TRAVERSE MOUNTAIN AREA PLAN
STORM DRAIN

23 November, 2011

The Traverse Mountain development is comprised of two main drainage areas. These areas, as shown in Figure One, consist of the Fox Hollow Drainage and the SR-92 Drainage. The Fox Hollow Drainage flows westerly to an existing 60" culvert under I-15. The culvert has been extended and an energy dissipater constructed in the Jordan Narrows Regional Drainage Facility. The SR-92 Drainage flows westerly and southerly to a recently constructed 72" outfall storm drain for the Timpanogos Highway. The outfall terminal is the Jordan Narrows Facility.

Outfall Drainage

The drainage from the SR-92 basin discharges into the 72" storm drain. Traverse Mountain's by agreement between UDOT and Lehi City has the ability to connect to this storm drain and discharge at specified flow rates. Traverse Mountain participated in the project to construct the Jordan Narrows Regional Detention Facility at the end of the 72" SR-92 outfall line. By the agreement, Traverse Mountain has 8.1 acre feet of capacity in the 17.1 acre feet constructed in the first phase. This allows them to transfer the existing Pond "A" facility offsite. Traverse Mountain also has the right to construct a second pond consisting of an additional 20 acre feet at the same location. Traverse Mountain will have to disconnect the existing pond "A" detention and connect it to the 72" storm drain at the Murdock Canal location when construction at pond "A" parcel occurs.

Drainage Analysis

The concept plan was modeled in WMS software using a hec-1 model to estimate drainage flow for the development. The rainfall data used is provided in the appendix. A rainfall depth of 2.52 inches for the 100 year event, 2.30 inches for the 50 year event and 1.79 inches for the 10 year event were used in the modeling.

The estimated peak flows are as follows (for location see Figure 1):

	10 year (CFS)	50 year (CFS)	100 year (CFS)
Fox Hollow (2C)	46	197	287
Chapel Ridge (3R)	60	136	175
Fox Hollow Discharge (12C)	276	621	808
Adobe (9C)	103	165	194
Rail Road (10C)	108	152	171
Triumph (4R)	45	73	88
Murdock Canal (11C)	244	368	434
Perry (13C)	48	90	111

RECEIVED
NOV 23 2011
LEHI CITY

The project will be required to meet Lehi City's requirement of 0.2 CFS per developed acre discharge rate. The detention will be both offsite (Jordan Narrows Facility) and onsite facilities. An analysis was performed using the rational method to estimate the required detention volumes. The following c-factors were used:

Land USE	C-Factor
Existing	.1
Parks /cut slopes	.2
Low Density	.4
Medium Density	.5
High Density	.6
Churches / Schools	.6
Commercial	.7

The results are shown in the attached detention tables.

The development will require approximately 64.80 acre-feet of detention. The following is an estimate of where it will be distributed.

	Total Req.	Constructed	Proposed
Jordan Narrows	8.10 AF	8.10 AF	
Lambert	5.00 AF		5.00 AF
Existing Facility	15.24 AF	15.24 AF	
On Site Storage	41.81 AF		41.81 AF
TOTAL	**70.15 acre-feet**		
Excess Storage	**5.35 acre-feet**		

The SR-92 basin will have storm drains designed for the 10 year event. The maximum 10 year event will not exceed the agreed discharge into the 72" storm drain. Detention will be required to control the flows from developments draining to the 72" storm drain. This will be done by the following discharge rates:

Cabella's:	109 CFS
Rail Road:	72.7 CFS
Murdock Canal:	62.8 CFS
Perry:	22.6 CFS

Central Canyon will have the main storm drain pipe designed for the 50 year event. The existing storm drain has a capacity of approximately 200 CFS. The flows will be detained to limit flow out of Central and West Canyon to meet the existing capacity. The outfall from the Lambert basin will be limited to 250 CFS maximum flow.

