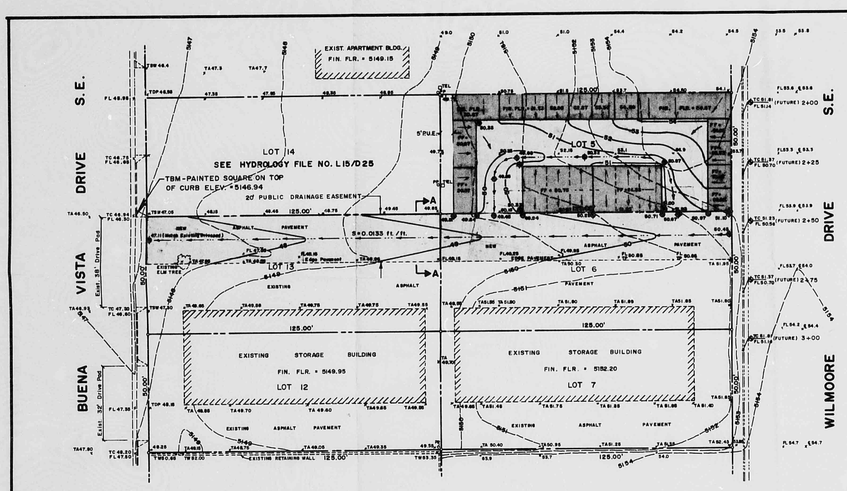
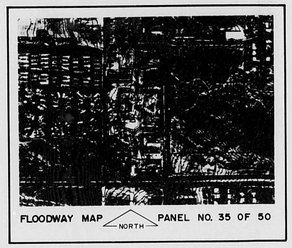
PUBLIC WORKS/HYDROLOGY

L15/D26

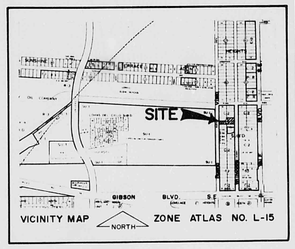


GRADING AND DRAINAGE PLAN

1" = 20'



FLOODWAY MAP — NORTH — PANEL NO. 35 OF 50



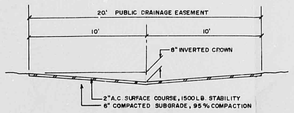
VICINITY MAP — NORTH — ZONE ATLAS NO. L-15

LEGEND:

EXISTING	NEW	DESCRIPTION
		CONTOUR
		SPOT ELEVATION
		PROPERTY LINE
		POWER POLE
		FLOW DIRECTION
		TC TOP OF CONCRET (CURB)
		FL FLOWLINE

CONSTRUCTION NOTES:

1. TWO (2) WORKING DAYS PRIOR TO ANY EXCAVATION, CONTRACTOR MUST CONTACT LINE LOCATING SERVICE AT 765-1234 FOR LOCATION OF EXISTING UTILITIES.
2. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL EXCAVATE AND VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF ALL POTENTIAL UNDERGROUND UTILITIES WHICH COULD CONFLICT WITH THE CONTRACTOR SHALL NOTIFY THE ENGINEER SO THAT THE CONFLICT CAN BE RESOLVED WITH A MINIMUM AMOUNT OF DELAY.
3. ALL WORK ON THIS PROJECT SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE, AND LOCAL LAWS, RULES, AND REGULATIONS CONCERNING CONDITIONS OF SAFETY AND HEALTH.
4. ALL CONSTRUCTION WITHIN CITY RIGHT-OF-WAY SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE CITY OF ALBUQUERQUE STANDARDS AND PROCEDURES.
5. SEE SITE PLAN FOR DIMENSIONS OF ALL BUILDINGS WITH RESPECT TO LOT LINES.



SECTION A-A – TYPICAL DRAINAGE EASEMENT

1/4" = 1'-0"

IMPORTANT: FINISHED FLOOR OF ALL BUILDINGS ADJACENT TO EASEMENT MUST BE A MINIMUM OF 6" HIGHER THAN OUTSIDE EDGE OF EASEMENT.

