Grand View Filing 5 & 6 Sewerline Pressure Tests

Sewerline Run	Length	Required Time	Test Time	Beginning Pressure	Ending Pressure	Results
EXISTING - TA-1			5 min 00 sec	4 psi	3.9 psi	PASS
TA-1 - TA-2	369	4 min 30 sec	4 min 30 sec	4 psi	4 psi	PASS
TA-2 - TA-3	399	4 min 48 sec	5 min 00 sec	4 psi	4 psi	PASS
RD-1 - TB-1/RD-2	108	2 min 00 sec	2 min 00 sec	4 psi	3.8 psi	PASS
TB-1/RD-2 - RD-3	132	2 min 00 sec	2 min 00 sec	4 psi	4 psi	PASS
TB-1/RD-2 - TB-2	399	4 min 48 sec	5 min 00 sec	4 psi	4 psi	PASS
TB-2 - TB-3	350	4 min 12 sec	4 min 30 sec	4 psi	4 psi	PASS
TB-3 - TB-4	281	3 min 24 sec	4 min 00 sec	4 psi	4 psi	PASS
CA-1 - CA-2	251	3 min 00 sec	3 min 00 sec	4.3 psi	4 psi	PASS

ATKINS AND ASSOCIATES, INC.
518 28 Road, Suite B-105, P.O. Box 2702
Grand Junction, Colorado 81502
PH. (970) 245-6630 Fax (970) 245-2355

September 17, 2001

Mr. Eric Hahn, P.E.
Community Development Department
City of Grand Junction
250 North 5th Street
Grand Junction, CO 81501

Re: Grand View Subdivision, Filings No. Five and Six

Dear Eric:

Attached you will find two blue-line copies and one mylar copy of the record drawings for the above referenced project. Enclosed are the testing reports and two 3 1/2" floppy disks containing the drawing files.

Please call me if you have any questions or need additional information.

Respectfully yours,

Richard L Atkins

Richard L. Atkins, PE-PLS

FILE NAME: 01001-5.WPD

From: Bill Nebeker
To: FergusonND@aol.com
Subject: Re: Grand View Filing 5 Plat

Please note that the Filing 6 plat will not be recorded until the corner monuments are set for Filing 5 and Filing 6. If you have any questions please call Peter Krick at 256-4003.

>>> <FergusonND@aol.com> 09/25/01 02:09PM >>>
Bill,

Attached is the Final Plat for Grand View Filing 5.

Nathan Ferguson
Atkins and Associates, Inc.

From: David Donohue
To: Atkinsrl@aol.com
Date: 10/26/01 4:35PM
Subject: Grand View Repair

Nathan, Richard:

I received Nathan's letter proposing areas to be re-compacted and repaved. I have two comments:

The City requires that there be some investigation and evaluation of the geotechnical setting in the areas where the pavement settled. One possibility would be to sink a couple of drill holes to the bottom of the utility trenches (along side the sewer main, but within the trench) and collect cores and analyze for compaction and moisture content, and observe groundwater elevations (if any) within the open hole. The information obtained from this investigation should be used to determine why the backfill and pavement is settling and what needs to be done to prevent additional settling.

The City does not accept new streets with patches. This means that the entire reach of roadway receiving repairs will need to have the uppermost lift milled off, followed by a curb-to-curb overlay.

Please call me at 256-4155 if you have any questions.

-Dave

David R. Donohue, PE.
Development Engineer
Community Planning and Development
City of Grand Junction

FP-2001-050

ATKINS AND ASSOCIATES, INC.
518 28 Road, Suite B-105, P.O. Box 2702
Grand Junction, Colorado 81502
PH. (970) 245-6630, FAX (970) 245-2355

October 26, 2001

Mr. Dave Donahue, P.E.
Community Development
City of Grand Junction
250 North 5th Street
Grand Junction, CO 81501

Re: Grand View Subdivision Filing No. Six

Dear Dave:

Attached is a sketch of the settled areas that are proposed to be repaired along with an improvements list for these repairs at Grand View Subdivision Filing No. Six. These items are for your review and approval.

The proposed area that needs repair is 1011.5 square feet. The proposed repair for this area is as follows: 1) To saw cut and remove the existing asphalt, 2) To recompact and retest the subgrade, removing and replacing material as necessary, and 3) To machine pave the removed asphalt areas.

At this time no conclusion has been drawn to pinpoint the cause of the settlement; however, this proposed solution guarantees the repair of the currently settled areas and the one-year warranty guarantees that any problem in the next year will also be addressed.

Feel free to contact us with any questions you may have.

Respectfully yours,

Nathan D. Ferguson

Nathan D. Ferguson, EIT

FILE NAME: 01001-8.WPD

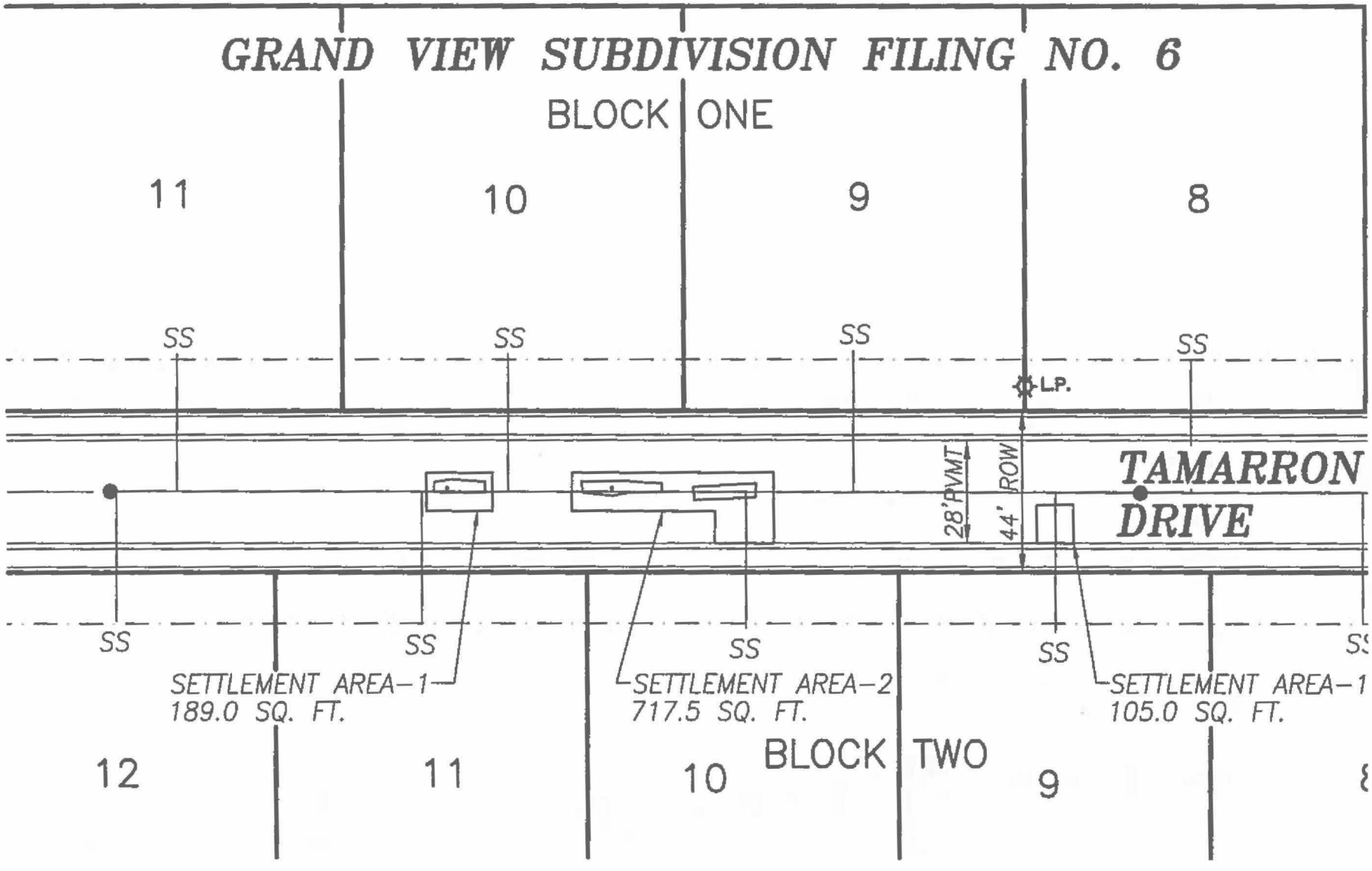

GRAND VIEW SUBDIVISION FILING NO. 6
BLOCK ONE
11
10
9
8
SS
SS
SS
SS
L.P.
28' PVMT
44' ROW
TAMARRON DRIVE
SS
SS
SS
SS
SETTLEMENT AREA-1
189.0 SQ. FT.
SETTLEMENT AREA-2
717.5 SQ. FT.
SETTLEMENT AREA-1
105.0 SQ. FT.
12
11
10
BLOCK TWO
9

EXHIBIT "B"

IMPROVEMENTS LIST/DETAIL
(Page 1 of 3)

DATE: 10/26/01
NAME OF DEVELOPMENT: Grand View Filing 6 - Repair Settled Areas
LOCATION: 28 Rd. North of F Rd.
PRINTED NAME OF PERSON PREPARING: Nathan D. Ferguson

	UNITS	TOTAL QTY.	UNIT PRICE	TOTAL AMOUNT
I. SANITARY SEWER				
1. Clearing and grubbing				
2. Cut and remove asphalt	SY	112.4	$ 3.25	$ 365.30
3. PVC sanitary sewer main (incl. trenching, bedding & backfill)				
4. Sewer Services (incl. trenching, bedding & backfill)				
5. Sanitary sewer manhole(s)				
6. Connection to existing manhole(s)				
7. Aggregate Base Course				
8. Pavement replacement				
9. Driveway restoration				
10. Utility adjustments				
II. DOMESTIC WATER				
1. Clearing and grubbing				
2. Cut and remove asphalt				
3. Water Main (incl. excavation, bedding, backfill, valves, and appurtenances)				
4. Water services (incl. excavation, bedding, backfill, valves, and appurtenances)				
5. Connect to existing water line				
6. Aggregate Base Course				
7. Pavement Replacement				
8. Utility adjustments				
III. STREETS				
1. Clearing and grubbing				
2. Earthwork, including excavation and embankment construction				
3. Utility relocations				
4. Aggregate sub-base course (square yard)				

5. Aggregate base course (ton)	TON	57	$ 15.00	$ 855.00
6. Sub-grade stabilization				
7. Asphalt or concrete pavement (ton)	TON	19	$ 55.00	$ 1,045.00
8. Curb, gutter, & sidewalk (linear feet)				
9. Driveway sections (square yard)				
10. Crosspans & fillets				
11. Retaining walls/structures				
12. Storm drainage system				
13. Signs and other traffic control devices				
14. Construction staking				
15. Dust control				
16. Street Lights (each)				
IV. LANDSCAPING				
1. Design/Architecture				
2. Earthwork, (includes top soil, fine grading, & berming)				
3. Hardscape features (includes walls, fencing, and paving)				
4. Plant material and planting				
5. Irrigation system				
6. Other features (incl. statues, water displays, park equipment, and outdoor furniture)				
7. Curbing				
8. Retaining walls and structures				
9. One year maintenance agreement				
V. MISCELLANEOUS				
1. Design/Engineering	LS	1	$ 1,000.00	$ 1,000.00
2. Surveying				
3. Developer's inspection costs				
4. Quality control testing	LS	1	$ 225.00	$ 225.00
5. Construction traffic control				
6. Rights-of-way/Easements				
7. City inspection fees @$45./hr				
8. Permit fees				
9. Recording costs				
10. Bonds				
11. Newsletters				
12. General Construction Supervision				

13. Other _____
14. Other _____

TOTAL ESTIMATED COST OF IMPROVEMENTS: $ 3,490.30

SCHEDULE OF IMPROVEMENTS

I. SANITARY SEWER	NA
II. DOMESTIC WATER	NA
III. STREETS	June 2002
IV. LANDSCAPING	NA
V. MISCELLANEOUS	NA

I have reviewed the esitmated costs and schedule shown above and based on the plans and the current costs of construction agree to construct and install the Improvements as required above.

SIGNATURE OF DEVELOPER date
(If corporation, to be signed by president and attested to by secretary together with the corporate seals.)

Reviewed and approved.

CITY ENGINEER date

COMMUNITY DEVELOPMENT date

ATKINS AND ASSOCIATES, INC.
518 28 Road, Suite B-105, P.O. Box 2702
Grand Junction, Colorado 81502
PH. (970) 245-6630, FAX (970) 245-2355

October 29, 2001

Mann 35
Ed 242-8968

Mr. David Donahue, P.E.
Community Development
City of Grand Junction
250 North 5th Street
Grand Junction, CO 81501

Re: Grand View Subdivision Filing No. Six

Dear David:

Attached is a revised sketch and an improvements list for repair of the settled areas in Grand View Subdivision Filing No. Six based upon your review comments. Included in the improvements list is the cost of drilling test holes and removing and replacing the asphalt from curb to curb.

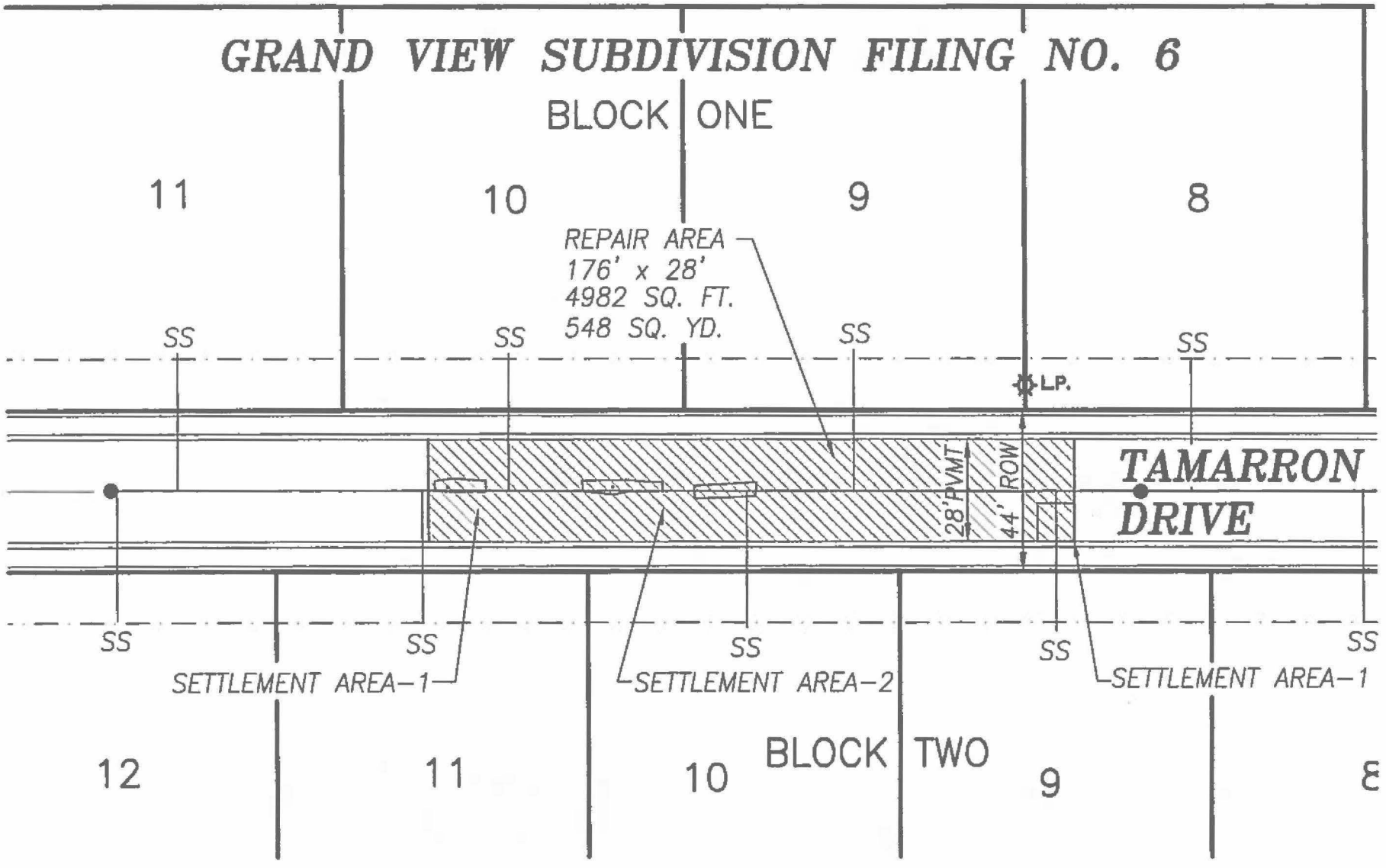
We propose that a DIA be submitted with the attached improvements list which would allow for the recording of the Final Plat for Filing No. Six.

Feel free to contact us with any questions you may have.

