CHAVEZ GRIEVES / CONSULTING ENGINEERS, INC.

6121 INDIAN SCHOOL RD., N.E. SUITE 120
ALBUQUERQUE, N.M. 87110
PH. (505) 881-7376

September 9, 1981

Mr. Fred Agguirre
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

Re: Drainage Plan Certification
Lots 4, 5, 6, and 7, Tract 2
Brentwood Park Addition

Dear Mr. Agguirre:

The above referenced lots were inspected on September 9, 1981. Al four lots were found to be in general compliance with the original drainage study dated March 28, 1980, as prepared by others, and our revised grading plan. Operation of the underground drains was verified by running water through each individual system.

Please call if I can be of any further assistance in this matter.

Sincerely,

Victor J. Chavez

Victor J. Chavez, P. E.

CHAVEZ GRIEVES / CONSULTING ENGINEERS, INC.

6121 INDIAN SCHOOL RD., N.E. SUITE 120
ALBUQUERQUE, N.M. 87110
PH. (505) 881-7376

July 1, 1981

Mr. Fred Agguirre
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

Re: Drainage Plan Certification
Lots 1, 2 and 3, Tract 2, Brentwood Park Addition

Dear Mr. Agguirre:

The above referenced lots were inspected on June 17th and again on July 1st of 1981. All three lots were found to be in general compliance with the original drainage study dated March 28, 1980 and our revised grading plan. Actual operation of the system was shown following locally heavy rains on the morning of July 1st.

Please call if I can be of any further assistance in this matter.

Sincerely,

Victor J. Chavez

Victor J. Chavez, P.E.

RECEIVED
JUL 1 1981
RECEIVED

APPROVED FOR DRAINAGE
7-1-81
DATE
SIGNATURE PE
TITLE
ADVISE DRANAGE INSPECTOR
WHEN GRADING EXECUTED

CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

HYDROLOGY SECTION PROJ. NO. H-22 (D15) DATE: 5/13/81

PLANNING DIVISION NO. _____

CONFERENCE RECAP

SUBJECT: TONY VALLEJOS OFFICE
MENAUL AND GEORGENE

ATTENDANCE:	WHO	REPRESENTING
	CM EASTERLINE	CITY ENGR.
	VIC CHAVEZ	CHAVEZ - GREEVES

FINDINGS:
1 FREE DISCHARGE ALLOWED WITH SOME CONTROL OF IRRIGATION DURESSAY
2 GRADING & DRAINAGE PLAN REQUIRED

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: C.M. Easterline
TITLE: PACE/HYDRO
DATE: 5/15/81

SIGNED: V.J. Chavez
TITLE: Proj. Eng.
DATE: 5/15/81

CHAVEZ / GRIEVES CONSULTING ENGINEERS, INC.

6121 INDIAN SCHOOL RD. N.E. SUITE 132
ALBUQUERQUE, N.M. 87110
PH. (505) 881-7376

April 23,1981

Engineers Division
123Central N.W.
Albuquerque, New Mexico

Attention: Fred J. Aguirre P.E.

Regarding: Grading Plan, Lots 1 - 7, Tract 2, Lawson Heights

With regard to your drainage comments on the above referenced project, dated April 13, 1981, enclosed please find a copy of the requested information and a copy of the revised grading plan. This should provide the information you need to properly review the construction progress.

Please call if we can be of any further assistance in this matter.

Sincerely

Victor J. Chavez

Victor J. Chavez P.E.

Lots 1-7, Tract 2, Lawson Heights

1. Pond volume calculations are shown on the revised Grading Plan.

2. Roof drains have been installed to drain to the backs of the lots. Typical roof area is 2850 sq. ft. Volume contributed by the roof is approximately 594 cubic feet. Therefore the approved ponding volumes will be fully utilized.

3. See revised Grading Plan.

4. The average area draining to each pond is approximately 0.103 ac. The Q_5 discharge for this area is approximately 0.32 cfs. Average discharge head with a full pond is 1.5 feet. With a 3" diameter pvc drain, peak discharge flow will be approximately 0.25 cfs. Volumes in excess of the pond capacity will escape as sheet flows to the west on lots 1-5 and across the parking area on lots 6&7.

5. All roof drains have been installed to drain to the back yards.

6. Drainage areas to the ponds basically include the roof area and back yard. Limits are shown on the attached grading plan blueprint.

7. See revised Grading Plan.

8. See revised Grading Plan.

9. Approval of the pond drain will allow the ponds to empty in approximately two hours, The landscape lining along with the drain has eliminated a need for the additional waterproofing adjacent to the foundations.

10.

11. No. Ponding will be provided in the front of lot 6.

12. Ponding areas east of lots 6&7 will drain through a drainage easement being provided between lots 6&7. As noted in the original approved drainage study, flows from areas south of study site will not enter the study site.

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

MAYOR
David Rusk

April 13, 1981

Mr. Victor Chavez
Chavez-Grieves Consulting Engineers
6121 Indian School Road NE., Suite 141
Albuquerque, New Mexico 87110

Re: REGARDING PLAN FOR LOTS 1-7, TRACT 2, LAWSON HEIGHTS

Dear Mr. Chavez:

Enclosed you will find my comments for the referenced site. If you have any comments concerning the enclosed, please feel free to call.

Very truly yours,

Fred J. Aguirre, PE
Civil Engineer
Engineering Division
766-7644

FJA:pp

Enclosure

DRAINAGE COMMENTS

LOTS 1-7, TRACT 2, LAWSON HEIGHTS

1) Provide pond volumes calculations for each pond; also indicate the pond limit.

2) Show that pond volumes balance with area contributing to the pond.

3) Show the pond overflow point with a spot elevation.

4) Provide positive discharge of ponds with required rate calculations and orfice calculations.

5) Show direction of roof drainage.

