Lombardo Homes: The Villas at Aragon
Stormwater Management Report

CSP22-000020

Volz # 22649

April 21, 2022
Rev. 1: June 30, 2022
Rev. 2: September 1, 2022

Prepared For:

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Prepared By:

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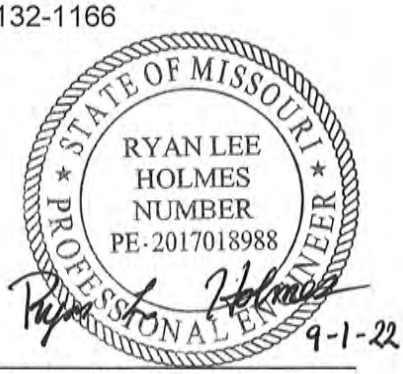

Ryan L. Holmes, PE
PE-2017018988

Lombardo Homes: The Villas at Aragon

Stormwater Management Facility Report

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Lombardo Homes: The Villas at Aragon

Stormwater Management Facility Report
Executive Summary

Volz #22649

SITE INFORMATION & INTRODUCTION

The Villas at Aragon by Lombardo Homes is a proposed 98 unit development consisting of 17 buildings with the units grouped in buildings of four (4) or six (6) units per building. The total area of the development is approximately 22 acres located in St. Charles County southwest of the I-70 and TR Hughes Blvd./Belleau Creek Rd interchange. The developers have a pre-annexation agreement for the property to be annexed into the City of O'fallon. As a condition of this agreement, there will be a separate 1.00+ Ac. commercial outparcel which is to be located near Veterans Memorial Parkway to the east of the proposed entrance. Stormwater detention for the 1.00+ Ac. commercial outparcel is not accounted for with this development and therefore any future development on the commercial outparcel will be required to provide stormwater detention separately for the development.

The site is currently unoccupied having previously been developed for a trailer park community. Remnants of the previous land usage remain present on site and will be addressed during the development of this project. The site is bounded to the north by Interstate 70 and an outer road known as Drennen Parkway. The property to the east is currently undeveloped but under contract for a commercial development. The south of the site is bordered by Veterans Memorial Parkway with a commercial landscaping business and single family residential (single family homes and single family trailer park) to the south of the Parkway. The property to the west is comprised of commercial developments, specifically Garden View Care Center of O'fallon, Slumberland Furniture, and The Salvation Army of O'fallon. The project stormwater design is governed by the City of O'fallon.

There is an existing stream crossing the site flowing from the middle of the western property line to the east. Additionally, there is a 2.95'W x 1.85'H stormwater box culvert going under Veterans Memorial Parkway bringing offsite stormwater from the south onto the development property. The box culvert discharges on the north side of Veterans Memorial Parkway and from there the stormwater routes overland through a tributary to the stream crossing the property. As part of this development, the offsite stormwater will be intercepted at the north of the Parkway and routed through a 36" public storm sewer

pipe to bypass the stormwater BMP's being constructed with this development. The public storm sewer will discharge the offsite stormwater to the east of the proposed main road known as Windsong Dr. From that point, the stormwater will flow in the existing stream under the same conditions that are current in the present day.

The existing roadway to access the site off Veterans Memorial Parkway will be removed along with the two (2) existing 21" CMP pipe culverts going under the road. With this development, a new culvert is proposed to allow the stream to cross under the new road to maintain the current overall conditions of the stormwater runoff.

STORMWATER MANAGEMENT REQUIREMENTS

As previously mentioned, the total area of the site is approximately 22.0 acres with the disturbance for this development to include 19.34 acres of the total. The site currently has one main outfall/discharge point which is located near the northeast corner of the property in at the existing stream. For comparison, the discharge point used for this calculation is the two (2) 48" RCP culverts crossing under Nicola Lane. This discharge point can be referenced on the drainage area map sheets in the civil improvement plans completed by Volz inc. See the PondPack model results contained within this report for both the existing and proposed conditions as well as proposed with the low flow blocked which have been modeled and designed per stormwater requirements.

As part of this development, one (1) wet retention pond (P-2) is proposed at the middle of the development to the west of Windsong Dr. and between the existing stream and buildings 9, 10, and 11. The wet retention pond has a designed outfall structure known as OS 35 which will discharge through a 36" RCP and flared end into the existing creek. In addition to the wet retention pond, there is one (1) dry bioretention basin (F-6) proposed on the east side of the site between the eastern Windward Pl cul-de-sac and the existing creek. Similar to the wet retention pond, OS 37 is designed as the outfall structure for the dry bioretenion basin. OS 37 also discharges into the existing creek through an 18" RCP and flared end. Both stormwater BMP's are tributary to the overall site discharge point. The stormwater design is completed per the requirements adopted by the City of O'fallon and reduce the overall stormwater discharge for the 2-yr, 15-yr, 25-yr, and 100-yr rain events.

The proposed development is required to meet the City of O'fallon requirements for water quality, channel protection, and flood protection. It is noted that the City of O'fallon has largely adopted requirements and specifications as written by the St. Louis Metropolitan Sewer District (MSD). Water quality (WQv) is required due to there being greater than 1 acre of land disturbance. Channel protection (CPv) is required to be provided due to the overall site area being greater than 5 acres. Lastly the development will provide flood protection because greater than 2 cfs runoff differential is being generated by the improvements being made as part of this development. All of these conditions will be addressed with the proposed P-2 wet retention pond and F-6 dry

detention basin. The outfall point will be designed to have a net reduction in peak flow out to meet the flood protection requirement.

Once this property is developed under the proposed changes, a stormwater system will be used to capture the stormwater runoff and pipe to the proposed P-2 wet retention pond and F-6 dry detention basin. A mixture of grate inlets, curb inlets, and area inlets will be the primary components used to capture the runoff as well as surface grading to direct stormwater runoff into the proposed stormwater BMP's. As previously discussed, the offsite stormwater entering the site though the culvert going under Veterans Memorial parkway from the south will bypass all on site stormwater BMP's. This offsite stormwater from the south was omitted from the PondPack model because no offsite work is proposed which will affect the conditions offsite and therefore the existing vs/ proposed flows will remain equal. It should be noted that the stormwater runoff was calculated for the purposes of storm sewer pipe hydraulic design which was previously approved on the grading permit under GR22-000002. The proposed P-2 wet pond and F-6 dry basin will have outlet structures designed for the proposed rain events to account for the WQv and CPv storage volumes and rain event high water and discharge requirements.

STORMWATER MANAGEMENT RESULTS

The stormwater runoff as previously mentioned is handled in a proposed P-2 wet retention pond and F-6 bioretention basin. Both of these basins are sized per the Georgia Stormwater Manual Guidelines which the City of O'fallon has adopted. Under these guidelines, each BMP will be sized appropriately for WQv, CPv, 2-yr, 15-yr, 25-yr, 100-yr, and 100-yr low flow blocked design requirements. The site existing and proposed conditions have been modeled in Bentley PondPack to simulate the routing of the 2-yr, 15-yr, 25-yr, 100-yr, and 100-yr low blocked scenarios to each of the three designated outfall points on site.

Under the existing conditions, the outfall has a 2-yr rain event peak flow of 164.88 cfs and a 100-yr rain event of 565.59 cfs. Under the proposed conditions, the 2-yr peak flow is 120.58 cfs (reduction of 44.30 cfs) and the 100-yr peak flow is 458.91 cfs (reduction of 106.68 cfs). The highwater of the P-2 wet retention pond under the 100-yr rain event low flow blocked scenario is 498.69 which is 1.01' below the proposed dam spillway elevation of 499.70. The F-6 dry bioretention basin has a 100-yr rain event low flow blocked scenario is 490.38 which is 1.12' below the proposed dam spillway elevation of 491.50.

See Table 1 in this report for the complete PondPack existing and proposed conditions results summary including 15-yr and 25-yr rain even existing and proposed condition results and Table 2 for the summary of the calculated highwater elevations for both the P-2 wet retention pond and F-6 dry bioretention basin for all rain events.

Area of Land Disturbance = 19.34 Acres

Natural Resources Protection Information

An Existing Conditions Plan has been included in the improvement plans on sheet C04 for this project.

The site currently does not have any habitable structures located on the property. There is currently some pavement and cultural debris areas which remain from the previous land use which will be demolished and removed with the construction activities when developing this site. After completion of the proposed improvements, the site will consist of 98 single family residential units grouped into four (4) and six (6) unit buildings for a total of seventeen (17) separate residential buildings. An additional building will be constructed to be used as a maintenance building.

No portion of the site or work taking place as part of this redevelopment project will be within the 100-year flood plain.

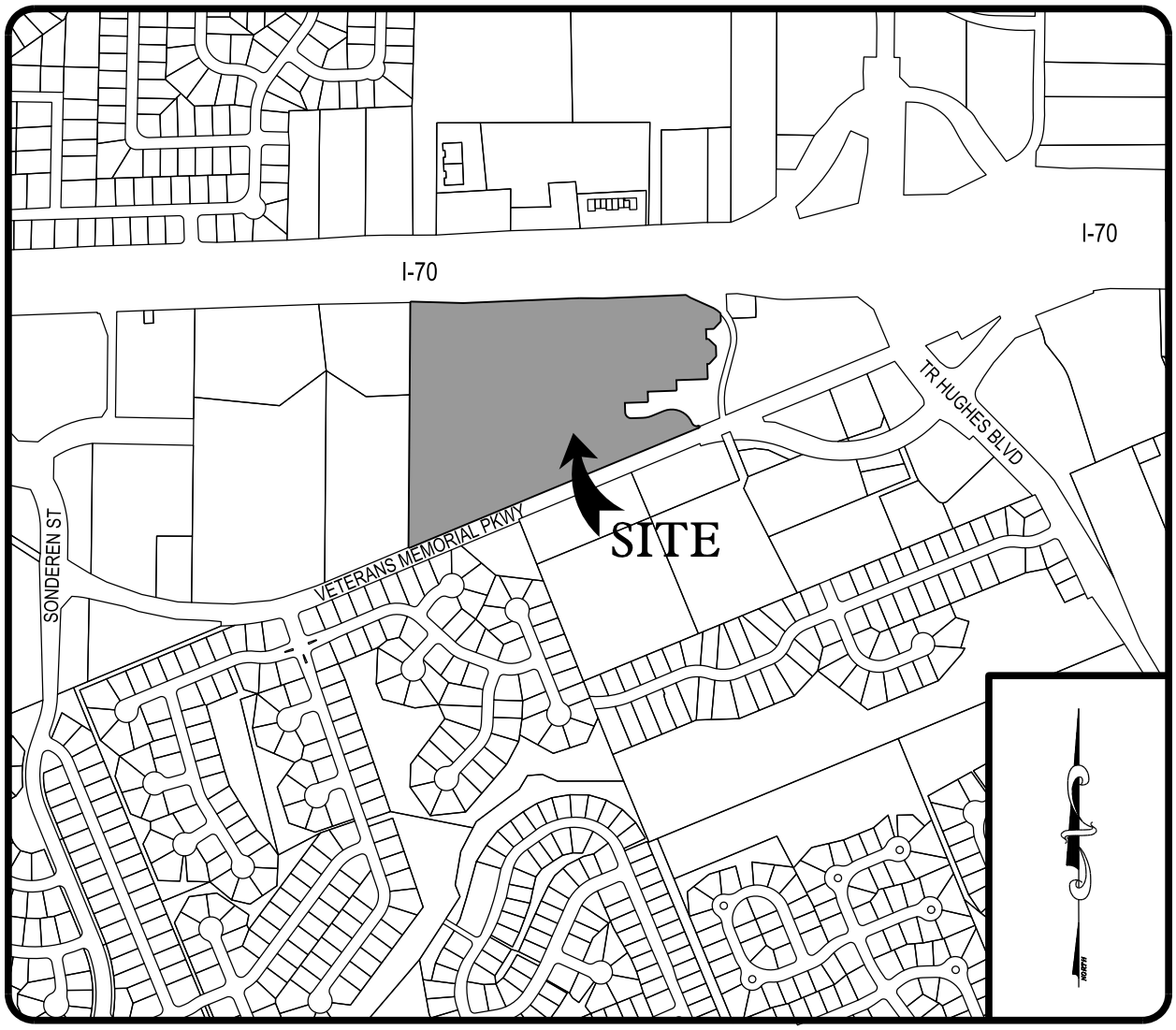
The USGA soil map for this area has been included in this overall Storm Water Facilities Report. There are no known wetlands on the property.

Table 1: The Villas at Aragon - PondPack Storm Routing Results Table

Model Discharge Location	Existing PondPack Model Area	Scenario (Rain Event)	Ex. Conditions Model Outfall (cfs)	Proposed Conditions PondPack Model Area	Scenario (Rain Event)	Proposed Conditions Outfall (cfs)	Total Outfall Differential (Existing vs. Proposed)			
							2-yr Rain Event	15-yr Rain Event	25-yr Rain Event	100-yr Rain Event
Outfall 1	Area 1	2-yr	164.88	Area 1A: West Bypass (offsite) Area 1A: West Bypass (onsite) Area 2A: Wet Pond Area 2B: Wet Pond Area 2C: Wet Pond Area 3A: Dry Basin Area 3B: Dry Basin East Bypass	2-yr	120.58	-44.30	-78.75	-88.22	-106.68
		15-yr	317.11		15-yr	238.36				
		25-yr	406.10		25-yr	317.88				
		100-yr	565.59		100-yr	458.91				

Table 2: The Villas at Aragon - Storm High Water Summary

Model Discharge Location	Normal Water El.	Dam Spillway El.	Depth Scenario	High Water El.	Freeboard (ft)
Wet Retention Pond (P-2)	496.00	499.70	Sediment Storage (Vs)	487.55 (Sediment El.)	N/A
			Water Quality (WQv)	496.95	2.75
			Channel Protection (CPv)	497.42	2.28
			2-Yr Rain Event	497.63	2.07
			15-Yr Rain Event	498.13	1.57
			25-Yr Rain Event	498.34	1.36
			100-Yr Rain Event	498.66	1.04
			100-Yr Rain Event - Low Flow Blocked	498.69	1.01
Dry Detention Pond (F-6)	487.50 (Filter Media Surface / Bottom)	491.50	Water Quality (WQv)	488.50	3.00
			Channel Protection (CPv)	489.20	2.30
			2-Yr Rain Event	489.43	2.07
			15-Yr Rain Event	489.82	1.68
			25-Yr Rain Event	489.99	1.51
			100-Yr Rain Event	490.36	1.14
			100-Yr Rain Event - Low Flow Blocked	490.38	1.12



LOCATION MAP

N.T.S.

FEMA F.I.R.M. SITE INFORMATION

F.I.R.M. PANEL NO.: 29183C0241G
FLOOD ZONE: ZONE X (MINIMAL FLOOD HAZARD)
REVISION DATE: JANUARY 20, 2016

NOTE: THE PROJECT SITE IS OUTSIDE OF THE 100 YEAR FLOODPLAIN PER THE FIRM MAP PANEL LISTED ABOVE.

Curve Table

Curve #	Radius (R/S)	Length (R/S)	Chord Bearing	Chord Length
C1	30.00	47.12	S46°55'32"E	42.43
C2	111.01	39.46	N77°53'28"E	39.25
C3	90.00	141.37	S67°17'32"E	127.28
C4	25.00	31.47	S58°21'00"E	29.43

Line Table

Line #	Length (R/S)	Direction (S)	Direction (R)
L1	21.56	S58°41'23"E	S58°45'57"E
L2	110.49	S66°41'23"E	S66°45'57"E
L3	19.71	S43°04'28"W	S43°00'00"W
L4	20.70	S46°55'32"E	S47°00'00"E
L5	41.42	S01°55'32"E	S02°00'00"E
L6	41.42	S43°04'28"W	S43°00'00"W
L7	35.72	S88°04'28"W	S88°00'00"W
L8	50.00	S01°55'32"E	S02°00'00"E
L9	10.71	N88°04'28"E	N88°00'00"E
L10	41.42	S46°55'32"E	S47°00'00"E
L11	41.42	S01°55'32"E	S02°00'00"E
L12	41.42	S43°04'28"W	S43°00'00"W
L13	10.71	S88°04'28"W	S88°00'00"W
L14	44.40	S01°55'32"E	S02°00'00"E
L15	50.00	N88°04'28"E	N88°00'00"E
L16	54.80	N67°42'28"E	N67°38'00"E

GEOTECHNICAL NOTES:

1. EXISTING UNSUITABLE FILL WERE ENCOUNTERED IN 4 OF 8 BORINGS COMPLETED BY JACOBI GEOTECHNICAL ENGINEERING, LLC PER THE GEOTECHNICAL REPORT TITLED '*EXPLORATION OF SUBSURFACE CONDITIONS AND FOUNDATION RECOMMENDATIONS*', JGE No. 20242.1 DATED NOVEMBER 2020.
2. THE APPROXIMATE LOCATIONS OF BORINGS COMPLETED BY JACOBI GEOTECHNICAL ENGINEERING, LLC CAN BE SEEN ON THE PLAN. BORINGS WHICH ENCOUNTERED UNSUITABLE FILL WERE B-1, B-2, B-5, & B-6.
3. CONTRACTOR TO REMEDIATE UNSUITABLES SOILS AS DESCRIBED IN THE AFOREMENTIONED GEOTECHNICAL REPORT (JGE No. 20242.1). AREAS UNDER PROPOSED ROADWAYS SHOULD ALSO BE CONSIDERED AS IMPROVEMENT AREAS WHEREIN UNSUITABLE FILL SHALL BE REMEDIATED PER THE REPORT RECOMMENDATIONS.

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O'fallon Planning and Development Division File No.: 21-002817 | Approved: July 2, 2021

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Authority #203

RYAN LEE HOLMES
NUMBER
PE-2017018988
Ryan L. Holmes
09-01-22
RYAN L. HOLMES
Professional Engineer
PE-2017018988

THE VILLAS AT ARAGON
VETERANS MEMORIAL PARKWAY
O'FALLON, MO 63366

EXISTING CONDITIONS & NATURAL RESOURCES PLAN

Design By: RLH
Drawn By: RLH
Checked By: RLH
Parcel ID: 2-056C-S028-00-0001.10
Permit No. GR22-000001
Volz Project # 22649

09-01-22
C04

N

60 0 60 120 180

Scale in Feet

Scale: 1"=60'

TREE PRESERVATION CALCULATIONS

CITY OF O'FALLON, MO: SECTION 402.040.B

DURING DEVELOPMENT, ONCE A SITE PLAN OR PRELIMINARY PLAT APPROVAL HAS BEEN REQUESTED, A MINIMUM OF TWENTY PERCENT (20%) OF THE EXISTING TREES OR FIFTEEN TREES PER ACRE SHALL BE RETAINED.

ARAGON REQUIREMENT: RETAIN TWENTY PERCENT (20%) OF THE EXISTING TREES.

CALCULATIONS (TREES 6" CALIPER AND GREATER):

EXISTING TREES = 10.27 Ac.
TREES TO BE REMOVED = 7.59 Ac.
TREES TO BE RETAINED = 2.68 Ac.
% RETAINED = 26.10% > 20%

GENERAL NOTES:

1. CLEARING LIMITS SHALL BE VISIBLY MARKED IN THE FIELD PRIOR TO REMOVAL OF TREES.

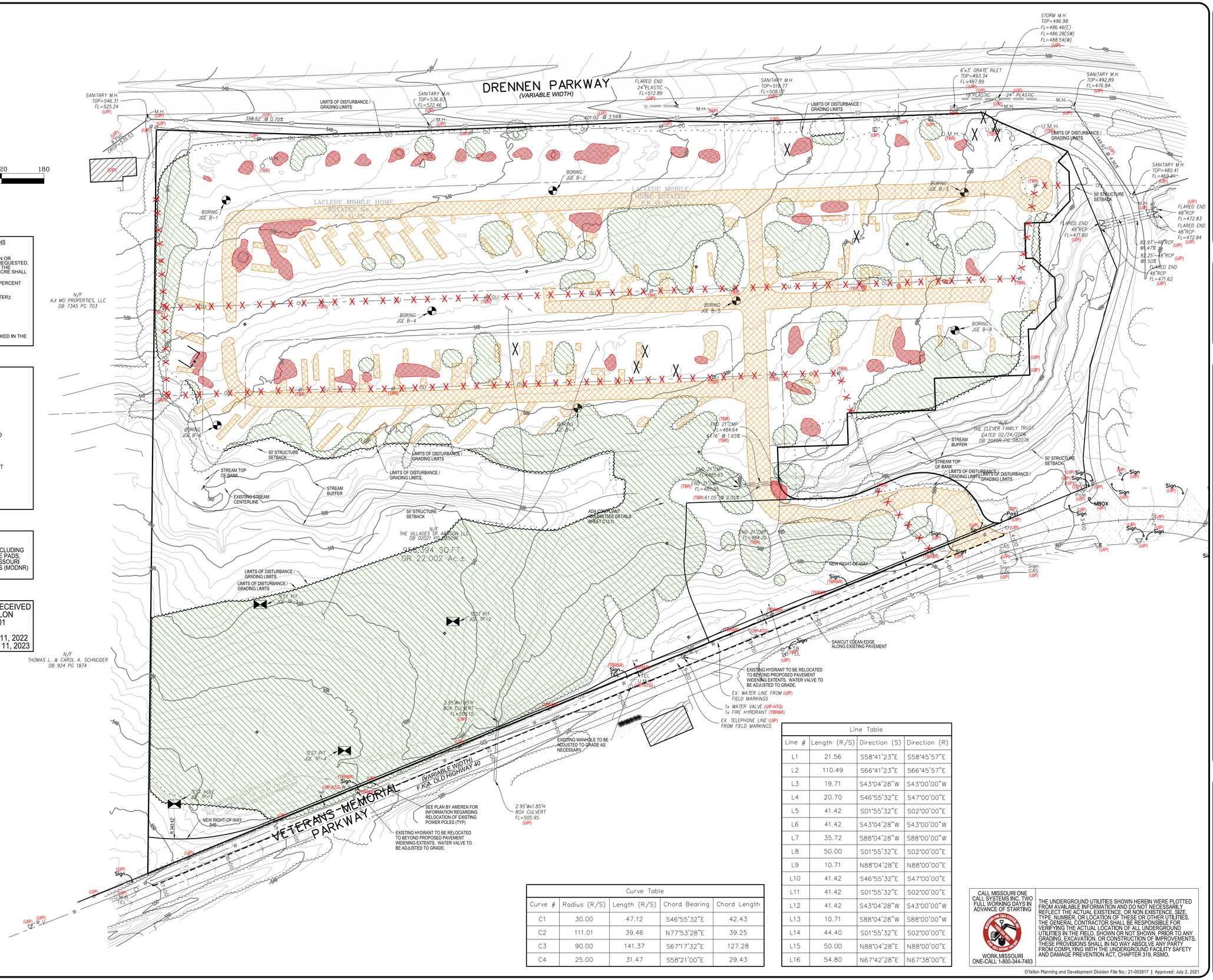
DEMOLITION LEGEND

- SAWCUT PAVEMENT
- UTILITY TO BE REMOVED
- TREE TO BE REMOVED
- TO BE REMOVED
- USE IN PLACE
- TO BE REMOVED & REPLACED
- AREA OF EXISTING TREES TO BE REMOVED
- AREA OF EXISTING PAVEMENT TO BE REMOVED
- AREA OF CULTURAL DEBRIS TO BE REMOVED
- EDGE OF NEW TREE LINE

CLEARING NOTE:

NO LAND DISTURBANCE PERMITTED (INCLUDING REMOVAL OF TREE STUMPS, CONCRETE PADS, ETC.) PRIOR TO RECEIPT OF ISSUED MISSOURI DEPARTMENT OF NATURAL RESOURCES (MODNR) LAND DISTURBANCE PERMIT.

SEPARTE CLEARING PERMIT RECEIVED
FROM THE CITY OF O'FALLON
PERMIT NO. GR22-000001
FILE NO. 22-000312
DATE APPROVED: FEBRUARY 11, 2022
EXPIRATION DATE: FEBRUARY 11, 2023



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L16	54.80	N67°42'28"E	N67°38'00"E

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Authority #203

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RYAN L. HOLMES
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DEMOLITION PLAN

Parcel ID: 2-056C-S028-00-0001.10
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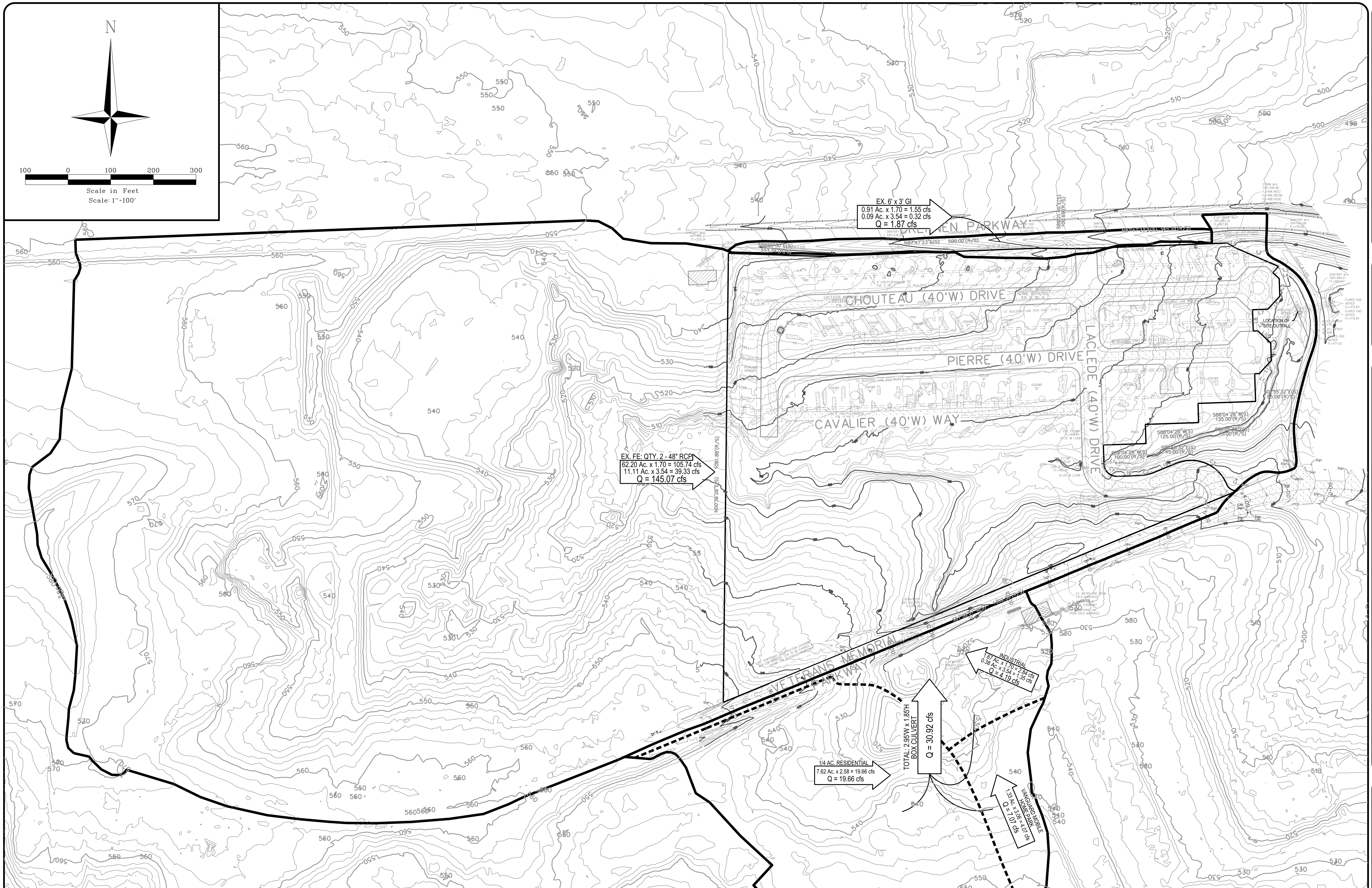
Design By: RLH
Drawn By: RLH
Checked By: RLH

09-01-22

C05



NOTE: THIS SHEET TO BE USED FOR DRAINAGE AREA PURPOSES ONLY. NOT TO BE USED AS CONSTRUCTION PLANS.

