PRELIMINARY STORM DRAINAGE CALCULATIONS
For

Orchard Vista
A Residential Subdivision

ATLAS ENGINEERING L.L.C.

REGISTERED PROFESSIONAL ENGINEER
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05/26/2022
STATE OF UTAH

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Orchard Vista Subdivision
Drainage Plan

Introduction:

Orchard Vista is a 5.10-acre residential subdivision located at 400 East and 200 North. It will create 9 building units, parking area, a pavilion, 2 pickleball courts, and a tot lot.

The storm water containment was evaluated and designed using Stormbrixx chambers. Stormwater will flow along to various low points on the site where it will be collected by an inlet box and flow into underground Stormbrixx chambers.

Drainage Plan:

5.80 acres was used in the storm drain calculations because that is the area that will flow into the storm drain system. Storm drain systems have been designed to contain a 100-year event. Retention systems for public right-of-way and private area have been kept separate. Public streets within the development will flow down curb and gutter until it reaches a catch basin. The private area stormwater will flow to various low points where it will be collected by inlet boxes. All catch basins and inlet boxes will flow into underground Stormbrixx chambers where stormwater will percolate back into the ground.

The Rational Method was used to calculate runoff from the developed site. A weighted "C" value of 0.74 was calculated that accounts for landscaped and impervious areas. The percolation rate of 5 min/inch was used per recommendation of Geotechnical Report No. 2588-001-18.

The project was divided into 9 basins. Each basin was designed to contain a 100-year event and allowing an outflow equal to the percolation rate. Storage amounts were determined by net storage volume of SD Stormbrixx (22.53 cf) and the amount of storage provided by drain rock surrounding the Stormbrixx, using a 0.40 void ratio. Stormbrixx will be placed 2 layers deep as groundwater was not encountered in geotechnical investigations.

Basin 1 collects stormwater from 0.73 acres. The total required storage is 1,848 ft^3. 69 Stormbrixx will provide 1,555 ft^3 of storage. Drain rock surrounding the Stormbrixx will provide 300 ft^3 of storage.

Basin 2 collects stormwater from 0.61 acres. The total required storage is 1,475 ft^3. 55 Stormbrixx will provide 1,239 ft^3 of storage. Drain rock surrounding the Stormbrixx will provide 250 ft^3 of storage.

Basin 3 collects stormwater from 0.54 acres. The total required storage is 1,274 ft^3. 47 Stormbrixx will provide 1,059 ft^3 of storage. Drain rock surrounding the Stormbrixx will provide 225 ft^3 of storage.

Basin 4 collects stormwater from 0.85 acres. The total required storage is 2,180 ft^3. 82 Stormbrixx will provide 1,847 ft^3 of storage. Drain rock surrounding the Stormbrixx will provide 340 ft^3 of storage.

Basin 5 collects stormwater from 0.59 acres. The total required storage is 1,425 ft^3. 53 Stormbrixx will provide 1,194 ft^3 of storage. Drain rock surrounding the Stormbrixx will provide 240 ft^3 of storage.

Basin 6 collects stormwater from 0.67 acres. The total required storage is 1,669 ft^3. 62 Stormbrixx will provide 1,397 ft^3 of storage. Drain rock surrounding the Stormbrixx will provide 275 ft^3 of storage.

Basin 7 collects stormwater from 0.74 acres. The total required storage is 1,535 ft^3. 57 Stormbrixx will provide 1,397 ft^3 of storage. Drain rock surrounding the Stormbrixx will provide 260 ft^3 of storage.

Basin 8 collects stormwater from 0.35 acres. The total required storage is 754 ft^3. 27 Stormbrixx will provide 608 ft^3 of storage. Drain rock surrounding the Stormbrixx will provide 160 ft^3 of storage.

Basin 9 collects stormwater from 0.85 acres. The total required storage is 2,178 ft^3. 82 Stormbrixx will provide 1,847 ft^3 of storage. Drain rock surrounding the Stormbrixx will provide 340 ft^3 of storage.

Summary:

The storm drain retention system meets or exceeds all Santaquin City storm drain requirements. Values given for storage requirements are conservatively derived from calculations included in the appendix. All buildings will have finished floor elevations that provide for positive drainage away from buildings. In the event that any of the drainage structures should become damaged or clogged with debris, the water will travel down the public roadways along 400 East and 200 North until it enters an existing storm drain system.

