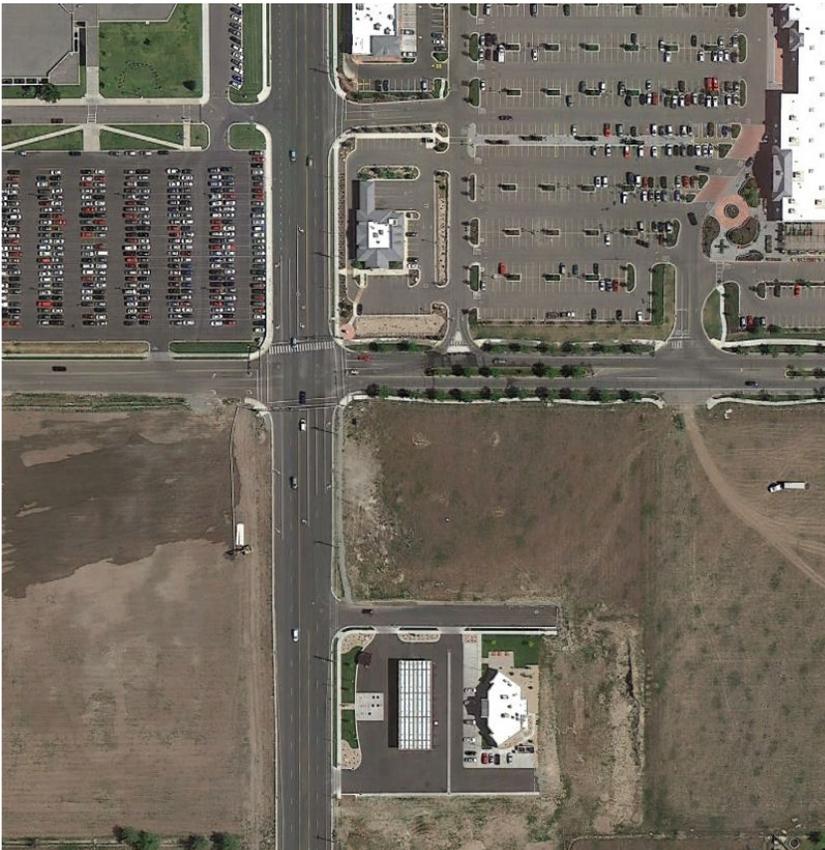




Cedar Hills Retail Center

4800 West Cedar Hills Drive
Cedar Hills, Utah 84062

Storm Water Analysis



Prepared For:

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Date: March 13, 2014

Table of Contents

Introduction.....	1
Location	1
Methodology	1
Analysis.....	1
Conclusions.....	1

Appendices

- ❖ Vicinity Map
- ❖ Rational Calculations
- ❖ Rainfall Data
- ❖ Basin Map

Introduction

Amsource is proposing a new commercial development called Cedar Hills Retail Center. The construction of this development will involve improvements to approximately 2.62 acres of land that is currently undeveloped and located at the corner of 4800 West Street and Cedar Hills Drive. The purposes of this report are to: (1) Determine the flows that will be generated by the proposed development and (2) Determine the required retention volume for the storm water runoff generated based on a rainfall intensities provided by the city of Cedar Hills.

