SHANNUN ENGINEERING, INC.

SUMMARY LETTER ON THE FEASIBILITY REPORT ON INDIVIDUAL ONSITE WASTEWATER SYSTEMS FOR VAL MORITZ VILLAGE, BLOCK 3, FILING 1

The homeowner's association of Val Moritz Village requested an engineering review of each of the 147 lots in the subdivision. This is to be in sufficient detail to determine the feasibility of using individual onsite wastewater systems (OWS) employing advanced treatment technologies. Each lot is approximately 1 acre in size, and the small size of the lots complicates the use of individual onsite wastewater systems in this subdivision.

The fundamental issue confronting the lot owners of Val Moritz Village is how to return their well water to the ground after it has been used for household needs. We have found the soil in this subdivision to not be receptive to typical septic tank effluent. However, by "cleaning up" the septic tank effluent through advanced treatment, this same soil will accept the wastewater over years of service. Therefore, it is important to apply only effluent that is sufficiently free of organics and suspended solids to the types of soils we have found at Val Moritz Village.

This second Report addresses the 24 lots in Block 3 of Filing 1. With the exception of Lot 8 (because of surface water drainage), our exploration of soil profile pits and upper soil horizon percolation or infiltration testing data indicate that it is feasible to apply treated septic tank effluent such as AdvanTex filtrate, or wastewater cleaned to the same or better quality, in a shallow drain field or drip irrigation system. These systems are now economically reasonable, and are routinely being approved by Grand County.

Detailed OWS designs will be required for each lot prior to obtaining building permits. Since each lot will have its own well, it is crucial that the placement of wells and OWS components be addressed from a multi-lot perspective. Otherwise, some lot owners may find that their neighbors have rendered a particular lot "un-build-able" due to setback conflicts. Proper planning and the judicious location of wells and OWS components will this avoid problem.

Advanced treatment, though somewhat more expensive than conventional wastewater systems, will be more environmentally sound. In considering the subdivision as a whole, advanced treatment will reduce the levels of nitrogen introduced into the soils and, in the long run, reduce the risks of well water contamination from compounds of nitrogen and phosphorous. In a similar vein, it would be prudent for the homeowner's association to consider adopting covenants that will reduce the potential wastewater loading for the entire subdivision by establishing a limit on the maximum number of bedrooms per home. The principle at work: the lower the wastewater loading, the lower the long term risks of contamination. Since the number of bedrooms or dwelling size is the main indicator of potential wastewater flows, limiting the number of bedrooms will therefore limit the overall wastewater loading.

Prepared by:

Randal F. George

9/15/2003

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FEASIBILITY REPORT ON INDIVIDUAL ONSITE WASTEWATER SYSTEMS FOR VAL MORITZ VILLAGE BLOCK 3, FILING 1

SCOPE

The homeowner's association of Val Moritz Village in Grand County, Colorado has investigated possible alternatives for handling the anticipated wastewater of individual homes on the 147 lots in the subdivision. Each lot is approximately 1 acre in size. The small size of the lots, high clay content soils, and some high groundwater situations complicate the use of individual wastewater systems in this subdivision. Consequently, the conventional individual onsite wastewater system (OWS) will not work here. A centralized community sewer system was explored, and although not impractical, it would be quite expensive and probably require adjudicating water issues. The traditional approach in dealing with these conditions by utilizing individual mound systems would work in many cases, but the slope of some lots, the area required for a mound, the negative aesthetic impacts, and the costs of imported materials make the mound an undesirable solution to the challenge at hand. Relatively recently however, advanced treatment and shallow dispersal technologies have become available that are affordable, reliable, and approved for use for individual homes. These treatment techniques sufficiently clean septic tank effluent to allow application at very shallow soil depths and into higher clay content soils exhibiting slow percolation rates.

The homeowner's association desires an engineering review of each lot in sufficient detail to determine the feasibility of employing advanced treatment technologies to provide individual onsite wastewater systems. It is understood that further detailed OWS designs will be required to complete the process for each lot prior to obtaining a building permit. Without specific details on the configuration of each house, it would be premature to design an OWS for a particular lot. Additionally, during the build-out of the subdivision, advanced treatment OWS technologies may improve; which might render early designs obsolete. Since each lot will have its own well, it is crucial that the placement of wells and OWS components be addressed from a multi-lot perspective. Otherwise, some lot owners may find that their neighbors have rendered a particular lot "un-build-able" due to setback conflicts.

GENERAL FINDINGS AND COMMENTS

In our investigation of the 24 lots in Block 3 of Filing 1 of the Val Moritz Subdivision, with the exception of Lot 8, we found no compelling reasons to preclude the use of onsite wastewater systems for each lot. These systems will require advanced

> Page 1 9/15/2003

treatment of the septic tank effluent and application to the soil at shallow depths. Proper planning and the judicious location of each OWS will allow each lot to have individual wells and proper setbacks from the OWS components. Advanced treatment, though more expensive than conventional wastewater systems, will be more environmentally sound. In considering the subdivision as a whole, advanced treatment will reduce the levels of nitrogen introduced into the soils, and, in the long run, reduce the risks of well water contamination.

Lot 8 has several areas of surface water drainage, and there was no obvious location for an OWS without reshaping the landscape or importing material to insure sufficient distance from surface and groundwater. Further testing may reveal a way to install an advance treatment OWS without site modifications, but it may prove economically advantageous to combined Lot 8 with a neighboring lot or have a drainfield shared on an adjacent lot.

There is an area of clay soils close to the surface on Lots 9, 10, 21, and 22. Particular care will be necessary in the final location and sizing of the drainfields for the homes on these lots.

As mentioned in previous Feasibility Reports, it would be prudent for the homeowner's association to consider adopting covenants that will reduce the potential wastewater loading for the entire subdivision by establishing a limit on the maximum number of bedrooms per lot. The principle at work: the lower the wastewater loading, the lower the risks of contamination. Since the number of bedrooms is the main indicator of potential wastewater flows, limiting the number of bedrooms will therefore limit the overall wastewater loading.

ADVANCED SEPTIC TANK EFFLUENT TREATMENT

As mentioned above, the site conditions at Val Moritz Village preclude the use of conventional onsite wastewater systems that employ only a septic tank and drain field. Development of the lots in this subdivision will take several years, and the OWS technology will improve over time. However, there are existing, economically viable systems for the advanced treatment of residential septic tank effluent that will allow application to an onsite drain field. There are several manufactures of these types of systems. We have had good success with the AdvanTex recirculating non-woven textile media filter system provided by Orenco Systems, Inc. (OSI). Several of these systems have been installed in Grand County, and the Board of Health has approved them for use on sites with difficult soil conditions. Appendix A outlines the advantages of this system. Appendix B provides comments on why the AdvanTex system is more desirable than some of the other types of treatment approaches that have historically been employed. As technology improves, we may find that other advanced treatment systems will prove to be superior to the AdvanTex system; however, our assertion that the residential wastewater for the lots in Val Moritz Village can be feasibly managed onsite is based upon achieving or surpassing the level of treatment provided by the OSI AdvanTex system. As a

> Page 2 9/15/2003

Shannon Engineering, Inc. PO Box 156, Galesburg, MI 49053-156 Phone: (269) 665-7440 Fax: (269) 665-7441 or PO Box 983, Kremmling, CO 80459 Phone & Fax: (970) 724-0247 minimum, "advanced treatment" as used in this report means producing wastewater that exceeds the NSF secondary effluent standards and achieves a 50 to 70% reduction in nitrogen in the septic tank effluent stream.

SOIL ABSORPTION AND DISPERSAL

The fundamental issue confronting the lot owners of Val Moritz Village is how to return their well water to the ground after it has been used for household needs. The soil in this subdivision is generally not receptive to typical septic tank effluent (STE). The organic materials and suspended solids in STE readily create an environment that clogs the minute pores in clay soils. By "cleaning up" the STE through advanced treatment, the same soil will accept the wastewater over years of service. Therefore, the first important factor is to apply only effluent that is sufficiently free of organics and suspended solids.

The second important factor is the use of shallow drain fields or drip irrigation to disperse the treated effluent back into the soil. A shallow drain field consists of a series of trenches approximately 1 ft. wide and 1 ft. deep with void space created by inverted sections of 12" diameter irrigation pipe cut in half. In this void space or chamber there are distribution lateral pipes of 1" to 1.5" diameter with orifices for dispersing the effluent evenly along the length of each trench. Typically we are designing these systems with 100 to 150 ft. of trench per bedroom. The length and layout of the trenches will depend upon the soil and the size of the home at that particular lot. Drip irrigation dispersal systems employ a bed of tubes with emitters that distribute the treated effluent directly into the soil over a relatively large area. On most lots, we have found that the upper soil horizon will readily accept the treated effluent. By applying the treated effluent in the upper soil horizons with high clay content.