The locations of the proposed layout of the drainage system and calculations to determine discharge rates are shown in the appendix and associated plans.

Appendix

WEIGHTED "C" VALUE

Orchard Vista

Total Acrage: **5.80**

Description	Area (Acres)	Runoff Coefficient	Percentage of Area	Weighted C Value
Pervious Area	1.42	0.25	24.48	6.12
Impervious Area	4.38	0.90	75.52	67.97
			Total	74

RETENTION BASIN SIZE

PROJECT TITLE: **Orchard Vista**

BASIN: 1

Retention Volume Determination

Basin Size, acres (A):   0.73
Runoff Coefficient (C):   0.74
Design Frequency: 100
perc rate   5 min/in
Area for perc   875 sf
outflow to perc   0.243056 cfs

Storm Duration (min.)	Rainfall intensity (in/hr)	Runoff volume (cu.ft.)	perc outflow (cu.ft.)	Storage volume (cu.ft.)	Storage volume (acre ft.)
(T)	(I)	CIAT	QT	CIAT-QT	
5	5.040	817	73	744	0.02
10	3.840	1245	146	1099	0.03
15	3.320	1614	219	1395	0.03
30	2.240	2178	438	1741	0.04
60	1.400	2723	875	**1848**	0.04
120	0.780	3034	1750	1284	0.03
180	0.560	3267	2625	642	0.01
360	0.320	3734	5250	-1516	-0.03
720	0.190	4434	10500	-6066	-0.14
1440	0.110	5134	21000	-15866	-0.36

69 Stormbrixx provides 1,555 cf of storage
Drain rock provides 300 cf of storage

RETENTION BASIN SIZE

PROJECT TITLE: **Orchard Vista**

BASIN: 2

Retention Volume Determination

Basin Size, acres (A):	0.61
Runoff Coefficient (C):	0.74
Design Frequency:	100
perc rate	5 min/in
Area for perc	800 sf
outflow to perc	0.222222 cfs

Storm Duration (min.)	Rainfall intensity (in/hr)	Runoff volume (cu.ft.)	perc outflow (cu.ft.)	Storage volume (cu.ft.)	Storage volume (acre ft.)
(T)	(I)	CIAT	QT	CIAT-QT	
5	5.040	683	67	616	0.01
10	3.840	1040	133	907	0.02
15	3.320	1349	200	1149	0.03
30	2.240	1820	400	1420	0.03
60	1.400	2275	800	**1475**	0.03
120	0.780	2535	1600	935	0.02
180	0.560	2730	2400	330	0.01
360	0.320	3120	4800	-1680	-0.04
720	0.190	3705	9600	-5895	-0.14
1440	0.110	4290	19200	-14910	-0.34

55 Stormbrixx provides 1,239 cf of storage

Drain rock provides 250 cf of storage

RETENTION BASIN SIZE

PROJECT TITLE: **Orchard Vista**

BASIN: 3

Retention Volume Determination

Basin Size, acres (A):	0.54
Runoff Coefficient (C):	0.74
Design Frequency:	100
perc rate	5 min/in
Area for perc	740 sf
outflow to perc	0.205556 cfs

Storm Duration (min.)	Rainfall intensity (in/hr)	Runoff volume (cu.ft.)	perc outflow (cu.ft.)	Storage volume (cu.ft.)	Storage volume (acre ft.)
(T)	(I)	CIAT	QT	CIAT-QT	
5	5.040	604	62	543	0.01
10	3.840	921	123	797	0.02
15	3.320	1194	185	1009	0.02
30	2.240	1611	370	1241	0.03
60	1.400	2014	740	**1274**	0.03
120	0.780	2244	1480	764	0.02
180	0.560	2417	2220	197	0.00
360	0.320	2762	4440	-1678	-0.04
720	0.190	3280	8880	-5600	-0.13
1440	0.110	3798	17760	-13962	-0.32

47 Stormbrixx provides 1,059 cf of storage

Drain rock provides 225 cf of storage

RETENTION BASIN SIZE

PROJECT TITLE: **Orchard Vista**
BASIN: 4
Retention Volume Determination

Basin Size, acres (A):   0.85
Runoff Coefficient (C):   0.74
Design Frequency: 100
perc rate   5 min/in
Area for perc   990 sf
outflow to perc   0.275 cfs