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THE VILLAS AT ARAGON

VETERANS MEMORIAL PARKWAY
O'FALLON, MO 63366

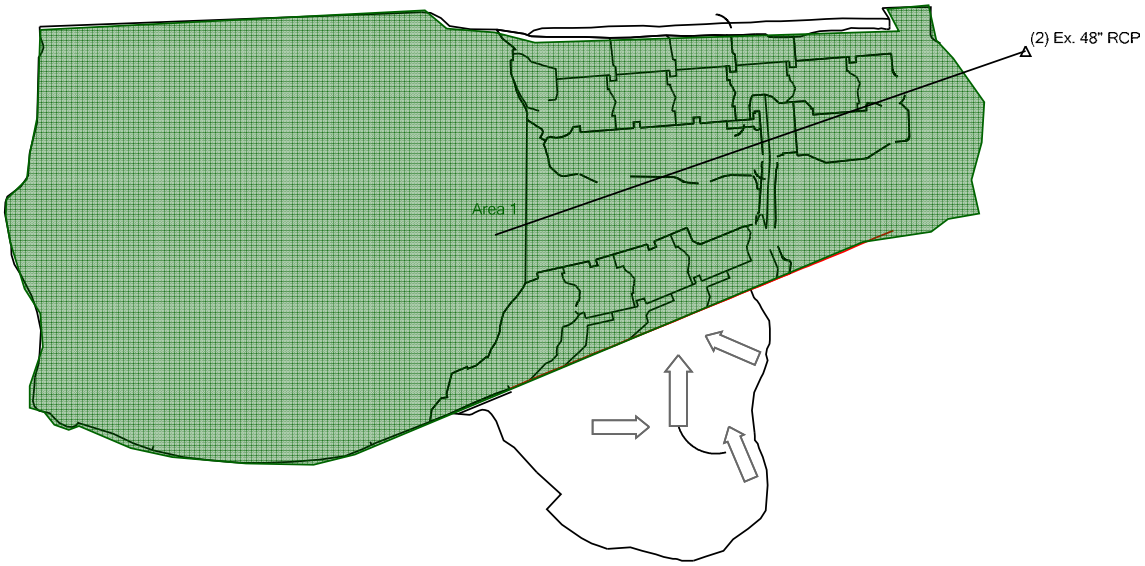
EXISTING DRAINAGE AREA MAP

Parcel ID: 2-056C-S028-00-0001.10
Permit No. GR22-000001
Volz Project # 22649
Design By: RLH
Drawn By: RLH
Checked By: RLH

09-01-22

C21.0

Scenario: Developed Conditions 2-yr



Time-Depth Curve: 2-yr	
Label	2-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	2 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.0	0.0	0.0	0.0
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.1	0.1	0.1
3.000	0.1	0.1	0.1	0.1	0.1
3.500	0.1	0.1	0.1	0.1	0.1
4.000	0.1	0.2	0.2	0.2	0.2
4.500	0.2	0.2	0.2	0.2	0.2
5.000	0.2	0.2	0.2	0.2	0.2
5.500	0.2	0.2	0.2	0.2	0.2
6.000	0.2	0.3	0.3	0.3	0.3
6.500	0.3	0.3	0.3	0.3	0.3
7.000	0.3	0.3	0.3	0.3	0.3
7.500	0.3	0.3	0.4	0.4	0.4
8.000	0.4	0.4	0.4	0.4	0.4
8.500	0.4	0.4	0.4	0.4	0.4
9.000	0.5	0.5	0.5	0.5	0.5
9.500	0.5	0.5	0.5	0.5	0.5
10.000	0.6	0.6	0.6	0.6	0.6
10.500	0.6	0.6	0.7	0.7	0.7
11.000	0.7	0.8	0.8	0.8	0.8
11.500	0.9	1.0	1.1	1.3	1.8
12.000	2.1	2.1	2.2	2.2	2.2
12.500	2.3	2.3	2.3	2.4	2.4
13.000	2.4	2.4	2.4	2.4	2.5
13.500	2.5	2.5	2.5	2.5	2.5
14.000	2.5	2.6	2.6	2.6	2.6
14.500	2.6	2.6	2.6	2.6	2.6
15.000	2.6	2.7	2.7	2.7	2.7
15.500	2.7	2.7	2.7	2.7	2.7
16.000	2.7	2.7	2.7	2.7	2.8
16.500	2.8	2.8	2.8	2.8	2.8
17.000	2.8	2.8	2.8	2.8	2.8
17.500	2.8	2.8	2.8	2.8	2.8

Subsection: Time-Depth Curve
Label: MyStorms

Return Event: 2 years
Storm Event: 2-yr

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
18.000	2.9	2.9	2.9	2.9	2.9
18.500	2.9	2.9	2.9	2.9	2.9
19.000	2.9	2.9	2.9	2.9	2.9
19.500	2.9	2.9	2.9	2.9	2.9
20.000	3.0	3.0	3.0	3.0	3.0
20.500	3.0	3.0	3.0	3.0	3.0
21.000	3.0	3.0	3.0	3.0	3.0
21.500	3.0	3.0	3.0	3.0	3.0
22.000	3.0	3.0	3.0	3.0	3.0
22.500	3.0	3.1	3.1	3.1	3.1
23.000	3.1	3.1	3.1	3.1	3.1
23.500	3.1	3.1	3.1	3.1	3.1
24.000	3.1	(N/A)	(N/A)	(N/A)	(N/A)

Time-Depth Curve: 15-yr	
Label	15-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	15 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.1	0.2	0.2
3.000	0.2	0.2	0.2	0.2	0.2
3.500	0.2	0.2	0.2	0.2	0.2
4.000	0.2	0.2	0.2	0.2	0.3
4.500	0.3	0.3	0.3	0.3	0.3
5.000	0.3	0.3	0.3	0.3	0.3
5.500	0.3	0.3	0.4	0.4	0.4
6.000	0.4	0.4	0.4	0.4	0.4
6.500	0.4	0.4	0.4	0.4	0.5
7.000	0.5	0.5	0.5	0.5	0.5
7.500	0.5	0.5	0.5	0.5	0.6
8.000	0.6	0.6	0.6	0.6	0.6
8.500	0.6	0.6	0.6	0.7	0.7
9.000	0.7	0.7	0.7	0.7	0.8
9.500	0.8	0.8	0.8	0.8	0.8
10.000	0.9	0.9	0.9	0.9	0.9
10.500	1.0	1.0	1.0	1.0	1.1
11.000	1.1	1.1	1.2	1.2	1.3
11.500	1.3	1.4	1.7	2.0	2.7
12.000	3.1	3.2	3.3	3.4	3.4
12.500	3.5	3.5	3.5	3.6	3.6
13.000	3.6	3.7	3.7	3.7	3.7
13.500	3.8	3.8	3.8	3.8	3.8
14.000	3.9	3.9	3.9	3.9	3.9
14.500	3.9	4.0	4.0	4.0	4.0
15.000	4.0	4.0	4.0	4.1	4.1
15.500	4.1	4.1	4.1	4.1	4.1
16.000	4.1	4.1	4.2	4.2	4.2
16.500	4.2	4.2	4.2	4.2	4.2
17.000	4.2	4.2	4.3	4.3	4.3
17.500	4.3	4.3	4.3	4.3	4.3

Subsection: Time-Depth Curve
Label: MyStorms

Return Event: 15 years
Storm Event: 15-yr

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
18.000	4.3	4.3	4.3	4.4	4.4
18.500	4.4	4.4	4.4	4.4	4.4
19.000	4.4	4.4	4.4	4.4	4.4
19.500	4.4	4.4	4.5	4.5	4.5
20.000	4.5	4.5	4.5	4.5	4.5
20.500	4.5	4.5	4.5	4.5	4.5
21.000	4.5	4.5	4.5	4.6	4.6
21.500	4.6	4.6	4.6	4.6	4.6
22.000	4.6	4.6	4.6	4.6	4.6
22.500	4.6	4.6	4.6	4.6	4.6
23.000	4.6	4.7	4.7	4.7	4.7
23.500	4.7	4.7	4.7	4.7	4.7
24.000	4.7	(N/A)	(N/A)	(N/A)	(N/A)

Time-Depth Curve: 25-yr	
Label	25-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	25 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.2
2.500	0.2	0.2	0.2	0.2	0.2
3.000	0.2	0.2	0.2	0.2	0.2
3.500	0.2	0.2	0.2	0.3	0.3
4.000	0.3	0.3	0.3	0.3	0.3
4.500	0.3	0.3	0.3	0.3	0.3
5.000	0.4	0.4	0.4	0.4	0.4
5.500	0.4	0.4	0.4	0.4	0.4
6.000	0.4	0.5	0.5	0.5	0.5
6.500	0.5	0.5	0.5	0.5	0.5
7.000	0.6	0.6	0.6	0.6	0.6
7.500	0.6	0.6	0.6	0.6	0.7
8.000	0.7	0.7	0.7	0.7	0.7
8.500	0.7	0.8	0.8	0.8	0.8
9.000	0.8	0.8	0.9	0.9	0.9
9.500	0.9	0.9	1.0	1.0	1.0
10.000	1.0	1.0	1.1	1.1	1.1
10.500	1.1	1.2	1.2	1.2	1.3
11.000	1.3	1.4	1.4	1.5	1.5
11.500	1.6	1.7	2.0	2.4	3.2
12.000	3.7	3.8	3.9	4.0	4.1
12.500	4.1	4.2	4.2	4.2	4.3
13.000	4.3	4.4	4.4	4.4	4.4
13.500	4.5	4.5	4.5	4.5	4.6
14.000	4.6	4.6	4.6	4.7	4.7
14.500	4.7	4.7	4.7	4.7	4.8
15.000	4.8	4.8	4.8	4.8	4.8
15.500	4.9	4.9	4.9	4.9	4.9
16.000	4.9	4.9	5.0	5.0	5.0
16.500	5.0	5.0	5.0	5.0	5.0
17.000	5.0	5.1	5.1	5.1	5.1
17.500	5.1	5.1	5.1	5.1	5.1

Subsection: Time-Depth Curve
Label: MyStorms

Return Event: 25 years
Storm Event: 25-yr

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
18.000	5.2	5.2	5.2	5.2	5.2
18.500	5.2	5.2	5.2	5.2	5.2
19.000	5.3	5.3	5.3	5.3	5.3
19.500	5.3	5.3	5.3	5.3	5.3
20.000	5.3	5.3	5.3	5.4	5.4
20.500	5.4	5.4	5.4	5.4	5.4
21.000	5.4	5.4	5.4	5.4	5.4
21.500	5.4	5.4	5.5	5.5	5.5
22.000	5.5	5.5	5.5	5.5	5.5
22.500	5.5	5.5	5.5	5.5	5.5
23.000	5.5	5.5	5.5	5.6	5.6
23.500	5.6	5.6	5.6	5.6	5.6
24.000	5.6	(N/A)	(N/A)	(N/A)	(N/A)

Time-Depth Curve: 100-yr	
Label	100-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	100 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.1	0.1	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.2	0.2	0.2	0.2	0.2
2.500	0.2	0.2	0.2	0.2	0.2
3.000	0.2	0.3	0.3	0.3	0.3
3.500	0.3	0.3	0.3	0.3	0.3
4.000	0.3	0.4	0.4	0.4	0.4
4.500	0.4	0.4	0.4	0.4	0.4
5.000	0.5	0.5	0.5	0.5	0.5
5.500	0.5	0.5	0.5	0.6	0.6
6.000	0.6	0.6	0.6	0.6	0.6
6.500	0.6	0.7	0.7	0.7	0.7
7.000	0.7	0.7	0.7	0.8	0.8
7.500	0.8	0.8	0.8	0.8	0.8
8.000	0.9	0.9	0.9	0.9	0.9
8.500	1.0	1.0	1.0	1.0	1.0
9.000	1.1	1.1	1.1	1.1	1.2
9.500	1.2	1.2	1.2	1.2	1.3
10.000	1.3	1.3	1.4	1.4	1.4
10.500	1.5	1.5	1.5	1.6	1.6
11.000	1.7	1.7	1.8	1.9	2.0
11.500	2.0	2.2	2.6	3.1	4.1
12.000	4.8	4.9	5.0	5.1	5.2
12.500	5.3	5.4	5.4	5.5	5.5
13.000	5.6	5.6	5.6	5.7	5.7
13.500	5.8	5.8	5.8	5.8	5.9
14.000	5.9	5.9	6.0	6.0	6.0
14.500	6.0	6.1	6.1	6.1	6.1
15.000	6.1	6.2	6.2	6.2	6.2
15.500	6.2	6.3	6.3	6.3	6.3
16.000	6.3	6.4	6.4	6.4	6.4
16.500	6.4	6.4	6.4	6.5	6.5
17.000	6.5	6.5	6.5	6.5	6.6
17.500	6.6	6.6	6.6	6.6	6.6

Subsection: Time-Depth Curve
Label: MyStorms

Return Event: 100 years
Storm Event: 100-yr

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
18.000	6.6	6.6	6.7	6.7	6.7
18.500	6.7	6.7	6.7	6.7	6.7
19.000	6.8	6.8	6.8	6.8	6.8
19.500	6.8	6.8	6.8	6.8	6.8
20.000	6.9	6.9	6.9	6.9	6.9
20.500	6.9	6.9	6.9	6.9	6.9
21.000	6.9	7.0	7.0	7.0	7.0
21.500	7.0	7.0	7.0	7.0	7.0
22.000	7.0	7.0	7.1	7.1	7.1
22.500	7.1	7.1	7.1	7.1	7.1
23.000	7.1	7.1	7.1	7.1	7.2
23.500	7.2	7.2	7.2	7.2	7.2
24.000	7.2	(N/A)	(N/A)	(N/A)	(N/A)

CURVE NUMBER CALCULATOR - PROPOSED CONDITIONS			
PROJECT:	The Villas at Aragon	DATE:	4/18/22
CLIENT:	Lombardo Homes	JOB #	22649

COMPOSITE CURVE NUMBER (CN) - Area 1: Offsite

Soil Name/Description	Hydrologic Soil Group (HSG)	CN	Area	Product (CN x Area)
Woods - Good Condition	D	77	16.64	1281.28
Developed Open Space - Good Condition	D	80	21.4	1712.00
Impervious Surfaces	-	98	8.12	795.76
	-			
		Totals:	46.16	3789.04

$$\text{Area 1A: CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{3789.04}{46.16} = 82.08$$

COMPOSITE CURVE NUMBER (CN) - AREA 2: Onsite

Soil Name/Description	Hydrologic Soil	CN	Area	Product
Woods - Good Condition	D	77	8.87	682.99
Developed Open Space - Fair Condition	D	84	29.17	2450.28
Impervious Surfaces	-	98	8.12	795.76
		Totals:	46.16	3929.03

$$\text{Area 1B: CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{3929.03}{46.16} = 85.12$$

Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	73.310 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	172.70 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	164.88 ft³/s

Drainage Area	
SCS CN (Composite)	82.53
Area (User Defined)	73.310 acres
Maximum Retention (Pervious)	2.1 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.5 in
Runoff Volume (Pervious)	9.131 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	9.118 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	996.76 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	15-yr
Return Event	15 years
Duration	24.000 hours
Depth	4.7 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	73.310 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	329.38 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	317.11 ft³/s

Drainage Area	
SCS CN (Composite)	82.53
Area (User Defined)	73.310 acres
Maximum Retention (Pervious)	2.1 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.9 in
Runoff Volume (Pervious)	17.476 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	17.456 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	996.76 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	25-yr
Return Event	25 years
Duration	24.000 hours
Depth	5.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	73.310 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	420.00 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	406.10 ft³/s

Drainage Area	
SCS CN (Composite)	82.53
Area (User Defined)	73.310 acres
Maximum Retention (Pervious)	2.1 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.7 in
Runoff Volume (Pervious)	22.446 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	22.421 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	996.76 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	7.2 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	73.310 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	582.04 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	565.59 ft³/s

Drainage Area	
SCS CN (Composite)	82.53
Area (User Defined)	73.310 acres
Maximum Retention (Pervious)	2.1 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.2 in
Runoff Volume (Pervious)	31.546 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	31.513 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	996.76 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

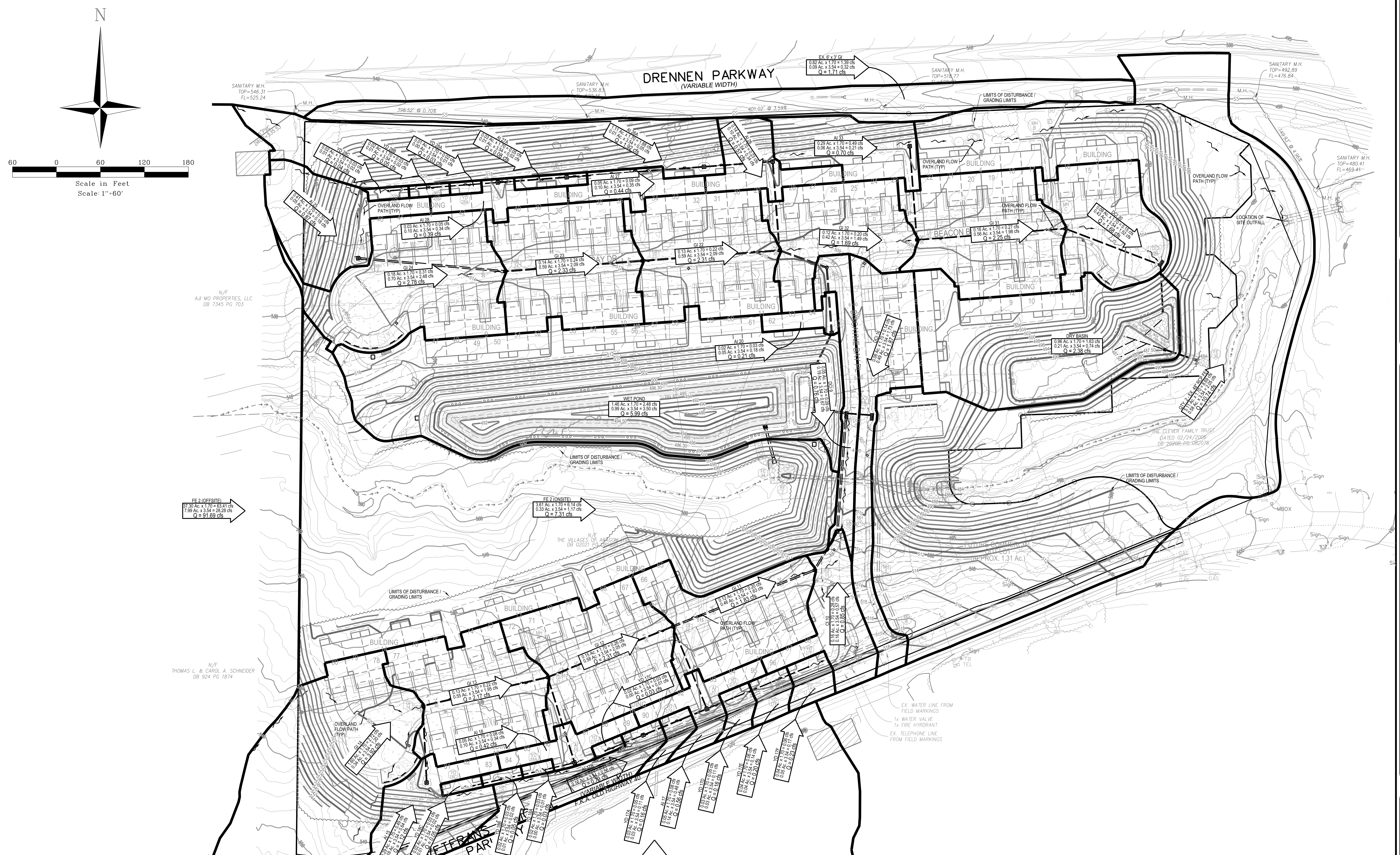
Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
Area 1	Existing Conditions 2-yr	2	9.118	11.950	164.88
Area 1	Existing Conditions 15-yr	15	17.456	11.900	317.11
Area 1	Existing Conditions 25-yr	25	22.421	11.900	406.10
Area 1	Existing Conditions 100-yr	100	31.513	11.900	565.59

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
(2) Ex. 48" RCP	Existing Conditions 2-yr	2	9.118	11.950	164.88
(2) Ex. 48" RCP	Existing Conditions 15-yr	15	17.456	11.900	317.11
(2) Ex. 48" RCP	Existing Conditions 25-yr	25	22.421	11.900	406.10
(2) Ex. 48" RCP	Existing Conditions 100-yr	100	31.513	11.900	565.59



NOTE: THIS SHEET TO BE USED FOR DRAINAGE AREA PURPOSES ONLY. NOT TO BE USED AS CONSTRUCTION PLANS.

CALL MISSOURI ONE CALL SYSTEMS INC. TWO FULL WORKING DAYS IN ADVANCE OF STARTING WORK.MISSOURI ONE-CALL 1-800-344-7483

THE UNDERGROUND UTILITIES SHOWN HEREIN WERE PLOTTED FROM AVAILABLE INFORMATION AND DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, OR NON EXISTENCE, SIZE, TYPE, NUMBER, OR LOCATION OF THESE OR OTHER UTILITIES. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND UTILITIES IN THE FIELD, SHOWN OR NOT SHOWN, PRIOR TO ANY GRADING, EXCAVATION, OR CONSTRUCTION OF IMPROVEMENTS. THESE PROVISIONS SHALL IN NO WAY ABSOLVE ANY PARTY FROM COMPLYING WITH THE UNDERGROUND FACILITY SAFETY AND DAMAGE PREVENTION ACT, CHAPTER 319, RSMO.

