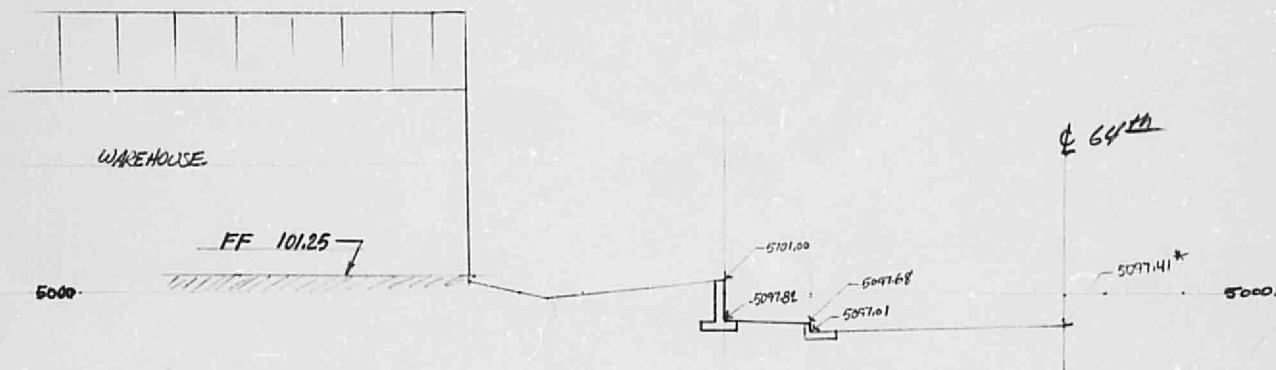


Attachment to Drainage Report J10-D10



SECTION AT N. EDGE OF NORTHERN-MOST BLDG.
SCALE 1"=10' HORIZ & VERT

*Based on a 0.4% slope from Manhole at 64th & Hanover (5100.62)



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

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

September 21, 1984

Mr. Richard Hall
Hall Engineering
2625 Pennsylvania Avenue NE, Suite 350
Albuquerque, New Mexico 87110

RE: REVISED GRADING & DRAINAGE PLAN FOR WAREHOUSE COMPLEX AT
1301 64 th ST. NW (J10-D10) RECEIVED AUGUST 24, 1984

Dear Rich,

The above referenced plan, dated August 24, 1984 is approved.

Please attach a copy of this approved plan to the construction set
prior to Hydrology sign-off.

If I can be of further assistance, please contact me at 766-7644.

Sincerely yours,

Billy J. Goolsby
Billy J. Goolsby, PE
Civil Engineer/Hydrology

BJG/cl

MUNICIPAL DEVELOPMENT DEPARTMENT

C. Dwayne Sheppard, P.E., City Engineer

ENGINEERING DIVISION

Telephone (505) 766-7467

AN EQUAL OPPORTUNITY EMPLOYER

INFORMATION SHEET

4th Submittal
DRAINAGE REPORT

PROJECT TITLE WAREHOUSE COMPLEX TYPE OF SUBMITTAL DRAINAGE REPORT
ZONE ATLAS PAGE NO. J-10 CITY ADDRESS _____
LEGAL DESCRIPTION Tract 66, Unit Eight, Town of Atrisco Grant
ENGINEERING FIRM HALL ENGINEERING CO., INC. CONTACT Richard Hall
ADDRESS 337 Eubank NE Suite 103 PHONE 292-1115
OWNER Pargin Realty CONTACT Ken Williams
ADDRESS 3530 Wyoming Blvd NE PHONE 296-1500
ARCHITECT David Fry CONTACT David Fry
ADDRESS 200 Ridgecrest SE PHONE 255-8985
SURVEYOR Hall Surveying Company CONTACT Verlon Hall
ADDRESS 2625 Pennsylvania Ste. 350 PHONE 884-6444/884-6200
CONTRACTOR _____ CONTACT _____
ADDRESS _____ PHONE _____

PRE-DESIGN MEETING:

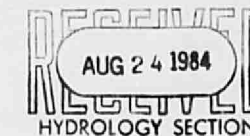
☒ YES
☐ NO
☒ COPY OF CONFERENCE RECAP SHEET PROVIDED

PLEASE CHECK TYPE OF APPROVAL EXPECTED WITH THIS SUBMITTAL:

☐ SKETCH PLAT APPROVAL
☐ PRELIMINARY PLAT APPROVAL
☐ SITE DEVELOPMENT PLAN APPROVAL
☐ FINAL PLAT APPROVAL
☒ BUILDING PERMIT APPROVAL
☐ CERTIFICATE OF OCCUPANCY APPROVAL
☐ ROUGH GRADING PERMIT APPROVAL
☐ GRADING/PAVING PERMIT APPROVAL
☐ OTHER _____ (SPECIFY)

DATE SUBMITTED: August 24, 1984

BY: Frank D. Lovelady





CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION



HYDROLOGY SECTION PROJ. NO. F17 DATE: 7/30/84

PLANNING DIVISION NO. _____

CONFERENCE RECAP

SUBJECT: Jorgensen Office/Warehouse
Tract II Reindeer Addn.

WHO

REPRESENTING

ATTENDANCE: Frank Lovelady
Knight Saavey
Billy Goolsby

FINDINGS: ① Approved Drainage Plan required
per DPM prior to release of building
permit.
② Discharge determined by downstream
capacity.
③ Easements for drainage across lot
lines to be provided.

*Please provide a copy of recap w/submittal

The undersigned agrees that the above findings are summarized accurately and are only subject to change if further investigation reveals that they are not reasonable or that they are based on inaccurate information.

SIGNED: Billy Goolsby

SIGNED: Frank Lovelady

TITLE: CE/Hydrology

TITLE: _____

DATE: 7/30/84

DATE: 7/30/84



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

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

July 18, 1984

Mr. Richard Hall
Hall Engineering
2625 Pennsylvania Avenue NE, Suite 350
Albuquerque, NM 87110

REF: REQUEST FOR VARIANCE FOR APPROVED STREET GRADES ON 64TH STREET NW

Dear Richard:

The subject variance requested is in order given the circumstances identified in your letter dated 6-29-84; therefore, the required City approved street grades, per Section 22.7C, Page 109 of the DPM are waived for this development.

However, this variance is granted with the understanding that the owner agrees to participate in any future Special Assessment District as indicated by Mr. Kenneth A. Williams letter dated 7-5-84.

In addition, the City will require the execution of an Indemnification Agreement, acceptable to the City Attorney's Office prior to the issuance of a Certificate of Occupancy, for any damages arising from the establishment of future street grades on 64th Street.

The building permit can be released with the inclusion of the approved drainage plan dated June 8, 1984, and the Indemnification Agreement requirement stipulated on the building plans.

If you have any comments regarding the above, please contact Mr. Fred Aguirre at 766-7644.

Sincerely yours,

Fred J. Aguirre
C. Dwayne Sheppard
City Engineer

CDS:FJA:mrk

cc: Ken Williams, G.R.I.

MUNICIPAL DEVELOPMENT DEPARTMENT

Sheppard, P.E., City Engineer

ENGINEERING DIVISION

Telephone (505) 766-7467

AN EQUAL OPPORTUNITY EMPLOYER

KENDOL INVESTMENTS

3530 WYOMING BLVD., N.E.
ALBUQUERQUE, NEW MEXICO 87111
(505) 296-1500

July 5, 1984

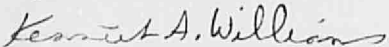
Dwayne Sheppard, City Engineer
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: Indemnification for City of Albuquerque

Dear Mr. Sheppard:

We, KENDOL INVESTMENTS, the owners of Tract 266 in the Town of Atrisco Grant Subdivision located at the Northwest corner of the intersection of 64th Street and Hanover NW, do hereby agree to hold the City harmless for any damages incurred due to the construction of 64th Street.

