

MICRO STORM WATER DRAINAGE STUDY

Hawthorn Assisted Living Community
SE Battery Drive & SE Shenandoah Drive
Jackson County
Lee's Summit, Missouri

June 29, 2026



Prepared For:

6/29/26

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ENGINEERING, INC.

Consulting Structural and Civil Engineers

5907 Raytown Trafficway

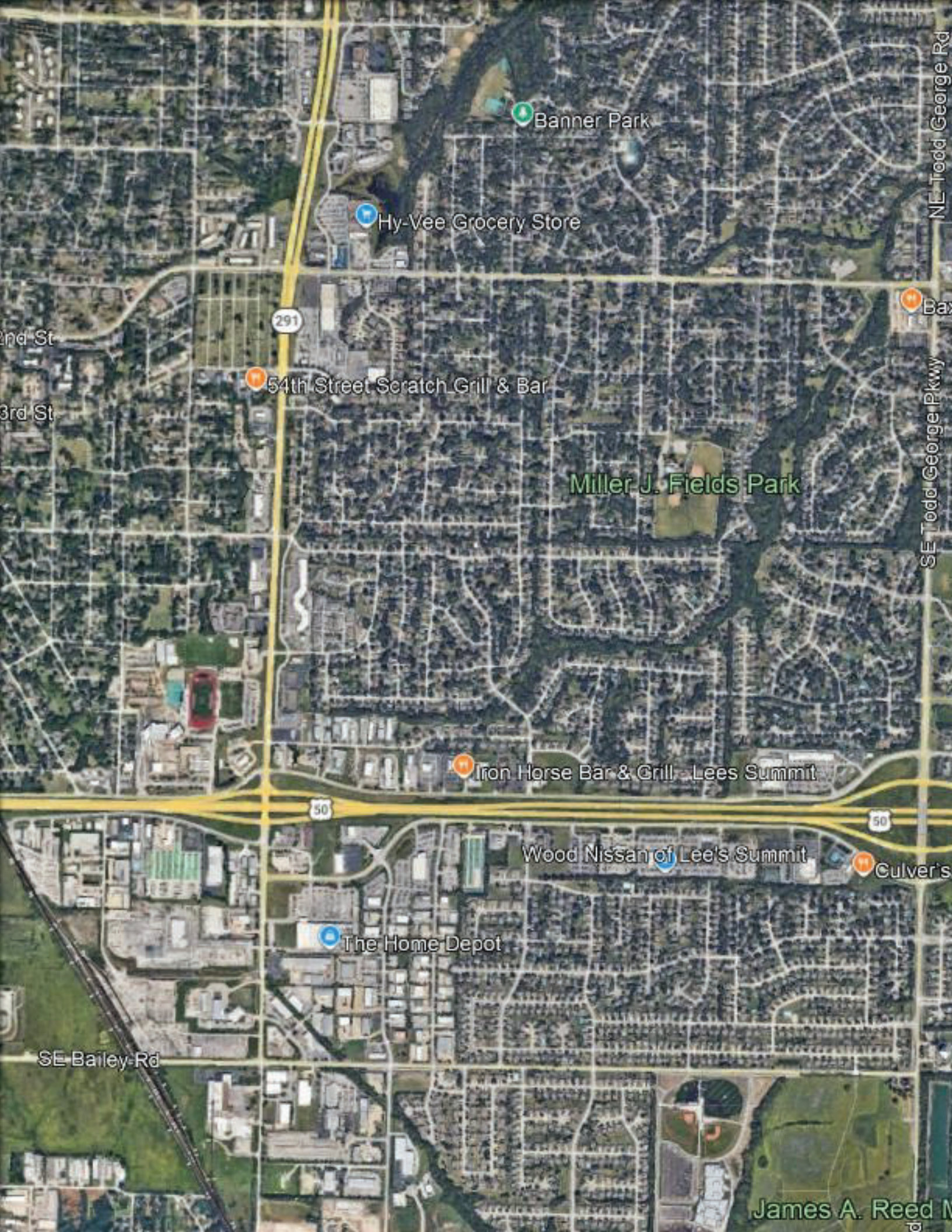
Raytown, Missouri 64133

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STORM WATER DRAINAGE STUDY
Hawthorn Assisted Living Center
SE Battery Drive & SE Shenandoah Drive
Lees Summit, MO