RECEIVED
NOV 23 2011
LEHI CITY

DETENTION SUMMARY

RECEIVED
NOV 23 2011
LEHI CITY

Detention Basin Summary

Traverse Mountain Overall System
November 23, 2011

Proposed Plats	Required Detention		Onsite Detention		Offsite Detention	
	CF	Acre-Ft	CF	Acre-Ft	CF	Acre-Ft
West Canyon	163,260	3.75	121,824	2.80	41,436	0.95
Central Canyon	295,416	6.78	219,582	5.04	75,834	1.74
East Canyon	227,520	5.22	227,520	5.22	0	0.00
Perry Properties	413,694	9.50	413,694	9.50	0	0.00
Riverbend Properties	227,448	5.22	171,324	3.93	56,124	1.29
Commercial	699,498	16.06	667,512	15.32	31,986	0.73
Total Required Storage	**2,026,836**	**46.53**	**1,821,456**	**41.81**	**205,380**	**4.71**

Constructed Plats	Required Storage	
	CF	Acre-Ft
Chapel Ridge	39,725	0.91
Country Run	35,667	0.82
Cresthaven Appartments	31,741	0.73
Cresthaven Townhomes	23,666	0.54
Eagle Summit	77,168	1.77
Harvest Homes	33,000	0.76
Heather Moore	31,000	0.71
Hunter Chase	31,000	0.71
Road Plats	53,865	1.24
Shadow Ridge	54,880	1.26
Vialetto (39 lots)	80,770	1.85
Vista Ridge	66,764	1.53
Winterhaven	42,274	0.97
Woodhaven	68,310	1.57
Traverse Mountain Plat D & Challenger School	11,909	0.27
Fashion Outlets	114,138	2.62
Total Required Storage	**795,877**	**18.27**

Existing Storage	Constructed Storage	
	CF	Acre-Ft
On Site:		
TRAVERSE MOUNTAIN POND A	352,836	8.10
TRAVERSE MOUNTAIN POND B	196,020	4.50
TRAVERSE MOUNTAIN POND B	60,984	1.40
HARVEST HOMES	33,000	0.76
COUNTRY RUN	87,120	2.00
CRESTHAVEN (constructed)	44,000	1.01
FASHION OUTLET	65,959	1.51
TRAVERSE MOUNTAIN SALES CENTER	3,973	0.09
CABELLAS ON SITE	131,237	3.01
CHURCH (TRAVERSE MOUNTAIN BLVD)	9,230	0.21
CHURCH (CHAPEL RIDGE)	13,464	0.31
CHURCH (FOXTAIL DR.)	9,967	0.23
Total On Site Storage	**654,954**	**15.04**
Off Site:		
JORDAN NARROWS (REPLACES POND A)	361,548	8.10
Total Off Site Storage	**361,548**	**8.10**
Total Constructed Storage	**1,016,502**	**23.34**

	CF	Acre-Ft
As Constructed Required	795,877	18.27
As Constructed Storage	1,016,502	23.34
As Constructed Total Excess	**220,625**	**5.06**

Total Required Storage For Constructed Plats	795,877	18.27
Total Required Storage For Proposed Plats	2,026,836	46.53
Total Storage Needed	**2,822,713**	**64.80**

Existing Storage	1,016,502	23.34
Proposed On-Site Storage	1,821,456	41.81
Proposed Lambert Basin	217,800	5.00
Total Storage	**3,055,758**	**70.15**

Percent of Storage Used	92%	92%
Percentage of Storage Available	8%	8%

Total Excess	**233,045**	**5.35**

RECEIVED
NOV 23 2011
LEHI CITY

Proposed Plats Required Detention

Traverse Mountain Overall System

November 23, 2011

West Canyon	Acres	Required Detention		Onsite Detention		Offsite Detention	
		CF	Acre-Ft	CF	Acre-Ft	CF	Acre-Ft
A1-A3	16.0	40,104	0.92	30,168	0.69	9,936	0.23
B1-B2	5.1	11,556	0.27	8,622	0.20	2,934	0.07
C1-C2	15.8	37,728	0.87	28,260	0.65	9,468	0.22
D1	5.7	16,344	0.38	12,402	0.28	3,942	0.09
E1-E2	14.0	32,580	0.75	24,372	0.56	8,208	0.19
F1-F3	15.5	24,948	0.57	18,000	0.41	6,948	0.16
Total	**72.1**	**163,260**	**3.75**	**121,824**	**2.80**	**41,436**	**0.95**