Signed,



Kenneth A. Williams, General Partner



HALL ENGINEERING & SURVEYING RECEIVED

2625 Pennsylvania Ave. N.E., Suite 350
Albuquerque, New Mexico 87110
Phones: (505) 884-6200 & 884-6444

3501
JUL 03 1984

CITY ENGINEER

June 29, 1984

Dwayne Sheppard, City Engineer
City of Albuquerque
Box 1293
Albuquerque, New Mexico 87102

RE: Request for Variance for Approved Street Grades on 64th Street NW

Dear Mr. Sheppard:

I am requesting a Variance for Approved Street Grades on 64th Street for the following reasons:

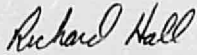
1. The land East of the right-of-way line of 64th Street is presently developed by Mountain Bell and self-storage units together with some open storage areas. A block wall exists along Mountain Bell's property along 64th Street, approximately 450 feet. These developments took place prior to this areas annexation in 1981. Therefore, any significant change in grade could adversely affect the land on both the West and East sides of 64th Street.
2. There is presently about 70 cfs offsite flow continuing across 64th Street into the private land on the East side. All offsite flow should be allowed to continue across the property uninhibited by adverse grading.
3. The owners of the subject property, Ken Williams and Jude Baca, are willing to work with the City on any future improvements to 64th Street and Hanover Road, and have expressed their commitment in writing to the City Hydrology Department. (See attached copy.)
4. Andrews, Asbury and Roberts are presently involved in a Phase II Analysis of the area and are proposing to the City, plans for storm sewer in the area. I recall the proposal to be the end of July. After review of the proposal, the City will make recommendations before going to Phase III. Whether or not the grades I've proposed for 64th Street and Hanover Road will be accepted or not, will probably depend on the recommendations by the City to Andrews, Asbury and Roberts proposal. I've worked closely with Andrews, Asbury and Roberts and feel that my grades are workable but final approval looks "far down the road". My clients' proposed buildings are a minimum of 1.8 feet above any existing grades in either 64th Street or Hanover Road and in my opinion, will not conflict with future development or planning of 64th Street or Hanover Road.

con't.
page 2

5. Finally, as an interim solution, we propose that temporary retention ponds be maintained on the subject site until such time as a decision is reached on the proposed storm sewer in 64th Street.

Thank you for your consideration of this request, and your speedy reply is requested.

Sincerely,

A handwritten signature in cursive script, reading "Richard V. Hall".

Richard V. Hall, P.E.

INFORMATION SHEET

PROJECT TITLE WAREHOUSE Complex TYPE OF SUBMITTAL Request Variance Approval
 ZONE ATLAS PAGE NO. J10 CITY ADDRESS 1301 64th STREET
 LEGAL DESCRIPTION TRACT 66 Unit B. 2 Town of Alameda Grant
 ENGINEERING FIRM Hall Engineering CONTACT Richard Hall
 ADDRESS 337 Eubank NE PHONE 292 1115
 OWNER Pergin Realty CONTACT Ken Williams
 ADDRESS 3530 Wyoming PHONE 296 1500
 ARCHITECT David Fry CONTACT David Fry
 ADDRESS 202 Ridgewood SE PHONE 255 8985
 SURVEYOR Hall Engineering CONTACT Richard Hall
 ADDRESS 337 Eubank PHONE 292 1115
 CONTRACTOR Apache Ind. CONTACT Mr. Howard
 ADDRESS Bernadillo PHONE —

PRE-DESIGN MEETING:

- ☒ YES
☐ NO
☒ COPY OF CONFERENCE RECAP SHEET PROVIDED

PLEASE CHECK TYPE OF APPROVAL EXPECTED WITH THIS SUBMITTAL:

- ☐ SKETCH PLAT APPROVAL
☐ PRELIMINARY PLAT APPROVAL
☐ SITE DEVELOPMENT PLAN APPROVAL
☐ FINAL PLAT APPROVAL
☒ BUILDING PERMIT APPROVAL
☐ CERTIFICATE OF OCCUPANCY APPROVAL
☐ ROUGH GRADING PERMIT APPROVAL
☐ GRADING/PAVING PERMIT APPROVAL
☐ OTHER _____ (SPECIFY)

DATE SUBMITTED: June 29, 84
 BY: Richard Hall



HALL ENGINEERING & SURVEYING CO.

2625 Pennsylvania Ave. N.E., Suite 350
Albuquerque, New Mexico 87110
Phones: (505) 884-6200 & 884-6444

June 8, 1984

Billy J. Goolsby, PE
City/County Flood Plain Admin.
Design Hydrology Section
123 Central NW, Albuquerque, NM 87102

REF: DRAINAGE REPORT FOR WAREHOUSE COMPLEX AT 1301 64th
STREET NW (J10-D10)

Dear Billy:

With regard to subject drainage plan, we believe that an interim solution is to improve Hanover Road as access to the site and leave 64th Street unimproved until the following improvements are completed.

1. Channel north of Interstate Highway 40 to intercept offsite flow from Off-site Area 3.
2. Storm sewer in 64th that will continue east paralleling I-40 to Coors Boulevard Interchange.

Robert Foglesong of Andrews, Asbury and Roberts has stated that the latter is proposed by that firm.

The following solutions for grading 64th street were considered in evaluating the effect of site runoff. These are briefly described below:

1. Surface drainage in the street, sloping from north to south. This proposal requires a minimum of 4 feet of fill at the north end of 64th. The site would have to be raised equally high which would block off-site drainage from the west.
2. Surface drainage in the street, sloping from south to north. This proposal requires that an easement between 64th and Iliff Street be provided. Iliff is also very flat and the minimum slope of 0.4% could not be achieved.
3. Surface drainage in the street, sloping both north and south from the mid point. This proposal would make it possible to achieve minimum grade between 64th Street and Coors Boulevard on Iliff. However, it would also block off-site flow from the west.
4. Storm sewer in 64th Street with undulating grade, catch basins at approximate third points. As previously

Billy J. Goolsby, PE

Page 2

stated, this proposal is recommended by the engineering firm presently studying area drainage.

The interim solution proposed for developing this site has the following points:

1. Improve north half of Hanover Road as paved access to the site.
2. Leave 64th Street unimproved until future storm sewer can be installed.
3. Allow off-site flow from Areas 2 and 3 to pass through the site essentially as it presently does.
4. Pond all on-site flow in retention ponds without positive discharge. The ponds would depend upon infiltration and evaporation to empty.

A copy of the revised drainage plan showing the required ponding without pond discharge pipes is attached. It is requested that the subject drainage report and plan be approved in accordance with the interim solution described above.

Thanking you, we are

HALL ENGINEERING AND SURVEYING CO.

Richard Hall

Richard V. Hall, PE

June 8, 1984

Mr. Billy Goolsby, P.E.
Hydrology Department
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: 64th and Hanover Streets,
Ken Williams Warehouse

Mr. Goolsby:

This is to advise you that we, as Owners and Proprietors of the above-described property, will agree to provide the necessary grading, paving and retaining walls, on or within the boundaries of our property, in the event that the Interim Drainage Plan submitted herewith does not provide sufficient relief for the area following development of the surrounding properties.

Very truly yours,

Ken Williams

Ken Williams

Jude S. Baca

Jude Baca

INFORMATION SHEET

PROJECT TITLE WAREHOUSE COMPLEX TYPE OF SUBMITTAL THIRD SUBMITTAL DRAINAGE REPORT

ZONE ATLAS PAGE NO. J10-D10 CITY ADDRESS 1301 64th Street

LEGAL DESCRIPTION TRACT 66 UNIT 8 , TOWN OF ATRISCO GRANT

ENGINEERING FIRM HALL ENGINEERING CONTACT Richard Hall

ADDRESS 2625 Pennsylvania NE PHONE 884-6444

OWNER Pargin Realty CONTACT Ken Williams

ADDRESS 3530 Wyoming Blvd NE PHONE 296-1500

ARCHITECT David Fry CONTACT David Fry

ADDRESS 200 Ridgcrest SE PHONE 255-8985

SURVEYOR Hall Engineering CONTACT Richard Hall

ADDRESS 2625 Pennsylvania NE PHONE 884-6444

CONTRACTOR N/A CONTACT _____

ADDRESS _____ PHONE _____

PRE-DESIGN MEETING:

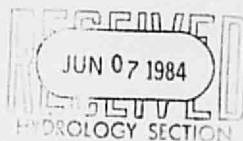
☒ YES
☐ NO
☒ COPY OF CONFERENCE RECAP SHEET PROVIDED

PLEASE CHECK TYPE OF APPROVAL EXPECTED WITH THIS SUBMITTAL:

___ SKETCH PLAT APPROVAL
 ___ PRELIMINARY PLAT APPROVAL
 ___ SITE DEVELOPMENT PLAN APPROVAL
 ___ FINAL PLAT APPROVAL
☒ BUILDING PERMIT APPROVAL
 ___ CERTIFICATE OF OCCUPANCY APPROVAL
 ___ ROUGH GRADING PERMIT APPROVAL
 ___ GRADING/PAVING PERMIT APPROVAL
 ___ OTHER _____ (SPECIFY)

DATE SUBMITTED: June 8, 1984

BY: Richard V. Hall, PE



HALL ENGINEERING & ASSOCIATES
 2625 Pennsylvania Ave., N.E.
 Suite 350
 Albuquerque, New Mexico 87110



Sicly

HALL ENGINEERING & SURVEYING CO.

