HYDROLOGY

K15/D5

7 PLANS
1 OF 2

C

B

A

K15/D5

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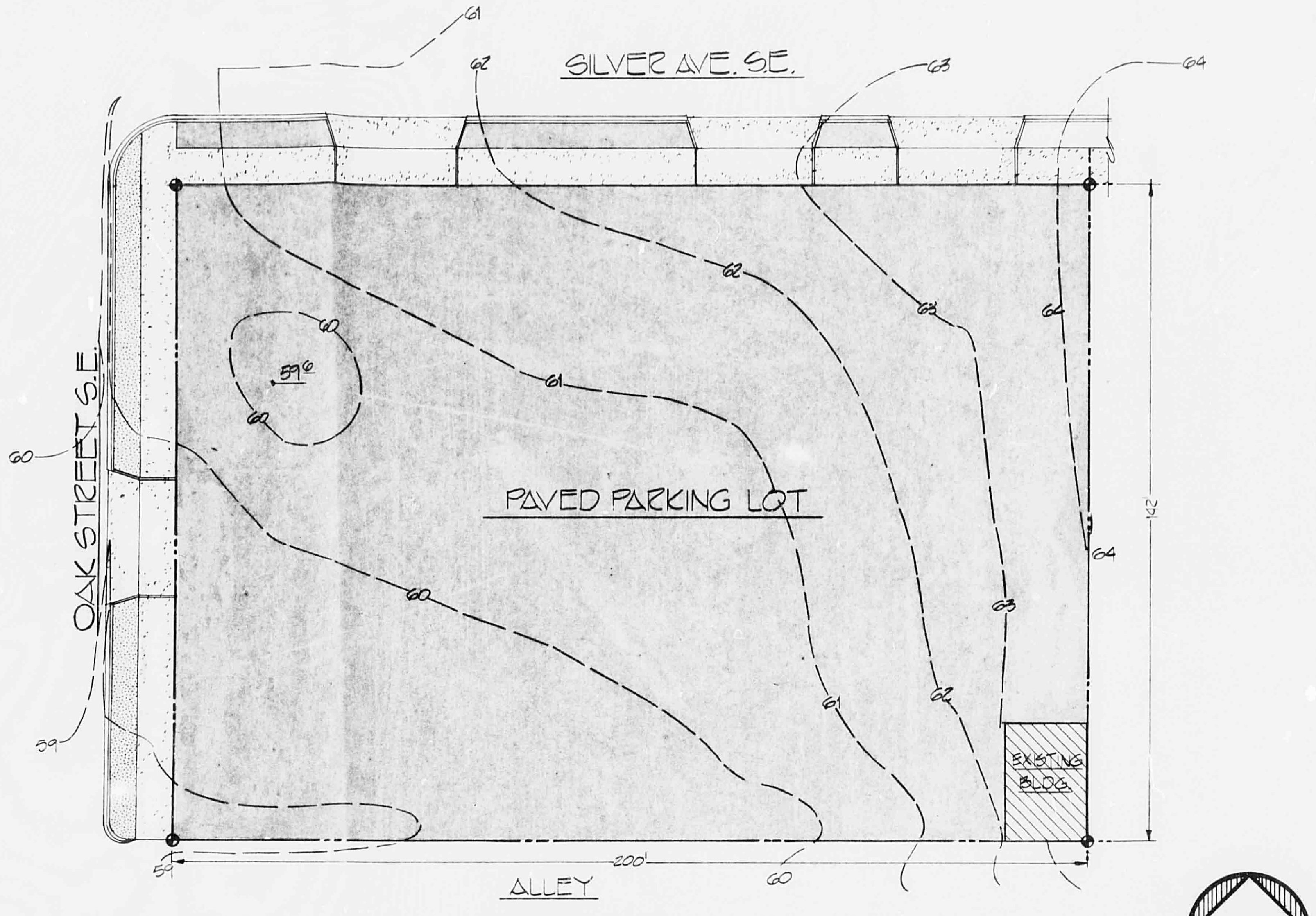
7 Plans

