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Date 9/16/99

Present	Scanned	
		A few items are denoted with an asterisk (*), which means they are to be scanned for permanent record on the ISYS retrieval system. In some instances, not all entries designated to be scanned, are present in the file. There are also documents specific to certain files, not found on the standard list. For this reason, a checklist has been included. **Remaining items, (not selected for scanning), will be marked present on the checklist. This index can serve as a quick guide for the contents of each file.** **Files denoted with (**) are to be located using the ISYS Query System. Planning Clearance will need to be typed in full, as well as other entries such as Ordinances, Resolutions, Board of Appeals, and etc.**
X	X	***Summary Sheet – Table of Contents**
X	X	Application form
X	X	Receipts for fees paid for anything
X	X	***Submittal checklist**
X	X	***General project report**
		Reduced copy of final plans or drawings
X	X	Reduction of assessor's map
		Evidence of title, deeds
X	X	***Mailing list**
		Public notice cards
		Record of certified mail
X	X	Legal description
		Appraisal of raw land
		Reduction of any maps – final copy
X	X	***Final reports for drainage and soils (geotechnical reports)**
		Other bound or nonbound reports
		Traffic studies
		Individual review comments from agencies
X	X	***Consolidated review comments list**
X	X	***Petitioner's response to comments**
X	X	***Staff Reports**
		***Planning Commission staff report and exhibits**
		***City Council staff report and exhibits**
		***Summary sheet of final conditions**
		***Letters and correspondence dated after the date of final approval (pertaining to change in conditions or expiration date)**

DOCUMENTS SPECIFIC TO THIS DEVELOPMENT FILE:

X		Letter from Kathy Portner to Delbert Parmenter – 5/20/97	X		Tax Notice – 6/1/95
X	X	Release of Improvements Agreement & Guarantee -**- 12/13/96	X		Vicinity Map
X	X	Release of Building Permit Hold – **-12/1/96	X		Final Plat
X	X	Drainage Report – 12/93	X		Grading and Stormwater Management Plan
X	X	Geo-technical Study	X		Utility Composite
X		Letter from Jody Kliska to Delbert Marilyn Parmenter – 10/24/96	X		Water Plan, Sewer Plan and Profile
X		Memo to Jody Kliska, Trent Prall, Hank Masterson from Kathy Portner – 12/2/96	X		Roadway Plan and Profile
X		Declaration of Covenants, Conditions and Restrictions	X		Roadway Intersection Details and Typical Broadway Section
X	X	Development Improvements Agreement - **	X		Standards Concrete Details
X		Form for approval of filing & recording of Subdivision	X		Standard Storm Drain Details
X	X	Development Improvements Agreement - **	X		Accessible Ramp and Parking Stall Details
X	X	Disbursement Agreement - **	X		Standard Water Line Details
X	X	Declaration of Covenants, Conditions and Restrictions	X		Standard Sanitary Details
X	X	Letter from Jody Kliska to Delbert & Marilyn Parmenter- 9/19/95	X	X	SITE ANALYSIS PLAN
X	X	Letter of Transmittal re: Subdivision Covenants			
X	X	Letter from Jeffrey Parker to Dan Wilson – 8/17/95			
X		Posting of Public Notice Signs			
X		Warranty Deed			
X	X	Planning Commission Minutes - ** - 9/5/95			

720 + 75[illegible] SUBMITTAL CHECKLIST

MAJOR SUBDIVISION: FINAL 2943-053-00-145

Location: F 1/2 of 29 3/8 Rd Project Name: Del Mar - Filing #2

Submittal deadline ~~July 31st~~ Aug. 1

Date Received 8/1/95

Receipt # 2708

File # FPP-95-135 PC 3/

ITEMS		DISTRIBUTION																												
DESCRIPTION	SSID REFERENCE	● City Community Development	● City Dev. Eng.	● City Utility Eng.	● City Property Agent	● City Parks/Recreation	● City Fire Department	● City Attorney	● City G.J.P.C. (8 sets)	O City Downtown Dev. Auth.	● City Police	● County Planning	O County Building Department	● County Surveyor	O Walker Field	● School Dist. #51	● Irrigation District Palisade G.V.I.	● Drainage District U.S.	● Water District U.S.	● Sewer District Central M.V.	● U.S. West	● Public Service	● GVRP	O CDOT	O Corps of Engineers	O Colorado Geologic Survey	O U.S. Postal Service	~~● Persigo WWTF~~	● TCI Cable			TOTAL REQ'D.
● Application Fee	VII-1	1																												1
● Submittal Checklist*	VII-3	1																												1
● Review Agency Cover Sheet*	VII-3	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
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● Names and Addresses*	VII-2	1																												1
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● County Treasurer's Tax Cert.	VII-1	1																												1
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O CDOT Access Permit	VII-3	1	1																											2
O 404 Permit	VII-3	1	1																											2
O Floodplain Permit*	VII-4	1	1																											2
● General Project Report	X-7	1	1	1	1	1	1	1	8	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	28
● Composite Plan	IX-10	1	2	1	1																									5
● 11"x17" Reduction Composite Plan	IX-10	1				1	1	1	8	1	1	1	1				1	1	1	1	1	1	1	1	1	1		1	1	23
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● Cover Sheet	IX-11	1	2																											3
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O Stormwater Management Plan	X-14	1	2															1						1						6
O Sewer System Design Report	X-13	1	2	1																1										5
O Water System Design Report	X-16	1	2	1															1											5
O Traffic Impact Study	X-15	1	2																				1							4
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NOTES: * An asterisk in the item description column indicates that a form is supplied by the City.

DEVELOPMENT APPLICATION

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

Receipt _____
Date _____
Rec'd By _____

File No. _____

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

PETITION	PHASE	SIZE	LOCATION	ZONE	LAND USE
☒ Subdivision Plat/Plan	☐ Minor ☒ Major ☐ Resub	0.13	29 3/8 Rd & Patterson	PR	Residential
☐ Rezone				From: To:	
☐ Planned Development	☐ ODP ☐ Prelim ☐ Final				
☐ Conditional Use					
☐ Zone of Annex					
☐ Variance					
☐ Special Use					
☐ Vacation					☐ Right-of Way ☐ Easement
☐ Revocable Permit					

☒ PROPERTY OWNER	☒ DEVELOPER	☒ REPRESENTATIVE
Delbert & Marilyn Parmenter	Del-Mar Construction	Banner Associates, Inc.
Name	Name	Name
3210 E½ Road	3210 E½ Road	2777 Crossroads Blvd.
Address	Address	Address
Clifton, CO 81520	Clifton, CO 81520	Gr. Jct., CO 81506
City/State/Zip	City/State/Zip	City/State/Zip
(970) 434-7049	(970) 434-7049	(970) 243-2242
Business Phone No.	Business Phone No.	Business Phone No.

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

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

X Ron E. Chaney BANNER ASSOC. 07-31-95
Signature of Person Completing Application — Date

X Delbert C. Parmenter 8-1-95
X Marilyn A. Parmenter 8/1/95
Signature of Property Owner(s) - attach additional sheets if necessary — Date

GENERAL PROJECT REPORT
DEL-MAR SUBDIVISION, FILING TWO

A. PROJECT DESCRIPTION

Del-Mar Subdivision is a proposed residential Planned Unit Development which will consist of 43 lots on approximately 13.3 acres. It is located at 29⅜ Road on the north side of Patterson Road and is situated in Section 5, Township 1 South, Range 1 East of the Ute Principal Meridian. Filing Two will consist of approximately 4.1 of the project with 13 lots ranging in size from 0.21 arcres to 0.28 acres.

B. PUBLIC BENEFIT

The Grand Valley in recent years has seen a steady growth in population. With this growth comes the demand for new housing. The Del-Mar Subdivision is a development that provides this need and is a logical progression of development. It is located in a area that is surrounded by existing subdivisions and makes use of parcels that have historically had no use.

C. PROJECT COMPLIANCE, COMPATIBILITY, AND IMPACT

The Preliminary Plan and Official Development Plan for the Del-Mar Subdivision was submitted in the fall of 1993 and went through the approval process of Mesa County at which time the land was also rezoned for the P.U.D. Final plans and a Final Plat were then prepared for Filing One in the spring of 1994 and also approved through the County process, however, before the plat was filed and construction could begin, the subdivision was annexed by the City of Grand Junction. With only minor modifications, the plat was filed and Filing One completed in the Spring of 1995. Although the process for approval of Filing Two is now going through the City, the plan for development has not changed. The approved Official Development Plan, as recorded, is enclosed as part of the submittal documents for Filing Two.

As stated previously, this project is a logical progression of development in the area. Located along the western boundary of the site is Cris-Mar Subdivision. This fully developed subdivision is similar in its' development, in fact the developers of Del-Mar Subdivision patterned this development after Cris-Mar. Remaining land to the north and east currently remain as agricultural. To the south, along Patterson Road, is located several subdivisions including White Subdivision, New Beginnings Subdivision, and Sroufe Subdivision.

During the initial planning of Del-Mar Subdivision, it was always planned to have two access points into the project. One would be to continue Bonito Avenue from the west as

it exits Cris-Mar, and the other access point would be off of Patterson Road. Due to an existing structure, the original location of this entrance was east of 29⅜ Road by a distance of approximately 80 feet. This offset distance was not acceptable to Mesa County making it necessary to acquire the property in which the structure was located. In doing so the plan could be revised so that 29⅜ Road be extended into the site as it is currently shown.

With the existence of these other subdivisions and the roadways, all necessary utilities are available to the site. Some of these have already been brought into the site with the construction of the first filing. For Filing Two, new connections for water and sewer will be necessary within Patterson Road. These connections have been designed and are shown on the plans for Filing Two. There will be no unusual demands on any utilities.

During the review of the Development Plan, no adverse effects on any public facilities were identified.

In preparing plans for Filing One, and meeting the necessary requirements for submittal with the County, a Subsurface Soils Investigation and a Geological Hazards Report were prepared. These reports identified existing soil types and conditions as well as any problems that may be encountered at the site. No major problems exist and design parameters are given to adequately design the subdivision. These reports are on file with City Community Development staff.

Signage within the subdivision will be in accordance with the City standards.

D. DEVELOPMENT SCHEDULE AND PHASING

As can be seen on the Official Development Plan, Del-Mar Subdivision is being proposed to be developed in four filings. As previously mentioned, Filing One was completed earlier this year. It is anticipated that Filing Two will be constructed in the fall of 1995, possibly extending into the spring of 1996. The remaining development schedule is approximately as follows:

Filing Three	Completion in the fall of 1996
Filing Four	Completion in the fall of 1997

FPP-95-125 Del Mar

BEN ZIMMERMAN
2940½ Road
Grand Junction, CO 81504-4837

STANLEY D CARLSON
606 Viewpoint Drive
Grand Junction, CO 81506-8223

PAUL S SPARKS
2926 F Road
Grand Junction, CO 81504-4837

TERRY R KIMBER
608 Wagon Way
Grand Junction, CO 81504-5287

JAMES F BARKER
608½ Wagon Way
Grand Junction, CO 81504-5287

OTIS B TESTERMAN
610 Wagon Way
Grand Junction, CO 81504-5287

BAILUS ROWLES
612 Wagon Way
Grand Junction, CO 81504-5287

TERI SLOAN
614 Wagon Way
Grand Junction, CO 81504-6954

DELBERT A PARMENTER
3210 E½ Road
Clifton, CO 81520

JAMES LEHR
2929 Bonito Avenue
Grand Junction, CO 81504

DANE D MEISENHEIMER
616 Wagon Way
Grand Junction, CO 81504-6978

GLENN A WALN
605 S Sunset Ct.
Grand Junction, CO 81504-5248

HARRY E KLINE
1346 Atigun Street
North Pole, AK 99705-5457

WILLIS L HARRISON
2925 F Road
Grand Junction, CO 81504-4855

PEDRO R FREDERICO
597 29¼ Road
Grand Junction, CO 81504-5392

DARRELL D PARKS
2926 Amethyst Ct.
Grand Junction, CO 81504

SUSAN GAIL BENAK
2928 Amethyst Ct.
Grand Junction, CO 81504

HAROLD WADKINS
2927 Amethyst Ct.
Grand Junction, CO 81504

LYLE GAURMER
2906 F Road
Grand Junction, CO 81504-5441

COLORADO DIST. OF
THE WESLEYAN CHURCH
2935 F Road
Grand Junction, CO 81504-4819

BEN E GARCIA
593 29 3/8 Road
Grand Junction, CO 81504-5385

JOHN McCOY
598 29 3/8 Road
Grand Junction, CO 81504-4929

EMIL F OPALKA
596 29 3/8 Road
Grand Junction, CO 81504-4929

MIKE M GABRIEL
594 29 3/8 Road
Grand Junction, CO 81504-4929

LOLA LOIS WALES
568½ Cindy Anne Road
Grand Junction, CO 81501-4982

JOHN P McDONOUGH
595 Colanwood Street
Grand Junction, CO 81504-4928

RICHARD H WEAVER
2942 Brand Ct.
Grand Junction, CO 81504-5360

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

October 4, 1993

Banner Associates
2777 Crossroads Blvd.
Grand Junction, CO 81506

PN: M93208GE

Attention: Mr. David Chase

Subject: Geotechnical Study for the
Proposed Del-Mar Subdivision
Grand Junction, Colorado

Mr. Banner:

Lambert and Associates is pleased to present our geotechnical engineering study for the subject project. The field study was conducted on August 27, 1993. The laboratory study was completed on October 1, 1993. The analysis was performed and the report prepared from September 27, 1992 through October 4, 1993. Our geotechnical engineering report is attached.

Section 2.0 provides a technical guide for design team members for rapid information retrieval from our report. We are available to review the geotechnical engineering aspects of your plans and specifications for the project including the earthwork specifications as discussed in this project.

We are available to provide material testing services for soil and concrete and provide foundation excavation observations during construction. We recommend that Lambert and Associates, the geotechnical engineer for the project provide material testing services to maintain continuity between design and construction phases.

If you have any questions concerning the geotechnical engineering aspects of your project please contact us. Thank you for the opportunity to perform this study for you.

Respectfully submitted,

LAMBERT AND ASSOCIATES

Norman W. Johnston, P. E.
NWJ/nr

P.O. BOX 3986
GRAND JUNCTION, CO 81502
(303) 245-6506

P.O. BOX 0045
MONTROSE, CO 81402
(303) 249-2154

463 TURNER, 104 A
DURANGO, CO 81301
(303) 259-5095

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

GEOTECHNICAL ENGINEERING STUDY

DEL-MAR SUBDIVISION

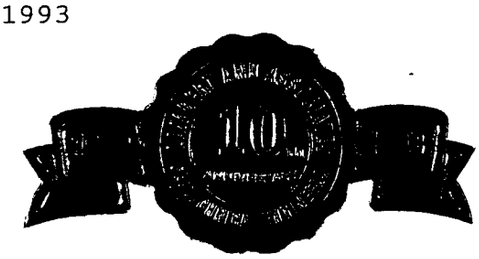
GRAND JUNCTION, COLORADO

Prepared for:

BANNER ASSOCIATES

PROJECT NUMBER: M93208GE

October 4, 1993



P.O. BOX 3986
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P.O. BOX 0045
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463 TURNER, 104 A
DURANGO, CO 81301
(303) 259-5095

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1.0 INTRODUCTION

This report presents the results of the geotechnical engineering study we conducted for the proposed Del-Mar Subdivision, Grand Junction, Colorado. The study was conducted at the request of Mr. David Chase, Banner Associates.

The conclusions, suggestions and recommendations presented in this report are based on the data gathered during our site and laboratory study and on our experience with similar soil conditions. Factual data gathered during the field and laboratory work are summarized in Appendices A and B.

1.1 Proposed Construction

It is our understanding that the proposed subdivision will consist of about forty three (43) single family lots. The proposed structures may be single and multi-story superstructures supported on concrete foundations. The proposed structures may include concrete slab-on-grade floors. The proposed subdivision will include paved streets.

1.2 Scope of Services

Our services included geotechnical engineering field and laboratory studies, analysis and report preparation for the proposed site. The scope of our services is outlined below.

- The field study consisted of describing and sampling the soils encountered in twenty three (23) auger advanced test borings at the proposed subdivision.

- The soils encountered in the test borings were described and samples retrieved for the subsequent laboratory study.

- The laboratory study included tests of select soil samples obtained during the field study to help assess the strength and swell/consolidation potential of the soils tested. A soil sample was tested for sulfate chemicals which may be potentially corrosive to concrete.

- This report presents our geotechnical engineering suggestions and recommendations for planning and design of site development including:

  . Viable foundation types for the conditions encountered,
  . Allowable bearing pressures for the foundation types,
  . Lateral earth pressure recommendations for design of laterally loaded walls, and
  . Geotechnical engineering considerations and recommendations for concrete slab-on-grade floors.

- Our recommendations and suggestions are based on the subsurface soil and ground water conditions encountered during our site and laboratory studies.

2.0 TECHNICAL GUIDE FOR DESIGN TEAM

This report contains geotechnical engineering suggestions and recommendations with background and support information. Design specific values may be difficult to locate quickly within the sections that present each design criteria. Therefore, some of the design values are discussed briefly in this section. The values presented here are a brief synopsis of the design values presented

in the appropriate sections of this report and therefore do not present all of the pertinent information for that section.

The design bearing capacity for spread footings will depend on the minimum depth of embedment of the bottom of the footing below the lowest adjacent grade and is 1000 pounds per square foot, with a minimum dead load of at least 300 pounds per square foot and a minimum depth of embedment of at least one (1) foot. The bearing capacity may be increased by about 20 percent for transient loads such as wind and seismic loads. Foundation design considerations are presented in section 5.0 and 6.0.

Monolithic slab-on-grade or mat foundations should be adequately reinforced to distribute the structure loads and soil loads evenly over the area of the monolithic slab-on-grade foundation. Mat foundations are discussed in section 6.3.

Drilled pier foundations may be used. Piers should be drilled a minimum of five (5) feet into the hard unweathered formational material and designed for end bearing only using an end bearing capacity of 20,000 pounds per square foot and a minimum dead load of 5000 pounds per square foot. Drilled pier foundations are discussed in section 6.4.

Concrete slab-on-grade floors should be separated from all bearing members and placed on a blanket of compacted structural fill which is at least one (1) foot thick. We suggest the floor slab be reinforced with welded wire mesh as a minimum reinforcement. Concrete floor slabs should be appropriately jointed. Concrete floor slabs are discussed in section 7.0.

Lateral earth pressures for the design of walls retaining soils are; active lateral earth pressure of 60 pounds per cubic foot per foot of depth, at rest lateral earth pressure of 80 pounds per cubic foot per foot of depth, passive lateral earth pressure of 240 pounds per cubic foot per foot of embedment and a coefficient of friction between the concrete and soil of 0.25 for the natural on-site soils. Lateral earth pressures are discussed in section 9.0.

We recommend that we be contacted to observe foundation excavations during construction. We are available for material testing services to test soil and concrete during construction operations.

3.0 SITE CHARACTERISTICS

Site characteristics include observed existing and pre-existing site conditions that may influence the geotechnical engineering aspects of the proposed site development.

3.1 Site Location

The proposed subdivision site is located north of Patterson Road, east of 29 1/4 Road, Grand Junction, Colorado. A project vicinity map is shown on Figure 1.

3.2 Site Conditions

The proposed subdivision slopes down to the south at inclinations of 20 to 1 (horizontal to vertical) or flatter. The site contains several abandoned irrigation ditches and an active irrigation ditch along the north and east edge of the proposed development. The site contains a sparse cover of dryland vegetation with some trees located near irrigation ditches. The site appears to have been used for agricultural purposes in the recent past. Several small buildings in various states of repair are located in the south portion of the proposed development.

3.3 Subsurface Conditions

The subsurface exploration consisted of observing, describing and sampling the soils encountered in twenty three (23) test

borings. The approximate locations of the test borings are shown on Figure 2. The logs describing the soils encountered in the test borings are presented in Appendix A.

The soils encountered in the test borings consisted generally of silty clay to a depth of about twelve (12) feet to twenty (20) feet. The silty clay soils tested have a low swell potential when wetted and may consolidate under light to moderate building loads.

Formational material was encountered in test borings 8, 9, 10, 11, 17, 19, 21, 22 and 23 at depths of fourteen (14), fifteen (15), fifteen and one half (15 1/2), eighteen (18), eighteen (18), eighteen (18), sixteen (16) twelve (12) and twelve and one half (12 1/2) feet respectfully. No formational material was encountered in the remaining test borings to depths ranging from five (5) to twenty (20) feet. The formational material encountered was a silty clay shale of the Mancos formation. The Mancos shale typically has a moderate to high swell potential when wetted.

Free subsurface water was encountered in test borings 1, 5, 8, 9, 10, 11, 17, 18, 19, 20, 21, 22 and 23 at depths of eighteen (18), sixteen (16), nine (9), nine (9), nine (9), nine (9), nine (9), nine (9), five (5), five (5) five (5), five (5) and five (5) respectively at the time of our field study. No free subsurface

water was encountered in the remaining test borings at the time of our field study.

4.0 ON-SITE DEVELOPMENT CONSIDERATIONS

We anticipate that the subsurface water elevation may fluctuate with seasonal and other varying conditions. Deep excavations may encounter subsurface water and soils that tend to cave. It may be necessary to dewater construction excavations to provide more suitable working conditions. Excavations should be well braced or sloped to prevent wall collapse. Federal, state and local safety codes should be observed.

Organic soils were encountered in the test borings. The organic soils are not suitable for support of the structure or structural components. The organic soils should be removed prior to foundation construction.

It has been our experience that sites in developed areas may contain existing subterranean structures or poor quality man-placed fill. If subterranean structures or poor quality man-placed fill are suspected or encountered, they should be removed and replaced with compacted structural fill as discussed under COMPACTED STRUCTURAL FILL below.

5.0 FOUNDATION DISCUSSION

Two criteria for any foundation which must be satisfied for satisfactory foundation performance are:

1) contact stresses must be low enough to preclude shear failure of the foundation soils which would result in lateral movement of the soils from beneath the foundation, and

2) settlement or heave of the foundation must be within amounts tolerable to the superstructure.

The soils encountered in the test borings have varying engineering characteristics that may influence the design and construction considerations of the foundations. The characteristics include swell potential, settlement potential, bearing capacity and the bearing conditions of the soils supporting the foundations. The general discussion below is intended to increase the readers familiarity with characteristics that can influence any structure.

5.1 Swell Potential

Some of the materials encountered in the test borings at the anticipated foundation depth may have swell potential. Swell potential is the tendency of the soil to increase in volume when it becomes wetted. The volume change occurs as moisture is absorbed into the soil and water molecules become attached to or adsorbed by

the individual clay platlets. Associated with the process of volume change is swell pressure. The swell pressure is the force the soil applies on its surroundings when moisture is absorbed into the soil. Foundation design considerations concerning swelling soils include structure tolerance to movement and dead load pressures to help restrict uplift. The structure's tolerance to movement should be addressed by the structural engineer and is dependent upon many facets of the design including the overall structural concept and the building material. The uplift forces or pressure due to wetted clay soils can be addressed by designing the foundations with a minimum dead load. Suggestions and recommendations for design dead load are presented below.

5.2 Settlement Potential

Settlement potential of a soil is the tendency for the soil to experience volume change when subjected to a load. Settlement is characterized by downward movement of all or a portion of the supported structure as the soil particles move closer together resulting in decreased soil volume. Settlement potential is a function of foundation loads, depth of footing embedment, the width of the footing and the settlement potential or compressibility of the influenced soil. Foundation design considerations concerning

settlement potential include the amount of movement tolerable to the structure and the design and construction concepts to help reduce the potential movement. The settlement potential of the foundation can be reduced by reducing foundation pressures and/or by placing the foundations on a blanket of compacted structural fill. The anticipated post construction settlement potential and suggested compacted fill thickness recommendations are based on site specific soil conditions and are presented below.

5.3 Soil Support Characteristics

The soil bearing capacity is a function of the engineering properties of the soil material supporting the foundations, the foundation width, the depth of embedment of the bottom of the foundation below the lowest adjacent grade, the influence of the ground water and the amount of settlement tolerable to the structure. Soil bearing capacity and associated minimum depth of embedment are presented below.

The foundation for the structure should be placed on relatively uniform bearing conditions. Varying support characteristics of the soils supporting the foundation may result in nonuniform or differential performance of the foundation. The influence of nonuniform bearing conditions may be reduced by

placing the foundation members on a blanket of compacted structural fill. Suggestions and recommendations for constructing compacted structural fill are presented under COMPACTED STRUCTURAL FILL below.

6.0 FOUNDATION RECOMMENDATIONS

We have analyzed spread footings, drilled piers and mat foundations as potential foundation systems for the proposed structures. These are discussed below.

6.1 Spread Footings

The structures may be founded on spread footings which are placed either on the natural undisturbed soils or a blanket of compacted structural fill. The blanket of compacted structural fill is to help reduce the anticipated post construction settlement. The anticipated post construction settlement and associated fill thickness supporting the footings are presented below. If the footings are supported on a blanket of compacted structural fill the blanket of compacted structural fill should extend beyond each edge of each footing a distance at least equal to the fill thickness. This concept is shown on Figure 3. Geotechnical engineering recommendations for constructing compacted structural fill are presented below. The bearing capacity will

depend on the minimum depth of embedment of the bottom of the footing below the lowest adjacent grade. The embedment concept is shown on Figure 4. The footings may be designed using a bearing capacity of 1000 pounds per square foot and a minimum dead load of 300 pounds per square foot and a minimum depth of embedment for all footings of at least one (1) foot below the lowest adjacent grade when placed either on the natural undisturbed soils or a blanket of compacted structural fill.

The minimum depth of embedment is sufficient only to develop the bearing capacity for design purposes. Actual design and construction should result in interior footings with one (1) foot or more embedment and exterior footings with frost depth or more embedment. Typically deeper embedment will increase bearing capacity and decrease post construction settlement.

The bearing capacity may be increased by about 20 percent for transient loads such as wind and seismic loads.

We suggest that you consider supporting interior column loads on continuous spread footings which are structurally tied to the other foundation members. This is to provide more uniform performance of the interior footings with respect to the other

foundation members and help reduce the potential differential settlement between interior and exterior foundation members.

The anticipated post construction settlement may be reduced by placing the footings on a blanket of compacted structural fill. The anticipated post construction settlement and associated thickness of compacted structural fill are presented below.

THICKNESS OF COMPACTED STRUCTURAL FILL SUPPORTING FOOTINGS	ANTICIPATED POST CONSTRUCTION SETTLEMENT (INCHES)
0	about 2/3
*B/2	about 1/2
B	about 1/3

*B is equal to the footing width

The tabulated settlements are theoretical only. Actual settlement could vary throughout the site and with time.

We anticipate that about one half (1/2) to two thirds (2/3) of the above settlement could occur as differential settlement.

We recommend that we be contacted to observe the foundation excavations and backfill operations during construction to verify the soil support conditions and our recommendations. If necessary we will then revise our recommendations based on our observations.

6.2 General Spread Footing Considerations

In our analysis it was necessary to assume that the material encountered in the test borings extended throughout the building site and to a depth below the maximum depth of the influence of the footings. We should be contacted to observe the soils exposed in the foundation excavations prior to placement of foundations to verify the assumptions made during our analysis.

The bottom of any footings exposed to freezing temperatures should be placed below the maximum depth of frost penetration for the area. Refer to the local building code for details.

The bottom of the foundation excavations should be proof rolled or proof compacted prior to placing compacted structural fill or foundation concrete. The proof rolling is to help reduce the influence of any disturbance that may occur during the excavation operations. Any areas of loose, low density or yielding soils evidenced during the proof rolling operation should be removed and replaced with compacted structural fill. Caution should be exercised during the proof rolling operations. Excess proof rolling may increase pore pressure of the soil and degrade the integrity of the soils.

All footings should be proportioned as much as practicable to reduce the post construction differential settlement. Footings for large localized loads should be designed for bearing pressures and footing dimensions in the range of adjacent footings to reduce the potential for differential settlement. We are available to discuss this with you.

Foundation walls may be reinforced for geotechnical purposes. We suggest at least two (2) number 5 bars, continuous at the top and the bottom (4 bars total), at maximum vertical spacing. This will help provide the walls with additional beam strength and help reduce the effects of slight differential settlement. The walls may need additional reinforcing steel for structural purposes. The structural engineer should be consulted for foundation design. The structural engineering reinforcing design tailored for this project will be more appropriate than the suggestions presented above.

