Table of Contents

File 1994-0074 Name: South Rim Subdivision – Filing #2 – Final Plat/Plan

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**
X		Review Sheets
X		Receipts for fees paid for anything
X	X	***Submittal checklist**
		***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
X	X	Legal description
		Appraisal of raw land
		Reduction of any maps – final copy
		***Final reports for drainage and soils (geotechnical reports)**
		Other bound or non-bound reports
		Traffic studies
X	X	***Review Comments**
X	X	***Petitioner's response to comments**
X	X	***Staff Reports**
		***Planning Commission staff report and exhibits**
		***City Council staff report and exhibits**
		***Summary sheet of final conditions**

DOCUMENT DESCRIPTION:

X	X	South Rim on the Redlands Architectural and Landscape Standards/Guidelines	X		Location Map
X		Western Colorado Title Company- Owners and Encumbrances Report – 9/9/93	X	X	Reduced Plat Map
X	X	Correspondence	X		Official Site Development Plan
X	X	Stormwater Management Plan – 4/13/94	X		Street Plan
X		Posting of Public Notice Signs – 5/27/94	X		Street Profiles
X	X	Utility Coordinating Committee APPROVAL – 6/8/94	X		Street Details
X	X	Certification of Plat – 6/21/94	X		Sewer and Water Plan
X	X	First Supplement to the Declaration of Covenants, Conditions and Restrictions of South Rim Sub.	X		Sewer Profiles
X	X	All South Rim Subdivision Maps – Historical GIS Maps-**	X		Water Details
X		Stormwater Mgmt. Plan Erosion Control Detail	X	X	Sewer Details
X	X	Drainage and Grading	X		South Rim – Drive C & G – Gutter Profiles
X	X	Reduced Outline Development Plan	X		Trail Channel Drainage Map
X	X	South Rim Subsurface Soils Exploration	X	X	Subsurface Soil Exploration Report – 8/3/93

X	X	Final Drainage Report	X	X	Mesa County File information – scanned at the end of this file
X	X	Resolution No. C97-93	X	X	Development Improvement Agreement - **
			X	X	Disbursement - ** - sent to City Clerk for retention/scanning
			X	X	Release of Improvements Agreement & Guarantee-**

SUBMITTAL CHECKLIST

MAJOR SUBDIVISION: FINAL

Location: South Rim Drive Project Name: South Rim filing #2

ITEMS		DISTRIBUTION (44 Lots)																																	
~~Original~~ Do NOT Remove ~~From Office~~ DESCRIPTION Revise Preliminary Plan As per Annexation Agreement #74 94	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	○ County Bldg. Dept.	● County Surveyor	○ Walker Field	○ School Dist. #51	○ Irrigation District	○ Drainage District	○ Water District	○ Sewer District	● U.S. West	● Public Service	○ GVRP	○ CDOT	○ Corps of Engineers	○ Colorado Geologic Survey	○ U.S. Postal Service	● Persigo WWTF							TOTAL REQ'D.
● Application Fee	VII-1	1																																	1
● Submittal Checklist*	VII-3	1																																	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	1	1							25
● 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	1							33
● 11"x17" Reduction of 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	1							33
● Evidence of Title	VII-2	1			1			1																											3
● ~~Approval to Plat Land~~	VII-1				1	1																													2
● Names and Addresses	VII-3	1																																	1
● Legal Description	VII-2	1			1																														2
○ Deeds	VII-1	1			1			1																											3
○ Easements	VII-2	1	1	1	1			1													1	1	1												7
○ Avigation Easement	VII-1	1			1			1																											3
○ ROW	VII-3	1	1	1	1			1													1	1	1												7
● Covenants, Conditions, & Restrictions	VII-1	1	1					1																											3
○ Common Space Agreements	VII-1	1	1					1																											3
● County Treasurer's Tax Cert.	VII-1	1																																	1
● Improvements Agreement/Guarantee*	VII-2	1	1	1				1																											4
○ CDOT Access Permit	VII-3	1	1																																2
○ 404 Permit	VII-3	1	1																																2
○ Floodplain Permit*	VII-4	1	1																																2
● General Project Report	X-7	1	1	1	1	1	1	1	8	1	1	1	1	1	1	1	1		1	1	1	2	1	1	1	1	1	1							33
● Composite Plan	IX-10	1	2	1	1																														5
● 11"x17" Reduction Composite Plan	IX-10	1				1	1	1	8	1	1	1	1				1	1	1	1	1	1	1	1	1	1		1							25
● Final Plat	IX-15	1	2	1	1			1					1																						7
● 11"x17" Reduction of Final Plat	IX-15	1							8	1	1	1			1	1	1	1	1	1	1	1	1				1								25
● Cover Sheet	IX-11	1	2																																3
● Grading & Stormwater Mgmt Plan	IX-17	1	2															1						1	1										6
○ Storm Drainage Plan and Profile	IX-30	1	2															1			1	1	1												6
● Water and Sewer Plan and Profile	IX-34	1	2	1		1													1	1	1	1	1					1							9
● Roadway Plan and Profile	IX-28	1	2															1																	4
○ Road Cross-sections	IX-27	1	2																																3
○ Detail Sheet	IX-12	1	2																																3
○ Landscape Plan	IX-20	2	1	1																															4
● Geotechnical Report	X-8	1	1									1													1										4
○ Phase I & II Environmental Report	X-10,11	1	1																																2
● Final Drainage Report	X-5,6	1	2															1																	4
○ Stormwater Management Plan	X-14	1	2															1							1										5
○ Sewer System Design Report	X-13	1	2	1																1															5
○ Water System Design Report	X-16	1	2	1														1																	5
○ Traffic Impact Study	X-15	1	2																				1												4

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.

PRE-APPLICATION CONFERENCE

Date: 3-9-94
Conference Attendance: Tom Logue, Dave Thornton, Jody Kliska
Proposal: Filing #2 of South Rim
Location: South Rim Drive

Tax Parcel Number: _____
Review Fee: 740.00 plus Acreage fees @ $15.00 per Acre
(Fee is due at the time of submittal. Make check payable to the City of Grand Junction.)

Additional ROW required? _____
Adjacent road improvements required? _____
Area identified as a need in the Master Plan of Parks and Recreation? NA
Parks and Open Space fees required? ? Estimated Amount: _____
Recording fees required? Yes Estimated Amount: _____
Half street improvement fees required? _____ Estimated Amount: _____
Revocable Permit required? NA
State Highway Access Permit required? NA

Applicable Plans, Policies and Guidelines _____

Located in identified floodplain? FIRM panel # _____
Located in other geohazard area? _____

Located in established Airport Zone? Clear Zone, Critical Zone, Area of Influence? NA
Avigation Easement required? NA

While all factors in a development proposal require careful thought, preparation and design, the following "checked" items are brought to the petitioner's attention as needing special attention or consideration. Other items of special concern may be identified during the review process.

○ Access/Parking	○ Screening/Buffering	○ Land Use Compatibility
● Drainage	○ Landscaping	○ Traffic Generation
○ Floodplain/Wetlands Mitigation	○ Availability of Utilities	● Geologic Hazards/Soils

○ Other _____
Related Files: County File #

It is recommended that the applicant inform the neighboring property owners and tenants of the proposal prior to the public hearing and preferably prior to submittal to the City.

PRE-APPLICATION CONFERENCE

WE RECOGNIZE that we, ourselves, or our representative(s) must be present at all hearings relative to this proposal and it is our responsibility to know when and where those hearings are.

In the event that the petitioner is not represented, the proposed item will be dropped from the agenda, and an additional fee shall be charged to cover rescheduling expenses. Such fee must be paid before the proposed item can again be placed on the agenda. Any changes to the approved plan will require a re-review and approval by the Community Development Department prior to those changes being accepted.

WE UNDERSTAND that incomplete submittals will not be accepted and submittals with insufficient information, identified in the review process, which has not been addressed by the applicant, may be withdrawn from the agenda.

WE FURTHER UNDERSTAND that failure to meet any deadlines as identified by the Community Development Department for the review process may result in the project not being scheduled for hearing or being pulled from the agenda.

X Thomas A. Logue
Signature(s) of Petitioner(s)

Lowe Development Corporation
X David D. Behrhorst
Signature(s) of Representative(s) Vice President

DEVELOPMENT APPLICATION

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

Original
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Receipt _____
Date _____
Rec'd By _____
File No. 7 4 9 4

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 ■ Major [ ] Resub				
[ ] Rezone				From: To:	
■ Planned Development	[ ] ODP [ ] Prelim ■ Final				
[ ] Conditional Use					
[ ] Zone of Annex					
[ ] Text Amendment					
[ ] Special Use					
[ ] Vacation					[ ] Right-of-Way [ ] Easement

■ PROPERTY OWNER	■ DEVELOPER	■ REPRESENTATIVE
David G. Behrhorst, vice president		
Lowe Development, Corp.		Thomas A. Logue
Name	Name	Name
1235 Riverside Drive		227 So. 9th Street
Address	Address	Address
Aspen, CO 81611		Grand Jct. CO. 81501
City/State/Zip	City/State/Zip	City/State/Zip
303-925-4497		245-4099
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.

X Thomas A. Logue — 4/1/94
Signature of Person Completing Application — Date

X David G. Behrhorst Vice President

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

74-94

John C. Middleton
2306 Arriba Drive, #1
Grand Junction, CO 81503

James Sutton
2311 Arriba Drive
Grand Junction, CO 81503

John Lafferty
2310 E Road
Grand Junction, CO 81503

Craig Davis
2828 Orchard Ave.
Grand Junction, CO 81501

Edith McClfresh
2314 Palace Verdes Drive
Grand Junction, CO 81503

John Schoonover
2320 E Road
Grand Junction, CO 81503

Clarence Wood
2302 Arriba Drive
Grand Junction, CO 81503

WY National Bank Cheyenne
P.O. Box 1768
Cheyenne, WY 82003

Richard Parsons
2324 E Road
Grand Junction, CO 81503

Janice Drvik
2308 Arriba Drive
Grand Junction, CO 81503

Mary Ellen Sarten
2308 Palace Verdes Drive
Grand Junction, CO 81503

Charles Griffith
2322 E Road
Grand Junction, CO 81503

Jamie Fitz
2310 Arriba Drive
Grand Junction, CO 81503

Michael Rasmussen
2312 Palace Verdes Drive
Grand Junction, CO 81503

G. Michael Curtis
2328 E Road
Grand Junction, CO 81503

Kenneth Ralston
P.O. Box 61919
Boulder City, NV 89006

Kathryn Boeschenstein
2309 Palace Verdes Drive
Grand Junction, CO 81503

Joseph Carrire
2328 1/2 E Road
Grand Junction, CO 81503

Ronald Milsap
2314 Arriba Court
Grand Junction, CO 81503

Ralph Dorn
2313 Palace Verdes Drive
Grand Junctoin, CO 81503

Fred Crocker
2358 E Road
Grand Junction, CO 81503

Gary Burgher
2318 Arriba Drive
Grand Junction, CO 81503

Meyer Bernard Sussman
2330 E Road
Grand Junction, CO 81503

James Groves
2350 E Road
Grand Junction, CO 81503

Philip Wright
2320 Arriba Court
Grand Junction, CO 81503

George Mitchell
2311 Palace Verdes Dr.
Grand Junction, CO 81503

Carles Futherford
2352 E Road
Grand Junction, CO 81503

Catherine Anne Robertson
2317 Arriba Court
Grand Junction, CO 81503

Patrician Paiz
2890 Orchard Ave.
Grand Junction, CO 81501

Robert Smith
2356 E Road
Grand Junction, CO 81503

Carol Blanche Frost
2357 E Road
Grand Junction, CO 81503

City of Grand Junction
Community Development Dept.
250 N 5th Street
Grand Junction, CO 81501

Gary Grow
2349 E Road
Grand Junction, CO 81503

Richard Brasher
7555 E. Gunnison Pl.
Denver, CO 80231

William Vonstocken
2359 E Road
Grand Junction, CO 81503

Bernice Mouser
2311 E Road
Grand Junction, CO 81503

Gregory Smith
216 Alcove Dr.
Grand Junction, CO 81503

Vera Pearce
1714 N 21st Street
Grand Junction, CO 81501

Bruce Smith
129 E Alcove Dr.
Grand Junction, CO 81503

David G. Behrhorst
Lowe Development Corp.
1235 Riverside Dr.
Aspen, CO 81611

Tom Logue
227 S 9th Street
Grand Junction, CO 81501

[redacted]
2323 F 1/2 Road
[redacted] 81503

[redacted]
2301 Hacienda [redacted] #8
[redacted]

Craig A. Davis
2828 Orchard Ave
City 81501

[redacted]a
2325 F 1/2 Rd.
[redacted] 81503

[redacted]
535 Hacienda
[redacted]

Clarence E. Wood
2302 Arriba Dr.
City 81503

[redacted]tta
2312 [redacted]enda
[redacted] 81503

[redacted]McGee
532 23 [redacted]. #A
[redacted] 81503

Janice E. Drvik
2308 Arriba Dr
City 81503

[redacted]el
2324 F 1/2 Rd.
[redacted]

[redacted]ley
533 Hacienda Dr.
[redacted]

Jamie R. Fitz
2310 Arriba Dr
City 81503

[redacted]uff
552 [redacted] Road
[redacted] 81503

[redacted]vis
2302 Hacienda Dr.
[redacted]

Kenneth E. Ralston
PO Box 61919
Boulder City, NV 89006

[redacted]
561 36 [redacted]
Palisade CO 81526

[redacted]
324 27 [redacted] Rd.
[redacted]

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Ronald C. Milsap
2314 Arriba Ct.
City 81503

[redacted]
2313 F 1/2 Rd.
[redacted] 81503

[redacted]
10900 Dr[redacted] Rd.
[redacted] CA 95014

Gary D. Burgher
2318 Arriba Dr
City 81503

[redacted]is
2305 [redacted] Ct.
[redacted] 81501

[redacted]
2309 [redacted]enbelt Dr
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[redacted]
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[redacted]

[redacted]er
284 29 [redacted] Road
[redacted] 81503

Catherine Anne Robertson
2317 Arriba Ct
City 81503

[redacted] Jr.
528 6th. [redacted]
Fairbanks AK 81503

[redacted]r
534 23 [redacted] Road
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[redacted]
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[redacted]

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[redacted]
505 Skyway Dr
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[redacted]
400 Quincy St
[redacted]

[redacted]
507 Vista Grande
[redacted]

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129 E Alcove Dr
City 81503

[redacted]
522 Skyway Dr
[redacted]

[redacted]
2360 Monument Rd
[redacted]

[redacted]
115 Vista Grande
[redacted]

[redacted]

[redacted]
149 Vista Grande Dr
[redacted]

[redacted]
510 Vista Grande Dr
[redacted]

Carol Blanche Frost
2357 E Road
City 81503

[redacted]
514 Vista Grande
[redacted]

[redacted]
147 Vista Grande Dr
[redacted]

For Tom Joyce

Please review + make Margin Comments S.

South Rim
on the Redlands

Architectural and Landscape Standards and Guidelines

A) Architectural Standards and Guidelines

In order to attain the highest quality of development and construction and to ensure lasting value, it is to the benefit of all owners to have a guideline of architectural standards as to the quality of workmanship and materials, harmony of exterior design and color with existing structures and the location with respect to existing topography and finished grade elevation. Architectural guidelines are intended to provide owners the opportunity to secure individual freedom of design and style. The only constant is quality and harmony with the particular lot and general landscape.

1) Building Setbacks and Minimums

a) All Lot corner monuments are available to establish dimensions for the required building setbacks. The following are building setbacks requirements except as provided for all Lots adjacent to the bluff area as defined in Section 23 Building Restrictions of the Covenants, Conditions and Restrictions of South Rim:

Front lot line 20 feet
Side lot line 10 feet
Rear lot line 20 feet

b) No principal building should be nearer than 20 feet to any other principal building on an adjacent lot.

c) Eaves, steps and open porches are not considered part of a principal building for purpose of determining compliance with setback requirements.

d) All houses are required to have covered garages to accommodate a minimum of two cars and a maximum of three cars, plus hard surface space for two additional cars.

e) The total finished living area of any main structure shall be a minimum 1600 square feet for Ranch Style and a minimum of 2,000 square feet for a Two Story style, excluding open porches, garages and basements. All measurements shall be on an outside foundation wall.

2) Geotechnical Requirements

Prior to commencement of the construction of any improvements on any lot, the owner shall submit written confirmation of compliance with the requirements of the Lincoln DeVore Subsurface Exploration Report dated August 3, 1993 and amended December 7, 1993, a copy of which is attached.

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3) **Roofs**

The roofs shall have a minimum pitch of 5 in 12 except for flat roofs approved by the ACCO. Roof materials shall be covered with either shake or cedar material, premium asphalt shingles (earth tone color Shadow Line or 2nd Load — 25 or 30 year), wood shingles, earth tone color tile roofs (red color prohibited), and built-up roofs where approved by the ACCO.

4) **Building Height**

Height restrictions will be 27 feet as defined by the City of Grand Junction code except for those bluff Lots restricted in the South Rim Covenants, Conditions and Restrictions for South Rim and the Official Development Plan.

The Architectural Committee intends to discourage and has the right to prohibit the construction of any dwelling or other structure which would appear excessive in height when viewed from the roads, drives or other Lots.

5) **Color**

The color of external materials will be generally subdued to blend with the colors of the natural landscape. Earth tones, generally muted, are recommended, although occasionally accent colors used judiciously and with restraint may be permitted.

6) **Materials — Exterior Surfaces**

Exterior surfaces will be generally of natural materials that blend and are compatible with the natural landscape. Exterior masonry materials of brick or stucco shall be "substantial" of at least 40% coverage. Reflective materials and surfaces are prohibited.

7) **Accessory Buildings**

Detached accessory buildings must be approved by the ACCO. Construction shall be similar to that of the house and shall be a maximum total height of 6 feet and fenced in the rear of the Lot from public view. No accessory buildings shall be allowed on all lots adjacent to the bluffs area as defined in the Official Development Plan.

8) **Trash Enclosures**

All trash enclosures shall be fenced from public view.

9) **Fencing**

All fencing shall be restricted to a maximum six feet natural color cedar privacy fence. Clear preservatives only shall be used. Fences will not be permitted on that portion of the Lot between the front of the house and the street. No fencing of any type is allowed on the rear portion of the Lots adjacent to the bluffs area as identified on the Official Development Plan and as defined in Section 23 Building Restrictions in the Covenants, Conditions and Restrictions for South Rim.

10) **Building Projections**

All projections including, but not limited to, chimney flues, evaporative coolers, heating/air conditioning units, humidifiers, vents, gutters, downspouts, utility boxes, porches, railings, and exterior stairways shall match the color of the surface from which they project, or shall be an approved color. Any building projection must be contained within any setback restrictions and every attempt shall be made to limit mechanical roof projections to the rear portion of the dwelling.

11) **Site Drainage and Grading**

Site drainage and grading will be done with minimum disruption to the Lot and shall not drain to adjoining Lots, unless such drainage is part of an approved drainage and grading plan for a particular Filing, nor cause a condition that could lead to soil erosion on the Lot, Common Areas or Open Spaces. Special review will be required for all Lots adjacent to the bluffs area.

12) **Garage Doors**

Visual impact of garage doors will be minimized by such measures as, but not limited to, siting of the Dwelling, protective overhangs, projections, special door facing materials or design, and/or landscaping.

13) **Foundation Walls**

Any foundation walls shall be finished to blend with the upper walls of the Dwelling.

14) **Exterior Mechanical Equipment**

All exterior mechanical equipment shall be either incorporated into the overall form of the Dwelling or be permanently enclosed by a material approved by the Architectural Committee other than plant material.

15) **Exterior Lighting**

Exterior lighting that is subdued and whose light source is not visible from adjoining Dwelling may be permitted by the Architectural Committee for such purposes approved by the Committee. In all cases, exterior lights are subject to the prior approval of the Committee.

B) **Landscape and Irrigation Guidelines and Standards**

1) **Irrigation**

Due to concerns regarding water conservation and the geologic integrity of the Subdivision, the Association shall have the exclusive right to control the irrigation system within the Subdivision. Use of the irrigation system shall be controlled by the Association under Rules and Regulations adopted by the Association which shall incorporate xeriscape principles and the irrigation water recommendations of Lincoln DeVore, Inc. [a copy of which is attached hereto]. Lawn area shall be restricted to

a maximum of 5,000 square feet per single family lot. The flow of irrigation water shall be limited to 1 gallon per minute to each single family lot.

2) **Landscaping**

Lot owners are required to comply with the following landscape requirements:

a. Mimize disruption from grading.
b. Revegetate and restore ground cover for erosion and appearance reasons.
c. Use indigenous species of plant materials (suggested plant types attached).
d. Select man-made elements that blend and are compatible with the land.
e. When possible use existing or natural drainage paths.
f. All attempts shall be made by the Owner to conserve and protect existing vegetation on the Lot prior to and during construction. Plans submitted should identify any existing trees or bushes greater than 2 inch caliper to be removed.
g. Retaining walls shall be faced with the same masonry used on the exterior walls of the primary Dwelling.
h. A standard mail box design, dimensions and lettering shall be required for each Lot consistent with the attached drawing.
i. It shall be the duty and obligation of each Owner to landscape the front yard of his or her lot within sixty (60) days from occupancy and the backyard of his or her Lot within one (1) year from occupancy. The initial landscaping shall include an automatic sprinkler system, at least three (3) trees consisting of at least one 6 to 7 foot Austrian Pine, and ten (10) shrubs. The time limits contained herein may be extended in writing by the Architectural Control Committee pursuant to the provisions of Article V in the Covenants, Conditions and Restrictions of South Rim.

The Committee requires complete landscaping plans, and Lot Owners are encouraged to make adequate provisions for landscaping costs in their overall construction budget.

C) Submittal Requirements

The following is a summary of the architectural and landscape submittal requirements created by the Architectural Control Committee and governed by the Covenants, Conditions and Restrictions of South Rim:

1) Submit two complete sets of plans and specifications to the chairman of the South Rim Architectural Control Committee along with the attached application form in duplicate.

2) Consideration should be given to:
   a) consistent quality use of exterior materials
   b) minimal grading of the site
   c) use of earth tone exterior colors

d) installation of patio structures so they blend and compliment (no aluminum or plastic patio roofs)

3) The plans and specifications submitted should include:
   a) plot plan with Lot and Block showing Lot layout and setbacks
   b) flow and manner of surface drainage
   c) natural and finished grade elevations with building cross sections
   d) floor plans showing overall dimensions
   e) roof plans showing pitch (minimum 5 in 12 pitch)
   f) roof materials and color with sample
   g) exterior elevations showing doors and windows and garage door
   h) all exterior materials including masonry and field and trim color, including color chips
   i) landscape and irrigation plans showing tree and plant types, areas in grass, etc.
   j) any other details or written description which would assist in understanding design features and components.

4) Once the plans and specifications are submitted, the Architectural Control Committee will approve or disapprove in writing within 30 days of submittal. Every attempt will be made to expedite the approval in a shorter period.

FINAL DRAINAGE REPORT

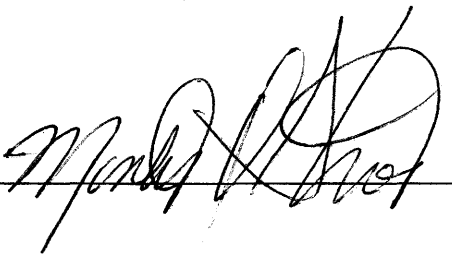
FOR

SOUTH RIM ON THE REDLANDS FILING NO. 2

April 1, 1994

Prepared for:
LOWE DEVELOPMENT CO.
c/o David "Skip" Behrhorst
1235 Riverside Drive
Aspen, CO (303) 925-4497

Prepared by:
HART GROUP, PC
ENGINEERS DESIGNERS PLANNERS
A DIVISION OF
LANDesign
227 South 9th St.
Grand Junction, Colorado 81501

Prepared by: 

"I hereby certify that this report for the final drainage design of South Rim on the Redlands, Filing No. 2 was prepared under my direct supervision."

Reviewed By: _____

Philip M. Hart, PE
State of Colorado, #19346

Prepared by:_____

"I hereby certify that this report for the final drainage design of South Rim on the Redlands, Filing No. 2 was prepared under by direct supervision."

Reviewed By:_____

Philip M. Hart, PE
State of Colorado, #19346

I. Location and Description of Property

A. Property Location:

South Rim on the Redlands is located in the City of Grand Junction, County of Mesa, State of Colorado, more particularly being located in the SW 1/4 of Section 8, T.1 S., R.1 W. of the Ute Meridian, (Tax I.D. #2945-08-083, 087 and 091).

Existing streets within the area of the project include 23 Road to the west and South Rim Drive (aka Greenbelt Drive) which runs west to east and is to be used as primary access to the site.

The South Rim development is bounded to the northeast by the Tailrace Redlands Power Canal and to the northwest by undeveloped lands. To the west lies Vista Villa Subdivision and Palace Verdes Estates, best described as medium density residential developments. To the south lies Haas Subdivision and Chamberlain Estates, undeveloped pasture lands. To the southeast lies Rio Vista Subdivision a medium density residential development.

B. Description of Property:

The South Rim Development contains approximately 91.5 acres including 38.9 acres of area designated for open-space. The second phase of development, South Rim Filing No. Two contains approximately 16.89 acres planned for 45 single family residential lots being the middle one-third of the South Rim development.

Ground cover on upland areas includes native grasses and isolated
pockets of trees and brush. Lowland areas, gullies and washes are host to a variety of ground covers including thick brush, dense willows, native grasses and trees.

The site soils are classified as (Hc) Hinman clay loam, 0 to 2 percent slopes and falls within the hydrological soil group "C".
Soils along gullies and washes are classified as (Rr) Rough broken land, Mesa, Chipeta and Persayo soils materials and falls within the hydrological soils group "D" (Reference 4, Exhibit VII-2.0).

Irrigation facilities include a pressurized under ground system supplied by a storage pond located northeast of and adjacent to Filing One.

II. Drainage Basins and Sub-Basins

A. Major Basin Description:

The project site is bounded to the northeast by the Tailrace Redlands Power canal flowing from the southeast to the northwest.

The canal serves to convey return irrigation water and storm water runoff from areas southeast of the site.

As defined in the detailed drainage study entitled "Flood Hazard Information, Colorado River and Tributaries" (Reference 2, Exhibit VII-1.0) South Rim Filing No. Two is not within the 100 and 500 year floodplains.

The entire South Rim Development is bisected by a ridgeline running southwest to northeast, dividing the site in half. The Final Drainage Study For South Rim Filing No. One (Reference 9) addressed and analyzed onsite and offsite drainage concerns associated lands northwest of the ridgeline. The scope of this analysis shall be limited to land southeast of the ridgeline and within the Filing No. Two boundary. The drainage report for Filing No. One is on file with The City of Grand Junction, Department of Public Works and The Mesa County Planning Department.

B. Sub-Basin Description:

Historically the property drains in a sheetflow fashion from the northwest to the southeast at slopes of 6 to 8 percent towards a natural gully and 3 existing irrigation storage ponds. Drainage within the gully flows from the southwest to the northeast and is ultimately conveyed and discharged to the Tailrace Redlands Power Canal.

The property is bounded to the south by developed and undeveloped lands. Runoff from these areas is directed away from the property by natural topography. Runoff from lands southwest and west is routed through Filing No. One and is analyzed in Reference 9, therefor offsite drainage concerns area considered mitigated.

III. Drainage Design Criteria

A. Regulations:

The "Interim Outline Of Grading And Drainage Criteria" (Reference 8) shall be used as the basis for analysis and facility design.

B. Development Criteria Reference and Constraints:

Offsite tributary flows are calculated and presented in the study for South Rim Filing No. One (Reference 9).

The primary design constraints for the project site are the routing and conveyance of developed flows to and along the aforementioned gully as well as mitigation of potential impacts to the Redlands Power Canal from erosion and sediment loading. The gully is paralleled by an existing trail system and is host to a variety of vegetation. The concept of this report is to implement Best Management Practices (BMP's) which will minimize impact due to development while meeting minimum drainage criteria as defined by City of Grand Junction. Calculations and resultant facility designs are based on extensive site

investigations.

Due to the projects proximity to the Tailrace Redlands Power Canal and the Colorado River, developed flows will have a insignificant affect on the peak hydrograph for the regional basin and resultant flows in the canal. Therefor onsite detention requirements are considered mitigated.

C. Hydrological Criteria:

Since the project is a single family residential development containing approximately 16.89 acres the "Rational Method" is used to calculate historic and developed flow rates. The minor storm is the 2 year frequency rainfall event and the major storm is the 100 year frequency rainfall event.

Runoff Coefficients used in the computations are based on the most recent City of Grand Junction criteria as defined in Reference 8 and shown on Exhibit VII-3.0. Coefficients used in the calculations were assigned based on land use and hydrological soils groups "C" and "D".

The project is located within the Grand Junction Urbanized area (Exhibit VII-4.0) the Intensity Duration Frequency Curves (IDFC) shown on Exhibit VII-5.0 were used for design and analysis.

Times of Concentration were calculated based on the Average Velocities For Overland Flow and the Overland Flow Curves as provided in Reference 1 and shown on Exhibits VII-6.0 and 7.0.

D. Hydraulic Criteria:

Minimum standards for analysis and design of drainage facilities are based on City of Grand Junction criteria (Reference 8).

The computer program "Flowmaster" (Reference 7) was used to aid in the determination of pipe capacities.

Information contained in Reference 5 was used to determine outlet treatment on storm sewers.

IV. Drainage Facility Design:

A. General Concept:

Based on the proposed land use plan, significant changes to the existing drainage patterns are not anticipated. The proposed roadway alignments and lot grading divides the site into 7 sub-basins labeled "A" thru "E" and "PI". The proposed drainage patterns shall continue to direct runoff from sub-basins to the aforementioned gully ultimately

discharging to the Tailrace Redlands Power Canal.

Times of concentration and calculated flow rates at select design points are presented on Exhibits VII-8.0 and VII-9.0. Facility design including storm sewers, inlets, street capacities and channel analysis are presented on Exhibits VII-10.0 thru VII-27.0. Proposed drainage patterns, roadway alignments and drainage facilities are presented on the " South Rim Filing No. Two Drainage and Grading Plan".

B. Specific Details:

Runoff from all offsite and onsite sub-basins are routed to and through the existing gully and irrigation ponds and ultimately to the Redlands Power Canal.

Primary drainage improvements associated with the development of South Rim Filing No. Two shall include to the following:

Design Point #1

A single combination inlet shall be installed at the low point in Wren Court to intercept runoff from sub-basin "A". A 3-foot V-pan and swale shall be installed adjacent to the south line of Lot 24, Block 3 to convey flow to Design Point #2.

Design Point #2

A 18-inch RCP culvert shall be installed under Ewing Drive to convey flow from sub-basins "A" and "B" to a natural drainageway. The drainageway will convey the runoff east to the gully and irrigation ponds.

Design Point #3

A temporary rip-rap drainage swale shall be installed from the end of the construction of South Rim Drive to convey runoff from sub-basin "D" to the natural drainageway.

Design Point #4

A single combination inlet shall be installed at the low point in Grouse Court to intercept runoff from sub-basin "E". A 3-foot V-pan shall be installed adjacent to the east line of Lot 2, Block 3 to convey flow to Design Point #5.