Methodology

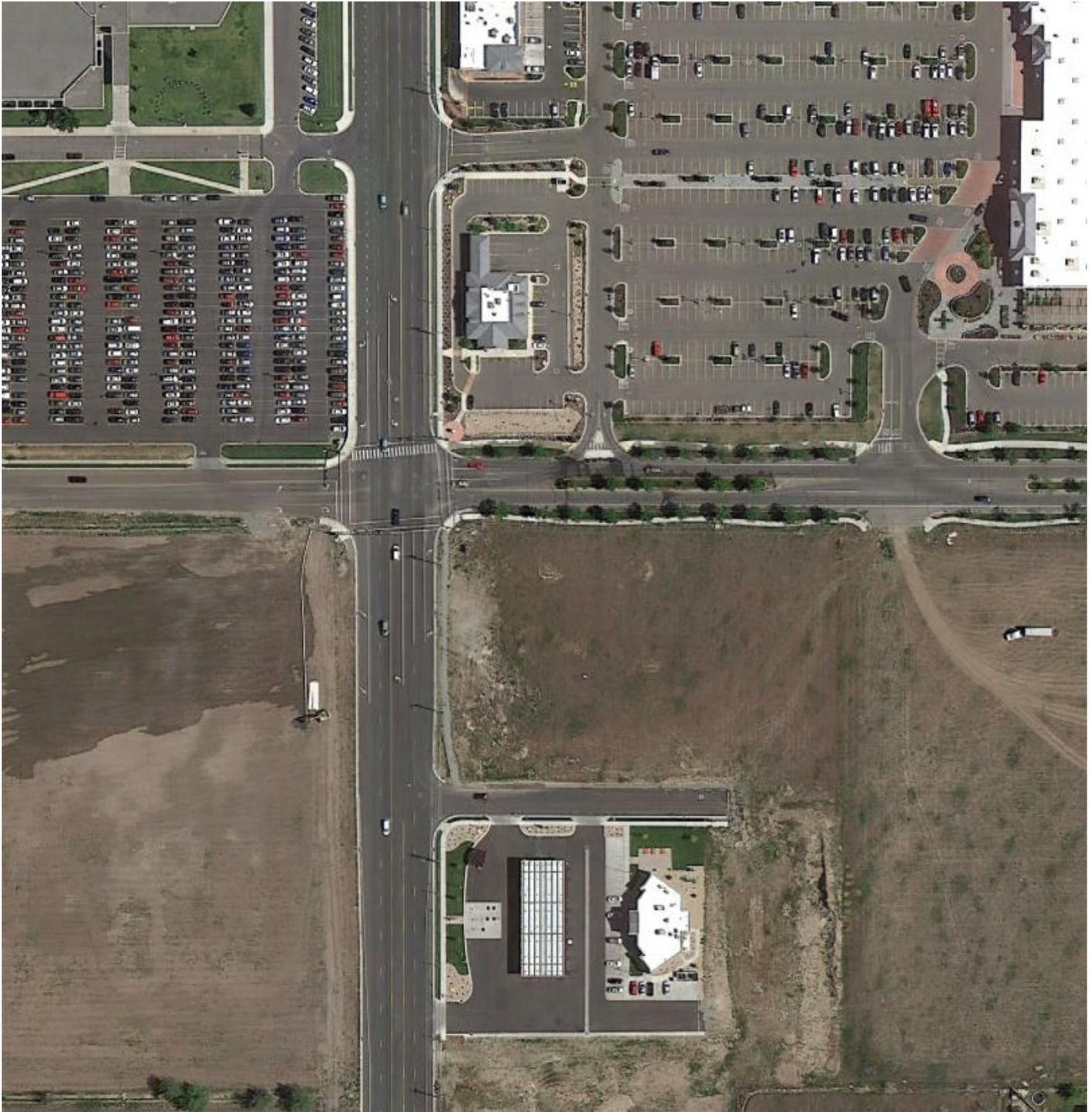
Rainfall intensities were provided by the city of Cedar Hills; and the 100 year intensities were utilized in this analysis. The rational method was used to determine the storage volume required for the site. The site was divided into two basins. Each basin was divided into one of three categories (landscape, roof, and impervious) for use in the rational method and in determining a composite runoff coefficient. Individual runoff coefficients of 0.1, 0.85 and 0.9 were used for landscape, roof and impervious surfaces respectively.

Analysis

All storm water will be detained on site in underground storage chambers. Storm water will be treated using a hydrodynamic separator prior to entering the chambers. An onsite geotechnical field investigation was conducted to determine the percolation rate for this site. The field test resulted in a percolation rate of 1.0 minute/inch however a conservative 5 minutes/ inch was used for this evaluation. Using this value a release rate was determined based on the footprint of the chambers. Basin 1 resulted in a required storage of 4,575 cubic feet and Basin 2 resulted in a required storage of 4,459 cubic feet. It should be noted that the evaluated area is greater than the parcel area to account for public improvements.

Conclusions

Adequate storage will be provided for each basin to retain the runoff produced in a 100 year storm. Each chamber system will hold 4,494 cubic feet of runoff. Basin 1 will also utilize catch basins and storm drain pipes to meet storage needs. Basin 1 storm drain network can accommodate an additional 453 cubic feet resulting in a total storage of 4,947 cubic feet.