- 1. The use of shallow trenches or drip irrigation spreads the effluent over a much larger area than would a conventional infiltration bed.
- 2. The treated effluent will be polished further by the natural processes that occur as it flows through the upper soil horizon.
- 3. The treated effluent will spread out in the upper soil horizon before reaching the clay soil horizon. This effectively increases the area to which it is applied and lowers the application rate to the clay soil horizon.
- 4. The natural interface between the upper and clay soil horizons is not disturbed. Root penetrations and irregularities in this interface will greatly facilitate the movement of the effluent into the clay soil.
- 5. Vegetation rooted in the upper soil horizon will draw some of the moisture away from the clay soils below.
- 6. Shallow trenches are narrow and can be installed using smaller equipment. This results in less tree removal and less general disturbance to the lot.
- 7. Shallow drain fields are more economical to construct than deeper ones.
- 8. Advanced treatment coupled with shallow drain fields will allow for adequate separation in the case of higher groundwater.

The principal concern that we hear regarding shallow drain fields or drip irrigation systems is the fear of freezing. These systems are designed to drain at the end of each dosing cycle and have been used in climates that have more severe freezing problems than Grand County. In addition to shallow systems that have been functioning properly here for several winters, they have been successfully used in Alaska, Minnesota and Wisconsin.

The third important factor is pressure micro dosing. Pressure dosing extends the life of the drain field by spreading out the organic loading over the entire filed. By applying small doses, saturated soil conditions are avoided. This enhances the further treatment of the effluent and increases the acceptance of the moisture into the clay soil horizon. It improves adsorption of phosphates by minimizing saturated flow and channeling in the soil pores.

This Feasibility Report addresses the 18 lots in Block 4 of Filing 1. Attached is soil profile information and upper soil horizon percolation or infiltration testing data. These indicate that it is feasible to apply AdvanTex filtrate, or wastewater cleaned to the same or better quality, in a shallow drain field or drip irrigation system. We have concern for those few areas where the upper more permeable soil horizons are less than 1'-4" in total depth. Particular care will be required on all lots during the installation of the shallow drain fields to insure that the bottoms of the trenches do not dive into the extremely low permeability soil horizon. If the more permeable upper soil horizon should prove to be too shallow in spots, the trenches will need to be kept in the permeable horizon and imported fill added over the trenches to provide proper top cover.

One other challenge presented itself on some lots. There was high groundwater. This would have been a problem if conventional OWS approaches were being seriously considered. The level of treatment provided by the AdvanTex or equivalent systems will allow for the application of the treated effluent at sufficiently shallow depths to provide adequate separation from observed groundwater levels.

Prepared by:

Randal F. George

Approved Hano

David H. Shannon, P. E. Shannon Engineering, Inc. Colorado Registration Number 30183

Attachments: Appendix A - AdvanTex, Appendix B - OWS Treatment Alternatives, Soil Profile Hole Information for Filing 1 - Block 3, Percolation and Infiltration Test Summary for Filing 1 - Block 3, OWS and Well Location Maps, Shallow Trench Drawing, AdvanTex Brochure, VeriComm Brochure.

APPENDIX A: Orenco Systems, Inc. - AdvanTex System

A specific example of the type of advanced effluent treatment that is available today is the Orenco Systems, Inc. AdvanTex system. The AdvanTex system passed the National Sanitation Foundation ANSI/NSF Standard 40, Class 1 tests for treatment of residential wastewater. These systems are also approved for advanced treatment of septic tank effluent by the Grand County Board of Health.

The following table indicates the properties of residential wastewater and treated effluent from the proposed OSI AdvanTex system. It also gives figures for the requirements under Article IX of the Colorado ISDS regulations for dispersal of effluent in various ways.

As can be seen from these figures on the table below, the effluent from the AdvanTex system would be "clean" enough to dispose of on the surface if human contact were restricted and certainly sufficient to disperse in a sub-surface manner even where the soil is unsuitable for normal soil absorption bed.

	Typical	Surface	Surface	Sub-surface	OSI
	Screened	Disposal	Disposal	Disposal In	AdvanTex
	Septic Tank	Where	Protected	Unsuitable	System
	Residential	Human	From Human	Soils	Effluent
	Wastewater	Contact Is	Contact		
		Possible			
		- Article IX	- Article IX	- Article IX	
BOD ₅ mg/1	130	<20	<20	<60	5
TSS mg/l	30	<40	<40	<40	≤5
Tot. N mg/l	65				<i>≤</i> 32 *
Coliform	106	<25	<500		≈1000
cts/100ml					
Oil &	20				<10
Grease mg/l					

* The amount of nitrogen removal may be limited by the alkalinity of the water source. Table A-1 - Effluent Characteristics

It is documented in the literature that residential wastewater that has been treated in the OSI AdvanTex - AX system is relatively "clean." It surpasses secondary treatment criteria. However, the AdvanTex system will not remove sufficient fecal coliform to allow for discharge directly into streams or to the surface unprotected. This system will utilize shallow trenches or drip irrigation techniques for a sub-surface soil absorption field to remove the coliform still remaining in the filtrate effluent. Additionally, the level of nitrogen in the treated effluent is substantially reduced. The use of the AdvanTex units is expected to result in a substantial reduction in the total nitrogen in the wastewater stream of the subdivision. This is a definite environmental benefit.

OSI's system was selected because of their history of providing high quality systems for over 20 years. There are over 150 AdvanTex based onsite wastewater systems that have already been installed in Colorado and hundreds more around the country. The ability of SCG Enterprises, Inc. of Wheatridge, Colorado to provide remote monitoring of the pump controls and tank high-level indicators gives confidence that we will have warning if the wastewater flows exceed design limits. Periodic onsite monitoring of the effluent quality by SCG's approved service provider for Grand County will give confidence that the system is performing properly.

APPENDIX B: Onsite Wastewater Treatment Alternatives

Several alternatives for treatment were considered. Recirculating media filter technology is proven and has been used for decades. The OSI AdvanTex units are modular, facilitating installation flexibility. With these units, the quality of the media textile is controlled in the factory, and it may be easily cleaned as needed or replaced if it becomes necessary. They have passes NSF testing and are approved for use by the Colorado Department of Public Health and Environment and by the Grand County Board of Health.

The practicality of using a "package treatment plant" for clusters of homes was also considered. This type of OWS is relatively expensive for this level of wastewater flow. These systems typically require frequent monitoring by specially trained operators and often require attention to the many mechanical components. Seasonal shutdown/startup may also prove problematic.

The use of a recirculating or single pass sand filter to accomplish the pretreatment of the effluent was considered. The variability of the media, its cost, installation challenges, and the difficulty of replacing media when needed again directed us toward the textile media system.

Mound systems constructed from imported materials could also be employed for these lots. The mound systems have the same disadvantages as sand filters, but with increased difficulty of installation, and they tend to be unsightly.

Therefore, the AdvanTex approach has several advantages.

- 1. The treatment units are modular and compact requiring only a small footprint for installation. Disruption of the rest of the lot is kept to a minimum. The light weight units are easy to transport and install on difficult-to-access sites.
- 2. The quality of the filtration media is assured in the AdvanTex systems. Sand media of proper quality is difficult to find, expensive to haul, and requires skilled placement by the installing contractor in order to function properly.
- 3. Once installed, sand media can be serviced only by replacement. This is difficult and costly. The non-woven textile media in the AdvanTex modules can be easily removed for cleaning or replacement should it become necessary.
- 4. Sand filters and mounds are constructed onsite with locally available materials. The effectiveness of the treatment is greatly influenced by the knowledge and ability of the installing contractor. AdvanTex units are factory assembled and then installed by authorized service providers.

Lot 1 Profile Hole Observed: 6/28/2003

U.S.D.A. SOIL CLASSIFICATION METHOD								
	1	DEPTH	0'-0" - 2'-8"	2'-8" - 3'-8"	3'-8" - 7'-0"			
			Topsoil					
TEXTURE	1		Clay Loam	Clay	Sandy Clay w/some gravel.			
ROCK FRAGMENTS	% Rock		< 5%	< 5%	= 25%			
	Size			·	To 4"			
	Shape				Angular and Sub-Angular			
				[
SOIL STRUCTURE	Degree		Compound	Compound	Compound			
	ļ							
	Shape		Sub-Angular Blocky	Sub-Angular Blocky	Sub-Angular Blocky			
	ļ		l		· · · · · · · · · · · · · · · · · · ·			
	Grade		Moderate	Firm	Firm			
	Size		Fine	Fine	Fine			
CONDICTENCE								
CONSISTENCE	Wet							
	łł	Stickiness	Somewhat Sticky	Sticky	Somewhat Sticky			
	<u> </u>		Remark of Direction	O I 4 ¹	0			
		Plasticity	Somewhat Plastic	Plastic	Somewhat Plastic			
	{							
			Frishts.	C de bio	Eddbla			
	MOISC		rnable	Fnable	Fnable			
	<u> </u>				******			
			{	f				
	Diy	Consistance	Moderate	Mard				
	łł	COnsistence	Moderate	riaio	naru			
	<u>}</u>	Comentation	None	Nono	None			
	}	Cellinguation	Ttolia	10.08	NOIE			
COLOR	Munsell		10 YR 4/2	5 YR 5/6	5 YR 5/4			
	Description		Dark Gravish Brown	Yellowish Red	Reddish Brown			
	t t							
	Mottling		None	Some	Some			
					1			
OBSERVED MOISTURE			None	Moist	Moist			

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be:

24 min./in.

