HYDROLOGY

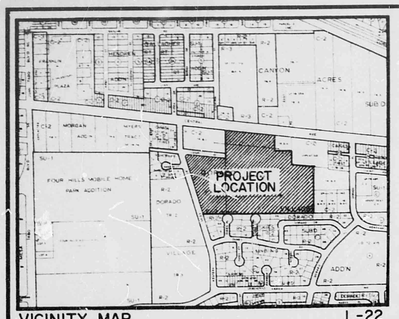
L22/D9

THREE PLANS

THE DUNES
APARTMENTS

L22-D9

1 3-PLANS



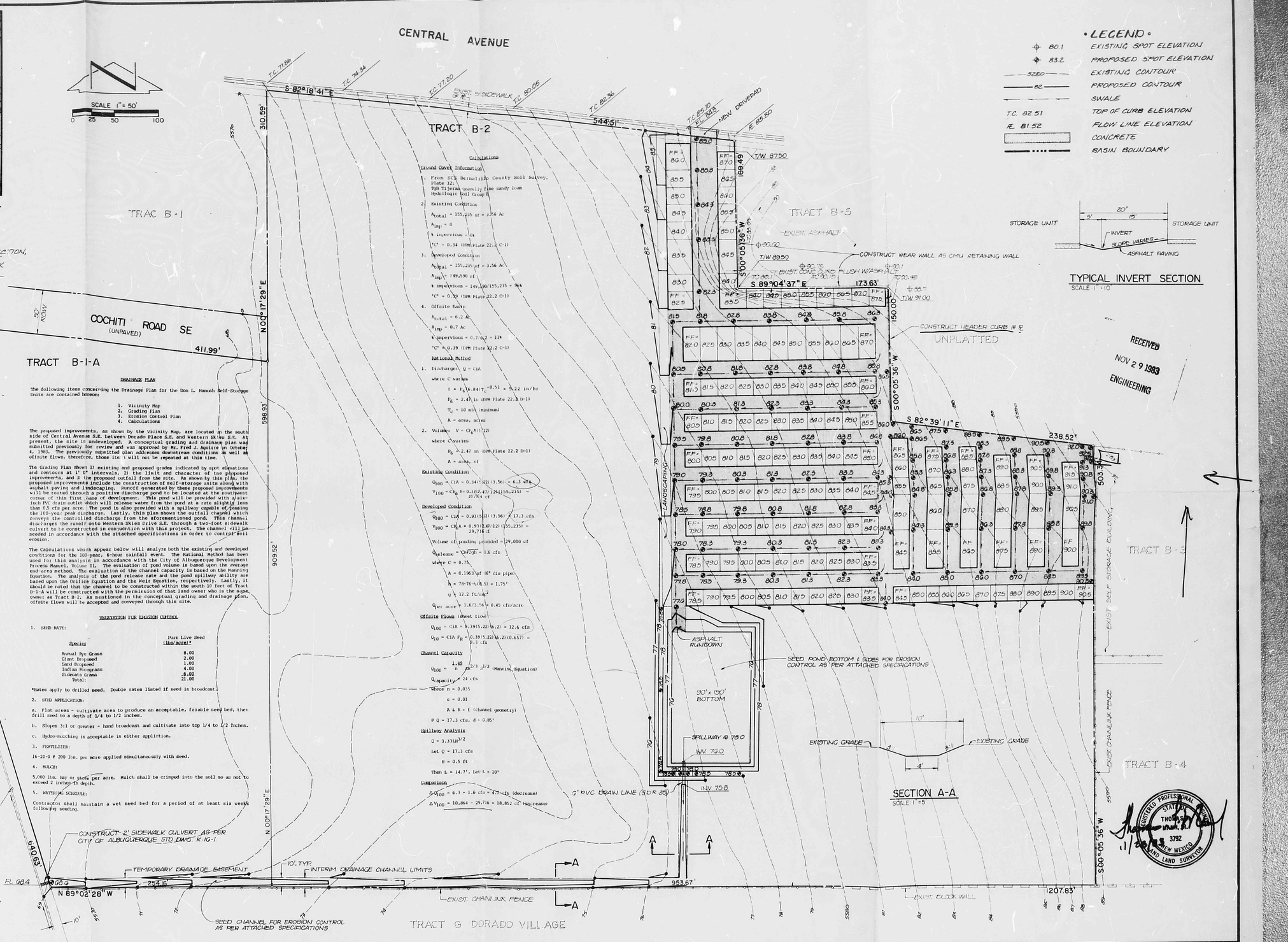
VICINITY MAP
SCALE 1" = 800'