2625 Pennsylvania Ave. N.E., Suite 350
Albuquerque, New Mexico 87110
Phones: (505) 884-6200 & 884-6444

May 15, 1984

Mr. C. D. Sheppard,
City Engineer
City Hall
400 Marquette N. E.
Albuquerque, New Mexico 87102

Re: REQUEST FOR VARIANCE
Ken Williams Warehouse
64th and Hanover

Sir:

In the above-captioned matter, we wish to request a Variance regarding the Proposed Drainage Plan; specifically, the drainage standard which requires the paving of unimproved roads adjacent to a newly developed property, when such roads will be accepting run-off from the developed property.

The reasons for the request are as follows:

- (a) No Department—other than Drainage—requires paving of adjacent unimproved roadways;
- (b) Prior to this time, our client has requested an assessment for paving. The assessment was requested because of the undue financial hardship which would be incurred as a result of the lump sum payment required to raise the unimproved roads to City Standards

Needless to say, the necessity for controlling the flow from the site is apparent and must be dealt with. However, in lieu of paving the adjacent streets to allow for relatively uncontrolled flow,

64th/Hanover
Page Two

we propose to have the water discharged from the site at a controlled rate.

We realize that this is not a definitive procedure; however the area is currently being staged for other planned development in the near future, and that that development will require paving of the streets adjacent to our client's site. When that development occurs, the paving will either

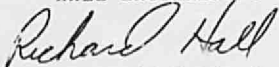
- (a) be accomplished on a separate contract with the City, which will be paid for the the assessments levied on the property owners adjacent to the improvement, or
- (b) be accomplished by the City, which will be paid by the assessments levied on the property owners adjacent to the improvement.

We therefore recommend and respectfully request the approval of the requested Variance.

Thanking you, we are

Very truly yours,

HALL ENGINEERING COMPANY



Richard V. Hall, P. E.

cc: file

KENDOL INVESTMENTS

3530 WYOMING BLVD., N.E.
ALBUQUERQUE, NEW MEXICO 87111
(505) 296-1300

April 23, 1984

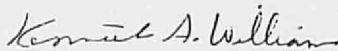
City Engineer
Engineering Division
400 Marquette NW
Albuq., NM 87103

Dear Sir,

We own the Southerly Portion of Tract numbered 266 in the Airport Unit, Town of Atrisco Grant, Bernalillo County, New Mexico, located at the Northwest corner of Hanover and 64th Street. We would like to have the property put into a paving district as soon as it is practical, as we are now developing the property.

If you have any questions, please call me at 296-1951.

Sincerely,



Kenneth A. Williams

KW:sa



HALL ENGINEERING & SURVEYING CO.

2625 Pennsylvania Ave. N.E., Suite 350
Albuquerque, New Mexico 87110
Phones: (505) 884-6200 & 884-6444



May 8, 1984

City of Albuquerque
Design Hydrology Section
123 Central Avenue N. W.
Albuquerque, New Mexico 87102

ATTN: Mr. Billy J. Goolsby, P. E.
City/County Flood Plain Administrator

RE: DRAINAGE REPORT FOR WAREHOUSE COMPLEX
AT 1301 64th STREET N.W. (J10-D10)
Second Submittal

Dear Billy:

In response to your letter of April 11, 1984, the following listed items correspond to items 1 through 3:

1. No Department has required any approved grades or paving since 64th Street is being put in a paving district. No erosion will take place as a result of this construction other than can now take place undeveloped. It would not seem feasible to require 1/2 of 64th to be paved at the owner's expense then make him pay again when assessment is required.
2. The value of 5.1 cfs was incorrect. The allowable pond discharge has been recalculated based on Q_5 undeveloped.
3. The flows leaving the site will enter 64th, then:
 - a) flow from Ponding Area 1 will go to Iliff. No impact is expected since the flow is less than Q_5 undeveloped.
 - b) flow from Ponding Area 2 will go to Hanover Road. No impact is expected for the same reason as (a) above.
 - c) Flow from off-site will be the most significant. The flow will probably continue across 64th and be dissipated against the existing wall. The flow will then be directed to Iliff and Hanover.

Page Two

Additionally, we have determined that the north end of the area is large enough for an additional building and a ponding area of sufficient size. Consequently, we will adjust our plans accordingly.

Thanking you, we are

Very truly yours,
HALL ENGINEERING COMPANY

Richard Hall

Richard V. Hall, P. E.



INFORMATION SHEET

SECOND SUBMITTAL

PROJECT TITLE WAREHOUSE COMPLEX TYPE OF SUBMITTAL DRAINAGE REPORT

ZONE ATLAS PAGE NO. J-10 CITY ADDRESS _____

LEGAL DESCRIPTION TRACT 66, UNIT EIGHT, TOWN OF ATRISCO GRANT

ENGINEERING FIRM HALL ENGINEERING CONTACT FRANK LOVELADY

ADDRESS 2625 PENNSYLVANIA NE PHONE 884-6444

OWNER PARGIN REALTY CONTACT KEN WILLIAMS

ADDRESS 3530 Wyoming Blvd. NE PHONE 296-1500

ARCHITECT David Fry CONTACT David Fry

ADDRESS 200 Ridgecrest SE PHONE 255-8985

SURVEYOR HALL SURVEYING CONTACT VERNON HALL

ADDRESS 2625 PENNSYLVANIA NE PHONE 884-6444

CONTRACTOR _____ CONTACT _____

ADDRESS _____ PHONE _____

PRE-DESIGN MEETING:

XX YES

NO

XX COPY OF CONFERENCE RECAP SHEET PROVIDED

PLEASE CHECK TYPE OF APPROVAL EXPECTED WITH THIS SUBMITTAL:

- ___ SKETCH PLAT APPROVAL
- ___ PRELIMINARY PLAT APPROVAL
- ___ SITE DEVELOPMENT PLAN APPROVAL
- ___ FINAL PLAT APPROVAL
- XX BUILDING PERMIT APPROVAL
- ___ CERTIFICATE OF OCCUPANCY APPROVAL
- ___ ROUGH GRADING PERMIT APPROVAL
- ___ GRADING/PAVING PERMIT APPROVAL
- ___ OTHER _____ (SPECIFY)

DATE SUBMITTED: 8 May 1984

BY: Frank D. Lovelady





CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION



HYDROLOGY SECTION PROJ. NO. J-10 DATE: 2/22/94
PLANNING DIVISION NO. J-10

CONFERENCE RECAP

SUBJECT: TRACT 266, UNIT EIGHT, TOWN OF ATRISIO GRANT
(J10)

WHO	REPRESENTING
ATTENDANCE: <u>RICHARD HALL</u>	
<u>FRED J. RAVIARE</u>	

FINDINGS:

1. ONE PRIVATE ACCESS TO THE PROPOSED DEVELOPMENT REQUIRED
(SEE SECTION 7, F FOR THE DRAINAGE ORDINANCE)
2. DRAINAGE REPORT REQUIRED IN ACCORDANCE WITH THE DPM.
3. COORDINATE DRAINAGE FROM DEVELOPMENT REQUIRED BECAUSE OF
EXISTING FLOODING PROBLEM DOWNSTREAM. NOTE: ~~THE~~ REMAINING
DRAINAGE IS BASED ON DOWNSTREAM CAPACITY.

The undersigned agrees that the above findings are summarized accurately and are only subject to change if further investigation reveals that they are not reasonable or that they are based on inaccurate information.

SIGNED: <u>Fred J. Raviare</u>	SIGNED: <u>Richard Hall</u>
TITLE: _____	TITLE: <u>PE</u>
DATE: <u>2/22/94</u>	DATE: <u>1/22/94</u>



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

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

April 11, 1984

Mr. Richard Hall
Hall Engineering Co.
2625 Pennsylvania Avenue NE Suite 350
Albuquerque, NM 87110

REF: DRAINAGE REPORT FOR WAREHOUSE COMPLEX AT 1301 64TH STREET NW
(J10-D10) RECEIVED MARCH 22, 1984

Dear Rick:

I have reviewed the above referenced submittal and forward the following comments:

- Zoning*
5-YEAR UNDEVELOPED
1. As per the pre-design, a paved access is required. Whether the paved access is constructed through a paving district or by other means, the construction will need to be assured prior to release of the building permit.
 2. It is mentioned in the report that 5.10 cfs will be the discharge rate from the pond. How was this rate determined to be the allowable.
 3. There is no mention of where the flows go or what the impacts will be once they leave the site.

Should you have any questions or comments, please contact me at 766-7644.

Sincerely yours,

Billy J. Goolsby
Billy J. Goolsby, PE
City/County Flood Plain Admin.