Respectfully yours,

Nathan D. Ferguson, EIT

FILE NAME: 01001-7.WPD


GRAND VIEW SUBDIVISION FILING NO. 6
BLOCK ONE
11
10
9
8
REPAIR AREA
176' x 28'
4982 SQ. FT.
548 SQ. YD.
SS
SS
SS
SS
LP.
28' PVMT
44' ROW
TAMARRON
DRIVE
SS
SS
SS
SS
SS
SETTLEMENT AREA-1
SETTLEMENT AREA-2
SETTLEMENT AREA-1
12
11
10
BLOCK TWO
9
8

GRAND JUNCTION
LINCOLN DeVORE, Inc.
GEOTECHNICAL ENGINEERS - GEOLOGISTS

1441 Motor Street
Grand Junction, CO. 81505

Tel: (970) 242-8968
Fax: (970) 242-1561
gjldem@gj.net

November 16, 2001

Mr. Don Dela Motte, DONADA Inc.
626 Grandview Dr. Grand Junction, CO

Mr. Nathan Ferguson, ATKINS & ASSOCIATES
518 28 Road, Grand Junction, CO

Re: Study of Trench Settlement, Grand View Sub. Fil.6

As requested by Mr. Nathan Ferguson, of ATKINS & ASSOCIATES, Grand Junction Lincoln DeVore proposes to place a minimum of four (4) shallow exploration borings along the settled sewer trench in Grand View Sub. Fil.6. Grand Junction Lincoln DeVore, Inc proposes to advance the borings and obtain samples using a CME 45-B truck mounted drill rig. Field Testing and sampling will be accomplished using Bulk Methods and ASTM D1587 Thin-Walled Shelby Tubes. The samples will be classified according to ASTM D-2487 (Sieve Analysis and Atterburg Limits) and subjected to the following Laboratory testing, as applicable:

ASTM D-2435 One Dimensional Consolidation
ASTM D-5195 Density & Moisture of Soil at Depth by Nuclear Methods
ASTM D-2937 In-Place Soil Density, (from Shelby Tubes or Lined Sampler)
ASTM D-2216 Moisture Content of Soil
ASTM D-4647 Identification of Dispersive Clay Soils by the Pinhole Test
Approximation of Maximum Density (ASTM D-698) by the Harvard Miniature Compaction Apparatus

The final report will contain a summary of the field investigation and the laboratory testing. The report will also include graphical logs of the Exploration Borings, Laboratory Testing Results and boring location diagrams.

The costs associated with this geotechnical site evaluation is estimated at $ 600.00 .

It is anticipated the Field Exploration can begin within 2 working days after we receive written acceptance of this proposal and the Final Report should be completed within an additional 12 Working Days.

The cost estimate given in this geotechnical site evaluation proposal assumes a number of job specific factors.

- Access to the site is available. Access is the responsibility of the property owner or his agent. Grand Junction Lincoln DeVore, Inc does not assume responsibility for access, either for personnel or for equipment.
- Standard 5'-10' test borings have been assumed.
- Location of all utilities are the responsibility of the owner or his agent. As a precaution, Grand Junction Lincoln DeVore, Inc will contact the Colorado Utility Locate Service, prior to drill rig mobilization on the site.
- A site location diagram, with appropriate dimensions (to include underground utility locations) is provided before arrival on the site by Grand Junction Lincoln DeVore, Inc personnel.
- Scheduling is such that the entire investigation can be accomplished as a single project, with a minimum of equipment and personnel mobilization required.

- OWNERSHIP of DOCUMENTS All reports, maps and documents produced by Grand Junction Lincoln DeVore, Inc remain the property of Grand Junction Lincoln DeVore, Inc and may not be used by the Client for any other endeavor without the written consent of Grand Junction Lincoln DeVore, Inc.

- DISPUTES Any claims or disputes made during design, construction or post-construction between the Client and Grand Junction Lincoln DeVore, Inc shall be submitted to non-binding mediation. Client and Grand Junction Lincoln DeVore, Inc agree to include a similar mediation agreement with all contractors, sub-contractors, sub-consultants, suppliers and fabricators, thus providing for mediation as the primary method of dispute resolution between all parties.
- INDEMNIFICATION The Client shall, to the fullest extent permitted by law, indemnify and hold harmless Grand Junction Lincoln DeVore, Inc, employees and sub-consultants from and against all damage, liability and cost, including reasonable attorney's fees and defense costs, arising out of and in any way connected with the performance by any of the parties above named of the services under this proposal, excepting only those damages, liabilities or costs attributable to the sole negligence or willful misconduct of Grand Junction Lincoln DeVore, Inc.
- LIABILITY LIMITATION In recognition of the relative risks, rewards and benefits of the project to both the Client and Grand Junction Lincoln DeVore, Inc, the risks have been allocated such that the Client agrees that, to the fullest extent permitted by law, Grand Junction Lincoln DeVore, Inc's total liability to the Client for any and all injuries, claims losses, expenses, damages or claim expenses arising out of this agreement from any cause or causes shall not exceed $ 20,000.00. Such causes include, but are not limited to, Grand Junction Lincoln DeVore, Inc's negligence, errors, omissions, strict liability, breach of contract or breach of warranty. **Higher limits are available, speak with CONSULTANT for details.**
- METHODS & SAFETY Grand Junction Lincoln DeVore, Inc will not have control over or charge of, and will not be responsible for, construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the construction work.
- TERMINATION This agreement may be terminated by the Client or Grand Junction Lincoln DeVore, Inc should the other fail to perform its obligations hereunder. In the event of termination, the Client shall pay Grand Junction Lincoln DeVore, Inc for all services rendered to the date of termination, all reimbursable expenses and reimbursable termination expenses.
- BILLINGS & PAYMENTS Grand Junction Lincoln DeVore, Inc sends invoices and statements to, and expect payment from, the person or company authorizing the work. If persons other than the authorizing agency is to be responsible for the charges, arrangements must be made in advance. Work will not proceed until written authorization is received by Grand Junction Lincoln DeVore, Inc from the responsible party.
- LATE PAYMENTS Grand Junction Lincoln DeVore, Inc requires net payment of the project costs within 30 days after receipt of the report by the owner or his agent, unless other arrangements are made. Overdue accounts will be subject to collection procedures and will be charged 1.5% interest per month on the unpaid balance. Grand Junction Lincoln DeVore, Inc shall be entitled to collect all court costs and reasonable attorneys fees incurred for collection of any and all sums due under this agreement.

If the proposal and terms are acceptable, please fill out and sign one copy in the space provided below and return the copy to Grand Junction Lincoln DeVore, Inc. The second copy is for your records. We thank you for considering Grand Junction Lincoln DeVore, Inc for this project and look forward to working with you should this proposal be accepted.

Accepted by: _____ Date_____ Purchase Order No.: _____ Contract No.: _____
owner or agent (person responsible for payment if not agent) (if required) (if required)

Respectfully Submitted,

GRAND JUNCTION
LINCOLN DeVORE, Inc.

by: Edward M. Morris PE
Principal Engineer

ATKINS AND ASSOCIATES, INC.
P.O. BOX 2702
518 28 ROAD, SUITE B-105
GRAND JUNCTION, COLORADO 81502-2702
PHONE 970-245-6630
FAX 970-245-2355

FAX TRANSMITTAL

TO: ERIC HAHN

FAX NO.: 256-4031

RE: GRAND VIEW FILING 6

DATE: 9/1/02

COMMENTS:

ERIC,

FOLLOWING IS A PROPOSAL FOR THE STUDY OF TRENCH SETTLEMENT AT GRAND VIEW.

IS THIS THE TYPE OF STUDY THE CITY WAS EXPECTING?

PLEASE LET US KNOW IF THIS STUDY IS ACCEPTABLE.

THANKS.

FROM: NATHAN FERGUSON

PAGE 1 OF 3

PLANNING COMMISSION
GRAND JUNCTION, COLORADO

FOR	)	**FINAL DECISION**
	)	
Donada, Inc.	)	**FP-2001-058**
626 Grand View Drive	)	
Grand Junction CO 81506	)	

An application by Donada, Inc., requesting approval of a Final Plat for Grand View Subdivision Filings 5 and 6, located east of 28 Road and north of F Road in a RMF-5 zone district, was considered by the Grand Junction Planning Commission on April 10, 2001.

After considering all the pertinent testimony and reviewing various data, the Planning Commission approved the final plat with the following conditions.

1. Minor planning and engineering technical review comments shall be complied with prior to construction or plat recordation.

This approval is valid for one year. If the final plat is not recorded prior to April 10, 2002 this approval becomes void.

The following items must be completed before construction may begin on this site:

1. Submit signed, development improvements agreement (DIA) on our form dated 03/0600 with an executed guarantee. The DIA shall contain original signatures and shall not include FAXED copies of any pages.

2. Comply with Planning Commission conditions of final approval, where applicable.

3. Make changes to the final construction plans per review comments from applicable agencies, then submit mylars of final plans signed by Ute Water to the Community Development. A copy of the utility composite showing fire hydrants and water lines shall be delivered to the Fire Department.

4. A pre-construction meeting with the Public Works Department may be scheduled AFTER final plans have been approved and the DIA signed and recorded, unless a "Plat Hold" option is used for the guarantee.

The following items must be completed before the plat may be recorded:

1. Submit a development improvements agreement with an approved guarantee for any remaining unconstructed improvements in the subdivision.

2. Submit signed originals of CC&Rs, if applicable.

3. Submit signed original of instrument for conveyance of irrigation easements to Homeowner's Association.

4. Submit signed mylar plat and computer disk or email of plat on AutoCAD. Send to billn@ci.grandjct.co.us.

5. Pay applicable fees, which are as follows:

	Filing 5	Filing 6
Open Space	$4725 ($225 per 21 lots)	$5175 ($225 per 23 lots)
Plat Copying Fee	$45.00	$45.00

Make check payable to City of Grand Junction.

6. Recording fees for plat, deed of conveyance, CC&Rs if applicable, and DIA will be determined prior to recording.

Please allow at least two weeks for recording after ALL of the items listed above have been submitted.

Bill Nebeker
Senior Planner

4-11-01
April 11, 2001

c: Richard Atkins

Grand View 5 & 6
April 17, 2001 Final Review Comments

Bill Nebeker, Community Development Department

1. Delete the "F" designation on plats and the note in the legend. It has been determined by staff that this will no longer be a requirement for corner lots.
2. Need a utility easement in dedication language on filing 5 plat for 8' utility easement shown.
3. Add this to the end of the irrigation dedication language, "Deed of conveyance recorded in Book _____, at Page _____ subject to further conditions and restrictions as may be set forth in that instrument.

Eric Hahn, Development Engineer

STREETS PLANS AND PROFILES (FILINGS 5 & 6)
1. Show a Type III barricade at the east ends of Ridge Drive and Cortland Avenue.

SEWER PLANS & PROFILES (FILINGS 5 & 6)
2. The sewer main between manholes TB-1 and TB-2 has an unacceptable grade break. The portion of the main in Filing 5 has a proposed slope of 1.00%, while the portion of the main in Filing 6 has a proposed slope of 0.87%. Please correct this condition.

WATER DETAILS
3. Ute Water has agreed to require that any new water mains installed within City limits be bedded per City Standards. If necessary, verify this requirement with Ute Water (242-7491) and/or the City Utility Engineer (244-1590). Modify the "Trench Detail" to show the pipe bedded per City standards. See the Typical Trench Detail (GU-03) in the Standard Contract Documents for reference.

Trent Prall, Utility Engineer: None

Client: Elam Construction	Report No: 1
Project: Grandview Subdivision	Date of Test: 7-2-02
Location:	Test By: RL
	GJLD Job No: 89535-GJ

TEST TYPE: Nuclear (ASTM 2922) Backscatter | Nuclear (ASTM 2922) Direct Trans. X | (ASTM D-1556) Sand Cone

SPECIFICATIONS: Project | City: X | County: | State:

Test No.	Location of Test	COMPACTION %	COMPAC. SPEC. %	MOISTURE CONT. %	MOISTURE SPEC. %	PROCTOR VALUE	SOIL TYPE
1	Roadway repair, Tamarron Dr., sta 7+50, over sewer line @ FG	98	95	5.2	+-2	136.3@6.9	ABC
2	Roadway repair, Tamarron Dr., sta 8+00, over sewer line @ FG	99	95	5.4	+-2	136.3@6.9	ABC
3	Roadway repair, Tamarron Dr., sta 8+00, LT lane @ FG	100	95	6.1	+-2	136.3@6.9	ABC
4	Roadway repair, Tamarron Dr., sta 8+50, RT lane @ FG	98	95	6.0	+-2	136.3@6.9	ABC
5	Roadway repair, Tamarron Dr., sta 9+00, over sewer line @ FG	99	95	6.1	+-2	136.3@6.9	ABC
6	Roadway repair, Tamarron Dr., sta 9+50, LT lane @ FG	99	95	5.9	+-2	136.3@6.9	ABC

DISTRIBUTION:

1-Client

KEY: * Fails Compaction Spec. | C = Cohesive
** Fails Moisture Spec. | NC = NonCohesive
S Standard Proctor | ABC = Aggregate Base
M Modified Proctor | PR = Pit Run

GRAND JUNCTION LINCOLN DeVORE, INC.

BY:

FILL DENSITY TEST DAILY REPORT

NOTE: Results indicate in-place soil densities at the locations and depths identified above. Grand Junction Lincoln DeVore has relied on the contractor to provide uniform mix placement and compactive effort throughout the fill area.

Nuclear Density Testing of "pit run" or other coarse grained soils may require correction of Unit Weight And Water Content, ASTM D-4718. If soils contain oversize particles in excess of the limits of ASTM D-4718

Nuclear Density Testing is performed for acceptance control and is combined with visual and penetration methods.

GRAND JUNCTION LINCOLN DeVORE

Geotechnical Engineers-Geologists

ATKINS AND ASSOCIATES, INC.
P.O. BOX 2702
518 28 ROAD, SUITE B-105
GRAND JUNCTION, COLORADO 81502-2702
PHONE 970-245-6630
FAX 970-245-2355

FAX TRANSMITTAL

TO: Eric Hahn

FAX NO.: 256-4031

RE: Grand View Testing

DATE: 7/10/02

COMMENTS: Eric

Following are the testing results from the repair area at Grand View.

FROM: Nathan Ferguson

SUBSTANTIAL COMPLETION INSPECTION CHECKLIST

Project: GRAND VIEW 5-6

DATE: 9/4/01

City of Grand Junction, Colorado
250 N. 5th Street
81501-2668
FAX: (303) 244-1599

STREETS

- [x] Pavement
  NEED AS-BUILTS, SHOW LOCATION OF [illegible] REINFORCEMENT, PROPOSE FIX FOR [illegible] JOINT IN FRONT OF [illegible]
- [x] Concrete
  NEED AS-BUILTS [illegible] IN [illegible] RAMPS/[illegible], TRIM EXP. JT. MATERIAL AS NECESSARY.
- [ ] Manholes
  [illegible]
  TRIM RUBBER [illegible]
- [x] Signs
  REVERSE STOP SIGN DIRECTION AT TAMARRON/RIDGE INTERSECTION
- [x] Lighting
  FINISH INSTALLING STREET LIGHTS
- [x] Site Grading
  SUBMIT FULL & Q.C. PACKET W/MAP OF TEST LOCATIONS PER [illegible]
- [x] Other
  INSTALL TYPE-3 BARRICADES AT DEAD END OF RIDGE DR. [illegible]

UTILITIES & DRAINAGE

- [ ] Water lines
- [ ] Sewer Lines
  [illegible]
- [ ] Inlet Structures
- [ ] Detention Facilities
- [ ] Outlet Structures
- [ ] Other

Inspected by: [signature]

City Development Engineer

Developer or Representative: [signature]

Final acceptance of the Streets and Drainage Facilities will be made when the above items have been corrected and inspected. Please call 256-4031 when ready for final acceptance.

Distribution: White to Developer Yellow to Development Engineering Pink to Engineering Lab/Inspector Goldenrod to Community Development

COMMUNITY DEVELOPMENT
CITY OF GRAND JCT
250 N 5TH ST
GRAND JUNCTION, CO 81501

ATKINS AND ASSOCIATES, INC
RICHARD ATKINS
PO BOX 2702
GRAND JUNCTION, CO 81501

DAWN SUBDIVISION
KELLY TURNER
2813 DAYBREAK AVE
GRAND JUNCTION, CO 81506

SPRING VALLEY HOA
DON MCFARLAND
PO BOX 9164
GRAND JUNCTION, CO 81501

WILLIAM B WOODWORTH
G A
684 28 RD
GRAND JUNCTION, CO 81506-4802

JOHN R ELLIS
JOAN A
676 28 RD
GRAND JUNCTION, CO 81506-4802

MARK S SUTRINA
LYNDA J
674 28 RD
GRAND JUNCTION, CO 81506-4802

GRAND JUNCTION PUBLIC
FINANCE
250 N 5TH ST
GRAND JUNCTION, CO 81501-2628

JOHN B ROMOLO
2814 RIDGE DR
GRAND JUNCTION, CO 81506

BETTE A JOHNSON
2812 RIDGE DR
GRAND JUNCTION, CO 81506-6003

TERESA A WALTER
2810 RIDGE DR
GRAND JUNCTION, CO 81506

JAMES F PASQUA
DIANNA L PASQUA
654 E PAGOSA DR
GRAND JUNCTION, CO 81506-6063

LARRY W CLEVER
CONNIE L CLEVER
2822 RIDGE DR
GRAND JUNCTION, CO 81506-6003

CARL A BECHARD
MARY S BECHARD
2813 NORTHSTAR DR
GRAND JUNCTION, CO 81506

WALTER E WILLIAMSON
LEONA L GRAY
664 WINDSTAR DR
GRAND JUNCTION, CO 81506-6076

JOHN P MILLER
DORIS J MILLER
666 WINDSTAR DR
GRAND JUNCTION, CO 81506-6076

VIRGINIA M REVEL
668 WINDSTAR DR
GRAND JUNCTION, CO 81506-6076

ROBERT M BOBERG
DOROTHY L BOBERG
670 WINDSTAR DR
GRAND JUNCTION, CO 81506

NICHOLAS P THIESSEN
672 WINDSTAR DR
GRAND JUNCTION, CO 81506

WILLIAM E KISTLER
INA MAY KISTLER - CO
674 WINDSTAR DR
GRAND JUNCTION, CO 81506

G CLARK JENSEN
KRISTI L JENSEN
676 WINDSTAR DR
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DONADA INC
DON DELA MOTTE
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MYRNA M COOPER
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GRAND JUNCTION
LINCOLN DeVORE, Inc.
GEOTECHNICAL ENGINEERS – GEOLOGISTS

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TEL: (970) 242-8968
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May 17, 2002

Travis Jordan
1207 18 Rd
Fruita, CO 81521

Re: Pavement Distress/Sewer Utility Trench Settlement, Grandview Subdivision, Filing 6, Tamarron Dr., Grand Junction, CO

At the request of Mr. Nathan Ferguson of Atkins & Associates, Grand Junction, personnel of Grand Junction Lincoln DeVore placed three very shallow exploration borings along the sewer main trench, as shown on the attached boring location diagram. Following are our findings.

