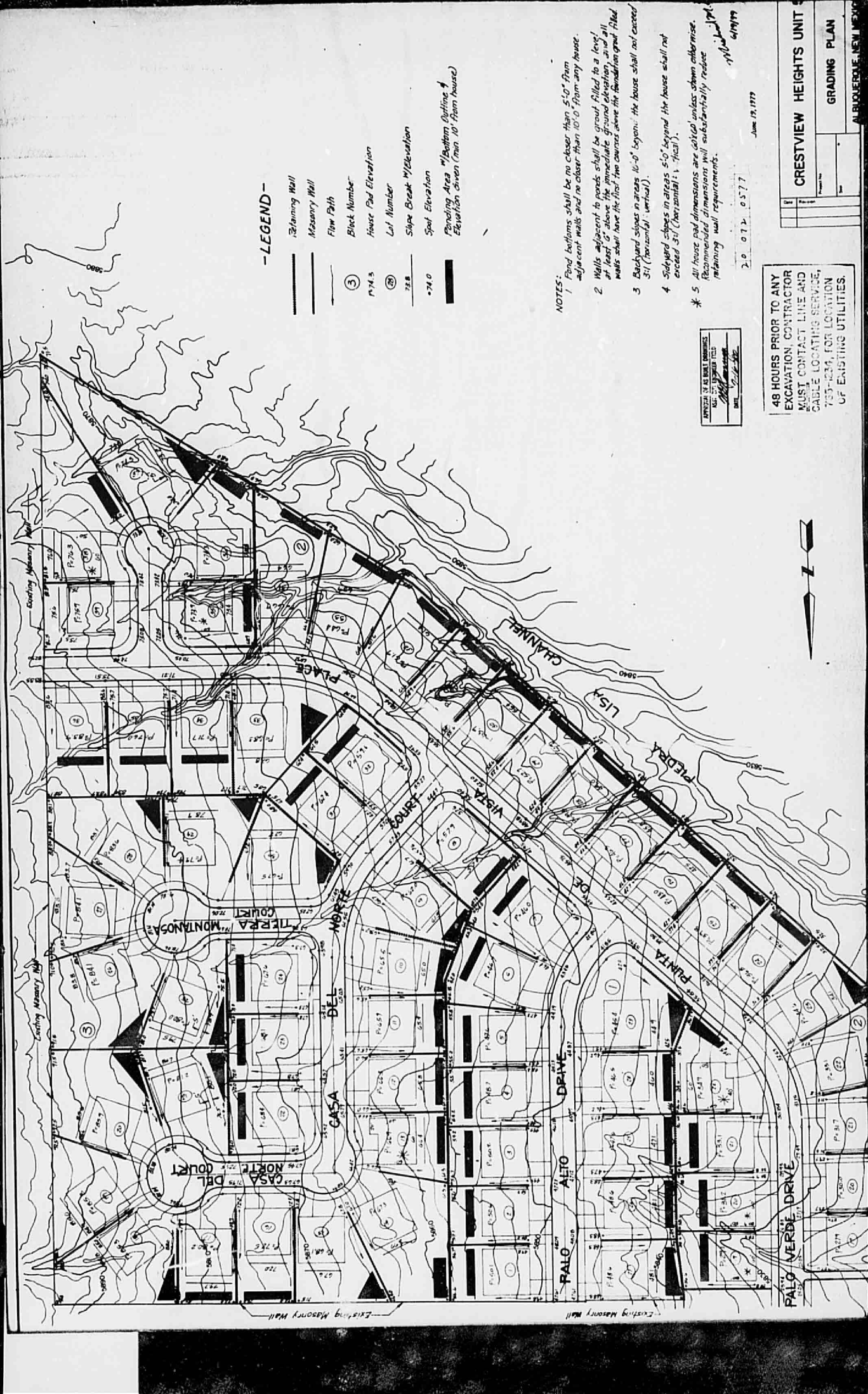
CROSS SECTION

REINFORCED CONCRETE MASONRY - 8" & 12" WALLS

ELEVATION



M	m	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	aa	ab	ac	ad	ae	af	ag	ah	ai	aj	ak	al	am	an	ao	ap	aq	ar	as	at	au	av	aw	ax	ay	az	ba	bb	bc	bd	be	bf	bg	bh	bi	bj	bk	bl	bm	bn	bo	bp	bq	br	bs	bt	bu	bv	bw	bx	by	bz	ca	cb	cc	cd	ce	cf	cg	ch	ci	cj	ck	cl	cm	cn	co	cp	cq	cr	cs	ct	cu	cv	cw	cx	cy	cz	da	db	dc	dd	de	df	dg	dh	di	dj	dk	dl	dm	dn	do	dp	dq	dr	ds	dt	du	dv	dw	dx	dy	dz	ea	eb	ec	ed	ee	ef	eg	eh	ei	ej	ek	el	em	en	eo	ep	eq	er	es	et	eu	ev	ew	ex	ey	ez	fa	fb	fc	fd	fe	ff	fg	fh	fi	fj	fk	fl	fm	fn	fo	fp	fq	fr	fs	ft	fu	fv	fw	fx	fy	fz	ga	gb	gc	gd	ge	gf	gg	gh	gi	gj	gk	gl	gm	gn	go	gp	gq	gr	gs	gt	gu	gv	gw	gx	gy	gz	ha	hb	hc	hd	he	hf	hg	hh	hi	hj	hk	hl	hm	hn	ho	hp	hq	hr	hs	ht	hu	hv	hw	hx	hy	hz	ia	ib	ic	id	ie	if	ig	ih	ii	ij	ik	il	im	in	io	ip	iq	ir	is	it	iu	iv	iw	ix	iy	iz	ja	jb	jc	jd	je	jf	jj	jk	jl	jm	jn	jo	jp	jq	jr	js	jt	ju	jv	jw	jx	ky	kz	la	lb	lc	ld	le	lf	lg	lh	li	lj	lk	ll	lm	ln	lo	lp	lq	lr	ls	lt	lu	lv	lw	lx	ly	lz	ma	mb	mc	md	me	mf	mg	mh	mi	mj	mk	ml	mm	mn	mo	mp	mq	mr	ms	mt	mu	mv	mw	mx	my	mz	na	nb	nc	nd	ne	nf	ng	nh	ni	nj	nk	nl	nm	nn	no	np	nq	nr	ns	nt	nu	nv	nw	nx	ny	nz	oa	ob	oc	od	oe	of	og	oh	oi	oj	ok	ol	om	on	oo	op	oq	or	os	ot	ou	ov	ow	ox	oy	oz	pa	pb	pc	pd	pe	pf	pg	ph	pi	pj	pk	pl	pm	pn	po	pp	pq	pr	ps	pt	pu	pv	pw	px	py	pz	qa	qb	qc	qd	qe	qf	qg	qh	qi	qj	qk	ql	qm	qn	qo	qp	qq	qr	qs	qt	qu	qv	qw	qx	qy	qz	ra	rb	rc	rd	re	rf	rg	rh	ri	rj	rk	rl	rm	rn	ro	rp	rq	rr	rs	rt	ru	rv	rw	rx	ry	rz	sa	sb	sc	sd	se	sf	sg	sh	si	sj	sk	sl	sm	sn	so	sp	sq	sr	ss	st	su	sv	sw	sx	sy	sz	ta	tb	tc	td	te	tf	tg	th	ti	tj	tk	tl	tm	tn	to	tp	tq	tr	ts	tt	tu	tv	tw	tx	ty	tz	ua	ub	uc	ud	ue	uf	ug	uh	ui	uj	uk	ul	um	un	uo	up	uq	ur	us	ut	uu	uv	uw	ux	uy	uz	va	vb	vc	vd	ve	vf	vg	vh	vi	vj	vk	vl	vm	vn	vo	vp	vq	vr	vs	vt	vu	vv	vw	vx	vy	vz	wa	wb	wc	wd	we	wf	wg	wh	wi	wj	wk	wl	wm	wn	wo	wp	wq	wr	ws	wt	wu	wv	ww	wx	wy	wz	xa	xb	xc	xd	xe	xf	xg	xh	xi	xj	xk	xl	xm	xn	xo	xp	xq	xr	xs	xt	xu	xv	xw	xx	xy	xz	ya	yb	yc	yd	ye	yf	yg	yh	yi	yj	yk	yl	ym	yn	yo	yp	yq	yr	ys	yt	yu	yv	yw	yx	yy	yz	za	zb	zc	zd	ze	zf	zg	zh	zi	zj	zk	zl	zm	zn	zo	zp	zq	zr	zs	zt	zu	zv	zw	zx	zy	zz
6	0	15	3	9	2	12																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												



-LEGEND-

- Retaining Wall
- Masonry Wall
- Flow Path
- Block Number
- House Footprint
- Lot Number
- Slope Break Elevation
- Spot Elevation
- Ponding Area "Bottom Outline" Elevation Given (Min. 10' from house)

NOTES:

1. Pond bottoms shall be no closer than 5'-0" from adjacent walls and no closer than 10'-0" from any house.
2. Walls adjacent to ponds shall be built to a level at least 6" above the immediate ground elevation, and all walls shall have the first two courses above the foundation grade filled with concrete (horizontal vertical).
3. Backyard slopes in areas 10'-0" beyond the house shall not exceed 3:1 (horizontal vertical).
4. Saturated slopes in areas 5'-0" beyond the house shall not exceed 3:1 (horizontal vertical).
- * 5. All house pad dimensions are 60'x60' unless shown otherwise. Recommended dimensions will substantially reduce retaining wall requirements.

APPROVED FOR AS-BUILT DRAWINGS	DATE: 07/10/79
BY: [Signature]	DATE: 07/10/79

2.0 0.7 0.5 7.7

June 19, 1979

48 HOURS PRIOR TO ANY EXCAVATION, CONTRACTOR MUST CONTACT LINE AND CABLE LOCATING SERVICE, 753-4234, FOR LOCATION OF EXISTING UTILITIES.