BJG:mrk

MUNICIPAL DEVELOPMENT DEPARTMENT

C. Dwayne Ford, P.E., City Engineer

ENGINEERING DIVISION

Telephone (505) 766-7467

AN EQUAL OPPORTUNITY EMPLOYER

Storm Drainage Report
For
Southerly Portion of Tract 266
Airport Unit, Town of Atrisco Grant

I. PURPOSE:

The purpose of this report is to present a comprehensive analysis of drainage control constraints on the proposed development and to present a plan for handling the storm runoff in a manner consistent with current storm drainage policy of the City of Albuquerque.

II SCOPE:

The scope of this report includes determining on-site and off-site flow rates and volumes, presenting a design for on-site storage with controlled discharge and generally satisfying the listed storm drainage requirements.

Calculations of volumes and flow rates are in accordance with standard practice as presented in the City of Albuquerque Development Process Manual, Vol. 2, Design Criteria, hereafter referred to as the DPM.

III LOCATION AND USE:

The proposed development is located west of Coors Boulevard and South of Interstate 40. More specifically,

it fronts on the west side of 64th Street NW and on the north side of Hanover Road NW. The North End of the property abuts Interstate 40. The intended use of the property is construction of warehousing. Zoning is C-2, Community Commercial Zone.

IV. EXISTING CONDITIONS:

A. General Description.

The property is located on land that slopes very gently from west to east and drains to 64th street NW. Further east the historic drainage pattern is interrupted by Interstate Highway 40.

There are two major drainage structures crossing I-40 in this area. The closest is 5 30-inch concrete pipe culverts, the outlet of which is about 300 feet east of the northern third point of the property. Discharge from these culverts crosses the subject property and is intercepted by 64th street NW.

The other structure consists of 3-6'x3' CBC's. The outlet is about 870 feet west of the southern third point of the site. The flood map shows that discharge from this structure flows down Hanover Road without crossing the site. This has been verified by

visual inspection in the field.

Neither 64th Street or Hanover Road are paved adjacent to the site. Hanover Road is paved east of 64th. A request for a paving district for 64th street has been submitted.

B. Soil Types.

The Soil Survey of Bernalillo County, New Mexico, sheet No. 30 shows the following soil types:

Off-drainage area - Pajarito loamy fine sand (PAC), Group B.

On-site drainage area - Madurez-Wink (MWA) Group B.

C. Floodway Map.

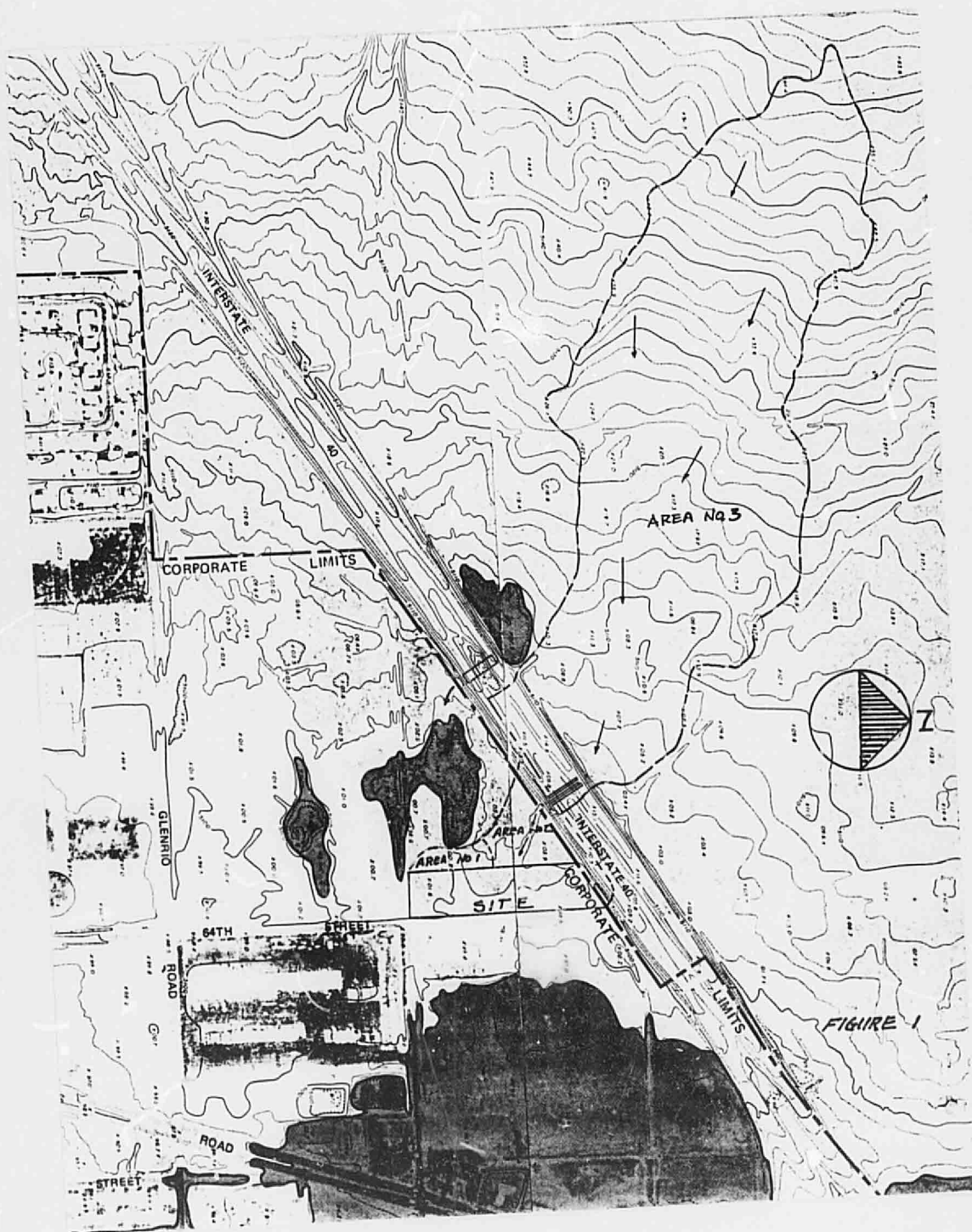
The floodway map is shown in Figure 1 with the off-site drainage areas. The site is not located in a flood Hazard Area.

D. Off-site Drainage.

There are three (3) off-site drainage areas. Off-site areas 1 and 2, the small areas directly east of the site contains 4.30 acres. Off-site area 3, the area north of Interstate 40 contains 10.92 acres. The runoff computations are as follows:

1. Off-site areas 1 and 2 (Area 1 = 0.377 acres:
Area 2 = 3.42 acres)

For SCS soils Group B, DPM Plate 22.2C-1 shows an undeveloped "C" factor of 0.34



$$T_c = 0.0078 (L^{0.77} / S^{0.385}) \quad L = 550 \quad S = (5113.5 - 5102.0) / 550 \\ = 0.0209 \text{ ft./ft.}$$

$T_c = 4.45$ minutes - Use 10 minutes

From DPM Plate 22.2 D-1, 6-hour rainfall volume is 2.2 inches. From DPM Plate 22.2 D-2

$$I = 2.2 \times 6.84 \times 10^{-0.51} = 4.65 \text{ inches/hour}$$

$$Q = CIA = 0.34 \times 4.65 \times 4.30 = 6.80 \text{ cfs}$$

Pro-rated flows for Areas 1 and 2

$$\text{Area 1} = 1.89 \text{ cfs} \quad \text{Area 2} = 5.41 \text{ cfs}$$

$$2. \text{ Off-site Area 3} \quad L = 3650 \quad S = (5166 - 5102) / 3650 \\ = 0.0175 \text{ ft./ft.}$$

$$T_c = 0.0078 (3650^{0.77} / 0.0175^{0.385}) = 20.49 \text{ minutes}$$

$$I = 2.2 \times 6.84 \times 20.49^{-0.51} = 3.23 \text{ in./hour}$$

$$Q = CIA = 0.34 \times 3.23 \times 70.72 = 77.66 \text{ cfs}$$

E. On-site drainage

The project site contains 4.0611 acres.

$$L = 210 \text{ feet} \quad S = (5102 - 5093.4) / 210 = 0.0162 \text{ ft./ft.}$$

$$T_c = 0.0078 (210^{0.77} / 0.0162^{0.385}) = 2.34 \text{ min. Use}$$

$$10 \text{ minutes. } Q = CIA = 0.34 \times 4.65 \times 4.0611 = 6.42 \text{ cfs}$$

V. PROPOSED DEVELOPMENT

A. General Description

The development planned for the site is a warehouse complex with all areas of the site around the buildings

to eventually be paved. The only pervious area will be at the north end where a detention pond is proposed. The pond will have controlled discharge which will be taken across 64th street to Iliff Road. The southern end of the site will be left undeveloped initially.