6.3 Mat Foundations

The structures may be supported on reinforced concrete slab-on-grade mat foundations. The mat foundations should be structurally reinforced to distribute the building loads over the entire area of the mat foundations. The mat foundations should be

designed using a bearing capacity of 500 pounds per square foot. The area of the mat foundations should be stripped of all organic material and loose poor quality man-placed fill and proof compacted prior to placement of foundation concrete.

6.4 Drilled Piers

Drilled piers or caissons that are drilled into the unweathered formational material may be used to support the proposed structure. The piers should be drilled into the formational material a distance equal to at least two (2) pier diameters, or five (5) feet, whichever is deeper. The piers should be designed as end bearing piers using a formational material bearing capacity of 20,000 pounds per square foot and a side friction of 2,000 pounds per square foot for the portion of the pier in the unweathered formational material. The drilled piers should be designed with a minimum dead load of 5000 pounds per square foot.

We suggest that piers be designed using end bearing capacity only. The side shear may be used for the design to resist uplift forces. When using skin friction for bearing support or resisting uplift we suggest that you discount the upper portion of the pier

embedment in the formational material to a depth of at least one and one half (1 1/2) pier diameters into the formational material.

The bottom of the pier holes should be cleaned to insure that all loose and disturbed materials are removed prior to placing pier concrete. Because of the rebounding potential in the formational materials when unloaded by excavation and the possibility of desiccation of the newly exposed material we suggest that concrete be placed in the pier holes immediately after excavation and cleaning.

If the piers are designed and constructed as discussed above we anticipate that the post construction settlement potential of each pier may be less than about one quarter (1/4) inch.

The portion of the pier above the formational surface and in the weathered formational material should be cased with a sono tube or similar casing to help prevent flaring on the top of the pier holes and help provide a positive separation of the pier concrete and the adjacent soils. Construction of the piers should include extreme care to prevent flaring of the top of the piers. This is to help reduce the potential of swelling soils to impose uplift forces which will put the pier in tension. The drilled piers should be vertically reinforced to provide tensile strength in the

piers should swelling on-site soils apply tensile forces on the piers. The structural engineer should be consulted to provide structural design recommendations.

Grade beams between piers should be provided with void spaces between the soil and the grade beam. The grade beam should not come in contact with the soils. Separation is to help reduce the potential for heave of the foundations should the soils swell.

Free ground water and caving soils were encountered in the test borings at the time of the field study. We anticipate that ground water will be encountered in the pier holes. Our experience in the area indicates that fractured layers may exist in the formational material and that the fractured layers may carry or store water. If ground water is encountered, the pier holes should be dewatered prior to placing pier concrete and no pier concrete should be placed when more than six (6) inches of water exists in the bottom of the pier holes. The piers should be filled with a tremie placed concrete immediately after the drilling and cleaning operation is complete. It may be necessary to case the pier holes with temporary casing to prevent caving during pier construction.

The structural engineer should be consulted to provide structural design recommendations for the drilled piers and grade beam foundation system.

7.0 INTERIOR FLOOR SLAB DISCUSSION

It is our understanding that, as currently planned, the floor may be either a concrete slab-on-grade or a supported structural floors. The natural soils that will support interior floor slabs are stable at their natural moisture content. However, the owner should realize that when wetted, the site soils may experience volume changes. It is our understanding that concrete slab-on-grade garage floors may be included in the construction. The geotechnical engineering suggestions and recommendations for interior floor slabs presented below are appropriate for garage floor slabs.

Concrete flatwork, such as concrete slab-on-grade floors, should be underlain by compacted structural fill. The layer of compacted fill should be at least one (1) foot thick and constructed as discussed under COMPACTED STRUCTURAL FILL below.

The natural soils exposed in the areas supporting concrete slab-on-grade floors should be kept moist during construction prior to placement of concrete slab-on-grade floors. This is to help

increase the moisture regime of the potentially expansive soils supporting floor slabs and help reduce the expansion potential of the soils. We are available to discuss this concept with you.

Concrete slab-on-grade floors should be provided with a positive separation, such as a slip joint, from all bearing members and utility lines to allow their independent movements and to help reduce possible damage that could be caused by movement of soils supporting interior slabs. The floor slab should be constructed as a floating slab. All water and sewer pipe lines should be isolated from the slab. Any equipment placed on the floating floor slab should be constructed with flexible joints to accommodate future movement of the floor slab with respect to the structure. We suggest partitions constructed on the concrete slab-on-grade floors be provided with a void space above or below the partitions to relieve stresses induced by elevation changes in the floor slab. The void space concept is shown on Figure 5.

The concrete slabs should be scored or jointed to help define the locations of any cracking. We recommend that joint spacing be designed as outlined in ACI 224R. In addition joints should be scored in the floors a distance of about three (3) feet from, and parallel to, the walls.

If moisture migration through the concrete slab-on-grade floors will adversely influence the performance of the floor or floor coverings a moisture barrier may be installed beneath the floor slab to help discourage capillary and vapor moisture rise through the floor slab. The moisture barrier may consist of a heavy plastic membrane, six (6) mil or greater, protected on the top and bottom by at least two (2) inches of clean sand. The plastic membrane should be lapped and taped or glued and protected from punctures during construction.

The Portland Cement Association suggests that welded wire reinforcing mesh is not necessary in concrete slab-on-grade floors when properly jointed. It is our opinion that welded wire mesh may help improve the integrity of the slab-on-grade floors. We suggest that concrete slab-on-grade floors should be reinforced, for geotechnical purposes, with at least 6 x 6 - W2.9 x W2.9 (6 x 6 - 6 x 6) welded wire mesh positioned midway in the slab. The structural engineer should be contacted for structural design of floor slabs.

8.0 COMPACTED STRUCTURAL FILL

Compacted structural fill is typically a material which is constructed for direct support of structures or structural components.

There are several material characteristics which should be examined before choosing a material for potential use as compacted structural fill. These characteristics include; the size of the larger particles, the engineering characteristics of the fine grained portion of material matrix, the moisture content that the material will need to be for compaction with respect to the existing initial moisture content, the organic content of the material, and the items that influence the cost to use the material.

Compacted fill should be a non-expansive material with the maximum aggregate size less than about two (2) inches and less than about twenty five (25) percent coarser than three quarter (3/4) inch size.

The reason for the maximum size is that larger sizes may have too great an influence on the compaction characteristics of the material and may also impose point loads on the footings or floor slabs that are in contact with the material. Frequently pit-run

material or crushed aggregate material is used for structural fill material. Pit-run material may be satisfactory, however crushed aggregate material with angular grains is preferable. Angular particles tend to interlock with each other better than rounded particles.

The fine grained portion of the fill material will have a significant influence on the performance of the fill. Material which has a fine grained matrix composed of silt and/or clay which exhibits expansive characteristics should be avoided for use as structural fill. The moisture content of the material should be monitored during construction and maintained near optimum moisture content for compaction of the material.

Soil with an appreciable organic content may not perform adequately for use as structural fill material due to the compressibility of the material and ultimately due to the decay of the organic portion of the material.

The natural on-site soils are not suitable for use as compacted structural fill material supporting building or structure members because of their clay content and swell potential. The natural on-site soils may be used as compacted fill in areas that

will not influence the structure such as to establish general site grade. We are available to discuss this with you.

All areas to receive compacted structural fill should be properly prepared prior to fill placement. The preparation should include removal of all organic or deleterious material and the areas to receive fill should be proof rolled after the organic deleterious material has been removed and the area moisture conditioned, if needed. Any areas of soft, yielding, or low density soil, evidenced during the proof rolling operation should be removed. The area excavated to receive fill should be moisture conditioned to wet of optimum moisture content as part of the preparation to receive fill. Fill should be moisture conditioned, placed in thin lifts not exceeding six (6) inches in compacted thickness and compacted to at least 90 percent of maximum dry density as defined by ASTM D1557, modified Proctor.

We recommend that the geotechnical engineer or his representative be present during the proof rolling and fill placement operations to observe and test the material.

9.0 LATERAL EARTH PRESSURES

Free subsurface water was encountered in some of the test borings at shallow and varying depths. We anticipate that the

ground water will vary with seasonal and irrigation influences. For this reason, we do not suggest constructing basements in areas where shallow ground water may be encountered. If basements will be constructed we should be contacted to provide geotechnical engineering considerations and recommendations for lateral earth pressures and basement construction.

10.0 PAVEMENT SECTION THICKNESS DESIGN RECOMMENDATIONS

It is our understanding that paved roadways will be constructed for the site.

Pavement sections tabulated below are based on estimated traffic volume and the subgrade resistance value (R-Value) obtained from test results of samples retrieved from the site. The R-Values were calculated from California Bearing Ratios (CBR) of 3 using "Thickness Design-Asphalt Pavements for Highways and Streets", by the Asphalt Institute, Manual Series Number 1, (MS-1) dated September, 1981. The R-Value used in our analysis was 5. The suggested pavement design thicknesses are tabulated below.

ASPHALTIC CONCRETE (INCHES)	CLASS 6 OR EQUIVALENT AGGREGATE BASE COURSE (INCHES)	CLASS 2 OR EQUIVALENT AGGREGATE BASE COURSE (INCHES)	RECONDITIONED SUBGRADE (INCHES)
2 1/2	4	8	12
2 1/2	10	0	12
3	4	6	12
3	8 1/2	---	12
5 1/2	---	---	12

Pavement design section of less than three (3) inches of asphalt over aggregate base course may be used, although, because of the shorter life before maintenance and the relatively poor long term performance, we suggest that this be considered as a intermediate design section only. If a lesser design section is used we suggest you consider a later asphalt overly of about one (1) to one and one half (1 1/2) inches to extend the life of the pavement section. The overlay should be constructed prior to any visible distress occurring in the pavement.

We suggest that the construction of the pavement section be done after the completion of other construction activities on the site. The reason for this is that the above sections are not

designed to accommodate high frequency heavy vehicle loads which are often associated with construction operations.

Prior to the construction of the pavement section the areas for pavement should be stripped of vegetation, any existing poor quality fill, debris or any deleterious materials. The subgrade soils exposed by stripping operations should be scarified to a depth of at least six (6) inches and replaced with compacted fill to subgrade elevation or scarified to one (1) foot below subgrade elevation and recompacted, whichever will provide at least one (1) foot of reconditioned subgrade soil. The subgrade soil should be moisture conditioned prior to compaction and should be compacted to at least ninety (90) percent of maximum dry density as defined by ASTM D1557, modified Proctor density.

The aggregate base course material and aggregate subbase course material should conform to Colorado State Highway Specifications for Class 6 and Class 2 or similar materials, respectively. We recommend material testing of these products prior to their use to determine conformance with the specifications. The base course and subbase course materials should be moisture conditioned prior to compaction and individual lift thickness during compaction should not exceed six (6) inches.

The base course and subbase course materials should be compacted to at least ninety (90) percent of maximum dry density as defined by ASTM D1557, modified Proctor density.

Asphalt pavement materials should be mixed from an approved mix design stating the Marshall properties, optimum asphalt content, job mix formula, recommended mixing and placing temperatures, and the date of the mix design. We recommend verification testing of the mix design prior to paving. The asphalt materials should be placed in lifts not exceeding three (3) inches and compacted to a maximum of ninety-five (95) percent of the Marshall density. Rolling patterns for compaction should be established during pavement construction to help determine proper compaction technique.

10.1 Rigid Pavement Thickness Design Recommendations

Our pavement thickness recommendations for rigid Portland cement concrete pavement are based on an assumed traffic volume, and a modulus of subgrade reaction obtained from the California Bearing Ratio test performed on the subgrade soil sample obtained during our field study. A modulus of subgrade reaction of 90 psi/inch was used in our analysis. The rigid pavement may be designed using a concrete thickness of four (4) inches.

The concrete should be supported on prepared subgrade which is at least one (1) foot thick. The prepared subgrade should consist of either compacted structural fill to establish subgrade elevation or of natural soils which are scarified to a depth of one (1) foot moisture conditioned to near optimum moisture content and recompacted to at least 90 percent of the maximum dry density as defined by ASTM D1557, modified moisture density relationship test. If during subgrade preparation any loose or yielding area or any areas of poorly constructed man-placed fill are encountered they should be removed and replaced with compacted structural fill. Suggestions for constructing compacted structural fill are presented below.

The Portland cement concrete should be from an approved concrete mix design stating the proportions and mixtures of the mix. We recommend verification of the mix design prior to paving. The coarse and fine aggregate used in the concrete mix should be tested for their suitability for use as concrete aggregate.

The concrete pavement should be appropriately jointed and structurally reinforced to help control the location of cracking. The structural engineer should be contacted to provide structural

design recommendations or structural reinforcement and joint design of the concrete pavement.

11.0 BACKFILL

Backfill areas and utility trench backfill should be constructed such that the backfill will not settle after completion of construction, and that the backfill is relatively impervious for the upper few feet. The backfill material should be free of trash and other deleterious material. It should be moisture conditioned and compacted to at least 90 percent relative compaction using a modified Proctor density (ASTM D1557). Only enough water should be added to the backfill material to allow proper compaction. Do not pond, puddle, float or jet backfill soils.

Improperly placed backfill material will allow water migration more easily than properly recompacted fill. Improperly compacted fill is likely to settle creating a low surface area which further enhances water accumulation and subsequent migration to the foundation soils.

Backfill placement techniques should not jeopardize the integrity of existing structural members. We recommend recently constructed concrete structural members be appropriately cured prior to adjacent backfilling.

12.0 SURFACE DRAINAGE

The foundation soils should be prevented from becoming wetted after construction. This can be aided by providing positive and rapid drainage of surface water away from the structure.

The final grade of the ground surface adjacent to the structures should have a definite slope away from the foundation walls on all sides. We suggest a minimum fall of about one (1) foot in the first ten (10) feet away from the foundation. Downspouts and faucets should discharge onto splash blocks that extend beyond the limits of the backfill areas. Splash blocks should be sloped away from the foundation walls. Snow storage areas should not be located next to the structure. Proper surface drainage should be maintained from the onset of construction through the proposed project life.

13.0 LANDSCAPE IRRIGATION

An irrigation system should not be installed next to foundation walls, concrete flatwork or asphalt paved areas. If an irrigation system is installed, the system should be placed so that the irrigation water does not fall or flow near foundation walls, flatwork or pavements. The amount of irrigation water should be controlled.

We recommend that wherever possible xeriscaping concepts be used. Generally the xeriscape includes planning and design concepts which will reduce irrigation water. The reason we suggest xeriscape concepts for landscaping is because the reduced landscape water will decrease the potential for water to influence the long term performance of the structure foundations and flatwork. Many publications are available which discuss xeriscape. Colorado State University Cooperative Extension has several useful publications and most landscape architects are familiar with the subject.

14.0 SOIL CORROSIVITY TO CONCRETE

Chemical tests were performed on a sample of soil obtained during the field study. The soil sample was tested for pH, water soluble sulfates, and total dissolved salts. The results are presented in Appendix B. The test results indicate a water soluble sulfate content of 0.328 to 1.87 percent. Based on the American Concrete Institute (ACI) information a water soluble sulfate content of 0.328 to 1.87 percent indicates sever exposure to sulfate attack on concrete. We suggest sulfate resistant cement be used in concrete which will be in contact with the on-site soils. American Concrete Institute recommendations for sulfate resistant cement based on the water soluble sulfate content should be used.

The American Concrete Institute recommends a maximum water/cement ratio of 0.45 for concrete where severe exposure to sulfate attack will occur.

15.0 POST DESIGN CONSIDERATIONS

The project geotechnical engineer should be consulted during construction of the project to observe site conditions and open excavations during construction and to provide materials testing of soil and concrete.

This subsurface soil and foundation condition study is based on limited sampling, therefore it is necessary to assume that the subsurface conditions do not vary greatly from those encountered in the field study. Our experience has shown that significant variations are likely to exist and can become apparent only during additional on-site excavation. For this reason, and because of our familiarity with the project, Lambert and Associates should be retained to observe foundation excavations prior to foundation construction, to observe the geotechnical engineering aspects of the construction and to be available in the event any unusual or unexpected conditions are encountered. The cost of the geotechnical engineering observations and material testing during construction or additional engineering consultation is not included

in the fee for this report. We recommend that your construction budget include site visits early during construction schedule for the project geotechnical engineer to observe foundation excavations and for additional site visits to test compacted soil.

We recommend that the observation and material testing services during construction be retained by the owner or the owner's engineer or architect, not the contractor, to maintain third party credibility. We are experienced and available to provide material testing services. We have included a copy of a report prepared by Van Gilder Insurance which discusses testing services during construction. It is our opinion that the owner, architect and engineer be familiar with the information. If you have any questions regarding this concept please contact us.

We suggest that your construction plans and schedule include provisions for geotechnical engineering observations and material testing during construction and your budget reflect these provisions.

It is difficult to predict if unexpected subsurface conditions will be encountered during construction. Since such conditions may be found we suggest that the owner and the contractor make

provisions in their budget and construction schedule to accommodate unexpected subsurface conditions.

15.1 Structural Fill Quality

It is our understanding that the proposed development may include compacted structural fill. The quality of compacted structural fill will depend on the type of material used as structural fill, fill lift thickness, fill moisture condition and compactive effort used during construction of the structural fill. Engineering observation and testing of structural fill is essential as an aid to safeguard the quality and performance of the structural fill.

Testing of the structural fill normally includes tests to determine the grain size distribution, swell potential and moisture-density relationship of the fill material to verify its suitability for use as structural fill and in-place moisture content and dry density to determine the relative compaction of the structural fill. We recommend that your budget include provisions for observation and testing of structural fill during construction.

15.2 Concrete Quality

It is our understanding current plans include reinforced structural concrete for foundations and walls, and may include

concrete slabs-on-grade and pavement. To insure concrete members perform as intended the structural engineer should be consulted and should address factors such as design loadings, anticipated movement and deformations.

The quality of concrete is influenced by proportioning of the concrete mix, placement, consolidation and curing. Desirable qualities of concrete include compressive strength, water tightness and resistance to weathering. Engineering observations and testing of concrete during construction is essential as an aid to safeguard the quality of the completed concrete.

Testing of the concrete is normally performed to determine compressive strength, entrained air content, slump and temperature. We recommend that your budget include provisions for testing of concrete during construction.

16.0 LIMITATIONS

It is the owner's and the owner's representatives responsibility to read this report and become familiar with the recommendations and suggestions presented. We should be contacted if any questions arise concerning the geotechnical engineering aspects of this project as a result of the information presented in this report.

The recommendations outlined above are based on our understanding of the currently proposed construction. We are available to discuss the details of our recommendations with you, and revise them where necessary. This geotechnical engineering report is based on the proposed site development and scope of services as provided to us by Mr. David Chase, Banner Associates, on the type of construction planned, existing site conditions at the time of the field study, and on our findings. Should the planned, proposed use of the site be altered, Lambert and Associates must be contacted, since any such changes may make our suggestions and recommendations given inappropriate. This report should be used ONLY for the planned development for which this report was tailored and prepared, and ONLY to meet information needs of the owner and the owner's representatives. In the event that any changes in the future design or location of the building are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report are modified or verified in writing. It is recommended that the geotechnical engineer be provided the opportunity for a general review of the final project design and specifications in order that the earthwork and

foundation recommendations may be properly interpreted and implemented in the design and specifications.

This report does not provide earthwork specifications. We can provide guidelines for your use in preparing project specific earthwork specifications. Please contact us if you need these for your project.

This report presents both suggestions and recommendations. The suggestions are presented so that the owner and the owner's representatives may compare the cost to the potential risk or benefit for the suggested procedures.

We represent that our services were performed within the limits prescribed by you and with the usual thoroughness and competence of the current accepted practice of the geotechnical engineering profession in the area. No warranty or representation either expressed or implied is included or intended in this report or our contract. We are available to discuss our findings with you. If you have any questions please contact us. The supporting data for this report is included in the accompanying figures and appendices.

This report is a product of Lambert and Associates. Excerpts from this report used in other documents may not convey the intent

or proper concepts when taken out of context or they may be misinterpreted or used incorrectly. Reproduction, in part or whole, of this document without prior written consent of Lambert and Associates is prohibited.

This report and information presented can be used only for this site, for this proposed development and only for the client for which our work was performed. Any other circumstances are not appropriate applications of this information. Other development plans will require project specific review by us of the project.

We have enclosed a copy of a brief discussion about geotechnical reports published by Association of Soil and Foundation Engineers for your reference.

Please call when further consultation or observations and tests are required.

If you have any questions concerning this report or if we may be of further assistance, please contact us.

Respectfully submitted;

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THE PROFESSIONAL LIABILITY PERSPECTIVE

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WHO HIRES THE TESTING LABORATORY?

It is one of those relatively small details in the overall scheme of things. Independent testing may be required by local building codes, or it may be insisted upon by lenders. Additional testing can usually be ordered by the design team during construction. Whatever the source of the requirement, many owners perceive it to be an unnecessary burden—an additional cost imposed principally for someone else's benefit.

What does this have to do with you? You may be the only one in a position to influence the use of testing and inspection services so they become more, rather than less likely to contribute to a successful outcome. There seems to be an almost irresistible inclination on the part of some owners to cast aside their potential value to the project in favor of the administrative and financial convenience of placing responsibility for their delivery into the hands of the general contractor.

Resist this inclination where you can. It is not in your client's best interests, and it is certainly not in yours. There are important issues of quality and even more important issues of life safety at stake. In the complex environment of today's construction arena, it makes very little sense for either of you to give up your control of quality control. Yet it happens altogether too often.

What's Behind this Misadventure?

The culprit seems to be the Federal Government. In the 1960's, someone came up with the idea that millions could be saved by eliminating the jobs of Federal workers engaged in construction inspection. The procurement model used to support this stroke of genius was the manufacturing segment of the economy, where producers of goods purchased by the Government had been required for years to conduct their own quality assurance programs. The result was a trendy new concept in Federal construction known as Contractor Quality Control (CQC).

It was a dumb idea. Costs were simply shifted from the Federal payroll to capital improvement budgets. Government contractors, selected on the basis of the lowest bid, were handed resources to assure the quality of their own performance. Some did so; many did not. All found themselves caught up in an impossible conflict between the demands of time and cost, on one hand, and the dictates of quality, on the other.

CQC was opposed by the Associated General Contractors of America, by independent testing laboratories, by the design professions, and by those charged with front-line responsibility for quality control in the Federal Agencies. Eventually, even the General Accounting Office came to the conclusion that it ought to be abandoned. But, once set in motion and fueled by the pervasive influence of the Federal Government, the idea spread—first to state and local governments; finally, to the private sector.

Why would the private sector embrace such an ill-conceived notion? Because so many

owners view testing and inspection as an undertaking which simply duplicates something they are entitled to in any event. They are confident they will be protected by contract documents which cover every detail and contingency. They look to local building inspectors to assure compliance with codes. And they fully expect the design team to fulfill its obligation to safeguard the quality of the work.

A Fox in the Henhouse

If testing is perceived as little more than an unnecessary, but unavoidable expense, why not make the general contractor responsible for controlling the cost? It may produce a savings, and it certainly eliminates an adminstrative headache. If contractual obligations dealing with the project schedule and budget can be enforced, surely those governing quality can be enforced, as well. Possibly so, but who is going to do it?

Some testing consultants will not accept CQC work. The reasons they give come from firsthand experience. They include: 1) inadequate to barely adequate scope, 2) selection based on the lowest bid; 3) non-negotiable contract terms inappropriate to the delivery of a professional service; 4) intimidation of inspectors by field supervisors; and 5) suppression of low or failing test results. This ought to be fair warning to any owner.

Keeping Both Hands on the Wheel

The largest part of the problem, from your point of view, is one of artful persuasion. If you cannot convince your client of the value of independent testing and inspection, no one can. Yet, if you do not, you are likely to find yourself responsible for an assurance of quality you are in no position to deliver. How can you keep quality control where it belongs and, in the process, prevent the owner from compromising his or her interests in the project as well as yours? Consider these suggestions:

1. Put the issue on an early agenda. It needs your attention. Anticipate the owner's inclination to avoid dealing with testing and inspection, and explain its importance to the success of the project. Persist, if you can, until your client agrees to hire the testing laboratory independently and to establish an adequate budget to meet the anticipated costs. A testing consultant hired by the owner cannot be fired by the general contractor for producing less than favorable results.

2. Tailor the testing requirements carefully. Scissors and paste can be your very worst enemies. Specify what the job requires, retain control of selection and hiring, make certain the contractor's responsibilities for notification for scheduling purposes are clear, and require that copies of all reports be distributed by the laboratory directly to you.

3. Insist on a preconstruction testing conference. It can be an essential element of effective coordination. Include the owner, the general contractor, major subcontractors, the testing consultant, and the design team. Review your requirements, the procedures to be followed, and the responsibilities of each of the parties. Have the testing consultant prepare a conference memorandum for distribution to all participants.

4. Monitor tests and inspections closely. Make certain your field representative is present during tests and inspections, so that deficiencies in procedures or results can be reported and acted upon quickly. Scale back testing if it becomes clear it is appropiate to do so under the circumstances; do not hesitate to order additional tests if they are required.

5. Finally, keep your client informed. Without your help, he or she is not likely to understand what the test results mean, nor will your actions in response to them make much sense. If additional testing is called for, explain why. Remember, it is an unexpected and, possibly, unbudgeted additional cost for which you will need to pave the way. In this sense, independent testing and inspection can serve an important, secondary purpose. You might view it as a communications resource. Use it in this way, and it just may yield unexpected dividends.

IMPORTANT INFORMATION
ABOUT YOUR
GEOTECHNICAL ENGINEERING REPORT

More construction problems are caused by site subsurface conditions than any other factor. As troublesome as subsurface problems can be, their frequency and extent have been lessened considerably in recent years, due in large measure to programs and publications of ASFE/ The Association of Engineering Firms Practicing in the Geosciences.

The following suggestions and observations are offered to help you reduce the geotechnical-related delays, cost-overruns and other costly headaches that can occur during a construction project.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

A geotechnical engineering report is based on a subsurface exploration plan designed to incorporate a unique set of project-specific factors. These typically include: the general nature of the structure involved, its size and configuration; the location of the structure on the site and its orientation; physical concomitants such as access roads, parking lots, and underground utilities, and the level of additional risk which the client assumed by virtue of limitations imposed upon the exploratory program. To help avoid costly problems, consult the geotechnical engineer to determine how any factors which change subsequent to the date of the report may affect its recommendations.

Unless your consulting geotechnical engineer indicates otherwise, *your geotechnical engineering report should not be used:*

- When the nature of the proposed structure is changed, for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one;
- when the size or configuration of the proposed structure is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership, or
- for application to an adjacent site.

Geotechnical engineers cannot accept responsibility for problems which may develop if they are not consulted after factors considered in their report's development have changed.

MOST GEOTECHNICAL "FINDINGS" ARE PROFESSIONAL ESTIMATES

Site exploration identifies actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing are extrapolated by geotechnical engineers who then render an opinion about overall subsurface conditions, their likely reaction to proposed construction activity, and appropriate foundation design. Even under optimal circumstances actual conditions may differ from those inferred to exist, because no geotechnical engineer, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. *Nothing can be done to prevent the unanticipated, but steps can be taken to help minimize their impact.* For this reason, *most experienced owners retain their geotechnical consultants through the construction stage,* to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

SUBSURFACE CONDITIONS CAN CHANGE

Subsurface conditions may be modified by constantly-changing natural forces. Because a geotechnical engineering report is based on conditions which existed at the time of subsurface exploration, *construction decisions should not be based on a geotechnical engineering report whose adequacy may have been affected by time.* Speak with the geotechnical consultant to learn if additional tests are advisable before construction starts.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical report. The geotechnical engineer should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS

Geotechnical engineers' reports are prepared to meet the specific needs of specific individuals. A report prepared for a consulting civil engineer may not be adequate for a construction contractor, or even some other consulting civil engineer. Unless indicated otherwise, this report was prepared expressly for the client involved and expressly for purposes indicated by the client. Use by any other persons for any purpose, or by the client for a different purpose, may result in problems. *No individual other than the client should apply this report for its intended purpose without first conferring with the geotechnical engineer. No person should apply this report for any purpose other than that originally contemplated without first conferring with the geotechnical engineer.*

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical engineering report. To help avoid these problems, the geotechnical engineer should be retained to work with other appropriate design professionals to explain relevant geotechnical findings and to review the adequacy of their plans and specifications relative to geotechnical issues.

