FILE COPY

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

Ken Schultz
Mayor

UTILITY DEVELOPMENT DIVISION
HYDROLOGY SECTION
(505) 768-2650

April 9, 1987

Steve Heth
Bohannan-Huston, Inc.
7500 Jefferson Street, NE
Albuquerque, New Mexico 87109

RE: DRAINAGE DESIGN REPORT SUBMITTAL OF 60" RCP EXTENSION AT AIRPORT TECHNICAL CENTER - MEMO RECEIVED APRIL 7, 1987 FOR CONSTRUCTION PLAN APPROVAL ~~(N-15/D1A3)~~ M-16/D024K (PROJECT #3222)

Dear Steve:

The above referenced submittal dated March 17, 1987, is approved. The construction drawings were signed by Hydrology on April 2, 1987, since my previous concerns have been addressed.

If I can be of further assistance, please let me know.

Cordially,

Roger A. Green, PE

Roger A. Green, P.E.
C.E./Hydrology Section

RAG/bsj

DESIGN REPORT
FOR
60" RCP EXTENSION
ACROSS
AIRPORT TECHNICAL CENTER
AND UNIVERSITY BOULEVARD

MARCH 1987

PREPARED FOR:

MR. TOM REINHARDT
AIRPORT TECHNICAL CENTER, LTD.
3317 LINDA VISTA S.E.
ALBUQUERQUE, NM 87106

PREPARED BY:

BOHANNAN-HUSTON, INC.
7500 JEFFERSON STREET, N.E.
ALBUQUERQUE, NM 87109

JOB # 71581

INTRODUCTION/PURPOSE

It is the goal of Airport Technical Center, Ltd. to extend the existing 60" RCP across the Airport Technical Center from its existing terminus at the UNM South Golf Course to the existing 60" CMP culvert under University Boulevard. In a meeting with City personnel on March 3, 1987, the benefits of the project, to both the public and private sectors, were recognized and an accelerated schedule for review and implementation was generally agreed to. It was also noted, however, that the installation must take place prior to the Spring rainy season. The purpose of the pipe is to safely convey runoff across the property and open more of this now encumbered area up for development. The runoff is generated by upstream watersheds which include the City Aviation Complex, private property and road thoroughfares servicing the area. Figure 1 is a location map identifying the area and project location.

The Airport Technical Center is a 28 acre parcel which lies west of University Boulevard and east of the golf course. Over the past year, a drainage management plan for Lots 1 - 6A has been approved for the site. One of the key elements of that plan was the connection of on-site detention ponds (by storm drains) to the recently installed 60" RCP system across the Golf Course. The owner desires to extend this 60" RCP (located on Lot 7) from the east boundary of the golf course to the existing 60" CMP culvert located under University Boulevard. The purpose of this report is to highlight the design and construction features of this extension in order that construction plans can be submitted for City review and approval. It is important to conclude construction prior to May 15, 1987, the assumed start of the rainy season. The main topics of this report include:

a) Past History
b) University Boulevard Profile
c) Design Features of Pipe Extension
d) Quantity Estimate
e) Recommendations

PAST HISTORY

Since 1978, the City has operated the South Aviation Complex located east of University Boulevard and south of the main airport terminal area. A series of catch basins and pipes discharge runoff from the complex to an arroyo system situated to the west of the site. Loose sediment is predominate in the watershed which eventually discharges west of the University South Golf Course. University Boulevard is afforded with a large culvert to allow the runoff to flow beneath the street. Private property is situated both east and west of University Boulevard. Figure 1 depicts the project area under consideration.

The impact of upland runoff on the golf course area has been studied several times since 1980. These independent studies have investigated the hydrology and hydraulic impact of runoff from the aviation complex on the golf course fairways. Recognizing that serious erosion was taking place on the fairways due to upstream runoff, sediment flow and runoff control features constructed on the golf course, the University and City Aviation Department entered into a cost sharing agreement for the construction of a storm sewer system to be constructed under the golf course. This system has been constructed and is now functioning. This system now carries upstream flows under the golf course and prevents further damage to the fairways.

As stated in the Introduction, development and planning of Airport Technical Center, east of the golf course has taken place. The general management plan outlined for the property west of the University Boulevard and east of the golf course is to pond developed runoff with release rates designed to match historic flowrates. The ultimate outfall for the ponded runoff is the 60" RCP outfall system, recently extended across the Golf Course. The approved drainage report to be referenced for Lots 1 - 6A, Airport Technical Center is submitted on December 9, 1986 and is filed under N-15/D1A2.