L-22

• PROJECT BENCH MARK = TBM •

ACS BENCH MARK N.M. BER 6 LOCATED AT THE INTERSECTION OF CENTRAL AVE AND WESTERN SKIES DR. SE IN THE SOUTHEAST QUADRANT OF THE INTERSECTION, 105' SOUTH OF THE E OF CENTRAL AVE AND 60' EAST OF THE E OF WESTERN SKIES DR. THE STATION MARK IS A STANDARD USCA BRASS TABLET STAMPED " NM Ber. 6, 1934 El. 5560 ", SET IN TOP OF A CONCRETE POST PROJECTING 0.4 FT.
ELEVATION = 5560.114 FEET (MSLD)

SCALE 1" = 50'
0 25 50 100



RECEIVED
NOV 29 1983
ENGINEERING

REGISTERED PROFESSIONAL ENGINEER
STATE OF NEW MEXICO
THOMAS T. MOORE
3792
LAND SURVEYOR

Drainage Plan

The following items concerning the Drainage Plan for the Don L. Hanosh Self-Storage Units are contained herein:

1. Vicinity Map
2. Grading Plan
3. Erosion Control Plan
4. Calculations

The proposed improvements, as shown by the Vicinity Map, are located in the south side of Central Avenue S.E. between Dorado Place S.E. and Western Skies S.E. At present, the site is undeveloped. A conceptual grading and drainage plan was submitted previously for review and was approved by Mr. Fred J. Aguirre in October 4, 1983. The previously submitted plan addressed downstream conditions as well as offsite flows, therefore, those items will not be repeated at this time.

The Grading Plan shows 1) existing and proposed grades indicated by spot elevations and contours at 1' 0" intervals, 2) the limit and character of the proposed improvements, and 3) the proposed outfall from the site. As shown by this plan, the proposed improvements include the construction of self-storage units along with asphalt paving and landscaping. Runoff generated by these proposed improvements will be routed through a positive discharge pond to be located at the southwest corner of this first phase of development. This pond will be provided with a six-inch PVC drain outlet which will release water from the pond at a rate slightly less than 0.5 cfs per acre. The pond is also provided with a spillway capable of passing the 100-year peak discharge. Lastly, this plan shows the outfall channel which conveys the controlled discharge from the aforementioned pond. This channel discharges the runoff onto Western Skies Drive S.E. through a two-foot sidewalk culvert to be constructed in conjunction with this project. The channel will be seeded in accordance with the attached specifications in order to control soil erosion.

The Calculations which appear below will analyze both the existing and developed conditions for the 100-year, 6-hour rainfall event. The Rational Method has been used for this analysis in accordance with the City of Albuquerque Development Process Manual, Volume II. The evaluation of pond volume is based upon the average end-area method. The evaluation of the channel capacity is based on the Manning Equation. The analysis of the pond release rate and the pond spillway ability are based upon the Orifice Equation and the Weir Equation, respectively. Lastly, it should be noted that the channel to be constructed within the south 10 feet of Tract B-1-A will be constructed with the permission of that land owner who is the same owner as Tract B-2. As mentioned in the conceptual grading and drainage plan, offsite flows will be accepted and conveyed through this site.