Storm Duration (min.)	Rainfall intensity (in/hr)	Runoff volume (cu.ft.)	perc outflow (cu.ft.)	Storage volume (cu.ft.)	Storage volume (acre ft.)
(T)	(I)	CIAT	QT	CIAT-QT	
5	5.040	951	83	869	0.02
10	3.840	1449	165	1284	0.03
15	3.320	1879	248	1632	0.04
30	2.240	2536	495	2041	0.05
60	1.400	3170	990	**2180**	0.05
120	0.780	3532	1980	1552	0.04
180	0.560	3804	2970	834	0.02
360	0.320	4348	5940	-1592	-0.04
720	0.190	5163	11880	-6717	-0.15
1440	0.110	5978	23760	-17782	-0.41

82 Stormbrixx provides 1,847 cf of storage
Drain rock provides 340 cf of storage

RETENTION BASIN SIZE

PROJECT TITLE: **Orchard Vista**

BASIN: 5

Retention Volume Determination

Basin Size, acres (A):   0.59
Runoff Coefficient (C):   0.74
Design Frequency: 100
perc rate   5 min/in
Area for perc   775 sf
outflow to perc   0.215278 cfs

Storm Duration (min.)	Rainfall intensity (in/hr)	Runoff volume (cu.ft.)	perc outflow (cu.ft.)	Storage volume (cu.ft.)	Storage volume (acre ft.)
(T)	(I)	CIAT	QT	CIAT-QT	
5	5.040	660	65	596	0.01
10	3.840	1006	129	877	0.02
15	3.320	1305	194	1111	0.03
30	2.240	1760	388	1373	0.03
60	1.400	2200	775	**1425**	0.03
120	0.780	2452	1550	902	0.02
180	0.560	2641	2325	316	0.01
360	0.320	3018	4650	-1632	-0.04
720	0.190	3584	9300	-5716	-0.13
1440	0.110	4149	18600	-14451	-0.33

53 Stormbrixx provides 1,194 cf of storage
Drain rock provides 240 cf of storage

RETENTION BASIN SIZE

PROJECT TITLE: **Orchard Vista**

BASIN: 6

Retention Volume Determination

Basin Size, acres (A):	0.67	
Runoff Coefficient (C):	0.74	
Design Frequency:	100	
perc rate	5	min/in
Area for perc	830	sf
outflow to perc	0.230556	cfs

Storm Duration (min.) (T)	Rainfall intensity (in/hr) (I)	Runoff volume (cu.ft.) CIAT	perc outflow (cu.ft.) QT	Storage volume (cu.ft.) CIAT-QT	Storage volume (acre ft.)
5	5.040	750	69	680	0.02
10	3.840	1142	138	1004	0.02
15	3.320	1481	208	1274	0.03
30	2.240	1999	415	1584	0.04
60	**1.400**	**2499**	**830**	**1669**	**0.04**
120	0.780	2784	1660	1124	0.03
180	0.560	2999	2490	509	0.01
360	0.320	3427	4980	-1553	-0.04
720	0.190	4070	9960	-5890	-0.14
1440	0.110	4712	19920	-15208	-0.35

62 Stormbrixx provides 1,397 cf of storage

Drain rock provides 275 cf of storage

RETENTION BASIN SIZE

PROJECT TITLE: **Orchard Vista**

BASIN: 7

Retention Volume Determination

Basin Size, acres (A):   0.63
Runoff Coefficient (C):   0.74
Design Frequency: 100
perc rate   5 min/in
Area for perc   815 sf
outflow to perc   0.226389 cfs

Storm Duration (min.)	Rainfall intensity (in/hr)	Runoff volume (cu.ft.)	perc outflow (cu.ft.)	Storage volume (cu.ft.)	Storage volume (acre ft.)
(T)	(I)	CIAT	QT	CIAT-QT	
5	5.040	705	68	637	0.01
10	3.840	1074	136	938	0.02
15	3.320	1393	204	1189	0.03
30	2.240	1880	408	1472	0.03
60	1.400	2350	815	**1535**	0.04
120	0.780	2618	1630	988	0.02
180	0.560	2820	2445	375	0.01
360	0.320	3222	4890	-1668	-0.04
720	0.190	3827	9780	-5953	-0.14
1440	0.110	4431	19560	-15129	-0.35

