H10/D5

9 Plans

DRAINAGE REPORT

for

UNITS I-A & I-B of LAURELWOOD SUBDIVISION, EL RANCHO ATRISCO III

PREPARED FOR

LADERA JOINT VENTURE

JANUARY, 1983

RECEIVED

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PREPARED BY ENGINEERING

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DRAINAGE REPORT FOR UNIT 1A & 1B
LAURELWOOD SUBDIVISION

I. PROJECT DESCRIPTION:

Units 1A and 1B of Laurelwood Subdivision are located at the southeast corner of El Rancho Atrisco III. Unit 1A will consist of 136 single-family homes on lots with an average lot size of 0.18 acres. Unit 1B will consist of 134 townhouses on an average lot size of 0.08 acres. (See Exhibits "A", "B", and "C".)

II. GENERAL:

The development of Laurelwood Subdivision will be closely tied to Special Assessment District 212. The major roadways (Ladera Drive and Laurelwood Parkway), master plan sewer and water as well as drainage infrastructure will be constructed as a part of Special Assessment District 212. The drainage improvements include a 16 acre-foot detention basin and outlet works, roadway drainage systems as well as major conveyance facilities to the detention basin from areas within El Rancho Atrisco III. The drainage improvements required within the Laurelwood Subdivision will connect to the major systems of Special Assessment District 212. We direct the reader to the Special Assessment District 212 Design Report for specific information concerning the District; however, we will repeat information in this report that is relevant to the Laurelwood Subdivision.

III. SOIL TYPES:

The El Rancho Atrisco III Drainage Report and Sector Plan discusses the soils in a general manner. We have enclosed as part of this package the Drainage Element of the Sector Plan which shows the soil types (Exhibit "E"). This was used in calculating the C value in the Rational equation later on in this report. A detailed site soils report prepared by Sergent, Hauskins & Beckwith is included in this report.

IV. DRAINAGE CALCULATIONS:

Exhibit "D" and Table IV of the Special Assessment District 212 Design Report (Hanover Storm Sewer System Design), indicates peak 100-year flow rates at pertinent points within the subdivision. Flow rates were determined using the Rational equation. Intensities were determined using estimated longest drainage paths and Plates 22.2 B-1, 22.2 B-2, and 22.2 D-2 of the City of Albuquerque Development Process Manual. The C factors were determined using soil type (Exhibit "E"), ground imperviousness (see below) and Plate 22.2 C-1 of the Development Process Manual. Table IV

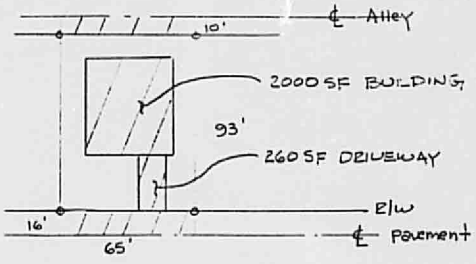
LOT IMPERVIOUS RATE (UNIT 1A)

$A_{impervious}$ = 3950 SF

Lot Size centerline to centerline = 7735 SF

% Impervious = .51

Use 55%



LOT IMPERVIOUS RATE (UNIT 1B)

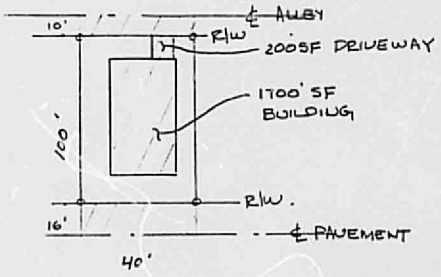
$A_{impervious}$ = 2940 SF

Lot Size centerline
to centerline = 5040 SF

% Impervious =

2940/5040 = 0.58

Use 60%



1. Catch Basins at Cherrywood & Alley "S"

   A. Q_{100} flowing down Cherrywood = 26 cfs (Table IV)

   B. Road 1/2 section capacity (2% cross slope, 26' pavement)

   D = (26/2)(.02) = 0.26' Road Slope = 0.85%

   $Q_{(from\ plate\ 22.3\ D-1)}$ = 1.4 cfs

   Conclusion: Water will be equally distributed between lanes or 13 cfs per lane.

   Double "A" Catch Basin capacity at depth of 0.5' (Plate 22.3 D-6) = 7.1 cfs

   Double "C" Catch Basin capacity at depth of 0.5' (Plate 22.3 D-6) = 7.0 cfs

   Construct one Double "A" and one Double "C" inlet on each side of Cherrywood at Station 10+80.

2. Storm Sewer System Station 8+00 Westwood Avenue

Q_{100} at inlets = 66 cfs (Table IV)

Street Slope = 2.06%

Street Width = 26' -- 2% cross slope

D = (13)(.02) = .26'

Half Section Capacity (Plate 22.3 D-1) = 2.4 cfs

Conclusion: The water will cross the centerline and spread uniformly across the pavement

Flow Depth at 66 cfs (Plate 22.3 D-1) = 0.58'

Double "A" inlet capacity at D = 0.58', S = 0.021 (Plate 22.3 D-6) = 12.3 cfs

Double "C" inlet capacity at D = 0.58', S = 0.021 (Plate 22.3 D-6) = 12.3 cfs

Construct one Double "A" and one Double "C" inlet on both sides of Westwood at Station 7+90. Send remaining 17 cfs to Single "D" at low point of intersection of Alley "S" and Westwood.

Required head to convey 17 cfs thru Single "D" inlet:

Area of Grate = (2.1)(3) = 6.3 SF

Area of 6 Acres = ((17)(1/2)(36))/144 = 2.13

Open Area = 6.3 - 2.13 = 4.17

$Q = CA\sqrt{2gh}$

$h = (Q/CA)^2/2g = (17/(.7)(4.17))^2/(2)(32.2) = 0.52$

Available h before water tops curb = 0.66'

3. Catch Basin at Intersection of Alley "F" & Eastwood

Q_{100} = 13 cfs (Table IV) or 6.5 cfs per lane

Single "A" inlet capacity at S = 0.0184, D = 0.36 (Plate 22.3 D-1) = 4.5 cfs

Construct Single "A" inlet on each side at Station 13+50 of Eastwood Drive and send 4 cfs down Alley "F" to catch basin at eastern terminus of Alley "F".

4. Catch Basin at Station 7+44 Alley "F"

Q_{100} = 12 cfs (Table IV) + 4 cfs (from above) = 16 cfs

Required head to convey 16 cfs thru Single "D" inlet:

$h = (Q/CA)^2/2g = ((16)/(.7)(4.17))^2/64.4 = 0.47$

Available h before water tops curb = 0.66'

5. 100-Year Flow at Intersection of Parkwood Drive & Lakewood Avenue

L = 1700' at slope = 0.0125

V = 3.05' (Plate 22.2 B-2)

Tc = 20.5 min.

I_{100} = 3.3 in/hr (Plate 22.2 D-2)

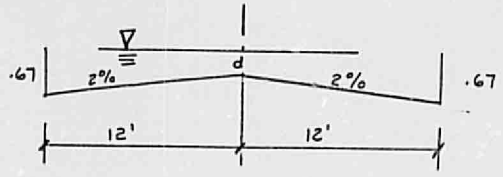
Soil Type: 50% Type "A", 50% Type "B", 55% Impervious

C_{comp} = ((.45 + .60)/2) = 0.53

Q_{100} = CIA = (.53)(3.3)(17.5) = 30.2 cfs

6. Intersection of Parkwood & Lakewood (100-year storm analysis)

The flow from the north to south of 20.4 cfs entering the intersection of Lakewood and Parkwood will be near normal depth, 0.56 feet (which is also near critical depth). This southerly flow will slow down at the intersection. The slope of Parkwood (0.0062 and 0.068 ∿ average 0.0065 ft/ft) is greater than Lakewood. Therefore, the depth of flow on Parkwood will be a little less than on Lakewood. The total energy involved in either of the two flows is 0.79 feet. Maximum depth of flow would only be 0.79 feet or 0.12 feet over curb, which is less than the allowable 0.87 feet (see supporting calculations).



Lakewood S = 0.0060 n = 0.017 Q = 40.2 cfs

Let d be the depth of flow over the crown.

$P = 2d + 2\sqrt{12^2 + .24^2} + 2 \times .24 = 2d + 24.485$

$A = 24d + ((2)(1/2)(12)(.24)) \quad 24d + 2.88$

for $d = 0.32'$ $A = 10.56$ SF $P = 25.125'$

$R = (10.56/25.125) = 0.4203$

$Q = (1.486/.017)(10.56)(0.4203)^{2/3}(.006)^{1/2} = 40.12$ cfs

$V = (Q/A) = 40.2/10.56 = 3.807$ fps

$E = y + (V^2/2g) = (.32 + .24) + (3.807^2/(2 \times 32.2) = 0.79'$

$F^2 = (V^2/(gA/24)) = 1.02$ Supercritical

Parkwood S = 0.0065 n = 0.07 Q = 40.2

y = 0.31 A = 10.32 P = 25.105 R = 0.411

$Q = (1.486/.017)(10.32)(0.411)^{2/3}(.0065)^{1/2} = 40.2$ cfs

V = (40.2/10.32) = 3.895 fps

$E = y + (V^2/2g) = .31 + .24 + (3.895^2/(2x32.2)) = 0.79'$

$F^2 = (3.895/(32.2)(10.32/24)) = 1.10$ Supercritical

7. Curb Opening into 72nd Street Channel at Parkwood & Rosewood

Q_{100} = 106 cfs (SAD 212 Design Report)

Use Orifice Equation

Try curb opening 36' in length

$H = (Q/3L)^{.667} = (106/(3)(36))^{.667} = 0.99'$

Construct Special 12" curb & gutter (see construction plans)

8. Curb Opening & Valley Gutter Design - Station 3+82.75 Applewood Lane

A = Area 3E1 (Exhibit "D") = 5.85 acres

C = 0.61 Assuming 90% Type "B" soil & 10% Type "A" soil

I = 4.71 using Tc of 10 min.

A = 5.85

$Q_{100} = CIA = (0.61)(4.71)(5.85) = 16.8$ cfs

$Q_{10} = (0.657)(16.8) = 11.0$ cfs

Capacity of curb opening (Weir Equation) $Q = 3LH^{1.5}$

$Q = (3)(7)(.67)^{1.5} = 11.5$ cfs

Note: 11.0 cfs will flow down Alley "N" thru the curb opening during the 10-year storm, 11.5 cfs will flow down Alley "N" thru the curb opening & 5.3 cfs will flow east on Applewood during the 10-year storm.

9. Curb Opening at Station 6+93 Applewood Lane

A = Area 3E2 = 8.3 acres

Q_{100} = CIA = (0.61)(4.71)(8.3) = 24 cfs

Q_{10} = (.671)(24) = 16 cfs

Capacity of curb opening (Weir Equation)

$Q = 3(10)(.666^{1.5}) = 16.3$ cfs

Note: 16.0 cfs will flow down Alley "T" thru the curb opening during the 10-year storm, 16.3 cfs will flow down Alley "T" thru the curb opening & 12.5 cfs (7.7+5.3) will flow to Laurelwood in the event of the 100-year storm.

V. GRADING:

Exhibits "F", "G" and "H" consist of the proposed subdivision's Grading Plan. Elevations are provided on all lot property lines and finished lot pads. Slope of roadways is also shown. On each

exhibit a typical lot grading scheme is indicated. Peak 100-year flow rates are also indicated at areas of concern.

All grading will be limited to the areas owned by the developers. No grade changes are proposed on either Hanover Street or 72nd Street.

VI. GRADING SPECIFICATIONS:

See attached sheets from Soils Report prepared by Sergent, Hauskins & Beckwith. The grading specifications are in compliance with the requirements outlined in FHA Data Sheet 79G.

El Rancho Atrisco Subdivision
Phase III
Albuquerque, New Mexico
SHB Job No. E82-1087

SPECIFICATIONS FOR EARTHWORK

1. SCOPE

Includes all clearing and grubbing, removal of obstructions, general excavating, grading and filling, and any related items necessary to complete the grading for the entire project in accordance with these specifications.

2. SUBSURFACE SOIL DATA

Subsurface soil investigations have been made, and the results are available for examination by the contractor. The contractor is expected to examine the site and determine for himself the character of materials to be encountered.

No additional allowance will be made for rock removal, site clearing and grading, filling, compaction, disposal or removal of any unclassified materials.

3. CLEARING & GRUBBING

A. General: Clearing and grubbing will be required for all areas shown on the plans to be excavated or on which fill is to be constructed.

B. Clearing: Clearing shall consist of removal and disposal of other vegetation as well as brush and any rubbish within the areas to be cleared.

C. Grubbing: Stumps, matted roots and roots larger than 2 inches in diameter shall be removed from within 6 inches of the surface of areas on which fills are to be constructed except in roadways. Materials as described above within 18 inches of finished subgrade of roadways in either cut or fill sections shall be removed. Areas disturbed by grubbing will be filled as specified hereinafter for EMBANKMENT.

D. Grass & Topsoil: Grass, grass roots and the incidental topsoil shall not be left beneath a fill

area, nor shall this material be used as fill material. Grass, grass roots and topsoil may be stockpiled and later used in the top 6 inches of fills outside roadways and building pads.

4. EARTH EXCAVATION

A. Earth excavation shall consist of the excavation and removal of suitable soils for use as embankment, as well as the satisfactory disposal of all vegetation, debris and deleterious materials encountered within the area to be graded and/or in a borrow area.

B. Excavated areas shall be continuously maintained so that the surface shall be smooth and have sufficient slope to allow water to drain from the surface.

5. EMBANKMENT

A. General: Embankments shall consist of a controlled fill constructed in the areas indicated on the grading plans.

B. Embankment Materials: Embankment fill material shall consist of soils that conform to the following physical characteristics:

Sieve Size (Square Openings)	Percent Passing by Weight
6 inch	100
no. 200	10-40

The plasticity index of the material, as determined in accordance with ASTM D423 and D424, shall not be more than 15.

The fill material shall be free from roots, grass, other vegetable matter, clay lumps, rocks larger than 6 inches, or other deleterious materials.

(1) Site Soils: The site soils from the cuts may be used for fill, provided they meet the requirements in paragraph 5.B.

(2) Borrow: When the quantity of suitable material required for embankments is not available within the limits of the jobsite, the contractor shall provide sufficient material to construct the embankments to the lines, elevations and cross sections as shown on the drawings from borrow areas. The contractor shall obtain from the owners of said borrow areas the right to excavate material, shall pay all royalties and other charges involved and shall pay all expenses in developing the source including the cost of right-of-way required for hauling the material.

C. Construction

(1) Treatment of the Natural Ground Surface: All building pad areas on which fills are to be constructed shall be scarified to a minimum depth of 12 inches and watered to bring the moisture content of the upper 5.0 feet as close as practicable to the optimum moisture content. Moisture increases achieved shall be verified by a representative of the geotechnical engineer by augering small holes to 5.0 feet and obtaining representative samples in order to confirm proper prewetting. In the event that infiltration does not take place to the prescribed depth, the geotechnical engineer's representative shall make a judgment decision based on the nature of the soil in question. The ground surface shall then be subjected to 20 coverages of a heavy steel drum vibratory roller (10 ton minimum weight). The upper 6 inches of the native soils shall be compacted to the minimum density required in paragraph 5.C(2). Building pads in cut areas shall be wetted and rolled, as specified above, after cutting to approximate finished grade.

(2) Compaction: The fill shall be spread in layers not exceeding 8 inches, watered as necessary, and compacted. The moisture content at the time of compaction shall be 2 percent below optimum or higher. Compaction shall be by mechanical methods only for a density of not less than 95 percent of maximum dry density for building pads. Embankments outside the building pads shall be compacted to 90 percent of maximum dry density.