Field Exploration and Laboratory Testing: A field evaluation was performed on 4-15-02, and consisted of a site reconnaissance by our geotechnical personnel and the drilling of 3 very shallow exploration borings. These 3 shallow exploration borings were drilled within the alignment of the existing sewer line. Test boring # 1 was placed in an area which had not experienced settlement, borings # 2 and # 3 were placed within areas which had experienced settlement. These 3 borings were placed in very close proximity to 2 asphalt core locations, GJLD Job # 88937-GJ, 10-3-01. A copy of our CONSTRUCTION QUALITY CONTROL DAILY REPORT for this asphalt coring is included with this report.

The exploration borings were located to obtain a reasonably good profile of the trench backfill soils and the pavement section at these locations. All exploration borings were drilled using a CME 45-B, truck mounted drill rig with continuous flight auger to depths of approximately 3 to 4 feet. Samples were taken with thin-wall Shelby Tubes and by bulk methods. The total depth of the samples extended the boring depths to approximately 4 ½ feet. The bottom of the Shelby tube samples included the poorly graded bedding material which was placed around the sanitary sewer pipe. Logs describing the subsurface conditions are presented in the attached figures.

The following field sampling and testing were performed.

ASTM D-1587 Thin-Walled Shelby Tube 2-1/2" id, Shelby Tube

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

ASTM D-2487 Soil Classification
ASTM D-2937 In-Place Soil Density
ASTM D-2216 Moisture Content of Soil
ASTM D-4647 Identification of Dispersive Clay Soils by the Pinhole Test and approximation of maximum density (ASTM D-698) Harvard Miniature Compaction Apparatus

Tests were performed in accordance with test methods of the American Society for Testing and Materials or other accepted standards. The results of our laboratory tests are included in this report. The in-place soil density, moisture content and the standard penetration test values are presented on the attached drilling logs.

Findings: The asphaltic concrete was found to be a consistent 3" thick. The aggregate base course (ABC) ranged from 4" to 8" thick. The design section is 3" A.C. over 9" ABC.

The soil material encountered as backfill was classified as a silty clay, sandy (CL-ML) in the Unified Classification System (UCS). The Soil Analysis and Summary sheets included with this report show the laboratory testing for a sample taken at 2 feet to approximately 2 ½ feet in each of the exploration borings. For purposes of comparison, the Soil Analysis and Summary sheets included with the original report of Subsurface Soils Exploration, GJLD Job # 88484-J, 2-26-01. As can be seen from the results of laboratory testing, the soils from all three test holes are nearly identical and are very similar to those soils originally sampled as part of the subdivision Subsurface Soils Exploration, taken at other locations within the subdivision.

Thin wall Shelby tube samples were obtained to determine in-place soil density and moisture content. As can be seen on the bore hole logs (upper portion) the in-place soil densities tend to 'move around somewhat', but most are well compacted. Visual observations of these samples and probing during the sample preparation phase in the laboratory indicated these soils are relatively firm apparently well compacted and, with the exception of the sample at 4 feet in boring # 2 no obvious defects were observed. Due to gravels being encountered during the sampling phase, the 1 foot sample in test boring # 2 could not be measured as the thin wall Shelby tube was significantly damaged, the sample at 4 feet encountered large amounts of intruded 'bedding gravel' and the lower portion of the sample, against the 'bedding gravel', was soft. The 4 foot sample in test boring # 3 could not be measured as significant amounts of 'bedding gravel' had intruded the lower portion of the sample and significantly damaged the Shelby tube.

Additional laboratory testing utilizing the Harvard Miniature Compaction Apparatus was utilized to measure the soils maximum density and moisture content. The Harvard Miniature Compaction Apparatus is a U.S. Bureau of Reclamation test designed to closely approximate the Standard Proctor test, ASTM D-698, AASHTO T-90. The Harvard Miniature Compaction Apparatus test (U.S.B.R. EC Method 5510), resulted in maximum densities for all samples ranging from 115.9 to 117.3 pcf at 13.2 to 13.8% with the single exception of the sample in boring # 1, at 3 feet which had a maximum density of 110.8 pcf at 15.2%. The original moisture density relationship used during the Grand Junction Lincoln DeVore density testing of the backfill during construction (ASTM D-698 A, AASHTO T-90), was 115.2 pcf at 14.7% moisture. It should be noted that the results of the Harvard Miniature Compaction Apparatus are slightly higher than the ASTM D-698 method used during construction.

The construction 'proctor' of 115.2 pcf at 14.7% moisture was taken on a composite sample at the beginning of the project and exact correlation between the soils of that 'proctor' and these very specific samples should be made with proper engineering judgement. In the opinion of Edward M. Morris, P.E., of Grand Junction Lincoln DeVore, the results of Harvard Miniature Compaction Apparatus testing correspond extremely well with the subdivision wide type sample utilized during the construction testing, with the exception of the sample obtained at 3 feet in boring # 1. The Harvard Miniature Compaction Apparatus indicates this soil is approximately 5 to 6 pounds 'lighter' than the average soils encountered both across this site and in these 3 exploration borings.

For purposes of comparison, the 3 logs of Subsurface Soils Exploration include a chart in the middle of the sheet indicating percent compaction, compared to the maximum density determined by the Harvard Miniature method. As can be seen on the logs, only the sample at 4 feet in boring # 2 was found to be less than the 95% compaction required by the City of Grand Junction Standard Contract documents for Capital Improvements Construction, revised March 2000. This was a poor sample, with significant amounts of intrusion of the 'bedding gravel' and, in our opinion, cannot be taken as indicative of poor construction techniques by the pipeline contractor without significant additional numbers of failing tests in the project area. It is possible this sample reflects low density and unstable conditions in the underlying bedding material.

Conclusion: **Based upon a review of our records of the sewer utility density testing program, GJLD Job # 88692-GJ (Fill Density Test Daily Reports included) and the results of our field and laboratory testing of the in-place backfilled soils, we do not believe the sewer line settlement observed on this site can be attributed to insufficient compaction of the backfill soils by the pipeline contractor.**

An AC overlay not justified due to settlement. The AC overlay does not address trench settlement, except to provide leveling of the existing pavement surface. Due to the use of geotextile fabric and using design numbers without rounding, the amount of required A.B.C. can be reduced to 4.5". As only 1 measured section out of 5 fell below the reduced, required section, there does not appear to be a need for an AC overlay, based upon actual design methods.

The history of this construction site is that the utilities were placed and final preparation of the road subgrade was delayed. During this delay, a significant rain storm occurred and water was standing in the northern portion of this project site, including this area of settled trench. After the free water either soaked in or evaporated, the road subgrade was prepared/compacted. Compaction testing indicated that the subgrade soils were relatively wet but, within project specifications. The soils were somewhat soft due to the high moisture content probably resulting in a slight 'heave' of the center portion of the road during the final construction 'haul' phase. A Geotextile fabric (Woven, similar to Mirafi 500-X) was placed on the finished subgrade surface and the placement and compaction of the aggregate base course and asphalt was completed.

This sequence of construction events justified additional laboratory testing of the soils, to wit ASTM D-4647 Identification of Dispersive Clay Soils by the Pinhole Test. The backfill soils were found to be nondispersive (Nd1) and other criteria, to include Skempton's Activity, also indicated the soils should not possess dispersive characteristics or characteristics similar to dispersive soils.

In our opinion, the possible reasons for trench settlement can be narrowed down to a single cause, collapse of the particle structure in the pipe bedding material when inundated with water, resulting in a 'columnar' type collapse of the backfill. It must be noted that the settlement areas in the pavement surface have occurred with very little applied traffic load and occurred rather quickly after paving.

The question is where would such amounts of water come from to initiate collapse of the particle structure in the bedding gravels. We believe the construction inactivity after the trench compaction was completed allowed the backfill soils (significantly wetter than the native undisturbed soils) to dry and therefore, shrink. Shrinkage cracking is obvious in these soils and such cracking in similar soils has been observed to be over 20 feet deep in the Grand Junction and Clifton area. We postulate the water ponding on this site after the storm event introduced large amounts of water into the shrinkage cracks and down to the bedding material. We believe the collapse started in the gravels and the collapse zone migrated up, taking a few months to affect the actual pavement structure.

The use of a poorly graded bedding material around pipe has been actively discouraged by the under signed, Edward M. Morris, P.E., for many years. The basic assumption for utilizing a poorly graded gravel is that it is 'self compacting'. I have dealt with enough failures of this 'self compacting gravel' over the years that I do not allow such materials, in excess of 4 inches thick, beneath slabs. I will not allow this material at all between load bearing elements of building foundations. A perusal of Internet forums for engineers indicate that this particular adversion to use of 'self compacting gravels' is wide spread around the world when addressed by geotechnical engineers. Civil engineers and structural engineers, as a whole, appear to have believed that uncemented materials can be 'self compacting'. Long term field experience, particularly dealing with constructions several years after completion and laboratory testing (to include maximum density determination of poorly graded materials using the vibratory table 'ASTM D-4253') is usually enough

to dispel such wishful thinking that uncemented materials can be 'self compacting'. It is interesting to note that there is no method of confirming either initial quality of placement nor final quality of placement of poorly graded gravels to determine if these backfill materials are prone to collapse or not. At least when native soils are utilized for bedding, the soils can be checked for moisture content and probed to see if the soils are reasonably compacted or not. In some cases, Shelby tubes can be placed to actually determine in-place density of 'native soils'.

It is our conclusion the settlement could have been avoided by increasing the degree of backfill compaction and simultaneously decreasing the amount of soil moisture required for compaction by utilizing the modified proctor (ASTM D-1557, AASHTO T-180). This extra compaction would provide a slightly more stable backfill from a strength stand point and would decrease the amount of potential soil shrinkage by virtue of placing less water in the soil. This specific construction recommendations is contained within the Grand Junction Lincoln DeVore report of Subsurface Soils Exploration for this subdivision, in the pavement section, Job # 88484-GJ, 2-27-01. This specific construction recommendations has been included in virtually all of Grand Junction Lincoln DeVore's recommendations for pavement construction and the vast majority of Lincoln DeVore's reports. We further believe the use of poorly graded gravel, particular the severe open graded gravel for pipe bedding is a problem waiting to happen and is usually manifested if a delay in the construction occurs, followed by standing water in the construction area or if the ground water table within the immediate area rises to saturate the bedding material.

Recommendations: The obvious trench settlement appears to be localized and does not appear to be increasing in area. I recommend a 'proof and roll' of the sewer main trench and travel lanes be made with a loaded 'water truck' (3 axle) to confirm the integrity of the in-place pavement structure. The settled areas and any additional 'weak' areas should be cut out to the top of the A.B.C., proof rolled, tested for compaction and patched with A.C.

I recommend the City of Grand Junction Capital Improvements Specifications (to include required materials) be re-evaluated. It seems inappropriate that proper soils compaction could be of little effect after a small precipitation event. Such problems are to be expected prior to or during compaction, but should not be expected after completion.

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,

GRAND JUNCTION
LINCOLN DeVORE, Inc.

by: Edward M. Morris PE
Principal Engineer

GJLD Job No.: 89329-GJ

SOILS DESCRIPTIONS

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

ROCK DESCRIPTIONS

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

SYMBOLS & NOTES

SYMBOL	DESCRIPTION
SPT 09/12	Standard Penetration Drive ASTM D-1586 Disturbed Sample Numbers indicate 9 Blows To drive the Spoon 12" into ground.
CS 09/12	'California Lined Sampler' Modified Penetration Drive ASTM D- Disturbed Sample Numbers indicate 9 Blows To drive the Spoon 12" into ground.
D&M 09/12	'Dames & Moore Lined Sampler' Modified Penetration Drive ASTM D- Disturbed Sample Numbers indicate 9 Blows To drive the Spoon 12" into ground.
ST	Thin-Walled 'Shelby' Tube ASTM D-1586 - 2.625"od 2.5" id 'Relatively Undisturbed Sample'
BULK	Disturbed, Bulk Sample ASTM D- Disturbed Sample
	Free Water Table
Wx	Weathered Rock Formation
	Test Boring Location
	Test Pit Location
	Seismic or Resistivity Station

Standard Penetration Drives are made by driving a standard 2" od, 1-5/8" id Split Spoon Sampler into the ground by dropping a 140 lb. weight 30". No Thinwall Shoe Extension and the Sample is Disturbed

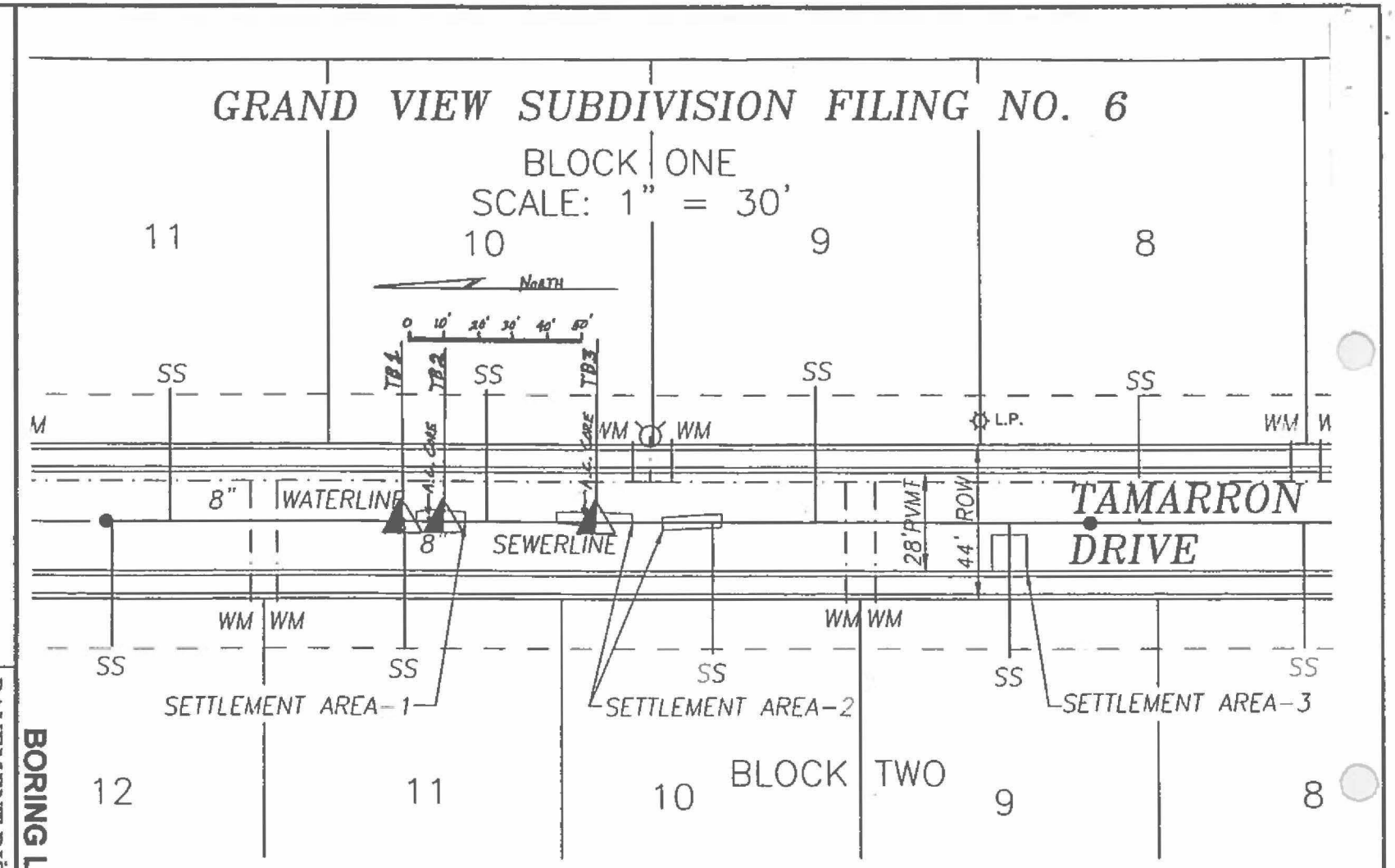
Modified Penetration Drives are made by driving a 2-1/2" od, 1.875" id California Spoon Sampler or a 3" od, 2-3/8" id California Spoon Sampler into the ground by dropping a 140 lb. weight 30". No Thinwall Shoe Extension and the Sample is Disturbed.