GROUND COVER: Grasses, forbs, rabbit brush.

SLOPE: 8% at a bearing of 350°

PERCOLATION RATE:

Avg Depth (in.) 16

1

Lake Creek Loam

NOTES:

Lot 2 Profile Hole Observed: 6/11/2003

		U.S.D.A. SOIL	CLASSIFICATION METHO	D	······
		DEPTH	0'-0" - 0'-5"	0'-5" - 0'-10"	0'-10" - 8'-0"
			Topsoil	0:14.1	Oliver Develop Develop
TEXTURE	ll		Pine Duff and Loam	Silty Loam	Clayey Sand to Sandy Clay
ROCK FRAGMENTS	% Rock		< 5%	< 5%	≈ 25%
	<u></u>				Fractured Sandstone
	Size			·····	1018"
	Shape			· · · · · · · · · · · · · · · · · · ·	Sub-Angular
				0	
SOIL STRUCTURE	Degree		Compound	Compound	Compound
L				O. A. Anne Jaco Director	C. h. Assulas Disalas
	Shape		Sub-Angular	Sub-Angular Blocky	Sub-Angular Blocky
	Grade		VVeak	Moderate	Fim
······					
				C 1	
	Size		Fine	Fine	Fine
CONSIGTENCE	Mat				
CONSISTENCE	4461	Stickingen	Not Sticky	Computed Sticky	Sticky
		3110711939	NOL SICKY	Somewhat Sucky	ουσκγ
	<u>}</u> }	Dissticity	Not Plastic	Somewhat Plaetic	Plastic
				JUINGWINGLE IASUC	r laouu
	<u>├</u> ────	<u> </u> -		· · · · · · · · · · · · · · · · · · ·	
	Moint		Friable	Frishle	Frieble
	MUSI			1 navie	/ Habie
	Dnd				
		Consistence	Weak	Firm	Hard
		Consistence	vygan	1.0.00	TIGIU
		Camentation	None	Nona	None
	r	Venienauon	NUIG	190116	14/4.10
COLOR	Munseil		10 YR 5/2	10 YR 7/2	10 YR 8/1 to 10 YR 5/8
	Description		Gravish Brown	Light Gray	White to Yellowish Brown
			City of Brothing	E-B-C OLON	Willie to Following District
······································				······································	1
	Mottling		None	Some	Some
OBSERVED MOISTURE			None	None	Moist at 8'

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be: Lake Creek Loam

GROUND COVER: Pine,aspen, grasses, forbs.

SLOPE: 10% at a bearing of 300°

0 min./in. Infiltration Test OK at 2 gpd/ft2

PERCOLATION RATE:

NOTES:

Avg Depth (in.) 16

1

Lot 3 Profile Hole Observed: 6/25/2003

U.S.D.A. SOIL CLASSIFICATION METHOD							
		DEPTH	0'-0" - 0'-4"	0'-3" - 2'-4"	2'-4" - 3'-6"	3'-6" - 6'-0"	
			Topsoil				
TEXTURE			Pine Duff and Loam	Loamy Sand	Clay	Sandy Clay & Claystone	
ROCK FRAGMENTS	% Rock		< 10%	= 15%	= 15%	≈ 30%	
				Fractured Sandstone &	Fractured Sandstone &	Fractured Sandstone &	
				Claystone	Claystone	Claystone	
	Size			To 1"	To 2"	Το 8"	
-	Shape			Sub-Angular	Sub-Angular	Sub-Angular	
				· · · · · · · · · · · · · · · · · · ·			
SOIL STRUCTURE	Degree		Compound	Simple	Compound	Compound	
	Shape		Sub-Angular Blocky	Granular	Sub-Angular Blocky	Sub-Angular Blocky	
	Grade		Weak	Weak	Moderate to Firm	Moderate	
	· • · · · · · · · · · · · · · · · · · ·		······				
	Class.		Eine -		<u> </u>		
	5129		FINE	Pine		Fire	
CONSISTENCE	Mat		······				
CONSISTENCE	- VIAL	Stickinger	Not Sticky	Not Sticky	Somewhat Sticky	Somewhat Sticky	
		000000000	Not Sticky	NOT STICKY	Joinewilat Oticky	Somewhat Sticky	
	+	Plasticity	Not Plastic	Not Plastic	Somewhat Plastic	Somewhat Plastic	
					00000000000		
	Moist		Friable	Friable	Friable	Friable	
		ĺ	1	T			
	Dry						
		Consistence	Weak	Weak	Firm	Moderate	
		Cementation	None	None	None	None	
COLOR	Munsell		10 YR 3/1	10 YR 8/2	10 YR 6/4	10 YR 6/4	
	Description		Very Dark Gray	Very Pale Brown	Light Yellowish Brown	Light Yellowish Brown	
			ļ		······		
	l						
	Mottling		None	None	Some	None	
	{ {						
OBSERVED MOISTURE	L	İ	None	None	None	None	

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be; Lake Creek Loam

.

GROUND COVER: Grasses, forbs, rabbit brush.

SLOPE: 10% at a bearing of 320°

PERCOLATION RATE:

NOTES: Profile Hole combined with Lot 4 Bedrock at 6'

89 min./in.

Avg Depth (in.) 15

1

Val Moritz Village Filing 1, Block 3

Lot 4 Profile Hole Observed: 8/25/2003

	+·····		U.S.D.A. SOIL CLASSIFICAT	ION METHOD	· · · · · · · · · · · · · · · · · · ·	
			0'.0" . 0'.4"	0'-3" - 2'-4"	2'.4" - 3'.6"	3'6"-6'0"
	{{		Topsoil			
TEXTURE			Pine Duff and Loam	Loamy Sand	Clay	Sandy Clay & Claystone
ROCK FRAGMENTS	% Rock		< 10%	≈ 15%	≈ 15%	≈ 30%
	, , , , , , , , , , , , , , , , , , ,	····-		Fractured Sandstone &	Fractured Sandstone &	Fractured Sandstone &
				Claystone	Claystone	Claystone
	Size			To 1"	To 2"	To 8"
	Shape			Sub-Angular	Sub-Angular	Sub-Angular
SOIL STRUCTURE	Degree		Compound	Simple	Compound	Compound
			0.1.4			
· · · · · · · · · · · · · · · · · · ·	Snape		Sub-Angular Blocky	Granular	Sub-Angular Blocky	Sub-Angular Blocky
	Grade		Wesk	Weak	Moderate to Firm	Moderate
				WODK		Miccontaile
	Size		Fine	Fine	Fine	Fine
CONSISTENCE	Wet					
	ļ	Stickiness	Not Sticky	Not Sticky	Somewhat Sticky	Somewhat Sticky
		Plasticity	Not Plastic	Not Plastic	Somewhat Plastic	Somewhat Plastic
				1		
	Moist		Friable	Friable	Friable	Friable
	Dry					
		Consistence	VVeak	VV98K	rim	Moderate
		Cementation	None	None	None	None
COLOR	Munsell		10 YR 3/1	10 YR 8/2	10 YR 6/4	10 YR 6/4
	Description		Very Dark Gray	Very Pale Brown	Light Yellowish Brown	Light Yellowish Brown
	Mottling		None	None	Some	None
OBSERVED MOISTURE			None	None	Nopé	Nope

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be: Lake Creek Loam

GROUND COVER: Grasses, forbs, rabbit brush.

SLOPE: 8% at a bearing of 310*

PERCOLATION RATE:

Avg Depth (in.) 16

1

NOTES: Profile Hole combined with Lot 3 Bedrock at 6'

34 min./in.