Optimum moisture and maximum dry density for each soil type used shall be determined in accordance with ASTM D1557.

(3) Weather Limitations: Controlled fill shall not be constructed when the atmospheric temperature is below 35 degrees F. When the temperature falls below 35 degrees, it shall be the responsibility of the contractor to protect all areas of completed surface against any detrimental effects by methods approved by the geotechnical engineer. Any areas that are damaged by freezing shall be reconditioned and reshaped and recompacted by the contractor in conformance with the requirements of this specification without additional cost to the owner.

(4) Special Compaction of Ponding Areas: After finished grading, all ponding areas located within the individual lot lines shall be subjected to 20 coverages of a vibratory roller complying with the requirements of paragraph 5.C.(2).

D. Slope Protection & Drainage: The edges of the controlled fill embankments shall be graded to the contours shown on the drawings and compacted to the density required in paragraph 5.C(2). Slopes steeper than 1 vertical to 3 horizontal shall be protected from erosion.

6. INSPECTION & TESTS

A. Field Inspection & Testing: The developer shall employ the services of a registered, licensed geotechnical engineer to observe all controlled earthwork. The geotechnical engineer shall provide continuous on-site inspection by experienced personnel during construction of controlled earthwork. The contractor shall notify the engineer at least two working days in advance of any field operations of the controlled earthwork, or of any resumption of operations after stoppages. Tests of fill materials and embankments will be made at the following rates:

(1) One field density test per each 1,000 square yards of original ground surface prior to placing fill or in cut areas.

(2) One field density test per each 350 cubic yards of fill placed or each layer of fill for each work area, whichever is greater.

(3) One moisture-density curve for each type of material used, as indicated by sieve analysis and plasticity index.

B. Report of Field Density Tests: The geotechnical engineer shall submit, daily, the results of field density tests required by these specifications.

C. Costs of Tests & Inspection: The costs of tests, inspection and engineering, as specified in this section of the specifications, shall be borne by the developer.

VII. CONSTRUCTION PHASING:

The development of Laurelwood Subdivision and the remainder of El Rancho Atrisco III will not happen all at once. The anticipated order of events within the area are as follows:

1. Construction of Special Assessment District 212 improvements include detention basin, storm sewer and channels, but not the cobbles that are required at the low areas of the detention basin (within 6 months).

2. Construction of Unser Boulevard by others (within 6 months).

3. Once approximately 40% of the lots within both Units 1A and 1B are completed we propose to place the cobbles at the low areas of the detention basin as specified on the construction plans (within 8 months).

   Park development activity may also take place at this time.

4. Construction of the remaining lots within both units (within 18 months).

5. Extending the townhouse development north to Ladera on the west side of Laurelwood and extending the single-family homes north to

Ladera on the east side. It is current thinking that the frontage road, alley concept will continue to Ladera with future road locations as shown on Exhibit "D" (within 24 months).

6. Improvement of the adjacent commercial and multi-family property by others. This item may run concurrently with Item 5 or may not take for a few years (within 48 months).

As this schedule indicates, the drainage plan as shown will not be realized for up to four years. The proposed interim drainage plan will be as follows:

A. All off-site flows within El Rancho Atrisco III will be routed to the detention basin as a part of activity 1 and 1A of the activity schedule which will preceed or parallel the Laurelwood construction activities.

B. The construction of Cherrywood will be a part of the initial improvements within Laurelwood Subdivision and will protect the development from the undeveloped areas to the west.

A temporary berm is proposed on Cherrywood (see Exhibit "F") near Redwood to divert the existing arroyo south past the subdivision.

The remaining storm water from Areas 3F and 3G will enter Cherrywood in sheet flow. Cherrywood will intercept this runoff and divert it south to Hanover.

Peak 100-year Undeveloped Flow to Cherrywood from Areas 3F and 3G:

A = 28+8 - area diverted by berm = 28.8-8.4 acres
= 27.62

C = (.55)(.16) + (.45)(.34) = 0.24 (assuming 55% Type "A" soil, 45% Type "B" soil & 0% impervious)

L_p = 1500' at 2% on bare ground

V = 0.8 fps Tc = 1500/(0.8)(60) = 31 min.

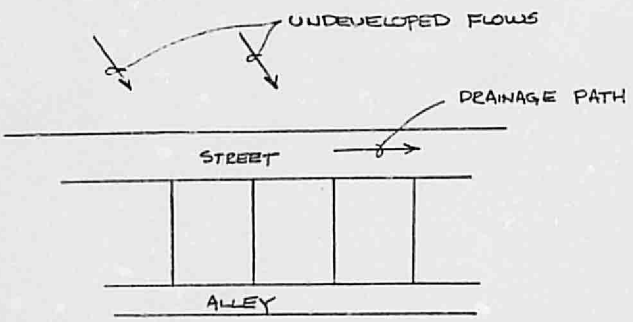
I_{100} = 1.2 x 2.2 = 2.64

Q = CIA = (0.24)(2.64)(27.62) = 17.5 cfs

Peak developed discharge from Area 3G = 26 cfs (Table IV)

Conclusion: Off-site undeveloped flows are less than peak developed flows and inlets at Cherrywood and Redwood will convey water to detention basin.

C. The construction of Applewood will serve as a barrier from the undeveloped storm water of northern Area 3E. Since the subdivision design calls for streets and alleys on each side of a proposed dwelling construction may be stopped at any tier of lots within Unit 1B and flood protection will be maintained by the interception of storm water by either the streets or alleys.



D. Unit 1A will be protected to the north in the same manner as Unit 1B described above, plus storm water in undeveloped Unit 1A will have a tendency to flow east away from the development.

TABLE IV

HANOVER STORM SEWER SYSTEM DESIGN

Area	Acreage (in acres)	Longest Drainage Path	Velocity[a1]	Tc	I_{100}[a2]	C[a3]	Q_{100}[a4]	Proposed Improvements
Off-site Area to West	45	Assume developed condition, 1125' on bare ground at slope 2% & 1670' on paved asphalt at slope of 2.2%	V = 0.8 fps for bare ground V = 2 fps for paved asphalt	34.70 min	2.51	Developed condition assume 70% impervious Type "A" Soil C = 0.54	61 cfs	Design storm sewer for peak flow of 80 cfs from Sta. 31+85.08 to 27+50 & a peak flow of 110 cfs from Sta. 27+50 to 23+30
3F only	28	2065' on roadway @ slope 1.2%	3 fps	11.47 min	4.18	65% Type "A" soil; 35% Type "B" soil; assume 80% impervious: C = (.64)(.65) + (.35)(.74) = .675	79 cfs	No improvement
Off-site & 3F	45 + 28 = 73	Longest path from off-site area & pipe time (assume 1200' of pipe)	10 fps (pipe velocity)	36.70 min	2.42	C_{comp} = ((.675x28)+(.54x45))/(48+28) = .59	104 cfs	Design storm sewer for peak flow of 130 cfs from Sta. 23+30 to 18+80
3G only	8	1750' on pavement at S = 1.4%	3.2 fps	10.00 min	4.71	55% Type "A" soil; 45% Type "B" soil; 80% impervious; C_{comp} = (.64x.55) + (.74x.45) = 0.69	26 cfs	Design stub out of manhole at Sta. 18+80 for a design flow of 26 cfs
Off-site, 3F & 3G	45+28+8 = 81	Off-site path and pipe time	10 fps	36.70 min	2.42	C_{comp} = ((8x.69)+(28x.675)+(45x.54)/(8+28+45) = 0.60	118 cfs	Design storm sewer for a peak flow of 150 cfs from Sta. 18+ 80 to 11+22
3E & 3D	35 + 1.4 = 36.4	2800' on pavement @ S = .0125	3.05 fps	20.50 min	3.30	50% Type "A" Soil; 50% Type "B" soil; 60% impervious; C_{comp} = ((.48+.63))/2 = .55	64 cfs	Design stub out of MH at Sta. 11+22 for a peak flow of 66 cfs
3E, 3D, 3G	35+1.4+8+28 = 72.4	2800' on pavement @ S = .0125	3.05 fps	20.50 min	3.30	C_{comp} = ((36.4x.55)+(8x.69)+(28+.675))/(36.4+8+28) = 0.60	143 cfs	See Below
3E, 3D, 3G, 3F & Off-site	72.4+45 = 117.4	Longest drainage path & pipe time; pipe time = 2200'	10 fps	38.20 min	2.38	C_{comp} = ((72.4)(.60)+(45)(.54))/117.4 = .58	162 cfs	See Below
3I	1.17	1150' on pavement S = .02	3.8 fps	10.00 min	4.71	0.9	5.0 cfs	Design inlet for 5 cfs
3C	1.17	1150' on pavement S = .02	3.8 fps	10.00 min	4.71	0.9	5.0 cfs	Design inlet for 5 cfs
3J	3.15	2400' on pavement S = .02	3.8 fps	10.00 min	4.71	0.9	13 cfs	Design stub at MH @ Sta. 9+89.84 for a peak flow of 13 cfs
3H	5.84	1220' on pavement S = .0082	2.42 fps	10.00 min	4.71	All Type "A" soil; 55% impervious C = .45	12 cfs	Design stub at Sta. 7+34.99 for a peak flow of 12 cfs
3H, 3J, 3C, 3I, 3F, 3G, 3D & 3E	83.70	Longest path from 3E & 3D & pipe time, 450' in pipe at 10 fps	10 fps	21.25 min	3.15	C_{comp} = ((72.4)(.60)+(5.84)(.45)+(5.49)(0.9))/83.73 = .60	158 cfs	See Below
Off-site area, 3H, 3J, 3C, 3I, 3F, 3G, 3D & 3E	83.7+45 = 128.7	Off-site path & pipe time; assume 2500' of storm pipe	10 fps	38.90 min	2.33	C_{comp} = ((.60)(83.7)+(45)(.54))/(83.7+45) = .58	174 cfs	Design storm sewer for a peak flow of 180 cfs from Sta. 11+22 to Sta. 9+88.84 and 200 cfs from Sta. 9+88.84 to detention basin

[a1] Plate 22.2 B-1
[a2] Plate 22.2 D-2
[a3] Plate 22.2 C-1 & Sector Development Plan
[a4] Rational Formula

$h_f = (\Sigma) \frac{V_2^2}{2g}$

$h_{mo} = 0.05\left(\frac{V_2}{2g}\right)$ $S = (QK)^2$ $K = \frac{149.0}{n}(A)(R^{2/3})$ CLOSED CONDUIT $h_v = V^2/2g$ $h_{exit\ loss} = 0.0033\theta \frac{V^2}{2g}$

SUMMARY OF HYDRAULIC CALCULATIONS

BY: JMA

DATE: 1/83

SHEET: ___ OF ___

PROJECT: ___ LINE: HANOVER STORM SEWER

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
TATION	STRUCT.	INV.	D	Q	A	V	K	S_f	L	Δ	LOSSES							E.G.	h_v	HG
											H_f	H_e	H_o	H_{mh}	H_T	H_{misc}	ΣH_L			
6+90	RCCP	22.00	54"	200	15.904	12.575	1367											28.35	2.45	26.5
								0.0107	29.19		0.30						0.30	29.25	2.45	26.8
7+19.19	mH #pt									$\Delta = 13.3$								29.47	2.45	27.02
			54"	200	15.904	12.575	1367	0.0103	15.8		0.16			0.12		0.1	0.22	29.63	2.45	27.18
7+34.99	junction																	29.63	2.45	27.18
			54"	200	15.904	12.575	1367	0.003	253.85				0				0	32.24	2.45	29.79
9+88.84	transition										2.61						2.61	32.54	2.45	30.09
													0.19	0.12			0.30	34.60	2.18	31.42
			48"	180	12.566	14.32	1436	0.0157	131.16		2.06						2.06	34.76	3.18	31.60
11+20	MH/Junction												0	0.16			0.16	38.9	2.21	36.70
			48"	150	12.566	11.93	1436	0.0109	380'		4.14						4.14	39.01	2.21	36.80
														0.11			0.11	47.44	3.77	43.67
15+00	MH										8.43						8.43	48.57	3.77	44.8
			42"	150	9.621	15.55	1006	0.0322	379.37				0.94	0.19			1.13	56.1	2.83	53.27
18+79.37	MH/Junction										7.53						7.53	56.24	2.83	53.41
			42"	130	9.621	13.51	1006	0.0167	450.63					0.14			0.14	67.66	3.76	63.90
23+30	MH										11.42						11.42	67.85	3.76	64.09
			36"	110	7.068	15.56	667	0.0272	420					0.19			0.19	74.12	1.98	72.14
27+50	MH										6.27						6.27	74.52	1.98	72.54
			36"	80	7.068	11.31	667	0.0144	435.05						0.4		0.4			
31+85.05	transition		"																	
								* PIPE NO LONGER U			DIKE	PRESSURE								

REMARKS:

7+34.99 junction loss calc

$h_j = \frac{V_2^2}{2g} - \frac{V_1^2}{2g} = \frac{\Sigma A_2}{A_2} \cdot \cos\theta$

$\theta = 30°$

$V_2 = V_1$ $h_j = 0$

9+88.84 $\theta = 90°$

$h_j = \frac{Q_2 V_2 - Q_1 V_1 - Q_2 V_2 \cos\theta}{}$

$= \frac{(200)(12.57) - (180)(14.32) - 0}{32.24 + 10.53}$

$h_j = 0.19'$

11+20

$h_j = \frac{V_2^2}{2g} - \frac{V_1^2}{2g} = \frac{\Sigma A_2}{A_2} \cdot \frac{V_2^2}{2g}\cos\theta$

$= 3.18 - 2.21 - 2\left(\frac{9.07}{12.566}\right)\left(\frac{12}{64.4}\right)^2 (.707) =$

$= 3.18 - 2.21 - 1.78$

$h_j = -0.81'$ 20

18+79.37

$h_j = \frac{V_2^2}{2g} - \frac{V_1^2}{2g} = \frac{\Sigma A_2}{A_2} \cdot \frac{V_2^2}{2g} \cos\theta$

$h_j = 3.31 - 3.31 = 0$

$= 0.94'$

$h_v = (z)\frac{V_2^2}{2g}$

$h_{misc} = 0.05\left(\frac{V_2^2}{2g}\right)$ $S = (QK)^2$ $K = \frac{1.486}{n}(A)(R^{2/3})$

