HYDROLOGY L15/D7 TWO PLANS

L15-D7

2 PLANS

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209 EUBANK BLVD. N.E. SUITE C-2 / ALBUQUERQUE, N.M. / (505) 298 7493

August 31, 1977

Mr. Van Gilbert, AIA
418 Tulane SE
Albuquerque, New Mexico

L 15-D7

Dear Mr. Gilbert:

At your request, we have prepared a drainage report for the Lobo Tennis Club located south of the University Stadium. This letter shows drainage computations and recommendations.

I. Existing Drainage Conditions

A. General: The area presently has an athletic building on site with parking areas as shown in the grading plan attached. The proposed area for construction of tennis courts is presently undeveloped. To the west of the proposed construction is an arroyo which flows when the capacity of the storm sewer system north of the property on the access road for the stadium surcharges.

B. Topography: The tract slopes from northwest to southeast with an average slope of one percent.

C. Contributing Drainage Areas: Storm drainage north of the property is diverted to University Boulevard or into the arroyo on the east side of proposed construction. The storm waters generated within the study area will be considered since no upstream flow traverses the proposed construction site.

D. Present Drainage Patterns: The present drainage from the site is characterized by sheet flow generally from northwest to southeast in the arroyo east of the construction site and thence south onto Sunrise Terrace to the south of the property.

II. Proposed Drainage Plan

Development will be tennis courts as shown in the drainage plan attached. Drainage control will allow ponding of all water that results in an increase in flow from the property with diversion of normal flows into the present discharge point east of the development.

III. Storm Drainage Analysis

This section includes criteria references and computations used to determine drainage requirements.

A. Criteria

1. General - Resolution No. 1972-2, Albuquerque Metropolitan Arroyo Flood Control Authority

2. Project Storm - 100 year frequency

3. Rational method of storm water runoff

4. Runoff coefficient of existing area - C = 0.40

B. Technical References

1. Master Plan of Drainage, City of Albuquerque, 1961.

2. Time of Concentration Nomograph, p.2. Kirpich, Civil Engineering, June, 1940.

3. Rainfall Intensity-Duration-Frequency Curves, U. S. Weather Bureau Technical Paper No. 40, May, 1961.

C. Computations

Area - 3.85 acres
High Elevation - 6001 feet
Low Elevation - 5095 feet
Difference - 6 feet
Minimum Water Travel - 1,020 feet
From Nomograph (Kirpich)
Time of Concentration = 12 minutes
From Rainfall Intensity-Duration-Frequency Curves
Rainfall Intensity = 4.75 inches/hour
Q Max = .85 x 4.75 x 3.85 = 7.32 cfs

PONDING AREA EQUIPMENT

Criteria

1. Store water from storm of 6 hour duration with total rain of 2.4 inches.

2. City will accept one half of runoff from above.

$$\text{Total Water} = 3.85 \text{ acres} \times 43{,}560 \frac{\text{sq ft.}}{\text{acre}} \times 2.4 \text{ inches} \times \frac{1 \text{ ft.}}{12''}$$

$$= 33{,}541 \text{ cubic feet}$$

Criteria Continued:

Portion to be ponded = 33,541 cu ft x .5 = 16,770 cu ft

Site Ponding:

Pond at southwest corner of property	= 9,862 cu ft
Pond at south center of property	= 3,752
Pond at southeast of property	= 5,774
Total Ponding	=19,388 cu ft

IV. Recommendations:

As shown on the grading plan, it is recommended that ponding areas as shown be constructed to prevent increase in runoff due to the proposed development. Water will be discharged into the arroyo east of the property and will flow south as it presently does in an undeveloped state.

Thank you for the opportunity to provide this drainage study. We will coordinate the results with the City of Albuquerque as required. Please consult us should questions arise.

Sincerely yours,

Gary L. Sweenhart

Gary L. Sweenhart, P. E.
SWEENHART, BACKENSTOW, INC.