Calculations

Ground Cover Information

1. From SCS Bernalillo County Soil Survey, Plate 32:
   Tijeras Stonelly fine sandy loam
   Hydrologic Soil Group B
2. Existing Condition
   $A_{total} = 155,235$ sf $= 3.56$ Ac
   $A_{imp} = 0$
   % impervious = 0%
   'C' = 0.34 (DPM Plate 22.2 C-1)
3. Developed Condition
   $A_{total} = 155,235$ sf $= 3.56$ Ac
   $A_{imp} = 149,590$ sf
   % impervious = 149,590/155,235 = 96%
   'C' = 0.39 (DPM Plate 22.2 C-1)
4. Offsite Basin
   $A_{total} = 6.2$ Ac
   $A_{imp} = 0.7$ Ac
   % impervious = 0.7/6.2 = 11%
   'C' = 0.39 (DPM Plate 22.2 C-1)

Rational Method

1. Discharge: $Q = CIA$
   where C varies
   $I = P_6(6.04T_c^{-0.51}) = 5.22$ in/hr
   $P_6 = 2.47$ in (DPM Plate 22.2 D-1)
   $T_c = 10$ min (minimum)
   A = area, acres
2. Volume: $V = CP_6A(1/12)$
   where C varies
   $P_6 = 2.47$ in (DPM Plate 22.2 D-1)
   A = area, sf

Existing Condition

$Q_{100} = CIA = 0.34(5.22)(3.56) = 6.3$ cfs
$V_{100} = CP_6A = 0.34(2.47)(1/12)(155,235) = 20,964$ cf

Developed Condition

$Q_{100} = CIA = 0.93(5.22)(3.56) = 17.3$ cfs
$V_{100} = CP_6A = 0.93(2.47/12)(155,235) = 29,716$ cf

Volume of ponding provided = 29,000 cf

$Q_{release} = CA\sqrt{2gh} = 1.6$ cfs
where C = 0.75
A = 0.1963 sf (6" dia pipe)
h = 78-76 = (6.5) = 1.75'
g = 32.2 ft/sec^2
$q_{per\ acre} = 1.6/3.56 = 0.45$ cfs/acre

Offsite Flows (sheet flow)

$Q_{100} = CIA = 0.39(5.22)(6.2) = 12.6$ cfs
$Q_{10} = CIA\ F_B = 0.39(5.22)(6.2)(0.657) = 8.3$ cfs

Channel Capacity

$Q_{100} = \frac{1.49}{n} AR^{2/3} S^{1/2}$ (Manning Equation)
$Q_{capacity} = 24$ cfs
where n = 0.035
S = 0.01
A & R = f (channel geometry)
@ Q = 17.3 cfs, d = 0.85'

Spillway Analysis

$Q = 3.33LH^{1/2}$
Let Q = 17.3 cfs
H = 0.5 ft
Then L = 14.7', Let L = 20'

Comparison

$\Delta Q_{100} = 6.3 - 1.6$ cfs $= 4.7$ cfs (decrease)
$\Delta V_{100} = 10,964 - 29,716 = 18,752$ cf (increase)

Construction Notes:

1. TWO (2) WORKING DAYS PRIOR TO ANY EXCAVATION, CONTRACTOR MUST CONTACT LINE LOCATING SERVICE, 765-1234, FOR LOCATION OF EXISTING UTILITIES.
2. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL EXCAVATE AND VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL POTENTIAL OBSTRUCTIONS. SHOULD A CONFLICT EXIST, 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 CONSTRUCTION SAFETY AND HEALTH.
4. ALL CONSTRUCTION WITHIN PUBLIC RIGHT-OF-WAY SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE CITY OF ALBUQUERQUE STANDARDS AND PROCEDURES.

Vegetation for Erosion Control

1. SEED RATE:

Species	Pure Live Seed (lbs/acre)*
Annual Rye Grass	8.00
Giant Dropseed	2.00
Sand Dropseed	1.00
Indian Ricegrass	4.00
Sideoats Grama	6.00
Total:	21.00

*Rates apply to drilled seed. Double rates listed if seed is broadcast.

2. SEED APPLICATION:
   a. Flat areas - cultivate area to produce an acceptable, friable seed bed, then drill seed to a depth of 1/4 to 1/2 inches.
   b. Slopes 3:1 or greater - hand broadcast and cultivate into top 1/4 to 1/2 inches.
   c. Hydro-mulching is acceptable in either application.
3. FERTILIZER:
   16-20-0 @ 200 lbs. per acre applied simultaneously with seed.
4. MULCH:
   5,000 lbs. hay or straw per acre. Mulch shall be crimped into the soil so as not to exceed 2 inches in depth.
5. WATERING SCHEDULE:
   Contractor shall maintain a wet seed bed for a period of at least six weeks following seeding.