SUMMARY OF HYDRAULIC CALCULATIONS

CLOSED CONDUIT $h_v = V^2/2g$ $h_{misc} = .0033\frac{V^2}{2g}$

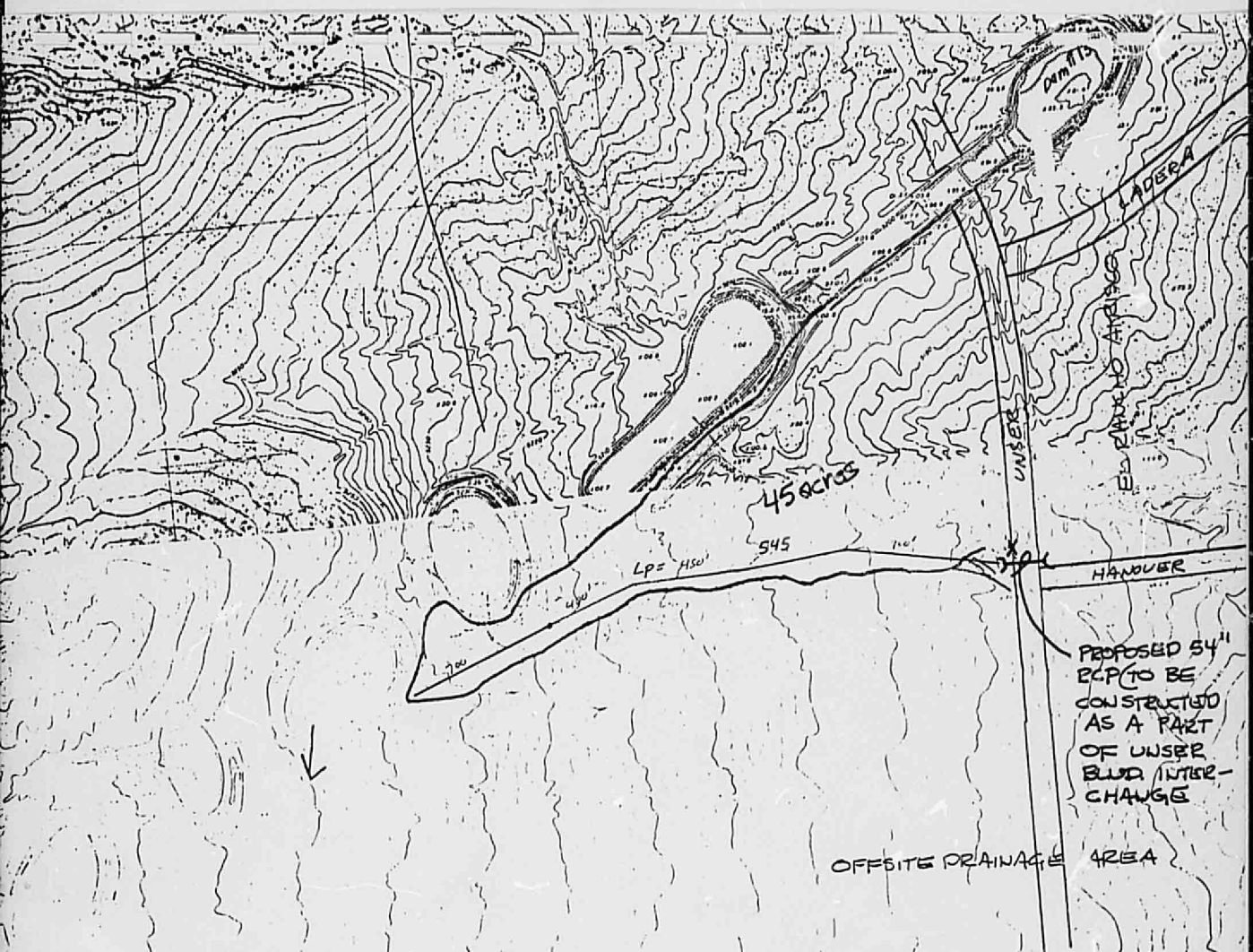
BY: JHA

DATE: 1/83

PROJECT: LINE: SHEET: OF

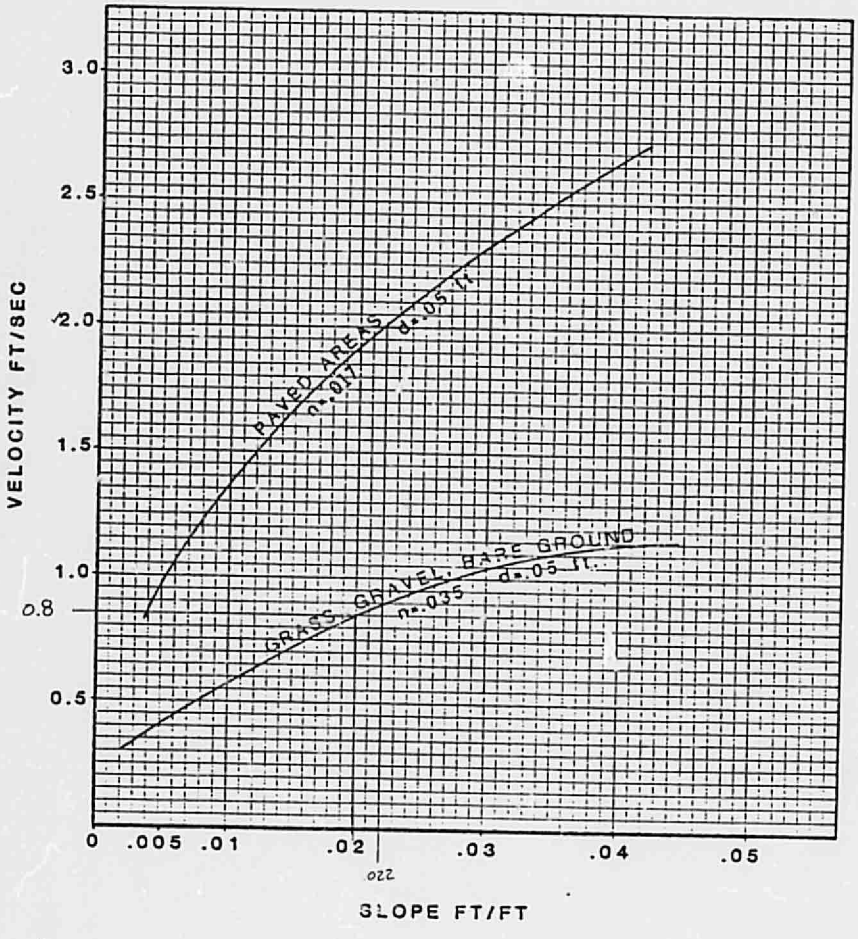
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
TATION	STRUCT.	INV.	D	Q	A	V	K	S_f	L	Δ	LOSSES H_f	H_e	H_j	H_{ex}	H_T	H_{misc}	ΣH_L	E.G.	h_v	HG
				WESTWOOD STORM SEWER SYSTEM																	
9+79.92																				
			30"	66	4.909	13.44	410.1	0.026	10'		0.26						0.26	34.4	2.80	31.60
9+73.52	mH&Kpt									45°				0.14		0.41	0.55	34.66	2.80	31.86
			30"	49	4.909	9.98	410.7	0.0143	160.07		2.37						2.37	35.21	2.80	32.41
8+07.42	mH&Kpt						--			45°				0.08		0.23	0.31	37.58	1.55	36.03
			24"	24.5	3.142	7.79	2262	0.011	7'		0.08						0.08	37.89	1.55	36.34
8+00.42	inlet																	37.96	0.94	37.02
				EASTWOOD STORM SEWER SYSTEM																
14+10.2	Begin MH																			
			24"	9	3.142	2.86	226.2	0.0016	55.5		0.09						0.09	30.22	0.127	30.09
13+54.52	mH&Kpt									45°				0.006		0.019	0.03	30.30	0.127	30.18
			18"	4.5	1.767	2.54	105.0	0.0019	23'		0.04						0.04	30.33	0.127	30.20
13+35.52	inlet																	30.37	0.10	30.27
					CHEERYWOOD AVENUE STORM SEWER SYSTEM																
11+45.2	Basin																			
			24"	26	3.142	8.27	226.2	0.0132	57.67		0.76						0.76	45.87	1.06	44.81
10+87.33	mH&Kpt													0.05		0.15	0.2	46.63	1.06	45.57
			18"	13	1.767	7.36	105.0	0.015	25		0.38						0.38	46.43	1.06	45.37
																		46.81	0.84	45.97

REMARKS: # from Hanover Storm Sewer Calc's


LADERA
UNSER
EL PASEO TO AIRPORT
45 acres
545
HANOVER
PROPOSED 54" RCP TO BE CONSTRUCTED AS A PART OF UNSER BLVD INTER-CHANGE
OFFSITE DRAINAGE AREA

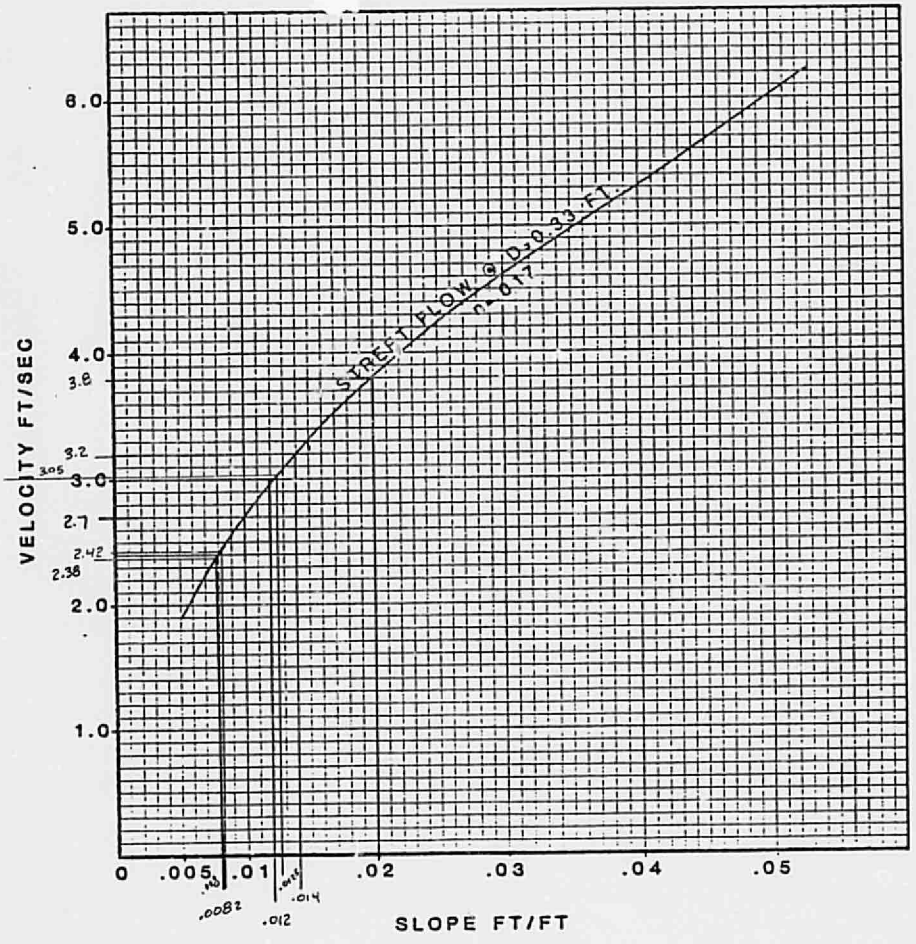
OVERLAND FLOW SEGMENTS

VELOCITY DETERMINATIONS FOR Tc CALCULATIONS



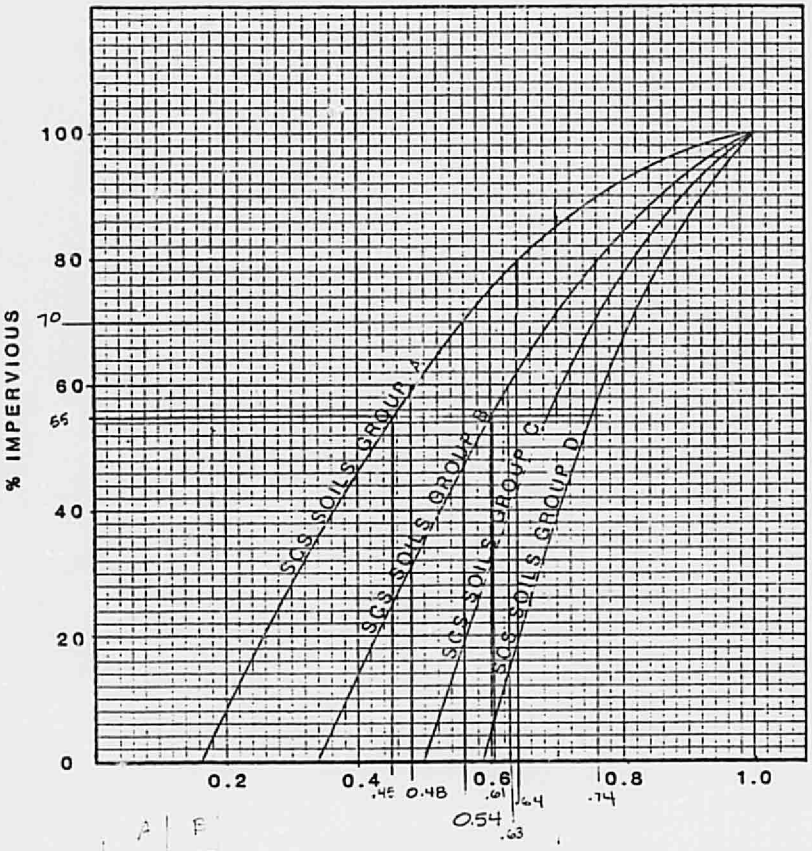
STREET FLOW SEGMENTS

VELOCITY DETERMINATIONS FOR Tc CALCULATIONS



DRAINAGE CRITERIA

DETERMINATION OF RATIONAL FORMULA 'C' FACTOR

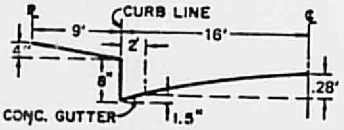


	A	B
60%	0.48	0.63
55%	0.45	0.6
0%	0.16	0.34

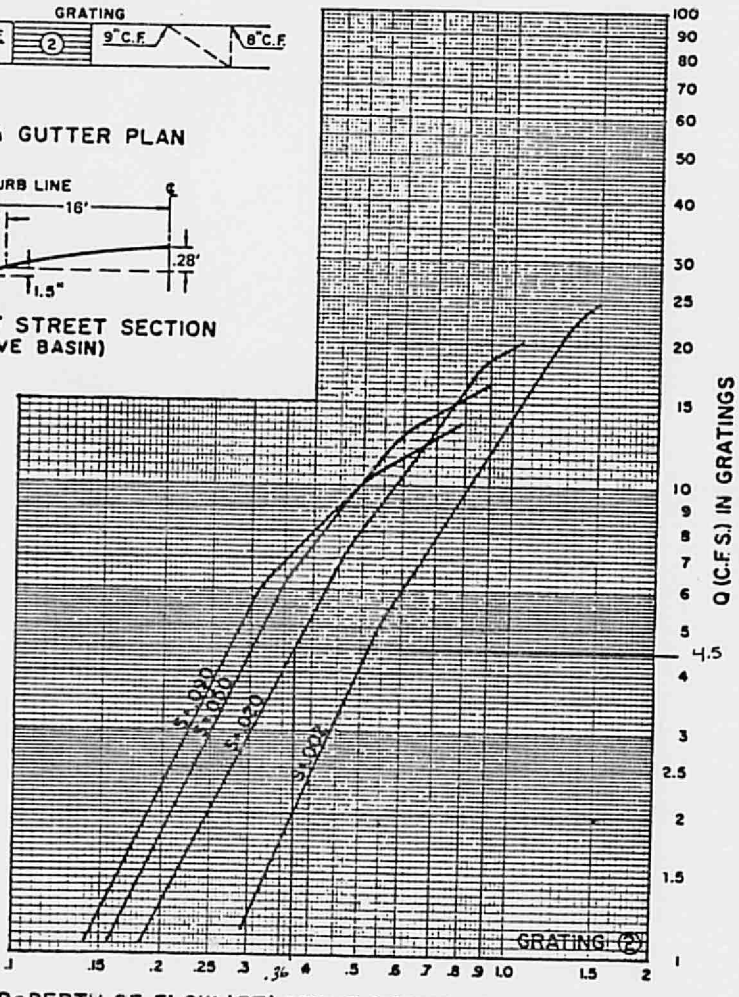
0.7

GRATING CAPACITIES FOR TYPE "A" & "C"