The Boring Logs show subsurface conditions at the dates and locations shown, and it is not warrented that they are representative of subsurface conditions at times and other locations.

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

EXPLANATION OF BOREHOLE LOGS AND LOCATION DIAGRAMS

Form No.	Drawn	Date
GJLDFORM-EXPL	EMM	10-15-98



2 - A.C. CORE HOLES - 10-3-2001

3 - BORINGS - TB1, TB2, TB3 4-15-2002

BORING LOCATION DIAGRAM

PAVEMENT DISTRESS, TAMARRON DRIVE

GRANDVIEW Sub., Fil 6, Grand Junction

TRAVIS JORDAN CONST.
Fruita, Colorado

Job No. **89329-GJ**

Drawn **EMM**

Date **5-9-2002**

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

BORING NO. 1 DRILL: GJLD CME-45B

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

DEPTH (FT.)	SOIL LOG	DESCRIPTION		BLOW COUNT /inch	SOIL DENSITY pcf	WATER %
		3" A.C. over 7" A.B.C. - Woven Geotextile Fabric				
		CL-ML	ST		115.6	10.9%
			ST		126.9	12.4%
			ST		109.0	13.6%
		GP/GM PIPE BEDDING	ST		122.2	13.4%
5			5			
		SAMPLE @ 4' INCLUDED SOME INTRUDED 'BEDDING GRAVEL'				
		TD @ 4.5'				

MEASURED % COMPACTION FOR EACH SAMPLE by HARVARD MINIATURE METHOD

		3" A.C. over 7" A.B.C. - Woven Geotextile Fabric				
		CL-ML	ST		98.9%	
			ST		108.0%	
		Harvard Miniature 110.8 pcf @ 15.2%	ST		98.4%	
		GP/GM PIPE BEDDING	ST		104.4%	
5			5			
		SAMPLE @ 4' INCLUDED SOME INTRUDED 'BEDDING GRAVEL'				

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

NO Free Water During Drilling 4-15-2002

LOG OF SUBSURFACE EXPLORATION

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

PAVEMENT DISTRESS, TAMARRON DRIVE
GRANDVIEW Sub., Fil 6, Grand Junction
TRAVIS JORDAN CONST.
Fruita, Colorado
Date 5-17-2002
Job No. 89329-GJ
Drawn EMM

BORING NO. 2 DRILL: GJLD CME-45B

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

DEPTH (FT.)	SOIL LOG	DESCRIPTION		BLOW COUNT /inch	SOIL DENSITY pcf	WATER %
		3" A.C. over 8" A.B.C. - Woven Geotextile Fabric				
		CL-ML	NO MEASURED SAMPLE ST			12.9%
			ST		118.9	13.5%
			ST		117.8	13.7%
		GP/GM PIPE BEDDING	POOR SAMPLE ST		92.4	10.3%
5		SAMPLE @ 1' CONTAINED SOME GRAVEL, TUBE was BENT	5			
		SAMPLE @ 4' CUT OUT ALL INTRUDED 'BEDDING GRAVEL'				
		TD @ 4.5'				
		MEASURED % COMPACTION FOR EACH SAMPLE by HARVARD MINIATURE METHOD				
		3" A.C. over 8" A.B.C. - Woven Geotextile Fabric				
		CL-ML.	NO MEASURED SAMPLE ST		N.V.	
			ST		102.6%	
			ST		101.6%	
		GP/GM PIPE BEDDING	POOR SAMPLE ST		79.7%	
5		SAMPLE @ 1' CONTAINED SOME GRAVEL, TUBE was BENT	5			
		SAMPLE @ 4' CUT OUT ALL INTRUDED 'BEDDING GRAVEL'				

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

NO Free Water During Drilling 4-15-2002

LOG OF SUBSURFACE EXPLORATION

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

PAVEMENT DISTRESS, TAMARRON DRIVE
GRANDVIEW Sub., Fil 6, Grand Junction
TRAVIS JORDAN CONST.
Fruita, Colorado
Date 5-17-2002
Job No. 89329-GJ
Drawn EMM

BORING NO. 3 DRILL: GJLD CME-45B

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

DEPTH (FT.)	SOIL LOG	DESCRIPTION		BLOW COUNT /inch	SOIL DENSITY pcf	WATER %
		3" A.C. over 5-1/2" A.B.C. - Woven Geotextile Fabric				
		CL-ML	ST		116.5	13.6%
			ST		117.3	14.1%
			ST		124.4	13.3%
		GP/GM PIPE BEDDING NO MEASURED SAMPLE	ST			12.1%
5			5			
		SAMPLE @ 4' WAS INTRUDED 'BEDDING GRAVEL', TUBE was BENT				
		TD @ 4.5'				
		MEASURED % COMPACTION FOR EACH SAMPLE by HARVARD MINIATURE METHOD				
		3" A.C. over 5-1/2" A.B.C. - Woven Geotextile Fabric				
		CL-ML	ST		100.2%	
			ST		100.9%	
			ST		107.0%	
		GP/GM PIPE BEDDING NO MEASURED SAMPLE	ST		N.V.	
5			5			
		SAMPLE @ 4' WAS INTRUDED 'BEDDING GRAVEL', TUBE was BENT				

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

NO Free Water During Drilling 4-15-2002

LOG OF SUBSURFACE EXPLORATION

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

PAVEMENT DISTRESS, TAMARRON DRIVE
GRANDVIEW Sub., Fil 6, Grand Junction

TRAVIS JORDAN CONST.
Fruita, Colorado

Date 5-17-2002

Job No. 89329-GJ

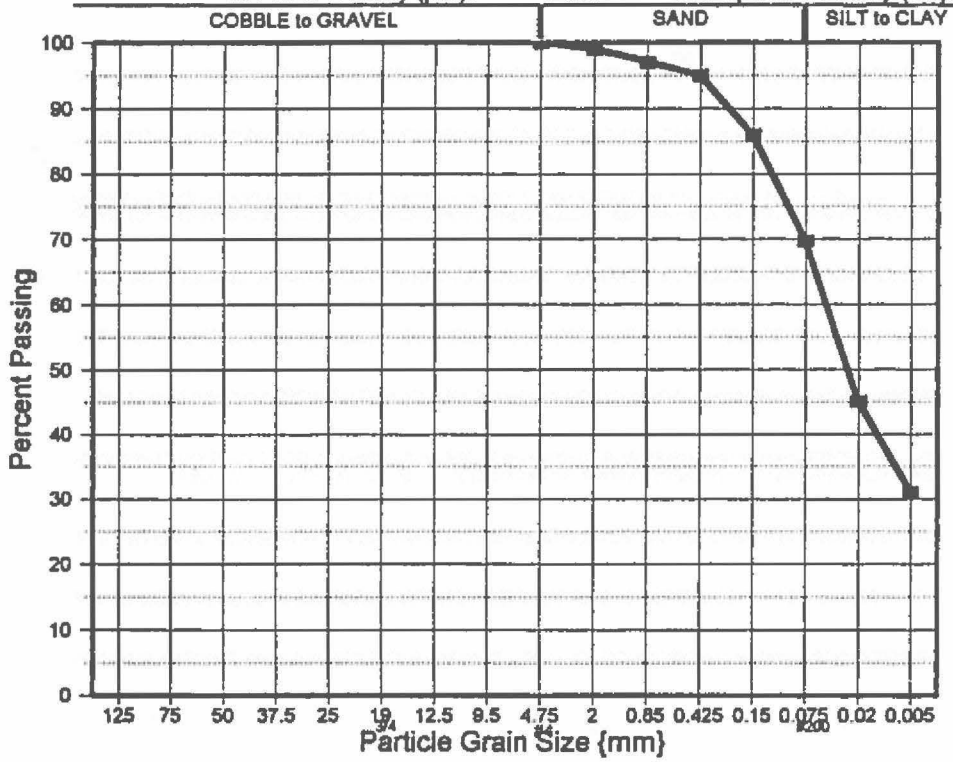
Drawn EMM

Soil Sample: SILTY CLAY, S[illegible]Y (CL-ML) Sample No.: (Typical) 1

Geologic Origin: TRENCH BACKFILL, ALLUVIAL/DEBRIS FAN DEPOSITS Test by: BK

Natural Water Content (w): 12.4% Boring No.: 1 Depth: 2'

In-Place Density (pcf): 126.9 Soil Specific Gravity (Gs):



Effective size mm

Cu

Cc

Plastic Limit (PL) 16%

Liquid Limit (LL) 22%

Plasticity Index (PI) 6%

Skempton's Activity 0.1

Shrinkage Limit (SL)

Shrinkage Ratio

DIRECT SHEAR: CD

Ult. Res.

Shear Angle: deg.

Tan Shear:

Cohesion: psf

Sieve	(mm)	% Passing
5"	125	
3"	75	
2"	50	
1-1/2"	37.5	
1"	25	
3/4"	19	
1/2"	12.5	
3/8"	9.5	
# 4	4.75	100
#10	2	99
#20	0.85	97
#40	0.425	95
#100	0.15	86
#200	0.075	69.7
	0.02	45
	0.005	31

Maximum Size Allowed By Sampler 2-1/2"

MOISTURE / DENSITY RELATIONSHIP:

ASTM Method: D-698 A AS USED FOR PROJECT

Max. Dry Density : 115.2 pcf

Optimum Moisture : 14.7%

TESTING of IN-PLACE SOILS, Sampled 4-15-2002 :

USBRec Method 5510: HARVARD MINATURE

Max. Dry Density : 117.3 pcf

Optimum Moisture : 13.8%

SULFATE SALTS: 4000 ppm

SOIL ANALYSIS and SUMMARY

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

PAVEMENT DISTRESS, TAMARRON DRIVE
GRANDVIEW Sub., Fil 6, Grand Junction

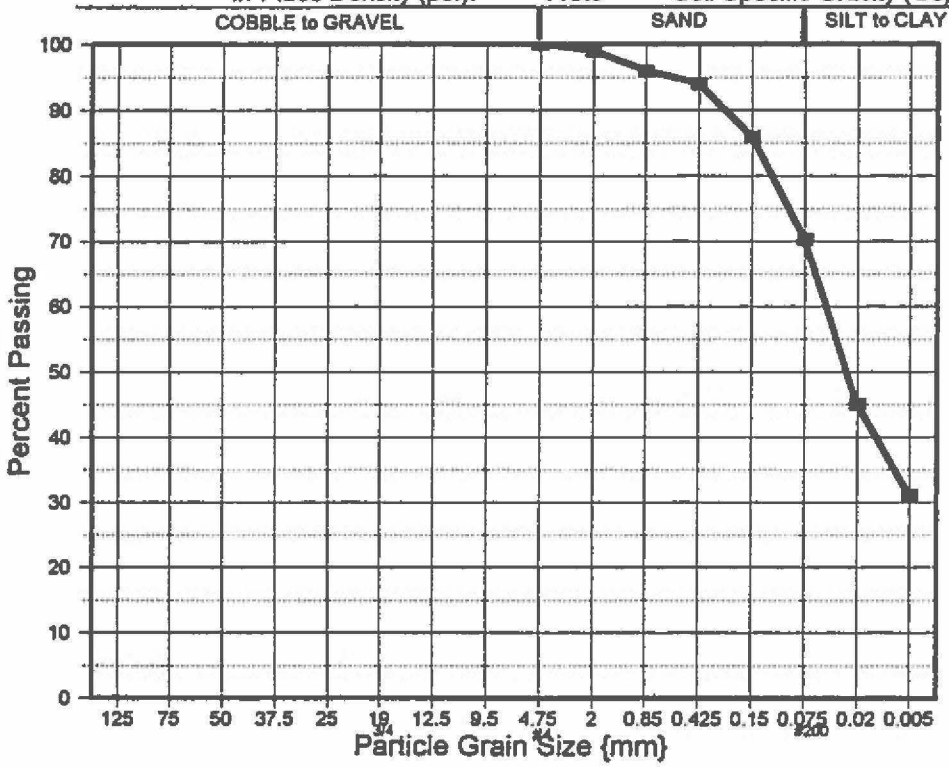
TRAVIS JORDAN CONST. Fruita, Colorado		Date 5-9-2002
Job No. 89329-GJ	Drawn EMM	

Soil Sample: SILTY CLAY, S[illegible]Y (CL-ML) Sample No.: (Typical) 2

Geologic Origin: TRENCH BACKFILL, ALLUVIAL/DEBRIS FAN DEPOSITS Test by: BK

Natural Water Content (w): 13.5% Boring No.: 2 Depth: 2'

In-Place Density (pcf): 118.9 Soil Specific Gravity (Gs):



Effective size mm

Cu

Cc

Plastic Limit (PL) 16%

Liquid Limit (LL) 22%

Plasticity Index (PI) 6%

Skempton's Activity 0.1

Shrinkage Limit (SL)

Shrinkage Ratio

DIRECT SHEAR: CD

Ult. Res.

Shear Angle: deg.

Tan Shear:

Cohesion: psf

Sieve	(mm)	% Passing
5"	125	
3"	75	
2"	50	
1-1/2"	37.5	
1"	25	
3/4"	19	
1/2"	12.5	
3/8"	9.5	
#4	4.75	100
#10	2	99
#20	0.85	96
#40	0.425	94
#100	0.15	86
#200	0.075	70.3
	0.02	45
	0.005	31

Maximum Size Allowed By Sampler 2-1/2"

MOISTURE / DENSITY RELATIONSHIP:

ASTM Method: D-698 A AS USED FOR PROJECT

Max. Dry Density : 115.2 pcf pcf

Optimum Moisture : 14.7%

TESTING of IN-PLACE SOILS, Sampled 4-15-2002 :

USBRec Method 5510: HARVARD MINATURE

Max. Dry Density : 115.9 pcf

Optimum Moisture : 13.2%

SULFATE SALTS: 1000 ppm

SOIL ANALYSIS and SUMMARY

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

PAVEMENT DISTRESS, TAMARRON DRIVE
GRANDVIEW Sub., Fil 6, Grand Junction

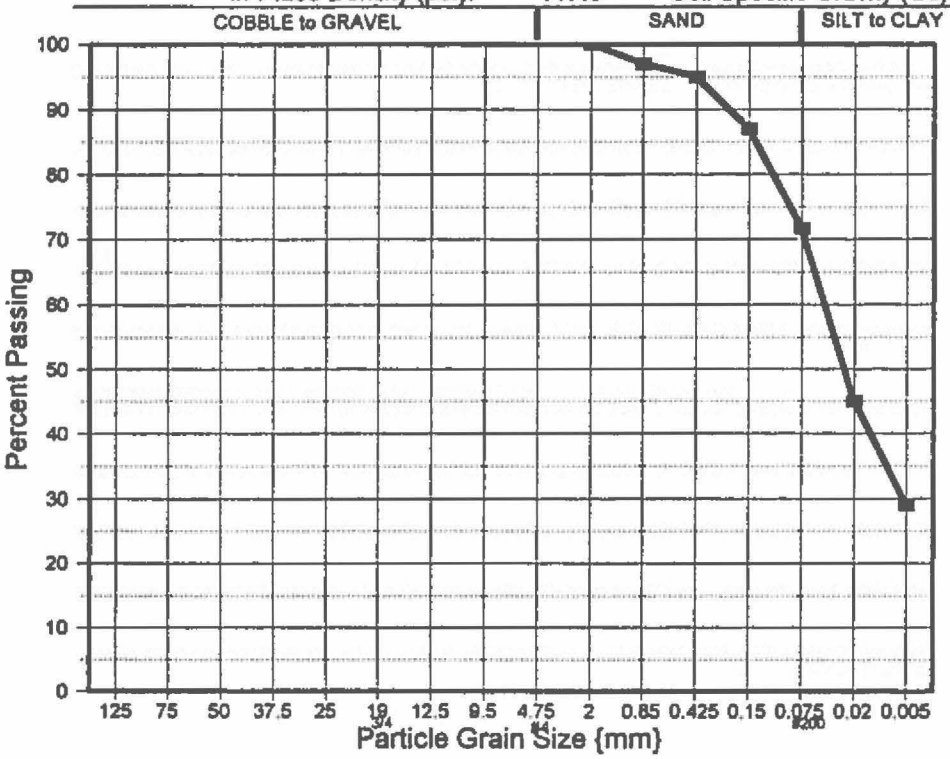
TRAVIS JORDAN CONST. Fruita, Colorado		Date 5-9-2002
Job No. 89329-GJ	Drawn EMM	

Soil Sample: SILTY CLAY, S[illegible]Y (CL-ML) — Sample No.: (Typical) — 3

Geologic Origin: TRENCH BACKFILL, ALLUVIAL/DEBRIS FAN DEPOSITS — Test by: BK

Natural Water Content (w): 14.1% — Boring No.: 3 — Depth: 2'

In-Place Density (pcf): 117.3 — Soil Specific Gravity (Gs):



Effective size mm

Cu

Cc

Plastic Limit (PL) 16%

Liquid Limit (LL) 21%

Plasticity Index (PI) 5%

Skempton's Activity 0.1

Shrinkage Limit (SL)

Shrinkage Ratio

DIRECT SHEAR: CD

	Ult.	Res.
Shear Angle:	deg.	
Tan Shear:		
Cohesion:	psf	

Sieve	(mm)	% Passing
5"	125	
3"	75	
2"	50	
1-1/2"	37.5	
1"	25	
3/4"	19	
1/2"	12.5	
3/8"	9.5	
# 4	4.75	
#10	2	100
#20	0.85	97
#40	0.425	95
#100	0.15	87
#200	0.075	71.7
	0.02	45
	0.005	29