Design Point #5

A swale shall be installed adjacent to the west line of Lot 15, Block 2, South Rim Filing No. One to convey runoff from sub-basins "E" and "F". This flow is to be intercepted at the southeast corner of Lot 14, Block 2, Filing No. One by a existing 8-inch "residual irrigation line", constructed as part of Filing No. One. This line shall convey flow to the

existing irrigation reservoir within Filing No. One located north of South Rim Drive. In the event the capacity of the irrigation reservoir is exceeded runoff will overflow directly to the Trail Channel as defined in Reference 9. In the event the capacity of the 8-inch line is exceeded runoff will flow between Lots 15 and 14 within a swale directly to South Rim Drive and subsequently to a existing 24-inch diameter storm sewer constructed with Filing No. One.

IV. Conclusion

The existing drainageway and gully receiving runoff from sub-basins "A" thru "D" are found to be well vegetated consisting of dense pockets of brush, willows, grass and wetlands. This ground cover provides a excellent filtering and erosion control affect. The 3 existing irrigation storage pond shall provide additional sediment control, therefore turbidity of the discharge to the Redlands Water and Power Tailrace Canal is considered mitigated.

This Final Drainage Report has been prepared to address site specific drainage concerns in accordance with the requirements of The City of Grand Junction, Colorado. The Appendix of this report includes criteria, exhibits, tables and design nomographs used in the analysis and design.

V. References

1. Mesa County Storm Drainage Criteria Manual, Final Draft, Mesa County, Colorado, March 1992.

2. Flood Hazard Information, Colorado River and Tributaries, Grand Junction, Colorado, prepared for the City of Grand Junction and Mesa County, by The Department Of The Army, Sacramento District, Corps Of Engineers, Sacramento, California, November, 1976.

3. Flood Insurance Rate Map, Mesa County, Colorado, (Unincorporated Areas), Community Panel Number 080115 0480 C, Federal Emergency Management Agency, Map Revised July 15th, 1992.

4. Soil Survey, Grand Junction Area, Colorado, Series 1940, No. 19, U.S. Department of Agriculture, issued November, 1955.

5. Urban Storm Drainage Criteria Manual, Urban Drainage and Flood Control District, prepared by Wright-McLaughlin Engineers, March 1969, Revised May, 1984.

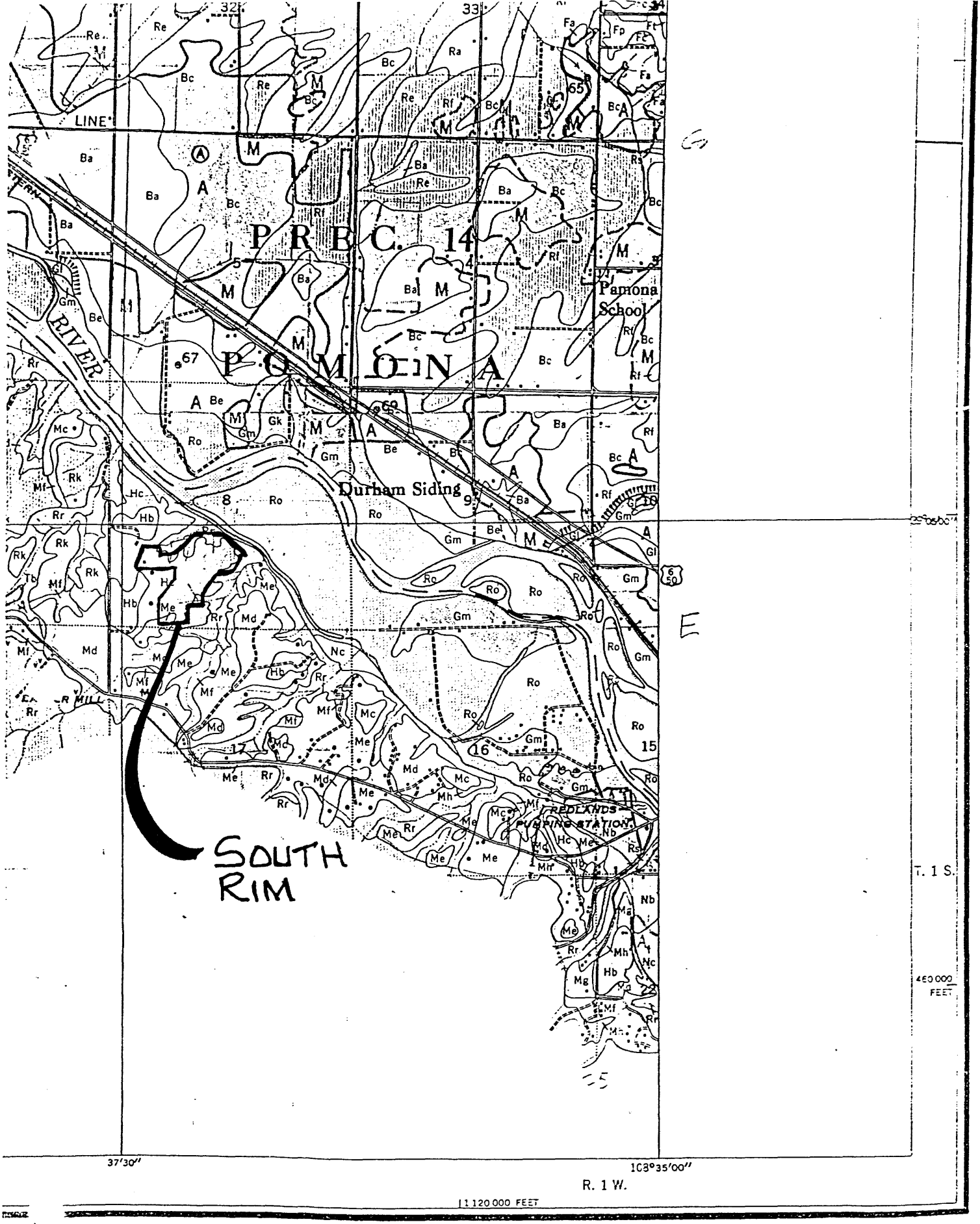
6. Concrete Pipe Design Manual, American Concrete Pipe Association, Fifth Printing (revised) June, 1980

7. Flowmaster I, Version 3.16, Haestad Methods, Inc., Copyright 1990

8. Interim Outline of Grading and Drainage Criteria, City of Grand Junction, July 1992.

9. Final Drainage Report For South Rim On The Redlands, Filing No. One, prepared by Philip M. Hart, P.E., December 10, 1993.

APPENDIX



NOTE:

See sheet No. 1 for Alphabetical Legend and Conventional Signs; sheet No. 3 for Color Grouping.

Map compilation by Division of Cartography, Soil Conservation Service, from controlled 1939 aerial mosaics.
Polyconic projection. 1927 North American datum.
10000 foot ... Colorado ... ral)
... coordinate system.

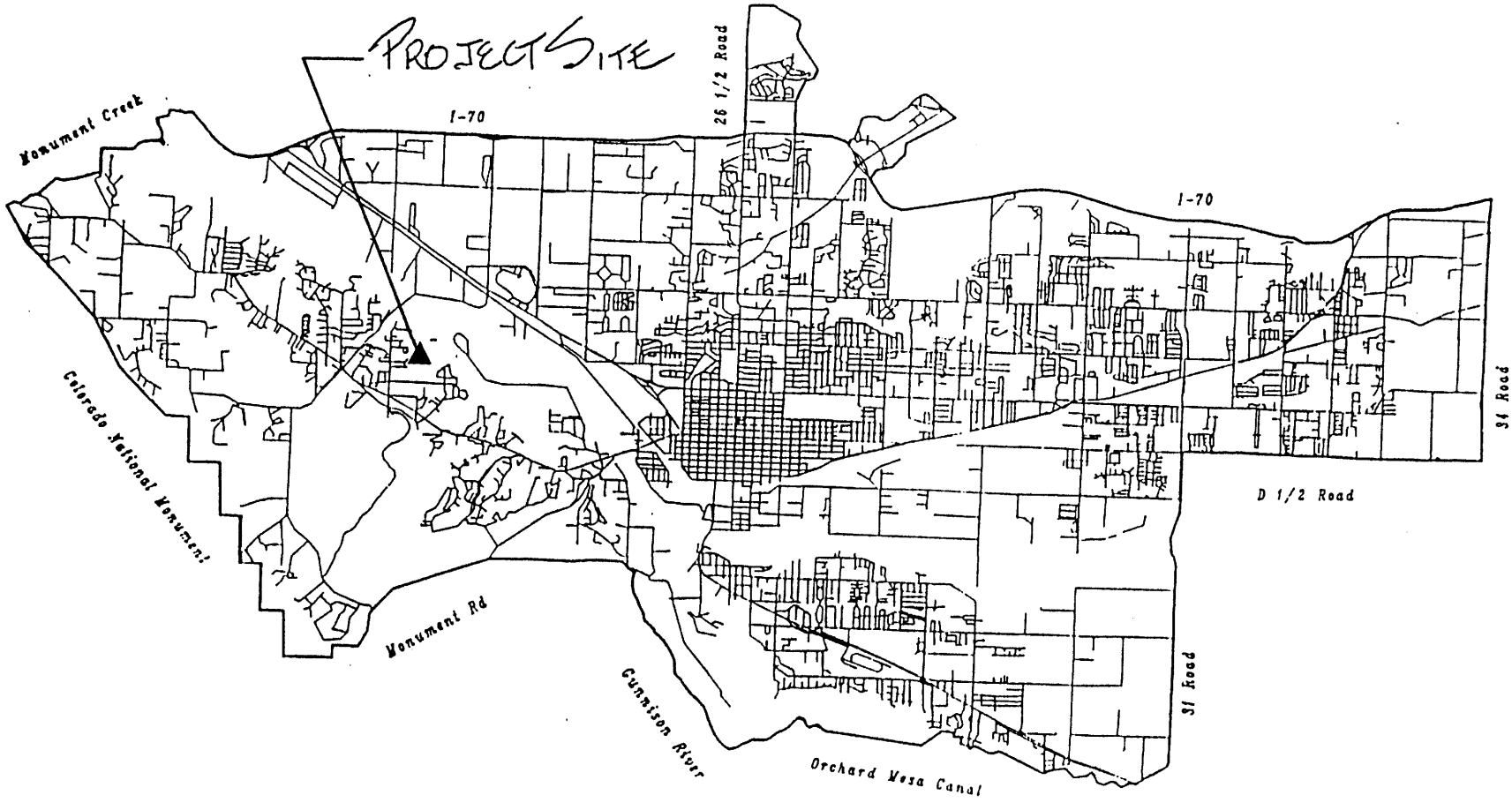
VII-2.0

APPENDIX B

RATIONAL METHOD
RECOMMENDED AVERAGE RUNOFF COEFFICIENTS

Land Use or Surface Characteristics	"C" VALUES 2-YR STORM A&B*	2-YR STORM C&D*	100-YR STOR A&B*	100-YR STOR C&D*
Undeveloped Areas (Vacant or pre-development analysis condition)	0.10	0.20	0.25	0.35
Residential Areas				
Less than 1/8 acre per unit	0.55	0.65	0.70	0.80
1/8 acre per unit	0.50	0.60	0.65	0.75
1/4 acre per unit	0.40	0.50	0.55	0.65
1/3 acre per unit	0.35	0.45	0.50	0.60
1/2 acre per unit	0.30	0.40	0.45	0.55
1 acre per unit	0.25	0.35	0.40	0.50
Pavement and Roofs	0.90	0.90	0.95	0.95
Gravel and Soil Traffic areas	0.70	0.70	0.85	0.85
Lawns and Green Landscaping	0.15	0.25	0.30	0.40
Gravel and Non-Green Landscaping	0.45	0.50	0.60	0.70
Parks, Cemeteries, Pastures	0.25	0.35	0.40	0.50
Schools	0.45	0.50	0.60	0.70

* Refers to SCS soil hydrologic group classification.



Mesa County Dept. of Public Works
Division of Engineering and Design

1992 Grand Jct - Mesa Co. MPO Boundary

MPO/GIS Project

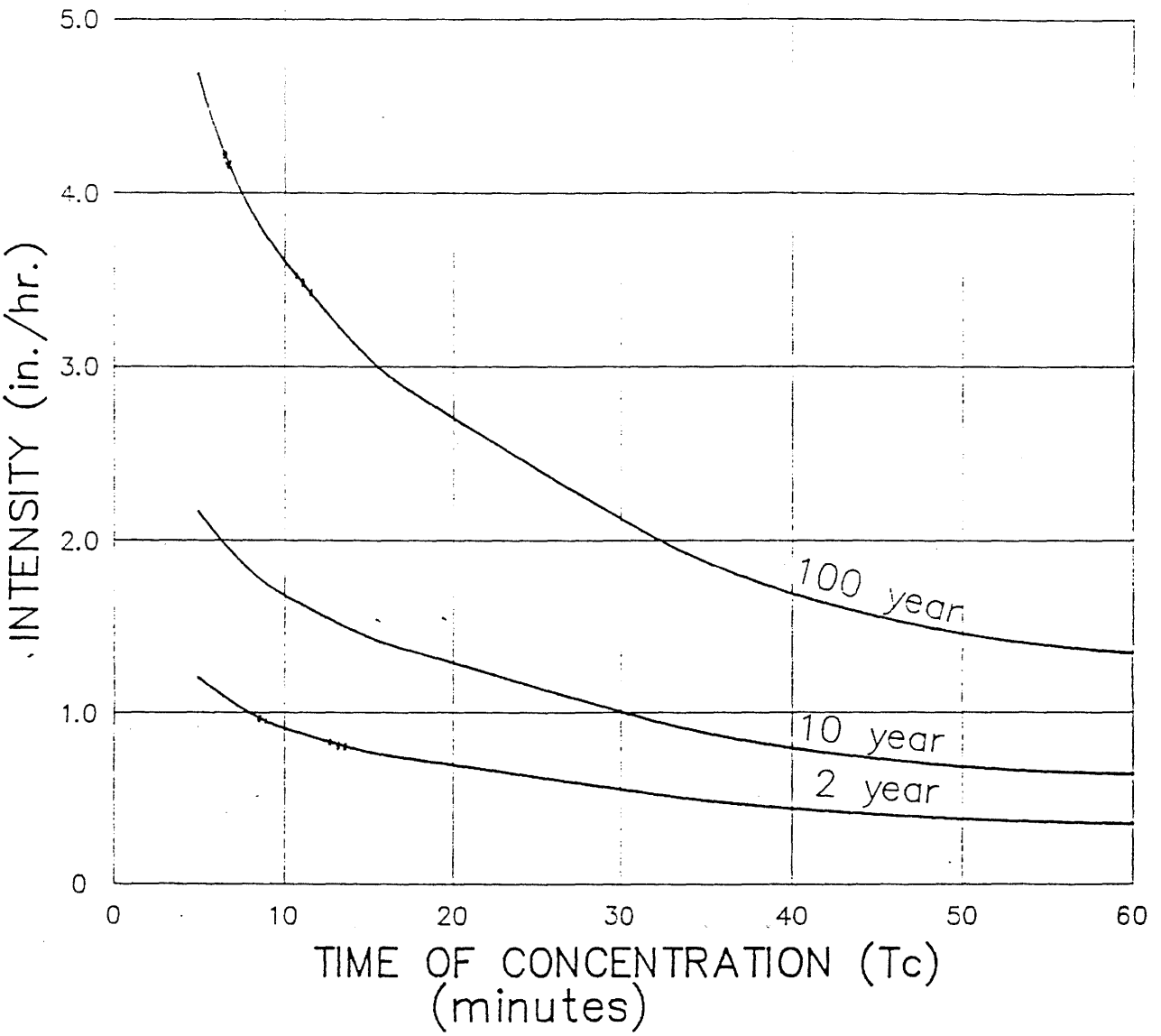
FIG 404

VII-40

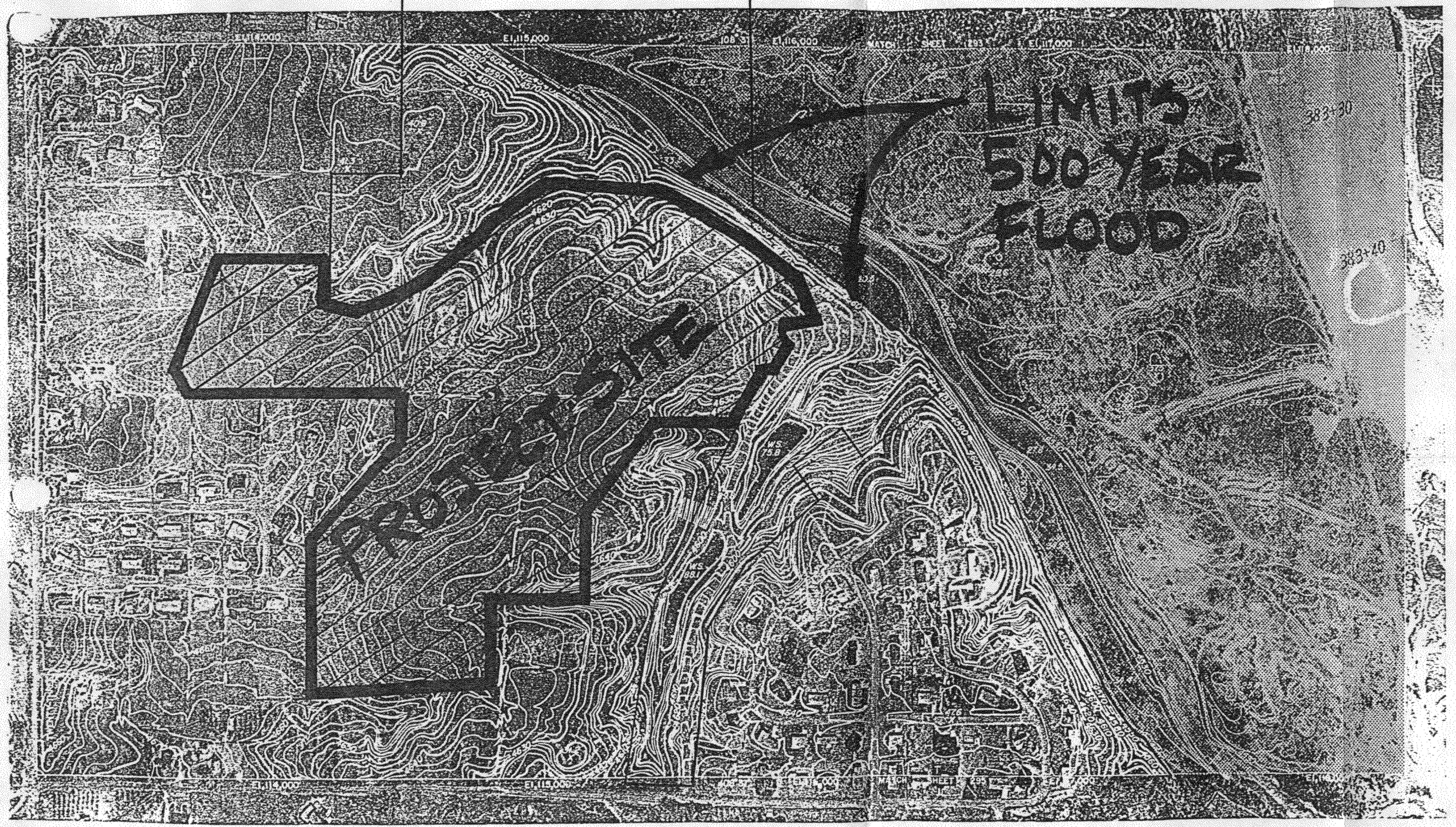
MESA COUNTY
STORM DRAINAGE CRITERIAL MANUAL

FIGURE 401b

INTENSITY DURATION FREQUENCY CURVES
GRAND JUNCTION, COLORADO



VII 5.0



LEGEND

Overflow Limits

100 Year Flood

500 Year Flood

N

383+40 Distance in miles upstream from Lees Ferry along the Colorado River, or from mouth along the Gunnison River.

NOTES

Map based on April 1975 orthophoto map provided by the U.S. Bureau of Reclamation. Minor additions and adjustments made by Corps of Engineers.

Sheet number agrees with sheet number shown on Bureau of Reclamation maps.

Limits of overflow shown may vary from actual locations on the ground because of accuracy of available topography.

Areas outside the overflow limits shown may be subject to flooding from local runoff.

SCALE IN FEET
200 0 200 400 600
CONTOUR INTERVAL 2 FEET
MEAN SEA LEVEL DATUM

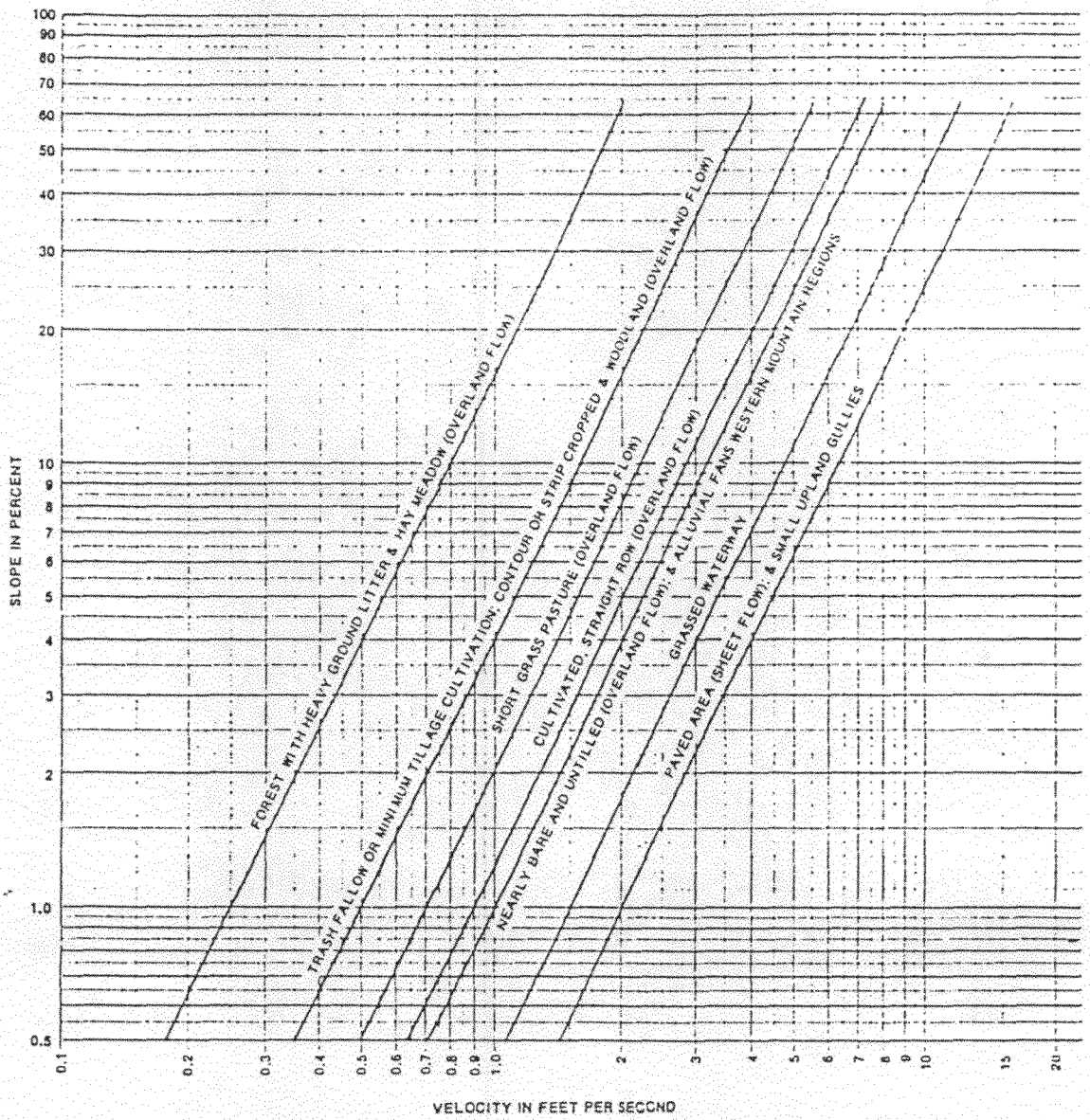
DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

FLOOD HAZARD INFORMATION
COLORADO RIVER AND TRIBUTARIES
GRAND JUNCTION, COLORADO

FLOODED AREAS
NOVEMBER 1976

SHEET 294 PLATE 8

VII-1.0

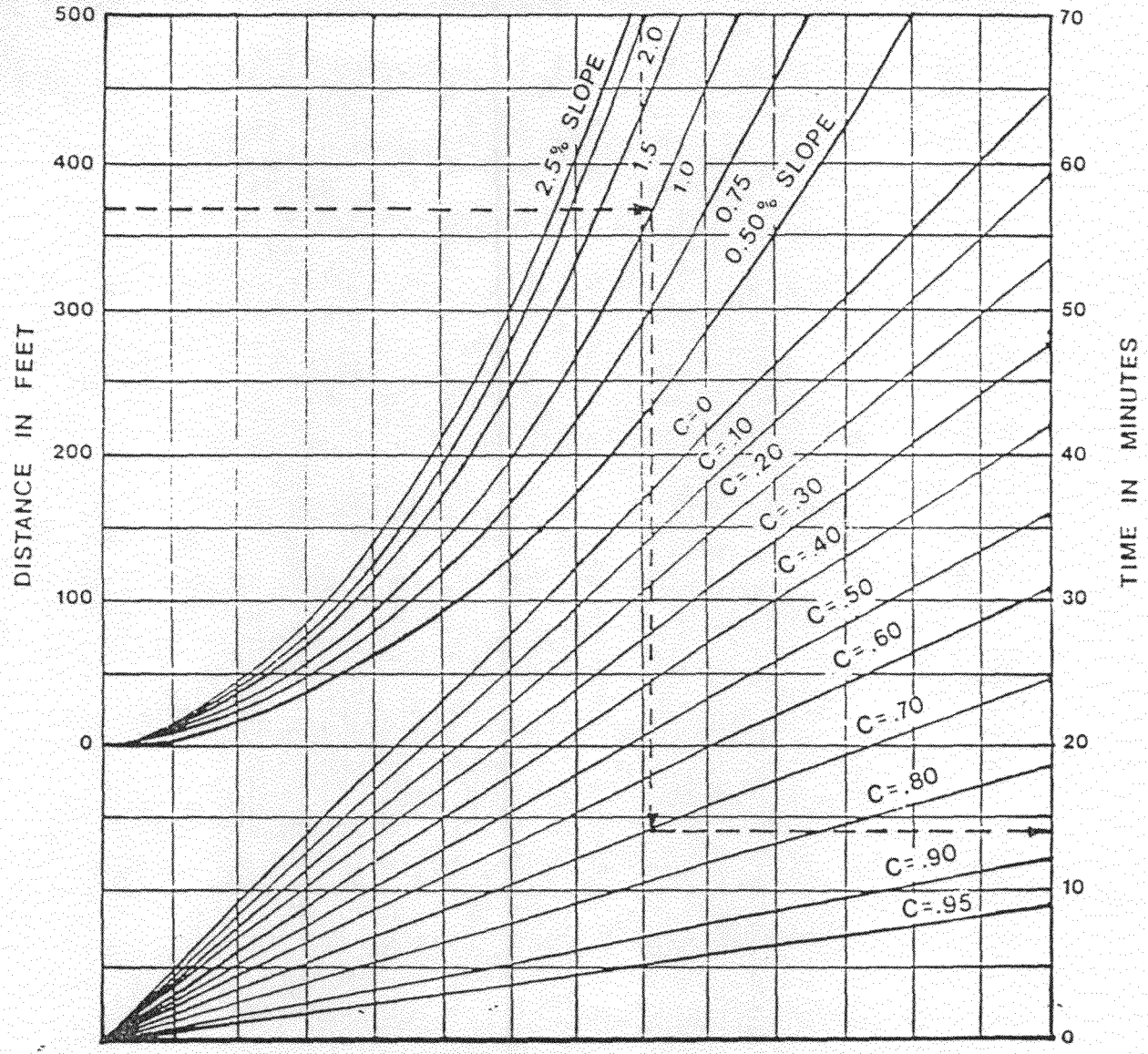


AVERAGE VELOCITIES
FOR OVERLAND FLOW

III-6.0

MESA COUNTY
STORM DRAINAGE CRITERIAL MANUAL

FIGURE 403



THE ABOVE CURVES ARE A SOLUTION OF THE FOLLOWING EQUATION:

$$t_c = \frac{1.8\,(1.1 - C_{10})\sqrt{L}}{\sqrt[3]{S}}$$

where: t_c = initial flow time (min.)
S = slope of basin (%)
C_{10} = runoff coeficient for 10 year frequency
L = length of basin (ft.)

Notes:
1. The curves are for use with the Rational Method.
2. The curves shall not be used for distances in excess of 500'.

OVERLAND FLOW CURVES

III-7.0

T I M E O F C O N C E N T R A T I O N C A L C U L A T I O N S (2 Y E A R S T O R M E V E N T)

PROJECT: SOUTH RIM FILING TWO
JOB # 94012
T A L

(O V E R L A N D F L O W)
DEVELEOPED CONDITION

DATE: 04-Apr-94

SUB-BASIN DATA			INITIAL/OVERLAND TIME (Ti)			TRAVEL TIME TIME (Tt)				INITIAL	Tc CHECK (URBANIZED BASINS)		FINAL Tc	REMARKS
BASIN	C 2	AREA AC.	LENGTH FT.	SLOPE %	Ti MIN.	LENGTH FT.	SLOPE %	VEL F.P.S.	Tt MIN.	Tc MIN.	TOTAL LENGTH FT.	Tc = (L/180)+10 MIN.	MIN.	
A	0.50	3.65	170.0	5.29	8.08	880.0	1.45	2.89	5.07	13.16	1050.00	15.83	13.16	OVERLAND FLOW RESIDENTIAL LOTS STREET FLOW
B	0.50	0.50	50.0	4.00	4.81	310.0	1.94	3.60	1.44	6.25	360.00	12.00	6.25	OVERLAND FLOW RESIDENTIAL LOTS FLOW IN SWALE
C	0.50	0.97	300.0	2.68	13.47					13.47	300.00	11.67	11.67	OVERLAND FLOW RESIDENTIAL LOTS
D	0.50	4.04	140.0	5.00	7.47	878.0	1.41	2.85	5.13	12.61	1018.00	15.66	12.61	OVERLAND FLOW RESIDENTIAL LOTS STREET FLOW
E	0.50	1.57	160.0	5.75	7.63	100.0	0.90	2.28	0.73	8.36	260.00	11.44	8.36	OVERLAND FLOW RESIDENTIAL LOTS STREET FLOW
F	0.50	0.18	20.0	33.00	1.51	118.5	2.00	5.40	0.37	1.87	138.50	10.77	5.00	OVERLAND FLOW RESIDENTIAL LOTS FLOW IN V-PAN

FORMULAS

$$Ti = \frac{1.8(1.1-C)(L)^{1/2}}{S^{1/3}} \qquad Tt = \frac{(L)}{60 \text{ SEC/MIN. } (V \text{ F.P.S.})}$$

A-8.0

T I M E O F C O N C E N T R A T I O N C A L C U L A T I O N S (1 0 0 Y E A R S T O R M E V E N T)

PROJECT: SOUTH RIM FILING TWO
JOB # 94012
T A L

(O V E R L A N D F L O W)
DEVELEOPED CONDITION

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A	0.65	3.65	170.0	5.29	6.06	880.0	1.45	2.89	5.07	11.14	1050.00	15.83	11.14	OVERLAND FLOW RESIDENTIAL LOTS STREET FLOW
B	0.65	0.50	50.0	4.00	3.61	310.0	1.94	3.60	1.44	5.04	360.00	12.00	5.04	OVERLAND FLOW RESIDENTIAL LOTS FLOW IN SWALE
C	0.65	0.97	300.0	2.68	10.10					10.10	300.00	11.67	10.10	OVERLAND FLOW RESIDENTIAL LOTS
D	0.65	4.04	140.0	5.00	5.60	878.0	1.41	2.85	5.13	10.74	1018.00	15.66	10.74	OVERLAND FLOW RESIDENTIAL LOTS STREET FLOW
E	0.65	1.57	160.0	5.75	5.72	100.0	0.90	2.28	0.73	6.45	260.00	11.44	6.45	OVERLAND FLOW RESIDENTIAL LOTS STREET FLOW
F	0.65	0.18	20.0	33.00	1.13	118.5	2.00	5.40	0.37	1.50	138.50	10.77	5.00	OVERLAND FLOW RESIDENTIAL LOTS FLOW IN V-PAN

FORMULAS

$$Ti = \frac{1.8(1.1-C)(L)^{1/2}}{S^{1/3}} \qquad Tt = \frac{(L)}{60 \text{ SEC/MIN. } (V \text{ F.P.S.})}$$

A.6.0

FINAL DRAINAGE REPORT

FOR

SOUTH RIM ON THE REDLANDS FILING NO. 2

April 1, 1994

Prepared for:
LOWE DEVELOPMENT CO.
c/o David "Skip" Behrhorst
1235 Riverside Drive
Aspen, CO (303) 925-4497

Prepared by:
HART GROUP, PC
ENGINEERS DESIGNERS PLANNERS
A DIVISION OF
LANDesign
227 South 9th St.
Grand Junction, Colorado 81501

Prepared by:_____

"I hereby certify that this report for the final drainage design of South Rim on the Redlands, Filing No. 2 was prepared under by direct supervision."