Tom Moore Associates, P.C.
811 DALLAS N.E. • ALBUQUERQUE • NEW MEXICO • 87110
ENGINEERS

NO.	DATE	BY	REVISIONS

DESIGNED BY: T.T.M.
DRAWN BY: T.M.A.
APPROVED: T.T.M.

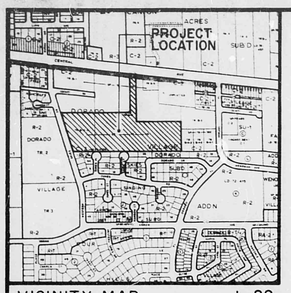
JOB NO. 31051
DATE 11·83

GRADING AND DRAINAGE PLAN
DON L. HANOSH SELF-STORAGE UNITS

L22/D9

FILE NO.
SHEET 1 OF 1

N29963



VICINITY MAP L-22
SCALE 1" = 800'

T.B.M.

TOP OF POUND REBAR @ THE NORTHWEST PROPERTY CORNER, AS SHOWN.
ELEVATION = 5577.12 FEET (M&LD)

PROJECT BENCHMARK

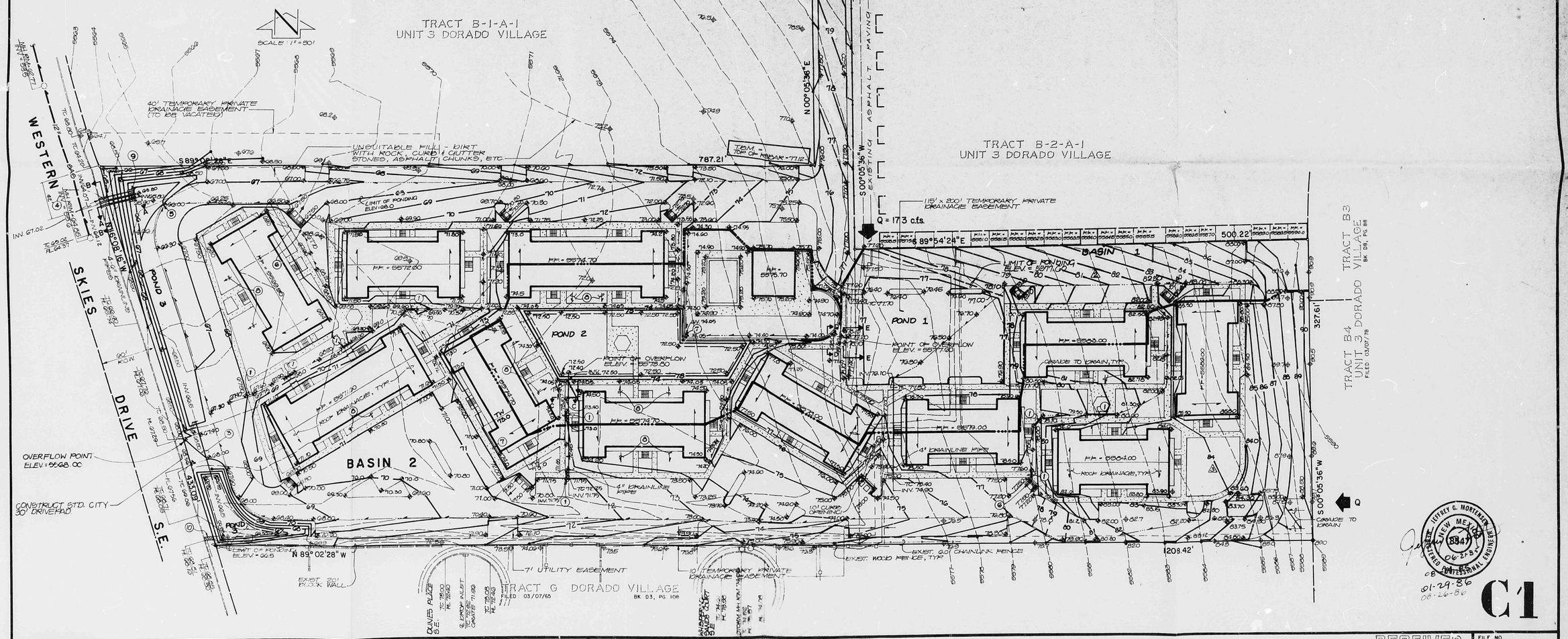
A STANDARD USGS BRASS TABLET STAMPED "N.M. BM 4, 1954 BT, 5560" SET IN TOP OF A CONCRETE POST PROJECTING 0.4 FEET. THE STATION IS LOCATED @ THE INTERSECTION OF CENTRAL AVE & WESTERN SKIES DR. SE. IN THE SOUTHEAST QUADRANT OF THE INTERSECTION, 105 FEET SOUTH OF CENTERLINE CENTRAL AVE. & 60 FEET EAST OF CENTERLINE WESTERN SKIES DR. SE. IN A VACANT LOT.
ELEVATION = 5560.11 FEET (M&LD)