6) Outline contributing drainage areas to the ponds, including roof areas.

7) Comply with the required elevations for the City standard drivepad.

8) Provide adequate construction details of the proposed storm water discharge thru the curb.

9) Provide adequate construction detail to demonstrate compliance with the site's soil investigation report.

10) Provide a description of the temporary bench mark (T.B.M.).

11) Is the rear of Lot 6 intended to be a pond since no outfall is indicated with the grades?

12) Do you anticipate any offsite flows from the adjacent property?

Note: Construction plans must comply with the approved drainage report.

CHAVEZ / GRIEVES CONSULTING ENGINEERS, INC.

6121 INDIAN SCHOOL RD. N.E. SUITE 132
ALBUQUERQUE, N.M. 87110
PH.(505) 881-7376

February 17, 1981

Mr. Bruno Conegliano
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: Lawson Heights Addition

Dear Sir:

Attached are copies of the typical lot grading plan and associated details for the referenced Lawson Heights Addition fourplexes. The grading has been prepared as outlined in our conversation on February 10, 1981 and as outlined in the approved drainage study for the site. Please feel free to call if any additional information is required.

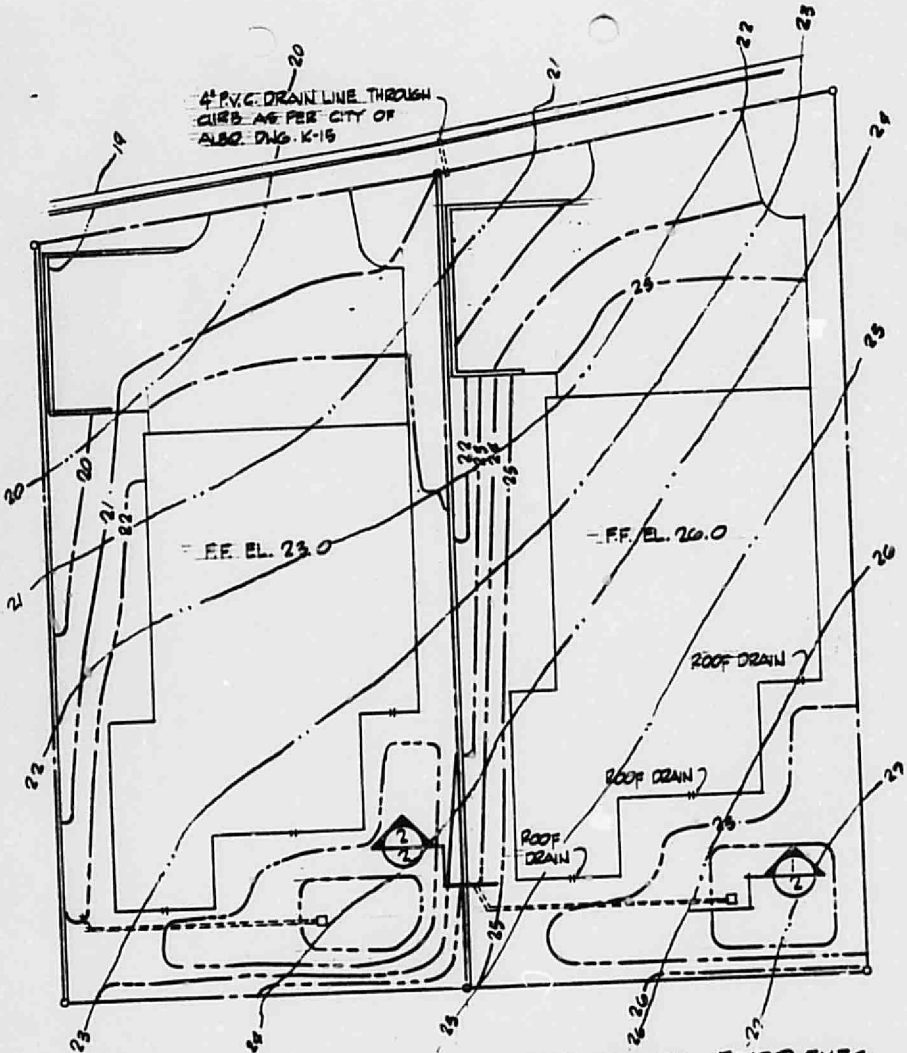
Your prompt responce and cosideration in this matter has been appreciated.

Yours truly,

Victor J. Chavez

Victor J. Chavez P.E.

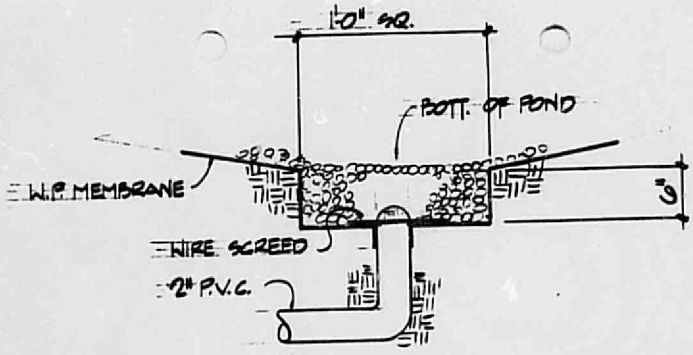
Enclosures
cc:Gerald Misurek



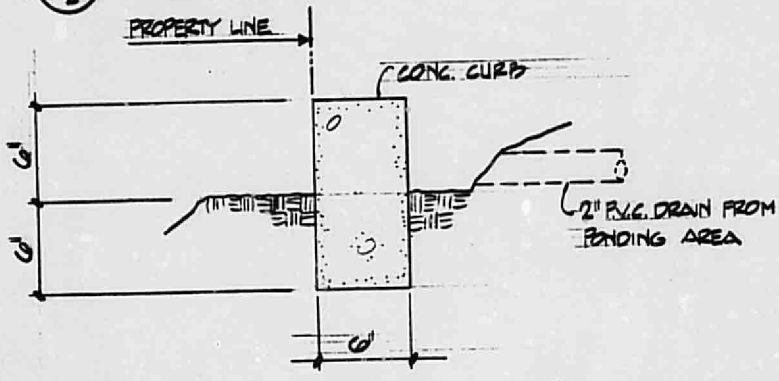
TYPICAL LOT GRADING PLAN - LAWSON HEIGHTS FOURPLEXES

1" = 20'

SHEET 1 OF 2



1/2 N.T.S.