The developer now desires the 60" RCP to be extended eastward towards University Boulevard. The advantages of such an extension are as follows:

1. An extensive reach of sediment-yielding arroyo will no longer carry major storm flows into the existing 60" RCP inlet and storm drain crossing the golf course. Associated with this is the reduced cleaning and maintenance of existing storm facilities.

2. An additional 500' of public storm drainage infrastructure is being funded by a private entity.

3. The extended pipe system can be used as the outfall and point of connection for future upstream development, including the widening of University Boulevard.

4. That portion of Airport Technical Center now encumbered by the wide drainage easement of the arroyo may be reduced to only the width of the easement required for the pipe. This will allow further development of the site.

UNIVERSITY BOULEVARD PROFILE

As a condition of developing lots in the Airport Technical Center property, preliminary street grades were established for the reach fronting the property. A copy of this profile is included in the report's rear pocket and has been a part of all previous reports for the site. The Appendix contains a letter from City Transportation regarding the proposed grades.

DESIGN FEATURES OF THE PIPE EXTENSION

This section will generally outline the design features of the pipe extension. The Appendix will provide a more detailed analysis of each discussion item. Contained in the rear pocket is a detailed plan and profile sheet incorporating these design parameters.

- **Alignment** - To allow maximum development flexibility and coincide with the arroyo's historical alignment east of University Boulevard, the pipe will be extended southeasterly to a terminus west of University Boulevard. The private property (an entire lot) which the pipe crosses is currently designated as a public drainage easement. When the property is replatted some time in the future, the drainage easement will be reduced to an adequate width centered over the pipe. The pipe will be connected to the existing 60" CMP culvert under University Boulevard. A significant advantage to utilizing the existing 60" CMP culvert as the upstream inlet is its past history of mostly satisfactory performance and its conformance to the arroyo's existing grades.

  The extension of the 60" RCP will eliminate the existing inlet located near the Golf Course. Although the major upstream arroyo flows will be directed to the proposed pipe, local surface flows must be collected and discharged to the pipe prior to entering the Golf Course property. To accomplish this, an anti-clog inlet will be placed over the proposed manhole which begins the extension. The existing berm will remain to direct the flows to the inlet and provide needed head.

- **Pipe Hydraulics** - Under 100-year storm conditions, the Tom Mann Study of 1982 predicted a 239 cfs flow under developed conditions (undeveloped flows, however) to the 60" CMP crossing University Boulevard. Under Manning's flow at 7.4%, this corresponds to a flow depth in the pipe of 2.1', or slightly over 42% of pipe depth. These values include a 10% bulking factor for sediment transport within the pipe. Velocity of flow will approximate 33 fps.

- **Sediment Control** - Although it must be recognized that a substantial sediment volume will be carried naturally in the flow due to upstream conditions, pipe and inlet design will reduce the potential of sediment and its dropping out of the

flow. At the inlet, this can be accomplished by utilizing the existing inlet of the culvert. By simply connecting to the existing inlet and, therefore, not lowering the arroyo's existing grade in the area immediately surrounding the inlet, we do not increase the potential for erosion and sediment production in the inlet area. Additionally, connection of the new 60" RCP to the existing culvert outlet at similar pipe slopes will reduce drastic fluctuations in flow velocities and turbulence after entering the pipe. These kinds of fluctuations can initiate sediment deposition in the pipe.

how about raising inlet?

- **Pipe Inlet Hydraulics** - As stated before, previous reports have dictated a 100-year design flowrate of approximately 239 cfs. For a 60" CMP culvert under sloped inlet conditions, approximately 11.5' of head must be generated for the system to function. The enclosed plan indicates that only 9.7' of head is available at University Boulevard. To provide the required head plus 1' of freeboard (a total head of 12.5'), a berm is to be constructed behind the culvert inlet to an elevation of 5200.5. In the vicinity of the inlet, the berm will be reinforced with either dumped riprap or concrete slope paving to prevent possible damage to the roadway.

- **Construction** - It is estimated that the construction will take 3-4 weeks to complete. Due to the May 15th deadline for completion, this means construction should begin approximately on April 15th.

Somewhat in a non-standard manner, the contractor will be directed to construct in an upstream to downstream direction, beginning at the 60" RCP culvert. This method will keep the existing 60" RCP inlet open for collection of any runoff that may occur during the construction process.

PROPOSED SCHEDULE

In order to meet the construction completion deadline of May 15, 1987, the project will require the full cooperation of all involved parties private and public in its design, review, and construction efforts. The significant benefits of the proposed construction warrant the extraordinary efforts that may be required. The following schedule is proposed:

March 18 - Complete and submit design report. Consultant begins basic construction plan preparation.