PRE-DESIGN CONFERENCE FINDINGS:

1. DRAINAGE PLAN PER DPM.
2. ONE PAVED ACCESS REQUIRED PER ORDINANCE.
   A. APPROVED STREET GRADES WILL BE REQUIRED BEFORE BUILDING PERMIT.
3. FREE DISCHARGE: ENGINEER MUST ADDRESS IF DEVELOPED FLOWS TO WILMOORE.
   A. LOW POINT WITHIN WILMOORE STREET, NO OUTFALL.
   B. MUST ADDRESS THE CONDITION OF DEVELOPED RUN-OFF FROM PROPOSED SITE ALONG WITH DEVELOPED RUNOFF WITHIN THE STREET WHEN IMPROVED.
   C. NO ACCESS THROUGH WILMOORE STREET WITHOUT IMPROVEMENTS.
4. ADDRESS ARROYO ALL RESPONSIBILITY.
5. EXISTING 36" STORM LINE CROSSING WILMOORE; FACILITY MAY BE ABLE TO HANDLE ADDITIONAL RUN-OFF; ENGINEER MUST ADDRESS.
6. MUST ADDRESS OFF-SITE FLOWS FROM ADJACENT PROPERTY.
7. DRAINAGE COVENANT FOR FLOWS ACROSS LOT LINES.

DRAINAGE COMMENTS:

1. THE PAVED ACCESS FOR THIS SITE IS BUENA VISTA DRIVE.
   A. APPROVED STREET GRADES WERE ON FILE IN ENGINEERING. EVEN THOUGH THIS SITE WILL NOT REQUIRE ACCESS TO WILMOORE DRIVE, THE APPROVED STREET GRADES WERE USED IN DESIGNING THE GRADE OF THE PROPOSED PUBLIC DRAINAGE EASEMENT.
2. FREE DISCHARGE IS GUARANTEED BECAUSE RUN-OFF FROM THE SITE WILL NOT HAVE ADVERSE IMPACT ON DOWNSTREAM FACILITIES. THERE IS A MAJOR DRAINAGE CHANNEL APPROXIMATELY 1500 FEET NORTH OF THE SITE. THERE IS A CONCRETE GUTTER ON THE WEST SIDE OF THE STREET AND A GROUP INLET ON THE EAST SIDE. IN BUENA VISTA DRIVE, THERE IS A GROUP INLET NORTH OF THE CHANNEL AND A 42" CULVERT UNDER BUENA VISTA DRIVE NORTH OF THE CHANNEL. THE CHANNEL EXITS THE CULVERT AND EVENTUALLY EMPTIES INTO THE CHANNEL. THIS SITE IS AT THE LOWEST END OF THE DRAINAGE BASIN SERVED BY THESE STORM SEWERS. THEREFORE, RUN-OFF FROM THIS SITE WILL ENTER THE CHANNEL LONG BEFORE THE PEAK FLOW OCCURS IN THE STORM SEWER AND CHANNEL.
3. DEVELOPED FLOW WILL NOT FLOW INTO WILMOORE DRIVE BUT WILL FLOW INTO BUENA VISTA DRIVE. THE LOW POINT ON WILMOORE DRIVE WILL COINCIDE WITH THE PUBLIC DRAINAGE EASEMENT TO BE RECORDED IN CONNECTION WITH THIS PLAN. THE DEVELOPED ON-SITE AND OFF-SITE RUN-OFF QUANTITIES ARE SHOWN IN THE DRAINAGE CALCULATIONS.
4. THE NEED FOR RETAINING WALLS HAS BEEN AVOIDED BY "STEPPING" THE FINISHED FLOOR OF THE STORAGE UNITS.
5. THE EXISTING 36" STORM LINE CROSSING WILMOORE DRIVE WILL HAVE TO INTERCEPT AS MUCH RUN-OFF AS POSSIBLE IN THE FUTURE WHEN WILMOORE DRIVE IS PAVED. OTHERWISE, THERE WILL BE EXCESSIVE FLOW THROUGH THE EASEMENT, POSSIBLE RESULTING IN FLOODING.
6. THERE ARE NOT OFF-SITE FLOWS FROM PRIVATE PROPERTY.
7. A DRAINAGE COVENANT WOULD NORMALLY BE REQUIRED FOR FLOW ACROSS THE LOT LINES. SEPARATING LOTS 5 AND 6 AND LOTS 6 AND 7. HOWEVER, A PUBLIC DRAINAGE EASEMENT IS TO BE RECORDED IN CONNECTION WITH THIS PLAN. THEREFORE, A COVENANT IS NOT REQUIRED.