10-10-19



TRI- PLEX

2824 PALO VERDE DR, N.E.

(a) ROCK PIT: $18' \times 5' = 90 \text{ SF} \times .66 = 59 \text{ CF}$

$30' \times 2' = 60 \text{ SF} \times .66 = 40 \text{ CF}$

(b) PAVING AREA $24' \times 20' = 480 \text{ SF} \times .66 = 316 \text{ CF}$

$6' \times 8' = 48 \text{ SF} \times .5 = 24 \text{ CF}$

TOTAL PAVING

439 CF

2800 PALO VERDE DR NE

(a) ROCK PIT $18 \times 5 = 90 \times .66 = 59 \text{ CF}$

$30 \times 2 = 60 \times .66 = 40 \text{ CF}$

(b) PAVING $24 \times 15 = 360 \times .66 = 237$

$6' \times 8' = 48 \times .5 = 24$

TOTAL PAVING

360 CF

4- PLEX

2900 PALO VERDE DR NE

(a) ROCK PIT: $30 \times 4 = 120 \times .33 = 40 \text{ CF}$

$30 \times 4 = 120 \times .33 = 40 \text{ CF}$

PAVING AREA $30 \times 15 = 450 \times .66 = 297 \text{ CF}$

$30 \times 15 = 450 \times .66 = 297 \text{ CF}$

TOTAL PAVING

674 CF

PONDING REQUIREMENTS

TRI-PLEX

2808 PALO VERDE DR. NE.

(a) ROCK PIT: $18' \times 5' = 90 \text{ SF} \times .66 = 59 \text{ CF}$

$30' \times 2' = 60 \text{ SF} \times .66 = 40 \text{ CF}$

(b) PAVING AREA $27' \times 24' = 648 \text{ SF} \times .66 = 427 \text{ CF}$

$6' \times 8' = 48 \text{ SF} \times .5 = 24 \text{ CF}$

TOTAL PONDING

550 CF +/-

TRI-PLEX

2804 PALO VERDE DR. NE.

(a) ROCK PIT: $18' \times 5' = 90 \text{ SF} \times .66 = 59 \text{ CF}$

$30' \times 2' = 60 \text{ SF} \times .66 = 40 \text{ CF}$

(b) PAVING AREA $25' \times 24' = 600 \text{ SF} \times .66 = 396 \text{ CF}$

$6' \times 8' = 48 \text{ SF} \times .5 = 24 \text{ CF}$

TOTAL PAVING

519 CF

TRI-PLEX

2820 PALO VERDE DR. NE.

(a) ROCK PIT: $18' \times 5' = 90 \text{ SF} \times .66 = 59 \text{ CF}$

$30' \times 2' = 60 \text{ SF} \times .66 = 40 \text{ CF}$

(b) PAVING AREA $24' \times 24' = 576 \text{ SF} \times .66 = 380 \text{ CF}$

~~TOTAL PONDING~~ $6' \times 8' = 48 \text{ SF} \times .5 = 24$

TOTAL PONDING

503 CF

TRI-PLEX

2824 PALO VERDE DR, N.E.

(a) ROCK PIT: $18' \times 5' = 90 \text{ SF} \times .66 = 59 \text{ CF}$

$30' \times 2' = 60 \text{ SF} \times .66 = 40 \text{ CF}$

(b) PAVING AREA $24' \times 20' = 480 \text{ SF} \times .66 = 316 \text{ CF}$

$6' \times 8' = 48 \text{ SF} \times .5 = 24 \text{ CF}$

TOTAL PAVING

439 CF

2800 PALO VERDE DR NE

(a) ROCK PIT $18 \times 5 = 90 \times .66 = 59 \text{ CF}$

$30 \times 2 = 60 \times .66 = 40 \text{ CF}$

(b) PAVING $24 \times 15 = 360 \times .66 = 237$

$6' \times 8' = 48 \times .5 = 24$

TOTAL PAVING

360 CF

4-PLEX

2900 PALO VERDE DR NE

(a) ROCK PIT: $30 \times 4 = 120 \times .33 = 40 \text{ CF}$

$30 \times 4 = 120 \times .33 = 40 \text{ CF}$

PAVING AREA $30 \times 15 = 450 \times .66 = 297 \text{ CF}$

$30 \times 15 = 450 \times .66 = 297 \text{ CF}$

TOTAL PAVING

674 CF



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
Harry E. Kinney

CHIEF
ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

June 24, 1977

Mr. Michael J. Irwin
Design Engineer
Bohannon-Huston Inc.
4125 Carlisle Blvd. N.E.
Albuquerque, N.M. 87107

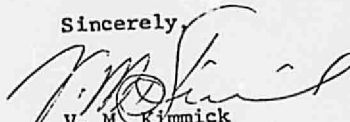
SUBJECT: PARK PLACE, CRESTVIEW HEIGHTS UNIT 5
AND CASA GRANDE PARK

Dear Mr. Irwin:

Your letter of June 20, 1977 has been received, however, the enclosed material referred to in the letter was not received by this office.

There is no objection to your firm designing these subdivisions, however, regardless of the advance state of design, both procedures should be followed. Therefore, the next step should be C.I. as outlined in Procedures for Design of Water and Sanitary Sewer Line Extensions. Following this a design conference should be held with Engineering and other appropriate City agencies to answer other questions posed in your letter.

Sincerely,


V. M. Kimmick
City Engineer

VMK/fs
cc: Bill Otto
Bob Kielich
Bruno Conegliano
Dwayne Sheppard

AN EQUAL OPPORTUNITY EMPLOYER

BOHANNAN-HUSTON INC.



4125 CARULE BLVD., N.E. ALBUQUERQUE, NEW MEXICO 87107 505 881-2000

June 20, 1977

Mr. V. M. Kimmick
City Engineer
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

RECEIVED

JUN 23 1977

Re: Park Place, Crestview Heights Unit 5 and Casa Grande Park
ENGINEERS

Dear Mr. Kimmick:

In accordance with the recent requirements of the City Engineering Division - Water Resources Department, we hereby request water and sewer extensions and approval to design the above referenced subdivisions.

Since approved preliminary plats are available, and much is already known about existing waterlines in these areas, reproducible copies of the preliminary plats will be supplied to the Water Resources Department with a copy of this letter showing an initial layout of the internal waterline.

Park Place will sewer to existing lines in Silver and Lead Avenue, and San Carlos Drive. Capacity of these existing lines should be analyzed.

Crestview Heights Unit 5 will sewer to Palo Verde Drive then west through a utility easement and discharges to the Sandia Main Trunk Sewer. Flows from Crestview Heights Unit 5 and Casa Grande Park were considered during the design of the Sandia Main Trunk Sewer.

Casa Grande Park lots 8 through 18, Blocks 1 and 2 will sewer to Palo Verde Drive then west through a utility easement and discharges to the Sandia Main Trunk Sewer. The remaining lots will sewer to the existing line in Candelaria Road. Capacity of this existing line should be analyzed.

The three referenced subdivisions are presently being designed by our office, and it is necessary that we determine the status of water and sewer utilities in these areas before designs can be completed. We hope the enclosed material will make your analysis easier.

If you should have any questions regarding this matter, please feel free to contact this office.

Sincerely,

Michael J. Irwin
Design Engineer

Enclosure

cc: Mr. Bill Otto

HJI/dlh
Job No. 77-117
77-021



DRAINAGE REPORT
FOR
CRESTVIEW HEIGHTS UNIT 5
AND
CASA GRANDE PARK

JUNE, 1977

BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.

1125 Camino Boulevard NE, Albuquerque, New Mexico 87107 Phone 881-2000

DRAINAGE REPORT
FOR
CRESTVIEW HEIGHTS UNIT 5
AND
CASA GRANDE PARK

JUNE 1977

PREPARED FOR
H. G. PICKARD & ASSOCIATES, INC.
8421 OSUNA ROAD, N.E.
ALBUQUERQUE, NEW MEXICO 87111

PREPARED BY
BOHANNAN-HUSTON, INC.
4125 CARLISLE BOULEVARD, N.E.
ALBUQUERQUE, NEW MEXICO 87107



Alfonso Delgado

ALFONSO DELGADO, P.E.
N.M.P.E. NO. 1789

TABLE OF CONTENTS

	<u>PAGE</u>
PURPOSE.	1
LOCATION	1
HYDROLOGIC ANALYSIS.	1
RECOMMENDATIONS.	3

APPENDIX
CALCULATIONS

PLATES
PLATE I DRAINAGE PATTERNS AND FLOW RATES

DRAINAGE REPORT
FOR
CRESTVIEW HEIGHTS UNIT 5
AND
CASA GRANDE PARK

PURPOSE

The purpose of this report is to present methods by which to limit the rate of runoff from the developed subdivisions to the rate that prevailed before development. By limiting the rate of runoff from the developed subdivision, the developer will be able to comply with the directives of the Albuquerque Metropolitan Arroyo Flood Control Authority.

LOCATION

Crestview Heights Unit 5 is located in the northeast heights of the City of Albuquerque, and is bounded on the east by Cibola Subdivision; bounded on the north by Casa Grande Manor Subdivision, and Casa Grande Park; bounded on the west by Tramway Boulevard, N.E., and bounded on the southerly side by the Piedra Lisa Channel north of Menaul Boulevard, N.E.

Casa Grande Park is located in the northeast heights of the City of Albuquerque and is bounded on the south by Crestview Heights Unit 5; bounded on the west by Tramway Boulevard, N.E.; bounded on the north by Candelaria Road, N.E., and bounded on the east by Casa Grande Manor Subdivision (see Plate I).

HYDROLOGIC ANALYSIS

The peak rates of undeveloped runoff from Crestview Heights

Unit 5, and Casa Grande Park are shown in the calculations to be 29.3 cfs and 13.6 cfs respectively. Runoff computations are for a 100 year storm frequency. The peak rate of runoff was determined by use of the rational formula, where the rate "Q" in cubic feet per second is equal to "C", a runoff factor, times "i", the intensity of rainfall over the entire study area, times "A", the area to be drained in acres. For the purpose of this report, the runoff factor "C", a constant, is 0.35 for undeveloped land. The intensity "i" is determined by first computing the time of concentration, which is the time required for runoff to reach the point of measurement from the most distant point in the area being considered. The time of concentration is computed using an imperial formula. The intensity in inches per hour is determined from the intensity duration frequency equations for this area as shown on the Master Plan of Drainage, City of Albuquerque, New Mexico and environs - 1963.

The peak rates of developed runoff from Crestview Heights Unit 5, and Casa Grande Park are shown in the calculations to be 22.8 cfs and 13.2 cfs respectively. These peak rates of runoff are less than the peak rates of the undeveloped subdivisions. In order to prevent the peak rates of developed runoff from exceeding the peak rates of undeveloped runoff, it is necessary to retain the rainfall on a portion of the lots in Crestview Heights Unit 5, by means of ponding from the setback line, as shown in the Appendix, and to detain the rainfall on all of the lots in Casa Grande Park by means of a controlled discharge from the parking area. The peak rates of developed runoff from the 100-year storm frequency are

determined by use of the rational formula. The runoff factor "C" is a weighted factor determined by multiplying the percent of grassed or planted area by 0.35 and adding the percent of pavement, sidewalk, drivepad, and roof area multiplied by 0.95. The intensity of rainfall is determined by the same method as described for undeveloped runoff except that the time required for runoff to reach the point of measurement is measured from the most distant point along the centerline of the carrier streets.

RECOMMENDATIONS

Crestview Heights Unit 5 - The rainfall from the 100-year storm frequency should be retained in backyard ponds from the 20 foot setback or building line to the rear of the lots including what falls on the building roofs. Since the runoff from the developed lots by implementing retention is computed to be 6.5 cfs less than the undeveloped peak runoff, ten of the lots would not require any retention. Upland flows are prevented from entering the subdivision by the use of water blocks on the streets in Cibola Subdivision.

The Piedra Lisa drainage channel should be improved to its final grade and section, as shown in "Study of the Embudo Arroyo System and its Tributaries 1976," City of Albuquerque, from 280 feet west of Malcolm Avenue to Tramway Boulevard. At Tramway Boulevard, a berm should be constructed from excess spoil material to turn flows from the Piedra Lisa drainage channel north, and to prevent flows from crossing Tramway Boulevard. From this point, flows will continue in a northerly direction along Tramway Boulevard until final grades are set on Tramway so that the channel can be designed in that area.

Flows from Crestview Heights Unit 5 should be diverted from Palo Verde Drive into the Piedra Lisa drainage channel through a 25-foot drainage easement between Lots 18 and 19, Block 2.

The peak upland runoff into Casa Grande Park from Casa Grande Manor, through a 20-foot drainage right-of-way is 108 cfs as predicted in the drainage report for Casa Grande Manor, prepared by Stites and Billingsley of Denver, Colorado. The peak runoff rate from Casa Grande Park at the west end of a 20-foot drainage right-of-way is $108 + 8.0 = 116.0$ cfs, with an additional 1.3 cfs from the backyards of Lots 1-18, Block 2. An additional 4.0 cfs is discharged onto Candelaria Road. The right-of-way must not be obstructed.