2/2 1 1/2" = 1'-0"

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

February 17, 1981

H22 - D15

Mr. Victor Chavez
6121 Indian School Rd. N.E., Suite 141
Albuquerque, New Mexico 87110

Ref: Proposed Lot Grading for Lawson Court

Dear Mr. Chavez:

The sketches, Sheet No. 1 and 2 submitted for my review regarding the referenced development are consistent with the discussion that we previously had on the subject. Nevertheless, it seems to me that you may not be able to provide a consistent solution for this development without a completely revised site grading plan. The existing topography must also be shown, together with the proposed grading and it must be demonstrated that your proposal does not affect adversely the adjacent property to the south and to the east.

Very truly yours,

Bruno Conegliano
Assistant Hydrology Engineer

BC/fs

cc - R. S. Heller

A&E ENGINEERING INC.
CIVIL ENGINEERING, LAND PLANNING, AND SURVEYING

JANUARY 19, 1981

City Engineer
123 Central Avenue N.E.
Albuquerque, New Mexico

Attn: Fred Aguirre

Transmitted herewith are grading and drainage plans for the Lawson Heights Addition - Lots 1 thru 7. These plans conform to your request and are in conformance with the drainage report.

Your immediate attention on this matter will be greatly appreciated.

Very truly yours,

A & E ENGINEERING INC.

JFE:mhe

John F. Esquibel, President

1330 SAN PEDRO NE, SUITE 114
ALBUQUERQUE, NEW MEXICO 87110 505/266-8791

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

May 13, 1980

John Esquibel
A & C Engineering, Inc.
5823 Lomas Blvd., N.E.
Albuquerque, New Mexico 87110

Reference: Prospect Avenue & Tract X-1 of Brentwood Hills

Dear Mr. Esquibel:

The drainage report for the referenced development addresses the problem of the handling of the offsite flows in a satisfactory manner, but the analysis of the onsite flows is more superficial. The drainage report is therefore approved in concept, but the site grading plan to be submitted with the construction plans must furnish more details for the onsite handling of the runoff; more particularly, the plans must show the proposed means to prevent adverse consequences to the existing development to the west. The runoff in the swale must not overflow the sidewalk and better details must be provided on the site grading plan for the mode of collection and conveyance of the detained runoff to the proposed 8" diameter pipe.

If you have any questions concerning the above, please don't hesitate to contact my office.

Very truly yours,

Bruno Conegliano
Assistant City Engineer

BC/lc
xc: Richard Heller, City Engineer
Richard Leonard, AMAFCA
Fred Aguirre, Civil Engineer

A&E ENGINEERING INC.
CIVIL ENGINEERING, LAND PLANNING, AND SURVEYING

April 8, 1980

H22-D15

Mr. Fred J. Aguirre
Civil Engineer
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: Lawson Heights, Tract 2, Brentwood Park

Dear Sir:

In response to your letter of March 28, 1980, we are answering all of your comments. We also feel that with the attached street plan and profile that the subdivision is in conformance with the City's requirements for drainage. Your office's approval of this report is needed to record the subdivision plat. Construction drawings will be forthcoming for further review.

If any further questions arise, please call on us.

Yours truly,

John Esquibel, President

JFE/lm

Enclosures

RECEIVED
APR 03 1980
CITY ENGINEER

5823 LOMAS N.E. ALBUQUERQUE, NEW MEXICO 87110 505/266-8791

Lawson Heights Tract 2 of Brentwood Park

1. Contours shown are existing. The finished configuration will be determined by spot elevations and pad elevations as shown on the grading plan and drainage plan.

2. This is incorrect. The ponds are at the rear of the lots as shown on the drainage plan.

3. Enclosed is a street plan and profile of Lawson Court showing how streets drain.

4. The front lots will run off into the streets down driveways. The rear lots will retain all runoff within themselves.

5. The developed runoff into Prospect Avenue less than the existing natural runoff.

6. Runoff on the west side will be intercepted by pond and CMU Wall; if any runoff should flow west it would flow into an existing paved alley and flow north to Prospect.

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

March 28, 1980

Mr. John F. Esquibel, President
A&E Engineering, Inc.
5823 Lomas N.E.
Albuquerque, N.M. 87110

Re: Lawson Heights, Tract 2, Brentwood Park

The attached are my comments concerning the above referenced Drainage Report submitted to this office on March 27, 1980 .

If you have any questions concerning these comments, please feel free to call on me.

Sincerely,

Fred J. Aguirre
Civil Engineer

FJA:pp

cc: Drainage File

Lawson Heights Tract 2 of Brentwood Park

1. How is the water supposed to get to the ponds? The contours on the grading plan indicate that the runoff will flow to the northwest away from the ponds as located.

2. The contours also indicate there will be ponding against the building structures.

3. The cul-de-sac area has elevations shown, however, the contours indicate water will be trapped in that area.

4. How will the runoff get to the street? Will it be by overland flow across the sidewalk and curb?

5. Does Prospect Avenue have the capacity to carry the additional runoff from the project?

6. What about runoff on the west side, will it be prevented from running onto adjacent property?

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
David Rusk

March 6, 1980

Lawson Realty & Investment Corporation
11701 Menaul NE
Albuquerque, NM 87112

REF: S-80-8 Lawson Heights

Gentlemen:

At their meeting of February 26, 1980, the Subdivision Review Board approved your request for a subdivision, subject to the following conditions:

1. Submittal of a drainage study for the site.
2. The resolution of the "drainage problem" with Prospect Ave.
3. That there be a small strip of land between the cul-de-sac and the south boundary of the subdivision.