Reviewed By:_____

Philip M. Hart, PE
State of Colorado, #19346

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B. Sub-Basin Description:

Historically the property drains in a sheetflow fashion from the northwest to the southeast at slopes of 6 to 8 percent towards a natural gully and 3 existing irrigation storage ponds. Drainage within the gully flows from the southwest to the northeast and is ultimately conveyed and discharged to the Tailrace Redlands Power Canal.

The property is bounded to the south by developed and undeveloped lands. Runoff from these areas is directed away from the property by natural topography. Runoff from lands southwest and west is routed through Filing No. One and is analyzed in Reference 9, therefor offsite drainage concerns area considered mitigated.

III. Drainage Design Criteria

A. Regulations:

The "Interim Outline Of Grading And Drainage Criteria" (Reference 8) shall be used as the basis for analysis and facility design.

B. Development Criteria Reference and Constraints:

Offsite tributary flows are calculated and presented in the study for South Rim Filing No. One (Reference 9).

The primary design constraints for the project site are the routing and conveyance of developed flows to and along the aforementioned gully as well as mitigation of potential impacts to the Redlands Power Canal from erosion and sediment loading. The gully is paralleled by an existing trail system and is host to a variety of vegetation. The concept of this report is to implement Best Management Practices (BMP's) which will minimize impact due to development while meeting minimum drainage criteria as defined by City of Grand Junction. Calculations and resultant facility designs are based on extensive site

investigations.

Due to the projects proximity to the Tailrace Redlands Power Canal and the Colorado River, developed flows will have a insignificant affect on the peak hydrograph for the regional basin and resultant flows in the canal. Therefor onsite detention requirements are considered mitigated.

C. Hydrological Criteria:

Since the project is a single family residential development containing approximately 16.89 acres the "Rational Method" is used to calculate historic and developed flow rates. The minor storm is the 2 year frequency rainfall event and the major storm is the 100 year frequency rainfall event.

Runoff Coefficients used in the computations are based on the most recent City of Grand Junction criteria as defined in Reference 8 and shown on Exhibit VII-3.0. Coefficients used in the calculations were assigned based on land use and hydrological soils groups "C" and "D".

The project is located within the Grand Junction Urbanized area (Exhibit VII-4.0) the Intensity Duration Frequency Curves (IDFC) shown on Exhibit VII-5.0 were used for design and analysis.

Times of Concentration were calculated based on the Average Velocities For Overland Flow and the Overland Flow Curves as provided in Reference 1 and shown on Exhibits VII-6.0 and 7.0.

D. Hydraulic Criteria:

Minimum standards for analysis and design of drainage facilities are based on City of Grand Junction criteria (Reference 8).

The computer program "Flowmaster" (Reference 7) was used to aid in the determination of pipe capacities.

Information contained in Reference 5 was used to determine outlet treatment on storm sewers.

IV. Drainage Facility Design:

A. General Concept:

Based on the proposed land use plan, significant changes to the existing drainage patterns are not anticipated. The proposed roadway alignments and lot grading divides the site into 7 sub-basins labeled "A" thru "E" and "PI". The proposed drainage patterns shall continue to direct runoff from sub-basins to the aforementioned gully ultimately

discharging to the Tailrace Redlands Power Canal.

Times of concentration and calculated flow rates at select design points are presented on Exhibits VII-8.0 and VII-9.0. Facility design including storm sewers, inlets, street capacities and channel analysis are presented on Exhibits VII-10.0 thru VII-27.0. Proposed drainage patterns, roadway alignments and drainage facilities are presented on the " South Rim Filing No. Two Drainage and Grading Plan".

B. Specific Details:

Runoff from all offsite and onsite sub-basins are routed to and through the existing gully and irrigation ponds and ultimately to the Redlands Power Canal.

Primary drainage improvements associated with the development of South Rim Filing No. Two shall include to the following:

Design Point #1

A single combination inlet shall be installed at the low point in Wren Court to intercept runoff from sub-basin "A". A 3-foot V-pan and swale shall be installed adjacent to the south line of Lot 24, Block 3 to convey flow to Design Point #2.

Design Point #2

A 18-inch RCP culvert shall be installed under Ewing Drive to convey flow from sub-basins "A" and "B" to a natural drainageway. The drainageway will convey the runoff east to the gully and irrigation ponds.

Design Point #3

A temporary rip-rap drainage swale shall be installed from the end of the construction of South Rim Drive to convey runoff from sub-basin "D" to the natural drainageway.

Design Point #4

A single combination inlet shall be installed at the low point in Grouse Court to intercept runoff from sub-basin "E". A 3-foot V-pan shall be installed adjacent to the east line of Lot 2, Block 3 to convey flow to Design Point #5.

Design Point #5

A swale shall be installed adjacent to the west line of Lot 15, Block 2, South Rim Filing No. One to convey runoff from sub-basins "E" and "F". This flow is to be intercepted at the southeast corner of Lot 14, Block 2, Filing No. One by a existing 8-inch "residual irrigation line", constructed as part of Filing No. One. This line shall convey flow to the

existing irrigation reservoir within Filing No. One located north of South Rim Drive. In the event the capacity of the irrigation reservoir is exceeded runoff will overflow directly to the Trail Channel as defined in Reference 9. In the event the capacity of the 8-inch line is exceeded runoff will flow between Lots 15 and 14 within a swale directly to South Rim Drive and subsequently to a existing 24-inch diameter storm sewer constructed with Filing No. One.

IV. Conclusion

The existing drainageway and gully receiving runoff from sub-basins "A" thru "D" are found to be well vegetated consisting of dense pockets of brush, willows, grass and wetlands. This ground cover provides a excellent filtering and erosion control affect. The 3 existing irrigation storage pond shall provide additional sediment control, therefore turbidity of the discharge to the Redlands Water and Power Tailrace Canal is considered mitigated.

This Final Drainage Report has been prepared to address site specific drainage concerns in accordance with the requirements of The City of Grand Junction, Colorado. The Appendix of this report includes criteria, exhibits, tables and design nomographs used in the analysis and design.

V. References

1. Mesa County Storm Drainage Criteria Manual, Final Draft, Mesa County, Colorado, March 1992.

2. Flood Hazard Information, Colorado River and Tributaries, Grand Junction, Colorado, prepared for the City of Grand Junction and Mesa County, by The Department Of The Army, Sacramento District, Corps Of Engineers, Sacramento, California, November, 1976.

3. Flood Insurance Rate Map, Mesa County, Colorado, (Unincorporated Areas), Community Panel Number 080115 0480 C, Federal Emergency Management Agency, Map Revised July 15th, 1992.

4. Soil Survey, Grand Junction Area, Colorado, Series 1940, No. 19, U.S. Department of Agriculture, issued November, 1955.

5. Urban Storm Drainage Criteria Manual, Urban Drainage and Flood Control District, prepared by Wright-McLaughlin Engineers, March 1969, Revised May, 1984.

6. Concrete Pipe Design Manual, American Concrete Pipe Association, Fifth Printing (revised) June, 1980

7. Flowmaster I, Version 3.16, Haestad Methods, Inc., Copyright 1990

8. Interim Outline of Grading and Drainage Criteria, City of Grand Junction, July 1992.

9. Final Drainage Report For South Rim On The Redlands, Filing No. One, prepared by Philip M. Hart, P.E., December 10, 1993.

APPENDIX

STORM DRAINAGE SYSTEM DESIGN DATA (2 YEAR STORM EVENT)

PROJECT: SOUTH RIM FILING TWO
JOB # 94012
T A L

DEVELOPED CONDITION
CITY OF GRAND JUNCTION, COLORADO

DATE:
04-Apr-94

LOCATION OR NODE	BASINS	LENGTH FEET	INLET TIME min.	FLOW TIME STREET	FLOW TIME PIPE	T C min.	COEFF. "C"	INTENSITY "I"	AREA "A" AC.	DIRECT RUNOFF C.F.S.	OTHER RUNOFF C.F.S.	SUM RUNOFF C.F.S.	STREET SLOPE %	STREET CAPACITY ALLOWED C.F.S.	PIPE SLOPE %	PIPE SIZE IN.	PIPE CAPACITY ALLOWED C.F.S.	STREET DESIGN F.P.S.	STREET VELOC. F.P.S.	PIPE DESIGN F.P.S.	PIPE VELOC. F.P.S.	REMARKS
1	A					13.16	0.50	0.83	3.65	1.5		1.5	0.57	4.71								FLOW IN WREN CRT. TO SUMP INLET #2
												******										
2	A					13.16	0.50		3.65													FLOW IN WREN CRT. TO SUMP INLET #2
	B	90.0		0.28		0.28	0.50		0.50				2.00	32.41	3' V-PAN			5.40				FLOW IN V-PAN
		50.0		0.08		0.08							6.70	59.31	3' V-PAN			9.89				FLOW IN V-PAN
						13.52	0.50	0.80	4.15	1.7		1.7			5.00	18	20.36					FLOW TO 18" RCP
												******										
* *	A						0.50		3.65													FLOW IN WREN CRT. TO SUMP INLET #2
	B					13.52	0.50		0.50													FLOW IN V-PAN
	C						0.50		0.97													OVERLAND FLOW TO EX. DRAINAGE
						13.52	0.50	0.80	5.12	2.0		2.0										FLOW TO EX. DRAINAGE
												******										
3	D					12.61	0.50	0.84	4.04	1.7		1.7										FLOW IN TEMPORARY RIP-RAP SWALE
												******										
4	E					8.36	0.50	0.95	1.57	0.7		0.7	0.9	6.31								FLOW IN GROUSE CT. TO SUMP INLET #1
												******										
5	E					8.36	0.50		1.57													FLOW IN GROUSE CT. TO SUMP INLET #1
	F	118.5		0.37		0.37	0.50		0.18				2.00	32.41	3' V-PAN			5.40				FLOW IN V-PAN
						8.73	0.50	0.94	1.75	0.8		0.8										FLOW TO REAR YARD SWALE
												******										

STORM DRAINAGE SYSTEM DESIGN DATA (100 YEAR STORM EVENT)

DEVELOPED CONDITION
CITY OF GRAND JUNCTION, COLORADO

PROJECT: SOUTH RIM FILING TWO
JOB # 94012
TAL

DATE: 04-Apr-94

LOCATION OR NODE	BASINS	LENGTH FEET	INLET TIME min.	FLOW TIME STREET	FLOW TIME PIPE	T C min.	COEFF. "C"	INTENSITY "I"	AREA "A" AC.	DIRECT RUNOFF C.F.S.	OTHER RUNOFF C.F.S.	SUM RUNOFF C.F.S.	STREET SLOPE %	STREET CAPACITY ALLOWED C.F.S.	PIPE SLOPE %	PIPE SIZE IN.	PIPE CAPACITY ALLOWED C.F.S.	STREET DESIGN F.P.S.	STREET VELOC. F.P.S.	PIPE DESIGN F.P.S.	PIPE VELOC. F.P.S.	REMARKS
1	A					11.14	0.65	3.48	3.65	8.3		8.3 ******	0.57	147.87								FLOW IN WREN CRT. TO SUMP INLET #2
2	A					11.14	0.65		3.65													FLOW IN WREN CRT. TO SUMP INLET #2
	B	90.0		0.28		0.28	0.65		0.50				2.00	32.41	3' V-PAN			5.40				FLOW IN V-PAN
		50.0		0.08		0.08							6.70	59.31	3' V-PAN			9.89				FLOW IN V-PAN
						11.50	0.65	3.43	4.15	9.3		9.3 ******			5.00	18	20.36					FLOW TO 18" RCP
" "	A						0.65		3.65													FLOW IN WREN CRT. TO SUMP INLET #2
	B					11.50	0.65		0.50													FLOW IN V-PAN
	C						0.65		0.97													OVERLAND FLOW TO EX. DRAINAGE
						11.50	0.65	3.43	5.12	11.4		11.4 ******										FLOW TO EX. DRAINAGE
3	D					10.74	0.65	3.53	4.04	9.3		9.3 ******	1.18	10.41	RIP-RAP							FLOW IN TEMPORARY RIP-RAP SWALE
4	E					6.45	0.65	4.21	1.57	4.3		4.3 ******	0.90	198.19								FLOW IN GROUSE CT. TO SUMP INLET #1
5	E					6.45	0.65		1.57													FLOW IN GROUSE CT. TO SUMP INLET #1
	F	118.5		0.37		0.37	0.65		0.18				2.00	32.41	3' V-PAN			5.40				FLOW IN V-PAN
						6.82	0.65	4.18	1.75	4.8		4.8 ******										FLOW TO REAR YARD SWALE

VIII 11.5

APPENDIX "D"
1 of 5

Appendix A.—TABLES

Design Charts for Open Channel Flow HDS No 3 US Dept of Transportation Aug 1961, Reprinted 1977

Table 1.—Manning roughness coefficients, n [1]

	Manning's n range [2]
I. Closed conduits:	
A. Concrete pipe	0.011–0.013
B. Corrugated-metal pipe or pipe-arch:	
1. 2⅔ by ½-in. corrugation (riveted pipe): [3]	
a. Plain or fully coated	0.024
b. Paved invert (range values are for 25 and 50 percent of circumference paved):	
(1) Flow full depth	0.021–0.018
(2) Flow 0.8 depth	0.021–0.016
(3) Flow 0.6 depth	0.019–0.013
2. 6 by 2-in. corrugation (field bolted)	0.03
C. Vitrified clay pipe	0.012–0.014
D. Cast-iron pipe, uncoated	0.013
E. Steel pipe	0.009–0.011
F. Brick	0.014–0.017
G. Monolithic concrete:	
1. Wood forms, rough	0.015–0.017
2. Wood forms, smooth	0.012–0.014
3. Steel forms	0.012–0.013
H. Cemented rubble masonry walls:	
1. Concrete floor and top	0.017–0.022
2. Natural floor	0.019–0.025
I. Laminated treated wood	0.015–0.017
J. Vitrified clay liner plates	0.015
II. Open channels, lined [4] (straight alinement): [5]	
A. Concrete, with surfaces as indicated:	
1. Formed, no finish	0.013–0.017
2. Trowel finish	0.012–0.014
3. Float finish	0.013–0.015
4. Float finish, some gravel on bottom	0.015–0.017
5. Gunite, good section	0.016–0.019
6. Gunite, wavy section	0.018–0.022
B. Concrete, bottom float finished, sides as indicated:	
1. Dressed stone in mortar	0.015–0.017
2. Random stone in mortar	0.017–0.020
3. Cement rubble masonry	0.020–0.025
4. Cement rubble masonry, plastered	0.016–0.020
5. Dry rubble (riprap)	0.020–0.030
C. Gravel bottom, sides as indicated:	
1. Formed concrete	0.017–0.020
2. Random stone in mortar	0.020–0.023
3. Dry rubble (riprap)	0.023–0.033
D. Brick	0.014–0.017
E. Asphalt:	
1. Smooth	0.013
2. Rough	0.016
F. Wood, planed, clean	0.011–0.013
G. Concrete-lined excavated rock:	
1. Good section	0.017–0.020
2. Irregular section	0.022–0.027
III. Open channels, excavated [4] (straight alinement, [5] natural lining):	
A. Earth, uniform section:	
1. Clean, recently completed	0.016–0.018
2. Clean, after weathering	0.018–0.020
3. With short grass, few weeds	0.022–0.027
4. In gravelly soil, uniform section, clean	0.022–0.025
B. Earth, fairly uniform section:	
1. No vegetation	0.022–0.025
2. Grass, some weeds	0.025–0.030
3. Dense weeds or aquatic plants in deep channels	0.030–0.035
4. Sides clean, gravel bottom	0.025–0.030
5. Sides clean, cobble bottom	0.030–0.040
C. Dragline excavated or dredged:	
1. No vegetation	0.028–0.033
2. Light brush on banks	0.035–0.050
D. Rock:	
1. Based on design section	0.035
2. Based on actual mean section:	
a. Smooth and uniform	0.035–0.040
b. Jagged and irregular	0.040–0.045
E. Channels not maintained, weeds and brush uncut:	
1. Dense weeds, high as flow depth	0.08–0.12
2. Clean bottom, brush on sides	0.05–0.08
3. Clean bottom, brush on sides, highest stage of flow	0.07–0.11
4. Dense brush, high stage	0.10–0.14
IV. Highway channels and swales with maintained vegetation [4] [7] (values shown are for velocities of 2 and 6 f.p.s.):	
A. Depth of flow up to 0.7 foot:	
1. Bermudagrass, Kentucky bluegrass, buffalograss:	
a. Mowed to 2 inches	0.07–0.045
b. Length 4–6 inches	0.09–0.05
2. Good stand, any grass:	
a. Length about 12 inches	0.18–0.09
b. Length about 24 inches	0.30–0.15
3. Fair stand, any grass:	
a. Length about 12 inches	0.14–0.08
b. Length about 24 inches	0.25–0.13
B. Depth of flow 0.7–1.5 feet:	
1. Bermudagrass, Kentucky bluegrass, buffalograss:	
a. Mowed to 2 inches	0.05–0.035
b. Length 4 to 6 inches	0.06–0.04
2. Good stand, any grass:	
a. Length about 12 inches	0.12–0.07
b. Length about 24 inches	0.20–0.10
3. Fair stand, any grass:	
a. Length about 12 inches	0.10–0.06
b. Length about 24 inches	0.17–0.09
V. Street and expressway gutters:	
A. Concrete gutter, troweled finish	0.012
B. Asphalt pavement:	
1. Smooth texture	0.013
2. Rough texture	0.016
C. Concrete gutter with asphalt pavement:	
1. Smooth	0.013
2. Rough	0.015
D. Concrete pavement:	
1. Float finish	0.014
2. Broom finish	0.016
E. For gutters with small slope, where sediment may accumulate, increase above values of n by	*0.002*
VI. Natural stream channels: [8]	
A. Minor streams [9] (surface width at flood stage less than 100 ft.):	
1. Fairly regular section:	
a. Some grass and weeds, little or no brush	0.030–0.035
b. Dense growth of weeds, depth of flow materially greater than weed height	0.035–0.05
c. Some weeds, light brush on banks	0.035–0.05
d. Some weeds, heavy brush on banks	0.05–0.07
e. Some weeds, dense willows on banks	0.06–0.08
f. For trees within channel, with branches submerged at high stage, increase all above values by	*0.01–0.02*
2. Irregular sections, with pools, slight channel meander; increase values given in 1a–e about	*0.01–0.02*
3. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stage:	
a. Bottom of gravel, cobbles, and few boulders	0.04–0.05
b. Bottom of cobbles, with large boulders	0.05–0.07
B. Flood plains (adjacent to natural streams):	
1. Pasture, no brush:	
a. Short grass	0.030–0.035
b. High grass	0.035–0.05
2. Cultivated areas:	
a. No crop	0.03–0.04
b. Mature row crops	0.035–0.045
c. Mature field crops	0.04–0.05
3. Heavy weeds, scattered brush	0.05–0.07
4. Light brush and trees: [10]	
a. Winter	0.05–0.06
b. Summer	0.06–0.08
5. Medium to dense brush: [10]	
a. Winter	0.07–0.11
b. Summer	0.10–0.16
6. Dense willows, summer, not bent over by current	0.15–0.20
7. Cleared land with tree stumps, 100–150 per acre:	
a. No sprouts	0.04–0.05
b. With heavy growth of sprouts	0.06–0.08
8. Heavy stand of timber, a few down trees, little undergrowth:	
a. Flood depth below branches	0.10–0.12
b. Flood depth reaches branches	0.12–0.16
C. Major streams (surface width at flood stage more than 100 ft.): Roughness coefficient is usually less than for minor streams of similar description on account of less effective resistance offered by irregular banks or vegetation on banks. Values of n may be somewhat reduced. Follow recommendation in publication cited [8] if possible. The value of n for larger streams of most regular section, with no boulders or brush, may be in the range of	0.028–0.033

TRAIL CHANNEL
BASE VALUE
INCREASE VALUE

Footnotes to table 1 appear at the top of page 101.

HDS 3

VII-12.0

Table 13-3
MANNING'S ROUGHNESS COEFFICIENTS

Lining Category	Lining Type	Depth Ranges 0 - 0.5 (ft)	0.5 - 2.0 (ft)	> 2.0 (ft)
Rigid	Concrete	0.015	0.013	0.013
	Grouted Riprap	0.040	0.030	0.028
	Stone Masonry	0.042	0.032	0.030
	Soil Cement	0.025	0.022	0.020
	Asphalt	0.018	0.016	0.016
Temporary	Woven Paper Net	0.016	0.015	0.015
	Jute Net	0.028	0.022	0.019
	Fiberglass Roving	0.028	0.021	0.019
	Straw and Erosion Net	0.065	0.033	0.025
	Curled Wood Mat	0.066	0.035	0.028
	Nylon Mat	0.036	0.025	0.021
Gravel	1-inch, D_{50}	0.044	0.033	0.030
	2-inch, D_{50}	0.066	0.041	0.034
Rock Riprap	6-inch, D_{50}	0.104	0.069	0.035
	12-inch, D_{50}	---	0.078	0.040

Streets 1016 - 1015

APPENDIX "D"
5 of 5

Rfz

(2-24)

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Table 2-1 Values of n to be used with the Manning equation [2]

Surface	Best	Good	Fair	Bad
Uncoated cast-iron pipe	0.012	0.013	0.014	0.015
Coated cast-iron pipe	0.011	0.012[a]	0.013[a]	
Commercial wrought-iron pipe, black	0.012	0.013	0.014	0.015
Commercial wrought-iron pipe, galvanized	0.013	0.014	0.015	0.017
Smooth brass and glass pipe	0.009	0.010	0.011	0.013
Smooth lockbar and welded "OD" pipe	0.010	0.011[a]	0.013[a]	
Riveted and spiral steel pipe	0.013	0.015[a]	0.017[a]	
Vitrified sewer pipe	{0.010 / 0.011}	0.013[a]	0.015	0.017
Common clay drainage tile	0.011	0.012[a]	0.014[a]	0.017
Glazed brickwork	0.011	0.012	0.013[a]	0.015
Brick in cement mortar; brick sewers	0.012	0.013	0.015[a]	0.017
Neat cement surfaces	0.010	0.011	0.012	0.013
Cement mortar surfaces	0.011	0.012	0.013[a]	0.015
Concrete pipe	0.012	0.013	0.015[a]	0.016
Wood stave pipe	0.010	0.011	0.012	0.013
Plank flumes				
Planed	0.010	0.012[a]	0.013	0.014
Unplaned	0.011	0.013[a]	0.014	0.015
With battens	0.012	0.015[a]	0.016	
Concrete-lined channels	0.012	0.014[a]	0.016[a]	0.018
Cement-rubble surface	0.017	0.020	0.025	0.030
Dry-rubble surface	0.025	0.030	0.033	0.035
Dressed-ashlar surface	0.013	0.014	0.015	0.017
Semicircular metal flumes, smooth	0.011	0.012	0.013	0.015
Semicircular metal flumes, corrugated	0.0225	0.025	0.0275	0.030
Canals and ditches				
Earth, straight and uniform	0.017	0.020	0.0225[a]	0.025
Rock cuts, smooth and uniform	0.025	0.030	0.033[a]	0.035
Rock cuts, jagged and irregular	0.035	0.040	0.045	
Winding sluggish canals	0.0225	0.025[a]	0.0275	0.030
Dredged-earth channels	0.025	0.0275[a]	0.030	0.033
Canals with rough stony beds, weeds on earth banks	0.025	0.030	0.035[a]	0.040
Earth bottom, rubble sides	0.028	0.030[a]	0.033[a]	0.035
Natural-stream channels				
1. Clean, straight bank, full stage, no rifts or deep pools	0.025	0.0275	0.030	0.033
2. Same as (1), but some weeds and stones	0.030	0.033	0.035	0.040
3. Winding, some pools and shoals, clean	0.033	0.035	0.040	0.045
4. Same as (3), lower stages, more ineffective slope and sections	0.040	0.045	0.050	0.055
5. Same as (3), some weeds and stones	0.035	0.040	0.045	0.050
6. Same as (4), stony sections	0.045	0.050	0.055	0.060
7. Sluggish river reaches, rather weedy or with very deep pools	0.050	0.060	0.070	0.080
8. Very weedy reaches	0.075	0.100	0.125	0.150

[a]Values commonly used in designing.

VII-14.0

WASTEWATER ENGR : COLLECTION & PUMPING OF WASTEWATER, METCALF & EDDY, 1901

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: V-PAN

Comment: 3 FOOT V-PAN SECTION A-A

Solve For Discharge

Given Input Data:

Bottom Width.....	3.00 ft
Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.029
Channel Slope....	0.0200 ft/ft — 2%
Depth.....	1.00 ft

COMPOSITE N VALUE BRICK AND CONC.

Computed Results:

Discharge.....	32.41 cfs
Velocity.....	5.40 fps
Flow Area.....	6.00 sf
Flow Top Width...	9.00 ft
Wetted Perimeter.	9.32 ft
Critical Depth...	1.08 ft
Critical Slope...	0.0144 ft/ft
Froude Number....	1.17 (flow is Supercritical)

VII-15.0

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: V-PAN

Comment: 3 FOOT V-PAN SECTION A-A

Solve For Discharge

Given Input Data:

Bottom Width.....	3.00 ft
Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.029
Channel Slope....	0.0670 ft/ft
Depth.....	1.00 ft

COMPOSITE N VALUE GRASS AND CONC.

6.7%

Computed Results:

Discharge.....	59.31 cfs
Velocity.....	9.89 fps
Flow Area.....	6.00 sf
Flow Top Width...	9.00 ft
Wetted Perimeter.	9.32 ft
Critical Depth...	1.47 ft
Critical Slope...	0.0133 ft/ft
Froude Number....	2.13 (flow is Supercritical)

VII-16.0

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: REAR YARD SWALE

Comment: PROPOSED SWALE SECTION B-B

Solve For Discharge

Given Input Data:

Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.035 ——— GRASS LINED
Channel Slope....	0.0194 ft/ft ——— 1.94%
Depth.....	1.00 ft

Computed Results:

Discharge.....	10.79 cfs
Velocity.....	3.60 fps
Flow Area.....	3.00 sf
Flow Top Width...	6.00 ft
Wetted Perimeter.	6.32 ft
Critical Depth...	0.96 ft
Critical Slope...	0.0245 ft/ft
Froude Number....	0.90 (flow is Subcritical)

Open Channel Flow Module, Version 3.16 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: RIP-RAP SWALE

Comment: 6 FOOT RIPRAP SWALE SECTION C-C

Solve For Discharge

Given Input Data:

Bottom Width.....	2.00 ft
Left Side Slope..	2.00:1 (H:V)
Right Side Slope.	2.00:1 (H:V)
Manning's n.....	0.045 ——— N VALUE FOR RIP-RAP
Channel Slope....	0.0118 ft/ft
Depth.....	1.00 ft

Computed Results:

Discharge.....	10.41 cfs
Velocity.....	2.60 fps
Flow Area.....	4.00 sf
Flow Top Width...	6.00 ft
Wetted Perimeter.	6.47 ft
Critical Depth...	0.74 ft
Critical Slope...	0.0403 ft/ft
Froude Number....	0.56 (flow is Subcritical)

Open Channel Flow Module, Version 3.16 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

VII-18.0

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: SRIM2 CULVERT

Comment: 18" RCP AT EWING DRIVE

Solve For Full Flow Capacity

Given Input Data:

Diameter.....	1.50 ft
Slope.....	0.0500 ft/ft — 5.0%
Manning's n.....	0.015 RCP
Discharge.....	20.36 cfs

Computed Results:

Full Flow Capacity.....	20.36 cfs
Full Flow Depth.....	1.50 ft
Velocity.....	11.52 fps
Flow Area.....	1.77 sf
Critical Depth....	1.47 ft
Critical Slope....	0.0448 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	20.36 cfs
QMAX @.94D.....	21.90 cfs
Froude Number.....	FULL

ALLOWABLE USE OF ROADS AND OF CROSS ROAD FLOW AS PART OF DRAINAGE SYSTEM DURING MINOR AND MAJOR STORM RUNOFF

STREET CLASSIFICATION	MINOR STORM (maximum roadway encroachment)	MAJOR STORM (allowable depth and inundation)
Local, Lane and Place (Residential or Subcollector)	Flow may spread to crown of street.	Residential dwellings, public, commercial, and industrial buildings. Access shall not be inundated at ground line, unless buildings are flood-proofed. Depth of water over gutter flow line shall not exceed 18".
URBAN SECTION	No curb overtopping.	
RURAL SECTION	Encroachment shall not extend over property line.	
Collector (Residential Collector, and Collector)	One traffic lane must remain free of inundation for both URBAN and RURAL SECTIONS	(same as above)
Arterial	One traffic lane in each direction must remain free of inundation for both URBAN and RURAL SECTIONS	(same as above) Depth of water at street crown shall not exceed 6", to allow for operation of emergency vehicles.