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Banner Park

Hy-Vee Grocery Store

291

54th Street Scratch Grill & Bar

Miller J. Fields Park

Iron Horse Bar & Grill - Lees Summit

50

Wood Nissan of Lee's Summit

The Home Depot

50

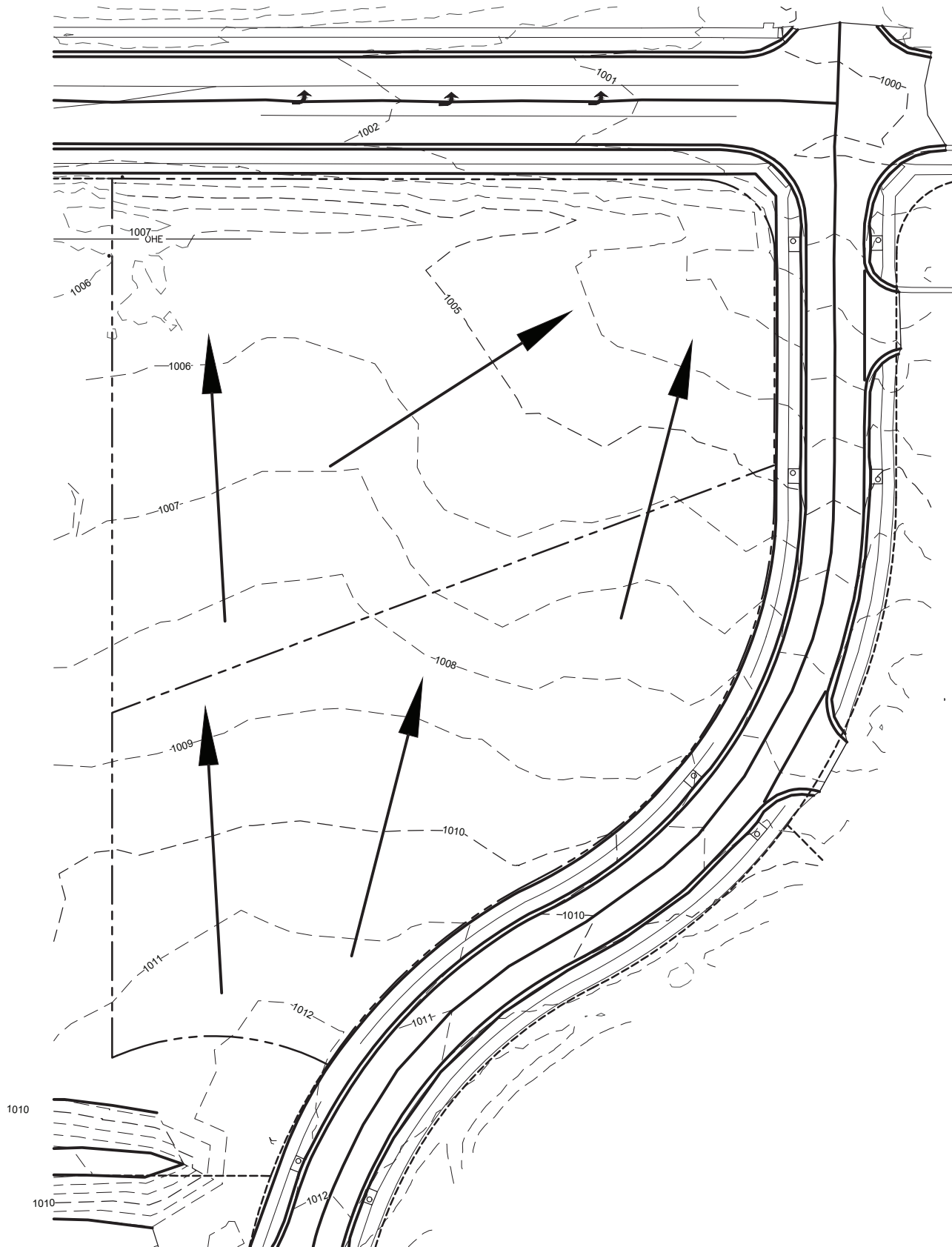
Culver's

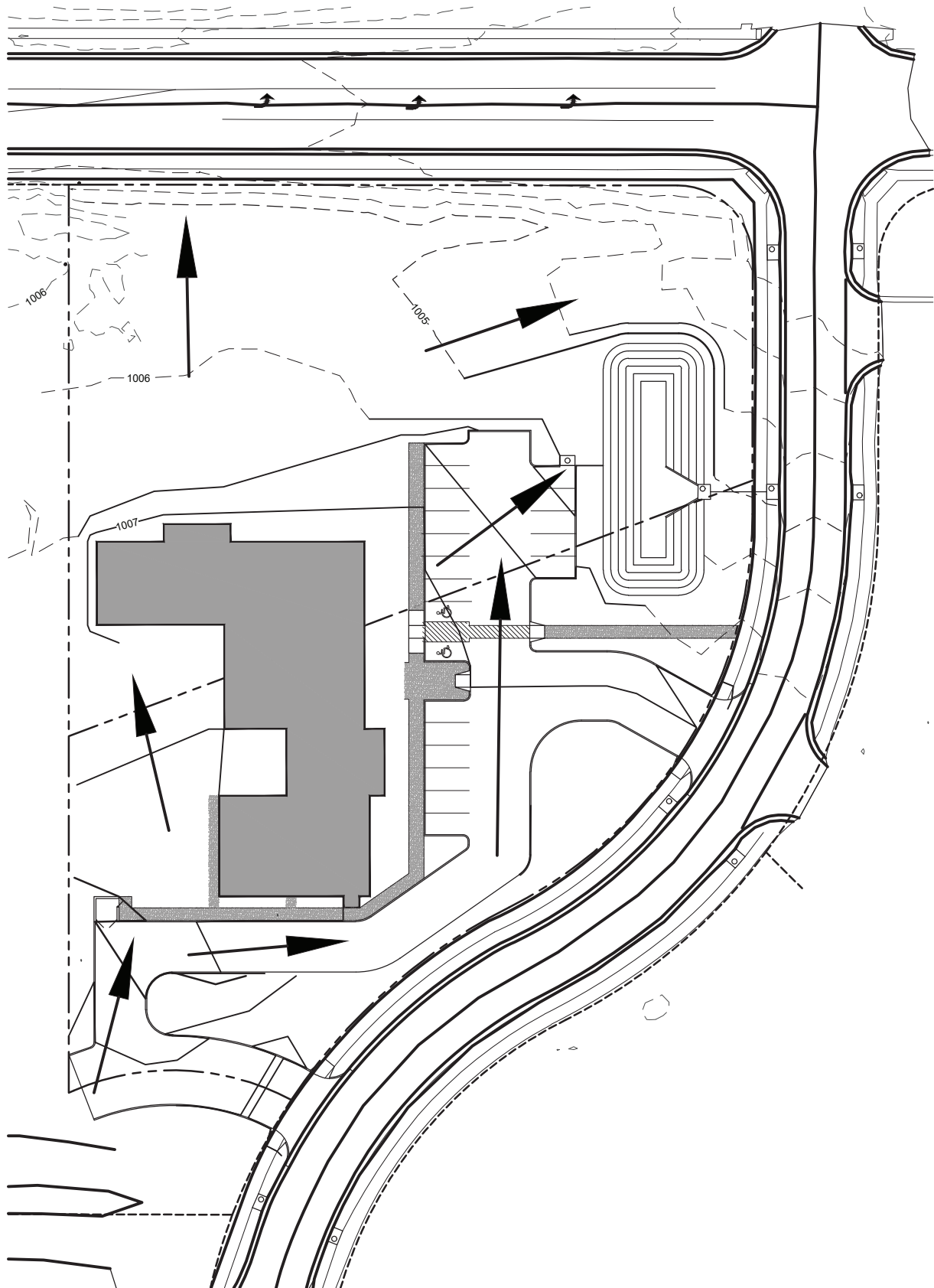
SE Bailey Rd

NE Todd George Rd

SE Todd George Pkwy

James A. Reed M





Existing Condition Analysis:

Prior to the proposed development, the site under consideration is undeveloped. The site consists of two tracts with a total area of 82,124 square feet (1.885 Acres). The surface of the entire site is pervious with some trees and brush at the northwest corner and a couple of medium sized trees along the north property line. There is a 12" water line approximately parallel to and approximately 100 feet north of the south property line of Tract 2 / north property line of Tract 3.

The site slopes generally from south to north. The elevation drop is approximately 10 feet over the length of 360 feet which is an average slope of 2.78%. The runoff flows over the curbs at SE Shenandoah Drive and SE Battery Drive and is directed to curb inlets on both streets. There is no measurable runoff traversing the site from the adjacent tracts.

The site is located in an unlabeled zone, outside of the 0.2% annual chance floodplain. The nearest 100-year floodplain is located approximately 5,800 feet south-south-east of the site at a northern tendril of Cottontail Lake. Reference the January 20, 2017 FEMA Flood Insurance Rate Map 29095C0439G. The base flood elevation has not been determined.

Onsite Captured Runoff

Storm Event	Peak Runoff	Volume
100 Year	5.201 cfs	6253 Ft ³
10 Year	2.928 cfs	3521 Ft ³
1 Year	1.555 cfs	1870 Ft ³

See pages 9-11 for site runoff printout.

Proposed Condition Analysis:

The proposed work will include construction of a new 9445 building and 17,927 square feet of sidewalks, drives, and parking. The resultant total impervious area will be 27,372 square feet and the remaining pervious area will be 54,752 square feet. The area to the north of the new building and parking area (21,415 square feet.) will be uncollected and will drain to the north as it did before development. The remaining area will surface drain to a curb inlet at the northeast corner of the parking area. The total design runoff released offsite (captured and uncaptured) will be less than that before development.

The detention pond will discharge through a field inlet with an orifice plate to meter the discharge that will flow to the adjacent existing curb inlet. Any overflow from the pond will discharge to an overflow pipe in the field inlet and be directed to the curb inlet.

Total Site Runoff Before Detention

Storm Event	Peak Runoff	Volume
100 Year	9.204 cfs	9570 Ft ³
10 Year	5.192 cfs	5398 Ft ³
1 Year	2.768 cfs	2878 Ft ³

See pages 12-14 for runoff printout.

Collected Runoff From Developed Area (South)

Storm Event	Peak Runoff	Volume
100 Year	8.143 cfs	7471 Ft ³
10 Year	4.601 cfs	4221 Ft ³
1 Year	2.460 cfs	2257 Ft ³

See pages 18-20 for runoff printout.

Uncollected Runoff From Developed Area (North)

Storm Event	Peak Runoff	Volume
100 Year	1.356 cfs	1630 Ft ³
10 Year	0.764 cfs	919 Ft ³
1 Year	0.406 cfs	488 Ft ³

See pages 15-17 for runoff printout.