March 27 - City completes review of design report and meets with consultant to discuss comments. Consultant begins revision process to construction plans.

March 23 - Consultant submits construction plans for review.

April 16 - Begin construction.

QUANTITY ESTIMATE

The following material quantities are estimated as part of the 60" RCP extension:

Item	Quantity (Approximate)
60" RCP	470 LF
Option A (inlet)	
Concrete slope paving	53 CY
Option B (inlet)	
Riprap	160 CY

Item	Quantity (Approximate)
Option B (inlet) (con't.)	
Filter material under riprap	72 CY
Berm earthwork (above the pipe and around inlet)	9000 CY
Manholes	2-8' dia. MH

RECOMMENDATIONS

Based on the design features outlined in this report, it is recommended that the 60" RCP be extended accordingly. Due to the need to complete construction ahead of the May 15th deadline, it is necessary to seek approvals of this drainage report, construction plans, and other agreements as expeditiously as possible.

FILE COPY

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

DESIGN HYDROLOGY SECTION
123 Central NW, Albuquerque, NM 87102
(505) 766-7644

May 12, 1986

James Topmiller, P.E.
Bohannan-Huston, Inc.
4125 Carlisle Blvd., NE
Albuquerque, New Mexico 87107

RE: DRAINAGE REPORT SUBMITTAL OF AIRPORT TECHNICAL CENTER, LOTS 2-6, RECEIVED MAY 6, 1986 FOR ROUGH GRADING PERMIT APPROVAL (N-15/D1A2)

Dear James:

The above referenced submittal, revised May 6, 1986, is approved for Rough Grading. Please bring in mylars for approval signature.

A Topsoil Disturbance Permit is required from Environmental Health before grading can begin.

If you have any questions, call me at 766-7644.

Cordially,

Roger A. Green, PE

Roger A. Green, P.E.
C.E./Hydrology Section

cc: Tom Reinhardt
Airport Technical Center, Ltd.

RAG/bsj

REVISED
DRAINAGE PLAN
FOR
AIRPORT TECHNICAL CENTER
LOTS 2 - 6
(N-15/D1A2)

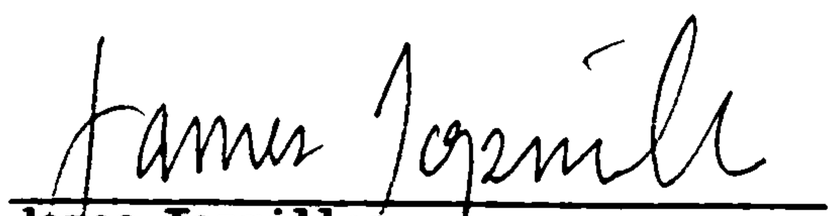
Prepared for:

AIRPORT TECHNICAL CENTER, LTD.
TOM REINHARDT
3317 LINDA VISTA S.E.
ALBUQUERQUE, NEW MEXICO 87106

Prepared by:

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

May 1986
Job No. 6 167 3



James Topmiller
N.M.P.E. # 9354

TABLE OF CONTENTS

PURPOSE AND SITE DESCRIPTION

The purpose of this drainage management plan is to provide a plan for the pre-development grading of Lots 2-6 of Airport Technical Center. A Vicinity Map identifying the site is shown on the drainage/grading plan in the rear pocket of this report. The property is bordered on the north by a partially developed lot, on the west by the University of New Mexico South Golf Course, on the south by undeveloped lots of the subdivision and on the east by University Boulevard. The site slopes at approximately a 5% grade from east to west. The soil classification is predominantly "B" type.

A previous conceptual drainage management plan (N15-D1A), prepared by Bohannan-Huston, Inc. and approved by the City in January, 1985 governs this plan now being submitted for Lots 2-6.

EXISTING CONDITIONS

Presently, the site (Lots 2-6) discharges freely to the University South Golf Course at an on-site undeveloped flowrate of 24.6 cfs in the 6-hour, 100-year storm event. Additionally, an off-site flow of 1.94 cfs impacts the site in the area of Lots 5 and 6, thereby increasing the site's total undeveloped discharge rate to approximately 26.5 cfs. These calculations are enclosed in the Appendix of this report.

A recently constructed 60" RCP pipe and inlet structure, located immediately off-site in Lot 7, drains a small portion of the site and a natural arroyo. The 60" pipe runs west under the Golf Course and discharges immediately west of the Golf Course. The east-west arroyo drains a large basin lying primarily east of University Boulevard. Lot 7 has been temporarily dedicated in its entirety as a public drainage easement.