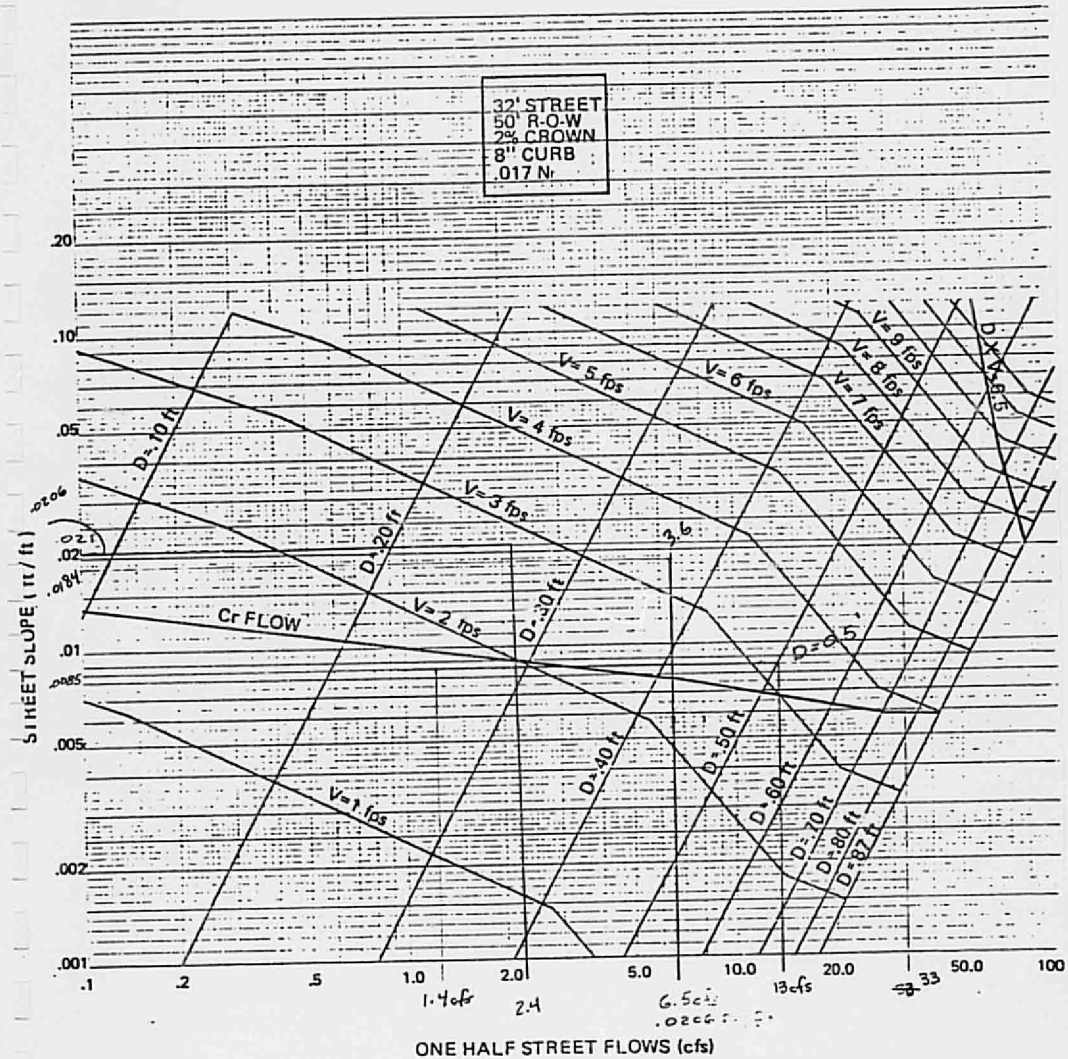
GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)

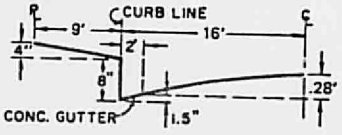


STREET CAPACITY

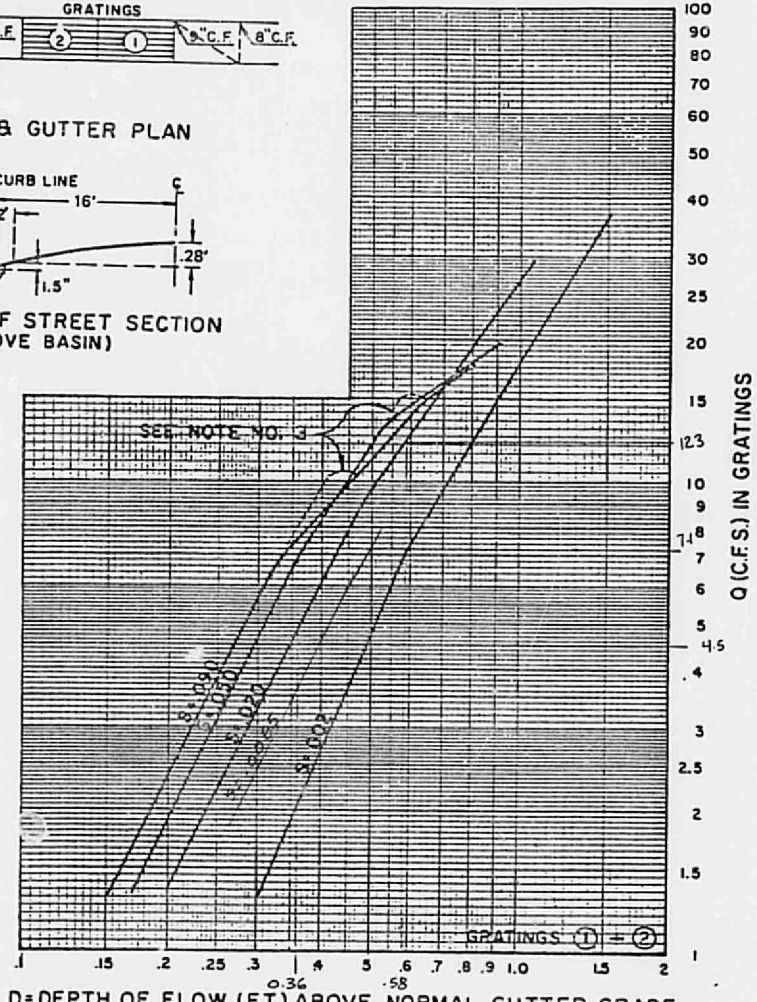


GRATING CAPACITIES FOR TYPE DOUBLE "A," "C," AND "D"

GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)



SERGENT, HAUSKINS & BECKWITH CONSULTING GEOTECHNICAL ENGINEERS

APPLIED SOIL MECHANICS • ENGINEERING GEOLOGY • MATERIALS ENGINEERING

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September 22, 1982

SHB Job No. E82-1087

Denney-Gross & Associates, Inc.
2400 Comanche Road, N.E.
Albuquerque, New Mexico 87107

Attention: Mr. Lou Gross

Re: El Rancho Atrisco Subdivision
Phase III
Albuquerque, New Mexico

Gentlemen:

Our Soil and Foundation Investigation Report on the referenced project is herewith submitted. The report includes the results of test drilling, laboratory analyses, and recommended criteria for foundation design, slab support and roadway pavement design. Recommendations contained in this report are in conformance with FHA Data Sheet 79G.

Should any questions arise concerning this report, we would be pleased to discuss them with you.

Respectfully submitted,
Sergent, Hauskins & Beckwith Engineers

By Jonathan A. Crystal, P.E.

Reviewed by Robert D. Booth, P.E.

REGISTERED PROFESSIONAL ENGINEER ROBERT D. BOOTH NEW MEXICO

Copies: Addressee (4)

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SHB Job No. E82-1087

SERGENT, HAUSKINS & BECKWITH
CONSULTING GEOTECHNICAL ENGINEERS
PHOENIX • ALBUQUERQUE • SANTA FE • SALT LAKE CITY

El Rancho Atrisco Subdivision
Phase III
Albuquerque, New Mexico
SHB Job No. E82-1087

1. INTRODUCTION

This report is submitted pursuant to a soil and foundation investigation made by this firm of the site of the proposed El Rancho Atrisco Subdivision, Phase III, located northwest of the intersection of 72nd Street, N.W., and proposed Hanover Road, N.W., in Albuquerque, New Mexico. The object of this investigation was to evaluate the physical properties of subsoils underlying the site to provide recommendations for foundation design and slab support. It was also within the scope of this investigation to provide criteria for roadway pavement design.

2. PROPOSED CONSTRUCTION

Preliminary details on the proposed construction were provided by Denney-Gross & Associates, Inc., Consulting Engineers. It is understood that residential lots are to be developed in the referenced subdivision upon which single story family residences of wood frame construction will be built. No basements are planned and slab-on-grade construction will be utilized. Based on experience with similar projects, it is anticipated that wall loads will be very low and probably will not exceed about 1.5 kips per lineal foot. Substantial cut and fill operations may be involved in site grading.

Should final design details vary significantly from those outlined above, this firm should be notified for review and possible revision of recommendations.

3. INVESTIGATION

Thirty exploratory borings were drilled to depths of 5 to 21 feet below existing grade utilizing a truck-mounted CME-55 drill rig. Twenty-one borings were located within the subdivision boundaries, as well as two borings along the centerline of a proposed drainage channel, and were advanced using 6½ inch O.D. hollow stem auger. Seven borings were located along the centerline of the proposed Ladera Drive and were advanced using 4½ inch O.D. conventional flight auger. Standard penetration testing and 2.42 inch diameter open-end drive sampling were performed at selected intervals in the hollow stem auger borings. Two bulk samples were recovered from the conventional flight auger borings along the proposed Ladera Drive alignment. Results of the subsurface exploration are presented in Appendix A, which includes a brief description of drilling and sampling equipment and procedures, a site plan showing boring locations, and logs of the test borings.

3.2 Laboratory Analysis

Moisture content determinations were made on all samples recovered, while dry densities were determined for selected, relatively undisturbed, 2.42 inch diameter open-end drive samples. Results of these tests are shown on the boring logs.

Grain-size analysis and Atterberg limits tests were performed on selected samples to aid in soil classification. In addition, a consolidation test was performed on a selected undisturbed sample, while moisture-density relationship tests and California Bearing Ratio tests were run on the two bulk samples recovered. Results of these tests are presented in Appendix B, along with a brief description of soil mechanics testing procedures.

4. SITE CONDITIONS & SOIL PROFILE

4.1 Site Conditions

The site slopes generally downward from the northwest to the southeast, with approximately 45 feet of elevation difference over the entire subdivision. Site topography is generally rolling from the duning of sands on the surface. With the exception of the existing Ladera Drainage Channel that crosses the north side of the site and Interstate 40 to the south, no evidence of previous development or construction was apparent in the vicinity of the site. Present vegetative cover on the site consists of a moderate growth of native grasses, weeds and shrubs.

4.2 Soil Profile

As indicated by the exploratory borings, the subsoils underlying the site consist predominantly of silty sand with thin stringers of sand, clayey sand, sandy silt,

and sandy clay. The silty sand soils are generally nonplastic, while the silt and clay soils are of low plasticity. The subsoils are generally soft to moderately firm, with isolated very soft layers encountered in the borings from 0 to 5 feet below existing grade. An exception to the above described soil profile was encountered at boring nos. 1 and 3, where relatively thick layers of clayey sand and sandy clay were encountered.

4.3 Soil Moisture & Groundwater Conditions

No free groundwater was encountered in the borings. Soil moisture contents were low throughout the depth of the borings, being well below the plastic limit of the clayey soils.

5. DISCUSSION & RECOMMENDATIONS

5.1 Analysis of Results

Based on classification, penetration and consolidation test data, many of the looser surface soils underlying the site would be weakened and their compressibility increased upon moisture increase. Experience with other projects located nearby with similar subsoil conditions indicates that these looser zones have the potential to settle several inches should they become saturated. This settlement could occur even with the use of very low bearing pressures in design. However, with proper

site preparation and provisions for positive site drainage, the residential structures can be supported on shallow spread-type footings bearing on densified native soils.

The recommended site preparation consists of prewetting to a depth of 5.0 feet below finished grade and compacting the natural ground surface in fill sections using a vibratory roller. The site should then be brought to finished subgrade elevation with properly compacted structural fill. Cut sections should be wetted and compacted with a vibratory roller, as above, after cutting to approximate finished grade. Guide specifications for site preparation are presented in Appendix C of this report.

It should be recognized that a risk of damage to the structures may be involved with this approach. Should a broken water line or other source of moisture develop after construction, excessive footing settlements may occur in some areas of the site. Moreover, permeability of the soils is such that relatively rapid infiltration of water would occur if a source of moisture developed. The site preparation recommended will lessen the risk and reduce the potential for settlement considerably; however, it will not completely eliminate the risk involved.

Alternate approaches involving deep overexcavation and recompaction of the surface soils, rigid structural

slabs, or deep foundations with structurally suspended floors could further reduce the calculated risk of excessive settlements. These alternate approaches do not appear to be economically feasible for this project. However, recommendations for these more costly systems can be provided by this firm, if desired.

5.2 Foundations

Provided site grading is carried out as recommended hereafter, shallow spread-type footings are recommended for support of the structures. A safe soil bearing pressure of 2,000 psf is recommended for footing design. Minimum recommended depths of footings are 2.0 feet below lowest adjacent finished grade for exterior footings and 1.0 foot below finished floor elevation for interior footings.

Due to the required site grading, footings designed as recommended above will bear on fill in some areas of the site and on densified native soils in other areas of the site.

The bearing value recommended above applies to full dead plus realistic live loads and can be safely increased by one-third for total loads including wind or seismic forces.

Two feet and 1.33 feet are the minimum recommended widths of square and continuous footings, respectively.

The following provisions are recommended to minimize the sensitivity of the structures to differential movements that may occur. Stem walls, interior columns and other structural elements should be isolated from slabs-on-grade by positive separation with expansion joint material. The slabs should not bear directly on stem walls or interior footings. As much flexibility as practicable should be built into the superstructure to accommodate possible downward movement of the roof structure relative to interior non-bearing walls.

It is estimated that total and differential settlements of foundations designed in accordance with the above criteria will not exceed 3/4 inch and 1/2 inch, respectively, for soil moisture contents encountered at the time of test drilling or compaction moisture introduced during construction.

5.3 Site Grading & Slab Support

Recommendations relative to site grading for slab and footing support are presented in Appendix C. These recommended guide specifications are presented in a format that meets the requirements of FHA Data Sheet 79G.

Site grading recommendations presented in this report will result in subgrade preparation which will provide adequate support for lightly loaded slab-on-grade floors so that granular base course is not considered necessary

for this purpose. However, should it be desired as a working surface, a 4-inch course of granular base can be placed beneath concrete floor slabs.

Where granular base is used, it should meet the following grading requirements as determined in accordance with ASTM C 136.

Sieve Size (Square Openings)	Percent Passing by Weight
1 inch	100
3/4 inch	85-100
no. 4	45-95
no. 200	0-8

The granular base should have a plasticity index of no greater than 3 when tested in accordance with ASTM D 423 and D 424. Coarse aggregate should have a percent of wear, when subjected to the Los Angeles abrasion test (ASTM C 131), of no greater than 50. The granular base should be compacted to at least 95 percent of ASTM D 1557 maximum dry density.

Granular base as recommended will not provide a positive capillary break against the rise of moisture to slabs. If moisture sensitive or impervious floor coverings are used, an impervious membrane vapor barrier should be placed beneath the floor slabs. In order to minimize shrinkage cracking of concrete slabs due to differential

curing rates, a 2-inch layer of clean, nonplastic sand should be placed between the vapor barrier and the slabs.

5.4 Site Drainage & Moisture Protection

Substantial moisture increases in the subsoils would reduce their support value and increase foundation settlements. Therefore, positive site drainage should be provided during construction and maintained thereafter. Where slabs or paved surfaces do not immediately adjoin the structures, the ground surface should be sloped away from their perimeter in a manner to allow flow along drainage lines at a minimum grade of 2 percent to points at least 15.0 feet away from the structures. Positive drainage should be provided from these points to streets or natural water courses. Roof runoff should be conveyed away from the structures by nonerosive devices at the ground surface. In no case should long-term ponding of water be allowed around the perimeters of the structures.

The possibility of moisture infiltration beneath the structures, in the event of plumbing leaks, should be considered in the design and inspection of underground water and sewer conduits.