BORING LOGS SHOULD NOT BE SEPARATED FROM THE ENGINEERING REPORT

Final boring logs are developed by geotechnical engineers based upon their interpretation of field logs (assembled by site personnel) and laboratory evaluation of field samples. Only final boring logs customarily are included in geotechnical engineering reports. *These logs should not under any circumstances be redrawn* for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process. Although photographic reproduction eliminates this problem, it does nothing to minimize the possibility of contractors misinterpreting the logs during bid preparation. When this occurs, delays, disputes and unanticipated costs are the all-too-frequent result.

To minimize the likelihood of boring log misinterpretation, *give contractors ready access to the complete geotechnical engineering report* prepared or authorized for their use. Those who do not provide such access may proceed under the *mistaken* impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes which aggravate them to disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY

Because geotechnical engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against geotechnical consultants. To help prevent this problem, geotechnical engineers have developed model clauses for use in written transmittals. These are *not* exculpatory clauses designed to foist geotechnical engineers' liabilities onto someone else. Rather, they are definitive clauses which identify where geotechnical engineers' responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your geotechnical engineering report, and you are encouraged to read them closely. Your geotechnical engineer will be pleased to give full and frank answers to your questions.

OTHER STEPS YOU CAN TAKE TO REDUCE RISK

Your consulting geotechnical engineer will be pleased to discuss other techniques which can be employed to mitigate risk. In addition, ASFE has developed a variety of materials which may be beneficial. Contact ASFE for a complimentary copy of its publications directory.

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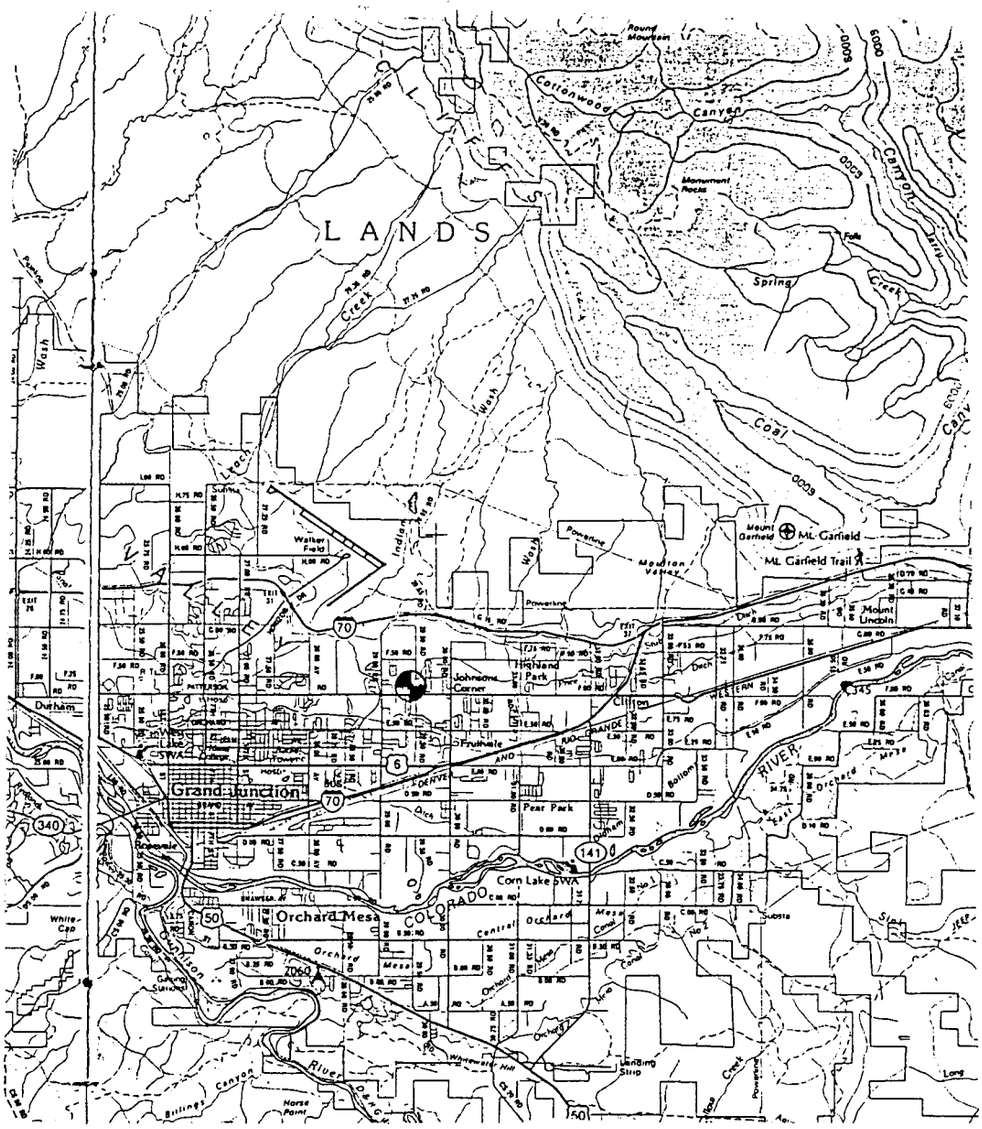

Indicates approximate project location

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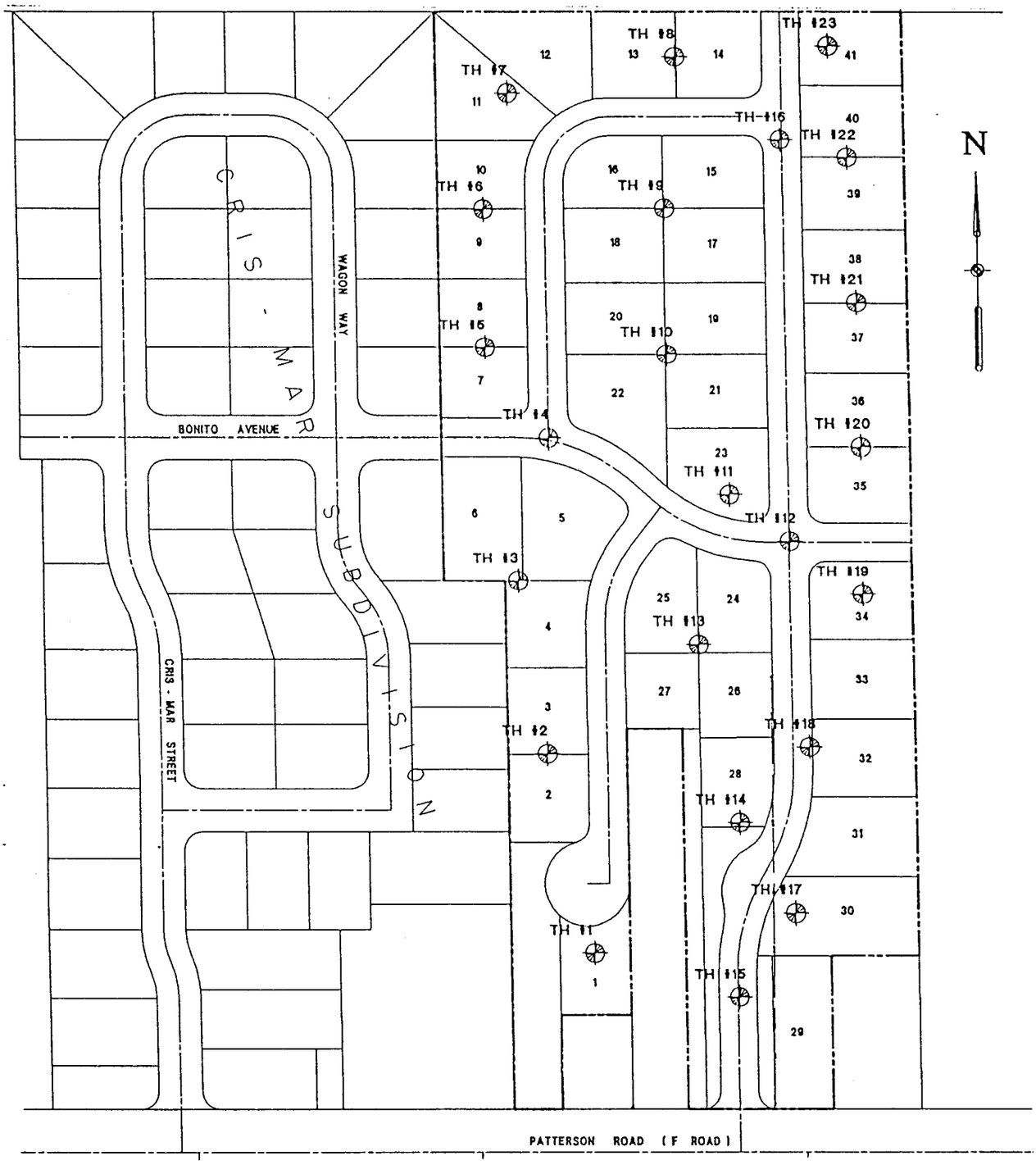
PROJECT VICINITY MAP

Lambert and Associates

Project No.:	M93208GE
Date:	10/4/93
Figure:	1



● Indicates approximate test boring locations

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TEST BORING LOCATION SKETCH

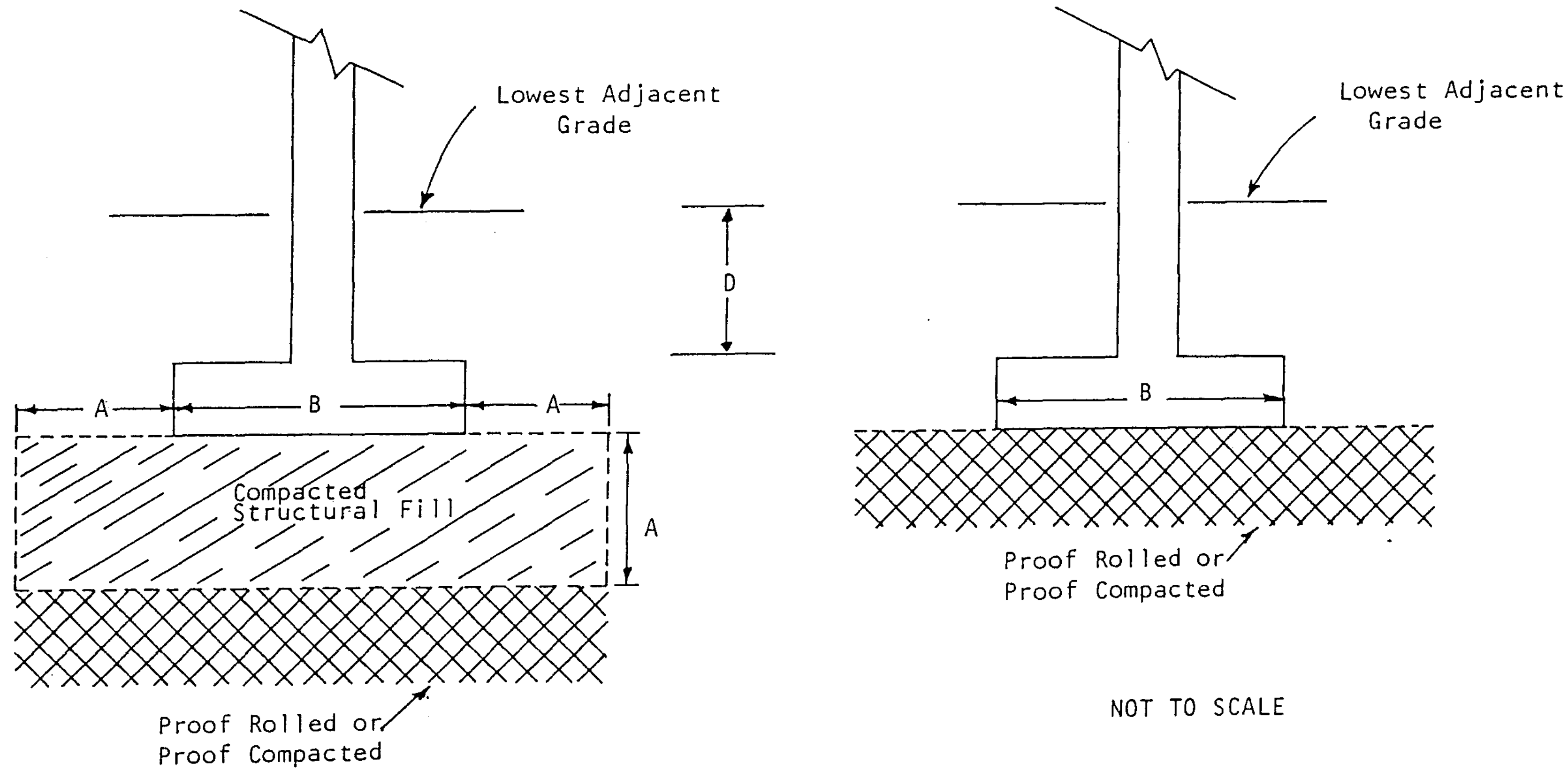
Lambert and Associates

Project No.:	M93208GE
Date:	10/4/93
Figure:	2

Lambert and Associates

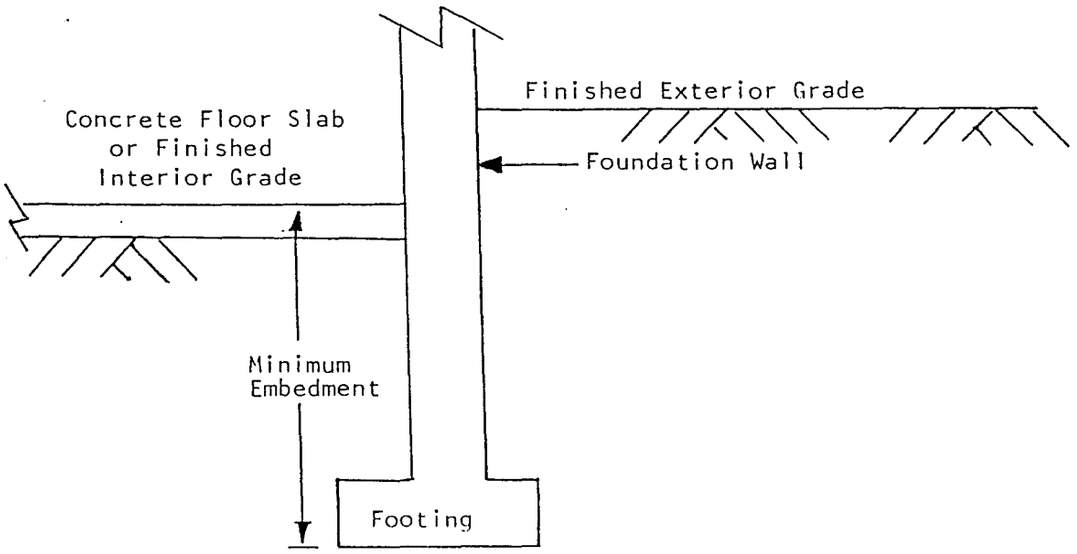
CONCEPTUAL SKETCH OF FOOTING SUBGRADE TREATMENT

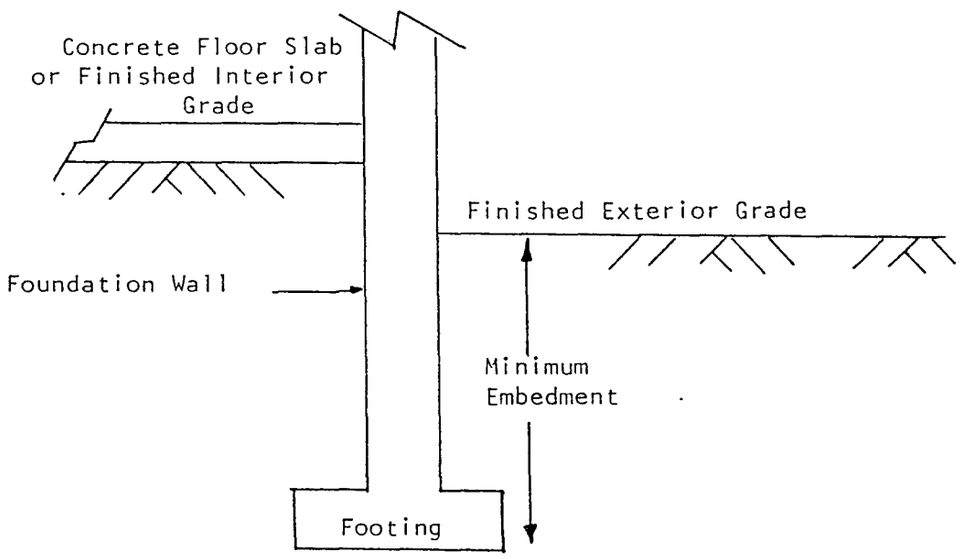
Project No.: M93208GE
Date: 10/4/93
Figure: 3



NOT TO SCALE

B = Footing Width
A = Compacted Structural Fill Thickness and Fill Width Beyond Footing Edge
D = Footing Embedment Below Lowest Adjacent Grade

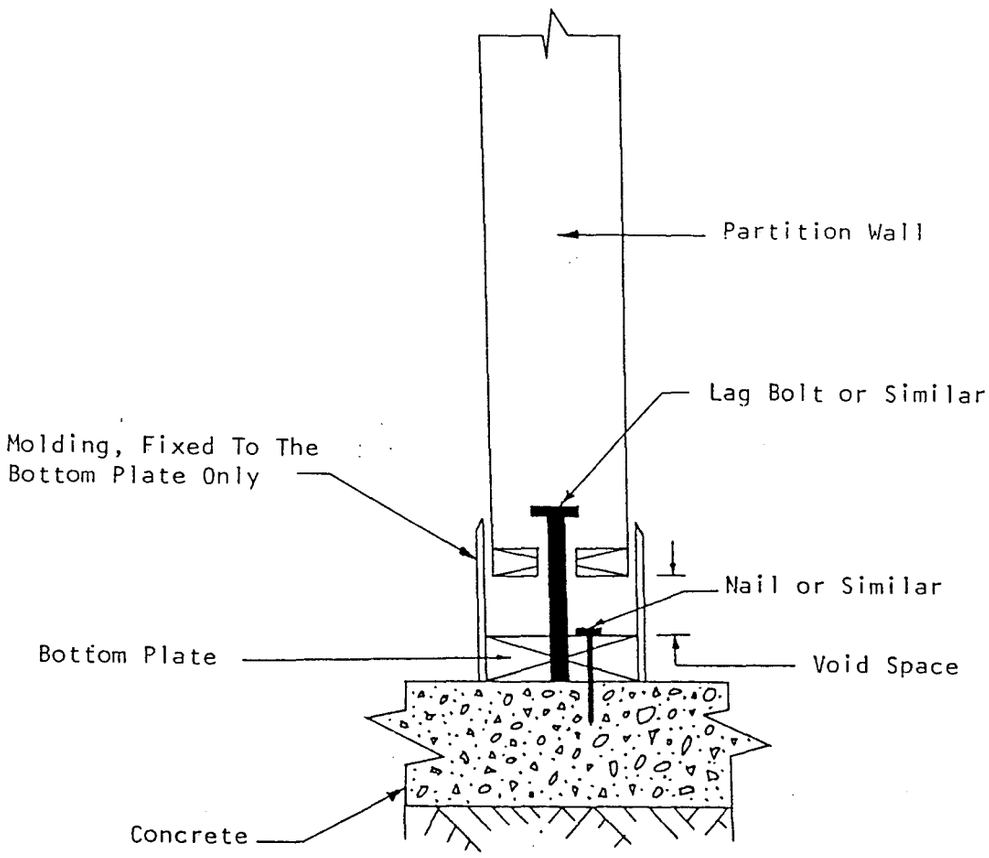




EMBEDMENT CONCEPT NO SCALE

Lambert and Associates

Project No.:	M93208GE
Date:	10/4/93
Figure:	4



NO SCALE

SCHEMATIC CONCEPT OF
VOID SPACE UNDER PARTITION WALL

Lambert and Associates

Project No.:	M93208GF
Date:	10/4/93
Figure:	5

APPENDIX A

The field study was performed on August 27, 1993. The field study consisted of logging and sampling the soils encountered in twenty three (23) test borings. The approximate locations of the test borings are shown on Figure 2. The log of the soils encountered in the test borings are presented on Figures A2 through A24.

The test borings were logged by Lambert and Associates and samples of significant soil types were obtained. The samples were obtained from the test borings using a Modified California Barrel sampler and bulk disturbed samples were obtained. Penetration blow counts were determined using a 140 pound hammer free falling 30 inches. The blow counts are presented on the logs of the test borings such as 7/6 where 7 blows with the hammer were required to drive the sampler 6 inches.

The engineering field description and major soil classification are based on our interpretation of the materials encountered and are prepared according to the Unified Soil Classification System, ASTM D2488. Since the description and classification which appear on the test boring log is intended to be that which most accurately describes a given interval of the

test borings (frequently an interval of several feet) discrepancies do occur in the Unified Soil Classification System nomenclature between that interval and a particular sample in the interval. For example, an interval on the test boring log may be identified as a silty sand (SM) while one sample taken within the interval may have individually been identified as a sandy silt (ML). This discrepancy is frequently allowed to remain to emphasize the occurrence of local textural variations in the interval.

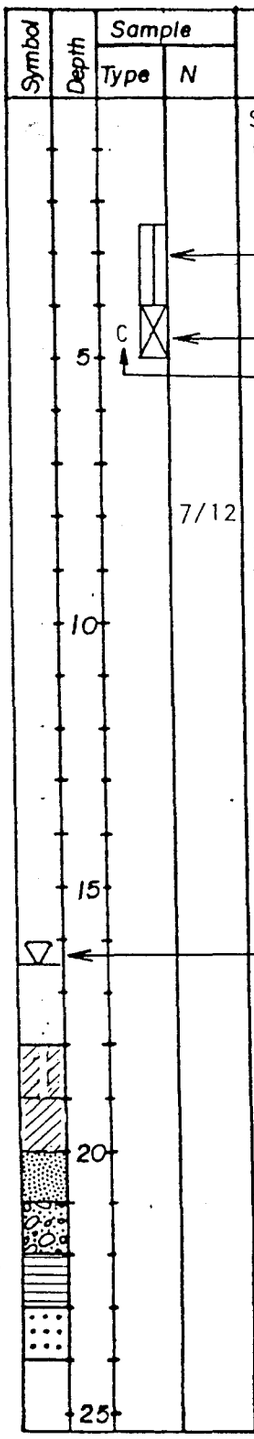
The stratification lines presented on the logs are intended to present our interpretation of the subsurface conditions encountered in the test borings. The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

KEY TO
LOG OF TEST BORING

Date Drilled _____ *Field Engineer* _____ *Boring Number* _____

Location _____ *Elevation* _____

Diameter _____ *Total Depth* _____ *Water Table* _____



Soil Description

Sand, silty, medium dense, moist, tan, (SM)

Unified Soil Classification

Indicates Bulk Bag Sample

Indicates Drive Sample

Indicates Sampler Type:

C - Modified California
St - Standard Split Spoon
H - Hand Sampler

7/12 Indicates seven blows required to drive the sampler twelve inches with a hammer that weighs one hundred forty pounds and is dropped thirty inches.

BOUNCE: Indicates no further penetration occurred with additional blows with the hammer

NR: Indicates no sample recovered

CAVED: Indicates depth the test boring caved after drilling

Indicates the location of free subsurface water when measured

CLAY
SILT
SAND
GRAVEL
CLAYSTONE
SANDSTONE

NOTE: Symbols are often used only to help visually identify the described information presented on the log.

Laboratory Test Results

Notes in this column indicate tests performed and test results if not plotted.

DD: Indicates dry density in pounds per cubic foot

MC: Indicates moisture content as percent of dry unit weight

LL: Indicates Liquid Limit

PL: Indicates Plastic Limit

PI: Indicates Plasticity Index

Project Name Delmar *Project Number* M93208GE *Figure* A1

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 1

Location See test boring location sketch **Elevation**

Diameter 4 inches **Total Depth** 20 feet **Water Table** 18 feet

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
		Bulk		Clay, silty, stiff to very stiff, moist, light brown (CL) no appreciable organics	
	5	C	7/6 7/6		Swell Consolidation Test: MC: 12.7% DD: 95.0 pcf
		C	10/12	Moisture increases with depth	Swell Consolidation Test: MC: 14.3% DD: 102.0 pcf
	10				
	15				
▽					
	20			Bottom of test boring 1 at 20 feet	
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A2

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 2

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 15 feet **Water Table** None encountered

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
				Clay, silty, stiff to very stiff, moist light brown (CL)	
	5				
	10			Moisture increase with depth	
	15			Bottom of test boring 2 at 15 feet	
	20				
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A3

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 3

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 15 feet **Water Table** None encountered

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
	0			Clay, silty, stiff to very stiff, moist, light brown (CL)	
	5		Bulk		
	10			Stiffer drilling	
	15			Bottom of test boring 3 at 15 feet	
	20				
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A4

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 4

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 5 feet **Water Table** None encountered

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
	0	Bulk		Clay,silty,stiff,very moist,light brown (CL)	
	5			Bottom of test boring 4 at 5 feet	
	10				
	15				
	20				
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A5

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 5

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 20 feet **Water Table** 16 feet

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
	0	Bulk		Clay, silty, stiff to very stiff, moist, light brown (CL)	
	5	C	push		
	10	C	push	Moisture increses with depth	
▽	15				
	20			Bottom of test boring 5 at 20 feet	
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A6

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 6

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 15 feet **Water Table** None encountered

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
				Clay, silty, stiff to very stiff, moist, light brown (CL)	
	5				
	10			More moist with depth	
	15			Bottom of test boring 6 at 15 feet	
	20				
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A7

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 7

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 10 feet **Water Table** None encountered

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
				Clay, silty, stiff, very moist, light brown (CL)	
	5				
	10			Bottom of test boring 7 at 10 feet	
	15				
	20				
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A8

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 8

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 17 feet **Water Table** 9 feet

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
		Bulk		Clay, silty, stiff, very moist, light brown (CL)	
		C	4/6 5/6		Swell Consolidation Test: MC: 20.2% DD: 100.0 pcf
	5				
▽					
	10			More moist with depth	
				Formational material, shale, clayey, hard, gray-brown, Mancos shale	
	15				
				Bottom of test boring 8 at 17 feet Auger refusal in shale	
	20				
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A9

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 9

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 16 1/2 feet **Water Table** 9 feet

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
	0			Clay, silty, stiff, very moist, light brown (CL)	
	5				
▽					
	10			Wetter with depth	
	15			Formational material, shale, clayey, hard, brown-gray, Mancos formation	
				Bottom of test boring 9 at 16 1/2 feet Auger refusal in shale	
	20				
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A10

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 10

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 17 feet **Water Table** 9 feet

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
				Clay, silty, stiff, very moist, light brown (CL)	
	5				
▽					
	10			More moist with depth	
	15			Formational material, shale, clayey, hard, brown-gray, Mancos formation	
				Bottom of test boring 10 at 17 feet Auger refusal in shale	
	20				
	25				

Project Name Delmar **Project Number** M93208GE **Figure** All

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 11

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 20 feet **Water Table** 9 feet

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
		Bulk		Clay,silty,stiff,very moist to wet, light brown (CL)	
		C	push		
	5				
				More moist with depth	
▽					
	10				
	15				
				Formational material,shale,clayey, hard,brown-gray,Mancos formation	
	20			Bottom of test boring 11 at 20 feet	
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A12

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 12

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 5 feet **Water Table** None encountered

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
		Bulk		Clay,silty,medium stiff,very moist, light brown,(CL) organic to 1/2 foot	
	5			Bottom of test boring 12 at 5 feet	
	10				
	15				
	20				
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A13

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 13

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 15 feet **Water Table** None encountered

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
				Clay,silty,stiff,very moist to wet, light brown (CL)	
	5				
	10			More moist with depth	
	15			Bottom of test boring 13 at 15 feet	
	20				
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A14

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 14

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 15 feet **Water Table** None encountered

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
	5			Clay, silty, stiff, moist to very moist, light brown (CL)	
	10			More moist with depth	
	15			Bottom of test boring 14 at 15 feet	
	20				
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A15

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 15

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 5 feet **Water Table** None encountered

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
		Bulk		Clay,silty,stiff,moist,brown (CL) organic to 1/2 foot	
	5			Bottom of test boring 15 at 5 feet	
	10				
	15				
	20				
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A16

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 16

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 5 feet **Water Table** None encountered

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
		Bulk		Clay,silty,stiff,moist,light brown (CL)	
	5			Bottom of test boring 16 at 5 feet	
	10				
	15				
	20				
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A17

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 17

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 20 feet **Water Table** 9 feet

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
	0	Bulk		Clay,silty,stiff to soft,moist,light brown (CL) organic to 1/2 foot	
	5	C	push		
▽				Becoming wetter with depth	
	10				
	15				
				Formational material,shale,clayey, hard,brown-gray,Mancos formation	
	20			Bottom of test boring 17 at 20 feet	
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A18

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 18

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 15 feet **Water Table** 9 feet

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
	0			Clay, silty, stiff to hard, moist, light brown (CL) organic to 1/2 foot	
	5				
▽	10				
	15			Bottom of test boring 18 at 15 feet	
	20				
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A19

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 19

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 20 feet **Water Table** 5 feet

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
				Clay, silty, soft, moist to wet, light brown (CL) organic to 1/2 foot	
▽	5				
	10				
	15				
				Formational material, shale, clayey, hard brown-gray, Mancos formation	
	20			Bottom of test boring 19 at 20 feet	
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A20

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 20

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 15 feet **Water Table** 5 feet

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
	0	Bulk		Clay, silty, soft, moist to wet, light brown (CL) organic to 1/2 foot	
▽	5	C	push		Swell Consolidation Test: MC: 23.7% DD: 105.0 pcf
	10				
	15			Bottom of test boring 20 at 15 feet	
	20				
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A21

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 21

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 15 feet **Water Table** 5 feet

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
				Clay, silty, soft, moist to wet, light brown (CL) organic to 1/2 foot	
▽	5			Very soft drilling	
	10				
	15			Formational material, shale, clayey, hard, brown-gray, Mancos formation	
				Bottom of test boring 21 at 15 feet	
	20				
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A22

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 22

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 15 feet **Water Table** 5 feet

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
▽	5			Clay,silty,stiff to soft,moist,light brown (CL) organic to 1/2 foot	
	10			Formational material,shale,clayey, hard,brown-gray,Mancos formation	
	15			Bottom of test boring 22 at 15 feet	
	20				
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A23

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

LOG OF TEST BORING

Date Drilled 8/27/93 **Field Engineer** Johnston **Boring Number** 23

Location See test boring location sketch **Elevation** _____

Diameter 4 inches **Total Depth** 15 feet **Water Table** 5 feet

Symbol	Depth	Sample Type	Sample N	Soil Description	Laboratory Test Results
		Bulk		Clay,silty,slightly sandy,stiff,moist to wet,light brown (CL) organic to 1/2 foot	
▽	5	C	push	Clay,silty,soft,wet,light brown (CL)	
	10			Formational material,shale,clayey, hard,brown-gray,Mancos formation	
	15			Bottom of test boring 23 at 15 feet	
	20				
	25				

Project Name Delmar **Project Number** M93208GE **Figure** A24

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

APPENDIX B

The laboratory study consisted of performing:

- Moisture content and dry density tests,
- Swell-consolidation tests,
- Direct Shear Strength tests,
- California bearing ratio tests,
- Moisture-density relationship tests, and
- Chemical tests.