B. Off-site Drainage

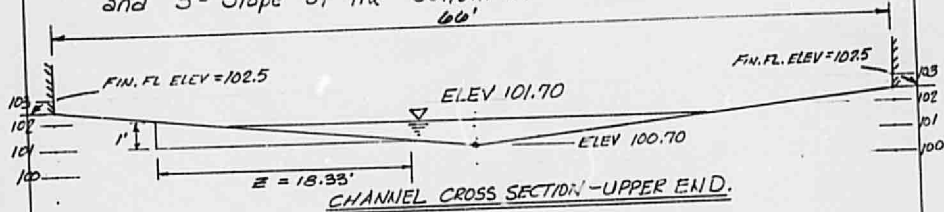
Practically all of the off-site flow (Areas 2 and 3) enters the site near the northern third-point of the western boundary spread over a fairly wide channel. To provide a channel of sufficient capacity to carry the flow through the site, one of the proposed warehouse buildings will not be constructed at this time. In the future, when the proposed drainage channel north of Interstate 40 is constructed, it will intercept all flow from Off-site Area 3. At that time the building can be constructed. Off-site Areas 1 and 2 are so small that they can be easily handled by inverted crowns in the access ways between the buildings as will be shown by calculations.

C. Capacity of Main Channel.

The capacity of the main channel is determined by Manning's Equation; $Q = A \frac{1.486}{n} R^{2/3} S^{1/2}$

where: $n = 0.017$; A = Area of channel below maximum desired

water level; $R = \text{Hydraulic Radius} = \text{Area} / \text{wetted perimeter}$;
and $S = \text{slope of the bottom of the channel, feet per foot}$



TRY Depth of 1.0' Area = 18.33 SQ FT

Wetted perimeter = $\sqrt{1^2 + 18.33^2} \times 2 = 36.71$ feet

$R = 18.33 \div 36.71 = 0.4993$ $S = 0.0090 \%$

$Q = 18.33 \left(\frac{1.486}{0.017} \right) (0.4993)^{2/3} (0.0090)^{1/2} = 95.66$ cfs

95.66 cfs > 77.66 cfs Therefore, the channel has adequate capacity and a minimum of 9.8 inches freeboard.

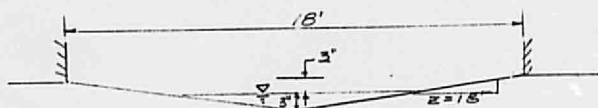
The buildings have been stepped in thirds so that the channel does not become excessively deep at the lower end. This also keeps the access ways between the buildings from becoming too deep.

D. Capacity of Access Ways.

stepping the building finish floors also makes it possible to attain a minimum slope of 0.0050 '1' in the access ways leading to the pond. The runoff that each of the east-west channels must carry is,

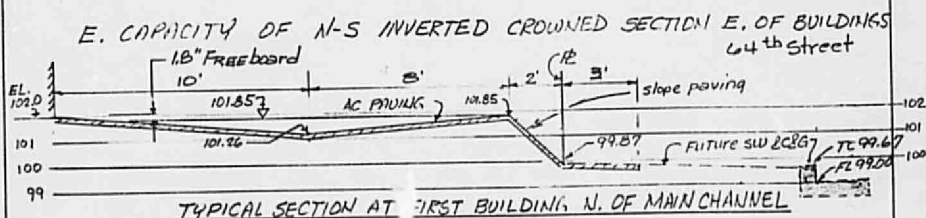
$$(170' \times 48' / 43560) \times 4.65 = 0.87 \text{ cfs.}$$

The finish floor is 6" above the center of the access way. Assuming 3" of freeboard and using Mannings equation the capacity is calculated as follows



TYPICAL CROSS SECTION OF ACCESS
BETWEEN BUILDINGS

By Mannings Equation, using the HP41CV, the capacity of the above channel is 1.74 cfs which is well above the peak flow of 0.87 cfs.

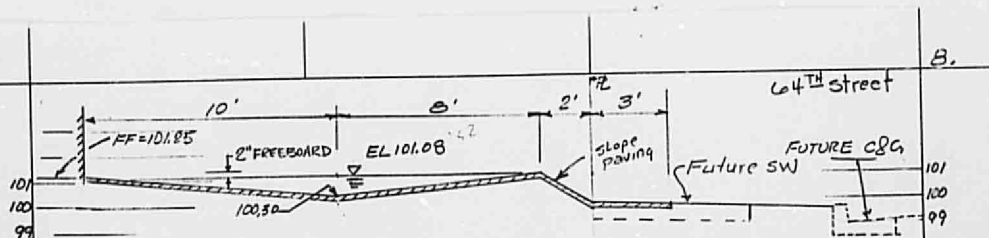


By the Mannings Equation, the capacity as shown in the above cross section is computed as follows:

$$\begin{aligned} \text{Depth } D &= 0.59' & Z &= 13.51 \text{ (Horizontal dist. for 1' Rise)} \\ n &= 0.017 & S &= 0.0050' \end{aligned}$$

BY HP41CV PROGRAM "V-DITCH" $Q = 12.26 \text{ cfs.}$

Also, check the capacity of the channel at a point even with the northern-most building.



TYPICAL SECTION AT S. EDGE OF NORTHERN-MOST BUILDING

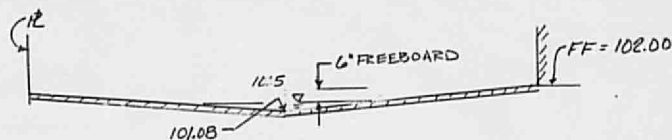
By the Mannings Equation, the capacity as shown in the above cross section is computed as follows:

$$\text{Depth } D = 0.78 \text{ feet} \quad z = 10.52 \text{ (Horizontal dist for 1' Rise)}$$

$$n = 0.017 \quad S = 0.0050 \%$$

$$\text{By HP41CV Program "V-Ditch" } Q = 21.05$$

F. CAPACITY OF INVERTED CROWN SECTION WEST OF BUILDINGS



SECTION AT C. OF 2ND BLDG. FROM N. END

$$\text{DEPTH } D = 0.42 \quad z = 10.86$$

$$n = 0.017 \quad S = 0.0082 \%$$

$$Q = 5.34 \text{ cfs}$$

$$\text{Actual } Q = ((130 \times 20) / 43560) \times 4.65 = 0.28 \text{ cfs}$$

This channel has more than Adequate capacity.

G. Pond Volume, Required

1. North of off-site flow channel

$$\text{Area} = [(390 + 260) / 2] \times 210 = 68250 \text{ SQ FT.}$$

$$\text{Unpaved area } (190 \times 120) / 2 + (22 \times 118) 2 = 12,700 \text{ SF}$$

"C" Factor for unpaved area = 0.34 AREA = 12,700 SF

"C" Factor for Paved Area = 0.95 AREA = 55,550 "

$$\text{Weighted "C" Factor} = (12,700 \times 0.34 + 55,550 \times 0.95) / 68,250 = 0.84$$

Pond Volume North of off-site flow channel..

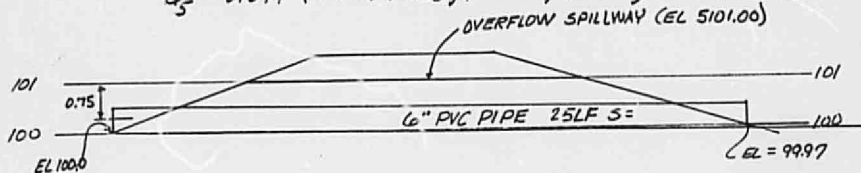
$$V = 0.84 \times 68,250 \times 2.2 / 12 = 10,510 \text{ cubic feet}$$

Actual Pond Volume. Total area inside 5100 contour, by planimeter, is 6,741 sq. ft. Area inside 5101 contour is 19,080 sq. ft. Average Area is 12,910 sq. ft. $12,910 \text{ SF} \times 1.0 \text{ foot depth} = 12,910 \text{ CF}$

$$12,910 > 10,510 \text{ cubic feet.}$$

POND DISCHARGE - Q_5 Undeveloped.

$$Q_5 = 0.541 (0.34) (4.65) (68250 / 43560) = 1.34 \text{ cfs.}$$



By orifice equation $Q = C a \sqrt{2gh}$ $C = 0.6$ $a = \frac{(6)^2 \pi}{4} / 144 = 0.1963$
 $h = 0.75$

$$Q = 0.6 \times 0.1963 \sqrt{2 \times 32.2 \times 0.75} = 0.818 < 1.34 \text{ cfs OK}$$