To insure that peak runoff from Casa Grande Park does not exceed undeveloped peak runoff, the following recommendations are made:

1. Lots 1-18, Block 1, will detain all rainfall within the parking area and release it through an 8"x8" curb opening with a 3"x2 5/8" orifice plate opening.
2. Lots 1-18, Block 2, will release rainfall falling on the backyards directly to the arroyo and detain all other rainfall within the parking area. It will be released through an 8"x8" curb opening with a 2"x2 1/4" orifice plate opening (see Appendix for details).

A water block should be provided on Palo Verde Drive between Lots 6 and 7 of Blocks 1 and 2. A water block should also be provided on Palo Verde Drive between Lots 17 and 18 of Blocks 1 and 2.

Runoff for all of Crestview Heights Unit 5 (Undeveloped)

Time of Concentration: $T_c = \text{Log}^{-1} [0.3641B + 3.854 \text{Log } L - .197 \text{Log } S - .3613]$

Where:

$B = \text{Ground Factor} = 1.80$

$L = \text{Length of Travel} = 1100 \text{ Feet}$

$S = \text{Slope in Percent} = 5889 - 5819 \div 1110 \times 100 = 6.6\%$

$T_c = \text{Log}^{-1} [0.3641(1.8) + 3.854(3.05) - .197(0.82) - .3613] = 20.3 \text{ Min.}$

From "Master Plan of Drainage" City of Albuquerque and Environs

Intensity Duration Curves Albuquerque Area - Chart 1.

$I = \text{Intensity in inches per hour} = 189 \div T_c + 25 \text{ (100 year Storm)}$

$I = 189 \div 20.3 + 25 = 4.17 \text{ inches per hour}$

Using the Rational Formula: $Q = CIA$

Where

$Q = \text{Runoff in cfs}$

$C = \text{Runoff Factor} = 0.35$

$I = \text{Intensity of rainfall over the entire Area for 100 Year Storm} = 4.17 \text{ inches per hour}$

$A = \text{Area to be Drained} = 20.1 \text{ acres}$

$Q = 0.35 \times 4.17 \times 20.1 = 29.3 \text{ Cfs.}$

Runoff for all of Casa Grande Park (Undeveloped)

$T_c = \text{Log}^{-1} [0.3641(1.8) + 3.854(2.41) - .197(0.79) - .3613] = 11.7 \text{ Min.}$

$I = 189 \div 11.7 + 25 = 5.14 \text{ inches per hour}$

$Q = CIA = 0.35 \times 5.14 \times 7.54 = 13.6 \text{ C.F.S.}$

Where:

$C = 0.35$

$B = 1.8$

$I = 5.14 \text{ In/hr.}$

$L = 260$

$A = 7.54 \text{ Ac.}$

$S = 6.15$



PROJECT NAME Crestview Heights Unit 5 & Casa Grande Park

SHEET 1 OF 10

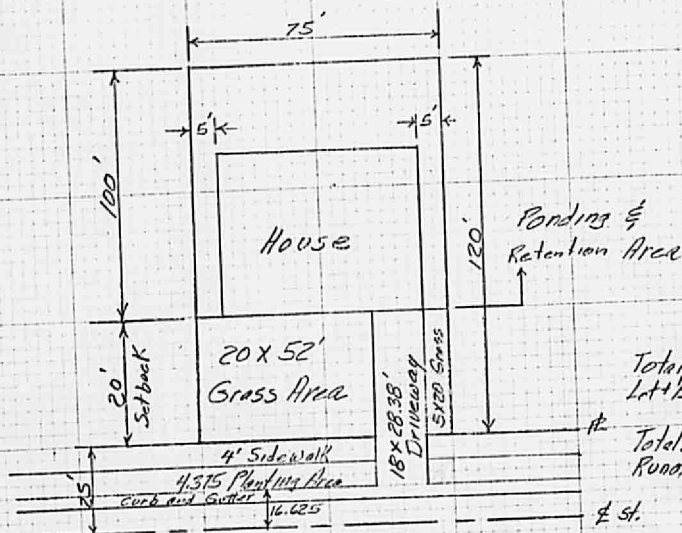
PROJECT NO. 77-117

BY A.D. DATE 6-13-77

SUBJECT Drainage Report

CH'D _____ DATE _____

Developed Area Runoff
Crest View Heights Unit 5



Total Area
 Lot + 1/2 St. = $115 \times 75 = 10,875 \text{ ft}^2$
 Total Area = $75 \times 45 = 3375 \text{ ft}^2$
 Runoff =

Grass and Planting Area: = $24.375 \times 52 = 1267.5$
 $20.0 \times 5 = 100$
 $5 \times 4.375 = 21.88$
 Total = $1389.0 = 41.16\%$

Pavement, Sidewalk and Driveway Area: = $18 \times 28.38 = 510.84 \text{ ft}^2$
 $4 \times 57 = 228.0$
 $75 \times 16.625 = 1246.88$
 Total = 1986.0 ft^2
 = 58.84%

Runoff Proportion = $3375 \div 10,875 = 0.31$

Runoff Factor (Adj.): $C = (.95 \times .5884) + (.35 \times .4116) = 0.70$

Total Area: Crest View Heights Unit 5 = 20.1 Acres

Developed Runoff Portion = $20.1 \times 0.31 = 6.23 \text{ Acres}$

Drainage Length of Travel = 1680 L. Ft.



PROJECT NAME _____

PROJECT NO. _____

SUBJECT Drainage Report

SHEET 2 OF 10

BY A.D. DATE _____

CHK'D _____ DATE _____

Developed Area Runoff

Crestview Heights Unit 5 (Continued)

$$\text{Slope} = 5894 - 5825 \div 1680 \times 100 = 4.1\%$$

$$\text{Ground Factor} = B = 0.77$$

$$\text{Time of Concentration, } T_c = \text{Log} [L \cdot 3641 \times 0.77 + 3854 \times 3.23 - .197 \times 0.61 - .3613] = 11.1 \text{ minutes}$$

$$\text{Intensity of Rainfall} = 189 \div 11.1 + 25 = 5.23 \text{ in./hr.}$$

$$Q = C I A$$

$$Q = 0.70 \times 5.23 \times 6.23 = 22.8 \text{ cfs. (Crestview Heights #5)}$$

Difference between developed and undeveloped runoff = $22.3 - 22.8 = 6.5 \text{ cfs}$

If area back of setback line is 52% grass and 48% Roof $C = .52 \times .35 + .48 \times .95 = 0.64$

$$\therefore Q = C I A = .64 \times 5.4 \times .172 = 0.59 \text{ cfs per lot}$$

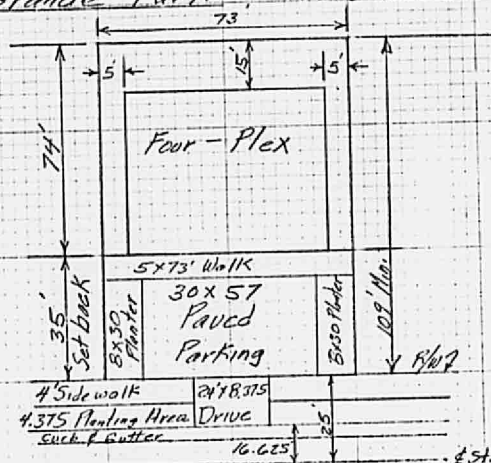
$$Q \text{ developed with 10 lots not ponded} = 22.8 + .59 \times 10 = 28.7 \text{ cfs.}$$

$\therefore$ 10 out of a total of 69 lots could be allowed to drain completely

Without ponding and not exceed the undeveloped peak runoff.

Casa Grande Park

LOTS 1-18 BLOCK 1



PROJECT NAME

PROJECT NO.

SUBJECT

77-117

Drainage Report

SHEET

3

OF

10

BY

A.D.

DATE

6-14-77

CH'D

DATE

Total Runoff from Developed Palo Verde Dr. = SEE SHEET 1

Length of road = 1320 L.Ft.

§ 10 FOR SPECIAL

Total Street Area = $1320 \times 50 = 66,000$ sq. ft.

CURB.

Adjusted Runoff Factor "C":

Sidewalk Area = $4 \times 1320 \times 2 = 10,560$ sq. ft.

Grass or Planter Area =

Driveway Area = $24 \times 4375 \times 36 = 3,780$

$4.375 \times 2 \times 1320 - 24 \times 4375 \times 36 = 7770$

Curbed and Paved Area = $38.25 \times 1320 = 43,890$

Total = 58,230 sq. ft.

Total = 7770 sq. ft.

% of Total Street = 88.23 %

% of Total Street = 11.77 %

Adjusted "C" = $0.95 \times .5823 + 0.35 \times .1177 = 0.88$

Time of Concentration "Tc":

Street grade, assumed = 0.5 %; Ground Factor = 0.11; Length = 1320 Ft.

$T_c = \log^{-1} [3.641 \times .77 + 38.59 \log 1320 - .197 \log 0.5 - .3613] = 15.2$ min.

Intensity = $189 \div 15.2 + 25 = 4.70$ in/hr. = "I"

Area = $66,000 \div 43,560 = 1.515$ Ac. = "A"

$Q = CIA = 0.88 \times 4.7 \times 1.515 = 6.3$ cfs

Allowable runoff per lot = Undeveloped runoff of 13.6

Less Runoff from Palo Verde Dr of 6.3 = 7.3 cfs $\div$ number of
Lots (36) = 0.2 cfs.

Area of opening from each lot (Four-Plex)

Orifice discharge Formula = $Q = C a \sqrt{2gh}$

Where: Q = allowable runoff per lot = 0.2 cfs

C = entrance coefficient = 0.62 (mean value)

g = Gravity constant = 32.2 ft/sec/sec

h = head on center of Orifice

a = Area of opening in Square Feet

Assume h = 3" high

$a = Q \div C \sqrt{2gh} = 0.2 \div 0.62 \sqrt{2 \times 32.2 \times \frac{8-14}{12}} = 0.0546$ Sq. Ft.

Width = $0.0546 \times 144 \div 3 = 2.62$ "; Use 2 5/8"



PROJECT NAME

PROJECT NO.

SUBJECT

77-117

Drainage Report

SHEET

4

OF

10

BY

A.D.

DATE

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DATE

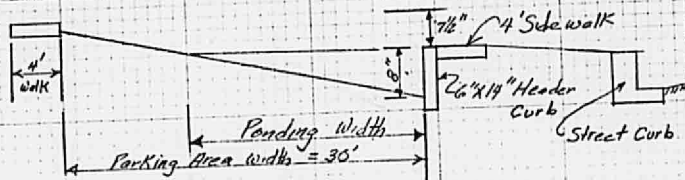
Maximum Volume of Detention (Ponding Volume)

$t = 189 \div 25 + t_c$; $Q = CIA$; Runoff Factor "C" = 0.79

$A = \text{Area} = 7957 \div 43,560 = 0.18266$

Storm Duration (t_c)	Intensity (I)	Runoff Rate (Q)	Volume of Runoff	Allowable Discharge Rate (Q_{out})	Discharge Volume	Volume Excess
10	5.4	0.7794	467.6	0.20	120.0	347.6
15	4.73	0.6824	614.3	0.2	180.0	434.3
20	4.20	0.6064	727.3	0.2	240.0	487.3
25	3.78	0.5454	818.2	0.2	300	518.2
30	3.44	0.4964	893.5	0.2	360	533.5
35	3.15	0.4544	954.6	0.2	420	534.6 *
40	2.91	0.4194	1007.8	0.2	480	527.8
45	2.70	0.3894	1052.0	0.2	540	512.0

Parking Area = $30 \times 57 = 1710 \text{ Sq. ft}$



Ponding Width = $534.6 \text{ cu. ft} \div 57 \times 8 1/2 = 14.068$ use 14'-1"

About 1/2 of each parking lot will contain storm water for 35 minutes at each 100 year Storm Frequency
There is a 1% Chance the lots will detain this much rainfall/year



PROJECT NAME

PROJECT NO.