Total Runoff From Site After Detention

Storm Event	Individual Area Runoff	Total
100 Year	1.356 + 3.11	4.466 cfs
10 Year	0.764 + 2.70	3.464 cfs
1 Year	0.406 + 1.82	2.226 cfs

Summary:

The addition of impervious area for the proposed development is 27,372 square feet with the same decrease in pervious area. The proposed detention pond will capture the runoff from 74% of the site and control the release through an orifice. Should there be an overflow condition, a pipe in the metering field inlet will discharge the runoff to the curb inlet on the west side of SE Battery Drive. The north part of the site will drain uncaptured onto NE Shenandoah Drive as was the pre-development condition.

The available storage volume of the detention pond is 11,300 cubic feet at overtopping. The storage volume is 7780 cubic feet at 12" freeboard and 4967 cubic feet at 24" freeboard. The required storage volume for the 100% storm is 3758 cubic feet.

Conclusions and Recommendations:

The proposed detention pond and metering field inlet will decrease storm water volume released to the watershed downstream for 100-year recurrence interval storms.

Supporting Calculations:

DRAINAGE AREA	82124	SQ. FT.	=	1.8853	ACRES
---------------	-------	---------	---	--------	-------

STORM RETURN INTERVAL	1	YEARS
-----------------------	---	-------

PERVIOUS AREA	82124	SQ. FT.	RUNOFF COEFFICIENT	0.3
---------------	-------	---------	--------------------	-----

IMPERVIOUS AREA		SQ. FT.	RUNOFF COEFFICIENT	0.9
-----------------	--	---------	--------------------	-----

SEMI-PERVIOUS AREA		SQ. FT.	RUNOFF COEFFICIENT	
--------------------	--	---------	--------------------	--

SITE RUNOFF COEFFICIENT =	0.3000
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TRAVEL DISTANCE	300	FEET	(<300 FEET)
-----------------	-----	------	-------------

ELEVATION DROP	9	FEET
----------------	---	------

SLOPE	0.03	FT/FT	=	3.00	%
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TRAVEL TIME =	15.000	MIN.
---------------	--------	------

"K" FACTOR =	1
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RAINFALL INTENSITY =	2.750
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Q=KCIA =	1.555	CFS
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DRAINAGE AREA	82124	SQ. FT.	=	1.8853	ACRES
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STORM RETURN INTERVAL	10	YEARS
-----------------------	----	-------

PERVIOUS AREA	82124	SQ. FT.	RUNOFF COEFFICIENT	0.3
---------------	-------	---------	--------------------	-----

IMPERVIOUS AREA		SQ. FT.	RUNOFF COEFFICIENT	0.9
-----------------	--	---------	--------------------	-----

SEMI-PERVIOUS AREA		SQ. FT.	RUNOFF COEFFICIENT	
--------------------	--	---------	--------------------	--

SITE RUNOFF COEFFICIENT =	0.3000
---------------------------	--------

TRAVEL DISTANCE	300	FEET	(<300 FEET)
-----------------	-----	------	-------------

ELEVATION DROP	9	FEET
----------------	---	------

SLOPE	0.03	FT/FT	=	3.00	%
-------	------	-------	---	------	---

TRAVEL TIME =	15.000	MIN.
---------------	--------	------

"K" FACTOR =	1
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RAINFALL INTENSITY =	5.178
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Q=KCIA =	2.928	CFS
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DRAINAGE AREA	82124	SQ. FT.	=	1.8853	ACRES
---------------	-------	---------	---	--------	-------

STORM RETURN INTERVAL	100	YEARS
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PERVIOUS AREA	82124	SQ. FT.	RUNOFF COEFFICIENT	0.3
---------------	-------	---------	--------------------	-----

IMPERVIOUS AREA		SQ. FT.	RUNOFF COEFFICIENT	0.9
-----------------	--	---------	--------------------	-----

SEMI-PERVIOUS AREA		SQ. FT.	RUNOFF COEFFICIENT	
--------------------	--	---------	--------------------	--

SITE RUNOFF COEFFICIENT =	0.3000
---------------------------	--------

TRAVEL DISTANCE	300	FEET	(<300 FEET)
ELEVATION DROP	9	FEET	

SLOPE	0.03	FT/FT	=	3.00	%
-------	------	-------	---	------	---

TRAVEL TIME =	15.000	MIN.
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"K" FACTOR =	1.25
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RAINFALL INTENSITY =	7.356
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Q=KCIA =	5.201	CFS
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DRAINAGE AREA	82124	SQ. FT.	=	1.8853	ACRES
STORM RETURN INTERVAL	1	YEARS			
PERVIOUS AREA	54752	SQ. FT.	RUNOFF COEFFICIENT	0.3	
IMPERVIOUS AREA	27372	SQ. FT.	RUNOFF COEFFICIENT	0.9	
SEMI-PERVIOUS AREA		SQ. FT.	RUNOFF COEFFICIENT		
SITE RUNOFF COEFFICIENT =		0.5000			
TRAVEL DISTANCE	300	FEET	(<300 FEET)		
ELEVATION DROP	9	FEET			
SLOPE	0.03	FT/FT	=	3.00	%
TRAVEL TIME =	12.971	MIN.			
"K" FACTOR =	1				
RAINFALL INTENSITY =	2.936				
Q=KCIA =	2.768	CFS			

DRAINAGE AREA	82124	SQ. FT.	=	1.8853	ACRES
---------------	-------	---------	---	--------	-------

STORM RETURN INTERVAL	10	YEARS
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PERVIOUS AREA	54752	SQ. FT.	RUNOFF COEFFICIENT	0.3
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IMPERVIOUS AREA	27372	SQ. FT.	RUNOFF COEFFICIENT	0.9
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SEMI-PERVIOUS AREA		SQ. FT.	RUNOFF COEFFICIENT	
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SITE RUNOFF COEFFICIENT =	0.5000
---------------------------	--------

TRAVEL DISTANCE	300	FEET	(<300 FEET)
ELEVATION DROP	9	FEET	

SLOPE	0.03	FT/FT	=	3.00	%
-------	------	-------	---	------	---

TRAVEL TIME =	12.971	MIN.
---------------	--------	------

"K" FACTOR =	1
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RAINFALL INTENSITY =	5.508
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Q=KCIA =	5.192	CFS
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DRAINAGE AREA	82124	SQ. FT.	=	1.8853	ACRES
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STORM RETURN INTERVAL	100	YEARS
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PERVIOUS AREA	54752	SQ. FT.	RUNOFF COEFFICIENT	0.3
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IMPERVIOUS AREA	27372	SQ. FT.	RUNOFF COEFFICIENT	0.9
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SEMI-PERVIOUS AREA		SQ. FT.	RUNOFF COEFFICIENT	
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SITE RUNOFF COEFFICIENT =	0.5000
---------------------------	--------

TRAVEL DISTANCE	300	FEET	(<300 FEET)
-----------------	-----	------	-------------

ELEVATION DROP	9	FEET
----------------	---	------

SLOPE	0.03	FT/FT	=	3.00	%
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TRAVEL TIME =	12.971	MIN.
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"K" FACTOR =	1.25
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RAINFALL INTENSITY =	7.812
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Q=KCIA =	9.204	CFS
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DRAINAGE AREA	21415	SQ. FT.	=	0.4916	ACRES
STORM RETURN INTERVAL	1	YEARS			
PERVIOUS AREA	21415	SQ. FT.	RUNOFF COEFFICIENT	0.3	
IMPERVIOUS AREA		SQ. FT.	RUNOFF COEFFICIENT	0.9	
SEMI-PERVIOUS AREA		SQ. FT.	RUNOFF COEFFICIENT		
SITE RUNOFF COEFFICIENT =		0.3000			
TRAVEL DISTANCE	300	FEET	(<300 FEET)		
ELEVATION DROP	9	FEET			
SLOPE	0.03	FT/FT	=	3.00	%
TRAVEL TIME =	15.000	MIN.			
"K" FACTOR =	1				
RAINFALL INTENSITY =	2.750				
Q=KCIA =	0.406	CFS			