EROSION CONTROL PLAN:

CONSTRUCT A 1.0 FOOT HIGH BERM ALONG THE SOUTH AND WEST SIDES OF THE BUILDING SITE TO INTERCEPT ALL RUNOFF FROM THE SITE DURING THE PERIOD THAT THE BUILDINGS ARE UNDER CONSTRUCTION.

DRAINAGE CALCULATIONS

I. **REFERENCES:**

A. CITY OF ALBUQUERQUE DEVELOPMENT PROCESS MANUAL (DPM) VOLUME 2, DESIGN CRITERIA, CHAPTER 22.
B. FLOODWAY MAP, PANEL 35 OF 50, (FEMA), OCTOBER 14, 1981.
C. SOIL SURVEY OF BERNALILLO COUNTY, NEW MEXICO, U.S. SOIL CONSERVATION SERVICE, JUNE, 1977.

II. **ON-SITE RUNOFF CHARACTERISTICS:**

A. UNDEVELOPED RUNOFF COEFFICIENT:

TYPE OF SURFACE	AREA	"C"-VALUE	AREA("C")
STREETS, DRIVES, WALKS	11,760	0.95	11,172
ROOFS	0,240	0.90	0,216
LAWNS & LANDSCAPING: UNDEVELOPED	11,250	0.40	4,500
TOTAL AREA	23,000	0.72	15,888

WEIGHTED "C" VALUE = 23,088 / 31,250 = 0.74

PERCENT IMPERVIOUS = 94%

B. DEVELOPED RUNOFF COEFFICIENT:

TYPE OF SURFACE	AREA	"C"-VALUE	AREA("C")
STREETS, DRIVES, WALKS	19,560	0.95	18,582
ROOFS	9,440	0.90	8,496
LAWNS & LANDSCAPING	2,250	0.25	563
UNDEVELOPED			
TOTAL AREA	31,250		28,941

WEIGHTED "C" VALUE = 28,941 / 31,250 = 0.93

PERCENT IMPERVIOUS = 94%

C. RAINFALL: 100-YR.,6-HR.;(REF. A., PLATE 22.2 D-1)
$P_6 = 2.25$ INCHES.

D. TIME OF CONCENTRATION: 10 MINUTES.

E. RAINFALL INTENSITY;(REF. A., PLATE 22.2 D-2)
$I_{10}=(P_6)(a)(10)^{(-0.78)}=(2.25)(4.44)(10)^{(-0.78)}=4.7618$/HR

F. SOIL TYPE (REF. I.C., SHEET NO. 31) SOIL IS Ca, HYDROLOGIC SOIL GROUP B

G. RUNOFF CURVE NUMBER (CN);(REF.I.A., PLATE 22.2 C-2)
UNDEVELOPED LAND USE: PASTURE, FAIR.
UNDEVELOPED CN = 54
DEVELOPED LAND USE: COMMERCIAL
DEVELOPED CN = 97