If landscaped areas are planned immediately adjacent to the building perimeters, it is recommended that native plants requiring little or no irrigation waters be used.

Otherwise, watertight boxes with provisions for drainage of excess irrigation water should be installed if landscape irrigating is planned.

5.5 Paved Areas

The upper 8 inches of subgrade soils for paved streets should be nonplastic to low plasticity and meet the gradation specifications for structural fill presented in Appendix C. Generally, the upper portions of the site soils will meet the gradation specifications. The subgrade soils should be compacted as specified in Appendix C of this report.

The pavement should consist of asphaltic concrete placed directly on the compacted subgrade. The pavement should have a minimum thickness of 4 inches.

In our opinion, full-depth asphalt pavement should be used to provide moisture protection for the subgrade soils. The full-depth asphalt also exceeds City of Albuquerque minimum requirements. Recommendations for asphalt pavement used in conjunction with granular base course can be provided by this firm upon request.

Asphaltic concrete materials quality and construction requirements should conform to Section 115 of current City of Albuquerque Contract Documents for City-Wide Utilities and Cash Paving. The mineral aggregate should comply with Grading C and, if a surface course is

desired, Grading D for that course. A job mix formula should be established using the Marshall method of mix design, with the stability and flow being determined in accordance with ASTM D 1559. The bituminous material and aggregate proposed for use in construction by the contractor should be used in the mix design.

5.6 Construction Observation & Testing

Recommendations presented in previous sections of this report are predicated on the fact that there will be continuous observation and testing by the geotechnical engineer during earthwork operations. Verification of recommended excavation, moisture increases, prewetting and required degree of compaction should be performed in accordance with "Guide Specifications for Earthwork", Appendix C.

TEST DRILLING EQUIPMENT & PROCEDURES

Drilling Equipment Truck-mounted CME-55 and CME-75 drill rigs powered with 6 cylinder Ford industrial engines are used in advancing test borings. The 6 cylinder engines are capable of delivering about 6,500 foot/pounds torque to the drill spindle. The spindle is advanced with twin hydraulic rams capable of exerting 12,000 pounds downward force. Drilling through soil or softer rock is performed with 6-1/2 inch O.D., 3-1/4 I.D. hollow stem auger or 4-1/2 inch continuous flight auger. Carbide insert teeth are normally used on the auger bits so they can often penetrate rock or very strongly cemented soils which require blasting or very heavy equipment for excavation. Where refusal is experienced in auger drilling, the holes are sometimes advanced with tricone gear bits and NX rods using water or air as a drilling fluid.

Sampling Procedures Dynamically driven tube samples are usually obtained at selected intervals in the borings by the ASTM D1586 procedures. In most cases, 2" O.D., 1-3/8" I.D. samplers are used to obtain the standard penetration resistance. "Undisturbed" samples of firmer soils are often obtained with 3" O.D. samplers lined with 2.42" I.D. brass rings. The driving energy is generally recorded as the number of blows of a 140 pound 30 inch free fall drop hammer required to advance the samplers in 6 inch increments. However, in stratified soils, driving resistance is sometimes recorded in 2 or 3 inch increments so that soil changes and the presence of scattered gravel or cemented layers can be readily detected and the realistic penetration values obtained for consideration in design. These values are expressed in blows per foot on the logs. "Undisturbed" sampling of softer soils is sometimes performed with thin walled Shelby tubes (ASTM D1587). Where samples of rock are required, they are obtained by NX diamond core drilling (ASTM D2113). Tube samples are labeled and placed in watertight containers to maintain field moisture contents for testing. When necessary for testing, larger bulk samples are taken from auger cuttings.

Continuous Penetration Tests Continuous penetration tests are performed by driving a 2" O.D. blunt nosed penetrometer adjacent to or in the bottom of borings. The penetrometer is attached to 1-5/8" O.D. drill rods to provide clearance to minimize side friction so that penetration values are as nearly as possible a measure of end resistance. Penetration values are recorded as the number of blows of a 140 pound 30 inch free fall drop hammer required to advance the penetrometer in one foot increments or less.

Boring Records Drilling operations are directed by our field engineer or geologist who examines soil recovery and prepares boring logs. Soils are visually classified in accordance with the Unified Soil Classification System (ASTM D2487), with appropriate group symbols being shown on the logs.

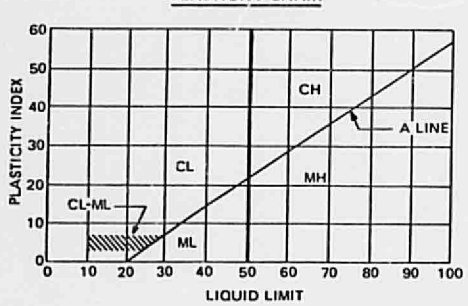
UNIFIED SOIL CLASSIFICATION SYSTEM

Soils are visually classified by the Unified Soil Classification system on the boring logs presented in this report. Grain-size analysis and Atterberg Limits Tests are often performed on selected samples to aid in classification. The classification system is briefly outlined on this chart. For a more detailed description of the system, see "The Unified Soil Classification System" Corp of Engineers, US Army Technical Memorandum No. 3-357 (Revised April 1960) or ASTM Designation: D2487-66T.

MAJOR DIVISIONS				GRAPHIC SYMBOL	GROUP SYMBOL	TYPICAL NAMES
COARSE-GRAINED SOILS (Less than 50% passes No. 200 sieve)	GRAVELS (50% or less of coarse fraction passes No. 4 sieve)	CLEAN GRAVELS (Less than 5% passes No. 200 sieve)			GW	Well graded gravels, gravel-sand mixtures, or sand-gravel-cobble mixtures.
					GP	Poorly graded gravels, gravel-sand mixtures, or sand-gravel-cobble mixtures.
		GRAVELS WITH FINES (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart		GM	Silty gravels, gravel-sand-silt mixtures.
			Limits plot above "A" line & hatched zone on plasticity chart		GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (More than 50% of coarse fraction passes No. 4 sieve)	CLEAN SANDS (Less than 5% passes No. 200 seive)			SW	Well graded sands, gravelly sands.
					SP	Poorly graded sands, gravelly sands.
		SANDS WITH FINES (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart		SM	Silty sands, sand-silt mixtures.
			Limits plot above "A" line & hatched zone on plasticity chart		SC	Clayey sands, sand-clay mixtures.
FINE-GRAINED SOILS (50% or more passes No. 200 sieve)	SILTS (Limits plot below "A" line & hatched zone on plasticity chart)	SILTS OF LOW PLASTICITY (Liquid Limit Less Than 50)			ML	Inorganic silts, clayey silts with slight plasticity.
		SILTS OF HIGH PLASTICITY (Liquid Limit More Than 50)			MH	Inorganic silts, micaceous or diatomaceous silty soils, elastic silts.
	CLAYS (Limits plot above "A" line & hatched zone on plasticity chart)	CLAYS OF LOW PLASTICITY (Liquid Limit Less Than 50)			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		CLAYS OF HIGH PLASTICITY (Liquid Limit More Than 50)			CH	Inorganic clays of high plasticity, fat clays, sandy clays of high plasticity.

NOTE: Coarse grained soils with between 5% & 12% passing the No. 200 sieve and fine grained soils with limits plotting in the hatched zone on the plasticity chart to have double symbol.

PLASTICITY CHART



DEFINITIONS OF SOIL FRACTIONS

SOIL COMPONENT	PARTICLE SIZE RANGE
Cobbles	Above 3 in.
Gravel	3 in. to No. 4 sieve
Coarse gravel	3 in. to ¾ in.
Fine gravel	¾ in. to No. 4 sieve
Sand	No. 4 to No. 200
Coarse	No. 4 to No. 10
Medium	No. 10 to No. 40
Fine	No. 40 to No. 200
Fines (silt or clay)	Below No. 200 sieve

TERMINOLOGY USED TO DESCRIBE THE RELATIVE DENSITY, CONSISTENCY, OR FIRMNESS, OF SOILS

The terminology used on the boring logs to describe the relative density, consistency, or firmness of soils relative to the standard penetration resistance is presented below. The standard penetration resistance (N) in blows per foot is obtained by ASTM D1586 procedure using 2" O.D., 1-3/8" I.D. samplers.

1. Relative Density. Terms for description of relative density of cohesionless, uncemented sands and sand-gravel mixtures.

N	Relative Density
0-4	Very loose
5-10	Loose
11-30	Medium dense
31-50	Dense
50+	Very dense

2. Relative Consistency. Terms for the description of clays which are saturated or near saturation.

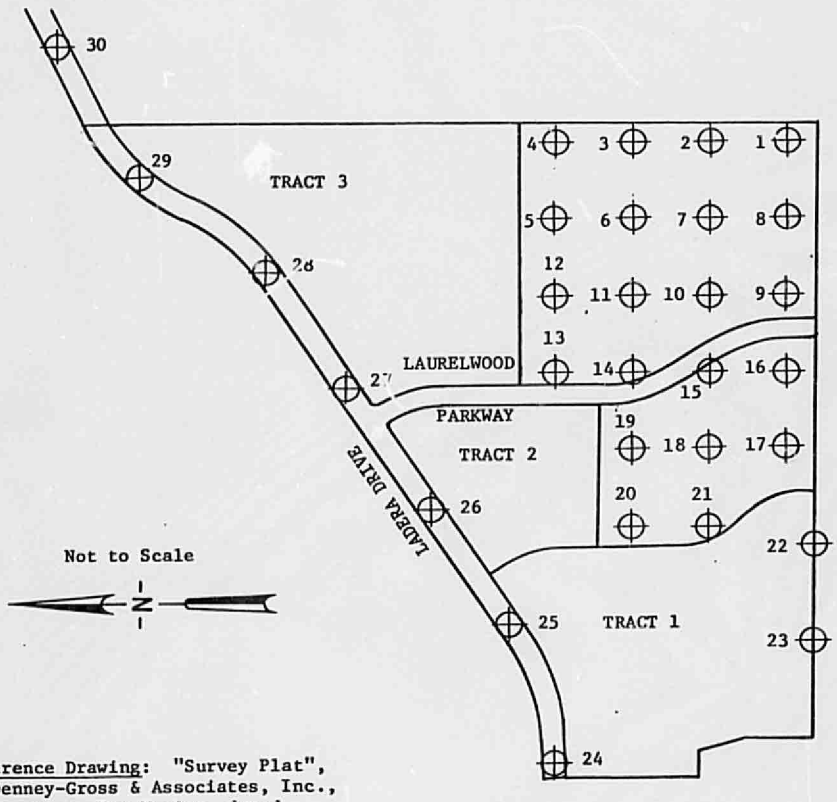
N	Relative Consistency	Remarks
0-2	Very soft	Easily penetrated several inches with fist
3-4	Soft	Easily penetrated several inches with thumb
5-8	Medium stiff	Can be penetrated several inches with thumb with moderate effort
9-15	Stiff	Readily indented with thumb, but penetrated only with great effort
16-30	Very stiff	Readily indented with thumbnail
30+	Hard	Indented only with difficulty by thumbnail

3. Relative Firmness. Terms for the description of partially saturated and/or cemented soils which commonly occur in the Southwest including clays, cemented granular materials, silts and silty and clayey granular soils:

N	Relative Density
0-4	Very soft
5-8	Soft
9-15	Moderately firm
16-30	Firm
31-50	Very firm
50+	Hard

SITE PLAN

SHOWING LOCATIONS OF TEST BORINGS



Reference Drawing: "Survey Plat", by Denney-Gross & Associates, Inc., Albuquerque, New Mexico, dated May, 1982

⊕ Boring Location

El Rancho Atrisco Subdivision
Phase III
Albuquerque, New Mexico
SHB Job No. E82-1087

SERGENT, HAUSKINS & BECKWITH
CONSULTING GEOTECHNICAL ENGINEERS
PHOENIX • ALBUQUERQUE • SANTA FE • SALT LAKE CITY

PROJECT El Rancho Atrisco Subdivision Phase III

JOB NO. E82-1087 DATE 8-26-82

LOG OF TEST BORING NO. 1

RIG TYPE CME-55

BORING TYPE 6½" Hollow Stem Auger

SURFACE ELEV. 5122'

DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			X	S	10		4		moderately firm	SILTY SAND, predominantly fine, nonplastic, tan note: stringer of silt at 10'
			X	S	11		6			
5			X	S	15		4	SM		
10			X	S	17		11	SM-SP	firm	SAND, some silt, predominantly fine, nonplastic, tan
15			X	S	15		9	SC-SM	moderately firm	CLAYEY SAND, some silt, predominantly fine, low plasticity, brown
20			X	S	19		5	SM	firm	SILTY SAND, predominantly fine, nonplastic, tan
										Stopped auger at 19'6" Stopped sampler at 21'
25										

A-5

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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El Rancho Arrisco Subdivision
PROJECT Phase III

LOG OF TEST BORING NO. 2

JOB NO. E82-1087 DATE 8-26-82

RIG TYPE CME-55
BORING TYPE 6½" Hollow Stem Auger
SURFACE ELEV. 5124'
DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0				S	7		5		soft to moderately firm	SILTY SAND, predominantly fine, nonplastic, tan
				S	12		5			
5				S	10		5	SM		
10				S	11		5			
								ML	moderately firm	SANDY SILT, nonplastic, brown
								SM	firm	SILTY SAND, predominantly fine, nonplastic, brown
15				S	24		7			
20										Stopped auger at 14'6" Stopped sampler at 16'

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE
A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT El Rancho Atrisco Subdivision Phase III

JOB NO. E82-1087 DATE 8-26-82

LOG OF TEST BORING NO. 3

RIG TYPE CME-55

BORING TYPE 6½" Hollow Stem Auger

SURFACE ELEV. 5124'

DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			X	S	5		5		soft to moderately firm	SILTY SAND, predominantly fine, nonplastic, tan
			X	S	9		5			
			X	S	11		4	SM		
5										
10			X	S	9		9		moderately firm to firm	SANDY CLAY, low plasticity, brown
								CL		
15			X	S	23		8			
									firm	SILTY SAND, predominantly fine, nonplastic, tan
20			X	S	25		7	SM		
										Stopped auger at 19'6" Stopped sampler at 21'
25										

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin walled Shelby tube.