If you have any questions concerning this matter, please do not hesitate to contact me at 766-7422.

Sincerely,

Bob Casias
Planner

BC/lmg

cc: A&E Engineering, Inc., 5823 Lomas NE, 87110

DRAINAGE REPORT
FOR
LAWSON HEIGHTS
TRACT 2 OF BRENTWOOD PARK
CITY OF ALBUQUERQUE
BERNALILLO COUNTY, NEW MEXICO

RECEIVED
MAR 27 1980
CITY ENGINEER

For Lawson Realty Corp.
By A & E Engineering, Inc.

A&E ENGINEERING INC.
CIVIL ENGINEERING, LAND PLANNING, AND SURVEYING

March 24, 1980

Mr. Bruno Conegliano
City of Albuquerque Engineering
P.O. Box 1293
Albuquerque, New Mexico
87103

RE: LAWSON HEIGHTS, TRACT 2, BRENTWOOD PARK

Dear Sir:

Transmitted herewith for your review and approval is the Drainage Report for Lawson Heights, Tract 2, Brentwood Park, Bounded on the North by Prospect Avenue, on the East by Lots 1, 2, and 3 in Block 9 of Indian Ridge Subdivision, on the South by Lots 9 thru 17 in Block 1 of the Replat of Brentwood Park, and on the West by an alley and Tract 1 of Brentwood Park.

Please notify us if there are any questions or problems.

Very truly yours,

John F. Esquibel
President

5823 LOMAS N.E. ALBUQUERQUE, NEW MEXICO 87110 505/266-8791

A&E ENGINEERING INC.
CIVIL ENGINEERING, LAND PLANNING, AND SURVEYING

March 24, 1980

Mrs. Bernadine Lawson
Lawson Realty and Investment Company
11701 Menaul Boulevard N.E., Suite A
Albuquerque, New Mexico 87112

RE: LAWSON HEIGHTS, TRACT 2, BRENTWOOD PARK

Dear Mrs. Lawson:

We are transmitting this drainage report for Lawson Heights, Tract 2, Brentwood Park. The control of the runoff shall comply with the requirements of the Albuquerque Metropolitan Arroyo Flood Control Authority and with present City of Albuquerque policies.

We do appreciate this opportunity to serve you. If any questions develop we will be available to assist you in your response.

Very truly yours,

John F. Esquibel
President

5823 LOMAS N.E. ALBUQUERQUE, NEW MEXICO 87110 505/266-8791

DRAINAGE REPORT

FOR

LAWSON HEIGHTS

TRACT 2, BRENTWOOD PARK

Prepared for;
Mrs. Brenadine Lawson
Lawson Realty and Investment Co.
11701 Menaul Blvd. N.E., Suite A
Albuquerque, New Mexico 87112

Prepared by;
A&E Engineering, Inc.
5823 Lomas Blvd. N.E.
Albuquerque, New Mexico 87110

March 24, 1980

Theodore M. Conrardy
Registered Professional
Engineer No. 293[illegible]

DRAINAGE REPORT
FOR
LAWSON HEIGHTS
TRACT 2, BRENTWOOD PARK

TABLE OF CONTENTS

GENERAL

This report consists of a hydraulic study of a probable 100-year storm effecting this proposed 2.5 acre, more or less, R-2 Townhouse and Fourplex Development situate within Section 10, Township 10 North, Range 4 East, New Mexico Principal Meridian, City of Albuquerque, Bernalillo County, New Mexico.

This development is bordered on the North by Prospect Avenue N.E. N.E., on the East by Lots 1, 2, and 3 in Block 9 of Indian Ridge Subdivision, on the South by Lots 9 thru 17 in Block 1 of the Replat of Brentwood Park, and on the West by an alley and Tract I of Brentwood Park.

The land slopes to the West at about 4% slope.

There is no offsite drainage effecting this property except the runoff from Indian Ridge Subdivision. This runoff flowing west on Prospect Avenue is intercepted by drainage structures described in the Drainage Report for Prospect Avenue NE and Tract X-1 of Brentwood Hills, prepared by this office for RESDECO-Real Estate Development Corporation.

DISCUSSION OF METHOD

Development of this area will be controled by the guidelines set forth in the recent Resolution of the Albuquerque Metropolitan Arroyo Flood Control Authority and the City of Albuquerque.

The amount of storm water is computed by using a 100-year storm, this being a storm consisting of 100-year 6 hour precipation as shown by the rainfall frequency maps for New Mexico, June 1967, published by the Special Studies Branch, Office of Hydrology

United States Weather Bureau.

Backyard areas shall retain and pond all runoff which originated within them. All roofs shall be flat and shall retain all rain water which falls on them. Runoff not retained in ponds or on roof-tops shall be directed onto Prospect Avenue, thence west to Juan Tabo Boulevard, thence north to Menaul Boulevard, thence west to the Embudo Drain. This is the path runoff from this area presently takes.

DEVELOPMENT

This parcel of land is to be developed into a subdivision of townhouses and fourplexs. Lawson Court shall be dedicated to the City of Albuquerque and paved.

Runoff flowing off the streets shall drain into the Embudo Drain via Prospect Avenue to Juan Tabo Boulevard to Menaul Boulevard, this shall be designated Area "A".

The backyards and roof-tops shall retain and pond all the run-off that enters them and shall be designated Area "B".