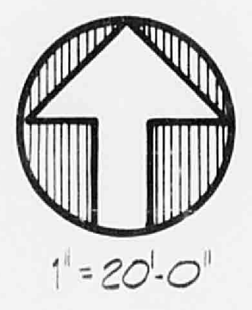
C 20 B 16 A 12

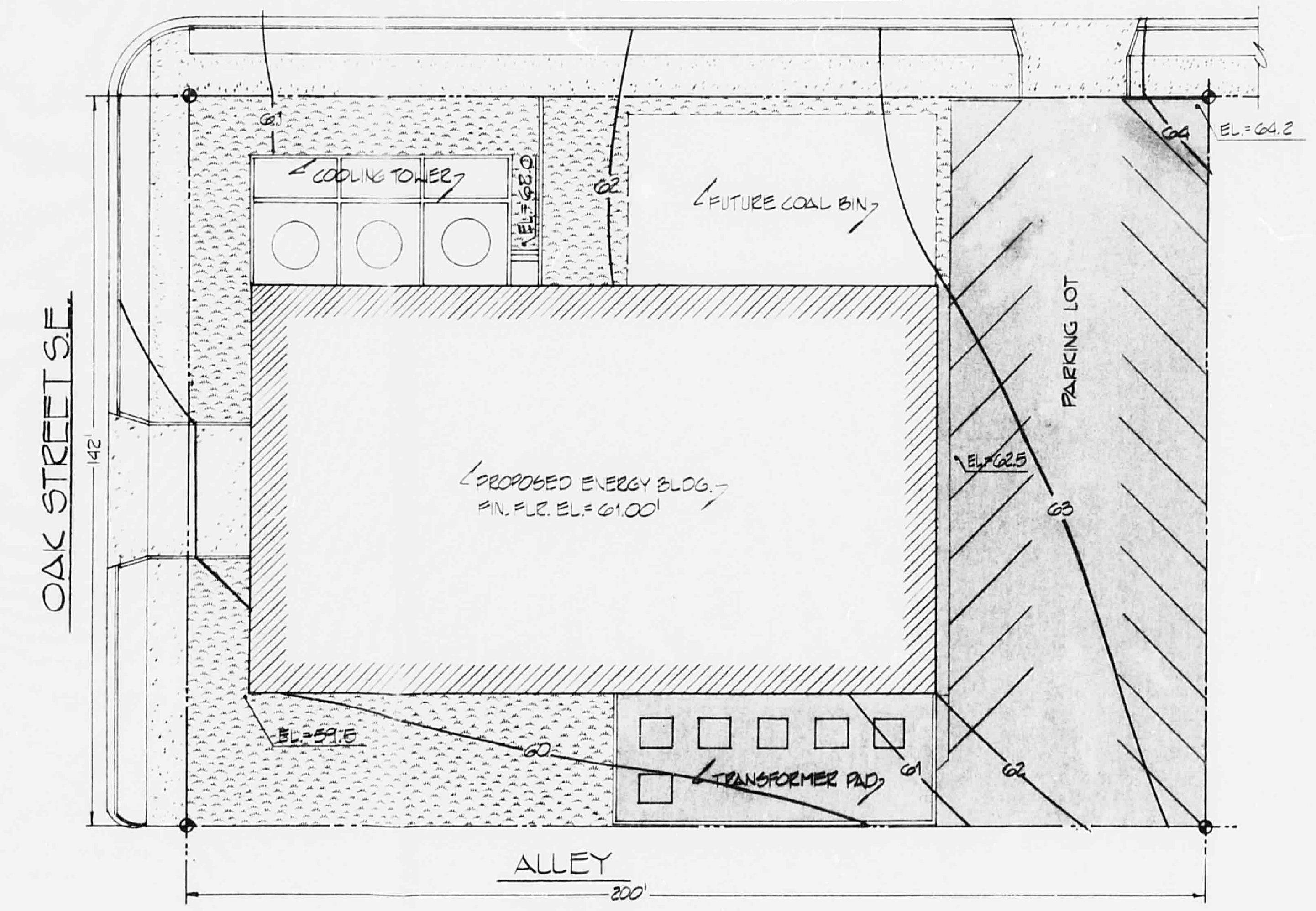
CITY OF ALBUQUERQUE

C



EXISTING LOT

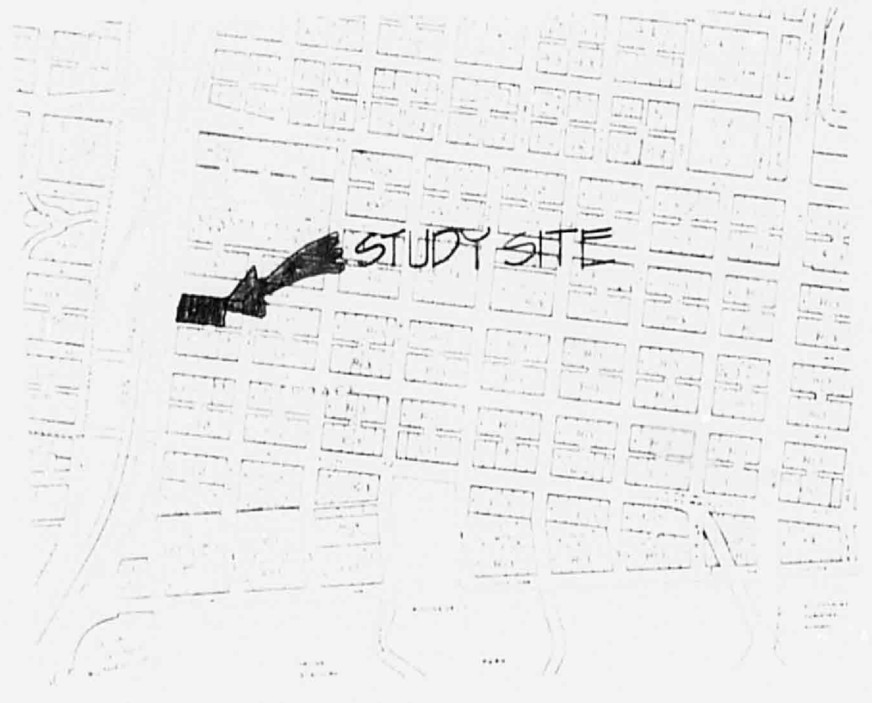




PROPOSED LOT

KEY:

- ▨ ASPHALT PAVING
- ▨ GRAVEL
- ▨ EXISTING BLDG
- ☐ CONCRETE
- ▨ LANDSCAPING
- - - - EXISTING CONTOURS
- —— PROPOSED CONTOURS



SITE LOCATION MAP

Lot 3, 4, 5 and 6, Block 17, Terrace Addition
Lead Avenue S.E. between Oak St. and Mulberry S.E.
Zone Classification [illegible]
Zone Atlas Sheet K-15-Z

Area Under Consideration:

200' X 142 = 28,400 Ft.^{2} = .652 Acres
Presently paved parking lot

The study area is located in the southeast heights area of Albuquerque. There are no natural or artificial water courses crossing the site and the site is not located in the 100 year flood plain. At present the study site is completely paved with a small existing building at the southwest corner of the site.

On the north side of the site is Silver Avenue which has been fully developed with curbs and gutters containing runoff and drainage directly to the west. On the east side of the site is a residential lot with a retaining wall separating the two properties. As a result there is no runoff to the site from either the north or the east which are the upstream directions of the study site. The site drains to the southwest toward the paved alley or to Oak St. All run-off flowing from the study site is caused by on-site rain-fall with no upstream contributions.

The proposed development plans include an energy building, cooling towers, transformer pad, coal bin, and 3969 ft.^{2} of landscaping. Neither Silver Avenue St. to the north nor the retaining wall to the east will be changed under the proposed development. Therefore, there will not be any change in the upstream run-off pattern to the study site. The drainage pattern of the proposed development will not be changed and will continue to flow to the southwest.

With the proposed development plan which includes approximately 3969 ft.^{2} of landscaping, the coefficient of runoff will be decreased from .95 to .87 with a corresponding decrease in both the rate and volume of runoff. As a result, the proposed development will not include a permanent ponding area.

It is our opinion that if developed as proposed in this study, the site will not be susceptible to flooding from on-site or upstream runoff and will not increase the threat of flooding to downstream areas.

Present Average Coefficient of Runoff

27,950 Ft.^{2} of paved parking lot
450 Ft.^{2} of existing building
28,400 Ft.^{2} Total developed, therefore

C = .95

Present Volume of Runoff

Vol. = C X I_t X A

I_t = 2.4 IN for East Mesa.

Vol. = .95 x 2.4 IN/12IN/ft. x 28,400 Ft.^{2}

Vol. = 5,396 Ft.^{3}

Proposed Average Coefficient of Runoff

24,431 Ft.^{2} Development
3,969 Ft.^{2} Landscaping

.95 X 24,431 = 23,209 F

.40 X 3969 = 1,588

24,797/28,400 =

C = 24,797/28,400

C = .87

Proposed Volume of Runoff

Vol. = C X I_t X A

Vol. = .87 X 2.4 IN/12IN/Ft. X 28,400 Ft.^{2}

Vol. = 4,942 Ft.^{3}

Present Volume of Runoff > Proposed Volume of Runoff

5393 Ft.^{3} > 4,942 Ft.^{3}

therefore no ponding required

Victor J. Chavez, NMPE License No. 5713

Revision Mark | Date

Boyle Engineering Corporation
consulting engineers

Victor J. Chavez 1/14/78
Date

PRESBYTERIAN HOSPITAL
ENERGY BLDG. DRAINAGE
STUDY

Designed by: VJC
Drawn by: ECG
Checked by: TCH

VICTOR J. CHAVEZ
NO. 5713

Job Number: 501-156-01
Sheet No 1 OF 1

THIS PLAN SHOT TWICE
ONCE ON LIGHT AND
ONCE ON DARK.