ALLOWABLE CROSS STREET FLOW

STREET CLASSIFICATION	MINOR STORM	MAJOR STORM
Local, Lane, Place and Collector (Residential Access, Subcollector, Residential Collector and Collector)	Where cross pan exists allowed depth of flow shall not exceed 6"	Depth of water over gutter flow line shall not exceed 18"
Arterial	None	Depth of water at crown shall not exceed 6"

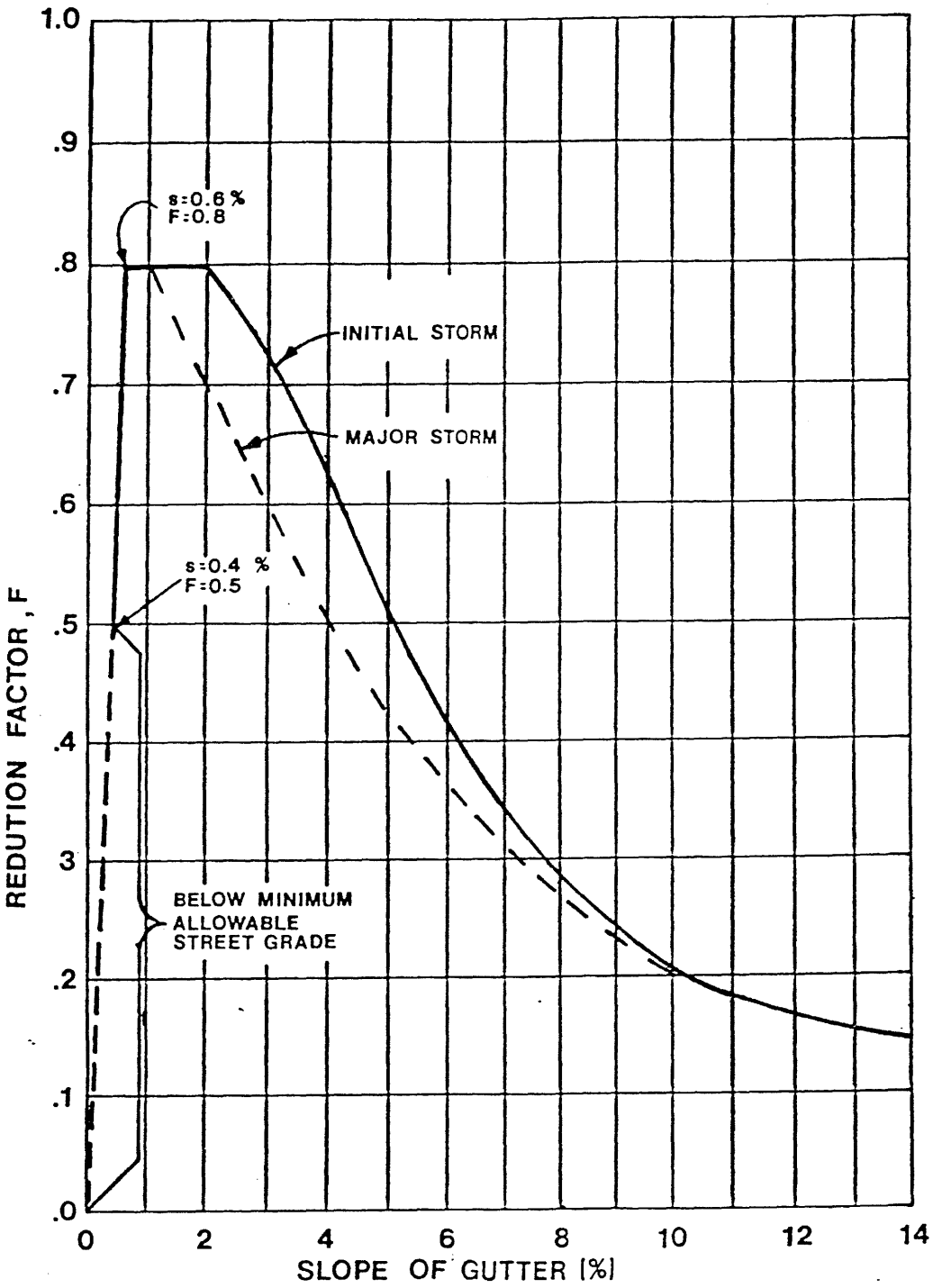

FIGURE 6-2 REDUCTION FACTOR FOR ALLOWABLE GUTTER CAPACITY LOCAL AND COLLECTOR STREETS

APPLY REDUCTION FACTOR FOR APPLICABLE SLOPE TO THE THEORETICAL GUTTER CAPACITY TO OBTAIN ALLOWABLE GUTTER CAPACITY APPROACHING ARTERIAL STREET

VII-21.0

STREET CARRING CAPACITY (2 YEAR)

PROJECT: SOUTH RIM FILING 2
LOCATION: CITY OF GRAND JUNCTION, COLORADO
DATE: Apr-94

Street Information:

R.O.W. Width =	44.00	FT.	Flow Area = 2.77 SF.
Flowline Width =	31.00	FT.	
Classification =	URBAN		
Mannings =	0.015		
Max. Depth =	0.41	FT.	To Top Back Of Curb
Str/ X-Slope =	2.00	%	
Gutter Slope =	8.33	%	Drive Over Curb, Gutter and Walk
Sidewalk Slope =	2.08	%	1/4" / FT.
Roadside Slope =	2.08	%	1/4" / FT.

SLOPE OF STREET %	REDUCTION FACTOR FOR SLOPE	ALLOWABLE CAPACITY C.F.S.	VELOCITY F.P.S.
0.50	0.60	3.53	1.27
0.51	0.60	3.56	1.29
0.57	0.75	4.71	1.70
0.63	0.80	5.28	1.91
0.71	0.80	5.60	2.02
0.90	0.80	6.31	2.28
1.05	0.80	6.81	2.46
1.18	0.80	7.22	2.61
1.41	0.80	7.90	2.85
1.45	0.80	8.01	2.89
2.41	0.77	9.94	3.59
2.87	0.74	10.42	3.76

Formula: $Qa = F \times (1.49/N) \times R^{2/3} \times S^{1/2} \times A$

F = Reduction Factor For Slope
N = Mannings Coefficient = 0.0150
R = Hydraulic Radius = A/WP = 0.1661
A = Cross Sectional Area Sq.Ft. = 2.770
WP = Wetted Perimeter Ft. = 16.679
S = Street Slope FT./FT.

STREET CARRING CAPACITY (100 YEAR)

PROJECT: SOUTH RIM FILING 2
LOCATION: CITY OF GRAND JUNCTION, COLORADO
DATE: Apr-94

Street Information:

R.O.W. Width =	44.00	FT.	Flow Area = 25.45 SF.
Flowline Width =	31.00	FT.	
Classification =	URBAN		
Mannings =	0.015		
Max. Depth =	1.5	FT.	Above Flowline
Str/ X-Slope =	2.00	%	
Gutter Slope =	8.33	%	Drive Over Curb, Gutter and
Sidewalk Slope =	2.08	%	1/4" / FT.
Roadside Slope =	2.08	%	1/4" / FT.

SLOPE OF STREET %	REDUCTION FACTOR FOR SLOPE	ALLOWABLE CAPACITY C.F.S.	VELOCITY F.P.S.
0.50	0.60	110.79	4.35
0.51	0.60	111.90	4.40
0.57	0.75	147.87	5.81
0.63	0.80	165.82	6.51
0.71	0.80	176.03	6.92
0.90	0.80	198.19	7.79
1.05	0.80	214.07	8.41
1.18	0.80	226.94	8.92
1.41	0.80	248.07	9.75
1.45	0.80	251.57	9.88
2.41	0.77	312.16	12.26
2.87	0.74	327.38	12.86

Formula: $Qa = F \times (1.49/N) \times R^{2/3} \times S^{1/2} \times A$

F = Reduction Factor For Slope
N = Mannings Coefficient = 0.0150
R = Hydraulic Radius = A/WP = 1.0497
A = Cross Sectional Area Sq.Ft. = 25.453
WP = Wetted Perimeter Ft. = 24.248
S = Street Slope FT./FT.

TABLE 2-1
REDUCTION FACTORS TO APPLY TO INLETS

Condition (1)	Inlet Type (2)	Percentage of Theoretical Capacity Allowed (3)
Sump	Curb Opening	80%
Sump	Grated	50%
Sump	Combination	65%
Continuous Grade	Curb Opening	80%
Continuous Grade	Deflector	75%
Continuous Grade	Longitudinal Bar Grated	60%
Continuous Grade	Transverse Bar Grate or Longitudinal Bar Grate incorporating transverse bars	50%
Continuous Grade	Combination	110% of that listed for type of grate utilized

DEPTH = 1.5' MAX.

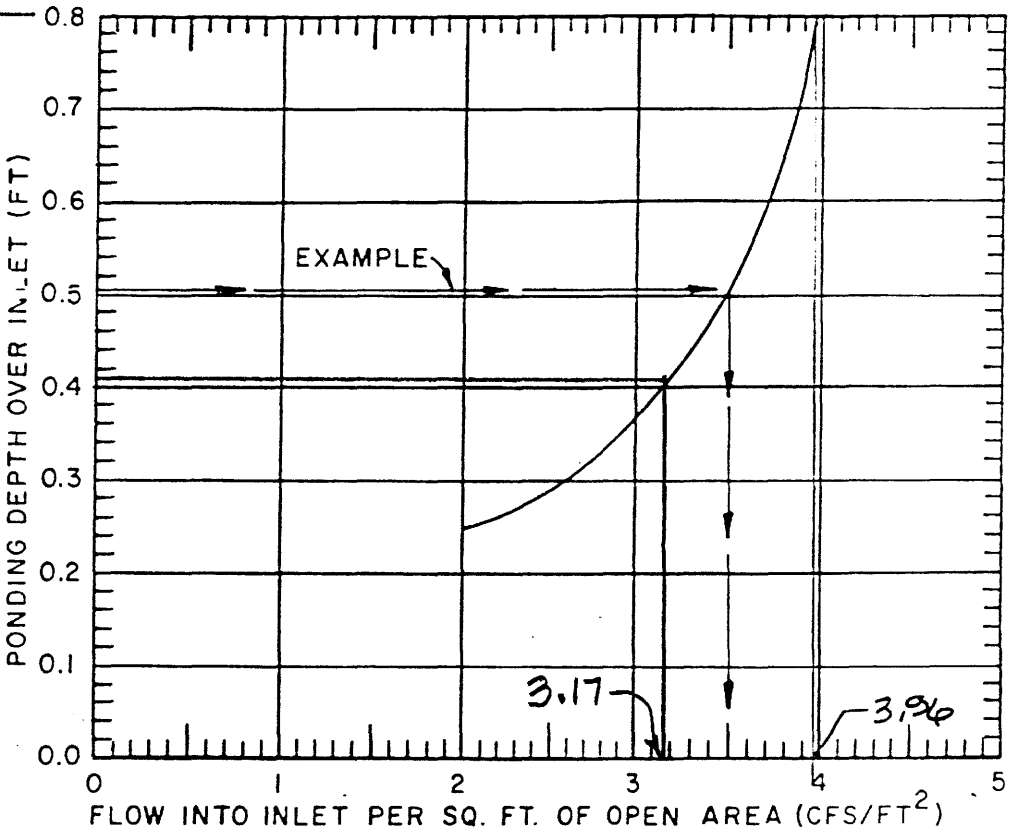

FIGURE 4-1. CAPACITY OF GRATED INLET IN SUMP

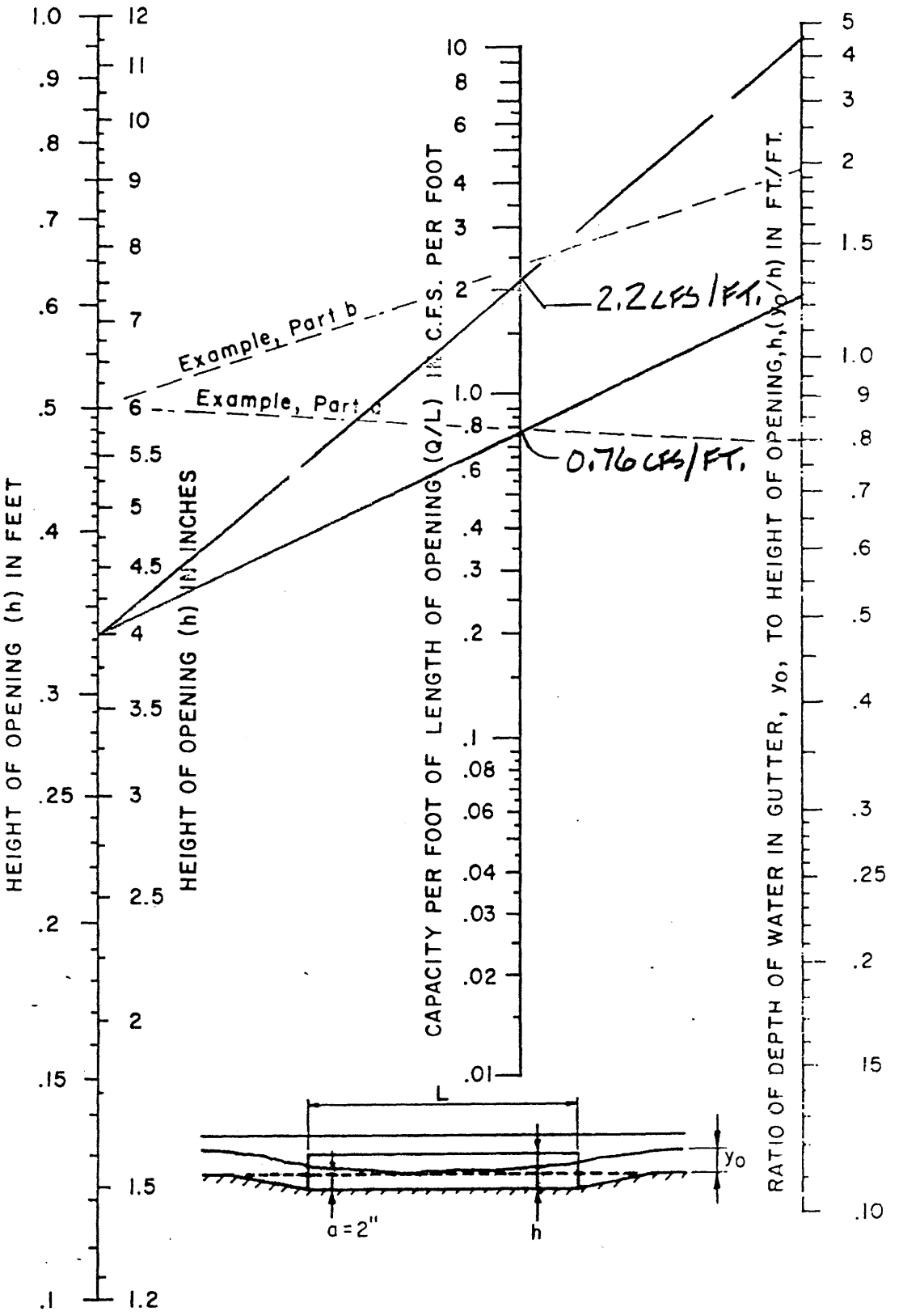

FIGURE 3-1. NOMOGRAPH FOR CAPACITY OF CURB OPENING INLETS IN SUMPS, DEPRESSION DEPTH 2"

Adapted from Bureau of Public Roads Nomograph.

10-15-68

PROJECT: SOUTH RIM FILING #2

SUBJECT: FINAL DRAINAGE

DATE: 04-Apr-94

INLET DESIGN

INLET NO. 1

CONDITION: SUMP

TYPE: TYPE C

Q2 = 0.7 CFS

Q100 = 4.3 CFS

CURB OPENING L = 2.75 FT. 33"

GRATE AREA W = 4.02 SF. 33" x 17 1/2"

DEPTH OVER FL.Yo = 0.41 FT.

OPENING H = 0.33 FT.

Yo/H = 1.24

CURB OPENING CAPACITY PER LF. (FIGURE 3-1) = 0.76 SINGLE INLET CAPACITY = 2.09 CFS

GRATE CAPACITY PER SF. (FIGURE 4-1) = 3.17 SINGLE INLET CAPACITY = 12.74 CFS

SUB-TOTAL = 14.83

REDUCTION FACTOR = 0.65

TOTAL Qc = 9.641

INLET NO. 1 USE SINGLE

****

INLET NO. 2

CONDITION: SUMP

TYPE: TYPE C

Q2 = 1.5 CFS

Q100 = 8.3 CFS

CURB OPENING L = 2.75 FT. 33"

GRATE AREA W = 4.02 SF. 33" x 17 1/2"

DEPTH OVER FL.Yo = 1.50 FT.

OPENING H = 0.33 FT.

Yo/H = 4.55

CURB OPENING CAPACITY PER LF. (FIGURE 3-1) = 0.76 SINGLE INLET CAPACITY = 2.09 CFS

GRATE CAPACITY PER SF. (FIGURE 4-1) = 3.17 SINGLE INLET CAPACITY = 12.74 CFS

SUB-TOTAL = 14.83

REDUCTION FACTOR = 0.65

TOTAL Qc = 9.641

INLET NO. 2 USE SINGLE

****

SUBSURFACE SOILS EXPLORATION

SOUTH RIM
ON THE REDLANDS

MESA COUNTY, COLORADO

Prepared For:

LOWE DEVELOPMENT CORP.
c/o Skip Behrhorst
227 So. 9th. Street
Grand Junction, CO 81501

Prepared By:

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

August 3, 1993

Lincoln DeVore, Inc.
Geotechnical Consultants
1441 Motor St.
Grand Junction, CO 81505

TEL: (303) 242-8968
FAX: (303) 242-1561

August 3, 1993

LOWE DEVELOPMENT CORPORATION
c/o Skip Behrhorst
c/o Mr. Thomas Logue
227 South 9th Street
Grand Junction, Colorado

Re: SUBSURFACE SOILS EXPLORATION

RIVERVIEW HIGHLANDS SUBDIVISION

Grand Junction, Colorado

Dear Sir:

Transmitted herein are the results of a Subsurface Soils Exploration for the proposed RIVERVIEW HIGHLANDS residential Subdivision, to be located on the Redlands, west of the City of Grand Junction, Colorado.

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: _____ 8/18/93
George D. Morris, P.E.
Colorado Springs Office

EMM/ss

LDTL Job No. 78619-J

TABLE OF CONTENTS

INTRODUCTION

PROJECT DESCRIPTION

This report presents the results of our geotechnical evaluation performed to determine the general subsurface conditions of the site applicable to construction of a proposed residential subdivision containing approximately 125 single family building lots and a multi-family portion containing approximately 92 units. A vicinity map is included in the Appendix of this report.

To assist in our exploration, we were provided with a site location diagram and a topographic map. The Boring Location Plan attached to this report is based on that plan provided to us. Reference is also made to previous Subsurface Soils Exploration studies completed by Lincoln DeVore: LDTL # 14243-GS, 11-19-1976 and LDTL # 48504-J, 4-28-1993.

We understand that the proposed structures will consist of one and two story, wood frame buildings with the possibility of full basements and concrete floor slabs on grade. Lincoln DeVore has not seen a set of building plans for any of the units, but residential structures of this type typically develop wall loads on the order of 900 to 1600 plf and column loads on the order of 6 - 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 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:

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 June 28, July 1 and July 2, 1993, and consisted of a site reconnaissance by our geotechnical personnel and the drilling of 19 exploration borings. These 19 shallow exploration borings were drilled within the proposed building envelopes 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 13 to 25 feet. Samples were taken with a standard split spoon sampler, California sampler, thin wall 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 South half of Section 8, Township 1 West, Range 1 South of the Ute Principal Meridian, Mesa County, Colorado. More specifically the site is located South and West of the Redlands power tail water canal, is East of the temporary cul-de-sac of the Greenbelt Drive and is located between two small, unnamed drainages which originate on the Redlands to the South West and drain to the Colorado River to the North East.

The topography of the site is quite variable, with the majority of the site being located on an ancient, elevated alluvial plain on the Colorado River. The North East boundary of the study area is a moderate to moderately steep bluff overlooking the Colorado River and two gullies are present on the South boundary and near the North West boundary of the study area. The North West gully separates the single family residential area to the South from the multi-family area to the North. The exact direction of surface run off on this site will be controlled somewhat by the proposed construction and therefore will be variable. In general, the surface run off is expected to travel to the main gully areas to the North West and South of the main study area, eventually entering the Colorado River to the North East. Surface and subsurface drainage on this site could be described as fair to good in the areas proposed for construction.

Subsurface drainage along the margins of

the developed area (gully areas) may be described as fair to poor depending upon the soils and rock formations encountered in the specific areas.

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 sites, 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 of alluvial gravel terrace deposit of the ancient Colorado River which overlies the Dakota formation which is considered bedrock on this site. In the East portion of the site, some alluvial and colluvial mud flow/debris flow sands overly the gravel terrace deposit. The geologic and engineering properties of the materials found in our 19 exploration borings will be discussed in the following sections. The fine grained, reddish colored soils encountered in the South and South West portions of the site have been designated Soil Type I. These soils are of variable thickness and rapidly become thin to non-existant toward the Center, North and East portions of the property.

This Soil Type is classified as a silty sand (SM) of fine grain size under the Unified Classification System. This soil type is low to non-plastic and of low to medium density. This soil will have virtually no tendency to expand upon the addition of moisture. Settlement will be minimal under the recommended foundation loads. This soil will undergo elastic settlement upon application of static foundation pressures. Such settlement is characteristically rapid and should be virtually complete by the end of construction. If the recommended allowable bearing values are not exceeded, and if all other recommendations are followed, differential movement will be within tolerable limits. At shallow foundation depths this soil was found to have an average allowable bearing capacity of 1200 psf.

The soil Type I consists 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 very slight.

The gravel terrace deposit of the ancient Colorado River is exposed on the majority of the flatter areas of the site. This soil has been designated Soil Type II for the purposes of this report.

This Soil Type is classified as a silty, sandy gravel (GM) of course grain size under the Unified Classification System. This soil type is alluvial in origin, nonplastic and of medium density. This soil will have virtually no tendency to expand upon the addition of moisture. Settlement will be minimal under the recommended foundation loads. This soil will undergo elastic settlement upon application of static foundation pressures. Such settlement is characteristically rapid and should be virtually complete by the end of construction. If the recommended allowable bearing values are not exceeded, and if all other recommendations are followed, differential movement will be within tolerable limits. At shallow foundation depths this soil was found to have an average allowable bearing capacity of 2800 psf.

The bedrock beneath this site is the Dakota Formation. The Dakota Formation is described as a series of sandstones, siltstones, mudstones, claystones and shales with some areas of carbonaceous materials, to include lignite and low

grade coals. The rock section of the Dakota formation is quite erratic and may change rapidly both horizontally and vertically. The majority of rock types found near the development areas and beneath the gravel terrace deposits are primarily claystones and shales, which have been designated as Soil Type III.

This soil type was classified as a low plastic clay (CL) under the Unified Classification System. Some strata or isolated lenses of claystone classified as a high plastic clay (CH). The Standard Penetration Tests ranged from 23 blows per foot to in excess of 90 blows per foot. Penetration tests of this magnitude indicate that the soil is somewhat erratic in consistency and of medium to high density. The moisture content varied from 1.1 % to 21.3 %, indicating very dry to very moist 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 1600 to 2400 psf were found to be typical. Samples of strata of high plastic clay were subjected to expansion testing and expansions pressures on the order of 5100 to 5700 psf were found to be possible. The allowable maximum bearing value for the low expansive portions was found to be on the order of 5500 to 6500 psf, for shallow foundation systems. A minimum dead load of 2500 psf would be required for shallow foundation systems founded on the low plastic clays. If the high plastic clays are within 8 feet of the proposed bottom of the foundation sys-

tem, it is not recommended that a shallow foundation be utilized.

For the areas which may have high plastic clays within 8 feet of the proposed foundation bottom elevation, it is recommended a deep foundation system or a thick structural fill be utilied. Specific information for either a deep foundation system, consisting of drilled piers or a thick structural fill will not be given in this report due to the variable nature of the soils and the many possible foundation configurations due to depths of excavation and loading characteristics of the individual structures. It is recommended a specific site investigation be performed for each structure which may have a foundation system with 8 feet of the expansive shales of the Dakota formation.

The boring logs and related information show subsurface conditions at the date and location of this exploration. Soil conditions may differ at locations other than those of the exploratory borings. If the structure is moved any appreciable distance from the locations of the borings, the soil conditions may not be the same as those reported here. The passage of time may also result in a change in the soil conditions at the boring locations.

The lines defining the change between soil types or rock materials on the attached boring logs and soil profiles are determined by interpolation and therefore are approximations. The transition between soil types may be abrupt or may be gradual.

GEOLOGIC HAZARDS AND DEVELOPMENT CONSTRAINTS

SLOPE STABILITY

The study area of this tract is bounded on the North and North East sides by moderate to moderately steep slopes overlooking the Colorado River and the Redlands power tail water way. This study area is indicated on the Drill Hole and SetBack Diagram, included with this report, as Steep Slopes, Possibly Unstable. This slope ranges in height from 15 feet to slightly less than 100 feet. The slope angles range from approximately 3:1 to 1:1 in the areas where the slope stability was believed to be in question or needed proper definition. At the time of Lincoln DeVore's field investigation, it is our understanding the steep slope areas are not to be used for development and to be left as open space. Some construction is anticipated near the upper extent of the slopes and studies have been undertaken to determine the slope stability and define a building set-back for site planning and construction purposes.

The areas of steeper slopes were carefully investigated and found to consist of exposures of the Dakota Formation. In many areas of steep slopes, the Dakota formation is somewhat obscured by thin soils which are derived partially from in-situ weathering of the Dakota Formation and ongoing soil creep of these thin soils.

Slope stability computations were completed by personnel of Lincoln DeVore, based on the results of site reconnaissance, geophoto studies, on site exploration borings and laboratory testing to determine specific engineering

properties. Based upon the existing topography, proposed site grading and development plans available at the time of this study, a building set-back line has been established. This building setback is defined, for planning purposes, as a line 35 feet back from the major slope, upper scarp edge. This building set-back line is indicated on the enclosed figure and is valid for the planned development, uses and construction as detailed in the project scope section of this report and as further detailed on the attached figure. The building set-back line shown is only for slope stability considerations and is not applicable for other, specific on-site geological or geotechnical considerations. For instance, areas of seasonal high soil moisture or possible ground water may be present in some of the drainage areas and would have some impact on individual site stability of excavations, but is not considered as part of the general slope stability study.

The general assumptions utilized for the slope stability computations include, but are not limited to:

Water Saturation of the bedrock formation has occured and will continue to be present beneath the site.

No further modification of the slopes will occur, from the present 'crest' to the north bank of the Redlands Power tail water way.

A perched water table will develop in the alluvial soils which 'cap' the bedrock formation.

The surface exposure and shallow drill hole penetrations sufficiently define the surficial soils and bedrock materials for a study of this type.

FLOODING

The 100 year floodplain of the two intermittent drainages which cross the site from the South West and empty into the Colorado River, should be addressed as part of the overall drainage plan for the site. We recommend that construction be avoided in this area and that drainageways be kept open and free from debris. During periods of high runoff, debris may cause damming at bridges and culverts, resulting in backwater effects which may be damaging. We recommend that this drainage plan be completed by a hydrologic or drainage engineer fully experienced in this area. Such a plan is beyond the scope of this report.

RADIOACTIVITY

A small area of naturally occurring radioactivity has been identified on a small portion of this tract, in the East portion. This area of naturally occurring radioactivity is the subject of a report prepared by the engineering firm of Nelson, Haley, Patterson & Quirk, Inc., which is undated but, apparently was completed in December of 1975. This N.H.P.Q. report is hereby referenced for the definition of the extent of this deposit and any possible hazards or preliminary mitigation measures which may be required.

GROUND WATER:

A free water table came to equilibrium during drilling at 16 to 23 feet below the present ground surface in the exploration borings toward the West and Southwest portion of the tract. Free water was encountered in Exploration Borings nos. 2, 3 & 4. This is probably not a true phreatic surface but is an accumulation of subsurface seepage moisture (perched water) probably associated with area-wide irrigation practices toward the South and West of the site. In our opinion the subsurface water conditions shown are a permanent feature on this site and may increase in extent with increased development. The depth to free water would be subject to fluctuation, depending upon external environmental effects.

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. Quantitative information concerning rates of flow into excavations or pumping capacities necessary to dewater excavations is not included and is beyond the scope of this report. If this information is desired, permeability and field pumping tests will be required.

Based upon evidence of seepage in the slopes immediately above the Colorado River, it is believed a true, confined water table is present in some beds of the Dakota Formation. This confined water is discharging from the Dakota Formation along the lower slope areas, near the Redlands Power Tail Water Canal. This water is apparently being recharged by

area wide irrigation on the Redlands and some natural recharge at the base of the Colorado National Monument. This water must be considered a permanent feature of the site.

Due to the proximity of the Dakota Formation beneath this entire site, there exists a possibility of a perched water table developing in the alluvial soils which overlie the Dakota formation, in the North and East portion of the tract. This perched water table would be quite similar to that encountered in the exploration program in the West and South portion of this tract. 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 Dakota Formation is relatively flat 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.

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 condition which would have the greatest effect on the planned development aree expansive clays of the Dakota Formation bedrock and potentially unstable slopes overlooking the Colorado River.

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 observa-

tion 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.

SITE PREPARATION

It is recommended that site preparation for individual structures begin with the removal of all vegetation, existing man-made fill and other deleterious materials. This applies both to areas to be filled and areas to be cut. The removed materials should be legally disposed of off-site or, if appropriate, stockpiled for later use in non-structural areas or landscaping. In the case of existing man-made fill, we recommend that it be removed completely. It is recommended that the exposed native soil be scarified to a depth of 12 inches, brought to near optimum moisture conditions and recompacted to a minimum of 90% of maximum dry density as determined by ASTM D 1557.

Prior to placing any fill, the exposed ground should be observed by representatives of Lincoln DeVore to determine that all deleterious material, man-made fill and soft areas have been adequately removed. The removed material may then be replaced with uniformly compacted lifts of structural fill until the desired slab or footing elevation is achieved. We recommend that the structural fill be placed within 2% of the optimum moisture content of the material and compacted to a

minimum of 90% of its maximum dry density, ASTM D 1557. These lifts should not be greater than six (6) inches in thickness after compaction.

STRUCTURAL FILL SOIL:

It appears that the majority of the material excavated from probable cut areas across the site 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, claystones, shales or radioactive soils be included in any structural fill.

FILL PLACEMENT AND COMPACTION:

We recommend that structural fill placed beneath floor slabs, foundations and parking lots be compacted to a minimum of 90% of its maximum modified Proctor dry density (ASTM D 1557). The structural fill shall be placed and compacted at a moisture content within +/- 2% of optimum moisture. These lifts should not be greater than six (6) inches in thickness after compaction.

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.

Based on slope stability computations,

for the alluvial on this site, the maximum stable cut slope which can be constructed in this material is 2:1 (horizontal to vertical). Based on similar calculations, the maximum fill slope which can be constructed using the proposed fill soils is 2:1 (horizontal to vertical). At points where fill is placed against an existing slope steeper than 10 degrees, we recommend that the existing slope be "benched" and fill placed against the benches in horizontal lifts. We recommend that the fill soil be brought to the optimum moisture content (+/- 2%) prior to placing, then compacted mechanically to at least 95% of the maximum standard Proctor dry density, ASTM D 698.

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 B for the native alluvial soils on this site excluding the areas of high soil moisture content in the drainage areas.

