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File 1994-0164 Name: The Hacienda – Preliminary – 28.5 Road / F Road

Present	Scanned	
		A few items are denoted with an asterisk (*), which means they are to be scanned for permanent record on the ISYS retrieval system. In some instances, items are found on the list but are not present in the scanned electronic development file because they are already scanned elsewhere on the system. These scanned documents are denoted with (**) and will be found on the ISYS query system in their designated categories. Documents specific to certain files, not found in the standard checklist materials, are listed at the bottom of the page. Remaining items, (not selected for scanning), will be listed and marked present. This index can serve as a quick guide for the contents of each file.
X	X	**Table of Contents**
		***Review Sheet Summary**
X	X	***Application form**
		Review Sheets
		Receipts for fees paid for anything
X	X	***Submittal checklist**
X	X	***General project report**
		Reduced copy of final plans or drawings
		Reduction of assessor's map.
		Evidence of title, deeds, easements
X	X	***Mailing list to adjacent property owners**
		Public notice cards
		Record of certified mail
		Legal description
		Appraisal of raw land
		Reduction of any maps – final copy
X	X	***Final reports for drainage and soils (geotechnical reports)**
		Other bound or non-bound reports
		Traffic studies
		***Review Comments**
		***Petitioner's response to comments**
		***Staff Reports**
		***Planning Commission staff report and exhibits**
		***City Council staff report and exhibits**
		***Summary sheet of final conditions**

DOCUMENT DESCRIPTION:

X	X	Subsurface Soils Exploration Report – 9/27/94			
X	X	Drainage Report			
X		Posting of Public Notice Signs – 10/6/94			
X	X	Correspondence			
X	X	Ordinance No. 1470 - ** - OLD ORDINANCE			
X	X	Planning Commission Minutes - ** - 7/25/73,8/29/73-OLD MINUTES			
X		Deed – not conveyed to City – Bk 1504 / Pg 541			
X	X	Preliminary Major Basin Drainage Plan			

DEVELOPMENT APPLICATION

Community Development Department
250 North 5th Street Grand Junction, CO 81501
(303) 244-1430

Receipt 1636
Date 10/4
Rec'd By RSL

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File No. 164 94

We, the undersigned, being the owners of property situated in Mesa County, State of Colorado, as described herein do hereby petition this:

PETITION	PHASE	SIZE	LOCATION	ZONE	LAND USE
[ ] Subdivision Plat/Plan	[ ] Minor [X] Major [ ] Resub				
[ ] Rezone				From: To:	
[ ] Planned Development	[X] ODP [X] Preiim [ ] Final				
[ ] Conditional Use					
[ ] Zone of Annex					
[ ] Text Amendment					
[ ] Special Use					
[ ] Vacation					[ ] Right-of-Way [ ] Easement

[ ] PROPERTY OWNER [X] DEVELOPER [ ] REPRESENTATIVE

JBI Associates	JBI Associates	
Name	Name	Name
2324 N.Seville Circle	Same	
Address	Address	Address
Grand Junction CO 81506		
City/State/Zip	City/State/Zip	City/State/Zip
303-242-6720		
Business Phone No.	Business Phone No.	Business Phone No.

NOTE: Legal property owner is owner of record on date of submittal.

We hereby acknowledge that we have familiarized ourselves with the rules and regulations with respect to the preparation of this submittal, that the foregoing information is true and complete to the best of our knowledge, and that we assume the responsibility to monitor the status of the application and the review comments. We recognize that we or our representative(s) must be present at all hearings. In the event that the petitioner is not represented, the item will be dropped from the agenda, and an additional fee charged to cover rescheduling expenses before it can again be placed on the agenda.

Signature of Person Completing Application — Date 9/30/94

Bethesda Foundation of Nebraska, Inc.

Roberta L Andrews — 9/30/94

Signature of Property Owner(s) - Attach Additional Sheets if Necessary

SUBMITTAL CHECKLIST

MAJOR SUBDIVISION: PRELIMINARY

Location: W) 28 ¼ Road between G Road / F Road   Project Name: PR 8 (…)

ITEMS		DISTRIBUTION																								
DESCRIPTION	SSID REFERENCE	City Community Development	City Dev. Eng.	City Utility Eng.	City Property Agent	City Parks/Recreation	City Fire Department	City Attorney	City G.J.P.C. (8 sets)	City Downtown Dev. Auth.	City Police	County Planning	Walker Field	School Dist #51	Irrigation District	Drainage District	Water District	Sewer District	U S West	Public Service	GVRP	CDOT	Corps of Engineers	Colorado Geological Survey	US Postal Service	Persigo WWTF
		●	●	●	●	○	●	●	●	○	●	○	○	●	○	●	○	●	●	●	○	○	○	●	○	○
● Application Fee	VII-1	1																								
● Submittal Checklist*	VII-3	1																								
● Review Agency Cover Sheet*	VII-3	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
● Application Form*	VII-1	1	1	1	1	1	1	1	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
● Assessor's Map	VII-1	1	1	1	1	1	1	1	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
● Evidence of Title	VII-2	1			1			1																		
● Names and Addresses	VII-3	1																								
● Legal Description	VII-2	1			1																					
● General Project Report	X-7	1	1	1	1	1	1	1	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
● Location Map	IX-21	1																								
● Preliminary Plan	IX-26	1	2	1	1																					
● 11"x17" Reduction of Prelim. Plan	IX-26					1	1	1	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
● Preliminary Drainage Report	X-12	1	2																							
Traffic Report (…)																										

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164 94

NOTES:
1) An asterisk in the item description column indicates that a form is supplied by the City.
2) Required submittal items and distribution are indicated by filled in circles, some of which may be filled in during the pre-application conference. Additional items or copies may be subsequently requested in the review process.
3) Each submitted item must be labeled, named, or otherwise identified as described above in the description column.

2943-072-00-009
Estandor Corporation
11999 San Vincente Blvd STE 440
Los Angeles, CA 90049

2943-072-00-037
Norman A Smith
Carol J
23061 Canyon Hills Rd
Corona, CA 91719-7637

2943-072-00-040
Bray Realty Company
1015 N 7th St
Grand Junction CO 81501-3102

2943-072-01-011
The First Church of the Nazarene
of Grand Junction
1022 Grand Ave
Grand Junction, CO 81501-3428

2943-072-01-025
Russell D Conner
Marilyn N
128 Santa Fe Dr
Grand Junction, CO 81501-8975

2943-072-01-026
Russell D. Conner
Marilyn J
128 Santa Fe Dr
Grand Junction, CO 81501-3428

2943-072-01-027
Michael Adamo
Sharon
13469 W Auburn Av
Lakewood CO 80228-4745

2943-072-01-030
Garry L DE Garmo
Lucretia J
122 Santa Fe Dr
Grand Junction, CO 81501-0000

2943-072-26-001
Bruce H Wilson
373 Ridges Blvd Unit 213
Grand Junction, Co 81503

2943-072-00-944
City of Grand Junction
Water Tank
Gran Junction CO 81501

2943-072-01-028
Ron Bockelman
2811 F Rd
Grand Junction CO 81506-6064

2943-072-02-002
Ronald Bockelman
2811 F Rd
Grand Junction CO 81506-6064

2943-072-02-014
Ronald Bockelman
2811 F Rd
Grand Junction, CO 81506-6064

2943-072-12-007
Leo H Warren
Helen M
2815 Patterson Rd
Grand Junction, CO 81506-6065

2043-072-12-008
Health & Rehabilitation
Properties Trust
400 Center St
Newton, MA 01258

2943-072-00-035
Lawrence B Dowd
2660 Paradise Way
Grand JUnction, CO 81506-8632

2943-072-22-002
Hallie E Kohles
2835 Villa Way #1
Grand Junction CO 81501-8916

2943-072-00-038
GEM Builders Inc
P O Box 2185
Grand Junction CO 81502-2185

2943-072-00-057
John A Siegfried
PO Box 60214
Grand Junction, CO 81506-8758

2943-072-17-022
John A Siegfried
PO Box 60214
Grand Junction, CO 81506-8758

2943-072-17-034
John A Siegfried
P O Box 60214
Grand Junction, CO 81506-8758

2943-072-17-038
John A Siegfried
P O Box 60214
Grand Junction, CO 81506-8758

2943-072-017-038
John A Siegfried
P O Box 60214
Grand Junction CO 81506-8758

2943-072-01-018
Ronald J Bockelman
2811 F Rd
Grand Junction, CO 81506-6064

164 94

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The Hacienda

The proposed subdivision, to be called "The Hacienda", is located on the west side of 28-1/4 Road across from the Falls, and adjoining the former Bethesda Care Home to the north, and bordered by Mantey Heights to the west. There is a large draw between this property and Mantey Heights on the southern adjoining property line.

We expect to use Spanish style architecture with flat roof lines on all of the single story buildings. This project will contain one and two story attached homes.

We expect to use xeriscape wherever possible. The soils on this property are shale and decomposed shale. We have had previous experience with development and building with these types of soils. We faced these problems during construction of "Heritage Homes the Falls" to the east of Fire Station No. 2.

A majority of these units will be designed as rentals aimed at the single professional market. All of the units will be 2 bedroom with off street parking. These units will also be attractive to the small investor.

SUBSURFACE SOILS EXPLORATION

28 1/4 Rd & Grand Valley Canal

Grand Junction,CO

Prepared For:

JBI Associates
2324 North Seville G
Grand Junction,CO 81506

Prepared By:

LINCOLN-DeVORE, INC.
1441 Motor Street
Grand Junction, CO 81505

September 27, 1994

September 27, 1994

JBI Associates
2324 North Seville G
Grand Junction,CO 81506

Re: SUBSURFACE SOILS EXPLORATION

28 1/4 Rd & Grand Valley Canal

Grand Junction,CO

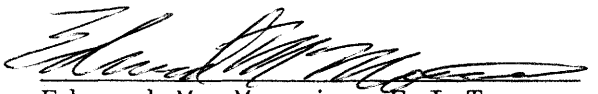
Dear Sir:

Transmitted herein are the results of a Subsurface Soils Exploration for the proposed Hacienda Subdivision

If you have any questions after reviewing this report, please feel free to contact this office at any time. This opportunity to provide Geotechnical Engineering services is sincerely appreciated.