Lot 5 Profile Hole Observed: 8/25/2003

DEPTH 0'-0" - 1'-8" 1'-8" - 2'-6" 2'-6" - 8'-0" Topsoil Topsoil Clay & Sandy Clay	lay
DEPTH 0'-0" - 1'-8" 1'-8" - 2'-6" 2'-6" - 8'-0" Topsoil Topsoil Clay & Sandy Clay	lay
Topsoil TEXTURE Loam Clay & Sandy Clay	lay
TEXTURE Loam & Clay Loam Loam Clay & Sandy Clay	lay
RUCK FRAGMENTS % ROCK < 5%	
SOIL STRUCTURE Degree Compound Compound Compound	
Shape Sub-Angular Blocky Sub-Angular Blocky Sub-Angular Blocky	ocky
Grade Moderate Strong Strong	····
Size rine rine rine rine	
CONSISTENCE Wet	·
Stickiness Slightly Sticky Somewhat Sticky Very Sticky	
Plasticity Slightly Plastic Somewhat Plastic Very Plastic	
Moist Friable Friable Friable	
bry Caracteria Wind	
Consistence Veak Moderate Firm	
Cementation None None None	i
10 YR 6/8, 5 Y 6/2 to 5	0 5 YR
COLOR Munsell 10 YR 3/1 10 YR 6/3 4/3	
Description Very Dark Gray Pale Brown Multi Colored	
Brownish Yellow, Olive C	ve Gray
to Reddish Brown	<u>vn</u>
OBSERVED MOISTURE Moist from recent rains. None Slightly Moist	

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be: Lake Creek or Cimarron Loam

1

GROUND COVER: Aspen, sage, grasses, forbs, juniper, shurbs.

34 min./in.

SLOPE: 8% at a bearing of 310°

PERCOLATION RATE:

Avg Depth (in.) 16

NOTES:

SOIL PROFILE INFORMATION Val Moritz Village

Filing 1, Block 3

Lot 6 Profile Hole Observed: 7/9/2003

		U.S.D.A. SO	IL CLASSIFICATION METH	<u>ор</u>	
			0'.0". 1'.4"	1'_4" - 3'-0"	3'-9" - 8'-0"
		DEFIN	Topsoil	1-4-5-0	
TEXTURE			Loam	Loamy Clay	Clayey Sand, Sandy Clay & Pockets of Clay
ROCK FRAGMENTS	% Rock		≈ 10%	≈ 10%	< 5%
	Size		20"	8"	
	Shape		Sub-Angular	Sub-Angular	
SOIL STRUCTURE	Degree		Compound	Compound	Compound
	Shape		Sub-Angular	Sub-Angular Blocky	Sub-Angular Blocky & Platy
	Grade		Moderate	Moderate	Strong
				· · · · · · · · · · · · · · · · · · ·	
	Size		Fine	Fine to Medium	Fine
CONSISTENCE	Wet				
		Stickiness	Somewhat Sticky	Sticky	Somewhat Sticky
		Plasticity	Somewhat Plastic	Plastic	Somewhat Plastic
	Malat		r	frida h la	Frickle & Fire
	MOIST		Fnable	Fnable	
	Dry				
		Consistence	Weak	Moderate	Firm to Hard
	<u> </u>	Cementation	None	None	None
COLOR	Munsell		10 YR 3/3	10 YR 5/6	10 YR 7/6
	Description		Dark Brown	Yellowish Brown	Yellow
	Mottling		None	No	Yes
OBSERVED MOISTURE			None	None	Moist

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be: Cimmaron Loam

GROUND COVER: Grasses, forbs, sagebrush, rabbit brush.

SLOPE: 14% at a bearing of 352°

PERCOLATION RATE:

Avg. Depth (in.): 15

1

NOTES: Profile Hole combined with Lot 17

59 min./in.

Lot 7 Profile Hole Observed: 7/12/2003

	rr	U.S.D.A. SO	L CLASSIFICATION METHOD)	······································
		ПЕРТН	0'-0" - 0'-4"	0'-4" - 2'-0"	2'-0" - 8'-0"
			Topsoil	0420	
TEXTURE			Pine Duff and Loam	Fine Loamy Sand	Clayey Sand to Clay
				and the second	
ROCK FRAGMENTS	% Rock		< 5%	< 5%	< 5%
	Size				
	Shape				
			· · · · · · · · · · · · · · · · · · ·		
SOIL STRUCTURE	Degree		Compound	Simple	Compound
	0		Cub Annulas	Creaviler	Sub Angulas Blooku
	Snape	·····	Sub-Angular	Granular	Sub-Aligular Blocky
			······		
	Grade		Weak	Weak	Firm
			[
	Size		Fine	Fine	Fine to Medium
CONSISTENCE	Wet			·····	
		Stickiness	Not Sticky	Not Sticky	Slightly Sticky
		Dia Ala lina	Net Distric	NI-4 DI4-	
		Plasticity	Not Plastic	NOT Plastic	Slightly Plastic
	Moist		Friable	Friable	Friable
			f	• • • · · · · · · · · · · · · · · · · ·	
	Dry				
		Consistence	Weak	Weak	Firm
		Cementation	None	None	None
	Mune - 1		10 XD 1/0	40 1/0 8/4	
COLOR	Description		Very Dark Cravich Brown	10 YK 8/1	White to Brownich Vollage
	Description		Very Dark Grayisti Drown	VVIIIG	variate to brownish Yellow
	Mottling		None	Some	Yes
	_	·······················			· · · · · · · · · · · · · · · · · · ·
					Water seeping in at 2',
OBSERVED MOISTURE			None	None	Standing water at 7'

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be: Cimmaron Loam

GROUND COVER: Pine, aspen, grasses, forbs.

SLOPE: 15% at a bearing of 275°

52 min./in.

.

1

PERCOLATION RATE:

Avg. Depth (in.): 15

NOTES:

Lot 8

Profile Hole Observed: No Profile Hole as of this report.

U.S.D.A. SOIL CLASSIFICATION METHOD							
		DEPTH					
TEXTURE							
ROCK FRAGMENTS	% ROCK						
	Size		·····				
	Snape						
	Degree						
SOL STRUCTURE	Degice						
	Shape	·					
·		· · · · · · · · · · · · · · · · · · ·					
	Grade		· · · · · · · · · · · · · · · · · · ·				
	1						
	Size						
CONSISTENCE	Wet						
		Stickiness					
	l	Plasticity					
	Moist						
	Dry	Consistence					
		Consistence					
		Comentation					
		Combinguon		······································			
COLOR	Munsell						
	Description						
	1						
	Mottling						
OBSERVED MOISTURE							

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be: Cimmaron Loam

GROUND COVER:

SLOPE:

PERCOLATION RATE:

0 min./in.

Avg. Depth (in.):

0

NOTES: There was no obvious suitable location for the OWS.

1

There are a number of drainages and areas of high groundwater. Diversion or elevation is a possibility. This lot may have to be combined with either Lot 7 or Lot 20.

Lot 9 Profile Hole Observed: 6/9/2003

	1 · · · · · · · · · · · · · · · · · · ·	U.S.D.A. SO	IL CLASSIFICATION METHO	D	·····
		DEPTH	0'-0" - 0'-2"	0'-2" - 1'-1"	1'_1" _ 7'_0"
			Topsoil	0-2 -1-1	1-1-1-0
TEXTURE	· · · · · · · · · · · · · · · · · · ·		Pine Duff and Loam	Sandy Clay Loam	Clay
	· ···· · · · · · · · · · · · · · · · ·			······	
ROCK FRAGMENTS	% Rock		< 5%	< 5%	< 5%
	Size				
	Shape				
SOIL STRUCTURE	Degree		Compound	Compound	Compound
			Cub Angular	Pub Angular Disaku	Sub Angular Blocky
	Snape		Sub-Angular	Sub-Angular Blocky	Sub-Angular Blocky
	Grade		Weak	Moderate	Firm
	0,000		, , , , , , , , , , , , , , , , , , ,		
	Size		Fine	Fine	Fine
CONSISTENCE	Wet				
		Stickiness	Not Sticky	Slightly Sticky	Sticky
		Plasticity	Not Plastic	Slightly Plastic	Plastic
				·	
····	Billiot		Erichia	Esiable	Erichia
	MOIST		rhable	rnabie	Fnable
······································	Drv				· · ···· · · · · · · · · · · · · · · ·
······································		Consistence	Weak	Moderate	Firm
	1				
		Cementation	None	None	None
COLOR	Munsell		10 YR 3/2	10 YR 6/3	5 Y 8/1 to 7.5 YR 6/6
	Description		Very Dark Grayish Brown	Pale Brown	White to Reddish Yellow
	i				
	Matting	·····	Nana	Nana	
	motuing		None	NONE	Yes
OBSERVED MOISTURE			None	None	Moist
ODJENTED MOISTURE	L			INUNE	MOISL

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be: Cimmaron Loam

GROUND COVER: Pine, aspen, grasses, forbs.

SLOPE: 13% at a bearing of 300°

PERCOLATION RATE:

0 min./in.