Central Canyon	Acres	Required Detention		Onsite Detention		Offsite Detention	
		CF	Acre-Ft	CF	Acre-Ft	CF	Acre-Ft
A1-A2	10.3	20,916	0.48	15,444	0.35	5,472	0.13
B	7.0	15,876	0.36	11,844	0.27	4,032	0.09
C	5.7	12,924	0.30	9,648	0.22	3,276	0.08
D1-D2	10.4	21,096	0.48	15,588	0.36	5,508	0.13
E1-E2	15.0	30,420	0.70	22,482	0.52	7,938	0.18
F1-F3	15.2	25,380	0.58	18,378	0.42	7,002	0.16
G1-G2	10.4	21,096	0.48	15,588	0.36	5,508	0.13
H1-H2	9.9	20,664	0.47	15,318	0.35	5,346	0.12
I1-I2	8.4	17,028	0.39	12,600	0.29	4,428	0.10
J1-J2	14.4	37,836	0.87	28,530	0.65	9,306	0.21
K1-K2	9.9	23,652	0.54	17,712	0.41	5,940	0.14
L1	14.5	36,360	0.83	27,324	0.63	9,036	0.21
M1	4.0	11,448	0.26	8,694	0.20	2,754	0.06
N	1.2	720	0.02	432	0.01	288	0.01
Total	**136.3**	**295,416**	**6.78**	**219,582**	**5.04**	**75,834**	**1.74**

East Canyon	Acres	Required Detention		Onsite Detention		Offsite Detention	
		CF	Acre-Ft	CF	Acre-Ft	CF	Acre-Ft
A1-A4	25.3	67,968	1.56	67,968	1.56	0	0.00
B1	9.0	25,776	0.59	25,776	0.59	0	0.00
C1-C2	19.3	34,560	0.79	34,560	0.79	0	0.00
D1-D6	59.4	99,216	2.28	99,216	2.28	0	0.00
Total	**113.0**	**227,520**	**5.22**	**227,520**	**5.22**	**0**	**0.00**

Perry Properties	Acres	Required Detention		Onsite Detention		Offsite Detention	
		CF	Acre-Ft	CF	Acre-Ft	CF	Acre-Ft
A1-A2	34.9	74,988	1.72	74,988	1.72	0	0.00
B1-B2	28.4	59,328	1.36	59,328	1.36	0	0.00
C	69.7	199,728	4.59	199,728	4.59	0	0.00
D	25.6	73,368	1.68	73,368	1.68	0	0.00
Private Park	10.4	6,282	0.14	6,282	0.14	0	0.00
Total	**169.0**	**413,694**	**9.50**	413,694	**9.50**	0	**0.00**

RECEIVED
NOV 23 2011
LEHI CITY

Proposed Plats Required Detention

Traverse Mountain Overall System

November 23, 2011

River Bend	Acres	Required Detention		Onsite Detention		Offsite Detention	
		CF	Acre-Ft	CF	Acre-Ft	CF	Acre-Ft
A	9.8	22,212	0.51	16,578	0.38	5,634	0.13
B	14.5	41,544	0.95	31,536	0.72	10,008	0.23
C	23.8	68,184	1.57	51,750	1.19	16,434	0.38
D	5.7	16,344	0.38	12,402	0.28	3,942	0.09
E	18.9	42,876	0.98	31,986	0.73	10,890	0.25
F	16.0	36,288	0.83	27,072	0.62	9,216	0.21
Total	**88.7**	**227,448**	**5.22**	**171,324**	**3.93**	**56,124**	**1.29**

