FEE $	10.00
TCP $	1000.00
SIF $	292.00

PLANNING CLEARANCE

(Single Family Residential and Accessory Structures)

Community Development Department

BLDG PERMIT NO.

Building Address 2068 Baseline Rd G.J.

Parcel No. 2697-354-51-002

Subdivision Independence Ranch

Filing 10 Block 2 Lot 2

OWNER INFORMATION:

Name Brian Fisher

Address 413 Smallwood Lane

City / State / Zip Clifton, Co 81520

APPLICANT INFORMATION:

Name Brian Fisher

Address 413 Smallwood

City / State / Zip Clifton, Co 81520

Telephone 970-216-7351

No. of Existing Bldgs 0 No. Proposed 1

Sq. Ft. of Existing Bldgs 0 Sq. Ft. Proposed Approx 3366 Sq. Ft

Sq. Ft. of Lot / Parcel Approx 18,744 Sq Ft

Sq. Ft. Coverage of Lot by Structures & Impervious Surface (Total Existing & Proposed) Approx 3300 Sq Ft

Height of Proposed Structure Approx [redacted] 25'

DESCRIPTION OF WORK & INTENDED USE:

- [X] New Single Family Home (*check type below)
- [ ] Interior Remodel [ ] Addition
- [ ] Other (please specify):

*TYPE OF HOME PROPOSED:

- [X] Site Built [ ] Manufactured Home (UBC)
- [ ] Manufactured Home (HUD)
- [ ] Other (please specify):

NOTES: Single Family Home

REQUIRED: One plot plan, on 8 1/2" x 11" paper, showing all existing & proposed structure location(s), parking, setbacks to all property lines, ingress/egress to the property, driveway location & width & all easements & rights-of-way which abut the parcel.

THIS SECTION TO BE COMPLETED BY COMMUNITY DEVELOPMENT DEPARTMENT STAFF

ZONE PD

SETBACKS: Front 25' from property line (PL)

Side 10' from PL Rear 50' from PL

Maximum Height of Structure(s)

Voting District A

Driveway Location Approval PAD 5-23-05 EJ (Engineer's Initials)

Maximum coverage of lot by structures

Permanent Foundation Required: YES X NO

Parking Requirement 2

Special Conditions Geotechnical investigation observation & analysis required by a professional Engineer

Modifications to this Planning Clearance must be approved, in writing, by the Community Development Department. The structure authorized by this application cannot be occupied until a final inspection has been completed and a Certificate of Occupancy has been issued, if applicable, by the Building Department (Section 305, Uniform Building Code).

I hereby acknowledge that I have read this application and the information is correct; I agree to comply with any and all codes, ordinances, laws, regulations or restrictions which apply to the project. I understand that failure to comply shall result in legal action, which may include but not necessarily be limited to non-use of the building(s).

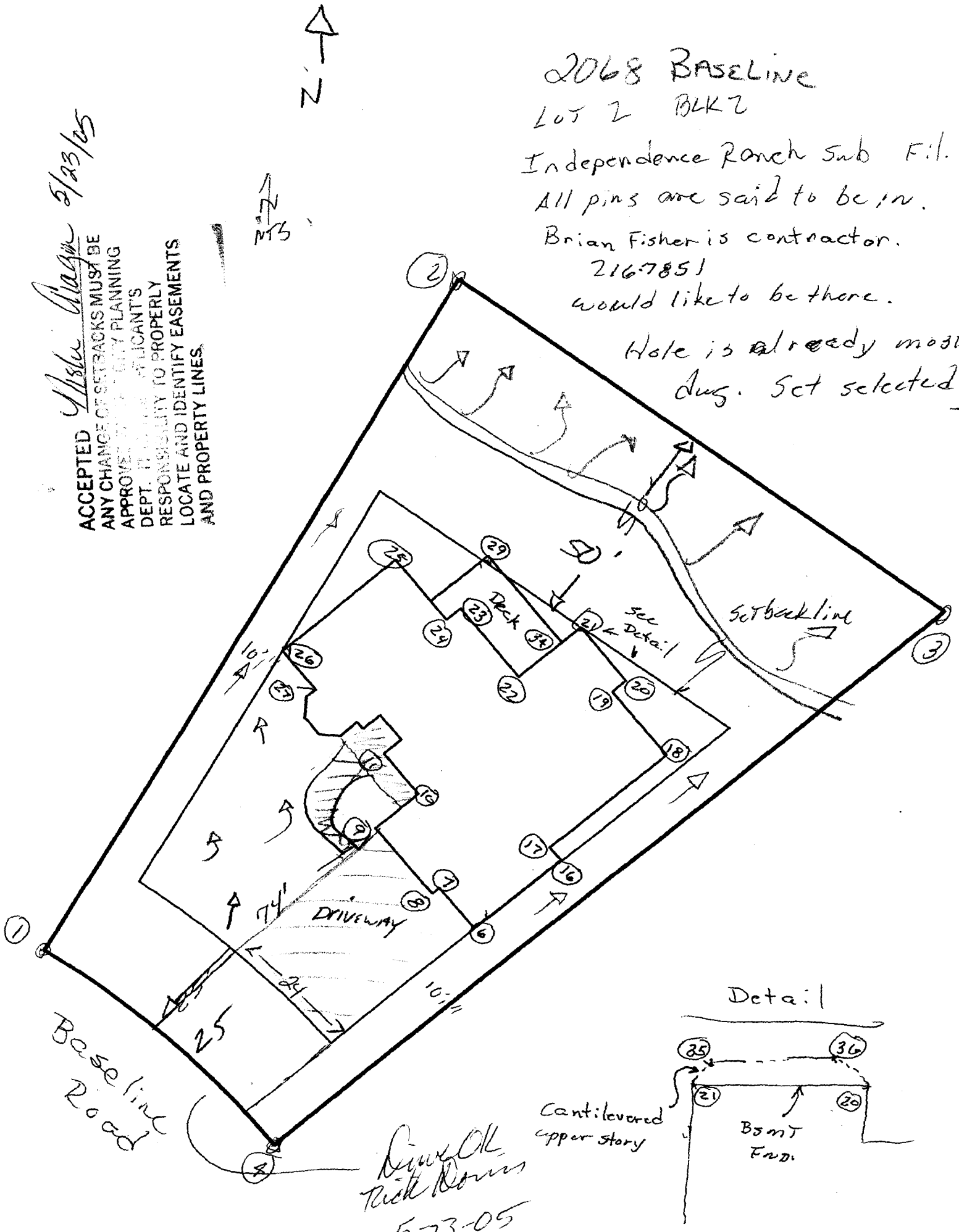
Applicant Signature [signature] Date 5-2-05

Department Approval Kristen Prager Date 5-23-05

Additional water and/or sewer tap fee(s) are required:	YES	NO	W/O No. 18105
Utility Accounting [signature]		Date 5/23/05	

VALID FOR SIX MONTHS FROM DATE OF ISSUANCE (Section 2.2.C.1 Grand Junction Zoning & Development Code)

(White: Planning) (Yellow: Customer) (Pink: Building Department) (Goldenrod: Utility Accounting)


N
NTS
2068 BASELINE
LOT 2 BLK 2
Independence Ranch Sub Fil. 1C
All pins are said to be in.
Brian Fisher is contractor.
216-7851
would like to be there.
Hole is already mostly dug. Set selected c
ACCEPTED 5/23/05
ANY CHANGE OF SETBACKS MUST BE
APPROVED BY PLANNING
DEPT. APPLICANTS
RESPONSIBILITY TO PROPERLY
LOCATE AND IDENTIFY EASEMENTS
AND PROPERTY LINES.
Deck
See Detail
Setback line
10'
74'
DRIVEWAY
24'
10'
25
Baseline Road
Dave Ott
Rick Davis
5-23-05
Detail
Cantilevered upper story
Bsmt Fndn.

COMPOSITE SITE PLAN

AREA OF SPECIAL SLOPE STABILITY CONCERN. GEOTECHNICAL CONSULTANT MUST REVIEW LINCOLN-DEVORE BLUFF PLAN DATED 10/07/2002. BUILDING PLANS FOR THIS AREA MUST CONFORM TO FINDINGS LISTED IN THE LINCOLN DEVORE REPORTS DATED FEBRUARY AND MARCH 2003.

OPEN SPACE
30.705 ACRES

NOTE: A SLOPE STABILITY ANALYSIS IS REQUIRED FOR LOTS 6 & 9 BLOCK 1 PRIOR TO ISSUANCE OF A PLANNING CLEARANCES TO DETERMINE WHAT SLOPE REINFORCEMENT IS REQUIRED. THE SLOPE STABILITY ANALYSIS MUST BE REVIEWED AND APPROVED BY THE COLORADO GEOLOGICAL SURVEY.

OPEN SPACE
2.313 ACRES

EX. 8" SANITARY SEWER TO BE ABANDONED ALONG WITH EX. EASEMENT AFTER COMPLETION OF NEW 8" SANITARY SEWER LINE

EXISTING 8" SANITARY SEWER TO BE RECONSTRUCTED AND ABANDONED ALONG WITH EXISTING EASEMENT.

LEGEND

- PROJECT BENCHMARK
- PROPOSED STORM SEWER WITH CURB OPENING INLETS
- PROPOSED 8" SANITARY SEWER WITH MANHOLE — 8" SS
- EXISTING SANITARY SEWER WITH MANHOLE AS SHOWN — 8" SS
- PROPOSED WATER WITH VALVE, TEE, THRUST BLOCK AND FIRE HYDRANT — 8" W
- EXISTING WATERLINE — 12"W
- COMMON TRENCHED ELECTRIC, GAS, TELEPHONE AND CABLE — EGTC
- PROPOSED IRRIGATION LINE — 6"IRR
- EXISTING IRRIGATION LINE — 6"IRR
- UNDERDRAIN — 4"UD

NOTES:

LOTS 1 THRU 6, BLOCK 2, FILING 10 AND LOTS 2 THRU 6, BLOCK 1, FILING 11 WILL REQUIRE SITE AND STRUCTURE SPECIFIC GEOTECHNICAL INVESTIGATION, OBSERVATION AND ANALYSIS BY A COLORADO REGISTERED PROFESSIONAL ENGINEER PRIOR TO THE ISSUANCE OF A PLANNING CLEARANCE/BUILDING PERMIT.

ALL FOUNDATION AND CONSTRUCTION MUST BE IN ACCORDANCE WITH THE SOILS REPORT AND LETTERS FROM THE COLORADO GEOLOGICAL SURVEY ON FILE WITH THE COMMUNITY DEVELOPMENT DEPARTMENT AND THAT THE COLORDO REGISTERED PROFESSIONAL ENGINEER SHALL OBSERVE ALL SITE AND STRUCTURE CONSTRUCTION TO ASSURE COMPLIANCE.

OVERWATERING OF AREAS ADJACENT TO SLOPES CAN LEAD TO INSTABILITY. IRRIGATION SHOULD BE KEPT TO A MINIMUM IN THE AREAS OF SPECIAL SLOPE STABILITY CONCERN AS NOTED HEREON.

AREA SUMMARY	
FILING – 10	
LOTS (17)	6.90 ACRES
RIGHTS–OF–WAY	1.14 ACRES
TOTAL:	8.04 ACRES
FILING – 11	
LOTS (16)	6.33 ACRES
RIGHTS–OF–WAY	0.62 ACRES
TOTAL:	6.95 ACRES

LEGAL DESCRIPTION

LOT 2, BLOCK 3, INDEPENDENCE RANCH FILING 9, MESA COUNTY, COLORADO; ACCORDING TO THE PLAT ON FILE WITH THE MESA COUNTY CLERK OF RECORDER

UTILITIES WILL BE PROVIDED TO THE SITE BY THE FOLLOWING VENDORS

GAS AND ELECTRIC:	EXCEL ENERGY OF COLORADO
WATER:	UTE WATER CONSERVANCY DISTRICT
CABLE TELEVISION:	ATT BROADBAND
SANITARY SEWER:	CITY OF GRAND JUNCTION
TELEPHONE:	QWEST

BULK REQUIREMENTS

MIN. STREET FRONTAGE = 50'
MINIMUM LOT SIZE = SF
MAXIMUN BUILDING HEIGHT = 35'
SETBACKS:
FRONT = 25'
SIDE = 10'
REAR = 20'
REAR = 25' FOR LOTS BACKING OPENSPACE. LOTS 1 THRU 6, BLOCK 2, FILING 10; LOTS 2 THRU 9, BLOCK 1, FILING 11; LOTS 1 THRU 4, BLOCK 2, FILING 11.

50 0 25 50 100
(IN FEET)
1 inch = 50 ft.