It should be noted that samples obtained using a drive type sleeve sampler may experience some disturbance during the sampling operations. The test results obtained using these samples are used only as indicators of the in situ soil characteristics.

TESTING

Moisture Content and Dry Density

Moisture content and dry density were determined for each sample tested of the samples obtained. The moisture content was determined according to ASTM Test Method D2216 by obtaining the moisture sample from the drive sleeve. The dry density of the sample was determined by using the wet weight of the entire sample tested. The results of the moisture and dry density determinations are presented on the log of test borings, Figures A2 through A24.

Swell Tests

Loaded swell tests were performed on drive samples obtained during the field study. These tests are performed in general accordance with ASTM Test Method D2435 to the extent that the same

equipment and sample dimensions used for consolidation testing are used for the determination of expansion. A sample is subjected to static surcharge, water is introduced to produce saturation, and volume change is measured as in ASTM Test Method D2435. Results are reported as percent change in sample height.

Consolidation Tests

One dimensional consolidation properties of drive samples were evaluated according to the provisions of ASTM Test Method D2435. Water was added in all cases during the test. Exclusive of special readings during consolidation rate tests, readings during an increment of load were taken regularly until the change in sample height was less than 0.001 inch over a two hour period. The results of the swell-consolidation load test are summarized on Figures B1 through B4, swell-consolidation tests.

It should be noted that the graphic presentation of consolidation data is a presentation of volume change with change in axial load. As a result, both expansion and consolidation can be illustrated.

Direct Shear Strength Tests

Direct shear strength properties of sleeve samples were evaluated in general accordance with testing procedures defined by ASTM Test Method D3080. The direct shear strength test was performed on a sample obtained from test borings 1 and 20 at a

depth of four (4) to five (5) feet. Based on the results of the direct shear strength tests an internal angle of friction of 20 degrees and a cohesion of 150 pounds per square foot were used in our analysis.

California Bearing Ratio Tests

California bearing ratio tests were conducted on select soil samples obtained during our field study. The California bearing ratio tests were conducted in accordance with ASTM Test Method D1883. The results of the California bearing ratio tests are presented on Figure B5.

Moisture-Density Relationship Tests

Moisture-density relationship tests were conducted on select soil subgrade samples obtained during our field study. The moisture-density relationship tests were conducted in accordance with ASTM Test Method D1557. The results of the moisture-density relationship tests are presented on Figure B5.

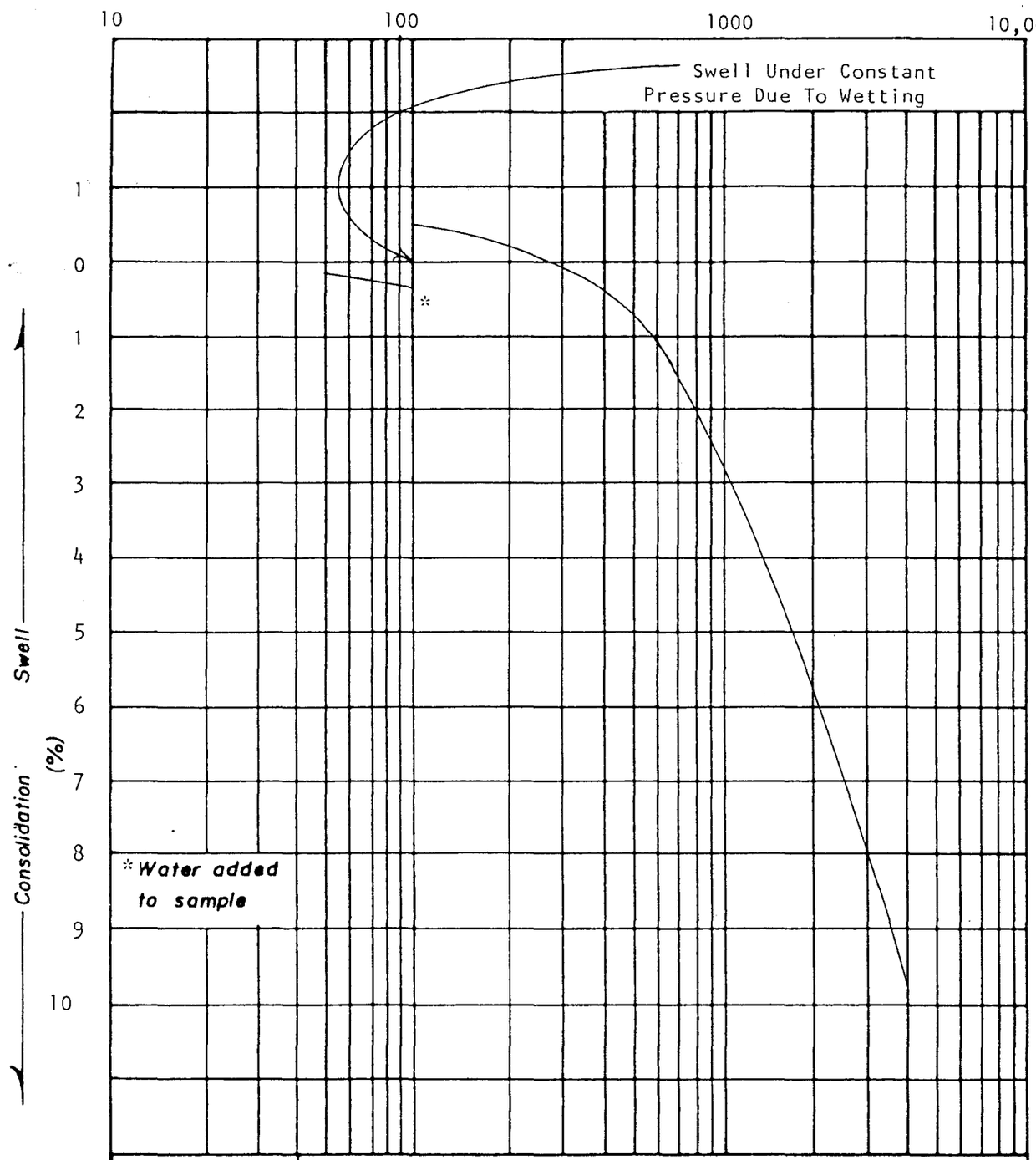
Chemical Tests

Chemical tests for water soluble sulfates, pH, and total dissolved salts were performed by Grand Junction Laboratories on

select samples obtained during the field study. The results of the chemical tests are tabulated below.

Test Boring	1	20
Depth	1 to 4 feet	1 to 4 feet
pH	7.8	8.8
Total Dissolved Salts	0.596%	2.44%
Water soluble sulfates	0.328%	1.87%

PRESSURE (POUNDS PER SQUARE FOOT)



Boring No. 1 Depth 4-5 feet	SUMMARY OF TEST RESULTS				
	Moisture Content (%)	Dry Density (P.C.F.)	Height (in.)	Diameter (in.)	Swell Pressure (P.S.F.)
Initial	12.7	95.0	1.0	1.94	350 ±
Final	26.2	105.0	.904	1.94	
Soil Description	Silt, light brown				

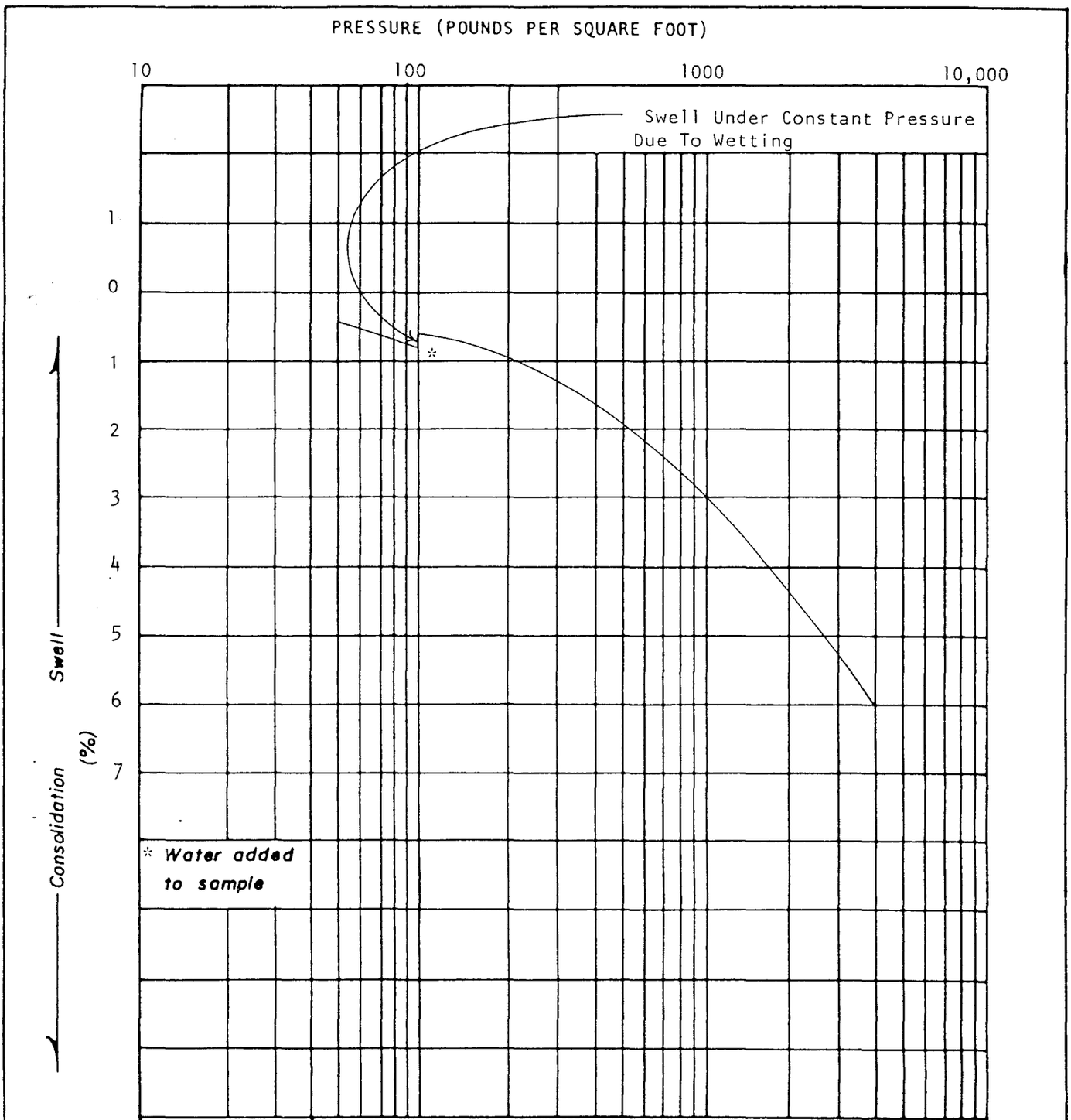
SWELL - CONSOLIDATION TEST

Lambert and Associates

Project No.: M93208GE

Date: 10/4/93

Figure: B1



Boring No. 1 Depth 9-10 ft	SUMMARY OF TEST RESULTS				
	Moisture Content (%)	Dry Density (P.C.F.)	Height (in.)	Diameter (in.)	Swell Pressure (P.S.F.)
Initial	14.3	102.0	1.0	1.94	200 ±
Final	24.4	107.0	.940	1.94	
Soil Description	Silt, brown				

SWELL - CONSOLIDATION TEST

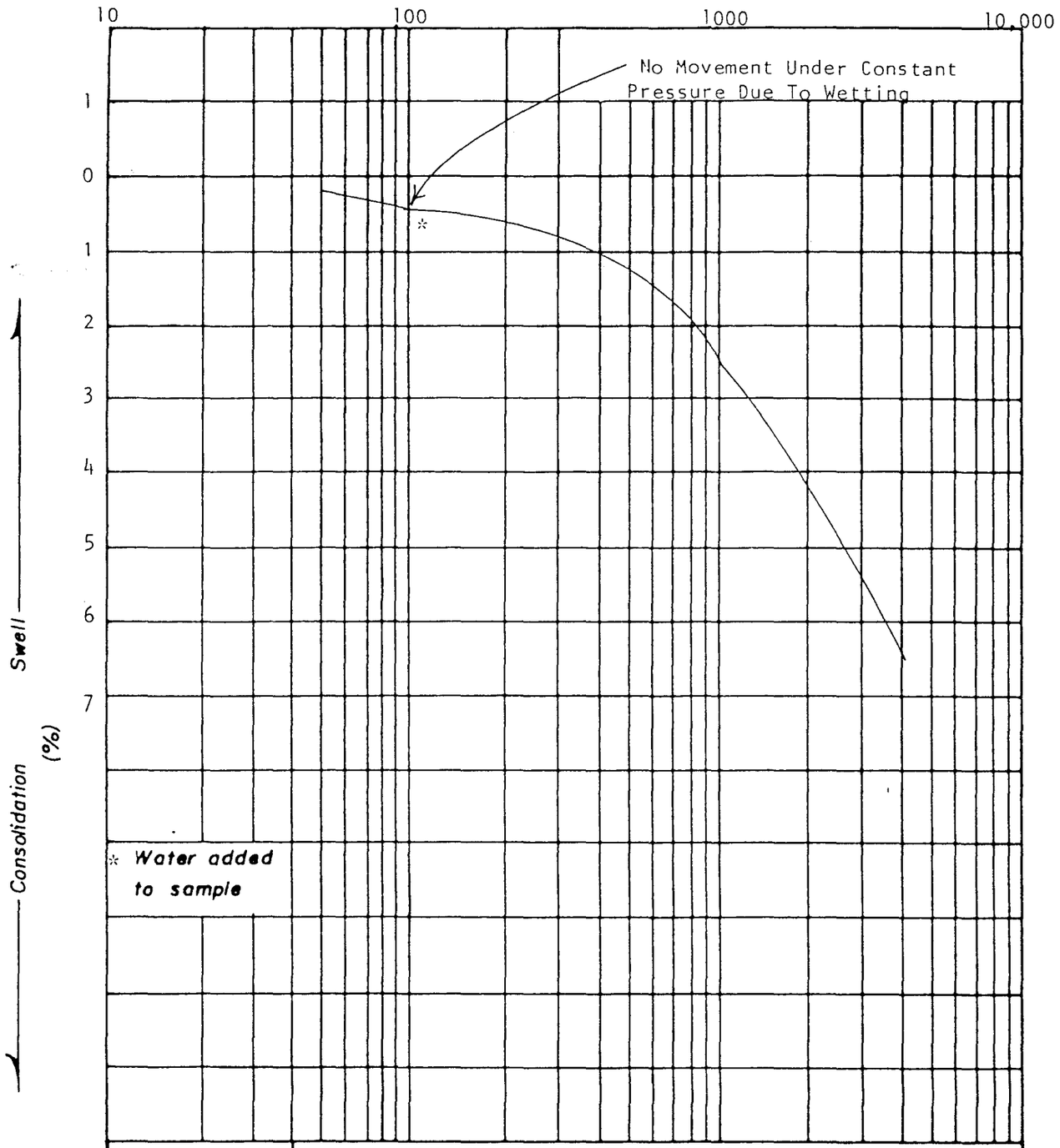
Lambert and Associates

Project No.: M93208GE

Date: 10/4/93

Figure: 82

PRESSURE (POUNDS PER SQUARE FOOT)



Boring No. 8 Depth 4-5 feet	SUMMARY OF TEST RESULTS				
	Moisture Content (%)	Dry Density (P.C.F.)	Height (in.)	Diameter (in.)	Swell Pressure (P.S.F.)
Initial	20.2	100.0	1.0	1.94	300 +
Final	22.8	107.0	.936	1.94	
Soil Description	Silty, sandy, brown				

SWELL - CONSOLIDATION TEST

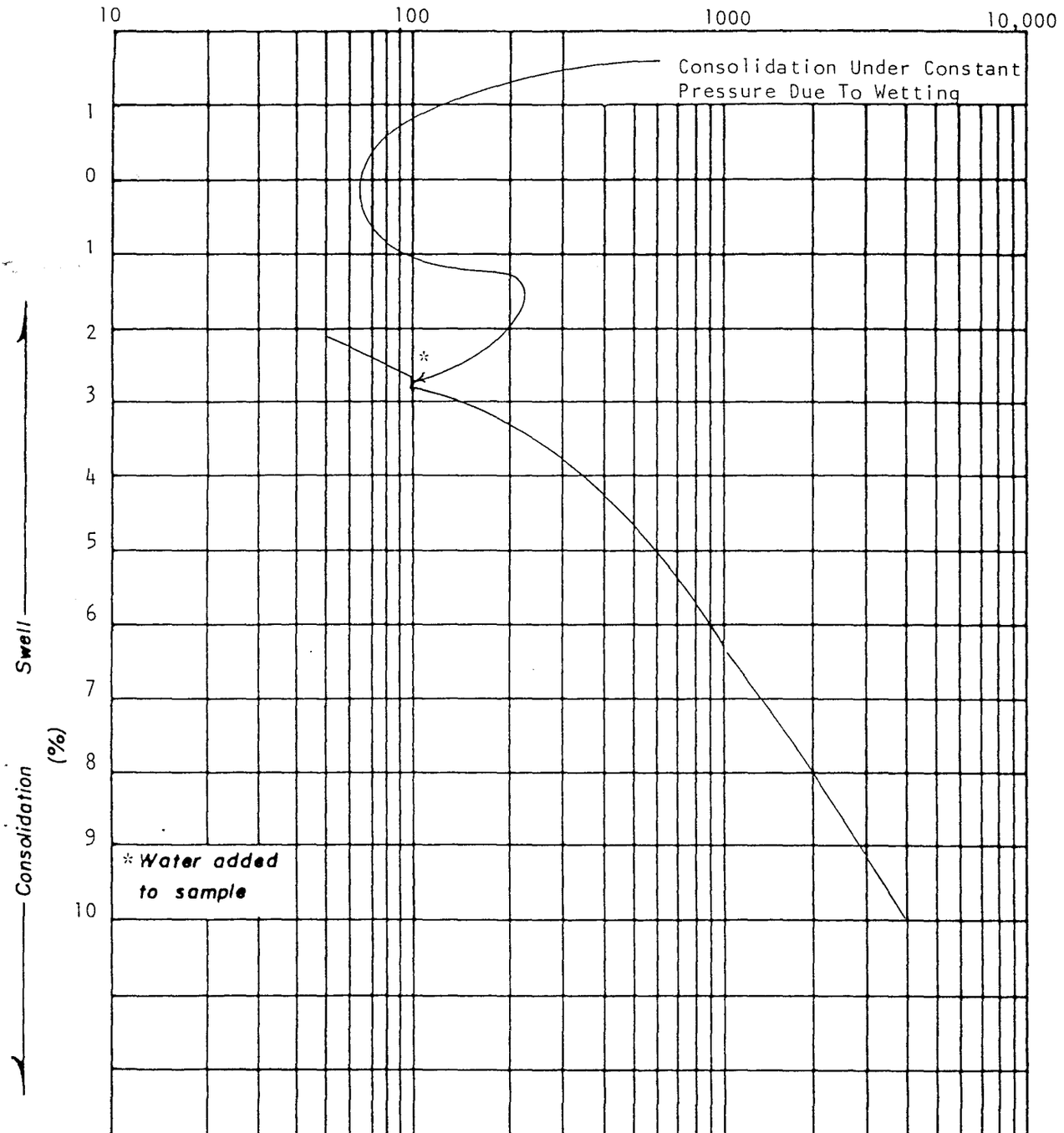
Lambert and Associates

Project No.: M93208GE

Date: 10/4/93

Figure: B3

PRESSURE (POUNDS PER SQUARE FOOT)



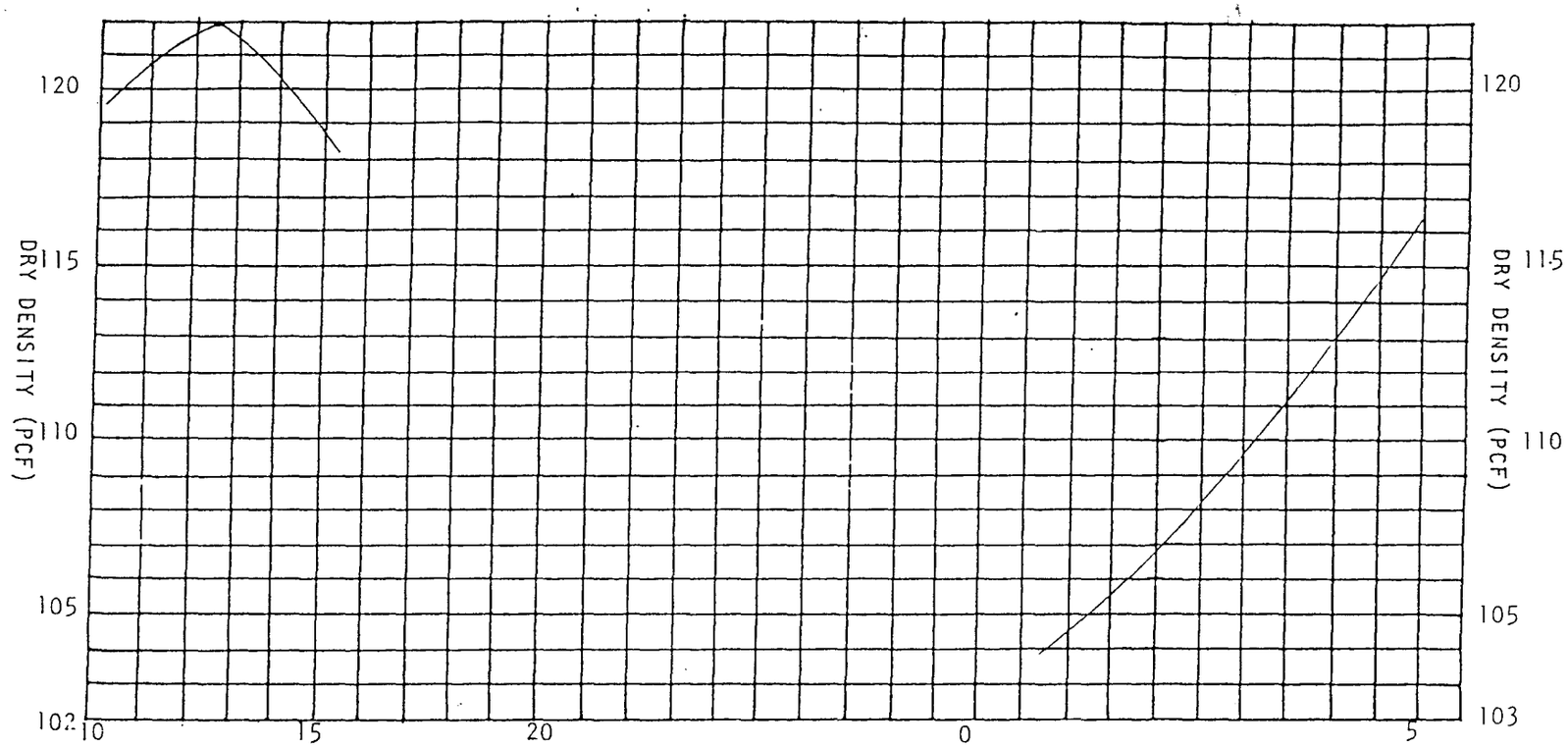
Boring No. 20 Depth 4-5 feet	SUMMARY OF TEST RESULTS				
	Moisture Content (%)	Dry Density (P.C.F.)	Height (in.)	Diameter (in.)	Swell Pressure (P.S.F.)
Initial	23.7	105.0	1.0	1.94	less than 100
Final	19.8	117.0	.899	1.94	
Soil Description	Silt, brown				

SWELL - CONSOLIDATION TEST

Lambert and Associates

Project No.:	M93208GE
Date:	10/4/93
Figure:	34

Lambert and Associates



MOISTURE-DENSITY RELATIONSHIP
ASTM D1557

MAXIMUM DRY DENSITY = 122.0 pcf
OPTIMUM MOISTURE CONTENT = 12.5%

SAMPLE DESCRIPTION: Clay, brown

SAMPLE LOCATION: Blend of TH 15 & 16

SURCHARGE WEIGHT: Blend of TH 15 & TH 16 at 1 to 4 feet

CALIFORNIA BEARING RATIO
ASTM D1883 (Soaked 96 hours)

METHOD OF COMPACTION: ASTM D1557 Method B

PRE-SOAK		AFTER SOAK			
DRY DENSITY (PCF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	SWELL (%)	CBR
103.4	15.9	102.3	24.0	1.1	0.5
109.8	15.9	108.4	20.4	1.3	3.3
115.6	15.9	112.2	17.4	1.5	5.0

CBR @ 90% relative compaction = 3.0

Project No.: M93208GE
Date: 10/4/93
Figure: B5

DRAINAGE REPORT

DEL-MAR SUBDIVISION

29⅜ ROAD & PATTERSON ROAD

GRAND JUNCTION, COLORADO

Prepared For:

DEL-MAR CONSTRUCTION
3210 E½ Road
Clifton, Colorado 81520

Prepared By:

BANNER ASSOCIATES, INC.
2777 Crossroads Boulevard
Grand Junction, Colorado 81506

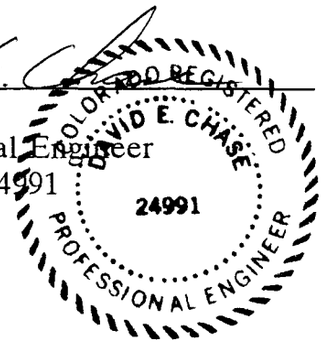
December 1993
Revised: September 1994

TABLE OF CONTENTS

CERTIFICATION

I hereby certify that this Drainage Report for the Del-Mar Subdivision was prepared under my direct supervision.