O'fallon Planning and Development Division File No.: 21-002817 | Approved: July 2, 2021

Lombardo HOMES
4 Research Park Drive, Suite 130
St. Charles, MO 63304
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VOLZ Incorporated
ENGINEERING
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10849 Indian Head Ind'l. Blvd.
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Authority #203

STATE OF MISSOURI
RYAN LEE HOLMES
NUMBER
PE-2017018988
REGISTERED PROFESSIONAL ENGINEER
09-01-22
RYAN L. HOLMES
Professional Engineer
PE-2017018988

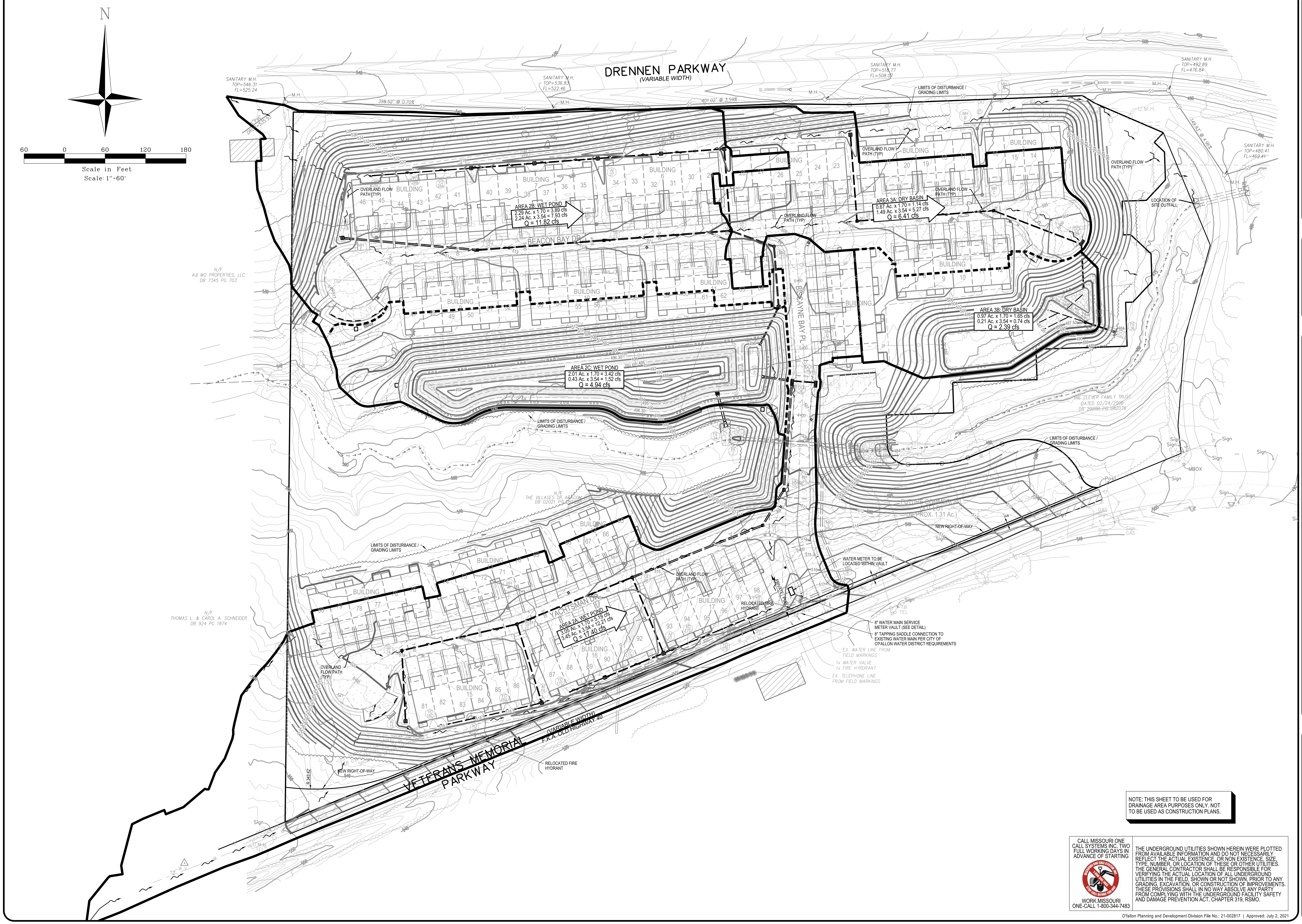
THE VILLAS AT ARAGON

VETERANS MEMORIAL PARKWAY
O'FALLON, MO 63366

PROPOSED DRAINAGE AREA MAP

Parcel ID: 2-056C-S028-00-0001.10	Design By: RLH
Permit No. GR22-000001	Drawn By: RLH
Volz Project # 22649	Checked By: RLH

09-01-22
C21.1



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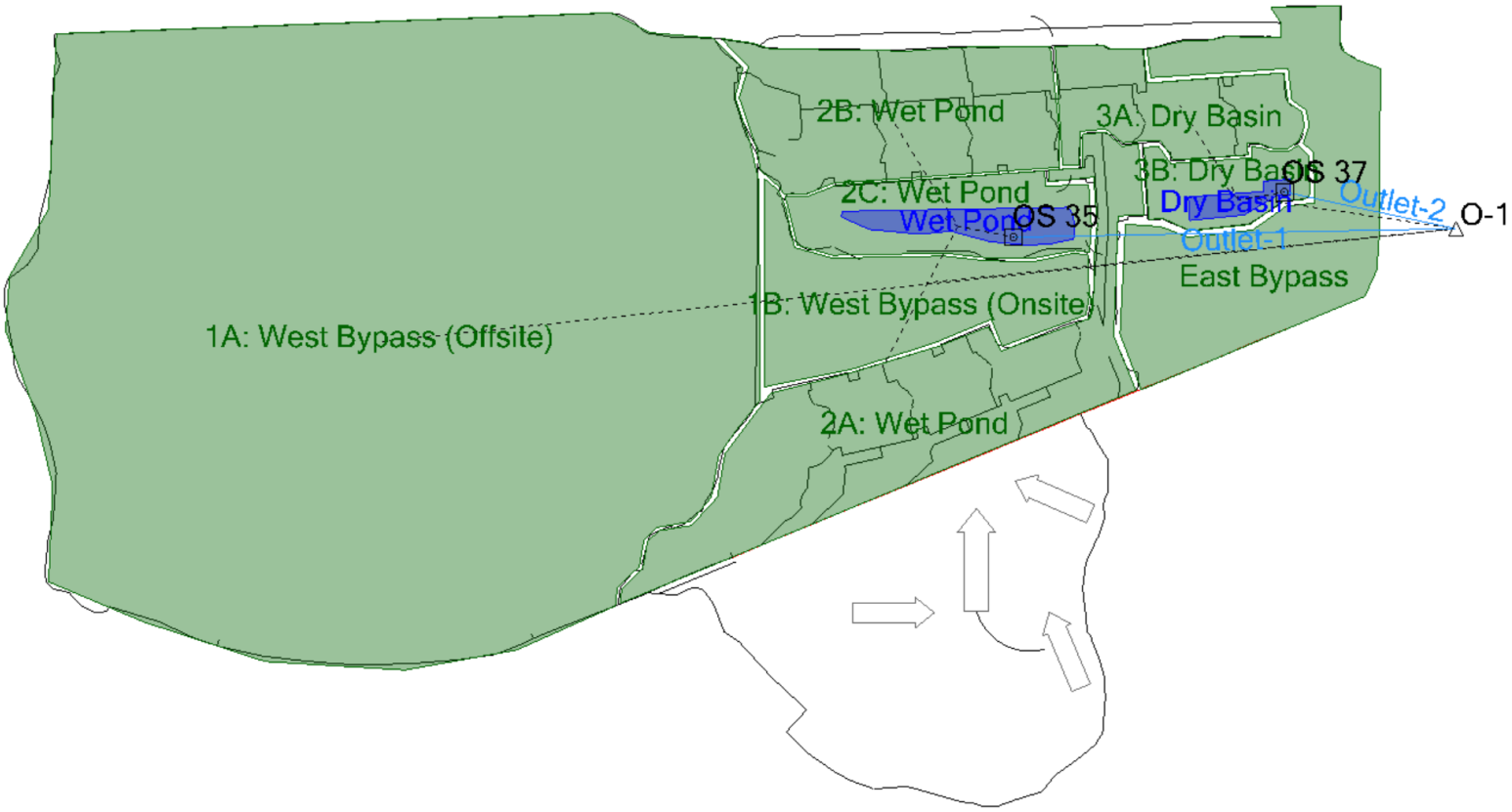
PROPOSED BMP DRAINAGE AREA MAP

Parcel ID: 2-056C-S028-00-0001.10
Permit No. GR22-000001
Volz Project # 22649
Design By: RLH
Drawn By: RLH
Checked By: RLH

09-01-22

C21.2

Scenario: Developed Conditions 2-yr



Time-Depth Curve: 2-yr	
Label	2-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	2 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.0	0.0	0.0	0.0
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.1	0.1	0.1
3.000	0.1	0.1	0.1	0.1	0.1
3.500	0.1	0.1	0.1	0.1	0.1
4.000	0.1	0.2	0.2	0.2	0.2
4.500	0.2	0.2	0.2	0.2	0.2
5.000	0.2	0.2	0.2	0.2	0.2
5.500	0.2	0.2	0.2	0.2	0.2
6.000	0.2	0.3	0.3	0.3	0.3
6.500	0.3	0.3	0.3	0.3	0.3
7.000	0.3	0.3	0.3	0.3	0.3
7.500	0.3	0.3	0.4	0.4	0.4
8.000	0.4	0.4	0.4	0.4	0.4
8.500	0.4	0.4	0.4	0.4	0.4
9.000	0.5	0.5	0.5	0.5	0.5
9.500	0.5	0.5	0.5	0.5	0.5
10.000	0.6	0.6	0.6	0.6	0.6
10.500	0.6	0.6	0.7	0.7	0.7
11.000	0.7	0.8	0.8	0.8	0.8
11.500	0.9	1.0	1.1	1.3	1.8
12.000	2.1	2.1	2.2	2.2	2.2
12.500	2.3	2.3	2.3	2.4	2.4
13.000	2.4	2.4	2.4	2.4	2.5
13.500	2.5	2.5	2.5	2.5	2.5
14.000	2.5	2.6	2.6	2.6	2.6
14.500	2.6	2.6	2.6	2.6	2.6
15.000	2.6	2.7	2.7	2.7	2.7
15.500	2.7	2.7	2.7	2.7	2.7
16.000	2.7	2.7	2.7	2.7	2.8
16.500	2.8	2.8	2.8	2.8	2.8
17.000	2.8	2.8	2.8	2.8	2.8
17.500	2.8	2.8	2.8	2.8	2.8

Subsection: Time-Depth Curve
Label: MyStorms

Return Event: 2 years
Storm Event: 2-yr

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
18.000	2.9	2.9	2.9	2.9	2.9
18.500	2.9	2.9	2.9	2.9	2.9
19.000	2.9	2.9	2.9	2.9	2.9
19.500	2.9	2.9	2.9	2.9	2.9
20.000	3.0	3.0	3.0	3.0	3.0
20.500	3.0	3.0	3.0	3.0	3.0
21.000	3.0	3.0	3.0	3.0	3.0
21.500	3.0	3.0	3.0	3.0	3.0
22.000	3.0	3.0	3.0	3.0	3.0
22.500	3.0	3.1	3.1	3.1	3.1
23.000	3.1	3.1	3.1	3.1	3.1
23.500	3.1	3.1	3.1	3.1	3.1
24.000	3.1	(N/A)	(N/A)	(N/A)	(N/A)

Time-Depth Curve: 15-yr	
Label	15-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	15 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.1	0.2	0.2
3.000	0.2	0.2	0.2	0.2	0.2
3.500	0.2	0.2	0.2	0.2	0.2
4.000	0.2	0.2	0.2	0.2	0.3
4.500	0.3	0.3	0.3	0.3	0.3
5.000	0.3	0.3	0.3	0.3	0.3
5.500	0.3	0.3	0.4	0.4	0.4
6.000	0.4	0.4	0.4	0.4	0.4
6.500	0.4	0.4	0.4	0.4	0.5
7.000	0.5	0.5	0.5	0.5	0.5
7.500	0.5	0.5	0.5	0.5	0.6
8.000	0.6	0.6	0.6	0.6	0.6
8.500	0.6	0.6	0.6	0.7	0.7
9.000	0.7	0.7	0.7	0.7	0.8
9.500	0.8	0.8	0.8	0.8	0.8
10.000	0.9	0.9	0.9	0.9	0.9
10.500	1.0	1.0	1.0	1.0	1.1
11.000	1.1	1.1	1.2	1.2	1.3
11.500	1.3	1.4	1.7	2.0	2.7
12.000	3.1	3.2	3.3	3.4	3.4
12.500	3.5	3.5	3.5	3.6	3.6
13.000	3.6	3.7	3.7	3.7	3.7
13.500	3.8	3.8	3.8	3.8	3.8
14.000	3.9	3.9	3.9	3.9	3.9
14.500	3.9	4.0	4.0	4.0	4.0
15.000	4.0	4.0	4.0	4.1	4.1
15.500	4.1	4.1	4.1	4.1	4.1
16.000	4.1	4.1	4.2	4.2	4.2
16.500	4.2	4.2	4.2	4.2	4.2
17.000	4.2	4.2	4.3	4.3	4.3
17.500	4.3	4.3	4.3	4.3	4.3

Subsection: Time-Depth Curve
Label: MyStorms

Return Event: 15 years
Storm Event: 15-yr

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
18.000	4.3	4.3	4.3	4.4	4.4
18.500	4.4	4.4	4.4	4.4	4.4
19.000	4.4	4.4	4.4	4.4	4.4
19.500	4.4	4.4	4.5	4.5	4.5
20.000	4.5	4.5	4.5	4.5	4.5
20.500	4.5	4.5	4.5	4.5	4.5
21.000	4.5	4.5	4.5	4.6	4.6
21.500	4.6	4.6	4.6	4.6	4.6
22.000	4.6	4.6	4.6	4.6	4.6
22.500	4.6	4.6	4.6	4.6	4.6
23.000	4.6	4.7	4.7	4.7	4.7
23.500	4.7	4.7	4.7	4.7	4.7
24.000	4.7	(N/A)	(N/A)	(N/A)	(N/A)

Time-Depth Curve: 25-yr	
Label	25-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	25 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.2
2.500	0.2	0.2	0.2	0.2	0.2
3.000	0.2	0.2	0.2	0.2	0.2
3.500	0.2	0.2	0.2	0.3	0.3
4.000	0.3	0.3	0.3	0.3	0.3
4.500	0.3	0.3	0.3	0.3	0.3
5.000	0.4	0.4	0.4	0.4	0.4
5.500	0.4	0.4	0.4	0.4	0.4
6.000	0.4	0.5	0.5	0.5	0.5
6.500	0.5	0.5	0.5	0.5	0.5
7.000	0.6	0.6	0.6	0.6	0.6
7.500	0.6	0.6	0.6	0.6	0.7
8.000	0.7	0.7	0.7	0.7	0.7
8.500	0.7	0.8	0.8	0.8	0.8
9.000	0.8	0.8	0.9	0.9	0.9
9.500	0.9	0.9	1.0	1.0	1.0
10.000	1.0	1.0	1.1	1.1	1.1
10.500	1.1	1.2	1.2	1.2	1.3
11.000	1.3	1.4	1.4	1.5	1.5
11.500	1.6	1.7	2.0	2.4	3.2
12.000	3.7	3.8	3.9	4.0	4.1
12.500	4.1	4.2	4.2	4.2	4.3
13.000	4.3	4.4	4.4	4.4	4.4
13.500	4.5	4.5	4.5	4.5	4.6
14.000	4.6	4.6	4.6	4.7	4.7
14.500	4.7	4.7	4.7	4.7	4.8
15.000	4.8	4.8	4.8	4.8	4.8
15.500	4.9	4.9	4.9	4.9	4.9
16.000	4.9	4.9	5.0	5.0	5.0
16.500	5.0	5.0	5.0	5.0	5.0
17.000	5.0	5.1	5.1	5.1	5.1
17.500	5.1	5.1	5.1	5.1	5.1

Subsection: Time-Depth Curve
Label: MyStorms

Return Event: 25 years
Storm Event: 25-yr

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
18.000	5.2	5.2	5.2	5.2	5.2
18.500	5.2	5.2	5.2	5.2	5.2
19.000	5.3	5.3	5.3	5.3	5.3
19.500	5.3	5.3	5.3	5.3	5.3
20.000	5.3	5.3	5.3	5.4	5.4
20.500	5.4	5.4	5.4	5.4	5.4
21.000	5.4	5.4	5.4	5.4	5.4
21.500	5.4	5.4	5.5	5.5	5.5
22.000	5.5	5.5	5.5	5.5	5.5
22.500	5.5	5.5	5.5	5.5	5.5
23.000	5.5	5.5	5.5	5.6	5.6
23.500	5.6	5.6	5.6	5.6	5.6
24.000	5.6	(N/A)	(N/A)	(N/A)	(N/A)

Time-Depth Curve: 100-yr	
Label	100-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	100 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.1	0.1	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.2	0.2	0.2	0.2	0.2
2.500	0.2	0.2	0.2	0.2	0.2
3.000	0.2	0.3	0.3	0.3	0.3
3.500	0.3	0.3	0.3	0.3	0.3
4.000	0.3	0.4	0.4	0.4	0.4
4.500	0.4	0.4	0.4	0.4	0.4
5.000	0.5	0.5	0.5	0.5	0.5
5.500	0.5	0.5	0.5	0.6	0.6
6.000	0.6	0.6	0.6	0.6	0.6
6.500	0.6	0.7	0.7	0.7	0.7
7.000	0.7	0.7	0.7	0.8	0.8
7.500	0.8	0.8	0.8	0.8	0.8
8.000	0.9	0.9	0.9	0.9	0.9
8.500	1.0	1.0	1.0	1.0	1.0
9.000	1.1	1.1	1.1	1.1	1.2
9.500	1.2	1.2	1.2	1.2	1.3
10.000	1.3	1.3	1.4	1.4	1.4
10.500	1.5	1.5	1.5	1.6	1.6
11.000	1.7	1.7	1.8	1.9	2.0
11.500	2.0	2.2	2.6	3.1	4.1
12.000	4.8	4.9	5.0	5.1	5.2
12.500	5.3	5.4	5.4	5.5	5.5
13.000	5.6	5.6	5.6	5.7	5.7
13.500	5.8	5.8	5.8	5.8	5.9
14.000	5.9	5.9	6.0	6.0	6.0
14.500	6.0	6.1	6.1	6.1	6.1
15.000	6.1	6.2	6.2	6.2	6.2
15.500	6.2	6.3	6.3	6.3	6.3
16.000	6.3	6.4	6.4	6.4	6.4
16.500	6.4	6.4	6.4	6.5	6.5
17.000	6.5	6.5	6.5	6.5	6.6
17.500	6.6	6.6	6.6	6.6	6.6

Subsection: Time-Depth Curve
Label: MyStorms

Return Event: 100 years
Storm Event: 100-yr

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
18.000	6.6	6.6	6.7	6.7	6.7
18.500	6.7	6.7	6.7	6.7	6.7
19.000	6.8	6.8	6.8	6.8	6.8
19.500	6.8	6.8	6.8	6.8	6.8
20.000	6.9	6.9	6.9	6.9	6.9
20.500	6.9	6.9	6.9	6.9	6.9
21.000	6.9	7.0	7.0	7.0	7.0
21.500	7.0	7.0	7.0	7.0	7.0
22.000	7.0	7.0	7.1	7.1	7.1
22.500	7.1	7.1	7.1	7.1	7.1
23.000	7.1	7.1	7.1	7.1	7.2
23.500	7.2	7.2	7.2	7.2	7.2
24.000	7.2	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Elevation-Area Volume Curve
Label: Dry Basin

Return Event: 2 years
Storm Event: 2-yr

Elevation (ft)	Planimeter (ft^2)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
487.50	0.0	0.034	0.000	0.000	0.000
488.00	0.0	0.089	0.178	0.030	0.030
489.00	0.0	0.228	0.458	0.153	0.182
489.50	0.0	0.251	0.718	0.120	0.302
489.51	0.0	0.261	0.768	0.003	0.305
490.00	0.0	0.281	0.812	0.133	0.437
491.50	0.0	0.346	0.938	0.469	0.906

Subsection: Elevation-Area Volume Curve
Label: Wet Pond

Return Event: 2 years
Storm Event: 2-yr

Elevation (ft)	Planimeter (ft^2)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
496.00	0.0	0.567	0.000	0.000	0.000
496.30	0.0	0.683	1.873	0.187	0.187
497.00	0.0	0.743	2.139	0.499	0.686
497.50	0.0	0.788	2.297	0.383	1.069
497.51	0.0	0.796	2.376	0.008	1.077
498.00	0.0	0.836	2.447	0.400	1.477
499.00	0.0	0.916	2.626	0.875	2.352
499.67	0.0	0.971	2.829	0.632	2.984

Requested Pond Water Surface Elevations	
Minimum (Headwater)	496.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	499.67 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Inlet Box	4'x4' Overflow	Forward	36" Outlet Pipe	497.45	499.67
Orifice-Circular	4.5" Low Flow	Forward	36" Outlet Pipe	496.00	499.67
Culvert-Circular	36" Outlet Pipe	Forward	TW	491.12	499.67
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: 4.5" Low Flow Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	496.00 ft
Orifice Diameter	4.5 in
Orifice Coefficient	0.60

Structure ID: 4'x4' Overflow Structure Type: Inlet Box	
Number of Openings	1
Elevation	497.45 ft
Orifice Area	16.0 ft²
Orifice Coefficient	0.60
Weir Length	16.00 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.00
Manning's n	0.00
Kev, Charged Riser	0.00
Weir Submergence	False
Orifice H to crest	False

Structure ID: 36" Outlet Pipe Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	36.0 in
Length	51.69 ft
Length (Computed Barrel)	51.69 ft
Slope (Computed)	0.012 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.50
Kb	0.01
Kr	0.00
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0098
M	2.0000
C	0.0398
Y	0.6700
T1 ratio (HW/D)	1.15

Inlet Control Data	
T2 ratio (HW/D)	1.30
Slope Correction Factor	-0.50

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	494.58 ft	T1 Flow	42.85 ft³/s
T2 Elevation	495.02 ft	T2 Flow	48.97 ft³/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall
Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Subsection: Composite Rating Curve
Label: OS 35

Return Event: 2 years
Storm Event: 2-yr

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
496.00	0.00	(N/A)	0.00
496.50	0.30	(N/A)	0.00
497.00	0.48	(N/A)	0.00
497.45	0.60	(N/A)	0.00
497.50	1.14	(N/A)	0.00
498.00	20.31	(N/A)	0.00
498.50	52.45	(N/A)	0.00
499.00	85.97	(N/A)	0.00
499.50	89.55	(N/A)	0.00
499.67	90.74	(N/A)	0.00

Contributing Structures
(no Q: 4'x4' Overflow,4.5" Low Flow,36" Outlet Pipe)
4.5" Low Flow,36" Outlet Pipe (no Q: 4'x4' Overflow)
4.5" Low Flow,36" Outlet Pipe (no Q: 4'x4' Overflow)
4.5" Low Flow,36" Outlet Pipe (no Q: 4'x4' Overflow)
4'x4' Overflow,4.5" Low Flow,36" Outlet Pipe
4'x4' Overflow,4.5" Low Flow,36" Outlet Pipe
4'x4' Overflow,4.5" Low Flow,36" Outlet Pipe
4'x4' Overflow,36" Outlet Pipe (no Q: 4.5" Low Flow)
4'x4' Overflow,36" Outlet Pipe (no Q: 4.5" Low Flow)
4'x4' Overflow,36" Outlet Pipe (no Q: 4.5" Low Flow)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	487.50 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	491.50 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Inlet Box	2.5'x2.5' Overflow	Forward	15" Outlet Pipe	489.25	491.50
Orifice-Circular	4" Low Flow	Forward	15" Outlet Pipe	488.50	491.50
Culvert-Circular	15" Outlet Pipe	Forward	TW	484.50	491.50
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: 4" Low Flow Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	488.50 ft
Orifice Diameter	4.0 in
Orifice Coefficient	0.60

Structure ID: 2.5'x2.5' Overflow Structure Type: Inlet Box	
Number of Openings	1
Elevation	489.25 ft
Orifice Area	6.3 ft²
Orifice Coefficient	0.60
Weir Length	10.00 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.00
Manning's n	0.00
Kev, Charged Riser	0.00
Weir Submergence	False
Orifice H to crest	False

Structure ID: 15" Outlet Pipe Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	15.0 in
Length	46.97 ft
Length (Computed Barrel)	46.97 ft
Slope (Computed)	0.011 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.20
Kb	0.02
Kr	0.00
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.09

Subsection: Outlet Input Data
Label: OS 37

Return Event: 2 years
Storm Event: 2-yr

Inlet Control Data	
T2 ratio (HW/D)	1.19
Slope Correction Factor	-0.50

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	485.86 ft	T1 Flow	4.80 ft³/s
T2 Elevation	485.99 ft	T2 Flow	5.49 ft³/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall
Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Subsection: Composite Rating Curve
Label: OS 37

Return Event: 2 years
Storm Event: 2-yr

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
487.50	0.00	(N/A)	0.00
488.00	0.00	(N/A)	0.00
488.50	0.00	(N/A)	0.00
489.00	0.24	(N/A)	0.00
489.25	0.32	(N/A)	0.00
489.50	4.13	(N/A)	0.00
490.00	14.18	(N/A)	0.00
490.50	14.91	(N/A)	0.00
491.00	15.60	(N/A)	0.00
491.50	16.26	(N/A)	0.00

Contributing Structures
(no Q: 2.5'x2.5' Overflow,4" Low Flow,15" Outlet Pipe)
(no Q: 2.5'x2.5' Overflow,4" Low Flow,15" Outlet Pipe)
(no Q: 2.5'x2.5' Overflow,4" Low Flow,15" Outlet Pipe)
4" Low Flow,15" Outlet Pipe (no Q: 2.5'x2.5' Overflow)
4" Low Flow,15" Outlet Pipe (no Q: 2.5'x2.5' Overflow)
2.5'x2.5' Overflow,4" Low Flow,15" Outlet Pipe
2.5'x2.5' Overflow,15" Outlet Pipe (no Q: 4" Low Flow)
2.5'x2.5' Overflow,15" Outlet Pipe (no Q: 4" Low Flow)
2.5'x2.5' Overflow,15" Outlet Pipe (no Q: 4" Low Flow)
2.5'x2.5' Overflow,15" Outlet Pipe (no Q: 4" Low Flow)

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	47.00 ft
Manning's n	(N/A)
Slope	0.020 ft/ft
2 Year 24 Hour Depth	3.1 in
Average Velocity	0.10 ft/s
Segment Time of Concentration	0.132 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	485.00 ft
Is Paved?	False
Slope	0.075 ft/ft
Average Velocity	4.42 ft/s
Segment Time of Concentration	0.030 hours

Segment #3: TR-55 Shallow Concentrated Flow	
Hydraulic Length	29.00 ft
Is Paved?	True
Slope	0.015 ft/ft
Average Velocity	2.49 ft/s
Segment Time of Concentration	0.003 hours

Segment #4: TR-55 Shallow Concentrated Flow	
Hydraulic Length	98.00 ft
Is Paved?	True
Slope	0.016 ft/ft
Average Velocity	2.57 ft/s
Segment Time of Concentration	0.011 hours

Segment #5: TR-55 Channel Flow	
Flow Area	0.8 ft²
Hydraulic Length	175.00 ft
Manning's n	(N/A)
Slope	0.010 ft/ft
Wetted Perimeter	3.14 ft
Average Velocity	4.55 ft/s
Segment Time of Concentration	0.011 hours

Segment #6: TR-55 Channel Flow	
Flow Area	1.8 ft²
Hydraulic Length	668.00 ft
Manning's n	(N/A)
Slope	0.017 ft/ft
Wetted Perimeter	4.71 ft
Average Velocity	7.78 ft/s
Segment Time of Concentration	0.024 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.211 hours

Subsection: Time of Concentration Calculations
Label: 2B: Wet Pond

Return Event: 2 years
Storm Event: 2-yr

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	100.00 ft
Manning's n	(N/A)
Slope	0.010 ft/ft
2 Year 24 Hour Depth	3.1 in
Average Velocity	0.09 ft/s
Segment Time of Concentration	0.319 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	120.00 ft
Is Paved?	False
Slope	0.250 ft/ft
Average Velocity	8.07 ft/s
Segment Time of Concentration	0.004 hours

Segment #3: TR-55 Shallow Concentrated Flow	
Hydraulic Length	180.00 ft
Is Paved?	False
Slope	0.017 ft/ft
Average Velocity	2.10 ft/s
Segment Time of Concentration	0.024 hours