DRAINAGE AREA	21415	SQ. FT.	=	0.4916	ACRES
---------------	-------	---------	---	--------	-------

STORM RETURN INTERVAL	10	YEARS
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PERVIOUS AREA	21415	SQ. FT.	RUNOFF COEFFICIENT	0.3
---------------	-------	---------	--------------------	-----

IMPERVIOUS AREA		SQ. FT.	RUNOFF COEFFICIENT	0.9
-----------------	--	---------	--------------------	-----

SEMI-PERVIOUS AREA		SQ. FT.	RUNOFF COEFFICIENT	
--------------------	--	---------	--------------------	--

SITE RUNOFF COEFFICIENT =	0.3000
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TRAVEL DISTANCE	300	FEET	(<300 FEET)
-----------------	-----	------	-------------

ELEVATION DROP	9	FEET
----------------	---	------

SLOPE	0.03	FT/FT	=	3.00	%
-------	------	-------	---	------	---

TRAVEL TIME =	15.000	MIN.
---------------	--------	------

"K" FACTOR =	1
--------------	---

RAINFALL INTENSITY =	5.178
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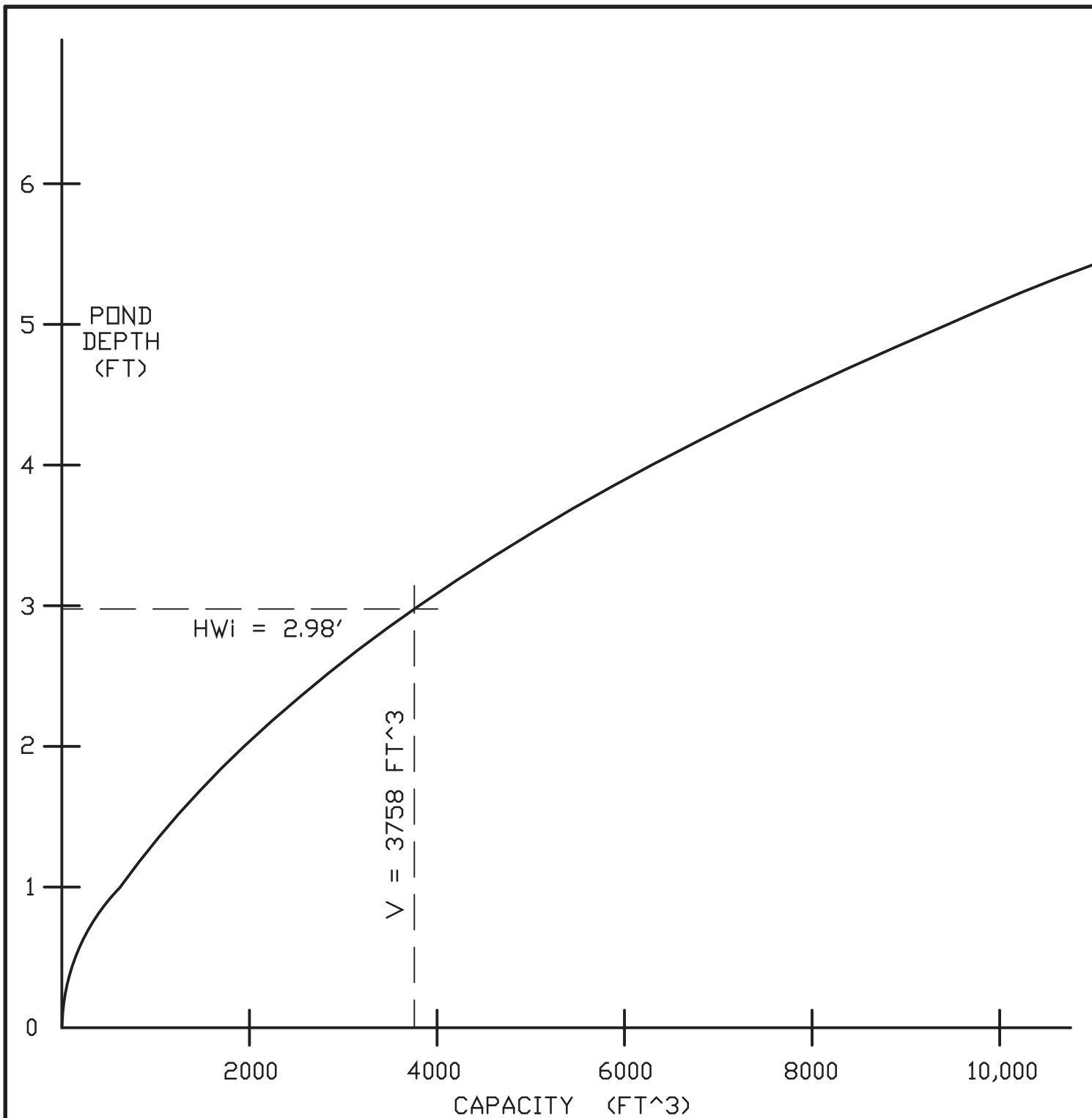
Q=KCIA =	0.764	CFS
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DRAINAGE AREA	21415	SQ. FT.	=	0.4916	ACRES
STORM RETURN INTERVAL	100	YEARS			
PERVIOUS AREA	21415	SQ. FT.	RUNOFF COEFFICIENT	0.3	
IMPERVIOUS AREA		SQ. FT.	RUNOFF COEFFICIENT	0.9	
SEMI-PERVIOUS AREA		SQ. FT.	RUNOFF COEFFICIENT		
SITE RUNOFF COEFFICIENT =		0.3000			
TRAVEL DISTANCE	300	FEET	(<300 FEET)		
ELEVATION DROP	9	FEET			
SLOPE	0.03	FT/FT	=	3.00	%
TRAVEL TIME =	15.000	MIN.			
"K" FACTOR =	1.25				
RAINFALL INTENSITY =	7.356				
Q=KCIA =	1.356	CFS			

DRAINAGE AREA	60709	SQ. FT.	=	1.3937	ACRES
STORM RETURN INTERVAL	1	YEARS			
PERVIOUS AREA	33337	SQ. FT.	RUNOFF COEFFICIENT	0.3	
IMPERVIOUS AREA	27372	SQ. FT.	RUNOFF COEFFICIENT	0.9	
SEMI-PERVIOUS AREA		SQ. FT.	RUNOFF COEFFICIENT		
SITE RUNOFF COEFFICIENT =		0.5705			
TRAVEL DISTANCE	300	FEET	(<300 FEET)		
ELEVATION DROP	9	FEET			
SLOPE	0.03	FT/FT	=	3.00	%
TRAVEL TIME =	11.446	MIN.			
"K" FACTOR =	1				
RAINFALL INTENSITY =	3.094				
Q=KCIA =	2.460	CFS			

DRAINAGE AREA	60709	SQ. FT.	=	1.3937	ACRES
STORM RETURN INTERVAL	10	YEARS			
PERVIOUS AREA	33337	SQ. FT.	RUNOFF COEFFICIENT	0.3	
IMPERVIOUS AREA	27372	SQ. FT.	RUNOFF COEFFICIENT	0.9	
SEMI-PERVIOUS AREA		SQ. FT.	RUNOFF COEFFICIENT		
SITE RUNOFF COEFFICIENT =		0.5705			
TRAVEL DISTANCE	300	FEET	(<300 FEET)		
ELEVATION DROP	9	FEET			
SLOPE	0.03	FT/FT	=	3.00	%
TRAVEL TIME =	11.446	MIN.			
"K" FACTOR =	1				
RAINFALL INTENSITY =	5.786				
Q=KCIA =	4.601	CFS			