SUBJECT

77-117

Drainage Report

SHEET 5

OF 10

BY

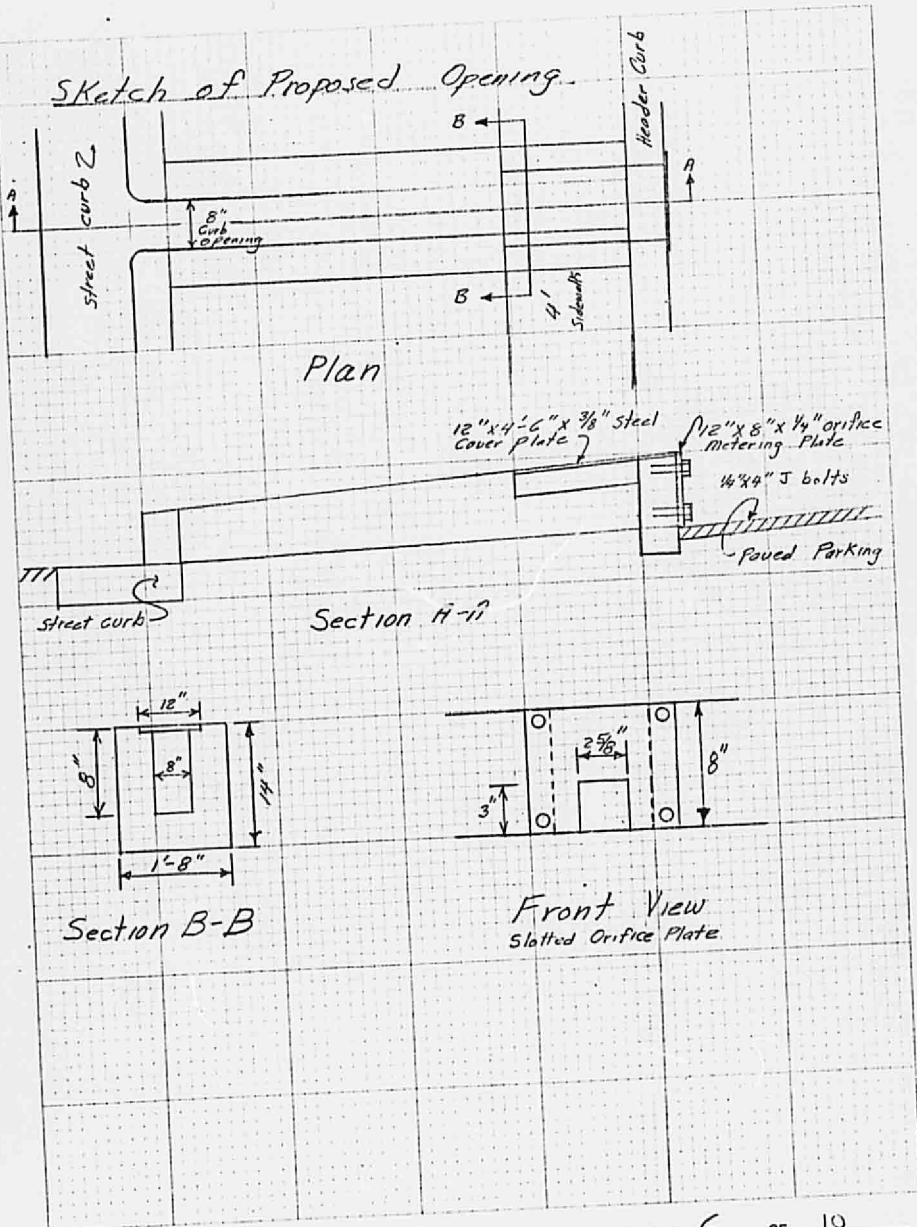
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Sketch of Proposed Opening



PROJECT NAME _____

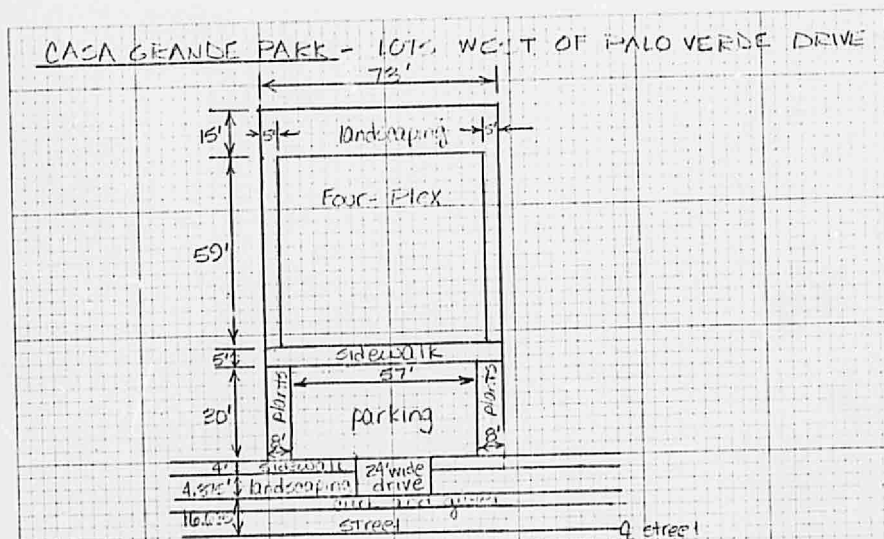
PROJECT NO. 77-117

SUBJECT Drainage Report

SHEET 6 OF 10

BY A.D. DATE _____

CHD _____ DATE _____



The runoff from the landscaping (storm drain) will flow out the back property line into the Piedra Lisa channel. The runoff from the rest of the property will be detained in the parking area.

Landscaping area

$$\left. \begin{array}{l} 72' \times 15' = 1095 \text{ ft}^2 \\ 20' \times 57' = 1140 \text{ ft}^2 \end{array} \right\} \text{total} = 2235 \text{ ft}^2 = .04 \text{ acres}$$

$Q = CIA$

$$C = 0.35$$

$$I = 5.4 \text{ in/hr}$$

$$A = .0387 \text{ acres}$$

$$Q = (0.35)(5.4)(.0387) = .073 \text{ cfs for each lot}$$

$$\text{allowable runoff from parking area} = .02 \text{ cfs (from previous calculations)}$$

$$- .073 \text{ cfs}$$

$$\underline{0.127 \text{ cfs per lot}}$$



PROJECT NAME Casa Grande Park

PROJECT NO. 77-117

SUBJECT Drainage Report

SHEET 7 OF 10

BY LN DATE 7-27-77

CH'D WJ DATE 9-15-77

Area of orifice opening

$$Q = C A \sqrt{2gh}$$

$$Q = 0.127 \text{ cfs}$$

$$C = 0.62$$

$$g = 32.2$$

assume height = 2" ...

$$\text{head} = h = 8" - 1" = 7" = 0.6 \text{ ft}$$

$$0.127 = (0.62)(A) \sqrt{(2)(32.2)(0.6)}$$

$$A = 0.0230 \text{ ft}^2$$

$$\text{width} = \frac{(0.0230 \text{ ft}^2)(144 \text{ in}^2/\text{ft}^2)}{(2")}$$

$$\text{width} = 2.31"$$

use 2.25" or 2 1/4"

MAXIMUM VOLUME OF DETENTION (PONDING VOLUME)

$$\text{Intensity} = \frac{1.89}{T_t + 25}$$

$$Q = CIA$$

C = runoff factor

where C = 0.95 (pavement)

$$\text{roof} = 59' \times 63' = 3717 \text{ ft}^2$$

$$\text{sidewalk} = 5' \times 73' = 365 \text{ ft}^2$$

$$\text{parking} = 51' \times 30' = 1530 \text{ ft}^2$$

$$5792 \text{ ft}^2 = 92\%$$

where C = 0.35 (landscaping)

$$\text{planting area} = 16' \times 30' = 480 \text{ ft}^2 = 8\%$$

adjusted runoff factor:

$$C = (0.95)(.92) + (0.35)(.08)$$

$$C = 0.90$$

$$A = \text{area} = 6272 \text{ ft}^2 = 0.14 \text{ acres}$$



PROJECT NAME Casa Grande Park

PROJECT NO. 77-117

SUBJECT Drainage Report

SHEET 8 OF 10

BY LH

DATE 7-27-77

CH'D JP

DATE 8-15-77

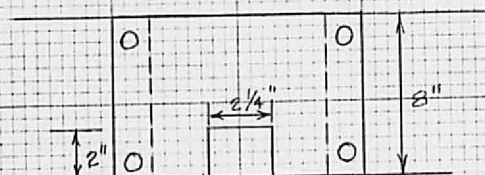
Storm duration	Intensity	Runoff Rate	Volume of runoff	allowable discharge	discharge volume	pond volume
T_c (min)	I (in/hr)	Q (cfs)	$Q \times T_c \times 60$ cu. ft	Q_{out} (cfs)	$Q_{out} \times T_c \times 60$ cu. ft	Runoff vol - discharge
10	5.40	0.68	408	0.12	72.0	336
15	4.73	0.60	540	0.12	108.0	432
20	4.20	0.53	636	0.12	144	492
25	3.78	0.48	720	0.12	180	540
30	3.44	0.43	774	0.12	216	558
35	3.15	0.40	840	0.12	252	588
40	2.91	0.37	888	0.12	288	600
45	2.70	0.34	918	0.12	324	594

parking area = $30' \times 57'$ max discharge (above) = 60×2^3

ponding width = $\frac{600 \text{ ft}^3}{(57 \text{ ft})(8" \times \frac{1}{12})} = 15.8 \text{ ft}$

assume head = 8"

FRONT VIEW OF ORIFICE PLATE



SEE SHEET 6 FOR DETAILS OF CURB OPENING



PROJECT NAME Casa Grande Park
PROJECT NO. 77-117
SUBJECT Drainage Report

SHEET 9 OF 10
BY LH DATE 7-27-77
CH'D 17 DATE 8-12-77

DEVELOPED AREA RUNOFF (continued)

NET DRAINAGE ONTO PALO VERDE DRIVE, CASA GRANDE PK.

AREA DRAINED TO PIEDRA LISA CHANNEL

$$0.039 \text{ ac/lot} \times 18 \text{ lots} = 0.702 \text{ acres}$$

From sheet 7

$$I = 5.4 \text{ inches/hr. From sheet 7}$$

$$C = 0.35 \text{ for grass \& soil}$$

$$Q_{\text{LOT}} = CIA = (0.35)(5.4)(0.039) = 0.073 \text{ cfs/lot}$$

$$Q_{\text{TOT}} = 0.073 \text{ cfs} \times 18 \text{ lots} = 1.3 \text{ cfs}$$

AREA DRAINED TO Candelaria

$$6(1.2) + 6(1.2) = 1.9 \text{ cfs FROM LOTS}$$

$$6.3 \text{ cfs } (9/18) = 2.1 \text{ cfs STREET}$$

$$\text{TOTAL } 4.0 \text{ cfs}$$

AREA DRAINED TO DRAINAGE ROW

$$12(1.2) + 12(1.2) = 3.8 \text{ cfs FROM LOTS}$$

$$6.3 \text{ cfs } (12/18) = 4.2 \text{ cfs FROM STREET}$$

$$\text{TOTAL} = 8 \text{ cfs}$$

TOTAL RUNOFF AFTER DEVELOPMENT

$$0.7 + 4.0 + 1.3 = 13.3 \text{ cfs}$$



PROJECT NAME CASA GRANDE PARK SHEET 10 OF 10
PROJECT NO. 77-117 BY W.P. DATE 8-15-77
SUBJECT DRAINAGE REPORT CND MJI DATE 8-17-77

**CRESTVIEW HEIGHTS
UNIT 5**

**Albuquerque,
Bernalillo County, New Mexico**

**DRAINAGE REPORT
FOR
HOME PLANNING DEVELOPMENT CO., INC.**

AUGUST 1973



August 6, 1973

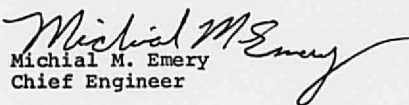
Crestview Heights, Inc.
1000 San Mateo Blvd SE
Albuquerque, New Mexico

Gentlemen:

We are submitting this Drainage Report to you on Crestview Heights Subdivision covering the development of Unit 5. The control of the runoff shall comply with the requirements of the Albuquerque Metropolitan Arroyo Flood Control Authority and with present City of Albuquerque policies.