Respectfully submitted,

LINCOLN-DeVORE, INC.

By: 

Edward M. Morris, E.I.T.
Western Slope Branch Manager
Grand Junction, Office

Reviewed by: _____

George D. Morris, P.E.
Colorado Springs Office

LDTL Job No. 81720-J

EMM/bh

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INTRODUCTION

PROJECT DESCRIPTION

This report presents the results of our preliminary geotechnical evaluation of the site applicable to evaluation of existing man made fills, construction of new man made structural fills, and all for the placement of single family and small multi-family residential structures, in the proposed Hacienda subdivision in Grand Junction,Colorado.

To assist in our exploration, we were provided with a preliminary site plan prepared by Q.E.D. Surveying Systems of Grand Junction, Colorado. The Boring Location Plan attached to this report is based on that plan provided to us.

We understand that the proposed structures may consist of a single and two story, wood framed structure with the possibility of full basements and concrete floor slabs on grade. Lincoln DeVore has not seen a full set of building plans, but structures of this type typically develop wall loads on the order of 600-1800 plf and column loads on the order of 4-15 kips.

The characteristics of the subsurface materials encountered were evaluated with regard to the type of construction described above. Recommendations are included herein to match the described construction to the soil characteristics found. The information contained herein may or may not be valid for other purposes. If the proposed site use is changed or types of construction proposed, other than noted herein, Lincoln

DeVore should be contacted to determine if the information in this report can be used for the new construction without further field evaluations.

PROJECT SCOPE

The purpose of our exploration was to evaluate the surface and subsurface soil and geologic conditions of the site and, based on the conditions encountered, to provide preliminary recommendations pertaining to the geotechnical aspects of the site development as previously described. The conclusions and recommendations included herein are based on an analysis of the data obtained from our field explorations, laboratory testing program, and on our experience with similar soil and geologic conditions in the area.

The scope of our geotechnical exploration consisted of a surface reconnaissance, a geophoto study, subsurface exploration, obtaining representative samples, laboratory testing, analysis of field and laboratory data, and a review of geologic literature.

Specifically, the intent of this study is to, on a preliminary bais only:

1. Explore the subsurface conditions to the depth expected to be influenced by the proposed construction.
2. Evaluate by laboratory and field tests the general engineering properties of the various strata which could influence the development.
3. Define the general geology of the site including likely geologic hazards which could have an effect on site development.
4. Develop geotechnical criteria for site grading and earthwork.
5. Identify potential construction difficulties and provide recommendations concerning these problems.

6. Recommend an appropriate foundation system for the anticipated structure and develop criteria for foundation design.

FIELD EXPLORATION AND LABORATORY TESTING

A field evaluation was performed on September 13, 1994, and consisted of a site reconnaissance by our geotechnical personnel and the drilling of 5 shallow exploration borings. These shallow exploration borings were drilled within the development, near the locations indicated on the Boring Location Plan. The exploration borings were located to obtain a reasonably good profile of the subsurface soil conditions. All exploration borings were drilled using a CME 45B, truck mounted drill rig with continuous flight auger to depths of approximately 15-21 feet. Samples were taken with a standard split spoon sampler, California lined split spoon sampler, thin walled Shelby tubes and by bulk methods. Logs describing the subsurface conditions are presented in the attached figures.

Laboratory tests were performed on representative soil samples to determine their relative engineering properties. Tests were performed in accordance with test methods of the American Society for Testing and Materials or other accepted standards. The results of our laboratory tests are included in this report. The in-place moisture content and the standard penetration test values are presented on the attached drilling logs.

FINDINGS

SITE DESCRIPTION

The project site is located in the Northwest Quarter of the Northwest Quarter of Section 7, Township 1 South, Range 1 East of the Ute Principal Meridian, Mesa County, Colorado. More specifically the site is located immediately West of 28 1/4 Road, North of the Grand Valley Canal and Southeast of the Mantey Heights area.

The topography of the site is that of a moderate to steep hillside, immediately below the Mantey Heights Bluff. The site is somewhat broken up by 3 gulleys which drop generally to the South. The 2 Eastern most gulleys on the site are presently filled with a man made fill placed several years ago. The slope gradient on this site ranges from 5% to in excess of 20% at some locations. The direction of surface runoff on this site will be locally controlled by the proposed construction, and future on site grading. In general, surface runoff will travel to the South. Surface drainage is fair to good ; subsurface drainage is fair to poor.

On-site erosion can be a significant problem if drainage and vegetation are not carefully controlled. Vegetation will probably be maintained in the immediate areas around the building sites, but special care should be taken to maintain vegetation on existing and future steeper slopes. We recommend that runoff from these slopes be carefully controlled to prevent erosion caused by irrigation practices, sheetwash or seepage. It may be necessary to provide culverts or drainage

ways to prevent excessive erosion along steeper slopes.

GENERAL GEOLOGY AND SUBSURFACE DESCRIPTION

The geologic materials encountered under the site consist of some areas of man made fill and the entire site is weathered to slightly weathered Mancos Shale. The geologic and engineering properties of the materials found in our 5 shallow exploration borings will be discussed in the following sections.

The soils on this site consist of up to 15 feet of man made fill in the East central portion of the site and in place weathered clays derived from the underlying Mancos Shale Formation. These soil materials found in the exploration borings consist of Low Plastic Silty Clays and Clay Silts which are derived from the Mancos Shale Formation. Due to the method of natural weathering and the man made fills, these soils are stratified and of variable density.

All the soils on this site were found to consist of either the Mancos Shale Formation or the weathered products of the Mancos Shale. The man made fill material originated on the small fills and ridges to the North and West of the actual fill area. All of the soils encountered in the exploration borings are very similar in engineering properties except for the in place density and moisture contents.

The Mancos Shale is described as a thin to thick-bedded, drab, light to dark gray to gray brown marine shale, with thinly interbedded fine grain sandstone and siltstone layers. Some portions of the Mancos Shale are bentonitic, and therefore, are highly expansive. The majority of the shale,

however, has only a moderate expansion potential. Formational shale was encountered in all Test Borings, at a depths ranging from the ground surface to 15 feet. It is anticipated that this formational shale will affect the construction and the performance of the foundations on the site.

This soil type (the formational Mancos Shale) was classified as a very Silty Clay (CL) under the Unified Classification System. The Standard Penetration Tests ranged from 50 blows per foot to in excess of 100 blows per foot. Penetration tests of this magnitude indicate that the soil is quite hard and of medium to high density. The moisture content varied from 4.3 % to 13.0%, indicating a relatively dry soil. This soil is plastic and is sensitive to changes in moisture content. With decreased moisture, it will tend to shrink, with some cracking upon desiccation. Upon increasing moisture, it will tend to expand. Expansion tests were performed on typical samples of the soil and expansive pressures on the order of 1000-2100 psf were found to be typical. The allowable maximum bearing value was found to be on the order of 4500-5500 psf for shallow foundation systems. A minimum dead load of 2100 psf will be required. This soil was found to contain sulfates in detrimental quantities.

This soil type, when encountered as man made fill, was classified as a Silty Clay(CL) under the Unified Classification System. The Standard Penetration Tests ranged from 16 blows per foot to 72 blows per foot. Penetration tests of this range indicate that the soil is inconsistent and of variable

density. The moisture content varied from 4.2% to 10.5%, indicating a relatively dry soil. This soil is plastic and is sensitive to changes in moisture content. With decreased moisture,some strata will tend to shrink, with some cracking upon desiccation. Upon increasing moisture,the denser will tend to expand however, the less dense strata may slightly consolidate under loads. Expansion tests were performed on typical samples of the fill soil and expansive pressures on the order of 200-1300 psf were found to be typical. The allowable maximum bearing value for the fill soils cannot be assigned at this time due to the variable density. This soil was found to contain sulfates in detrimental quantities.

The Mancos Shale Formation is often highly fractured, with fillings of soluble sulfate salts being very common. The samples obtained in this drilling program indicated approximately 40% of all fractured faces and 10% of the bedding planes in the shale contain sulfate salt deposits. Some seams of sulfate salts up to 1/32 of an inch thick were observed.

Sulfate Salts exhibit variable strength, depending upon surrounding moisture conditions and their chemistry as related to water. In addition, Sulfate Salts are soluble and may be physically removed from the soil by ground moisture conditions. Such removal may leave significant amounts of void areas within the Mancos Shale, which may affect the load bearing capacity of the formation. Many of the fractures in the Mancos Shale Formation are open, allowing the rapid transmission of water to occur. Some sandstone and siltstone strata within the

Mancos Shale Formation also exhibit elevated permeability.

GROUND WATER:

No free water was encountered during drilling on this site. In our opinion the true free water surface is fairly deep in this area, and hence, should not affect construction. Seepage moisture may affect construction if surface drainage is not properly controlled.

Due to the proximity of the Mancos Shale Formation, there exists a possibility of a perched water table developing in the alluvial soils which overlie the Shale. This perched water would probably be the result of increased irrigation due to the presence of lawns and landscaping and roof runoff. The exploration holes indicate that the top of the Mancos Shale Formation will probably collect significant amounts of water and that subsurface drainage would probably be quite slow.

While it is believed that under the existing conditions at the time of this exploration the construction process would not be effected by any free-flow waters, it is very possible that several years after development is initiated, a troublesome perched water condition may develop which will provide construction difficulties. In addition, this potential perched water could create some problems for existing or future foundations on this tract. Therefore it is recommended that the future presence of a perched water table be considered in all design and construction of both the proposed residential structures and any subdivision improvements.

Data presented in this report concerning

ground water levels are representative of those levels at the time of our field exploration. Groundwater levels are subject to change seasonally or by changed environmental conditions.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL DISCUSSION

No geologic conditions were apparent during our reconnaissance which would preclude the site development as planned, provided the recommendations contained herein are fully complied with. Based on our investigation to date and the knowledge of the proposed construction, the site conditions which would have the greatest effect on the planned development are in the variable density fills and the expansive clays the Mancos Shale Formation.