CITY OF ALBUQUERQUE
THIS MICROIMAGE IS THE BEST
POSSIBLE REPRODUCTION DUE
TO THE POOR QUALITY OF THE
ORIGINAL DOCUMENT

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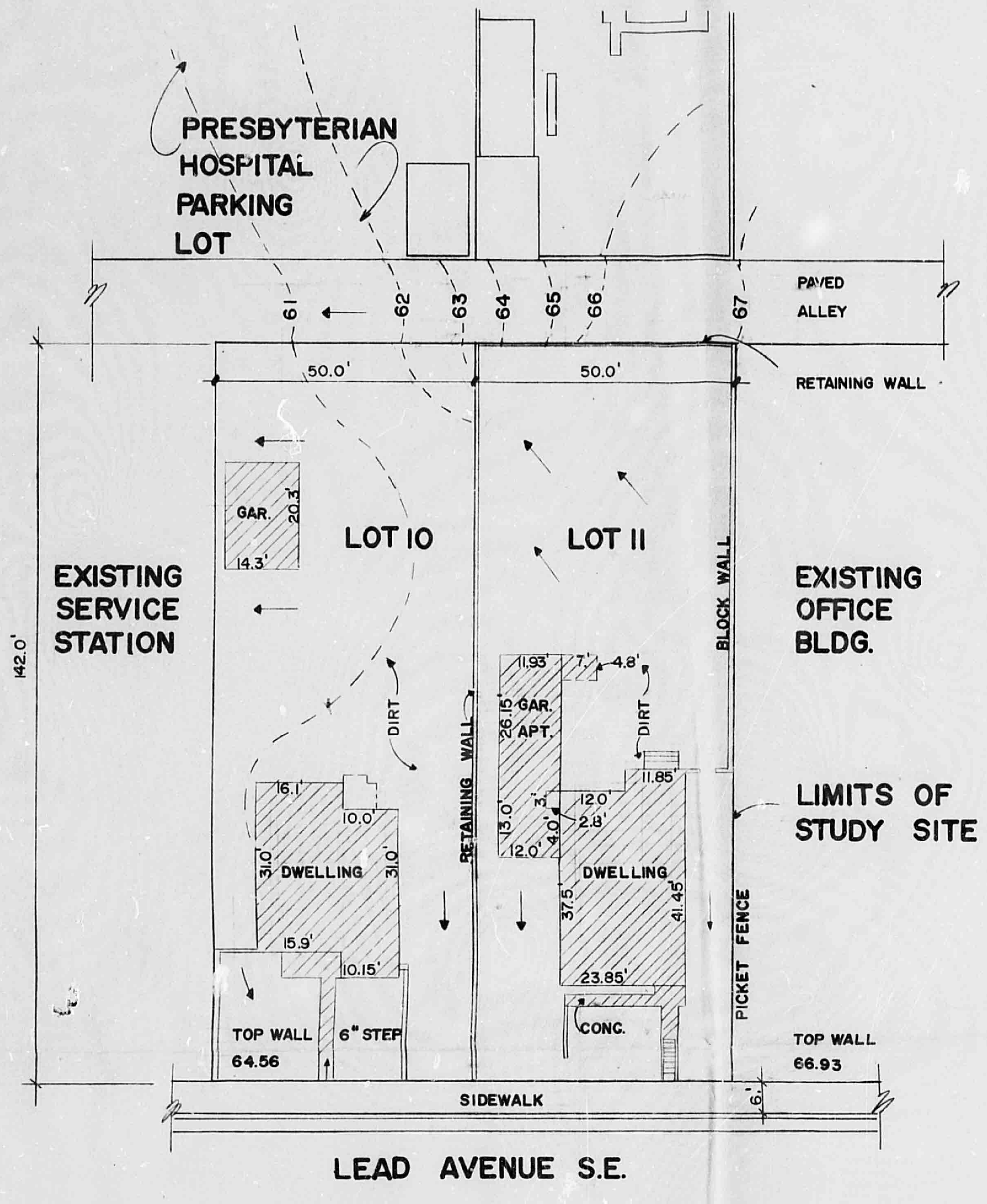
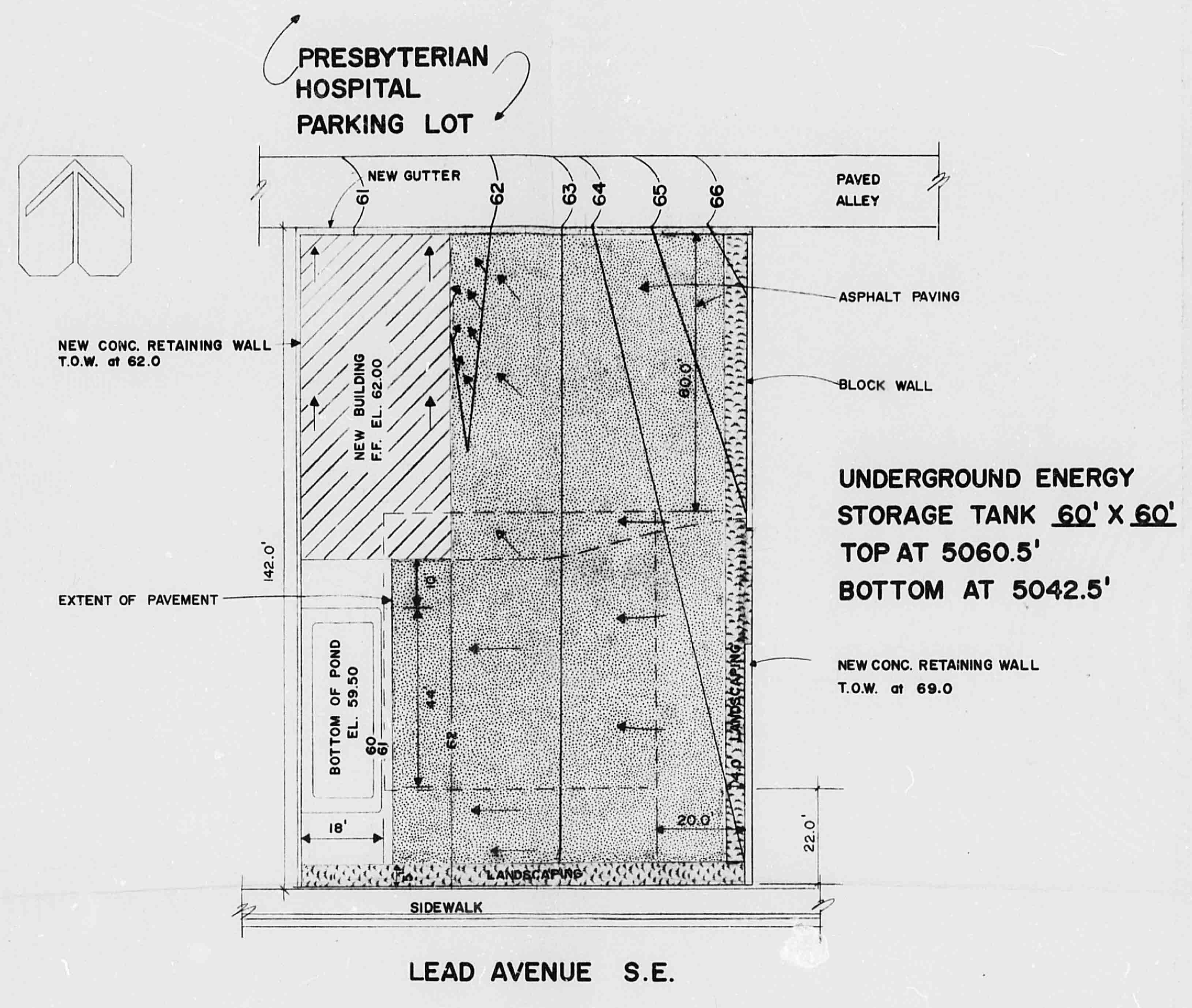


EXISTING CONDITIONS

SCALE 1" = 20'


PRESBYTERIAN HOSPITAL PARKING LOT
NEW GUTTER
PAVED ALLEY
61
62
63
64
65
66
ASPHALT PAVING
NEW CONC. RETAINING WALL T.O.W. at 62.0
BLOCK WALL
NEW BUILDING FF. EL. 62.00
60.0'
UNDERGROUND ENERGY STORAGE TANK 60' X 60' TOP AT 5060.5' BOTTOM AT 5042.5'
EXTENT OF PAVEMENT
142.0'
BOTTOM OF POND EL. 59.50
44
62
NEW CONC. RETAINING WALL T.O.W. at 69.0
18'
20.0
22.0'
LANDSCAPING
SIDEWALK
LEAD AVENUE S.E.

PROPOSED CONDITIONS

SCALE 1" = 20'

▨ IMPERMEABLE SURFACE

▒ LANDSCAPING

☐ PROPOSED SUBTERRANEAN ENERGY STORAGE TANK

▒ ASPHALT PAVING

- - - EXISTING CONTOURS

—— PROPOSED CONTOURS

← FLOW DIRECTION

SITE LOCATION MAP

Lot 10 & 11 Block Terrace Addition
Lead Avenue S.E. Between Oak St. & Mulberry S.E.
Zone Classification: Lot 10 = C-1, Lot 11=0-1
Zone Atlas Sheet K-15-Z

Area Under Consideration

100 X 142 = 14200 ft.^{2} = .336 Acres.
Presently Developed Residential Area

The study site is located in the southeast heights area of Albuquerque. There are no natural or artificial water courses crossing the site, and the site is not in the 100 year flood plain.

On the south side of the site is Lead Avenue which has fully developed drainage patterns away from the site. To the east at a higher elevation is an office on a lot that does not drain on to the study site because of a retaining wall at the property line. To the north is an alley and to the west is an existing service station. The study site currently drains to the alley, the service station, and Lead Avenue. Proposed concrete block walls on the east, south and west sides will continue to prevent runoff from adjacent properties from entering the study site.

At present Lot 10 and 11 are residential areas with an average coefficient of runoff of C = .51. The proposed development has a coefficient of C = .83. The Volume of Retension required for this study is the difference between the volume of runoff using C = .51 for the present condition, and the volume of runoff using a C = .83 of the proposed condition. The site will be graded such that the pond will fill up, but not over flow during a 100 year storm. The remainder of the runoff will flow to the paved alley as it does under present conditions.

Due to proposed construction of the concrete block walls and proposed average slope of the site being only 3.5%, erosion and siltation will be minimal.

It is our opinion that if developed as proposed in this study, the site will not be susceptible to flooding from on-site or upstream runoff and will not increase the threat of flooding to downstream areas.

Present Average Coefficient of Runoff

Total Developed Area = 2,751 ft.^{2}

Total Undeveloped Area = 11,449 ft.^{2}

Average C

$$\begin{aligned} .40 \times 11{,}449\ \text{ft.}^2 &= 4{,}580 \\ .95 \times 2{,}751\ \text{ft.}^2 &= \underline{2{,}614} \\ & 7{,}194 \end{aligned}$$

Average C = 7,194/14,200 = .51

Proposed Average Coefficient of Run-off

Total Developed Area = 11,976 ft.^{2}
Total Undeveloped Area = 1,048 ft.^{2}
Ponding Area = 1,176 ft.^{2}

Average C

$$\begin{aligned} .40 \times 1{,}048\ \text{ft.}^2 &= 419 \\ .95 \times 11{,}976\ \text{ft.}^2 &= \underline{11{,}377} \\ & 11{,}796 \end{aligned}$$

Average C = 11, 796/14,200 = .83

Present Volume of Runoff

Vol. = $C\ I_t\ A$
Vol. = .51 X 2.4 IN /12 IN /ft. X 14,200 ft.^{2}
Vol. = 1,448 Cu. Ft.