**Cedar Hills Retail Center: 4800 West Cedar Hills Drive
Cedar Hills, Utah 84062**

Storm Water Calculations

Job Name: AFCU
 Date: 3/10/2014
 Prepared By: Shaun Young
 Reviewed By:
 Methodology: Rational

Developed Conditions

Basin 1

Area Type	Area (ft ²)	C
Roof	4948	0.85
Hard Surfaces	44450	0.9
Landscape	21503	0.1
Subtotal=	70901	

Total= 1.627662994 acres
C average= 0.653884995

Percolation Rate = 0.000278 Feet / Second
 Rentention Area = 2052 Feet²
Release Rate = 0.570 Feet³/Second

Frequency: 100 Year

Time (min)	Intensity (in/hr)	Acc.Vol (ft ³)	Rel.Vol (ft ³)	Req. Stor. (ft ³)
10	5.02	3206	342	2863
15	4.14	3966	513	3452
30	2.79	5345	1027	4318
60	1.73	6628	2054	4575
120	0.95	7280	4107	3173
180	0.65	7471	6161	1310
360	0.36	8276	12322	-4046
720	0.22	10115	24644	-14529
1440	0.12	11035	49287	-38253

Storm Water Calculations

Job Name: AFCU
 Date: 3/10/2014
 Prepared By: Shaun Young
 Reviewed By:
 Methodology: Rational

Developed Conditions

Basin 2

Area Type	Area (ft ²)	C
Roof	13200	0.85
Hard Surfaces	37246	0.9
Landscape	8114	0.1
Subtotal=	58560	

Total= 1.344352617 acres
C average= 0.777882514

Percolation Rate = 0.000278 Feet / Second
 Retention Area = 2052 Feet²
Release Rate = 0.570 Feet³/Second

Frequency: 100 Year

Time (min)	Intensity (in/hr)	Acc.Vol (ft ³)	Rel.Vol (ft ³)	Req. Stor. (ft ³)
10	5.02	3150	342	2808
15	4.14	3896	513	3383
30	2.79	5252	1027	4225
60	1.73	6513	2054	4459
120	0.95	7153	4107	3046
180	0.65	7341	6161	1180
360	0.36	8132	12322	-4190
720	0.22	9939	24644	-14705
1440	0.12	10842	49287	-38445

**ESTIMATED RETURN PERIODS FOR SHORT DURATION PRECIPITATION
(inches)**

Station: Cedar Hills, UT
Latitude: 40.4138 N

Elevation: 4963 feet
Longitude: 111.7543 W

Intensity (IN/HR)

ARI*years	10 min.	15 min.	30 min.	1 Hr.	2 Hr.	3 Hr.	6 Hr.	12 Hr.	24 Hr.
2	1.5	1.24	0.83	0.52	0.32	0.25	0.16	0.1	0.06
5	2.06	1.7	1.15	0.71	0.42	0.31	0.2	0.13	0.08
10	2.57	2.12	1.43	0.88	0.51	0.37	0.23	0.14	0.09
25	3.39	2.8	1.89	1.17	0.66	0.47	0.28	0.17	0.1
50	4.13	3.42	2.3	1.42	0.8	0.55	0.32	0.19	0.11
100	5.02	4.14	2.79	1.73	0.95	0.65	0.36	0.22	0.12

9. Storm water quality criteria

A. Storm Water Treatment

Prior to discharging storm water; collected water must be treated in an attempt to prevent illicit discharges of sediment, oils, floatables and other pollutants.

B. Use of Best Management Practices

Cedar Hills City encourages the use of the BMP fact sheets included in PART 4, CONSTRUCTION AND POST CONSTRUCTION BEST MANAGEMENT PRACTICES. **The following BMPs are required to be a part of all Construction Site Storm Water Management Plans:**

* BMP Inspection & Maintenance	BMPIM
* Concrete Waste Management	CWM
* Dust Controls	DC
* Grading Practices	GP
* Portable Toilets	PT
* Vehicle and Equipment Fueling	VEF