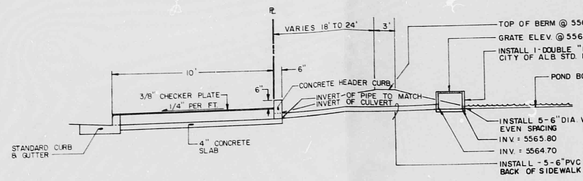
LEGAL DESCRIPTION

TRACTS B-1-A-2 & B-2-A-2, UNIT 3 DORADO VILLAGE

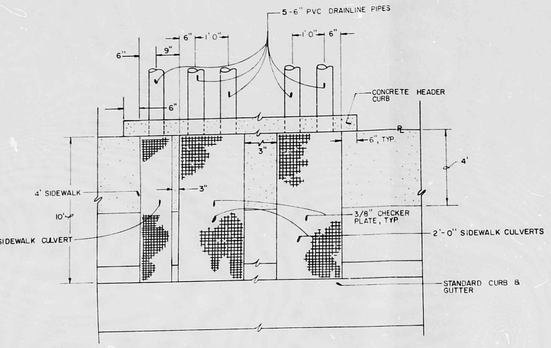
LEGEND

- 5570 — EXISTING CONTOUR
- 70 — PROPOSED CONTOUR
- EXISTING SPOT ELEVATION
- PROPOSED SPOT ELEVATION
- PROPOSED CONCRETE
- SWALE
- BASIN BOUNDARY LINE

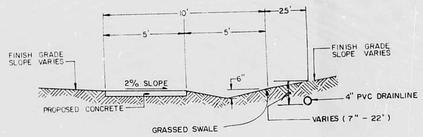

EAST CENTRAL AVENUE
WESTERN SKIES DRIVE S.E.
TRACT B-1-A-1
UNIT 3 DORADO VILLAGE
TRACT B-2-A-1
UNIT 3 DORADO VILLAGE
TRACT G DORADO VILLAGE
BK 03, PG. 108
FILED 03/07/65
TRACT B3 VILLAGE
BK 03, PG 88
TRACT B4
UNIT 3 DORADO VILLAGE
FILED 03/07/78
BASIN 1
BASIN 2
POND 1
POND 2
POND 3
SCALE 1" = 50'
S 82°41'00"E, 92.74'
Δ = 82°46'36"
R = 25.00'
L = 36.12'
Δ = 97°13'24"
R = 25.00'
L = 42.42'
N 00°05'36"E
S 00°05'36"W
S 89°54'24"E
N 89°02'28"W
S 89°02'28"E
Q = 17.3 c.f.s.
40' TEMPORARY PRIVATE DRAINAGE EASEMENT (TO BE VACATED)
UNSUITABLE FILL - DIRT WITH ROCK, CURB & GUTTER STONES, ASPHALT CHUNKS, ETC.
115' x 200' TEMPORARY PRIVATE DRAINAGE EASEMENT
10' TEMPORARY PRIVATE DRAINAGE EASEMENT
7' UTILITY EASEMENT
EXIST. 20' BLOCK WALL
EXIST. 6'0" CHAINLINK FENCE
EXIST. WOOD FENCE, TYP.
4" DRAINLINE PIPE
ROOF DRAINAGE, TYP.
GRADE TO DRAIN, TYP.
OVERFLOW POINT ELEV. = 5568.00
CONSTRUCT STD. CITY 30' DRIVEPAD
FOR DETAIL IN THIS AREA SEE ARCHITECTURAL SITE PLAN FOR LAYOUT.
CONSTRUCT CONCRETE VALLEY GUTTER & WEEPHOLES PER CITY OF ALB. STD. DWG. TRANSITION FROM 0'-0" TO 6" CURB W/IN FIRST HALF OF RETURN.
CONSTRUCT STD. CITY DRIVEPAD
DUNES PLACE S.E.
EXIST. 6" CURB & GUTTER
EXIST. 30' DRIVEPAD
EXIST. 6" CURB & GUTTER
EXIST. 6" CURB & GUTTER
EXIST. 30' DRIVEPAD