RUNOFF CALCULATIONS

Before Development; Total area = 108,856.2 Sq. Ft.

$$0.4 \times \frac{2.4"}{12} \times 108,856.2 \text{ Sq. Ft.} = 8708.50 \text{ Cu. Ft. Runoff}$$

After Development,

Area "A" (Front yards on Prospect Ave. and Lawson Ct. and also Lawson Ct. itself.) = 41,143.0 Sq. Ft.

$$0.9 \times \frac{2.4"}{12} \times 41,143.0 \text{ Sq. Ft.} = 7405.74 \text{ Cu. Ft. Runoff}$$

Area "A"s runoff, which is less than the runoff before development is allowed to flow to the Embudo Drain as described in the Discussion of Method above.

Area "B" (All not included in Area "A")

Area "B" is further subdivided into Area "B1", the roofs of the fourplexs and townhouses, which will retain all rainfall on them; Area "B2", the backyards of the townhouses, Lots 8 - 12, Block 1, and Lots 1 - 6, Block 2: and Area "B3", the back and sideyards of the fourplexs, Lots 1 - 7, Block 1. Area "B"s runoff shall be retained on site.

Area "B1" (Roof-tops) = 40,806.0 Sq. Ft.

$$0.9 \times \frac{2.4"}{12} \times 40,806.0 \text{ Sq. Ft.} = 7,345.08 \text{ Cu. Ft.}$$

Area "B2" (Townhouse Backyards) = 6,594.5 Sq. Ft.

$0.4 \times \frac{2.4"}{12} \times 6{,}594.5$ Sq. Ft. = 527.56 Cu. Ft. Runoff

527.56 Cu. Ft. ÷ 11 Lots = 47.96 Cu. Ft. to be ponded per townhouse lot.

Townhouse Ponds : 5' x 32.5' x 0.63' deep w/ 4:1 slope

$\frac{5' \times 32.5'}{2} \times 0.63' = 51.19$ Cu. Ft.

51.19 - 47.96 = 3.23 Cu. Ft. excess ponding capacity per townhouse lot.

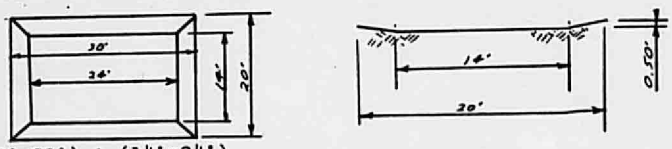
Area "B3" (Fourplex side and backyards) = 20,312.7 Sq. Ft.

$0.4 \times \frac{2.4"}{12} \times 20{,}312.7$ Sq. Ft. = 1,625.0 Cu. Ft. Runoff

1,625 ÷ 7 Lots = 232.15 Cu. Ft. to be ponded per fourplex lot.

Fourplex Ponds

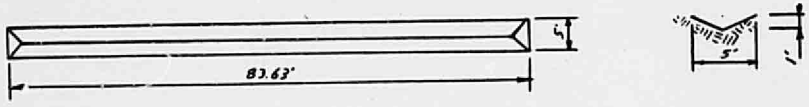
Lots 1 thru 5, Block 1: 20' x 30' x 0.5' deep w/ 6:1 slope



$\frac{(20' \times 30') + (14' \times 24')}{2} \times 0.5' = 234.0$ Cu. Ft.

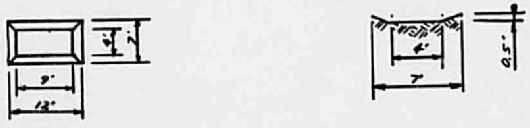
234.0 - 232.15 = 1.85 Cu. Ft. excess ponding per lot 1 - 5, block 1.

Lot 6, Block 1: South Pond, 83.63' x 5' x 1' deep w/ 2.5:1 slope



$\frac{83.63' \times 5'}{2} \times 1' = 209.08$ Cu. Ft.

East Pond, 7' x 12' x 0.5' deep w/ 3:1 slope

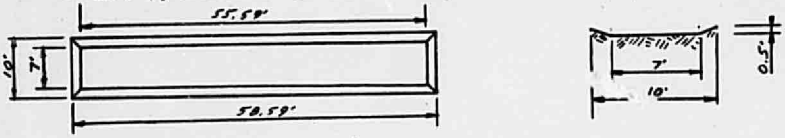


$\frac{(7' \times 12') + (4' \times 9')}{2} \times 0.5' = 30.0$ Cu. Ft.

209.08 + 30.0 = 239.08 Cu. Ft.

239.08 - 232.15 = 6.93 Cu. Ft. excess ponding capacity lot 6, block 1.