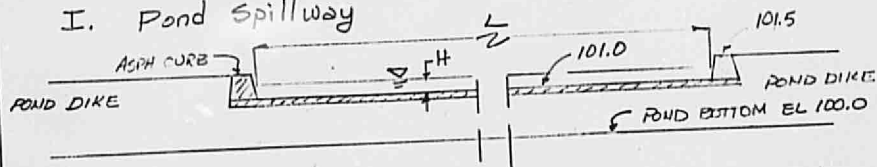
TRY 8" $A = \frac{B^2 \pi}{4} / 144 = 0.3491$

$$Q = 0.6 \times 0.3491 \sqrt{2 \times 32.2 \times 0.67} = 1.38 \text{ cfs} \approx 1.34 \text{ cfs}$$

use 8" ϕ

To prevent erosion at the outlet of the pond discharge, an asphalt apron has been shown on the drainage and grading plan. From the point of discharge for Pond No. 1 the direction of discharge is down Iliff. The topographic map shows that the direction of discharge is down Iliff. The topographic map shows that the slope is $1.97 \div 425 = 0.0046\%$. Since the rate of discharge is less than Q_5 undeveloped, and since the velocity at that slope is less than 1.0 fps (from 22.2 B-1), an erosive condition will not be created. The same analysis applies for Pond No. 2. Off-site flow will not cause 64th Street to erode for the same reason, that flat grades will result in low velocities.

I. Pond Spillway



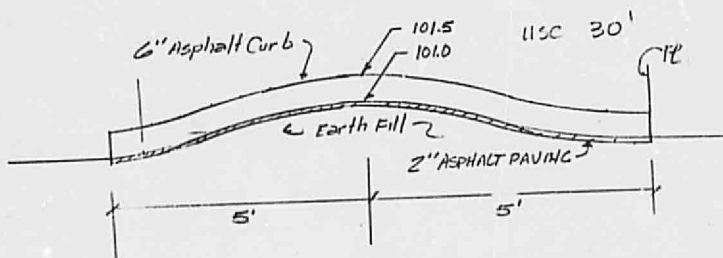
Determine length of spillway by weir equation:

$$Q = CLH^{3/2} \quad \text{TRY } H = 3''$$

$$L = \frac{Q}{CH^{3/2}} = \frac{16.81}{3.12 \times (0.25)^{3/2}} = 43.1 \text{ feet}$$

$$\text{TRY } H = 4''$$

$$L = \frac{16.81}{3.12 \times (0.33)^{3/2}} = 28.42 \text{ feet}$$



SECTION THROUGH EMERGENCY SPILLWAY
NTS.

VI. CONCLUSIONS:

1. The site is very flat and difficult to drain.
2. Due to the large amount of off-site drainage which splits the site, only the northern portion flows to the pond.
3. 64th street will likely require a storm sewer to drain it properly. A request for paving district for 64th has been submitted to the City.

VII. RECOMMENDATIONS:

1. It is recommended that a paving district for 64th street be formed as soon as possible.
2. It is recommended that this drainage report be approved.

3/23/84 FL

EROSION CONTROL DATA

1. See attached SCS Bernalillo County Soil Survey Map.
2. SCS Soil type is MWA, Madurez Wink Association, gently Sloping, Hydrologic Soils Group B
3. A. Rough Grading.

1. For grading see drainage plan.

2. Erosion protection includes:

- a. Construction of pond immediately and diverting all flow from construction areas to that pond with temporary berms, etc.

- b. Leaving existing off-site flow path undisturbed until paving is done, at which time the off-site flow swale will be paved

- c. Leaving the southern end of the site undisturbed

B. Phase Development

1. See drainage plan for grading.

2. Erosion protection will be as in A. above.



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

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

April 11, 1984

Mr. Richard Hall
Hall Engineering Co.
2625 Pennsylvania Avenue NE Suite 350
Albuquerque, NM 87110

REF: DRAINAGE REPORT FOR WAREHOUSE COMPLEX AT 1301 64TH STREET NW
(J10-D10) RECEIVED MARCH 22, 1984

Dear Rick:

I have reviewed the above referenced submittal and forward the following comments:

1. As per the pre-design, a paved access is required. Whether the paved access is constructed through a paving district or by other means, the construction will need to be assured prior to release of the building permit.
2. It is mentioned in the report that 5.10 cfs will be the discharge rate from the pond. How was this rate determined to be the allowable.
3. There is no mention of where the flows go or what the impacts will be once they leave the site.

Should you have any questions or comments, please contact me at 766-7644.

Sincerely yours,

Billy D. Goolsby
Billy D. Goolsby, PE
City/County Flood Plain Admin.

BJG:mrk

MUNICIPAL DEVELOPMENT DEPARTMENT

B. Goolsby, PE, City Engineer

ENGINEERING DIVISION

TELEPHONE 766-7644

AN EQUAL OPPORTUNITY EMPLOYER

INFORMATION SHEET

PROJECT TITLE WAREHOUSE COMPLEX TYPE OF SUBMITTAL DRAINAGE REPORT
 ZONE ATLAS PAGE NO. J-10 CITY ADDRESS 1301 64TH Street NW
 LEGAL DESCRIPTION TRACT 266, UNIT EIGHT, TOWN OF ATRISCO GRANT
 ENGINEERING FIRM HALL ENGINEERING CONTACT FRANK LOVELADY
 ADDRESS 2625 PENNSYLVANIA NE PHONE 884-6444
 OWNER PARGIN REALTY CONTACT KEN WILLIAMS
 ADDRESS 3530 Wyoming Blvd. NE PHONE 296-1500
 ARCHITECT David Fry CONTACT David Fry
 ADDRESS 200 Ridgcrest SE PHONE 255-8985
 SURVEYOR HALL SURVEYING CONTACT VERNON HALL
 ADDRESS 2625 PENNSYLVANIA NE PHONE 884-6444
 CONTRACTOR _____ CONTACT _____
 ADDRESS _____ PHONE _____

PRE-DESIGN MEETING:

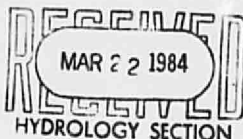
☒ YES
☐ NO
☒ COPY OF CONFERENCE RECAP SHEET PROVIDED

PLEASE CHECK TYPE OF APPROVAL EXPECTED WITH THIS SUBMITTAL:

____ SKETCH PLAT APPROVAL
 ____ PRELIMINARY PLAT APPROVAL
 ____ SITE DEVELOPMENT PLAN APPROVAL
 ____ FINAL PLAT APPROVAL
☒ BUILDING PERMIT APPROVAL
 ____ CERTIFICATE OF OCCUPANCY APPROVAL
 ____ ROUGH GRADING PERMIT APPROVAL
 ____ GRADING/PAVING PERMIT APPROVAL
 ____ OTHER _____ (SPECIFY)

DATE SUBMITTED: MARCH 21, 1984

BY: Frank D. Lovelady





CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION



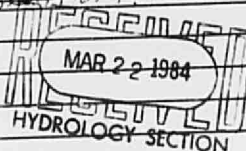
HYDROLOGY SECTION PROJ. NO. J-10 DATE: 2/22/84
PLANNING DIVISION NO. J-10

CONFERENCE RECAP

SUBJECT: TRACT 266, Unit Eight, Town of Atrisco Grant
(J10)

WHO	REPRESENTING
ATTENDANCE: <u>Richard Hall</u>	_____
<u>Fred J. Davila</u>	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

FINDINGS: _____
1. OUR PAID ACCESS TO THE PROPOSED DEVELOPMENT REQUIRED
(SEE SECTION 7, F OF THE DRAINAGE ORDINANCE)
2. DRAINAGE REPORT REQUIRED IN ACCORDANCE WITH THE DPM
3. CONTINUED DISCHARGE FROM DEVELOPMENT REQUIRED BECAUSE OF
EXISTING FLOODING PROBLEM DOWNSTREAM. NOTE: ~~THE~~ ^{EXISTING} DRAINAGE
DISCHARGE IS BASED ON DOWNSTREAM CAPACITY



The undersigned agrees that the above findings are summarized accurately and are only subject to change if further investigation reveals that they are not reasonable or that they are based on inaccurate information.

SIGNED: <u>Fred J. Davila</u>	SIGNED: <u>Richard Hall</u>
TITLE: _____	TITLE: <u>PE</u>
DATE: <u>2/22/84</u>	DATE: <u>1-22/84</u>

Storm Drainage Report
For
Southerly Portion of Tract 266
Airport Unit, Town of Atrisco Grant

I. PURPOSE:

The purpose of this report is to present a comprehensive analysis of drainage control constraints on the proposed development and to present a plan for handling the storm runoff in a manner consistent with current storm drainage policy of the City of Albuquerque.