Avg. Depth (in.): 7.5

1

NOTES: Infiltration Test OK at 2 gal./ft.2/day

a second of the second second second second second

Lot 10 Profile Hole Observed: \$/25/2003

agent at the state of the second states and

		U.S.D.A. SO	L CLASSIFICATION METHO	D		
	ļ ļ	DEPTH	0-0 - 0-5	0'-5" - 1'-2"	1'-2" - 4'-0"	4-0"-6-0"
			lopsoil		0	Olar to Oranti Olar
TEXTURE			Pine Duff and Loam	Sandy Clay Loam	Liay	Clay to Sandy Clay
POCK EPAGHENTS	* Pork		< 5%	< 5%	= 15%	≈ 80%
NOON (TONOMETTIC					Fractured Sandstone	Fractured Sandstone
	Size				To 8"	To 18"
	Shane				Sub-Angular	Sub-Angular
					oob fingalo,	000701000
SOIL STRUCTURE	Degree		Compound	Compound	Compound	Compound
COLE OTHOUTONE			0000000			
	Shape	· /	Sub-Angular	Sub-Angular Blocky	Sub-Angular Blocky	Sub-Angular Blocky
	Grade		Weak	Moderate	Moderate	Moderate
	ļ					
	Size		Fine	Fine	Fine to Medium	Fine
	1					
CONSISTENCE	Wet			A:-1		
	· · · · · · · · · · · · · · · · · · ·	Suckiness	Slightly Sticky	Sticky	Sticky	<u>Sticky</u>
		Dischielty	Stichtly Diantia	Plaatia	Plaatia	Diastia
	}	Plasucity	Signity Plastic	Plats(IC	Flastic	Plastic
	Moist		Friable	Friable	Friable	Friable
			· · · · · · · · · · · · · · · · · · ·			
	Dry					
		Consistence	Weak	Moderate	Firm	Firm
		Cementation	None	None	None	None
COLOR	Munsell		10 YR 3/2	10 YR 7/3	10 YR 6/3 to 10 YR 5/8	5 Y 8/1 to 7.5 YR 6/6
4					Pale Brown to Yellowish	
	Description		Very Dark Grayish Brown	Very Pale Brown	Brown	White to Reddish Yellow
	4			······		
	11-11-1		Nana	Noan		Y
	Motting			INUNG	res	Tes
OPSERVED MORTUPE			Slight from mine	Nopa	None	Decrock at o
UBJERVED MUISTURE	L	L	Sugneriorn rains.	NUT		LACILIA

According to the U.S.D.A. S.C.S. Grand County Soll Survey - This area is likely to be: Cimmaron Loam

GROUND COVER: Pine, aspen, grasses, forbs, juniper.

SLOPE: 8% at a bearing of 335*

PERCOLATION RATE:

0 min./in.

Avg. Depth (in.): 12

1

NOTES: Infillration Test OK at 1 gal./ft.2/day

Lot 11 Profile Hole Observed: 7/9/2003

······································		ILS DA SOL	CLASSIEICATION METHO	D	
	r	0.3.0.1. 001			T
		DEPTH	0'-0" - 1'-4"	1'-4" - 2'-6"	2'-6" - 6'-0"
	+		Topsoil		
TEXTURE			Loam	Loamy Clay	Ciay
ROCK FRAGMENTS	% Rock		< 5%	< 5%	≈ 10%
	Size				To 14"
	Shape				Sub-Angular
SOIL STRUCTURE	Degree		Compound	Compound	Compound
	B				
	Shape		Sub-Angular Blocky	Sub-Angular Blocky	Sub-Angular Blocky
	Grade		Moderate	Moderate	Firm
	Size		Fine	Fine	Fine
CONSISTENCE	Wet				
		Stickiness	Slightly Sticky	Somewhat Sticky	Sticky
		Plasticity	Slightly Plastic	Somewhat Plastic	Plasuc
	·····				
			Cichia	fraink la	Frights to Firm
	MOIST		riable	Filable	
	·				
	Der				
· · · · · · · · · · · · · · · · · · ·		Consistence	Wask	Moderate	Firm
······································		Gonalatence	**Gan	MICUGIALE	r util
		Cementation	None	None	None
COLOR	Munsell		10 YR 5 21	10 YR 6/3	5 YR 5/6
	Description		Dark Grayish Brown	Pale Brown	Reddish Yellow
		11			
	Mottling		None	Some	Yes
OBSERVED MOISTURE			None	None	Slightly Moist

According to the U.S.D.A. S.C.S. Grand County Soll Survey - This area is likely to be: Cimarron Loam

GROUND COVER: Pine, aspen, grasses, forbs.

SLOPE: 8% at a bearing of 315°

24 min./in.

PERCOLATION RATE:

NOTES:

Avg. Depth (in.): 16

1

Lot 12 Profile Hole Observed: \$/28/2003

U.S.D.A. SOIL CLASSIFICATION METHOD								
		DEPTH	0'-0" - 0'-5"	0'-5" - 1'-6"	1'-6" - 7'-0"			
			Topsoil					
TEXTURE			Pine Duff and Loam	Clay	Clay			
ROCK FRAGMENTS	% Rock		< 5%	≈ 15%	< 5%			
······								
· · · · · · · · · · · · · · · · · · ·	Size			To 6"				
	Shape			Sub-Angular				
SOIL STRUCTURE	Degree		Compound	Compound	Compound			
	Shape		Sub-Angular	Sub-Angular Blocky	Sub-Angular Blocky			
	Grade		Weak	Firm	Hard			
	Size		Fine	Fine	Fine			
				· 				
CONSISTENCE	Wet			harmon				
		Stickiness	Not Sticky	Sticky	Sticky			
				·····				
· · · · · · · · · · · · · · · · · · ·		Plasticity	Not Plastic	Plastic	Plastic			
	Moist		Friable	Firm	Hard			
				······································				
	Ury							
		Consistence	VVeak	Hard	Hard			
		Comentation						
		Cementation	NOTE	inorie	None			
COLOR	Muneall		75 10 3/2	10 8 8/1	2.5 VP 7/2			
UOLON	Description		Dark Brown	Dusky Red	2.5 TR //S			
	2000.101011		Dark brown	Dusty nou				
	Mottling		None	Some	Some			
OBSERVED MOISTURE			None	None	Nope			

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be: Lake Creek Loam

GROUND COVER: Pine, juniper, grasses, forbs.

SLOPE: 13% at a bearing of 275°

PERCOLATION RATE:

Avg. Depth (in.): 14

1

NOTES: Acceptable inflitration Test for Lots 11 & 12 at 3 gal./ft.²/day

Weathered bedrock at 6'-6"

59 min./in.

Val Moritz Village Filing 1, Block 3

Lot 13 Profile Hole Observed: 6/28/2003

U.S.D.A. SOIL CLASSIFICATION METHOD								
				· 				
		DEPTH	0'-0" - 0'-5"	0'-5" - 1'-6"	1'-6" - 7'-0"			
			Topsoil					
TEXTURE			Pine Duff and Loam	Clay	Clay			
				450/	- 50/			
RUCK FRAGMENTS	% ROCK		< 5%	<u>≈ 15%</u>	\$ 370			
	0.0			Ta 0"				
	Size			100 Sub Annular				
	Snape			Sub-Angular				
SOIL STRUCTURE	Degrad		Compound	Compound	Compound			
SOIL STRUCTURE	Degree		Compositio	compound	Compound			
	Shape		Sub-Angular	Sub-Angular Blocky	Sub-Angular Blocky			
	Grade		Weak	Firm	Hard			
	Size		Fine	Fine	Fine			
CONSISTENCE	Wet							
		Stickiness	Not Sticky	Sticky	Sticky			
		Plasticity	Not Plastic	Plastic	Plastic			
		· · · ·						
	Moist		Friable	Firm	Hard			
				· ··· · · · · · · · · · · · · · · · · ·				
······		·····						
	Ury	Canalatanaa	Mark	Lland	Used			
		Consistence	vveak	riaro	Haro			
		Cementation	None	Nona	None			
		Cementation	None	None	140/16			
COLOR	Munsell		7.5 YR 3/2	10 R 8/1	2.5 YR 7/3			
	Description		Dark Brown	Dusky Red	Pale Yellow			
				······				
	Mottling		None	Some	Some			
OBSERVED MOISTURE			None	None	None			

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be: Lake Creek Loam

GROUND COVER: Pine, juniper, grasses, forbs.

SLOPE: 13% at a bearing of 275°

30 min./in.

PERCOLATION RATE:

NOTES:

SHANNON ENGINEERING, INC.