Non-Canyon	Acres	Required Detention		Onsite Detention		Offsite Detention	
		CF	Acre-Ft	CF	Acre-Ft	CF	Acre-Ft
Church	3.4	9,756	0.22	7,398	0.17	2,358	0.05
A	8.1	23,220	0.53	17,604	0.40	5,616	0.13
B	6.5	18,612	0.43	14,130	0.32	4,482	0.10
C	3.3	7,488	0.17	5,580	0.13	1,908	0.04
D	0.6	1,368	0.03	1,008	0.02	360	0.01
Total	**21.9**	**60,444**	**1.39**	**45,720**	**1.05**	**14,724**	**0.34**

Commercial	Acres	Required Detention		Onsite Detention		Offsite Detention	
		CF	Acre-Ft	CF	Acre-Ft	CF	Acre-Ft
Public Park	9.6	5,814	0.13	3,420	0.08	2,394	0.05
Highway Comm.	9.4	32,544	0.75	25,776	0.59	6,768	0.16
Highway Comm.	7.3	25,272	0.58	20,016	0.46	5,256	0.12
Highway Comm.	6.7	23,220	0.53	18,396	0.42	4,824	0.11
Highway Comm.	7.8	27,000	0.62	21,384	0.49	5,616	0.13
Highway Comm.	5.0	17,316	0.40	13,716	0.31	3,600	0.08
Highway Comm.	14.8	51,264	1.18	51,264	1.18	0	0.00
Highway Comm.	2.5	8,676	0.20	8,676	0.20	0	0.00
Highway Comm.	114.6	396,900	9.11	396,900	9.11	0	0.00
Highway Comm.	27.3	94,536	2.17	94,536	2.17	0	0.00
HC	1.8	6,228	0.14	4,932	0.11	1,296	0.03
HC	3.1	10,728	0.25	8,496	0.20	2,232	0.05
Total	**209.9**	**699,498**	**16.06**	**667,512**	**15.32**	**31,986**	**0.73**

RECEIVED
NOV 23 2011
LEHI CITY

DETENTION BASIN TOTALS

Traverse Mountain Overall System

November 23, 2011

EXISTING DEVELOPMENT

Recorded Plats		DETENTION Location	REQUIRED DETENTION VOLUME (cubic feet)	POND A	POND B	HH POND	CR POND	Onsite	JORDAN NARROWS
TM BLVD. NORTH	ROAD PLAT	POND B	6,100		6,100				
TM BLVD. SOUTH	ROAD PLAT	POND A	22,500	22,500					
MORNING GLORY ROAD	ROAD PLAT	POND A	25,265	25,265					
CHAPEL RIDGE	PHASES 1&2	POND A	20,285						
	PHASE 3	POND B	19,440		19,440				
COUNTRY RUN	ALL PHASES	CR BASIN	35,667				35,667		
HARVEST HOMES	PLAT ONE	HAR HOMES	33,000			33,000			
	PLAT TWO	DET. BASIN							
	PLAT THREE								
HEATHER MOORE	PLAT ONE	POND A	31,000	31,000					
HUNTER CHASE	PLAT ONE	POND A	15,000	15,000					
	PLAT TWO	POND A	14,000	14,000					
	PLAT THREE	POND A	2,000	2,000					
EAGLE SUMMIT	PHASES 1&2	POND B	74,558		74,558				
	PLAT THREE	POND B	870		870				
	PLAT FOUR	POND B	870		870				
	PLAT FIVE	POND B	870		870				
Eagle Summit Plat 6	Site Plan	Detained onsite	0						
SHADOW RIDGE	PLAT ONE	POND B	28,290		28,920				
	PLAT TWO	POND B	26,590		26,950				
WINTERHAVEN	PHASES 1&2	POND B	42,274		42,274				
WOODHAVEN	PHASES 1-3	POND B	68,310		68,310				
VISTA RIDGE	PHASES 1&2	POND B	43,856		43,856				
	PHASE 3 & 4	POND A	22,908	22,908					
Traverse Mount Plat D & Challenger School	Plat D	Pond A	11,909	11,909					
Vialetto Recorded Plat		Pond B	80,770		39,350				
Cresthaven Townhomes	All	Harvest Homes	23,666			23666			
Cresthaven Apartments	All	JORDAN NARROWS/ HH	31,741			12630			19,111
FASHION OUTLET	SITE PLAN	JORDAN NARROWS	114,138						48,179
TRANSFER FROM POND A TOJORDAN NARROWS	AGREEMENT								144,582
		Total Volumes for Existing Development	795,877	144,582	352,368	69,296	35,667		211,872
		Acre/feet	18.27	3.32	8.09	1.59	0.82		4.86