We recommend that all backfill placed around the exterior of all buildings, and in utility trenches which are outside the perimeter of any buildings and not located beneath roadways or parking lots, be compacted to a minimum of 85% of its maximum Proctor dry density (ASTM D 698).

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). This structural fill should be placed in lifts not to exceed six (6) inches after compaction. 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, non-expansive soil.

DRAINAGE AND GRADIENT:

Adequate site drainage should be provided in the foundation 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 the 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 structure. 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 exca-

vation for foundation construction, a full perimeter drain is recommended for future buildings. It is further recommended the buildings placed on the lots included within the Recommended Building SetBack Line be constructed with perimeter drains, unless a site specific Geotechnical Exploration indicates such a drain is not required.

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 all the sites 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.

To give the buildings extra lateral stability and to aid in the rapidity of runoff, it is recommended that all backfill around any building and in utility trenches in the vicinity of the building be compacted to a minimum of 85% of its maximum Proctor dry density, ASTM D 698. The native soils on this site may be used for such backfill. We recommend that all

backfill be compacted using mechanical methods. No water flooding techniques of any type may be used in placement of fill on this site.

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 availible, to include, but not necessarily limited to: water metering, downsizing the distribution pipe sizes to limit usage, encouraging efficient landscaping and putting reasonable limits on the per lot sizes of high water use landscaping.

Should automatic lawn irrigation systems be used on these sites, 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.

The steep slope areas immediately adjacent to the major drainage ways which cross divide this site and the steep slopes overlooking the Colorado River can be considered potentially unstable due to the threat of ongoing erosion. A minimum set-back of 35 feet has been preliminarily established between the proposed construction and the edge of existing slope scarps. This set-back distance has been established by laboratory analysis of the soil shear strength and calculated stability of specific locations along the banks.

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The steep slope areas immediately adjacent to the major drainage ways which cross divide this site and the steep slopes overlooking the Colorado River can be considered potentially unstable due to the threat of ongoing erosion. A minimum set-back of 35 feet has been preliminarily established between the proposed construction and the edge of existing slope scarps. This set-back distance has been established by laboratory analysis of the soil shear strength and calculated stability of specific locations along the banks.

FOUNDATIONS

We recommend the use of conventional shallow foundation systems consisting of continuous spread footings beneath all bearing walls and isolated spread footings beneath all columns and other points of concentrated load. Such a shallow foundation system, resting on the alluvial, granular soils of soil Type I & II, may be designed on the basis of an allowable bearing capacity of 1100 psf maximum and no minimum dead load is required for soil Type I. Shallow foundation systems resting on the very course granular soil of soil Type II may be designed on the basis on allowable bearing capacity of 2800 psf maximum and no minimum dead load pressure will be required.

Contact stresses beneath all continuous walls should be balanced within + or - 150. psf at all points. Isolated interior column footings should be designed for contact stresses of about 150 psf less than the average used to balance the continuous walls. The criterion for balancing will depend somewhat upon the nature of the structure. Single-story, slab on grade structures may be balanced on the basis of dead load only. Multi-story structures may be balanced on the basis of dead load plus 1/2 live load, for up to 3 stories.

It should be noted that the term "footings" as used above includes the wall on grade or "no footing" type of foundation system. On this particular site, the use of a more conventional footing, the use of a "no footing", or the use of voids will depend entirely upon the foundation loads exerted by the structure. We would anticipate the use of a standard

footing and stemwall on the alluvial soils on this tract.

Stem walls for a shallow foundation system should be designed as grade beams capable of spanning at least 10 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, therefore, be better able to tolerate differential movements associated with isolated, low bearing soil strata which may be present in the soil deposits.

It is conceivable that some foundation systems near the areas of building set-back line, designated for the slope stability considerations, may be founded sufficiently close to the expansive clays of the Dakota formation that special foundation systems may be required. Foundations in these areas, which are founded within 6 feet of the Dakota Formation, should be individually investigated to determine the geotechnical characteristics of the underline soils and properly match an effecient and proper foundation system with the foundation soils. It is conceivable that over excavation and soil replacement techniques, shallow foundation systems such as voided stemwall on grade, stemwall on isolated pads or a deep foundation system such as drilled piers may be required in this area.

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.

CONCRETE SLABS ON GRADE

Slabs could be placed directly on the natural soils or on a structural fill. We recommend that all slabs on grade 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.

Any interior partitions which will be located on slabs on grade should be constructed with a minimum space of 1 1/2 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.

In general, we recommend that all on-grade slabs be isolated from other structural portions of the building. This is generally accomplished by an expansion joint at the slab-foundation wall interface.

In areas of high soil moisture or relatively high ground water conditions, it is recommended that

slabs on grade be constructed over a capillary break of approximately 6 inches in thickness. We recommend that the material used to form the capillary break be free draining, granular material and not contain significant fines. A free draining outlet is also recommended for this break so that it will not trap water beneath the slab. A vapor barrier is recommended beneath the floor slab and above the capillary break. To prevent difficulty in finishing concrete, a 2 inch sand layer should be placed above the break. An alternate method of reducing finishing problems would be to place the vapor barrier beneath approximately 6 inches of a minus 3/4 inch gravel fill. This method must be very carefully accomplished to minimize excessive puncturing and tearing of the vapor barrier.

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

EARTH RETAINING STRUCTURES

The active soil pressure for the design of earth retaining structures may be based on an equivalent fluid pressure of 42 pounds per cubic foot for the alluvial soils. 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 55 pounds per cubic foot may be used for the alluvial soils. 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 320 pcf per foot of depth for the alluvial soils. The coefficient of friction for concrete to soil may be assumed to be .35 for resistance to lateral movement. When combining frictional and passive resistance, the latter must be reduced by approximately 1/3.

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-1557. 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.

REACTIVE SOILS

Since groundwater in the Redlands area of Grand Junction 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.

PAVEMENTS

Samples of the surficial native soils at this property that may be required to support pavements have been evaluated using the Hveem-Carmany method to determine their support characteristics. The results of the laboratory testing are as follows:

Soil Type I Reddish Silty Sands, some clayey zones

R =	14
Expansion @ 300 psi =	4.5
Displacement @ 300 psi =	3.85

Soil Type II Coarse Gravel and Cobble Terrace Deposit

R =	54
Expansion @ 300 psi =	1.5
Displacement @ 300 psi =	3.38

No estimates of traffic volumes have been provided to Lincoln DeVore. However, we assume that the roads will be classified as low volume, residential. The design procedures utilized are those recognized by the Colorado Department of Highways and the 1986 AASHTO design procedure. The terminal Serviceability Index of 2.0, a Reliability of 70 and a design life of 20 years have been utilized, based on recommendations by the Highway Department. An 18 kip ESAL of 5, also recommended by the Highway Department, was used for the analysis.

Based on the soil support characteristics outlined above, the following pavement sections are recommended:.LS1

Residential Roadway:

3 inches of asphaltic concrete pavement
on 6 inches of aggregate base course
on 8 inches of recompacted native material

Full Depth Asphalt:

5 inches of asphaltic concrete pavement
on 12 inches of recompacted native material

Rigid Concrete:

6 inches of portland cement pavement
on 4 inches of aggregate base course (for Soil Type I, only)
on 8 inches of recompacted native material

We recommend that the asphaltic concrete pavement have a minimum R_t value of 95, and meet the State of Colorado requirements for a Grade C mix. In addition, the asphaltic concrete pavement should be compacted to a minimum of 95% of its maximum Hveem density. The aggregate base course should meet the requirements of State of Colorado Class 5 or Class 6 material, and have a minimum R value of 78. We recommend that the base course be compacted to a minimum of 95% of its maximum Modified Proctor dry density (ASTM D-1557), at a moisture content within + or -2% of optimum moisture. The native subgrade shall be scarified and recompacted to a minimum of 90% of their maximum Modified Proctor dry density (ASTM D-1557) at a moisture content within + or -2% of optimum moisture.

We recommend that the rigid concrete pavement have a minimum flexural strength (F_t) of 650 psi at 28 days. This strength requirement can be met using Class P or AX or A or B Concrete as defined in Section 600 of the Standard Specifications for Road and Bridge Construction, Colorado DOT. It is

recommended that field control of the concrete mix be made utilizing compressive strength criteria. Flexural Strength should only be used for the design process. Control joints should be placed at a minimum distance of 12 feet in all directions. If it is desired to increase the spacing of control joints, then 66-66 welded wire fabric should be placed in the mid-point of the slab. If the welded wire fabric is used, the control joint spacing can be increased to 40 feet. Construction joints designed so that positive joint transfer is maintained by the use of dowels is recommended.

Concrete with a lower flexural strength may be allowed by the agency having jurisdiction however, the design section thicknesses should be confirmed. In addition, the final durability of the pavement should be carefully considered.

Control joints should be placed at a minimum distance of 12 feet along the slab/road lane length or to match curb and gutter jointing and 15 feet in width. If it is desired to increase the spacing of control joints, then 66-66 welded wire fabric should be placed in the mid-point of the slab. If the welded wire fabric is used, the control joint spacing can be increased to a maximum of 40 feet.

All pavement should be protected from moisture migrating beneath the pavement structure. If surface drainage is allowed to pond behind curbs, islands or other areas of the site and allowed to seep beneath pavement, premature deterioration or possibly pavement failure could result.

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 these 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 should not be relied upon after a period of 6 years unless reviewed and extended, in writing, by the Geotechnical Engineer.

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 has prepared this report 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_o Natural Moisture Content
	W_x Weathered Material
Free water	Free water table
	γ^o Natural dry density
	T.B. – Disturbed Bulk Sample
	② Soil type related to samples in report
15' W_x / 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 TESTING LABORATORY

COLORADO: Colorado Springs, Pueblo, Glenwood Springs, Montrose, Gunnison, Grand Junction.– WYO.– Rock Springs

EXPLANATION OF BOREHOLE LOGS AND LOCATION DIAGRAMS

BORING NO. 1

ELEVATION: 4639

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			SILTY SAND on SURFACE			
			MEDIUM DENSITY SILTY, SANDY			
			GRAVELS SL. MOIST			
		II	INCREASING SIZES	SPT 21/6 50/9		2-3%
5			ANCIENT COLORADO RIVER TERRACE			
			DECREASING MOISTURE			
		II	SANDY STRATA	SPT 18/6 43/12		1-5%
10			NON PLASTIC			
			MEDIUM DENSITY			
			STRATIFIED			
		II	GRAVEL SILTY, SANDY FINES	BULK		0-5%
15			HOLE CAVING -			

NO FREE WATER IN BORING
6-28-93

LOG OF SUBSURFACE EXPLORATION

Lincoln DeVore, Inc.
Geotechnical Consultants

RIVERVIEW TERRACE - GRAND JUNCTION

DATE 7-29-93

JOB NO. 78619-J

DRAWN EHH

BORING NO. 2

ELEVATION: 4637

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION		PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			GRAVELS VERY SILTY, SANDY				
		II	SL. MOIST	SPT	35/6 68/12		1.7%
5			MEDIUM DENSITY				
			COBBLES UP TO 4" diameter, larger?				
			COLORADO RIVER TERRACE				
			NON PLASTIC FINES				
10		II	HOLE IS CAVING	BULK			1.7%
			SOME STRATA - LARGER COBBLE				
15		II	SILTY, SANDY COBBLE & GRAVEL	SPT	19/6 50/10		0.6%
			STRATIFIED				
		II	INCREASING MOISTURE	BULK			1.9%
20			MEDIUM DENSITY				
21			Wx DAKOTA FORM,				
23			FREE WATER ▽ SANDSTONE - VERY WEATHERED				
			CARBONACEOUS SHALES & CLAYSTONES	BULK			42.8%
25		IV	FIRM SATURATED				

MOISTURE @ 24' IS of AUGER SAMPLE

FREE WATER @ 23' 6-28-98

HOLE CAVED AFTER DRILLING

LOG OF SUBSURFACE EXPLORATION

Lincoln DeVore, Inc.
Geotechnical Consultants

RIVERVIEW TERRACE - GRAND JUNCTION

DATE 7-29-93

JOB NO. 7861J-J

DRAWN BKH

BORING NO. 3

ELEVATION: 4639

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION		PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			SLIGHTLY MOIST				
		II	GRAVEL & COBBLE - MEDIUM DENSITY	SPT	35/6 58/12		1.8%
5			NON PLASTIC - SILTY SAND FINES				
			COLORADO RIVER TERRACE				
			VERY SANDY STRATA -				
10		II	SMALLER COBBLES	BULK			1.6%
			HOLE CAVING				
			INCREASING COBBLE SIZE				
15			DIFFICULT TO DRILL				
		II	HOLE CAVING	BULK			0.8%
			COARSE SAND - VERY GRAVELLY - FEW COBBLES				
20			Wx DAKOTA FORM.				
			V. WEATHERED SANDSTONE	BULK			5.0%
22			FREE WATER ▼ FIRM				
			SHALE STRATA	LOW EXPANSION			
		IV	CARBONACEOUS - FIRM	SATURATED BULK			24.3%
25			CL LOW PLASTIC	EXPANSIVE			
			SOME SULFATES				
			FREE WATER @ 22' DURING DRILLING. 6-28-93				
			HOLE CAVED				

LOG OF SUBSURFACE EXPLORATION

Lincoln DeVore, Inc.
Geotechnical Consultants

RIVERVIEW TERRACE - GRAND JUNCTION

DATE 7-30-93

JOB NO. 7U619-J

DRAWN EHM

BORING NO. 4

ELEVATION: 4639

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION		PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			SILTY SAND @ SURFACE				
			GRAVEL & COBBLE				
		II	SILTY SAND - NON PLASTIC	SPT	27/6		1.1%
5			SL. MOIST		57/12		
			MEDIUM DENSITY				
			STRATIFIED				
			INCREASING COBBLE SIZE				
10		II	HOLE CAVING	BULK			0.9%
			DRY TO SL. MOIST				
15			MEDIUM DENSITY				
			COBBLES and GRAVELS				
18			W/ DAKOTA FORM.				
			STRATIFIED SANDSTONE & SHALE				
20		IV	SOME SILTSTONE CARBONACEOUS	BULK			4.0%
			DAMP TO MOIST				
			FIRM TO DRILL				
23			▼				
			SILTY CLAYSTONE & SHALE - CARBONACEOUS				
25			LOW PLASTIC LOW EXPANSION				
			FREE WATER @ 23 FEET 6-28-93				
			HOLE CAVED				

LOG OF SUBSURFACE EXPLORATION

RIVER VIEW TERRACE GRAND JUNCTION

DATE 7-30-93

JOB NO. 7617-J

DRAWN EHH

BORING NO. 5

ELEVATION: 4634

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION		PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			GRAVEL & SMALL COBBLES VERY SANDY				
		II	MEDIUM DENSITY				
5			Hole CAVING				1.9%
			COLORADO RIVER TERRACE				
			INCREASING COBBLE SIZE				
10			SILTY SANDY FINES				
			NONE PLASTIC				
		II					
15			W/x DAKOTA FORM.	BULK			1.0%
			SANDSTONE, SILTSTONE, THIN SHALES				
			CARBONACEOUS — SOFT TO SI-FIRM				
		IV	VERY WEATHERED — BLACK-GRAY	SPT	16/6 39/12		9.3%
20			Gray to Buff Sandstones				
			Thin Lignite Beds In Shale	BULK			12.1%
			Gray Brown to Gray Black				
			FIRM				
			LOW EXPANSION				
25							
			NO FREE WATER IN BORING 6-28-93				

LOG OF SUBSURFACE EXPLORATION

Lincoln DeVore, Inc.
Geotechnical Consultants

RIVER VIEW TERRACE GRAND JUNCTION

DATE 7-30-93

JOB NO. 78619-J

DRAWN EHM

BORING NO. 6

ELEVATION: 4633

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION		PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			COBBLES and GRAVELS				
			SILTY SAND FINES				
		II	MEDIUM DENSITY DRY to SL. MOIST	BULK	31/6 54/12		0.8%
5			STRATIFIED				
			NON PLASTIC				
			HOLE CAVING				
10		II		BULK			0.7%
			DRY to SL. MOIST				
			GRAVEL + COBBLE				
15			SILTY, SANDY FINES				
			SL. MOIST				
			Wx. DAKOTA FORMATION				
20		IV	CARBONACEOUS SHALES and SILTSTONES	SPT	17/6 31/12		5.0%
			SL. MOIST - V. FIRM to DRILL		54/18 75/24		
25			LOW EXPANSION				
			NO FREE WATER IN BORING 6-28-93				

LOG OF SUBSURFACE EXPLORATION

Lincoln DeVore, Inc
Geotechnical Consultants

RIVERVIEW TERRACE GRAND JUNCTION

DATE 7-30-93

JOB NO. 78619-J

DRAWN EMM

BORING NO. 7

ELEVATION: 4633

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION		PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			COLORADO RIVER TERRACE				
			SILTY SANDY GRAVELS & COBBLES				
5		II	DRY TO SL. MOIST	BULK			3%
			HOLE CAVING				
			MEDIUM DENSITY				
10		II	STRATIFIED	BULK			4%
			DRY TO SL. MOIST				
15		II	VERY SANDY - GRAVELS - DRY	SPT	13/6		3%
			W. DAKOTA FORM -		31/12		
			WEATHERED SANDSTONE, SILTSTONE		50/14		
			and SHALE GRAY, BUFF TO DARK GRAY				
20		IV	LOW PLASTIC, SL. MOIST	BULK			8.4%
			CARBONACEOUS — LOW EXPANSION				
			V. FIRM TO DRILL				
25							
			NO FREE WATER DURING BORING - 6-28-93				

LOG OF SUBSURFACE EXPLORATION

Lincoln DeVore, Inc.
Geotechnical Consultants

RIVER VIEW TERRACE GRAND JUNCTION

DATE 7-30-93

JOB NO. 7B619-J

DRAWN FMH

BORING NO. 8

ELEVATION: 4635

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION		PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
5		II	SANDY, SILTY GRAVELS & COBBLES SOME LARGE COBBLES	SPT	31/6 55/12		1.7%
			MORE GRAVEL - MEDIUM DENSITY DRY TO SL. MOIST				
10		II	CAVING - STRATIFIED NON PLASTIC FINES	BULK			1.0%
			VERY SANDY - DECREASING COBBLE				
15		II		BULK			1.3%
			W. DAKOTA FORM.				
20		III	LOW PLASTIC SILTSTONE and CLAYSTONE SL. MOIST VERY FIRM LOW EXPANSION	SPT	29/6 65/12		8.1%

NO FREE WATER IN BORING 7-1-93

LOG OF SUBSURFACE EXPLORATION

Lincoln DeVore, Inc.
Geotechnical Consultants

RIVER VIEW TERRACE GRAND JUNCTION

DATE 7-30-93

JOB NO. 7861-J

DRAWN EHM

BORING NO. 9

ELEVATION: 4637

DEPTH [FT]	SYMBOL	SAMPLE	DESCRIPTION		PENETRATION RESISTANCE	IN-SITU DENSITY [PCF]	MOISTURE CONTENT [%]
		II	GRAVEL & COBBLE — Non Plastic SILTY SANDY FINES	BULK			2.1%
5			COLORADO RIVER TERRACE MEDIUM DENSITY				
		II	Slightly Moist	SPT	29/6 7"/12"		1.2%
10							
			GRAVEL & COBBLE Non PLASTIC FINES				
15		II		BULK			1.1%
			Ulx DAKOTA FORM.				
20			SILTSTONE, CLAYSTONE & SHALE CARBONACEOUS — PLASTIC LOW EXPANSION				
		IV	Thin Sandstone strata — FIRM LOW MOISTURE	SPT	23/6 50/12"		5.6%
25							

No FREE WATER DURING DRILLING 7-1-93

LOG OF SUBSURFACE EXPLORATION

Lincoln DeVore, Inc.
Geotechnical Consultants

RIVER VIEW TERRACE GRAND JUNCTION

DATE 7-30-93

JOB NO. 7612-J

DRAWN EMM

BORING NO. 10

ELEVATION: 4622

DEPTH [FT]	SYMBOL	SAMPLE	DESCRIPTION		PENETRATION RESISTANCE	IN-SITU DENSITY [PCF]	MOISTURE CONTENT [%]
			WEATHERED DAKOTA FORM.				
			LOW PLASTIC CLAYSTONE				
		G	(IV) CL CARBONACEOUS STRATA		11/6 28/12		14.1%
5			(III) CH HIGH PLASTIC STRATA MED. EXPANSION	SPT	47/18		15.9%
			BROWN, SOME SILTY STRATA	BULK			
			(IV) CL GRAY & BROWN CLAY SULFATES	SPT	13/6 34/12		18.5%
10			LOW TO MEDIUM EXPANSION		59/18 75/24		
			PLASTIC - MEDIUM TO HIGH DENSITY	CSP		93.4	21.3%
			(IV) CL VERY MOIST - YELLOW & WHITE MINERALS		13/6 31/12		
15			CALICHE' ZONE?				
			MOIST LOW PLASTIC CLAY				
		G	(IV) CL EXPANSNE - SOME SILT	SPT	19/6 23/12		18.9%
20			CARBONACEOUS STRATA		38/18 57/24		
					15/6 35/12		
			(III) CH HIGH PLASTIC CLAY	SPT			19.8%
25			MEDIUM EXPANSION		56/18 81/24		
			MEDIUM TO HIGH DENSITY				
			SHRINKAGE CRACKS ON SURFACE				
			NO FREE WATER DURING DRILL.				
			7-1-93				

LOG OF SUBSURFACE EXPLORATION

Lincoln DeVore, Inc.
Geotechnical Consultants

RIVERVIEW TERRACE GRAND JUNCTION

DATE 7-30-93

JOB NO. T8619-J

DRAWN EHM

BORING NO. 11

ELEVATION: 4624

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			REWORKED NATIVE ALLUVIAL SOILS			
			CLAYSTONE - W/ DAKOTA FORMATION			
5			THIN SILTSTONE BEDS			
		IV	VERY FIRM - EXPANSIVE			11-1%
			MOIST			
			TAN TO BROWN -			
10			SOME SILTY STRATA			
			CARBONACEOUS			
			SILTSTONE & SHALE			
		IV	CLAYSTONE - PLASTIC - EXPANSIVE SPT	17/6 24/12		15-8%
			VERY MOIST			
15			MINERALIZED			
			SANDSTONE & SILTSTONE - FIRM	44/18		
		IV	CLAYSTONE BULK			14-7%
			THIN STRATA OF HIGH PLASTIC CLAY			
20			MEDIUM EXPANSION			

SHRINKAGE CRACKS ON SURFACE

NO FREE WATER IN BORING 7-1-93

LOG OF SUBSURFACE EXPLORATION

Lincoln DeVore, Inc.
Geotechnical Consultants

RIVER VIEW TERRACE GRAND JUNCTION

DATE 7-30-93

JOB NO. 7661-J

DRAWN EHM

BORING NO. 12

ELEVATION: 4621

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION		PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			REWORKED ALLUVIAL SOILS - GRAVELS LOW TO MEDIUM DENSITY				
				BULK			1.9%
5			W. DAKOTA FORM.				
		IV	CARBONACEOUS STRATA				
			SILTSTONE, SHALE and MUDSTONE	BULK			8.4%
			VERY FIRM TO HARD				
10			SL. MOIST				
		IV	DRILL CUTTINGS are Powdery				
			SULFATES	BULK			6.8%
			SHALE & SILTSTONE	SPT	20/6 47/12 82/18 135/24		9.3%
15							

SOME SHRINKAGE CRACKS IN VICINITY of BORING.

NO FREE WATER IN BORING 7-1-93

LOG OF SUBSURFACE EXPLORATION

Lincoln DeVore, Inc.
Geotechnical Consultants

RIVER VIEW TERRACE GRAND JUNCTION

DATE 7-30-93

JOB NO. 7861-J

DRAWN EMH

BORING NO. 13

ELEVATION: 4641

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Slightly Clayey SILTY SAND Sulfates – Sl. Compressive			
		(I)	ALLUVIAL SILTY SAND – STRATIFIED	SPT		7.4%
5			DEBRIS FLOW REDDISH TAN MOIST	9/6 21/12		
			GRAVEL & COBBLE with Silty Sand Fines			
		(II)		Bulk		7.2%
10			COLORADO RIVER DEPOSIT, MEDIUM DENSITY Non Plastic			
15						
			NO FREE WATER 7-2-93			

LOG OF SUBSURFACE EXPLORATION

Lincoln DeVore, Inc.
Geotechnical Consultants

RIVER VIEW TERRACE GRAND JUNCTION

DATE 7-30-93

JOB NO. 78619-J

DRAWN EHM

BORING NO. 14

ELEVATION:

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			DRY			
			CLAY, Very Silty SAND			
			VERY FINE GRAINED — Low Plastic			
			VERY STRATIFIED			
5			DEBRIS FLOW — ALLUVIAL			
			REDDISH			
			Bulk			7.0%
			FINE SILTY SAND — SPT	5/6 13/12		8.0%
10			(I) COARSE STRATA	21/18 31/24		
			DULL YELLOW TO WHITE — Moist			
			MEDIUM DENSITY			
			V. Moist			
			(I) VERY SOFT STRATA — SILT & SAND STRATA			
15			SILTY SAND — TAN — DAMP TO MOIST — SPT	1/6 3/12		7.5%
				5/18 7/24		
			(II) FINE COBBLE? and GRAVELS			
			VERY MOIST			
20			MEDIUM DENSITY — Bulk			5.5%
			SILTY SANDY FINES			
			No FREE WATER IN BORING 7-8-93			

LOG OF SUBSURFACE EXPLORATION

Lincoln DeVore, Inc.
Geotechnical Consultants

RIVER VIEW TERRACE — GRAND JUNCTION

DATE 7-30-93

JOB NO. 78619-J

DRAWN EAM

BORING NO. 15

ELEVATION:

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION		PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Slightly Clayey - Silty Sand Very Fine Grained				
		(I)	ALLUVIAL - TAN - SL. MOIST	SPT			4.9%
5			HIGH SULFATES				
			SILT - SAND CLAYEY STRATA				
			STRATIFIED				
		(I)	VERY FIRM Silt & Silty Sand	CS	15/6 33/12		18.7%
10			SATURATED		51/18		
			PERCHED WATER?				
		(I)	VERY MOIST — DECREASING	SPT	7/6 14/12		7.2%
15			SILTY SANDY GRAVEL & COBBLE		21/18		
		(II)	MEDIUM DENSITY	BULK			5.9%
20							
			NO FREE WATER DURING DRILLING 7-8-93				
			VERY MOIST TO WET STRATA 8'-12'				

LOG OF SUBSURFACE EXPLORATION

Lincoln DeVore, Inc.
Geotechnical Consultants

RIVERVIEW TERRACE GRAND JUNCTION

DATE 7-30-93

JOB NO. 78619-J

DRAWN EAM

BORING NO. 16

ELEVATION:

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			· RED · SILTY SAND · FINE GRAINED			
			SL. MOIST MEDIUM DENSITY			
			(I) STRATIFIED SL. COMPRESSIVE			
5			SPT	8/6 20/12		2.8%
			COBBLE and GRAVELS	27/18		
			(II) SILT + SAND FINES MOIST			
10			MEDIUM DENSITY NON-PLASTIC SPT	19/6 27/12		3.3%

NO FREE WATER DURING DRILLING.