Avg Depth (in.) 14

1

Val Moritz Village Filing 1, Block 3

Lot 14 Profile Hole Observed: 6/18/2003

U.S.D.A. SOIL CLASSIFICATION METHOD								
		DEPTH	0'-0" - 0'-4"	0'-4" - 2'-6"	2'-6" - 8'-0"			
			Topsoil					
		ł			Clayey Sand to Loamy			
TEXTURE	f		Loam and Pine Duff	Clay	Sand			
····								
ROCK FRAGMENTS	% Rock		≈ 30%	≈ 30%	< 5%			
	ļ							
	Size		To 18"	To 18"				
	Shape		Sub-Angular	Sub-Angular				
SOIL STRUCTURE	Degree		Compound	Compound	Compound			
	Shape		Sub-Angular Blocky	Angular Blocky	Sub-Angular Blocky			
				······································				
	Grade		Weak	Firm	Moderate			
		· · · · · · · · · · · · · · · · · · ·			4			
	Size		Fine	Fine	Fine			
001010751105					·			
CONSISTENCE	VVet	<u>.</u>	Net Office	O	Net Ofer			
		Stickiness	Not Sticky	Somewhat Sticky	Not Sticky			
		Distate	Not Direction	O and an third Direction	Alex Dia ette			
		Plasticity	Not Plastic	Somewhat Plastic	NOT Plastic			
	No. in A		E-labla	F -1-1-1-	C-t			
	MOIST		Friable	Fnable	Fnable			
• • • • • • • • • • • • • • • • • • • •		Consistence	10/ook	Fim	Week			
	<u> </u>	CONSISTENCE	V VOAN	F nin	VYGAN			
	↓	Competation	None	None	None			
	<u> </u>	Cementation	None	itale	110118			
COLOR	Munseli		10 YR 4/2	10 YR 8/3	7.5 YR 5/8			
	Description		Dark Gravish Brown	Vey Pale Brown	Strong Brown			
		· · · · · · · · · · · · · · · · · · ·						

	Mottling		None	None	Some			
OBSERVED MOISTURE			None	None	Moist below 6'			
					أسي مسجد عبد برجيد والمغرب والمعني المتطعين والمستعم والمترا المتراك من الألا			

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be: Lake Creek Loam

GROUND COVER: Pine, juniper, grasses, forbs.

SLOPE: 17% at a bearing of 310°

55 min./in.

PERCOLATION RATE:

NOTES:

Avg Depth (in.) 14

Val Moritz Village Filing 1, Block 3

Lot 15 Profile Hole Observed: 6/16/2003

U.S.D.A. SOIL CLASSIFICATION METHOD								
					0.01.01			
	······	DEPTH	<u> </u>	0'-4" - 2'-6"	2'-6" - 8'-0"			
			Iopson	++				
TEXTURE			Loam and Pine Duff	Fine Sand	Clay			
ROCK FRAGMENTS	% Rock		≈ 15%	≈ 15%	< 5%			
	Size		To 24"	To 24"				
	Shape		Sub-Angular	Sub-Angular				
SOIL STRUCTURE	Degree		Compound	Simple	Compound			
	Shape		Sub-Angular Blocky	Granular	Sub-Angular Blocky			
				++	<u></u>			
	Grade		Weak	Weak	Strong			
	<u> </u>		······································	·				
····	Size		Fine	Fine	Fine			
CONSISTENCE	Wet	Chickingso	Not Stiplu	Net Sticky	Ctiolog			
	<u>├</u>	SUCKINESS	NOL SUCKY	NOT SUCKY	JUCKY			
	•	Plasticity	Not Plastic	Not Plastic	Plastic			
· · · · · · · · · · · · · · · · · · ·	Moist		Friable	Friable	Friable			
	Dry							
		Consistence	VVeak	Weak	Hard			
	<u> </u>	Cementation	None	None	None			
COLOR	Munsell		10 YR 4/2	7.5 YR 8/1 to 7.5 YR 6/6	5 Y 7/3			
	Description		Dark Grayish Brown	Reddish Tellow	Pale tellow			
	<u> </u>				······································			
	Mottling		None	Some	Yes			
OBSERVED MOISTURE	<u> </u>		None	Slightly Moist	Moist below 6'			

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be: Lake Creek Loarn

GROUND COVER: Pine, juniper, grasses, forbs.

SLOPE: 18% at a bearing of 310°

PERCOLATION RATE:

Avg Depth (in.) 16

1

NOTES: Profile Hole is in combination with Lot 16

28 min./in.

Lot <u>16</u> Profile Hole Observed: 6/18/2003

U.S.D.A. SOIL CLASSIFICATION METHOD									
		DEPTH	0'-0" - 0'-5"	0'-4" - 2'-6"	2'-6" - 8'-0"				
			Topsoil						
TEXTURE			Loam and Pine Duff	Fine Sand	Clay				
	11								
ROCK FRAGMENTS	% Rock		≈ 15%	~ 15%	< 5%				
	Size		To 24"	To 24"					
	Shape		Sub-Angular	Sub-Angular					
SOIL STRUCTURE	Degree		Compound	Simple	Compound				
	Shape		Sub-Angular Blocky	Granular	Sub-Angular Blocky				
	Grade		Weak	Weak	Strong				
	Size		Fine	Fine	Fine				
CONSISTENCE	Wet								
		Stickiness	Not Sticky	Not Sticky	Sticky				
		Plasticity	Not Plastic	Not Plastic	Plastic				
	Moist		Friable	Friable	Friable				
	Dry								
		Consistence	Weak	Weak	Hard				
		Cementation	None	None	None				
	l								
COLOR	Munsell		10 YR 4/2	7.5 YR 8/1 to 7.5 YR 6/6	<u>5 Y 7/3</u>				
	Description		Dark Grayish Brown	Reddish Yellow	Pale Yellow				
	ll			h					
		·							
	Mottling		None	Some	Yes				
		·							
OBSERVED MOISTURE			None	Slightly Moist	Moist below 6'				

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be: Lake Creek Loam

GROUND COVER: Pine, juniper, grasses, forbs.

SLOPE: 16% at a bearing of 310°

PERCOLATION RATE:

69 min.*l*in.

Avg. Depth (in.): 15

1

NOTES: Profile hole is in coombination with Lot 15

Lot <u>17</u> Profile Hole Observed: 7/9/2003

·····	T	U.S.D.A. SO	IL CLASSIFICATION METH	<u> </u>	······································
	·	DEDTU	0'0" 1'4"	1' 4" 2' 0"	2' 0" 9' 0"
				1-4 - 3-3	3-3-0-0
TEXTURE			Loam	Loamy Clay	Clayey Sand, Sandy Clay & Pockets of Clay
ROCK FRAGMENTS	% Rock		≈ 10%	≈ 10%	< 5%
	Size		20"	8"	
	Shape		Sub-Angular	Sub-Angular	
SOIL STRUCTURE	Degree		Compound	Compound	Compound
	Shape		Sub-Angular	Sub-Angular Blocky	Sub-Angular Blocky & Platy
	Grade		Moderate	Moderate	Strong
			} • • • • • • • • • • • • • • • • • • •		
	Size		Fine	Fine to Medium	Fine
CONSISTENCE	Wet				
		Stickiness	Somewhat Sticky	Sticky	Somewhat Sticky
		Plasticity	Somewhat Plastic	Plastic	Somewhat Plastic
	Moist		Friable	Friable	Friable to Firm
	}				
	Drv				
		Consistence	Weak	Moderate	Firm to Hard
		Cementation	None	None	None
00.00				40.00 510	10.10 710
COLOR	Description		10 YR 3/3	10 YR 5/6	10 YR 7/6
	Description	<u> </u>			Tellow
				<u>+</u>	+
	Mottling		None	No	Yes
OBSERVED MOISTURE	L1		None	None	Moist

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be: Cimmaron Loam

GROUND COVER: Grasses, forbs, sagebrush, rabbit brush.

SLOPE: 14% at a bearing of 352°

PERCOLATION RATE:

Avg. Depth (in.): 14

1

NOTES: Profile Hole combined with Lot 6

73 min./in.