We appreciate this opportunity to serve you. If any questions arise, we will be available to assist you in your response.

Very truly yours,


Michial M. Emery
Chief Engineer

MME/teg

Enclosure

BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.



4125 CARLSLE BLVD. N.E.
ALBUQUERQUE, NEW MEXICO 87107
PHONE 505 345-2681

DRAINAGE REPORT

FOR

UNIT 5

CRESTVIEW HEIGHTS
BERNALILLO COUNTY, NEW MEXICO

AUGUST 1973

PREPARED FOR:

CRESTVIEW HEIGHTS, INC.
1000 SAN MATEO BLVD. SE
ALBUQUERQUE, NEW MEXICO 87108

BY

BOHANNAN WESTMAN HUSTON & ASSOCIATES, INC.
4125 CARLISLE BLVD NE
ALBUQUERQUE, NEW MEXICO 87107



Michial M. Emery
Michial M. Emery
Chief Engineer

DRAINAGE REPORT
FOR
UNIT 5
CRESTVIEW HEIGHTS SUBDIVISION

<u>ITEM</u>	<u>PAGE</u>
LOCATION	3
DRAINAGE BEFORE DEVELOPMENT	3
DRAINAGE AFTER DEVELOPMENT METHODS OF ANALYSIS	4
CONCLUSIONS	5
 TABLE I - Drainage Areas and Flow Calculations	 7
TABLE II - Hydraulic Computations for Diversion Wall and Channel	8
TABLE III- Stability Computations for Diversion Wall	10
 PLATE I - Location Map	
PLATE II - Drainage Areas & Design Flow	
PLATE III- Corps of Engineers Flood Intensity Graph	
PLATE IV - Flood Plain Layout and Drainage Improvements After Development	
PLATE V - Arroyo Cross Sections.	
PLATE VI - Arroyo Cross Sections.	

DRAINAGE REPORT
CRESTVIEW HEIGHTS SUBDIVISION
UNIT 5

LOCATION

Unit 5 of the Crestview Heights Subdivision is located in the City of Albuquerque along the eastern right of way of Tramway Boulevard northeast of Indian School Road. It covers an area of approximately 30 acres and is presently undeveloped.

Unit 5 lies on the alluvial fan that extends from the throat of the Piedra Lisa Canyon westward into the valley. The land slopes at approximately 6% from east to west and has a poor to moderate grass cover. (See Plate I, Location Map)

DRAINAGE BEFORE DEVELOPMENT

Runoff from the Piedra Lisa Canyon formed the alluvial fan on which Unit 5 is located. Plate 2, Drainage areas and Design Flows, shows that the Piedra Lisa Drainage Basin can be divided into three sub-drainage areas which more or less converge at the eastern property line of the parcel. Flows for these areas were taken from the Corps of Engineers "Hydraulic Data for Flood Plain Information Study, Albuquerque Arroyos Part IV". A portion of this study has been reproduced in this Report as Plate 3. Table I, Drainage Areas and Flow Calculations, indicate the procedure used for apportioning flows to individual sub-drainage areas. Plate 4, Flood Plain

Layout and Drainage Improvements After Development, shows the estimated flood plain routing based on the given contours. Plates 5 & 6 show cross sectional views at sections indicated on Plate 4.

It should be noted, however, that field inspections of the area suggest that contour resolution may be inadequate in critical areas for accurate flood plain routing. As a result, it must be concluded that flows coming out of the throat of the Canyon may approach the subject parcel at locations considerably north of those indicated on Plate 4.

DRAINAGE AFTER DEVELOPMENT - METHODS OF ANALYSIS

In order to prevent the Piedra Lisa flood waters from ever reaching the subject property after development, the concept of a diversion wall and channel was introduced and analyzed. Such diversion facilities could route all Piedra Lisa flood waters into the main Piedra Lisa Arroyo running through the property, and a drainage easement could be established along this arroyo.

Because of the uncertainty of the flood water routing as stated above, all design calculations and drainage improvement proposals have been based on the estimated worst case, i.e. that all flood waters generated in subsection A1 and parts of subsection A2 may approach the property in any arroyo along the eastern property line. In addition, the following two criteria were used in analyzing the hydraulics of diverting arroyo flows.

1) Flows rushing down channels and arroyos in a super-critical state of flow and subjected to a sudden change of direction would in the worst case, convert all velocity head to depth of water. Therefore, any diversion wall must be at least as high as the value of the total specific energy plus appropriate freeboard (freeboard assumed to be 1').

2) Assuming that all energy at the wall is in the form of potential energy, any diversion wall must be at least as high as the normal depth of the downstream channel, plus the energy in feet of water necessary to accelerate still water to the normal velocity of the downstream channel, plus appropriate freeboard.

Table 2, Hydraulic Computations for Diversion Wall and Channel, indicates that the maximum height of wall needed is 6.0'. Table 3, Stability Computations for Diversion Wall, indicates that a wall 1' thick with a base 5.5' wide will be adequate.

Since the purpose of this report is to examine the idea of a diversion wall and channel as an engineering concept, the dimensions and technical data indicated on Plate 4 are rough approximations only and not intended to be used for construction.

CONCLUSIONS

The waters of the Piedra Lisa Drainage Basin will eventually be directed into a retention dam which the City of Albuquerque plans to construct as part of its drainage

improvement program for Tramway Boulevard. The proposal for diversion of the Piedra Lisa waters outlined in this report conforms with the recommendations set forth in the City's "Tramway Boulevard Corridor and Drainage Study." Both that Study and this report recommend that a drainage easement be created along the Piedra Lisa Arroyo so that the arroyo may serve as a permanent drainage channel.

For this reason, and with the engineering analysis and recommendations made in this report, we feel the drainage plan for this property should be approved.

TABLE I
DRAINAGE AREAS AND
FLOW CALCULATIONS

Total Area = 0.61 sq.mi.
Total Design = 1586 cfs.
Flow (from Corps of
Engineers Chart,
Plate 3)

Sub-Basin Designation	Area (sq.mi.)	Sub-Basin Area/ Total Area= R_A	$Q_s = R_A \times Q_t$ (cfs)
A ₁	0.329	.54	858
A ₂	0.0540	.088	140
B	0.0342	.056	89
C	0.193	.32	502

TABLE II
HYDRAULIC COMPUTATIONS
for
DIVERSION WALL & CHANNEL

1) Specific Energy of Flow at Wall:

(As worst case assume all flow from Area A_1 and 80 cfs.
from A_2 is contained in Arroyo marked "T2" on Plate 4)

$$Q = 938 \text{ cfs}$$

$$S = 7.4\%$$

$$N = 0.04 \text{ (natural)}$$

From cross sectional geometry of arroyo and Mannings
formula.

$$\text{Depth} = 2.55 \text{ ft.}$$

$$\text{Vel} = 12.8 \text{ ft./sec.}$$

$$\therefore H_{\text{max}} = 2.55 + \frac{12.8^2}{64.4} + 1 \text{ (freeboard)}$$

$$= 6 \text{ ft.}$$

2) Channel Dimensions Along Wall

$$Q = 938 \text{ cfs.}$$

$$s \text{ (Available)} \\ = 1.7\%$$

$$\eta = .035 \text{ (improved earth channel)}$$

$$\text{Bottom Width} = 15 \text{ ft.}$$

from Manning's formula

$$\text{Depth} = 3.1 \text{ ft.}$$

$$V_{el} = 8.33 \text{ ft./sec.}$$

3) Ponding Height Necessary to Accelerate Water to Normal Velocity of Channel.

$$H = 3.1' + \frac{8.33^2}{64.4} + 1 \text{ (freeboard)}$$

$$= 5.2 \text{ ft.} < 6 \text{ ft.}$$

∴ Use a 6 ft. Wall

4) Force on Wall

A) Static Force/ft.

$$F = \frac{\gamma h^2}{2} = \frac{62.4 (5)^2}{2} = 780 \text{ lb./ft.}$$

B) Dynamic Force/ft. (Assume impulse is absorbed by 50' reach of wall)

$$F = \rho Q(V)/50 = 1.9(938)(12.8)/50 \\ = 456 \text{ lbs./ft.}$$

C) Total Force

$$780 + 456 = 1236 \text{ lbs.}$$

TABLE III
STABILITY COMPUTATIONS
for
DIVERSION WALL

- 1) Overturning Moment (Assume dynamic load applied at mid height)

$$\begin{aligned} M_o &= 780 (5/3+3) + 456 (2.5+3) \\ &= 3640 + 2508 = 6148 \text{ ft. lbs.} \end{aligned}$$

- 2) Vertical Load on Wall Foundation

Fv = Weight Wall & Weight Soil Above Foundation
(As worst case assume water does not contribute)

Unit weight soil assumed to be 110 lbs/ft³

Unit weight concrete assumed to be 150 lbs/ft³

$$\begin{aligned} F &= 8(1)(150) + (5.5)(1)(150) + 2(2.25)(2) \\ (110) &= 3015 \text{ lbs.} \end{aligned}$$

- 3) Check Against Overturning

$$\begin{aligned} M_R &= 8(1)(150)(2.75) + (5.5)(1)(150)(2.75) \\ &+ 2(2.25)(2)(110)(2.75) = 8291 \text{ lb.ft.} \end{aligned}$$

$$\text{Safety Factor} = 8291/6148 = 1.35$$

4) Check Against Sliding

Assume $\phi = 30^\circ$

$$K_p = \tan^2 (45 + \phi/2) = 3.0$$

$$f = \tan (2\phi/3) = .364$$

Assume $c = 0$

$$F_{SR} = \frac{K_p v h^2}{2} + F_v(f)$$

$$= \frac{3(110)(3)^2}{2} + 3015 (.364)$$

$$= 2582 \text{ lb.}$$

$$\text{Safety Factor} = 2582/1236 = 2$$

5) Check Bearing Stress @ Toe of Foundation

$$e = M_o/F_v = 6148/3015 = 2.04$$

$$q_{\max} = \frac{2 F_v}{3 (L/2 - e)} = \frac{2(3015)}{3 (5.5/2 - 2.04)}$$

$$= 2831 \text{ p.s.f.}$$

SCALE: 1" = 2000'

SCALE: 1" = 2000'