Segment #4: TR-55 Channel Flow	
Flow Area	0.8 ft²
Hydraulic Length	120.00 ft
Manning's n	(N/A)
Slope	0.012 ft/ft
Wetted Perimeter	3.14 ft
Average Velocity	4.98 ft/s
Segment Time of Concentration	0.007 hours

Segment #5: TR-55 Channel Flow	
Flow Area	1.2 ft²
Hydraulic Length	376.00 ft
Manning's n	(N/A)
Slope	0.012 ft/ft
Wetted Perimeter	3.93 ft
Average Velocity	5.79 ft/s

Segment #5: TR-55 Channel Flow	
Segment Time of Concentration	0.018 hours

Segment #6: TR-55 Channel Flow	
Flow Area	1.8 ft²
Hydraulic Length	221.00 ft
Manning's n	(N/A)
Slope	0.010 ft/ft
Wetted Perimeter	4.71 ft
Average Velocity	5.97 ft/s
Segment Time of Concentration	0.010 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.382 hours

Subsection: Time of Concentration Calculations
Label: 3A: Dry Basin

Return Event: 2 years
Storm Event: 2-yr

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	18.00 ft
Manning's n	(N/A)
Slope	0.100 ft/ft
2 Year 24 Hour Depth	3.1 in
Average Velocity	0.16 ft/s
Segment Time of Concentration	0.032 hours

Segment #2: TR-55 Sheet Flow	
Hydraulic Length	46.00 ft
Manning's n	(N/A)
Slope	0.330 ft/ft
2 Year 24 Hour Depth	3.1 in
Average Velocity	0.30 ft/s
Segment Time of Concentration	0.042 hours

Segment #3: TR-55 Shallow Concentrated Flow	
Hydraulic Length	185.00 ft
Is Paved?	False
Slope	0.010 ft/ft
Average Velocity	1.61 ft/s
Segment Time of Concentration	0.032 hours

Segment #4: TR-55 Channel Flow	
Flow Area	0.8 ft²
Hydraulic Length	538.00 ft
Manning's n	(N/A)
Slope	0.010 ft/ft
Wetted Perimeter	3.14 ft
Average Velocity	4.55 ft/s
Segment Time of Concentration	0.033 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.139 hours

CURVE NUMBER CALCULATOR - PROPOSED CONDITIONS			
PROJECT:	The Villas at Aragon	DATE:	4/18/22
CLIENT:	Lombardo Homes	JOB #	22649

COMPOSITE CURVE NUMBER (CN) - Area 1A: West Bypass (Offsite)

Soil Name/Description	Hydrologic Soil Group (HSG)	CN	Area	Product (CN x Area)
Woods - Good Condition	D	77	16.18	1245.86
Developed Open Space - Good Condition	D	80	21.12	1689.60
Impervious Surfaces	-	98	7.99	783.02
	-			
		Totals:	45.29	3718.48

$$\text{Area 1A: CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{3718.48}{45.29} = 82.10$$

COMPOSITE CURVE NUMBER (CN) - AREA 1B: West Bypass (Onsite)

Soil Name/Description	Hydrologic Soil	CN	Area	Product
Woods - Good Condition	D	77	2.24	172.48
Developed Open Space - Good Condition	D	80	1.37	109.60
Impervious Surfaces	-	98	0.33	32.34
		Totals:	3.94	314.42

$$\text{Area 1B: CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{314.42}{3.94} = 79.80$$

COMPOSITE CURVE NUMBER (CN) - AREA 2A: Wet Pond

Soil Name/Description	Hydrologic Soil	CN	Area	Product
Developed Open Space - Good Condition	D	80	3.05	244.00
Impervious Surfaces	-	98	3.45	338.10
		Totals:	6.50	582.10

$$\text{Area 2A: CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{582.1}{6.50} = 89.55$$

COMPOSITE CURVE NUMBER (CN) - AREA 2B: Wet Pond

Soil Name/Description	Hydrologic Soil	CN	Area	Product
Developed Open Space - Good Condition	D	80	2.28	182.40
Impervious Surfaces	-	98	2.26	221.48
		Totals:	4.54	403.88

$$\text{Area 2B: CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{403.88}{4.54} = 88.96$$

COMPOSITE CURVE NUMBER (CN) - AREA 2C: Wet Pond

Soil Name/Description	Hydrologic Soil	CN	Area	Product
Developed Open Space - Good Condition	D	80	1.46	116.80
Impervious Surfaces / Pond	-	98	0.99	97.02
		Totals:	2.45	213.82

$$\text{Area 2C: CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{213.82}{2.45} = 87.27$$

COMPOSITE CURVE NUMBER (CN) - AREA 3A: Dry Basin

Soil Name/Description	Hydrologic Soil	CN	Area	Product
Developed Open Space - Good Condition	D	80	0.65	52.00
Impervious Surfaces	-	98	1.52	148.96
		Totals:	2.17	200.96

$$\text{Area 3A: CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{200.96}{2.17} = 92.61$$

COMPOSITE CURVE NUMBER (CN) - AREA 3B: Dry Basin

Soil Name/Description	Hydrologic Soil	CN	Area	Product
Developed Open Space - Good Condition	D	80	0.96	76.80
Impervious Surfaces	-	98	0.21	20.58
		Totals:	1.17	97.38

$$\text{Area 3B: CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{97.38}{1.17} = 83.23$$

COMPOSITE CURVE NUMBER (CN) - AREA 4: East Bypass

Soil Name/Description	Hydrologic Soil	CN	Area	Product
Woods - Good Condition	D	77	0.68	52.36
Developed Open Space - Good Condition	D	80	4.43	354.40
Impervious Surfaces	-	98	0.58	56.84
		Totals:	5.69	463.60

$$\text{Area 3B: CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{463.6}{5.69} = 81.48$$

Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	45.290 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	104.52 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	99.91 ft³/s

Drainage Area	
SCS CN (Composite)	82.10
Area (User Defined)	45.290 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.5 in
Runoff Volume (Pervious)	5.530 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	5.522 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	615.79 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	15-yr
Return Event	15 years
Duration	24.000 hours
Depth	4.7 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	45.290 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	200.91 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	193.27 ft³/s

Drainage Area	
SCS CN (Composite)	82.10
Area (User Defined)	45.290 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.8 in
Runoff Volume (Pervious)	10.650 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	10.637 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	615.79 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	25-yr
Return Event	25 years
Duration	24.000 hours
Depth	5.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	45.290 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	256.80 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	248.14 ft³/s

Drainage Area	
SCS CN (Composite)	82.10
Area (User Defined)	45.290 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.6 in
Runoff Volume (Pervious)	13.705 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	13.690 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	615.79 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	7.2 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	45.290 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	356.87 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	346.61 ft³/s

Drainage Area	
SCS CN (Composite)	82.10
Area (User Defined)	45.290 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.1 in
Runoff Volume (Pervious)	19.307 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	19.287 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	615.79 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	3.940 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	8.09 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	7.79 ft³/s

Drainage Area	
SCS CN (Composite)	79.80
Area (User Defined)	3.940 acres
Maximum Retention (Pervious)	2.5 in
Maximum Retention (Pervious, 20 percent)	0.5 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.3 in
Runoff Volume (Pervious)	0.431 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.430 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	53.57 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	15-yr
Return Event	15 years
Duration	24.000 hours
Depth	4.7 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	3.940 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	16.26 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	15.57 ft³/s

Drainage Area	
SCS CN (Composite)	79.80
Area (User Defined)	3.940 acres
Maximum Retention (Pervious)	2.5 in
Maximum Retention (Pervious, 20 percent)	0.5 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.6 in
Runoff Volume (Pervious)	0.859 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.858 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	53.57 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	25-yr
Return Event	25 years
Duration	24.000 hours
Depth	5.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	3.940 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	21.06 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	20.27 ft³/s

Drainage Area	
SCS CN (Composite)	79.80
Area (User Defined)	3.940 acres
Maximum Retention (Pervious)	2.5 in
Maximum Retention (Pervious, 20 percent)	0.5 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.4 in
Runoff Volume (Pervious)	1.117 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.116 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	53.57 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	7.2 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	3.940 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	29.73 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	28.79 ft³/s

Drainage Area	
SCS CN (Composite)	79.80
Area (User Defined)	3.940 acres
Maximum Retention (Pervious)	2.5 in
Maximum Retention (Pervious, 20 percent)	0.5 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.9 in
Runoff Volume (Pervious)	1.595 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.593 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	53.57 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.211 hours
Area (User Defined)	6.500 acres

Computational Time Increment	0.028 hours
Time to Peak (Computed)	12.009 hours
Flow (Peak, Computed)	16.82 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	16.66 ft³/s

Drainage Area	
SCS CN (Composite)	89.55
Area (User Defined)	6.500 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.0 in
Runoff Volume (Pervious)	1.104 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.101 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.211 hours
Computational Time Increment	0.028 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	34.92 ft³/s
Unit peak time, Tp	0.141 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.562 hours
Total unit time, Tb	0.703 hours

Storm Event	15-yr
Return Event	15 years
Duration	24.000 hours
Depth	4.7 in
Time of Concentration (Composite)	0.211 hours
Area (User Defined)	6.500 acres

Computational Time Increment	0.028 hours
Time to Peak (Computed)	12.009 hours
Flow (Peak, Computed)	28.58 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	28.38 ft³/s

Drainage Area	
SCS CN (Composite)	89.55
Area (User Defined)	6.500 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.5 in
Runoff Volume (Pervious)	1.918 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.914 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.211 hours
Computational Time Increment	0.028 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	34.92 ft³/s
Unit peak time, Tp	0.141 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.562 hours
Total unit time, Tb	0.703 hours

Storm Event	25-yr
Return Event	25 years
Duration	24.000 hours
Depth	5.6 in
Time of Concentration (Composite)	0.211 hours
Area (User Defined)	6.500 acres

Computational Time Increment	0.028 hours
Time to Peak (Computed)	12.009 hours
Flow (Peak, Computed)	35.17 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	34.94 ft³/s

Drainage Area	
SCS CN (Composite)	89.55
Area (User Defined)	6.500 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.4 in
Runoff Volume (Pervious)	2.388 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2.382 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.211 hours
Computational Time Increment	0.028 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	34.92 ft³/s
Unit peak time, Tp	0.141 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.562 hours
Total unit time, Tb	0.703 hours

Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	7.2 in
Time of Concentration (Composite)	0.211 hours
Area (User Defined)	6.500 acres

Computational Time Increment	0.028 hours
Time to Peak (Computed)	12.009 hours
Flow (Peak, Computed)	46.80 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	46.53 ft³/s

Drainage Area	
SCS CN (Composite)	89.55
Area (User Defined)	6.500 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.0 in
Runoff Volume (Pervious)	3.232 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	3.225 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.211 hours
Computational Time Increment	0.028 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	34.92 ft³/s
Unit peak time, Tp	0.141 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.562 hours
Total unit time, Tb	0.703 hours

Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.382 hours
Area (User Defined)	4.540 acres

Computational Time Increment	0.051 hours
Time to Peak (Computed)	12.115 hours
Flow (Peak, Computed)	8.96 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	8.87 ft³/s

Drainage Area	
SCS CN (Composite)	88.96
Area (User Defined)	4.540 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.0 in
Runoff Volume (Pervious)	0.752 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.748 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.382 hours
Computational Time Increment	0.051 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	13.47 ft³/s
Unit peak time, Tp	0.255 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	1.018 hours
Total unit time, Tb	1.273 hours

Storm Event	15-yr
Return Event	15 years
Duration	24.000 hours
Depth	4.7 in
Time of Concentration (Composite)	0.382 hours
Area (User Defined)	4.540 acres

Computational Time Increment	0.051 hours
Time to Peak (Computed)	12.115 hours
Flow (Peak, Computed)	15.43 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	15.30 ft³/s

Drainage Area	
SCS CN (Composite)	88.96
Area (User Defined)	4.540 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.5 in
Runoff Volume (Pervious)	1.317 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.311 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.382 hours
Computational Time Increment	0.051 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	13.47 ft³/s
Unit peak time, Tp	0.255 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	1.018 hours
Total unit time, Tb	1.273 hours

Storm Event	25-yr
Return Event	25 years
Duration	24.000 hours
Depth	5.6 in
Time of Concentration (Composite)	0.382 hours
Area (User Defined)	4.540 acres

Computational Time Increment	0.051 hours
Time to Peak (Computed)	12.115 hours
Flow (Peak, Computed)	19.06 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	18.92 ft³/s

Drainage Area	
SCS CN (Composite)	88.96
Area (User Defined)	4.540 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.3 in
Runoff Volume (Pervious)	1.644 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.637 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.382 hours
Computational Time Increment	0.051 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	13.47 ft³/s
Unit peak time, Tp	0.255 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	1.018 hours
Total unit time, Tb	1.273 hours

Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	7.2 in
Time of Concentration (Composite)	0.382 hours
Area (User Defined)	4.540 acres

Computational Time Increment	0.051 hours
Time to Peak (Computed)	12.115 hours
Flow (Peak, Computed)	25.49 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	25.32 ft³/s

Drainage Area	
SCS CN (Composite)	88.96
Area (User Defined)	4.540 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.9 in
Runoff Volume (Pervious)	2.232 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2.222 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.382 hours
Computational Time Increment	0.051 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	13.47 ft³/s
Unit peak time, Tp	0.255 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	1.018 hours
Total unit time, Tb	1.273 hours

Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	2.450 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	7.12 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	6.85 ft³/s

Drainage Area	
SCS CN (Composite)	87.27
Area (User Defined)	2.450 acres
Maximum Retention (Pervious)	1.5 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.8 in
Runoff Volume (Pervious)	0.377 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.377 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.31 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	15-yr
Return Event	15 years
Duration	24.000 hours
Depth	4.7 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	2.450 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	12.52 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	12.15 ft³/s

Drainage Area	
SCS CN (Composite)	87.27
Area (User Defined)	2.450 acres
Maximum Retention (Pervious)	1.5 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.3 in
Runoff Volume (Pervious)	0.676 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.676 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.31 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	25-yr
Return Event	25 years
Duration	24.000 hours
Depth	5.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	2.450 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	15.56 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	15.16 ft³/s

Drainage Area	
SCS CN (Composite)	87.27
Area (User Defined)	2.450 acres
Maximum Retention (Pervious)	1.5 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.2 in
Runoff Volume (Pervious)	0.850 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.849 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.31 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	7.2 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	2.450 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	20.95 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	20.47 ft³/s

Drainage Area	
SCS CN (Composite)	87.27
Area (User Defined)	2.450 acres
Maximum Retention (Pervious)	1.5 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.7 in
Runoff Volume (Pervious)	1.165 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.164 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.31 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.139 hours
Area (User Defined)	2.170 acres

Computational Time Increment	0.019 hours
Time to Peak (Computed)	11.953 hours
Flow (Peak, Computed)	6.93 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	6.90 ft³/s

Drainage Area	
SCS CN (Composite)	92.61
Area (User Defined)	2.170 acres
Maximum Retention (Pervious)	0.8 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.3 in
Runoff Volume (Pervious)	0.418 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.418 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.139 hours
Computational Time Increment	0.019 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	17.66 ft³/s
Unit peak time, Tp	0.093 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.371 hours
Total unit time, Tb	0.464 hours

Storm Event	15-yr
Return Event	15 years
Duration	24.000 hours
Depth	4.7 in
Time of Concentration (Composite)	0.139 hours
Area (User Defined)	2.170 acres

Computational Time Increment	0.019 hours
Time to Peak (Computed)	11.953 hours
Flow (Peak, Computed)	11.26 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	11.23 ft³/s

Drainage Area	
SCS CN (Composite)	92.61
Area (User Defined)	2.170 acres
Maximum Retention (Pervious)	0.8 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.9 in
Runoff Volume (Pervious)	0.698 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.697 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.139 hours
Computational Time Increment	0.019 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	17.66 ft³/s
Unit peak time, Tp	0.093 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.371 hours
Total unit time, Tb	0.464 hours

Storm Event	25-yr
Return Event	25 years
Duration	24.000 hours
Depth	5.6 in
Time of Concentration (Composite)	0.139 hours
Area (User Defined)	2.170 acres

Computational Time Increment	0.019 hours
Time to Peak (Computed)	11.953 hours
Flow (Peak, Computed)	13.67 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	13.63 ft³/s

Drainage Area	
SCS CN (Composite)	92.61
Area (User Defined)	2.170 acres
Maximum Retention (Pervious)	0.8 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.7 in
Runoff Volume (Pervious)	0.858 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.857 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.139 hours
Computational Time Increment	0.019 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	17.66 ft³/s
Unit peak time, Tp	0.093 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.371 hours
Total unit time, Tb	0.464 hours

Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	7.2 in
Time of Concentration (Composite)	0.139 hours
Area (User Defined)	2.170 acres

Computational Time Increment	0.019 hours
Time to Peak (Computed)	11.953 hours
Flow (Peak, Computed)	17.92 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	17.88 ft³/s

Drainage Area	
SCS CN (Composite)	92.61
Area (User Defined)	2.170 acres
Maximum Retention (Pervious)	0.8 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.3 in
Runoff Volume (Pervious)	1.144 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.142 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.139 hours
Computational Time Increment	0.019 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	17.66 ft³/s
Unit peak time, Tp	0.093 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.371 hours
Total unit time, Tb	0.464 hours

Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	1.170 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	2.85 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	2.72 ft³/s

Drainage Area	
SCS CN (Composite)	83.23
Area (User Defined)	1.170 acres
Maximum Retention (Pervious)	2.0 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.5 in
Runoff Volume (Pervious)	0.151 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.150 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	15.91 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	15-yr
Return Event	15 years
Duration	24.000 hours
Depth	4.7 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	1.170 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	5.37 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	5.17 ft³/s

Drainage Area	
SCS CN (Composite)	83.23
Area (User Defined)	1.170 acres
Maximum Retention (Pervious)	2.0 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.9 in
Runoff Volume (Pervious)	0.285 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.285 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	15.91 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	25-yr
Return Event	25 years
Duration	24.000 hours
Depth	5.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	1.170 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	6.82 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	6.60 ft³/s

Drainage Area	
SCS CN (Composite)	83.23
Area (User Defined)	1.170 acres
Maximum Retention (Pervious)	2.0 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.7 in
Runoff Volume (Pervious)	0.365 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.365 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	15.91 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	7.2 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	1.170 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	9.40 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	9.14 ft³/s

Drainage Area	
SCS CN (Composite)	83.23
Area (User Defined)	1.170 acres
Maximum Retention (Pervious)	2.0 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.2 in
Runoff Volume (Pervious)	0.511 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.511 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	15.91 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	5.690 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	12.73 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	12.19 ft³/s

Drainage Area	
SCS CN (Composite)	81.48
Area (User Defined)	5.690 acres
Maximum Retention (Pervious)	2.3 in
Maximum Retention (Pervious, 20 percent)	0.5 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.4 in
Runoff Volume (Pervious)	0.675 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.674 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	77.36 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	15-yr
Return Event	15 years
Duration	24.000 hours
Depth	4.7 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	5.690 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	24.76 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	23.79 ft³/s

Drainage Area	
SCS CN (Composite)	81.48
Area (User Defined)	5.690 acres
Maximum Retention (Pervious)	2.3 in
Maximum Retention (Pervious, 20 percent)	0.5 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.8 in
Runoff Volume (Pervious)	1.311 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.309 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	77.36 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	25-yr
Return Event	25 years
Duration	24.000 hours
Depth	5.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	5.690 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	31.76 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	30.66 ft³/s

Drainage Area	
SCS CN (Composite)	81.48
Area (User Defined)	5.690 acres
Maximum Retention (Pervious)	2.3 in
Maximum Retention (Pervious, 20 percent)	0.5 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.6 in
Runoff Volume (Pervious)	1.692 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.690 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	77.36 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	7.2 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	5.690 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	44.33 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	43.02 ft³/s

Drainage Area	
SCS CN (Composite)	81.48
Area (User Defined)	5.690 acres
Maximum Retention (Pervious)	2.3 in
Maximum Retention (Pervious, 20 percent)	0.5 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.0 in
Runoff Volume (Pervious)	2.392 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2.390 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.43
K Factor	0.75
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	77.36 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
1A: West Bypass (Offsite)	Developed Conditions 2-yr	2	5.522	11.950	99.91
1A: West Bypass (Offsite)	Developed Conditions 15-yr	15	10.637	11.900	193.27
1A: West Bypass (Offsite)	Developed Conditions 25-yr	25	13.690	11.900	248.14
1A: West Bypass (Offsite)	Developed Conditions 100-yr	100	19.287	11.900	346.61
1B: West Bypass (Onsite)	Developed Conditions 2-yr	2	0.430	11.950	7.79
1B: West Bypass (Onsite)	Developed Conditions 15-yr	15	0.858	11.900	15.57
1B: West Bypass (Onsite)	Developed Conditions 25-yr	25	1.116	11.900	20.27
1B: West Bypass (Onsite)	Developed Conditions 100-yr	100	1.593	11.900	28.79
2A: Wet Pond	Developed Conditions 2-yr	2	1.101	12.000	16.66
2A: Wet Pond	Developed Conditions 15-yr	15	1.914	12.000	28.38
2A: Wet Pond	Developed Conditions 25-yr	25	2.382	12.000	34.94
2A: Wet Pond	Developed Conditions 100-yr	100	3.225	12.000	46.53
2B: Wet Pond	Developed Conditions 2-yr	2	0.748	12.100	8.87
2B: Wet Pond	Developed Conditions 15-yr	15	1.311	12.100	15.30
2B: Wet Pond	Developed Conditions 25-yr	25	1.637	12.100	18.92
2B: Wet Pond	Developed Conditions 100-yr	100	2.222	12.100	25.32
2C: Wet Pond	Developed Conditions 2-yr	2	0.377	11.900	6.85
2C: Wet Pond	Developed Conditions 15-yr	15	0.676	11.900	12.15
2C: Wet Pond	Developed Conditions 25-yr	25	0.849	11.900	15.16
2C: Wet Pond	Developed Conditions 100-yr	100	1.164	11.900	20.47
3A: Dry Basin	Developed Conditions 2-yr	2	0.418	11.950	6.90
3A: Dry Basin	Developed Conditions 15-yr	15	0.697	11.950	11.23
3A: Dry Basin	Developed Conditions 25-yr	25	0.857	11.950	13.63
3A: Dry Basin	Developed Conditions 100-yr	100	1.142	11.950	17.88

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
3B: Dry Basin	Developed Conditions 2-yr	2	0.150	11.950	2.72
3B: Dry Basin	Developed Conditions 15-yr	15	0.285	11.900	5.17
3B: Dry Basin	Developed Conditions 25-yr	25	0.365	11.900	6.60
3B: Dry Basin	Developed Conditions 100-yr	100	0.511	11.900	9.14
East Bypass	Developed Conditions 2-yr	2	0.674	11.950	12.19
East Bypass	Developed Conditions 15-yr	15	1.309	11.900	23.79
East Bypass	Developed Conditions 25-yr	25	1.690	11.900	30.66
East Bypass	Developed Conditions 100-yr	100	2.390	11.900	43.02

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
O-1	Developed Conditions 2-yr	2	8.273	11.950	120.58
O-1	Developed Conditions 15-yr	15	16.456	11.950	238.36
O-1	Developed Conditions 25-yr	25	21.329	11.950	317.88
O-1	Developed Conditions 100-yr	100	30.237	11.900	458.91

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Wet Pond (IN)	Developed Conditions 2-yr	2	2.226	12.000	29.82	(N/A)	(N/A)
Wet Pond (OUT)	Developed Conditions 2-yr	2	1.239	12.450	6.17	497.63	1.174
Wet Pond (IN)	Developed Conditions 15-yr	15	3.901	12.000	51.26	(N/A)	(N/A)

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Wet Pond (OUT)	Developed Conditions 15-yr	15	2.863	12.200	28.49	498.13	1.584
Wet Pond (IN)	Developed Conditions 25-yr	25	4.868	12.000	63.31	(N/A)	(N/A)
Wet Pond (OUT)	Developed Conditions 25-yr	25	3.820	12.150	42.45	498.34	1.769
Wet Pond (IN)	Developed Conditions 100-yr	100	6.611	12.000	84.60	(N/A)	(N/A)
Wet Pond (OUT)	Developed Conditions 100-yr	100	5.545	12.100	63.51	498.66	2.050
Dry Basin (IN)	Developed Conditions 2-yr	2	0.568	11.950	9.62	(N/A)	(N/A)
Dry Basin (OUT)	Developed Conditions 2-yr	2	0.408	12.150	3.06	489.43	0.284
Dry Basin (IN)	Developed Conditions 15-yr	15	0.982	11.950	16.27	(N/A)	(N/A)
Dry Basin (OUT)	Developed Conditions 15-yr	15	0.789	12.050	10.54	489.82	0.387
Dry Basin (IN)	Developed Conditions 25-yr	25	1.222	11.950	20.01	(N/A)	(N/A)
Dry Basin (OUT)	Developed Conditions 25-yr	25	1.012	12.050	14.05	489.99	0.435
Dry Basin (IN)	Developed Conditions 100-yr	100	1.653	11.950	26.64	(N/A)	(N/A)
Dry Basin (OUT)	Developed Conditions 100-yr	100	1.422	12.100	14.71	490.36	0.543

Subsection: Elevation-Area Volume Curve
Label: Dry Basin

Return Event: 100 years
Storm Event: 100-yr

Elevation (ft)	Planimeter (ft²)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
487.50	0.0	0.034	0.000	0.000	0.000
488.00	0.0	0.089	0.178	0.030	0.030
489.00	0.0	0.228	0.458	0.153	0.182
489.50	0.0	0.251	0.718	0.120	0.302
489.51	0.0	0.261	0.768	0.003	0.305
490.00	0.0	0.281	0.812	0.133	0.437
491.50	0.0	0.346	0.938	0.469	0.906

Subsection: Elevation-Area Volume Curve
Label: Wet Pond

Return Event: 100 years
Storm Event: 100-yr

Elevation (ft)	Planimeter (ft^2)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
496.00	0.0	0.567	0.000	0.000	0.000
496.30	0.0	0.683	1.873	0.187	0.187
497.00	0.0	0.743	2.139	0.499	0.686
497.50	0.0	0.788	2.297	0.383	1.069
497.51	0.0	0.796	2.376	0.008	1.077
498.00	0.0	0.836	2.447	0.400	1.477
499.00	0.0	0.916	2.626	0.875	2.352
499.67	0.0	0.971	2.829	0.632	2.984