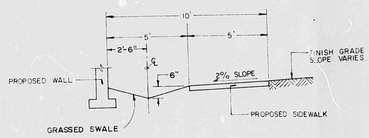
SECTION A-A
NO SCALE



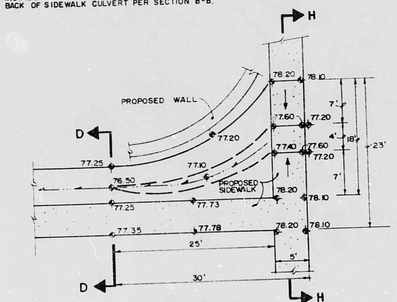
SECTION B-B
SCALE: 1" = 2'-0"



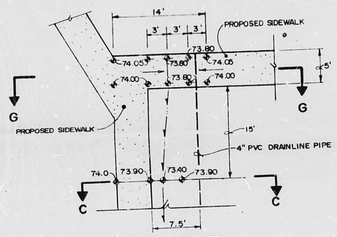
SECTION C-C
SCALE: 1" = 4'-0"



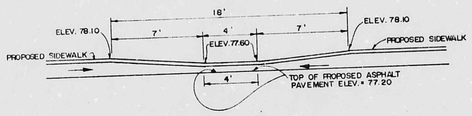
SECTION D-D
SCALE: 1" = 4'-0"



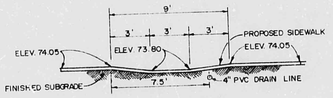
DETAIL E-E
SCALE: 1" = 10'



DETAIL F-F
SCALE: 1" = 10'



SECTION H-H
SCALE: 1" = 5'



SECTION G-G
SCALE: 1" = 5'

DRAINAGE PLAN

The following items concerning the Dune Apartments Drainage Plan are contained hereon:

1. Vicinity Map 2. Grading Plan 3. Calculations

The proposed improvements, as shown by the Vicinity Map, are located on the east side of Western Skies Drive S.E. just south of Central Avenue S.E. At present, the site is undeveloped. Much of the surrounding area is currently developed.

As shown by Plate L-22 of the Albuquerque Master Drainage Study, the site does not lie within a designated Flood Hazard Zone, however, downstream flooding is a concern. Because of this, runoff generated by this site will be routed through a series of positive discharge ponds and ultimately discharged to Western Skies Drive N.E. At present, the majority of the runoff generated from this site flows from east to west onto Western Skies Drive S.E. with a small portion of runoff draining onto adjoining Tract B-1-A-1. In addition, offsite flows enter the site at the northeast quadrant and along the east property line of the site into a positive discharge pond located in the east half of the site. These flows, which have been quantified below, will be accepted and conveyed through the site to Western Skies Drive S.E.