I_t = 2.4 IN for East Mesa.

Proposed Volume of Runoff

Vol. = $C\ I_t\ A$
Vol. = .83 X 2.4 IN/12IN/Ft. X 14,200 ft.^{2}
Vol. = 2,357 Cu. Ft.

Volume of Pond Required

Proposed Volume of Runoff - Present Volume of Runoff =
2,357 Cu. Ft. - 1,448 Cu. Ft. = 909 Cu. Ft.

Volume of Pond Provided

Top Area
18 X 44 - 792 Sq. Ft.

Bottom Area
12 X 38 = 456 Sq. Ft.

Avg. Area = $\frac{792 + 456}{2}$ = 624 Sq. Ft.

Volume of Pond = Avg. Area X d = 624 Sq. Ft. X 1.5 Ft. = 936 Cu. Ft.

Volume of Pond > Volume of Retension Required

936 Cu. Ft. > 909 Cu. Ft.

Volume Draining into Pond (South of Dahsed Line)

Area draining to pond = (75 X 65) + (20 X 65) = 6175 Sq. Ft.

Runoff Coefficient = [4875 (.95) + 1300 (.4)] ÷ 6175 = .83

Vol. = .83 X 2.4 IN/12 IN/ft. X 6175 Sq. Ft. = 1025 Cu. Ft.

∴ Area Contributing to the pond is adequate to fill the pond and maintain existing conditions.

Victor J. Chavez
Victor J. Chavez, NMPE License No. 5713

Revision Mark	Date

Boyle Engineering Corporation
consulting engineers

Victor J. Chavez 12/29/78
Date

PRESBYTERIAN HOSPITAL ENERGY STORAGE TANK DRAINAGE STUDY

Designed by: V.J.C.
Drawn by: A.J.T.
Checked by: F.B.

NO. 5713

Job Number: S01-156-01
Sheet No. 1 of 1

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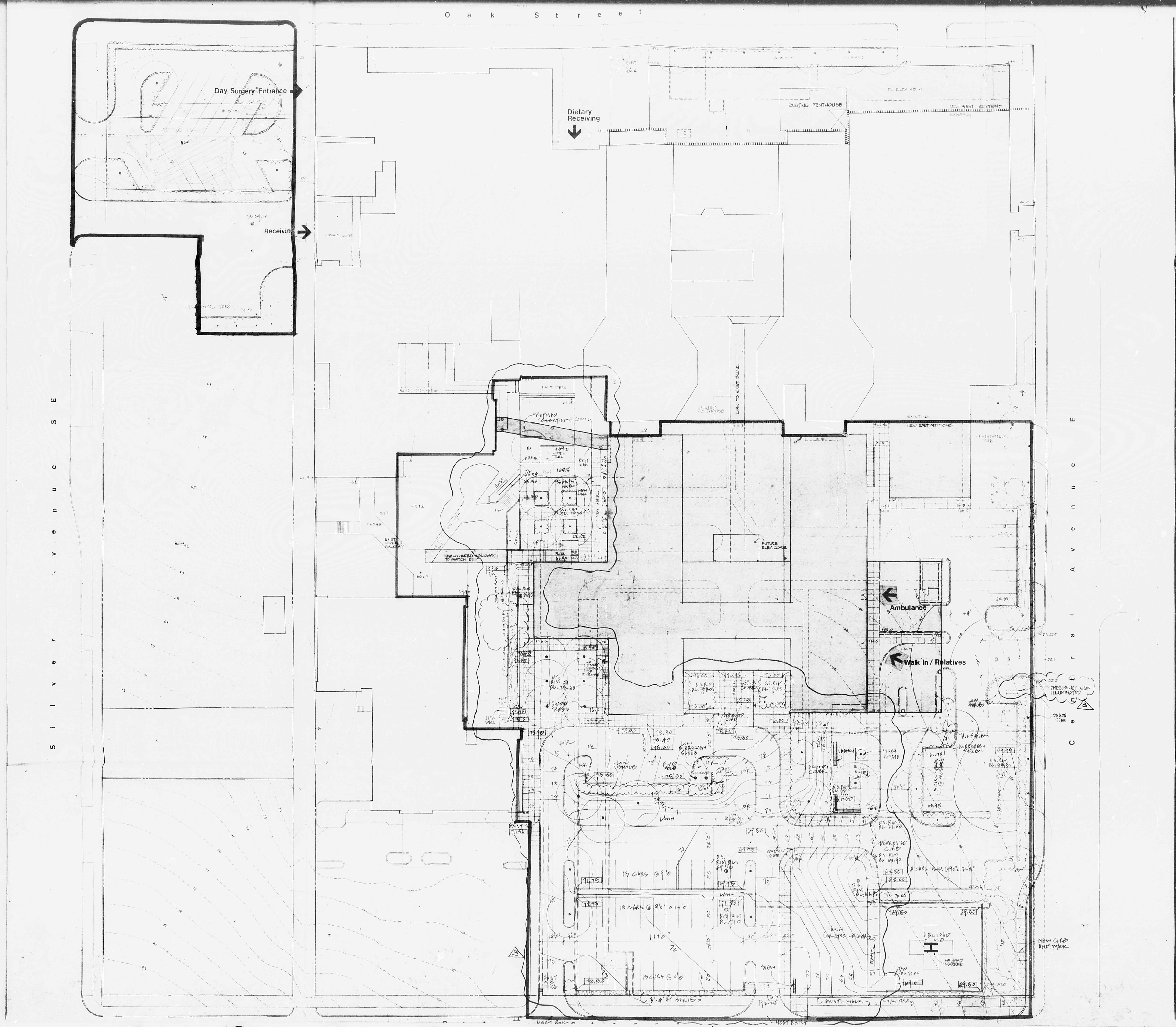

design development

Presbyterian Hospital Albuquerque New Mexico

Stevens, Mallory, Pearl & Campbell Architects

Perkins & Will Architects

MacCornack & Burns Consulting Engineers
consulting structural engineers

Bridgers & Paxton Consulting Engineers
consulting mechanical engineers

Uhl & Lopez Engineers, Inc.
consulting electrical engineers

Hamilton Associates, Inc.
hospital consultants

Turner Construction Company
construction consultants

general notes

no.	date	description	approved
3	JULY 5.78	ENTRANCE DRIVE & PARKING.	
2	MAY 24 78	AIR INTAKES, EXIST RETAIN. WALL	
	APR 27 78	HELIPAD INTAKES	

revision

North →

Site Plan

date	APRIL 14, 1978
drawn by	RIN LOH, JANET SHEN
checked	J. P. MAHAJAN
approved by	JEROME JONES
job number	7401-Z
scale	1" = 20'-0"

A2
AUG 18 1978

THIS PLAN SHOT TWICE
ONCE ON LIGHT AND
ONCE ON DARK.

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POSSIBLE REPRODUCTION DUE
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ORIGINAL DOCUMENT