Since the exact magnitude and nature of the foundation loads are not precisely known at the present time, the following recommendations must be somewhat general in nature. Any special loads or unusual design conditions should be reported to Lincoln DeVore so that changes in these recommendations may be made, if necessary. However, based upon our analysis of the soil conditions and project characteristics previously outlined, the following recommendations are made.

OPEN FOUNDATION OBSERVATION

Since the recommendations in this report are based on information obtained through random borings, it is possible that the subsurface materials between the boring points could vary. Therefore, prior to placing forms or pouring concrete, an open excavation observation should be performed by representatives of Lincoln DeVore. The purpose of this observation is to determine if the subsurface soils directly below the

proposed foundations are similar to those encountered in our exploration borings. If the materials below the proposed foundations differ from those encountered, or in our opinion, are not capable of supporting the applied loads, additional recommendations could be provided at that time.

EXCAVATION & STRUCTURAL FILL:

Subgrade Site preparation in all areas to receive structural fill should begin with the removal of all topsoil, vegetation, and other deleterious materials. Prior to placing any fill, the subgrade should be observed by representatives of Lincoln DeVore to determine if the existing vegetation has been adequately removed and that the subgrade is capable of supporting the proposed fills. The subgrade should then be scarified to a depth of 10 inches, brought to optimum or above moisture conditions and compacted to between 88 to 93% of its maximum standard Proctor dry density [ASTM D-698]. The moisture content of this material should be between optimum moisture and plus 4%, as determined by ASTM D-698.

Structural Fill In general, we recommend all structural fill in the area beneath any proposed structure or roadway be compacted to between 88 to 93% of its maximum standard Proctor dry density (ASTM D698). We recommend that fill be placed and compacted a minimum of its optimum moisture content to a maximum +4% above optimum moisture content as determined by ASTM D 698. For purposes of this report the structural fill material should be composed of the Silty Clays of on-site man made fill, in situ

structural fill should be placed on this site in lifts not to exceed 6 inches after compaction. This Structural Fill must be brought to the required density by mechanical means. No soaking, jetting or puddling techniques of any type should be used in placement of fill on this site.

Non-Structural Fill

We recommend that all backfill placed around the exterior of the building, and in utility trenches which are outside the perimeter of the building and not located beneath roadways or parking lots, be compacted to a minimum of 80% of its maximum standard Proctor dry density (ASTM D-698).

Fill Limits

To provide adequate lateral support, we recommend that the zone of overexcavation extend at least 3 feet beyond the perimeter of the building on all sides. The Structural Fill should be a minimum of 3 feet in final compacted thickness.

No major difficulties are anticipated in the course of excavating into the surficial soils on the site. It is probable that safety provisions such as sloping or bracing the sides of excavations over 4 feet deep will be necessary. Any such safety provisions shall conform to reasonable industry safety practices and to applicable OSHA regulations.

Field Observation & Testing:

During the placement of any structural

fill, it is recommended that a sufficient amount of field tests and observation be performed under the direction of the geotechnical engineer. The geotechnical engineer should determine the amount of observation time and field density tests required to determine substantial conformance with these recommendations. It is recommended that surface density tests be taken at maximum 2 foot vertical interval.

The opinions and conclusions of a geotechnical report are based on the interpretation of information obtained by random borings. Therefore the actual site conditions may vary somewhat from those indicated in this report. It is our opinion that field observations by the geotechnical engineer who has prepared this report are critical to the continuity of the project.

Slope Angles

Allowable slope angle for cuts in the native soils is dependent on soil conditions, slope geometry, the moisture content and other factors. Should deep cuts be planned for this site, we recommend that a slope stability analysis be performed when the location and depth of the cut is known.

No major difficulties are anticipated in the course of excavating into the surficial soils on the site. It is probable that safety provisions such as sloping or bracing the sides of excavations over 4 feet deep will be necessary. Any such safety provisions shall conform to reasonable industry safety practices and to applicable OSHA regulations. The OSHA Classifi-

cation for excavation purposes on this site is Soil Class B for the existing and prosed man made fills and Soil Class A for the insitu weathered clays and the Mancos Shale Formation.

Allowable slope angle for cuts in the native soils is dependent on soil conditions, slope geometry, the moisture content and other factors. Should deep cuts be planned for this site, we recommend that a slope stability analysis be performed when the location and depth of the cut is known.

We recommend that slopes cut into the formational Mancos Shale on the site be constructed no steeper than 3-1/2:1 (horizontal to vertical) at any slope supporting or above structures, and no steeper than 3:1 for slopes which do not support or overhang structures.

DRAINAGE AND GRADIENT:

Adequate site drainage should be provided in the foundations area both during and after construction to prevent the ponding of water and the saturation of the subsurface soils. We recommend that the ground surface around all structures be graded so that surface water will be carried quickly away from the buildings. The minimum gradient within 10 feet of the buildings will depend on surface landscaping. We recommend that paved areas maintain a minimum gradient of 2%, and that landscaped areas maintain a minimum gradient of 8%. It is further recommended that roof drain downspouts be carried across all backfilled areas and discharged at least 10 feet away from the structures. Proper discharge of roof drain downspouts may require the use subsurface piping in some areas. Planters, if any, should

be so constructed that moisture is not allowed to seep into foundation areas or beneath slabs or pavements.

If adequate surface drainage cannot be maintained, or if subsurface seepage is encountered during excavation for foundation construction, a full perimeter drain is recommended for this building. It is recommended that this drain consist of a perforated drain pipe and a gravel collector, the whole being fully wrapped in a geotextile filter fabric. We recommend that this drain be constructed with a gravity outlet. If sufficient grade does not exist on the site for a gravity outlet, then a sealed sump and pump is recommended. Under no circumstances should a dry well be used on this site.

The existing drainage on the site must either be maintained carefully or improved. We recommend that water be drained away from structures as rapidly as possible and not be allowed to stand or pond near the building. We recommend that water removed from one building not be directed onto the backfill areas of adjacent buildings. We recommend that a hydrologist or drainage engineer experienced in this area be retained to complete a drainage plan for this site.

Should an automatic lawn irrigation system be used on this site, we recommend that the sprinkler heads be installed no less than 5 feet from the building. In addition, these heads should be adjusted so that spray from the system does not fall onto the walls of the building and that such water does not excessively wet the backfill soils.

It is recommended that lawn and landscaping irrigation be reasonably limited, so as to prevent

complete saturation of subsurface soils. Several methods of irrigation water control are possible, to include, but not limited to:

* Metering the Irrigation water.
* Sizing the irrigation distribution service piping to limit on-site water usage.
* Encourage efficient landscaping practices.
* Enforcing reasonable limits on the size of high water usage landscaping for each lot and any park areas.

FOUNDATIONS

At this time Lincoln-DeVore has not been informed of the individual foundation/building plans and is therefore not informed as to the precise wall or column loading plan within any of the proposed buildings. Therefore, three foundation types which could be utilized for the Hacienda Subdivision are recommended based on our experience in this area. The choice between these foundation types depends on the internal loading of the foundation members and the amount of excavation planned to achieve the finished lower elevations.

The three foundation types preliminarily recommended are as follows:

1. The voided wall on grade foundation system with a stemwall resting directly on the shale formation.

2. The isolated pad and grade beam foundation system in which the grade beam is voided and loads are transferred to the isolated pads.

3. The drilled pier and fully voided grade beam system with the loads transferred to the piers.

Recommendations given in this report are given for the Shallow Foundation Types No. 1 and 2 and the Deep Foundation Type No 3.

Shallow Foundations

A conventional shallow foundation system consisting of either a voided wall on grade or an isolated pad and grade beam system, resting on the relatively unweathered expansive clays of the Mancos Shale Formation,both of which may include a structural fill constructed according to the recommendations contained in this report, may beutilized in the Hacienda Subdivision. These shallow type foundations may be designed on the basis of an allowable bearing capacity of 4500 psf maximum, and a minimum dead load of 2000 psf must be maintained.

Contact stresses beneath all continuous walls should be balanced to within + or - 150 psf at all points. Isolated interior column footings should be designed for contact stresses of about 150 psf more than the average used to balance continuous walls. The criteria use for balancing will depend somewhat upon the nature of the structure. Single-story, slab on grade structures and single-story crawlspace structures may be balance on the basis of dead load only. Multi-story structures may be balanced on the basis of Dead Load plus one half live load, for up to three stories.

Stem walls for a shallow foundation system should be designed as grade beams capable of spanning at least 14 feet. These "grade beams" should be horizontally reinforced both near the top and near the bottom. The horizontal reinforcement required should be placed continuously around the structure with no gaps or breaks. A foundation system designed in this manner should provide a rather rigid system and, there-

fore, be better able to tolerate differential movements associated with the expansive clays encountered on this site.

FROST PROTECTION

We recommend that the bottom of all foundation components rest a minimum of 1 1/2 feet below finished grade or as required by the local building codes. Foundation components must not be placed on frozen soils.

DRILLED PIERS:

Due to owner/builder preference, some building load conditions or individual site conditions, a drilled pier and grade beam type foundation system could be utilized within the Hacienda Subdivision. We recommend that drilled piers have a minimum shaft length of 7 feet and be embedded at least 7 feet into the weathered and relatively unweathered Mancos Shale Formation. At this level,these piers may be designed for a maximum end bearing capacity of 25000 psf, plus 2000 psf side support considering only the side wall area embedded in the bedrock. Due to the expansive potential of the bedrock, a minimum dead load uplift is required, consisting of a point uplift of 2000 psf and 300 psf side uplift, based on the side wall embedded in the bedrock. The overburden is soft and no supporting or uplift values are assigned to this material. The weight of the concrete in the pier may be incorporated into the required dead load.

Based upon our experience in this area and due to rather poor surface and subsurface drainage conditions

of the subdivision, a drilled pier foundation system may be the preferred system. It must be noted that a drilled pier and fully voided grade beam system is quite rigid and will be quite sensitive to relative differential movements of the individual piers. The lack of subsurface moisture in the upper portion of the Mancos Shale Formation indicates that a 'Stable Strata Below The Zone of Seasonal Moisture Change' may not be adequately defined at this period of time.