PROJECT BENCHMARK
FOUND MCSM CENTER 1/4 CORNER SECTION 15, T. 11 S., R. 101 W., SIXTH P.M. ELEVATION 4630.07

COUNTY CLERK AND RECORDER'S CERTIFICATE

I hereby certify that this instrument was filed in the office of the Clerk and Recorder of Mesa County, Colorado, at 3:08 o'clock P. M. this 16th day of July, 2003, and is duly recorded in Plat Book No. 19, Page 370 as Reception No. 2134527, Drawer No. CC-15

Clerk and Recorder of Mesa County

Date

INITIAL ACCEPTANCE
COMMUNITY DEVELOPMENT DEPARTMENT – GRAND JUNCTION

Ronnie Edwards APA 7-7-03
Date

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1 - 800 - 922 - 1987
OR 534 - 6700 IN METRO DENVER
CALL 2 BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

REVISION	DATE	DESCRIPTION	BY
1	9/9/02	REVISED PER CITY COMMENTS	LMS
2	4/14/03	REVISED PER CITY COMMENTS (11/18/02)	crk
3	4/30/03	REVISED PER CITY COMMENTS (4/28/03)	BMW
			CHD
			JEL
			JEL
			JEL

CITY OF GRAND JUNCTION

HANS BRUTSCHE

INDEPENDENCE RANCH – FILINGS 10&11

THOMPSON-LANGFORD CORP.
ENGINEERS AND LAND SURVEYORS
529 25 1/2 RD., SUITE B210
GRAND JUNCTION, COLORADO
PH. (970) 243-8067
FAX (970) 241-2845
tlc@tlcwest.com

DRAWN BY: ims
CHECKED BY: JEL

DATE: 4/30/03
SCALE: Horiz. 1"=50'
Project No: 0296-013
SHEET NO: 1 OF 1

Lower Valley Engineering and Consulting, Inc.

623 Silver Plume Drive Fruita, Colorado 81521
Ph. (970) 858-2000 Fax(970) 858-2005

City of Grand Junction and
Mesa County Building Department
Grand Junction, Colorado

5-9-05

RE: PERMIT #
Proposed Residence at 2068 Baseline, Grand Junction, Colorado

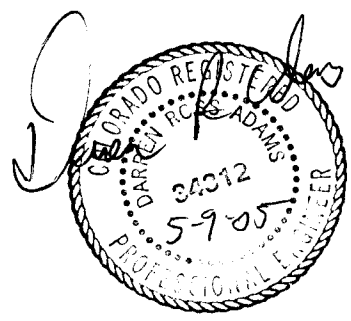
Building Department:

I have been retained by Fisher Construction to provide engineering services for the above referenced project. I have performed an open pit inspection and have verified that the site conditions were typical of the conditions cited in the Subsurface Soils Exploration report performed by Grand Junction Lincoln Devore Dated October 31, 1997. Additionally we have verified that the prepared soil bearing capacity is adequate to support the foundation that we designed.

Please contact me if there are any questions concerning this project.

Signed,

Darren R. Adams, P. E.



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Ph. (970) 858-2000 Fax(970) 858-2005

City of Grand Junction and
Mesa County Building Department
Grand Junction, Colorado

5-9-05

Proposed Residence at 2068 Baseline (Lot 2, Filing 10, Independence Ranch), Grand Junction, Colorado

Building Department:

I have been retained by Fisher Construction to provide foundation engineering services for the above referenced project. Attached please find exerpts from the Slope Stability Report prepared by Grand Junction Lincoln DeVore dated February 25, 2003. This report contains boring logs from 2 borings on lot 2 (Boring D3 and D4a) and one boring immediately adjacent to this lot (D4), the associated laboratory tests for the samples recovered and slope stability analysis for lot 2.

I have performed an open pit inspection and have verified that the site conditions were consistent of the conditions cited in this report, and have verified that the proposed structure will not adversely affect the slope stability as it is located well beyond the identified failure plane. Additionally we have verified that the prepared soil bearing capacity is adequate to support the foundation that we designed.

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GRAND JUNCTION
LINCOLN DeVORE, Inc.
GEOTECHNICAL ENGINEERS – GEOLOGISTS

1441 Motor St.
Grand Junction, CO 81505

TEL: (970) 242-8968
FAX: (970) 242-1561

February 25, 2003

Laughing Waters, LLP
15849 N. 71st St., Ste. 245
Scottsdale, AZ 85254

Re: SLOPE STABILITY STUDY

INDEPENDENCE RANCH SUBDIVISION, FILINGS 10 & 11

GRAND JUNCTION, CO

Dear Sir:

Transmitted herein are the results of a Slope Stability Study for the proposed Independence Ranch Subdivision, Filing 10 & 11, Grand Junction, CO.

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,

GRAND JUNCTION
LINCOLN DeVORE, INC.

COLORADO REGISTERED
EDWARD M. MORRIS
30590
2-25-03
PROFESSIONAL ENGINEER

By:
Edward M. Morris, P.E.
Principal Engineer

GJLD Job No. 89914-GJ

EMM/bw

TABLE OF CONTENTS

Lower Valley Engineering and Consulting, Inc.

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Ph. (970) 858-2000 Fax(970) 858-2005

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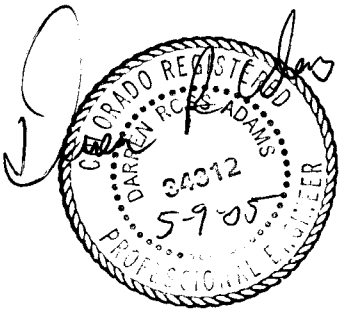

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Mesa County Building Department
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GRAND JUNCTION
LINCOLN DeVORE, INC.

By:
Edward M. Morris, P.E.
Principal Engineer

GJLD Job No. 89914-GJ

EMM/bw

TABLE OF CONTENTS

INTRODUCTION

PROJECT DESCRIPTION

This report presents the results of our geotechnical evaluation performed as related to the slope stability of the existing incised bank over looking the Colorado River and the bank at the medium sized gully between Canyon Creek, to the west and Limekiln Gulch, to the east. This subsurface exploration and laboratory testing was utilized as data for computations of slope stability which have been performed for the above referenced site. A vicinity map is included in the Appendix of this report.

To assist in our exploration, we were provided with electronic topographic mapping of the originally planned subdivision by Thompson Langford Corporation, Grand Junction, CO. The boring location plan attached to this report and the profiles utilized for slope stability computations are based upon this mapping.

We understand that the proposed construction along these lots will consist of one and possibly two story, wood framed single family residential structures, probably with full basements and concrete floor slabs on grade. Grand Junction Lincoln DeVore has not seen any building plans, but structures of this type typically develop wall loads on the order of 1000 to 2500 plf and column loads on the order of 5 to 20 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, Grand Junction 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 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.

Specifically, the intent of this study is to:

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 setback from the banks for the anticipated structures.

PREVIOUS GEOTECHNICAL REPORTS

This general area was the subject of a Subsurface Soils Exploration for the Independence Ranch Subdivision, Lincoln DeVore Job # 86356-J, 10-31-97. The majority of the exploration borings were placed in portions of this subdivision which now developed or are being constructed at this time. Test Borings TB-1, 77TB-4, 77TB-7, 77TB-9, 77R2 and 77R4 were in the general vicinity of this portion of the Independence Ranch Subdivision Building lots along the actual bluff edge in the vicinity of this current project were shown on the original base map provided to Lincoln DeVore by Thompson Langford Corporation in 1997. A Preliminary Building Setback Line was presented on the Boring Location Diagram.

FIELD EXPLORATION AND LABORATORY TESTING

A field evaluation was performed on 1-24-03 for initial subsurface exploration and 2-3-03 to 2-17-03 for detailed drilling and sampling. The field evaluation consisted of a site reconnaissance by our geotechnical personnel and the drilling of 11 shallow exploration borings. These 11 exploration borings were drilled within the proposed building areas 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. The exploration borings were also specifically situated to evaluate slope stability concerns on this site and to aid in establishing building set backs from the incised 'Colorado River Bank' and the Gully at the southeast side of Filing 11. Borings # 2 and #3 were drilled using a track mounted Dietrich T-50 rig with hollow stem auger to depths of 17 to 45 feet. All other exploration borings were drilled using a CME 45-B, truck mounted drill rig with continuous flight auger and hollow stem auger to depths of approximately 20 to 30 feet. Samples were taken with a standard split spoon sampler, thin-wall Shelby Tubes and by bulk methods. Logs describing the subsurface conditions are presented in the attached figures.

The following field sampling and testing were performed.

ASTM D-1586 Standard Penetration Testing (SPT) 1-5/8" id, unlined Split Spoon
ASTM D-1587 Thin-Walled Shelby Tube 2-1/2" id, Shelby Tube

The following laboratory tests were performed on representative soil samples to determine their relative engineering properties.

ASTM D-2487 Soil Classification
ASTM D-2435 One Dimensional Consolidation
ASTM D-4546 One Dimensional Swell or Settlement Potential for Cohesive Soils
ASTM D-3080 Direct Shear Strength, Cd
ASTM D-2937 In-Place Soil Density
ASTM D-2216 Moisture Content of Soil

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 soil density, moisture content and the standard penetration test values are presented on the attached drilling logs.

SITE DESCRIPTION

The project site is located in the southeast Quarter of Section 35, Township 1N, Range 2W of the Ute Principal Meridian, and the northeast portion of Section 15, Township 11S, Range 101W of the 6th Principle Meridian, Mesa County, Colorado. More specifically the site is bounded on the south and west by the developed the Independence Ranch Subdivision and on the northeast by the geologic flood plain of the Colorado River. The tract is approximately 3500' north of Colorado State Highway 340 (Broadway) and is accessed by20-½ Road, F-3/4 Road and then to Long Rifle Road.

The topography of the site is a relatively flat bench upon which the majority of the Independence Ranch Subdivision is located, with a moderately steep to steep hillside or bluff dropping to the north, northeast into the present flood plain of the Colorado River. This bluff ranges in height from 35 feet to 60 feet and is incised with one medium sized and several smaller sized gullies. . At the present time, the Colorado River is not flowing against the base of this bluff and the active river bank is approximately 500 to over 800 feet to the north. An abandoned channel is located approximately 250 to 300 feet from the toe of this bluff. At this time, significant realignment of the Colorado River is not anticipated, based upon controls on the river alignment at the Redlands Parkway Bridge, Interstate 70 and existing 'berms' at a sewage pump station on the south side and along abandoned gravel pits on the north side of the river.

The ground surface in the vicinity of this site has an over all gradient to the northeast. Some existing gullies are on the bank side and the subdivision development has been changing much of the site drainage, controlling it by the use of features associated with the newly constructed roads and an under ground

storm sewer system. Therefore, the exact direction of surface runoff on this site will be controlled to an extent by the proposed new construction and will be variable. The site runoff on these building lots on the northeast side of Long Rifle Drive and Raindance Court will be toward the northeast, except for the back portions of lots facing the gullies, which will drain into the gullies. Surface and subsurface drainage on this site would be described as fair to good after development.

The medium sized gully on the east side of Raindance Court has experienced significant erosion a few years ago. This erosion occurred during construction of the storm sewer outlet and will require the placement of a Mechanically Reinforced Structural Fill. The design of this structural fill is in progress. The Mechanically Reinforced Structural Fill will be placed on the east side of Lots 4, 5 and 6, Filing 11 and will have a maximum height of 30 feet high, at the face.

On-site erosion can be a significant problem if drainage and vegetation are not carefully controlled. Vegetation will probably be maintained in the immediate area around the building site, but special care should be taken to maintain vegetation on the 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 to be developed consist of fine grained alluvial/debris fan deposits of the Redlands Alluvium underlain by coarse grained sandy gravel and cobble of the Ancient Colorado River Terrace, which is underlain by the basal units of the Mancos Shale Formation which is part of

a very thick sequence of sedimentary rocks. The geologic and engineering properties of the materials found in our 8 exploration borings will be discussed in the following sections.

The surface soils on this site consist of a series of silty sands and gravelly sands which are a product of mud flow/debris flow features which originate on the north-facing slopes and canyons of the Colorado National Monument. These mud flow/debris flow features are a small part of a very extensive mud flow/debris flow complex along the base of The Colorado National Monument, extending across the Redlands Area and eventually to the Colorado River. Utilizing recent events and standard evaluation techniques, this tract is not considered to be within with an active debris flow hazard area.

The surface soils are an erosional product of the sandstones, mudstones and metamorphic Rock Formations which are exposed on the slopes of the Colorado National Monument. The soils contained within these mud flow/debris flow features normally exhibit a metastable condition which can range from very slight to moderate. Metastable soil is subject to internal collapse and is very sensitive to changes in the soil moisture content. Based on the field and laboratory testing of the soils on this site, the severity of the

metastable soils can be described as slight to moderate.

The surface soils on this site, in the building areas, was designated Soil Type I and was classified as a poorly graded silty sand (SP/SM) under the Unified Classification System. Some strata contained slight amounts of gravel. The Standard Penetration Tests ranged from 7 blows per foot to 14 blows per foot above the water table. Penetration tests of this magnitude indicate that the soil ranges from slight firm to firm and of low to medium density. The moisture content varied from 1.9% to 21.5%, indicating a relatively desiccated soil in some areas and saturated soil in the area of a free water surface. This material is generally nonplastic, of moderate to occasionally moderately high permeability, and was encountered in a low to medium density condition.

Soil Type II is also part of the Redlands Alluvium. These soils are a sandy lean clay (CL) and low plastic sandy silt (ML) under the Unified Classification System. These soils were encountered as thin strata, up to 4 inches thick.