H. DIRECT RUNOFF, Q_p; INCHES (REF. I.A., PL. 22.2 C-4)
UNDEVELOPED Q_p = 0.10 IN. DEVELOPED Q_p = 1.90 IN.

III. **ON-SITE PEAK DISCHARGE BY RATIONAL EQUATION:**

A. EXISTING CONDITION:
$Q_{100} = (0.74)(4.76)(0.72) = 2.54$ CFS
$Q_{10} = (0.67)(4.76)(0.72) = 1.67$ CFS

B. DEVELOPED CONDITION:
$Q_{100} = (0.93)(4.76)(0.72) = 3.19$ CFS
$Q_{10} = (0.67)(4.76)(0.72) = 2.18$ CFS

IV. **ON-SITE VOLUME BY S.C.S. METHOD:**

A. EXISTING CONDITION:
$V_{100} = (AREA)(Q_p)(12) = (1.250)(0.10)(12) = .250$ CF
$V_{10} = (0.67)(.250) = .175$ CF

B. DEVELOPED CONDITION:
$V_{100} = (AREA)(Q_p)(12) = (1.250)(1.90)(12) = 28.5$ CF
$V_{10} = (0.67)(28.5) = 19.1$ CF

V. **OFF-SITE FLOW:**

A. DRAINAGE BASIN CONDITIONS: TWO CONDITIONS MUST BE CONSIDERED: 1. THE CONDITION WHERE THE RUNOFF PER ACRE IS LOW BECAUSE MUCH OF THE BASIN IS UNDEVELOPED BUT THE STORM SEWER SIZES ARE NOT INTERCEPT ANY OF THE FLOW; AND, THE FUTURE DEVELOPED CONDITION WHERE RUNOFF PER ACRE IS HIGHER BUT THE STORM SEWER INTERCEPTS A PORTION OF IT.
B. EXISTING CONDITION. IN THIS CASE, ALL RUNOFF FROM THE BASIN MUST BE CONSIDERED TO BE HANDLED BY THE EASEMENT.
   AREA = (WIDTH)(LENGTH) / 43560 = (1320' x 314.200) / 43,560 = 11.81 ACRES (LESS 0.29 ACRE FOR THE CAR WASH IN TALE WHICH DRAINS TO TALE.)
   1.90 - 0.29 = 11.52 ACRES
   DEVELOPED AREA = (200 X 140) + (300 X 200) = 96,000 = 2.2 ACRES

ASSUME DEVELOPED AREA IS COMMERCIAL AND BUSINESS AREAS; BUT ASSUME THAT THE IMPERVIOUS AREA IS EQUALLY DIVIDED BETWEEN ROOF AND STREETS/DRIVES/WALKS. THE WEIGHTED "C" FACTOR IS COMPUTED AS FOLLOWS:

TYPE OF SURFACE	AREA	"C" VALUE	AREA("C")
STREETS, DRIVES, WALKS	0.94	0.95	0.89
ROOFS	0.94	0.90	0.85
LAWNS AND LANDSCAPING	0.12	0.25	0.08
UNDEVELOPED	9.32	0.40	3.73
TOTALS	11.52		5.55

WEIGHTED "C" VALUE = 5.55 / 11.52 = 0.48

ASSUME MINIMUM Tc = 10 MIN. I = 4.76 IN/HR

Q = CIA = (0.48 X 4.76 X 11.52 = 26.32 CFS

C. FUTURE DEVELOPED CONDITION. IT IS ASSUMED THAT WHEN WILMOORE DRIVE IS PAVED, THERE WILL BE CATCH BASINS CONSTRUCTED WHERE THE EXISTING STORM SEWER CROSSES WILMOORE DRIVE. THE STORM SEWER WILL BE ABLE TO HANDLE THE FLOW CONDITIONS OF THE BASIN LYING NORTH OF THE STORM SEWER WILL BE INTERCEPTED BY THE CATCH BASINS. IT IS ALSO ASSUMED THAT ALL PROPERTY FRONTING ON TALE BLVD. THAT IS NOW UNDEVELOPED, WILL BE DEVELOPED IN SUCH A WAY THAT ALL RUNOFF WILL BE DIRECTED TO TALE BLVD.

THEREFORE, THE DEVELOPED AREA CONSISTS OF LOTS 1 THROUGH 10, BLOCK 14, APPROXIMATELY 1.72 ACRES; AND, LOTS 15 THROUGH 26, BLOCK 13, APPROXIMATELY 2.04 ACRES. THE TOTAL AREA IS 3.76 ACRES. FROM PLATE 22.2 C-2, ASSUME AREA IS RESIDENTIAL, 65% IMPERVIOUS, WITH THE IMPERVIOUS AREA EQUALLY DIVIDED BETWEEN ROOFS AND STREETS DRIVES/WALKS. THE REMAINING 35.0 IS ASSUMED TO BE LANDSCAPING. THE WEIGHTED "C" FACTOR IS COMPUTED AS FOLLOWS:

TYPE OF SURFACE	AREA	"C" VALUE	AREA("C")
STREETS, DRIVES, WALKS	1.22	0.95	1.16
ROOFS	1.22	0.90	1.10
LAWNS AND LANDSCAPING	1.32	0.25	0.33
TOTALS	3.76		2.59