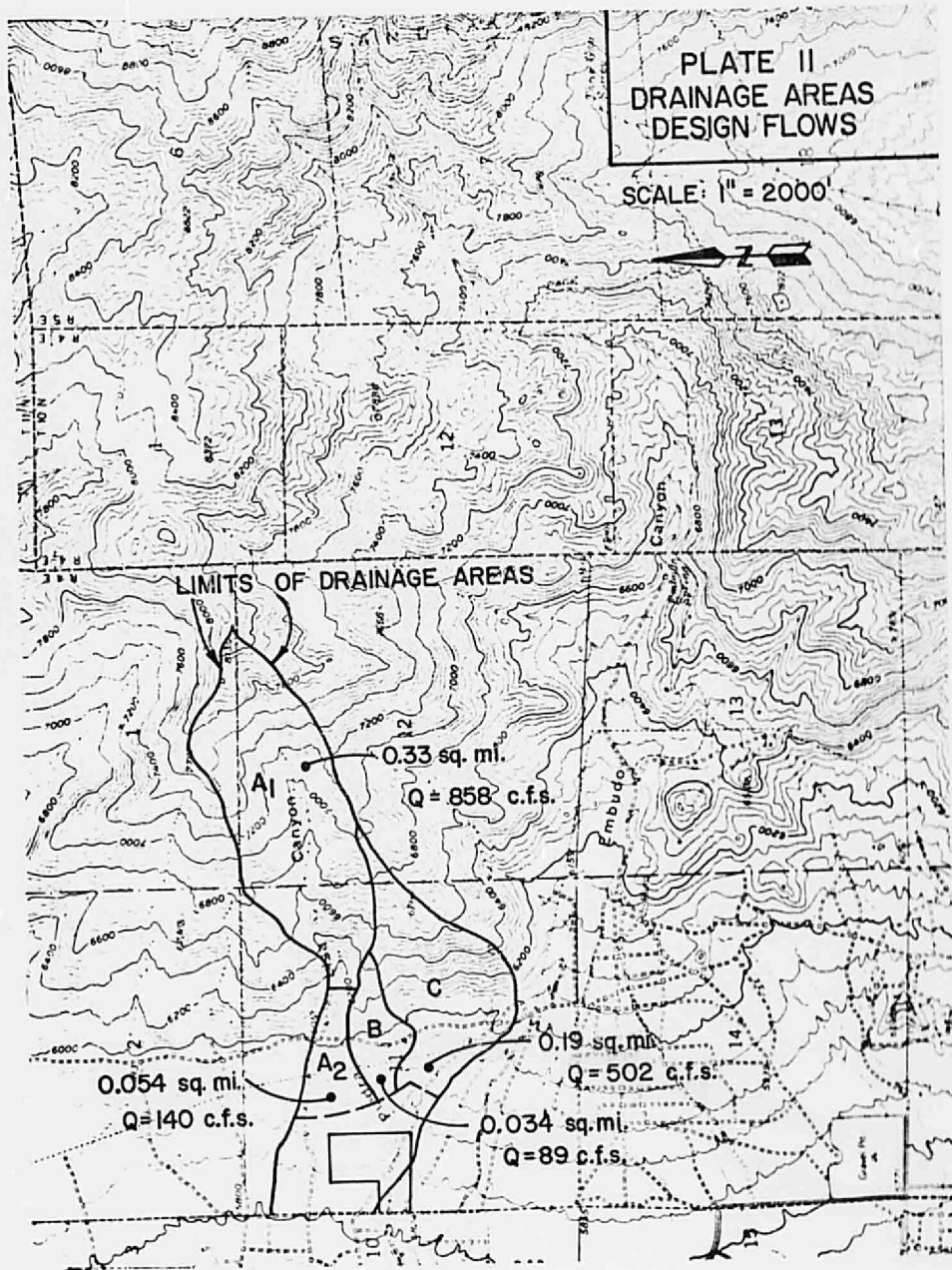
MANUAL BLVD.

CRESTVIEW HEIGHTS
UNIT 5

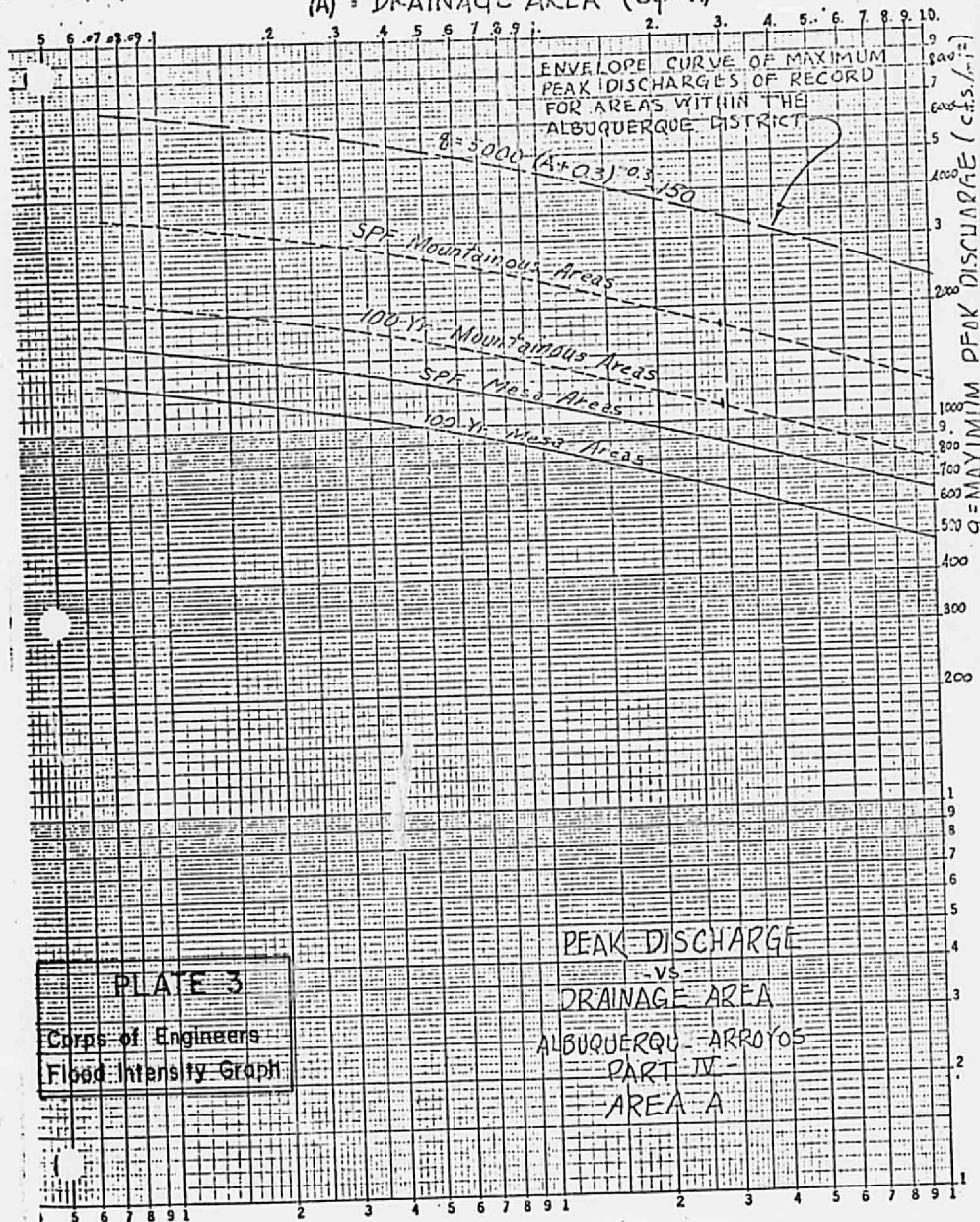
TRAMWAY BLVD

PLATE II
DRAINAGE AREAS
DESIGN FLOWS

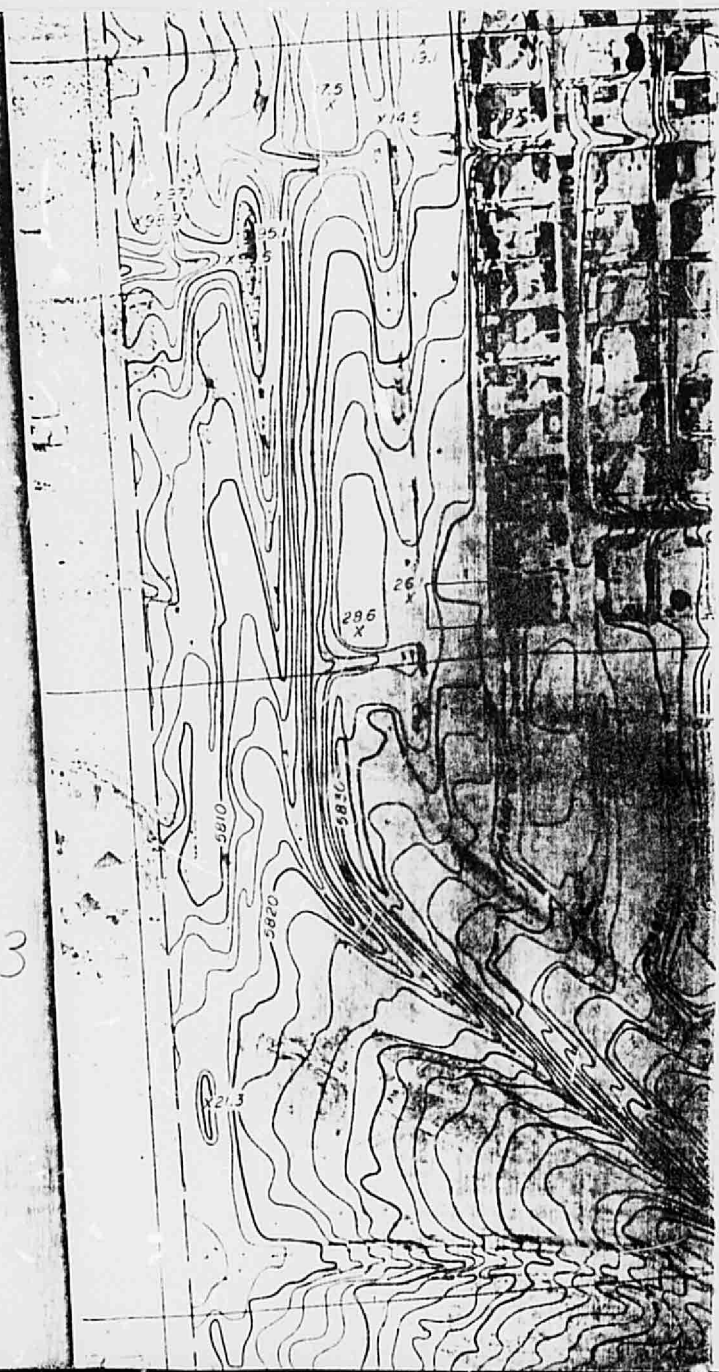
SCALE: 1" = 2000'