The lower alluvial soils (Soil Type III) encountered on this site were classified as a poorly graded sandy gravel and cobble (GP-GM) of coarse grain size under the Unified Classification System. These soils represent the Ancient Colorado River Terrace and is generally mapped as the lower terrace upon the Redlands area. Direct, in-place density determinations could not be made but, probing of these soils indicate this soil is of medium density. The moisture content varied from 0.6% to 3.1% in the areas with no free water table. Sampling of these soils in the free water table proved to be very difficult due to flowing sands penetrating the hollow stem auger drill system during sampling. This soil is non plastic but is very sensitive to changes in moisture content. This soil will have virtually no tendency to expand upon the addition of moisture. Slight amounts of collapse of low density strata are possible if the soils are saturated.

The surface alluvial and debris fan soils are deposited over the dense formational material of the Mancos Shale of Cretaceous Age. The Mancos Shale is described as a thin bedded, drab, light to dark gray 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 low to moderate expansion potential. The formational shale was encountered in all test borings at approximately 18 to 19 feet deep. In addition, the Mancos Shale Formation was exposed in the deeper portions of the gully. The slopes along the 'river beak' are covered with colluvial soils, obscuring the Mancos Formation.

The exposed Mancos Shale Formation in the gullies and along the river bank indicated the 'softened to very softened zone' was relatively thin. The shale formation in the exploration borings proved to be very hard, with only a thin very 'softened zone' immediately beneath the erosional surface/contact with the overlying alluvial soils. Laboratory testing of the few good samples obtained indicated very high strengths, typical of soft rock shear strengths for argillaceous siltstone and silty shale. The excessive high strength values

were not utilized during our slope stability computations.

The soils of the weathered Mancos Shale Formation were designated Soil Type IV, V and VI and were classified as sandy lean clay (CL) under the Unified Classification System. The Standard Penetration Tests were often times in excess of 50 blows per foot. Penetration tests of this magnitude indicate the soft rock is stiff to very stiff and of medium to medium high density. Significant strata of argillaceous siltstone and some argillaceous sandstone were encountered throughout drilling. Exposures of the Mancos in the gully walls indicates the siltstone may comprise as much as 40% of the shale section, in the section above the gully base elevation. The moisture content varied from 4.5% in the very dense argillaceous siltstone strata to 17.3% in the very softened zone, beneath the water table, when encountered. The free water does not appear to have significantly penetrated into the Mancos Formation. This soil is plastic and is very sensitive to changes in moisture content. Upon increasing moisture, these soils will tend to expand. With subsequent decreased moisture, these soils will tend to shrink, with some cracking upon desiccation.

GROUND WATER

No free water was encountered during drilling across the majority of this site. These areas are generally quite high and the exploration borings were probably terminated above the free water level. Based upon test boring #3 and #7, the free water is within buried gullies in the erosional surface of the Mancos Formation. In our opinion the true free water surface is fairly deep in this area but, a perched water will develop in the alluvial soils as development continues.

Due to the proximity of the Mancos Shale Formation beneath the entire site, there exists a possibility of an additional perched water table developing in the alluvial (probably sandy gravel and cobble deposit) which overlie the Mancos Shale Formation. This perched water would probably be the result of increased irrigation due to the presence of lawns and landscaping and roof runoff.

While it is believed that under the existing conditions at the time of this exploration the initial 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.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL DISCUSSION

No geologic conditions were apparent during our reconnaissance which would preclude the site development, provided the recommendations contained herein are fully complied with. None of the planned building envelopes adjacent to the Colorado River bank will require minor adjustment based upon the results of our Subsurface Soils Exploration and Slope Stability Study. The building envelope on 3, filing will be somewhat restricted, due to slope stability concerns. The Mechanically Reinforced Structural Fill on Lots 5 and 6, Filing 11, will be restricted, due to slope stability concerns and the geometry of the fill placement. Based on our investigation to date and the knowledge of the proposed construction, the site condition which would have the greatest effect on the planned development are the unstable banks along the medium sized gully, along the east side of Filing 11.

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 Grand Junction 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. This observation will also determine if the final building placement is similar with the modeling parameters of the Slope Stability Study. If the materials below the proposed foundations differ from those encountered, are unstable, or in our opinion, are not capable of supporting the applied loads, additional recommendations could be provided at that time.

EXCAVATION & STRUCTURAL FILL

All earth work and grading for this site development should be accomplished in accordance with the grading recommendations contained in this soils report and Chapter 18 of the International Building Code (IBC). In addition, no additional fill or addition of material by grading is to be allowed within the Building Set Back Area from the Colorado River bank and the gullies. This Building Set Back is presented on the attached Boring and Setback Location Diagram of the Independence Ranch Subdivision. Cuts or removals of material within this Building Set Back are allowed and, encouraged, as long as surface drainage within in and adjacent to the set backs is improved over the native conditions at the time of our explorations. Any existing, uncontrolled man-made fills adjacent to the gullies may require removal and replacement or removal in entirety. Any man-made fills placed around new structures or roadways which are beyond the Building Set Back but, within 30 feet of the building set back shall be investigated by a Geotechnical Engineer

with regard to slope stability on both the site and the global condition of the Colorado River bank/slope or gully bank/slope. General, fills greater than 4 feet are strongly discouraged in the area within 30 feet of the Building Set Back, unless these fills have been previously modeled in the Slope Stability Study.

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 Grand Junction 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 near optimum moisture conditions and compacted to at least 90% of its maximum modified Proctor dry density [ASTM D-1557]. The moisture content of this material should be within + or - 2% of optimum moisture, as determined by ASTM D-1557.

Structural Fill Soil It appears that the majority of the material excavated from cut areas is suitable for reuse as structural fill. Material to be approved shall be free of deleterious matter and oversized hard rock. We recommend that no predominantly clayey soils or claystones be included in the structural fill.

Structural Fill In general, we recommend all structural fill in the area beneath any proposed structure or roadway be compacted to a minimum of 90% of its maximum modified Proctor dry density (ASTM D1557). We recommend that fill be placed and compacted at approximately its optimum moisture content (+/-2%) as determined by ASTM D 1557. Structural fill should be a granular, coarse grained, non-free draining, non-expansive soil. This structural fill should be placed in the overexcavated portion of 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 to obtain the final compaction 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 85% of its maximum modified Proctor dry density (ASTM D-1557).

Fill Limits To provide adequate lateral support, we recommend that any zones of over excavation extend at least 2 feet beyond the perimeter of any building or structural elements, on all sides. Any structural fill placed beneath residential structures should be a minimum of 2 feet in final compacted thickness, as indicated in the Foundations portions of this report.

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 Classification for excavation purposes on this site is Soil Class C for Soil Type I and II. Excavation into the Mancos Shale Formation is not anticipated.

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.

Preliminary site grading plan has been made available at the time of writing this report. The extent of proposed site grading and the proposed footing elevations is known. These grading recommendations are considered preliminary until Grand Junction Lincoln DeVore has had the opportunity to review the final site grading plans.

DRAINAGE AND GRADIENT

Adequate site drainage should be provided in the building foundation areas and in the mechanically Stabilized Structural Fill Area both during and after construction to prevent the ponding of water and the wetting or saturation of the subsurface soils. We recommend that the ground surface around the structures be graded so that surface water will be carried quickly away from the buildings. The minimum gradient within 10 feet of the building 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 at least 5 feet beyond all backfilled areas and discharged a minimum 10 feet away from the structure. **Proper discharge of roof drain downspouts may require the use of subsurface piping in some areas**. Under no circumstances should a 'dry well discharge'

be used on this site, unless specifically sited by a Geotechnical Engineer. Planters, if any, should be so constructed that moisture is not allowed to seep into foundation areas or beneath slabs or pavements.

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 the hydrologist or drainage engineer of record for this project monitor any modifications of the drainage plan for this site.

As automatic lawn irrigation systems are normally used on similar sites, we recommend that the sprinkler heads, irrigation piping and valves be installed no less than 5 feet from any 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 undesirable saturation of subsurface soils or backfilled areas. Several methods of irrigation water control are possible and, due to the slope stability concerns on this site, must be implemented.

* **Not provide a separate irrigation water system for the residences unless specifically controlled and metered for each individual site. Irrigation from either a metered irrigation or domestic water source is strongly recommended.**
* Sizing any 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.
* Incorporating 'xeriscaping' landscaping and irrigation techniques.

GRADING PLAN REVIEW

The grading plan for Filings 10 and 11, Composite Site Plan, 7-26-03, Project # 0296-013, provided by Thompson Langford Corp., indicate significant amounts of cut and regrading of the 'bluff' lots. In addition, some areas of fill are proposed. Grand Junction Lincoln DeVore has reviewed those plans and has incorporated the grading elevations into our slope stability computations. The proposed grading plan, as a whole, has been accomplished in general conformance with the previous and present grading and drainage recommendations for this subdivision which have been prepared by Grand Junction Lincoln DeVore. The drainage and gradient recommendations presented in this present report, will apply to both subdivision wide grading and individual lot grading.

EARTH RETAINING STRUCTURES

The active soil pressure for the design of earth retaining structures retaining less than 20 feet of soil, may be based on an equivalent fluid pressure of 40 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 50 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 350 pcf per foot of depth. The coefficient of friction for concrete to soil may be assumed to be 0.4 for resistance to lateral movement. When combining frictional and passive resistance, the latter must be reduced by approximately 1/3.

On a preliminary basis, soil strength values given on the enclosed Soil Analysis and Summary Sheets can be used for initial design of structures retaining more than 10 feet of soil.

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.

The use of Mechanically Stabilized Earth Slopes and 'Modular' type retaining structure facings is strongly recommended on the 'bluff lots' in Filing 10 and 11.

REACTIVE SOILS

Since groundwater in the Grand Junction area 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.

SEISMIC DATA

Utilizing the criteria of the 2000 International Building Code, Section 1615 and our interpretation of figures 1615(1) and 1615(2), Structures in Grand Junction, Colorado should be designed with

Special Response Acceleration factors, S_s=0.35 & S_1 = 0.08. Based upon our analysis of the soils which are expected to be present beneath the building foundations, the **Site Classification is D**. These values can be used to determine the **Values of Site Coefficient**, **F_a & F_v** from Tables 1615.1.2(1) & 1615.1.1(2), to calculate **Sms, Sm_1, Sps & SP1** and to determine the **Seismic Design Categories** from Tables 1616.3(1) and 1616.3(2).

SLOPE STABILITY

The slope areas immediately adjacent to the medium sized gully and portions of the Colorado River bank are considered to be potentially unstable due to the existing slope heights and steepness. A minimum Set Back line has been established between the proposed residential construction and the edge of the existing slope scarps. This line is shown on the Boring Location and Building Set Back Diagram.

It must be noted that many bank areas in the Redlands area, with similar geometry have been relatively stable for over 50 years, based upon existing building locations and interviews. The computations of Factors of Safety (FOS) indicate a 'degree of safety'. These computations do not produce any 'guarantees' that the slopes are as bad or as good as perceived. The use of Factors of Safety must be limited to assessing Relative Risk. Relative Risk must be applied to property owners (original and future), design professionals, utility/facility owners and others designated by Legislation.

The most significant areas of potentially unstable and unstable slopes are present along the gully on the east side of Lots 3, 4 and 5, Filing 11. Mitigation of these unstable areas will include, the observance of the Building Set Back indicated on the attached diagram, grading on these lots to remove some of the soils on the upper portion of the bank and, control of irrigation and drainage within this portion of the subdivision to reduce or prevent on going erosion of these banks.

Slope stability calculations were performed on the proposed graded slopes. The proposed graded slope profiles have been taken from a site grading plan prepared by Thompson Langford Corp., Grand Junction, CO. The proposed site grading incorporates areas of cut or soil removal adjacent to the medium depth gully. The amount of material removed is considered to be adequate by Grand Junction Lincoln DeVore. If additional material can be removed adjacent to the in depth gully along the east side of Filing 11, either as an overall basis or as a series of 'steps' the slope stability will be enhanced as long as overall site drainage is either maintained or improved. The stability analysis addressed the individual slope and the 'global' condition of the entire slope height. The analysis was performed using the PC software SLOPE/W, Version 5.11, Geo-Slope International LTD, Calgary, Alberta, Canada. The analysis utilized the Limit Equilibrium Theory for the factor of safety, incorporating the Morgenstern-Price Method using both Moment and Force Equilibrium

Samples of the slightly softened (slightly weathered) and very softened Mancos Formation were obtained and subjected to Direct Shear Testing. The Direct Shear Testing was accomplished using Multi-Stage Testing of single samples. This is similar to the testing described by Gan, Fredlund and Rahardjo, 1988, but not for unsaturated soil. The strength values from the slightly weathered Mancos obtained were unreasonably high, compared to other testing in nearby locations and when utilized during the 'Back Computations' portion of the analysis. Lower strength values, obtained up stream and down stream of this site were compared and, when appropriate, used for this study.

No seismic coefficient was assumed in these calculations. Several models were assumed for the slope conditions. Modifications to building lot grading was assumed. Cuts of 6 to 10 feet, which would require walk out basement construction, are presently proposed in Filing 11. The addition of a shallow, perched water table has been assumed for the west section. Building/landscaping fills in the building set back area are not allowed. Planned fill areas in Filings 10 and 11 have been incorporated into the modeling.