The Grading Plan shows 1) existing and proposed grades indicated by spot elevations and contours at 1'-0" intervals, 2) continuity between existing and proposed grades, and 3) the limit and character of the existing and proposed improvements. As shown by this plan, the proposed improvements consist of the construction of apartment buildings along with adjacent paving and landscaping. Flows generated by Basin 1, a portion of the site and the adjoining mini-storage site, will be routed from east to west through two positive discharge ponds located at the center of the site. These ponds will discharge to Basin 2. Flows generated and accepted by Basin 2 will be routed from east to west to a positive discharge pond located along the west side of the site. This pond will discharge onto Western Skies Drive S.E. via sidewalk culverts. From that point, the runoff will flow in a northerly direction in Western Skies Drive S.E. toward Central Avenue S.E. The grading required by these improvements will not alter the existing drainage pattern. Overflow runoff from the pond will be discharged via a drivepad located on the west side of the site to Western Skies Drive S.E.

The Calculations which appear hereon analyze both the existing and developed conditions for the 100-year, 6-hour rainfall event. The Rational Method has been used for this analysis in accordance with the City of Albuquerque Development Process Manual, Volume II. The analysis of the pond release rate is based upon the Orifice Equation. The analysis of the pond volume is based upon the Average End-Area Method. The analysis of the channel capacity is based upon the Manning Equation. As shown by these calculations, the proposed improvements will result in a net decrease in peak runoff generated by this site.

CALCULATIONS

Ground Cover Information

From SCS Bernalillo County Soil Survey, Plate 32:
TgB - Tijeras gravelly fine sandy loam
Hydrologic Soil Group B

Rational Method

Basin 1

Discharge: $Q = CiA$
where C varies
$i = P_6(6.84)T_c^{-.051} = 5.22$ in/hr
$P_6 = 2.47$ in (DPM Plate 22.2 D-1)
$T_c = 10$ min (minimum)
A = area, acres

Volume: $V = CP_6A(1/12)$
where C varies
$P_6 = 2.47$ in (DPM Plate 22.2 D-1)
A = area, sf

Basin 2

$L = 1{,}650'$, Δ elev = 86 -66 = 20', s = 10/1,650 = 0.0121

$T_c = 0.00013\ L^{0.77}/s^{0.385} = 0.21$ hrs = 12.8 min.

Let T_c = 12.8 min, $\therefore$ i = 4.60 in/hr

Existing Condition (Entire Site)

A_{total} = 499,264 sf = 11.46 Ac
A_{imp} = 0 sf; % impervious = 0%
C_{UP} = 0.34 (DPM Plate 22.2 C-1)
$Q_{100} = (0.34)(5.22)(11.46) = 20.3$ cfs
$V_{100} = (0.34)(2.47/12)(499{,}264) = 34{,}940$ cf

Developed Condition

1. Basin 1 (Portion of site and offsite Mini-Storage units)

a. Runoff Calculations

A_{total} = 250,870 sf = 5.6 Ac
A_{imp} = 214,025 sf; % impervious = 85%
C_{UP} = 0.81 (DPM Plate 22.2 C-1)
$Q_{100} = (0.81)(5.22)(5.76) = 24.4$ cfs
$V_{100} = (0.81)(2.47/12)(250{,}870) = 41{,}826$ cf

b. Pond 1

$$\text{Volume} = 1/2[(A_{76.0}+A_{77.0})(77.0 - 76.0) + (A_{77.0}+A_{77.6})(77.6 - 77.0)]$$
$$= 1/2[(0+16{,}388)(1.0) + (16{,}388+22{,}700)(0.4)]$$
$$= 16{,}012 \text{ cf}$$

⚠ $Q_{release} = 1.49/n\ AR^{2/3}\ S^{1/2}$ (Manning Equation)
where n = 0.010
S = 0.012
A = 0.0873 sf
R = A/P = 0.0873/1.047 = 0.083
$Q_{release}$ = 0.3 cfs

c. Channel Capacity (Section D-D)

$Q_{100} = 1.49/n\ AR^{2/3}s^{1/2}$ (Manning Equation)
where n = 0.035 (grass channel)
s = 0.313
A,R = f (channel geometry)
A = 1.25 sf
R = A/P = 1.25/5.10 = 0.25 ft
$Q_{capacity}$ = 21.10 cfs > $Q_{overflow}$ (By hydrograph analysis)

d. Pond 2

$$\text{Volume} = 1/2[(A_{72.0}+A_{72.5})(72.5 - 72.0) + (A_{72.5}+A_{73.0})(73.0-72.5) + (A_{73.0}+A_{73.80})(73.80 - 73.0)]$$
$$= 1/2[(0+11{,}463)(0.5) + (11{,}463+13{,}075)(0.5) + (13{,}075+14{,}037)(0.8)]$$
$$= 19{,}845 \text{ cf}$$

