



October 17, 2012

Chad Meyerhoffer
Weber County Engineering Division
2380 Washington Blvd., Suite 240
Ogden, UT 84401

RE: Engineering Review on the Eden Center

The purpose of this letter is to illustrate the storm drainage system design process for the Eden Center. As shown in Appendix A & B, the infiltration rate plays a key role in the calculations. When using the rate, the required detention capacity is 2,492 CF. However, without it, the capacity required is 4,751 CF. Currently, the designed capacity is 3,729 CF. The designed capacity doesn't meet the capacity requirements if infiltration is ignored. However, it far exceeds the capacity requirements when taking infiltration into account.

The attached exhibit illustrates the area in which the detention system was designed. As illustrated, the subject area includes the lot (38,869 SF) and the roadway (13,079 SF) for a total area of 51,948 SF.

Please let us know of any questions, comments, concerns or suggestions.

Thanks

Dustin Bay
Gardner Engineering

APPENDIX A – DRAINAGE CALCULATIONS WITH INFILTRATION

Eden Center

Eden, Weber County, Utah

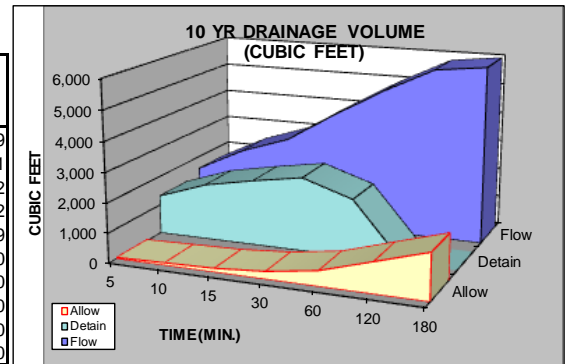
Lat= 41.3061 Long=-111.8281



Areas	Area		C	Infiltration Rate (MPI)	40.00
	Sq. Ft.	Acre			
Hard Surface	25,122	0.5767	0.85	Allow Release Rate (cfs/acre)	0.1
Building	6,968	0.1600	0.90	Q Allowable (cfs)	0.12
Landscape	19,858	0.4559	0.10		
Total/Weighted	51,948	1.1926	0.57		

100yr

MIN	Release Vol (cf) Allowable	Inch / Hr i100	Total Vol (cf) 100 YEAR	Detain Vol (cf) Difference	Landscape Infiltration (cf)	Adjusted Detain Vol (cf)
5	43	7.69	1,568	1,526	207	1,319
10	85	5.86	2,390	2,305	414	1,891
15	128	4.84	2,961	2,833	621	2,212
30	256	3.26	3,989	3,733	1,241	2,492
60	512	2.02	4,943	4,431	2,482	1,949
120	1,024	1.18	5,775	4,751	4,965	0
180	1,536	0.81	5,971	4,435	7,447	0
360	3,072	0.46	6,779	3,707	14,894	0
720	6,144	0.30	8,663	2,519	29,787	0
1440	10,254	0.17	10,254	0	59,574	0



	CUBIC FEET	CUBIC YARDS
100 YEAR STORM RECOMMENDED MIN. VOLUME DETAINED	2,492	92

Orifice Calculation

- H = 3 Maximum water height to center of orifice (ft)
- Q = 0.12 Flowrate out of orifice (cfs)
- Cc = 0.62 Coefficient of Contraction
- Cv = 0.98 Coefficient of Velocity
- Area = 0.014 Orifice Area (ft²)
- Π = 3.14
- g = 32.17 Gravitational Constant
- d = 2 Orifice Diameter (in)