The analysis indicated the Building Set Backs have a sufficient Factor of Safety (FOS), equal to or greater than 1.5, assuming all recommendations contained in this report are followed. The stability modeling indicates the lower strength fully softened 'residual' strength layer modeled near the bank toe will be the controlling factor. The insertion of this fully softened 'residual' strength layer into the model is suggested in the article by Mesri and Shahien, 2003. The modeling assumed this lower strength soil layer is continuously present along the gully bank edge. This low strength fully softened 'residual' strength layer was not encountered in any test borings. This 'layer' is modeled as being 3 feet thick and intercepts the gully at and below the existing gully floor elevation. All geologic bedding in the Mancos Shale Formation is dipping 4°, into the gully.

The modeling also assumed a significant 'tension crack' for the deeper failures, to account for the known structural fractures in the Mancos Formation and the observed 'head scarp' configurations on the existing slope failures. The 'tension crack' was not critical in the final Factor of Safety (FOS) computations.

The figures included with this report (Fig. I-VII) present the picture of the problem, a listing of the basic soils properties and the building set back for the design Factor of Safety (FOS) of 1.5. Several computer 'runs' were made for each model, analyzing several hundred failure surfaces for each figure presented with this report.

The majority of low factors of safety (FOS) indicate the steeper slopes are 'sloughing' under the modeled conditions. These sloughing slopes and failures are visible on the steeper slopes. Analysis (Back Computations) of existing slope failure masses in the Redlands and Orchard Mesa areas were used to 'calibrate' the model. Further analysis indicates the Morgenstern-Price Method of study correlates well with existing banks of similar materials along the Colorado River. This method of calculation has been used for our final slope recommendations.

MECHANICALLY STABILIZED FILL

The use of Mechanically Stabilized Earthen Fill, in conjunction with modular facing units and/or geo cell type elements will be required to construct the relatively large fill to be placed on the west gully bank, on the east side of Lots 4 and 5 of Filing 11. Mechanically Stabilized Structural Fill can also be utilized for other small fills associated with individual building sites, drainage work and site grading throughout this subdivision.

The Mechanically Stabilized Fill at Lots 4 and 5 will require three elements. The first element will be a drainage system within the structural fill, to intercept waters and excessive moisture which may be traveling toward the fill from the building/landscaped areas to the west. Such a drain system will probably consist of perforated piping and gravel collectors which are wrapped in a geotextile filter fabric and possibly geo composite type drainage materials to 'draw or collect' the water into the larger capacity collection system.

The second major element of this fill will be the layers of geotextile or geogrid type reinforcing materials within the soil mass. Design of such a Mechanically Reinforced Soil Mass involves both internal and external stability. Internal stability requires that the soil mass be sufficiently stable against failure within the actual reinforced mass. This means the internal reinforcement is not over stressed and capable of supporting of any 'facing units'. External stability considers the entire reinforced soil mass. The unit, similar to a standard concrete gravity retaining wall which resists sliding failure, foundation bearing failure and over all slope (global) failure. In some cases, over turning failure must also be considered.

Two distinct design methodologies are commonly used. The ultimate strength method is that which is utilized by the proprietary modular block retaining wall manufacturers. The service load method is advocated by the Colorado Transportation Institute (CTI). Both design methods have advantages. The ultimate strength method tends to result in a rather high factor of safety against failure but, is also tolerant of initial construction problems and long term lack of maintenance problems. The service load design method is a good deal more efficient than the ultimate strength design method but, is more sensitive to initial construction and long term site drainage maintenance. The third element of this Mechanically Stabilized Fill will be the facing elements. It is anticipated that a modular or solid type facing element will be utilized in the lower 5 to 10 feet of the fill constructed in the gully. The modular or rigid facing elements will be required to resist erosive forces from water flows within the gully. The lower facing elements could be the proprietary type modular block, rock filled gabian units or even solid concrete blocks.

The upper fill facing elements can be 'hard' such as modular blocks, small boulders or other similar elements. The facing may also be 'soft' which could utilize geo cells (which can be landscaped). Landscaping composites or early immediate planting with very careful irrigation to establish the plantings.

Geotextile Fabric for reinforcement should be either a woven with a minimum Grab Strength of 180 lb., in the weakest direction (such as Amoco 2002 or Contech C-180 or Mirafi 500-X). If free water is encountered, Equivalent Reinforcement Strength (minimum Grab Strength of 180 lb., in the weakest direction) can be obtained by using Amoco 4552 or Contech C-70NW or Mirafi 180N may be used for better constructability. In instances requiring only minor reinforcement properties, a non-woven/needle punched Geotextile with a minimum Grab Strength of 120 lbs., in the weakest direction (such as Amoco 4506, Contech C-50NW or Mirafi 140N) may be utilized, even though it is a weaker fabric.

Biaxial Geogrid for medium reinforcement shall have a minimum Tensile strength @ 5% Strain of 550 lb/ft., in the weakest direction (such as Tensar BX 1100).

The imported structural Fill (Hveem-Carmany R>70 , swell not critical) is to be Granular, Medium to Coarse Grained, Very low plastic (PI<4), Non Freedraining, Compactable and within the following Gradation:

Maximum size, by screening	8"
Passing the #4 screen	20% - 85%
Passing the #40 screen	10% - 60%
Passing the #200 screen	3% - 15%

The maximum aggregates size may be exceeded if the contractor can provide evidence of proper compaction of the matrix material while avoiding excessive particle size segregation of the fill material or avoiding excessive overworking of the subgrade soils.

Imported Structural Fill and Aggregate Base Course (ABC) to be compacted to 90% of its maximum Modified Proctor dry density (ASTM-D-1557) at a moisture content within $\pm$ 2% of optimum moisture. The use of light weight tracked equipment will minimize subgrade degradation, vibratory compaction equipment is not recommended.

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.

Any areas of Fill or Subgrade instability encountered during construction are to be immediately brought to the attention of the Geotechnical Engineer, so recommendations for stabilization can be given.

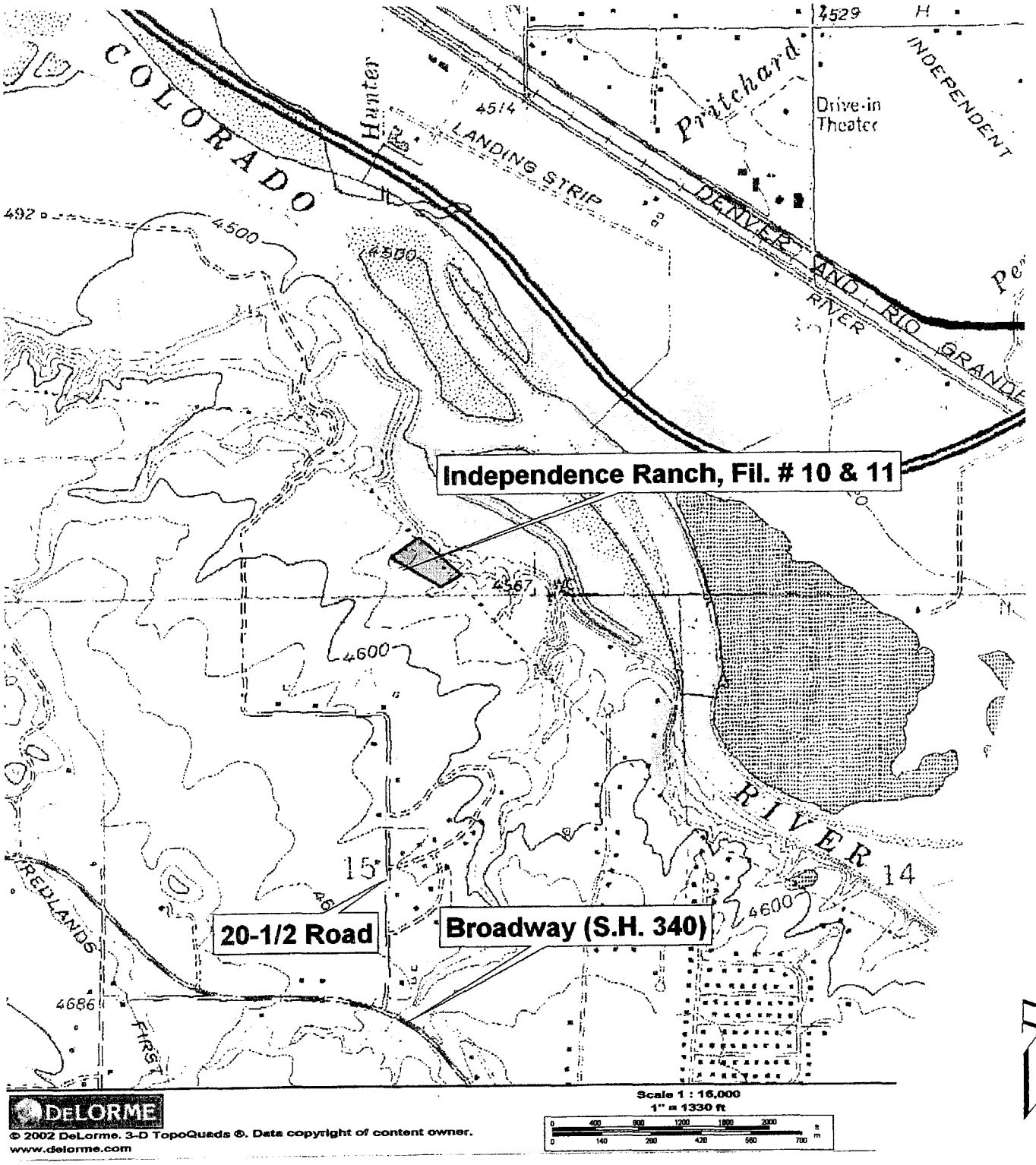
LIMITATIONS

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, Grand Junction Lincoln DeVore should be notified so that supplemental recommendations can be provided, if appropriate.

Grand Junction 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.



SITE LOCATION DIAGRAM

GRAND JUNCTION LINCOLN - DeVORE, Inc. Geotechnical Consultants **Grand Junction, Colorado**	**SLOPE STABILITY STUDY, Fil. 10 & 11** **Independence Ranch Sub., Grand Junction, CO.**	
	LAUGHING WATERS, LLC **Grand Junction, Colorado**	Date **2-22-2003**
	Job No. **89914-GJ**	Drawn **EMM**

SOILS DESCRIPTIONS

SYMBOL	USCS	DESCRIPTION
		Topsoil
		Man-Made Fill
	GW	Gravel Well-Graded
	GP	Gravel Poorly-Graded
	GM	Silty Gravel
	GC	Clayey Gravel
	SW	Sand Well-Graded
	SP	Sand Poorly-Graded
	SM	Silty Sand
	SC	Clayey Sand
	ML	Silt Low-Plastic
	CL	Clayey Sand Low-Plastic
	OL	Organic Silt & Clay Low-Plastic
	MH	Elastic Silt High-Plastic
	CH	Clay High-Plastic
	OH	Organic Clay High-Plastic
	Pt	Peat
	GW/GM	Silty Gravel Well-Graded
	GW/GC	Clayey Gravel Well-Graded
	GP/GM	Silty Gravel Poorly-Graded
	GP/GC	Clayey Gravel Poorly-Graded
	GM/GC	Silty Clayey Gravel
	SW/SM	Silty Sand Well-Graded
	SW/SC	Clayey Sand Well-Graded
	SP/SM	Silty Sand Poorly-Graded
	SP/SC	Clayey Sand Poorly-Graded
	SM/SC	Silty Clayey Sand
	CL-ML	Silty Clay

ROCK DESCRIPTIONS

SYMBOL	DESCRIPTION
	Sedimentary Rocks
	CONGLOMERATE
	SANDSTONE
	SILTSTONE
	SHALE
	CLAYSTONE
	MUDSTONE
	COAL
	LIMESTONE
	DOLOMITE
	MARLSTONE
	GYPSUM
	Other Sedimentary Rocks
	Igneous Rocks
	GRANITIC ROCKS
	DIORITIC ROCKS
	GABBRO
	BASALT
	RHYOLITE
	TUFF & ASH FLOWS
	BRECCIA & Other Volcanics
	Other Igneous Rocks
	Metamorphic Rocks
	GNEISS
	SCHIST
	PHYLLITE
	HORNFELS
	METAQUARTZITE
	MARBLE
	Other Metamorphic Rocks

SYMBOLS & NOTES

SYMBOL	DESCRIPTION
SPT 09/06	Standard Penetration Drive ASTM D-1586 Disturbed Sample Numbers indicate 9 Blows To drive the Sampler 'Spoon' 6" into ground.
CS 09/06	'California Lined Sampler' Modified Penetration Drive ASTM D-3550 Disturbed Sample Numbers indicate 9 Blows To drive the Sampler 'Spoon' 6" into ground.
D&M 09/06	'Dames & Moore Lined Sampler' Modified Penetration Drive ASTM D-3550 Disturbed Sample Numbers indicate 9 Blows To drive the Sampler 'Spoon' 6" into ground.
ST	Thin-Walled 'Shelby' Tube ASTM D-1587 2-1/2" I.D. 'Relatively Undisturbed Sample'
BULK	Disturbed, Bulk Sample Disturbed Sample
	Free Water Table
Wx	Weathered Rock Formation
	Test Boring Location
	Test Pit Location
	Seismic or Resistivity Station

Standard Penetration Drives are made by driving a standard 2" od. 1-5/8" id Split Spoon Sampler into the ground by dropping a 140 lb. weight 30", ASTM D-1586. **CME Automatic Hammer used, unless noted.** The Drive Shoe is Blunt and the sample is Disturbed.