Lot 18 Profile Hole Observed: 7/9/2003

]					
		DEPTH	0'-0" - 0'-4"	0'-4" - 1'-5"	1'-5" - 5'-6"	5'-6" - 6'-0"
			Topsoil			
						Fine Sandy Clay &
TEXTURE	L		Loam and Pine Duff	Loam	Loamy Fine Sand	Weathered Bedrock
	ll					704/
ROCK FRAGMENTS	% Rock		< 5%	< 5%	< 5%	= /070
						T- 34"
	Size					Nub Angular
	5hape			<u> </u>		Sub-Ariguiar
			0	0	Cime ala	Compound
SOIL STRUCTURE	Degree		Compound	Compound	Simple	Compound
·····	Share		Sub Angular	Sub Angular Blocky	Gregular	Sub Angular Blocky
	snape		Suc-Angular	Sub-Aigular Blocky	Granular	Gurringdial Blocky
		[<u> </u>	·····		
	Grade		Week	Moderate	Week	Firm
	- Oludo		, , , , , , , , , , , , , , , , , , ,		, , , , , , , , , , , , , , , , , , ,	1
	· · · · · · · · · · · · · · · · · · ·				······	
	Size		Fine	Fine	Fine	Fine to Medium
		ff	[1
CONSISTENCE	Wet			· · · · · · · · · · · · · · · · · · ·		
		Stickiness	Not Sticky	Somewhat Sticky	Not Sticky	Sticky
			1			1
		Plasticity	Not Plastic	Somewhat Plastic	Not Plastic	Plastic
	Moist		Friable	Friable	Firm	Firm
						L
	ļ					· · · · · · · · · · · · · · · · · · ·
	Dry					
		Consistence	Weak	Moderate	Weak	Firm to Hard
		Company	Naza	NI	Nasa	
	·	Cementation	NOR	None	NOTIO	198
	Muneall		10 78 3/3	10 YP 6/3	10 YP 8/2	75 10 7/8
COLOR	Description		Dark Brown	Pale Brown	Very Pala Brown	Reddieb Vellow
	Description				Voly 1 ale Diowii	Trouger Tellow
	+	├		<u> </u>		
	Mottling		Nooe	None	None	Yes
				1		
OBSERVED MOISTURE	1		None	None	None	Water at 6'

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be: Cimmaron Loam

.

GROUND COVER: Pine, juniper, some aspen, grasses, forbs.

33 min./in.

SLOPE: 18% at a bearing of 280°

PERCOLATION RATE:

Avg. Depth (in.): 15

1

NOTES:

Lot 19 Profile Hole Observed: 7/12/2003

U.S.D.A. SOIL CLASSIFICATION METHOD							
		DEPTH	0'-0" - 0'-4"	0'-4" - 2'-0"	2'-0" - 8'-0"		
			Topsoil				
TEXTURE			Pine Duff and Loam	Fine Loamy Sand	Clayey Sand to Clay		
ROCK FRAGMENTS	% Rock		< 5%	< 5%	< 5%		
	Size						
	Shape		1				
SOIL STRUCTURE	Degree		Compound	Simple	Compound		
	Shape		Sub-Angular	Granular	Sub-Angular Blocky		
		-	······································				
			<u>}</u>				
······································	Grade		Weak	Weak	Firm		
	Size		Fine	Fine	Fine to Medium		
				······································			
CONSISTENCE	Wet						
		Stickiness	Not Sticky	Not Sticky	Slightly Sticky		
			1		1		
		Plasticity	Not Plastic	Not Plastic	Slightly Plestic		
			1				
	Moist		Friable	Eriable	Friable		
			112010		11140.10		
				······································	+		
	Drv			······································	+		
		Consistence	Weak	Week	Firm		
					· · · · · · · · · · · · · · · · · · ·		
		Cementation	None	None	None		
		ociliariaria		Hone	10018		
COLOR	Munsell		10 YR 3/2	10 YR 8/1	10 YR 8/1 to 10 YR 6/6		
	Description		Very Dark Gravish Brown	White	White to Brownish Yellow		
			<u> </u>		1		
	Mottling		None	Some	Yee		
			······		+		
					Water seeping in at 2'		
OBSERVED MOISTURE			None	None	Standing water at 7'		
		ŧ	·····				

According to the U.S.D.A. S.C.S. Grand County Soll Survey - This area is likely to be: Cimmaron Loam

GROUND COVER: Pine, aspen, grasses, forbs.

SLOPE: 15% at a bearing of 275°

PERCOLATION RATE:

31 min*.l*in.

Avg. Depth (in.): 16

1

NOTES: Profile Hole in combination with Lot 20.

.

Lot 20 Profile Hole Observed: 7/12/2003

		U.S.D.A. SO	IL CLASSIFICATION METHOD)	
		OCRTH	01.011.01.41	01 411 01 01	21 A" 8' A"
	ļ	DEPTH	<u> </u>	0-4 - 2-0	2-0-8-0
TEVTIDE			Dino Duff and Loom	Fine Loamy Sand	Clavey Sand to Clay
IEXIORE			Pine Duir and Loam	Fille Loamy Sand	Clayey Sand to Clay
POCK EPACMENTE	% Pock		< 5%	< 5%	< 5%
RUCK FRAGMEN 13	A ROCK		- 570	- 578	
	Size				
	Shane		<u>†</u>		
	Onapo		·····		
SOU STRUCTURE	Ποστορ		Compound	Simple	Compound
SOL STRUCTURE	Degree		Compound	Ointple	Compositio
	Shape		Sub-Angular	Granular	Sub-Angular Blocky
			<u> </u>		
	Grade		Weak	Weak	Firm
			1		
				·····	
	Size		Fine	Fine	Fine to Medium
CONSISTENCE	Wet				
		Stickiness	Not Sticky	Not Sticky	Slightly Sticky
		Plasticity	Not Plastic	Not Plastic	Slightly Plastic
	Moist		Friable	Friable	Friable
	Dıy				
		Consistence	Weak	Weak	Firm
		Cementation	None	None	None
			101000		
COLOR	Munsell		10 YR 3/2	10 YR 8/1	10 YR 8/1 to 10 YR 6/6
	Description		very Dark Grayish brown	VVNILO	VVIILLE TO BROWNISH YELLOW
			<u>}</u>		
	Mottling		Nana	Sama	
	motuling		indie	Sound	165
			<u>∤</u>		Water seening in et 2'
OBSERVED MOISTURE			None	None	Standing water at 7'
	L			HUNG	Juan unity material /

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be: Cimmaron Loam

GROUND COVER: Pine, aspen, grasses, forbs.

SLOPE: 15% at a bearing of 275°

PERCOLATION RATE:

Avg. Depth (in.): 15

1

NOTES: Profile Hole combination with Lot 19 Spring is about 15' uphill from the test hole.

57 min./in.

Lot 21 Profile Hole Observed: 6/9/2003

U.S.D.A. SOIL CLASSIFICATION METHOD								
		DEPTH	0'-0" - 0'-2"	0'-2" - 1'-1"	1'-1" - 7'-0"			
			Topsoil					
TEXTURE		·····	Pine Duff and Loam	Sandy Clay Loam	Clay			
ROCK FRAGMENTS	% Rock		< 5%	< 5%	< 5%			
			· · · · · · · · · · · · · · · · · · ·					
	Size							
	Shape							
SOIL STRUCTURE	Degree		Compound	Compound	Compound			
	Shape		Sub-Angular	Sub-Angular Blocky	Sub-Angular Blocky			
	Grade		Weak	Moderate	Firm			
	Size		Fine	Fine	Fine			
CONSISTENCE	Wet							
		Stickiness	Not Sticky	Slightly Sticky	Sticky			
		Plasticity	Not Plastic	Slightly Plastic	Plastic			
				······································				
	Moist		Friable	Friable	Friable			
·····								
	Dry							
	_ _	Consistence	Weak	Moderate	Firm			
				······································				
	f f	Cementation	None	None	None			
COLOR	Munsell		10 YR 3/2	10 YR 6/3	5 Y 8/1 to 7.5 YR 6/6			
	Description		Very Dark Grayish Brown	Pale Brown	White to Reddish Yellow			
				······································				
			1		· · · · · · · · · · · · · · · · · · ·			
	Mottling		None	None	Yes			
			· · · · · · · · · · · · · · · · · · ·					
OBSERVED MOISTURE			None	None	Moist			

According to the U.S.D.A. S.C.S. Grand County Soll Survey - This area is likely to be: Cimmaron Loam

GROUND COVER: Pine, aspen, grasses, forbs.

SLOPE: 13% at a bearing of 300°

PERCOLATION RATE:

43 min./in.