It is recommended that the bottoms of all piers be thoroughly cleaned prior to the placement of concrete. The amount of reinforcing in each pier will depend on the magnitude and nature of loads involved. As a rule of thumb, reinforcing equal to approximately 1/2 of 1% of the gross cross-sectional concrete area should be used. Additional reinforcing should be used if structural conditions warrant. We recommend that reinforcing extend through the full length of pier.

To minimize the possibility of voids developing in the drilled piers, concrete with a slump of 5 to 6 inches is recommended. We recommend that piers be dewatered and thoroughly cleaned of all loose material prior to placing the steel cage and concrete. The pier excavation should contain no more than 2 inches of free water unless the concrete is placed by means of a tremie extending to the bottom of the pier. A free fall in excess of 5 feet is not recommended when placing concrete in drilled piers. We recommend that casing be pulled as the concrete is being placed and that a 5 foot head of concrete be maintained while pulling the casing. It is recommended that

drilled piers be plumb with 2% of their length and that the shaft maintain a constant diameter for the full length of the pier and not allowed to "mushroom" at the top.

DRILLED PIER OBSERVATION:

The foundation installation for drilled piers should be continuously observed by a representative of Lincoln DeVore to determine that the recommended bearing material has been adequately penetrated and that soil conditions are as anticipated by the exploration. This observation will aid in attaining an adequate foundation system. In addition, abnormalities in the subsurface conditions encountered during foundation installation can be identified and corrective measures taken as required. Lincoln DeVore requires a minimum of one working day's notice, and a copy of the foundation plan, to schedule any field observation.

GRADE BEAMS:

A reinforced concrete grade beam is recommended to carry the exterior wall loads in conjunction with the deep foundation system. We recommend that this grade beam be designed to span from bearing point to bearing point and not be allowed to rest on the ground surface between these points. We recommend a void space be left between the bottom of the grade beam and the subgrade below due to the expansive nature of the subgrade soils.

CONCRETE SLABS ON GRADE

Slabs could be placed directly on the natural soils or on a properly constructed structural fill. We recommend that all slabs on grade within the Hacienda Sudivision- be constructed to act independently of the other structural portions of the buildings. One method of allowing the slabs to float freely is to use expansion material at the slab- structure interface.

Any partitions which will be located on slabs on grade should be constructed with a minimum space of 2 inches at the bottom of the wall. This space should allow for any future potential upward movement of the floor slabs and minimize damage to the walls and roof sections above the slabs.

The magnitude of expansion measured of the soils on this site is such that floor slab movement should be expected if slab on grade construction is used. In general, the closer the slab is to the Mancos Shale Foundation, the more movement which should be expected. Where floor slabs are cast on expansive soils, no known method of construction will prevent all future slab movement.

If the builder and future owner are willing to risk the possibility of some damage due to concrete floor slab movement, the recommendations contained herein should be carefully followed and can help minimize such damage. Any subsequent owner should be advised of the soil conditions and advised to maintain the surface and subsurface drainage, framing of partition above floor slabs, dry wall and finish work above floor slabs, etc.

If the slab is to be placed directly on the expansive soils or on a thin fill overlying these soils, the risk of slab movement is high and stringent mitigation techniques are recommended. Therefore, to mitigate the effects of slab movement should they occur, we recommend the following:

1. Control joints should be placed in such a manner that no floor area exceeding 400 square feet remains without a joint. Additional joints should be placed at columns and at inside corners. These control joints should minimize cracking associated with expansive soils by controlling location and direction of cracks.

2. We recommend that all slabs on grade be isolated from structural members of the building. This is generally accomplished by an expansion joint at the floor slab / foundation interface. In addition, positive separation should be maintained between the slab and all interior columns, pipes and mechanical systems extending through the slab.

3. The slab subgrade should be kept moist 3 to 4 days prior to placing the slab. This is done by periodically sprinkling the subgrade with water. However, under no circumstances should the subgrade be kept wet by the flooding or ponding water.

4. Any partitions which will rest on the slabs on grade should be constructed with a minimum void space of 2 inches at the bottom of the wall (see figure in the Appendix). This base should allow for future upward movement of the floor slabs and minimize movement and damage in walls and floors above the slabs. This void may require rebuilding after a period of time, should heave exceed 2 inches.

The first alternative is to dispense with slab-on-grade construction and use a structural floor system. A structural floor system may be either a structural reinforced concrete slab or a structural wood floor system suspended with floor joists. Each system would utilize a crawl space.

This alternative would substantially reduce a potential for post construction slab difficulties due to the expansive properties of the Mancos Shale Formation.

The second alternative is to install a three foot "buffer zone" of non-expansive, granular soil beneath the slab. This would mitigate the potential for slab movement; however, some potential for movement still exists. Should this alternative be selected, we would recommend that the following be performed:

1. Non-expansive granular soils should be selected for the "buffer zone". The granular soils should contain less than 20% of the material, by dry weight, passing the U.S. No. 200 Sieve. We recommend that the geotechnical engineer be contacted to examine the soils when they are selected, to substantiate that they comply with the recommendations.

2. The perimeter drain for the structures should be located at the elevation equal to or deeper than the "buffer zone". This is to reduce the potential for a "bathtub" effect" which may cause the slab to heave. The "bathtub effect" is created when water is allowed to seep into the "buffer zone" and then becomes trapped since the underlying clay soils have a much lower permeability rate than the "buffer zone" material. Therefore, water may accumulate in the "buffer zone" and subsequently wet the clay soils and cause them to expand.

3. All the non-bearing partitions which will be located on the slabs should be constructed with a minimum 2 inches of void space at the bottom of the wall. This space would allow for the future upward movement of the floor slabs and minimize damage to walls and roof sections above the slabs. The space may require rebuilding after a period of time, since heaving produced by the soils may exceed 2 inches.

4. We recommend that all slabs being placed on the "buffer zone" be constructed to act independently of the other structural portions of the building. One method of allowing the slabs to float freely is to use expansion material at the slab-structure interface. Control joints should be placed 20 feet on center in each

direction. These control joints should control the cracking of the slab should the under-lying soils come in contact with water.

It is recommended that floor slabs on grade be constructed with control joints placed to divide the floor into sections not exceeding 360-400 square feet, maximum. Also, additional control joints are recommended at all inside corners and at all columns to control cracking in these areas.

Problems associated with slab 'curling' are usually minimized by proper curing of the placed concrete slab. This period of curing usually is most critical within the first 5 days after placement. Proper curing can be accomplished by continuous water application to the concrete surface or by the placement of a 'heavy' curing compound, formulated to minimize water evaporation from the concrete. Curing by continuous water application must be carefully undertaken to prevent the wetting or saturation of the subgrade soils.

EARTH RETAINING STRUCTURES

The active soil pressure for the design of earth retaining structures may be based on an equivalent fluid pressure of 60 pounds per cubic foot. The active pressure should be used for retaining structures which are free to move at the top (unrestrained walls). For earth retaining structures which are fixed at the top, such as basement walls, an equivalent fluid pressure of 75 pounds per cubic foot may be used. It should be noted that the above values should be modified to take into account any surcharge loads, sloping backfill or other externally applied forces. The above equivalent fluid pressures should also be modified for the effect of free water, if any.

The passive pressure for resistance to lateral movement may be considered to be 245 pcf per foot of depth. The coefficient of friction for concrete to soil may be assumed to be .24 for resistance to lateral movement. When combining frictional and passive resistance, the latter must be reduced by approximately 1/3.

Since below grade construction may be planned, the lower level walls would function as retaining walls. It is recommended that the natural drainage, existing prior to construction, be disturbed as little as possible by final grading. In particular, we recommend that water not be channeled along or across any newly filled areas, as this may result in accelerated erosion and damage to the fill. To fully minimize erosion, a vegetative cover should be established as soon after grading is complete as possible.

We recommend that the backfill behind any retaining wall be compacted to a minimum of 85% of its maximum modified Proctor dry density, ASTM D-698, and placed at or slightly above the optimum moisture. The backfill material should be approved by the Soils Engineer prior to placing and a sufficient amount of field observation and density tests should be performed during placement. Placing backfill behind retaining walls before the wall has gained sufficient strength to resist the applied lateral earth pressures is <u>not</u> recommended.

Drainage behind retaining walls is considered critical. If the backfill behind the wall is not well drained, hydrostatic pressures are allowed to build up and lateral earth pressures will be considerably increased. Therefore, we recommend a vertical drain be installed behind any impermeable retaining walls. Because of the difficulty in placement of a gravel drain, we recommend the use of a composite drainage mat similar to Exxon Battledrain or Tensar MD Series NS-1100. An outfall must be provided for this drain.

REACTIVE SOILS

Since groundwater in the Grand Junction area and in particular The Falls, typically contains sulfates in quantities detrimental to a Type I cement, a Type II or Type I-II or Type II-V cement is recommended for all concrete which is in contact with the subsurface soils and bedrock. Calcium chloride should not be added to a Type II, Type I-II or Type II-V cement under any circumstances.

LIMITATIONS

This report is issued with the understanding that it is the responsibility of the owner, or his representative to ensure that the information and recommendations contained herein are brought to the attention of the individual lot purchasers for the subdivision. In addition, it is the responsibility of the individual lot owners that the information and recommendations contained herein are brought to the attention of the architect and engineer for the individual projects and the necessary steps are taken to see that the contractor and his subcontractors carry out the appropriate recommendations during construction.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. In addition, changes in acceptable or appropriate standards may occur or may result from legislation or the broadening of engineering knowledge. Accordingly, the findings of this report may be invalid, wholly or partially, by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of 3 years.

The recommendations of this report pertain only to the site investigated and are based on the assumption that the soil conditions do not deviate

from those described in this report. If any variations or undesirable conditions are encountered during construction or the proposed construction will differ from that planned on the day of this report, Lincoln DeVore should be notified so that supplemental recommendations can be provided, if appropriate.