Lot 7, Block 1: 58.59' x 10.0' x 0.5' deep w/ 3:1 slope

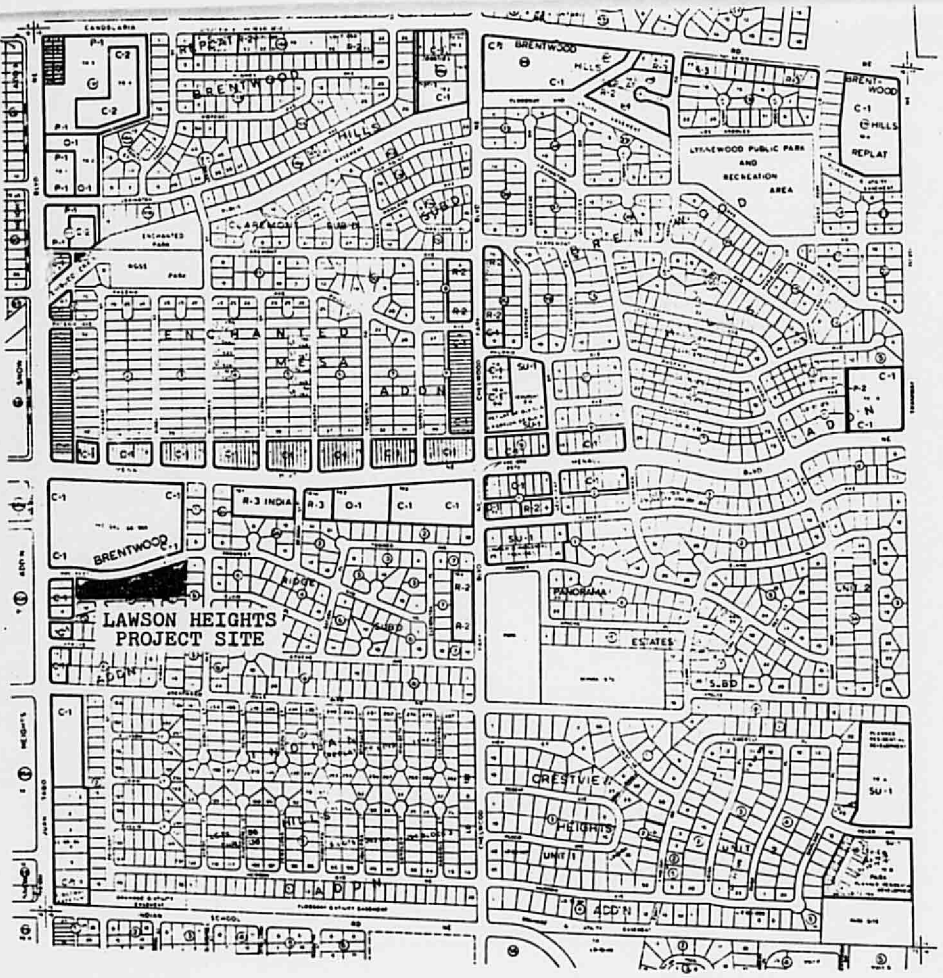


$\frac{(58.59' \times 10.0') + (55.59' \times 7.0')}{2} \times 0.5' = 243.76$ Cu. Ft.

243.76 - 232.15 = 11.61 Cu. Ft. excess ponding capacity lot 7, block 1.

SUMMARY

It is recomended that this development be approved since the calculations and drainage plans show that the proposed design is adequate to satisfactorily handle runoff by ponding. The runoff allowed to flow to the Embudo Drain from Area "A" is less than the total undeveloped runoff.



VICINITY MAP

H-22-Z

SUBSOIL INVESTIGATION

FOR PROPOSED LAWSON HEIGHTS SUBDIVISION

ALBUQUERQUE, NEW MEXICO

FOX Consulting Engineers and Geologists

FOX Consulting Engineers and Geologists

F.M. FOX & ASSOCIATES, INC.
3412 BRYN MAWR DRIVE, N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0900 - FMFOX

SUBSOIL INVESTIGATION

FOR PROPOSED LAWSON HEIGHTS SUBDIVISION

ALBUQUERQUE, NEW MEXICO

Prepared For

Capital Construction and Development Company

Job No. 31102070500

January 15, 1981

TABLE OF CONTENTS

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

1. Soils on the site consist of structural fill, silty sands, silty and clayey sands, and clean sand.

2. Residences in the subdivision should be supported on conventional spread footings designed for a maximum soil bearing pressure of 1500 pounds per square foot.

3. Neither groundwater nor bedrock were encountered in any of the test holes to a depth of 15 feet, the maximum depth of exploration.

4. Other design and construction considerations are presented in this report.

GENERAL

This report presents the results of a subsoil investigation conducted at the site of the proposed Lawson Heights Subdivision, Albuquerque, New Mexico. The purpose of this investigation is to determine the safest and most economical types and depths of foundations, allowable soil bearing pressures, groundwater conditions, and any special precautions which should be taken in the design and construction of the residences due to soil and groundwater conditions.

Conclusions and recommendations presented in this report are based on data compiled during the site investigation, on the results of laboratory testing, on the results of field density testing, and on our experience with similar soil conditions. Data gathered during the field and laboratory investigations are presented in Figures 1 through 4, and Table 1.

PROPOSED CONSTRUCTION AND SITE CONDITIONS

It is our understanding that the western portion of the site will be developed with single family detached housing with townhouse units being constructed on the eastern portion of the site. It is assumed that the residences will be single or two story structures of wood frame with brick veneer or stucco type construction. No basements or sublevels are planned and floors will be concrete slabs-on-grade. Wall loads on the order of 1500 pounds per lineal foot are anticipated.

The site is bounded by Prospect Avenue on the north, Indian Ridge Subdivision on the east, undeveloped property to the south, and a retail store to the west.

The site has been graded resulting in shallow fills on the western portion of the site and shallow cuts on the eastern portion of the site. The fill placed was compacted as structural fill and the testing was performed as reported in our Job Number 34104173500.

SUBSOIL CONDITIONS

As shown on the Logs of Test Holes, Figures 2 and 3, subsoil conditions across the site are somewhat erratic and vary with depth. The test holes generally encountered medium dense to dense silty sands with intervals of clean sand and silty, clayey sands. Test Hole #1 encountered structural fill from ground surface to a depth of 2 feet.

Neither groundwater nor bedrock were encountered in any of the test holes to a depth of 15 feet, the maximum depth of exploration.

The silty sands have a low to moderate consolidation potential under the light building loads with increases in their natural moisture content. Refer to Swell-Consolidation Test, Figure 4. The amount of possible settlement can be minimized by means of densification of the soils as well as other positive methods designed to control the moisture content of the soils.

FOUNDATIONS - CONVENTIONAL SPREAD FOOTINGS

Differential settlement is the governing criteria for foundation design of the residences. Therefore, the residences should be founded on conventional spread footings bearing on compacted natural soils or structural fill. Foundations should be designed for a maximum soil bearing pressure of 1500 pounds per square foot.