Modified Penetration Drives are made by driving a 2-1/2" od. 1.875" id California Spoon Sampler or a 3" od. 2-3/8" id Dames & Moore Spoon Sampler into the ground by dropping a 140 lb. weight 30", ASTM D-3550. **CME Automatic Hammer used, unless noted.** The Drive Shoe is Blunt and the sample is Disturbed.

The Boring Logs show subsurface conditions at the dates and locations shown. It is not warrented that these Boring logs are representative of subsurface conditions at other times, or at other locations near these Borings.

GRAND JUNCTION
LINCOLN - DeVORE, Inc.
Geotechnical Consultants
Grand Junction, Colorado

EXPLANATION OF BOREHOLE LOGS AND LOCATION DIAGRAMS

Form No.	Drawn	Date
GJLDFORM-EXPL	EMM	11-25-2003

BORING NO. 4a DRILL: GJLD CME-45B

Cross-Section #4 Lot 1 / 2, Block 2, Filing 10

BORING ELEVATION: AUGER/TOOLS: 4" od, SOLID

DEPTH (FT.)	SOIL LOG	DESCRIPTION	BLOW COUNT /inch	SOIL DENSITY pcf	WATER %
		SP-SM SILTY SAND POORLY GRADED AEOLIAN			
		I COLLAPSIBLE DRY			
		GM SANDY GRAVEL & COBBLE			
		III SI.COLLAPSIBLE			
5		DRY 5			
		OLDER COLORADO RIVER TERRACE DEPOSITS, Qa			
		STRATIFIED			
		GM SANDY GRAVEL & COBBLE			
10		III SI.COLLAPSIBLE 10			
		STRATIFIED DRY			
		OLDER COLORADO RIVER TERRACE DEPOSITS, Qa			
15		GM SANDY GRAVEL & COBBLE DRY 15			
		III SI.COLLAPSIBLE			
		Weathered MANCOS SHALE, Km			
		CL LEAN CLAY SANDY SI. DAMP			
		V EXPANSIVE SULFATES			
20		V. STIFF to DRILL 20			
25		25			
		TD @ 24'			
30		30			
		VISUALLY LOGGED			
35		35			
		Blow Counts are counted for each 6 inches of sampler penetration.			
40		**NO Free Water** 40			
		During Drilling 1-24-2003			

LOG OF SUBSURFACE EXPLORATION

GRAND JUNCTION
LINCOLN - DeVORE, Inc.
Geotechnical Consultants
Grand Junction, Colorado

SLOPE STABILITY STUDY, Fil. 10 & 11
Independence Ranch Sub., Grand Junction, CO.
LAUGHING WATERS, LLC
Grand Junction, Colorado

Date: 2-22-2003

Job No.: 89914-GJ

Drawn: EMM

BORING NO. 4 DRILL: GJLD CME-45B

Cross-Section #4 Lot 1 / 2, Block 2, Filing 10

BORING ELEVATION: AUGER/TOOLS: 3.75" id, HSA

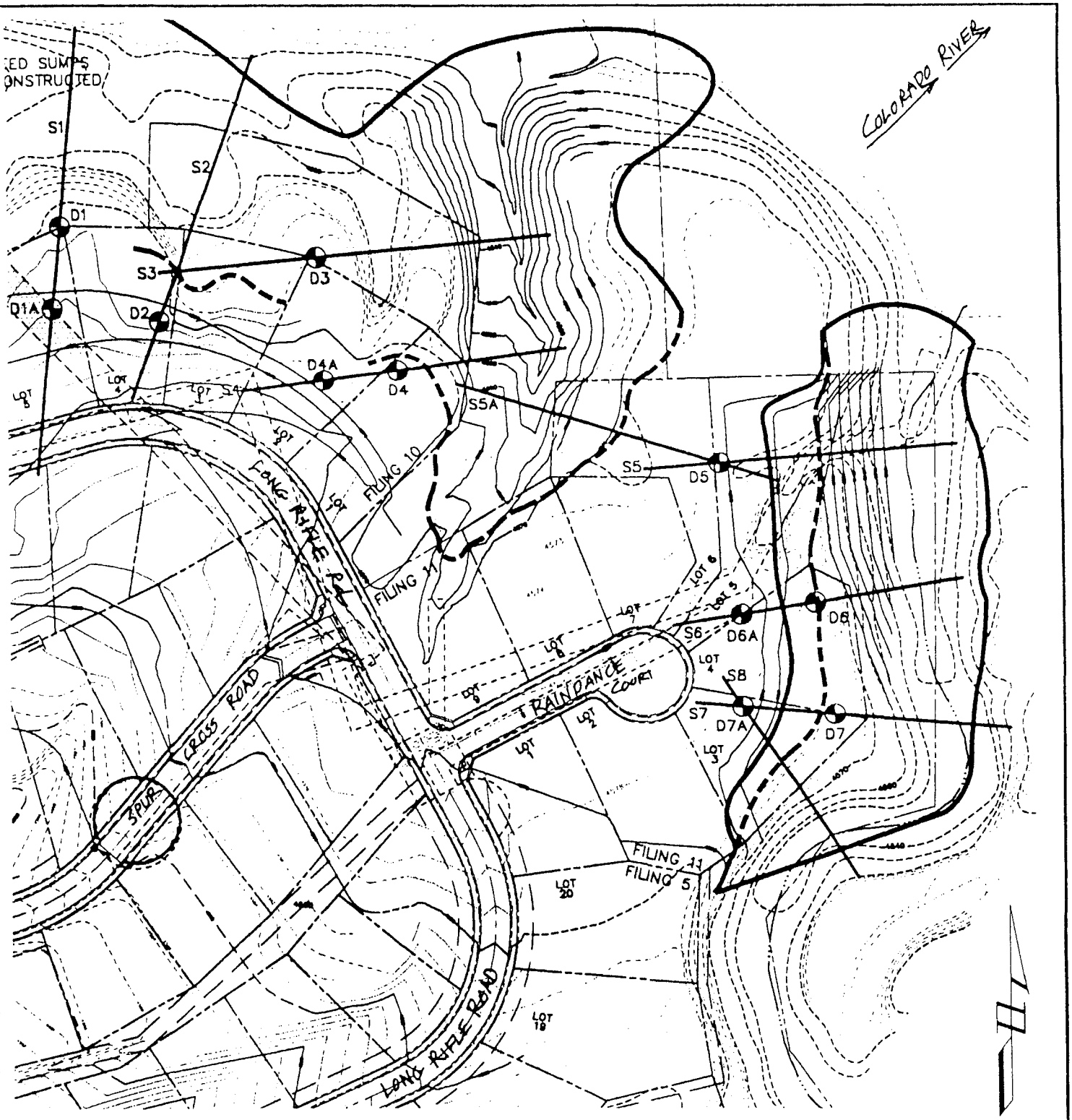
DEPTH (FT.)	SOIL LOG	DESCRIPTION					BLOW COUNT /inch	SOIL DENSITY pcf	WATER %
		SP-SM	SILTY SAND	POROUS STRUCTURE	AEOLIAN				
		I	COLLAPSIBLE	POORLY GRADED			14/6		
		GM	SANDY GRAVEL & COBBLE	MEDIUM DENSITY		SPT	14/6		1.3%
		III	SI.COLLAPSIBLE		DRY		18/6		
5				COLORADO RIVER ALLUVIAL DEPOSITS, Qa		5	11/6		1.4%
				FIRM to DRILL		SPT	10/6		
				STRATIFIED			14/6		
				MEDIUM DENSITY					
		GM	SANDY GRAVEL & COBBLE		DRY	SPT			
10		III	SI.COLLAPSIBLE			10	6/6		2.2%
				POORLY NESTED			10/6		
				COLORADO RIVER ALLUVIAL DEPOSITS, Qa			10/6		
		GM	SANDY GRAVEL & COBBLE		DRY				
		III	SI.COLLAPSIBLE			SPT			
15						15	24/6		4.1%
			Weathered MANCOS SHALE, Km				41/6		
		CL	LEAN CLAY	Gray-Green Tint	SULFATES		50/6		
		IV	EXPANSIVE	ARGILLACEOUS SILTSTONE					
				MEDIUM DENSITY	DRY	ST			
20				V. STIFF to DRILL		20		116.5	4.5%
		CL	LEAN CLAY	BLOCKY					
		IV	EXPANSIVE	FRACTURED					
				AUGER REFUSAL @ 20'					
25			TD @ 20'			25			
30						30			
35						35			
				Blow Counts are counted for each					
				6 inches of sampler penetration.					
40				**NO Free Water**		40			
				During Drilling	**2-11-2003**				

LOG OF SUBSURFACE EXPLORATION

GRAND JUNCTION
LINCOLN - DeVORE, Inc.
Geotechnical Consultants
Grand Junction, Colorado

SLOPE STABILITY STUDY, Fil. 10 & 11
Independence Ranch Sub., Grand Junction, CO.

LAUGHING WATERS, LLC Grand Junction, Colorado		Date 2-22-2003
Job No. 89914-GJ	Drawn EMM	



BORING LOCATION DIAGRAM

GRAND JUNCTION
LINCOLN - DeVORE, Inc.
Geotechnical Consultants
Grand Junction, Colorado

SLOPE STABILITY STUDY, Fil. 10 & 11		
Independence Ranch Sub., Grand Junction, CO.		
LAUGHING WATERS, LLC		Date
Grand Junction, Colorado		2-22-2003
Job No.	Drawn	
89914-GJ	EMM	

BORING NO. 3 DRILL: D.A. Smith, T-60

Cross-Section #3 Lot 2 / 3, Block 2, Filing 10

BORING ELEVATION: AUGER/TOOLS: 3.75" id, HSA

DEPTH (FT.)	SOIL LOG		DESCRIPTION			BLOW COUNT /inch	SOIL DENSITY pcf	WATER %
		SP-SM	SILTY SAND	HEAVY BRUSH				
			COLLAPSIBLE	LOW DENSITY	DRY			
		CL	SANDY CLAY	POROUS STRUCTURE				
		IIa	SI. EXPANSIVE					
5				AEOLIAN SAND STRATA	DAMP	5		
		SP-SM	SILTY SAND	LOW DENSITY		ST	97.7	14.3%
		I	COLLAPSIBLE					
				ALLUVIAL/DEBRIS FAN DEPOSITS, Qa/Qdf				
				STRATA of SANDY CLAY				
10		SP-SM	SILTY SAND	MEDIUM DENSITY	SI. DAMP	10		
		I	COLLAPSIBLE	SULFATE CALICHE STRATA		ST	103.8	7.0%
				POROUS STRUCTURE				
		SP-SM	SILTY SAND					
15		I	COLLAPSIBLE	LOW DENSITY	DAMP	15		
				SULFATE CALICHE STRATA		ST	94.7	3.5%
		SP-SM	SILTY SAND	**V. POORLY GRADED STRATA**				
			COLLAPSIBLE	**MICA**				
20		SP-SM	SILTY SAND	LOW DENSITY	DAMP	20		
		I	COLLAPSIBLE			ST		11.3%
				SCATTERED GRAVELS	WET			
		FREE WATER		LOW DENSITY				
25		SP-SM	SILTY SAND			25		
		I	COLLAPSIBLE			SPT	2/18	19.0%
				ALLUVIAL/DEBRIS FAN DEPOSITS, Qa/Qdf				
		SP-SM	SILTY SAND	SCATTERED GRAVELS				
30		I	COLLAPSIBLE			30		
				LOW DENSITY		SPT	1/6	21.5%
							1/6	
			BORING LOG CONTINUED on NEXT SHEET				2/6	

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

Free Water @ 23'

During Drilling 2-3-2003

LOG OF SUBSURFACE EXPLORATION

GRAND JUNCTION
LINCOLN - DeVORE, Inc.
Geotechnical Consultants
Grand Junction, Colorado

SLOPE STABILITY STUDY, Fil. 10 & 11
Independence Ranch Sub., Grand Junction, CO.

LAUGHING WATERS, LLC
Grand Junction, Colorado

Date: 2-22-2003

Job No.: 89914-GJ

Drawn: EMM

BORING NO. **3 cont.** DRILL: D.A. Smith, T-50

Cross-Section #3 Lot 2 / 3, Block 2, Filing 10

BORING ELEVATION: AUGER/TOOLS: 3.75" id, HSA

DEPTH (FT.)	SOIL LOG	DESCRIPTION					BLOW COUNT /inch	SOIL DENSITY pcf	WATER %
30		SP-SM	SILTY SAND	POORLY GRADED		30	4/18		21.5%
		I			LOW DENSITY	SPT			
				V. SOFT to DRILL					
35			**Weathered MANCOS SHALE, Km**		SOFT FOR 6 inches	35			
		CL	LEAN CLAY	SANDY	HIGH DENSITY	SI. MOIST	ST	120.4	15.7%
		V	EXPANSIVE	ARGILLACEOUS SILTSTONE		SULFATES			
				HARD to DRILL					
40		CL	LEAN CLAY	V. SANDY		40			
		VI	EXPANSIVE		HIGH DENSITY	SI. MOIST	SPT	50/3.5	13.6%
				FRACTURED					
				V. HARD to DRILL					
45		CL	LEAN CLAY	SANDY		SI. MOIST	45		
		V	EXPANSIVE	ARGILLACEOUS SILTSTONE			SPT	50/2	17.3%
				AUGER REFUSAL @ 45'					
50						50			
55			TD @ 45'			55			

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

Free Water @ 23'

During Drilling 2-3-2003

LOG OF SUBSURFACE EXPLORATION

GRAND JUNCTION
LINCOLN - DeVORE, Inc.
Geotechnical Consultants
Grand Junction, Colorado

SLOPE STABILITY STUDY, Fil. 10 & 11
Independence Ranch Sub., Grand Junction, CO.