Lincoln DeVore makes no warranty, either expressed or implied, as to the findings, recommendations, specifications or professional advice, except that they were prepared in accordance with generally accepted professional engineering practice in the field of geotechnical engineering.

SOILS DESCRIPTIONS:

SYMBOL	USCS	DESCRIPTION
		Topsoil
		Man-made Fill
	GW	Well-graded Gravel
	GP	Poorly-graded Gravel
	GM	Silty Gravel
	GC	Clayey Gravel
	SW	Well-graded Sand
	SP	Poorly-graded Sand
	SM	Silty Sand
	SC	Clayey Sand
	ML	Low-plasticity Silt
	CL	Low-plasticity Clay
	OL	Low-plasticity Organic Silt and Clay
	MH	High-plasticity Silt
	CH	High-plasticity Clay
	OH	High-plasticity Organic Clay
	Pt	Peat
	GW/GM	Well-graded Gravel, Silty
	GW/GC	Well-graded Gravel, Clayey
	GP/GM	Poorly-graded Gravel, Silty
	GP/GC	Poorly-graded Gravel, Clayey
	GM/GC	Silty Gravel, Clayey
	GC/GM	Clayey Gravel, Silty
	SW/SM	Well-graded Sand, Silty
	SW/SC	Well-graded Sand, Clayey
	SP/SM	Poorly-graded Sand, Silty
	SP/SC	Poorly-graded Sand, Clayey
	SM/SC	Silty Sand, Clayey
	SC/SM	Clayey Sand, Silty
	CL/ML	Silty Clay

ROCK DESCRIPTIONS:

SYMBOL	DESCRIPTION
	SEDIMENTARY ROCKS
	CONGLOMERATE
	SANDSTONE
	SILTSTONE
	SHALE
x x x x x x	CLAYSTONE
	COAL
	LIMESTONE
	DOLOMITE
	MARLSTONE
	GYPSUM
	Other Sedimentary Rocks
	IGNEOUS ROCKS
	GRANITIC ROCKS
+ + + + + +	DIORITIC ROCKS
	GABBRO
	RHYOLITE
	ANDESITE
	BASALT
	TUFF & ASH FLOWS
	BRECCIA & Other Volcanics
	Other Igneous Rocks
	METAMORPHIC ROCKS
	GNEISS
	SCHIST
	PHYLLITE
	SLATE
	METAQUARTZITE
	MARBLE
	HORNFELS
	SERPENTINE
	Other Metamorphic Rocks

SYMBOLS & NOTES:

SYMBOL	DESCRIPTION
	9/12 Standard penetration drive Numbers indicate 9 blows to drive the spoon 12" into ground.
	ST 2-1/2" Shelby thin wall sample
	W_0 Natural Moisture Content
	W_x Weathered Material
Free water	Free water table
	γ^0 Natural dry density
	T.B. – Disturbed Bulk Sample
	② Soil type related to samples in report
15' Wx Form.	Top of formation
	Test Boring Location
	Test Pit Location
	Seismic or Resistivity Station. Lineation indicates approx. length & orientation of spread (S = Seismic, R = Resistivity)

Standard Penetration Drives are made by driving a standard 1.4" split spoon sampler into the ground by dropping a 140 lb. weight 30". ASTM test des. D-1586.

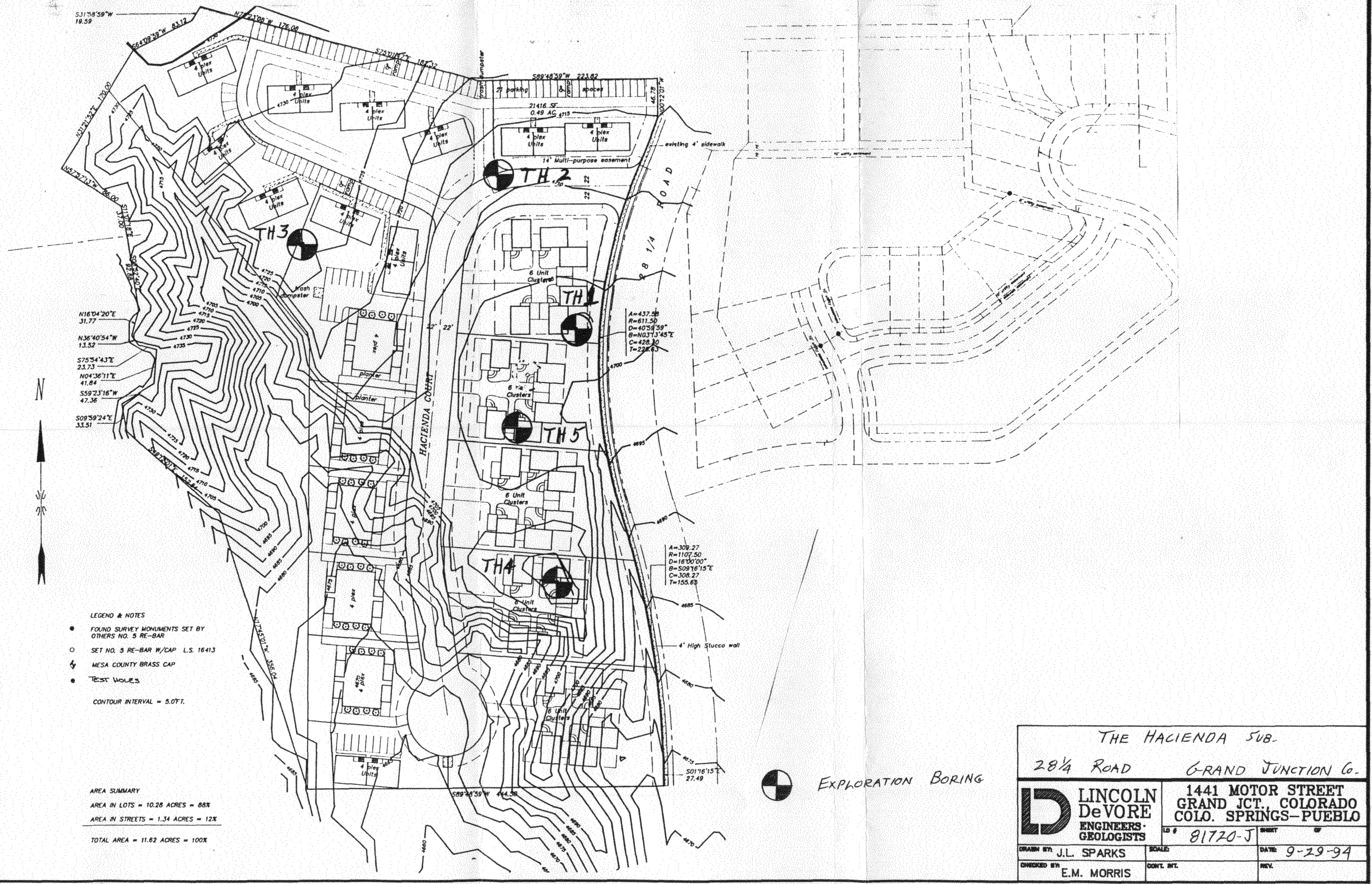
Samples may be bulk, standard split spoon (both disturbed) or 2-1/2" I.D. thin wall ("undisturbed") Shelby tube samples. See log for type.

The boring logs show subsurface conditions at the dates and locations shown, and it is not warranted that they are representative of subsurface conditions at other locations and times.

LINCOLN DeVORE INC.

COLORADO SPRINGS
PUEBLO – GRAND JUNCTION

EXPLANATION OF BOREHOLE LOGS AND LOCATION DIAGRAMS



THE HACIENDA SUB.

28 1/4 ROAD GRAND JUNCTION CO.

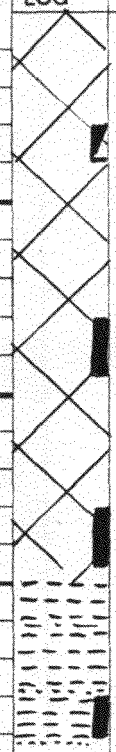
LINCOLN DeVORE ENGINEERS · GEOLOGISTS

1441 MOTOR STREET
GRAND JCT., COLORADO
COLO. SPRINGS—PUEBLO

LD # 81720-J		SHEET	OF
DRAWN BY J.L. SPARKS	SCALE:	DATE: 9-29-94	
CHECKED BY E.M. MORRIS	CONT. INT.	REV.	

BORING NO. 1

BORING ELEVATION:



DEPTH (FT.)	DESCRIPTION			BLOW COUNT	SOIL DENSITY pcf	WATER %
	Man-Made Fill	Dessicated Surface				
	Variable Density Fill	Some Compressive Strata				
	CL Silty Clay	Some Expansive Strata	ST		91.2	6.1%
5	I Low Plastic	Shale Fragments in Fill	5			
	Man-Made Fill	Slightly Moist				
		Increasing Density				
	CL Silty Clay					
	I Low Plastic	Expansive	CS	25/6	119.0	7.0%
10	**Man-Made Fill**		10	43/12		
	Firm, Stratified			60/18	122.3	7.4%
		Expansive				
		Increasing Density				
	CL Silty Clay	Increasing Moisture	CS	11/6	123.9	12.5%
15	I Low Plastic	Sulfates	15	28/12		
	Mancos Shale	Weathered Surface		57/18	119.4	13.1%
	Occ. Siltstone Strata	Expansive				
		Deacreasing Moisture				
	CL Silty Clay	Sandstone Strata	SPT	30/6		10.6%
20	I Low Plastic	Sl. Moist	20	80/12		
		Increasing Density				
	TD @ 19'					
25			25			
30			30			
	Blow Counts are cumulative for each					
	6 inches of sampler penetration.					
	NO Free Water					
	During Drilling 9-13-94					

LOG OF SUBSURFACE EXPLORATION

LINCOLN - DeVORE, Inc.

Grand Junction, Colorado

The HACIENDA Sub.
28-1/4 Rd. & Mantey Heights

JBI ASSOCIATES
Grand Junction, CO.