Lot 1 of the Airport Technical Center, immediately north of the site, is currently required by the previous conceptual plan to provide retention ponding of developed flows. Upon installation of a private storm sewer system in the lots south of Lot 1, the retention pond would become a detention pond and be connected to the new system. However, downstream drainage easements, west of I-25, must be procured prior to connection of Lot 1 to the proposed storm sewer system.

There are no existing floodplains on or immediately near the site. A Flood Insurance Map is enclosed for verification.

PROPOSED CONDITIONS

The drainage/grading plan for the site, included in the rear pocket of this report, identifies proposed improvements in accordance with the previously approved conceptual drainage management plan for Airport Technical Center. The enclosed plan proposes only pre-development grading and installation of the private storm sewer system along the west boundary. No impervious area is being added with this plan.

The proposed storm sewer system drains south to the existing 60" RCP storm sewer through a series of 18"-36" pipes and manholes. It is designed to carry undeveloped flowrates from each lot and will include 4 cfs from Lot 1 to the north and 1.9 cfs from the off-site basin adjacent to Lots 5 and 6. Inlets, or standpipes, with 15" connector pipes and a graded collection basin will be placed at each lot to collect runoff. Prior to final construction plans for the system, a decision will be made to install Permaloc (PVC) or corrugated metal (CMP) as the pipe material used. Upon actual development of the lots, detention ponds over the inlets must be provided to release runoff at the current undeveloped rate. The storm sewer system is located in an existing 40' private drainage easement. A private maintenance agreement will be prepared to insure that maintenance responsibilities of the system will be upheld between individual lot owners. Calculations for design are enclosed in the Appendix of this report.

Grading of the site has been designed with the future development of University Boulevard in mind. This was accomplished by referring to a preliminary street grades drawing of University Boulevard improvements prepared in conjunction with the previous conceptual drainage management plan. Preliminary street grade elevations have been indicated on the drainage/grading plan. The preliminary street profile sheet, as previously submitted, is enclosed in the rear pocket of this report.

SUMMARY

The key elements of this proposed drainage and grading plan for Lots 2-6 of the Airport Technical Center include:

1. The plan has been prepared in accordance with the previously approved conceptual drainage plan for Airport Technical Center.

2. Since the plan establishes only pre-development grading, runoff from the site is not increased.

3. A private storm sewer system is to be installed in the 40' wide drainage easement along the site's west boundary. The system will carry undeveloped flowrates to the existing 60" RCP storm sewer in Lot 7. Inlets to each lot will transfer lot runoff to the system.

4. Erosion control during and following grading operations will be accomplished by the construction of a 2' high trench/berm along the downstream boundaries of the site.

5. Downstream drainage easements, west of I-25, must be obtained prior to (a) development of Lots 2-6 and (b) connection of Lot 1 to the proposed storm sewer system.

AIRPORT TECHNICAL CENTER

Drainage Calculations - Lots 1-6

UNDEVELOPED CONDITIONS

1. Offsite Flows — Approx. 1 acre of an existing vacant drainage basin east of University Blvd. drains to Lots 5, 6 of the site. Other basins draining towards Lots 1-4 are diverted by University Blvd. to impact only Lot 1. Lot 1 is not part of this plan.

2. Adjacent Areas — The University South Golf Course lies west of the site (and downstream). Lot 1 of the Airport Technical Center was purchased by Wonder Corporation who obtained at least rough grading approval on a drainage plan submitted to the City in June - October, 1985. Other adjacent lands are vacant. (excluding University Blvd. at the east property line).

3. Drainage Management Plan — A plan is to be prepared to grade the site for <u>future</u> development. The plan will therefore utilize undeveloped flowrate analysis ($C = 0.40$, Rational Method) Provisions for Lot 1 drainage to the south are insured. A storm sewer system is proposed for the 40' easement. The system will be designed for existing undeveloped flowrates. See enclosed storm sewer design.

PROJECT NAME AIRPORT TECHNICAL CENTER SHEET 1 OF 4
PROJECT NO. BY James Top DATE 4.1.86
SUBJECT CH'D DATE

3. (cont.)

Future development of the Lots will provide detention ponds to detain runoff above the existing rates.

4. Allowable Discharge — Determine for Lots 2-6 only.

use Rational Method, per "Emergency Rule"
use C= 0.40 for undeveloped conditions
Tc = 10 min.
Rainfall (100yr. 6-hr) = 2.3" (by DPM)
Intensity = (2.3") (4.84) $(10)^{-0.51}$ = 4.86 in/hr
Acreage, A= 12.66 acres

then flowrate, Q= C I A (Rational Formula)
Q= 0.40 (4.86 in/hr) 12.66 ac.
Q= 24.6 cfs (from site)

offsite flows = 0.40 (4.86) 1 = 1.94 cfs
(from basin east of University)

NOTE: The construction of University Blvd. into a 4-lane facility will divert all offsite flows east of University Blvd.