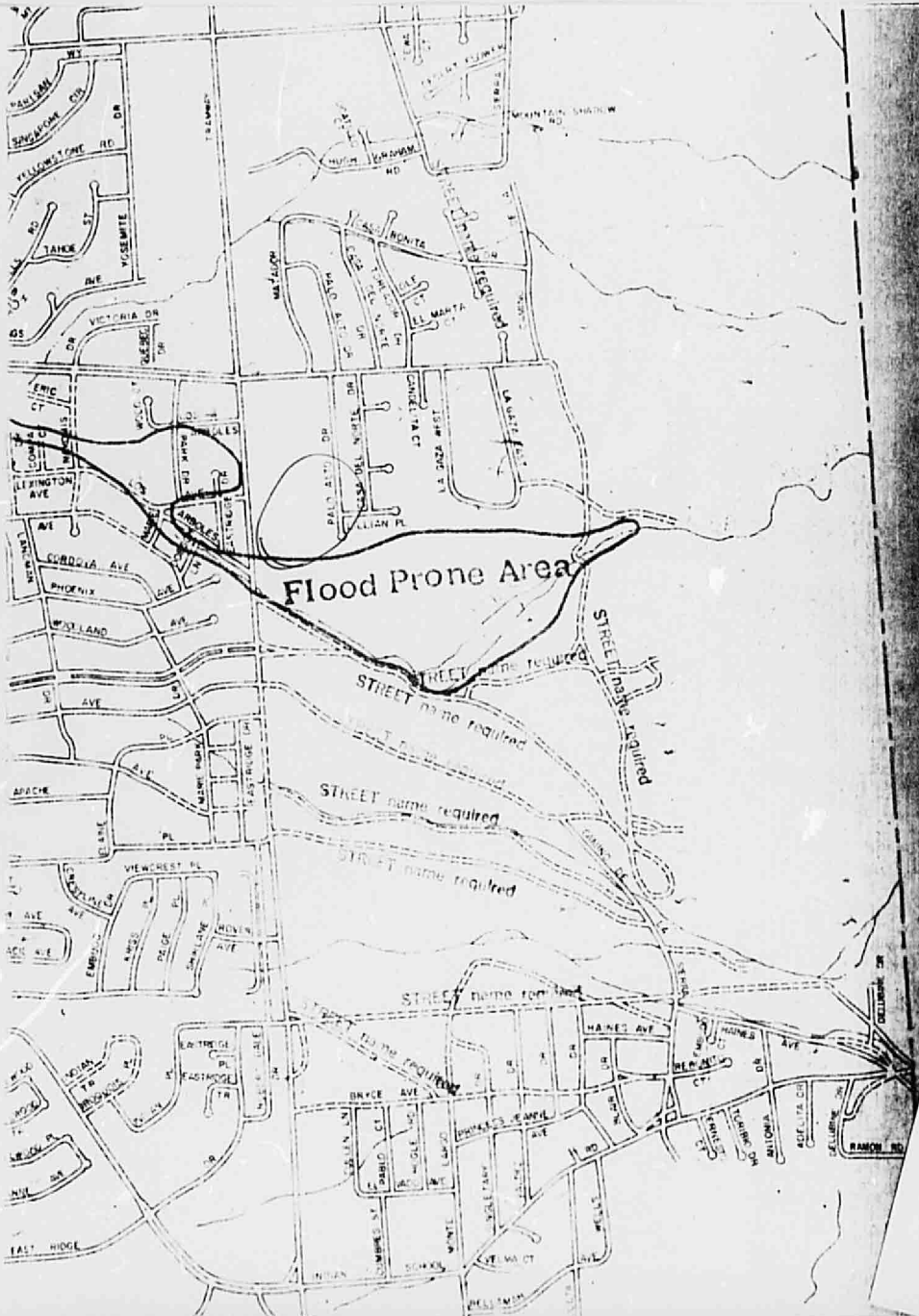


(A) = DRAINAGE AREA (sq.mi.)



H/23/D3





BUILDING & INSPECTION DIVISION

CITY OF ALBUQUERQUE

DATE 15 AUG 78

APPLICANT TO COMPLETE SPACES BELOW

BUILDING & INSPECTION DIVISION

Job Address 2801 PALO VERDE DR NE THESE PLANS NOT APPROVED UNLESS INITIALED BELOW

Owner H. S. PICKARD Phone 392-2306 Building (UBC), W

Contractor " Phone " Sign Code "

Architect LONG & WATERS Phone 265-5775 Mechanical, Plumbing, W

Designer " Phone " Swimming Pool (UMC, UPC) W

Engineer " Phone " Electrical (NEC) W

Describe Work TRI-PLEX

Valuation of Work \$65,000

Size of Building (Total) Sq. Ft. 3343

Class of Work: ☐ Public; ☒ Commercial; ☐ Multi-Residential;

☐ Single Residential

Subdivision CRESTVIEW WST

of 18 Block 2

PLANS & SPECIFICATIONS TO BE KEPT AT BUILDING OR WORK SITE AT ALL TIMES DURING WHICH THE WORK AUTHORIZED THEREBY IS IN PROGRESS.

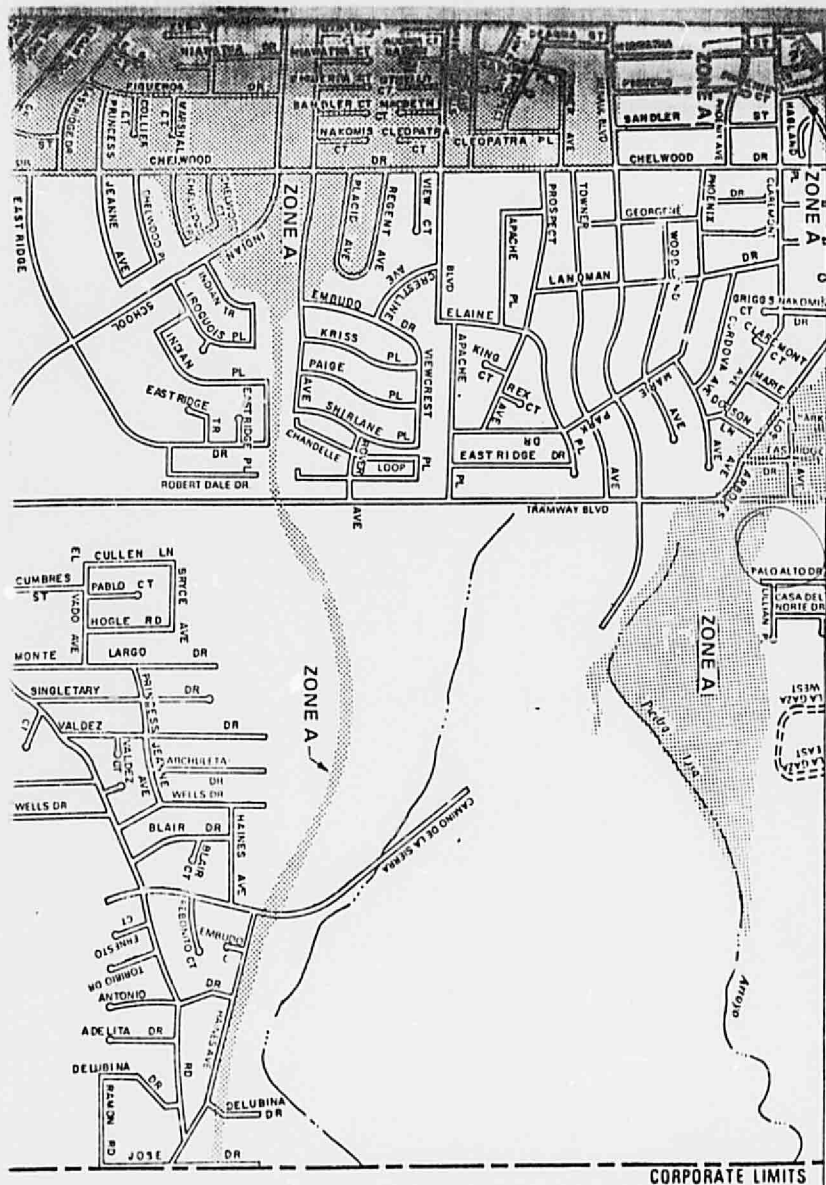
Valuation of Work 68,482

Plan Check Fee \$87.00

Building Permit Fee \$150.00

PLAN	CHECK	LOG
STATION	APPR.	RE
Pro rata		
Zoning		
Fire Dept.		
Police Dept.		
Health Dept.		
Public Works		
Electric		
Mechanical		
Structural		
Fire		

8/15/78 8:30 A.M.