DRAINAGE AREA	60709	SQ. FT.	=	1.3937	ACRES
STORM RETURN INTERVAL	100	YEARS			
PERVIOUS AREA	33337	SQ. FT.	RUNOFF COEFFICIENT	0.3	
IMPERVIOUS AREA	27372	SQ. FT.	RUNOFF COEFFICIENT	0.9	
SEMI-PERVIOUS AREA		SQ. FT.	RUNOFF COEFFICIENT		
SITE RUNOFF COEFFICIENT =		0.5705			
TRAVEL DISTANCE	300	FEET	(<300 FEET)		
ELEVATION DROP	9	FEET			
SLOPE	0.03	FT/FT	=	3.00	%
TRAVEL TIME =	11.446	MIN.			
"K" FACTOR =	1.25				
RAINFALL INTENSITY =	8.193				
Q=KCIA =	8.143	CFS			



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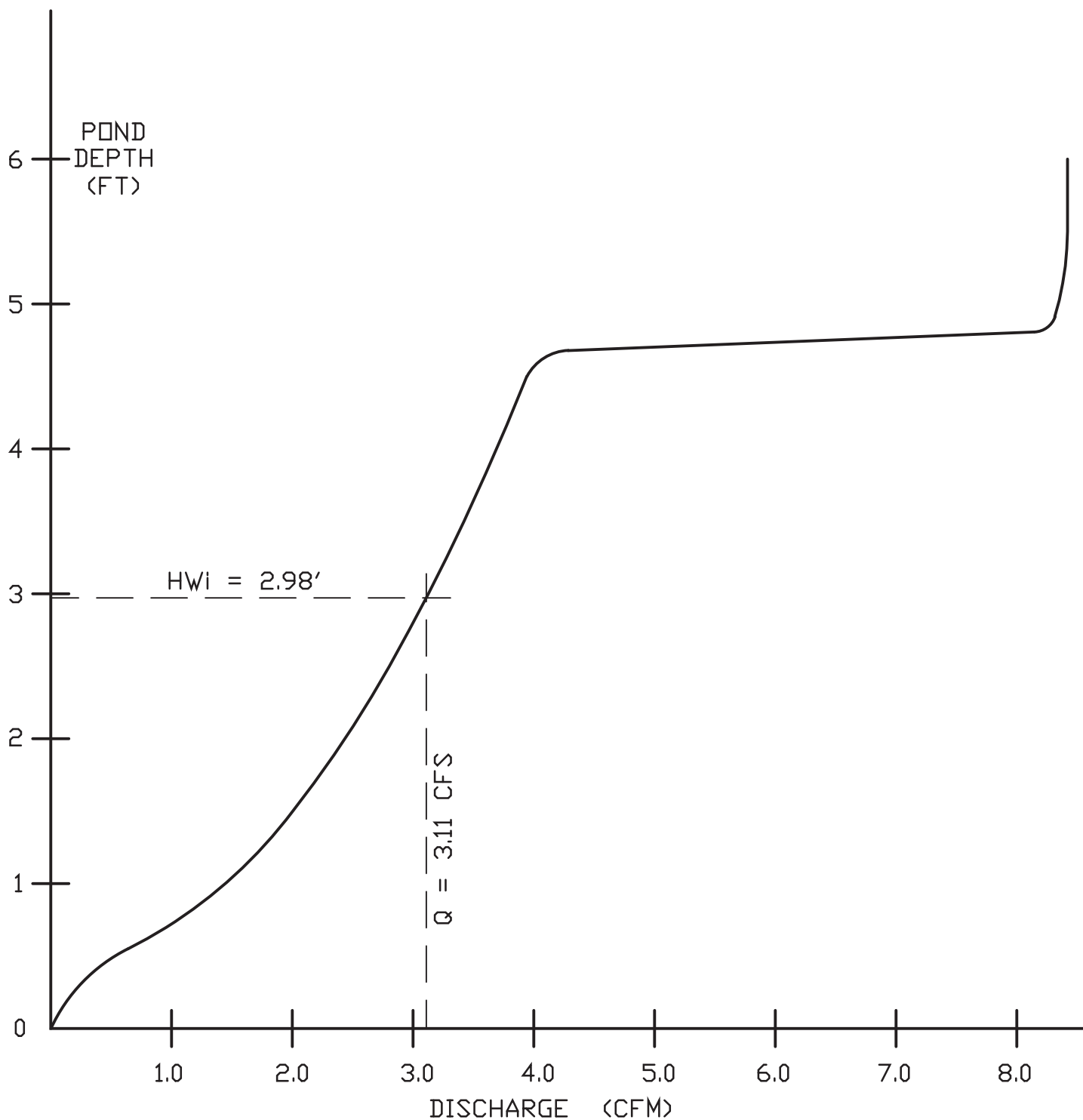
Consulting Structural and Civil Engineers

5907 Raytown Trafficway
Raytown, Missouri 64133
816-356-1445 Fax: 816-356-1477

Job Location POND DEPTH VS. CAPACITY
HAWTHORN ASSISTED LIVING CENTER
LEES SUMMIT, MO

Drawn by	APH	6/29/26	Revision
Chk. by	APH	6/29/26	

Dwg. No. ELvsCAP



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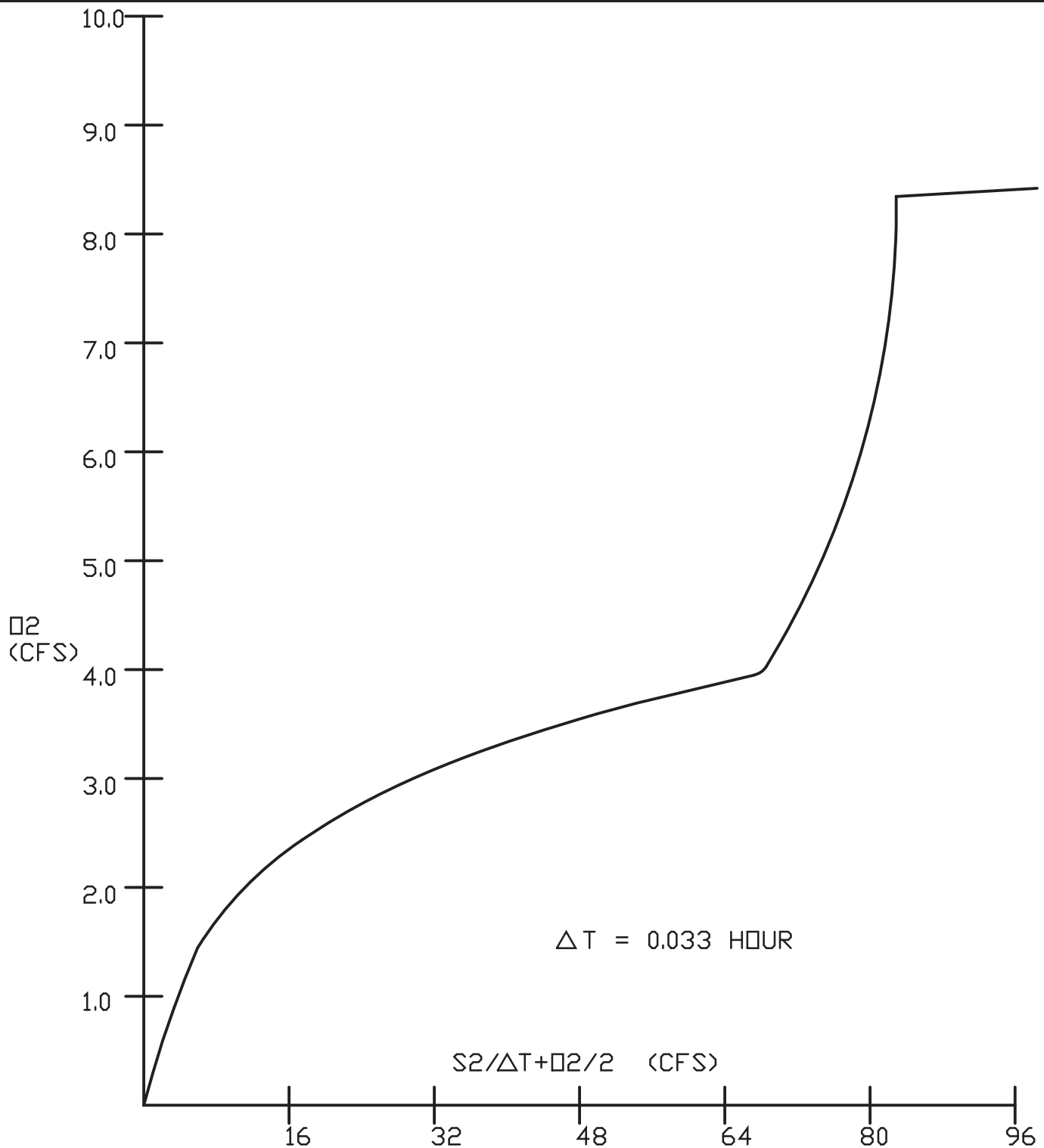
5907 Raytown Trafficway
Raytown, Missouri 64133
816-356-1445 Fax: 816-356-1477