GS/dp

THE UNIVERSITY OF NEW MEXICO | ALBUQUERQUE, NEW MEXICO 87131
DEPARTMENT OF CIVIL ENGINEERING
TELEPHONE 505: 277-2722

July 23, 1979

RECEIVED
JUL 23 1979
CITY ENGINEER

Mr. Bruno Conegliano
Assistant City Engineer
City of Albuquerque
400 Marquette Avenue, NW
Albuquerque, NM 87102

Dear Bruno:

Transmitted with this letter is a drainage report carried out for the Lobo Tennis Club, as a public service activity. It is my feeling that my suggestions to the club satisfy the full intent of the City's drainage objectives: compensatory retention of increased runoff and channel capacity improved to 100-year flow level.

I do realize the City may require certain calculations, maps, etc. to verify drainage reports and plans. Should you wish additional information, I will be happy to supply it as best I can. Let me know.

The Lobo Tennis Club appears to be willing to develop in accord with proper drainage requirements. They have dropped one court from their original design to do this. I hope we can facilitate their plans.

Thank you for your attention.

Sincerely yours,

Richard

Richard J. Heggen, P.E.

Encl.

bm

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

July 25, 1979

L15-07

Dr. Richard J. Heggen, P.E.
Dept. of Civil Engineering
University of New Mexico
Albuquerque, N.M. 87131

Re: Lobo Tennis Club Expansion

Dear Dr. Heggen:

The drainage concept involving the expansion of the Lobo tennis courts is approved, subject to some slight alterations in your proposed plan.

1. The earthen berm at the lower (southern) court needs to be constructed with a gentler angle of divergence.

2. The height of said berm should be increased to a minimum of 2' to allow for a backwater effect created by the channel construction.

3. The face of the berm at the narrowest point of the channel should have erosion protection to offset the increased velocity of departing runoff.

4. The long term integrity of both upper and lower berms should be guaranteed by appropriate surface treatment (soil. cement, granite, rip-rap etc.) to prevent breaching.

5. The channel freeboard should be increased to 1' to account for a super elevation effect on the outside radius of the channel curve.

6. If space permits, the channel side slope should be flattened to 3! 1.

Sincerely,

Richard S. Heller

Richard S. Heller
City Engineer

RSH/ds

cc-Richard Leonard-AMAFCA
Drainage File
Bruno Conegliano

Lobo Tennis Club
Drainage Report - Technical Data

I Drainage Area

The following area constitutes the approximate watershed discharging thru the Lobo Tennis Club property.

From the club east, approximately along Terrace, then Ross St, passing thru Puerto del Sol Golf Course,
North on Amherst.
West on San Joaquin, then Kathryn Ave.
North on Columbia
West between St. Cyr and Coal Ave.
South on Buena Vista.
West thru field east of UNM stadium
UNM stadium

Most discharge is collected in storm sewers discharging to main passing south of UNM stadium and north of Lobo Tennis Club.

Discharge is limitted in storm sewer flow by a 36" section at 0.0025 grade. Chicago Pump Bulletin 9900 sewer capacity chart indicates discharge is limitted to 30 cfs.

Assuming sewer overflow spills at this limitting section, flow to the Lobo Tennis Club traverses approximately 2400 ft of sewer and 3600 ft of

land surface.

The watershed consists of 45% single family residential, 9% multi-family units, 39% parks, fields, and cemeteries, and 7%, a drive-in theater.

II Design Discharge

Rational method.

SF Resid	0.4 × .45
MF Resid	0.65 × .09
PF + C	0.20 × .39
DIT	0.60 × .07
C =	.358

$$t_c = \frac{2400 \text{ ft}}{6 \text{ ft/sec}} + \frac{3600 \text{ ft}}{2.5 \text{ ft/sec}} = 1840 \text{ sec} \approx 30 \text{ min}$$

i_{30} = 3.0 in/hr (NOAA Atlas, aprox 10% below Herkenhoff at this location).