II SCOPE:

The scope of this report includes determining on-site and off-site flow rates and volumes, presenting a design for on-site storage with controlled discharge and generally satisfying the listed storm drainage requirements.

Calculations of volumes and flow rates are in accordance with standard practice as presented in the City of Albuquerque Development Process Manual, Vol. 1, Design Criteria, hereafter referred to as the DPM.

III LOCATION AND USE:

The proposed development is located west of Coors Boulevard and South of Interstate 40. More specifically,

It fronts on the west side of 64th Street NW and on the north side of Hanover Road NW. The North End of the property abuts Interstate 40. The intended use of the property is construction of warehousing. Zoning is C-2, Community Commercial Zone.

IV. EXISTING CONDITIONS:

A. General Description.

The property is located on land that slopes very gently from west to east and drains to 64th street NW. Further east the historic drainage pattern is interrupted by Interstate Highway 40.

There are two major drainage structures crossing I-40 in this area. The closest is 5 30-inch concrete pipe culverts, the outlet of which is about 300 feet east of the northern third point of the property. Discharge from these culverts crosses the subject property and is intercepted by 64th street NW.

The other structure consists of 3-6'x3' CBC's. The outlet is about 870 feet west of the southern third point of the site. The flood map shows that discharge from this structure flows down Hanover Road without crossing the site. This has been verified by

visual inspection in the field.

Neither 64th Street or Hanover Road are paved adjacent to the site. Hanover Road is paved east of 64th. A request for a paving district for 64th Street has been submitted.

B. Soil Types.

The Soil Survey of Bernalillo County, New Mexico, sheet No. 30 shows the following soil types:

Off-drainage area - Pajarito loamy fine sand (PAC), Group B.

On-site drainage area - Madurez-Wink (MWA) Group B.

C. Floodway Map.

The Floodway map is shown in Figure 1 with the off-site drainage areas. The site is not located in a flood Hazard Area.

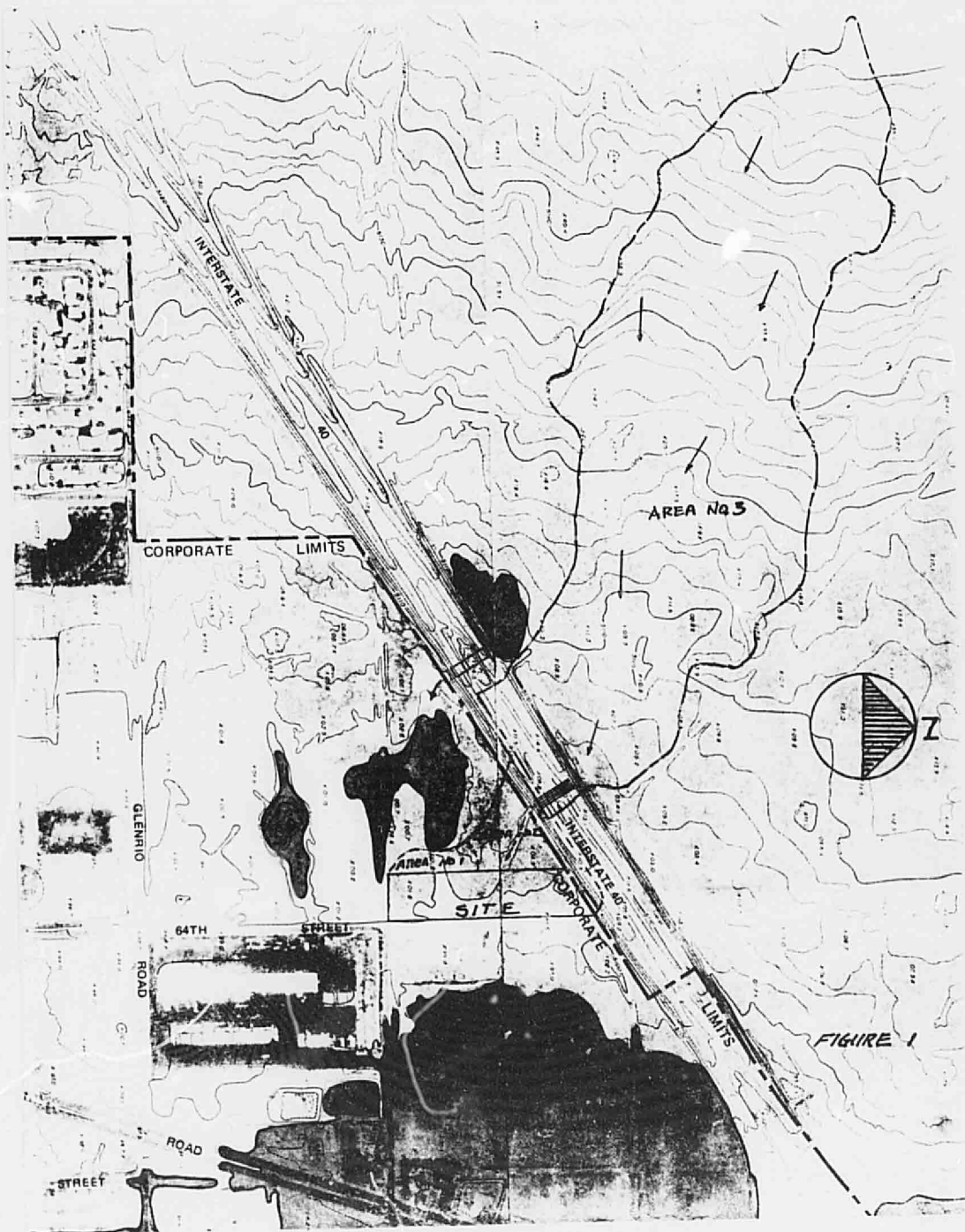
D. Off-site Drainage.

There are three (3) off-site drainage areas. Off-site areas 1 and 2, the small areas directly ^{west} east of the site contains 4.80 acres. off-site area 3, the area north of Interstate 40 contains 10.72 acres.

The runoff computations are as follows:

1. off-site areas 1 and 2 (Area 1 = 2.377 acres;
Area 2 = 3.42 acres)

For SCS soils Group B, DPM Plate 22.2 C-1 shows an undeveloped C factor of 0.34



$$T_c = 0.0015 (L^{0.77} / S^{0.385}) \quad L = 850 \quad S = (5110.5 - 5100) / 850 \\ = 0.0209 \text{ ft/ft.}$$

$T_c = 4.45$ minutes - Use 10 minutes

From DPM Plate 22.2 D-1, 4-hour rainfall volume is 2.2 inches. From DPM Plate 22.2 D-2

$$I = 2.2 \times 6.34 \times 10^{-0.51} = 4.65 \text{ inches/hour}$$

$$Q = CIA = 0.34 \times 4.65 \times 4.30 = 6.80 \text{ cfs}$$

Proposed flows for Areas 1 and 2

$$\text{Area 1} = 1.89 \text{ cfs} \quad \text{Area 2} = 5.41 \text{ cfs}$$

$$2. \text{ off-site Area 3} \quad L = 3650 \quad S = (5166 - 5102) / 3650 \\ = 0.0175 \text{ ft/ft.}$$

$$T_c = 0.0015 (3650^{0.77} / 0.0175^{0.385}) = 20.49 \text{ minutes}$$

$$I = 2.2 \times 6.34 \times 10^{-0.51} = 3.23 \text{ in./hour}$$

$$Q = CIA = 0.34 \times 3.23 \times 70.72 = 77.66 \text{ cfs}$$

E. On-site drainage

The project site contains 4.0611 acres.

$$L = 210 \text{ feet} \quad S = (5102 - 5098.4) / 210 = 0.0162 \text{ ft/ft.}$$

$$T_c = 0.0015 (210^{0.77} / 0.0162^{0.385}) = 2.34 \text{ min. Use 10 minutes. } Q = CIA = 0.34 \times 4.65 \times 4.0611 = 6.42 \text{ cfs}$$

VI. PROPOSED DEVELOPMENT

A. General Description

The development planned for the site is a warehouse to play with all areas of the site around the building.

eventually be paved. The only pervious area will be at the north end where a detention pond is proposed. The pond will have controlled discharge which will be taken across 64th street to Iliff Road. The southern end of the site will be left undeveloped initially.

B. Off-site Drainage

Practically all of the off-site flow (Areas 2 and 3) enters the site near the northern third-point of the western boundary spread over a fairly wide channel. To provide a channel of sufficient capacity to carry the flow through the site, one of the proposed warehouse buildings will not be constructed at this time. In the future, when the proposed drainage channel north of Interstate 40 is constructed, it will intercept all flow from Off-site Area 3. At that time the building can be constructed. Off-site Areas 1 and 2 are so small that they can be easily handled by inverted crowns in the access ways between the buildings as will be shown by calculations.