Maximum Size Allowed By Sampler 2-1/2"

MOISTURE / DENSITY RELATIONSHIP:

ASTM Method: D-698 A AS USED FOR PROJECT

Max. Dry Density : 115.2 pcf

Optimum Moisture : 14.7%

TESTING of IN-PLACE SOILS, Sampled 4-15-2002 :

USBRec Method 5510: HARVARD MINATURE

Max. Dry Density : 116.3 pcf

Optimum Moisture : 13.5%

SULFATE SALTS: 10,000 ppm

SOIL ANALYSIS and SUMMARY

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

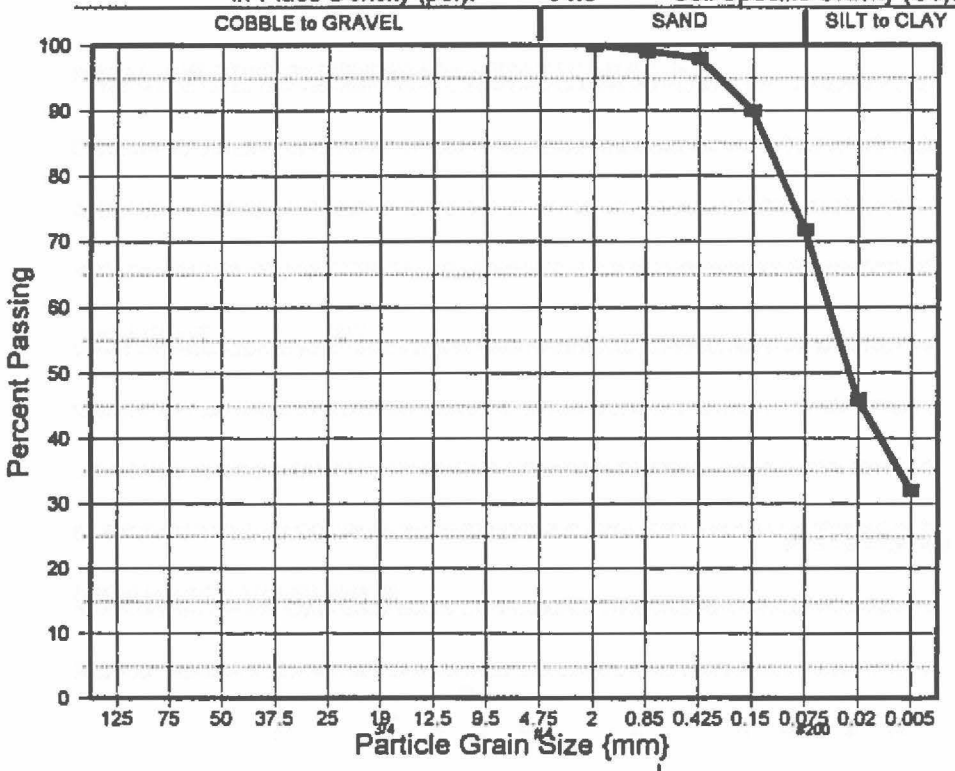
PAVEMENT DISTRESS, TAMARRON DRIVE GRANDVIEW Sub., Fil 6, Grand Junction		
TRAVIS JORDAN CONST. Fruita, Colorado		Date 5-9-2002
Job No. 89329-GJ	Drawn EMM	

Soil Sample: SILTY CLAY (C[illegible]L) — Sample No.: I (Typical) — 4

Geologic Origin: ALLUVIAL/DEBRIS FAN DEPOSITS — Test by: LRS

Natural Water Content (w): 7.8% — Boring No.: 2 — Depth: 3'

In-Place Density (pcf): 94.0 — Soil Specific Gravity (Gs):



Effective size mm

Cu

Cc

Plastic Limit (PL)	19%
Liquid Limit (LL)	23%
Plasticity Index (PI)	4%
Skempton's Activity	0.1
Shrinkage Limit (SL)	
Shrinkage Ratio	

DIRECT SHEAR: CD

	Ult.	Res.
Shear Angle:	deg.	
Tan Shear:		
Cohesion:	psf	

Sieve	(mm)	% Passing
5"	125	
3"	75	
2"	50	
1-1/2"	37.5	
1"	25	
3/4"	19	
1/2"	12.5	
3/8"	9.5	
# 4	4.75	
#10	2	100
#20	0.85	99
#40	0.425	98
#100	0.15	90
#200	0.075	71.7
	0.02	46
	0.005	32

Maximum Size Allowed By Sampler 2-1/2"

MOISTURE / DENSITY RELATIONSHIP:

ASTM Method: D-698 A — D 4718 - 30% Rock Correctio

Max. Dry Density : pcf — pcf

Optimum Moisture :

HVEEM-CARMANY:

'R' Value @ 300 psi: 8

Displacement 300 psi: 4.85

Expansion @ 300 psi: 18.9 psf

FHA Soil Swell:

% Swell

psf

Remolded Sample

ALLOWABLE BEARING (net): 1800 psf by Consolidometer

Standard Penetration (SPT): 2100 psf by Penetrometer

Unconfined Compression (qu): psf

CONSTANT VOLUME SWELL: 660 psf

COLLAPSE OF 0.70% **DURING SWELL PHASE**

CONSOLIDATION: 1.33% @ 1025 psf

CONSOLIDATION: 2.58% @ 2050 psf

SULFATE SALTS: 10,000 ppm

PERMEABILITY:

K (20 C) Remolded cm/sec @ pcf

SOIL ANALYSIS and SUMMARY (Orig.)

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

GRANDVIEW SUBDIVISION, Filings 5 & 6
GRAND JUNCTION, COLORADO

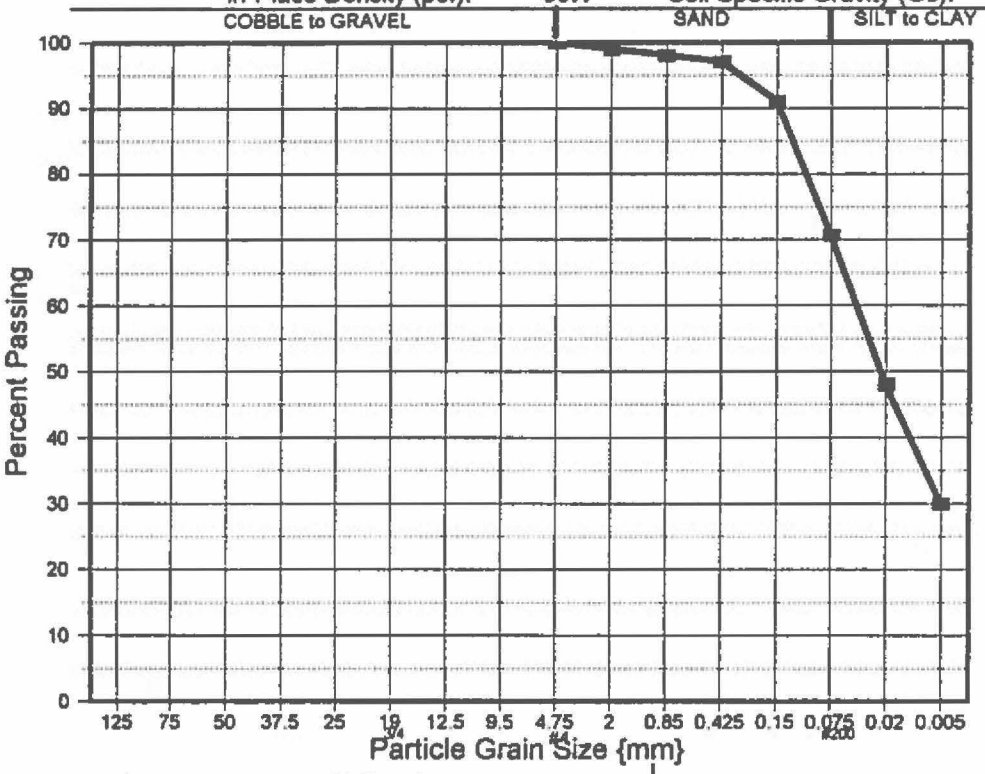
DONADA	Date
Grand Junction, Colorado	2-26-2001
Job No. 88484 (89329)-GJ	Drawn EMM

Soil Sample: LEAN CLAY (C… Sample No.: II (Typical)

Geologic Origin: ALLUVIAL/DEBRIS FAN DEPOSITS Test by: LRS

Natural Water Content (w): 23.8% Boring No.: 1 Depth: 8'

In-Place Density (pcf): 99.1 Soil Specific Gravity (Gs):



Effective size mm

Cu

Cc

Plastic Limit (PL)	20%
Liquid Limit (LL)	30%
Plasticity Index (PI)	10%
Skempton's Activity	0.2
Shrinkage Limit (SL)	
Shrinkage Ratio	

DIRECT SHEAR: CD

	Ult.	Res.
Shear Angle:	deg.	
Tan Shear:		
Cohesion:	psf	

Sieve	(mm)	% Passing
5"	125	
3"	75	
2"	50	
1-1/2"	37.5	
1"	25	
3/4"	19	
1/2"	12.5	
3/8"	9.5	
# 4	4.75	100
#10	2	99
#20	0.85	98
#40	0.425	97
#100	0.15	91
#200	0.075	70.7
	0.02	48
	0.005	30

Maximum Size Allowed By Sampler 2-1/2"

MOISTURE / DENSITY RELATIONSHIP:

ASTM Method: D-698 A D 4718 - 30% Rock Correcti

Max. Dry Density : pcf pcf

Optimum Moisture :

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

'R' Value @ 300 psi: % Swell

Displacement 300 psi: psf

Expansion @ 300 psi: psf Remolded Sample

ALLOWABLE BEARING (net): 1100 psf by Consolidometer

Standard Penetration (SPT): 1000 psf by Penetrometer

Unconfined Compression (qu): psf

COLLAPSE @ Wetting 0.00% @ 1025 psf

CONSOLIDATION: 2.14% @ 1025 psf

CONSOLIDATION: 3.19% @ 2050 psf

SULFATE SALTS: 2000 ppm

PERMEABILITY:

K (20 C) Remolded cm/sec @ pcf

SOIL ANALYSIS and SUMMARY (Orig.)

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

GRANDVIEW SUBDIVISION, Filings 5 & 6
GRAND JUNCTION, COLORADO

DONADA	Date
Grand Junction, Colorado	2-26-2001
Job No. 88484 (89329)-GJ	Drawn EMM

GRAND JUNCTION
LINCOLN DeVORE

Construction Quality Control Daily Report

Report 1 **Job #** 88937-GJ **Date** 10-3-01

Location of work: Grandview Subdivision, Fil. 6 **Contractor:** Travis Jordan

Description: Subgrade density

Weather: Clear **Temperature: Min.** 65 **Max.**

1. Work Performed Today by Contractor:

2. List Specific Inspection Performed and Results of These Inspections (Include Corrective Actions):

3. List Type and Location of Tests Performed, and Results of These Tests:

At the request of the client, subgrade testing was performed on two areas that appear to have 'settled' in Tammaron Drive.

Two cores were drilled through the asphalt to determine the moisture content and density of the subgrade. The results are as follows:

Core Hole # 1
5' N, 23' E of property pin at NE corner of
Lot 10, Blk 3, Fil. 6, Tammaron Dr.
3" AC
4" ABC
subgrade dry density 117.8 pcf
subgrade moisture content 11.6%

Core Hole # 2
47' S, 23' E of property pin at NE corner of
Lot 11, Blk 3, Fil. 6, Tammaron Dr.
3" AC
6 1/2" ABC
subgrade dry density 127.0 pcf
subgrade moisture content 11.3%

Both core holes had a layer of woven geotextile fabric between the subgrade and the base course.

The proctor used during testing of the utility trench backfill and street and sidewalk subgrade was 115.2@14.7 (ASTM D-698). This indicates that the subgrade densities obtained from the Shelby tube samples are over 100% compaction and approximately 3% below optimum moisture content.

4. Remarks:

Inspected By: Andy Rosedahl
Andy Rosedahl

Reviewed By:
Edward M. Morris, PE

GRAND JUNCTION
LINCOLN DEVORE, Inc.
GEOTECHNICAL ENGINEERS - GEOLOGISTS

1441 Motor St.
Grand Junction, CO 81505
Phone: (970) 242-8968/Fax (970) 242-1561

Proctor 115, 2@14.7

#236 = FS6 98@13.7%
#76 = 2'856 99@12.2%
#60 = 4'856 97@13.6%
MH C02

#125 = FS6 96@14.3
#113 = 2'856 95@14.6%

#120 = FS6 96@14.0
#110 = 2'856 95@14.7%

#116 = FS6 96@14.4%
#96 = 2'856 95@13.6%
MH T83

#103 = FS6 95@14.0
#92 = 2'856 96@13.4

#75 = 2'856 95@12.8%
MH T82

#86 = FS6 99@13.1%
#74 = 2'856 97@13.7%

#82 = FS6 96@13.3%
#72 = 2'856 97@14.1%

#80 = FS6 96@13.3%
#68 = 2'856 97@13.6%
main

#78 = FS6
#77 = 2'856
#61 = 4'856

#121 = FS6 95@13.9%
#111 = 2'856 98@13.0%
main

#118 = FS6 95@12.2%
#108 = 2'856 96@13.7%

#105 = FS6 98@12.7%
#94 = 2'856 95@13.3%
Lot 8

#101 = FS6 99@12.9
#90 = 2'856 97@13.3

#99 = FS6 98@13.7
#88 = 2'856 98@13.0

#81 = FS6 95@13.0
#70 = 2'856 96@13.7%

#56 = FS6 100@14.2%
#55 = 2'856 100@14.3%
#63 = 4'856 97@13.7%
main

Main

MH T84

#124 = FS6 98@13.9
#115 = 2'856 98@13.9%
MH T74

COLTRANE AVENUE

TAMARRON DRIVE

BLOCK ONE

BLOCK TWO

Main

MH T83

Main

main
#104 = FS6 98@12.8%
#93 = 2'856 97@15.1%

#80 = FS6 97@12.2%
#69 = 2'856 95@13.8%

#62 = FS6 96@13.9%
#57 = 2'856 96@13.9%

#123 = FS6 95@13.3
#114 = 2'856 97@14.2%

#122 = FS6 95@13.5%
#112 = 2'856 95@13.2%

#119 = FS6 95@14.7%
#109 = 2'856 97@14.7%

#117 = FS6 95@13.3%
#107 = 2'856 96@13.5%

#104 = FS6 97@12.8%
#93 = 2'856 95@13.4%

#102 = FS6 95@12.9%
#91 = 2'856 99@13.7%

#100 = FS6 95@13.3%
#89 = 2'856 96@13.8%

#98 = FS6 97@13.2%
#87 = 2'856 100@13.1%

#85 = FS6 96@13.4%
#73 = 2'856 99@12.7%

#83 = FS6 95@12.9%
#71 = 2'856 98@14.0%

5	53-57	6-1-01
6	58-63	6-4-01
7	64-78	6-5-01
	Test	
Report 8	67A	6-6-01
	79-96	
9	97-115	6-7-01
10	116-125	6-8-01
19	236	7-11-01

LEGEND

AG – AT GRADE	AC – ASPHALTIC CONCRETE
FG – FINAL GRADE	ABC – AGGREGATE BASE
BG – BELOW GRADE	BCG – BASE COURSE GRADE
BSG – BELOW SUBGRADE	FSG – FINAL SUBGRADE
SG – SUBGRADE	MH# – MANHOLE #___
PL – PROPERTY LINE	

___ – REFERS TO DENSITY TEST NUMBER

ONLY PASSING TESTS HAVE BEEN PLOTTED and REFERENCED

SEWER UTILITY DENSITY TESTING

Project: Grand View Fil 6

Mapping From:

GRAND JUNCTION LINCOLN DeVORE
1441 MOTOR STREET
GRAND JCT., COLORADO
970-242-8968 (fax 970-242-1561)

JOB # 88692 | SHEET OF

DRAWN BY: | SCALE: VARIES | DATE:

CHECKED BY: | FILE # UTILITY | REV.

Client: Travis Jordan			Report No: 5
Project: Grandview Subdivision, Fil. 5/6			Date of Test: 6-1-01
Location:			Test By: LS, JS
			GJLD Job No: 88692-GJ
TEST TYPE: Nuclear (ASTM 2922) Backscatter	Nuclear (ASTM 2922) Direct Trans. X	(ASTM D-1556) Sand Cone	SPECIFICATIONS: Project: City: X County: State:

Test No.	Location of Test	COMPACTION %	COMPAC. SPEC. %	MOISTURE CONT. %	MOISTURE SPEC. %	PROCTOR VALUE	SOIL TYPE
53	Sewer MH CA1 @ 2' BSG	100	95	14.2	+-2	115.2@14.7	C
54	Sewer MH CA1 @ FSG	95	95	13.8	+-2	115.2@14.7	C
55	Sewer main between MH CA1 & CA2 @ 2' BSG	100	95	14.3	+-2	115.2@14.7	C
56	Sewer main between MH CA1 & CA2 @ FSG	100	95	14.2	+-2	115.2@14.7	C
57	SS, Lot 13, Blk 2 @ 2' BSG	96	95	13.9	+-2	115.2@14.7	C

DISTRIBUTION:

1-Client 1-Ute Water

1-Subdiv Env 1-City of GJ

1-Atkins & Assoc.