David E. Chase
Registered Professional Engineer
State of Colorado, #24991



8-1-95

DRAINAGE REPORT
DEL-MAR SUBDIVISION

INTRODUCTION

The proposed Del-Mar Subdivision is located on the north side of Patterson Road near 29⅜ Road. It is situated entirely in the SE¼ of the SW¼ of Section 5, Township 1 South, Range 1 East of the Ute Principle Meridian and will consist of approximately 13.5 acres. A Vicinity Map is included in this report as Exhibit A which shows the project limits in relation to the area. As can be seen, a residential neighborhood is located along the west side of the project, this being Cris-Mar Subdivision. Several single family parcels, not included in this project, complete the frontage along Patterson Road with the remainder of adjacent land being used for agricultural purposes.

The land that makes up the proposed Del-Mar Subdivision has no current land uses. It is vacant land with vegetation at the site consisting of mature cottonwood trees scattered about in northern portion of the project, clumps of tamarisk, Russian Olives, tall grasses and bare soil. Exhibit B shows the existing conditions at the site. An open irrigation ditch runs along the northern boundary as well as a large drainage ditch for a portion of this boundary. The north boundary of the project is in fact at the center of the drainage ditch. A smaller irrigation ditch also flows to the south in the eastern portion of the proposed subdivision. The site is relatively flat with an approximate grade of 1.3% sloping downward toward the south.

In researching the floodplain hazard for the area, reference was made to the FEMA Flood Hazard Study. The elevation of the 100-year floodplain for the Colorado River in this area is approximately 4590, well out the limits of this project. No other canals or washes are located near this site.

During the winter of 1993, while this project was being reviewed, the entrance into the subdivision from Patterson Road was relocated. The entrance was required to be directly across from 29⅜ Road. This condition was met, however Exhibit C was not adjusted for this report. The proposed drainage system will remain unchanged and this modification will not effect anticipated runoff from the site. Following the review, and subsequent approval, by Mesa County, this subdivision was annexed by the City of Grand Junction. However, detention requirements are somewhat different for the City as compared to the County. Rather than detaining the 10-year storm as this Report originally used, it will be necessary to detain the 100-year storm now that the subdivision is located with the City of Grand Junction. Included at the end of this report is Appendix C which contains calculations necessary to determine volume requirements for the detention of the 100-year storm.

HYDROLOGY

Grading of the existing Cris-Mar Subdivision is such that runoff from that area will not impact the proposed development of Del-Mar Subdivision. This, along with the existence of the irrigation and drainage ditches mentioned above, prevent any runoff from adjacent areas from contributing to this site.

Existing runoff from the site consist of the discharge from two sub-basins. These sub-basins, Area A and Area B, are shown on Exhibit B. The runoff from Area A is not well defined, but it ultimately makes its way to the existing road improvements along Patterson Road. It then either ponds and percolate into the soil or finds one or more locations where it would flow into the street. This flow would then reach the existing storm sewer within Patterson Road. Runoff from Area B is much more defined as it incorporates the existing irrigation ditch to travel south to Patterson Road. This runoff is added to the irrigation water currently in the ditch and finally discharges into an existing concrete box that ties into the 48" RCP storm sewer in Patterson Road. This box is located in the area where 29⅜ is proposed to intersect with Patterson Road. Measurements taken in the field were used to calculate the flow in this irrigation ditch to be approximately 0.56 cfs.

In the preparation of this report, investigation included determining the classification of the soil type at the site. Information was obtained from the Grand Junction office of the Soil Conservation Service which includes a map showing the soil types in the area and a narrative describing these soil types. This information is contained in this report as Appendix A.

Appendix B of this report contains the runoff calculations, both historic and developed for this proposed subdivision. The hydrology calculations were based on using the TR-55 Method developed by the Soil Conservation Service. Reference was also made in the use of the Storm Drainage Criteria Manual prepared by the Mesa County engineering and planning staffs.

HYDRAULICS

As can be expected, runoff due to a 10-year storm will be increased because of this development. In Exhibit C the sub-basins are shown that will be created by design and grading of improvements for Del-Mar Subdivision. Area D, which comprises most of the development, would create surface runoff that would tend to exit the site in much the same manner as the undeveloped Area A. As shown in the calculations this flow will be increased from 0.23 cfs to 1.52 cfs. To meet the requirements of Mesa County, a detention pond is proposed which will be designed

to keep the release equal to that of historic and sized to hold the excess volume of water that would accumulate during this 10-year storm. If a 100-year storm should occur, or a storm greater than that of the 10-year, a storm inlet will be constructed at the south end of the detention pond that will release additional flows that may be necessary to prevent damage to this or adjacent sites. An eight inch pipe will then be constructed to tie into the existing 48" RCP storm sewer in Patterson Road. This detention pond will be sized to store 7,000 cubic feet of water. The Grading Plan shows the location, grading and details for this detention pond.

Area C, which comprises of Filing One of Del-Mar Subdivision, generates runoff in an area of the subdivision that is not practical to reach the detention pond. As mentioned before, a existing irrigation ditch currently discharges into a concrete box and then into the storm sewer in Patterson Road. At this point in time, the Palisade Irrigation District, in conjunction with the Bureau of Reclamation Salinity Project, is making improvements to the system in this area that will replace this open ditch. Therefore the continuous flow, that was estimated to be 0.56 cfs, will no longer be emptying into the Patterson Road storm sewer. It is proposed to make use of this existing concrete box as a discharge point for the runoff from Area C. Although the 10-year runoff is increased at this point from 0.07 cfs to 0.54 cfs, this infrequent flow is still less than the historic continuous flow that will be shortly abandoned. Therefore it is requested, and proposed, that no detention for Area C be required.

CONCLUSIONS

In developing this area into Del-Mar Subdivision it is impossible not to increase the amount of runoff. However with proper planning and design, the requirement to maintain historic runoff volumes can be met. In the proposed drainage plan for the Del-Mar Subdivision it is felt that this has been done. By using existing and proposed structures it is anticipated that the flows which currently discharge into the storm sewer system can actually be reduced. As mentioned above the constant flow seen as waste irrigation water of 0.56 cfs discharging into the storm sewer will be reduced to infrequent flows that will be approximately the same rate. With the construction of the detention pond it is also anticipated that runoff will be kept at historic levels. It is also anticipated that the runoff from the area will also be better controlled and directed to improve drainage in the area. The development of this project will not have any adverse impacts on any surrounding land. None of the proposed runoff patterns require the use of any other drainage facilities other than those in Patterson Road.

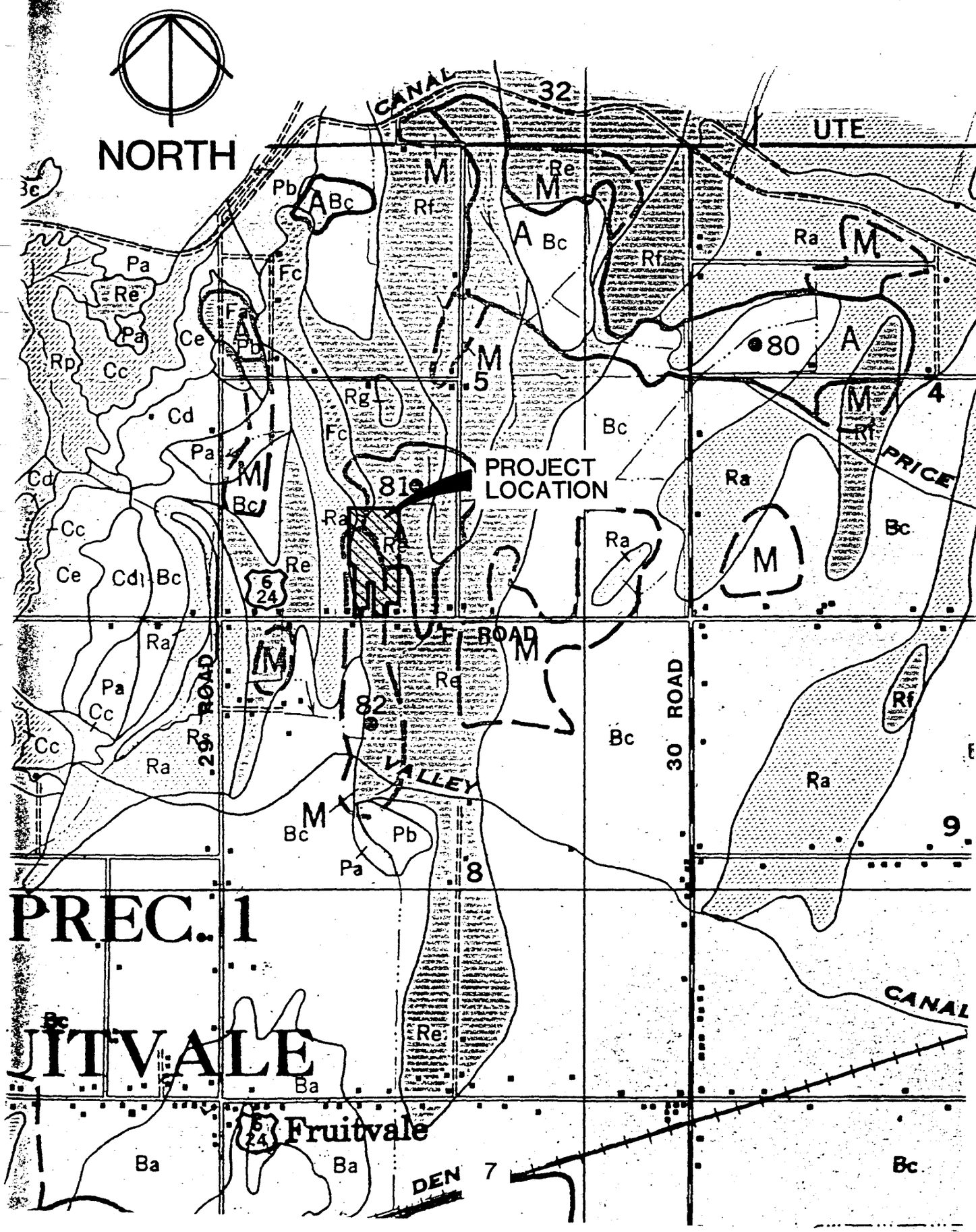
REFERENCES

Mesa County Storm Drainage Criteria Manual, Mesa County, Colorado, 1992.

TR-55 Urban Hydrology for Small Watersheds, 2nd Edition, U.S. Department of Agriculture, Soil Conservation Service, Washington, D.C., 20250, June, 1986.

APPENDIX A

SOIL INFORMATION


NORTH
CANAL
32
UTE
PROJECT LOCATION
81
80
82
PRICE
ROAD
29 ROAD
30 ROAD
VALLEY
Fruitvale
DEN
CANAL
PREC. 1
ITVALE

RAVOLA LOAM, 0 to 2 percent slopes, Class I Land (Re)

This soil occupies relatively broad alluvial fans and flood plains along streams. It is at a slightly higher elevation than the bordering areas of Billings silty clay loam soils. It has developed in an alluvial deposit derived largely from Mancos shale and to lesser extent from the fine-grained sandstone of the Mesaverde formation. The soil is very similar to Ravola very fine sandy loam, 0 to 2 percent slopes, but it contains less very fine sand and a definitely larger amount of silt. In a number of small areas the texture approaches, or may be, a silt loam. From the Ravola clay loam soils, this soil differs in being coarser textured and not so gritty.

The 10- or 12-inch surface layer consists of light brownish-gray to pale-yellow, calcareous, heavy loam. The subsoil, similar to the surface soil in color, invariably contains a higher percentage of silt than the subsoil of the Ravola very fine sandy loams. Differences among the thin alluvial layers in the subsoil are almost imperceptible to depths of 3 to 4 feet. At depths greater than this, however, 1- to 3-inch layers of either silt or very fine sandy loam commonly occur among the more numerous layers of loam.

All areas of this soil have a friable and moderately permeable profile suitable for production of shallow- and deep-rooted crops. Surface runoff is slow and internal drainage is medium. Well-disseminated lime is present throughout the profile. A few saline areas have developed because of local inadequate drainage and excessive use of irrigation water. The tilth is good in spite of the generally low organic-matter content.

No severe soil limitations exist for this soil type.

RAVOLA CLAY LOAM, 0 to 2 percent slopes, Class IIs Land (Ra)

This soil has developed in material that consists largely of reworked Mancos shale but includes an appreciable amount of sandy alluvium from the higher Mesaverde formation. The surface of these deposits is relatively level, but the depth of the deposits ranges from 5 to 30 feet. The soil is associated with the Billings silty clay loams and the Ravola fine sandy loams.

The soil is much like the Billings silty clay loams but more porous because it contains more fine sand, especially in the subsoil. Ordinarily, the 10- or 12-inch surface layer consists of light brownish-gray to very pale-brown light clay loam. The underlying layers vary from place to place in thickness and texture and become more sandy below depths of 4 to 5 feet. The range in the subsoil is from fine sandy loam to clay loam.

Small fragments of shale and sandstone are common from the surface downward and are especially noticeable in areas nearest the source of the soil material. The entire profile is calcareous and friable, so internal drainage is medium and development of plant roots is not restricted. The surface is smooth. Most areas are at slightly higher levels than the associated areas of Billings silty clay loams and therefore have better drainage and a lower content of salts. The soil, however, is slightly saline under native cover, and in places it has strongly saline spots and a high water table.

No severe limitations exist for this soil type.

FRUITA AND RAVOLA LOAMS, 2 to 5 percent slopes, Class IIIe Land (Fc)

The soils of this unit have formed in old alluvial deposits derived mainly from the Mesaverde sandstone and Mancos shale formations that lie to the north. The alluvial mantle is $3\frac{1}{2}$ to 7 feet deep and is underlain by Mancos shale. Either this unit is associated with soils of the Fruita series or it occurs in positions between Fruita soils and Ravola soils.

On the gently sloping rounded crests and upper slopes of the narrow ridges, or on the brows of the mesas or the alluvial fans, the soil is similar to the Fruita very fine sandy loams. In contrast, on the lower slopes and in the bottoms of shallow troughs, the soil is similar to the Ravola loams in that it has no distinct profile layers. Instead, there is very pale-brown, calcareous, medium-textured surface soil and a subsoil that shows no definite stratification.

The soils of this unit are calcareous throughout. The soil on the ridge crests is noticeably splotched or spotted with lime, but the lime is not visible in the soil on the lower slopes. Angular and semirounded pieces of sandstone rock and gravel are common in some places but they do not seriously impair cultivation. This unit has a textural range from fine sandy loam to light clay loam.

Soil limitations are severe for local roads and streets (frost action), and sewage lagoons (when the slope is over 7%).

Exhibit A-1, continued: Hydrologic soil groups for United States soils

POQUONOCK	C	PREMIER	B	PUNCHBOWL	D	QUINLIVEN	C	RAMROD	C
PORFIRIO	C	PRENTISS	C	PUNG	C	QUINN	B/D	RAMSDELL	D
PORRETT	D	PRESA	B	PUNGO	D	QUINNEY	C	RAMSDELL, DRAINED	C
PORRONE	B	PRESHER	B	PUNOHU	A	QUINTANA	B	RAMSEY	D
PORT	B	PRESTO	B	PUNSIT	C	QUINTO	D	RAMSHORN	B
PORT BYRON	B	PRESTON	A	PUNTA	B/D	QUINTON	C	RANA	D
PORTAGE	D	PREWITT	B	PUNTILLA	B	QUITERIA	B	RANCE	C
PORTAGEVILLE	D	PREY	C	PURCELLA	B	QUITMAN	C	RANCHOSECO	D
PORTALES	B	PRICE	B	PURCHES	C	QUIVERA	C	RANDADO	C
PORTALTO	B	PRIDA	C	PURDAM	C	QUONSET	A	RANDALL	D
PORTERFIELD	C	PRIDHAM	D	PURDY	D	QUOPANT	D	RANDCORE	D
PORTERS	B	PRIESTLAKE	B	PURETT	B	QUOSATANA	D	RANDMAN	D
PORTERVILLE	D	PRIETA	D	PURGATORY	C	RABBITEX	B	RANDOLPH	C
PORTHILL	D	PRIM	D	PURNER	D	RABER	C	RANDS	C
PORTIA	C	PRIMEAUX	C	PUROB	D	RABIDEUX	B	RANDSBURG	D
PORTINO	C	PRIMEN	D	PURSLEY	B	RABUN	B	RANGEE	D
PORTLAND	D	PRINGHAR	B	PURVES	D	RACE	B	RANGER	C
PORTMOUNT	B	PRINCETON	B	PUSHMATAHA	C	RACINE	B	RANPUFF	D
PORTNEUF	B	PRINEVILLE	C	PUSTOI	B	RACKER	A	RANSLO	D
PORTOLA	B	PRING	B	PUTNAM	D	RACOMBES	B	RANSOM	B
PORTSMOUTH	B/D	PRINGLE	D	PUTNEY	B	RACOON	C/D	RANSTEIN	B
PORUM	D	PRITCHARD	C	PUTT	C	RAD	B	RANTOUL	D
POSANT	D	PRITCHETT	C	PUTTSTER	C	RAD, LACUSTRINE	C	RAPATEE	D
POSEN	B	PROCHASKA	A/D	PUU OO	A	SUBSTRATUM		RAPELJE	B
POSEY	B	PROCTOR	B	PUU OPAE	B	RAD, FLOODED	C	RAPH	B
POSEYVILLE	C	PROGRESSO	C	PUU PA	A	RADDLE	B	RAPHO	B
POSITAS	D	PROMISE	D	PUU PA, NONSTONY	B	RADER	D	RAPIDAN	B
POSKIN	C	PROMO	D	PUUKALA	D	RADERSBURG	B	RAPLEE	C
POSO	B	PRONG	C	PUUONE	C	RADFORD	B	RAPPAHANNOCK	D
POSOS	C	PROPHETSTOWN	B/D	PUYALLUP	B	RADLEY	B	RAPSON	B
POST	D	PROSPECT	B	PYBURN	D	RADNOR	C	RARDEN	C
POTAMUS	B	PROSPER	B	PYLE	B	RAFAEL	D	RARICK	C
POTCHUB	C	PROSSER	C	PYLON	D	RAFTON	D	RARITAN	C
POTEET	C	PROTIVIN	C	PYOTE	A	RAFTRIVER	C	RASBAND	B
POTELL	B	PROUT	C	PYRAMID	D	RAGLAN	B	RASILLE	B
POTH	C	PROUTY	C	PYRMONT	D	RAGNAR	B	RASSER	B
POTLATCH	C	PROVIDENCE	C	PYRMONT, BEDROCK	C	RAGNEL	B	RASSET	B
POTOMAC	A	PROVIG	C	SUBSTRATUM		RAGO	C	RASTUS	C
POTOSI	A	PROVO	D	PYWELL	D	RAGPIE	D	RATAKE	D
POTRATZ	C	PROVO BAY	D	QUAFENO	C	RAGSDALE	B/D	RATHBUN	C
POTSDAM	C	PROW	D	QUAKER	C	RAGSDALE, OVERWASH	B	RATHDRUM	B
POTTER	C	PRUDY	B	QUAKERTOWN	C	RAGTOWN	C	RATLAKE	D
POTTINGER	B	PRUE	B	QUAM	B/D	RAHAL	C	RATLEFLAT	B
POTTS	B	PRUITTON	B	QUAMON	A	RAHM	C	RATLIFF	B
POTTSBURG	B/D	PRUNIE	D	QUANAH	B	RAHWORTH	B	RATON	D
POUDRE	D	PRYOR	C	QUANDER	B	RAIL	D	RATSOW	C
POUJADE	D	PSUGA	B	QUANTICO	B	RAILCITY	A	RATTLER	D
POULSBO	D	PTARMIGAN	C	QUARLES	D	RAINBOW	C	RATTO	C
POUNCEY	D	PUAPUA	D	QUARTZBURG	C	RAINEY	C	RATTO, STONY	D
POVERTY	D	PUAULU	A	QUARTZVILLE	B	RAINIER	C	RAUB	C
POVEY	B	PUCHYAN	B	QUARZ	C	RAINO	D	RAUGHT	B
POWDER	B	PUDDLE	B	QUATAMA	C	RAINS	B/D	RAUVILLE	D
POWDERHORN	C	PUERCO	D	QUAY	B	RAINS, FLOODED	D	RAUZI	B
POWDERWASH	C	PUERTA	D	QUAZO	D	RAINSBORO	C	RAVALLI	D
POWEEN	C	PUERTECITO	D	QUEALMAN	C	RAINSVILLE	B	RAVALLI, BEDROCK	B
POWELL	C	PUETT	D	QUEALY	D	RAIRDENT	B	SUBSTRATUM	
POWER	B	PUFFER	D	QUEBRADA	C	RAISIO	C	RAVEN	A
POWERLINE	C	PUGET	D	QUEENY	D	RAKANE	C	RAVENDALE	D
POWLEY	D	PUGET, PROTECTED	C	QUEETS	B	RAKE	D	RAVENELL	D
POWMENT	C	PUGSLEY	C	QUEMADO	C	RAKIED	C	RAVENNA	C
POWWAHKEE	B	PUHI	B	QUENZER	D	RALEIGH	D	RAVENSWOOD	C
POWWATKA	C	PUHIMAU	D	QUERC	C	RALLOD	D	RAVIA	C
POY	D	PUICE	C	QUERENCIA	B	RALLS	B	RAVOLA	B
POYGAN	D	PULA	C	QUETICO	D	RALPH	B	RAWAH	C
POYNOR	B	PULANTAT	C	QUICKSELL	C	RALPHSTON	B	RAWE	C
POZO	C	PULASKI	B	QUICKSILVER	D	RALSEN	D	RAWLES	B
POZO BLANCO	B	PULCAN	C	QUICKVERT	C	RAMADERO	B	RAWLINS	B
PRAG	C	PULEHU	B	QUIDEN	B	RAMBLA	C	RAWSON	B
PRAIRIEVILLE	B	PULEXAS	B	QUIENSABE	C	RAMBOUILLET	B	RAWSONVILLE	C
PRAMISS	C	PULLMAN	D	QUIETUS	C	RAMELLI	D	RAYBURN	D
PRATHER	C	PULPIT	C	QUIGLEY	B	RAMIRES	C	RAYEX	D
PRATLEY	C	PULS	D	QUIHI	C	RAMMEL	C	RAYFORD	C
PRATT	A	PULSIPHER	D	QUILCENE	C	RAMO	C	RAYLAKE	D
PREACHER	B	PULTNEY	C	QUILLAYUTE	B	RAMONA	B	RAYMONDVILLE	D
PREAKNESS	B/D	PUMEL	D	QUILOTOSA	D	RAMONA, HARD	C	RAYNE	B
PREATORSON	B	PUMEL, NONGRAVELLY	C	QUILT	D	SUBSTRATUM		RAYNESFORD	B
PREBISH	C/D	PUMPER	B	QUIMA	B	RAMPART	B	RAYNHAM	C
PREBLE	D	PUNA	A	QUINCY	A	RAMPARTER	B	RAYNOLDSON	B
PRELO	B	PUNALUU	D	QUINLAN	C	RAMPS	B	RAYOHILL	C

NOTES: TWO HYDROLOGIC SOIL GROUPS SUCH AS B/C INDICATES THE DRAINED/UNDRAINED SITUATION.
MODIFIERS SHOWN, E.G., BEDROCK SUBSTRATUM, REFER TO A SPECIFIC SOIL SERIES PHASE FOUND IN SOIL MAP LEGEND.

APPENDIX B

CALCULATIONS

10-YEAR AND 100-YEAR RAINFALL PRECIPITATION:

24-hr.

Directly from Fig. 405b in MCSDCM

$P_{24} = 1.4$ in.

2-hr.

Calculate by using 6-hr. & 24-hr. amounts in Fig. 405a and 405b:

X_1 = 2-yr., 6-hr. precipitation = 0.8
X_2 = 2-yr., 24-hr. precipitation = 1.0
X_3 = 100-yr., 6-hr. precipitation = 1.8
X_4 = 100-yr., 24-hr. precipitation = 2.2

Z = Elevation = 46.85 hundred feet

Compute 2-yr., 1-hr. rainfall

$$Y_2 = 0.218 + 0.709 [X_1 (X_1/X_2)] = 0.672$$

Compute 100 yr., 1 hr. rainfall

$$Y_{100} = 1.897 + 0.439 [X_3 (X_3/X_4)] - 0.008 Z$$
$$= 1.897 + 0.439 [1.8 (^{1.8}/_{2.2})] - 0.008 (46.85)$$
$$Y_{100} = 2.17$$

By use of Fig. 408, MCSDCM

10-yr., 1-hr. Rainfall Precipitation

$Y_{10} = 1.30$ in.

Therefore from Fig. 407, 10-yr., 2-hr. Rainfall Precipitation

$P_2 = 1.30 \times 0.892$
$P_2 = 1.16$ in.

Also from Fig. 407, 100-yr., 2-hr. Rainfall Precipitation
$P_2 = 2.17 \times 0.968$
$P_2 = 2.10$ in.

Worksheet 2: Runoff curve number and runoff

Project DEL-MAR SUB. By DEC Date 9-24-93

Location GRAND JCT., CO Checked ____ Date ____

Circle one: (Present) Developed AREAS A & B

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2 (408)	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
Ravola (Re) B	Bare soil, intermittent trees, weeds & grass	76			13.30	

1/ Use only one CN source per line. Totals =

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = ____ = ____; Use CN = 76

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	10	100	
Rainfall, P (24-hour)	in	1.16	2.10	
Runoff, Q (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)	in	0.076	0.466	

S = 3.16

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project DEL-MAR SUB. By DEG Date 9-23-93

Location GRAND JCT., CO Checked ____ Date ____

Circle one: (Present) Developed AREA A

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID		
1. Surface description (table 3-1)	Bare soil w/ little or no grass		
2. Manning's roughness coeff., n (table 3-1) ..	0.14		
3. Flow length, L (total L ≤ 300 ft) ..... ft	150		
4. Two-yr 24-hr rainfall, P_2 ..... in	1.0		
5. Land slope, s ..... ft/ft	0.013		
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t ..... hr	0.45	+	= 0.45

Shallow concentrated flow	Segment ID		
7. Surface description (paved or unpaved)	(2) PAVED		
8. Flow length, L ..... ft	1000		
9. Watercourse slope, s ..... ft/ft	0.013		
10. Average velocity, V (figure 3-1) ..... ft/s	0.8		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr	0.35	+	= 0.35

Channel flow	Segment ID		
12. Cross sectional flow area, a ..... ft^2			
13. Wetted perimeter, p_w ..... ft			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ..... ft			
15. Channel slope, s ..... ft/ft			
16. Manning's roughness coeff., n			
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ..... ft/s			
18. Flow length, L ..... ft			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr		+	= —
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr			0.80

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project DEL-MAR SUB. By DEG Date 9-23-93

Location GRAND JCT., CO Checked ____ Date ____

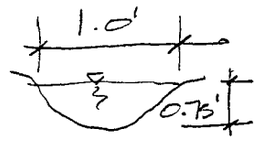
Circle one: (Present) Developed AREA B

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID		
1. Surface description (table 3-1)			Bare soil with little or no grass	
2. Manning's roughness coeff., n (table 3-1) ..			0.14	
3. Flow length, L (total L ≤ 300 ft)	ft		100	
4. Two-yr 24-hr rainfall, P_2	in		1.0	
5. Land slope, s	ft/ft		0.01	
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr		0.36 + ____ =	0.36
Shallow concentrated flow		Segment ID		
7. Surface description (paved or unpaved)				
8. Flow length, L	ft			
9. Watercourse slope, s	ft/ft			
10. Average velocity, V (figure 3-1)	ft/s			
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		____ + ____ =	—
Channel flow		Segment ID		
12. Cross sectional flow area, a	ft^2		0.52	
13. Wetted perimeter, p_w	ft		1.5	
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft		0.35	
15. Channel slope, s	ft/ft		0.011	
16. Manning's roughness coeff., n			0.05	
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s		1.55	
18. Flow length, L	ft		1700	
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		0.30 + ____ =	0.30
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr			0.66



A = 0.52 ft²

P = 1.5 '

Worksheet 4: Graphical Peak Discharge method

Project DEL-MAR SUB. By DEC Date 9-24-93

Location GRAND JCT., CO Checked ____ Date ____

Circle one: (Present) Developed AREA A 2-hr.