Requested Pond Water Surface Elevations	
Minimum (Headwater)	496.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	499.67 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Inlet Box	4'x4' Overflow	Forward	36" Outlet Pipe	497.45	499.67
Culvert-Circular	36" Outlet Pipe	Forward	TW	491.12	499.67
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: 4'x4' Overflow Structure Type: Inlet Box	
Number of Openings	1
Elevation	497.45 ft
Orifice Area	16.0 ft²
Orifice Coefficient	0.60
Weir Length	16.00 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.00
Manning's n	0.00
Kev, Charged Riser	0.00
Weir Submergence	False
Orifice H to crest	False

Structure ID: 36" Outlet Pipe Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	36.0 in
Length	51.69 ft
Length (Computed Barrel)	51.69 ft
Slope (Computed)	0.012 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.50
Kb	0.01
Kr	0.00
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0098
M	2.0000
C	0.0398
Y	0.6700
T1 ratio (HW/D)	1.15
T2 ratio (HW/D)	1.30
Slope Correction Factor	-0.50

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	494.58 ft	T1 Flow	42.85 ft³/s
T2 Elevation	495.02 ft	T2 Flow	48.97 ft³/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall
Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Subsection: Composite Rating Curve
Label: OS 35 (LFB)

Return Event: 100 years
Storm Event: 100-yr

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
496.00	0.00	(N/A)	0.00
496.50	0.00	(N/A)	0.00
497.00	0.00	(N/A)	0.00
497.45	0.00	(N/A)	0.00
497.50	0.54	(N/A)	0.00
498.00	19.57	(N/A)	0.00
498.50	51.64	(N/A)	0.00
499.00	85.97	(N/A)	0.00
499.50	89.55	(N/A)	0.00
499.67	90.74	(N/A)	0.00

Contributing Structures
(no Q: 4'x4' Overflow,36" Outlet Pipe)
(no Q: 4'x4' Overflow,36" Outlet Pipe)
(no Q: 4'x4' Overflow,36" Outlet Pipe)
(no Q: 4'x4' Overflow,36" Outlet Pipe)
4'x4' Overflow,36" Outlet Pipe
4'x4' Overflow,36" Outlet Pipe
4'x4' Overflow,36" Outlet Pipe
4'x4' Overflow,36" Outlet Pipe
4'x4' Overflow,36" Outlet Pipe
4'x4' Overflow,36" Outlet Pipe

Requested Pond Water Surface Elevations	
Minimum (Headwater)	487.50 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	491.50 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Inlet Box	2.5'x2.5' Overflow	Forward	15" Outlet Pipe	489.25	491.50
Culvert-Circular	15" Outlet Pipe	Forward	TW	484.50	491.50
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: 2.5'x2.5' Overflow Structure Type: Inlet Box	
Number of Openings	1
Elevation	489.25 ft
Orifice Area	6.3 ft²
Orifice Coefficient	0.60
Weir Length	10.00 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.00
Manning's n	0.00
Kev, Charged Riser	0.00
Weir Submergence	False
Orifice H to crest	False

Structure ID: 15" Outlet Pipe Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	15.0 in
Length	46.97 ft
Length (Computed Barrel)	46.97 ft
Slope (Computed)	0.011 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.20
Kb	0.02
Kr	0.00
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.09
T2 ratio (HW/D)	1.19
Slope Correction Factor	-0.50

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	485.86 ft	T1 Flow	4.80 ft³/s
T2 Elevation	485.99 ft	T2 Flow	5.49 ft³/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall
Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Subsection: Composite Rating Curve
Label: OS 37 (LFB)

Return Event: 100 years
Storm Event: 100-yr

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
487.50	0.00	(N/A)	0.00
488.00	0.00	(N/A)	0.00
488.50	0.00	(N/A)	0.00
489.00	0.00	(N/A)	0.00
489.25	0.00	(N/A)	0.00
489.50	3.75	(N/A)	0.00
490.00	14.18	(N/A)	0.00
490.50	14.91	(N/A)	0.00
491.00	15.60	(N/A)	0.00
491.50	16.26	(N/A)	0.00

Contributing Structures
(no Q: 2.5'x2.5' Overflow,15" Outlet Pipe)
(no Q: 2.5'x2.5' Overflow,15" Outlet Pipe)
(no Q: 2.5'x2.5' Overflow,15" Outlet Pipe)
(no Q: 2.5'x2.5' Overflow,15" Outlet Pipe)
(no Q: 2.5'x2.5' Overflow,15" Outlet Pipe)
2.5'x2.5' Overflow,15" Outlet Pipe
2.5'x2.5' Overflow,15" Outlet Pipe
2.5'x2.5' Overflow,15" Outlet Pipe
2.5'x2.5' Overflow,15" Outlet Pipe
2.5'x2.5' Overflow,15" Outlet Pipe

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
1A: West Bypass (Offsite)	Developed Conditions 100-yr	100	19.287	11.900	346.61
1B: West Bypass (Onsite)	Developed Conditions 100-yr	100	1.593	11.900	28.79
2A: Wet Pond	Developed Conditions 100-yr	100	3.225	12.000	46.53
2B: Wet Pond	Developed Conditions 100-yr	100	2.222	12.100	25.32
2C: Wet Pond	Developed Conditions 100-yr	100	1.164	11.900	20.47
3A: Dry Basin	Developed Conditions 100-yr	100	1.142	11.950	17.88
3B: Dry Basin	Developed Conditions 100-yr	100	0.511	11.900	9.14
East Bypass	Developed Conditions 100-yr	100	2.390	11.900	43.02

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
O-1	Developed Conditions 100-yr	100	31.479	11.900	463.82

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Dry Basin (IN)	Developed Conditions 100-yr	100	1.653	11.950	26.64	(N/A)	(N/A)
Dry Basin (OUT)	Developed Conditions 100-yr	100	1.648	12.100	14.73	490.38	0.547
Wet Pond (IN)	Developed Conditions 100-yr	100	6.611	12.000	84.60	(N/A)	(N/A)
Wet Pond (OUT)	Developed Conditions 100-yr	100	6.560	12.100	65.01	498.69	2.076

STORMWATER MANAGEMENT SIZING CALCULATOR

PROJECT:	The Villas at Aragon	DATE:	6/29/22
CLIENT:	Lombardo Homes	JOB #	22649

WATER QUALITY VOLUME (WQv)

Knowns:

13.49	A_{Tot} = Area in Acres
6.70	A_{Imp} = Impervious Area in Acres
49.67	I = Post Developed % Impervious

1.14 P = Rainfall depth in inches

Note: 85th percentile storm event, i.e. all the runoff from 85% of the storms that occur on average during the course of a year and a portion of the runoff from all storms greater than 1.2 inches

Vol. Runoff coeff.: $Rv = 0.05 + 0.009 \times I$ = 0.50

Water quality Vol: $WQv = P \times Rv \times A_{Tot} \times 43560 / 12$

WQv = 27745 Cubic Feet

WQv provided by Wet Pond per Georgia Stormwater Manual

Volume Required: $Fv = 0.1x\ I \times A_{Imp} \times 43560 / 12$ = **2,432 CF**

FE 8 & FE 19 FOREBAY CALCULATION

Discharge Point Tributary Area:

$A_{FE\ 1}$ = 11.04 Ac.

= 81.84%

Required: $V_{FE\ 1\ Forebay}$ = 1,990 CF

Provided: $V_{FE\ 1\ Forebay}$ = 1,990 CF

Proposed $V_{FE\ 1\ Forebay}$ > Required $V_{FE\ 1\ Forebay}$ = **PASS**

VOLUME WITHIN FOREBAY

Elevation	Area (sf)	Volume (cf)	Cumulative	Notes
496.00	1,703	0	0	Normal water level
497.00	2,277	1,990	1,990	Forebay spillway elevation

PROVIDED POND VOLUME (ELEVATION-AREA CALCULATION)

Elevation	Area (sf)	Volume (cf)	Total	Notes:
496.00	24,706	0	0	Normal water level
496.30	29,763	8,170	8,170	
496.95	32,192	20,135	28,306	WQv Ponding Depth 0.95' (El. 496.95)
497.00	32,379	21,750	29,920	
497.50	34,324	16,676	46,596	
497.51	34,676	345	46,941	
498.00	36,400	17,414	64,354	
499.00	39,897	38,149	102,503	
499.67	42,277	27,528	130,031	10' Wide Emergency Spillway

ACTUAL WATER QUALITY VOLUME (WQv) CHECK

WQv Volume Check:	PROPOSED		MINIMUM REQUIRED		
	Vp = 28,306 CF	**>**	**Vp = 27,745 CF**	**=**	**PASS**

Notes: The WQv required for the project must be calculated from the Disturbed Area. The WQv required for the P-2 Pond must be calculated from the Tributary Area

STORMWATER MANAGEMENT SIZING CALCULATOR

PROJECT:	The Villas at Aragon	DATE:	6/29/22
CLIENT:	Lombardo Homes	JOB #	22649

CHANNEL PROTECTION VOLUME (Cpv)

Knowns:

D	Soil Type
88.18	Post Developed CN
0.237	Time of Concentration (hours) - Post Developed Property
13.49	A = Area in Acres

2.50 P1 = 1-Year, 24-Hour Rainfall (inches)

S = 1000 / CN - 10 = 1.340

Initial abstraction: Ia = 0.2 x S = 0.268

Post runoff depth: Qa = [P1 - Ia]^2 / [(P1 - Ia)+S] = 1.394 inches

620 qu = Unit peak discharge (csm/inch) - Find from Figure D.11.1

Peak inflow rate: qi = qu x A x Qa = 18.22 cfs * Area is in square miles

Note: if qi < 2.0, then Cpv is not required

0.031 qo / qi = Ratio of the outflow to inflow - Find from Figure D.11.2 (Use T=24 hours)

Peak outflow rate: qo = (qo/qi) x qi = 0.565 cfs

Vs/Vr = Ratio of storage volume to runoff volume and is equal to 0.683 - 1.43(qo/qi) + 1.64(qo/qi)^2 - 0.804(qo/qi)^3 = 0.640

Vs = (Vs/Vr) x Qa = 1.0036 Acre-feet

Cpv = 43717 CF

PROVIDED POND VOLUME (ELEVATION-AREA CALCULATION)

Elevation	Area (sf)	Volume (cf)	Total Volume	Notes:
496.00	24,706	0	0	Normal water level
496.30	29,763	8,170	8,170	
497.00	32,379	21,750	29,920	
497.42	34,013	13,942	43,862	CPv Ponding Depth 1.42' (El. 497.42)
497.50	34,324	16,676	46,596	
497.51	34,676	345	46,941	
498.00	36,400	17,414	64,354	
499.00	39,897	38,149	102,503	
499.67	42,277	27,528	130,031	10' Wide Emergency Spillway

1.00 ho = Maximum storage depth associated with Vr (feet)

Required Orifice Area for Ext Det.: Ao = qo / (4.81 x ho^0.5) = 0.117 Square Feet

Required Maximum Orifice Diameter: Do = (4 x Ao / Pi)^0.5*12 = 4.64 inches

Notes: The CPv required for the project must be calculated from the Disturbed Area. The CPv required for the P-2 Pond must be calculated from the Tributary Area

STORMWATER MANAGEMENT SIZING CALCULATOR

PROJECT:	The Villas at Aragon	DATE:	6/29/22
CLIENT:	Lombardo Homes	JOB #	22649

SEDIMENT VOLUME (V_S)

Knowns: 13.49 A_{Tot} = Area in Acres

35 ft^3/year sediment per MO-DNR guidelines

V_s = 472 ft^3/year

Per City of O'fallon requirements, 2 years of sediment storage volume to be accounted for within basin.

$V_{s\ (2\ yr)}$ = 944 ft^3

Elevation	Area (sf)	Volume (cf)	Total Volume (cf)	Notes:
486.00	180	0	0	Pond Invert
487.55	1,074	972	972	2-yr Sediment Storage Depth
488.00	1,334	1,514	1,514	
490.00	3,330	4,664	6,178	

F-6 Bioretention Calculator - Dry Detention Basin

PROJECT:	The Villas at Aragon	DATE:	4/18/22
CLIENT:	Lombardo Homes	JOB #	22649

WATER QUALITY VOLUME (WQv)

Knowns:

3.34	A = Site Area ((Ac)
1.14	P = Rainfall depth in inches (90% of recorded daily events)

Impervious area: 1.73 Ac

I= 51.8 %

Vol. Runoff coeff.: $R_v = 0.05 + 0.009 * I$ = 0.516

Tributary Runoff Volume: $WQ_v = P \times R_v \times A \times 43560 / 12$ = 7,134.3 CF

BIORETENTION SIZING

Knowns:

2.00	k = coefficient of permiability (ft/day) - typically 2
2.00	t_f = design filter bed drain time (days) - typically 2 days
0.40	n = porosity of filter media - typically 0.40
2.00	p = ponding depth (ft) (max height of water above filter media)
2.50	d_f = filter bed depth (ft) (2' - 4' deep)
0.75	h_f = average height of water above filter bed (ft) (p / 2)

Surface Area of Treatment Req: $A_f = [WQ_v \times d_f] / [k \times (h_f + d_f) \times t_f]$ = 1372 SF

Surface Area of Treatment Provided: A_f = 1,485 SF

Provided A_f > Required A_f = **PASS** See volume calculation below

Temporary Volume Required: $V_{Temp} = 75\% WQ_v$ = 5351 CF

Temporary Volume Provided: V_{temp} = **5,609** **CF**

Provided V_{Temp} > Required V_{Temp} = **PASS** See volume calculation below

Notes: The WQv required for the Bioretention must be calculated from the Tributary Area using a P = 1.14in for the water quality storm event.

CHANNEL PROTECTION VOLUME (Cpv)

Knowns:

D	Soil Type
89.32	Post Developed Composite CN
0.083	Time of Concentration (hours) - Post Developed Property
3.34	A = Area in Acres
2.50	P1 = 1-Year, 24-Hour Rainfall (inches)

S = 1000 / CN - 10 = 1.196

Initial abstraction: Ia = 0.2 x S = 0.239

Post runoff depth: Qa = [P1 - Ia]^2 / [(P1 - Ia)+S] = 1.479 inches

980 qu = Unit peak discharge (csm/inch) - Find from Figure D.11.1

Peak inflow rate: qi = qu x A x Qa = 7.56 cfs * Area is in square miles

Note: if qi < 2.0, then Cpv is not required

0.020 qo / qi = Ratio of the outflow to inflow - Find from Figure D.11.2 (Use T=24 hours)

Peak outflow rate: qo = (qo/qi) x qi = 0.151 cfs

Vs/Vr = Ratio of storage volume to runoff volume and is equal to 0.683 - 1.43(qo/qi) + 1.64(qo/qi)^2 - 0.804(qo/qi)^ 0.655

Vs = (Vs/Vr) x Qa = 0.2696 Acre-feet

Channel Protection Volume Required: **$CP_{V\ Req.}$ = 11,744 CF**

Channel Protection Volume Provided: **$CP_{V\ Pro.}$ = 11,832 CF** See volume calculation below

Provided CP_V > Required CP_V = **PASS**

FOREBAY SIZING

Discharge Point Tributary Area: $A_{FE\ 29}$ = 2.16 Ac.
= 64.67%

Forebay Volume Required: V_{FORE} = 25% WQ_V = 1,338 CF

FE 29 Forebay Vol. Required: = 865 CF
FE 29 Forebay Vol. Provided: = 1,060 CF

Proposed $V_{FE\ 29\ Forebay}$ > Required $V_{FE\ 29\ Forebay}$ = **PASS** See volume calculation below

VOLUME WITHIN FE 29 FOREBAY

Elevation	Area (sf)	Volume (cf)	Cumulative	Notes
488.00	842	0	0	
489.00	1,277	1,060	1,060	Forebay Overflow Weird El.

VOLUME WITHIN BASIN

Elevation	Area (sf)	Volume (cf)	Cumulative Volume (cf)	Notes
484.83	1,485	0	0	Bottom filter media
487.50	1,485	1,586	1,586	Filter media surface - 40% porosity
487.50	1,485	0	1,586	Start area above sediment storage
488.00	3,860	1,336	2,922	
488.50	6,886	2,687	5,609	WQv Ponding Depth (1.00')
489.00	9,912	6,886	9,808	
489.20	10,329	2,024	11,832	CPv Ponding Depth (1.70')
489.50	10,955	5,217	15,025	
489.51	11,352	112	15,137	
490.00	12,246	5,782	20,918	
491.50	15,053	20,474	41,392	

SEDIMENT VOLUME (V_S)

Knowns: 3.34 A_{Tot} = Area in Acres

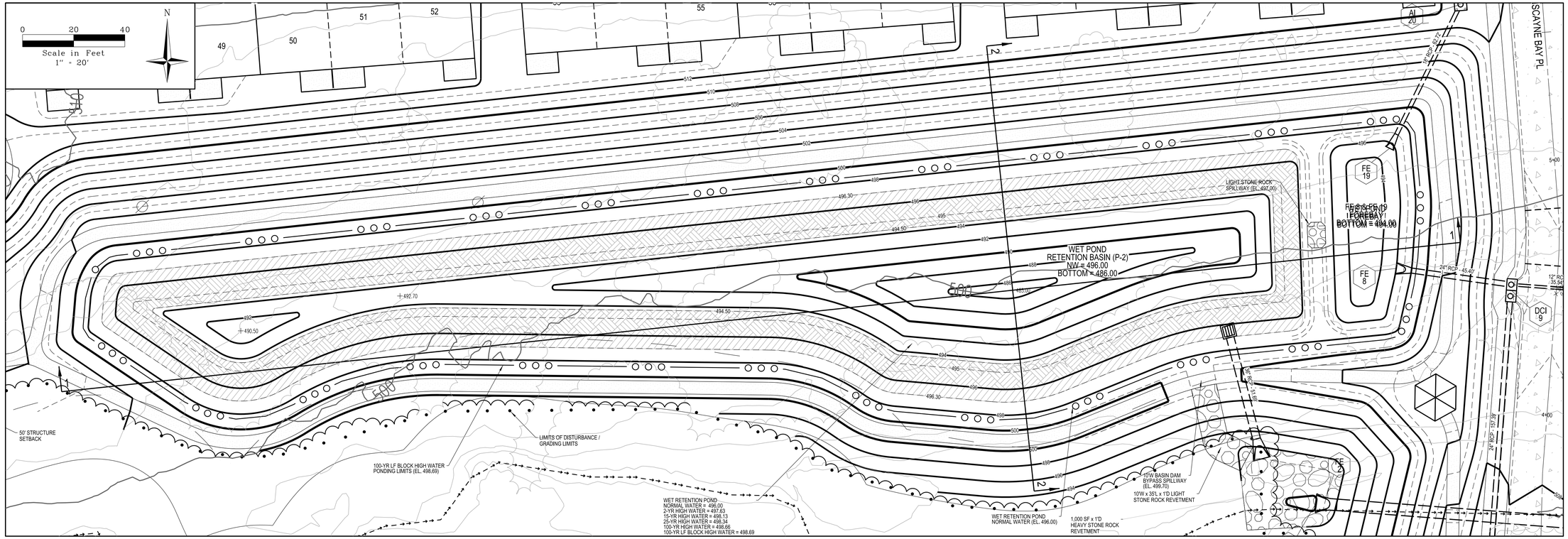
35 ft^3/year sediment per MO-DNR guidelines

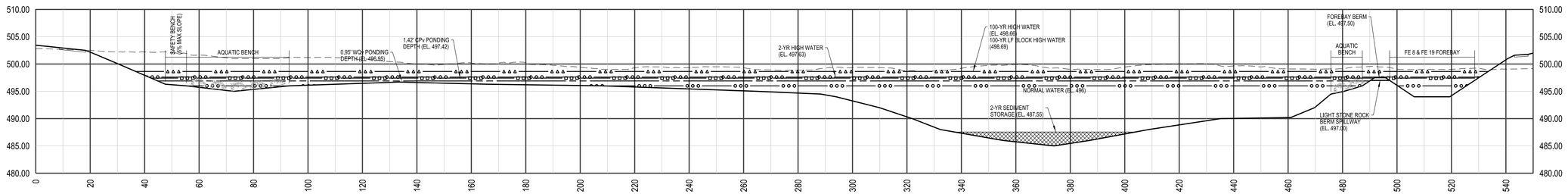
V_s = 117 ft^3/year

Per City of O'fallon requirements, 2 years of sediment storage volume to be accounted for within basin.

$V_{s\ (2\ yr)}$ = 234 ft^3

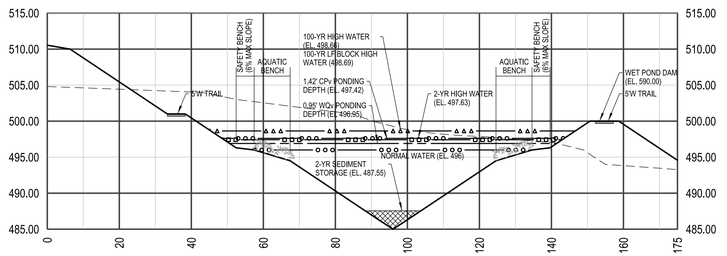
Elevation	Area (sf)	Volume (cf)	Cumulative Volume (cf)	Notes
487.50	1,485	0	0	Start area above filter media
487.65	2,197	276	276	2yr Sediment Storage Depth (0.15')
488.00	3,860	1,336	1,336	
489.00	9,912	6,886	8,222	
490.00	12,246	16,106	17,442	





WET RETENTION POND: SECTION 1-1

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1' = 10'



WET RETENTION POND: SECTION 2-2

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1' = 10'

P-2 Wet Retention Pond Area Maintenance Plan for The Villas at Aragon

Primary maintenance activities include vegetation management and debris and sediment removal. Routine maintenance activities, and the frequency at which they will be conducted, are shown below

No.	Routine Maintenance Task	Frequency of Task
1	If ponding water above the low flow openings remains for longer than 3 days, Clogging of the low flow openings on the outlet structure has occurred. Repair by inspecting and removing debris caught in the outlet structure openings.	As needed
2	Trim and/or remove vegetation to give the desired "shape", to prevent establishment of woody vegetation, and for mosquito control.	Twice a year (February and September)
3	Trim vegetation near the pond area or as directed by a Landscape Professional.	November through March
4	Conduct vegetation management, removing weeds and harvesting vegetation along banks. Remove all grass cuttings and other green waste.	Twice a year (February and September)
5	Remove accumulated trash and debris from the facilities and dispose of trash and debris properly.	Twice a year (February and September)
6	Remove sediment from the forebay and dispose of sediment properly.	Twice a year (February and September)
7	Inspect structural components (Overflow Drains, etc.) for cracking, subsidence, erosion and deterioration.	Twice a year, or as needed

Wet Retention Pond Design and As-built Verification Information Table

Basin ID	Design Overflow Sill Elev. (ft)*	As-built Overflow Sill Elev. (ft)*	Design Bypass/ Spill Point Elev. (ft)**	As-built Bypass/ Spill Point Elev. (ft)**	Required WQ Volume (ft^3)	Proposed WQ Volume (ft^3)	As-built WQ Volume (ft^3)	Required CP_v Volume (ft^3)	Proposed CP_v Volume (ft^3)	CP_v Provided (ft^3)
Wet Retention Pond (P-2 Wet Pond)	497.45		499.70		27,745	28,306 (El. 496.95)		43,717	43,862 (El. 497.42)	

* Overflow Sill Elevation = Maximum Water Quality Storage Elevation
** Bypass/Spill Point Elevation = Lowest adjacent elevation on the basin perimeter where overland flow would be directed.
As-built portion of table to be certified by a Professional Engineer or Professional Land Surveyor licensed in Missouri

CALL MISSOURI ONE CALL SYSTEMS INC. TWO FULL WORKING DAYS IN ADVANCE OF STARTING
WORK.MISSOURI ONE-CALL 1-800-344-7483

THE UNDERGROUND UTILITIES SHOWN HEREIN WERE PLOTTED FROM AVAILABLE INFORMATION AND DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, OR NON EXISTENCE, SIZE, TYPE, NUMBER, OR LOCATION OF THESE OR OTHER UTILITIES. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND UTILITIES IN THE FIELD, SHOWN OR NOT SHOWN, PRIOR TO ANY GRADING, EXCAVATION, OR CONSTRUCTION OF IMPROVEMENTS. THESE PROVISIONS SHALL IN NO WAY ABSOLVE ANY PARTY FROM COMPLYING WITH THE UNDERGROUND FACILITY SAFETY AND DAMAGE PREVENTION ACT, CHAPTER 319, RSMO.