⚠ $Q_{release} = 1.49/n\ AR^{2/3}\ S^{1/2}$ (Manning Equation)
where n = 0.010
S = 0.0068
A = 0.0873 sf
R = A/P = 0.0873/1.047 = 0.083
$Q_{release}$ = 0.2 cfs

e. Channel Capacity (Section C-C)

$Q_{100} = 1.49/n\ AR^{2/3}s^{1/2}$ (Manning Equation)
where n = 0.035
s = 0.0230
A,R = f (channel geometry)
A = 1.25 ft
R = A/P = 1.25/5.10 = 0.25 ft
$Q_{capacity}$ = 13 cfs > $Q_{overflow}$ (By hydrograph analysis)

f. $V_{pond\ (total)}$ = 22,030 + 18,065 = 40,095 cf > $V_{required}$ (By hydrograph analysis)

2. Basin 2

a. Runoff Calculations

A_{total} = 403,629 sf =9.27 Ac
A_{imp} = 308,719 sf; % impervious = 76%
C_{UP} = 0.74 (DPM Plate 22.2 C-1)
$Q_{100} = (0.74)(4.6)(9.27) = 31.6$ cfs
$V_{100} = (0.74)(2.47/12)(103{,}29) = 61{,}480$ cf
By hydrograph analysis, $Q_{peak} = Q_{100} + Q_{inflow} = 31.6 + 0.6 + 0.6 = 32.8$ cfs

b. Pond 1

$$\text{Volume} = 1/2[(A_{65.8}+A_{66.0})(66.0 - 65.8) + (A_{66.0}+A_{67.0})(67.0-66.0) + (A_{67.0}+A_{68.0})(68.0 - 67.0)]$$
$$= 1/2[(0+1{,}250)(0.2) + (1{,}250+18{,}880)(1.0) + (18{,}880+34{,}690)(1.0)]$$
$$= 36{,}975 \text{ cf} = V_{required}$$

By hydrograph analysis, $Q_{release}$ = 8.3 cfs
By Orifice Equation, $Q = CA\sqrt{2gh}$, the release rate for a single 6-inch weephole is 1.7 cfs

$Q = CA\sqrt{2gh} = 1.7$ cfs
where C = 0.80
A = 0.1963 sf (6" dia. pipe)
g = 32.2 ft/sec^2
h = 1.75 ft

The required number of drains is 5.7/1.3 = 5
$\therefore$ install 5 - 6" drain pipes

⚠ c. Offsite Sheet Flow Entering Site Along the East Property Line

A_{total} = 180,000 sf = 4.13 Ac
A_{imp} = 0 sf; % impervious = 0%
C_{UP} = 0.34 (DPM Plate 22.2 C-1)
$Q_{100} = (0.34)(5.22)(4.13) = 7.3$ cfs
$V_{100} = (0.34)(2.47/12)(180{,}000) = 12{,}600$ cf

3. Comparison

ΔQ_{100} = (20.3 + 1.6) - 8.3 = 13.6 cfs (decrease)
ΔV_{100} = (34,940 + 29,719) - 41,826 + 61,480) = 38,650 cf (increase)

ALFRED G. MORTENSEN NEW MEXICO 8547 REGISTERED PROFESSIONAL ENGINEER 08-27-86

C2

CONTI, MORTENSEN & ASSOCIATES, INC.
811 DALLAS N.E. · ALBUQUERQUE · NEW MEXICO · 87110
ENGINEERS

NO.	DATE	BY	REVISIONS
1	8/85	LPU	REVISE CALCULATIONS

ASSIGNED BY JGM
DRAWN BY HD
APPROVED JGM

JOB NO 40196
DATE 5-85

DETAILS, TEXT & CALCULATIONS
THE DUNE APARTMENTS

RECEIVED AUG 27 1986 HYDROLOGY SECTION

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