KEY: * Fails Compaction Spec. C = Cohesive

** Fails Moisture Spec. NC = NonCohesive

S Standard Proctor ABC = Aggregate Base

M Modified Proctor PR = Pit Run

GRAND JUNCTION LINCOLN-DeVORE, INC.

BY: LJS

FILL DENSITY TEST DAILY REPORT

NOTE: Results indicate in-place soil densities at the locations and depths identified above. Grand Junction Lincoln DeVore has relied on the contractor to provide uniform mix placement and compactive effort throughout the fill area.

Nuclear Density Testing of 'pit run' or other coarse grained soils may require correction of Unit Weight And Water Content, ASTM D-4718. If soils contain oversize particles in excess of the limits of ASTM D-4718

Nuclear Density Testing is performed for acceptance control and is combined with visual and penetration methods.

GRAND JUNCTION LINCOLN DeVORE

Geotechnical Engineers-Geologists

Client: Travis Jordan	Report No: 6
Project: Grandview Subdivision, Fil. 5/6	Date of Test: 6-4-01
Location:	Test By: RL
	GJLD Job No: 88692-GJ

TEST TYPE:	Nuclear (ASTM 2922) Backscatter	Nuclear (ASTM 2922) Direct Trans. X	(ASTM D-1556) Sand Cone	SPECIFICATIONS:	Project:	City: X	County:	State:

Test No.	Location of Test	COMPACTION %	COMPAC. SPEC. %	MOISTURE CONT. %	MOISTURE SPEC. %	PROCTOR VALUE	SOIL TYPE
58	Sewer MH RO2, Fil. 5 @ -2' BSG	97	95	13.7	+-2	115.2@14.7	C
59	Sewer MH RO3, Fil. 5 @ -2' BSG	98	95	13.3	+-2	115.2@14.7	C
60	Sewer MH CA2, Fil. 6 @ -4' BSG	97	95	13.6	+-2	115.2@14.7	C
61	SS, Lot 12, Blk 1, Fil. 6 @ -4' BSG	96	95	13.7	+-2	115.2@14.7	C
62	SS, Lot 13, Blk 1, Fil. 6 @ FSG	96	95	13.3	+-2	115.2@14.7	C
63	Sewer main between MH CA2 & CA1, Fil. 6 @ -4' BSG	97	95	13.7	+-2	115.2@14.7	C

DISTRIBUTION:

1-Client 1-Ute Water

1-Subdiv Env 1-City of GJ

1-Atkins & Assoc.

KEY: * Fails Compaction Spec. C = Cohesive

** Fails Moisture Spec. NC = NonCohesive

S Standard Proctor ABC = Aggregate Base

M Modified Proctor PR = Pit Run

GRAND JUNCTION LINCOLN DeVORE, INC.

BY: RL

FILL DENSITY TEST DAILY REPORT

NOTE: Results indicate in-place soil densities at the locations and depths identified above. Grand Junction Lincoln DeVore has relied on the contractor to provide uniform mix placement and compactive effort throughout the fill area.

Nuclear Density Testing of 'pit run' or other coarse grained soils may require correction of Unit Weight And Water Content, ASTM D-4718. If soils contain oversize particles in excess of the limits of ASTM D-4718

Nuclear Density Testing is performed for acceptance control and is combined with visual and penetration methods.

GRAND JUNCTION LINCOLN DeVORE

Geotechnical Engineers-Geologists

Client: Travis Jordan	Report No: 7
Project: Grandview Subdivision, Fil. 5/6	Date of Test: 6-5-01
Location:	Test By: LS
	GJLD Job No: 88692-GJ

TEST TYPE:	Nuclear (ASTM 2922) Backscatter	Nuclear (ASTM 2922) Direct Trans. X	(ASTM D-1556) Sand Cone	SPECIFICATIONS:	Project:	City: X	County:	State:

Test No.	Location of Test	COMPACTION %	COMPAC. SPEC. %	MOISTURE CONT. %	MOISTURE SPEC. %	PROCTOR VALUE	SOIL TYPE
64	SS, Lot 9, Blk 2 @ FSG	95	95	13.5	+-2	115.2@14.7	C
65	SS, Lot 10, Blk 1 @ FSG	97	95	13.6	+-2	115.2@14.7	C
66	Sewer MH TD1 @ 1' BSG	95	95	14.6	+-2	115.2@14.7	C
67	Sewer MH RD3 @ 1' BSG	90*	95	12.9	+-2	115.2@14.7	C
68	Sewer main between MH TD1 & TD2 @ 2' BSG	97	95	13.6	+-2	115.2@14.7	C
69	SS, Lot 2, Blk 2 @ 2' BSG	96	95	12.8	+-2	115.2@14.7	C
70	SS, Lot 2, Blk 1 @ 2' BSG	96	95	15.2	+-2	115.2@14.7	C
71	SS, Lot 3, Blk 2 @ 2' BSG	98	95	14.0	+-2	115.2@14.7	C
72	SS, Lot 3, Blk 1 @ 2' BSG	97	95	14.1	+-2	115.2@14.7	C
73	SS, Lot 4, Blk 2 @ 2' BSG	99	95	12.7	+-2	115.2@14.7	C
74	SS, Lot 4, Blk 1 @ 2' BSG	97	95	13.7	+-2	115.2@14.7	C
75	Sewer MH TD2 @ 2' BSG	95	95	12.7	+-2	115.2@14.7	C
76	Sewer MH CA2 @ 2' BSG	95	95	12.8	+-2	115.2@14.7	C

DISTRIBUTION: Page 1 of 2

1-Client 1-Ute Water

1-Subdiv Env 1-City of GJ

1-Atkins & Assoc.

KEY: * Fails Compaction Spec. C = Cohesive

** Fails Moisture Spec. NC = NonCohesive

S Standard Proctor ABC = Aggregate Base

M Modified Proctor PR = Pit Run

GRAND JUNCTION LINCOLN DeVORE, INC.

BY:

FILL DENSITY TEST DAILY REPORT

NOTE: Results indicate in-place soil densities at the locations and depths identified above. Grand Junction Lincoln DeVore has relied on the contractor to provide uniform mix placement and compactive effort throughout the fill area.

Nuclear Density Testing of 'pit run' or other coarse grained soils may require correction of Unit Weight And Water Content, ASTM D-4718. If soils contain oversize particles in excess of the limits of ASTM D-4718

Nuclear Density Testing is performed for acceptance control and is combined with visual and penetration methods.

GRAND JUNCTION LINCOLN DeVORE

Geotechnical Engineers-Geologists

Travis Jordan			Report No: 7
Project: Grandview Subdivision, Fil. 5/6			Date of Test: 6-5-01
Location:			Test By: LS
			GJLD Job No: 88692-GJ

TEST TYPE:	Nuclear (ASTM 2922) Backscatter	Nuclear (ASTM 2922) Direct Trans. X	(ASTM D-1556) Sand Cone	SPECIFICATIONS:	Project:	City: X	County:	State:

Test No.	Location of Test	COMPACTION %	COMPAC. SPEC. %	MOISTURE CONT. %	MOISTURE SPEC. %	PROCTOR VALUE	SOIL TYPE
77	SS, Lot 12, Blk 1 @ 2' BSG	96	95	12.7	+-2	115.2@14.7	C
78	SS, Lot 12, Blk 1 @ FSG	96	95	13.0	+-2	115.2@14.7	C

DISTRIBUTION: Page 2 of 2

1-Client 1-Ute Water

1-Subdiv Env 1-City of GJ

1-Atkins & Assoc.

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M Modified Proctor PR = Pit Run

GRAND JUNCTION LINCOLN DeVORE, INC.

BY:

FILL DENSITY TEST DAILY REPORT

NOTE: Results indicate in-place soil densities at the locations and depths identified above. Grand Junction Lincoln DeVore has relied on the contractor to provide uniform mix placement and compactive effort throughout the fill area.

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GRAND JUNCTION LINCOLN DeVORE

Geotechnical Engineers-Geologists

Client: Travis Jordan	Report No: 8
Project: Grandview Subdivision, Fil. 5/6	Date of Test: 6-6-01
Location:	Test By: LS
	GJLD Job No: 88692-GJ

TEST TYPE:	Nuclear (ASTM 2922) Backscatter	Nuclear (ASTM 2922) Direct Trans. X	(ASTM D-1556) Sand Cone	SPECIFICATIONS:	Project:	City: X	County:	State:

Test No.	Location of Test	COMPACTION %	COMPAC. SPEC. %	MOISTURE CONT. %	MOISTURE SPEC. %	PROCTOR VALUE	SOIL TYPE
67A	RETEST	100	95	14.2	+-2	115.2@14.7	C
79	Sewer MH TD1 @ FSG	100	95	13.5	+-2	115.2@14.7	C
80	SS, Lot 2, Blk 2 @ FSG	99	95	12.2	+-2	115.2@14.7	C
81	SS, Lot 2, Blk 1 @ FSG	95	95	13.0	+-2	115.2@14.7	C
82	Sewer main between MH TB1 & TB2 @ FSG	96	95	13.3	+-2	115.2@14.7	C
83	SS, Lot 3, Blk 2 @ FSG	95	95	12.9	+-2	115.2@14.7	C
84	SS, Lot 3, Blk 1 @ FSG	96	95	13.6	+-2	115.2@14.7	C
85	SS, Lot 4, Blk 2 @ FSG	96	95	13.4	+-2	115.2@14.7	C
86	SS, Lot 4, Blk 1 @ FSG	99	95	13.1	+-2	115.2@14.7	C
87	SS, Lot 5, Blk 2 @ 2' BSG	100	95	13.1	+-2	115.2@14.7	C
88	SS, Lot 5, Blk 1 @ 2' BSG	98	95	13.0	+-2	115.2@14.7	C
89	SS, Lot 6, Blk 2 @ 2' BSG	96	95	13.8	+-2	115.2@14.7	C
90	SS, Lot 6, Blk 1 @ 2' BSG	95	95	13.3	+-2	115.2@14.7	C

DISTRIBUTION: Page 1 of 2

1-Client 1-Ute Water

1-Subdiv Env 1-City of GJ

1-Atkins & Assoc.

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GRAND JUNCTION LINCOLN DeVORE, INC.

BY:

FILL DENSITY TEST DAILY REPORT

NOTE: Results indicate in-place soil densities at the locations and depths identified above. Grand Junction Lincoln DeVore has relied on the contractor to provide uniform mix placement and compactive effort throughout the fill area.

Nuclear Density Testing of 'pit run' or other coarse grained soils may require correction of Unit Weight And Water Content, ASTM D-4718. If soils contain oversize particles in excess of the limits of ASTM D-4718

Nuclear Density Testing is performed for acceptance control and is combined with visual and penetration methods.

GRAND JUNCTION LINCOLN DeVORE

Geotechnical Engineers-Geologists

...t:	Travis Jordan	Report No:	8
Project:	Grandview Subdivision, Fil. 5/6	Date of Test:	6-6-01
Location:		Test By:	LS
		GJLD Job No:	88692-GJ

TEST TYPE:	Nuclear (ASTM 2922) Backscatter	Nuclear (ASTM 2922) Direct Trans. X	(ASTM D-1556) Sand Cone	SPECIFICATIONS:	Project:	City:	X	County:	State:

Test No.	Location of Test	COMPACTION %	COMPAC. SPEC. %	MOISTURE CONT. %	MOISTURE SPEC. %	PROCTOR VALUE	SOIL TYPE
91	SS, Lot 7, Blk 2 @ 2' BSG	99	95	13.7	+-2	115.2@14.7	C
92	SS, Lot 7, Blk 1 @ 2' BSG	96	95	13.4	+-2	115.2@14.7	C
93	SS, Lot 8, Blk 2 @ 2' BSG	95	95	13.4	+-2	115.2@14.7	C
94	SS, Lot 8, Blk 1 @ 2' BSG	95	95	15.3	+-2	115.2@14.7	C
95	Sewer main between MH TP2 & TP3 @ 2' BSG	97	95	15.1	+-2	115.2@14.7	C
96	Sewer MH TP3 @ 2' BSG	95	95	13.6	+-2	115.2@14.7	C

DISTRIBUTION: Page 2 of 2

1-Client 1-Ute Water

1-Subdiv Env 1-City of GJ

1-Atkins & Assoc.

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M Modified Proctor PR = Pit Run

GRAND JUNCTION LINCOLN DeVORE, INC.

BY:

FILL DENSITY TEST DAILY REPORT

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Nuclear Density Testing of 'pit run' or other coarse grained soils may require correction of Unit Weight And Water Content, ASTM D-4718. If soils contain oversize particles in excess of the limits of ASTM D-4718

Nuclear Density Testing is performed for acceptance control and is combined with visual and penetration methods.

GRAND JUNCTION LINCOLN DeVORE

Geotechnical Engineers-Geologists

Client: Travis Jordan	Report No: 9
Project: Grandview Subdivision, Fil. 5/6	Date of Test: 6-7-01
Location:	Test By: BK, LS
	GJLD Job No: 88692-GJ

TEST TYPE:	Nuclear (ASTM 2922) Backscatter	Nuclear (ASTM 2922) Direct Trans. X	(ASTM D-1556) Sand Cone	SPECIFICATIONS:	Project:	City: X	County:	State:

Test No.	Location of Test	COMPACTION %	COMPAC. SPEC. %	MOISTURE CONT. %	MOISTURE SPEC. %	PROCTOR VALUE	SOIL TYPE
97	Sewer MH TP2 @ FSG	99	95	13.4	+-2	115.2@14.7	C
98	SS, Lot 5, Blk 2 @ FSG	97	95	13.2	+-2	115.2@14.7	C
99	SS, Lot 5, Blk 1 @ FSG	98	95	13.7	+-2	115.2@14.7	C
100	SS, Lot 6, Blk 2 @ FSG	95	95	13.3	+-2	115.2@14.7	C
101	SS, Lot 6, Blk 1 @ FSG	99	95	12.9	+-2	115.2@14.7	C
102	SS, Lot 7, Blk 2 @ FSG	95	95	12.9	+-2	115.2@14.7	C
103	SS, Lot 7, Blk 1 @ FSG	95	95	14.0	+-2	115.2@14.7	C
104	SS, Lot 8, Blk 2 @ FSG	95	95	12.8	+-2	115.2@14.7	C
105	SS, lot 8, Blk 1 @ FSG	98	95	12.7	+-2	115.2@14.7	C
106	Sewer main between MH TP2 & TP3 @ FSG	98	95	12.8	+-2	115.2@14.7	C
107	SS, Lot 9, Blk 2 @ 2' BSG	96	95	13.5	+-2	115.2@14.7	C
108	SS, Lot 9, Blk 1 @ 2' BSG	96	95	13.7	+-2	115.2@14.7	C
109	SS, Lot 10, Blk 2 @ 2' BSG	97	95	14.7	+-2	115.2@14.7	C

DISTRIBUTION: Page 1 of 2

1-Client 1-Ute Water

1-Subdiv Env 1-City of GJ

1-Atkins & Assoc.

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M Modified Proctor PR = Pit Run

GRAND JUNCTION LINCOLN DeVORE, INC.

BY: BK

FILL DENSITY TEST DAILY REPORT

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Nuclear Density Testing is performed for acceptance control and is combined with visual and penetration methods.

GRAND JUNCTION LINCOLN DeVORE

Geotechnical Engineers-Geologists

Travis Jordan

Report No: 9

Project: Grandview Subdivision, Fil. 5/6

Date of Test: 6-6-01

Location:

Test By: LS

GJLD Job No: 88692-GJ

TEST TYPE:	Nuclear (ASTM 2922) Backscatter	Nuclear (ASTM 2922) Direct Trans. X	(ASTM D-1556) Sand Cone	SPECIFICATIONS:	Project:	City: X	County:	State:

Test No.	Location of Test	COMPACTION %	COMPAC. SPEC. %	MOISTURE CONT. %	MOISTURE SPEC. %	PROCTOR VALUE	SOIL TYPE
110	SS, Lot 10, Blk 2 @ 2' BSG	95	95	14.7	+-2	115.2@14.7	C
111	Sewer main between MH TP3 & TP4 @ 2' BSG	98	95	13.0	+-2	115.2@14.7	C
112	SS, Lot 11, Blk 2 @ 2' BSG	95	95	13.2	+-2	115.2@14.7	C
113	SS, Lot 11, Blk 1 @ 2' BSG	95	95	14.6	+-2	115.2@14.7	C
114	SS, Lot 12, Blk 2 @ 2' BSG	97	95	14.2	+-2	115.2@14.7	C
115	Sewer MH TP4 @ 2' BSG	98	95	13.9	+-2	115.2@14.7	C

DISTRIBUTION: Page 2 of 2

1-Client 1-Ute Water

1-Subdiv Env 1-City of GJ

1-Atkins & Assoc.

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M Modified Proctor PR = Pit Run

GRAND JUNCTION LINCOLN DeVORE, INC.