Avg. Depth (in.): 15

1

NOTES: Profile Hole combined with Lot 22

Lot 22 Profile Hole Observed: 6/9/2003

U.S.D.A. SOIL CLASSIFICATION METHOD								
	ļ	DEPTH	0'-0" - 0'-2"	0'-2" - 1'-1"	1'-1" - /'-0"			
				Condu Claud com	Clau			
TEXTURE			Pine Duff and Loam	Sandy Clay Loam	Clay			
					- 50/			
ROCK FRAGMENTS	% Rock		< 5%	< 5%	< 5%			
	Size			·····				
	Snape							
RON CTRUCTURE			Compound	Companyed	Compound			
SULSTRUCTURE	Degree		Compound	Compound	Compound			
	Rhana		Sub Angular	Sub Angular Biochu	Sub Angular Pleaky			
	Snape		Sub-Angulai	Sub-Aliguiai Blocky	Sub-Angular Blocky			
	∤∤		·····					
	Grada		Mask	Noderate	Firm			
	Giade		y Can	Wicderald	1 1 1 1			
	Size		Fine	Fine	Fine			
CONSISTENCE	Wet		· · · · · · · · · · · · · · · · · · ·					
		Stickiness	Not Sticky	Slightly Sticky	Sticky			
	1		·					
		Plasticity	Not Plastic	Slightly Plastic	Plastic			
				· · · · · · · · · · · · · · · · · · ·				
	Moist		Friable	Friable	Friable			
	Dry							
		Consistence	Weak	Moderate	Firm			
		Cementation	None	None	None			
COLOR	Munsell		10 YR 3/2	10 YR 6/3	5 Y 8/1 to 7.5 YR 6/6			
	Description		Very Dark Gravish Brown	Pale Brown	White to Reddish Yellow			
	<u>↓</u> ↓							
	Mattil		None	Nana	Xaa			
~~~~	motting		None	NONG	res			
OBSERVED MOISTURE	┟─────┤		None	None	Moiet			

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be: Cimmaron Loam

GROUND COVER: Pine, aspen, grasses, forbs.

SLOPE: 13% at a bearing of 300°

PERCOLATION RATE:

48 min./in.

Avg. Depth (in.): 14

1

NOTES: Profile Hole combined with Lot 21

Lot 23 Profile Hole Observed: 6/28/2003

U.S.D.A. SOIL CLASSIFICATION METHOD							
		DEPTH	0'-0" - 0'-6"	0'-6" - 1'-8"	1'-8" - 5'-0"		
TEMELOP				Candy Clay Loan	Candy Clay		
TEXTURE			Loam	Sandy Clay Loam	Sandy Clay		
DOCK FOA OMENTO	e Dank		< EN/	- E%	< E9/		
RUCK PRAGMENTS	78 ROCK		576	< 5 <i>7</i> 8	- 578		
	Siza			To 10"	To 16"		
	Shane			Sub-Angular	Sub-Angular		
	Unape			Gub / Figural			
SOIL STRUCTURE	Degree	·	Compound	Compound	Compound		
				1			
	Shape		Sub-Angular Blocky	Sub-Angular Blocky	Sub-Angular Blocky		
		-					
	Grade		Weak	Moderate	Firm		
	0						
·····	Size		Fine	Fine	Fine		
CONSISTENCE	Wat						
CONSISTENCE	44.01	Stickingse	Not Sticky	Sticky	Slightly Sticky		
		0000000000	(the blocky	Olicity	Slightly Sucky		
		Plasticity	Not Plastic	Plastic	Slightly Plastic		
				1			
					·····		
	Moist		Friable	Firm	Moderate		
	Dry						
		Consistence	Weak	Firm	Moderate		
		Cementation	None	None	None		
	Muncell		10 VP 2/1	10 VP 5/1 to 10 VP 0/2	7 EVDER		
COLOR	munsen			10 TK 5/1 10 10 TK 6/2	0/6 71 6.1		
	Description	Į.	Verv Dark Grav	Grav to Light Brownish Grav	Strong Brown		
	Mottling		None	Yes	Yes		
OBSERVED MOISTURE			None	None	None		

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be: Cimmaron Loam

GROUND COVER: Aspen, grasses, forbs, shrubs, juniper and a few pines.

47 min.*l*in.

SLOPE: 14% at a bearing of 348°

PERCOLATION RATE:

Avg. Depth (in.): 16

1

NOTES: Profile Hole combined with Lot 24

.

Lot 24 Profile Hole Observed: 6/28/2003

U.S.D.A. SOIL CLASSIFICATION METHOD										
		DEPTH	0'-0" - 0'-6"	0'-6" - 1'-8"	1'-8" - 5'-0"					
			Topsoil		Dearth Clay					
TEXTURE			Loam	Sandy Clay Loam	Sandy Clay					
ROCK FRAGMENTS	% Rock		< 5%	< 5%	< 5%					
					<b>T</b> 4 84					
	Size			10 10"	10.16"					
	Shape			Sub-Angular	Sub-Angular					
SOIL STRUCTURE	Degree		Compound	Compound	Compound					
	Shape		Sub-Angular Blocky	Sub-Angular Blocky	Sub-Angular Blocky					
	Grade		VVeak	Moderate	Firm					
			·····							
			<b>F</b> '	<b>F</b> in a	Fina					
	5120		Fine	Fine	rine					
CONGIGITENCE	19/-4									
CUNSISTENCE	wet	Ottablassa	Ned Official	Chinhur	Oliophiles Objeter					
		SUCKINESS	NOT SUCKY	Sucky	Signuy Sucky					
		Disatists	Not Plantin	Plantia	Stightly Digetia					
		Flasticity	NOLFIASTIC	r lasuç	Signay Flasuc					
	Moist		Friable	Firm	Moderate					
	MULIBL		1112010	1	WOUGHAID					
	<u>  </u>									
	<b>D</b> ~			h						
		Consistence	Weak	Firm	Moderate					
	<u> </u>	- Unavariance		T 1740	110001010					
	<u> </u>	Comentation	None	None	None					
			110/10	1010	Nore					
COLOR	Munsell		10 YR 3/1	10 YR 5/1 to 10 YR 6/2	7.5 YR 5/6					
	Description		Very Dark Grav	Gray to Light Brownish Grav	Strong Brown					
				1	······································					
	Mottling		None	Yes	Yes					
			I							
OBSERVED MOISTURE			None	None	None					

According to the U.S.D.A. S.C.S. Grand County Soil Survey - This area is likely to be: Cimmaron Loam

GROUND COVER: Aspen, grasses, forbs, shrubs, juniper and a few pines.

38 min./in.

SLOPE: 14% at a bearing of 348°

PERCOLATION RATE:

Avg. Depth (in.): 16

1

NOTES: Profile Hole combine with Lot 23

## Val Moritz Village Filing 1, Block 3

	Avg.	cm of fall	cm of fall	cm of fall		Avg.	
	Perc.	in Perc.	in Perc.	in Perc.	Time	Depth	
Lot	(mln./in.)	Hole #1	Hole #2	Hole #3	Minutes	Inches	
1		1.1	1.3	0.9	10	16	
,	24	23	20	28			
2						16	
	{ t						
3	┟╌╌──╴┟╸	02	0.2	1.9	10	15	
	89	127	127	13			
4	<u>*</u>	0.6	0.9	0.8	10	16	
· · · · · · · · · · · · · · · · · · ·	34	42	28	32			
5	<u>-</u> +	0.6	0.8	0.9	10	16	
v	34	42	32	28		11	
8		0.6	0.3	0.5	10	15	
Y	59	42	85	51			
7		0.9	03	0.6	10	15	
	52	28	85	42		+	
ß		No test done					
	<u> </u>	1.00.00.00.	<u></u>				
٥	+	1				7.5	
<u>_</u>	} <u></u>					+	
10		1				12	
10	<u> </u>					+	
11	<u> </u>	07	11	21	10	16	
	24	36	23	12		+	
12	<u>├<u>-</u>`}</u>	0.4	0.5	0.4	10	14	
	59	64	51	64		1	
13		0.6	2.1	0.7	10	14	
	30	42	12	36		11	
14	11	0.4	0.5	0.5	10	14	
	55	64	51	51			
15		1	0.9	0.8	10	16	
	28	25	28	32			
16		0.2	0.6	0.7	10	15	
	69	127	42	36			
17		0.5	0.2	0.6	10	14	
	73	51	127	42			
18		1.1	1.9	0.4	10	15	
	33	23	13	64			
19	ļļ	1.5	1	0.5	10	16	
	31	17	25	51			
20	<u>-</u>  -	0.3	1.1	0.4	10	15	
	57	85	23	64		+	
21		0.4	0.7	0.9	10	15	
00	43	64	36	28	40	+	
22	<u> </u>	0.4	0.3	0.4	10	14	
22	<u>├^^</u>	04	00	04 E	10	10	
23	<u>├</u>	U.5	0.3	5	10	+'º	
24	4/	1 0 0	00	5	10	1	
24		0.0	0.0	0.9		+'º	
	1 301	1 42	42	L 201	· · · · · · · · · · · · · · · · · · ·	•	

Infiltration Test OK at 2 gal./ft.²/day

Profile Combo w/4

Profile Combo w/3

Profile Combo w/17

No suitable location was apparent. Infiltration Test OK at 2 gal./ft.²/day Infiltration Test OK at 1 gal./ft.²/day

Profile Combo w/16 Profile Combo w/15 Profile Combo w/6

Profile Combo w/20 Profile Combo w/19

Profile Combo w/24 Profile Combo w/23





Indicates probable well locations.



Filing 1, Block 3 Val Moritz Village