Prior to the placement of foundations, the footing bearing surfaces should be brought to optimum moisture content (± 2%) and compacted to a minimum of 95% of maximum density as determined by ASTM D-1557.

The bottom of exterior footings should be a minimum of 18 inches below final exterior grade for frost protection. Footings should be proportioned as much as practicable in order to minimize differential settlement. However, a minimum strip footing width of 16 inches should be maintained. Prior to footing placement, care should be taken to insure that all loose materials on the bearing surfaces are removed or recompacted to the specified density.

INTERIOR FLOOR SLAB CONSTRUCTION

The interior floor slabs should be placed on the natural soils or structurally controlled fill. Prior to the placement of slabs, the natural soils should be moistened to optimum moisture content (± 2%) and compacted to a minimum of 90% of maximum Proctor density.

It is good practice to separate slabs from all bearing members and utility lines to allow their independent movement. However, if desired, slabs may be tied into the foundation walls. Where concentrated loads are anticipated, a gravel layer should be placed beneath the slab to help distribute these loads. Frequent joints should be scored in the slabs to control the location of any cracking.

REINFORCING

Foundations and slabs should be well reinforced to minimize the effects of differential settlement. Refer to foundation design for details.

BACKFILL AND SURFACE DRAINAGE

Foundation soils should be prevented from being wetted after construction. Backfill around the foundations should be free from trash and construction debris and should be moistened and well compacted. Only enough water should be added to the backfill material to allow for proper compaction. Do not puddle or jet backfill.

The final grade should slope away from foundation walls and exterior slabs on all sides. A minimum slope of 1 foot of fall in the first 10 feet is recommended. Downspouts and sillcocks or roof canales should discharge onto splash blocks where the ground surface is not protected. Where limited lot space precludes placing shallow ponding areas a minimum of 15 feet away from foundations, the footings should be protected by sealing a polyethylene moisture barrier to the stem wall and footing. The polyethylene should be a minimum of 4 mils thick and should extend away from foundation walls a minimum distance to the center of the pond. If desired, the entire ponding areas may be lined with a control discharge system. In order to minimize the size of the ponds, it is advisable that drainage to the backyards be minimized by providing roof drainage to the front of the lots where possible.

CONSTRUCTION INSPECTION

The recommendations outlined above are based on the current plans for the proposed development. If the plans become significanlty modified in the future, we should be contacted for supplemental recommendations.

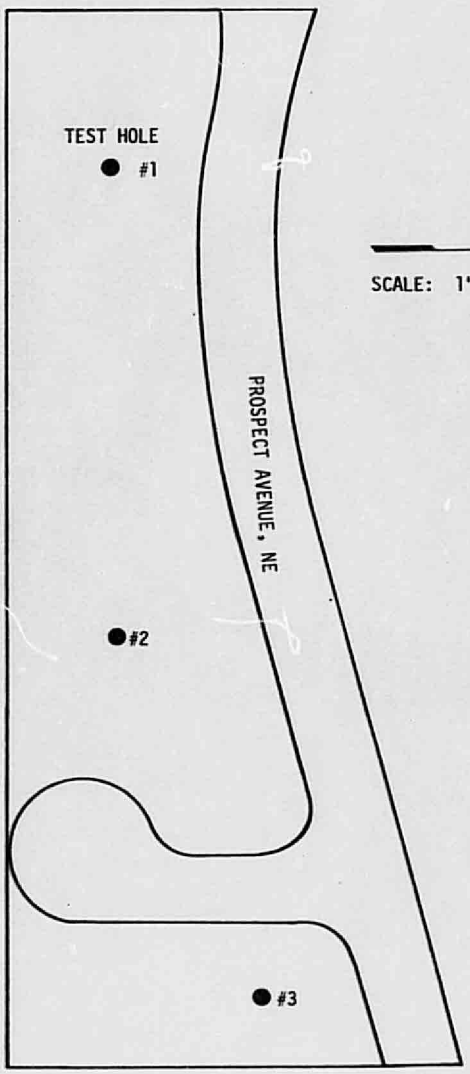
In any foundation investigation, it is necessary to assume that the subsoil conditions do not vary greatly from the conditions encountered in the test holes. Our experience has shown that variations do exist and that they are generally apparent in the foundation excavations. For this reason, we recommend that we be called back to inspect soils exposed in

foundation excavations prior to construction to insure adequate compaction of footing bearing surfaces and to supervise any additional fill placement. We are available to discuss the details of this report with you.

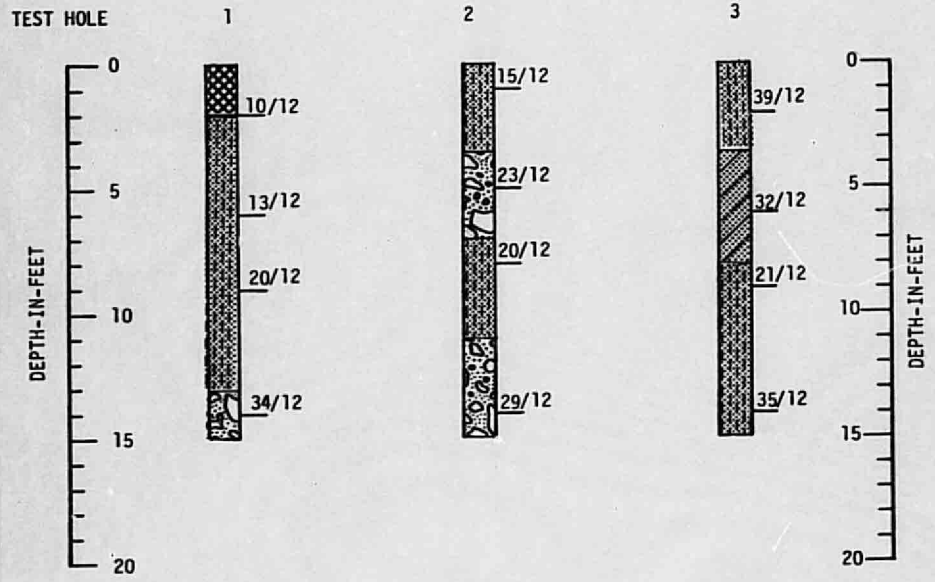
F. M. FOX & ASSOCIATES OF THE SOUTHWEST, INC.