24.60
+ 1.94
26.54

5. Lot 1 Runoff to Lots 2-6 — from the drainage report prepared by Weiss/Hines Engineering, the undeveloped runoff rate (allowable) is 4 cfs. Offsite flows to the site are insignificant, even questionable that any reach the site.

TOTAL ALLOWABLE DISCHARGE = 30.5 CFS
(24.6 + 1.94 + 4 = 30.5)

PROJECT NAME AIRPORT TECHNICAL CENTER SHEET 2 OF 4
PROJECT NO. BY James Top DATE 4-1-86
SUBJECT CH'D " DATE "

G. Determine Storm System Flowrates & Required Pipe Sizes (Undeveloped Conditions)

- assume gravity flow system & Rational Formula
- C = 0.40
- I = 4.86 in/hr (100-yr)
- "n" value = 0.013 (RCP), 0.011 (Permalok), 0.025 (CMP)

Lot #	Area (acres)	Flowrate (cfs)	Accumulated Flow (cfs)	RCP Pipe Size (S = 1.1%)	RCP Pipe Size (S = 0.5%)
1		4	(from previous report)		
2	2.21	4.3	8.3	18"	21"
3	2.21	4.3	12.6	21"	24"
4	2.22	4.3	16.9	21"	30" ***
5	3.5 *	6.8	23.7	24"	30"
6	3.5 *	6.8	30.5 **	30" ***	33"

* the 1-acre offsite basin is divided equally between Lots 5 & 6

** this capacity not required until south end of lot

*** a 30" pipe is used here because 27" is not available

Lot #	Accum. Flowrate	Permalok (S = 0.5%)	CMP (S = 0.5%)
1			
2	8.3	18"	24"
3	12.6	21"	30"
4	16.9	24"	36" ← 33" is not available
5	23.7 *	27"	36"
6	30.5 *	30"	42"

7. Inlets and connector Pipes (to storm sewer system)

Connector Pipe –

- due to slopes involved, pipe flow capacity will be adequate at any pipe size greater than 15"
- check orifice @ minimum heads

orifice equation:

$Q = CA\sqrt{2gh}$ where Q = C.B cfs (max. single lot contribution)

$C = 0.6$ (Handbook)

$g = 32.2$

$A_{18"}$ @ 30% clogged = 1.36 sq. ft.

use smallest pipe possible > 15"

try 18" @ 30% clogged ...

determine required head .....

$h = (Q/AC)^2/g(2)$

$h = 1.1'$ acceptable

USE 18" CONNECTOR PIPES

Inlets –

- since individual lot owners may not use (or be able to use) the inlets as located and designed, the inlets will be constructed as inexpensively as possible,
- use an 18" vertical CMP with #4 rebars welded across the top (see plan for detail)

CITY OF
Albuquerque
Public Works Department

June 24, 1997

Martin J. Chávez, Mayor

Robert E. Gurulé, Director

Jeff Mortensen, P.E.
Jeff Mortensen & Assoc.
6010-B Midway Park NE
Albuquerque, NM 87109

M-16/D024K

RE: LOT 3B, AIRPORT TECHNICAL CENTER ~~(N15-D1A6)~~. GRADING AND DRAINAGE PLAN FOR GRADING PERMIT APPROVAL. ENGINEER'S STAMP DATE JUNE 5, 1997.

Dear Mr. Mortensen:

Based on the information provided on your June 17, 1997 submittal, the above referenced project is approved for Grading Permit.

An Engineer's Certification will be required prior to Certificate of Occupancy.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

Lisa Ann Manwill, P.E.
Engineering Assoc./Hyd.

c: Andrew Garcia
File

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

January 13, 1999

J. Graeme Means, P.E.
Jeff Mortensen & Associates
6010-B Midway Park Blvd. NE
Albuquerque, NM 87109

M-16/D024K

RE: AIRPORT TECHNICAL CENTER - LOTS 8B & 6B2 ~~(N15-DTA)~~. GRADING AND DRAINAGE PLAN, AND EROSION CONTROL PLAN FOR ROUGH GRADING PERMIT. ENGINEER'S STAMP DATED NOVEMBER 24, 1998.

Dear Mr. Means:

This letter is to confirm the approval of the above referenced project for Rough Grading Permit. Thank you for furnishing a copy of the Record Drawing showing Mr. Aguirre's approval for Rough Grading on November 25, 1998.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

John P. Murray, P.E.
Hydrology

c: Andrew Garcia
File