Date: 9-29-94

Job No.: 81720-J

Drawn: EMM

BORING NO. 2

BORING ELEVATION:

DEPTH (FT.)	SOIL LOG	DESCRIPTION		BLOW COUNT	SOIL DENSITY pcf	WATER %
		Man-Made Fill				
		Dessicated Surface				
		Variable Density Fill	Some Compressive Strata			
		CL Silty Clay	Some Expansive Strata	ST	126.0	4.2%
5		I Low Plastic		5		
		Man-Made Fill	Shale Fragments in Fill			
			Increasing Density Slightly Moist			
		CL Silty Clay	Low Plastic			
		I	Expansive	CS	19/6	118.8 10.0%
10		**Man-Made Fill**		10	66/12	
		Firm, Stratified	Shale Fragments in Fill		91/18	122.6 6.6%
		Mancos Shale	Expansive			
		Occ. Siltstone Strata	Weathered Surface			
		CL Silty Clay	Increasing Moisture	CS	27/6	113.8 13.0%
15		I Low Plastic	Sulfates	15	82/12	
		Increasing Density	Increasing Density		149/18	
		Occ. Siltstone Strata	Expansive			
		CL	Deacreasing Moisture			
		I Thin Sandstone Strata				
20				20		
		TD @ 19'				
25				25		
30				30		

Blow Counts are cumulative for each 6 inches of sampler penetration.

NO Free Water During Drilling 9-13-94

LOG OF SUBSURFACE EXPLORATION

LINCOLN - DeVORE, Inc.

Grand Junction, Colorado

The HACIENDA Sub.
28-1/4 Rd. & Mantey Heights

JBI ASSOCIATES
Grand Junction, CO.

Date: 9-29-94

Job No.: 81720-J

Drawn: EMM

BORING NO. 3

BORING ELEVATION:

DEPTH (FT.)	SOIL LOG	DESCRIPTION			BLOW COUNT	SOIL DENSITY pcf	WATER %
		Mancos Shale	Dessicated Surface				
		Sulfates	Weathered Surface	Brown			
		CL Silty Clay	Decreasing Moisture	CS	28/6	123.7	7.8%
5		I Low Plastic	Increasing Density	5	63/12		
		Sandstone Strata	Moist				
		Gray-Brown	Low Density				
		CL Silty Clay	Sulfates				
		I Low Plastic	Expansive	ST		116.3	5.6%
10		Fractured	Occ. Siltstone Strata	10			
		Firm, Stratified					
		Gray-Black	Very Hard to Drill				
		Decreasing Moisture					
			Some Blocky Strata	ST		117.0	6.1%
15		CL Low Plastic	Sulfates	15			
		I Silty Clay					
			Expansive				
		Very Hard to Drill	Occ. Siltstone Strata				
			Fractured	CS	47/6	114.4	4.3%
20		I Low Plastic	Sl. Moist	20	138/12		
		CL Silty Clay	Increasing Density				
			Gray-Black				
		TD @ 21'					
25				25			
30				30			

Blow Counts are cumulative for each 6 inches of sampler penetration.

NO Free Water During Drilling 9-13-94

LOG OF SUBSURFACE EXPLORATION

LINCOLN - DeVORE, Inc.

Grand Junction, Colorado

The HACIENDA Sub.
28-1/4 Rd. & Mantey Heights

JBI ASSOCIATES
Grand Junction, CO.

Date: 9-29-94

Job No.: 81720-J

Drawn: EMM

BORING NO. 4

BORING ELEVATION:

DEPTH (FT.)	SOIL LOG	DESCRIPTION				BLOW COUNT	SOIL DENSITY pcf	WATER %
		Mancos Shale	Dessicated Surface					
		Sulfates	Weathered Surface	Brown				
		CL Silty Clay		Decreasing Moisture	ST		123.7	7.8%
5		I Low Plastic	Increasing Density	Sl. Moist	5			
		Expansive	Gray-Brown					
			Low Density					
		CL Silty Clay	Sulfates					
		I Low Plastic			ST		116.3	5.6%
10		Fractured	Occ. Siltstone Strata		10			
		Firm, Stratified	Some Blocky Strata					
		Gray-Black						
		Decreasing Moisture						
			Very Hard to Drill		CS	44/6	113.1	4.2%
15		CL Low Plastic	Sulfates		15	130/12	122.1	4.5%
		I Silty Clay	Sandstone Strata					
			Expansive					
		Very Hard to Drill						
		Occ. Siltstone Strata	Gray-Black	Fractured	SPT	47/6	No	
20		I Low Plastic	Sl. Moist		20	138/12	Sample	
		CL Silty Clay		Increasing Density			Recovery	
		TD @ 29'						
25					25			
30					30			
		Blow Counts are cumulative for each 6 inches of sampler penetration.						
		NO Free Water During Drilling 9-13-94						

LOG OF SUBSURFACE EXPLORATION

The HACIENDA Sub.
28-1/4 Rd. & Mantey Heights

LINCOLN - DeVORE, Inc.

Grand Junction, Colorado

JBI ASSOCIATES
Grand Junction, CO.

Date: 9-29-94

Job No.: 81720-J

Drawn: EMM

BORING NO. 5

BORING ELEVATION:

DEPTH (FT.)	SOIL LOG	DESCRIPTION		BLOW COUNT	SOIL DENSITY pcf	WATER %
		Man-Made Fill — Dessicated Surface				
		Variable Density Fill — Some Compressive Strata				
	CL	Silty Clay — Some Expansive Strata	ST		110.2	15.8%
5	I	Low Plastic — Shale Fragments in Fill	5			
		Man-Made Fill — Moist				
		Low Density				
	CL	Silty Clay				
	I	Low Plastic — Compressive	CS	8/6	106.2	16.6%
10		**Man-Made Fill**	10	16/12		
		Firm, Stratified — Increasing Moisture		24/18		
		Expansive		34/24	115.4	14.4%
		Increasing Density				
		Mancos Shale	CS	35/6	128.4	10.4%
15	CL	Low Plastic — Sulfates	15	91/12		
	I	Silty Clay — Weathered Surface				
		Occ. Siltstone Strata — Expansive				
		Very Hard to Drill — Deacreasing Moisture				
	CL	Silty Clay — Sandstone Strata	SPT	38/6		9.3%
20	I	Low Plastic — Sl. Moist	20	75/12		
		Increasing Density				
		TD @ 19'				
25			25			
30			30			

Blow Counts are cumulative for each 6 inches of sampler penetration.

NO Free Water During Drilling 9-13-94

LOG OF SUBSURFACE EXPLORATION

LINCOLN - DeVORE, Inc.

Grand Junction, Colorado

The HACIENDA Sub.
28-1/4 Rd. & Mantey Heights

JBI ASSOCIATES
Grand Junction, CO.

Date: **9-29-94**

Job No.: **81720-J**

Drawn: **EMM**

SUMMARY SHEET

Soil Sample SILTY CLAY (CL) MANCOS SHALE Test No. 81720-J

Location THE HACIENDA, GRAND JUNCTION Date 9-29-94
Boring No. 3 Depth 8'
Sample No. I Test by JLS

Natural Water Content (w) 6.5 %
Specific Gravity (Gs) 2.67 In Place Density (γ_o) 116.3 pcf

SIEVE ANALYSIS:

Sieve No.	% Passing
1 1/2"	
1"	
3/4"	
1/2"	100
4	97
10	93
20	90
40	83
100	78
200	69

HYDROMETER ANALYSIS:

Grain size (mm)	%
.02	57
.005	31

Plastic Limit P.L. 35 %
Liquid Limit L. L. 21 %
Plasticity Index P.I. 14 %
Shrinkage Limit ____ %
Flow Index ____
Shrinkage Ratio ____ %
Volumetric Change ____ %
Lineal Shrinkage ____ %

MOISTURE DENSITY: ASTM METHOD

Optimum Moisture Content - w_o ____ %
Maximum Dry Density - γ_d ____ pcf
California Bearing Ratio (av) ____ %
Swell: 1 Days 3.2 %
Swell against 1350 psf Wo gain 11.3 %

BEARING:

Housel Penetrometer (av) 5000+ psf
Unconfined Compression (qu) ____ psf
Plate Bearing: ____ psf
Inches Settlement ____
Consolidation ____ % under ____ psf

PERMEABILITY:

K (at 20°C) ____
Void Ratio ____

Sulfates 1500 ppm.

SOIL ANALYSIS

LINCOLN-DeVORE TESTING LABORATORY
COLORADO SPRINGS, COLORADO

SOIL EXPANSION TEST

SAMPLE	1 @ 8'	1 @ 13'	2 @ 3'	2 @ 8'
INITIAL MOISTURE (%)	9.5	8.1	10.5	6.6
FINAL MOISTURE (%)	18.1	21.6	22.6	16.3
INITIAL DENSITY (PCF)	118.9	106.2	100.4	122.6
CHANGE IN HEIGHT (%)	1.8%	2.5%	0.5%	4.1%
CONFINING PRESSURE (PSF)	735	980	205	1260

SAMPLE	2 @ 13'	3 @ 8'	4 @ 3'	5 @ 3'
INITIAL MOISTURE (%)	13.0	5.6	8.5	15.8
FINAL MOISTURE (%)	17.9	16.9	17.9	19.0
INITIAL DENSITY (PCF)	113.8	116.3	113.1	110.2
CHANGE IN HEIGHT (%)	0.3%	3.2%	5.0%	1.9%
CONFINING PRESSURE (PSF)	95	1350	2040	585

NICHOLS ASSOCIATES, INC.
751 Horizon Court, Suite #102
P.O. Box 60010
Grand Junction, Colorado 81506

30-September-1994

CITY OF GRAND JUNCTION
GRAND JUNCTION, COLORADO

Ladies and Gentlemen:

Please find enclosed a preliminary drainage report for the proposed Hacienda development.

I hereby certify that this report was prepared under my direct supervision.