Charles M. Miller, P.E.
Principal Geotechnical Engineer

Copies: Capital Construction and Development Company (3)



TEST HOLE LOCATION PLAN	Job No: 31102070500
FOX Consulting Engineers and Geologists	Date: January 15, 1981
	Figure 1



LOGS OF TEST HOLES	Job No: 31102070500
FOX Consulting Engineers and Geologists	Date: January 15, 1981
	Figure 2

LEGEND

STRUCTURAL FILL, sand, silty

SAND, coarse to fine-grained, silty, medium dense to dense, slightly moist, brown (SM)

SAND, coarse to fine-grained, clean to slightly silty, medium dense to dense, slightly moist, brown (SW-SM)

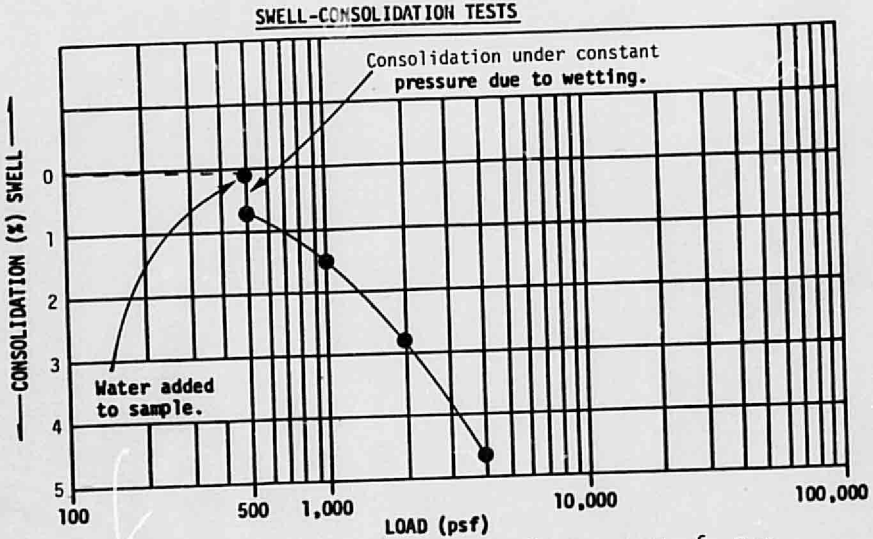
SAND, coarse to fine-grained, silty and clayey, medium dense, slightly moist, calcareous, white (SM-SC)

NOTES

1. Test holes were drilled on January 3, 1981, with a 4-inch diameter continuous flight power auger.
2. (10/12) location of Standard Penetration Test; indicates that 10 blows with a 140-pound hammer, falling 30 inches, were required to drive a 2-inch diameter sampler 12 inches.

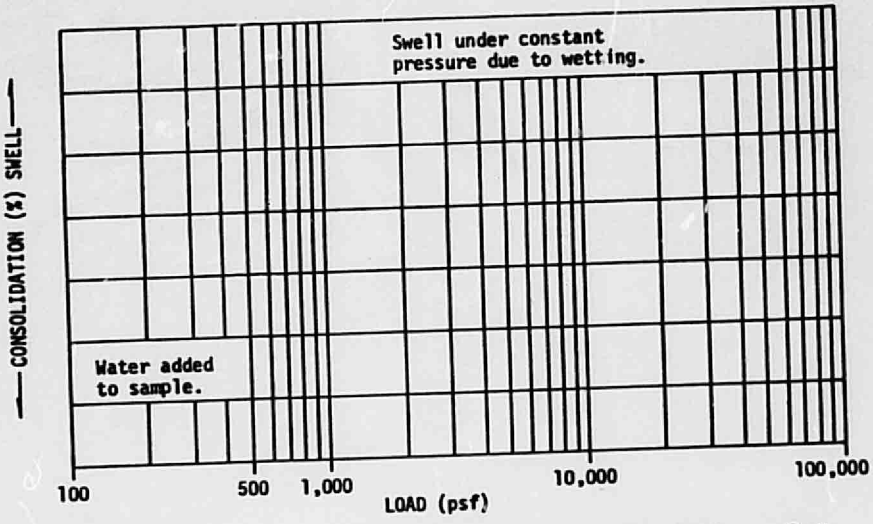
LOGS OF TEST HOLES	Job No: 31102070500
FOX Consulting Engineers and Geologists	Date: January 15, 1981
	Figure 3

SWELL-CONSOLIDATION TESTS



Sample of silty SAND from test hole 3 from depth 6 feet.

Natural Moisture Content 2.1% Natural Dry Density 119 pcf



Sample of _____ from test hole ____ from depth ____ feet.

Natural Moisture Content _____ Natural Dry Density _____

FIGURE 4

Form 1-109

SUMMARY OF LABORATORY TEST DATA

Hole No.	Depth of Sample (ft)	Natural Dry Density (pcf)	Natural Moisture Content (%)	Atterberg Limits LL	Atterberg Limits PI	Sieve Analysis % Passing No. 4	No. 10	No. 40	No. 200	Soil Description	Remarks
1	6	120	1.4	NV	NP	95	74	36	14.5	silty SAND	-
3	2	109	4.5	NV	NP	86	73	60	31.4	silty SAND	-
3	6	119	2.1	20	3	91	65	40	25.9	silty SAND	Figure 4

NV indicates No Value

NP indicates Non Plastic

Table 1