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www.volzinc.com
Authority #203

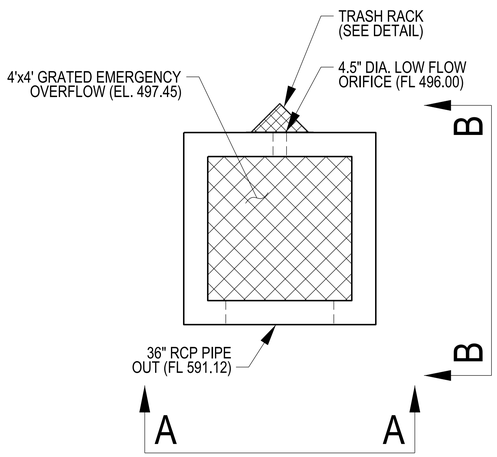
STATE OF MISSOURI
RYAN LEE HOLMES
NUMBER
PE-2017018988
PROFESSIONAL ENGINEER
09-01-22
RYAN L. HOLMES
Professional Engineer
PE-2017018988

THE VILLAS AT ARAGON

VETERANS MEMORIAL PARKWAY
O'FALLON, MO 63366

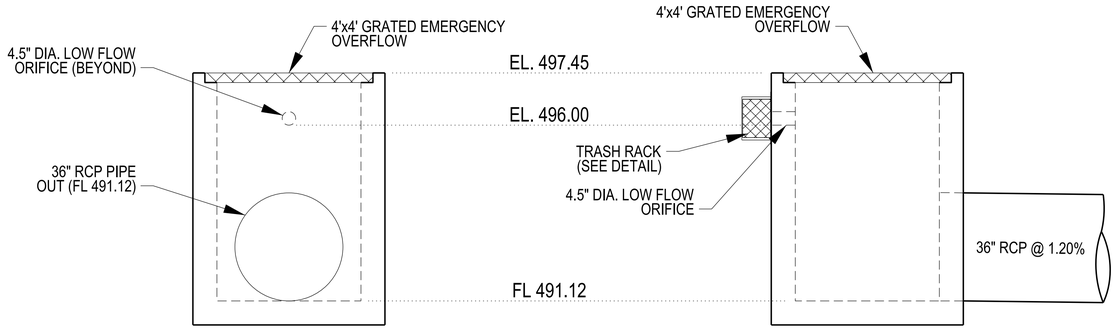
WET RETENTION POND
PLAN & CROSS-SECTIONS

Design By: RLH
Drawn By: RLH
Checked By: RLH
Parcel ID: 2-056C-S028-00-0001.10
Permit No. GR21-000001
Volz Project # 22449
09-01-22
C17.0



OS 35 TOP VIEW

SCALE: 1" = 2'

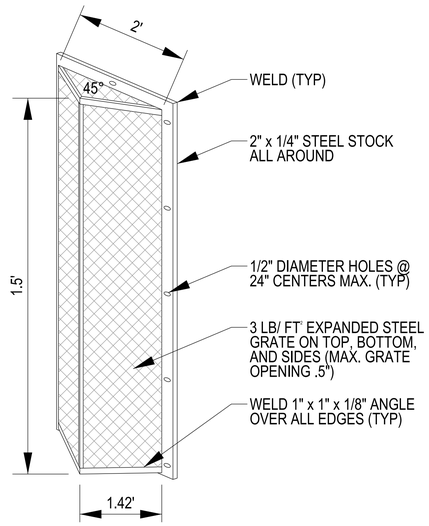


SECTION A-A

SCALE: 1" = 2'

SECTION B-B

SCALE: 1" = 2'

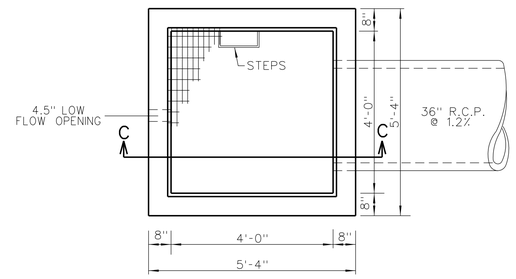


NOTES FOR TRASH RACK:

1. TRASH RACK SHALL BE CENTERED OVER OPENING.
2. STEEL TO CONFORM TO ASTM-36.
3. ALL SURFACES SHALL BE COATED WITH ZRC COLD GALVANIZING COMPOUND AFTER WELDING.
4. TRASH RACK SHALL BE FASTENED TO THE WALL WITH 1/2" MASONRY ANCHORS. TRASH RACK SHALL BE REMOVEABLE.

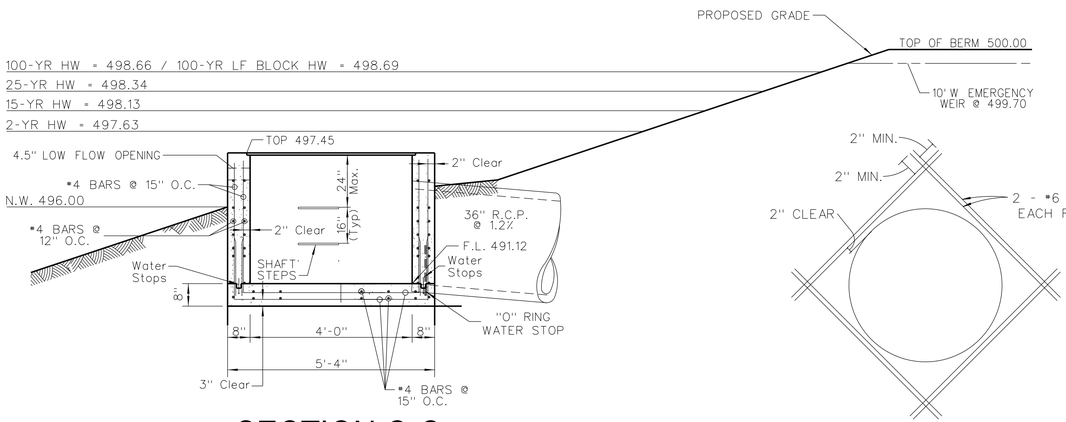
TRASH RACK DETAIL (OR APPROVED EQUAL)

N.T.S.



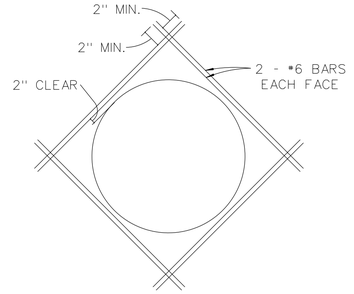
OS 35 TOP VIEW

N.T.S.



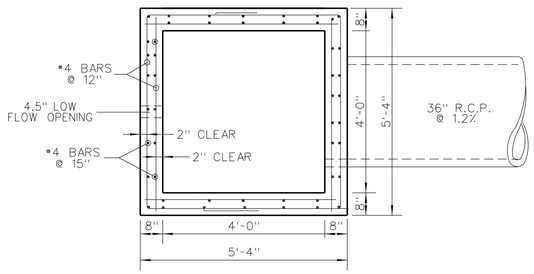
SECTION C-C
OS 35 REINFORCEMENT DETAIL

N.T.S.



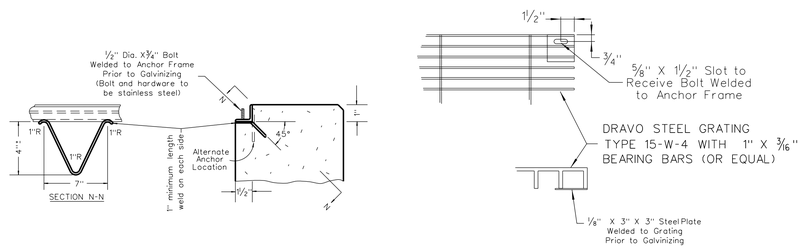
REINFORCEMENT AROUND OPENING

N.T.S.



OS 35 TOP VIEW
REINFORCEMENT DETAIL

N.T.S.



DETAIL OF CONTINUOUS ANCHOR FOR ANGLE SEAT & BOLT DOWN GRATE

N.T.S.

CONSTRUCTION NOTES:

1. Concrete for the structure shall be "air entrained" and contain at least 6 sacks Class "A" Portland Cement per cubic yard. The concrete shall be placed at a slump of 4 inches +-1/2 inch. The concrete shall be proportioned and transported in accordance with ASTM C-94.
2. Reinforcing steel shall conform to ASTM C-615-60 with deformations conforming to ASTM A-305 and shall have a minimum cover of 2 inches except for 3 inches where concrete is poured against earth.
3. Laps and/or splices in reinforcing steel shall be a minimum of 30 bar diameters.
4. Keyed joints shown are to be 2-inch x 2-inch keyed construction joints.
5. fs = 24,000 psi.
6. fc = 3,750 psi.
7. All exposed edges to have a 3/4-inch chamfer.
8. Contractor to provide for bypass of stormwater during construction of structure.
9. All soil specifications shall be directed by soils engineer.

CALL MISSOURI ONE CALL SYSTEMS INC. TWO FULL WORKING DAYS IN ADVANCE OF STARTING

WORK MISSOURI
ONE-CALL 1-800-344-7483

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O'fallon Planning and Development Division File No.: 21-002817 | Approved: July 2, 2021

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Authority #203

STATE OF MISSOURI
RYAN LEE HOLMES
NUMBER
PE-2017018988
PROFESSIONAL ENGINEER
09-01-22
RYAN L. HOLMES
Professional Engineer
PE-2017018988

THE VILLAS AT ARAGON

VETERANS MEMORIAL PARKWAY
O'FALLON, MO 63366

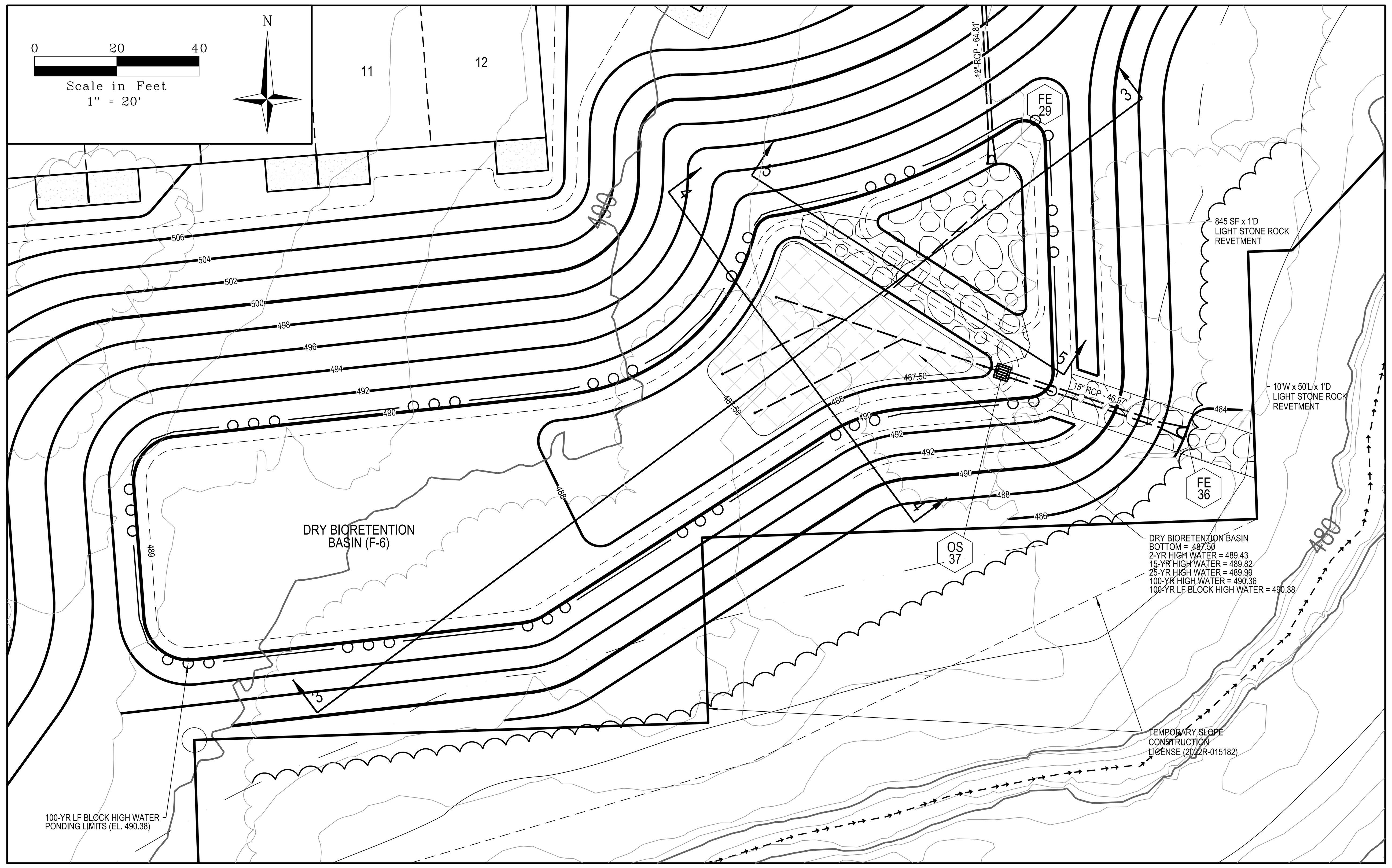
WET RETENTION POND OUTFALL STRUCTURE DETAILS (OS 35)

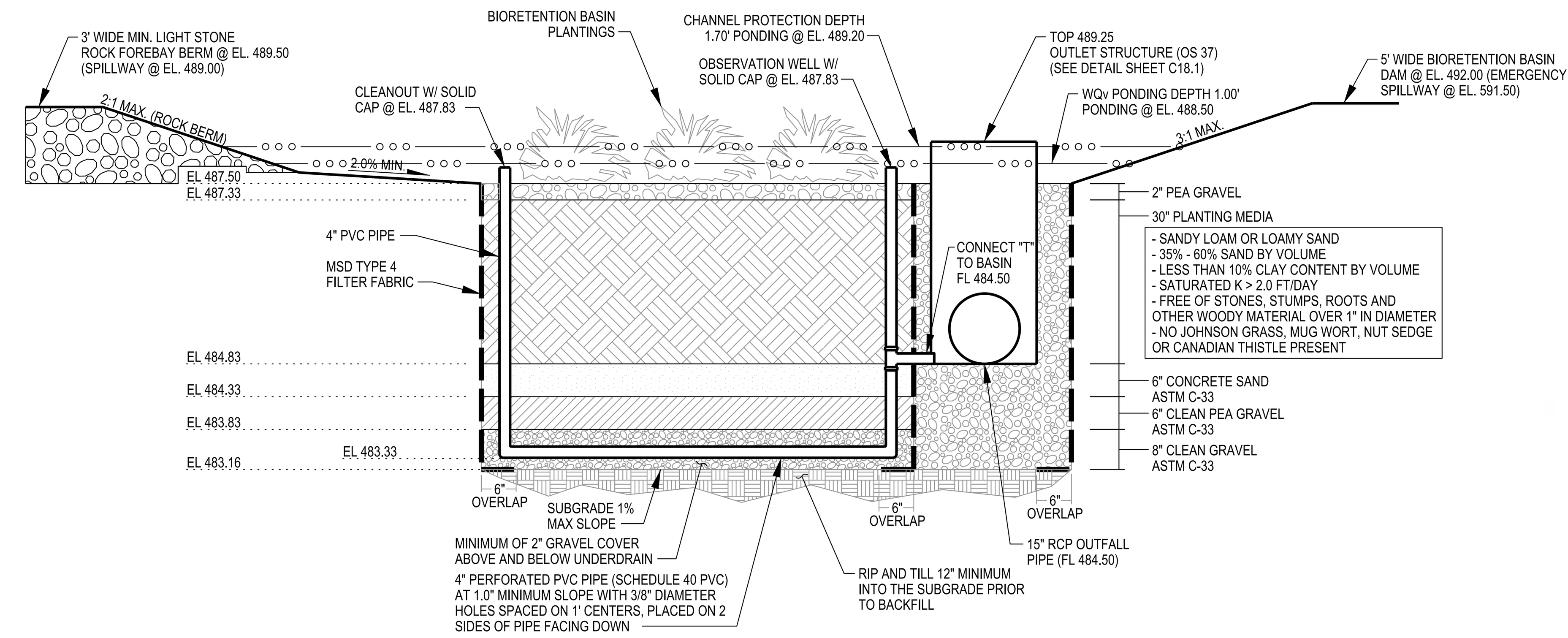
Parcel ID: 2-056C-9028-00-0001.10
Permit No. ERS2-000001
Volz Project # 22649

Design By: RLH
Drawn By: RLH
Checked By: RLH

09-01-22

C17.1





BIORETENTION (F-6) TYPICAL SECTION: DRY DETENTION BASIN

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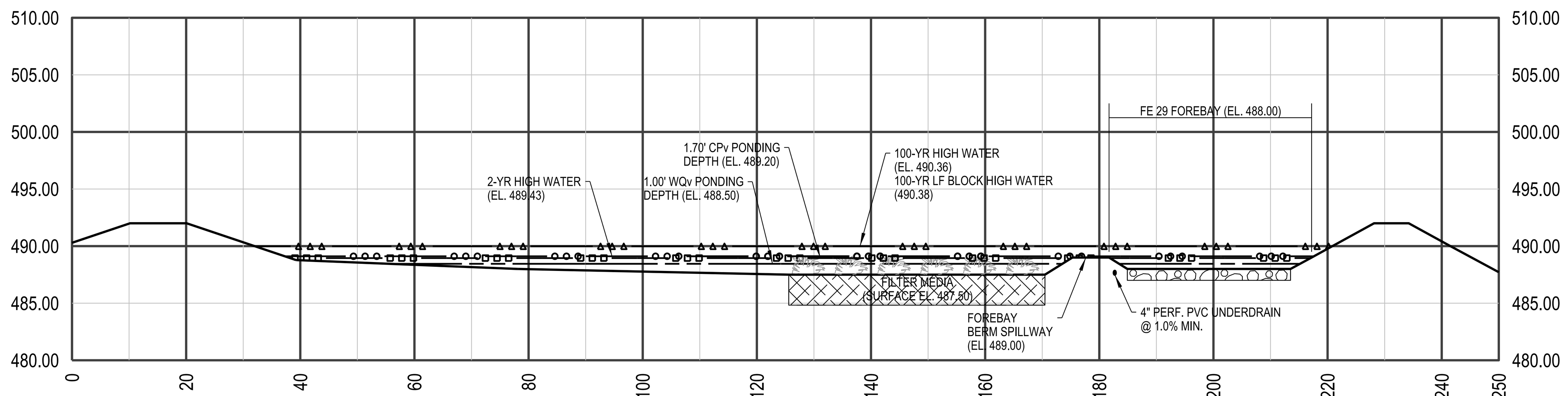
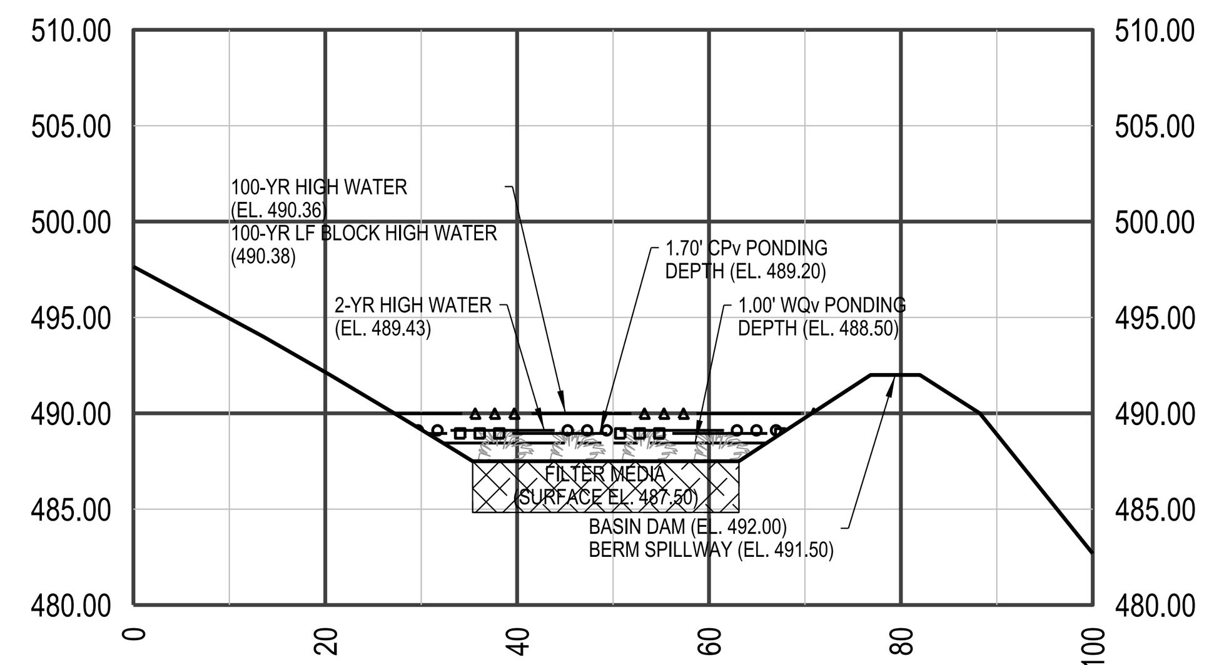


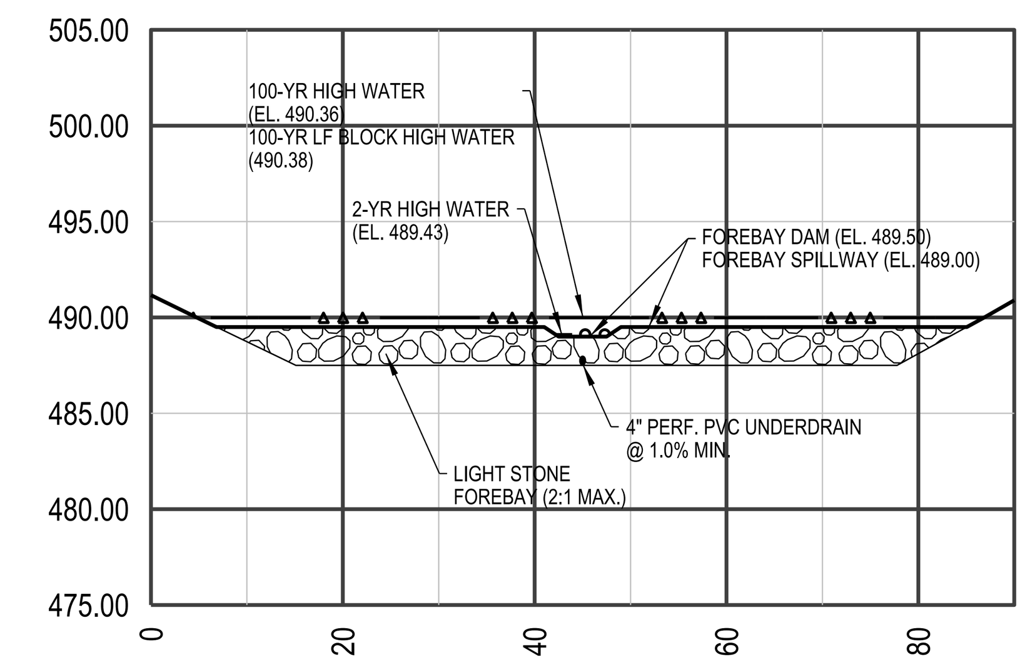
DRY BIORETENTION BASIN: SECTION 3-3

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1' = 10'



DRY BIORETENTION BASIN: SECTION 4-4

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1' = 10'



DRY BIORETENTION BASIN: SECTION 5-5

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1' = 10'

F-6 Dry Detention Basin Area Maintenance Plan for The Villas at Aragon

Primary maintenance activities include vegetation management and debris and sediment removal. Routine maintenance activities, and the frequency at which they will be conducted, are shown below

No.	Routine Maintenance Task	Frequency of Task
1	If ponding water remains for longer than 3 days, clogging of the filter media and/or underdrain has occurred. Repair by removing and replacing top layer of filter or sand media.	As needed
2	Trim and/or remove vegetation to give the desired "shape", to prevent establishment of woody vegetation, and for mosquito control.	Twice a year (February and September)
3	Trim vegetation near the basin area or as directed by a Landscape Professional.	November through March
4	Conduct vegetation management, removing weeds and harvesting vegetation. Remove all grass cuttings and other green waste.	Twice a year (February and September)
5	Remove accumulated trash and debris from the facilities and dispose of trash and debris properly.	Twice a year (February and September)
6	Remove sediment from the facilities and dispose of sediment properly.	Twice a year (February and September)
7	Inspect structural components (Overflow Drains, etc.) for cracking, subsidence, erosion and deterioration.	Twice a year, or as needed

Dry Detention Basin Design and As-built Verification Information Table

Basin ID	Design Overflow Sill Elev. (ft)*	As-built Overflow Sill Elev. (ft)*	Design Filter Surface Area (ft^2)	As-built Filter Surface Area (ft^2)	Design Filter Surface Elev. (ft)	As-built Filter Surface Elev. (ft)	Design Bypass/ Spill Point Elev. (ft)**	As-built Bypass/ Spill Point Elev. (ft)**	Required WQ Volume (ft^3)	Proposed WQ Volume (ft^3)	As-built WQ Volume (ft^3)	Required CP_v Volume (ft^3)	Proposed CP_v Volume (ft^3)	CP_v Provided (ft^3)
Dry Detention Basin (F-6 Bioretention)	489.25		1,485		487.50		489.00		5,351	5,609 (El. 488.50)		11,744	11,832 (El. 489.20)	

* Overflow Sill Elevation = Maximum Water Quality Storage Elevation
** Bypass/Spill Point Elevation = Lowest adjacent elevation on the basin perimeter where overland flow would be directed.
As-built portion of table to be certified by a Professional Engineer or Professional Land Surveyor licensed in Missouri

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O'fallon Planning and Development Division File No.: 21-002817 | Approved: July 2, 2021

Lombardo HOMES
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Authority #203

STATE OF MISSOURI RYAN LEE HOLMES NUMBER PE-2017018988 REGISTERED PROFESSIONAL ENGINEER
09-01-22
RYAN L. HOLMES
Professional Engineer
PE-2017018988

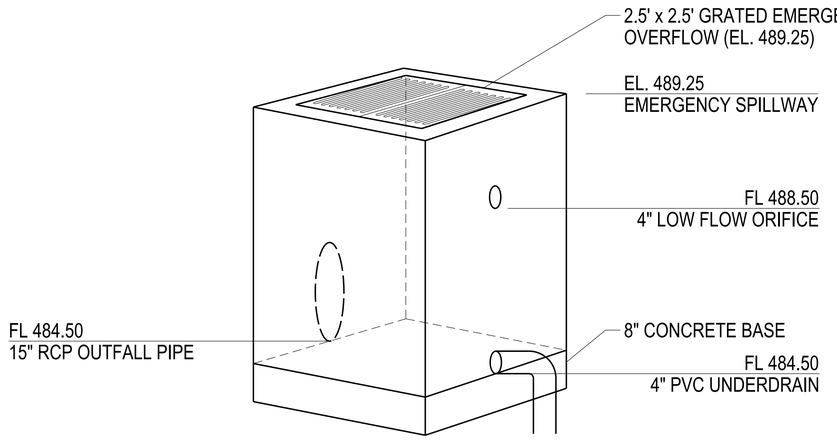
THE VILLAS AT ARAGON

VETERANS MEMORIAL PARKWAY
O'FALLON, MO 63366

DRY BIORETENTION BASIN PLAN & CROSS-SECTIONS

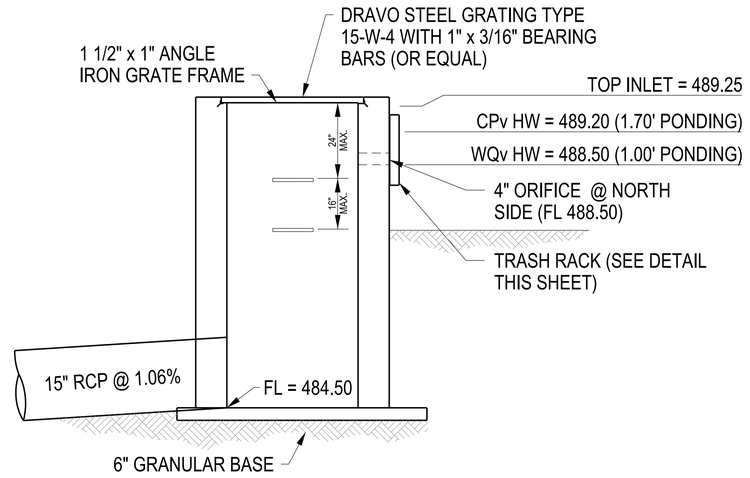
Parcel ID: 2-056C-S028-00-0001.10 | Design By: RLH
Permit No. GR22-000001 | Drawn By: RLH
Volz Project # 22649 | Checked By: RLH

09-01-22
C18.0



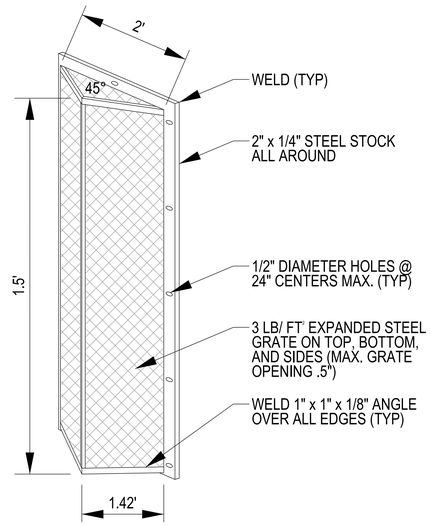
OS 37 STRUCTURE ISOMETRIC VIEW

SCALE: 1" = 2'



OS 37 STRUCTURE PROFILE VIEW

SCALE: 1" = 2'

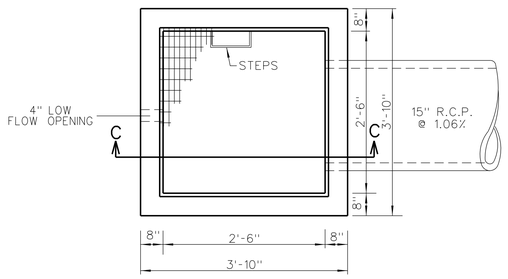


NOTES FOR TRASH RACK:

1. TRASH RACK SHALL BE CENTERED OVER OPENING.
2. STEEL TO CONFORM TO ASTM-36.
3. ALL SURFACES SHALL BE COATED WITH ZRC COLD GALVANIZING COMPOUND AFTER WELDING.
4. TRASH RACK SHALL BE FASTENED TO THE WALL WITH 1/2" MASONRY ANCHORS. TRASH RACK SHALL BE REMOVEABLE.