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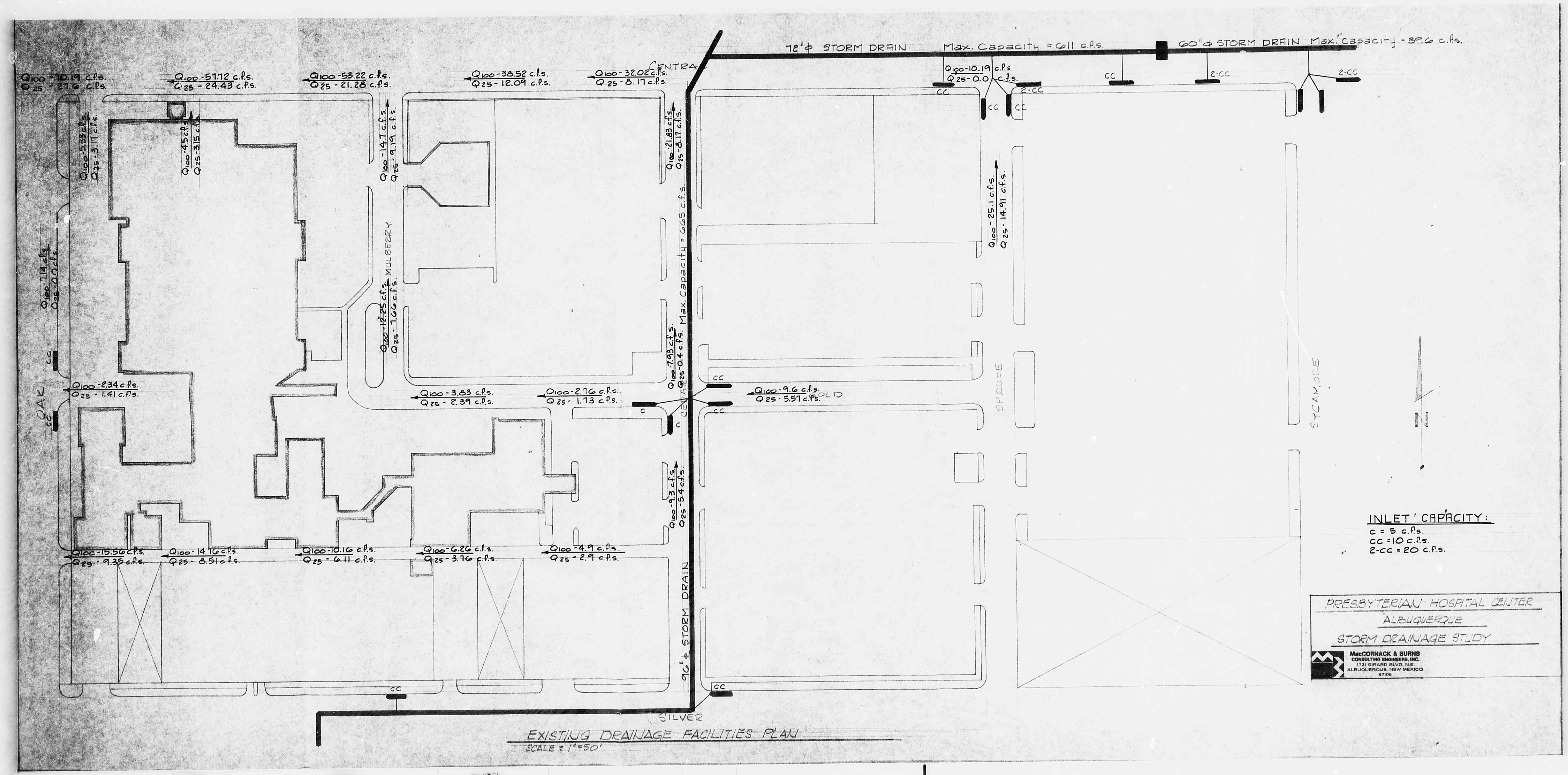
CITY OF ALBUQUERQUE

C D F

HYDROLOGY

K15/D5

7 PLANS
2 of 2

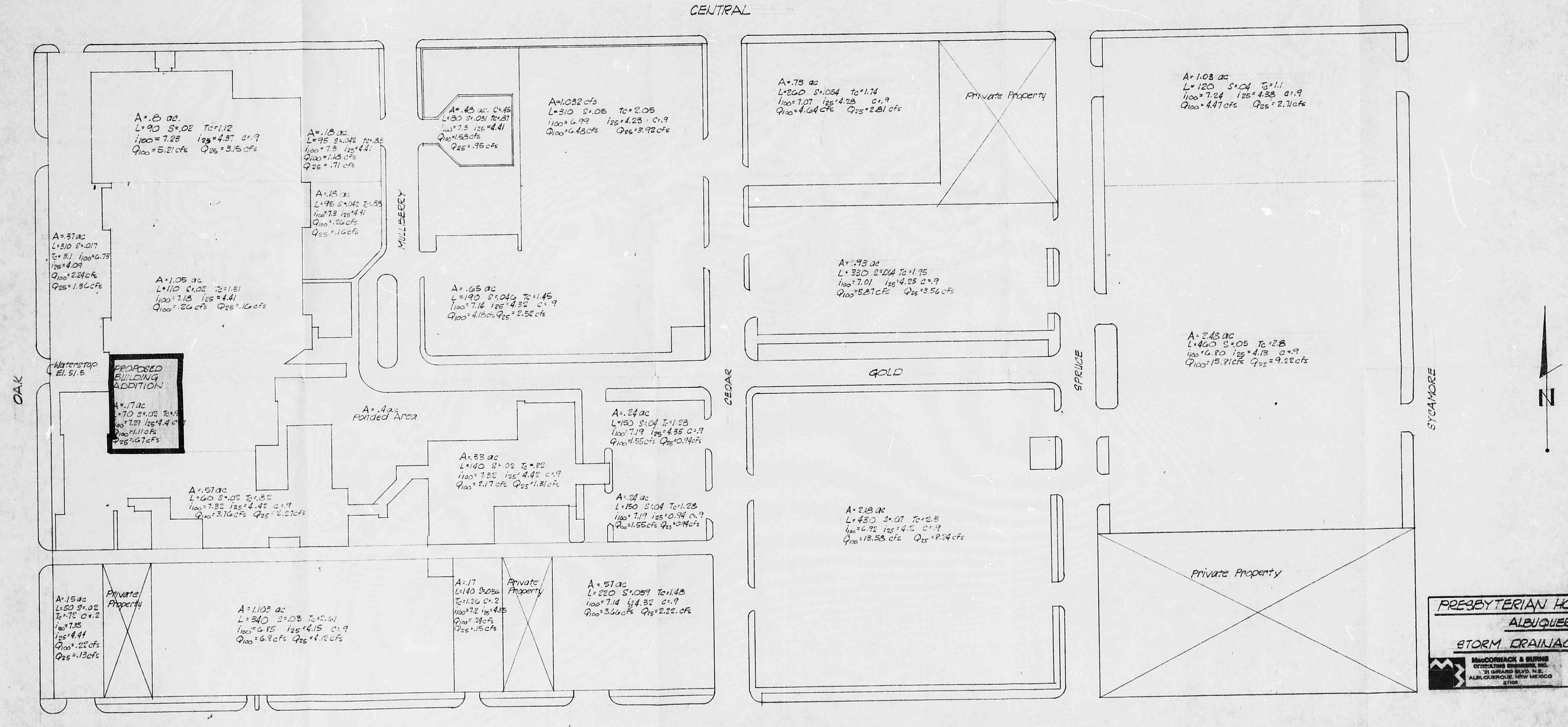

72"ϕ STORM DRAIN Max. Capacity = 611 c.f.s.
60"ϕ STORM DRAIN Max. Capacity = 396 c.f.s.
CENTRAL
Q100 - 70.19 c.f.s. Q25 - 27.6 c.f.s.
Q100 - 57.72 c.f.s. Q25 - 24.43 c.f.s.
Q100 - 53.22 c.f.s. Q25 - 21.28 c.f.s.
Q100 - 38.52 c.f.s. Q25 - 12.09 c.f.s.
Q100 - 32.02 c.f.s. Q25 - 8.17 c.f.s.
Q100 - 10.19 c.f.s Q25 - 0.0 c.f.s.
Q100 - 5.33 c.f.s. Q25 - 3.11 c.f.s.
Q100 - 4.5 c.f.s. Q25 - 3.15 c.f.s.
Q100 - 14.7 c.f.s. Q25 - 9.19 c.f.s.
Q100 - 21.83 c.f.s. Q25 - 8.17 c.f.s.
Q100 - 25.1 c.f.s. Q25 - 14.91 c.f.s.
Q100 - 7.14 c.f.s. Q25 - 0.0 c.f.s.
MULBERRY
Q100 - 12.25 c.f.s. Q25 - 7.66 c.f.s.
Max. Capacity = 665 c.f.s.
Q100 - 7.93 c.f.s. Q25 - 0.4 c.f.s.
Q100 - 2.34 c.f.s. Q25 - 1.41 c.f.s.
OAK
Q100 - 3.83 c.f.s. Q25 - 2.39 c.f.s.
Q100 - 2.76 c.f.s. Q25 - 1.73 c.f.s.
CEDAR
Q100 - 9.6 c.f.s. Q25 - 5.57 c.f.s.
GOLD
SPRUCE
SYCAMORE
N
Q100 - 9.3 c.f.s. Q25 - 5.4 c.f.s.
Q100 - 15.56 c.f.s. Q25 - 9.35 c.f.s.
Q100 - 14.76 c.f.s. Q25 - 8.51 c.f.s.
Q100 - 10.16 c.f.s. Q25 - 6.11 c.f.s.
Q100 - 6.26 c.f.s. Q25 - 3.76 c.f.s.
Q100 - 4.9 c.f.s. Q25 - 2.9 c.f.s.
96"ϕ STORM DRAIN
SILVER
C
CC
2-CC

INLET CAPACITY:
C = 5 c.f.s.
CC = 10 c.f.s.
2-CC = 20 c.f.s.