RECEIVED NOV 23 2011 LEHI CITY

DETENTION BASIN TOTALS

Traverse Mountain Overall System

November 23, 2011

DETENTION BASIN CONSTRUCTION

	CONSTRUCTED	DETENTION VOLUME (cubic feet)	POND A	POND B	HH POND	CR POND	On Site	JORDAN NARROWS
TRAVERSE MOUNTAIN POND A	TRAV. PLAT 1	352,836	352,836					
TRAVERSE MOUNTAIN POND B	CHAPPLE BEND	196,020		196,020				
TRAVERSE MOUNTAIN POND B	SHADOW RIDGE	60,984		60,984				
HARVEST HOMES	HARVEST HOME	33,000			33,000			
COUNTRY RUN	COUNTRY RUN	87,120				87,120		
CRESTHAVEN (constructed)	CRESTHAVEN	44,000			44,000			
JORDAN NARROWS (REPLACES POND A)	AGREEMENT	361,548						361,548
FASHION OUTLET		65,959					65,959	
TRAVERSE MOUNTAIN SALES CENTER		3,973					3,973	
CABELLAS ON SITE		131,237					131,237	
CHURCH (TRAVERSE MOUNTAIN BLVD)		9,230					9,230	
CHURCH (CHAPEL RIDGE)		13,464					13,464	
CHURCH (FOXTAIL DR.)		9,967					9,967	
	Total Storage Provided (cubic feet)	1,016,502	352,836	257,004	77,000	87,120	233,830	361,548
	Total Storage Provided (Acre Feet)	23.34	8.10	5.90	1.77	2.00	5.37	8.30
	Percentage of storage used	78%	41%	137%	90%	41%	0%	59%
	Percentage Available	22%	59%	-37%	10%	59%	100%	41%

RECEIVED
NOV 23 2011
SARATOGA SPRINGS CITY

DETENTION BASIN TOTALS

Traverse Mountain Overall System

November 23, 2011

PROPOSED DEVELOPMENT (Pla ts not recorded)			DETENTION VOLUME (cubic feet)	POND A	POND B	HH POND	CR POND	JORDAN NARROWS
LAMBERT POND		POND B	217,800		217,800			
LA RHINGIERA (POD II-6B)	ALL	POND A	51,424					51,424
		Total Volumes for Proposed Development added to existing.	269,224	0	217,800	0	0	51,424
		Acre/feet	6.18	0.00	5.00	0.00	0.00	1.18
		Acre/feet (total ex+prop)	24.45	3.32	13.09	1.59	0.82	6.04
		Total Storage Provided	23.34	8.10	5.90	1.77	2.00	8.30
		Percentage of storage used	105%	41%	222%	90%	41%	73%
		Percentage Available	-5%	59%	-122%	10%	59%	27%
		Total expansion required						

Note: Expansion of Pond B to be in the Lambert Parcel with Vialetto and Fox Canyon Subdivisions. Upon final build out of project, no pond will exceed 100% of capacity.

RECEIVED
NOV 23 2011