7-8-93

LOG OF SUBSURFACE EXPLORATION

Lincoln DeVore, Inc.
Geotechnical Consultants

RIVER VIEW TERRACE GRAND JUNCTION

DATE 7-30-93

JOB NO. 78619-J

DRAWN EMH

BORING NO. 17

ELEVATION: 4644

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Very Silty Sand & Sandy Silt			
			ALLUVIAL Scattered Gravels			
		I		ST		5.2%
5			GRAVEL - SILTY SAND FINES REDDISH			
			INCREASING GRAVELS and COBBLES TRANSITION TO			
		II	COBBLE and GRAVEL, SILTY SANDY SPT	9/6 29/12		4.3%
10			COLORADO RIVER TERRACE			
			MEDIUM DENSITY	30/18		
15						
			NO FREE WATER IN BORING 7-2-93			

LOG OF SUBSURFACE EXPLORATION

Lincoln DeVore, Inc.
Geotechnical Consultants

RIVERVIEW TERRACE GRAND JUNCTION

DATE 7-30-93

JOB NO. 78619-J

DRAWN EHM

BORING NO. 18

ELEVATION:

DEPTH [FT]	SYMBOL	SAMPLE	DESCRIPTION		PENETRATION RESISTANCE	IN-SITU DENSITY [PCF]	MOISTURE CONTENT [%]
		(I)	FINE GRAINED SILTY SAND - COBBLES and GRAVELS SCATTERED - DESSICATED SURFACE				
		(II)	SILTY SANDY COBBLES and GRAVELS Sl. MOIST MEDIUM DENSITY	SPT	9/6 23/12		3.7%
5			ANCIENT COLORADO RIVER TERRACE NON PLASTIC FINES				
		(II)	COARSE STRATA Sl. MOIST	SPT	32/6 54/12		2.6%
10			VERY SANDY - MEDIUM DENSITY				
		(II)	INCREASING COBBLES NEAR TO DRILL REFUSAL	SPT	38/6		2.2%
15							

NO FREE WATER IN BORING 7-8-93

LOG OF SUBSURFACE EXPLORATION

Lincoln DeVore, Inc.
Geotechnical Consultants

RIVER VIEW TERRACE - GRAND JUNCTION

DATE 7-30-93

JOB NO. 78619-J

DRAWN EMM

BORING NO. 19

ELEVATION:

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION		PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
		(I)	SILTY SAND - REDDISH - SCATTERED GRAVELS FINE GRAINED - ALLUVIAL				
			GRAVEL & COBBLES	SPT	35/6		3.5%
		(II)	FIRM - SLIGHTLY MOIST		50/9		
5			COLORADO RIVER TERRACE				
		(II)	STRATIFIED	SPT	16/6		1.8%
			NON PLASTIC - SILTY SANDY FINES				
10		(II)	DIFFICULT DRILLING				
				BULK			2.1%
15							
			NO FREE WATER IN BORING 7-8-93				

LOG OF SUBSURFACE EXPLORATION

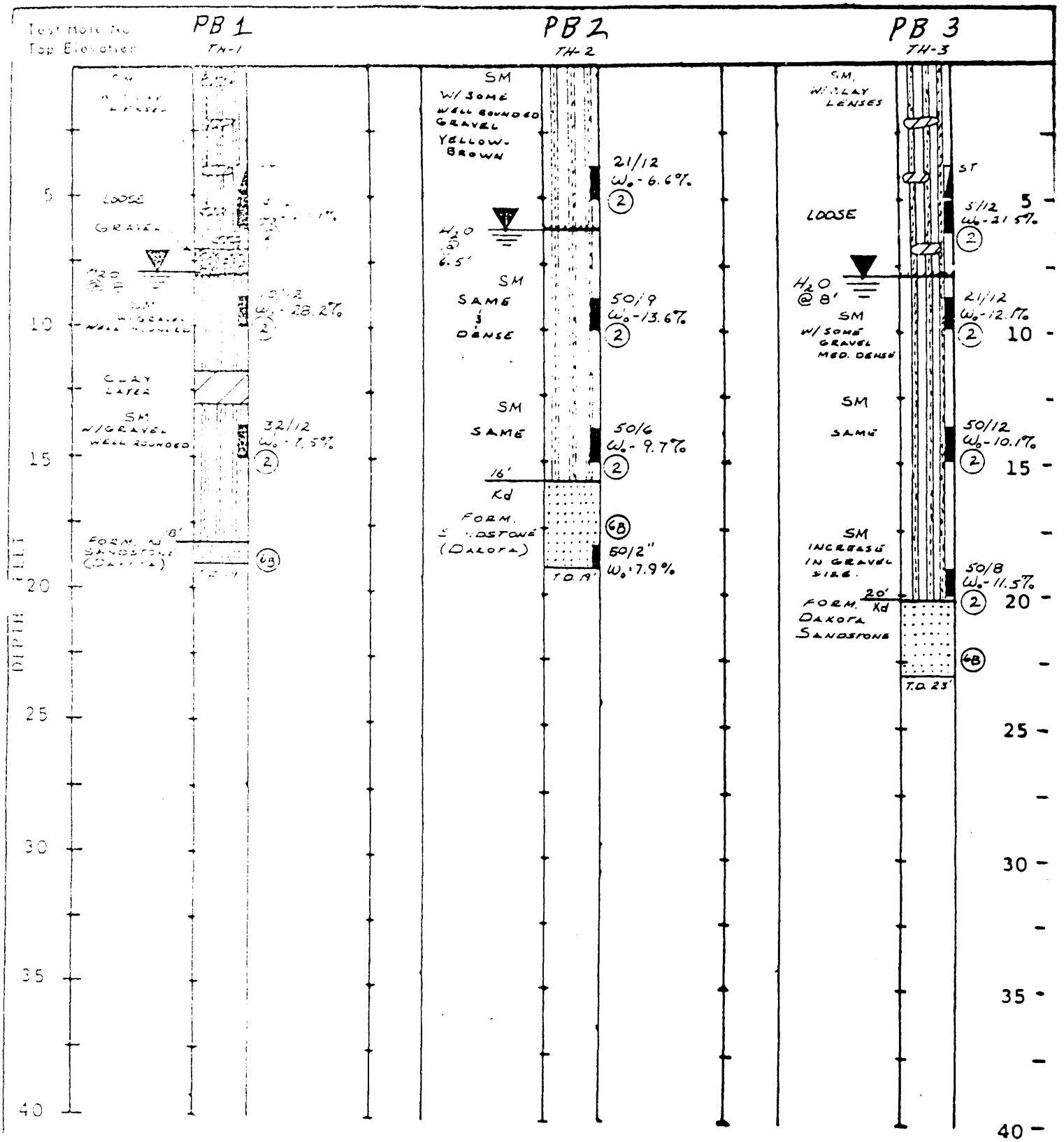
Lincoln DeVore, Inc.
Geotechnical Consultants

NO FREE WATER — GRAND JUNCTION

DATE 7-30-93

JOB NO. 78619-J

DRAWN EMH

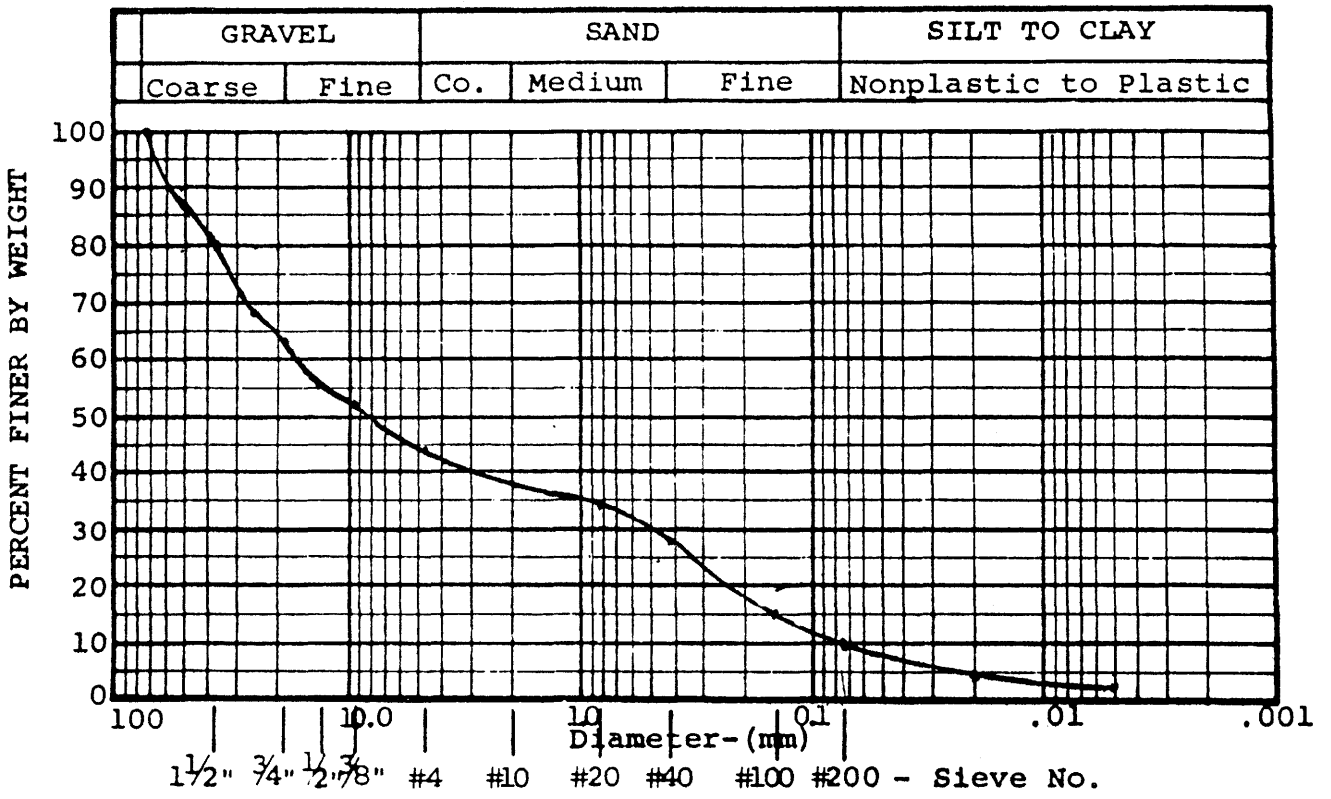


DRILLED - 1976

WDTL# 14243-GS

DRILLING LOGS

LINCOLN-DeVORE TESTING LABORATORY
COLORADO SPRINGS-PUEBLO, COLORADO



BANK CUT NEAR

Soil Sample COBBLE, SILTY GRAVEL Sample Location TB 9 @ 4-8

Sample No. II

Specific Gravity

Moisture Content 1.3%

Effective Size .076 mm

Cu

Cc

Fineness Modulus

L.L. ____ % P.I. NP %

Bearing 2800 psf

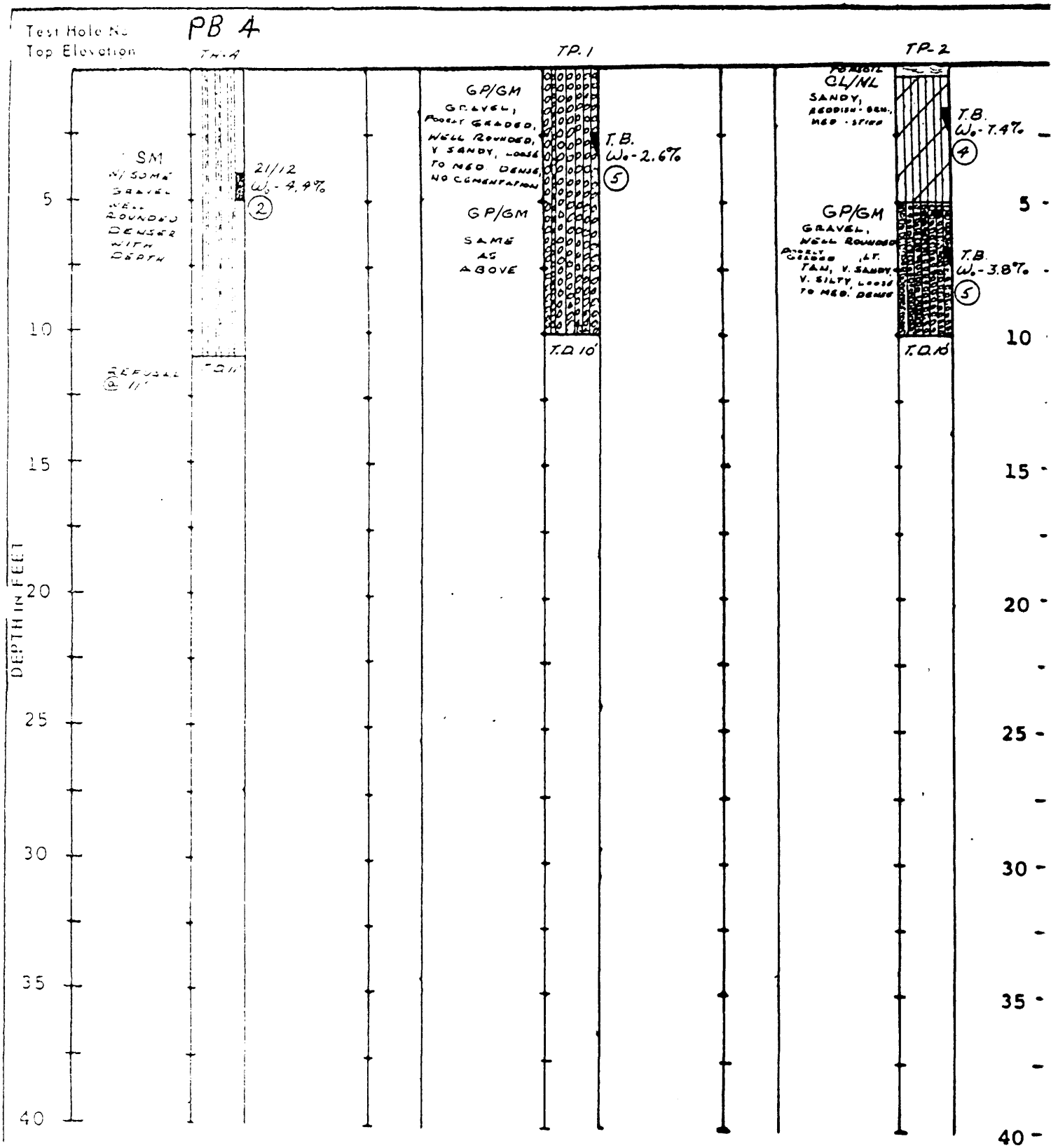
Sulfates 250 ppm

Sieve Size	3" Max. Size % Passing
1-1/2"	80.
1"	68
3/4"	63
1/2"	56
3/8"	52
#4	44
#10	38
#20	34
#40	28
#100	15
#200	10
0.0200	4
0.0050	2

Lincoln DeVore, Inc.
Geotechnical Consultants

DATE

JOB NO. | DRAWN



DRILLED - 1976

LOTL # 14243-GS

DRILLING LOGS

LINCOLN-DeVORE TESTING LABORATORY
COLORADO SPRINGS-PUEBLO, COLORADO

SUMMARY SHEET

Soil Sample HIGH PLASTIC CLAY DAKOTA FORMATION - (CH)

Test No. 78619-J

Location RIVERVIEW TERRACE G.J.

Date 7-17-93

Boring No. 10 Depth 5

Sample No. III

Test by JLS

Natural Water Content (w)____%

Specific Gravity (Gs)____

In Place Density (γ_o)____pcf

SIEVE ANALYSIS:

Sieve No.	% Passing
1 1/2"	
1"	
3/4"	
1/2"	
4	
10	100
20	99
40	99
100	98
200	96

HYDROMETER ANALYSIS:

Grain size (mm)	%
.02	68
.005	54

Plastic Limit P.L. 22 %

Liquid Limit L. L. 57 %

Plasticity Index P.I. 35 %

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)____%

Remold Swell: 1 Days____%

Swell against____psf Wo gain____%

BEARING:

Housel Penetrometer (av)____psf

Unconfined Compression (qu)____psf

Plate Bearing:____psf

Inches Settlement____

Consolidation % under psf

PERMEABILITY:

K (at 20°C)____

Void Ratio____

Sulfates 1000 ppm.

SOIL ANALYSIS

LINCOLN-DeVORE TESTING LABORATORY
COLORADO SPRINGS, COLORADO

SUMMARY SHEET

Soil Sample Low Plastic - Lignitic Clay DAKOTA FORMATION (CL)

Test No. 78619-J

Location RIVERVIEW TERRACE G.J.

Date 7-9-93

Boring No. _____ Depth _____

Sample No. IV

Test by TLS

Natural Water Content (w) _____ %

Specific Gravity (Gs) _____

In Place Density (γ_o) _____ pcf

SIEVE ANALYSIS:

Sieve No.	% Passing
1 1/2"	
1"	
3/4"	
1/2"	100
4	99
10	98
20	96
40	92
100	89
200	81

HYDROMETER ANALYSIS:

Grain size (mm)	%
.02	64
.005	39

Plastic Limit P.L. 29 %

Liquid Limit L. L. 20 %

Plasticity Index P.I. 9 %

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: _____ Days _____ %

Swell against _____ psf Wo gain _____ %

BEARING:

Housel Penetrometer (av) _____ 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

Lincoln DeVore, Inc.
Geotechnical Consultants
1441 Motor St.
Grand Junction, CO 81505

TEL: (303) 242-8968
FAX: (303) 242-1561

January 19, 1994

TOMAS A. LOGUE, LAND DEVELOPMENT CONSULTANTS
227 South 9th Street
Grand Junction, CO 81501

Re: South Rim on the Redlands Subdivision
Irrigation Water Recommendations

Dear Mr. Logue;

At your request, personnel of LINCOLN-DeVORE, INC. have reviewed the documents entitled ANALYSIS OF IRRIGATION SYSTEM FOR SOUTH RIM ON THE REDLANDS. This review is regarding recommendations contained in the Report of the Subsurface Soils Exploration for this Subdivision, prepared by LINCOLN-DeVORE, INC., Report #78619-J, dated August 3, 1993. Specifically, the relevant drainage and subsurface water findings and recommendations are found on pages 11, 13, 14 and 19-21 in the Report of the Subsurface Soils Exploration. Following are our Findings.

The designed Irrigation Water Delivery Rates of approximately 12 gpm per single family site and 6 gpm per multi-family site, both @ 50 psi is believed to be a reasonable design response to the recommendations of the Subsurface Soils Exploration, Job # 78619-J.

It is recommended the irrigation system be reviewed on a per Phase/Filing basis to determine if adjustments to the system design are warranted.

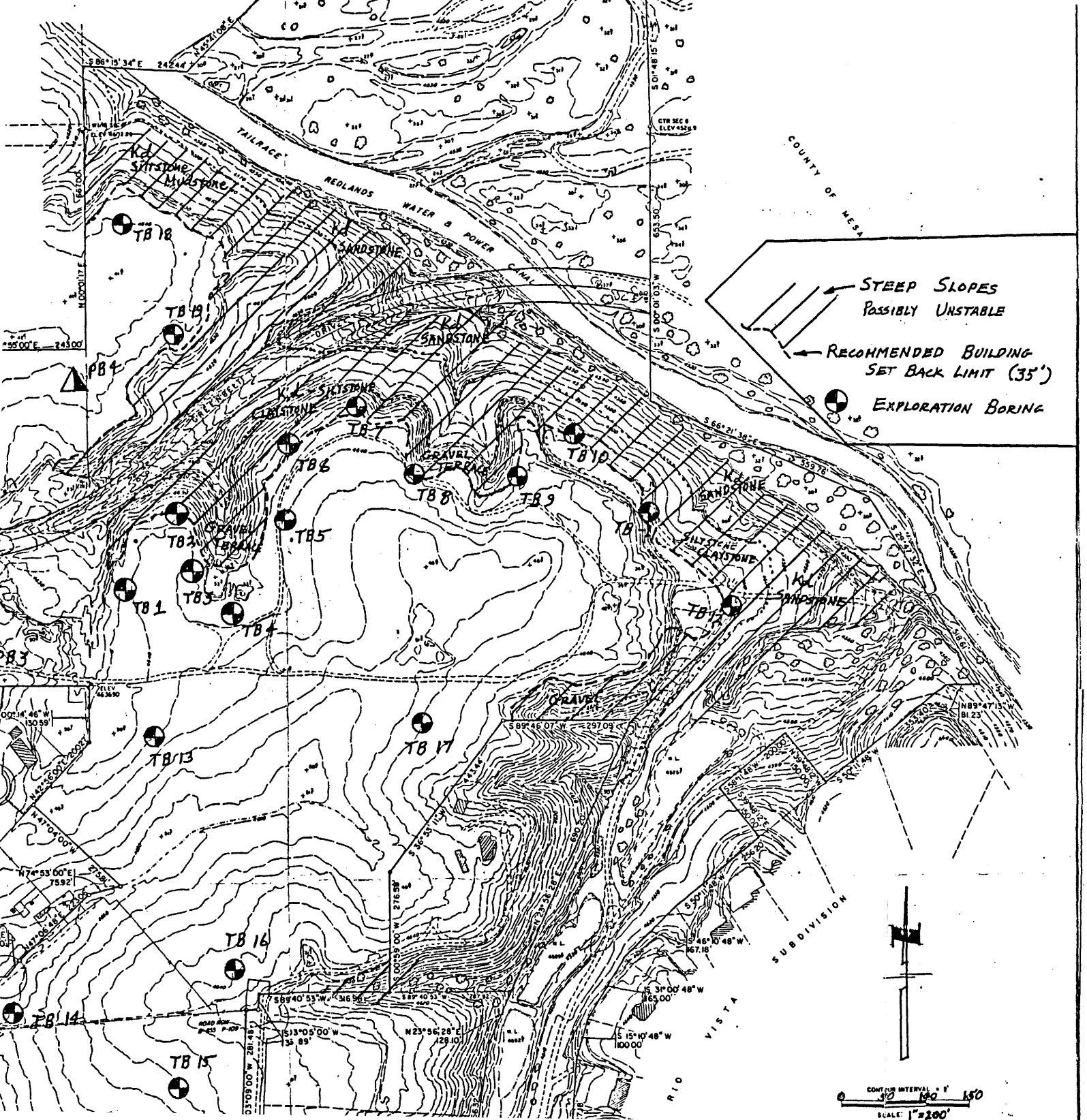
It is believed that all pertinent points have been addressed. If any further questions arise regarding this project or if we can be of any further assistance, please do not hesitate to contact this office at any time.

Respectfully Submitted,

LINCOLN DeVORE, Inc.

by: Edward M. Morris EIT
Engineer/Western Slope Manager

LD Job No.: 78619-J


STEEP SLOPES
POSSIBLY UNSTABLE
RECOMMENDED BUILDING SET BACK LIMIT (35')
EXPLORATION BORING
TB 1
TB 2
TB 3
TB 4
TB 5
TB 6
TB 7
TB 8
TB 9
TB 10
TB 11
TB 12
TB 13
TB 14
TB 15
TB 16
TB 17
TB 18
TB 19
PB 4
Kd SANDSTONE
Kd SILTSTONE
CLAYSTONE
GRAVEL TERRACE
TAILRACE
REDLANDS WATER & POWER CANAL
COUNTY OF MESA
RIO VISTA SUBDIVISION
CONTOUR INTERVAL = 5'
SCALE: 1"=200'

STORMWATER MANAGEMENT PLAN

FOR

SOUTH RIM ON THE REDLANDS FILING NO. 2

April 13, 1994

Prepared for:
LOWE DEVELOPMENT CO.
c/o David "Skip" Behrhorst
1235 Riverside Drive
Aspen, CO 303-925-4497

Prepared by:
HART GROUP, PC
ENGINEERS DESIGNERS PLANNERS
A DIVISION OF
LANDesign
227 South 9th St.
Grand Junction, Colorado 81501

Prepared by: Monty D. Stroup
Monty D. Stroup

Reviewed and Approved by: Philip Hart
Philip M. Hart P.E.
State of Colorado, #19346

A. Site and Project Description

1. Site Location:

South Rim on the Redlands is located in the City of Grand Junction, County of Mesa, State of Colorado, more particularly being located in the SW 1/4 of Section 8, T.1 S., R.1 W. of the Ute Meridian, (Tax I.D. #2945-08-083, 087 and 091).

Existing streets within the area of the project include 23 Road to the west and South Rim Drive (aka Greenbelt Drive) which runs west to east and is to be used as primary access to the site.

The South Rim development is bounded to the northeast by the Tailrace Redlands Power Canal and to the northwest by undeveloped lands. To the west lies Vista Villa Subdivision and Palace Verdes Estates, best described as medium density residential developments. To the south lies Haas Subdivision and Chamberlain Estates, undeveloped pasture lands. To the southeast lies Rio Vista Subdivision a medium density residential development.

2. Description of Property:

The South Rim Development contains approximately 91.5 acres including 38.9 acres of area designated for open-space. The second phase of development, South Rim Filing No. Two contains approximately 16.89 acres planned for 45 single family residential lots being the middle one-third of the South Rim development.

3. Description of Proposed Construction Activity:

Activity shall include the construction of roadway, water, sanitary sewer, storm sewer, irrigation, dry utility infrastructures followed by the construction of 45 single family residential structures and associated landscaping.

4. Proposed Sequence of Major Construction Activities:

Phase I Clearing and grubbing of proposed roadway alignments and disposal of construction debris.

Phase II Construction of roadways to proposed subgrade elevations including cut and fill activities as required. Excess embankment material to be stockpiled in designated areas.

Phase III Utility infrastructures to be installed including storm sewers and culverts, swales and permanent erosion control features.

Phase IV Curb, gutter and sidewalks installed.

Phase V Clearing, Grubbing and overlot grading of single or multiple lots as sales and market conditions allow.

Phase VI Construction of single or multiple building structures as sales and market conditions allow.

Phase VII Final landscaping of individual lots as required by the project Covenants, Conditions and Restrictions.

5. Estimate of Areas Subject to Clearing, Grubbing and Excavation:

South Rim on The Redlands Filing No. Two contains a total of 16.89 acres. Construction Phases I through IV will consist of approximately 3.02 acres. Phases V through VII will consist of the residual area of 13.87.

6. Preconstruction and Postconstruction Runoff Coefficients:

As defined in the Final Drainage Report For South Rim Filing No. Two (References 9) the historic runoff coefficients for the 2 year and 100 year storm events respectively are 0.20 and 0.35.
With the construction of proposed roadways coefficients are expected to increase to 0.29 and 0.44 respectively.

7. Soil Erosion Potential:

The site soils are classified as (Hc) Hinman clay loam, 0 to 2 percent slopes and falls within the hydrological soil group "C".
Soils along gullies and washes are classified as (Rr) Rough broken land, Mesa, Chipeta and Persayo soils materials and falls within the hydrological soils group "D" (Reference 4). The soils report for the development (Reference 10) characterizes the potential for erosion as significant in areas where drainage and vegetation are not carefully controlled.

8. Existing Vegetation:

Ground cover on upland areas includes native grasses and isolated pockets of trees and brush. Lowland areas, gullies and washes are host to a variety of ground covers including thick brush, dense willows, native grasses and trees. The estimated ground cover for Filing No. Two is 80 to 90 percent.

9. Storage of Fuel Oils, Chemicals, Fertilizers or Other Potential Pollution Sources:

The storage of fuel oils, chemicals, fertilizers or other potential pollutants is prohibited without prior written notice to the owner by the contractor, subcontractor or other persons doing work on the site. In the event in becomes necessary to store such items, storage areas shall be designated. Storage areas shall be located above and away from drainages, waterways and other apparent conveyance elements. Appropriate measures shall be taken to protect such areas from spills or vandalism including but not limited to spill control berms and fencing.

10. Anticipated Non-Stormwater Components of Discharge:

Irrigation facilities include a pressurized under ground system supplied by a storage pond located northeast of and adjacent to Filing One. Offsite residual irrigation runoff is collected and routed underground to the storage pond upon entering the site.

11. Name and Location of Receiving Waters:

The project site is bounded to the northeast by the Tailrace Redlands Power canal flowing from the southeast to the northwest.
The canal serves to convey return irrigation water and storm water runoff from areas southeast of the site.

As defined in the detailed drainage study entitled "Flood Hazard Information, Colorado River and Tributaries" (Reference 2), South Rim Filing No. Two is not within the 100 and 500 year floodplains.

B. Management During Construction

1. Anticipated Problems and Corrective (BMPs) Best Management Practices:

Structural Erosion Control Areas below the toe of fill slopes shall be isolated from fill areas by the installation of prefabricated silt fences as shown on the Drainage and Grading Plan and as detailed on the Erosion Control Plan. Straw bales shall be installed along side and rear yard swales at the locations shown on the plans. Straw bale outlet barriers shall be installed immediately below discharge points and pipe outlets.

Non-Structural Erosion Control Disturbed areas not designated for immediate construction or permanent landscaping shall be temporarily re-vegetated. In the event construction activity ceases for a period of 60 calendar days disturbed areas including cut and fill slopes shall be revegitated with a annual and perennial seed mixture as indicated on the Erosion Control Plan.

Dust Abatement The contractor shall be required to provide a consistent and reliable source of construction water. Watering to prevent dust shall be ongoing for the duration of the project. In the event high winds and heavy traffic loads create a situation where

watering by itself is not sufficient the contractor is to apply an approved dust palliative other than or in addition to water.

Soil Tracking Access to Filing No. Two shall be from Ewing Drive which is currently unimproved. Construction traffic through Filing No. One along South Rim Drive is to be limited. Where construction traffic enters or exits unimproved areas onto asphalted public roadways a crushed rock construction staging pad shall be installed to minimize soil tracking.

Waste Disposal Construction debris shall be stockpiled in a central location. Debris shall be removed from the site and disposed of at appropriate locations secured by the contractor.

Sedimentation Control The contractor shall be responsible for inspecting the entire site on a weekly basis to ensure compliance and identify existing or potential sedimentation problems. The Final Drainage Reports For South Rim On The Redlands (Reference 8 and 9) identify two major waterways which receive stormwater runoff from the site. Each of these natural drainages is heavily vegetated with dense pockets of brush, willows, trees and native grasses. Based on field investigations the mannings (N) value for each approaches 0.08. These drainages will provide an excellent sediment control and filtering effect and are to be maintained in their natural state.

Final Stabilization and Long Term Management

The project's Covenants Conditions and Restrictions (Reference 12) obligate each lot owner to fully landscape front yard within 60 days and the rear yard within 1 year from the issuance of a Certificate of Occupancy. Other areas including open-space are to be landscaped by the developer and maintained by the Homeowners Association.

Permanent structural BMP's include pipe outlet protection, rip-rap over filter fabric and grassed swales as shown on the Drainage and Grading Plan.

Inspection and Maintenance

The Contractor shall be ultimately responsible for compliance and maintenance during construction. The owners representative and the contractor shall make weekly inspections of the site to assure compliance and implementation of the proposed BMPs.

V. References

1. Mesa County Storm Drainage Criteria Manual, Final Draft, Mesa County, Colorado, March 1992.

2. Flood Hazard Information, Colorado River and Tributaries, Grand Junction, Colorado, prepared for the City of Grand Junction and Mesa County, by The Department Of The Army, Sacramento District, Corps Of Engineers, Sacramento, California, November, 1976.

3. Flood Insurance Rate Map, Mesa County, Colorado, (Unincorporated Areas), Community Panel Number 080115 0480 C, Federal Emergency Management Agency, Map Revised July 15th, 1992.

4. Soil Survey, Grand Junction Area, Colorado, Series 1940, No. 19, U.S. Department of Agriculture, issued November, 1955.

5. Urban Storm Drainage Criteria Manual, Urban Drainage and Flood Control District, prepared by Wright-McLaughlin Engineers, March 1969, Revised May, 1984.

6. Interim Outline of Grading and Drainage Criteria, City of Grand Junction, July 1992.

7. Douglas County Storm Drainage Design and Technical Criteria, Addendum A, Erosion Control Criteria, prepared by HydroDynamics Incorporated, Parker, Colorado, October, 1992.

8. Final Drainage Report For South Rim On The Redlands, Filing No. One, prepared by Philip M. Hart, P.E., December 10, 1993.

9. Final Drainage Report For South Rim On The Redlands, Filing NO. Two, prepared by HART GROUP, PC, Engineers Designers Planners, A Division Of LANDesign, Grand Junction, Colorado, April 1, 1994.

10. Subsurface Soils Exploration, South Rim Subdivision, Grand Junction, Colorado, prepared by Lincoln-DeVore, Inc., Grand Junction, Colorado, August 3, 1993.

11. Colorado Department of Transportation, Erosion Control and Stormwater Quality Guide, Draft version, November 27, 1992.

12. Declaration Of Covenants, Conditions, And Restrictions Of South Rim Subdivision, Recorded in Book 2055, Pages 317 to 414 of the Mesa County Clerk and Recorders Office.

APPENDIX

Seeding

Planting of temporary or permanent vegetation on all disturbed area.

I. Application

Disturbed areas not designated for immediate construction or permanent landscaping shall be temporarily revegetated. In the event construction activity ceases for a period of sixty (60) calendar days, disturbed areas including cut and fill slopes shall be revegetated with an annual and perennial seed mixture as indicated on the Erosion Control Plan.

II. Site Seed Mixture

15% Annual Rye Grass
25% Perennial Rye Grass
12% Nordan Crested Wheatgrass
12% Fairway Crested Wheatgrass
12% Blue Gramma
12% Red Fescue
12% Buffalo Grass

A minimum of 5 lbs/acre shall be used and planted using drill seeding methods and 10 lbs/acre when using a broadcast method.

III. Construction Guidelines

Seeding in areas that are unirrigated or that are not provided with sprinkling or watering systems, shall be restricted to the seasons described in Table S-1.

Table S-1
Seeding Seasons

ZONE	SPRING SEEDING	FALL SEEDING
Below 6000'	Spring thaw - June 15th	Sept. 1st - Consistent ground freeze
6000' - 7000'	Spring thaw - July 1st	Aug. 15th - Consistent ground freeze
7000' - 8000'	Spring thaw - July 15th	Aug. 1st - Consistent ground freeze
Above 8000'	Spring thaw (starts)	Consistent ground freeze (ends)

For the purpose of Table S-1 "spring thaw" is the earliest date when seed can be buried 1/2 inch into the soil through normal drill seeding methods. "Consistent ground freeze" is that latest date when seed can no longer be buried 1/2 into the soil through normal drill seeding methods.

During permanent seeding, apply topsoil prior to applying seed.

When use of fertilizers and herbicides is required, apply according to the manufacturer's recommended rates.

All seeding operations shall be performed at right angles to the slope.

When needed to improve germination of seeds, apply mulching immediately after seeding. Use soil retention blankets on steep slopes (2:1 and steeper). Some locations with 3:1 slopes facing south or west or 20 feet or more high may also require soil retention blankets.

Seeded areas shall be inspected frequently. Areas with failures shall be repaired and reseeded within the planting season.

Mulching

Application of plant residues or other suitable material to the soil surface. Typical mulching material includes straw, hay, and wood cellulose fiber.

I. Application

Used to provide temporary protection for exposed soils against erosion where temporary or permanent seeding operations are not feasible, especially during adverse growing seasons.

Used as part of seeding practices to protect newly seeded areas.

Used to protect soil stockpiles.

II. Use Limitations

Use only on disturbed areas as a temporary cover.