BY: BLC

FILL DENSITY TEST DAILY REPORT

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GRAND JUNCTION LINCOLN DeVORE

Geotechnical Engineers-Geologists

Client: Travis Jordan	Report No: 10
Project: Grandview Subdivision, Fil. 5/6	Date of Test: 6-8-01
Location:	Test By: RL
	GJLD Job No: 88692-GJ

TEST TYPE:	Nuclear (ASTM 2922) Backscatter	Nuclear (ASTM 2922) Direct Trans. X	(ASTM D-1556) Sand Cone	SPECIFICATIONS:	Project:	City: X	County:	State:

Test No.	Location of Test	COMPACTION %	COMPAC. SPEC. %	MOISTURE CONT. %	MOISTURE SPEC. %	PROCTOR VALUE	SOIL TYPE
116	MH TB3 @ FSG	96	95	14.4	+-2	115.2@14.7	C
117	SS, Lot 9, Blk 2 @ FSG	95	95	13.3	+-2	115.2@14.7	C
118	SS, Lot 9, Blk 1 @ FSG	95	95	12.8	+-2	115.2@14.7	C
119	SS, Lot 10, Blk 2 @ FSG	95	95	14.7	+-2	115.2@14.7	C
120	SS, Lot 10, Blk 1 @ FSG	98	95	14.0	+-2	115.2@14.7	C
121	Sewer main between MH TB3 & TB4 @ FSG	95	95	13.9	+-2	115.2@14.7	C
122	SS, Lot 11, Blk 2 @ FSG	95	95	13.5	+-2	115.2@14.7	C
123	SS, Lot 12, Blk 2 @ FSG	95	95	13.3	+-2	115.2@14.7	C
124	MH TB4 @ FSG	98	95	13.9	+-2	115.2@14.7	C
125	SS, Lot 11, Blk 1 @ FSG	96	95	14.3	+-2	115.2@14.7	C

DISTRIBUTION:

1-Client 1-Ute Water

1-Subdiv Env 1-City of GJ

1-Atkins & Assoc.

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M Modified Proctor PR = Pit Run

GRAND JUNCTION LINCOLN DeVORE, INC.

BY: RL

FILL DENSITY TEST DAILY REPORT

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GRAND JUNCTION LINCOLN DeVORE

Geotechnical Engineers-Geologists

Client: Travis Jordan			Report No: 19
Project: Grandview Subdivision, Fil. 5/6			Date of Test: 7-11-01
Location:			Test By: LS
			GJLD Job No: 88692-GJ
TEST TYPE: Nuclear (ASTM 2922) Backscatter	Nuclear (ASTM 2922) Direct Trans. X	(ASTM D-1556) Sand Cone	SPECIFICATIONS: Project: City: X County: State:

Test No.	Location of Test	COMPACTION %	COMPAC. SPEC. %	MOISTURE CONT. %	MOISTURE SPEC. %	PROCTOR VALUE	SOIL TYPE
236	Sewer MH CA2 @ FSG	98	95	13.7	+-2	115.2@14.7	C

DISTRIBUTION:

1-Client 1-Ute Water

1-Subdiv Env 1-City of GJ

1-Atkins & Assoc.

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M Modified Proctor PR = Pit Run

GRAND JUNCTION LINCOLN DeVORE, INC.

BY: LRL

FILL DENSITY TEST DAILY REPORT

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GRAND JUNCTION LINCOLN DeVORE

Geotechnical Engineers-Geologists

PRE-CONSTRUCTION MEETING
PRIVATE DEVELOPMENT STREET AND UTILITY CONSTRUCTION

Project: GRAND VIEW, FILINGS 5+6

Date: 5/9/01

Developer: _____

Engineer: RICHARD ATKINS

Schedule:

Utilities: _____ **Streets:** _____

Concrete: _____ **Testing:** _____

Other: _____ **Other:** _____

Attendance: _____ _____

_____ _____

_____ _____

_____ _____

- REVISE WATER SERVICE STAMP RESULTS IN STDS. (?)
- THICKER BEDDING SPEC ?

Testing

- Pit Run Material in Utility Trenches (Proctor curve, base spec.)
- Pavement Mix Design (Prior to placing asphalt)
- Submitting Test Results (Compaction test results are to be submitted periodically)
- Compile all testing information along with a test location map and submit with as-builts at the end of the project.

- WIRE TEST SPEC^d 105.5 (UNDERGROUND UTILITIES SPECS.)

Safety

- City Observation of Safety Practices / OSHA Requirements for Trenching
- Mud Tracking Streets / Dust

Plans

- Changes – Notify Engineer and City - Submit revised plans for approval and signature by City Engineer.
- Verify grades of utilities prior to street construction (red line as-builts must be submitted to the City Utility Engineer prior to paving)
- As-built surveying of stub-outs required prior to backfill (dimension from P_L, record elevation).
- Pressure testing of sewer and water lines required prior to paving and after PSCO installs their utilities.

Other

- No inverted rings/covers
- As-built detention/retention pond certification required by engineer prior to accepting improvements.
- Acceptance of the improvements as soon after construction as possible will ensure that the contractors warranty period coincides with the City's warranty period.
- Improvements will not be accepted until all items on the "punch list" are addressed.
- Final walk-through can not be scheduled until PSCO and U.S. West are finished.
- BZ concrete and blankets required from November to April.

- STAMP WALKS W/ SERVICE LOCATIONS

VI CONSTRUCTION PHASE SUBMITTALS

A. KEY TO QUALITY Many a well-conceived idea fell short of its potential due to lack of proper implementation. Well prepared plans followed by poor or unsupervised construction may result in an undesirable project. Having adequate and competent inspection and testing during the construction process is essential and is the key to achieving a quality product. Consequently, the City requires Quality Control and Quality Assurance inspection and testing during the construction of:

1) Facilities that will become public, such as streets, sidewalks, water, sewer, and storm drains; and
2) Facilities that may ultimately impact the public at large, such as Best Management Practices, overlot grading, private detention/retention basins, and stormwater collection and conveyance.

B. QUALITY CONTROL The contractor is usually responsible to the developer for Quality Control (QC) of the construction project. City-approved plans will be of specification format, and the developer or contractor as agent shall implement whatever procedures, methods, testing, surveying, and inspection that is required in order that the work conforms to specifications.

C. QUALITY ASSURANCE Developers are responsible for providing Quality Assurance (QA) during construction of facilities which are shown on City-approved development plans. Quality Assurance typically involves a systematic inspection of work and testing of materials and compaction, all of which serve to assure the developer (and ultimately the City) that his or her contractor is providing work that is in conformance to City-approved plans and specifications.

The following is quoted from a Colorado State Board of Registration publication:

Rule XVII - Construction Supervision

Section 12-25-102(10) of the Colorado Revised Statutes defines the ".... supervision of construction for the purpose of assuring compliance with specifications and design..." as the practice of engineering. Supervision of construction for the purpose of assuring compliance with specifications and design includes, but is not limited to the following activities:

1. *Observing construction operations and interpreting the project plans and specifications to monitor compliance with the plans, specifications and the purpose of the design;*

2. *Providing or reviewing documentation concerning compliance with plans and specifications (For purposes of this rule, documentation shall include but not be limited to, shop drawings, samples, test data, and performance data for components);*

3. *Identifying design problems due to actual field conditions encountered; or*

4. *Evaluation or analysis of the testing of materials, equipment or systems for acceptance, when appropriate to the project.*

A person who is performing, or is obligated to perform, any of the above listed activities is engaging in the practice of engineering and must either be licensed as a Professional Engineer in Colorado or must be supervised by a Colorado Professional Engineer.

D. CITY INSPECTION In addition to Quality Control and Quality Assurance provided by the contractor and developer, the City reserves the right to observe the construction of facilities identified in sub-section "A" above. The developer shall notify the City Public Works Department at 244-1555 of construction activity that is ready to commence. As time permits, a City inspector will make periodic observations as the work progresses. Such inspection of work by the City does not relieve the developer nor contractor of their duties regarding inspection, monitoring, and testing.

E. CONSTRUCTION SEGMENTATION As construction proceeds, the quality or acceptability of work often depends upon the quality of work which precedes it. Hence the common practice will be required of having QC/QA inspections and approvals at various stages in the construction effort in order to avoid unnecessary removal of previous work.

F. CONSTRUCTION PHASE SUBMITTAL CHART A chart has been prepared which identifies various steps of construction activity and corresponding submittal items. Depending on the type and size of project involved, some of the items may not be necessary. The chart will be completed by City Staff, and submitted to the developer along with City-approved plans prior to the commencement of construction. Only those items with shaded-in circles will be required.

CONSTRUCTION PHASE SUBMITTAL CHART

Location:_____ Project Name:_____

STEP	ACTIVITY	SUBMITTAL ITEMS	SSID REF.
1	None	● City Approval of Construction Drawings	VII-3
		● Pre-construction Notice	VII-3
		○ Work within Public ROW Permit	VII-4
		○ NPDES Permit	VII-4
		● Improvements Agreement/Guarantee	
		○ _____	_____
2	Grading Street Rough Cut Sanitary Sewer Water Irrigation Other Utilities Subgrade Base Course Concrete Placement	○ Construction Report: Grading and Pipeline Phase	X-4
		● As-built Grading Drawing	IX-6
		● As-built Drainage Drawing	IX-5
		● As-built Water & Sewer Drawing	IX-9
		○ _____	_____
		○ Construction Report: Concrete and Pavement Preparation	X-3
		● Flowline Grade Sheets	VII-4
		● Revised Asphalt Design (if necessary)	VII-4
		● Request City Lamping of Sewerline	VII-4
3	Asphalt Pavement Traffic Control Facilities Monumentation Permanent On-Site Benchmark (Subdivisions Only)	○ Construction Report: Concrete and Pavement Placement	X-2
		● Complete Set of As-Built Drawings	IX-5 to IX-9
		● Request for City Initial Inspection	VII-4
		○ _____	_____
4	Warranty Period	● Request for City Final Inspection	VII-4

NOTES:

1. Only those submittal items which are preceded by a shaded-in circle are required for the project. At the time of construction drawing approval, City Engineering will submit to the developer one signed approved set of drawings and a copy of this form which has been completed for the specific project, and one completed copy of Form VI-4 and VI-5.

2. City Engineering approval of submittal items is required prior to commencement of subsequent steps. The City will make every effort to provide timely approvals in order to accommodate construction schedules. If information is submitted for Step 2 in a timely manner as construction proceeds, then City Engineering review of remaining items may be done within ½ working day.

City of Grand Junction
Construction Approval & Progress

Project Name: GRAND VIEW - FILING 5+6
Location: _____
Developer: _____
Engineer: RICHARD ATKINS
A Licensed Professional Engineer is required to oversee construction of public improvements.

Date Construction Plans Approved: _____
Submittal of four sets of prints is required for approval and signature. Distribution: Development Engineer, City Inspector, Community Development, Developer/Contractor.

Improvements Agreement in Place: _____

Pre-Construction Meeting: 5/9/01
1. Attendance by developer's engineer, contractor(s), testing lab, city engineering representative, city inspector is required.
2. Submit list of contractors and approximate starting dates.
3. Submit quality assurance plan for testing and inspection. A test location map will be required prior to final acceptance of work.
4. Notification of city inspector 24 hours prior to commencement of work is required.

Permit for Construction and Installation of Facilities in Public Right of Way required: _____

Date of Final Inspection : _____
Reinspections: _____
Final Acceptance: _____
Warranty Period Ends: _____

Note: City inspection of work does not relieve developer or contractor of their duties regarding inspection, monitoring, and testing.

Submittal Requirements for Final Acceptance of Improvements

The following items must be submitted prior to the acceptance of streets, drainage, and utilities by the City of Grand Junction.

X As-Built Drawings (Reference SSID IX-5,6,X,8,9) irrigation - not required

- Sealed by a Professional Engineer
- Two Blue-line copies
- One Mylar Copy
- One 3 1/2" Floppy Disk with drawing files

X Report (Reference SSID X-2,3,4)

- Testing Location Map
- Inspection Diaries
- Testing Reports

_Certification of Detention/Retention Basin (Reference SSID IX-6)

- Sealed by a Professional Engineer

Note: A one-year warranty period begins once public facilities are accepted by the City of Grand Junction. Any defects or deficiencies which occur during this period must be corrected by the developer. (Reference Zoning and Development Code 5-4-12, A-4)

REPORT CHECKLIST AND OUTLINE

CONSTRUCTION REPORT: CONCRETE AND PAVEMENT PLACEMENT

CHECKLIST	OK	NA
Size: 8½"x11" format		
Bound: Use bar or spiral binder or staple. Do not use a notebook		
Title Page: Name of report		
Exhibits: Maximum 11: high and 32" wide, bound in report and folded as required for 8½"x11" size		
Maps: Attach or place into bound pocket the maps listed below. Testing Location Maps		

OUTLINE

I INSPECTION DIARIES
- A. Concrete
  - ✓ Expansion joints
  - ✓ Finishing
  - ✓ Curing and sealing
  - ✓ Freeze protection
  - ✓ Weather conditions
  - ✓ General progress
  - ✓ Other observations
- B. Paving
  - ✓ Lift thickness
  - ✓ Joints (location and type)
  - ✓ Compaction effort
  - ✓ Surface texture and uniformity
  - ✓ Weather conditions

II TESTING (Testing frequency and methods shall be per City Specifications)
- A. Concrete
  - ✓ Air content
  - ✓ Slump
  - ✓ Compressive strength
- B. Asphalt
  - ✓ Gradation
  - ✓ Asphalt content
  - ✓ Maximum specific gravity
  - ✓ Percent relative compaction

COMMENTS

1. Submittal to the City Development Engineer of test results as they are obtained is encouraged to provide an on-going progress report. However, whether submitted previously or not, a complete set of test results and Test Location Map or exhibits as required shall be submitted bound together with inspection reports as shown above.

REPORT CHECKLIST AND OUTLINE

CONSTRUCTION REPORT: CONCRETE AND PAVEMENT PLACEMENT

CHECKLIST	OK	NA
Size: 8½"x11" format		
Bound: Use bar or spiral binder or staple. Do not use a notebook		
Title Page: Name of report		
Exhibits: Maximum 11: high and 32" wide, bound in report and folded as required for 8½"x11" size		
Maps: Attach or place into bound pocket the maps listed below. Testing Location Maps		

OUTLINE

I INSPECTION DIARIES
- ✓ Subgrade and base course compaction effort
- ✓ Materials
- ✓ Crown
- ✓ Weather
- ✓ General progress
- ✓ Other observations

II TESTING (Testing frequency and methods shall be per City Specifications)
- ✓ Subgrade compaction
- ✓ Base course compaction

COMMENTS

1. Submittal to the City Development Engineer of test results as they are obtained is encouraged to provide an on-going progress report. However, whether submitted previously or not, a complete set of test results and Test Location Map or exhibits as required shall be submitted bound together with inspection reports as shown above.

REPORT CHECKLIST AND OUTLINE

CONSTRUCTION REPORT: GRADING & PIPELINE PHASE

CHECKLIST	OK	NA
Size: 8½"x11" format		
Bound: Use bar or spiral binder or staple. Do not use a notebook (See Note 1)		
Title Page: Name of report and preparer		
Exhibits: Maximum 11: high and 32" wide, bound in report and folded as required for 8½"x11" size		
Maps: Attach or place into bound pocket the maps listed below. Testing Location Maps		

OUTLINE

I INSPECTION DIARIES
- A. Grading phase
  - ✓ Best management practices
  - ✓ Compaction effort
  - ✓ Weather conditions
  - ✓ General progress
  - ✓ Other observations
- B. Pipeline phase
  - ✓ Bedding type and placement
  - ✓ Pipeline material
  - ✓ Backfill material
  - ✓ Manholes
  - ✓ Compaction effort
  - ✓ Weather conditions
  - ✓ General progress
  - ✓ Other observations

II TESTING (Testing frequency and methods shall be per City specifications)
- A. Grading phase
  - ✓ Compaction in structural fill areas
- B. Pipeline Phase
  - ✓ Bedding compaction
  - ✓ Backfill compaction
  - ✓ Waterline pressure tests
  - ✓ Waterline chlorination
  - ✓ Sewerline pressure tests
  - ✓ Sewerline lamping results
  - ✓ Sewerline deflection (if required)

COMMENTS

1. Submittal to the City Development Engineer of test results as they are obtained is encouraged to provide an on-going progress report. However, whether submitted previously or not, a complete set of test results and Test Location Map or exhibits as required shall be submitted bound together with inspection reports as shown above.

DRAWING STANDARDS CHECKLIST

AS-BUILT DRAINAGE

	ITEM	GRAPHIC STANDARDS	OK	NA
SECTION VIII	J	Stamped and sealed drawings by registered professional ~~competent in the work~~ P.E.		
	O	As-built drawings		
	R	Neatness and legibility		

	ITEM	FEATURES	OK	NA
-	1	Use the Storm Drainage Plan and Profile as a base drawing		
ADD'L INFO	2	All vertical, horizontal, and other design information required for primary features in the Storm Drainage Plan and Profile must have corresponding as-built information provided, including elevations, station and offset, pipe and culvert slopes and distances, etc.		
	3	As-built information for all significant changes from the approved design plans		
	4	Pipe and culvert type		
	5	Space for approval signature by City Engineering with date and title.		