APPENDIX B – DRAINAGE CALCULATIONS WITHOUT INFILTRATION

Eden Center

Eden, Weber County, Utah

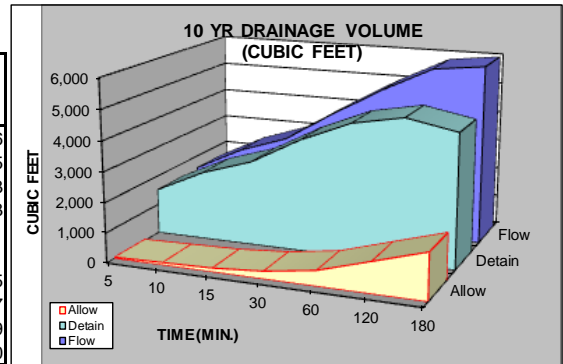
Lat= 41.3061 Long=-111.8281



Areas	Area			Infiltration Rate (MPI)	40.00
	Sq. Ft.	Acre	C		
Hard Surface	25,122	0.5767	0.85	Allow Release Rate (cfs/acre)	0.1
Building	6,968	0.1600	0.90	Q Allowable (cfs)	0.12
Landscape	19,858	0.4559	0.10		
Total/Weighted	51,948	1.1926	0.57		

100yr

MIN	Release Vol (cf) Allowable	Inch / Hr i100	Total Vol (cf) 100 YEAR	Detain Vol (cf) Difference	Landscape Infiltration (cf)	Adjusted Detain Vol (cf)
5	43	7.69	1,568	1,526	0	1,526
10	85	5.86	2,390	2,305	0	2,305
15	128	4.84	2,961	2,833	0	2,833
30	256	3.26	3,989	3,733	0	3,733
60	512	2.02	4,943	4,431	0	4,431
120	1,024	1.18	5,775	4,751	0	4,751
180	1,536	0.81	5,971	4,435	0	4,435
360	3,072	0.46	6,779	3,707	0	3,707
720	6,144	0.30	8,663	2,519	0	2,519
1440	10,254	0.17	10,254	0	0	0



100 YEAR STORM RECOMMENDED MIN. VOLUME DETAINED	CUBIC FEET	CUBIC YARDS
	4,751	176

Orifice Calculation

- H = 3 Maximum water height to center of orifice (ft)
- Q = 0.12 Flowrate out of orifice (cfs)
- Cc = 0.62 Coefficient of Contraction
- Cv = 0.98 Coefficient of Velocity
- Area = 0.014 Orifice Area (ft²)
- Π = 3.14
- g = 32.17 Gravitational Constant
- d = 2 Orifice Diameter (in)

Eden Center
Eden, Weber County, Utah

Lat=41.3061 Long=-111.8281

Gardner Engineering

Area	Sq. Ft.	Area	C	Infiltration Rate (MPI)	Allow Release Rate (cfs/acre)	Q Allowable (cfs)
Hard Surface	25,122	0.5767	0.85	40.00	0.1	
Building	6,968	0.1600	0.90			
Landscape	19,858	0.4559	0.10			
Total/Weighted	51,948	1.1926	0.57			

100yr	Release Vol (cf)	Inch / Hr	Total Vol (cf)	Detain Vol (cf)	Landscape Infiltration (cf)	Adjusted Detain Vol (cf)
MIN	Allowable	100	YEAR	Difference		
5	43	7.69	1,508	1,526	207	1,319
10	86	5.86	2,390	2,305	414	1,891
15	129	4.84	2,961	2,833	621	2,212
30	258	3.28	3,988	3,733	1,241	2,492
60	512	2.02	4,943	4,431	2,482	1,949
120	1,024	1.18	5,775	4,751	4,965	0
180	1,536	0.81	5,971	4,435	7,447	0
360	3,072	0.46	6,778	3,707	14,894	0
720	6,144	0.30	8,663	2,516	29,787	0
1440	10,254	0.17	10,254	0	59,574	0