LAUGHING WATERS, LLC
Grand Junction, Colorado

Date: 2-22-2003

Job No.: 89914-GJ

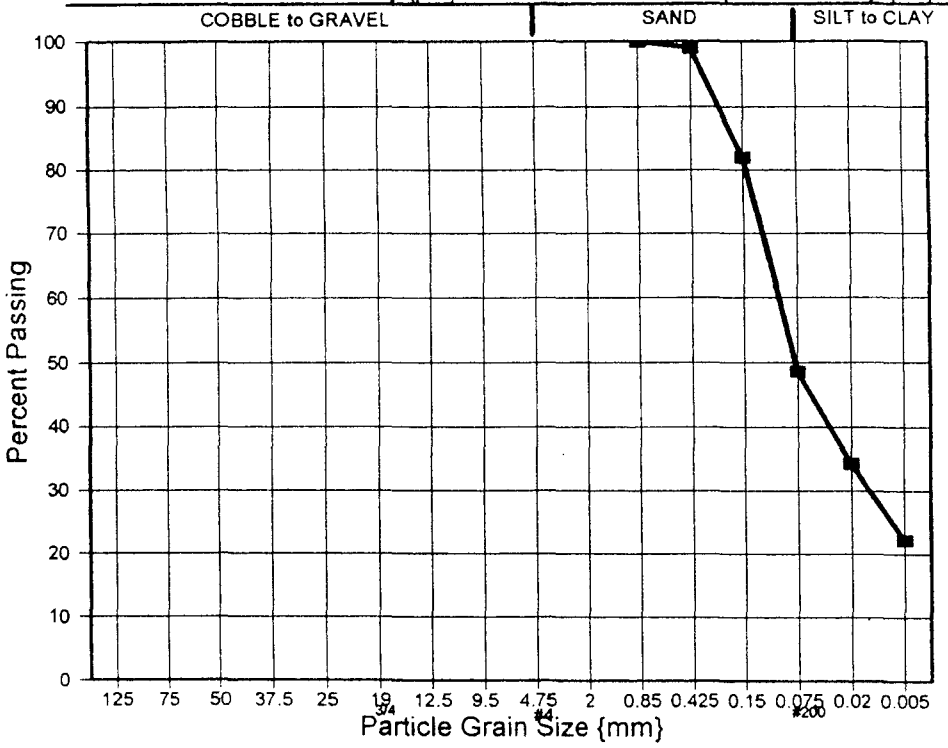
Drawn: EMM

Soil Sample: **Fine Grained SILTY SAND, Poorly Graded (SP-SM)** Sample No.: 1 (Typical)

Geologic Origin: **ALLUVIAL/DEBRIS FAN DEPOSITS, Qa/Qdf, Redlands Alluv.** Test by: DC

Natural Water Content (w): **7.0%** Boring No.: **3** Depth: **10'**

In-Place Density (pcf): **103.8** Soil Specific Gravity (Gs): **2.63** est.



Effective size mm

Cu

Cc

Plastic Limit (PL)	N.P.
Liquid Limit (LL)	N.V.
Plasticity Index (PI)	N.P.
Skempton's Activity	0.0
Shrinkage Limit (SL)	
Shrinkage Ratio	

DIRECT SHEAR: **CD**

MultiStage Testing of a Single Sample

	Softened Peak		Res.
Shear Angle:	21.5	deg.	21.3
Tan Shear:	0.394		0.389
Cohesion:	54	psf	19

Sieve	(mm)	% Passing
5"	125	
3"	75	
2"	50	
1-1/2"	37.5	
1"	25	
3/4"	19	
1/2"	12.5	
3/8"	9.5	
# 4	4.75	
#10	2	
#20	0.85	100
#40	0.425	99
#100	0.15	82
#200	0.075	48.6
	0.02	34
	0.005	22

Maximum Size Allowed By Sampler 2-1/2"

MOISTURE / DENSITY RELATIONSHIP:

ASTM Method: D-698 A D 4718 - 0% Rock Correction

Max. Dry Density : pcf pcf

Optimum Moisture :

HVEEM-CARMANY: **FHA Soil Swell:**

'R' Value @ 300 psi: Swell

Displacement 300 psi: psf

Expansion @ 300 psi: psf Remolded Sample

ALLOWABLE BEARING (net): psf by Consolidometer

Standard Penetration (SPT): psf by Penetrometer

Unconfined Compression (qu): psf

COLLAPSE @ Wetting: @ psf

CONSOLIDATION: @ psf

CONSOLIDATION: @ psf

SULFATE SALTS: <50 ppm

PERMEABILITY:

K (20 C) Remolded cm/sec @ pcf

SOIL ANALYSIS and SUMMARY

GRAND JUNCTION
LINCOLN - DeVORE, Inc.
Geotechnical Consultants
Grand Junction, Colorado

SLOPE STABILITY STUDY, Fil. 10 & 11
Independence Ranch Sub., Grand Jct., CO.

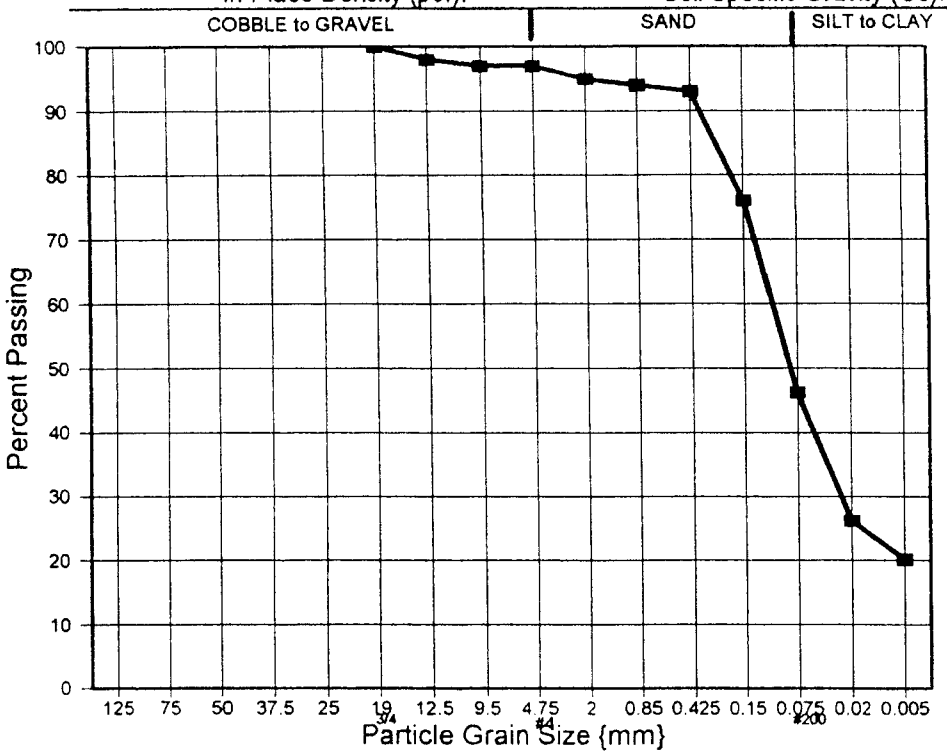
LAUGHING WATERS, LLC Grand Junction, Colorado		Date 2-22-2003
Job No. **89914-GJ**	Drawn **EMM**	

Soil Sample: **MedIUM Grained SILTY SAND, Poorly Graded (SP-SM)** Sample No.: **Ia** (Typical)

Geologic Origin: **ALLUVIAL/DEBRIS FAN DEPOSITS, Qa/Qdf, Redlands Alluv.** Test by: **DC**

Natural Water Content (w): **21.5%** Boring No.: **3** Depth: **30'**

In-Place Density (pcf): Soil Specific Gravity (Gs):



Effective size mm

Cu

Cc

Plastic Limit (PL)	**18%**
Liquid Limit (LL)	**19%**
Plasticity Index (PI)	**1%**
Skempton's Activity	**0.0**
Shrinkage Limit (SL)	
Shrinkage Ratio	

DIRECT SHEAR: **CD**

Softened Peak Res.

Shear Angle: deg.

Tan Shear:

Cohesion: psf

MultiStage Testing of a Single Sample

Sieve	(mm)	% Passing
5"	125	
3"	75	
2"	50	
1-1/2"	37.5	
1"	25	
3/4"	19	100
1/2"	12.5	98
3/8"	9.5	97
# 4	4.75	97
#10	2	95
#20	0.85	94
#40	0.425	93
#100	0.15	76
#200	0.075	46.2
	0.02	26
	0.005	20

Maximum Size Allowed By Sampler 2-1/2"

MOISTURE / DENSITY RELATIONSHIP:

ASTM Method: D-698 A D 4718 - 0% Rock Correction

Max. Dry Density : pcf pcf

Optimum Moisture :

HVEEM-CARMANY: **FHA Soil Swell:**

'R' Value @ 300 psi: Swell

Displacement 300 psi: psf

Expansion @ 300 psi: psf Remolded Sample

ALLOWABLE BEARING (net): psf by Consolidometer

Standard Penetration (SPT): psf by Penetrometer

Unconfined Compression (qu): psf

COLLAPSE @ Wetting: @ psf

CONSOLIDATION: @ psf

CONSOLIDATION: @ psf

SULFATE SALTS: <50 ppm

PERMEABILITY:

K (20 C) Remolded cm/sec @ pcf

SOIL ANALYSIS and SUMMARY

GRAND JUNCTION
LINCOLN - DeVORE, Inc.
Geotechnical Consultants
Grand Junction, Colorado

SLOPE STABILITY STUDY, Fil. 10 & 11
Independence Ranch Sub., Grand Jct., CO.

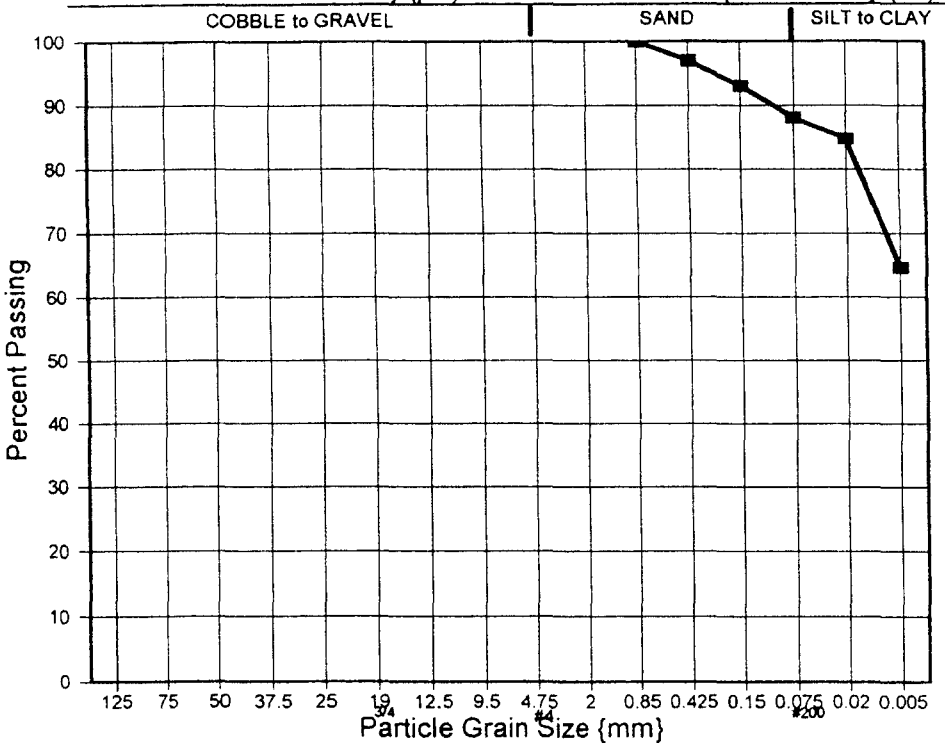
LAUGHING WATERS, LLC Grand Junction, Colorado	Date 2-22-2003
Job No. **89914-GJ**	Drawn **EMM**

Soil Sample: **SANDY, LEAN CLAY (CL) High Carbonate Caliche** Sample No.: **IIa (Typical)**

Geologic Origin: **ALLUVIAL/DEBRIS FAN DEPOSITS, Qa/Qdf, Redlands Alluv.** Test by: **DC**