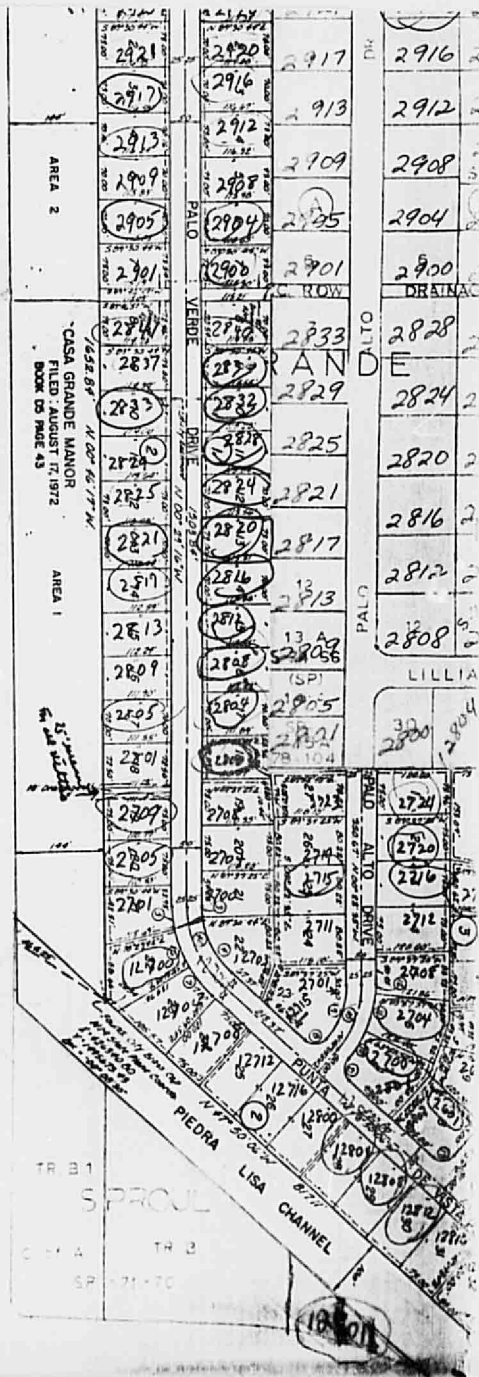


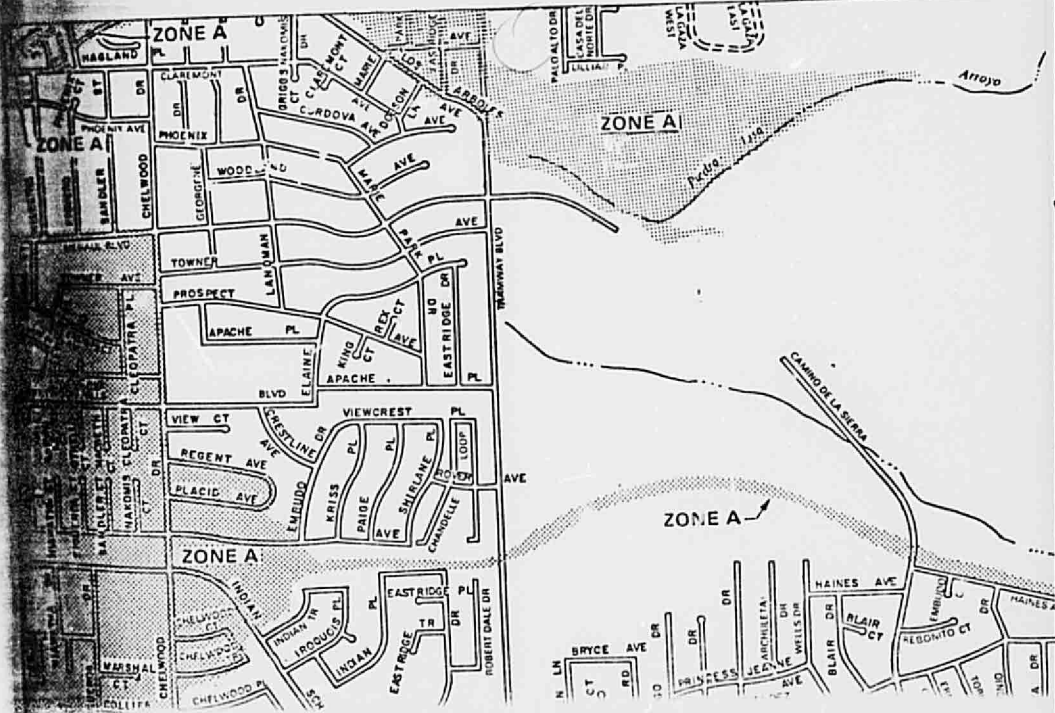
10-10-79

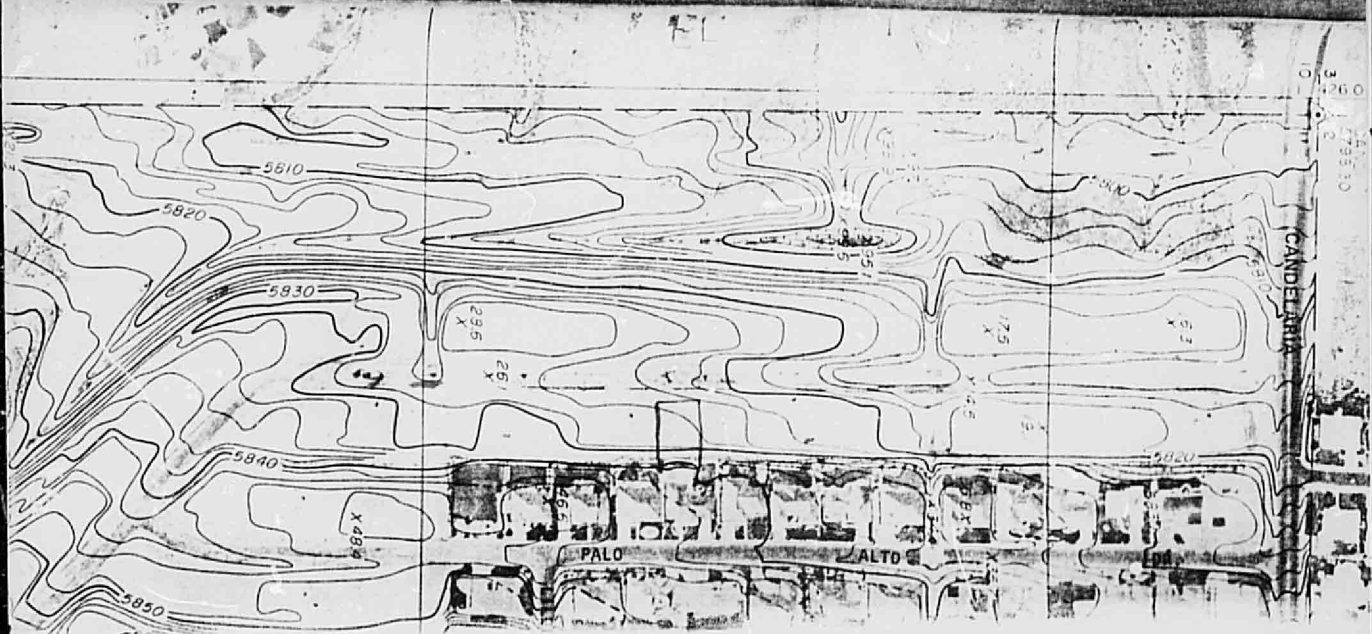
H23/D3

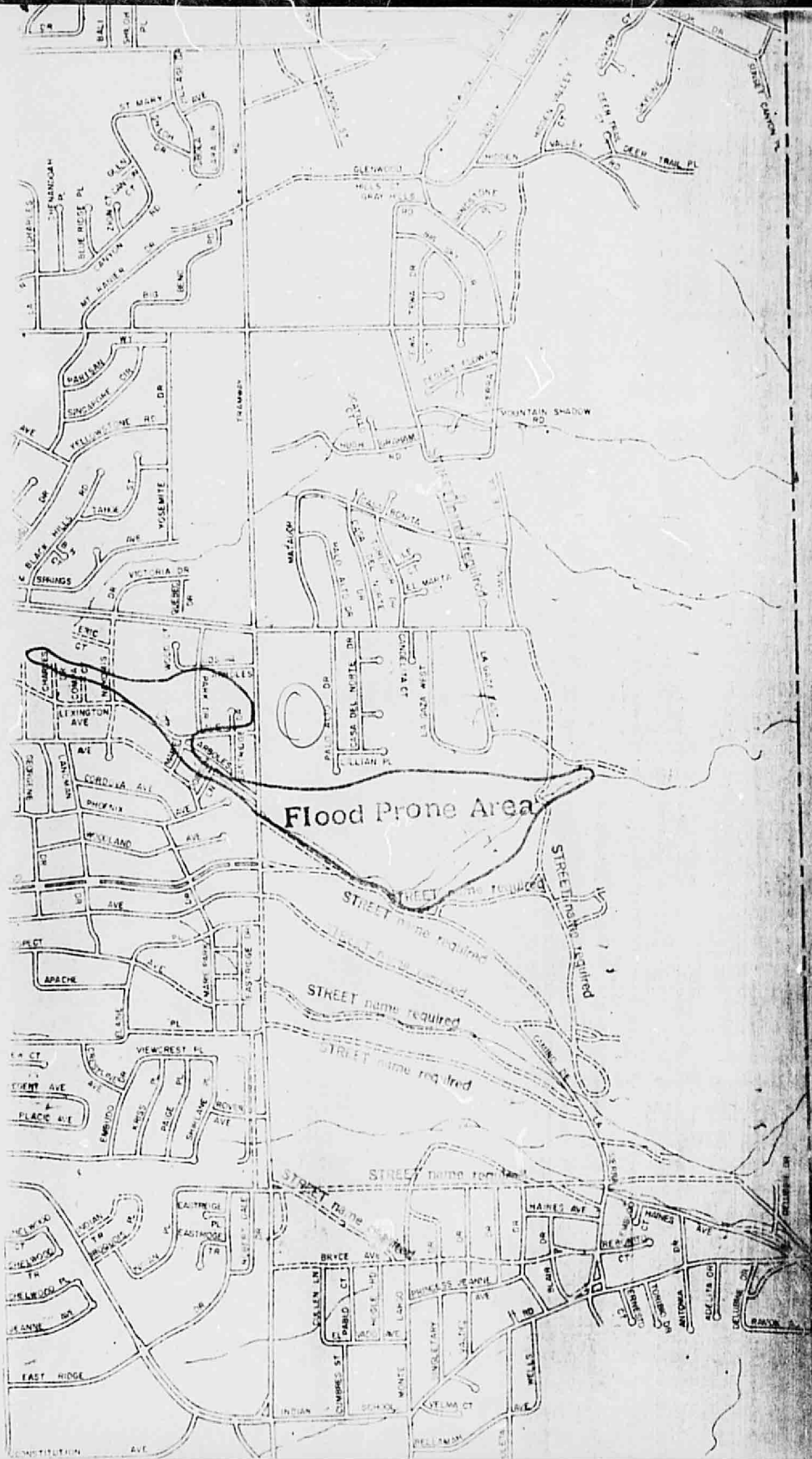
(27A)

BRENTWOOD HILLS REPL







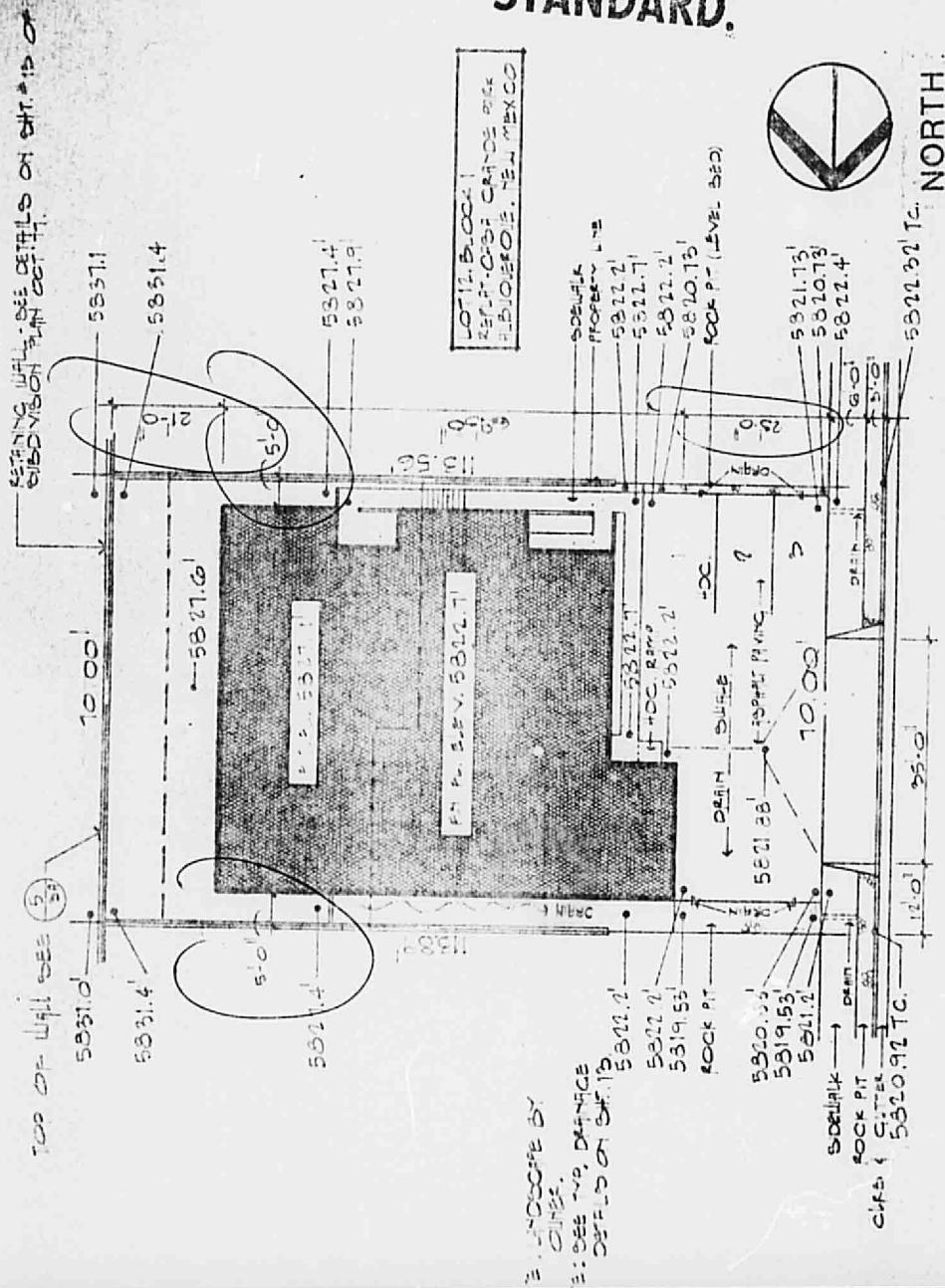


Tree: 1.5 inch in caliper or 10-12 feet in length.

Shrubs: 5 gallon minimum

ZONING DIVISION

PAVE AND APPROPRIATELY
MARK THE LOCATION OF
THE SPACES PER CITY
STANDARD.



CANDELARIA