100 YEAR STORM RECOMMENDED MIN. VOLUME DETAINED: 2,492 CUBIC FEET / 92 CUBIC YARDS

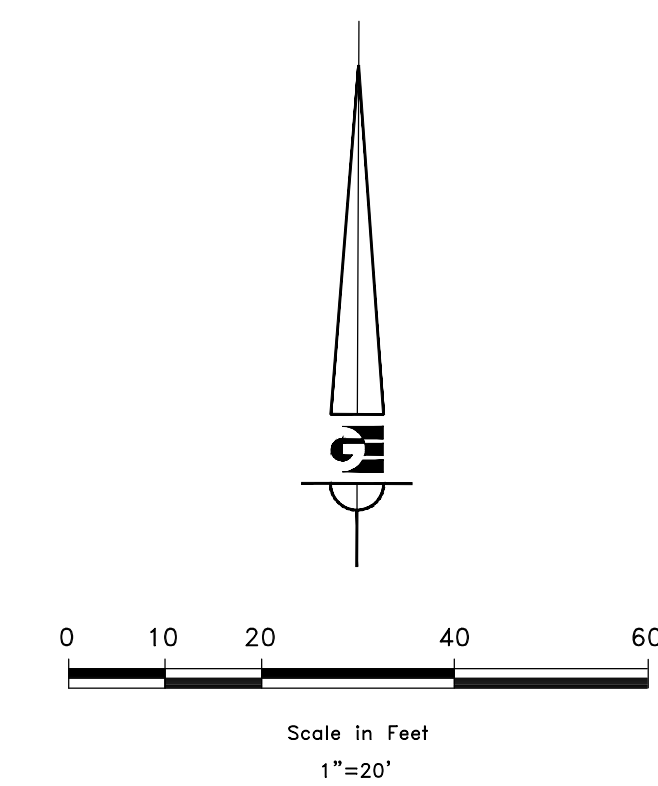