PRESBYTERIAN HOSPITAL CENTER
ALBUQUERQUE
STORM DRAINAGE STUDY

MacCORNACK & BURNS
CONSULTING ENGINEERS, INC.
1721 GIRARD BLVD. N.E.
ALBUQUERQUE, NEW MEXICO
87106

EXISTING DRAINAGE FACILITIES PLAN
SCALE : 1"=50'



SUBSECTION CALCULATIONS ~ 100 & 25 YEAR STORMS
Scale: 1" = 50'

PRESBYTERIAN HOSPITAL CENTER
ALBUQUERQUE
STORM DRAINAGE STUDY

MacCORNACK & BURNS
CONSULTING ENGINEERS, INC.
1721 GIRARD BLVD. N.E.
ALBUQUERQUE, NEW MEXICO
87106

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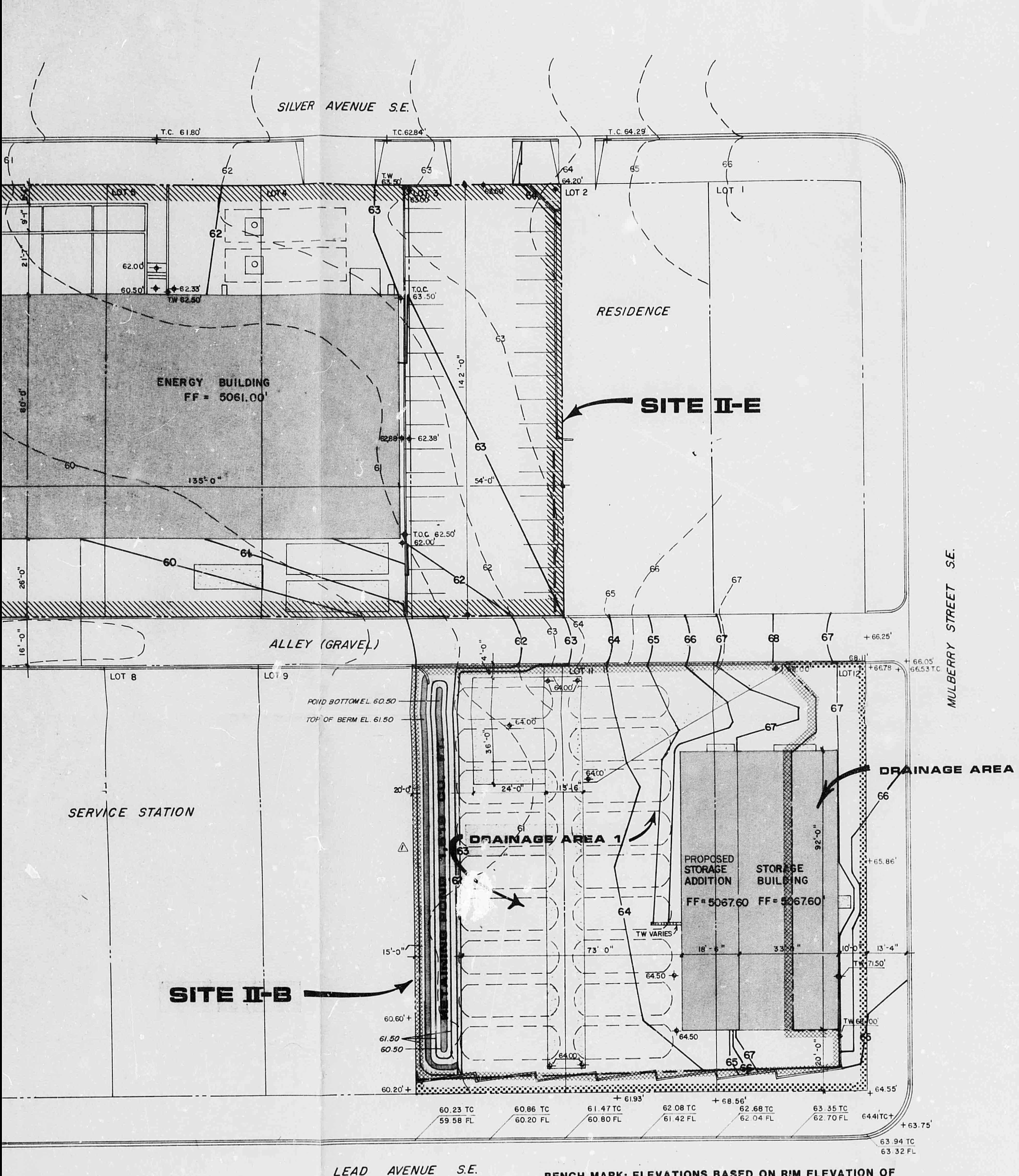
CITY OF ALBUQUERQUE
C D



BENCH MARK: ELEVATIONS BASED ON RIM ELEVATION OF SANITARY SEWER AT OAK AND SILVER OF 5060.49

TE PLAN

ALE: 1"=20'

△ SUPPLEMENT A

ON-SITE FLOW PATFS (Use Minimum t_c = 10 minutes)

A. Undeveloped Q = CIA i = 5.85 for 10 min. Minimum t_c

Q = 0.95 x 5.85 x 0.652 = 3.62 cfs

B. Developed Q = CIA

Q = 0.92 x 5.85 x 0.652 = 3.51 cfs

△ SUPPLEMENT B

ON-SITE FLOW RATES (Use Minimum t_c = 10 min.)

Drainage Area 1

A. Undeveloped Q = 0.51 x 5.85 x 0.3985 = 1.19 cfs

B. Developed Q = 0.85 x 5.85 x 0.3985 = 1.98 cfs

Drainage Area 2

A. Undeveloped Q = 0.5 x 5.85 x 0.489 = 1.43 cfs

B. Developed Q = 0.68 x 5.85 x 0.489 = 1.95 cfs

Emergency Spillway (Use trapezoidal weir formula, Q - 3.367 $LH^{3/2}$) size to handle the 100 year undeveloped peak flow. Depth of flow 1" below top of berm (elev. 60.92) h = (60.92 - 60.65) + 2 (Average) = 0.14' L = 8' Q = 3.36 ([illegible] 14)$^{3/2}$ = 1.41 cfs > 1.19 cfs

△ LEGEND

EXISTING ELEVATION	+
PROPOSED ELEVATION	⌖
TOP OF CURB ELEVATION	TC
FLOW LINE ELEVATION	FL
TOP OF WALL ELEVATION	TW
EXISTING CONTOUR	— — 61 — —
PROPOSED CONTOUR	—— 61 ——

DRAINAGE AREA II-E, ENERGY BUILDING

NOTE: What follows is a re-statement of the original drainage study of 1-4-79 submitted by Boyle Engineering Corporation. Values of runoff are slightly different from those in the 1-4-79 report due to a reduced area of landscaping. The terms "present" or "existing" refer to site conditions existing at the time of writing of the original report.

DESCRIPTION

Lots 3, 4, 5 and 6, Block 17, Terrace Addition
Silver Avenue, S.E. between Oak St. and Mulberry St.
Zone Classification SU-2, SU-1
Zone Atlas Sheet K-15-Z

Area = 4x50'x142' = 28,400 ft^2 = 0.652 Acres

The study area is located in the southeast heights area of Albuquerque. There are no natural or artificial water courses crossing the site and the site is not located in the 100 year flood plain. At present the study site is completely paved with a small existing building at the southwest corner of the site.

On the north side of the site is Silver Avenue which has been fully developed with curbs and gutters containing runoff and drainage directly to the west. On the east side of the site is a residential lot with a retaining wall separating the two properties. As a result there is no runoff to the site for either the north or the east which are the upstream directions of the study site. The site drains to the southwest toward the gravel alley or to Oak St. All runoff flowing from the study site is caused by on-site rain-fall with no upstream contributions.

The proposed development plans include an energy building, cooling towers, transformer pad, coal bin, and 1500 ft^2 of landscaping. Neither Silver Avenue to the north nor the remaining wall to the east will be changed under the proposed development. Therefore, there will not be any change in the upstream run-off pattern to the study site. The drainage pattern of the proposed development will not be changed and will continue to flow to the southwest.