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PROJECT Phase III

JOB NO. E82-1087 DATE 8-26-82

LOG OF TEST BORING NO. 4

RIG TYPE CME-55

BORING TYPE 6½" Hollow Stem Auger

SURFACE ELEV. 5124'

DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			X	S	5		5		soft to moderately firm	SILTY SAND, predominantly fine, nonplastic, tan
			X	S	7		5			
5			X	S	9		5			
								SM		
10			X	S	12		6			
15			X	S	13		6			Stopped auger at 14'6" Stopped sampler at 16'
20										

A-8

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT El Rancho Atrisco Subdivision Phase III

JOB NO. E82-1087 DATE 8-26-82

LOG OF TEST BORING NO. 5

RIG TYPE CME-55

BORING TYPE 6½" Hollow Stem Auger

SURFACE ELEV. 5132'

DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			☒	S	10		6		moderately firm to firm	SILTY SAND, predominantly fine, nonplastic, tan
			☒	S	13		5			
5			☒	S	11		5			
								SM		
10			☒	S	21		7			
15			☒	S	18		6			
								SM-SP	moderately firm	SAND, some silt, predominantly fine, nonplastic, tan
20			☒	S	14		4			
										Stopped auger at 19'6" Stopped sampler at 21'
25										

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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JOB NO. E82-1087 DATE 8-26-82

LOG OF TEST BORING NO. 6

RIG TYPE CME-55

BORING TYPE 6½" Hollow Stem Auger

SURFACE ELEV. 5133'

DATUM Topo

Depth In Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			☒	S	4		4		very soft to moderately	SILTY SAND, predominantly fine, nonplastic, brown
			☒	S	12		5			
5			☒	U	22	103	3			
								SM		
10			☒	S	11		6			
15			☒	S	15		6			Stopped auger at 14'6" Stopped sampler at 16'
20										

A-10

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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JOB NO. E82-1087 DATE 8-26-82

LOG OF TEST BORING NO. 7

RIG TYPE CME-55

BORING TYPE 6½" Hollow Stem Auger

SURFACE ELEV. 5131'

DATUM Topo

Depth in Feet	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0	X	S	6		4	SM	soft	SILTY SAND, predominantly fine, nonplastic, tan
	X	S	11		4	SM-SP	moderately firm	SAND, some silt, predominantly fine, nonplastic, tan
5	X	S	10		5		moderately firm to firm	SILTY SAND, predominantly fine, nonplastic, tan note: occasional stringers of silty clay
10	X	S	12		4			
						SM		
15	X	S	15		7			
20	X	S	29		5			
25								Stopped auger at 19'6" Stopped sampler at 21'

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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JOB NO. E82-1087 DATE 8-26-82

LOG OF TEST BORING NO. 8

RIG TYPE CME-55

BORING TYPE 6½" Hollow Stem Auger

SURFACE ELEV. 5127'

DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			☒	S	11		3		moderately firm	SILTY SAND, predominantly fine, nonplastic, tan note: occasional stringers of silty clay
			☒	S	14		5			
5			☒	S	19		3			
								SM		
10			☒	S	14		7			
15			☒	S	13		9			
										Stopped auger at 14'6" Stopped sampler at 16'
20										

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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LOG OF TEST BORING NO. 9

JOB NO. E82-1087 DATE 8-27-82

RIG TYPE CME-55
BORING TYPE 6½" Hollow Stem Auger
SURFACE ELEV. 5133'
DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			☒	S	6		5	SM-SP	soft to moderately firm	SAND, some silt, predominantly fine, nonplastic, tan
			☒	S	15		4			
5			☒	S	18		4		moderately firm to firm	SILTY SAND, predominantly fine, nonplastic, tan note: stringer of sandy clay at 10'
10			☒	U	32	103	7	SM		
15			☒	S	15		6			
20			☒	S	26		4			
25										Stopped auger at 19'6" Stopped sampler at 21'

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE
A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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LOG OF TEST BORING NO. 10

JOB NO. E82-1087 DATE 8-27-82

RIG TYPE CME-55
BORING TYPE 6½" Hollow Stem Auger
SURFACE ELEV. 5136'
DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			X	S	7		5		soft to moderately firm	SILTY SAND, predominantly fine, nonplastic, tan
			X	S	11		3			
5			X	S	10		5			
								SM		
10			X	S	10		5			
15			X	S	14		7			
										Stopped auger at 14'6" Stopped sampler at 16'
20										

A-14

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE
A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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JOB NO. E82-1087 DATE 8-27-82

LOG OF TEST BORING NO. 11

RIG TYPE CME-55

BORING TYPE 6½" Hollow Stem Auger

SURFACE ELEV. 5141'

DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			X	S	3		5	SM-SP	very soft to moderately firm	SAND, some silt, predominantly fine, nonplastic, tan
			X	S	12		1			
5			X	S	8		4		soft to firm	SILTY SAND, predominantly fine, nonplastic, brown
10			X	S	9		6	SM		
15			X	S	14		6			
20			X	S	19		5			
25										Stopped auger at 19'6" Stopped sampler at 21'

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT El Rancho Atrisco Subdivision Phase III

JOB NO. E82-1087 DATE 8-27-82

LOG OF TEST BORING NO. 12

RIG TYPE CME-55

BORING TYPE 6½" Hollow Stem Auger

SURFACE ELEV. 5141'

DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			X	S	3		6		very soft to firm	SILTY SAND, predominantly fine, nonplastic, tan
			X	S	12		5			
5			X	S	8		5			
								SM		
10			X	S	13		4			
15			X	S	18		5			
										Stopped auger at 14'6" Stopped sampler at 16'
20										

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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El Rancho Atrisco Subdivision
PROJECT Phase III
JOB NO. E82-1087 DATE 8-27-82

LOG OF TEST BORING NO. 13

RIG TYPE CME-55
BORING TYPE 6½" Hollow Stem Auger
SURFACE ELEV. 5147'
DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			X	S	5		5	SM	soft to moderately firm	SILTY SAND, predominantly fine, nonplastic, tan
			X	S	9		3			
5			X	U	11		1	SP SM	moderately firm	SAND, some silt, predominantly fine, nonplastic, tan
									firm	SILTY SAND, predominantly fine, nonplastic, tan note: stringer of silty clay at 10'
10			X	S	16		9			
								SM		
15			X	S	21		5			
20			X	S	21		7			
25										Stopped auger at 19'6" Stopped sampler at 21'

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE
A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

A-17

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PROJECT Phase III

JOB NO. E82-1087 DATE 8-27-82

LOG OF TEST BORING NO. 14

RIG TYPE CME--55

BORING TYPE 6½" Hollow Stem Auger

SURFACE ELEV. 5145'

DATUM Topo

Depth in Feet	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0	X	S	9	6	SM	moderately firm	SILTY SAND, predominantly fine, nonplastic, tan
	X	S	13	4			
5	X	S	9	5			
10	X	S	12	4	SP SM	moderately firm	INTERCALATED SAND, SILT & SILTY SAND, predominantly fine, nonplastic, tan
15	X	S	14	3			
20							Stopped auger at 14'6" Stopped sampler at 16'

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.33" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT El Rancho Atrisco Subdivision Phase III

JOB NO. E82-1087 DATE 8-27-82

LOG OF TEST BORING NO. 15

RIG TYPE CME-55

BORING TYPE 6½" Hollow Stem Auger

SURFACE ELEV.

DATUM

Depth In Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			X	S	6		4	SM-SP	soft	SAND, some silt, predominantly fine, nonplastic, tan
			X	S	11		5		moderately firm	SILTY SAND, predominantly fine, nonplastic, tan
5			X	S	11		5			note: stringer of silty clay at 10'
								SM		
10			X	S	10		7			
15			X	S	17		3	SP SM	firm	SAND, some silt, predominantly fine, nonplastic, tan
								SM	moderately firm	SILTY SAND, predominantly fine, nonplastic, tan
20			X	S	14		5			
25										Stopped auger at 19'6" Stopped sampler at 21'

A-19

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT El Rancho Atrisco Subdivision Phase III

JOB NO. E82-1087 DATE 8-27-82

LOG OF TEST BORING NO. 16

RIG TYPE CME-55

BORING TYPE 6½" Hollow Stem Auger

SURFACE ELEV. 5140'

DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			☒	S	5		4		soft to moderately firm	SILTY SAND, predominantly fine, nonplastic, tan
			☒	S	8		7			
5			☒	S	10		7	SM		
10			☒	S	12		6	CL	moderately firm	SILTY CLAY, low plasticity, brown
								SM	moderately firm	SILTY SAND, predominantly fine, nonplastic, tan
15			☒	S	15		12			
20										Stopped auger at 14'6" Stopped sampler at 16'

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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LOG OF TEST BORING NO. 17

JOB NO. E82-1087 DATE 8-27-82

RIG TYPE CME-55
BORING TYPE 6½" Hollow Stem Auger
SURFACE ELEV. 5146'
DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			☒	S	5		5		soft to firm	SILTY SAND, predominantly fine, nonplastic, tan note: occasional stringer of clean sand & silty clay
			☒	S	10		4			
5			☒	S	11		5			
10			☒	S	11		6	SM		
15			☒	S	14		7			
20			☒	S	23		5			Stopped auger at 19'6" Stopped sampler at 21'
25										

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE
A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT El Rancho Atrisco Subdivision Phase III

JOB NO. E82-1087 DATE 8-27-82

LOG OF TEST BORING NO. 18

RIG TYPE CME-55

BORING TYPE 6½" Hollow Stem Auger

SURFACE ELEV. 5151'

DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			X	S	5		4		soft to moderately firm	SILTY SAND, predominantly fine, nonplastic, tan
			X	S	14		4			
5			X	S	7		7			
								SM		
10			X	S	13		5			
15			X	S	16		8			Stopped auger at 14'6" Stopped sampler at 16'
20										

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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Phase III

PROJECT
JOB NO. E82-1087 DATE 8-27-82

LOG OF TEST BORING NO. 19

RIG TYPE CME-55
BORING TYPE 6½" Hollow Stem Auger
SURFACE ELEV. 5152'
DATUM Topo

Depth In Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			X	S	5		5		soft to moderately firm	SILTY SAND, predominantly fine, nonplastic, tan
			X	S	10		5			
5			X	S	8		4			
10			X	S	10		4	SM		
15			X	S	14		6			
20			X	S	17		4			
25										Stopped auger at 19'6" Stopped sampler at 21'

A-23

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE
A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT Phase III

JOB NO. E82-1087 DATE 8-27-82

LOG OF TEST BORING NO. 20

RIG TYPE CME-55

BORING TYPE 6½" Hollow Stem Auger

SURFACE ELEV. 5161'

DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			X	S	6		6		soft to moderately firm	SILTY SAND, predominantly fine, nonplastic, tan
			X	S	8		5			
5			X	U	10	98	3			
								SM		
10			X	S	9		5			
15			X	S	11		7			
										Stopped auger at 14'6" Stopped sampler at 16'
20										

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT El Rancho Atrisco Subdivision Phase III

JOB NO. E82-1087 DATE 8-27-82

LOG OF TEST BORING NO. 21

RIG TYPE CME-55

BORING TYPE 6½" Hollow Stem Auger

SURFACE ELEV. 5158'

DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			X	S	7		6		soft to moderately firm	SILTY SAND, predominantly fine, nonplastic, tan
			X	S	11		6			
5			X	S	6		5			
								SM		
10			X	S	10		4			
15			X	S	16		5			
20										Stopped auger at 14'6" Stopped sampler at 16'

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT Phase III

JOB NO. E82-1087 DATE 8-27-82

LOG OF TEST BORING NO. 22

RIG TYPE CME-55

BORING TYPE 6½" Hollow Stem Auger

SURFACE ELEV. 5157'

DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			X	S	3		3	SP	very soft to moderately firm	SAND, predominantly fine, nonplastic, tan
			X	S	9		2			
5			X	S	8		4	SM	soft	SILTY SAND, predominantly fine, nonplastic, tan
10			X	S	14		3	SP SM	moderately firm	SAND, some silt, predominantly fine, nonplastic, tan
15			X	S	12		4			
20										Stopped auger at 14'6" Stopped sampler at 16'

A-26

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT El Rancho Atrisco Subdivision Phase III

JOB NO. E82-1087 DATE 8-27-82

LOG OF TEST BORING NO. 23

RIG TYPE CME-55
BORING TYPE 6½" Hollow Stem Auger
SURFACE ELEV. 5166'
DATUM Topo

Depth in Feet	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0	X	S	6		5	SM	soft	SILTY SAND, predominantly fine, nonplastic, brown
	X	S	8		4			
5	X	S	19		2		firm	SAND, predominantly fine, nonplastic, tan
						SP		
10	X	S	21	(no recovery)				
						SM	moderately firm	SILTY SAND, predominantly fine, nonplastic, brown
15	X	S	11		11			
								Stopped auger at 14'6" Stopped sampler at 16'
20								

A-27

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE
A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT Phase III

LOG OF TEST BORING NO. 24

JOB NO. E82-1087 DATE 8-27-82

RIG TYPE CME-55
BORING TYPE 4½" Continuous Flight Auger
SURFACE ELEV. 5190'
DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0								SM		SILTY SAND, predominantly fine, nonplastic, tan
5										Stopped auger at 5'
10										

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE
A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT El Rancho Atrisco Subdivision Phase III

JOB NO. E82-1087 DATE 8-27-82

LOG OF TEST BORING NO. 25

RIG TYPE CME-55

BORING TYPE 4½" Continuous Flight Auger

SURFACE ELEV. 5175'

DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0								SM		SILTY SAND, predominantly fine, nonplastic, tan
5										Stopped auger at 5'
10										

A-29

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT El Rancho Atrisco Subdivision Phase III

JOB NO. E82-1087 DATE 8-27-82

LOG OF TEST BORING NO. 26

RIG TYPE CME-55

BORING TYPE 4½" Continuous Flight Auger

SURFACE ELEV. 5167'

DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0								SM		SILTY SAND, predominantly fine, nonplastic, tan
			A				1	SP-SM		SAND, some silt, predominantly fine, nonplastic, tan
5										Stopped auger at 5'
10										

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample.
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT El Rancho Atrisco Subdivision Phase III

JOB NO. E82-1087 DATE 8-27-82

LOG OF TEST BORING NO. 27

RIG TYPE CME-55

BORING TYPE 4½" Continuous Flight Auger

SURFACE ELEV. 5156'

DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0								SM		SILTY SAND, predominantly fine, nonplastic, tan
5										Stopped auger at 5'
10										

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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JOB NO. E82-1087 DATE 8-27-82

LOG OF TEST BORING NO. 28

RIG TYPE CME-55

BORING TYPE 4½" Continuous Flight Auger

SURFACE ELEV. 5141'

DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0								SM		SILTY SAND, predominantly fine, nonplastic, tan
5										Stopped auger at 5'
10										

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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JOB NO. E82-1087 DATE 8-27-82

LOG OF TEST BORING NO. 29

RIG TYPE CME-55

BORING TYPE 4½" Continuous Flight Auger

SURFACE ELEV. 5135'

DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0				A			1	SM-SP		SAND, considerable silt, predominantly fine, non-plastic, tan
5										Stopped auger at 5'
10										

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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El Rancho Atrisco Subdivision
PROJECT Phase III

LOG OF TEST BORING NO. 30

JOB NO. E82-1087 DATE 8-27-82

RIG TYPE CME-55
BORING TYPE 4½" Continuous Flight Auger
SURFACE ELEV. 5120'+
DATUM Topo

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0								SM		SILTY SAND, predominantly fine, nonplastic, tan
5										Stopped auger at 5'
10										

A-34

GROUND WATER

DEPTH	HOUR	DATE
	none	

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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LABORATORY TESTING PROCEDURES

Consolidation Tests Soiltest or Clockhouse apparatus of the "floating-ring" type are employed for the one-dimensional consolidation tests. They are designed to receive one inch high, 2.5 inch O.D. brass liner rings with soil specimens as secured in the field. Procedures for the tests generally are those outlined in ASTM D2435. Loads are applied in several increments to the upper surface of the test specimen and the resulting deformations are recorded at selected time intervals for each increment. For soils which are essentially saturated, each increment of load is maintained until the deformation versus log of time curve indicates completion of primary consolidation. For partially saturated soils, each increment of load is maintained until the rate of deformation is equal or less than 1/10,000 inch per hour. Applied loads are such that each new increment is equal to the total previously applied loading. Porous stones are placed in contact with the top and bottom of the specimens to permit free addition or expulsion of water. For partially saturated soils, the tests are normally performed at in situ moisture conditions until consolidation is complete under stresses approximately equal to those which will be imposed by the combined overburden and foundation loads. The samples are then submerged to show the effect of moisture increase and the tests continued under higher loadings. Generally, the tests are continued to about twice the anticipated curve due to overburden and structural loads, with a rebound curve then being established by releasing loads.

Expansion Tests The same type of consolidometer apparatus described above is used in expansion testing. Undisturbed samples contained in brass liner rings are placed in the consolidometers, subjected to appropriate surcharge loads and submerged. The loads are maintained until the expansion versus log of time curve indicates the completion of "primary swell".