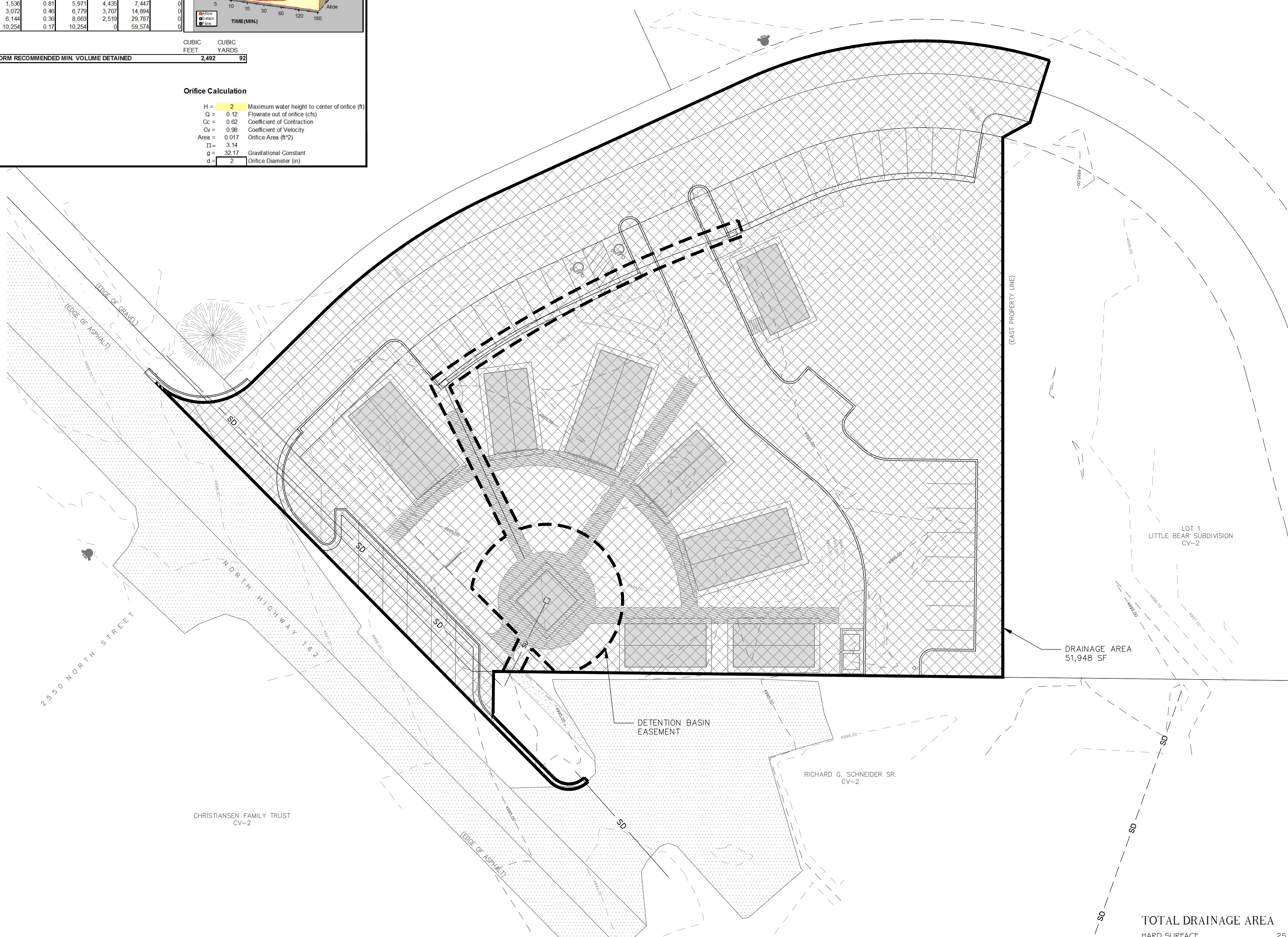
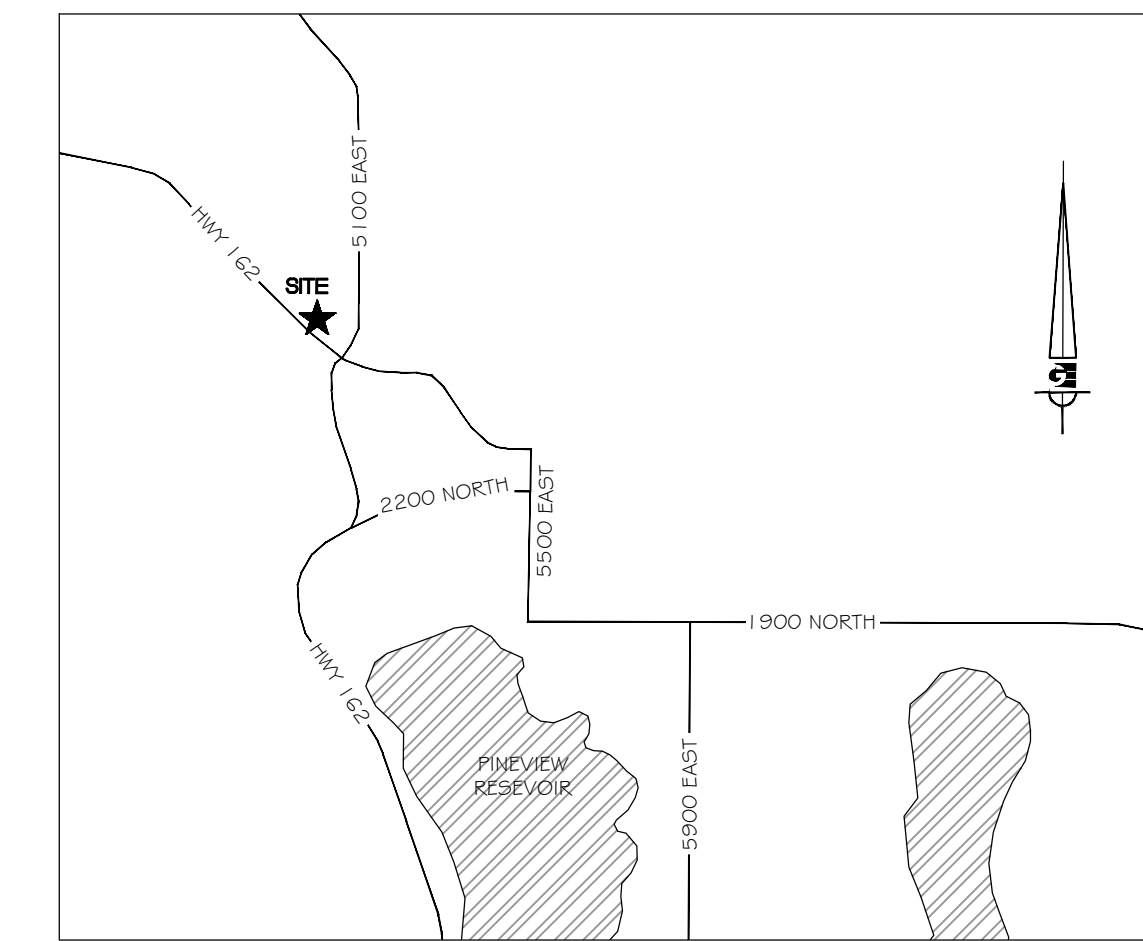
Orifice Calculation