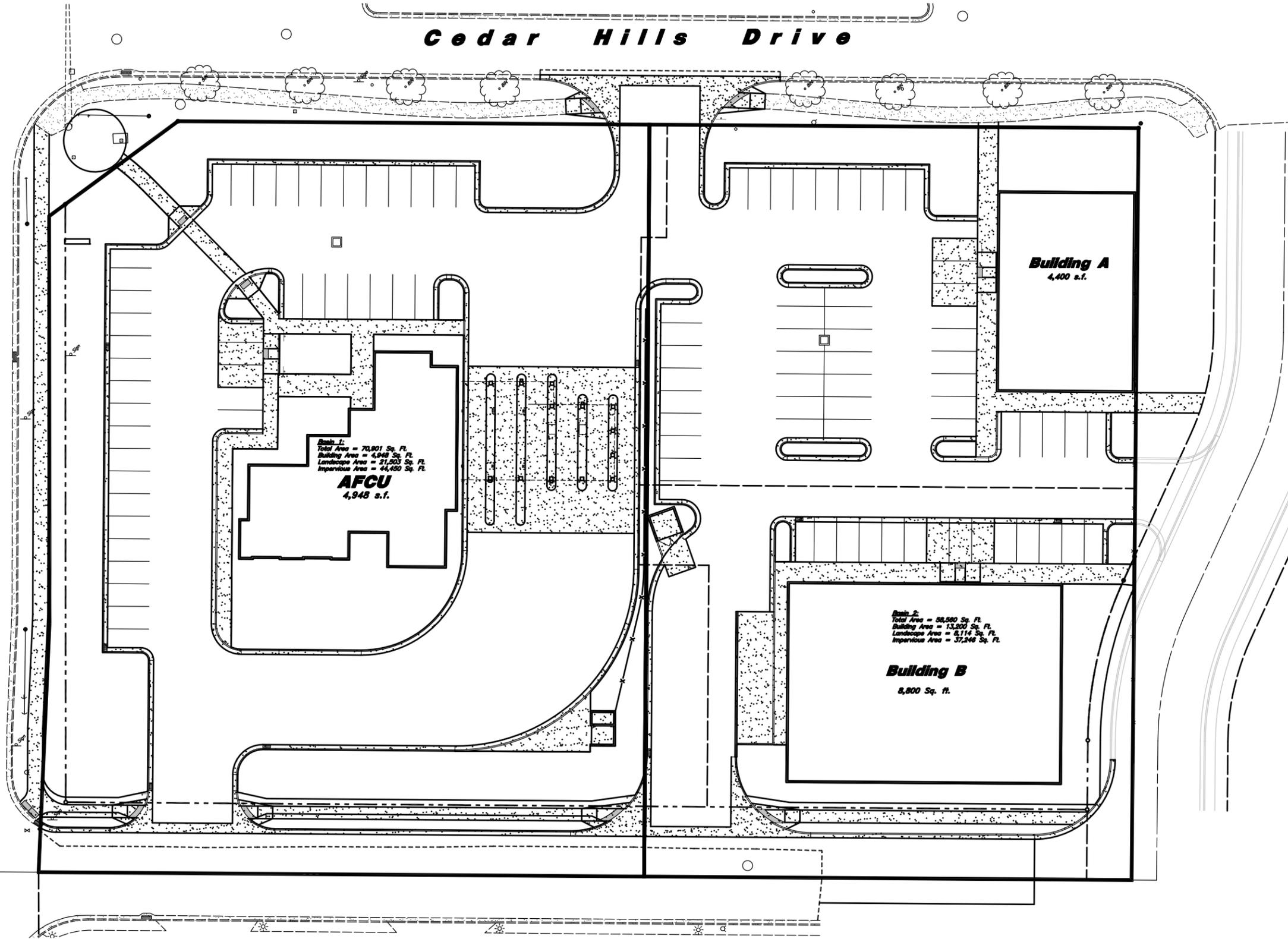
There is no list of BMPs that is required on all Post Construction Storm Water Management Plans.

In addition to the required BMPs listed above, other BMPs from PART 4 that apply to a given development should be used. Cedar Hills City also encourages the use of practices in addition to those contained in the Cedar Hills Storm Water Management Program that may be suitable for a given development.

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Adobe PDF-13.pc3, 1:2.1727

4800 West Street

Cedar Hills Drive



Basin 1
Total Area = 70,801 Sq. Ft.
Building Area = 4,948 Sq. Ft.
Landscape Area = 21,503 Sq. Ft.
Impervious Area = 44,450 Sq. Ft.
AFCU
4,948 s.f.

Basin 2
Total Area = 58,500 Sq. Ft.
Building Area = 13,200 Sq. Ft.
Landscape Area = 6,114 Sq. Ft.
Impervious Area = 37,246 Sq. Ft.
Building B
8,800 Sq. ft.

Building A
4,400 s.f.

REV	DATE	DESCRIPTION
X		
XX		
XXX		

Designed by: DA

Drafted by: LC

Client Name: Amours/FFCU

13-0370R

ANNA
ANDERSON WAHLEN & ASSOCIATES
— Great Basin Engineering South —
2010 North Basin Road, Suite 100, Ogden, Utah 84416
801-521-8529 - awhengineering.com

Basin Map

Cedar Hills Retail Center
4800 West Cedar Hills Drive
Cedar Hills, Utah

13 Mar, 2014

SHEET NO.
Basin