57 Stormbrixx provides 1,397 cf of storage
Drain rock provides 260 cf of storage

RETENTION BASIN SIZE

PROJECT TITLE: **Orchard Vista**
BASIN: 8
Retention Volume Determination

Basin Size, acres (A):   0.35
Runoff Coefficient (C):   0.74
Design Frequency: 100
perc rate   5 min/in
Area for perc   580 sf
outflow to perc   0.161111 cfs

Storm Duration (min.)	Rainfall intensity (in/hr)	Runoff volume (cu.ft.)	perc outflow (cu.ft.)	Storage volume (cu.ft.)	Storage volume (acre ft.)
(T)	(I)	CIAT	QT	CIAT-QT	
5	5.040	392	48	343	0.01
10	3.840	597	97	500	0.01
15	3.320	774	145	629	0.01
30	2.240	1044	290	**754**	0.02
60	1.400	1305	580	725	0.02
120	0.780	1455	1160	295	0.01
180	0.560	1566	1740	-174	0.00
360	0.320	1790	3480	-1690	-0.04
720	0.190	2126	6960	-4834	-0.11
1440	0.110	2462	13920	-11458	-0.26

27 Stormbrixx provides 608 cf of storage
Drain rock provides 160 cf of storage

RETENTION BASIN SIZE
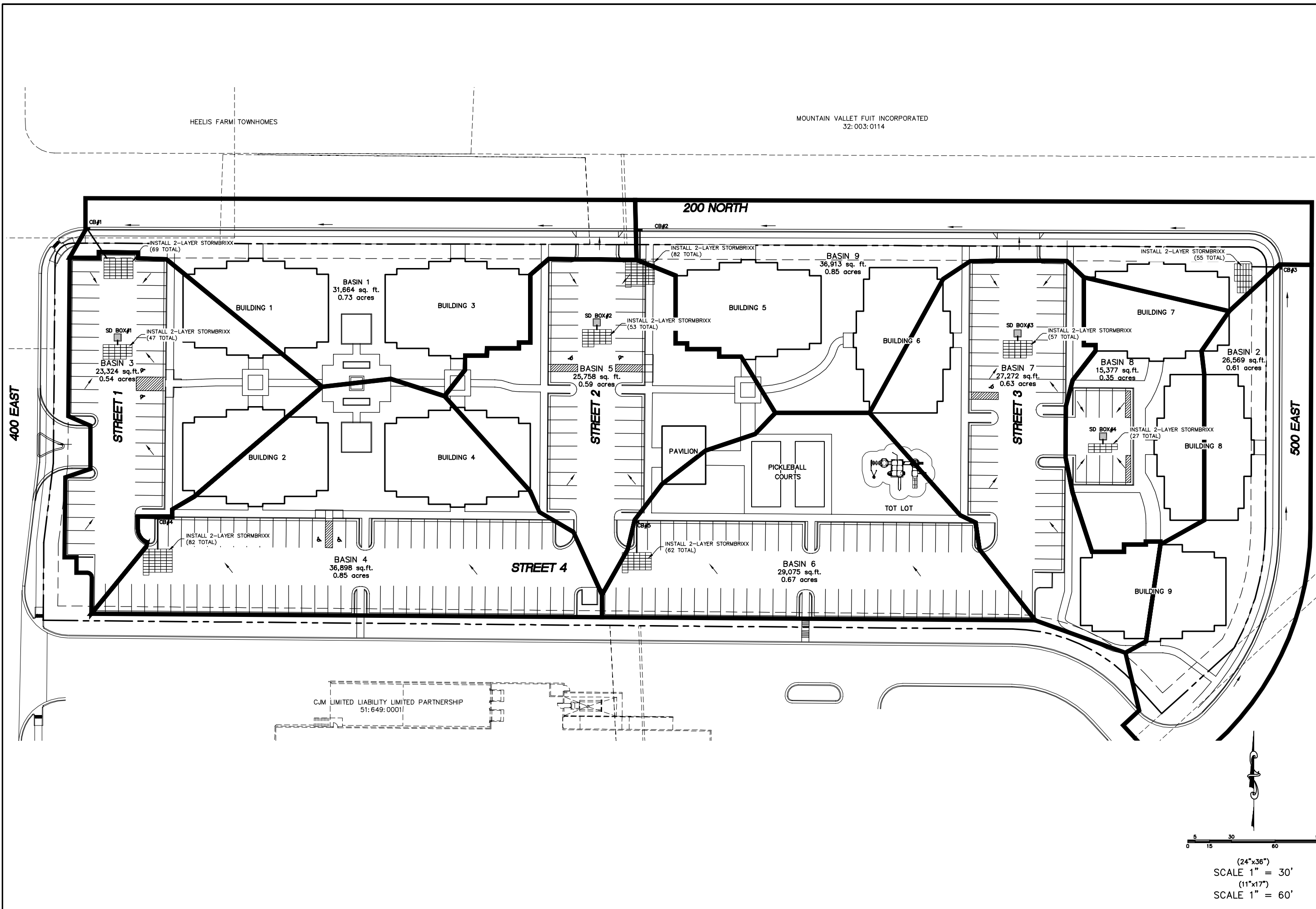
PROJECT TITLE: **Orchard Vista**