Area = 322 ac

$$Q = .358 \times 3 \times 322 = 345 \text{ cfs}$$

assuming 30 cfs carried by sewer

Q overland at Lobo Tennis Club = 315 cfs

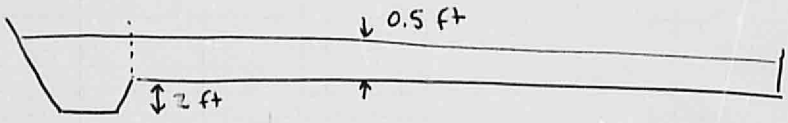
III Conveyance

Channel $b = 2$ ft, $m = 1.5$, $n = 0.025$, $s = 0.01$

flowing $d = 1.5$ ft

$$Q = 7.5 \times \frac{1.49}{.025} (.861)^{2/3} (.01)^{1/2} \approx 40 \text{ cfs}$$

flowing $d = 2.5$ ft with 60 ft flood plain.



$$Q = 30 \times \frac{1.49}{.013} (.5)^{2/3} (.01)^{1/2} + 1.7 \times \frac{1.49}{.025} (1.48)^{2/3} (.01)^{1/2}$$

$$= 217 \text{ cfs} \quad + \quad 125 \text{ cfs} \quad = \quad 342 \text{ cfs}$$

IV Retention

As developed in the report, 5450 cubic ft might be added to runoff were the entire 1.65 acres paved. The submitted plans call for only approximately 1/2 this area to be developed. Thus retention design is conservative. Such design will incur no more expense than one of half the capacity as the retention basin is essentially already in existance

V. Notes to accompany Site Plan

The existing wash is entirely inadequate to carry the 100-year flow without jeprodizing the UNM Athletic Building and homes just below the proposed development

The UNM Physical Plant (Ned Ross) has agreed to do any earthwork required to assure that discharge will continue to enter the Lobo Tennis Club property at the present location and that that flow be conveyed to the channel thru the Club property. UNM would prefer to construct the floodway adjacent to the Athletic Building in a parabolic section so that they could move equipment across it. I see no hydraulic problem

The floodway indicated on the plan is approximate in that computer profiles were not run. It is my feeling that the indicated floodway represents a worst case condition. I would expect the flood boundaries to be less extensive than shown.

I am not satisfied that the exit conditions are desirable, but see the problem to one of channel allignment in bordering property. UNM has agreed to riprap the exit to confine flow and reduce potential problems of a shifting, degrading channel.

L15/D7

Drainage Report
Lobo Tennis Club Expansion

I. General

A. It is proposed to develop the 1.65 acre eastern portion of the Lobo Tennis Club, 1710 University Blvd., S.E., into tennis facilities. The land proposed for development is presently undeveloped and contains a wash which carries overland discharge from the north end of the property, immediately east of the UNM Athletic Building, to the south end onto Sunrise Terrace. Channel slope is approximately one percent.

B. Development will be in accord with two drainage requirements:

1. That increased runoff due to the proposed development will be retained (or detained in accordance with policy established by the City of Albuquerque) from contributing to arroyo flow (AMAFCA 1972-2 3-B).

2. That modifications to the existing wash within the development be such that runoff from a 100-year storm could be carried through the property (AMAFCA 1972-2 3-A).

II. Wash Reconstruction

A. It is proposed to replace the existing ill-defined wash bed with a trapezoid earthen channel, 2 feet deep, sideslopes 2:1, base 2 feet, aligned north-south between the existing tennis courts and those proposed. The channell would be deflected to the east at its upper end to capture in[illegible] where it presently enters the property. This entrance provides a [illegible] transition superior to the present right-angle configuration. [illegible]e channel would exit from the development at the same location as present. With 6 inches freeboard, channel capacity is 40 cfs.

B. Because upstream storm sewerage is inadequate, high intensity precipitation floods the existing wash. With 322 acres of upstream drainage, a weighted rational C of 0.358 (approximately 40% of the area is grassed open space), a 30 minute time of concentration based on combined overland and storm sewer flow), a 100-year 30-minute precipitation intensity of 3 in/hr, discharge at the proposed development is 345 cfs. The sewer system will transmit approximately 30 cfs of this, flow being limited by pipe capacity from Buena Vista. Thus, 315 cfs can be anticipated as overland discharge through the proposed development.