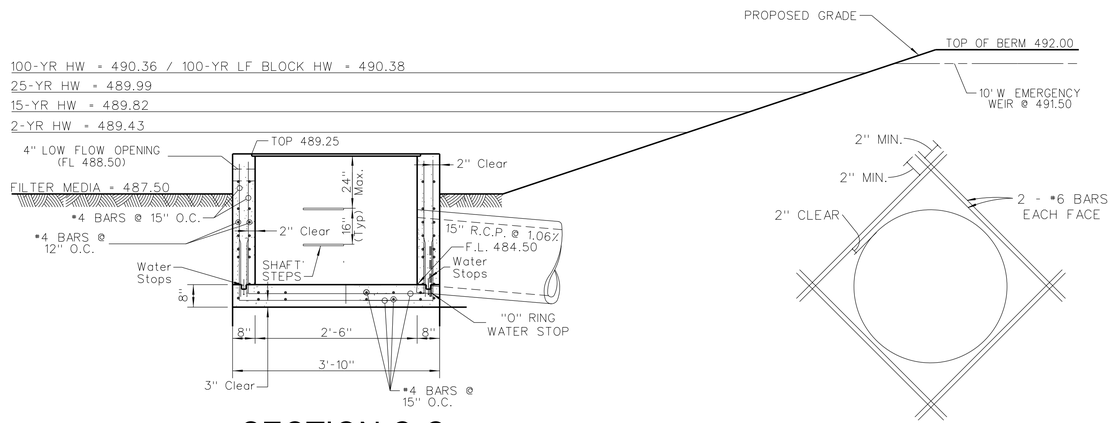
TRASH RACK DETAIL (OR APPROVED EQUAL)

N.T.S.



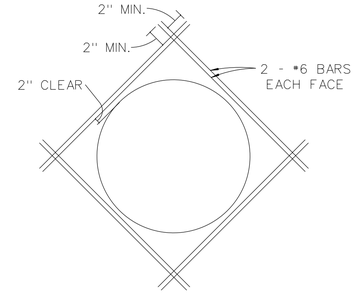
OS 37 TOP VIEW

N.T.S.



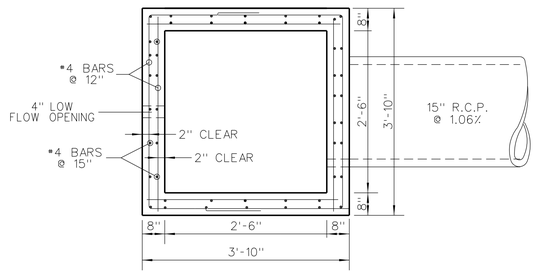
SECTION C-C
OS 37 REINFORCEMENT DETAIL

N.T.S.



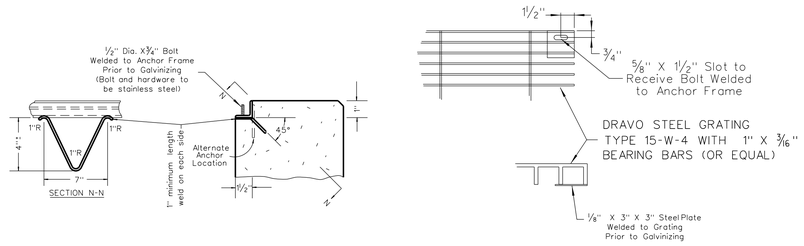
REINFORCEMENT AROUND OPENING

N.T.S.



OS 37 TOP VIEW REINFORCEMENT DETAIL

N.T.S.



DETAIL OF CONTINUOUS ANCHOR FOR ANGLE SEAT & BOLT DOWN GRATE

N.T.S.

CONSTRUCTION NOTES:

1. Concrete for the structure shall be "air entrained" and contain at least 6 sacks Class "A" Portland Cement per cubic yard. The concrete shall be placed at a slump of 4 inches +-1/2 inch. The concrete shall be proportioned and transported in accordance with ASTM C-94.
2. Reinforcing steel shall conform to ASTM C-615-60 with deformations conforming to ASTM A-305 and shall have a minimum cover of 2 inches except for 3 inches where concrete is poured against earth.
3. Laps and/or splices in reinforcing steel shall be a minimum of 30 bar diameters.
4. Keyed joints shown are to be 2-inch x 2-inch keyed construction joints.
5. fs = 24,000 psi.
6. fc = 3,750 psi.
7. All exposed edges to have a 3/4-inch chamfer.
8. Contractor to provide for bypass of stormwater during construction of structure.
9. All soil specifications shall be directed by soils engineer.

CALL MISSOURI ONE CALL SYSTEMS INC. TWO FULL WORKING DAYS IN ADVANCE OF STARTING

WORK MISSOURI ONE-CALL 1-800-344-7483

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Authority #203

STATE OF MISSOURI
RYAN LEE HOLMES
NUMBER PE-2017018988
PROFESSIONAL ENGINEER
01-22
RYAN L. HOLMES
Professional Engineer
PE-2017018988

THE VILLAS AT ARAGON

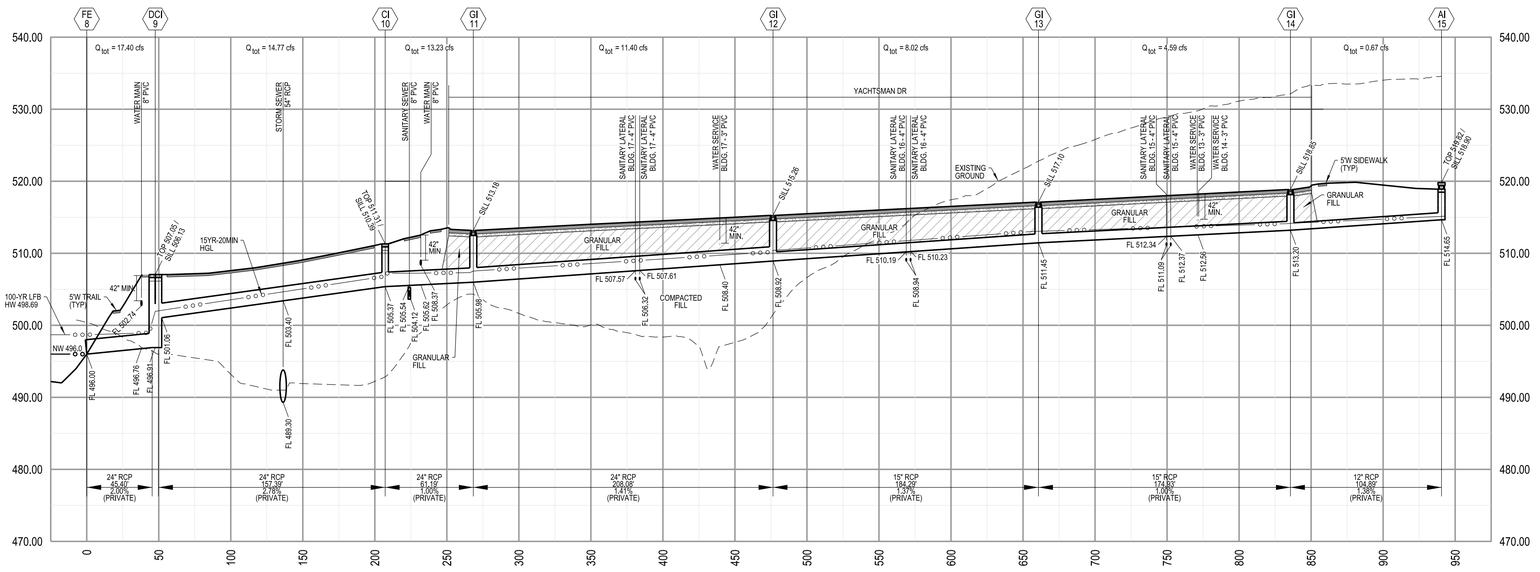
VETERANS MEMORIAL PARKWAY
O'FALLON, MO 63366

DRY DETENTION BASIN OUTFALL STRUCTURE DETAILS (OS 37)

Parcel ID: 2-056C-S028-00-0001.10
Permit No. SR22-000001
Design By: RLH
Drawn By: RLH
Checked By: RLH
Volz Project # 22649

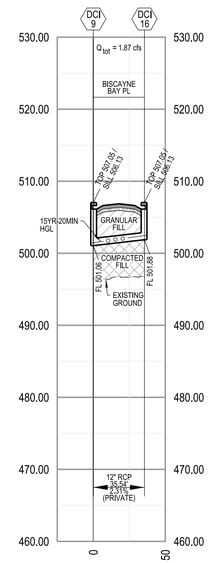
09-01-22

C18.1



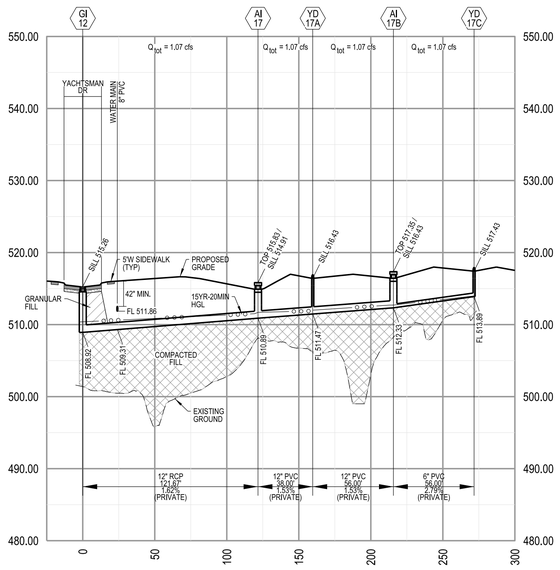
STORM PROFILE: FE 8 - AI 15

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1' = 10'



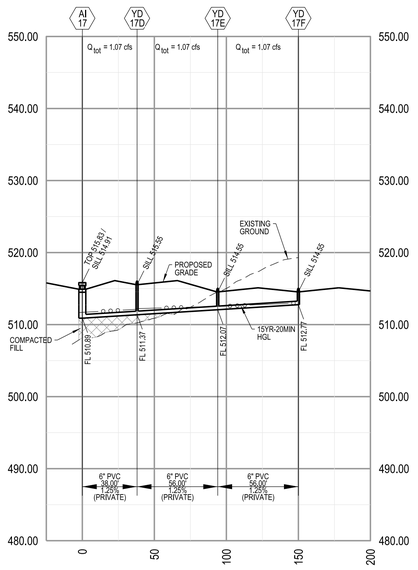
STORM PROFILE: DCI 9 - DCI 16

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1' = 10'



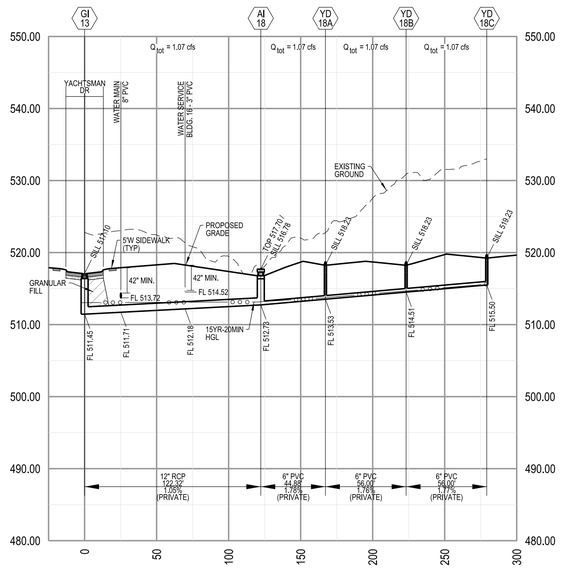
STORM PROFILE: GI 12 - YD 17C

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1' = 10'



STORM PROFILE: AI 17 - YD 17F

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1' = 10'



STORM PROFILE: GI 13 - YD 18C

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1' = 10'

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WORK.MISSOURI ONE-CALL 1-800-344-7483

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NOTE: STORM SEWERS FE 1 - FE 2 AND FE 3 - MH 7 WERE APPROVED AND PERMITTED WITH THE GRADING PLAN (PERMIT NUMBER GR22-000002)

O'fallon Planning and Development Division File No.: 21-002817 | Approved: July 2, 2021

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RYAN L. HOLMES
Professional Engineer
PE-2017018988

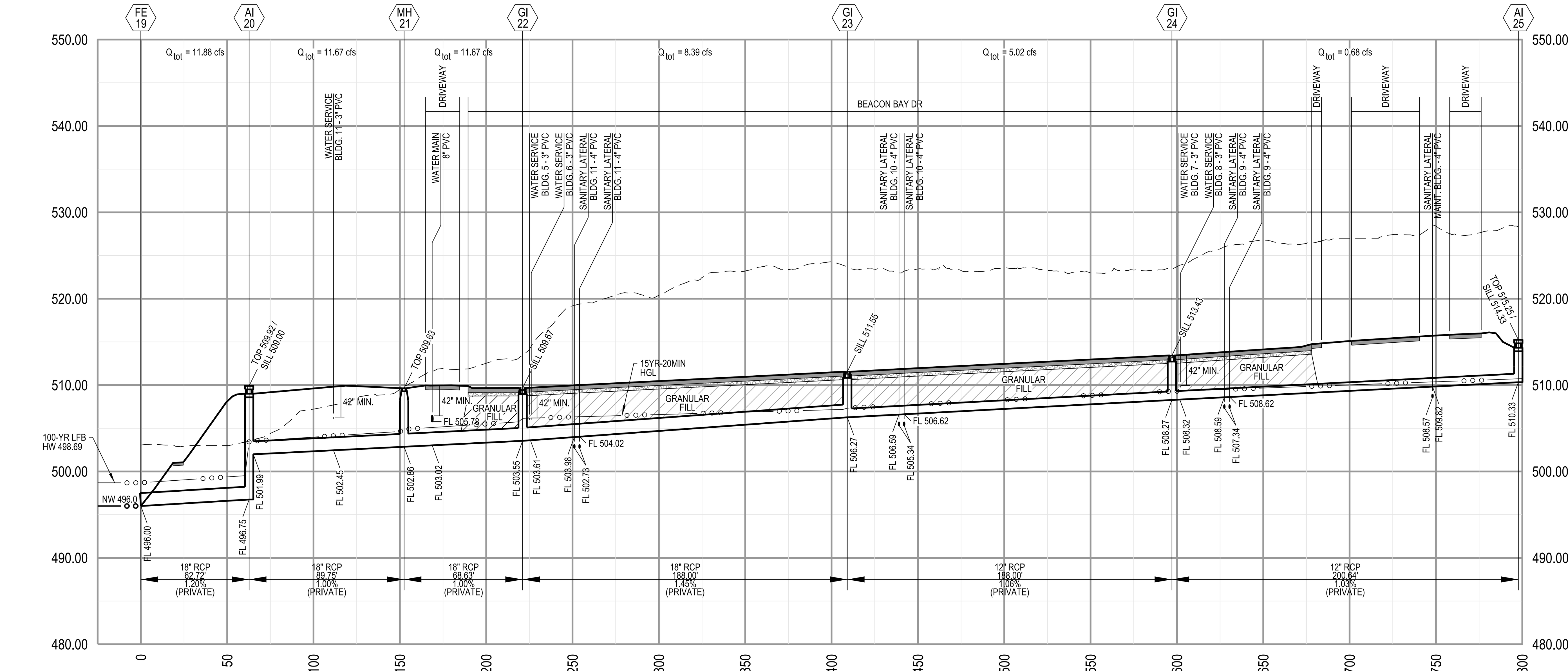
THE VILLAS AT ARAGON

VETERANS MEMORIAL PARKWAY
O'FALLON, MO 63366

STORM SEWER PROFILES: SHEET 1

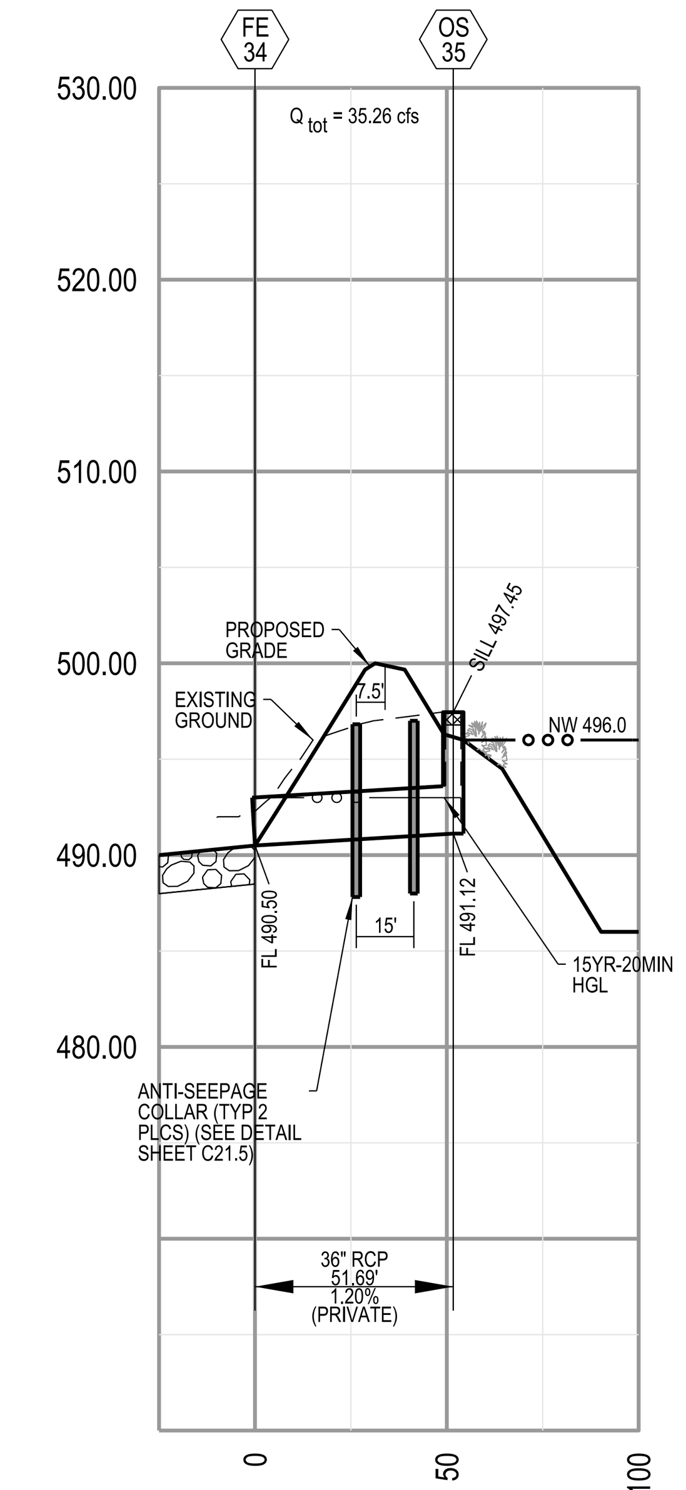
Parcel ID: 2-056C-5028-00-0001.10
Permit No. GR22-000001
Design By: RLH
Drawn By: RLH
Checked By: RLH
Volz Project # 22649

09-01-22
C15.0



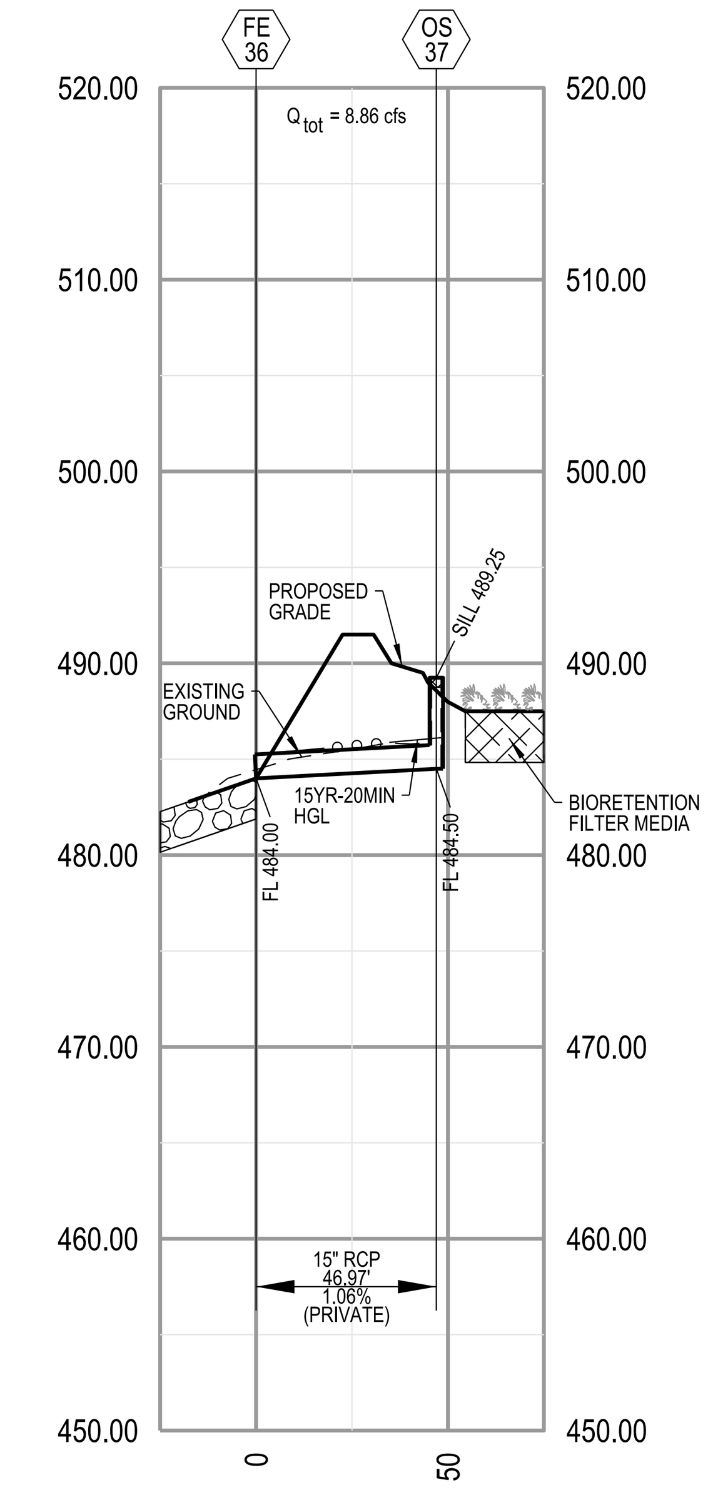
STORM PROFILE: FE 19 - AI 25

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1' = 10'