With the proposed development plan, which includes approximately 1500 $ft.^2$ of landscaping, the coefficient of runoff will be decreased from 0.95 to 0.92 with a corresponding decrease in both the rate and volume of runoff. As a result, the proposed development will not include a permanent ponding area.

It is our opinion that if developed as proposed in this study, the site will not be susceptible to flooding from on-site or upstream runoff and will not increase the threat of flooding to downstream areas.

Present Average Coefficient of Runoff

27,950 $Ft.^2$ paved parking lot
450 $Ft.^2$ existing building
28,400 $Ft.^2$ Total area is developed, therefore C=0.95

Present Volume of Runoff

P_6 = 2.4in. Ref. 6-hour, 100-year Precipitation map

$Vol = CAP_6 = 0.95(28,400)(\frac{2.4}{12})$

$= 5,396\ ft.^3$

Proposed Average Coefficient of Runoff

Description	A	C	CA
Developed Area	26,900	0.95	25,555
Landscaping	1,500	0.40	600
	28,400		26,155 ÷ 28,400=0.92 C avg.

Proposed Volume of Runoff

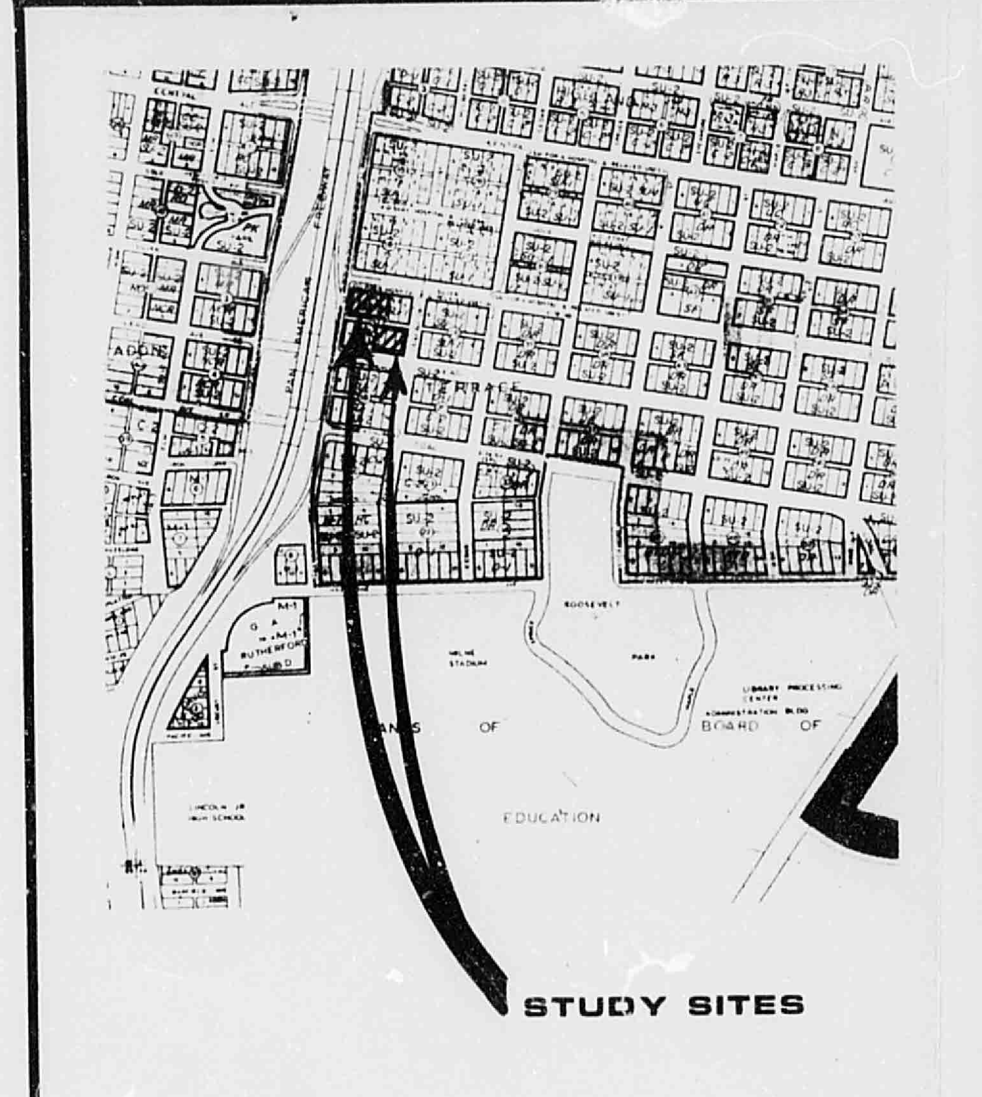
$Vol = CAP_6$

$= 0.92(28,400)(\frac{2.4}{12})$

$= 5,226 < 5,396\ ft^3$

Therefore no ponding is required.

SEE SUPPLEMENT A



SITE LOCATION MAP

DRAINAGE AREA II-B, SITE OF STORAGE BUILDING

NOTE: What follows is a revision to the original drainage study of 12-29-78 submitted by Boyle Engineering Corporation. The terms "present" or "existing" refer to site conditions existing at the time of writing of the original report.

DESCRIPTION

Lots 10,11, and 12, Block 17, Terrace Addition, Lead Avenue, S.E., between Oak St. and Mulberry St., S.E. Zone classification: SU-2,SU-1
Zone Atlas Sheet K-15-Z

AREA = 3x50'x142' = 21,300 ft^2 = 0.489 Acres

The study site is located in the southeast heights area of Albuquerque. There are no natural or artificial water courses crossing the site, and the site is not in the 100-year flood plain.

On the south side of the site is Lead Avenue which has fully developed drainage patterns away from the site. To the east is Mulberry Street which has been fully developed with curbs and gutters, containing runoff east of the site. To the north is a gravelled alley and to the west is an existing service station. Lots 10 and 11 currently drain to the alley, the service station, and Lead Avenue. Lot 12 drains to the east and south due to the presence of a retaining wall on the west property line of Lot 12.

At present Lots 10 and 11 are residential areas with an average coefficient of runoff C=0.51. Lot 12 is like wise a residential area with C=0.50. The proposed development calls for a pitched roof storage building having a roof ridge running north-south. As a result of the proposed grading, runoff down the eastern portion of this roof will flow from Lot 12 onto Mulberry St. to the east and to some extent onto Lead Ave. on the south. A retaining wall set in an average of 6 feet from the south property line will insure that all runoff from the remainder of the building and from the paved parking area north of the wall will flow to the retention pond on the west.

The pond volume is such that it will fill up, but not overflow during the 100-year storm. The existing grade in the gutter of Lead Ave. at the southwest corner of Area II-B is too high to permit positive discharge from the bottom of the pond into the street. Moreover, as this report is a revision to the 12-29-78 report, the current requirement to provide positive 5-year discharge from a detention pond will not be invoked retroactively, i.e., a retention pond will still be acceptable.

Present Conditions

P_6 = 2.4in. Ref. 6-hour, 100-year precipitation map

Areas draining to the west property line: Lots 10 and 11

	A	C	CA
Developed Area	2,751	0.95	2,614 ft^2
Undeveloped Area	11,449	0.40	4,580 ft^2
	14,200		7,194 ÷ 14,200=0.51 C avg.

$Vol = CAP_6 = 0.51(14,200)(\frac{2.4}{12}) = 1,448\ ft^3$

Area draining to Mulberry St. and Lead Ave: Lot 12

	A	C	CA
Developed Area	1,290	0.95	1,225
Undeveloped Area	5,810	0.40	2,324
	7,100		3,549 ÷ 7,100=0.50 C avg.

$Vol = 0.5(7,100)(\frac{2.4}{12}) = 710\ ft^3$

Proposed Conditions

Drainage Area 1

Areas draining to retention pond at west property line: Lots 10 and 11 and westerly portion of Lot 12

	A	C	CA
Developed Area	15,166	0.95	14,408
Undeveloped Area	560	0.40	224
Ponding Area	1,632	0	0
Sub Total	17,358		14,673 ÷17,358=0.85 C avg.

$Vol = 0.85(17,358)(\frac{2.4}{12}) = 2,950\ ft^3$

Drainage Area 2

Area drainage to Lead Ave.: remainder of Lot 12 and southerly strip of Lots 10 and 11.