LABORATORY TEST RESULTS

Job No E82-1087 Date

Client:

Project El Rancho Atrisco Subdivision
Phase III
Albuquerque, New Mexico

Material

Source

HOLE NO.	LOCATION	DEPTH	UNIFIED CLASS.	LL	PI	SIEVE ANALYSIS – ACCUM. % PASSING											Moist	LAB. NO.
						200	100	40	10	4	3/8	1/2	3/4	1	1-1/2	3		
1	See Site Plan	14½'	SC-SM	23	5	40	66	94	100								9.4	87-1
3	See Site Plan	9½'	CL	22	3	57	87	99	100								9.4	87-2
6	See Site Plan	4½'	SM	NV	NP	20	61	99	100								2.5	87-3
9	See Site Plan	9½'	CL	25	6	56	86	99	100								4.8	87-4
11	See Site Plan	2½'	SP-SM	NV	NP	7	25	76	99	100							1.4	87-5
13	See Site Plan	4½'	SP-SM	NV	NP	5	23	80	99	100							1.1	87-6
17	See Site Plan	19½'	SM	NV	NP	28	58	94	99	100							4.9	87-7
20	See Site Plan	4½'	SM	NV	NP	24	67	99	100								2.5	87-8
22	See Site Plan	2½'	SP	NV	NP	2	7	47	95	97	99	--	100				1.7	87-9
23	See Site Plan	4½'	SP	NV	NP	1	8	50	96	98	100						1.6	87-10
26	See Site Plan	2'-5'	SP-SM	NV	NP	7	21	68	96	99	100						1.2	87-11
29	See Site Plan	'-5'	SM-SP	NV	NP	10	34	91	100								1.4	87-12

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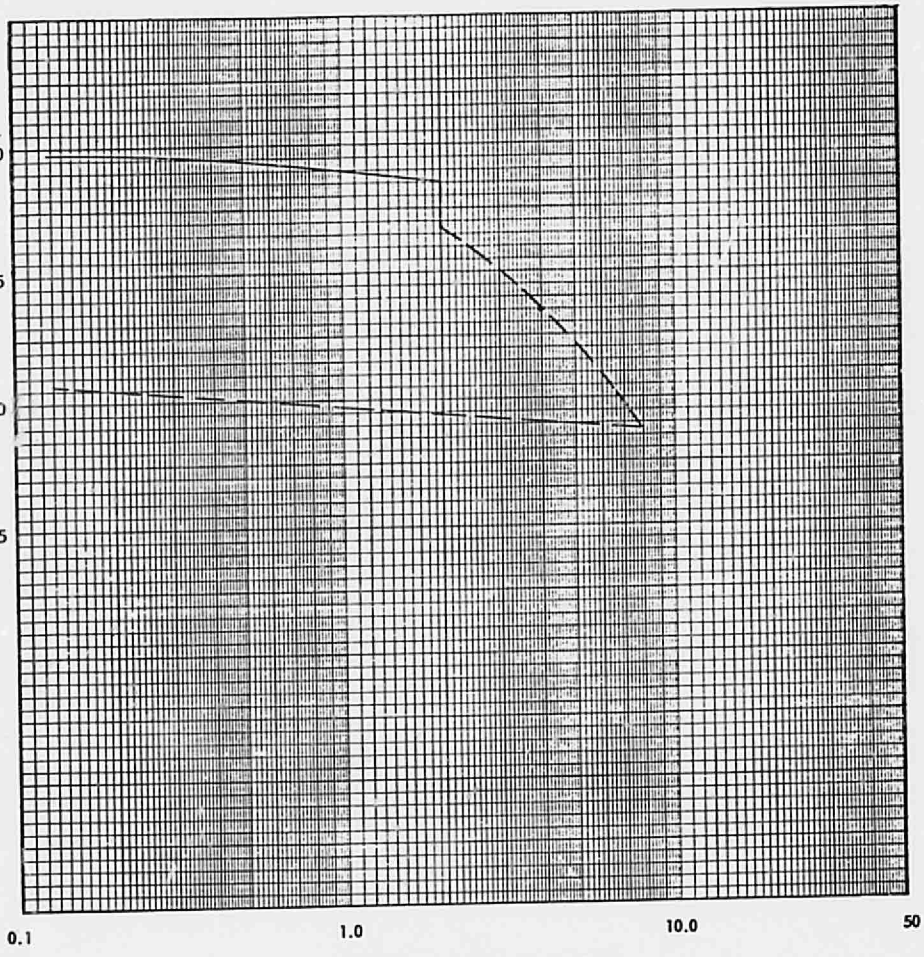
SUMMARY OF CONSOLIDATION TESTS

PROJECT El Rancho Atrisco Subdivision, Phase III JOB NO. E82-1087



CURVE	SAMPLE	INITIAL DRY DENSITY LBS./CU. FT.	MOISTURE CONTENT % DRY WEIGHT		UNIFIED SOIL CLASSIFICATION
			INITIAL	FINAL	
A	Boring #9 @ 9½'	102.8	6.8	19.7	SM

SOIL MOISTURE CONDITION

——— INSITU
– – – – SUBMERGED

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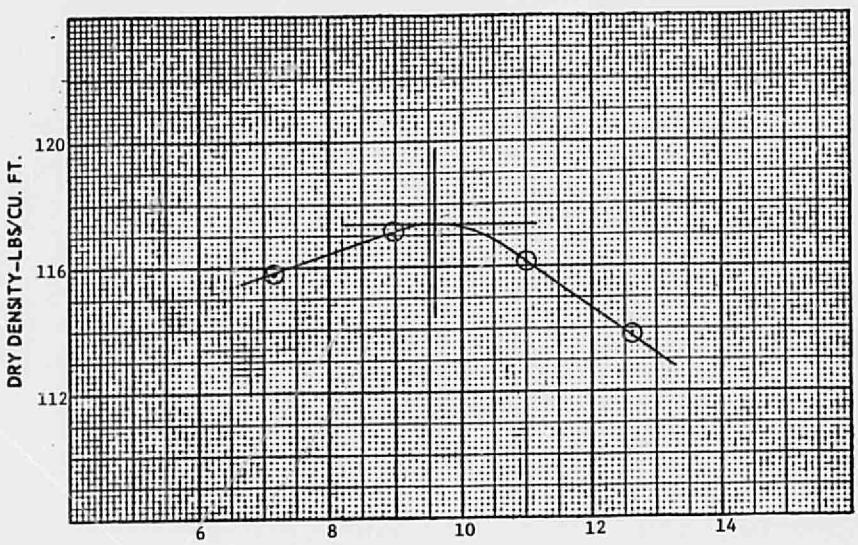
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT El Rancho Atrisco Subdivision, Phase III JOB NO. E82-1087

CLIENT _____ LAB NO. 87-11



MOISTURE CONTENT – % DRY WEIGHT

CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS./CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
A	Boring #26 @ 2'-5'	9.6	117.4	ASTM D 1557	C	87-11

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D 698-78

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	13,317
C	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317

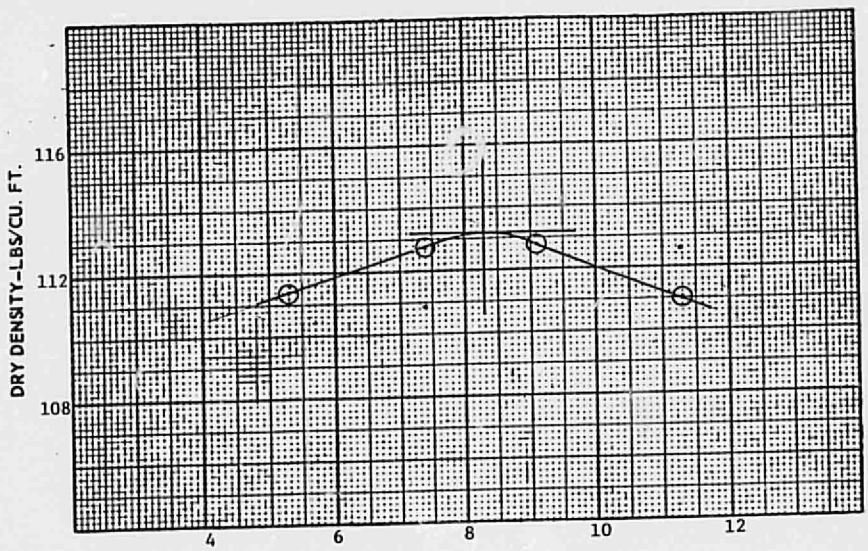
ASTM D 1557-78

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,986
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,986

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT El Rancho Atrisco Subdivision, Phase III **JOB NO.** E82-1087

CLIENT _____ **LAB NO.** 87-12



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS./CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
B	Boring #29 @ 0-5'	8.3	113.2	ASTM D 1557	C	87-12

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D 698-78

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317

ASTM D 1557-78

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,986
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,986

SERGENT, HAUSKINS & BECKWITH
CONSULTING GEOTECHNICAL ENGINEERS
PHOENIX • ALBUQUERQUE • SANTA FE • SALT LAKE CITY

El Rancho Atrisco Subdivision
Phase III
Albuquerque, New Mexico
SHB Job No. E82-1087

REPORT OF CBR DATA

Sample: Boring No. 26 @ 2'-5' Lab No.: 87-11

Initial CBR density (pcf)	104.8	110.8	117.0
Initial moisture content (%)	9.3	9.3	9.3
Final moisture content (%)	13.1	11.3	10.0
Moisture pick up (%)	3.8	2.0	0.7
Final CBR density (pcf)	104.8	110.8	117.0
Swell, % initial height	0.0	0.0	0.0
CBR value (ASTM D1883)	2	18	45

Sample: Boring No. 29 @ 0-5' Lab No.: 87-12

Initial CBR density (pcf)	102.5	107.2	112.4
Initial moisture content (%)	8.5	8.5	8.5
Final moisture content (%)	14.8	13.1	11.0
Moisture pick up (%)	6.3	4.6	2.5
Final CBR density (pcf)	102.5	107.2	112.4
Swell, % initial height	0.0	0.0	0.0
CBR value (ASTM D1883)	5	19	41

El Rancho Atrisco Subdivision
Phase III
Albuquerque, New Mexico
SHB Job No. E82-1087

SPECIFICATIONS FOR EARTHWORK

1. SCOPE

Includes all clearing and grubbing, removal of obstructions, general excavating, grading and filling, and any related items necessary to complete the grading for the entire project in accordance with these specifications.

2. SUBSURFACE SOIL DATA

Subsurface soil investigations have been made, and the results are available for examination by the contractor. The contractor is expected to examine the site and determine for himself the character of materials to be encountered.

No additional allowance will be made for rock removal, site clearing and grading, filling, compaction, disposal or removal of any unclassified materials.

3. CLEARING & GRUBBING

A. General: Clearing and grubbing will be required for all areas shown on the plans to be excavated or on which fill is to be constructed.

B. Clearing: Clearing shall consist of removal and disposal of other vegetation as well as brush and any rubbish within the areas to be cleared.

C. Grubbing: Stumps, matted roots and roots larger than 2 inches in diameter shall be removed from within 6 inches of the surface of areas on which fills are to be constructed except in roadways. Materials as described above within 18 inches of finished subgrade of roadways in either cut or fill sections shall be removed. Areas disturbed by grubbing will be filled as specified hereinafter for EMBANKMENT.

D. Grass & Topsoil: Grass, grass roots and the incidental topsoil shall not be left beneath a fill

area, nor shall this material be used as fill material. Grass, grass roots and topsoil may be stockpiled and later used in the top 6 inches of fills outside roadways and building pads.

4. EARTH EXCAVATION

A. Earth excavation shall consist of the excavation and removal of suitable soils for use as embankment, as well as the satisfactory disposal of all vegetation, debris and deleterious materials encountered within the area to be graded and/or in a borrow area.

B. Excavated areas shall be continuously maintained so that the surface shall be smooth and have sufficient slope to allow water to drain from the surface.

5. EMBANKMENT

A. General: Embankments shall consist of a controlled fill constructed in the areas indicated on the grading plans.

B. Embankment Materials: Embankment fill material shall consist of soils that conform to the following physical characteristics:

Sieve Size (Square Openings)	Percent Passing by Weight
6 inch	100
no. 200	10-40

The plasticity index of the material, as determined in accordance with ASTM D423 and D424, shall not be more than 15.

The fill material shall be free from roots, grass, other vegetable matter, clay lumps, rocks larger than 6 inches, or other deleterious materials.

(1) Site Soils: The site soils from the cuts may be used for fill, provided they meet the requirements in paragraph 5.B.

(2) Borrow: When the quantity of suitable material required for embankments is not available within the limits of the jobsite, the contractor shall provide sufficient material to construct the embankments to the lines, elevations and cross sections as shown on the drawings from borrow areas. The contractor shall obtain from the owners of said borrow areas the right to excavate material, shall pay all royalties and other charges involved and shall pay all expenses in developing the source including the cost of right-of-way required for hauling the material.

C. Construction

(1) Treatment of the Natural Ground Surface: All building pad areas on which fills are to be constructed shall be scarified to a minimum depth of 12 inches and watered to bring the moisture content of the upper 5.0 feet as close as practicable to the optimum moisture content. Moisture increases achieved shall be verified by a representative of the geotechnical engineer by augering small holes to 5.0 feet and obtaining representative samples in order to confirm proper prewetting. In the event that infiltration does not take place to the prescribed depth, the geotechnical engineer's representative shall make a judgment decision based on the nature of the soil in question. The ground surface shall then be subjected to 20 coverages of a heavy steel drum vibratory roller (10 ton minimum weight). The upper 6 inches of the native soils shall be compacted to the minimum density required in paragraph 5.C(2). Building pads in cut areas shall be wetted and rolled, as specified above, after cutting to approximate finished grade.

(2) Compaction: The fill shall be spread in layers not exceeding 8 inches, watered as necessary, and compacted. The moisture content at the time of compaction shall be 2 percent below optimum or higher. Compaction shall be by mechanical methods only for a density of not less than 95 percent of maximum dry density for building pads. Embankments outside the building pads shall be compacted to 90 percent of maximum dry density.

Optimum moisture and maximum dry density for each soil type used shall be determined in accordance with ASTM D1557.

(3) Weather Limitations: Controlled fill shall not be constructed when the atmospheric temperature is below 35 degrees F. When the temperature falls below 35 degrees, it shall be the responsibility of the contractor to protect all areas of completed surface against any detrimental effects by methods approved by the geotechnical engineer. Any areas that are damaged by freezing shall be reconditioned and reshaped and recompacted by the contractor in conformance with the requirements of this specification without additional cost to the owner.

(4) Special Compaction of Ponding Areas: After finished grading, all ponding areas located within the individual lot lines shall be subjected to 20 coverages of a vibratory roller complying with the requirements of paragraph 5.C.(2).

D. Slope Protection & Drainage: The edges of the controlled fill embankments shall be graded to the contours shown on the drawings and compacted to the density required in paragraph 5.C(2). Slopes steeper than 1 vertical to 3 horizontal shall be protected from erosion.