WEIGHTED "C" FACTOR = 2.59 / 3.76 = 0.68

ASSUME MINIMUM Tc = 10 MIN. I = 4.76 IN/HR

Q = CIA = (0.68 X 4.76 X 3.76 = 12.34 CFS

VI. **CAPACITY OF EASEMENT BY MANNING'S EQUATION:**

20' WIDE EASEMENT WITH 8" INVERTED CROWN. CROSS SLOPE = (8/12)/10
CROSS SLOPE = 0.0667 FT./FT. ASSUME 3 INCH DEPTH OF FLOW AT CENTER.
WIDTH OF FLOW = (0.25)(0.0667) / 2 = 18.75 FT.
AREA OF FLOW = (18.75 X 0.0625) = 5.86 SF
WETTED PERIMETER P = $(0.25)^2 + (0.625)^2$ = 18.78 FT.
R = 5.9 / 18.78 = 0.312 FT.
V = (1.49/0.014)* $(0.312)^{(2/3)}$ $(0.0333)^{(1/2)}$ = (106.5)(0.46)(0.182) = 4.54 FPS
Q = AV = 5.86 X 4.54 = 26.59 CFS - 26.32 CFS CAPACITY IS ADEQUATE FOR THE 100-YR. CONDITION, EXISTING UNDEVELOPED.

VII. **CALCULATION OF LOW POINT ON WILMOORE DRIVE:**

A. CALCULATE STATION OF EASEMENT CENTERLINE:
   REFER TO PLAN AND PROFILE SG-15-72. "PROPOSED STREET GRADES ON WILMOORE BETWEEN ROSS AND GIBSON".
   STATIONING: 2+00 APPEARS TO BE ON CURB RETURN AT THE INTERSECTION OF ROSS AND WILMOORE. WITH 10 + 00 FT. SOUTH OF FLOWLINE ON ROSS. ASSUME 5 FT. SOUTH OF THE SOUTH R.O.W.: LINE ON ROSS. LOTS 1 THROUGH 5 FACE ROSS NOT FRONTAGE ON WILMOORE. THEREFORE THE STATION OF THE SOUTH BOUNDARY OF LOT 5 IS 250 - 5 = 2 + 45. THE CENTERLINE OF THE EASEMENT IS 10 FEET FURTHER SOUTH, OR THAT 2+55 (= 55).
B. CALCULATE STATION AND ELEVATION OF LOW POINT.
   GRADE BETWEEN 0+25 AND 2+05, WEST SIDE, TOP OF CURB = 6.0%
   GRADE BETWEEN 2+05 AND 4+25, WEST SIDE, TOP OF CURB = 3.7%
   LENGTH OF VERTICAL CURVE = 250'
   TOTAL CHANGE IN GRADE THROUGH CURVE = 6.0% - 3.7% = 11.8%
   CHANGE PER 100' = 11.8%/250' = -0.0472
   STATION OF LOW POINT = (6.0%) / (-0.0472) = 1+27.0
   THE GRADE = GE + (-0.0472)(1.27) = 6.0% - 0.06 = 5.94%
   STATION OF LOW POINT = 0+80 + 1+27.0= 2+07.0
   TANGENT ELEVATION AT PVI = 48.00
   TANGENT ELEVATION AT STA. 2+50 = 48 + (5.94%)(0.2)(5) = 49.71
   OFF-SET = (.125 - .45)/(125)^2 X 100 = 1.52'
   CURVE ELEVATION AT LOW POINT = 49.71 - 1.52 = 51.23 TOP OF CURB.
   FLOWLINE ELEVATION = 50.54

BENCH MARK:

A.C.S. STATION "7-L15" IS LOCATED ON THE NORTH SIDE OF KATRINA AVE., S.E., WEST SIDE OF TALE BLVD., S.E. THE ELEVATION FOR SAID BENCH MARK IS 5161.484.

LEGAL DESCRIPTION:

LOTS NUMBERED FIVE (5), SIX (6), SEVEN (7), TWELVE (12), AND THIRTEEN (13) IN BLOCK NUMBERED FOURTEEN (14) OF CLAYTON HEIGHTS SUBDIVISION, [illegible] SAME ARE SHOWN AND DESIGNATED ON THE PLAT THEREOF, FILED IN THE OFFICE OF THE COUNTY CLERK OF BERNALILLO COUNTY, NEW MEXICO, ON OCTOBER 19, [illegible]

OCT 1 1986
HYDROLOGY SECTION

REGISTERED PROFESSIONAL ENGINEER
Frank D. Quickly
October 7, 1986

GRADING AND DRAINAGE PLAN
KEY STORAGE FACILITY ADDITION
1824 BUENA VISTA DRIVE, S.E.
ALBUQUERQUE, NEW MEXICO

R# 28 DATE 3-27-02 OD EP

CITY OF ALBUQUERQUE

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The photographic process used meets the Basic Microfilm Standards of the National Micrographics Association (MSI&E-1977)