C. To transmit 100-year discharge, it is proposed to construct one file of tennis courts immediately to the east of the trapezoidal channel at the existing ground elevation, approximately 12 inches below the existing courts. Courts further to the east would be elevated 12 inches, creating a court-width floodway, 60 feet wide, 1 foot deep through the property. With 6 inches of freeboard, 217 cfs discharge could be transmitted in the floodway and 125 cfs transmitted in the

overtopped channel. The total 342 cfs exceeds the design criteria of 315. Channel velocity would 7.1 fps; floodway velocity would be 7.2 fps. Velocities are within an allowable 8.0 fps.

D. An earthen berm would be constructed below the lower (southern) court boundry to divert flood flow from the courts back to the existing flow exit, affording protection superior to that of the present for dwellings downstream.

III. Retention of Runoff

A. From the 1.65 acre undeveloped area, 50 percent of a 2.4 inch 6-hour 100-year storm can be expected to contribute to arroyo flow. This yields 7190 cubic feet. If the land is developed into tennis courts, the runoff portion can be expected to be 90 percent of rainfall, an addition of 5450 cubic feet. This portion will be ponded at the eastern boundry of the property by constructing a 18 inch berm at the lower end of the depression separating the Lobo Tennis Club from the UNM Athletic fields. Such a pond will retain 6000 cubic feet.

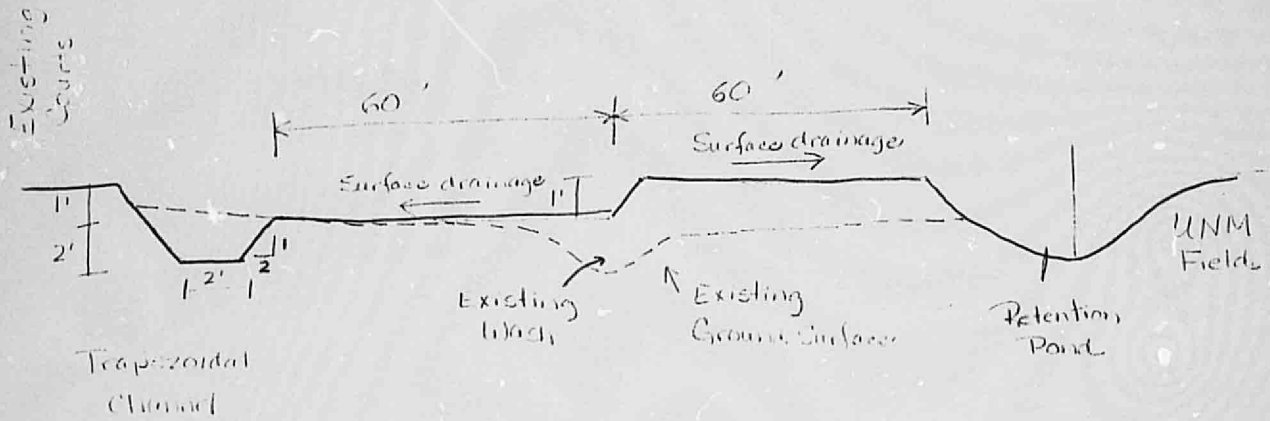
B. The eastern-most file of tennis courts will be sloped to drain into the retention pond. The adjacent UNM practice field now draining to the arroyo will also drain into this pond, compensating additionally for runoff from the floodway courts.

IV. Recommendations

It is recommended that the Lobo Tennis Club development be constructed with the realigned channel, depressed-court floodway, and retention pond.

So constructed, the development will not increase direct runoff quantity, will not alter location of flow exit, and will not lead to excessive flow velocities through the property. The development will provide a well-defined channel and floodway capable of transmitting the 100-year discharge.

Richard Hoff



west ← Typical Section East →