Terry Nichols
Registered Professional Engineer.
State of Colorado, Number 12093

I. GENERAL DESCRIPTION AND LOCATION

A. Site and Major Basin Location

The Hacienda is a proposed residential housing development to be built near the southwest corner of $28^1/_4$ and F Roads. The property is bounded on the east by $28^1/_4$ Road; on the south by a thin strip of undeveloped land bordering the Grand Valley Canal; on the north by Community Care of America of Grand Junction (CCA); and the property immediately to the west is developed and part of the area locally known as Mantey Heights. The property east of $28^1/_4$ Road is the development known as The Falls.

B. Site and Major Basin Description

The property has an area of 11.62 acres. Ground cover is comprised of scattered native grasses. The soils in the major basin and the site consists of low plastic silty clays and clay silts which are derived from the Mancos Shale Formation. All the soils on the site were found to consist of mancos shale or the weathered products of mancos shale. Some areas on the site consist of 15 feet of man made fill originating from similar soils. Surface drainage is fair to good and subsurface drainage is fair to poor.

II EXISTING DRAINAGE CONDITIONS

A. Major Basin

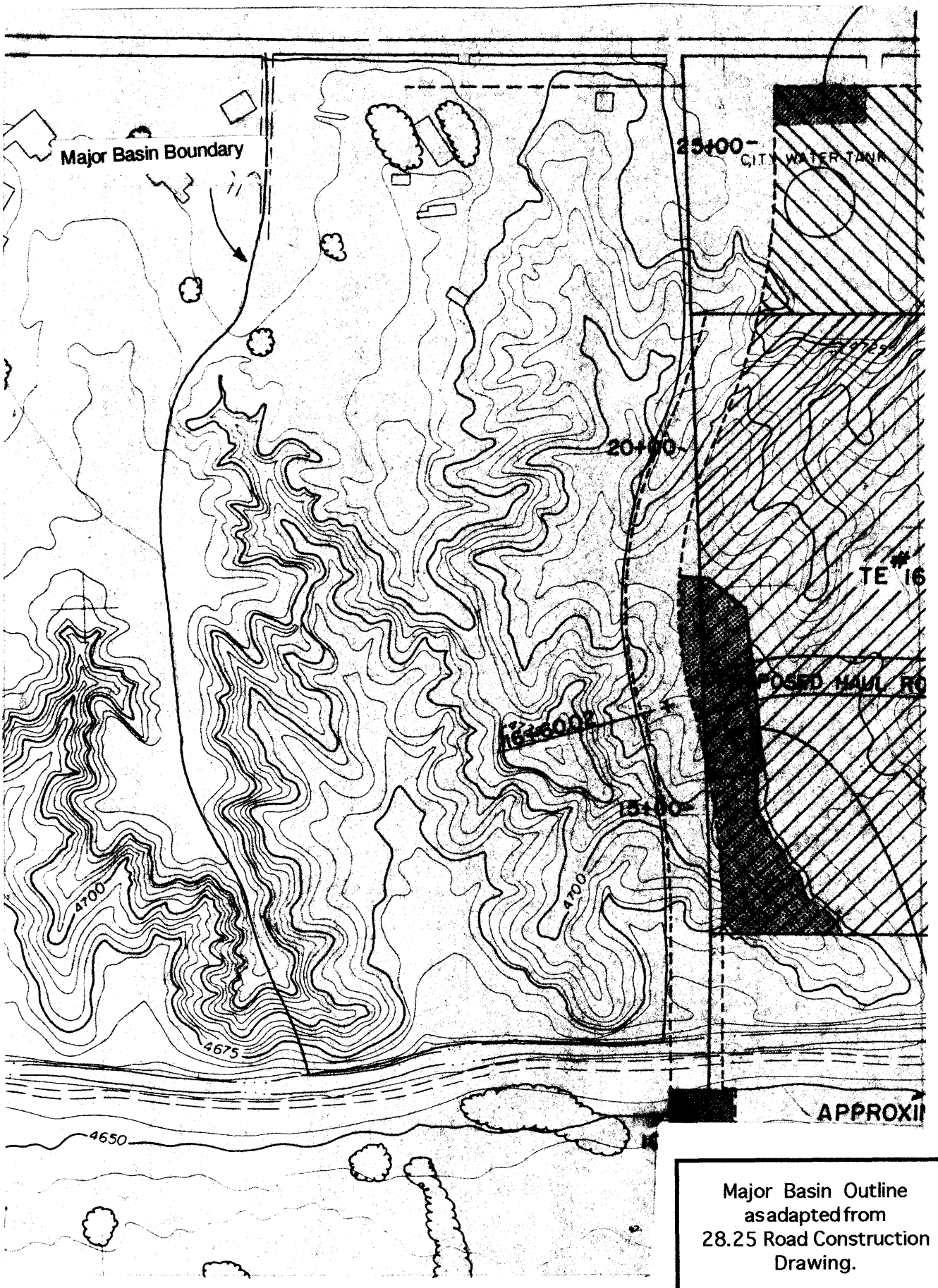
The topography of the major basin is that of moderate to steep hillsides as shown on Figure 1. The major basin generally slopes to the south from a high elevation of 4730 feet in the northwest corner to the Grand Valley Canal at the south with an elevation of 4660 feet. A natural drainage pathway borders the property on the west. The drainage is approximately 200 feet wide at its widest location near the canal and approximately 1100 feet long, extending north from the canal towards F Road. Relief in the drainage is as large as 70 feet. The major basins more mild sloping grades tend to slope from northwest to southeast toward a ditch bordering the sidewalk at $28\frac{1}{4}$ Road. Historically, all runoff drains into the Grand Valley Canal and there are no wetlands on the property.

The property as well as the major basin are zoned X (i.e. outside of the 500 year floodplain) by the National Flood Insurance Program. Though the Flood Insurance Rate Maps (FIRM) do not necessarily identify all areas subject to flooding, no local features have been identified to suggest the FIRM is incorrect.

B. Site

Drainage patterns for the site are similar to those described for the major basin. The only upstream contributions of runoff onto the property is produced from the north at CCA and discharged as sheet flow along the northern limit of

Figure 1



Major Basin Outline as adapted from 28.25 Road Construction Drawing.

the proposed development. Since runoff has historically been discharged into the Grand Valley Canal, there are no effects of runoff from the site to downstream subbasins.

III. PROPOSED DRAINAGE CONDITIONS

A. Changes in Drainage Patterns

Drainage patterns in the major basin and the proposed development will be affected by completion of the proposed development in several aspects as follows:

- Increases in peak flows are expected
- Runoff will be channeled and diverted through engineered structures.
- Runoff will be diverted and detained with discharge flows at or near historical flows

B. Maintenance Issues

The developer is planning to retain ownership of the property and will assume responsibility of maintaining the drainage system. Drainage appurtenances will be located within designated easements.

IV. DESIGN CRITERIA & APPROACH

A. General Considerations

Master planning issues are limited in scope due to the planned discharge into the canal and the absence of downstream subbasins. The criteria affecting master planning are the same criteria driving the requirements to submit a drainage report.

The most obvious site consideration was placement of the detention pond. The size of the proposed development governs the quantity of the water to be detained. The obvious detention basin area is near the outfall into the canal but this placement also minimizes the slope of the discharge conveyance structure. The offsite inflow and approximately one third of the site drainage will be diverted through an existing storm sewer located onsite to an existing detention area east of $28\frac{1}{4}$ road in The Falls subdivision.

B. Hydrology

Design storm durations will conform with Table VI-2 of the City of Grand Junction Storm Water Management Manual (SWMM). Rainfall intensity information will also be obtained from the SWMM without adjustment for basin area. Runoff calculations will be performed using either the Rational Method or the SCS-Unit Hydrograph Method as calculated by the HEC-1 modeling program. Detention basin design will be accomplished by the manual calculation procedures as outlined in the SWMM or HEC-1 compatible models (i.e. HEC-2 or the EPA Storm Water Management Model). Input parameters

for the modeling programs will be chosen in accordance with the procedures as outlined in the SWMM and as recommended in the modeling manuals. Alternate approximate design calculations will be performed to support the analysis. Though the alternate calculations will not produce results of design quality, they can be used to compare orders of magnitude of results to support design calculations.

C. Hydraulics

Hydraulic calculations and methods will follow those recommended in the SWMM. Parameter selection will be in accordance with standard engineering practices for the materials chosen for inlets, conveyance, and outlets. Design calculations will be completed manually.

Grand Junction Community Development Department
Planning • Zoning • Code Enforcement
250 North Fifth Street
Grand Junction, Colorado 81501-2668
(303) 244-1430 FAX (303) 244-1599

October 7, 1994

William Ihrig
JBI Associates
2324 N. Seville Circle
Grand Junction, CO 81506

Dear Mr. Ihrig,

This letter is a follow-up to our conversation yesterday regarding the zoning of your property on 28 1/4 Rd. south of F Road (our file #164-94). Our records indicate that the zoning designation (approved in 1973) for the parcel is PD-8 (Planned Unit Development) with the density of an R-1-B zone district (one-family residence zone, min lot size 9,000 sq. ft. w/cluster option).

The plans which you have submitted are for multi-family residences at a density of eight (8) units per acre. Both the housing type and proposed density are not permitted under the existing zoning. Development of the property at any density greater than permitted under the existing zoning would require a resubmittal with a rezoning application.

At this time we are pulling the application from the November Planning Commission agenda. As per your request, we will be refunding your application fees and will contact the Colorado Geological Survey to inform them not to process your application.

If you wish to further discuss zoning and/or development proposals for this property, please feel free to call me.

Sincerely yours,

Michael T. Drollinger
Senior Planner

164-94

FILE COPY

MEMO

To: Marcia Petering
From: Michael Drollinger
Re: 164-94 - The Hacienda
Date: October 12, 1994

This item has been pulled from the November Planning Commission agenda and must be resubmitted to be heard again. The petitioner would like the application fees for this item refunded. Please begin the refund process. I have attached a copy of the receipt for application fees (in the amount of $810). Thank you.