BASIN: 9

Retention Volume Determination

Basin Size, acres (A):	0.85
Runoff Coefficient (C):	0.74
Design Frequency:	100
perc rate	5 min/in
Area for perc	992 sf
outflow to perc	0.275556 cfs

Storm Duration (min.) (T)	Rainfall intensity (in/hr) (I)	Runoff volume (cu.ft.) CIAT	perc outflow (cu.ft.) QT	Storage volume (cu.ft.) CIAT-QT	Storage volume (acre ft.)
5	5.040	951	83	868	0.02
10	3.840	1449	165	1284	0.03
15	3.320	1879	248	1631	0.04
30	2.240	2536	496	2040	0.05
60	1.400	3170	992	**2178**	0.05
120	0.780	3532	1984	1548	0.04
180	0.560	3804	2976	828	0.02
360	0.320	4348	5952	-1604	-0.04
720	0.190	5163	11904	-6741	-0.15
1440	0.110	5978	23808	-17830	-0.41

82 Stormbrixx provides 1,847 cf of storage

Drain rock provides 340 cf of storage

HEELIS FARM TOWNHOMES

MOUNTAIN VALLET FUIT INCORPORATED
32: 003: 0114

200 NORTH

CB#1

CB#2

CB#3

INSTALL 2-LAYER STORMBRIXX
(69 TOTAL)

INSTALL 2-LAYER STORMBRIXX
(82 TOTAL)

INSTALL 2-LAYER STORMBRIXX
(55 TOTAL)

BASIN 9
36,913 sq. ft.
0.85 acres

BASIN 1
31,664 sq. ft.
0.73 acres

BUILDING 1

BUILDING 3

BUILDING 5

BUILDING 7

SD BOX#1

INSTALL 2-LAYER STORMBRIXX
(47 TOTAL)

SD BOX#2

INSTALL 2-LAYER STORMBRIXX
(53 TOTAL)

BUILDING 6

SD BOX#3

INSTALL 2-LAYER STORMBRIXX
(57 TOTAL)

BASIN 3
23,324 sq. ft.
0.54 acres

BASIN 5
25,758 sq. ft.
0.59 acres

BASIN 7
27,272 sq. ft.
0.63 acres

BASIN 2
26,569 sq. ft.
0.61 acres

BASIN 8
15,377 sq. ft.
0.35 acres

400 EAST

STREET 1

STREET 2

STREET 3

500 EAST

BUILDING 2

BUILDING 4

PAVILION

SD BOX#4

INSTALL 2-LAYER STORMBRIXX
(27 TOTAL)

BUILDING 8

PICKLEBALL
COURTS

TOT LOT

BUILDING 9

CB#4

INSTALL 2-LAYER STORMBRIXX
(82 TOTAL)

CB#5

INSTALL 2-LAYER STORMBRIXX
(62 TOTAL)

BASIN 4
36,898 sq. ft.
0.85 acres

STREET 4

BASIN 6
29,075 sq. ft.
0.67 acres

CJM LIMITED LIABILITY LIMITED PARTNERSHIP
51: 649: 0001

(24"x36")
SCALE 1" = 30'
(11"x17")
SCALE 1" = 60'

5 15 30 60 90