Hydraulic mulching with wood cellulose fibers shall be limited to slopes steeper than 3:1 or where access is limited.

III. Construction Guidelines

Material

Hay shall consist of native grasses free of noxious weed seeds.

Straw shall consist of clean cereal grain.

Wood cellulose fiber shall consist of virgin wood cellulose processed into a uniform fibrous physical state.

Tackifiers (for anchoring) shall consist of a free flowing non-corrosive powder produced from the natural plant gum of Plantago Insularis (Desert Indianwheat). This material shall not contain any mineral filler, recycled cellulose fiber, clays, or other substances which may inhibit germination or growth of plants.

Spreading Procedure

Hay and straw mulch shall be spread at a rate of two tons per acre.

At a minimum, 50% of the mulch, by weight, shall be 10 inches or more than two inches.

Applied mulch shall reach a uniform distribution so that no more than 10% of the soil surface shall be exposed.

Hay and straw mulch shall be anchored to the soil surface using Tackifiers, blankets, or nets, or with a mulch crimping machine., Mechanical anchoring is preferred and recommended for slopes flatter than 3:1. When using blankets or nets, these may need to be anchored to the soil with staples, or as required by the manufacturer's specifications.

Wood cellulose fiber mulch shall be mixed with water (maximum 50 lbs. of wood cellulose per 100 gallons of water) and a tackifying agent. Application shall be at a rate of 1500 pounds per acre with a hydraulic seeder or mulcher.

Tackifiers (for anchoring) shall be applied in a slurry with water and wood fiber (100 lbs. of powder and 150 lbs. of fiber per 700 gallons of water). Application rate of the powder shall be 100 lbs. per acre.

Erosion Bale

A temporary sediment barrier consisting of a row of entrenched and anchored straw, or hay bales.

I. Application

Use as filters along the toe of fills.

Use as erosion checks in ditches.

Use for diversions and filters in unfinished drop inlets, culvert inlets, and outlets.

II. Use Limitations

Do not use if size of the drainage area is greater than 1/4 acre per 100 feet of barrier length.

Maximum slope length behind the barrier is 100 feet.

Maximum slope gradient behind the barrier is 50%.

In minor swales or ditch lines where the maximum contributing drainage area is no greater than one acre.

Where effectiveness is required for less than 3 months.

Under no circumstances should erosion bale barriers be constructed in active streams or in swales where there is the possibility of a washout.

Should be used only in areas of sheet flow or very low flow.

Not to be used where the control of sediment is critical or in high risk areas.

Not to be used where it cannot be entrenched as required and firmly anchored. Useful life of erosion bale barriers is relatively short; the barrier may have to be replaced one or more times during construction.

III. **Construction Guidelines**

All bales shall be either wire-bound or string-tied. Erosion bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales (in order to prevent deterioration of bindings).

The barrier shall be entrenched and backfilled. A trench shall be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. After the bales are staked, the excavated soil shall be backfilled against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to 4 inches against the uphill side of the barrier.

Each base shall be securely anchored by at least two 2"X2" stakes or #4 rebars driven toward the previously laid bale to force the bales together. Stakes or rebars shall be driven 12 inches minimum into the ground to securely anchor the bales.

The gaps between bales shall be filled by wedging with straw to prevent water from escaping between the bales. The main consideration is to obtain tight joints. Erosion bales will not filter sediment out of the water if the water is allowed to flow between, around, or under the bales. Loose straw or hay scattered over the area immediately uphill from an erosion bale barrier tends to increase barrier efficiency.

Since erosion bales deteriorate quickly, the inspection during construction shall be frequent and repair or replacement shall be made promptly as needed.

Erosion bales shall be removed when they have served their usefulness, but not before

the upslope areas have been permanently stabilized.

Trenches where erosion bales were located shall be graded and stabilized.

Sheet Flow Applications

Bales shall be placed in a single row, lengthwise on the contour with ends of adjacent bales tightly abutting.

Channel Flow Applications

Bales shall be placed in a single row, lengthwise, oriented perpendicular to the contour, with ends of adjacent bales tightly abutting one another.

The barrier shall be extended to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale to assure that sediment-laden runoff will flow either through or over the barrier but not around it.

Silt Fence

A temporary vertical barrier of filter fabric attached and supported by posts and entrenched to the ground.

I. Application

Used to intercept and detain small amounts of sediment from disturbed areas during construction operations to prevent sediment from leaving the site.

Used to decrease the velocity of sheet flows and low-to-moderate level channel flows.

Typically used along the toe of fills, in transition areas between cut and fills, adjacent to streams and along private property.

Also used around median and yard inlets as applicable, and behind curb and gutter to prevent silting of the pavement.

II. Use Limitations

Where the size of the drainage areas is no more than 1/4 acre per 100 feet of silt fence length; the maximum slope length behind the barrier is 100 feet; and the maximum gradient behind the barrier is 50% (2:1).

On steep slopes care should be given to placing alignment of fence perpendicular to the general direction of the flow.

Should not be used in areas where rocky soils will prevent keying in the filter fabric.

III. **Construction Guidelines**

Materials

The synthetic filter fabric shall conform to the requirements described in CDOT's Standard Specifications for Road and Bridge Construction.

The Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0 to 120 degrees F.

If a burlap is used, it shall be purchased in a continuous roll and cut to the length of the barrier to avoid than use of joints and thus improve the strength and efficiency of the barrier.

Posts for silt fences shall be metal or hardwood with a minimum length of 42 inches. Pine wood shall not be used. Wood posts shall have a minimum diameter or cross section of 1.25 inches. Metal posts shall be "studded tee" or "U" type with minimum weight of 1.33 lbs/lin. ft., and they shall be protected against corrosion. Metal posts should also have projections for fastening wire to them.

Wire fence reinforcement for silt fences using standard strength filter cloth shall be a minimum of 42 inches in height, a minimum of 14 gauge and shall have a maximum mesh spacing of 6 inches.

Installation

Silt fences must be located along a terrain contour and the area below the fence must be undisturbed or stabilized.

The posts shall be driven vertically into the ground to a minimum depth of 18 inches.

A trench shall be excavated approximately 6 inches wide and 6 inches deep along the line of posts and upslope from the barrier; the bottom one foot of the filter fabric shall be buried into this trench.

The trench shall be backfield and the soil compacted.

The filter materials shall be fastened securely to metal or wood posts using wire ties, or to the wood posts with 3/4 inches long #9 heavy duty staples. Filter material shall not be stapled to existing trees.

If a filter barrier is to be constructed across a ditch line or swale, the barrier shall be of

sufficient length to eliminate end flow, and the plan configuration shall resemble an arc or horseshoe with the ends oriented upslope.

When joints are necessary, filter cloth shall be spliced together only at a support post, with a minimum 6-inch overlap, and securely sealed.

When standard strength filter fabric is used, a wire mesh support fence shall be fastened securely to the upslope side of the posts using heavy duty wire staples at least 3/4 inch long, tie wires or hog rings. The wire shall extend into the trench a minimum of 2 inches and shall not extend more than 36 inches above the original ground surface.

When extra strength filter fabric and closer post spacing are used, the wire mesh support fence may be eliminated. In such a case, the filter fabric is stapled or wired directly to the posts with all other provisions of the above item applying.

Silt fences shall be periodically maintained to prevent sediment from passing over or under the fence. Sediments shall be removed from behind the silt fence when it accumulates to one-half the exposed fabric height.

Filter barriers shall be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized.

Sheet Flow Applications

The height of the silt fence shall be minimum 22 inches and shall not exceed 36 inches; higher fences may impound volumes of water sufficient to cause failure of the structure.

Posts shall be spaced a maximum of 10 feet apart. If an extra strength filter fabric without the wire support fence is used, maximum space shall not exceed 6 feet.

Channel Flow Applications

The height of the silt fence shall be a minimum of 15 inches and shall not exceed 18 inches.

Posts shall be spaced a maximum of 3 feet apart.

REVIEW COMMENTS

FILE #74-94

TITLE HEADING: Final Plat/Plan - South Rim, Filing #2

LOCATION: East end of South Rim Drive

PETITIONER: David G. Behrhorst
Lowe Development Corporation

PETITIONER'S ADDRESS/TELEPHONE: 1235 Riverside Drive
Aspen, CO 81611
(303) 925-4497

PETITIONER'S REPRESENTATIVE: Thomas A. Logue

STAFF REPRESENTATIVE: Michael Drollinger

NOTE: WRITTEN RESPONSE BY THE PETITIONER TO THE REVIEW COMMENTS IS REQUIRED ON OR BEFORE 5:00 P.M., MAY 27, 1994.

CITY UTILITY ENGINEER **4/22/94**
Bill Cheney **244-1590**

See attached comments.

ADDITIONAL COMMENTS - 5/12/94

1. The encasement detail on the "Water Details" needs to be changed to reflect current specifications.
2. The drop manhole detail on "Sewer Details" needs to be updated to reflect the requirements of flowable fill instead of CL 6 ABC.
3. Manhole E-1 needs to be lowered by approximately 0.6' to achieve 72" of cover over the sewer line as required by City specifications.
4. The line extension from Dove Court to Palace Verdes Drive needs to be extended at least 10 feet past the property line to facilitate future extensions of the sewer.
5. Show details on profile view of utilities in 14' multi-purpose easement.

UTE WATER **4/27/94**
Gary R. Mathews **242-7491**

Ute Water will not accept the water main proposed for the easement between lots 10 and 11 on Dove Court. Lots 10 and 11 will be stubbed out off the main line in Dove Court.

Policies and fees in effect at the time of application will apply.

CITY DEVELOPMENT ENGINEER **4/22/94**
Jody Kliska **244-1591**

See attached comments and red-lined drawings.

PARKS & RECREATION DEPARTMENT **5/2/94**
Don Hobbs **244-1542**

Departmental concerns are included in the annexation agreement.

PUBLIC SERVICE COMPANY **5/3/94**
Gary Lewis

ELECTRIC - Additional 10' utility easement required along the northerly lot line of Lot 1, Block 3; the northerly and northwesterly lot line of lot 2, block 3; and the northwesterly lot line of lot 3, block 3 as previously requested. Additional 10' utility easement along the southeasterly lot line of Lot 24, Block 3. Amend "20' Exclusive Use Easement to Ute Water" between Lots 10 & 11, Block 3 to be 20' utility easement OR additional 10' easement along westerly and southwesterly lot line of Lot 11, Block 3.

GAS - 14' front lot easements sufficient to serve lots. May utilize utility easements requested by electric above.

MESA COUNTY PLANNING **5/6/94**
Linda Dannenberger **244-1771**

1. Lot 4, Block 1 has a 30 foot setback from the escarpment. 35 feet was required. Has Lincoln DeVore reviewed the reduction?
2. Has Greenbelt Drive right-of-way been vacated?
3. West lot line for Lot 3 and north line of Lot 4, Block 1 should pull back from the trail and rear yard aesthetics considered on both as seen from the trail.
4. Driveway restrictions should be noted on a site plan.

COMMENTS ON ADJUSTMENTS ALLOWED ON THE O.D.P.

1. The envelope types A and B on the official development plan depict the requirement for single-story structures from the top of the bench. The slight increase in height to 18 feet affects only the roof peaks and prevents construction of flat roofs and allows better design. The 27-feet height on the bench of envelope B matches the same single-story height limitation from the top of the bench considering the elevations shown on the contour map.
2. Lot 29 is considered a B lot since a bench will be created. The developer voluntarily restricted lots 6, 7, and 18-21.
3. Fences were not allowed along the bluffs for aesthetic reasons. The revisions on the official development plan allow minimal deck, spa and patio fencing and prohibit fences from zig-zagging all over the slopes. The applicant wanted consideration of several practicalities such as retaining walls, deck rails that would meet building codes, and protection from wind and certain patio areas.

GRAND JUNCTION FIRE DEPARTMENT **5/6/94**
George Bennett **244-1400**

The fire hydrant between Lots 16 & 17 of Block 3 needs to be moved to between Lots 12 & 13 of Block 3.

CITY POLICE DEPARTMENT **5/9/94**
Dave Stassen **244-3587**

No comments.

COMMUNITY DEVELOPMENT DEPARTMENT **5/18/94**
Michael Drollinger **244-1439**

1. The developer should provide street lighting at appropriate locations or at minimum provide conduit for the future installation of street lighting in all streets.
2. As per the annexation agreement, the applicant is required as part of Filing #2 to propose an amendment to the ODP which includes the improvement of South Rim Drive west of the subdivision to 23 Road with curb, gutter, sidewalk and an asphalt overlay.
3. As per the annexation agreement, the developer is required to improve the connecting bicycle/pedestrian path from South Rim to the adjacent open space.

Mesa County Department of Public Works
Current Planning and Development Section

(303) 244-1636

750 Main Street • P.O. Box 20,000 • Grand Junction, Colorado 81502-5022

M E M O

TO: Dave Thornton, City Community Development
FROM: Linda Dannenbergen, Mesa County Current Planning & Development
DATE: May 5, 1994
SUBJECT: South Rim on the Redlands ODP

This memorandum will serve to communicate to you minor adjustments allowed on the ODP pertaining to height limitations and agreement on the definition of fences that could be allowed on lots along the bluffs.

The envelope types A and B on the official development plan depict the requirement for single-story structures from the top of the bench. The slight increase in height to 18 feet affects only the roof peaks and prevents construction of flat roofs and allows better design. The 27-feet height on the bench of envelope B matches the same single-story height limitation from the top of the bench considering the elevations shown on the contour map.

Lot 29 is considered a B lot since a bench will be created. The developer voluntarily restricted lots 6, 7, and 18-21.

Fences were not allowed along the bluffs for aesthetic reasons. The revisions on the official development plan allow minimal deck, spa and patio fencing and prohibit fences from zig-zagging all over the slopes. The applicant wanted consideration of several practicalities such as retaining walls, deck rails that would meet building code, and protection from wind for certain patio areas.

RESPONSE TO REVIEW COMMENTS

May 25, 1994

Title: SOUTH RIM, FILING NO. TWO, Final Plat and Plan

File No: 74-94

Location: East End of South rim Drive

RESPONSE TO UTILITY ENGINEER

Requested plan and specification changes have been transmitted to the Public Works Department under separate cover.

RESPONSE TO UTE WATER:

Revised review comments are attached in reference to the side lot easement. The construction plans have been revised to reflect requested changes to the service line locations.

RESPONSE TO DEVELOPMENT ENGINEER:

Requested plan and specification changes have been transmitted to the Engineering Department under separate cover.

RESPONSE TO CITY PARKS: 3RD REVIEW — SAME COMMENTS

Comments do not require a response.

RESPONSE TO PUBLIC SERVICE CO:

The requested utility easements have been added to the Final Plat which has been transmitted to the Community Development Dept.

RESPONSE TO MESA COUNTY PLANNING:

1. The setback from the main rim escarpment on Lot 4, Block 1 is 35 feet as recommended by the applicants soils engineer. The 30 foot setback is from the top of a small draw located along the easterly side of Lot 4, Block 1. Conformation of the 30 foot setback will be transmitted to the City Development Department under separate cover.

2. The Greenbelt Drive right-of-way has been vacated per item 16 of the Pre-annexation Agreement dated, May 2nd., 1994

3. The covenants for South Rim prohibit any disturbance to areas outside of the building envelope along rim slopes. This requirement will insure that the rear yard aesthetics will remain unchanged as view from the trail.

RESPONSE TO FIRE DEPARTMENT:

The fire hydrant has been relocated as requested.

RESPONSE TO COMMUNITY DEVELOPMENT:

1. Street lighting will be installed as recommended by the Public Service Co. of Colorado. At such time as Public Service completes their design for electric service, the location of street lighting will be provided to the department for their review and comment.

2. Detailed construction plans and specification for the extension of curb, gutter, and sidewalk, as well as, pavement overlay have been transmitted to the Community Development and Engineering Departments.

3. The applicant is aware of the requirement to improve the bicycle/pedestrian path between South Rim and the existing path located along the easterly boundary of South Rim. The improvement will be completed in conjunction with the site development of Phase 4.

Memorandum

To: Jody Kliska

CC: Michael Dollinger

From: Tom Logue

Date: May 31, 1994

Subject: Response To Review Comments, South Rim, Filing No. Two

After our phone conservation with you and Michael on Tuesday, May 31, we carefully reviewed our construction plans and found that our set, with a few minor exceptions, responded to your review comments of April 22, 1994. Phil Hart will go over those exceptions with you Wednesday morning.

Item which can not be addressed on the construction plans include:

1. The drainage easements outside of this filing will be handled as follows:

   a) The drainage discharge at the end of South Rim drive is intended to be temporary and will be abandoned when the next phase of development is completed. The drainage within this filing will ultimately be carried further to the east on South Rim Drive to a permanent discharge point.

   b) The drainage at the end of Grouse Court will be carried within an existing "utility and irrigation easement", of record, across Lot 15. If this is not acceptable the applicant can provide the City with a drainage easement dedicated to the home owner's association. We will be awaiting your requirements.

2. Street light locations have not been shown on the roadway plans. As is the case with Filing One street lights will be provided in Filing Two, as well as, all of the remaining development. Street light locations will be determined by the Public Service Company. Historically, we have relied on Public Service lighting engineers to make the determination of lighting locations. Public Service normally installs a street light a each intersection and at mid-block location in the event of a lengthy block. On several occasions we have attempted to locate a local lighting expert. But, have been unsuccessful. If you know of one in our area we would appreciate knowing so.

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

May 31, 1994

David G. Behrhorst, Vice President
Lowe Development Corporation
1235 Riverside Drive
Aspen, CO 81611

Dear Mr. Behrhorst,

City staff has not received all of the material required through the review process for the proposed South Rim Filing #2 at (File #74-94). **Deficiencies include the absence of a revised Grading and Drainage Plan, a revised Drainage Report as required by Code, and revisions to the Plat, the Street Plan and the Water and Sewer Plans.** Other material that was submitted with revisions as a response to review agency comments is currently being reviewed for accuracy and completeness.

Section 6-7-4 of the Zoning and Development Code states that "a submittal with insufficient information, identified in the review process, which has not been addressed by the applicant, may be withdrawn from the Agenda by the Administrator." Scheduling for the review and required processing of development requests is on a very tight timeline so the applicants can get to a public hearing as soon as possible. There would not be adequate time for us to review additional revised plans now and have the necessary information available for the June 7th Planning Commission meeting. Therefore, we can not schedule your proposal for the June 7th hearing.

For South Rim #2 to be scheduled for the July 5th Planning Commission hearing, all deficiencies as outlined in the review comments for Filing #2 must be rectified and resubmitted by June 27, 1994 at 5:00 PM to the Community Development Department. A readvertisement fee of $50 is also required.

If further clarification is needed please contact me at your earliest convenience to schedule a meeting with myself and Jody Kliska, City Development Engineer. I encourage you to submit the materials prior to the deadline. If the deficiencies can not be adequately addressed by June 24th, then the earliest this item could be heard would be August 2, 1994 with a resubmittal deadline toward the end of July.

Sincerely yours,

Michael T. Drollinger
Senior Planner

cc: Tom Logue
File # 74-94

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

June 1, 1994

David G. Behrhorst, Vice President
Lowe Development Corporation
1235 Riverside Drive
Aspen, CO 81611

Dear Mr. Behrhorst,

This letter is to inform you that South Rim Filing #2 (File #74-94) has been reinstated on the June 7, 1994 Planning Commission Meeting agenda. The reason for the change is that two other items which were scheduled have been withdrawn which has freed up sufficient staff time to review your application, despite the fact that it was submitted past the normal submission deadline.

If you have any questions feel free to call me at 244-1439.

Sincerely yours,

Michael T. Drollinger
Senior Planner

cc: Tom Logue
File # 74-94

1

MTD

STAFF REVIEW

FILE: #74-94

DATE: June 5, 1994

REQUEST: Final Plan and Plat

LOCATION: South Rim Drive

APPLICANT: Lowe Development Corporation
1235 Riverside Drive
Aspen, CO 81611

EXISTING LAND USE: Vacant

PROPOSED LAND USE: Single Family Residential

SURROUNDING LAND USE:

NORTH:	Vacant
SOUTH:	Residential
EAST:	Vacant
WEST:	Residential

EXISTING ZONING: PR-3.5

RELATIONSHIP TO COMPREHENSIVE PLAN:

No comprehensive plan exists for this area.

STAFF ANALYSIS:

The applicant is requesting final plan and plat approval for 45 single family building sites on 16.9 acres. ODP approval for the entire 213 unit project was originally obtained from Mesa County prior to annexation of the parcel by the City. The subject property is zoned PR-3.5. The developer will improve Green Belt Drive from the site to 23 Road as part of Phase 2 improvements.

STAFF RECOMMENDATION:

Staff recommends approval.

be amended to include a the revised ODP to show conditions of annexation agreement

SUGGESTED PLANNING COMMISSION MOTION:

Mr Chairman, on item #74-94, a request for final approval and plat, I move that the application be approved subject to compliance with all review comments.

CITY OF GRAND JUNCTION FILE #74-94 SOUTH RIM, FILING #2 FINAL PLAT LOCATED AT SOUTH RIM DRIVE, EAST OF 23 ROAD, IN THE CITY OF GRAND JUNCTION HAS BEEN REVIEWED AND APPROVED BY THE UTILITY COORDINATING COMMITTEE.

The committee has reviewed the proposal on 6/8/94 Chairman will sign when Public Service and Fire Dept. has signed.

L. Dale Clawson — 6/10/94

CHAIRMAN — DATE

Public Service L. Dale Clawson — 6/10/94

Date

Fire Dept. George Bennett — 6-9-94

Date

(Form for approval of filing & recording of SUBDIVISION PLATS)

SUB NO. SB-62-94

MESA COUNTY LAND RECORDS
544 ROOD AVE.
GRAND JUNCTION, CO 81501
(303) 244-1823

To: Monika Todd, Mesa County Clerk & Recorder

This is to certify that the SUBDIVISION PLAT described below

SOUTH RIM FILING NO. TWO

has been reviewed under my direction and to the best of my knowledge it conforms with the neccessary requirements pursuant to the Colorado Revised Statute 1973, 38-51-102 for the recording of Land Survey Plats in the records of the County Clerk's Office. This approval does not certify as to the possibility of omissions of easements and other Rights-of-Way or Legal Ownerships.

Dated this 21st day of June, 1994.

Signed: Ken Swearengin
KEN SWEARENGIN

RECORDED IN MESA COUNTY RECORDS
DATE: _____
TIME: _____
BOOK: 14 PAGE: 241-243
RECEPTION NO.: _____
Drawer AA/104

NOTE:
The recording of this plat is subject to all approved signatures & dates.

1686797 03:54 PM 06/23/94
MONIKA TODD CLK&REC MESA COUNTY CO

FIRST SUPPLEMENT TO THE
DECLARATION OF COVENANTS, CONDITIONS AND RESTRICTIONS
OF
SOUTH RIM SUBDIVISION

THIS First Supplement of Declaration of Covenants, Conditions and Restrictions of South Rim Subdivision (the "First Supplement of Declaration") is made as of June 8th, 1994, by Lowe Development Corporation (the "Declarant").

A. Declarant has heretofore caused to be recorded in Book 2055 at Page 317, Mesa County, Colorado records, a Declaration of Covenants, Conditions and Restrictions of South Rim Subdivision (the "Declaration").

B. In Article IX, Section 6 of the Declaration, Declarant expressly reserved for itself and any Successor Declarant (all capitalized terms used herein shall have the meanings as defined in the Declaration, unless otherwise defined or modified herein) the right to expand the Property by annexing and submitting additional Lots and Common Area by one or more duly recorded supplements to the Declaration.

C. Declarant wishes to submit to the Property the following described property:

See Exhibit "A" attached hereto and by this reference incorporated herein.

D. Declarant wishes to reserve the right for itself and any Successor Declarant to further expand the Property in the future.

Declarant hereby declares that both the Property and the Supplemental Property shall be held, sold and conveyed subject to the Declaration, which is for the purpose of protecting the value and desirability of the Property and the Supplemental Property and which shall run with the land and be binding on all parties and heirs, successors and assigns of parties having any right, title or interest in all or any part of the Property of the Supplemental Property.

1. General. The terms and provisions contained in this First Supplement to Declaration shall be in addition and supplemental to the terms and provisions contained in the Declaration. All terms and provisions of the Declaration, including all definitions, except those terms and provisions specifically modified herein, shall be applicable to the First Supplement to Declaration and to the Supplemental Property. The definitions used in the Declaration are hereby expanded and shall hereafter be deemed to encompass and refer to the Property as defined in the Declaration and the Supplemental Property as defined herein. For example, reference to the "Property" shall mean both the Property and the Supplemental Property, reference to the "Owner" shall mean the record owner

of fee simple title both to any Vacant Lot or Dwelling Unit as defined in the Declaration and to the Lots constituting the Supplemental Property, reference to "Member" shall mean every Owner as defined in the Declaration and as modified by this First Supplement to Declaration, and reference to the "Declaration" shall mean the Declaration as supplemented by this First Supplement to Declaration. All ownership and other rights, obligation and liabilities of owners of original Lots, Vacant Lots and Dwelling Units are hereby modified as described herein.

2. Effect of Expansion. Assessments levied by the Association as provided in the Declaration, after the recording of this First Supplement to Declaration, shall be levied against all Lots including Lots which are part of the Supplemental Property. Notwithstanding any inclusion of additional Lots under the Declaration, each Owner (regardless of whether such Owner is the owner of a Vacant Lot or Dwelling Unit shown on the original plat or is the owner of a Lot Constructed in the Supplemental Property) shall remain fully liable with respect to his obligation for the payment of the Assessments of the Association, including those relating to the expenses for all Common Area and related costs and fees, if any. The recording of this First Supplement to Declaration shall not alter the amount of the assessments assessed to a Vacant Lot or Dwelling Unit prior to such recording.

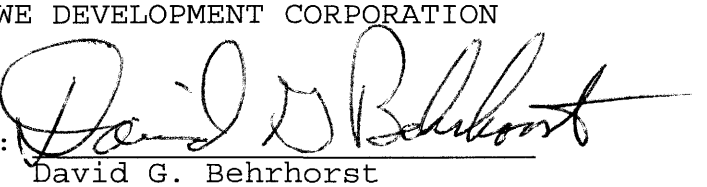
3. Reservation. Declarant hereby reserves the right for itself and any Successor Declarant to further expand the Property in the future to include additional Lots and to further expand the Common Area.

4. Severability. Invalidation of any one of these covenants or restrictions by judgment or court order shall in no way affect any other provisions which shall remain in full force and effect.

5. Conflicts between Documents. In case of conflict between the Declaration as supplemented hereby and the Articles and the Bylaws of the Association, the Declaration as supplemented shall control.

DATED as of the day and year first above written.

LOWE DEVELOPMENT CORPORATION

By: 

David G. Behrhorst
Vice-President

STATE OF COLORADO)
) ss.
COUNTY OF M E S A)

The foregoing instrument was acknowledged before me this 8th day of June, 1994 by David G. Behrhorst as Vice-President of LOWE DEVELOPMENT CORPORATION.

WITNESS my hand and official seal.
My commission expires: 11/26/97

Thomas A. Logue
Notary Public

THOMAS A. LOGUE NOTARY PUBLIC STATE OF COLORADO

EXHIBIT "A"

Property situated in the SW1/4 of Section 8, Township 1 South, Range 1 West of the Ute Meridian, and being located in the City of Grand Junction, County of Mesa, Stateof Colorado, being more particularly described as follows: (being a portion of the property as described in Warranty Deed Book 1539, Page 87-90)

Beginning at the Mesa County Brass Cap at the Northwest corner of the Southeast Quarter of the Southwest Quarter (SE1/4 SW1/4) of Section 8, Township 1 South, Range 1 West, Ute Meridian, Mesa County, Colorado, whence the Mesa County Brass Cap at the Northeast corner of the Southeast Quarter Southwest Quarter (SE1/4 SW1/4) bears N 89 47'07" E,1319.34 feet for a basis of bearings with all bearings contained herein relative thereto; Thence South 0 degrees 02 minutes 09 seconds East (N 00°02'09" E), a distance of 132.00 feet along the East boundary of Palace Verdes Estates Filing 3 to the TRUE POINT OF BEGINNING;

Thence following along the Southerly and Easterly boundary of South Rim on the Redlands Filing No. 1 the following 10 courses; (1) North 69 degrees 53 minutes 56 seconds East (N 69°53'56" E), a distance of 120.13 feet; (2) thence North 74 degrees 13 minutes 33 seconds East (N 74°13'33" E), a distance of 52.00 feet; (3) thence along a curve to the left having a radius of 592.25 feet, arc length of 16.97 feet, delta angle of 1 degrees 38 minutes 30 seconds (1°38'30"), a chord bearing of North 16 degrees 35 minutes 41 seconds West (N 16°35'41" W), and a chord length of 16.97 feet;(4) thence North 26 degrees 14 minutes 59 seconds East (N 26°14'59" E), a distance of 27.62 feet; (5) thence along a curve to the left having a radius of 588.69 feet, arc length of 87.01 feet, delta angle of 8 degrees 28 minutes 06 seconds (8°28'06"), a chord bearing of North 65 degrees 40 minutes 52 seconds East (N 65°40'52" E), and a chord length of 86.93 feet; (6) thence North 28 degrees 33 minutes 10 seconds West (N 28°33'10" W), a distance of 153.50 feet; (7) thence North 40 degrees 00 minutes 51 seconds West (N 40°00'51" W), a distance of 105.85 feet; (8) thence North 42 degrees 16 minutes 13 seconds West (N 42°16'13" W), a distance of 97.51 feet; (9) thence North 10 degrees 16 minutes 26 seconds West (N 10°16'26" W), a distance of 100.00 feet; (10) thence North 00 degrees 00 minutes 00 seconds East (N 00°00'00" E), a distance of 9.67 feet to the Southerly right-of-way of Greenbelt Drive as recorded in Book 1061, Page 892; thence following said Southerly right-of-way along a curve to the left having a radius of 746.20 feet, arc length of 143.63 feet, delta angle of 11 degrees 01 minutes 42 seconds (11°01'42"), a chord bearing of North 54 degrees 49 minutes 50 seconds East (N 54°49'50" E), and a chord length of 143.41 feet; thence South 40 degrees 40 minutes 55 seconds East (S 40°40'55" E), a distance of 10.00 feet; thence North 49 degrees 19 minutes 01 seconds East (N 49°19'01" E), a distance of 182.25 feet;

thence leaving the right-of-way of Greenbelt Drive South 12 degrees 04 minutes 04 seconds East (S 12°04'04" E), a distance of 299.40 feet; thence South 65 degrees 02 minutes 42 seconds West (S 65°02'42" W), a distance of 9.43 feet; thence South 37 degrees 48 minutes 18 seconds East (S 37°48'18" E), a distance of 140.54 feet; thence South 14 degrees 24 minutes 40 seconds East (S 14°24'40" E), a distance of 47.80 feet; thence South 37 degrees 00 minutes 59 seconds East (S 37°00'59" E), a distance of 115.33 feet; thence South 05 degrees 25 minutes 05 seconds East (S 05°25'05" E), a distance of 50.20 feet; thence South 37 degrees 54 minutes 08 seconds East (S 37°54'08" E), a distance of 175.30 feet; thence South 37 degrees 45 minutes 51 seconds West (S 37°45'51" W), a distance of 108.89 feet; thence South 29 degrees 35 minutes 10 seconds West (S 29°35'10" W), a distance of 80.45 feet; thence South 47 degrees 00 minutes 03 seconds West (S 47°00'03" W), a distance of 98.88 feet; thence North 59 degrees 50 minutes 04 seconds West (N 59°50'04" W), a distance of 45.00 feet; thence South 24 degrees 40 minutes 17 seconds West (S 24°40'17" W), a distance of 58.40 feet; thence South 14 degrees 08 minutes 51 seconds East (S 14°08'51" E), a distance of 192.23 feet to the Southerly right-of-way of South Rim Drive; thence along a curve to the right having a radius of 201.77 feet, arc length of 74.73 feet, delta angle of 21 degrees 13 minutes 11 seconds (21°13'11"), a chord bearing of North 83 degrees 58 minutes 31 seconds West (N 83°58'31" W), and a chord length of 74.30 feet; thence South 39 degrees 53 minutes 58 seconds West (S 39°53'58" W), a distance of 137.81 feet; thence South 33 degrees 39 minutes 12 seconds East (S 33°39'12" E), a distance of 57.64 feet; thence North 81 degrees 12 minutes 42 seconds East (N 81°12'42" E), a distance of 69.37 feet to a point of the West right-of-way of Ewing Drive as recorded in Book 855, Page 108; thence along said right-of-way South 03 degrees 10 minutes 00 seconds West (S 03°10'00" W), a distance of 320.20 feet to a point on the North line of Haas Subdivision; thence along said North line of Haas Subdivision South 86 degrees 15 minutes 00 seconds West (S 86°15'00" W), a distance of 682.63 feet; thence North 00 degrees 05 minutes 58 seconds West (N 00°05'58" W), a distance of 280.00 feet; thence North 00 degrees 12 minutes 55 seconds East (N 00°12'55" E), a distance of 106.00 feet to a point on the South right-of-way of Palace Verdes Drive as recorded in Book 991, Page 153; thence along said right-of-way North 89 degrees 55 minutes 25 seconds East (N 89°55'25" E), a distance of 86.89 feet; thence North 59 degrees 55 minutes 25 seconds East (N 59°55'25" E), a distance of 50.00 feet to the radius point of a 50 foot cul-de-sac; thence North 43 degrees 08 minutes 00 seconds East (N 43°08'00" E), a distance of 50.00 feet; thence North 47 degrees 07 minutes 48 seconds East (N 47°07'48" E), a distance of 223.06 feet; thence North 74 degrees 54 minutes 00 seconds East(N 74°54'00" E), a distance of 75.92 feet; thence North 47 degrees 03 minutes 00 seconds West (N 47°03'00" W), a distance of 275.22 feet to a point on the Easterly boundary of Palace Verdes Estates Filing

3; thence along said boundary North 42 degrees 57 minutes 51 seconds East (N 42°57'51" E), a distance of 198.94 feet to the TRUE POINT OF BEGINNING.