Grand Junction Community Development Department
Planning • Zoning • Code Enforcement
250 North Fifth Street
Grand Junction, Colorado 81501-2668
(303) 244-1430 FAX (303) 244-1599

October 17, 1994

William Ihrig
JBI Associates
2324 N. Seville Circle
Grand Junction, CO 81506

Dear Mr. Ihrig,

Enclosed is your check made out to the Colorado Geological Survey in the amount of $595 which was returned as per our request for the 28 1/4 Road project. Your application fee refund has also been processed and should be returned to you shortly.

Please feel free to contact me should you have any questions.

Sincerely yours,

Michael T. Drollinger
Senior Planner

· check enclosed

164-943

MEMO

To: Dan Wilson
From: Michael Drollinger
Re: Property adjacent to "Bethesda" (now known as Community Care of America)
Date: November 9, 1994

This memo serves to summarize my research and involvement with the subject property (Tax parcel number 2943-072-12-001), located on 28 1/4 Road south of Patterson Road. A development proposal for this property was submitted in October by Mr. William Ihrig of JBI Associates. The proposed subdivision, known as "The Hacienda" was to consist of a mix of 4-plex and 6-unit attached clusters with 94 units total. I was the planner responsible for the review of the Preliminary Major Subdivision review. The petitioner had a preapplication conference (as required) at an earlier date with Tom Dixon, at which I was not in attendance.

As with each application I review, I started by looking at the proposal and evaluating it with regard to consistency with zoning. Both the zoning map and materials submitted by the petitioner indicated that this was a "PR-8" zone. Being it was a planned zone, I researched the issue further to determine what zoning standards and/or plan had been approved by the Planning Commission and City Council when the property was originally rezoned. I looked in our "zoning history" book which lists the ordinance numbers for all zoning by parcel in the City. I soon found the Ordinance (#1470). The ordinance indicated that the property in question (including the nursing home) was rezoned to PD-8 (Planned Unit Development). Based on the fact that the designation was "PD-8" and not "PR-8" as indicated on the zoning map and given that no specific density was noted in the ordinance, I decided I needed to look into this further to find both the approved density and an approved plan (if any). I believe that the PD-8 was transcribed to PR-8 at some point when the zoning map was updated (unintentional error).

Further research into the Planning Commission minutes revealed that the PD-8 zoning was initially intended for the nursing home site only, but as a result of Planning Commission's concerns (which are clearly expressed in the minutes of July 25, 1973 and August 29, 1973 - which are attached FYI). I also was able to locate the file (#28-73 - also attached FYI) which contained a chronology prepared by staff which further confirmed my initial research - that the Planning Commission recommended to Council approval of a PD-8 zoning designation **but** with an R-1-B density on the south parcel (the subject property). As you can see by the attached zoning ordinance, the R-1-B zone was a single family residential zone. Also, the records indicate that Council approved this designation (the Council minutes which I reviewed do not indicate any discussion on this item - only a motion for approval).

Mr. Ihrig was notified of this situtation and that any development to other than the R-1-B density would require an application for rezoning. Mr. Carnes was also informed of this situation. A letter was send to Mr. Ihrig on October 17th to confirm the facts and inform Mr. Ihrig that his application as submitted would require a rezoning. Mr. Ihrig received a refund of his application fees.

I have taken the time to attach copies of the most relevent documents to this memo which the

most pertinant items highlighted. If I can be of further assistance on this item please do not hesistate to let me know.

Michael D.

City of Grand Junction, Colorado
250 North Fifth Street
81501-2668
FAX: (303) 244-1599

December 10, 1994

Joseph C. Coleman
Attorney at Law
P. O. Box 2207
Grand Junction, CO 81502

Dear Joe:

As I mentioned yesterday, our research is that "PR-8" is an error; it should be "PD-8." The reason for that statement is there is no evidence in the record for allowing eight (8) units per acre, but there is substantial evidence that the approximately five (5) units per acre density was specifically discussed.

The sum of all evidence that we have found to date is enclosed. Michael Drollinger is the staff planner who performed the research.

It also appears that any development would require an updated plan to be proposed even at the five (5) units per acre.

As you know, given this available information, any increase in density would require that a rezoning application be submitted (see, the enclosed letter to Mr. Ihrig from Michael Drollinger).

I would be happy to discuss this matter further with you.

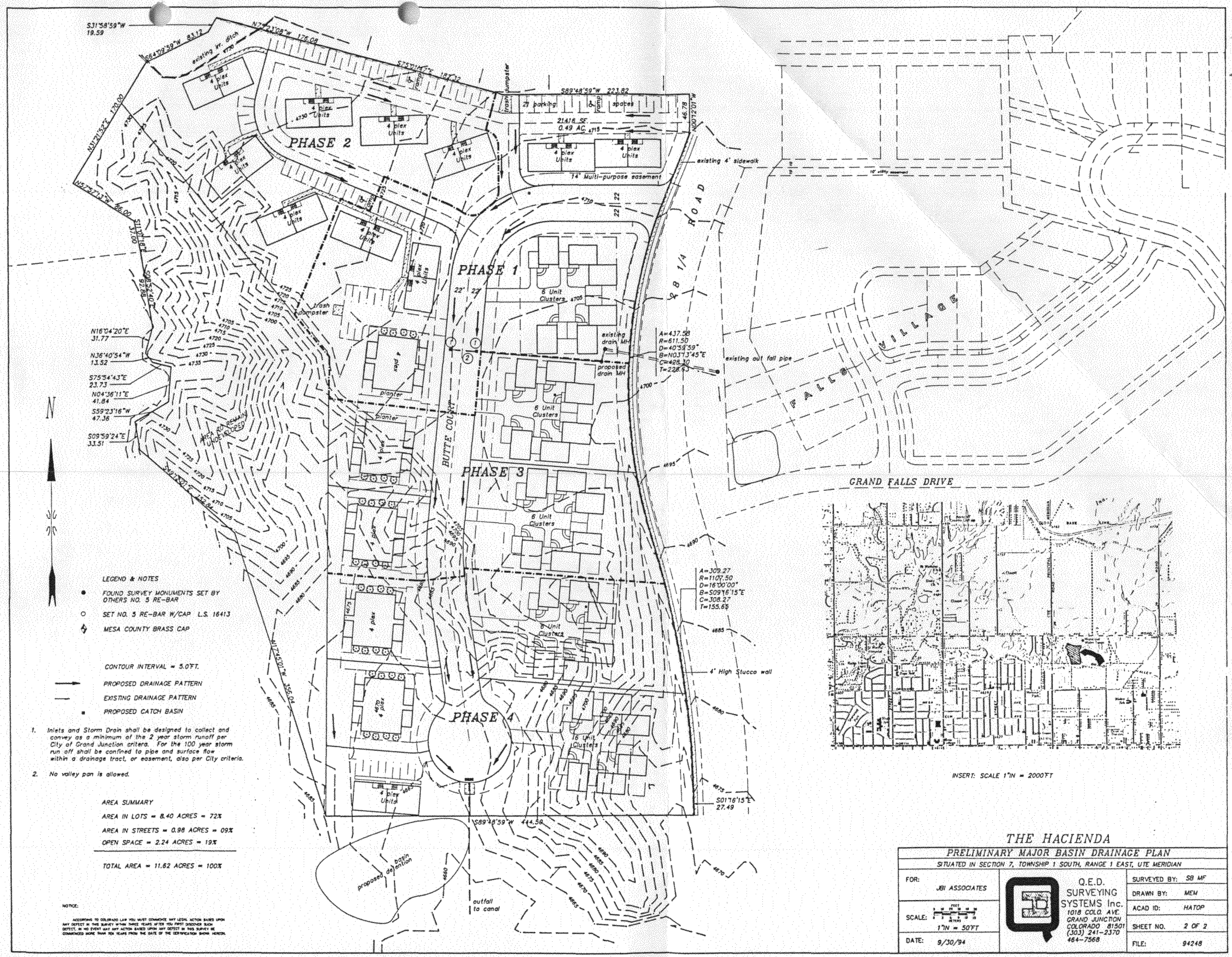
Very truly yours,

Dan E. Wilson
City Attorney

c: Michael Drollinger, Senior Planner

Enclosed: Ordinance 1470
July 25, 1973 Planning Commission minutes (2 pages)
August 29, 1977 Planning Commission minutes (2 pages)
Staff notes dated 6/5/73 (1 page)
Copy of R-1-B zoning code (3 pages)
October 7, 1994 letter from M. Drolliger to W. Ihrig

Original Received
JUN 1994
MESA COUNTY
PLANNING DEPT.



INSERT: SCALE 1"IN = 2000'FT

LEGEND & NOTES

- ● FOUND SURVEY MONUMENTS SET BY OTHERS NO. 5 RE-BAR
- ○ SET NO. 5 RE-BAR W/CAP L.S. 16413
- ⚡ MESA COUNTY BRASS CAP

CONTOUR INTERVAL = 5.0'FT.

PROPOSED DRAINAGE PATTERN

EXISTING DRAINAGE PATTERN

PROPOSED CATCH BASIN

1. Inlets and Storm Drain shall be designed to collect and convey as a minimum of the 2 year storm runoff per City of Grand Junction critera. For the 100 year storm run off shall be confined to pipe and surface flow within a drainage tract, or easement, also per City criteria.
2. No valley pan is allowed.

AREA SUMMARY

AREA IN LOTS = 8.40 ACRES = 72%

AREA IN STREETS = 0.98 ACRES = 09%

OPEN SPACE = 2.24 ACRES = 19%

TOTAL AREA = 11.62 ACRES = 100%

NOTICE:

ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON.

THE HACIENDA

PRELIMINARY MAJOR BASIN DRAINAGE PLAN

SITUATED IN SECTION 7, TOWNSHIP 1 SOUTH, RANGE 1 EAST, UTE MERIDIAN

FOR: JBI ASSOCIATES	Q.E.D. SURVEYING SYSTEMS Inc. 1018 COLO. AVE. GRAND JUNCTION, COLORADO 81501 (303) 241-2370 464-7568	SURVEYED BY: SB MF
SCALE: 1"IN = 50'FT		DRAWN BY: MEM
DATE: 9/30/94		ACAD ID: HATOP
		SHEET NO. 2 OF 2
		FILE: 94248