1. Data:

Drainage area ..... A_m = 0.017 mi^2 (acres/640)

Runoff curve number .... CN = 76 (From worksheet 2)

Time of concentration .. T_c = 0.80 hr (From worksheet 3)

Rainfall distribution type = II (I, IA, II, III)

Pond and swamp areas spread throughout watershed ..... = 0 percent of A_m (0 acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	10	100	
3. Rainfall, P (~~24-hour~~ 2-hr.)	in	1.16	2.10	
4. Initial abstraction, I_a ..... (Use CN with table 4-1.)	in	0.632	0.632	
5. Compute I_a/P		~~Use 0.50~~ ~~0.54~~	0.30	
6. Unit peak discharge, q_u ..... (Use T_c and I_a/P with exhibit 4-II)	csm/in	180	340	
7. Runoff, Q ..... (From worksheet 2).	in	0.076	0.466	
8. Pond and swamp adjustment factor, F_p .... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)		1.0	1.0	
9. Peak discharge, q_p ..... (Where $q_p = q_u A_m Q F_p$)	cfs	0.23	2.69	

Worksheet 4: Graphical Peak Discharge method

Project DEL-MAR SUB. By DEC Date 9-24-93

Location GRAND JCT., CO Checked ____ Date ____

Circle one: (Present) Developed AREA B 2-HR.

1. Data:

Drainage area ..... A_m = 0.0046 mi^2 (acres/640)

Runoff curve number .... CN = 76 (From worksheet 2)

Time of concentration .. T_c = 0.66 hr (From worksheet 3)

Rainfall distribution type = II (I, IA, II, III)

Pond and swamp areas spread throughout watershed ..... = 0 percent of A_m (— acres or mi^2 covered)

			Storm #1	Storm #2	Storm #3
2.	Frequency	yr	10	100	
3.	Rainfall, P (~~24-hour~~ 2-hr)	in	1.16	2.10	
4.	Initial abstraction, I_a ..... (Use CN with table 4-1.)	in	0.632	0.632	
5.	Compute I_a/P		~~0.54~~ 0.50	0.30	
6.	Unit peak discharge, q_u ..... (Use T_c and I_a/P with exhibit 4-II)	csm/in	197	380	
7.	Runoff, Q ..... (From worksheet 2).	in	0.076	0.466	
8.	Pond and swamp adjustment factor, F_p .... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)		1.0	1.0	
9.	Peak discharge, q_p ..... (Where $q_p = q_u A_m Q F_p$)	cfs	0.07	0.81	

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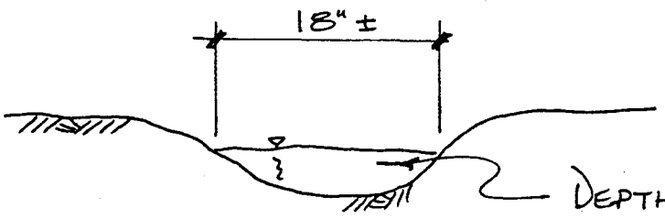
JOB NO. #8291-01 DEL-MAR SUB.
JOB
CALCULATED BY DEC DATE 9-24-93
CHECKED BY DATE
SHEET NO. OF

FLOW IN EXISTING IRRIGATION DITCH

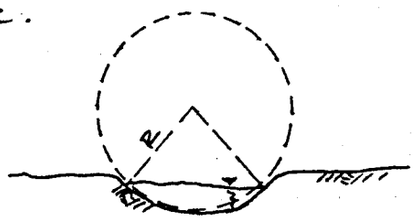
EXISTING DITCH DIMENSIONS:



DEPTH VARIES FROM 3" TO 6"
USE 0.40'

USE CURVE FORMULAS TO DETERMINE FLOW AREA AND WETTED PERIMETER.

Chord = 18" = 1.50'
Mid. = 0.40'



BY TRIAL & ERROR : R = 0.90'
L = 1.77' ⇒ Wetted perimeter
Seg. Area = 0.425 sq. ft.

HYD. RAD. = A/P = $0.425/1.77$ = 0.24 ft.

SLOPE = 1.3% n = 0.05 for open ditches

$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2} = \frac{1.49}{0.05}(0.425)(0.24)^{2/3}(0.013)^{1/2}$$

$$= 29.8(0.425)(0.386)(0.114)$$

$$Q = 0.56 \text{ cfs}$$

Worksheet 2: Runoff curve number and runoff

Project DEL-MAR SUB. By DEC Date 9-29-93

Location GRAND JCT., CO Checked ____ Date ____

Circle one: Present Developed AREA C 2-HR.

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☒acres ☐mi² ☐%	Product of CN x area
Ravola (Re) B	Roads: Asphalt, curb/gutter/sidewalk	99			0.645	63.86
Ravola (Re) B	Buildings: Roofs, driveways, sidewalks	99			0.680	67.32
Ravola (Re) B	Landscaping: Lawns, trees, flower beds, etc.	78			1.315	102.57
				Totals =	2.64	233.75

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{233.75}{2.64} = 88.5$; Use CN = 88

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	10	100	
Rainfall, P (2-hr. ~~24-hour~~)	in	1.16	2.10	
Runoff, Q (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)	in	0.35	1.05	

S = 1.36

Worksheet 2: Runoff curve number and runoff

Project DEL-MAR SUB By DEC Date 09-29-93

Location GRAND JCT., CO Checked _____ Date _____

Circle one: Present (Developed) AREA D 2-HR.

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2 (409)	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☒ acres ☐ mi^2 ☐ %	Product of CN x area
Ravola (Re) B	Roads: Asphalt, curb/gutter/sidewalk	99			2.056	203.54
Ravola (Re) B	Buildings: Roofs, driveways, sidewalks	99			2.72	269.28
Ravola (Re) B	Landscaping: Lawns, trees, flowerbed, etc	78			5.894	459.73
1/ Use only one CN source per line.				Totals =	10.67	932.56

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{932.56}{10.67} = 87.4$; Use CN = 88

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	10	100	
Rainfall, P (2-hr. ~~24-hour~~)	in	1.16	2.10	
Runoff, Q (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)	in	0.35	1.05	

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project DEL-MAR SUB. By DEE Date 9-29-93

Location GRAND JCT CO Checked ____ Date ____

Circle one: Present (Developed) AREA C

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID	AB			
1. Surface description (table 3-1)		Lawn			
2. Manning's roughness coeff., n (table 3-1) ..		0.30			
3. Flow length, L (total L ≤ 300 ft)	ft	30			
4. Two-yr 24-hr rainfall, P_2	in	1.0			
5. Land slope, s	ft/ft	0.01			
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t	hr	0.26	+		= 0.26
Shallow concentrated flow	Segment ID				
7. Surface description (paved or unpaved)					
8. Flow length, L	ft				
9. Watercourse slope, s	ft/ft				
10. Average velocity, V (figure 3-1)	ft/s				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr		+		=
		GUTTER	PIPE		
Channel flow	Segment ID	BC	CD		
12. Cross sectional flow area, a	ft^2	0.0938	0.091		
13. Wetted perimeter, p_w	ft	1.625	1.57		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft	0.0577	0.0577		
15. Channel slope, s	ft/ft	0.015	0.004		
16. Manning's roughness coeff., n		0.011	0.009		
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V	ft/s	2.48	1.56		
18. Flow length, L	ft	574	180		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t	hr	0.064	+ 0.032	=	0.10
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr				0.36

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project DEL-MAR SUB By DEL Date 9-30-93

Location GRAND JCT. CO Checked ____ Date ____

Circle one: Present (Developed) AREA D

Circle one: (T_c) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)		Segment ID	AB	
1. Surface description (table 3-1)			Lawn	
2. Manning's roughness coeff., n (table 3-1)			0.30	
3. Flow length, L (total L ≤ 300 ft)	ft		75	
4. Two-yr 24-hr rainfall, P_2	in		1.0	
5. Land slope, s	ft/ft		0.015	
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t	hr		0.45 +	= 0.45

Shallow concentrated flow		Segment ID	EF	
7. Surface description (paved or unpaved)			Unpaved	
8. Flow length, L	ft		225	
9. Watercourse slope, s	ft/ft		0.010	
10. Average velocity, V (figure 3-1)	ft/s		1.6	
11. $T_t = \frac{L}{3600\, V}$ Compute T_t	hr		0.04 +	= 0.04

Channel flow		Segment ID	BC	CD	DE
12. Cross sectional flow area, a	ft^2		0.094	0.094	0.094
13. Wetted perimeter, p_w	ft		1.625	1.625	1.625
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft		0.058	0.058	0.058
15. Channel slope, s	ft/ft		0.015	0.005	0.010
16. Manning's roughness coeff., n			0.011	0.011	0.011
17. $V = \frac{1.49\, r^{2/3}\, s^{1/2}}{n}$ Compute V	ft/s		2.48	1.43	2.02
18. Flow length, L	ft		620	446	230
19. $T_t = \frac{L}{3600\, V}$ Compute T_t	hr		0.07 +	0.09 +	0.03 = 0.19

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr 0.68

Worksheet 4: Graphical Peak Discharge method

Project DEL-MAR SUB By DEL Date 9-29-93

Location GRAND JCT., CO Checked _____ Date _____

Circle one: Present (Developed) AREA C 2-HR.

1. Data:

Drainage area ..... A_m = 0.0041 mi^2 (acres/640)

Runoff curve number .... CN = 88 (From worksheet 2)

Time of concentration .. T_c = 0.36 hr (From worksheet 3)

Rainfall distribution type = II (I, IA, II, III)

Pond and swamp areas spread throughout watershed ..... = 0 percent of A_m (— acres or mi^2 covered)

			Storm #1	Storm #2	Storm #3
2.	Frequency	yr	10	100	
3.	Rainfall, P (~~24-hour~~ 2-hr.)	in	1.16	2.10	
4.	Initial abstraction, I_a ..... (Use CN with table 4-1.)	in	0.500	0.500	
5.	Compute I_a/P		0.43	0.24	
6.	Unit peak discharge, q_u ..... (Use T_c and I_a/P with exhibit 4-____)	csm/in	375	570	
7.	Runoff, Q ..... (From worksheet 2).	in	0.35	1.05	
8.	Pond and swamp adjustment factor, F_p .... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)		1.0	1.0	
9.	Peak discharge, q_p ..... (Where $q_p = q_u A_m Q F_p$)	cfs	0.54	2.45	

Worksheet 4: Graphical Peak Discharge method

Project DEL-MAR SUB By DEL Date 9-30-93

Location GRAND JCT., CO Checked ____ Date ____

Circle one: Present (Developed) AREA D 2-HR

1. Data:

Drainage area ..... A_m = 0.0167 mi^2 (acres/640)

Runoff curve number .... CN = 88 (From worksheet 2)

Time of concentration .. T_c = 0.68 hr (From worksheet 3)

Rainfall distribution type = II (I, IA, II, III)

Pond and swamp areas spread throughout watershed ..... = 0 percent of A_m (— acres or mi^2 covered)

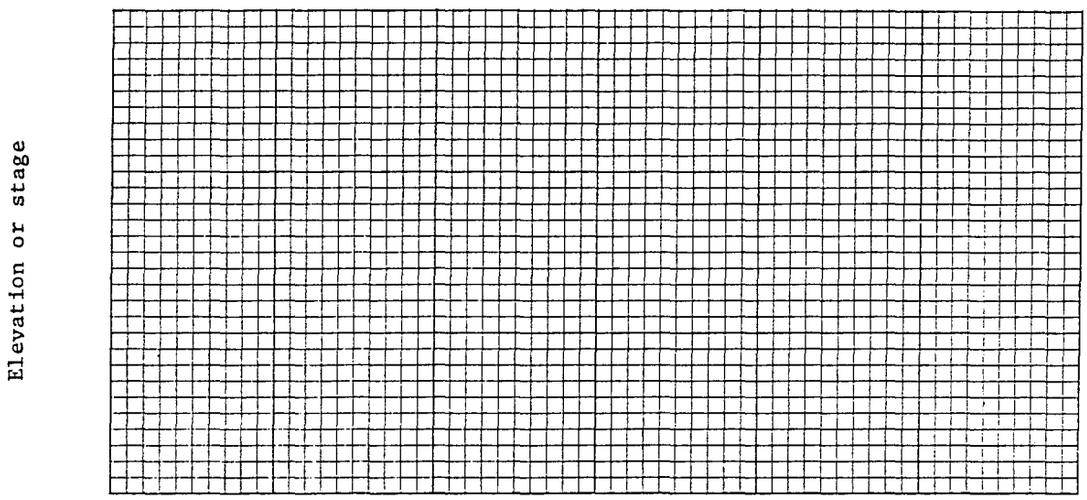
			Storm #1	Storm #2	Storm #3
2.	Frequency	yr	10	100	
3.	Rainfall, P (24-hour)	in	1.16	2.10	
4.	Initial abstraction, I_a ..... (Use CN with table 4-1.)	in	0.500	0.500	
5.	Compute I_a/P		0.43	0.24	
6.	Unit peak discharge, q_u ..... (Use T_c and I_a/P with exhibit 4-___)	csm/in	260	400	
7.	Runoff, Q ..... (From worksheet 2).	in	0.35	1.05	
8.	Pond and swamp adjustment factor, F_p .... (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)		1.0	1.0	
9.	Peak discharge, q_p ..... (Where $q_p = q_u A_m Q F_p$)	cfs	1.52	7.01	

Worksheet 6a: Detention basin storage, peak outflow discharge (q_o) known

Project DEL-MAR SUB. By DEL Date 9-30-93

Location GRAND JCT., CO Checked ____ Date ____

Circle one: Present (Developed) AREA D 2-HR.



Detention basin storage

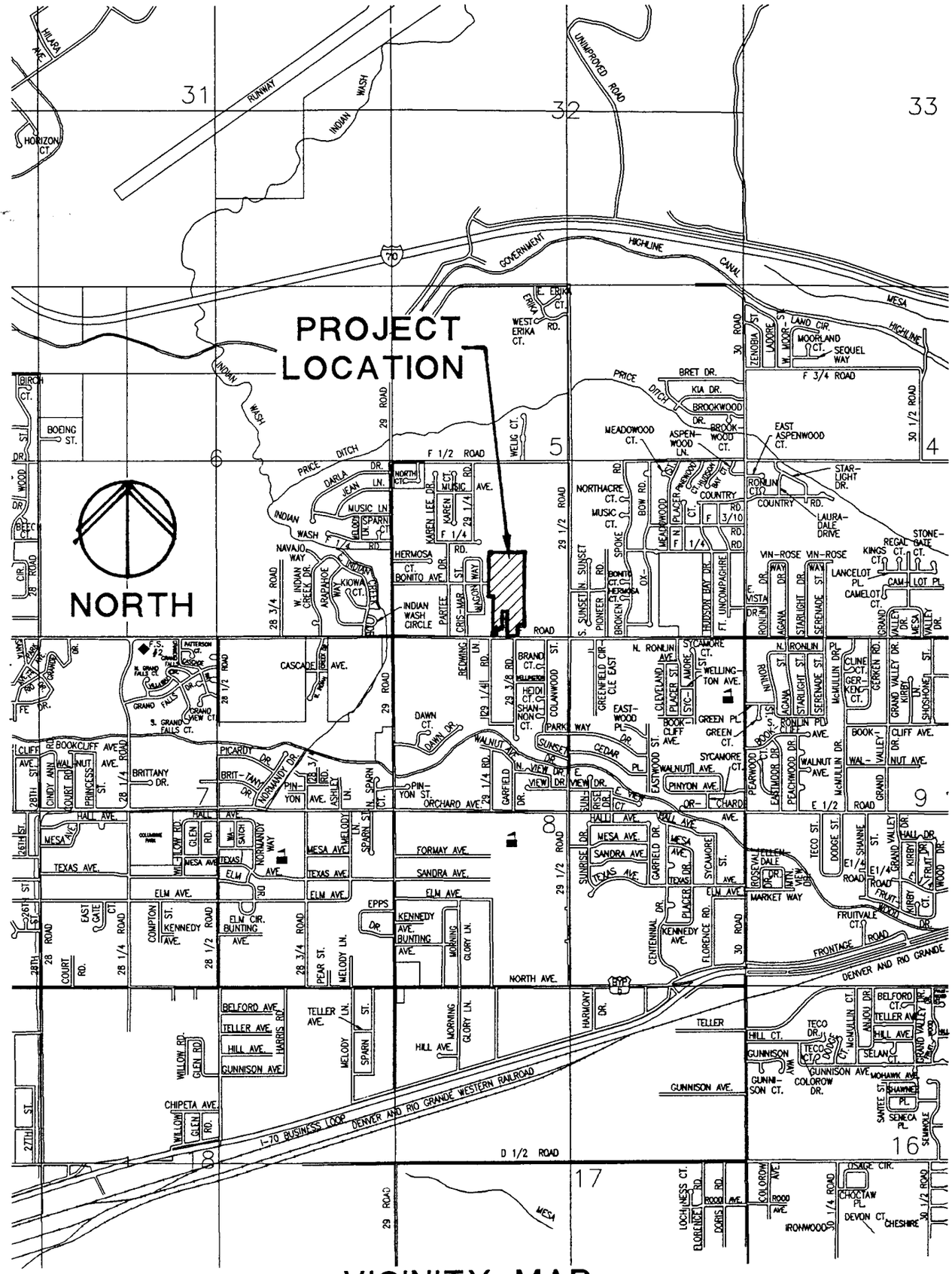
		1st stage	2nd stage
1.	Data: Drainage area ..... A_m = 0.0167 mi^2; Rainfall distribution type (I, IA, II, III) = II		
2.	Frequency ..... yr	10	
3.	Peak inflow discharge, q_i .... cfs (From worksheet 4 or 5b)	1.52	
4.	Peak outflow discharge, q_o .... cfs 1/	0.23	
5.	Compute $\frac{q_o}{q_i}$	0.151	
6.	$\frac{V_s}{V_r}$ ..... (Use $\frac{q_o}{q_i}$ with figure 6-1)	0.50	
7.	Runoff, Q ..... in (From worksheet 2)	0.35	
8.	Runoff volume, V_r ..... ac-ft ($V_r = QA_m 53.33$)	0.312	
9.	Storage volume, V_s ..... ac-ft ($V_s = V_r(\frac{V_s}{V_r})$)	0.156 = 6,795 c.f.	
10.	Maximum stage, E_{max} (From plot)		

Minimum Volume for Detention Pond

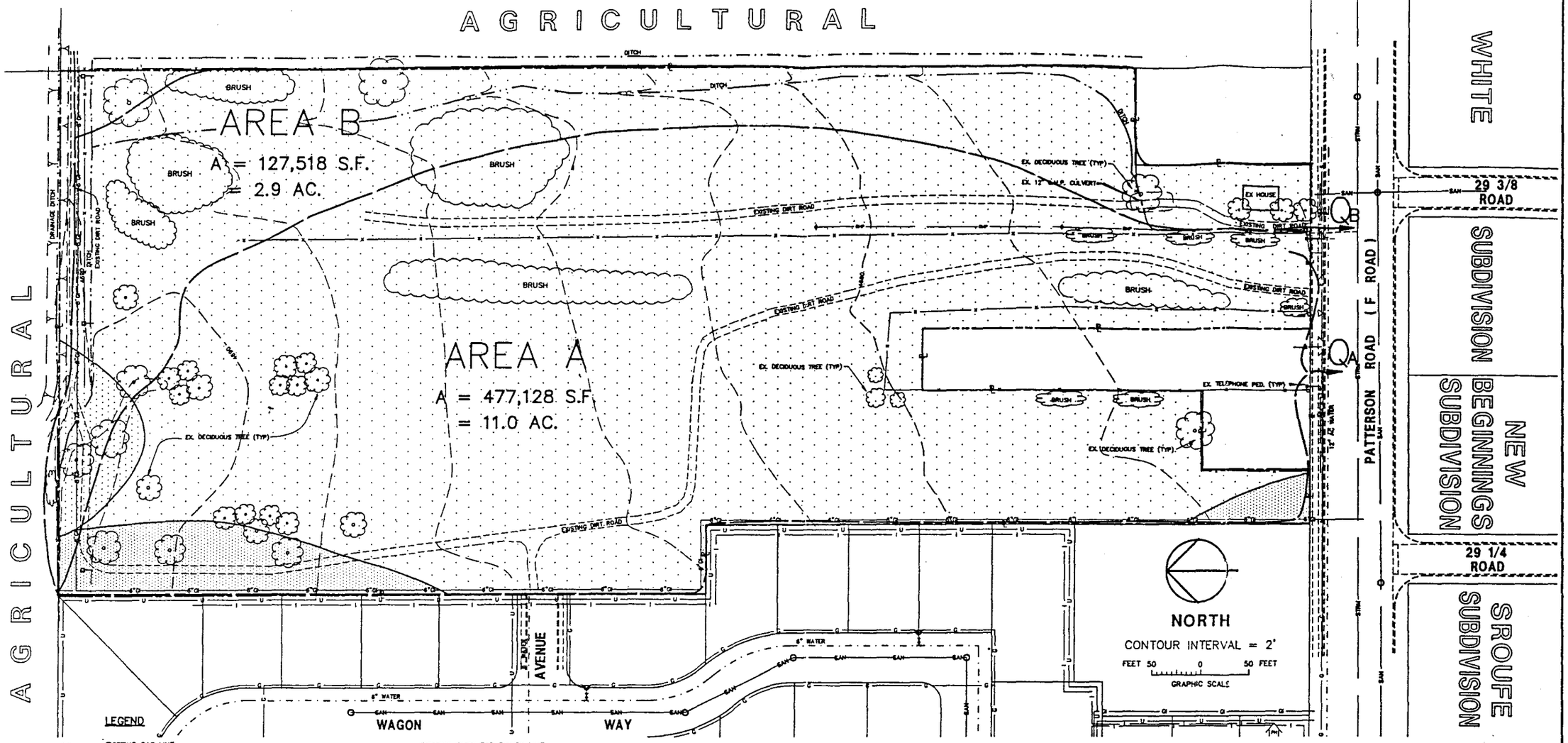
1/ 2nd stage q_o includes 1st stage q_o.

EXHIBITS

EXHIBIT A



VICINITY MAP



LEGEND

- EXISTING GAS LINE
- EXISTING UTILITY LINE CONSISTING OF TELEPHONE, AND OR CABLE TELEVISION.
- EXISTING TELEPHONE LINE
- EXISTING TELEPHONE PEDESTAL
- EXISTING WATER MAIN
- EXISTING WATER METER
- EXISTING SEWER MAIN AND MANHOLE
- EXISTING IRRIGATION LINE – FORCED
- EXISTING IRRIGATION LINE – GRAVITY
- EXISTING STORM SEWER LINE
- EXISTING OVERHEAD POWER LINE
- EXISTING POWER POLE
- EXISTING FENCE LINE
- EXISTING BRUSH
- EXISTING DECIDUOUS TREE
- EXISTING DITCH AND DITCH BANK
- EXISTING DIRT ROAD
- EXISTING CONTOUR LINE
- EXISTING BUILDING
- BOUNDARY LINE
- SOIL TYPE RE (RAVOLA LOAM)
- SOIL TYPE RA (RAVOLA CLAY LOAM)
- SOIL TYPE FC (FRUITA LOAM)

HISTORIC RUNOFF

REFER TO APPENDIX B OF DRAINAGE REPORT FOR CALCULATIONS:

10 YEAR STORM
Q_A = 0.23 cfs
Q_B = 0.07 cfs
100 YEAR STORM
Q_A = 2.69 cfs
Q_B = 0.81 cfs

EXHIBIT B

BY: JCS
ED BY: DEC
ED BY: DEC

REVIEWED _____
DATE: _____ FOR _____
REVIEWED _____
DATE: _____ FOR BANNER ASSOCIATES, INC.

American Consulting Engineers Council Member

BANNER
BANNER ASSOCIATES, INC. ● CONSULTING ENGINEERS & SURVEYORS
2777 CROSSROADS BOULEVARD ● GRAND JUNCTION, CO 81506 ● (303) 243-2242
605 E. MAIN ● SUITE 6 ● ASPEN, CO 8161 ● (303) 925-5857

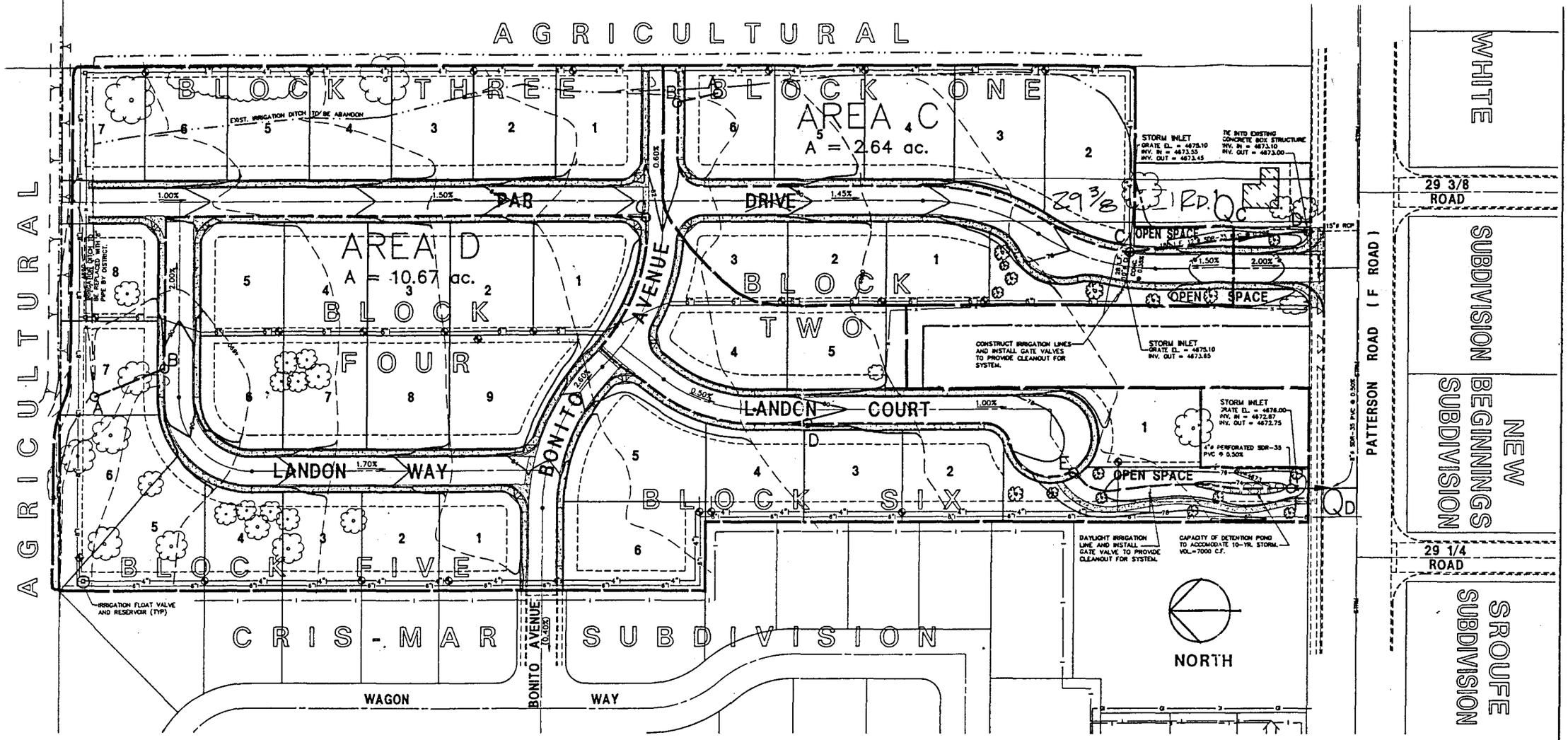
REVISION	DATE	DESCRIPTION	BY	CHD

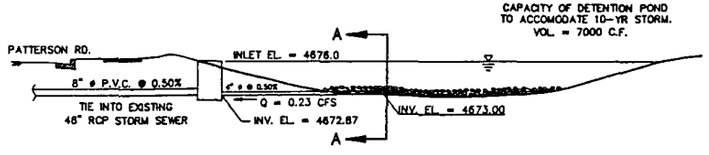
DEL-MAR CONSTRUCTION — CLIFTON, COLORADO

DEL-MAR SUBDIVISION
SITE ANALYSIS PLAN

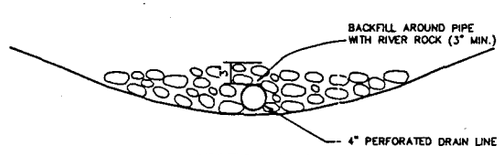
SCALE:	JOB NO:	DATE:
1" = 100'	8291-01	12-20-93

SHEET NO: 29





DETENTION POND DETAIL
N.T.S.