Natural Water Content (w): **14.3%** Boring No.: **3** Depth: **5'**

In-Place Density (pcf): **97.7** Soil Specific Gravity (Gs):



Effective size mm

Cu

Cc

Plastic Limit (PL)	25%
Liquid Limit (LL)	38%
Plasticity Index (PI)	13%
Skempton's Activity	0.2
Shrinkage Limit (SL)	
Shrinkage Ratio	

DIRECT SHEAR: **CD**

	Softened Peak		Res.
Shear Angle:	23.3	deg.	21.7
Tan Shear:	0.431		0.399
Cohesion:	935	psf	520

MultiStage Testing of a Single Sample

Sieve	(mm)	% Passing
5"	125	
3"	75	
2"	50	
1-1/2"	37.5	
1"	25	
3/4"	19	
1/2"	12.5	
3/8"	9.5	
# 4	4.75	
#10	2	
#20	0.85	100
#40	0.425	97
#100	0.15	93
#200	0.075	88.1
	0.02	85
	0.005	65

Maximum Size Allowed By Sampler 2-1/2"

MOISTURE / DENSITY RELATIONSHIP:

ASTM Method: D-698 A D 4718 - 0% Rock Correction

Max. Dry Density : pcf pcf

Optimum Moisture :

HVEEM-CARMANY: **FHA Soil Swell:**

'R' Value @ 300 psi: Swell

Displacement 300 psi: psf

Expansion @ 300 psi: psf Remolded Sample

ALLOWABLE BEARING (net): psf by Consolidometer

Standard Penetration (SPT): psf by Penetrometer

Unconfined Compression (qu): psf

COLLAPSE @ Wetting: @ psf

CONSOLIDATION: @ psf

CONSOLIDATION: @ psf

SULFATE SALTS: <50 ppm

PERMEABILITY:

K (20 C) Remolded cm/sec @ pcf

SOIL ANALYSIS and SUMMARY

GRAND JUNCTION
LINCOLN - DeVORE, Inc.
Geotechnical Consultants
Grand Junction, Colorado

SLOPE STABILITY STUDY, Fil. 10 & 11
Independence Ranch Sub., Grand Jct., CO.

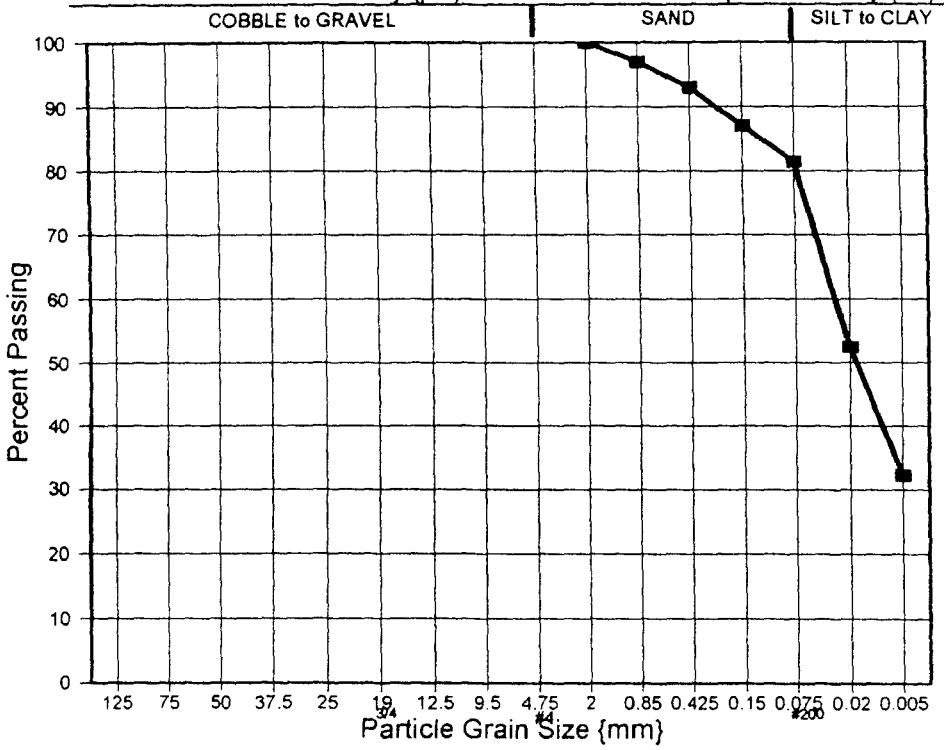
LAUGHING WATERS, LLC Grand Junction, Colorado		Date 2-22-2003
Job No. 89914-GJ	Drawn EMM	

Soil Sample: **SANDY, LEAN CLAY (CL) Gray-Black** Sample No.: **V** (Typical)

Geologic Origin: **Weathered MANCOS SHALE, Km** Test by: **DC**

Natural Water Content (w): **15.7%** Boring No.: **3** Depth: **35'**

In-Place Density (pcf): **120.4** Soil Specific Gravity (Gs): est.



Effective size mm

Cu

Cc

Plastic Limit (PL)	21%
Liquid Limit (LL)	36%
Plasticity Index (PI)	15%
Skempton's Activity	0.3
Shrinkage Limit (SL)	
Shrinkage Ratio	

DIRECT SHEAR: **CD**

	Softened Peak		Res.
Shear Angle:	19.4	deg.	18.8
Tan Shear:	0.352		0.34
Cohesion:	102	psf	91

MultiStage Testing of a Single Sample

Sieve	(mm)	% Passing
5"	125	
3"	75	
2"	50	
1-1/2"	37.5	
1"	25	
3/4"	19	
1/2"	12.5	
3/8"	9.5	
# 4	4.75	
#10	2	100
#20	0.85	97
#40	0.425	93
#100	0.15	87
#200	0.075	81.5
	0.02	53
	0.005	32

Maximum Size Allowed By Sampler 2-1/2"

MOISTURE / DENSITY RELATIONSHIP:

ASTM Method: D-698 A D 4718 - 0% Rock Correction

Max. Dry Density : pcf pcf

Optimum Moisture :

HVEEM-CARMANY: **FHA Soil Swell:**

'R' Value @ 300 psi: Swell

Displacement 300 psi: psf

Expansion @ 300 psi: psf Remolded Sample

ALLOWABLE BEARING (net): psf by Consolidometer

Standard Penetration (SPT): 10000+ psf by Penetrometer

Unconfined Compression (qu): psf

CONSTANT VOLUME SWELL: psf

COLLAPSE OF **DURING SWELL PHASE**

CONSOLIDATION: @ psf

CONSOLIDATION: @ psf

SULFATE SALTS: 250 ppm

PERMEABILITY:

K (20 C) Remolded cm/sec @ pcf

SOIL ANALYSIS and SUMMARY

GRAND JUNCTION LINCOLN - DeVORE, Inc.
Geotechnical Consultants
Grand Junction, Colorado

SLOPE STABILITY STUDY, Fil. 10 & 11
Independence Ranch Sub., Grand Jct., CO.

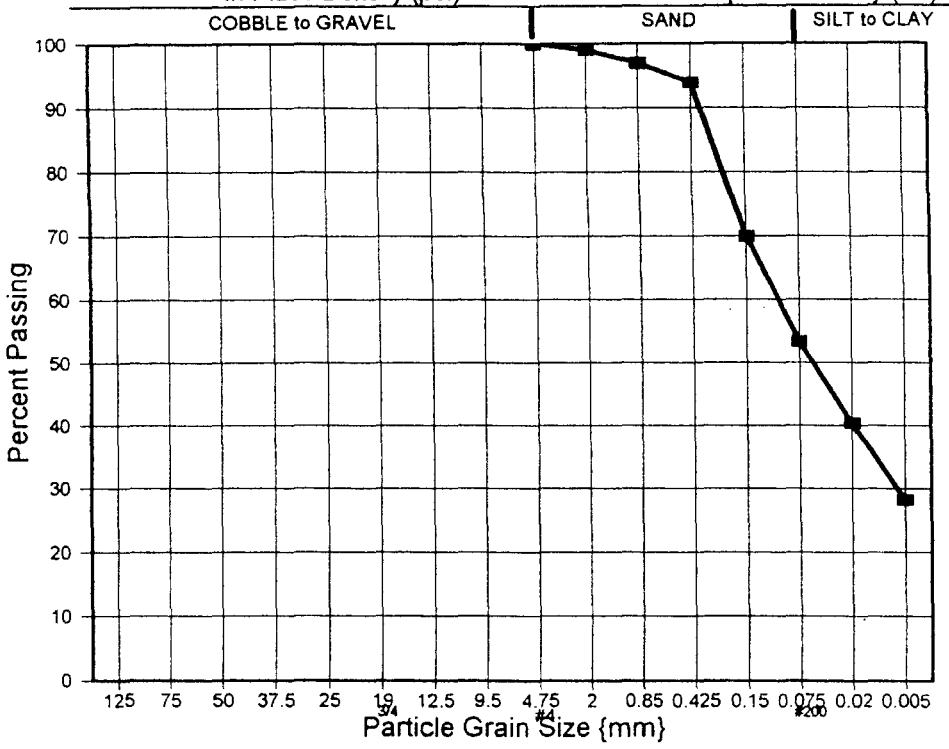
LAUGHING WATERS, LLC **Grand Junction, Colorado**	Date **2-22-2003**
Job No. **89914-GJ**	Drawn **EMM**

Soil Sample: **V. SANDY, LEAN CLAY (CL) Gray-Black** Sample No.: **VI** (Typical) 3

Geologic Origin: **Weathered MANCOS SHALE, Km (Sandstone & Siltstone)** Test by: **DC**

Natural Water Content (w): **13.6%** Boring No.: **3** Depth: **40'**

In-Place Density (pcf): Soil Specific Gravity (Gs):



Effective size mm

Cu

Cc

Plastic Limit (PL)	**16%**
Liquid Limit (LL)	**26%**
Plasticity Index (PI)	**0%**
Skempton's Activity	**ERR**
Shrinkage Limit (SL)	
Shrinkage Ratio	

DIRECT SHEAR: CD

	Softened Peak		Res.
Shear Angle:	**28.4**	deg.	**26.6**
Tan Shear:	**0.541**		**0.501**
Cohesion:	**309**	psf	**256**

MultiStage Testing of a Single Sample

Sieve	(mm)	% Passing
5"	125	
3"	75	
2"	50	
1-1/2"	37.5	
1"	25	
3/4"	19	
1/2"	12.5	
3/8"	9.5	
# 4	4.75	100
#10	2	99
#20	0.85	97
#40	0.425	94
#100	0.15	70
#200	0.075	53.4
	0.02	40
	0.005	28

Maximum Size Allowed By Sampler 2-1/2"

MOISTURE / DENSITY RELATIONSHIP:

ASTM Method: **D-698 A** **D 4718 - 0% Rock Correction**

Max. Dry Density : pcf pcf

Optimum Moisture :

HVEEM-CARMANY: **FHA Soil Swell:**

'R' Value @ 300 psi: Swell

Displacement 300 psi: psf

Expansion @ 300 psi: psf Remolded Sample

ALLOWABLE BEARING (net): psf by Consolidometer

Standard Penetration (SPT): **10000+** psf by Penetrometer

Unconfined Compression (qu): psf

CONSTANT VOLUME SWELL: psf

COLLAPSE OF **DURING SWELL PHASE**

CONSOLIDATION: @ psf

CONSOLIDATION: @ psf

SULFATE SALTS: **<50** ppm

PERMEABILITY:

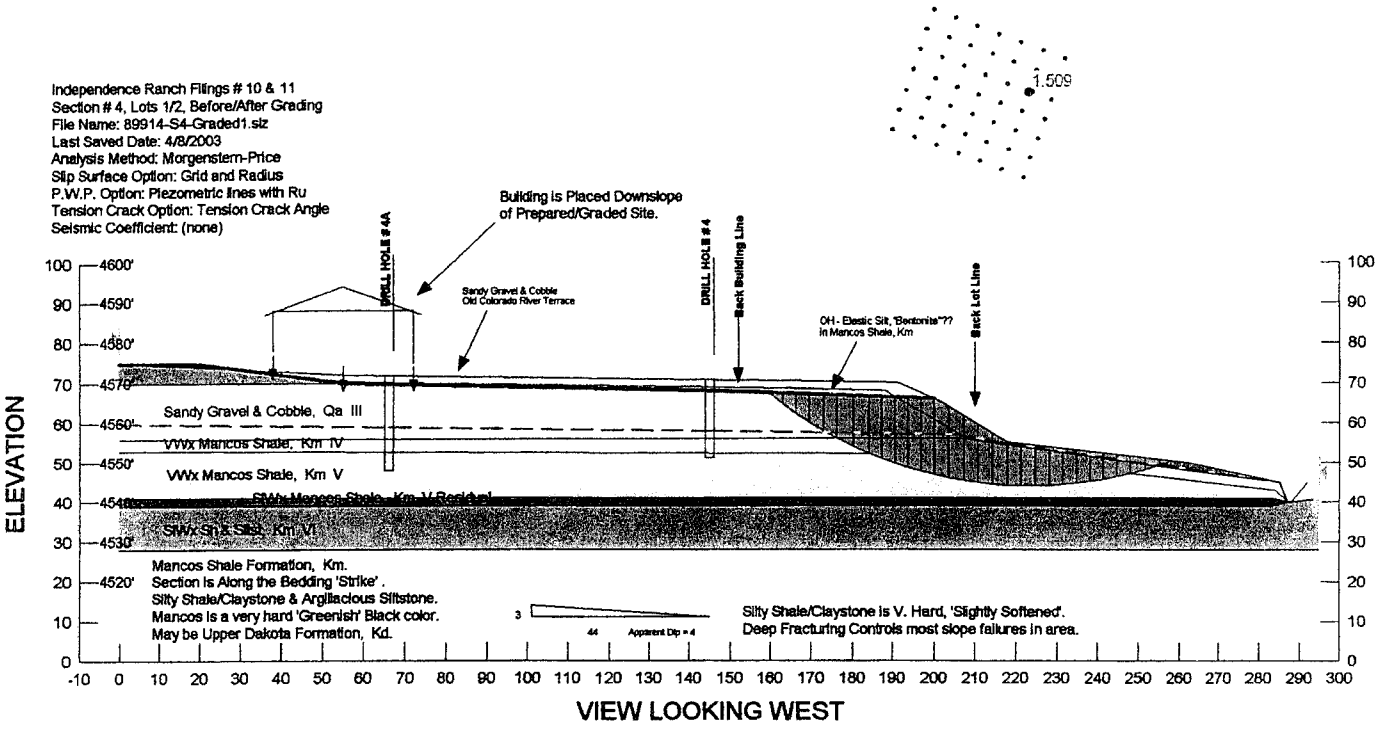
K (20 C) Remolded cm/sec @ pcf

SOIL ANALYSIS and SUMMARY

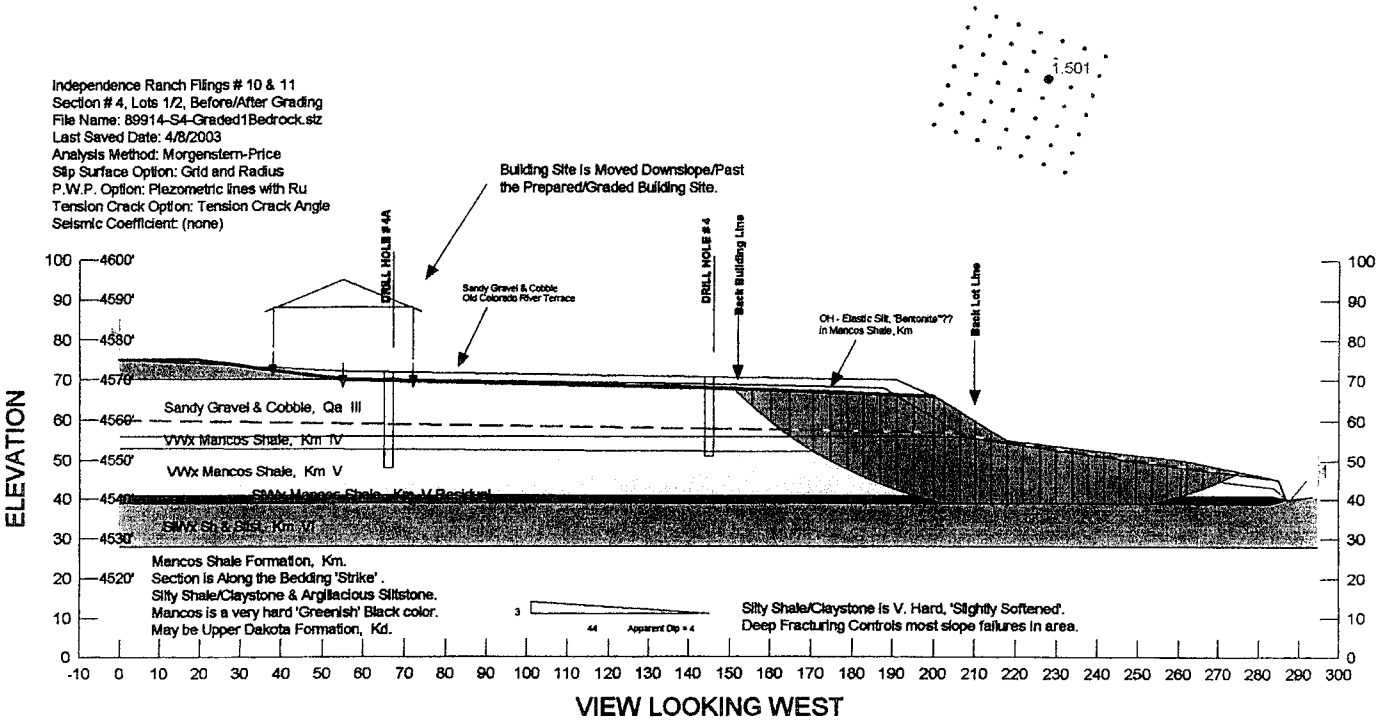
GRAND JUNCTION
LINCOLN - DeVORE, Inc.
Geotechnical Consultants
Grand Junction, Colorado

SLOPE STABILITY STUDY, Fil. 10 & 11
Independence Ranch Sub., Grand Jct., CO.

LAUGHING WATERS, LLC **Grand Junction, Colorado**	Date **2-22-2003**
Job No. **89914-GJ**	Drawn **EMM**



Probable Failure Mode **Computed S.F. = 1.509**

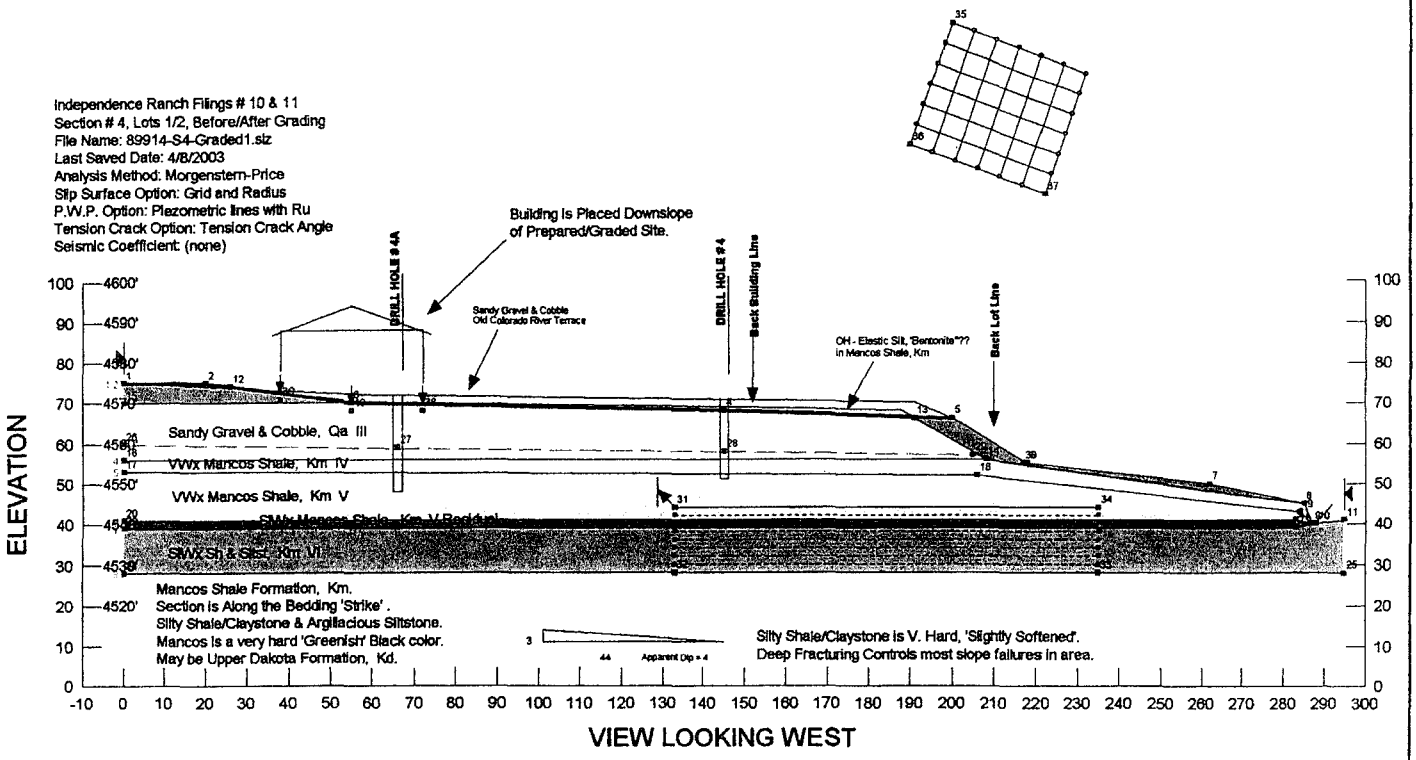


Probable Failure Mode **Computed S.F. = 1.501**

GRAND JUNCTION
LINCOLN DeVORE, Inc.
GEOTECHNICAL ENGINEERS - GEOLOGISTS

Figure II-4

INDEPENDENCE RANCH Sub. Fil. # 10 & 11
GJLD # 89144-GJ, April 8, 2003



This Study is Along Section S4, Overlooking a Small Gully

The Site has been Developed, The Site Grading has Removed Up To 4 Feet of Alluvial Sands and Gravels.
The Structure has been Constructed as a 'Walkout Basement and the Landscaping is irrigated.
The Upper Water Table is Elevated to within 10 feet of the Backyard Surface and Seepage is Occurring at the Slope.
Building Loads are Modeled at 1500 plf. For the Interior and 2000 plf for the Exterior, Placed At Test Hole 4A.
Fill is Placed at the Building Area But, No Fill is Placed Toward the Slope Edge..

The Building/Setback is over 50' From the Back Lot Line & over 45' From the New Crest of the Slope.
The Building Setback is Significantly Steeper than the 3:1 (hor : vert) Limit of the IBC, Chapter 18.

The Very Weathered Mancos Shale (VWx) IV, is the Former and Existing Erosional Surfaces and is considered to be 'Fully Softened', for this analysis and includes the slope face.
The Weathered Mancos Shale (Vwx) V, is considered to be 'Softened', for this analysis.
The Mancos Shale (Vwx) V, Residual Strength is considered to be 'Fully Softened', for this analysis and represents the anticipated Failure Plane..
The Slightly Weathered Shale & Siltstone Strata are considered to be 'Slightly Softened', for this analysis.

Slope stability calculations were performed on the existing slopes overlooking the Colorado River and the Deeper Gullies. The stability analysis addressed portions of the individual slopes and the 'global' condition of the entire slope height. The analysis was performed using the PC software SLOPE/W, Version 5.11, Geo-Slope International LTD, Calgary, Alberta, Canada. The Limit Equilibrium Theory for the factor of safety, incorporating the Morgenstern-Price Method which uses both Moment and Force Equilibrium Theory, generally considered to be a relatively rigorous analysis.

STUDY SECTION S4 Building Lot 1 & 2, Filing 10

All Soils
Soil 1
Qa/Qc Ib
Soil Model Mohr-Coulomb
Unit Weight 102
Cohesion 0
Phi 16
Piezometric Line # 2
Ru 0
Pore-Air Pressure 0

Soil 2
Silty Sand, Qra I
Soil Model Mohr-Coulomb
Unit Weight 124
Cohesion 19
Phi 21.3
Unit Wt. above WT 111
Phi B 0
Anisotropic Fn. 0
Piezometric Line # 2
Ru 0
Pore-Air Pressure 0

Soil 3
Sandy Gravel & Cobble, Qa III
Soil Model Mohr-Coulomb
Unit Weight 140
Cohesion 36
Phi 23.2
Unit Wt. above WT 130
Phi B 0
Anisotropic Fn. 0
Piezometric Line # 2
Ru 0
Pore-Air Pressure 0

Soil 4
VWx Mancos Shale, Km IV
Soil Model Mohr-Coulomb
Unit Weight 142
Cohesion 0
Phi 18.8
Unit Wt. above WT 132
Phi B 0
Anisotropic Fn. 0
Piezometric Line # 2
Ru 0
Pore-Air Pressure 0

Soil 5
VWx Mancos Shale, Km VI
Soil Model Mohr-Coulomb
Unit Weight 139
Cohesion 0
Phi 26.6
Unit Wt. above WT 132
Phi B 0
Anisotropic Fn. 0
Piezometric Line # 2
Ru 0
Pore-Air Pressure 0

Soil 6
Mancos Shale, Km V Residual
Soil Model Mohr-Coulomb
Unit Weight 139
Cohesion 0
Phi 18.8
Unit Wt. above WT 132
Phi B 0
Anisotropic Fn. 0
Piezometric Line # 2
Ru 0
Pore-Air Pressure 0

Soil 7
SlWx Sh & Sltst, Km VI
Soil Model Mohr-Coulomb
Unit Weight 142
Cohesion 0
Phi 26.6
Unit Wt. above WT 122
Phi B 0
Anisotropic Fn. 0
Piezometric Line # 0
Ru 0
Pore-Air Pressure 0

Soil 8
Bedrock
Soil Model Bedrock
Piezometric Line # 0
Ru 0
Pore-Air Pressure 0