	A	C	AC
Developed Area	1,982	0.95	1,883
Undeveloped Area	1,960	0.40	784
Sub Total	3,942		2,667 ÷ 3,942=0.68 C avg.
Total Area	21,300		

$Vol = 0.68\ (3,942)(\frac{2.4}{12}) = 536\quad 710\ ft^3$ existing

Volume of pond required to intercept runoff reaching west property line of Area II-B:

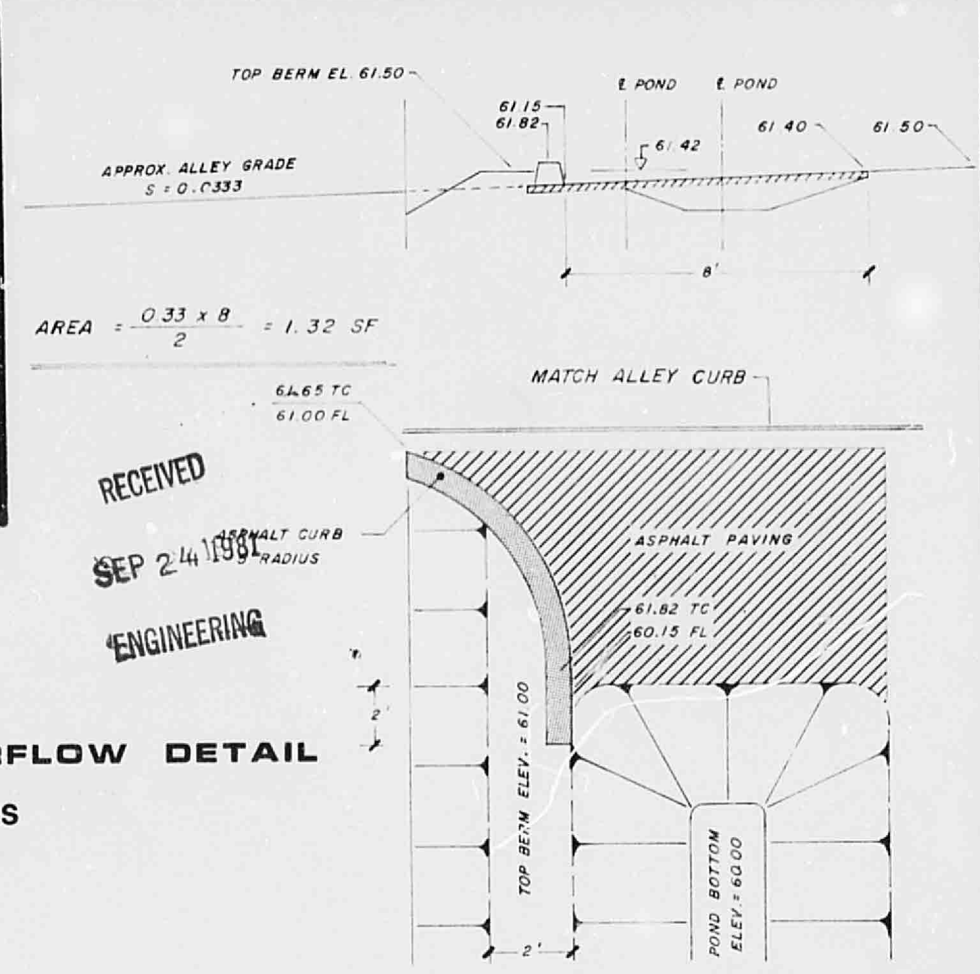
$V = 2,950 - 1,448 = 1,502\ ft^3$

Volume of retention pond provided by grading plan

= Average area x Depth

$= (7.5)(.35) \times 15 = 1,519\ ft^3 > 1,502\ ft^3$ O.K.

SEE SUPPLEMENT B



RECEIVED
SEP 24 1981
ENGINEERING

POND OVERFLOW DETAIL

NTS

Revision Mark	Date
REVISION △	9-10-81

Boyle Engineering Corporation
consulting engineers

Thornton Al... 8-14-81
Date

REVISIONS TO 12-29-78 AND 1-4-79
DRAINAGE STUDIES
PRESBYTERIAN HOSPITAL
ENERGY AND STORAGE BUILDING SITES

Designed by: TDS
Drawn by: BCM
Checked by: FDL

Job Number: AL-S01-200-01
Sheet No. 1 OF 1

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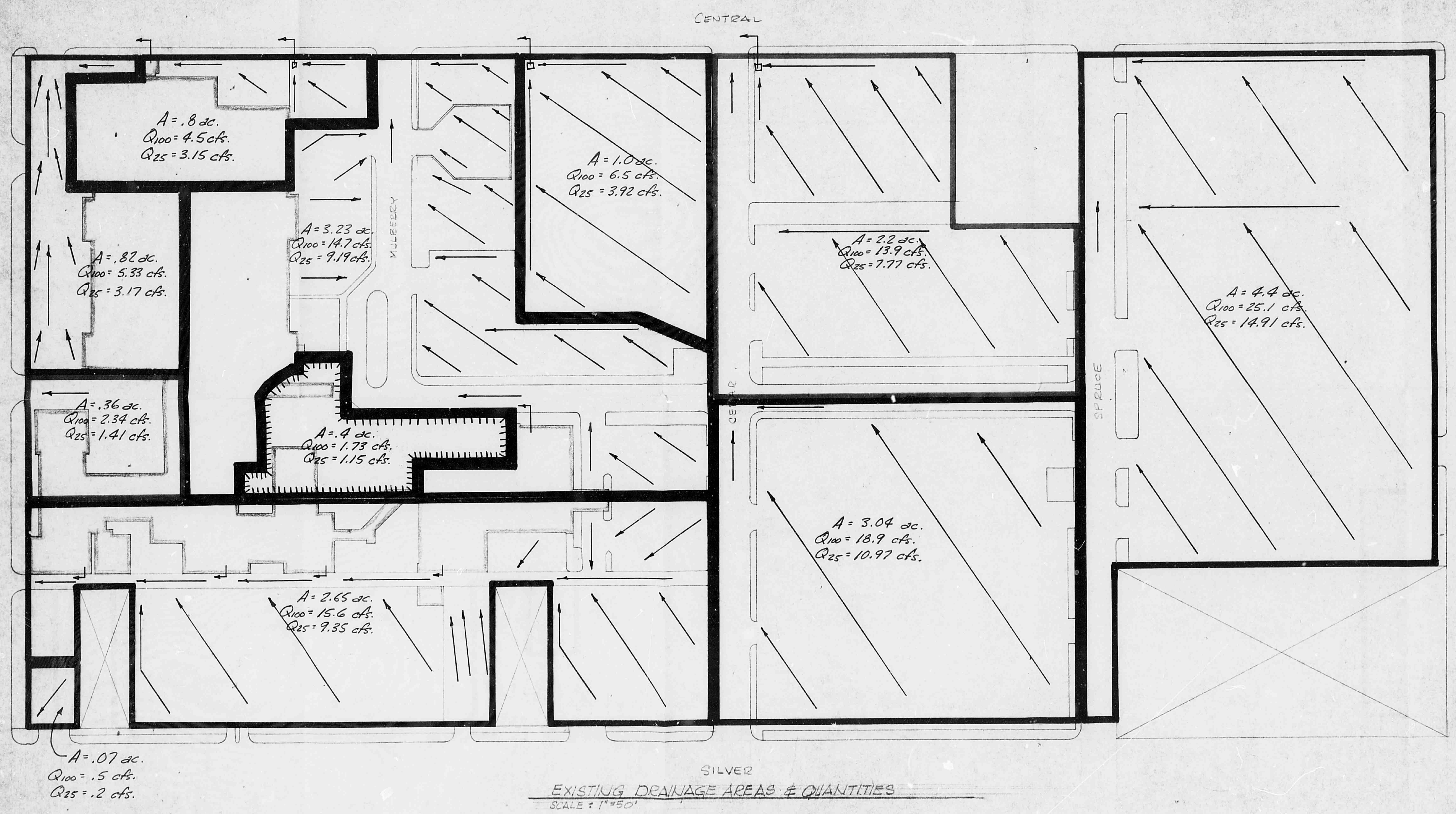
CITY OF ALBUQUERQUE

C D



EXISTING DRAINAGE AREAS & QUANTITIES
SCALE : 1" = 50'

PRESBYTERIAN HOSPITAL CENTER
ALBUQUERQUE
STORM DRAINAGE STUDY

MacCORNACK & BURNS
CONSULTING ENGINEERS, INC.
1721 GIRARD BLVD. N.E.
ALBUQUERQUE, NEW MEXICO
87106

D 24 C 20 B 16 A 12 CITY OF ALBUQUERQUE C D