Job Location POND DEPTH VS. DISCHARGE
HAWTHORN ASSISTED LIVING CENTER
LEES SUMMIT, MO

Drawn by	APH	6/29/26	Revision
Chk. by	APH	6/29/26	

Dwg. No.

EL vs DIS



ENGINEERING, INC.

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816-356-1445 Fax: 816-356-1477

Job Location $Q2 \text{ VS. } S2/\Delta T + Q2/2$
HAWTHORN ASSISTED LIVING CENTER
LEES SUMMIT, MO.

Drawn by	APH	6/29/26	Revision
Chk. by	APH	6/29/26	

Dwg. No. $Q2 \text{ vs } S2$

TIME (HR.)	INFLOW (CFS)	I (CFS)	S2/TΔ+O2/2(CFS)	O2 (CFS)	S2 (FT3)	Δt =
0.033	0.07	0.04	0.04	0.01	3.66	0.033
0.067	0.25	0.16	0.18	0.06	18.66	
0.100	0.47	0.36	0.48	0.15	49.08	
0.133	0.76	0.62	0.95	0.29	96.78	
0.167	1.16	0.96	1.62	0.47	166.50	
0.200	1.62	1.39	2.54	0.71	262.62	
0.233	2.02	1.82	3.66	0.97	380.40	
0.267	2.29	2.15	4.84	1.23	506.76	
0.300	2.44	2.36	5.97	1.45	629.28	
0.333	2.46	2.45	6.97	1.58	741.06	
0.367	2.44	2.45	7.83	1.68	839.34	
0.400	2.29	2.36	8.52	1.75	916.86	
0.433	2.12	2.20	8.97	1.80	967.98	
0.467	1.92	2.02	9.18	1.82	992.94	
0.500	1.67	1.80	9.16		1,099.26	
0.533	1.38	1.53	10.69		1,282.32	
0.567	1.13	1.26	11.94		1,432.92	
0.600	0.96	1.05	12.99		1,558.38	
0.633	0.81	0.89	13.87		1,664.64	
0.667	0.69	0.75	14.62		1,754.70	
0.700	0.51	0.60	15.22		1,826.58	
0.733	0.36	0.44	15.66		1,878.84	
0.767	0.26	0.31	15.97		1,916.34	
0.800	0.19	0.23	16.20		1,943.46	
0.833	0.14	0.16	16.36		1,962.90	
0.867	0.10	0.12	16.47		1,976.88	
0.900	0.07	0.08	16.56		1,987.02	
0.933	0.05	0.06	16.62		1,994.40	
0.967	0.04	0.04	16.66		1,999.74	
1.000	0.03	0.03	16.70		2,003.58	
1.033	0.01	0.02	16.72		2,005.92	
1.067	0.00	0.01	16.72		2,006.64	
1.100	0.00	-	16.72		2,006.64	
1.133	0.00	-	16.72		2,006.64	
1.167	0.00	-	16.72		2,006.64	
1.200	0.00	-	16.72		2,006.64	
1.233	0.00	-	16.72		2,006.64	
1.267	0.00	-	16.72		2,006.64	
1.300	0.00	-	16.72		2,006.64	
1.333	0.00	-	16.72		2,006.64	
1.367	0.00	-	16.72		2,006.64	
1.400	0.00	-	16.72		2,006.64	
1.433	0.00	-	16.72		2,006.64	
1.467	0.00	-	16.72		2,006.64	
1.500	0.00	-	16.72		2,006.64	
1.533	0.00	-	16.72		2,006.64	
1.567	0.00	-	16.72		2,006.64	
1.600	0.00	-	16.72		2,006.64	
1.633	0.00	-	16.72		2,006.64	

TIME (HR.)	INFLOW (CFS)	I (CFS)	S2/TΔ+O2/2(CFS)	O2 (CFS)	S2 (FT3)
0.033	0.14	0.07	0.07	0.02	6.96
0.067	0.46	0.30	0.35	0.11	34.98
0.100	0.87	0.67	0.90	0.27	92.16
0.133	1.43	1.15	1.78	0.51	183.00
0.167	2.16	1.79	3.06	0.83	317.52
0.200	3.04	2.60	4.83	1.23	505.98
0.233	3.77	3.41	7.01	1.58	745.98
0.267	4.28	4.03	9.45	1.85	1,023.24
0.300	4.56	4.42	12.02	2.07	1,318.08
0.333	4.60	4.58	14.53	2.26	1,607.58
0.367	4.56	4.58	16.85	2.40	1,877.22
0.400	4.28	4.42	18.86	2.52	2,112.12
0.433	3.96	4.12	20.46	2.60	2,299.44
0.467	3.59	3.77	21.64	2.66	2,436.78
0.500	3.13	3.36	22.34	2.69	2,518.86
0.533	2.58	2.85	22.50	2.70	2,537.76
0.567	2.12	2.35	22.15		2,657.40
0.600	1.79	1.96	24.10		2,892.00
0.633	1.52	1.66	25.76		3,090.72
0.667	1.29	1.40	27.16		3,259.08
0.700	0.95	1.12	28.28		3,393.48
0.733	0.68	0.81	29.09		3,491.16
0.767	0.49	0.58	29.68		3,561.24
0.800	0.35	0.42	30.10		3,612.00
0.833	0.25	0.30	30.40		3,648.42
0.867	0.18	0.22	30.62		3,674.64
0.900	0.13	0.16	30.78		3,693.66
0.933	0.10	0.12	30.90		3,707.46
0.967	0.07	0.08	30.98		3,717.42
1.000	0.05	0.06	31.04		3,724.62
1.033	0.02	0.04	31.08		3,729.06
1.067	0.00	0.01	31.09		3,730.44
1.100	0.00	-	31.09		3,730.44
1.133	0.00	-	31.09		3,730.44
1.167	0.00	-	31.09		3,730.44
1.200	0.00	-	31.09		3,730.44
1.233	0.00	-	31.09		3,730.44
1.267	0.00	-	31.09		3,730.44
1.300	0.00	-	31.09		3,730.44
1.333	0.00	-	31.09		3,730.44
1.367	0.00	-	31.09		3,730.44
1.400	0.00	-	31.09		3,730.44
1.433	0.00	-	31.09		3,730.44
1.467	0.00	-	31.09		3,730.44
1.500	0.00	-	31.09		3,730.44
1.533	0.00	-	31.09		3,730.44
1.567	0.00	-	31.09		3,730.44
1.600	0.00	-	31.09		3,730.44
1.633	0.00	-	31.09		3,730.44