C. Capacity of Main Channel.

The capacity of the main channel is determined by Manning's Equation; $Q = A \frac{1.49}{n} R^{2/3} S^{1/2}$
where: $n = 0.017$; A = Area of channel below maximum desired

water level; $R = \text{Hydraulic Radius} = \text{Area} / \text{wetted perimeter}$; and $S = \text{Slope of the bottom of the channel, feet per foot}$



TRY Depth of 1.0' Area = 18.33 sq ft

Wetted perimeter = $\sqrt{1^2 + 18.33^2} \times 2 = 36.71$ feet

$R = 18.33 \div 36.71 = 0.4993$ $S = 0.0090 \%$

$Q = 18.33 \left(\frac{1.486}{0.017} \right) (0.4993)^{2/3} (0.0090)^{1/2} = 75.66$ cfs

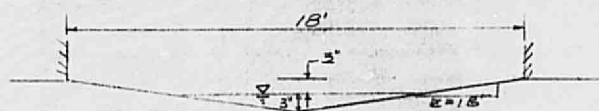
95.66 cfs > 77.66 cfs Therefore, the channel has adequate capacity and a minimum of 9.8 inches freeboard.

The buildings have been stepped in thirds so that the channel does not become excessively deep at the lower end. This also keeps the access ways between the buildings from becoming too deep.

D. Capacity of Access Ways.

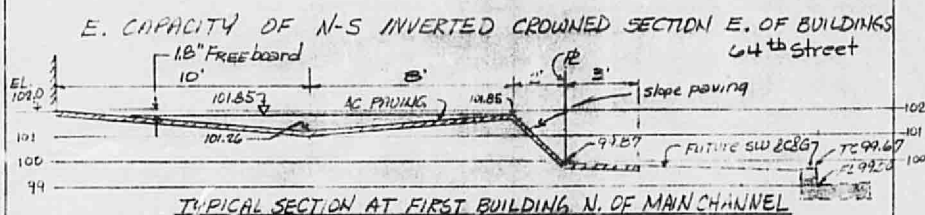
stepping the building finish floors also makes it possible to attain a minimum slope of 0.0050 % in the access ways leading to the pond. The runoff that each of the east-west channels must carry is, $(170' \times 48' / 43560) \times 4.65 = 0.87$ cfs.

The finish floor is 6" above the center of the access way. Assuming 3" of freeboard and using Manning's equation the capacity is calculated as follows



TYPICAL CROSS SECTION OF ACCESS
BETWEEN BUILDINGS

By Mannings Equation, using the HP41CV, the capacity of the above channel is 174 cfs which is well above the peak flow of 0.87 cfs.



By the Mannings Equation, the capacity as shown in the above cross section is computed as follows:

$$\begin{aligned} \text{Depth } D &= 0.59' & Z &= 19.51 \text{ (Horizontal dist. for 1' Rise)} \\ n &= 0.017 & S &= 0.0050' \end{aligned}$$

BY HP 41CV PROGRAM "V-DITCH" $Q = 12.26$ cfs.

Also, check the capacity of the channel at a point even with the northern-most building.

Area that will remain unpaved - $[(23+155)/2] \times 10 = 18,690$

"C" Factor = 0.34

Weighted "C" Factor = $\frac{18,690 \times 0.34 + 158,212 \times 0.95}{177,902}$

= 0.89

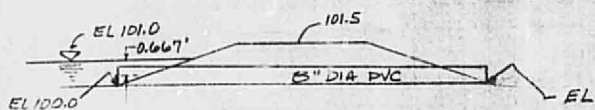
Volume = $4.0611 \times 43560 \times (2.2/12) \times 0.89 = 28,364 \text{ CF}$

PEAK Discharge $Q = CIA = 0.89 \times 4.65 \times 4.0611 = 16.81 \text{ cfs}$

Duration of Runoff

$T = 2V/60Q_p = 2 \times 28,364 / 60 \times 16.81 = 57.23 \text{ min.}$

Pond Discharge Rate:



By Orifice Equation, the discharge through the outlet pipe is determined as follows:

$$Q = C_a \sqrt{2gh} \quad C = 0.6 \quad a = \left(\frac{50.29}{144} \right) = 0.34919F$$

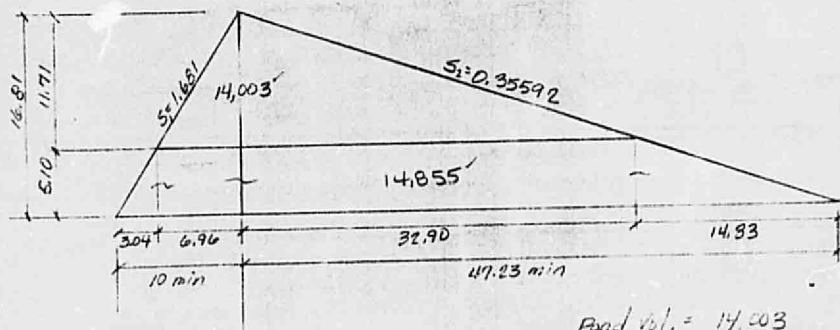
$$h = 0.667'$$

$$= 0.6 \times 0.3491 \sqrt{2 \times 32.2 \times 0.667}$$

$$= 2.55 \text{ cfs}$$

use 2-8" PVC Pipes at 2.55 cfs ea = 5.10 cfs

Runooff Hydrograph :



$$\text{Pond Vol.} = 14,003$$

$$\text{Disch. Vol} = 14,855$$

$$\text{Total } 28,858 \approx 28,864$$

H. Actual Pond Volume :

$$\text{Area inside 100 contour} = [(130 + 25)/2] 170 = 13,175 \text{ SF}$$

Area inside 101 contour (in area of pond only)

$$[(50 + 169)/2] 175 = 19,075 \text{ SF}$$

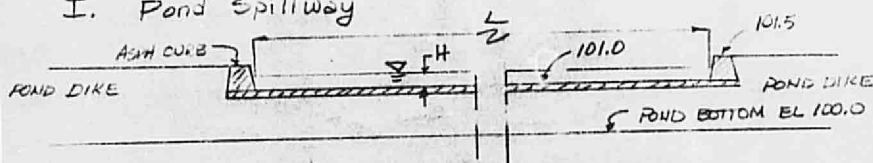
$$\text{Average Area} = (13,175 + 19,075)/2 = 16,125 \text{ SF}$$

Depth of pond = 1.0 feet.

$$\text{Volume is } 16,125 \text{ SF} \times 1.0 = 16,125 \text{ cubic Feet} > 14,003 \text{ CF}$$

Since the 101 contour extends into the access ways, the 100 year storm will back water up into these areas a short distance. OK.

I. Pond Spillway



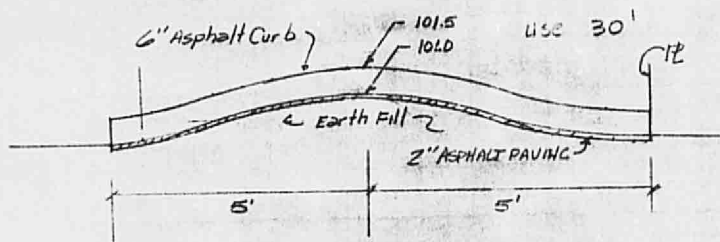
Determine length of spillway by weir equation:

$$Q = CLH^{3/2} \quad \text{TRY } H = 3''$$

$$L = \frac{Q}{CH^{3/2}} = \frac{16.81}{3.12 \times (0.25)^{3/2}} = 43.1 \text{ feet}$$

TRY $H = 4''$

$$L = \frac{16.81}{3.12 \times (0.33)^{3/2}} = 25.42 \text{ feet}$$



SECTION THROUGH EMERGENCY SPILLWAY
NTS.

VI. CONCLUSIONS:

1. The site is very flat and difficult to drain.
2. Due to the large amount of off-site drainage which splits the site, only the northern portion flows to the pond.
3. 64th street will likely require a storm sewer to drain it properly. A request for paving district for 64th has been submitted to the City.

VII. RECOMMENDATIONS:

1. It is recommended that a paving district for 64th street be formed as soon as possible.
2. It is recommended that this drainage report be approved.

42-381 50 SHEETS 5 SQUARE
 42-382 100 SHEETS 5 SQUARE
 42-383 200 SHEETS 5 SQUARE
 42-384 400 SHEETS 5 SQUARE

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