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NOTARY PUBLIC

OFFICIAL SEAL
Roberto Duran
NOTARY PUBLIC
MY COMMISSION EXPIRES
07/01/02

PLAN SHOT TWICE ONCE ON LIGHT ONCE ON DARK

CITY OF ALBUQUERQUE
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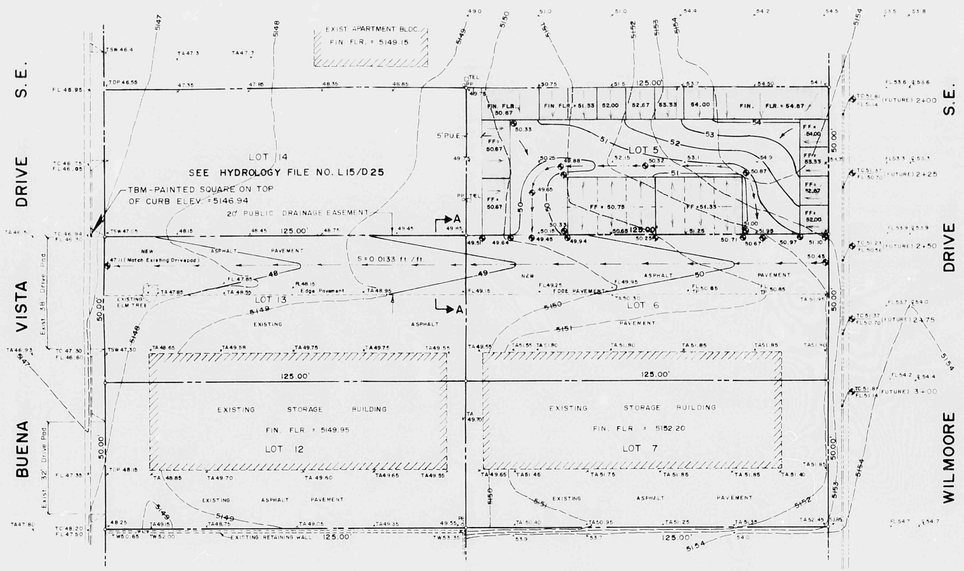
PLANS/PLATS ON FILE

FILE DESC: L15/D26

PLANS/PLATS 2

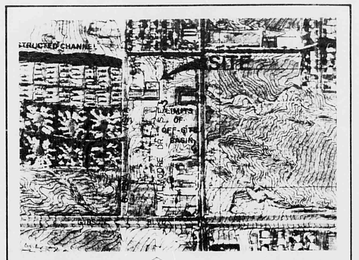
E 30 D 24 C 20 B 16 A 12 CITY OF ALBUQUERQUE C D F



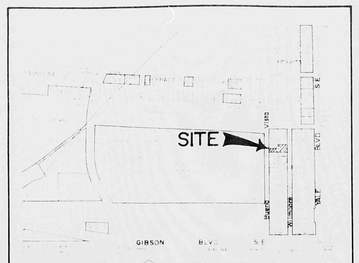
GRADING AND DRAINAGE PLAN

1" = 20'

NORTH



FLOODWAY MAP — NORTH — PANEL NO. 35 OF 50



VICINITY MAP — NORTH — ZONE ATLAS NO. L-15

DRAINAGE CALCULATIONS

I. REFERENCES:

II. ON-SITE RUNOFF CHARACTERISTICS:

III. CAPACITY OF EASEMENT IN MANNINGS' EQUATION:

IV. ON-SITE PEAK DISCHARGE BY RATIONAL EQUATION:

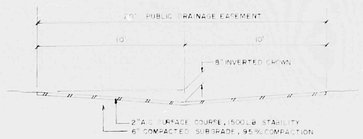
V. ON-SITE VOLUME BY SCS METHOD:

VI. DEPRESSED PLAN:

VII. INUNDATION IN EASEMENT IN WILMOORE DRIVE:

BENCH MARK:

LEGAL DESCRIPTION:



SECTION A-A – TYPICAL DRAINAGE EASEMENT

1/4" = 1'-0"

IMPORTANT: FINISHED FLOOR OF ALL BUILDINGS ADJACENT TO EASEMENT MUST BE A MINIMUM OF 6" HIGHER THAN OUTLET EDGE OF EASEMENT.