6. INSPECTION & TESTS

A. Field Inspection & Testing: The developer shall employ the services of a registered, licensed geotechnical engineer to observe all controlled earthwork. The geotechnical engineer shall provide continuous on-site inspection by experienced personnel during construction of controlled earthwork. The contractor shall notify the engineer at least two working days in advance of any field operations of the controlled earthwork, or of any resumption of operations after stoppages. Tests of fill materials and embankments will be made at the following rates:

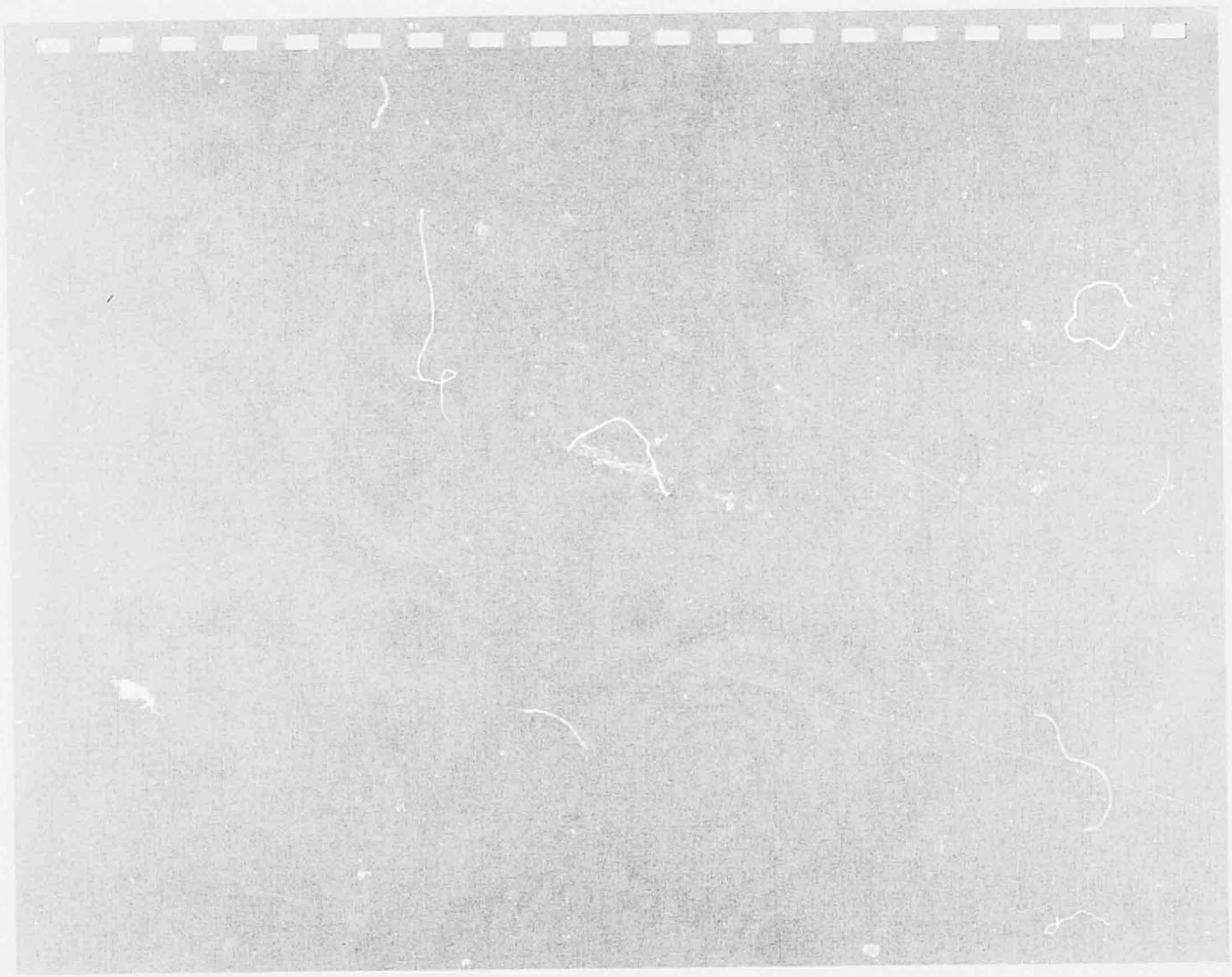
(1) One field density test per each 1,000 square yards of original ground surface prior to placing fill or in cut areas.

(2) One field density test per each 350 cubic yards of fill placed or each layer of fill for each work area, whichever is greater.

(3) One moisture-density curve for each type of material used, as indicated by sieve analysis and plasticity index.

B. Report of Field Density Tests: The geotechnical engineer shall submit, daily, the results of field density tests required by these specifications.

C. Costs of Tests & Inspection: The costs of tests, inspection and engineering, as specified in this section of the specifications, shall be borne by the developer.



CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

INTER-OFFICE CORRESPONDENCE April 11, 1983 REF. NO._____

TO: Sergio Miranda, Design Section

FROM: Brian Burnett, Hydrology Section BB

SUBJECT: PROJECT # 1682 - LAURELWOOD SUBDIVISION UNITS 1A & 1B

I forward several comments in regards to the referenced plans.

1. Sheet 6 - It is my understanding that the wall along 72nd is no longer proposed and that the grades along alley "D" will be dropped to more nearly match existing ground. This should be reflected on the plans.

2. A cost estimate of drainage improvements for the subdivisions should be submitted to this office.

BGB/tsl

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

April 8, 1983

Mr. Joe Allen
Denney-Gross & Associates, Inc.
2400 Comanche Rd. N.E.
Albuquerque, N.M. 87107

RE: LAURELWOOD SUBDIVISION UNITS 1A AND 8B - YOUR SUBMITTAL OF APRIL 5, 1983

Dear Joe:

I have reviewed the cost estimates for storm drainage improvements in the referenced subdivisions and I forward the following response in regards to your request that bonding be dropped for the improvements:

As you know, Section 9D of the Drainage Ordinance requires financial commitments for proposed improvements. Since adoption of the Ordinance, Chuck Easterling and myself have been requiring such commitments for subdivision improvements prior to plat sign-off at DRB. The total cost of these improvements has really not been a criteria for obtaining the bonding and I feel we have been consistent in the enforcement of this requirement. Therefore, in order to maintain consistency from one project to another, bonding or a letter of credit will be required prior to City Engineer sign-off. I have enclosed forms prepared by City Legal for this purpose.

In terms of my role on DRB and the requirements placed on other similar projects in the past, I feel the above stipulation is necessary. I will be glad to assist you in obtaining the necessary signatures for the agreement.

Please contact me if you, or your client, have any questions.

Very truly yours,

Brian G. Burnett

Brian G. Burnett
Civil Engineer/Hydrology

BGB/tsl

Enclosures

CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

INTER-OFFICE CORRESPONDENCE March 9, 1983 REF. NO._____

TO: Gene Mares, Principal Planner

FROM: Brian Burnett, Civil Engineer/Hydrology BB

SUBJECT: DEVELOPMENT REVIEW BOARD HEARING FOR LAURELWOOD SUBDIVISION, UNITS 1A AND 1B

Following are Hydrology's comments in regards to the referenced development:

1. Conceptual approval has been granted for the subdivisions.

2. Prior to City Engineer sign-off a bond or letter of credit will be required for drainage improvements not covered in the Special Assessment Districts for the area.

BGB/tsl

To Subd. CORB. File UC44

Please help us keep your parks clean

MAR 10 1983

March 7, 1983

Mr. Bob Miller
Bellamah Community Development
P. O. Box 3300
Albuquerque, New Mexico 87190

Dear Bob:

Parks and Recreation along with AMAFCA support the development of recreational uses in the Mariposa Detention Basin and the channels leading into it. Based on the figure of 35.6 acres in the basin and 4.4 acres in the two channels, we believe a fair open space credit would be 40 acres. Once the detention basin project is complete, Parks will be discussing a development plan with the Taylor Ranch Neighborhood Association, area youth athletic groups and other interested parties.

Sincerely,

Marty Valdez

Marty Valdez
Assistant Director
Recreational Services

cc: Rich Leonard, AMAFCA
Vern Hagen, Planning
Councillor Pat Baca

ALBUQUERQUE PARKS & RECREATION
121 TIJERAS NE • ALBUQUERQUE, NM 87102

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

MAYOR
Harry E. Kinney

CHIEF
ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

February 22, 1983

INTER-OFFICE MEMORANDUM

TO: DEVELOPMENT REVIEW BOARD MEMBERS
JIM MILTON, Transportation
LEORA JAEGER, Transit
JOE QUINTANA, Council of Governments
TED SCHOLER, CIP Planner
DAN SABO, AMAFCA
SAM TRUJILLO, Refuse Removal Division
PAT EVERTSEN, Police Planning
BOB CASIAS, Fire Department
DAMACIO SALAZAR, Environmental Health
BOB ROMERO, Zoning Enforcement Officer
MARY LOU HAYWOOD, Neighborhood Coordination
LEONARD GREENSPAN, Albuquerque Public Schools
VAL VALDEZ, Real Estate Officer
LLOYD D. BARLOW, Zoning Hearing Examiner
NICK ESTES, Acting City Attorney

FROM: GENE MARES, Chairman, Development Review Board

SUBJECT: DEVELOPMENT REVIEW BOARD HEARING ON MAJOR SUBDIVISION

DRB-83-92 (S-83-6) Denney-Gross and Associates, Incorporated, agent for Ladera Joint Venture, requests approval for the proposed Laurelwood Subdivision, Units 1A and 1B, zoned R-D, and located on the north side of Hanover Road, N.W., between Seventy-Second Street and Unser Boulevard, N.W., containing approximately 52.5 acres. (H and J-10)

Your comment on the above case is requested. The date comments are to be at this office is March 10, 1983, so that the Board may hear this case on March 14, 1983. Attached are copies of the request.

If you have any further questions, please contact Felipe at 7422, ex.48.

DENNEY-GROSS & ASSOCIATES, INC.
CONSULTING ENGINEERS
2400 COMANCHE ROAD, N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0696

February 10, 1983

RECEIVED
FEB 11 1983
CITY ENGINEER

Mr. Chuck Easterling
Principal Assistance City Engineer
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: Laurelwood Subdivision
Units 1A and 1B
DGA Job No. 599.11

Dear Chuck:

As indicated in the enclosed letter to Mr. Gene Mares, Chairman of the Developmental Review Board, we are sending a copy of the subdivision plat map for Laurelwood Subdivision Units 1A and 1B directly to other Board Members.

I have been working with Brian Burnett on drainage and conceptual approval has been obtained. Construction drawings will be submitted to City Engineering shortly for review and Brian has a complete preliminary set.

Please let us know if you need any additional information for the meeting.

Very truly yours,

Joeph M. Allen

JMA/lm

Enclosure

DENNEY-GROSS & ASSOCIATES, INC.
CONSULTING ENGINEERS
2400 COMANCHE ROAD, N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0886

February 9, 1983

Mr. Gene Mares, Chairman
Development Review Board
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: Laurelwood Subdivision
Units 1A and 1B
DGA Job No. 599.11

Dear Gene:

In accordance with the policies outlined in the Development Process Manual we are formally applying for preliminary approval of Units 1A and 1B, Laurelwood Subdivision. We have enclosed five copies of the plats and the application sheet.

Since the Development Process Manual indicates that this item must be discussed in a public meeting and advertising time will be required, let us know the time of the meeting.

To ensure that all parties receive the plat with adequate time for review I will be sending copies directly to the other Board Members.

Very truly yours,

Joseph M. Allen

JMA/lm
Enclosures

cc: Robert Fasnauh, Traffic Engineering
Charles Easterling, Principal Assistant City Engineer
Paul Brasher, Water Resources
Marty Valdez, Parks & Recreation

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

H10 - D5

January 28, 1983

Mr. Joe Allen
Denney-Gross & Associates
2400 Comanche N.E.
Albuquerque, N.M.

RE: LAURELWOOD SUBDIVISION DRAINAGE REPORT

Dear Joe:

Per our recent conversations regarding the referenced report, I am forwarding the following comments in regards to drainage:

1. This letter will serve as conceptual approval of the plan. Therefore, construction plans can be submitted for City review.

2. The following comments relate to the drainage report text:

   a. Page 3 - The Block-to-Block specifications do not provide details for Double "A" inlets. This point should be clarified and a detail provided in the construction plans (Comment also refers to reference to Double "A" on page 4).

   b. Page 4 - Report Statement: "Send remaining 17 cfs to Single "D" at low point of intersection of Alley "S" and Westwood,"

      Comment: In sump conditions, Single and Double "C" inlets work very well. I suggest that the "D" inlet be replaced with a "C" type. You may need to coordinate with the Design Section to develop a detail for the inlet.

   c. Page 6 - Is the 20.4 cfs referenced really 40.2?

   d. Page 7-8, Curb Opening Computations: Does a weir accurately model this condition. It really falls closer to a side-channel spillway situation.

I tried to use Figure 309.4D from the NMSHD Design Manual to determine the required length of the curb opening, but was unsuccessful in determining the different variables. Can you think of any other way to compute the length of opening?

e. Page 9 - Report Statement: "No grade changes are proposed on either Hanover Street or 72nd St."

Comment: Some statement should be made regarding the proposed grades along these streets and what impact the development has on them. For example page 19 of the construction drawings indicates a grade change of 6 to 9 feet between the proposed street grade and the existing ground. How tall will the retaining walls be in this reach? Will additional garden walls be placed on the permanent wall for each unit? Who will be responsible for certifying the construction of the retaining walls? I believe this one reach is going to be of particular concern to the other reveiwing City staff.

f. Page 15 - Report Statement: "Once approximately 40% of the lots...".

Comment: Who will be responsible for monitoring the progress of the development to insure that the proposed improvements will be constructed? For clarification, why was 40% chosen?

g. Page 15 - Report Statement: "Park development may also take place at this time."

Comment: How does this proposed scheme fit in with plans of Parks and Recreation? Will interim erosion control measures be required to prevent sediment from covering the bolders if park construction does not take place at this time?

h. Page 16 - Report Statement: "All off-site flows within El Rancho Atrisco III will be routed....:"

Comment: How will this be accomplished? Will plans be provided?

i. Page 16 - Report Statement: "A temporary berm is proposed on Cherrywood near Redwood to divert the existing arroyo south past the subdivision."

Comment: The type of diversion is not allowed per AMAFCA's 80-15. Instead, a temporary desilting basin west of Cherrywood must be constructed and the runoff allowed to spill into Cherrywood. Construction details should be provided.

3. General Comments on erosion control measures and temporary easements:

a. What measures are suggested for prevention of siltation in the pipe due to runoff generated west of Unser Blvd. It maybe appropriate to block the pipe just west of Cherrywood until future developmenmt occurs. In any case, something must be done if the area west of Unser remains undeveloped.

b. As you know, sediment built-up in the street ROW is a constant problem, even in areas where the contributing watershed surface has not be disturbed (e.x. Lomas Blvd. east of Tramway). Would it be appropriate to provide some sort of erosion control berm adjacent to developed streets (Sherwood, Applewood, and Cherrywood) to prevent sediment from entering the streets?

c. All temporary drainage easements must be covered by easements and maintenance agreements.

4. I concur with the hydrologic computations presented in Table IV. Also, a check of the hydraulic computations for the storm sewer indicates that the pipe(s) will adequately function as a pressure flow system.

5. Offsite drainage area 4: See comment 4b regarding protection of the pipe from sediment build-up.

6. Future comments regarding the construction plans will be forwarded after a complete review.

I appreciate the effort put forth in the drainage submittal. It appears that we are heading towards a workable drainage management plan. Please call if you have any questions.

Very truly yours,

Brian G. Burnett

Brian G. Burnett
Civil Engineer/Hydrology

BGB/tsl
3788B

DENNEY-GROSS & ASSOCIATES, INC.
CONSULTING ENGINEERS
2400 COMANCHE ROAD, N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0696

January 7, 1983

Mr. Charles Easterling
Principal Assistant City Engineer
Design Section
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

1710-DS

Re: Laurelwood Subdivision
Drainage Report
DGA Job No. 602.11

Dear Chuck:

Enclosed are two copies of the Laurelwood Subdivision Drainage Report, Exhibits, and Laurelwood Subdivision Construction Plans for your review and approval. We have also enclosed a copy of the SAD 212 Hanover Storm Sewer System along with related calculations (which are enclosed in the Laurelwood Subdivision Drainage Report) that can be used in review of the Laurelwood Subdivision Drainage Plan.

We would appreciate your expeditious review so the drawings can be forwarded to the remaining City reviewing agencies.

Very truly yours,

RECEIVED
JAN 7 1983
ENGINEERING

Joseph M. Allen

JMA/lm

Enclosures