H = 2 Maximum water height to center of orifice (ft)
 Q = 0.12 Flowrate out of orifice (cfs)
 Cc = 0.62 Coefficient of Contraction
 Cv = 0.98 Coefficient of Velocity
 Area = 0.017 Orifice Area (ft²)
 Tl = 3.14
 g = 32.17 Gravitational Constant
 d = 2 Orifice Diameter (in)

GRADING & DRAINAGE PLAN

EDEN CENTER

PART OF THE NORTHWEST QUARTER OF SECTION 34 T7N, R1E, SLB & M, U.S. SURVEY
EDEN CITY, WEBER COUNTY, UTAH
2012



LEGEND

	EASEMENT LINE
	PROPERTY LINE
	DRAINAGE AREA

TOTAL DRAINAGE AREA

HARD SURFACE	25,122 SF
BUILDING	6,968 SF
LANDSCAPE	19,858 SF
TOTAL	51,948

RELEASE RATE	0.10 CFS/ACRE
INFILTRATION RATE	1.51 CFS/ACRE
REQUIRED DETENTION CAPACITY	2,492 CF
	3,551 CF

NOTICE:
EXISTING UTILITIES ARE SHOWN ON PLANS FOR THE CONVENIENCE OF THE CONTRACTOR ONLY. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES. THE ENGINEER BEARS NO RESPONSIBILITY FOR THE UTILITIES NOT SHOWN OR SHOWN INCORRECTLY.

Call BLUE STAKES BEFORE YOU Dig
1-800-662-4111

DEVELOPER
WOP WOM, LLC.
ERIC SMITH
212 MERCHANT ST. #330
HONOLULU, HI 96813
PHONE: (808) 524-3551
FAX: (808) 524-8803

NOTE: ALL CONSTRUCTION TO CONFORM TO WEBER COUNTY STANDARDS AND SPECIFICATIONS.

SCALE: 1" = 20'

DATE: 2012
DESIGN: TMN/RC/JSCC
DRAWN: RC
CHECKED: TMN

REVISIONS	DESCRIPTION

DATE: _____
DWG.: SEE PLOT STAMP AT LEFT

Professional Engineer Seal:
No. 4859845
TYLER M. NIELSON
STATE OF UTAH

WOP WOM LLC
EDEN CENTER
GRADING PLAN
EDEN CITY, WEBER COUNTY, UTAH

Gardner Engineering
5875 South Adams Ave. Parkway, Suite 200 • Ogden, UT 84405
• Phone (801) 476-0202 • Fax (801) 476-0066

EX 1