Δt = 0.033

TIME (HR.)	INFLOW (CFS)	I (CFS)	S2/TΔ+O2/2(CFS)	O2 (CFS)	S2 (FT3)
0.033	0.67	0.34	0.34	0.11	33.84
0.067	2.03	1.35	1.58	0.46	161.88
0.100	4.20	3.12	4.23	1.10	442.26
0.133	6.66	5.43	8.57	1.76	922.56
0.167	7.93	7.30	14.10	2.23	1,558.74
0.200	8.10	8.02	19.89	2.57	2,232.66
0.233	7.44	7.77	25.09	2.82	2,841.90
0.267	6.37	6.91	29.18	2.98	3,322.50
0.300	4.83	5.60	31.80	3.08	3,630.90
0.333	3.48	4.16	32.87	3.11	3,758.10
0.367	2.60	3.04	32.80	3.11	3,749.52
0.400	1.99	2.30	31.99	3.08	3,653.34
0.433	1.51	1.75	30.65	3.04	3,496.14
0.467	1.12	1.32	28.93	2.97	3,293.34
0.500	0.85	0.99	26.94	2.90	3,059.46
0.533	0.63	0.74	24.79	2.80	2,806.32
0.567	0.47	0.55	22.53	2.70	2,542.02
0.600	0.36	0.42	20.25	2.59	2,274.48
0.633	0.27	0.32	17.98	2.47	2,008.98
0.667	0.21	0.24	15.75	2.34	1,749.54
0.700	0.15	0.18	13.59	2.19	1,499.34
0.733	0.11	0.13	11.53	2.03	1,261.38
0.767	0.09	0.10	9.60	1.86	1,039.74
0.800	0.07	0.08	7.81	1.68	837.12
0.833	0.05	0.06	6.20	1.48	654.78
0.867	0.04	0.05	4.76	1.21	498.54
0.900	0.02	0.03	3.58	0.95	372.30
0.933	0.01	0.02	2.64	0.73	273.06
0.967	0.00	0.01	1.92	0.55	196.80
1.000	0.00	-	1.37	0.40	139.62
1.033	0.00	-	0.96	0.29	98.10
1.067	0.00	-	0.67	0.21	68.46
1.100	0.00	-	0.47	0.15	47.40
1.133	0.00	-	0.32	0.10	32.64
1.167	0.00	-	0.22	0.07	22.50
1.200	0.00	-	0.15	0.05	15.54
1.233	0.00	-	0.11	0.04	10.62
1.267	0.00	-	0.07	0.02	7.20
1.300	0.00	-	0.05	0.02	4.92
1.333	0.00	-	0.03	0.01	3.36
1.367	0.00	-	0.02	0.01	2.40
1.400	0.00	-	0.02	0.01	1.68
1.433	0.00	-	0.01	0.00	1.14
1.467	0.00	-	0.01	0.00	0.78
1.500	0.00	-	0.00	0.00	0.12
1.533	0.00	-	-		-
1.567	0.00	-	-		-
1.600	0.00	-	-		-
1.633	0.00	-	-		-

Δt = 0.033

Maps and Exhibits:

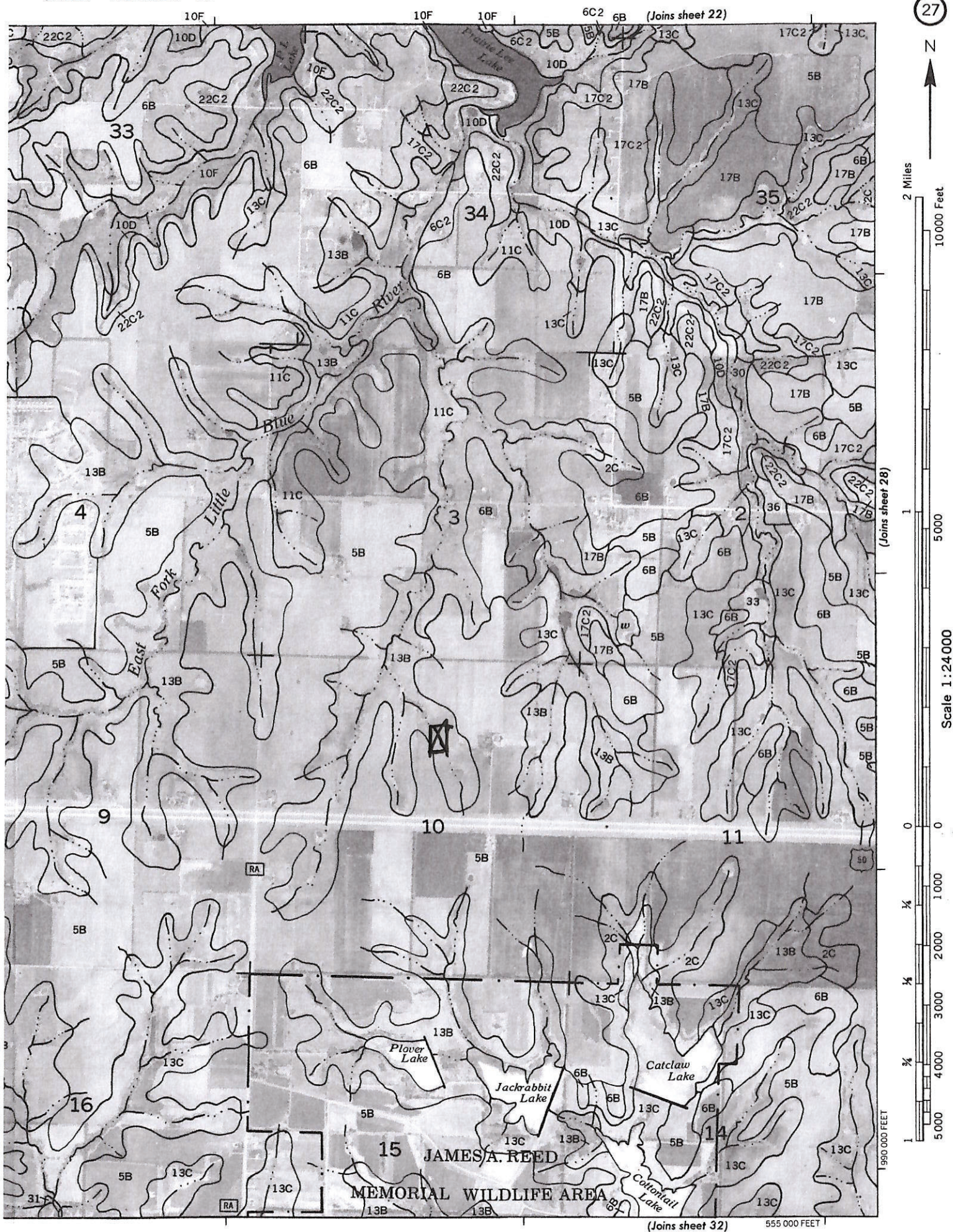


TABLE 17.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
1B, 1C----- Sibley	B	None-----	---	---	<u>Ft</u> >6.0	---	---	<u>In</u> >60	---	High-----	Low-----	Moderate.
2C----- Higginsville	C	None-----	---	---	1.5-3.0	Perched	Nov-Apr	>60	---	High-----	Moderate	Moderate.
5B----- Macksburg	B	None-----	---	---	2.0-4.0	Apparent	Apr-Jul	>60	---	High-----	High-----	Moderate.
6B, 6C2----- Sharpsburg	B	None-----	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
8*. Pits												
10D*, 10F*: Snead-----	D	None-----	---	---	2.0-3.0	Perched	Nov-Mar	20-40	Soft	Moderate	High-----	Low.
Rock outcrop.												
11C----- Greentown	C	None-----	---	---	1.0-3.0	Perched	Nov-Apr	>60	---	Moderate	High-----	Moderate.
13B, 13C----- Sampsel	D	None-----	---	---	0-1.5	Perched	Nov-Apr	40-70	Soft	High-----	High-----	Low.
15B, 15C2, 16D3----- Menfro	B	None-----	---	---	>6.0	---	---	>60	---	High-----	Low-----	Moderate.
17B, 17C2----- Polo	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
19B----- Weller	C	None-----	---	---	2.0-4.0	Apparent	Nov-Jul	>60	---	High-----	High-----	High.
20C2----- McGirk	C	None-----	---	---	0.5-2.0	Perched	Nov-May	>60	---	High-----	High-----	High.
22C2----- Oska	C	None-----	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Moderate.
30----- Kennebec	B	Occasional	Brief-----	Nov-Jun	3.0-5.0	Apparent	Nov-Jul	>60	---	High-----	Moderate	Low.
31----- Colo	B/D	Occasional	Very brief to long.	Nov-Jun	1.0-3.0	Apparent	Nov-Jul	>60	---	High-----	High-----	Moderate.
33----- Zook	C/D	Occasional	Brief to long.	Nov-Jun	1.0-3.0	Apparent	Nov-May	>60	---	High-----	High-----	Moderate.

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	G/cm ³	In/hr	In/in	pH					Pct
1B, 1C----- Sibley	0-15	20-30	1.20-1.50	0.6-2.0	0.19-0.21	5.6-7.8	Moderate-----	0.28	5	6	3-4
	15-54	28-38	1.30-1.50	0.6-2.0	0.19-0.21	5.6-7.3	Moderate-----	0.28			
	54-76	20-30	1.20-1.50	0.6-2.0	0.19-0.21	5.6-7.3	Moderate-----	0.43			
2C----- Higginsville	0-12	20-27	1.30-1.50	0.6-2.0	0.21-0.24	5.6-7.3	Low-----	0.37	5	6	3-4
	12-18	27-35	1.30-1.40	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-----	0.37			
	18-49	27-35	1.40-1.50	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-----	0.37			
	49-60	25-30	1.50-1.60	0.6-2.0	0.18-0.22	5.1-6.5	Moderate-----	0.37			
5B----- Macksburg	0-16	25-34	1.30-1.35	0.6-2.0	0.21-0.23	5.1-6.5	Moderate-----	0.32	5	7	3-4
	16-43	36-42	1.35-1.40	0.2-0.6	0.18-0.20	5.1-6.0	High-----	0.43			
	43-54	30-38	1.40-1.45	0.6-2.0	0.18-0.20	5.6-6.5	Moderate-----	0.43			
	54-60	28-34	1.40-1.45	0.6-2.0	0.18-0.20	5.6-6.5	Moderate-----	0.43			
6B----- Sharpsburg	0-13	25-27	1.30-1.35	0.6-2.0	0.21-0.23	5.1-6.5	Moderate-----	0.32	5	6	3-4
	13-55	36-42	1.35-1.40	0.2-0.6	0.18-0.20	5.1-6.0	Moderate-----	0.43			
	55-60	25-32	1.40-1.45	0.6-2.0	0.18-0.20	6.1-6.5	Moderate-----	0.43			
6C2----- Sharpsburg	0-7	25-27	1.30-1.35	0.6-2.0	0.21-0.23	5.1-6.5	Moderate-----	0.32	5	6	3-4
	7-41	36-42	1.35-1.40	0.2-0.6	0.18-0.20	5.1-6.0	Moderate-----	0.43			
	41-60	25-32	1.40-1.45	0.6-2.0	0.18-0.20	6.1-6.5	Moderate-----	0.43			
8*. Pits											
10D*, 10F*: Snead-----	0-14	20-40	1.30-1.40	0.2-0.6	0.12-0.16	6.1-7.3	Moderate-----	0.28	3	6	2-4
	14-30	40-60	1.25-1.35	0.06-0.2	0.12-0.14	6.6-8.4	High-----	0.32			
	30-45	---	---	---	---	---	---	---			
Rock outcrop.											
11C----- Greenton	0-16	27-40	1.30-1.45	0.2-0.6	0.12-0.18	5.6-6.5	Moderate-----	0.37	2	6	1-3
	16-46	35-50	1.35-1.50	0.06-0.2	0.11-0.15	5.6-7.3	High-----	0.37			
	46-60	40-50	1.35-1.50	0.06-0.2	0.08-0.12	6.6-7.8	High-----	0.37			
13B, 13C----- Sampsel	0-7	25-35	1.30-1.50	0.2-0.6	0.21-0.24	5.6-7.3	Moderate-----	0.37	3	4	3-4
	7-60	35-60	1.40-1.60	0.06-0.2	0.11-0.13	5.6-7.8	High-----	0.37			
15B, 15C2----- Menfro	0-6	18-27	1.25-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Low-----	0.37	5	6	.5-2
	6-49	27-35	1.35-1.50	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.37			
	49-60	8-20	1.30-1.45	0.6-2.0	0.20-0.22	5.6-7.3	Low-----	0.37			
16D3----- Menfro	0-6	27-30	1.30-1.45	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.37	4	6	.5-1
	6-40	27-35	1.35-1.50	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.37			
	40-66	8-20	1.30-1.45	0.6-2.0	0.20-0.22	5.6-7.3	Low-----	0.37			
17B----- Polo	0-14	22-30	1.10-1.40	0.6-2.0	0.22-0.24	5.6-6.5	Low-----	0.32	5	6	2-5
	14-19	27-35	1.20-1.40	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-----	0.32			
	19-45	34-42	1.20-1.40	0.6-2.0	0.12-0.18	5.1-6.5	Moderate-----	0.32			
	45-67	40-50	1.40-1.60	0.6-2.0	0.10-0.12	5.1-6.5	High-----	0.32			
17C2----- Polo	0-8	22-30	1.10-1.40	0.6-2.0	0.22-0.24	5.6-6.5	Low-----	0.32	5	6	2-5
	8-40	34-42	1.20-1.40	0.6-2.0	0.12-0.18	5.1-6.5	Moderate-----	0.32			
	40-60	40-50	1.40-1.60	0.6-2.0	0.10-0.12	5.1-6.5	High-----	0.32			
19B----- Weller	0-21	16-27	1.35-1.45	0.6-2.0	0.22-0.24	4.5-7.3	Low-----	0.43	3	6	1-2
	21-60	28-48	1.35-1.50	0.06-0.2	0.12-0.18	4.5-6.5	High-----	0.43			
	60-70	28-40	1.40-1.55	0.2-0.6	0.18-0.20	5.1-6.5	High-----	0.43			

See footnote at end of table.