Said parcel containing 16.887 acres, or 735598 square feet.

ALSO KNOWN AS:

Lots 1-5, Block 1; Lots 1-12, Block 2; Lots 1-28, Block 3; South Rim, Filing No. Two.

July 6, 1994

Tom Logue
Landesign Consultants
227 South Ninth St.
Grand Junction, CO 81501

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

RE: South Rim Offsite Improvements (Greenbelt Drive)

Dear Tom,

This letter is a follow-up to our phone conversation regarding the site work on South Rim Drive (Greenbelt Drive). The following items need to be addressed:

The slope behind the sidewalk on the north side of the street is unacceptable. This can be corrected by installing a retaining wall or by slope paving. The slope as constructed is too steep to maintain. If the slope paving option is exercised, a handrail for slopes greater than 3:1 will be required. Please contact the property owner at 532 23 Road, Dr. Shanna McGee, to describe the action being taken to correct the slope and a timetable for completion of the work.

Drainage from Hacienda to Greenbelt needs to be addressed and corrected. It appears water will run down Hacienda and end up in the yard of 533 Hacienda. An inlet and pipe may be necessary to address this problem. The slope from the sidewalk into the yard at this address needs to be addressed as well.

At 2309 South Rim Drive please rake out the rocks and bring in clean topsoil and level so the property owners can plant grass. This should be done as soon as possible as the owners are working on the sprinkler system installation now for this area.

At 532 Hacienda, slope paving or ground cover will be necessary from the new retaining wall to where the slope flattens. Please work with the property owner, Dwight Maddux, on this.

Please submit plans which address the solutions for each of the above, as well as the landscaping plan for the retaining wall areas at the entrance to South Rim. Thank you for your prompt attention to these items.

Sincerely,

Jody Kliska

Jody Kliska, P.E.
City Development Engineer

cc: Jim Shanks

Mesa County Health Department

515 Patterson Rd., Grand Junction, CO 81506
P.O. Box 20000, Grand Junction, CO 81502-5033

Administration 248-6900
Environmental Health 248-6960
Nursing 248-6950
Animal Control 242-4646
362 28 Rd.

July 27, 1994

Certified Mail: P 220 775 330
Return Receipt Requested

Mr. Thomas Logue
Landesign Consultants
(Representative for Lowe Develoment Co.)
227 S. 9th Street
Grand Junction, CO 81501
245-4099

Re: APEN/Land Development

Dear Mr. Logue:

Your attention is directed to the Colorado Air Quality Control Commission's Regulation No.3.A.II.D.j. (copy enclosed) which requires an APEN (Air Pollution Emission Notice) to be filed with the Air Pollution Control Division of the Colorado Department of Health prior to commencing the disturbance of surface areas for purposes of development projects exceeding 25 contiguous acres and six months duration.

Upon review of Filing No.'s 1 & 2 for the South Rim Development Project on the Redlands, it is apparent that an APEN should have been filed with the Division prior to the engagement of construction activity. Currently, this office has no record of an APEN having been submitted to the Division and requests that you take this opportunity to complete and submit the enclosed forms. In addition, a fugitive dust control plan shall be submitted with respect to the operations or activities associated with the project. Both the 20% opacity and the no off-property transport emission limitation guidelines shall apply to related land development/construction activities.

Your response to this notice needs to be received by the Division within 30 days upon receipt. *Please note that a $100.00 filing fee must accompany the APEN made payable to the **COLORADO DEPARTMENT OF HEALTH**.*

Pursuant to the above information, and as provided in Section 25-7-115(2) C.R.S., this letter serves notice of non-compliance with Section 25-7-114 .1 C.R.S. for any construction activities that may have occurred prior to the filing of an APEN and may be subject to a civil penalty of up to $500.00 (Section 25-7-122 (1)(c) C.R.S., amended 1992).

Any questions you have concerning the submitting of an APEN may be directed to this office at 248-6966.

Sincerely,

Perry Buda/Air Pollution Control
Mesa County Health Department
515 Patterson Road
Grand Junction, CO 81506

:pb

enclosures

cc: Steven DeFeyter, Environmental Health Director/Mesa County Health Department
Harry Collier, Air Pollution Control Division/Colorado Department of Health
Larry Timm, Community Development and Planning/City of Grand Junction
David Behrhorst, Lowe Development Corporation

b:logue.ltr/d.5

S. Rim file

74-N

November 15, 1994

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

Mr. David G. Berhorst
Lowe Development Corporation
1235 Riverside Drive
Aspen, Colorado 81611

Subject: South Rim Filing 1 Subdivision

Dear Mr. Behrhorst:

A final inspection of the streets and drainage facilities in Subdivision was conducted on July 14, 1994. As a result of this inspection, a list of remaining items was given to Tom Logue for completion. These items were reinspected and found to be satisfactorily completed.

"As Built" record drawings and required test results for the streets and drainage facilities were received on October 14, 1994. These have been reviewed and found to be acceptable.

In light of the above, the streets and drainage improvements are accepted for future maintenance by the City of Grand Junction.

This acceptance is subject to a warranty of all materials and workmanship for a period of one year beginning July 14, 1994.

Thank you for your cooperation in the completion and acceptance of this project.

Sincerely,

Jody Kliska, P.E.
City Development Engineer

cc: Don Newton
Doug Cline
Walt Hoyt
Kathy Portner
Tom Logue - Landesign

SOUTH RIM FILING NO. TWO

A REPLAT OF THE BLUFFS WEST AS RECORDED IN PLAT BOOK 11, PAGE 267, AND LOCATED IN THE SW1/4, SECTION 8, T1S, R1W, UTE MERIDIAN, MESA COUNTY, COLORADO

SCALE IN FEET

Basis of bearings assume the North line of the SE1/4 SW1/4 of Section 8 to bear S 89°47'07" W 1319.34 feet. Both monuments on this line are Mesa County Survey Monuments as shown on the accompanying plat.

Note: Existing property corners which were recovered during this survey which were within 0.25 feet ± of the calculated position were accepted as being "in position".

AREA SUMMARY

AREA IN LOTS	=	13.866 Acres
ROAD ROW	=	3.021 Acres
TOTAL	=	16.887 Acres

LEGEND

- MESA COUNTY OR BLM SURVEY MONUMENT
- SET ALUMINUM CAP ON No. 5 REBAR, PLS 16835, IN CONCRETE
- FOUND REBAR AND CAP AS NOTED
- SET #5 REBAR AND CAP AT ALL LOT CORNERS LS 16835

Original
Do NOT Remove
From Office

94 94

BUILDING SETBACK TABLE
Front Yard = 25 Feet, EXCEPT at Corner Lots = 20 Feet
Side Yard = 10 Feet
Rear Yard = 20 Feet EXCEPT Lot 3 and Lot 4, Block 1 (See Building Envelopes on Plat)
Maximum Building Height = 28' EXCEPT Lots 3 and 4, Block 1 = 18'

SOUTH RIM FILING NO. TWO
A REPLAT OF THE BLUFFS WEST
LOCATED IN THE SW1/4
SECTION 8, T1S, R1W,
UTE MERIDIAN, MESA COUNTY, CO

Professional Surveying Services
P.O. BOX 4506
Grand Junction, CO 81502
303-241-3841

SUR. BY: JF/LD | DRAWN BY: DWJ/RSK
JOB NO. 94012 | SHEET 1 OF 3

03/31/94

TYPE LEGAL DESCRIPTION (S) BELOW, USING ADDITIONAL SHEETS AS NECESSARY. USE SINGLE SPACING WITH A ONE INCH MARGIN ON EACH SIDE.

****

Beginning at the Mesa County Brass Cap at the Northwest corner of the Southeast Quarter of the Southwest Quarter (SE1/4 SW1/4) of Section 8, Township 1 South, Range 1 West, Ute Meridian, Mesa County, Colorado, whence the Mesa County Brass Cap at the Northeast corner of the Southeast Quarter Southwest Quarter (SE1/4 SW1/4) bears N 89°47'07" E, 1319.34 feet for a basis of bearings with all bearings contained herein relative thereto; Thence South 0 degrees 02 minutes 09 seconds East (N 00°02'09" E), a distance of 132.00 feet along the East boundary of Palace Verdes Estates Filing 3 to the TRUE POINT OF BEGINNING;

Thence following along the Southerly and Easterly boundary of South Rim on the Redlands Filing No. 1 the following 10 courses; (1) North 69 degrees 53 minutes 56 seconds East (N 69°53'56" E), a distance of 120.13 feet; (2) thence North 74 degrees 13 minutes 33 seconds East (N 74°13'33" E), a distance of 52.00 feet; (3) thence along a curve to the left having a radius of 592.25 feet, arc length of 16.97 feet, delta angle of 1 degrees 38 minutes 30 seconds (1°38'30"), a chord bearing of North 16 degrees 35 minutes 41 seconds West (N 16°35'41" W), and a chord length of 16.97 feet; (4) thence North 26 degrees 14 minutes 59 seconds East (N 26°14'59" E), a distance of 27.62 feet; (5) thence along a curve to the left having a radius of 588.69 feet, arc length of 87.01 feet, delta angle of 8 degrees 28 minutes 06 seconds (8°28'06"), a chord bearing of North 65 degrees 40 minutes 52 seconds East (N 65°40'52" E), and a chord length of 86.93 feet; (6) thence North 28 degrees 33 minutes 10 seconds West (N 28° 33'10" W), a distance of 153.50 feet; (7) thence North 40 degrees 00 minutes 51 seconds West (N 40°00'51" W), a distance of 105.85 feet; (8) thence North 42 degrees 16 minutes 13 seconds West (N 42°16'13" W), a distance of 97.51 feet; (9) thence North 10 degrees 16 minutes 26 seconds West (N 10°16'26" W), a distance of 100.00 feet; (10) thence North 00 degrees 00 minutes 00 seconds East (N 00°00'00" E), a distance of 9.67 feet to the Southerly right-of-way of Greenbelt Drive as recorded in Book 1061, Page 892; thence following said Southerly right-of-way along a curve to the left having a radius of 746.20 feet, arc length of 143.63 feet, delta angle of 11 degrees 01 minutes 42 seconds (11°01'42"), a chord bearing of North 54 degrees 49 minutes 50 seconds East (N 54°49'50" E), and a chord length of 143.41 feet; thence South 40 degrees 40 minutes 55 seconds East (S 40°40'55" E), a distance of 10.00 feet; thence North 49 degrees 19 minutes 01 seconds East (N 49°19'01" E), a distance of 182.25 feet; thence leaving the right-of-way of Greenbelt Drive South 12 degrees 04 minutes 04 seconds East (S 12°04'04" E), a distance of 299.40 feet; thence South 65 degrees 02 minutes 42 seconds West (S 65°02'42" W), a distance of 9.43 feet; thence South 37 degrees 48 minutes 18 seconds East (S 37°48'18" E), a distance of 140.54 feet; thence South 14 degrees 24 minutes 40 seconds East (S 14°24'40" E), a distance of 47.80 feet; thence South 37 degrees 00 minutes 59 seconds East (S 37°00'59" E), a distance of 115.33 feet; thence South 05 degrees 25 minutes 05 seconds East (S 05°25'05" E), a distance of 50.20 feet; thence South 37 degrees 54 minutes 08 seconds East (S 37°54'08" E), a distance of 175.30 feet; thence South 37 degrees 45 minutes 51 seconds West (S 37° 45'51" W), a distance of 108.89 feet; thence South 29 degrees 35 minutes 10 seconds West (S 29°35'10" W), a distance of 80.45 feet; thence South 47 degrees 00 minutes 03 seconds West (S 47°00'03" W), a distance of 98.88 feet; thence North 59 degrees 50 minutes 04 seconds West (N 59°50'04" W), a distance of 45.00 feet; thence South 24 degrees 40 minutes 17 seconds West (S 24°40'17" W), a distance of 58.40 feet; thence South 14 degrees 08 minutes 51 seconds East (S 14°08'51" E), a distance of 192.23 feet to the Southerly right-of-way of South Rim Drive; thence along a curve to the right having a radius of 201.77 feet, arc length of 74.73 feet, delta angle of 21 degrees 13 minutes 11 seconds (21°13'11"), a chord bearing of North 83 degrees 58 minutes 31 seconds West (N 83°58'31" W), and a chord length of 74.30 feet; thence South 39 degrees 53 minutes 58 seconds West (S 39°53'58" W), a distance of 137.56 feet; thence South 33 degrees 39 minutes 12 seconds East (S 33°39'12" E), a distance of 57.64 feet; thence North 81 degrees 12 minutes 42 seconds East (N 81°12'42" E), a distance of 69.37 feet to a point of the West right-of-way of Ewing Drive as recorded in Book 855, Page 108; thence along said right-of-way South 03 degrees 10 minutes 00 seconds West (S 03°10'00" W), a distance of 320.20 feet to a point on the North line of Haas Subdivision; thence along said North line of Haas Subdivision South 86 degrees 15 minutes 00 seconds West (S 86°15'00" W), a distance of 682.63 feet; thence North 00 degrees 05 minutes 58 seconds West (N 00°05'58" W), a distance of 280.00 feet; thence North 00 degrees 12 minutes 55 seconds East (N 00°12'55" E), a distance of 106.00 feet to a point on the South right-of-way of Palace Verdes Drive as recorded in Book 991, Page 153; thence along said right-of-way North 89 degrees 55 minutes 25 seconds East (N 89°55'25" E), a distance of 86.89 feet; thence North 59 degrees 55 minutes 25 seconds East (N 59°55'25" E), a distance of 50.00 feet to the radius point of a 50 foot cul-de-sac; thence North 43 degrees 08 minutes 00 seconds East (N 43°08'00" E), a distance of 50.00 feet; thence North 47 degrees 07 minutes 48 seconds East (N 47° 07'48" E), a distance of 223.06 feet; thence North 74 degrees 54 minutes 00 seconds East (N 74°54'00" E), a distance of 75.92 feet; thence North 47 degrees 03 minutes 00 seconds West (N 47°03'00" W), a distance of 275.22 feet to a point on the Easterly boundary of Palace Verdes Estates Filing 3; thence along said boundary North 42 degrees 57 minutes 51 seconds East (N 42°57'51" E), a distance of 198.94 feet to the TRUE POINT OF BEGINNING.

Said parcel containing 16.887 acres, or 735598 square feet.

WATER NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH UTE WATER DISTRICT SPECIFICATIONS.
2. ALL CONCRETE SHALL BE COLORADO DIVISION OF HIGHWAYS CLASS "B".
3. SEE CITY OF GRAND JUNCTION STANDARD SPECIFICATIONS FOR ROADS AND UTILITIES FOR TESTING REQUIREMENTS INCLUDING WATERLINE PRESSURE TESTING.
4. ALL EXISTING PAVEMENT NOT DESIGNATED FOR REMOVAL WHICH IS DAMAGED BY CONSTRUCTION SHALL BE REPLACED IN-KIND BY CONTRACTOR.
5. ALL CONCRETE SHALL BE PROTECTED FROM FREEZING FOR FIVE DAYS AFTER BEING PLACED. NO CONCRETE SHALL BE PLACED ON FROZEN GROUND.
6. MEASUREMENTS SHOWN ARE TO THE CENTER OF THE FITTINGS OR VALVE.
7. MINIMUM COVER FOR ALL WATERLINES TO BE 54" FROM F.G. AND 48" FROM S.G..

SEWER NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH CITY OF GRAND JUNCTION SPECIFICATIONS.
2. ALL CONCRETE SHALL BE COLORADO DIVISION OF HIGHWAYS CLASS "B".
3. ALL CEMENT USED IN MORTAR, CONCRETE BASES, GRADE RINGS, RISER SECTIONS, CONES AND FLAT TOPS, FOR MANHOLES AND/OR WET WELLS SHALL BE TYPE V OR MODIFIED TYPE I PORTLAND CEMENT WITH LESS THAN 5% TRICALCIUM ALUMINATE.
4. BACKFILL AROUND MANHOLES AND/OR WET WELLS SHALL BE PLACED IN 8" MAX. LIFTS AND COMPACTED TO 95% AASHTO T-99.
5. MANHOLE CONE AND FLAT TOP SECTIONS SHALL BE POSITIONED SUCH THAT THE MANHOLE RING AND COVER IS CENTERED OVER THE MAIN SEWER LINE.
6. SEE CITY OF GRAND JUNCTION STANDARD SPECIFICATIONS FOR ROADS AND UTILITIES FOR TESTING REQUIREMENTS.
7. ALL EXISTING PAVEMENT NOT DESIGNATED FOR REMOVAL WHICH IS DAMAGED BY CONSTRUCTION SHALL BE REPLACED IN-KIND BY CONTRACTOR.
8. VEHICULAR TRAFFIC SHALL BE KEPT OFF NEW CONCRETE FOR A MINIMUM OF FIVE DAYS.
9. ALL CONCRETE SHALL BE PROTECTED FROM FREEZING FOR FIVE DAYS AFTER BEING PLACED. NO CONCRETE SHALL BE PLACED ON FROZEN GROUND.
10. ALL SANITARY SEWER PIPE TO BE PVC SDR-35, UNLESS OTHERWISE NOTED.
11. ALL SEWER MAINS SHALL BE LAID TO GRADE UTILIZING A PIPE "LASER".
12. ALL SERVICE LINE CONNECTIONS TO THE NEW MAIN SHALL BE ACCOMPLISHED WITH FULL-BODY WYES OR TEES. TAPPING SADDLES WILL NOT BE ALLOWED.
13. A MINIMUM OF 10 FOOT SEPARATION SHALL BE MAINTAINED AT ALL TIMES BETWEEN THE WATERLINE AND SEWER LINE (EXCEPT AT CROSSINGS).
14. ALL SEWER SERVICE LINES SHALL EXTEND AT LEAST FOURTEEN FEET BEYOND THE PROPERTY LINE WITH A GLUED CAP AND MARKED WITH 2X4 POSTS.

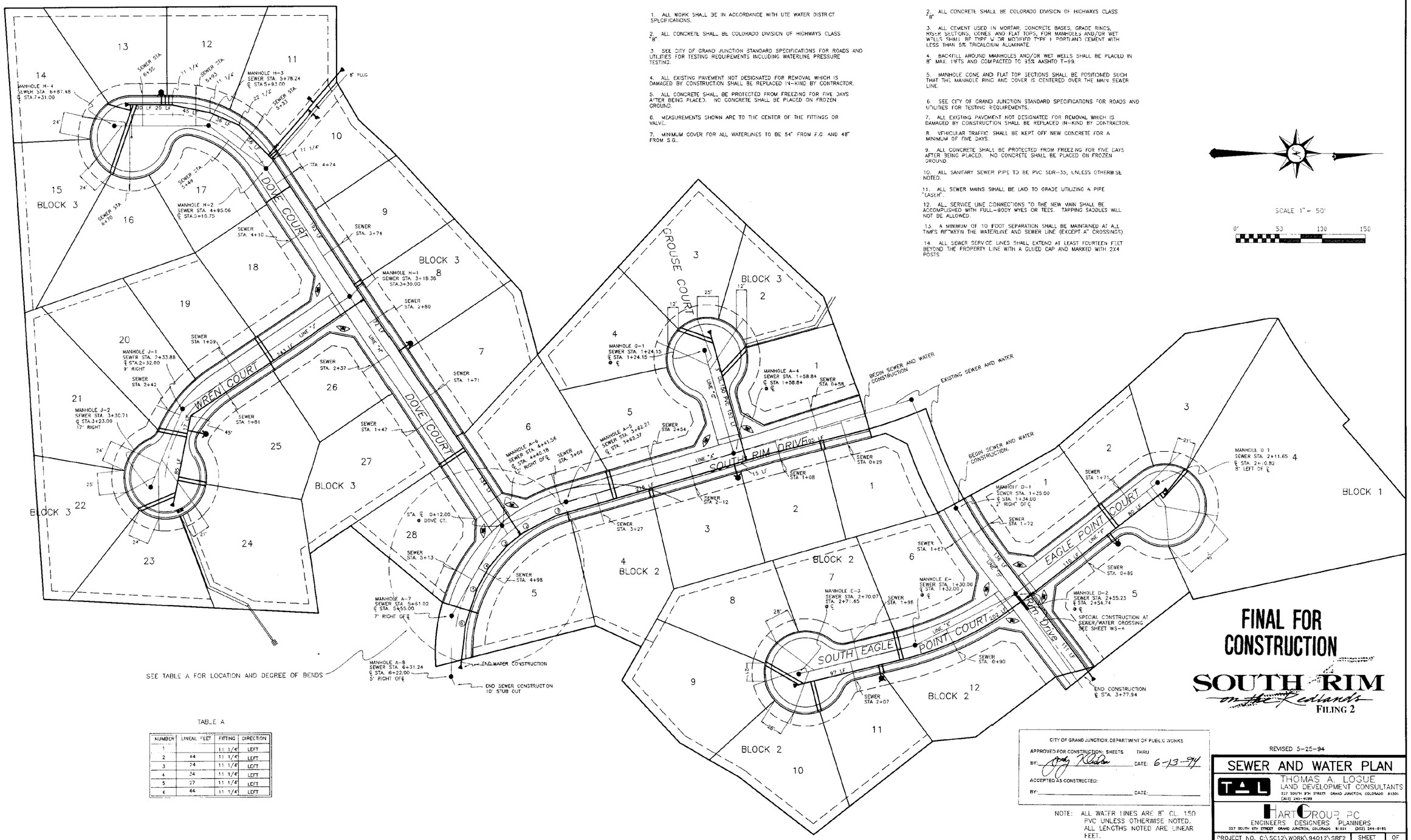


TABLE A

NUMBER	LINEAL FEET	FITTING	DIRECTION
1		11 1/4°	LEFT
2	44	11 1/4°	LEFT
3	24	11 1/4°	LEFT
4	34	11 1/4°	LEFT
5	27	11 1/4°	LEFT
6	44	11 1/4°	LEFT

CITY OF GRAND JUNCTION, DEPARTMENT OF PUBLIC WORKS

APPROVED FOR CONSTRUCTION: SHEETS THRU

BY: _____ DATE: 6-13-94

ACCEPTED AS CONSTRUCTED:

BY: _____ DATE: _____

NOTE: ALL WATER LINES ARE 8" CL. 150 PVC UNLESS OTHERWISE NOTED. ALL LENGTHS NOTED ARE LINEAR FEET.

FINAL FOR CONSTRUCTION

SOUTH RIM on the Redlands
FILING 2

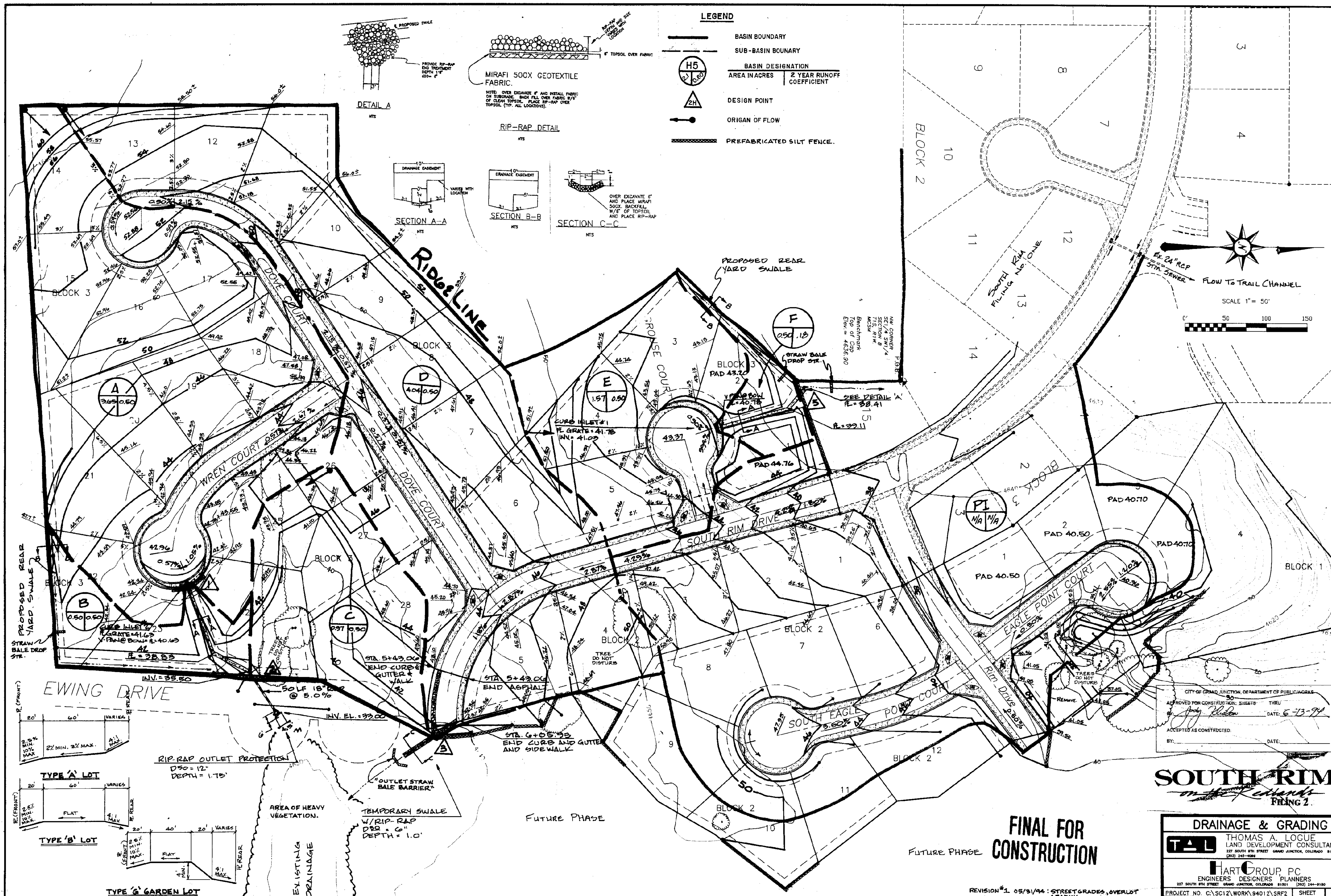
REVISED 5-25-94

SEWER AND WATER PLAN

THOMAS A. LOGUE
LAND DEVELOPMENT CONSULTANTS
217 SOUTH 8TH STREET GRAND JUNCTION, COLORADO 81501
(303) 245-6099

HART GROUP PC
ENGINEERS DESIGNERS PLANNERS
237 SOUTH 6TH STREET GRAND JUNCTION, COLORADO 81501 (303) 244-9180

PROJECT NO. C:\SC12\WORK\94012\SRF2	SHEET	OF
DATE: MARCH, 1994	SW-1	4


LEGEND
BASIN BOUNDARY
SUB-BASIN BOUNARY
BASIN DESIGNATION
AREA IN ACRES
2 YEAR RUNOFF COEFFICIENT
DESIGN POINT
ORIGAN OF FLOW
PREFABRICATED SILT FENCE.
DETAIL A
MIRAFI 500X GEOTEXTILE FABRIC.
RIP-RAP DETAIL
SECTION A-A
SECTION B-B
SECTION C-C
RIDGE LINE
DOVE COURT
WREN COURT
GROUSE COURT
SOUTH RIM DRIVE
EAGLE POINT COURT
SOUTH EAGLE POINT COURT
RIM DRIVE
EWING DRIVE
BLOCK 1
BLOCK 2
BLOCK 3
SOUTH RIM FILING NO. ONE
PROPOSED REAR YARD SWALE
FLOW TO TRAIL CHANNEL
SCALE 1" = 50'
RIP-RAP OUTLET PROTECTION
"OUTLET STRAW BALE BARRIER"
TEMPORARY SWALE W/RIP-RAP
AREA OF HEAVY VEGETATION.
EXISTING DRAINAGE
FUTURE PHASE
TYPE 'A' LOT
TYPE 'B' LOT
TYPE 'G' GARDEN LOT
FINAL FOR CONSTRUCTION
REVISION #1 05/31/94 : STREET GRADES, OVERLOT GRADING.
CITY OF GRAND JUNCTION, DEPARTMENT OF PUBLIC WORKS
APPROVED FOR CONSTRUCTION
ACCEPTED AS CONSTRUCTED
SOUTH RIM on the Redlands FILING 2
DRAINAGE & GRADING
THOMAS A. LOGUE LAND DEVELOPMENT CONSULTANTS
HART GROUP, PC ENGINEERS DESIGNERS PLANNERS
PROJECT NO. C:\SC12\WORK\94012\SRF2
DATE: MARCH, 1994
SHEET DG-1 OF 1