COMMENTS

1. As-built sketches and drawings must contain the same information. Submittal format is different, however. See Section VIII-2

DRAWING STANDARDS CHECKLIST

AS-BUILT GRADING

	ITEM	GRAPHIC STANDARDS	OK	NA
SECTION VIII	J	Stamped and sealed drawings by registered professional ~~competent in the work~~		
	O	As-built drawings		
	R	Neatness and legibility		

	ITEM	FEATURES	OK	NA
-	1	Use the Grading and Drainage Plan or Grading and Stormwater Management Plan as a base drawing		
ADD'L INFO	2	Provide as-built pad elevations for all lots that are in or are adjacent to the 100-year floodplain		
	3	Detention/retention basin as-built contours (except for where on pavement, then use as-built grading).		
	4	Volume certification of detention/retention basin		
	5	Drainage channel and swale as-built information		
	6	Space for approval signature by City Engineering with date and title		

COMMENTS

1. As-built sketches and drawings must contain the same information. Submittal format is different, however. See Section VIII-2

DRAWING STANDARDS CHECKLIST

AS-BUILT ROADWAY

ITEM		GRAPHIC STANDARDS	OK	NA
SECTION VIII	J	Stamped and sealed drawings by registered professional competent in the work		
	O	As-built drawings		
	R	Neatness and legibility		

ITEM		FEATURES	OK	NA
-	1	Use the Roadway Plan and Profile as a base drawing		
ADD'L Info	2	All vertical, horizontal, and other design information required for primary features on the Roadway Plan and Profile must have corresponding as-built information provided, including pavement width, curb/gutter/sidewalk width and type, base course, and pavement thickness, geosynthetics, sub-grade stabilization, elevations horizontal control, signalization, etc.		
	3	As-built information for all significant changes from the approved design plans		
	4	Space for approval signature by City Engineering with date and title		

COMMENTS

1. As-built sketches and drawings must contain the same information. Submittal format is different, however. See Section VIII-2

DRAWING STANDARDS CHECKLIST

AS-BUILT WATER & SEWER

ITEM		GRAPHIC STANDARDS	OK	NA
SECTION VIII	J	Stamped and sealed drawings by registered professional ~~competent in the~~ work		
	O	As-built drawings		
	R	Neatness and legibility		

ITEM		FEATURES	OK	NA
-	1	Use the Water and Sewer Plan and Profile as a base drawing		
ADD'L INFO	2	All vertical, horizontal, and other design information required for primary features on the water and Sewer Plan and Profile must have corresponding as-built information provided, including elevations, station and offset etc. for manholes, cleanouts, valves, vaults, bends, tees, crosses, fire hydrants, and other appurtenances		
	3	Ends of services (subdivisions only) must be tied to lot corners or be located by station and offset		
	4	As-built information for all significant changes from the approved design plans		
	5	Pipe type and type of pipe connections (MJ, SJ, FL, etc)		
	6	Space for approval signature by City Engineering with date and title		

COMMENTS

1. As-built sketches and drawings must contain the same information. Submittal format is different, however. See Section VIII-2

GRAND JUNCTION
LINCOLN DeVORE, Inc.
GEOTECHNICAL ENGINEERS – GEOLOGISTS

1441 Motor St.
Grand Junction, CO 81505

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

February 27, 2001

Mr. Don Dela Motte
626 Grandview Dr.
Grand Junction, CO 81506

Re: SUBSURFACE SOILS EXPLORATION

GRANDVIEW SUBDIVISION, FILING 5 & 6

GRAND JUNCTION, CO

Dear Sir:

Transmitted herein are the results of a Subsurface Soils Exploration for the proposed residential Grandview Subdivision.

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

Respectfully submitted,

GRAND JUNCTION
LINCOLN DeVORE, INC.

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

GJLD Job No. 88484-GJ

EMM/bw

SUBSURFACE SOILS EXPLORATION

GRANDVIEW SUBDIVISION, FILING 5 & 6

GRAND JUNCTION, CO

Prepared For:

DON DELA MOTTE
626 GRANDVIEW DR.
GRAND JUNCTION, CO

Prepared By:

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

February 27, 2001

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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 the additional Filings 5 and 6 to the Grandview residential subdivision in Grand Junction, CO. A vicinity map is included in the Appendix of this report.

To assist in our exploration, we were provided with a revised Development Plan prepared by Atkins and Associates, Grand Junction, CO. The Boring Location Plan attached to this report is based on that plan provided to us.

We understand that the proposed construction will probably consist of single and two story, wood framed residential structures with either half basement or no basement type construction. The no basement construction will probably entail a crawl space or a concrete slab on grade. The half basement construction will probably utilize a concrete slab on grade. Due to the potential of increasing water table elevations due to development of a school site to the east and a City park to the northeast, we do not recommend that full basements be placed on this site unless special precautions are taken to protect from ground water infiltration. Grand Junction Lincoln DeVore has not seen any building plans proposed for this area, but structures of this type typically constructed in the Grand Junction area develop wall loads on the order of 400 to 2000 plf and column loads on the order of 3000 to 15000 kips.

The characteristics of the subsurface materials encountered were evaluated with regard to the type of construction described above. Recommendations are included herein to match the described construction to the soil characteristics found. The information contained herein may or may not be valid for other purposes. If the proposed site use is changed or types of construction proposed, other than noted herein, Grand Junction Lincoln DeVore should be contacted to determine if the information in this report can be used for the new construction without further field evaluations.

PROJECT SCOPE

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

testing program, and on our experience with similar soil and geologic conditions in the area.

The scope of our geotechnical exploration consisted of a surface reconnaissance, 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 2-9-01, and consisted of a site reconnaissance by our geotechnical personnel and the drilling of 4 shallow exploration borings. These 4 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 45-B, truck mounted drill rig with continuous flight auger to depths of approximately 16 to 33 feet. Samples were taken with a standard split spoon sampler, thin wall Shelby tubes and by bulk methods. Logs describing the subsurface conditions are presented in the attached figures.

The 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.

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

ASTM D-2487 Soil Classification
ASTM D-2435 One Dimensional Consolidation
ASTM D-4546 One Dimensional Swell or Settlement Potential for Cohesive Soils
ASTM D-2937 In-Place Soil Density
ASTM D-2216 Moisture Content of Soil
ASTM D-2844 R-Value of Soils (Hveem-Carmany)

Tests were performed in accordance with test methods of the American Society for Testing and Materials or other accepted standards. The results of our laboratory tests are included in this report. The in-place soil density, moisture content and the standard penetration test values are presented on the attached drilling logs.

FINDINGS

SITE DESCRIPTION

The project site is located in the west half of the northwest Quarter in the northeast Quarter of Section 6, Township 1S, Range 1E of the Ute Principal Meridian, Mesa County, Colorado. More specifically the site is bordered on the north by Cortland Avenue and on the south by the extension and the north building lots along Hawthorne Avenue within Grandview Estates, Filing 1. These filings are positioned in a north-south direction and bisected by the extension of Tamarron Drive. Filing 5 is approximately the south half of the tract and Filing 6 is the approximate north half of the tract, both of which are separated by the extension of Ridge Drive. It is anticipated that approximately 45 to 50 lots will be plated within these two filings.

The topography of the site is relatively flat, with a slight overall gradient to the south, southwest. This site has been utilized for agricultural purposes in the past and may have been subjected to minor land leveling activity. The exact direction of surface runoff on this site will be controlled by the proposed construction and therefore will be variable. In general, surface runoff is expected to travel into Tamarron Drive and then be collected by and transported within the subdivision wide drainage system. The surface runoff will eventually enter the drainage system along 28 Road and then into a drainage system incorporating improved gullies, primarily of the Ancient Indian Wash. The drainage water is expected to travel to the southwest, eventually entering the Colorado River approximately 3 ½ miles away. Surface and subsurface drainage on this site would be described as fair to poor.

GENERAL GEOLOGY AND SUBSURFACE DESCRIPTION

The geologic materials encountered under the site consist of approximately 12 to 31 feet of soft, fine grained, unconsolidated alluvial deposits which overlie the Mancos Shale Formation which is part of a very thick sequence of sedimentary rocks. The geologic and engineering properties of the materials found in our 4 exploration borings will be discussed in the following sections.

The surface soils on this site consist of a series of silty sands and gravelly sands which are a product of mud flow/debris flow features which originate on the north-facing slopes and canyons of the Colorado National Monument. These mud flow/debris flow features are a small part of a very extensive mud flow/debris flow complex along the base of The Colorado National Monument, extending across the

Redlands Area and eventually to the Colorado River. Utilizing recent events and standard evaluation techniques, this tract is not considered to be within with an active debris flow hazard area.

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

Soil Type I was classified as a silty clay (CL-ML) under the Unified Classification System. The Standard Penetration Tests ranged from 8 blows per foot to 10 blows per foot in the upper 10 feet of the soil profile. Penetration tests of this magnitude indicate that the soil is slightly stiff and of generally low density. The moisture content in the upper 10 feet of the soil profile varied from 4.9% to 10.7%, indicating a dry (desiccated) to slightly moist soil. This soil is encountered as thin strata at greater depths and is generally found at a very moist to saturated condition below 10 feet. This soil is slightly plastic and is sensitive to changes in moisture content. These soils, during desiccation from the former seasonally wet condition during the episodes of agricultural irrigation, have shrunk during drying, have slightly densified and are slightly expansive when moistened but will undergo collapse/consolidation upon saturation. The near surface soils must be considered as somewhat over consolidated. These soils will tend to expand upon small moisture increases. Expansion/Consolidation tests using the Consolidation Apparatus, ASTM D-4546, Method C, were performed on relatively undisturbed samples of the soil, using slightly damp porous stones. Expansive pressures on the order of 660 psf, at constant volume were found to be typical, prior to sample inundation. With subsequent decreased moisture, these soils will tend to shrink, with some cracking upon desiccation. This material will also consolidate upon saturation or excessive loading. Upon test saturation, collapse of 0.63%, which should be added to the collapse of 0.7% experienced during the swell phase, was measured, with 1.33% consolidation occurring at an applied load of 1025 psf. Upon further test loading, 2.58% consolidation occurred at an applied load of 2050 psf. If recommended bearing values are not exceeded, such settlement will remain within tolerable limits. The allowable maximum bearing value was found to be on the order of 1800 psf. A minimum dead load of 700 psf will be required for the native soils. If these soils are over excavated, water conditioned, reworked and compacted according to recommendations contained in this report, the minimum bearing may be reduced to 300 psf. This soil was found to contain sulfates in detrimental quantities.

Soil Type II was classified as a lean clay (CL) under the Unified Classification System. The Standard Penetration Tests within the upper 10 feet ranged from 4 blows per foot to 10 blows per foot. Penetration tests of this magnitude indicate that the soil are soft to slightly stiff and of low to occasionally medium density. The moisture content varied from 5.4% to 20.6%, indicating a slightly moist to very moist soil. At depths below 10 feet, these soils were found to be of low to occasionally medium density and very moist to saturated. This soil is plastic and is sensitive to changes in moisture content. Some strata in the upper 10 feet of the soil profile are desiccated and have shrunk during the drying process. Some of these thin strata may experience expansive characteristics and should be considered as slightly to moderately over consolidated. This material is of low plasticity, of low to moderate permeability, and was encountered in a medium density, moist condition. If this soil is found in a relatively dry condition, it may undergo slight expansion with the entry of small amounts of moisture, but will undergo collapse/long-term consolidation upon the addition of larger amounts of moisture. This material will consolidate/collapse upon saturation or excessive loading. One Dimensional Consolidation tests using the Consolidation Apparatus, ASTM D-2435, were performed on relatively undisturbed samples of the soil. Upon test saturation, virtually no collapse was measured, with 2.14% consolidation occurring at an applied load of 1025 psf. Upon further test loading, 3.19% consolidation occurred at an applied load of 2050 psf. Some of these strata were found to be very compressible and may experience slight collapse if encountered in a desiccated condition. The maximum allowable bearing capacity for this soil was found to be 1900 psf, with 250 minimum dead load pressure recommended in the native condition. If these soils are over excavated, moisture conditioned, reworked and compacted according to recommendations contained in this report, the maximum allowable bearing capacity can be increased to 1600 psf. A minimum dead load of 250 psf will be required. The finer grained portion of Soil Type No. II contains sulfates in detrimental quantities.

The surface soils are deposited over the weathered to dense formational material of the Mancos Shale of Cretaceous Age. The Mancos Shale is described as a thin bedded, drab, light to dark gray marine shale, with thinly interbedded fine grain sandstone and siltstone layers. Some portions of the Mancos Shale are bentonitic, and therefore, are highly expansive. The majority of the shale, however, has only a low to moderate expansion potential. The formational shale was encountered in Test Boring No. 3 at a depth of 12 feet and at greater depths in the other exploration borings. It is anticipated that this formational shale will not affect the construction and the performance of shallow foundations on the site unless full basement construction is utilized in the vicinity of Test Boring No. 3.

The shale surface has varying elevations, due to being an erosional surface and the presence of ancient gullies in this area. The shale was found to be reasonably close to the surface (12 feet) in the vicinity of Test Boring No. 3 and was significantly deeper (22 to 31 feet) in the other three exploration borings.

The Mancos Shale Formation is often highly fractured, with fillings of soluble sulfate salts (Gypsum & Anhydrite) being very common. The samples obtained in this drilling program indicated many of the fractured faces and bedding planes in the shale contain sulfate salt deposits. Some seams of sulfate salts up to 1/16 inch thick were observed.

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

The soils of the weathered Mancos Shale Formation (Soil Type III) were classified as lean clay (CL) under the Unified Classification System. The shale was found to have a very weathered surface approximately 1 to 1 ½ feet thick and then became very stiff to hard. The upper 2 to 4 feet appear to have significant amounts of soluble sulfate salts which have affected the strength and swell characteristics. The moisture content was found to be 14.8% in the weathered zone within Test Hole No. 3. In the other three exploration borings, the shale surface was found to be soft and saturated and then became more stiff to hard with depth, with a corresponding decrease in the soil moisture content. This soil is plastic and is very sensitive to changes in moisture content. Upon increasing moisture, these soils will tend to expand. Expansion tests using the FHA PVC Meter were performed on remolded samples of the soil and expansive pressures on the order of 1183 psf, at 2.9% Swell were found to be typical. Expansion tests using the Consolidation Apparatus, ASTM D-4546, Method C, were performed on relatively undisturbed samples of the soil and expansive pressures on the order of 1140 psf, at constant volume were found to be typical. After reaching the maximum constant volume swell, the swell pressure 'fell back' or reduced to 440 psf. This is interpreted as the significant amounts of soluble sulfate crystals under going crushing or collapse during the swell phase of the test. The sample was subjected to additional test loads and total consolidation of 3.16%, at an applied load of 8200 psf was measured. With subsequent decreased moisture, these soils will tend to shrink, with some cracking upon desiccation. The allowable maximum bearing value for the weathered shale was found to be on the order of

7000 psf. A minimum dead load of 1500 psf will be required in the upper 2 feet of the shale profile. At greater depths into the relativley unweathered shale, the maximum allowable bearing capacity should significant increase, however, the minimum dead load will also increase, probably in close proportion to the increase in bearing capacity. This soil was found to contain sulfates in detrimental quantities.

GROUND WATER

A free water table came to equilibrium during drilling at 13 ½ to 15 feet below the present ground surface. This is probably very close to the true phreatic surface rather than a perched water table. In our opinion the subsurface water conditions shown are a permanent feature on this site. The depth to free water would be subject to fluctuation on this site depending upon external environmental effects.

Because of capillary rise, the soil zone within a few feet above the free water level identified in the borings will be quite wet. Pumping and rutting may occur during the excavation process, particularly if the bottom of the foundations are near the capillary fringe. Pumping is a temporary, quick condition caused by vibration of excavating equipment on the site. If pumping occurs, it can often be stopped by removal of the equipment and greater care exercised in the excavation process. In other cases, geotextile fabric layers can be designed or cobble sized material can be introduced into the bottom of the excavation and worked into the soft soils. Such a geotextile or cobble raft is designed to stabilize the bottom of the excavation and to provide a firm base for equipment.

Due to the proximity of the Mancos Shale Formation, there exists a possibility of a perched water table developing in the alluvial soils which overlie the Mancos Shale Formation. This perched water would probably be the result of increased irrigation due to the presence of lawns and landscaping, roof runoff and future development of the school site to the east and the City park to the northeast. The exploration holes indicate that much of the top of the Mancos Shale 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 would be the metastable condition of the upper, desiccated soils.

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 Grand Junction 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 Grand Junction Lincoln DeVore. The purpose of this observation is to determine if the subsurface soils directly below the proposed foundations are similar to those encountered in our exploration borings. If the materials below the proposed foundations differ from those encountered, are unstable, or in our opinion, are not capable of supporting the applied loads, additional recommendations could be provided at that time.

EXCAVATION & STRUCTURAL FILL

Subgrade Site preparation in all areas to receive structural fill should begin with the removal of all topsoil, vegetation, and other deleterious materials. Prior to placing any fill, the subgrade should be observed by representatives of Grand Junction Lincoln DeVore to determine if the existing vegetation has been adequately removed and that the subgrade is capable of supporting the proposed fills. The subgrade should then be scarified to a depth of 10 inches, brought to near optimum moisture conditions and compacted to at least 90%

of its maximum modified Proctor dry density [ASTM D-1557]. The moisture content of this material should be within + or - 2% of optimum moisture, as determined by ASTM D-1557.

Structural Fill In general, we recommend all structural fill in the area beneath any proposed structure or roadway be compacted to a minimum of 90% of its maximum modified Proctor dry density (ASTM D1557). We recommend that fill be placed and compacted at approximately its optimum moisture content (+/-2%) as determined by ASTM D 1557. Structural fill should be a granular, coarse grained, non-free draining, non-expansive soil. This structural fill should be placed in the overexcavated portion of this site in lifts not to exceed 6 inches after compaction. This Structural Fill must be brought to the required density by mechanical means. No soaking, jetting or puddling techniques of any type should be used in placement of fill on this site.

Non-Structural Fill We recommend that all backfill placed around the exterior of the building, and in utility trenches which are outside the perimeter of the building and not located beneath roadways or parking lots, be compacted to a minimum of 85% of its maximum modified Proctor dry density (ASTM D-1557).

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

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

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