SECTION A-A
N.T.S.

DEVELOPED RUNOFF

REFER TO APPENDIX B OF DRAINAGE REPORT FOR CALCULATIONS:

10 YEAR STORM
Q_c = 0.54 cfs
Q_o = 1.52 cfs
100 YEAR STORM
Q_c = 2.45 cfs
Q_o = 7.01 cfs

EXHIBIT C

DWN BY: JCS	REVIEWED		
DESIGNED BY: DEC	DATE:	FOR	
CHECKED BY: DEC	REVIEWED		
	DATE:	FOR BANNER ASSOCIATES, INC.	

American Consulting Engineers Council Member

BANNER
BANNER ASSOCIATES, INC. ● CONSULTING ENGINEERS & SURVEYORS
2777 CROSSROADS BOULEVARD ● GRAND JUNCTION, CO 81506 ● (303) 243-2242
605 E. MAIN ● SUITE 6 ● ASPEN, CO 8161 ● (303) 925-5857

REVISION	DATE	DESCRIPTION	BY	CHK'D

DEL-MAR CONSTRUCTION — CLIFTON, COLORADO

DEL-MAR SUBDIVISION
DEVELOPED GRADING AND DRAINAGE PLAN

SCALE:	JOB NO:	DATE:
1" = 100'	8291-01	12-20-93

SHEET NO: 30

APPENDIX C

REVISED CALCULATIONS

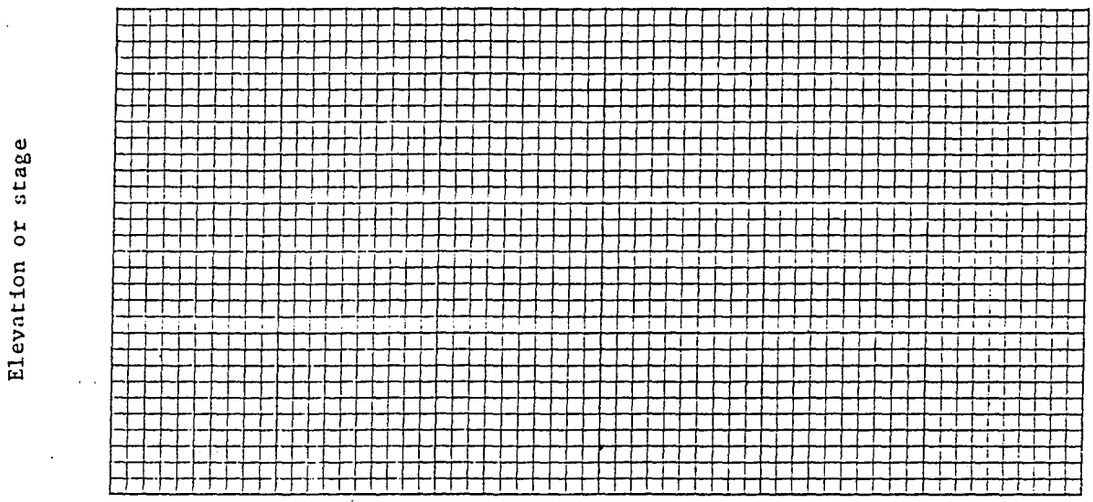
Many of the values required to determine the volume requirement for a 100-year storm were generated in the original report. To complete to calculation, only "Worksheet 6a: Detention Basin Storage, peak flow discharge(q_0) known" was needed to be revised. This worksheet follows as weel as a sketch of the proposed grading for the detention area which will provide the necessary volume capacity.

Worksheet 6a: Detention basin storage, peak outflow discharge (q_o) known

Project DEL-MAR SUB. By DEL Date 9-30-93

Location GRAND JCT., CO Checked ____ Date ____

Circle one: Present (Developed) AREA D 2-HR.



Detention basin storage

1. Data:
   Drainage area ..... A_m = 0.0167 mi^2
   Rainfall distribution type (I, IA, II, III) = II

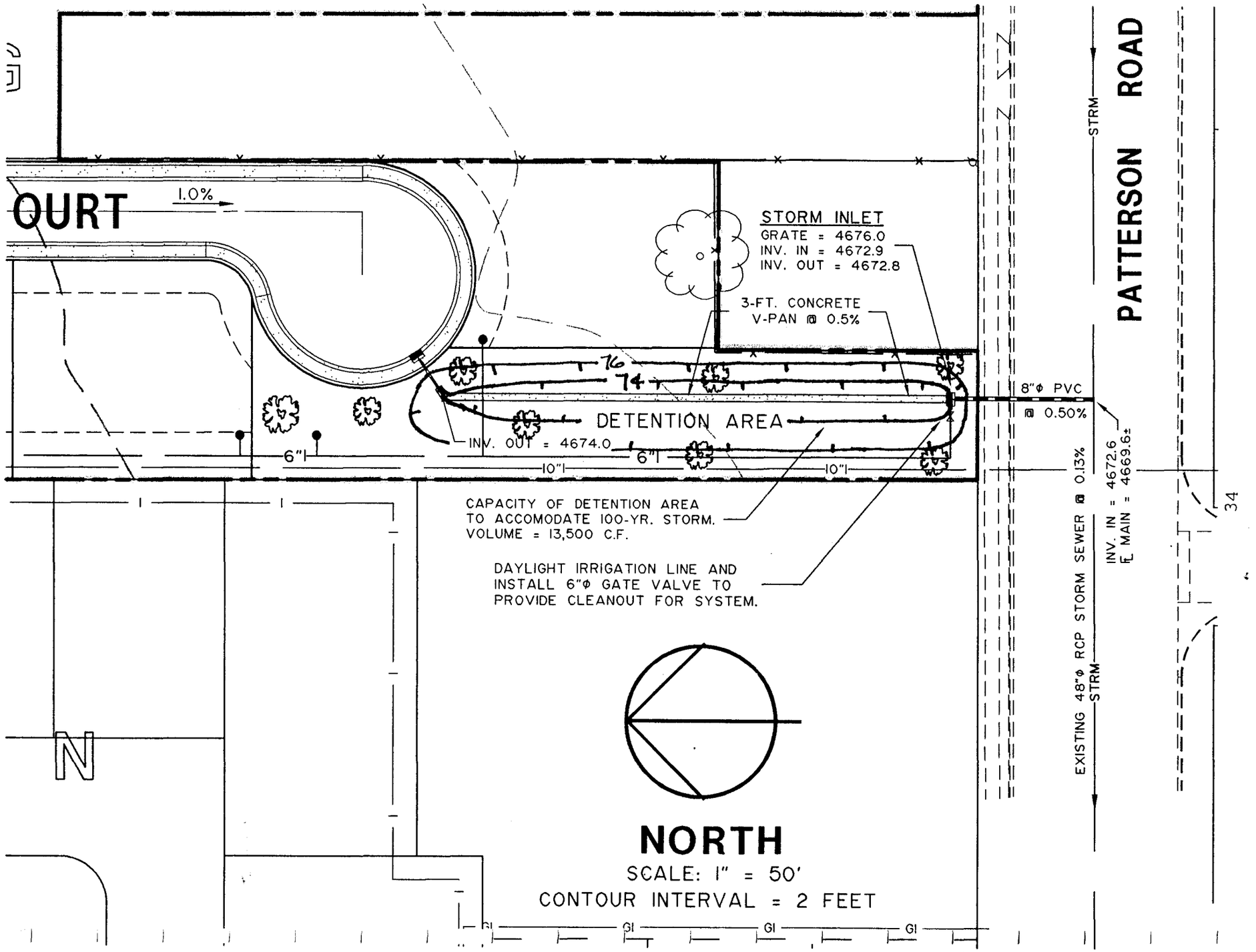
	1st stage	2nd stage
2. Frequency ..... yr	10	100
3. Peak inflow discharge, q_i .... cfs (From worksheet 4 or 5b)	1.52	7.01
4. Peak outflow discharge, q_o .... cfs 1/	0.23	2.69
5. Compute $\frac{q_o}{q_i}$	0.151	0.384
6. $\frac{V_s}{V_r}$ ..... (Use $\frac{q_o}{q_i}$ with figure 6-1)	0.50	0.33
7. Runoff, Q ..... in (From worksheet 2)	0.35	1.05
8. Runoff volume, V_r ..... ac-ft ($V_r = QA_m 53.33$)	0.312	0.935
9. Storage volume, V_s ..... ac-ft	0.156	0.309
10. Maximum stage, E_{max} (From plot)		

13,440 c.f.

($V_s = V_r(\frac{V_s}{V_r})$) = 6,795 c.f.

Minimum Volume for Detention Pond

1/ 2nd stage q_o includes 1st stage q_o.


OURT
1.0%
STORM INLET
GRATE = 4676.0
INV. IN = 4672.9
INV. OUT = 4672.8
3-FT. CONCRETE
V-PAN @ 0.5%
76
74
DETENTION AREA
INV. OUT = 4674.0
6"
10"
6"
10"
8"ϕ PVC
@ 0.50%
STRM
PATTERSON ROAD
INV. IN = 4672.6
℄ MAIN = 4669.6±
EXISTING 48"ϕ RCP STORM SEWER @ 0.13%
STRM
34
CAPACITY OF DETENTION AREA
TO ACCOMODATE 100-YR. STORM.
VOLUME = 13,500 C.F.
DAYLIGHT IRRIGATION LINE AND
INSTALL 6"ϕ GATE VALVE TO
PROVIDE CLEANOUT FOR SYSTEM.
N
NORTH
SCALE: 1" = 50'
CONTOUR INTERVAL = 2 FEET
GI
GI
GI
GI

REVIEW COMMENTS

FILE #FPP-95-135 **TITLE HEADING:** Final Plan/Plat - Del Mar Subdivision Filing #2

LOCATION: 29 3/8 Road and F Road

PETITIONER: Del Mar Construction

PETITIONER'S ADDRESS/TELEPHONE: 3210 E 1/2 Road Clifton, CO 81520

434-7049

PETITIONER'S REPRESENTATIVE: Banner Associates

STAFF REPRESENTATIVE: Kathy Portner

NOTE: THE PETITIONER IS REQUIRED TO SUBMIT FOUR (4) COPIES OF WRITTEN RESPONSE AND REVISED DRAWINGS ADDRESSING ALL REVIEW COMMENTS ON OR BEFORE 5:00 P.M., AUGUST 25, 1995.

CITY FIRE DEPARTMENT **8/4/95**
Hank Masterson **244-1414**

The Fire Department has no problems with this proposal.

GRAND VALLEY RURAL POWER **8/7/95**
Perry Rupp **242-0040**

Need front lot (14') easements on Lot 1, Block 4 & Lot 1, Block 3.

PALISADE IRRIGATION DISTRICT **8/8/95**
Wayne Bain **464-5113**

Palisade Irrigation District recommends that a storage reservoir of appropriate size be placed in the Subdivision to reduce the impact of residential water users competing for water at the same time as all other water users of the entire canal system. The water right is insufficient to serve all users at the same time.

Failure to reconstruct such storage reservoir may result in the subdivision being provided with an opening sized to the actual water right which is 1/3 to 1/2 a miners inch of continuous flow per acre. This equates to approximately 5.6 gallons per minute per acre in the subdivision at the 1/2 inch maximum rate. The average lawn pump output ranges from 30 GPM to 50 GPM.

GRAND JUNCTION DRAINAGE DISTRICT **8/14/95**
John Ballagh **242-4343**

There are no existing or planned GJDD facilities on the site of Filing #2.

UTE WATER DISTRICT **8/16/95**
Gary Mathews **242-7491**

1. Water mains shall be C-900, Class 150. Installation of pipe fittings, valves and services including testing and disinfection shall be in accordance with Ute Water standard specifications and drawings.
2. Developer is responsible for installing meter pits and yokes for a complete installation. Ute Water will furnish the meter pits and yokes.

POLICIES AND FEES IN EFFECT AT THE TIME OF APPLICATION WILL APPLY....

MESA COUNTY PLANNING **8/10/95**
Linda Dannenberger **244-1771**

No comment or objection to the proposal.

CITY POLICE DEPARTMENT **8/14/95**
Dave Stassen **244-3587**

This proposal does not appear to pose any concerns for the Police Department.

CITY PROPERTY AGENT **8/16/95**
Steve Pace **244-1452**

1. Interior lot corner monumentation needs to be shown.
2. In the legal description, the chord bearing in call No. 3 and the bearing in call No 5, do not match the plat.
3. The title at the top of the plat could be larger and bolder.

COMMUNITY DEVELOPMENT DEPT. **8/16/95**
Kathy Portner **244-1446**

See attached comments.

CITY UTILITY ENGINEER **8/16/95**
Trent Prall **244-1590**

Sewer: Central Grand Valley Sanitation District - No Comment.
Water: Ute - No Comment.

PUBLIC SERVICE CO. **8/14/95**
Dale Clawson **244-2695**

Require Tract A Open Space be dedicated as utility easement.
Require 14' front lot line multi-purpose easements on Lot 1, Block 3, and Lot 1, Block 4.

CITY DEVELOPMENT ENGINEER **8/16/95**
Jody Kliska **244-1591**

Add end of road markers to ends of streets; adjust the improvements agreement amount accordingly.

CENTRAL GRAND VALLEY SANITATION **8/15/95**
S.T. LaBonde **241-7076**

See attached comments.

TCI CABLEVISION **8/15/95**
Glen Vancil **245-8750**

See attached comments.

LATE COMMENTS

CITY PARKS & RECREATION DEPARTMENT **8/16/95**
Shawn Cooper **244-3869**

1. Parks and Open Space fees are required.
2. Is "open space" to remain private? Maintenance?

U.S. WEST **8/17/95**
Max Ward **244-4721**

New or additional telephone facilities necessitated by this project may result in a "contract" and up-front monies required from developer, prior to ordering of placing of said facilities. For more information, please call 1-800-526-3557.

TO DATE, NO COMMENTS RECEIVED FROM:
City Attorney
Mesa County Surveyor
Mesa County School District #51

STAFF REVIEW

FILE: #FPP-95-135

DATE: August 17, 1995

STAFF: Kathy Portner

REQUEST: Final Plat/Plan--Del Mar, Filing #2

LOCATION: F Road and 29 3/8 Road

APPLICANT: Delbert & Marilyn Parmeter

EXISTING LAND USE: Undeveloped

PROPOSED LAND USE: Residential Single Family, 3 units per acre

SURROUNDING LAND USE:

NORTH: Undeveloped
SOUTH: Single family residential (3-4 units per acre)
EAST: Undeveloped
WEST: Single family residential (3-4 units per acre)

EXISTING ZONING: PR (Planned Residential)

PROPOSED ZONING: PR (Planned Residential)

SURROUNDING ZONING:

NORTH: R-2 (County)
SOUTH: PR, approximately 3 units per acre
EAST: R-2
WEST: R-2

RELATIONSHIP TO COMPREHENSIVE PLAN:

No Comprehensive Plan exists for this area.

STAFF ANALYSIS:

1. Potential driveway access through Tract A for the property just east of tract A should be preserved by dedicating it as an ingress/egress easement for that purpose.

2. Is fencing and/or berming and landscaping proposed along F Road. Some provision for landscaping and maintenance of that area behind the sidewalk should be made.

3. Is a subdivision identification sign proposed along F Road and 29 3/8 Road? If so, please indicate the size, design and location.

4. The plat should include a note that no driveway access onto F Road is allowed.

5. The setbacks as established with filing #1 shall apply and must be noted on the plat or on a separate recorded document.

6. A landscaping and maintenance plan must be submitted for tract A.

STAFF RECOMMENDATION:

Staff will make a recommendation after reviewing the petitioner's response to comments.

REVIEW COMMENTS FOR DEL-MAR SUBDIVISION, FILING 2 - CGVSD (8/15/95)

1. The proposed alignment to service Landon Court through Lots 3 and 4 of Block 2, is not acceptable. Sewer service to Landon Court should be in accordance with the approved overall utility composite dated April 10, 1994. Whenever possible, the District requires that all sewer lines be placed either along the street centerlines or the center of lanes. It is possible to provide service to Landon Court by installing the sewerlines along Landon Court to Bonita Avenue, then along Bonita Avenue to 29 3/8 Road, in accordance with the approved utility composite. It may be necessary to adjust the proposed sewerline grades along 29 3/8 Road to ensure adequate service can be provided to Landon Court. If it is proposed to pave Bonita Avenue as part of Filing 2, it will be necessary to install the sewerline along Bonita Avenue from 29 3/8 Road to Landon Court as part of this filing.

2. There appears to be a discrepancy in the existing manhole elevations, that should be re-verified. Our field measurements indicate that there is approximately a 0.3 ft. drop between the south invert-out and the north invert-in, not 1.3 ft. as shown on the plans. The invert elevations should be accurately shown and the design revised as necessary. There also appears to be an elevation discrepancy for the existing manhole elevations between the District's records that show a rim elevation of 4677.78, as compared to the elevation shown on the plans of 4675.56. This should be resolved in order that the District's overall system plans are consistent. At a minimum, the elevation difference between the design plans and the District's system plans should be noted.

3. A manhole is required for the sewerline stub-out along 29 3/8 Road north of Bonita Avenue that will provide service to Lot 1 of Block 3 and Lot 1 of Block 4. The District does not allow service connections on stub-out lines. The sewerline could be stubbed-out to the next manhole in the proposed future filing with service lines provided to future lots, if the lot configuration is known. If the petitioner constructs this segment of sewerline, an easement will be necessary for the sewerline that is outside the platted right-of-way that will be located on private property in the interim before the future filing is platted.

4. The stub-out to the east of 29 3/8 Road along Bonita Avenue should be extended to the end of asphalt. A profile should also be provided.

5. The District requires a minimum of one clay cut-off wall be installed upstream of each manhole to prevent groundwater flow through the pipe bedding. The cut-off walls should be shown and noted on the plan and profile.

6. A note should be added on both the plan and profile that the stub-outs are to be glue-capped and marked with 2x4 posts painted green.

7. The size and type of pipe should be noted on the plan.

8. The County has required boring of Patterson Road on past developments. If the County requires boring, this should be shown on the plans, as well as the required steel casing pipe and detail.

9. The City of Grand Junction's standard detail sheet should be included with the final submittal.

10. The following notes and signature block should either be revised or added to the plans that have changed in the interim between Filing 1 and Filing 2:

    a. Note #3 should be revised to include that all pipe joints for the sanitary sewer main are to be 13 ft., unless otherwise approved by the District Engineer.

    b. Note #9 should be revised that sewer service lines extend at least 14 ft. beyond the property, instead of the 10 ft. listed. This will ensure that the service lines extend beyond the utility easements that are 14 ft. as shown on the plat.

    c. Note #10 should be revised that the District is to be notified 48 hours prior to construction instead of the 24 hours listed.

    d. An additional note #15 should be added stating that "The Contractor is responsible for all required sewerline testing, to be completed in the presence of the District Engineer or their representative. Final testing is to be accomplished only after all other infrastructure has been installed. This includes water lines, gas lines, electric lines, etc. These tests will be the basis of issuing initial acceptance of the sewer line extension. All final sewer line testing is to be accomplished prior to final street paving."

    e. The "Accepted as Constructed" signature block has been changed by the District to "Initial Acceptance", consistent with the District rules and regulations and Extension Agreement.

11. The District's Sewerline Extension Application and Agreement will need to be executed by the petitioner prior to commencement of construction.

We're taking television into tomorrow.

TCI Cablevision of Western Colorado, Inc.

August 15, 1995

RECEIVED GRAND JUNCTION PLANNING DEPARTMENT
AUG 16 RECD

Del Mar Sub. Fil. 2
Del Mar Construction
% Community Development Department
250 North 5th Street
Grand Junction, CO 81501

Ref. No. TCICON.079

Dear Sir or Madame;

We are in receipt of the plat map for your new subdivision, **Del Mar Sub. Fil. 2.** We will be working with the other utilities to provide service to this subdivision in a timely manner.

I would like to take this opportunity to bring to your attention a few details that will help both of us provide the services you wish available to the new home purchasers. These items are as follows:

1. We require the developers to provide, at no charge to TCI Cablevision, an open trench for cable service where underground service is needed. This trench may be the same one used by other utilities.

2. We require developers to provide, at no charge to TCI Cablevision, fill-in of the trench once cable has been installed in the trench.

3. We require developers to provide, at no charge to TCI Cablevision, a 4" PVC conduit at all utility road crossings where cable TV will be installed. This 4" conduit will be for the sole use of cable TV.

4. Should your subdivision contain cul-de-sac's the driveways and property lines (pins) must be clearly marked prior to the installation of underground cable. If this is not done, any need to relocate pedestals or lines will be billed directly back to your company.

5. TCI Cablevision will provide service to your subdivision so long as it is within the normal cable TV service area. Any subdivision that is out of the existing cable TV area may require a construction assist charge, paid by the developer, to TCI Cablevision in order to extend the cable TV service to that subdivision.

6. TCI will normally not activate cable service in a new subdivision until it is approximately 30% developed. Should you wish cable TV service to be available for the first home in your subdivision it will, in most cases, be necessary to have you provide a construction assist payment to cover the necessary electronics for that subdivision.

Should you have any other questions or concerns please feel free to contact me at any time. If I am out of the office when you call please leave your name and phone number with our office and I will get back in contact with you as soon as I can.

Sincerely,

Glen Vancil

Glen Vancil,
Construction Supervisor 245-8777

2502 Foresight Circle
Grand Junction, CO 81505
(303) 245-8750

RESPONSE TO REVIEW COMMENTS

FILE: #FFP-95-135 TITLE HEADING: Final Plan/Plat
Del-Mar Sub., Filing Two

LOCATION: 29⅜ Road and F Road

PETITIONER: Del Mar Construction, Inc.

PETITIONER'S ADDRESS/TELEPHONE: 3210 E½ Road
Clifton, CO 81520
434-7049

PETITIONER'S REPRESENTATIVE: Banner Associates, Inc.
2777 Crossroads Blvd., G.J., CO
243-2242

STAFF REPRESENTATIVE: Kathy Portner

CITY FIRE DEPARTMENT

No response necessary.

GRAND VALLEY RURAL POWER

The 14' Multi-Purpose Easements were left off of these lots by mistake. They will be added to the Final Plat.

PALISADE IRRIGATION DISTRICT

Storage reservoirs are being installed for this subdivision. As was proposed with Filing One, the Petitioner will be installing individual storage reservoirs for each lot that will be continuously replenished during off-peak times. Lot owners will not be allowed to tie directly onto the irrigation distribution lines within the subdivision.

GRAND JUNCTION DRAINAGE DISTRICT

No response necessary.

UTE WATER DISTRICT

1. Petitioner will construct water mains according to the District's specifications as noted in the General Notes on Sheet 7 of 14 in the set of construction drawings.

2. Petitioner takes no exception to installing the meter pits and yokes that are furnished by the District.

MESA COUNTY PLANNING

No response necessary.

CITY POLICE DEPARTMENT

No response necessary.

CITY PROPERTY AGENT

1. Monumentation of the interior lot corners will be provided as per Colorado state regulations. To show these corners as monumented at the time the Plat is recorded would mean these monuments would be set before any construction has taken place. With the property lines, or right-of-way lines, being only 1'-6" behind the sidewalk as well as being in the 14' Multi-Purpose Easement, these monuments would no doubt be destroyed before construction of the subdivision was complete. State regulation require that interior lot corners be monumented within one-year of the lot sale.

2. The legal description and/or plat will be corrected so that these calls match.

3. The title along the top of the plat will be made larger and bolder.

COMMUNITY DEVELOPMENT DEPARTMENT

1. The Petitioner takes no exception in dedicating Tract A as an ingress/egress easement for future access to the adjacent property to the east.

2. The only frontage along F Road is that which is in Lot 1, Block 2. It will the responsibility of that homeowner to install landscaping. The landscaping of Tract A will be done with sod and/or shrubs with the maintenance provided by the Homeowners Association.

3. There are no plans for a subdivision identification sign.

4. A note will be added to the plat stating that no driveway access will be allowed onto F Road.

5. The setback requirements will be added to the plat.

6. A landscaping and maintenance plan for Tract A will be submitted.

CITY UTILITY ENGINEER

No response necessary

PUBLIC SERVICE COMPANY

As well as an ingress/egress easement, Tract A will be dedicated as Multi-Purpose Easement, which will accommodate the installation of utilities.

As stated previously, the multi-purpose easement was left off in error and will be added to the Final Plat.

CITY DEVELOPMENT ENGINEER

End of road markers will be added to the plans and the Improvements Agreement will adjusted accordingly.

CENTRAL GRAND VALLEY SANITATION DISTRICT

1. The alignment of the future sewer service to Landon Court was discussed with Steve LaBonde, the District's engineer. The alignment proposed was in order to maintain the 72" depth requirement that the District has adopted. Mr. LaBonde stated that the District would rather maintain a sewer alignment that is within the street right-of-way and deviate from the depth requirement than have the sewer line cross private property, even if an easement is dedicated. Therefore, the sewer line alignment will be revised to show the line being constructed within Bonito Avenue as originally outlined on the Utility Composite dated April 10, 1994.

2. The elevation discrepancy will be investigated and the inverts corrected to show as-constructed conditions. If the elevation datum on the **Banner** plans is different than that being used by the District, then an elevation difference will be noted.

3. The issue of installing a manhole at the end of the sewer stub in 29⅜ Road was also discussed with Mr. LaBonde. It was suggested that since the sewer line will be revised to be aligned within Bonito Avenue, then the sewer service for Lot 1, Block 4 can tie onto this main line thus leaving only one service (for Lot 1, Block Three) on the stub in 29⅜ Road. The District has allowed the use of one service on a stub line in the past, therefore Mr. LaBonde felt that this may be agreeable to the District. However, it was acknowledged the this sewer stub line will not be accepted into the District until it is extended to a future manhole.

4. The stub-out in Bonito Avenue east of 29⅜ Road will be extended to the property line and a profile developed as requested.

5. The cut-off wall, and notation, will be added to the plan and profile sheet as requested.

6. A note can be added to both the plan and profile, although it is addressed in the General Notes on the same page.

7. The size and type of the sewer mains will be added to the plan, however, the type and size is again called out in the General Notes on the same page.

8. The petitioner will be working with the City and County regarding the details of tying the sewer into the existing manhole in F Road. In conversations with Mr. Joe Beilman, it is highly probable that boring the sewer line across F Road will be necessary. This requirement is currently being verified and if it is indeed necessary, then all the applicable details and notes will be added to the plans.

9. City of Grand Junction detail sheets are included in the set of drawings that will be used for construction.

10. All the revisions to the notes and revision block will be performed as requested.

11. The Petitioner is familiar with the District's Sewerline Extension Application and Agreement and that it will need to be executed prior to commencement of construction.

TCI CABLEVISION

The Petitioner takes no exception to review comments made.

STAFF REVIEW

FILE: #FPP-95-135

DATE: August 17, 1995

STAFF: Kathy Portner

REQUEST: Final Plat/Plan--Del Mar, Filing #2

LOCATION: F Road and 29 3/8 Road

APPLICANT: Delbert & Marilyn Parmeter

EXISTING LAND USE: Undeveloped

PROPOSED LAND USE: Residential Single Family, 3 units per acre

SURROUNDING LAND USE:

NORTH:	Undeveloped
SOUTH:	Single family residential (3-4 units per acre)
EAST:	Undeveloped
WEST:	Single family residential (3-4 units per acre)

EXISTING ZONING: PR (Planned Residential)

PROPOSED ZONING: PR (Planned Residential)

SURROUNDING ZONING:

NORTH:	R-2 (County)
SOUTH:	PR, approximately 3 units per acre
EAST:	R-2
WEST:	R-2

RELATIONSHIP TO COMPREHENSIVE PLAN:

No Comprehensive Plan exists for this area.