SECTION CONTROL PLAN:

Frank E. Lovelady
October 7, 1986

GRADING AND DRAINAGE PLAN
KEY STORAGE FACILITY ADDITION
1824 BUENA VISTA DRIVE, S.E.
ALBUQUERQUE, NEW MEXICO

PLAN SHOT TWICE
ONCE ON LIGHT
ONCE ON DARK

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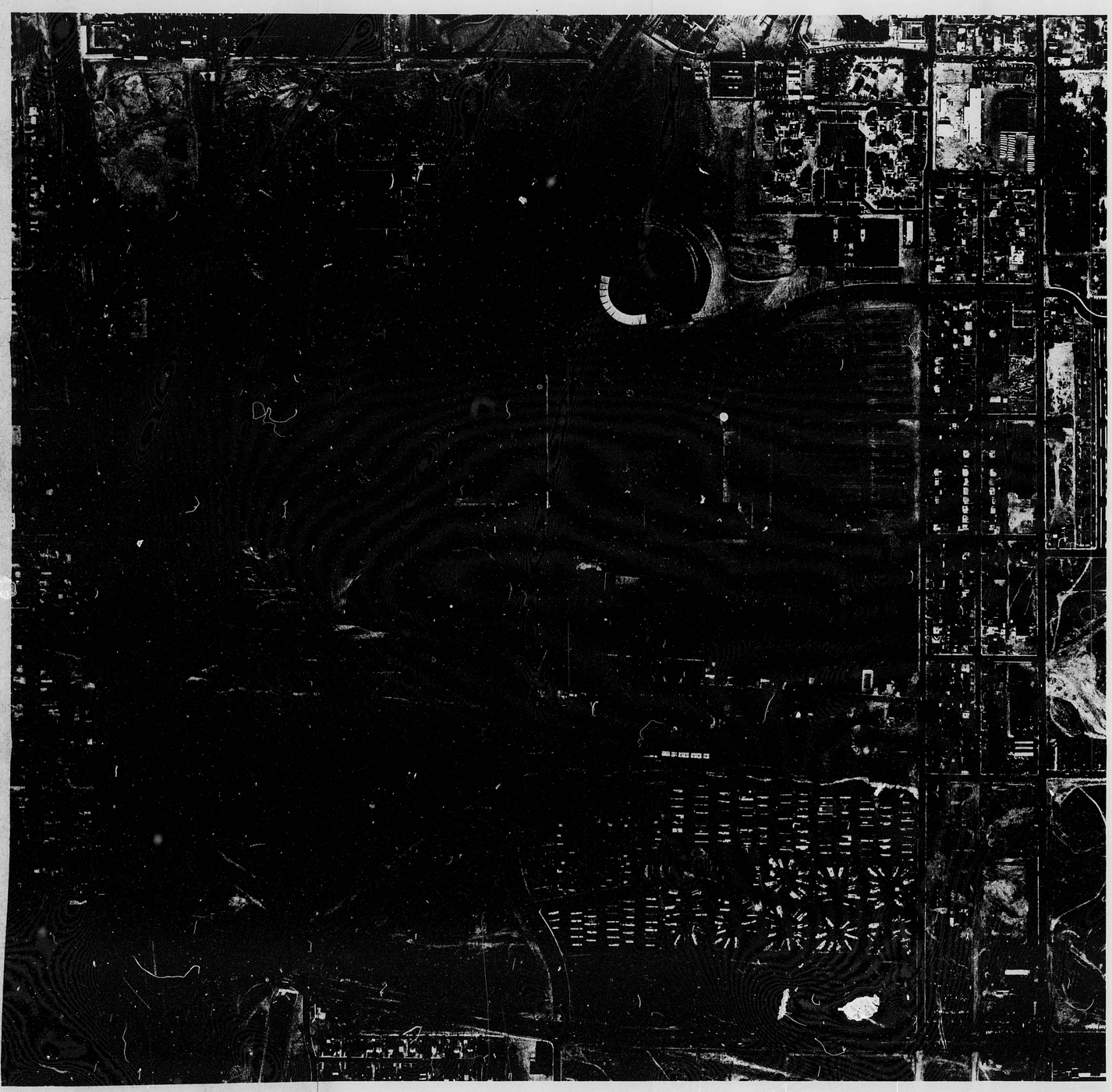