STAFF ANALYSIS:

1. Potential driveway access through Tract A for the property just east of tract A should be preserved by dedicating it as an ingress/egress easement for that purpose.

STAFF REVIEW

FILE: #FPP-95-135

DATE: August 29, 1995

STAFF: Kathy Portner

REQUEST: Final Plat/Plan--Del Mar, Filing #2

LOCATION: F Road and 29 3/8 Road

APPLICANT: Delbert & Marilyn Parmeter

EXISTING LAND USE: Undeveloped

PROPOSED LAND USE: Residential Single Family, 3 units per acre

SURROUNDING LAND USE:

NORTH:	Undeveloped
SOUTH:	Single family residential (3-4 units per acre)
EAST:	Undeveloped
WEST:	Single family residential (3-4 units per acre)

EXISTING ZONING: PR (Planned Residential)

PROPOSED ZONING: PR (Planned Residential)

SURROUNDING ZONING:

NORTH:	R-2 (County)
SOUTH:	PR, approximately 3 units per acre
EAST:	R-2
WEST:	R-2

RELATIONSHIP TO COMPREHENSIVE PLAN:

No Comprehensive Plan exists for this area.

STAFF ANALYSIS:

Del Mar Subdivision received Preliminary approval by the Planning Commission at the time of annexation. The proposed final plat for filing 2 is in accordance with that approved plan.

In the response to comments, the petitioner has agreed to the following requests and requirements:

1. The 14' multi-purpose easement will be provided on all front lot-lines.
2. Storage reservoirs for irrigation will be installed.
3. Petitioner will comply with all Ute Water comments.
4. Petitioner will comply with all City Property Agent comments.
5. Tract A will be dedicated as an ingress/egress easement for future access to the adjacent property to the east and a multi-purpose easement.
6. End of road markers will be added to the plans and the Improvements Agreement adjusted accordingly.
7. Petitioner will comply with all requirements of Central Grand Valley Sanitation District.
8. Petitioner will comply with all TCI Cable comments.
9. A note will be added to the plat stating that no driveway access will be allowed onto F Road.
10. The setback requirements will be added to the plat.
11. A landscaping and maintenance plan for Tract A will be submitted.

The setback requirements shall be the same as approved with the Preliminary Plan (Development File #204-94) which are as follows:

Principal Building	20'--Front 20'--Rear 10'--Side (including corner lots or easement width)
Accessory Buildings	Limited to the rear 1/2 of lot 5'--Rear 5'--Side (or easement width, whichever is greater)

The side yard setback for the side street of a corner lot for principal buildings, where the garage and associated parking are proposed to have access from the side street shall be 20' for the garage portion of the principal structure, with the remaining portions of the principal structure meeting a 14' setback (the width of the multi-purpose easement).

A Parks and Open Space fee of $225 per lot must be paid prior to recording the plat. The required Transportation Capacity Payment (TCP) is collected at the time of building permit.

STAFF RECOMMENDATION:

Staff recommends approval of the proposed final plat.

RECOMMENDED PLANNING COMMISSION MOTION:

Mr. Chairman, on item #FPP-95-135, Final Plan/Plat of Del Mar Subdivision, Filing #2, I move we approve the final plan/plat.

willing to amend DIA to complete Road Improvements by June 1, 1996 — all other improvements ~~be~~ w/in 1 year

Filing 2
4.1 acres ; 13 lots

covenants need to address ongoing maintenance of Tract A

NORWEST BANKS

Norwest Bank Grand Junction, N.A.
2808 North Avenue
P.O. Box 1568
Grand Junction, Colorado 81502-1568
303/242-8822

Kathy P
rec'd 8/22/95
c CDD
Please have the assigned planner call me ... thx
Dan W
8/22/95

August 17, 1995

Dan Wilson, City Attorney
250 N. 5th St.
Grand Junction, CO 81501

RE: Del-Mar Subdivision, Filing 2

Dear Mr. Wilson:

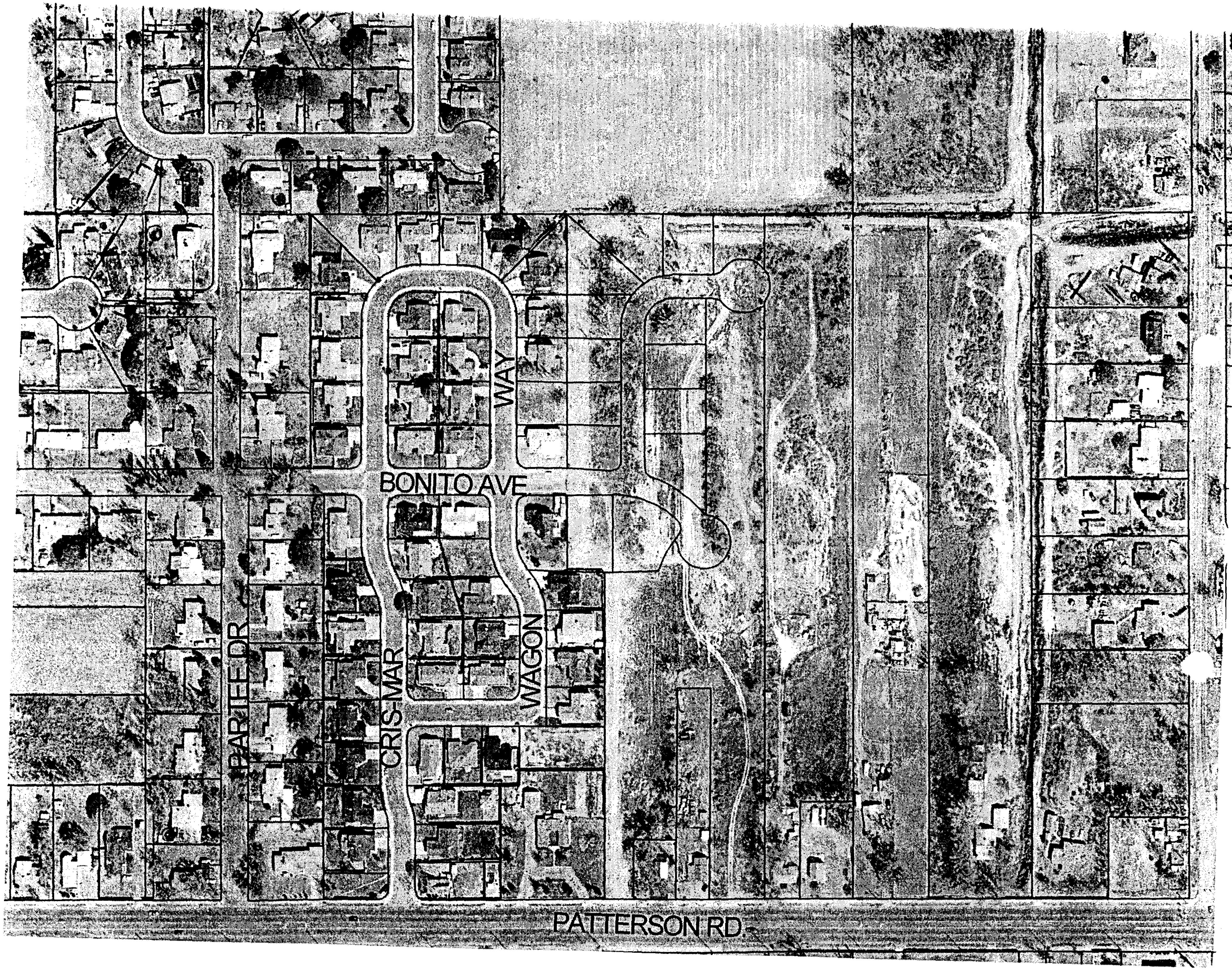
Norwest Bank has committed to fund the development of the second phase of Del-Mar Subdivision, up to an amount of $175,000. The commitment is of course dependent upon the actual final approval by the City of Filing 2 which, I believe, is set for September 5. The $175,000 is based on the cost estimate provided by Banner Associates, Inc. dated July 11, 1995. I believe that the actual infrastructure cost that the bank will commit to fund, as will be required by the City on the subdivision improvements agreement, will be somewhat less than $175,000. Kathy at City Planning has yet to provide the actual number to me.

It is my understanding that this commitment from the bank as to future funding of Del-Mar, Filing 2 will allow the developer to proceed with building out the last five lots of Filing 1. Please let me know at your convenience if additional information is needed.

Sincerely,

Jeffrey F. Parker

Jeffrey F. Parker
Vice President



BONITO AVE
WAY
PARTEE DR
CRIS-MAR
WAGON
PATTERSON RD.

copies sent to John Shaver 9/13/95

LETTER OF TRANSMITTAL

BANNER

CONSULTING ENGINEERS & SURVEYORS

BANNER ASSOCIATES, INC.
2777 Crossroads Blvd.
Grand Junction, Colorado 81506
(303) 243-2242
FAX (303) 243-3810

TO: G.J. COMMUNITY DEVELOP.
250 N. 5th STREET
GRAND JCT., CO 81501

ATTENTION: KATHY PORTNER

SUBJECT: DEL-MAR SUB.
FILING TWO

DATE: SEPT. 7, 1995

JOB NO: 8291-07

TRANSMITTED ARE:

- ☐ For Approval
- ☐ For Your Use
- ☐ As Requested
- ☒ For Review and Comment
- ☐ Submittal Accepted
- ☐ Submittal Accepted as Noted (Resubmit)
- ☐ Submittal Returned for Revision (Resubmit)
- ☐ Submittal Not Acceptable (Submit Anew)
- ☐ Preliminary Submittal
- ☐ For Reference Only
- ☐ Distribution Copy (Previously Accepted)
- ☐ _____
- ☐ _____
- ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1		9	Subdivision covenants

REMARKS _____

COPY TO _____

SIGNED David Chase

DECLARATION
OF COVENANTS, CONDITIONS AND RESTRICTIONS
OF DEL MAR SUBDIVISION

THIS DECLARATION, made on the date hereinafter set forth by DEL MAR CONSTRUCTION, INC. hereinafter referred to as "Declarant."

WHEREAS, Declarant is the owner of certain property in the County of Mesa, State of Colorado, which is more particularly described as:

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

NOW, THEREFORE, Declarant hereby declares that all of the properties described above shall be held, sold and conveyed subject to the following easements, restrictions, covenants and conditions which are for the purpose of protecting the value and desirability of, and which shall run with, the real property and be binding on all parties having any right, title or interest in the described properties or any part thereof, their heirs, successors and assigns, and shall inure to the benefit of each owner thereof.

ARTICLE I

DEFINITIONS

Section 1. "Association" shall mean and refer to Del Mar Homeowners Association, its successors and assigns.

Section 2. "Owner" shall mean and refer to the record owner, whether one or more persons or entities, of a fee simple title to any Lot which is a part of the Properties, including contract sellers, but excluding those having such interest merely as security for the performance of an obligation.

Section 3. "Properties" shall mean and refer to that certain real property hereinbefore described, and such additions thereto as may hereafter be brought within the jurisdiction of the Association.

Section 4. "Common Area" shall mean all real property (including the improvements thereto) owned by the Association for the common use and enjoyment of the owners, including but not limited to the drainage retention areas at the south end of the subdivision.

Section 5. "Lot" shall mean and refer to any plot of land shown upon any recorded subdivision map of the Properties with the exception of the Common Area.

Section 6. "Declarant" shall mean and refer to Del Mar Construction, Inc., its successors and assigns if such successors

or assigns should acquire more than one undeveloped Lot from the Declarant for the purpose of development.

Section 7. "Architectural Control Committee" shall mean and refer to the Architectural Control Committee set forth at Article VI of this Declaration.

ARTICLE II

PROPERTY RIGHTS

Section 1. Irrigation Water Delivery System. Every Owner shall have a right to access and use the irrigation water delivery system located in the utility and irrigation easement located along the boundary of each Lot, subject to the following provisions:

a. The right of the Association to charge reasonable fees for the use and maintenance of the irrigation water delivery system; and,

b. The right of the Association to suspend the voting rights and right to use of the irrigation water delivery system by an Owner for any period during which any assessment against his Lot remains unpaid; and for a period not to exceed 60 days for any infraction of its published rules and regulations.

Section 2. Delegation of Use. Any Owner may delegate, in accordance with the By-laws, his right of use to the members of his family, his tenants, or contract purchasers who reside on the property.

Section 3. Irrigation Pump Restrictions. Each Lot Owner shall be entitled to install one (1) irrigation water pump with a flow restriction limiting flow to 15 gpm.

Section 4. Drainage. The Association shall hold title to and shall maintain the Common Area including the drainage retention areas.

ARTICLE III

MEMBERSHIP AND VOTING RIGHTS

Section 1. Every Owner of a Lot which is subject to assessment shall be a member of the Association. Membership shall be appurtenant to and may not be separated from ownership of any Lot which is subject to assessment.

Section 2. The Association shall have one class of voting membership, being all Owners of Lots within Del Mar Subdivision who shall be entitled to one vote for each Lot owned. When more than one person holds an interest in any Lot, all such persons shall be

members. The vote for such Lot shall be exercised as they determine, but in no event shall more than one vote be cast with respect to any Lot.

ARTICLE IV

COVENANT FOR MAINTENANCE ASSESSMENTS

Section 1. Creation of the Lien and Personal Obligation of Assessments. The Declarant, for each Lot owned within the Properties, hereby covenants and each Owner of any Lot by acceptance of a deed therefor, whether or not it shall be so expressed in such deed, is deemed to covenant and agree to pay to the Association: (1) annual assessments or charges, and (2) special assessments for capital improvement, such assessments to be established and collected as hereinafter provided. The annual and special assessments, together with interest, costs and reasonable attorney's fees, shall be a charge on the land and shall be a continuing lien upon the property against which each such assessment is made. Each such assessment, together with interest, costs and reasonable attorney's fees, shall also be the personal obligation of the person who was the Owner of such property at the time when the assessment fell due. The personal obligation for delinquent assessments shall not pass to his successors in title unless expressly assumed by them.

Section 2. Purpose of Assessments. The assessments levied by the Association shall be used exclusively to provide and maintain irrigation water and an irrigation water delivery system to the Properties.

Section 3. Maximum Annual Assessment. Until January 1 of the year immediately following the conveyance of 75% of the lots to nondeclarant Owners the maximum annual assessment shall be One Hundred Dollars ($100.00) per Lot.

a. From and after January 1 of the year immediately following the conveyance of 75% of the lots to nondeclarant Owners the maximum annual assessment may be increased each year not more than 5% above the maximum assessment for the previous year without a vote of the membership.

b. From and after January 1 of the year immediately following the conveyance of 75% of the lots to nondeclarant Owners the maximum annual assessment may be increased above 5% by a vote of two-thirds (2/3) of the members who are voting in person or by proxy, at a meeting duly called for this purpose.

c. The Board of Directors may fix the annual assessment at an amount not in excess of the maximum.

Section 4. Special Assessments for Capital Improvements. In addition to the annual assessments authorized above, the Association may levy, in any assessment year, a special assessment applicable to that year only for the purpose of defraying, in whole or in part, the cost of any construction, reconstruction, repair or replacement of the irrigation water delivery system, including fixtures and personal property related thereto, provided that any such assessment shall have the assent of two-thirds (2/3) of the votes of the members who are voting in person or by proxy at a meeting duly called for this purpose.

Section 5. Notice and Quorum for any Action Authorized under Sections 3 and 4. Written notice of any meeting called for the purposes of taking any action authorized under Section 3 or 4 shall be sent to all members not less than 30 days nor more than 60 days in advance of the meeting. At the first such meeting called, the presence of members or of proxies entitled to cast sixty percent (60%) of all the votes of the membership shall constitute a quorum. If the required quorum is not present, another meeting may be called subject to the same notice requirement, and the required quorum at the subsequent meeting shall be one-half (1/2) of the required quorum at the preceding meeting. No such subsequent meeting shall be held more than 60 days following the preceding meeting.

Section 6. Uniform Rate of Assessment. Both annual and special assessments must be fixed at a uniform rate for all Lots and may be collected on a monthly basis.

Section 7. Date of Commencement of Annual Assessments: Due Date. The annual assessments provided for herein shall commence as to all Lots on the first day of the month following the conveyance of a Lot to a nondeclarant Owner. The first annual assessment shall be adjusted according to the number of months remaining in the calendar year. The Board of Directors shall fix the amount of the annual assessment against each Lot at least thirty (30) days in advance of each annual assessment period. Written notice of the annual assessment shall be sent to every Owner subject thereto. The due dates shall be established by the Board of Directors. The Association shall, upon demand, and for a reasonable charge, furnish a certificate signed by an officer of the Association setting forth whether the assessments on a specified Lot have been paid. A properly executed certificate of the Association as to the status of assessments on a Lot is binding upon the Association as of the date of its issuance.

Section 8. Effect of Nonpayment of Assessments: Remedies of the Association. Any assessment not paid within thirty (30) days after the due date shall bear interest from the due date at the rate of 18 percent per annum. The Association may bring an action at law against the Owner personally obligated to pay the same, or foreclose the lien against the property. No owner may waive or

otherwise escape liability for the assessments provided for herein by nonuse of the irrigation water delivery system or abandonment of his Lot.

Section 9. Subordination of the Lien to Mortgages. The lien of the assessments provided for herein shall be subordinate to the lien of any first mortgage. Sale or transfer of any Lot shall not affect the assessment lien. However, the sale or transfer of any Lot pursuant to mortgage foreclosure or any proceeding in lieu thereof, shall extinguish the lien of such assessments as to payment which became due prior to such sale or transfer. No sale or transfer shall relieve such Lot from liability for any assessments thereafter becoming due or from the lien thereof.

ARTICLE V

USE RESTRICTIONS

A. There will be only one dwelling per Lot to be used by one family only.

B. No rear yard fencing may be erected or maintained in excess of 6 feet in height. The style of all rear yard fences shall be chain link fence or wooden picket fence.

C. No obnoxious, offensive or other activity which would constitute a public or private nuisance or annoyance to the neighborhood will be permitted, including, but not limited to, the repair of automobiles other than minor tune-ups performed by an Owner on his own vehicle.

D. Dangerous or wild animals, livestock, including rabbits or poultry will not be kept. A reasonable number of household pets will be permitted so long as they remain in control of the Lot Owner.

E. No firearms, fireworks, explosives, air rifles, BB guns, crossbows or similar devices shall be discharged on the Properties.

F. No advertising signs, billboards or unsightly objects shall be maintained or erected. "For Sale" signs may be posted if no larger than those allowed by Mesa County Zoning Resolution.

G. No junk or trash, including inoperable automobiles, will be allowed to accumulate and the same must be regularly removed.

H. The Association or Declarant upon the failure of the Owner or tenant of any site to maintain his site and improvements, including the payment of any taxes assessed thereon, in a reasonable satisfactory manner as determined by the Association, or upon use by the Owner or tenant in a manner inconsistent with these covenants, may enter upon the site and repair, maintain,

rehabilitate, and restore the premises and/or improvements or abate the improper use or pay the taxes thereon and any costs shall be charged against the Owner or tenant of said site and collected in the manner set forth in Article IV hereof.

I. It is specifically understood and recognized that agricultural land uses and practices are being conducted on properties adjoining the subdivision and that such routine practices of plowing, spraying and cultivating said properties are not to be interfered with or objected to by the Owners of the properties in the subdivision.

J. Recreational vehicles, boats and trailers shall not be parked on the streets adjacent to each Lot.

ARTICLE VI

ARCHITECTURAL CONTROL COMMITTEE

Section 1. Appointment of Architectural Control Committee. The Architectural Control Committee shall consist of three (3) persons to be appointed by the majority of the Board. The initial Architectural Control Committee is chaired by Delbert E. Parmenter c/o Del Mar Construction, Inc., 3210 E 1/2 Road, Clifton, CO 81520.

Section 2. Submission of Plans. Duplicate copies of plans and specifications relating to an improvement, including, but not limited to residences, fences, garages, and outbuildings, shall be submitted to the Architectural Control Committee for review and final approval. Plans and specifications shall contain, without limitation, the plot plans showing layout, including setbacks, flow and manner of surface drainage, finish and natural grade elevations, floor plans showing overall dimensions, roof plans showing pitch, roof materials, color, exterior elevations showing doors, windows and exterior materials and colors, and a perspective sketch if requested, and other details necessary to explain any feature or component of the Improvement.

Section 3. Matters Considered. The Architectural Control Committee shall consider the aesthetic and functional design of any Improvement as to the quality of workmanship and materials, harmony of exterior design with existing Improvements, location with respect to topography and finished grade elevation, and the preservation and enhancement of the value and the visual appearance of existing Improvements.

Section 4. Approval. The Architectural Control Committee shall approve or disapprove all written plans within thirty (30) days after submission. In the event the Architectural Control Committee fails to take any action within such thirty (30) day period, the proposed Improvement shall be deemed approved. The majority of vote of the Architectural Control Committee shall be

required for the approval or disapproval of any proposed Improvement.

Section 4. Limitation on Liability. The Architectural Control Committee shall not be liable in damage to any person submitting requests for approval or to any Owner within the Property by reason of any action, failure to act, approval, disapproval, or failure to approve or disapprove with regard to such request. The actions of the Architectural Control Committee shall be deemed conclusively binding upon the Owners.

GENERAL PROVISIONS

Section 1. Enforcement. The Association, or any Owner, shall have the right to enforce, by any proceeding at law or in equity, all restrictions, conditions, covenants, reservations, liens and charges now or hereafter imposed by the provisions of this Declaration. Failure by the Association or by any Owner to enforce any covenant or restriction herein contained shall in no event be deemed a waiver of the right to do so thereafter.

Section 2. Severability. Invalidation of any one of these covenants or restrictions by judgment or court order shall in no way affect any other provisions which shall remain in full force and effect.

Section 3. Amendment. The covenants and restrictions of this Declaration shall run with and bind the land for a term of twenty (20) years from the date this Declaration is recorded, after which time they shall be automatically extended for successive periods of ten (10) years. This Declaration may be amended during the first twenty (20) year period by an instrument signed by not less than ninety percent (90%) of the Lot Owners, and thereafter by an instrument signed by not less than seventy-five percent (75%) of the Lot Owners. Any amendment must be recorded.

Section 4. Annexation. Additional residential property may be annexed to the Properties with the consent of two-thirds (2/3) of the members.

IN WITNESS WHEREOF, the undersigned, being the Declarant herein, has hereunto set its hand and seal this _____ day of _____, 1994.

DEL MAR CONSTRUCTION, INC.

ATTEST: By_____
Declarant

_____
Secretary

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

The foregoing instrument was acknowledged before me this _____ day of _____, 1994.

WITNESS my hand and official seal.
My commission expires:

_____
Notary Public

EXHIBIT "A"

LEGAL DESCRIPTION OF DEL-MAR SUBDIVISION

DEL-MAR Subdivision is located in the SE¼ of the SW¼ of Section 5, Township 1 South, Range 1 East, Ute Meridian, County of Mesa, State of Colorado and is more particularly described as follows:

Beginning at the southeasterly corner of DEL-MAR Subdivision whence the ¼ corner common to Sections 5 and 8, Township 1 South, Range 1 East, Ute Meridian, bears S 86° 14' 09" E, 761.63 feet;

1. Thence S 89° 59' 59" W, 168.91 feet;
2. Thence N 00° 09' 03" W, 390.00 feet;
3. Thence S 89° 59' 59" W, 62.5 feet;
4. Thence S 00° 06' 15" E, 279.94 feet;
5. Thence S 89° 57' 09" W, 80.07 feet;
6. Thence S 00° 02' 38" E, 110.00 feet;
7. Thence N 89° 59' 59" W, 54.17 feet;
8. Thence N 00° 12' 46" W, 609.72 feet;
9. Thence S 89° 58' 18" W, 69.93 feet;
10. Thence N 00° 08' 09" W, 661.68 feet;
11. Thence S 89° 54' 55" E, 535.22 feet;
12. Thence S 00° 09' 50" E, 1091.58 feet;
13. Thence S 89° 59' 59" W, 99.00 feet;
14. Thence S 00° 09' 50" E, 179.00 feet to the Point of Beginning.

DEL-MAR Subdivision as described above contains 13.471 acres more or less.

COLORADO REGISTERED
WALLACE E.
BEEDLE
20632
P.E. AND P.L.S.

Sept. 7, 1995

September 19, 1995

Delbert & Marilyn Parmenter
Del Mar Construction
3210 E 1/2 Road
Clifton, CO

City of Grand Junction, Colorado
250 North Fifth Street
81501-2668
FAX:(970)244-1599

RE: Del Mar Filing 2 Subdivision

Dear Mr. & Mrs. Parmenter,

The final plan and plat for the Del Mar Filing 2 Subdivision was approved by the City of Grand Junction Planning Commission on September 5, 1995.

As you begin the construction phase outlined in the Submittal Standards for Improvements and Developments (SSID), there are several items which must be completed prior to construction. I have included a Construction Phase Submittal Chart, a Construction Approval and Progression Form, and Submittal Requirements for Final Acceptance of Improvements for your information.

Submittal of four sets of construction drawings for approval and sign off is required.

An improvements agreement/guarantee must be recorded prior to sign off of construction drawings.

A pre-construction notice as detailed in Section VII-3 of SSID is required and a meeting should be scheduled.

Please contact me if I can answer any questions. My number is 244-1591.

Sincerely,

Jody Kliska
City Development Engineer

cc: Kathy Portner
David Chase, Banner & Associates

CONSTRUCTION PHASE SUBMITTAL CHART

Location: N. OF PATTERSON, E. OF CHRISMAN Project Name: DEL MAR FILING 2

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: DEL MAR FILING 2
Location: _____
Developer: DEL MAR CONSTRUCTION
Engineer: BANNER & ASSOC.
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: _____

Construction Meeting: _____
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-5,6,7,8,9)
- 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

X 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)

October 24, 1996

Delbert & Marilyn Parmenter
Del-Mar Construction
3210 E 1/2 Road
Grand Junction, CO

City of Grand Junction, Colorado
250 North Fifth Street
81501-2668
FAX: (970)244-1599

Subject: Del-Mar Filing 2 Subdivision

Dear Mr. & Mrs. Parmenter:

A final inspection of the streets and drainage facilities in Del-Mar Filing 2 Subdivision was conducted on May 2, 1996. As a result of this inspection, a list of remaining items was given to you for completion. These items were reinspected and found to be satisfactorily completed.

"As Built" record drawings and required test results for the streets and drainage facilities were received on June 7, 1996 and Ocotber 24, 1996. These have been reviewed and found to be acceptable.

In light of the above, the streets and drainage improvements are eligible to be accepted for future maintenance by the City of Grand Junction one year after the date of substantial completion. The date of substantional completion is June 7, 1996.

Your warranty obligation for all materials and workmanship for a period of one year beginning with the date of substantial completion will expire upon acceptance by the City.
If you are required to replace or correct any defects which are apparent during the period of the warranty, a new acceptance date and extended warranty period will be established by the City.

Thank you for your cooperation in the completion of the work on this project.

Sincerely,

Jody Kliska
City Development Engineer

cc: Don Newton
Doug Cline
Walt Hoyt
Kathy Portner
Banner & Associates

FDP-1995-135

file in Del Mar filing #2

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

May 20, 1997

Mr. Delbert Parmenter
3210 E 1/2 Rd.
Grand Junction, CO 81520

Re: Antenna/Del-Mar Sub.

Dear Mr. Parmenter:

Thank you for you inquiry about possible zoning regulations for a 40' antenna proposed for installation in Del-Mar Subdivision. The Zoning and Development Code does not have specific restrictions on antennas. The antenna may be erected with the following conditions:

1) A building permit may be required from the Mesa County Building Department.

2) Accessory structure setbacks for this planned residential zone must be met. They are 5' from the rear property line and 5' from the side property line (on rear half of parcel).

3) The possibility of electrical interference would fall under the jurisdiction of the FCC. It is also the responsibility of the property owner to check with the Airport Authority as to any regulations or restrictions they may have.

Your compliance with these conditions is appreciated.

Sincerely,

Katherine M. Portner

Katherine M. Portner
Acting Community Development Director