ALBUQUERQUE PLANNING DIVISION
MUNICIPAL DEVELOPMENT DEPT.
DATE FLOWN: DEC., 1982

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200 100 0 200 400
SCALE

L-15

PLAN SHOT TWICE
ONCE ON LIGHT
ONCE ON DARK

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3/15/02
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NOTARY PUBLIC
STATE OF NEW MEXICO
My Commission Expires 07/03/02

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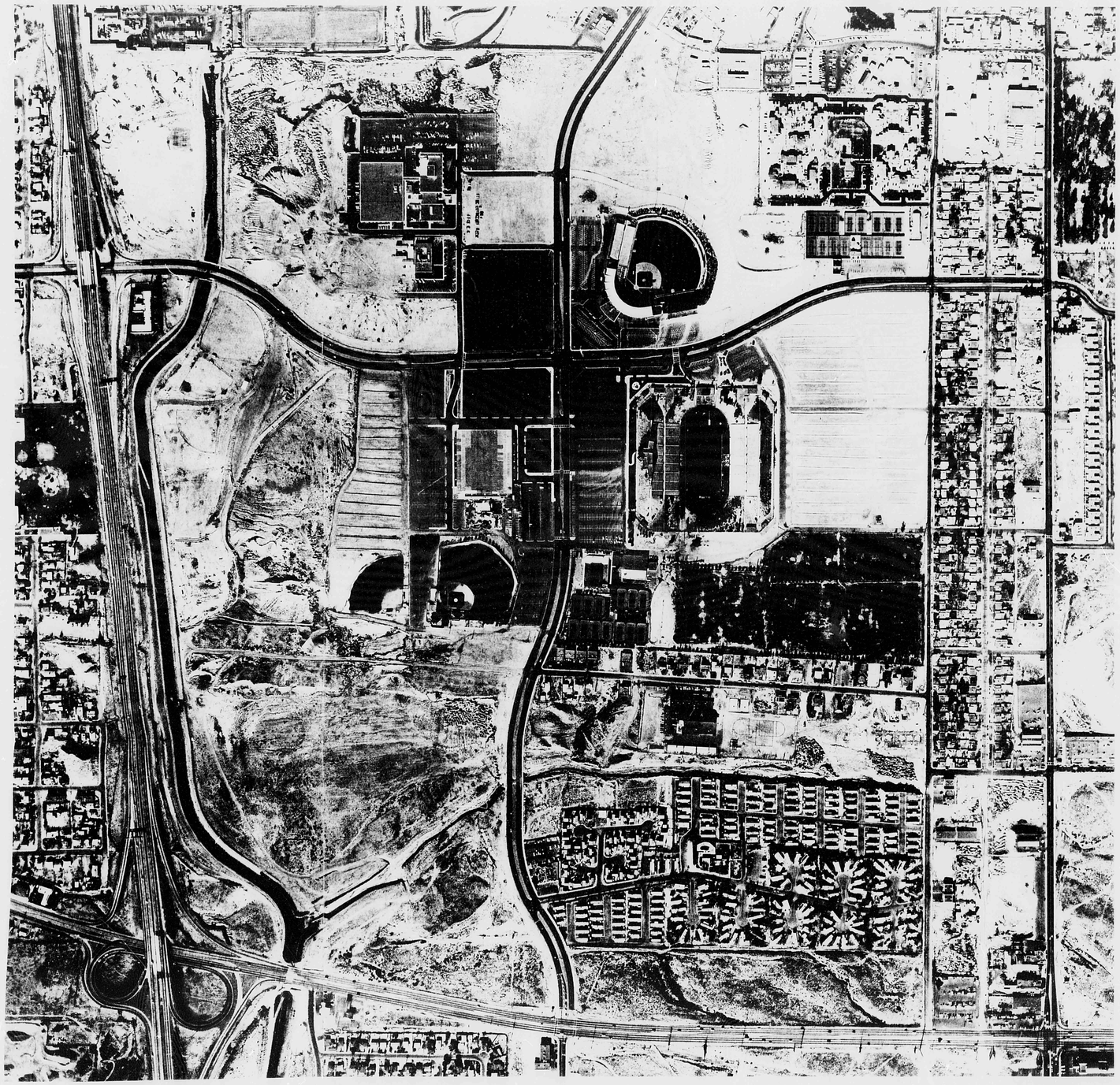

ALBUQUERQUE PLANNING DIVISION
MUNICIPAL DEVELOPMENT DEPT.
DATE FLOWN: DEC., 1982

L-15

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CITY OF ALBUQERQUE C D F