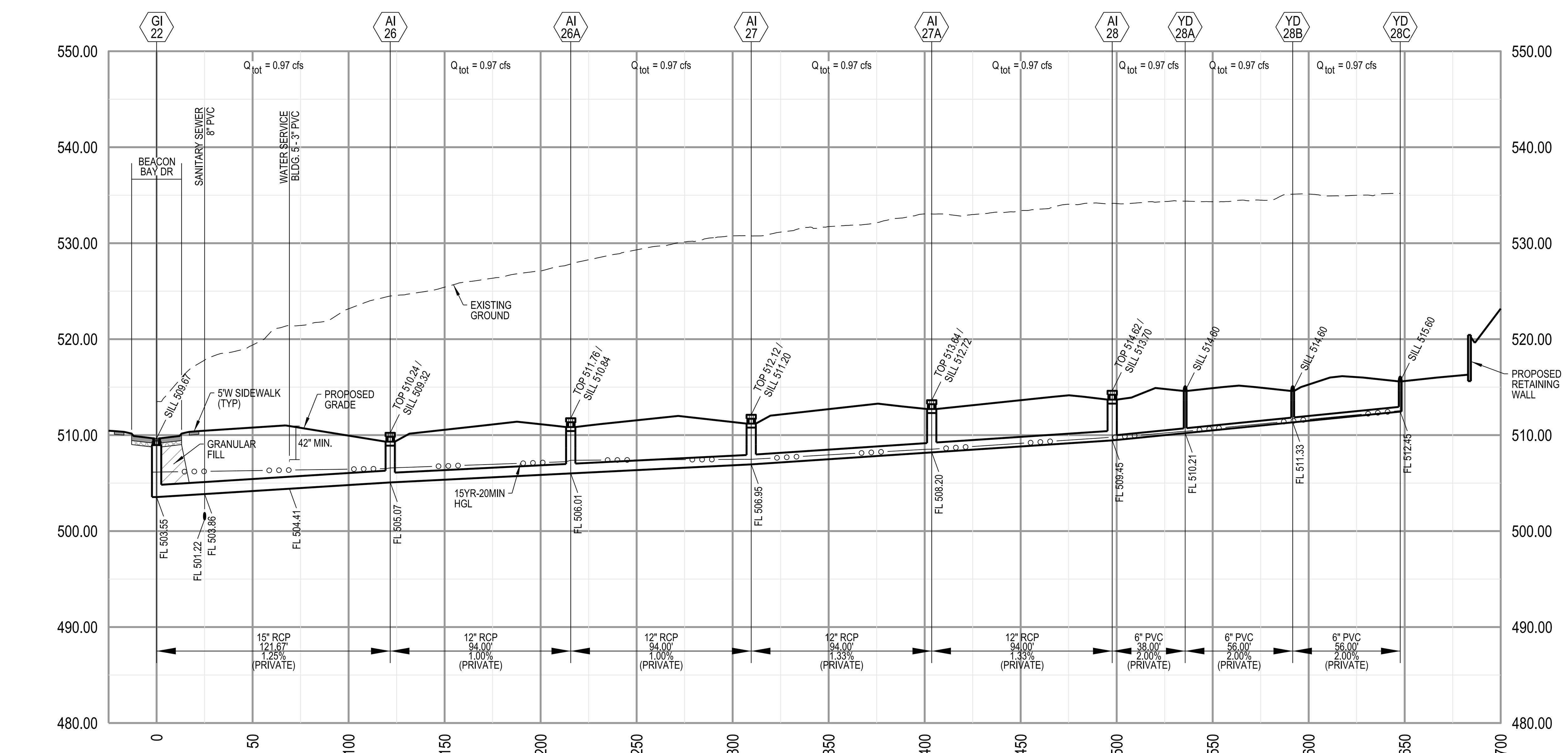
STORM PROFILE: FE 34 - OS 35

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1' = 10'



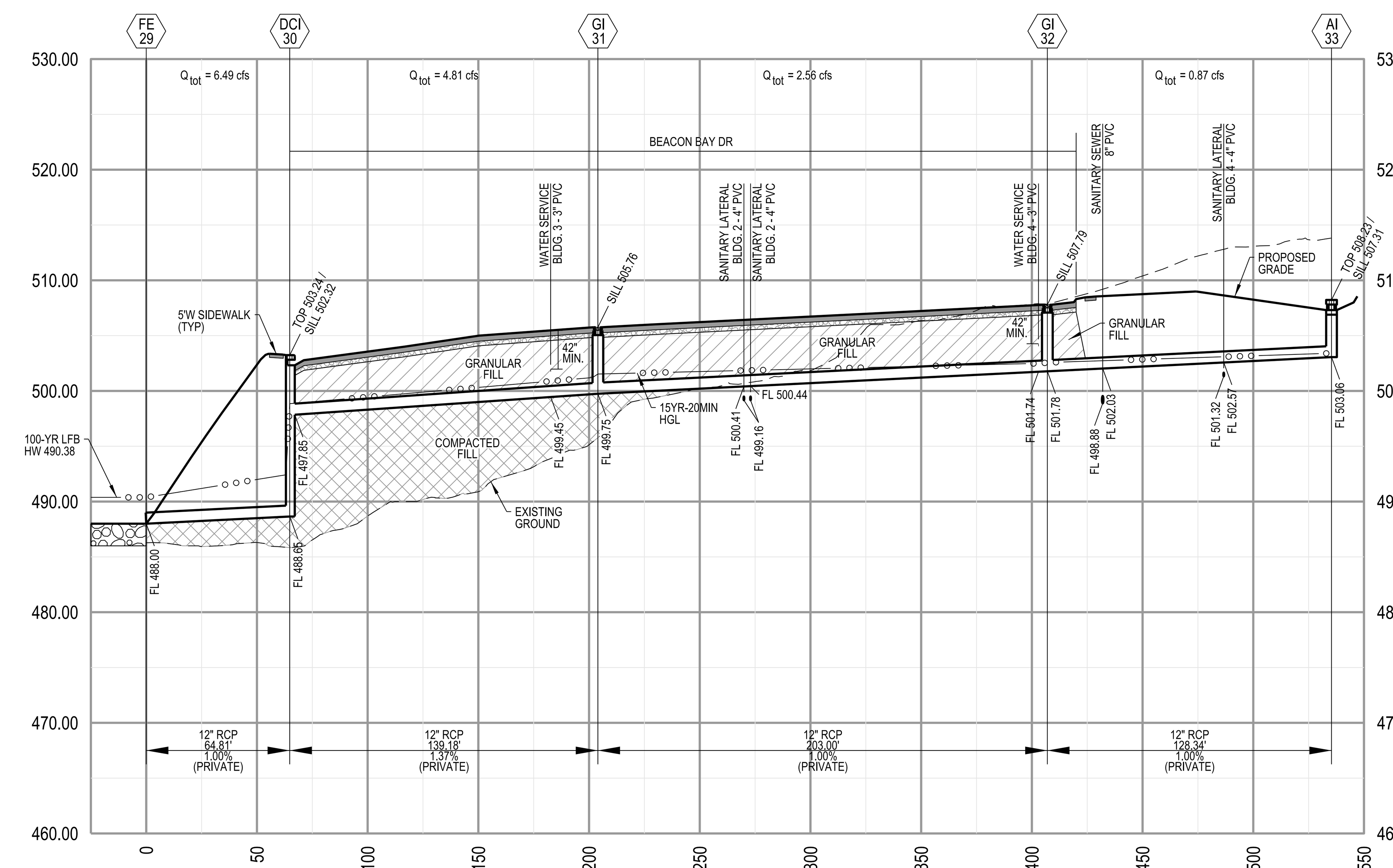
STORM PROFILE: FE 36 - OS 37

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1' = 10'



STORM PROFILE: GI 22 - YD 28C

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1' = 10'



STORM PROFILE: FE 29 - AI 33

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1' = 10'

NOTE: STORM SEWERS FE 1 - FE 2 AND FE 3 - MH 7 WERE APPROVED AND PERMITTED WITH THE GRADING PLAN (PERMIT NUMBER GR22-000002)

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THE VILLAS AT ARAGON

VETERANS MEMORIAL PARKWAY
O'FALLON, MO 63366

STORM SEWER PROFILES: SHEET 2

Parcel ID: 2-0560-S028-00-0001.10
Permit No. GR22-000001
Volz Project # 22649
Design By: RLH
Drawn By: RLH
Checked By: RLH

09-01-22

C15.1

Lombardo Homes: The Villas at Aragon
15 Year-20 Minute Storm Calculations

LineNo.	LineID	Pipe Length (ft)	Pipe Size (in)	Invert Down (ft)	Invert Up (ft)	Slope (%)	n Value	Top El Down (ft)	Top El Up (ft)	HGL (Down) (ft)	HGL (Up) (ft)	Juntion Loss	Velocity Average (ft/s)	Deflec. Angle (Deg)	Energy Loss (ft)	Known Q (cfs)	Flow Rate (cfs)	Minor Loss (ft)	Capacity (Full) (cfs)	Free-board (ft)
1	FE 8 - DCI 9	45.40	24	496.00	496.91	2.00	0.013	498.00	506.13	498.69	498.96	0.00	5.57	36.50	0.27	0.76	17.51	0.00	32.02	7.17
2	DCI 9 - CI 10	157.39	24	501.06	505.37	2.74	0.013	506.13	510.39	501.94	506.74	0.70	8.85	57.90	2.65	0.85	14.88	0.46	37.43	3.65
3	CI 10 - GI 11	61.19	24	505.37	505.98	1.00	0.013	510.39	513.18	507.20	507.31	0.35	5.50	26.30	0.30	1.83	14.03	0.22	22.58	5.87
4	GI 11 - GI 12	208.08	24	505.98	508.92	1.41	0.013	513.18	515.26	507.53	510.16	0.42	5.33	37.60	0.95	2.31	12.20	0.23	26.88	5.10
5	GI 12 - GI 13	184.29	15	508.92	511.45	1.37	0.013	515.26	517.10	510.39	513.05	0.00	6.32	-0.40	2.66	2.17	7.76	0.00	7.57	4.05
6	GI 13 - GI 14	174.93	15	511.45	513.20	1.00	0.013	517.10	518.85	513.05	514.11	0.11	4.70	9.20	1.23	3.92	5.04	0.05	6.46	4.74
7	GI 14 - AI 15	104.89	12	513.20	514.65	1.38	0.013	518.85	518.90	514.15	515.10	0.65	2.36	-80.00	0.35	1.12	1.12	0.11	4.19	3.80
8	DCI 9 - DCI 16	35.54	12	501.06	501.88	2.31	0.013	506.13	506.13	501.47	502.46	0.38	5.09	-32.20	0.52	1.87	1.87	0.09	5.41	3.67
9	GI 12 - AI 17	121.67	12	508.92	510.89	1.62	0.013	515.26	514.91	510.39	511.51	0.70	3.44	-90.80	0.66	0.56	2.13	0.19	4.53	3.40
10	AI 17 - YD 17A	38.00	12	510.89	511.47	1.53	0.013	514.91	516.43	511.70	511.89	0.70	2.29	90.10	0.12	0.16	0.98	0.11	4.40	4.54
11	YD 17A - AI 17B	56.00	12	511.47	512.33	1.54	0.013	516.43	516.43	512.00	512.71	0.00	2.45	0.00	0.20	0.79	0.82	0.00	4.41	3.72
12	AI 17B - YD 17C	56.00	6	512.33	513.89	2.79	0.013	516.43	517.43	512.71	513.98	0.00	0.74	0.00	0.18	0.03	0.03	0.00	0.94	3.45
13	AI 17 - YD 17D	38.00	6	510.89	511.37	1.26	0.013	514.91	515.55	511.70	512.12	0.70	3.01	-90.00	0.42	0.16	0.59	0.10	0.63	3.43
14	YD 17D - YD 17E	56.00	6	511.37	512.07	1.25	0.013	515.55	514.55	512.22	512.52	0.00	2.25	0.00	0.31	0.20	0.43	0.00	0.63	2.03
15	YD 17E - YD 17F	56.00	6	512.07	512.77	1.25	0.013	514.55	514.55	512.52	513.01	0.00	1.83	0.00	0.25	0.23	0.23	0.00	0.63	1.54
16	GI 13 - AI 18	122.32	12	511.45	512.73	1.05	0.013	517.10	516.78	513.05	513.14	0.70	1.26	-85.40	0.13	0.42	0.55	0.04	3.64	3.64
17	AI 18 - YD 18A	44.88	6	512.73	513.53	1.78	0.013	516.78	518.23	513.18	513.71	0.70	1.35	94.30	0.16	0.03	0.13	0.04	0.75	4.52
18	YD 18A - YD 18B	56.00	6	513.53	514.51	1.75	0.013	518.23	518.23	513.76	514.67	0.00	1.50	0.60	0.23	0.05	0.10	0.00	0.74	3.56
19	YD 18B - YD 18C	56.00	6	514.51	515.50	1.77	0.013	518.23	519.23	514.67	515.61	0.00	1.21	0.10	0.22	0.05	0.05	0.00	0.75	3.62
20	FE 19 - AI 20	62.72	18	496.00	496.75	1.20	0.013	498.00	509.00	498.69	499.51	0.00	6.80	-63.80	0.82	0.21	12.02	0.00	11.48	9.49
21	AI 20 - MH 21	89.75	18	501.99	502.86	0.97	0.013	509.00	509.63	503.49	504.63	0.36	6.68	-30.60	1.14	0.00	11.81	0.25	10.34	5.00
22	MH 21 - GI 22	68.63	18	502.86	503.55	1.01	0.013	509.63	509.67	504.88	505.74	0.58	6.68	-65.70	0.87	2.31	11.81	0.40	10.53	3.93
23	GI 22 - GI 23	188.00	18	503.55	506.27	1.45	0.013	509.67	511.55	506.15	507.20	0.30	4.28	-90.00	0.91	2.33	5.98	0.12	12.63	4.35
24	GI 23 - GI 24	188.00	12	506.27	508.27	1.06	0.013	511.55	513.43	507.33	509.27	0.00	4.65	0.00	1.94	2.78	3.65	0.00	3.67	4.16
25	GI 24 - AI 25	200.64	12	508.27	510.33	1.03	0.013	513.43	514.33	509.27	510.73	0.11	2.06	9.30	0.61	0.87	0.87	0.02	3.61	3.60
26	GI 22 - AI 26	121.67	15	503.55	505.07	1.25	0.013	509.67	509.32	506.15	506.51	0.58	2.87	0.00	0.36	0.57	3.52	0.07	7.22	2.81
27	AI 26 - AI 26A	94.00	12	505.07	506.01	1.00	0.013	509.32	510.84	506.58	507.23	0.70	3.76	-90.10	0.65	1.92	2.95	0.15	3.56	3.61
28	AI 26A - AI 27	94.00	12	506.01	506.95	1.00	0.013	510.84	511.20	507.38	507.48	0.00	1.87	0.10	0.17	0.44	1.03	0.00	3.56	3.72
29	AI 27 - AI 27A	94.00	12	506.95	508.20	1.33	0.013	511.20	512.72	507.48	508.53	0.00	2.02	0.00	0.29	0.08	0.59	0.00	4.11	4.19
30	AI 27A - AI 28	94.00	12	508.20	509.45	1.33	0.013	512.72	513.70	508.53	509.75	0.00	2.42	0.00	0.43	0.39	0.51	0.00	4.11	3.95
31	AI 28 - YD 28A	38.00	6	509.45	510.21	2.00	0.013	513.70	514.60	509.75	510.39	0.00	1.45	0.00	0.14	0.03	0.12	0.00	0.79	4.21
32	YD 28A - YD 28B	56.00	6	510.21	511.33	2.00	0.013	514.60	514.60	510.39	511.48	0.00	1.62	0.00	0.28	0.05	0.09	0.00	0.79	3.12
33	YD 28B - YD 28C	56.00	6	511.33	512.45	2.00	0.013	514.60	515.60	511.48	512.55	0.00	1.09	-0.10	0.21	0.04	0.04	0.00	0.79	3.05
34	FE 29 - DCI 30	64.81	12	488.00	488.65	1.00	0.013	489.00	502.32	490.38	492.42	0.00	8.05	-92.90	2.04	1.68	6.32	0.00	3.57	9.90
35	DCI 30 - GI 31	139.18	12	497.85	499.75	1.37	0.013	502.32	505.76	498.85	501.21	0.58	5.91	-66.20	2.36	2.25	4.64	0.31	4.16	4.55
36	GI 31 - GI 32	203.00	12	499.75	501.78	1.00	0.013	505.76	507.79	501.53	502.50	0.31	3.50	-25.30	1.07	1.69	2.39	0.08	3.56	5.29
37	GI 32 - AI 33	128.34	12	501.78	503.06	1.00	0.013	507.79	507.31	502.57	503.41	0.70	1.93	90.00	0.37	0.70	0.70	0.09	3.56	3.90
38	FE 34 - OS 35	51.69	36	490.50	491.12	1.20	0.013	493.50	497.45	493.50	493.50	0.00	5.46	-104.60	0.15	35.52	35.52	0.00	73.04	3.95
39	FE 36 - OS 37	46.97	15	484.00	484.50	1.06	0.013	485.50	489.00	485.25	486.10	0.00	7.08	-161.70	0.85	8.69	8.69	0.00	6.66	2.90

Lombardo Homes: The Villas at Aragon
100 Year-20 Minute Storm Calculations

LineNo.	LineID	Pipe Length (ft)	Pipe Size (in)	Invert Down (ft)	Invert Up (ft)	Slope (%)	n Value	Top El Down (ft)	Top El Up (ft)	HGL (Down) (ft)	HGL (Up) (ft)	Juntion Loss	Velocity Average (ft/s)	Deflec. Angle (Deg)	Energy Loss (ft)	Known Q (cfs)	Flow Rate (cfs)	Minor Loss (ft)	Capacity (Full) (cfs)	Free-board (ft)
1	FE 8 - DCI 9	45.40	24	496.00	496.91	2.00	0.013	498.00	506.13	498.69	499.19	0.00	7.52	36.50	0.50	1.02	23.62	0.00	32.02	6.94
2	DCI 9 - CI 10	157.39	24	501.06	505.37	2.74	0.013	506.13	510.39	502.10	506.96	0.70	9.80	57.90	2.80	1.15	20.07	0.61	37.43	3.43
3	CI 10 - GI 11	61.19	24	505.37	505.98	1.00	0.013	510.39	513.18	507.57	507.98	0.35	6.02	26.30	0.42	2.47	18.92	0.20	22.58	5.20
4	GI 11 - GI 12	208.08	24	505.98	508.92	1.41	0.013	513.18	515.26	508.17	510.36	0.42	6.02	37.60	1.29	3.12	16.45	0.30	26.88	4.90
5	GI 12 - GI 13	184.29	15	508.92	511.45	1.37	0.013	515.26	517.10	510.66	515.51	0.00	8.53	-0.40	4.85	2.93	10.47	0.00	7.57	1.59
6	GI 13 - GI 14	174.93	15	511.45	513.20	1.00	0.013	517.10	518.85	515.51	517.46	0.11	5.56	9.20	1.95	5.30	6.82	0.05	6.46	1.39
7	GI 14 - AI 15	104.89	12	513.20	514.65	1.38	0.013	518.85	518.90	517.51	517.70	0.65	1.94	-80.00	0.19	1.52	1.52	0.04	4.19	1.20
8	DCI 9 - DCI 16	35.54	12	501.06	501.88	2.31	0.013	506.13	506.13	501.54	502.55	0.38	5.62	-32.20	0.55	2.53	2.53	0.12	5.41	3.58
9	GI 12 - AI 17	121.67	12	508.92	510.89	1.62	0.013	515.26	514.91	510.66	511.61	0.70	4.19	-90.80	0.92	0.76	2.86	0.24	4.53	3.30
10	AI 17 - YD 17A	38.00	12	510.89	511.47	1.53	0.013	514.91	516.43	511.85	511.96	0.70	2.58	90.10	0.14	0.21	1.31	0.13	4.40	4.47
11	YD 17A - AI 17B	56.00	12	511.47	512.33	1.54	0.013	516.43	516.43	512.09	512.77	0.00	2.71	0.00	0.22	1.06	1.10	0.00	4.41	3.66
12	AI 17B - YD 17C	56.00	6	512.33	513.89	2.79	0.013	516.43	517.43	512.77	513.99	0.00	0.81	0.00	0.18	0.04	0.04	0.00	0.94	3.44
13	AI 17 - YD 17D	38.00	6	510.89	511.37	1.26	0.013	514.91	515.55	511.85	512.61	0.70	4.02	-90.00	0.75	0.21	0.79	0.18	0.63	2.94
14	YD 17D - YD 17E	56.00	6	511.37	512.07	1.25	0.013	515.55	514.55	512.78	513.38	0.00	2.95	0.00	0.60	0.27	0.58	0.00	0.63	1.17
15	YD 17E - YD 17F	56.00	6	512.07	512.77	1.25	0.013	514.55	514.55	513.38	513.55	0.00	1.58	0.00	0.17	0.31	0.31	0.00	0.63	1.00
16	GI 13 - AI 18	122.32	12	511.45	512.73	1.05	0.013	517.10	516.78	515.51	515.56	0.70	0.92	-85.40	0.05	0.56	0.72	0.01	3.64	1.22
17	AI 18 - YD 18A	44.88	6	512.73	513.53	1.78	0.013	516.78	518.23	515.56	515.60	0.70	0.81	94.30	0.04	0.04	0.16	0.01	0.75	2.63
18	YD 18A - YD 18B	56.00	6	513.53	514.51	1.75	0.013	518.23	518.23	515.61	515.63	0.00	0.61	0.60	0.03	0.06	0.12	0.00	0.74	2.60
19	YD 18B - YD 18C	56.00	6	514.51	515.50	1.77	0.013	518.23	519.23	515.63	515.67	0.00	0.65	0.10	0.05	0.06	0.06	0.00	0.75	3.56
20	FE 19 - AI 20	62.72	18	496.00	496.75	1.20	0.013	498.00	509.00	498.69	500.19	0.00	9.19	-63.80	1.50	0.28	16.23	0.00	11.48	8.81
21	AI 20 - MH 21	89.75	18	501.99	502.86	0.97	0.013	509.00	509.63	503.49	505.56	0.36	9.03	-30.60	2.07	0.00	15.95	0.46	10.34	4.07
22	MH 21 - GI 22	68.63	18	502.86	503.55	1.01	0.013	509.63	509.67	506.02	507.60	0.58	9.03	-65.70	1.58	3.12	15.95	0.73	10.53	2.07
23	GI 22 - GI 23	188.00	18	503.55	506.27	1.45	0.013	509.67	511.55	508.34	509.45	0.30	4.57	-90.00	1.11	3.14	8.08	0.10	12.63	2.10
24	GI 23 - GI 24	188.00	12	506.27	508.27	1.06	0.013	511.55	513.43	509.55	513.17	0.00	6.29	0.00	3.62	3.76	4.94	0.00	3.67	0.26
25	GI 24 - AI 25	200.64	12	508.27	510.33	1.03	0.013	513.43	514.33	513.17	513.39	0.11	1.50	9.30	0.22	1.18	1.18	0.00	3.61	0.94
26	GI 22 - AI 26	121.67	15	503.55	505.07	1.25	0.013	509.67	509.32	508.34	508.99	0.58	3.87	0.00	0.66	0.77	4.75	0.14	7.22	0.33
27	AI 26 - AI 26A	94.00	12	505.07	506.01	1.00	0.013	509.32	510.84	509.13	510.30	0.70	5.07	-90.10	1.17	2.60	3.98	0.28	3.56	0.54
28	AI 26A - AI 27	94.00	12	506.01	506.95	1.00	0.013	510.84	511.20	510.58	510.73	0.00	1.76	0.10	0.14	0.59	1.38	0.00	3.56	0.47
29	AI 27 - AI 27A	94.00	12	506.95	508.20	1.33	0.013	511.20	512.72	510.73	510.77	0.00	1.01	0.00	0.05	0.10	0.79	0.00	4.11	1.95
30	AI 27A - AI 28	94.00	12	508.20	509.45	1.33	0.013	512.72	513.70	510.77	510.81	0.00	0.88	0.00	0.04	0.53	0.69	0.00	4.11	2.89
31	AI 28 - YD 28A	38.00	6	509.45	510.21	2.00	0.013	513.70	514.60	510.81	510.84	0.00	0.81	0.00	0.03	0.04	0.16	0.00	0.79	3.76
32	YD 28A - YD 28B	56.00	6	510.21	511.33	2.00	0.013	514.60	514.60	510.84	511.51	0.00	1.28	0.00	0.20	0.06	0.12	0.00	0.79	3.09
33	YD 28B - YD 28C	56.00	6	511.33	512.45	2.00	0.013	514.60	515.60	511.51	512.57	0.00	1.27	-0.10	0.22	0.06	0.06	0.00	0.79	3.03
34	FE 29 - DCI 30	64.81	12	488.00	488.65	1.00	0.013	489.00	502.32	490.38	494.09	0.00	10.85	-92.90	3.71	2.26	8.52	0.00	3.57	8.23
35	DCI 30 - GI 31	139.18	12	497.85	499.75	1.37	0.013	502.32	505.76	498.85	503.15	0.58	7.97	-66.20	4.30	3.04	6.26	0.57	4.16	2.61
36	GI 31 - GI 32	203.00	12	499.75	501.78	1.00	0.013	505.76	507.79	503.72	505.38	0.31	4.10	-25.30	1.66	2.28	3.22	0.08	3.56	2.41
37	GI 32 - AI 33	128.34	12	501.78	503.06	1.00	0.013	507.79	507.31	505.47	505.56	0.70	1.20	90.00	0.09	0.94	0.94	0.02	3.56	1.75
38	FE 34 - OS 35	51.69	36	490.50	491.12	1.20	0.013	493.50	497.45	493.50	493.51	0.00	7.36	-104.60	0.28	47.95	47.95	0.00	73.04	3.94
39	FE 36 - OS 37	46.97	15	484.00	484.50	1.06	0.013	485.50	489.00	485.25	486.80	0.00	9.57	-161.70	1.55	11.74	11.74	0.00	6.66	2.20

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STATE OF MISSOURI
RYAN LEE HOLMES
NUMBER PE-2017018988
PROFESSIONAL ENGINEER
09-01-22
RYAN L. HOLMES
Professional Engineer
PE-2017018988

THE VILLAS AT ARAGON
VETERANS MEMORIAL PARKWAY
O'FALLON, MO 63366

STORM SEWER HYDRAULIC CALCULATIONS

Parcel ID: 2-056C-S028-00-0001.10
Permit No. GR22-000001
Volz Project # 22649

Design By: RLH
Drawn By: RLH
Checked By: RLH

09-01-22
C15.2

United States Department of Agriculture

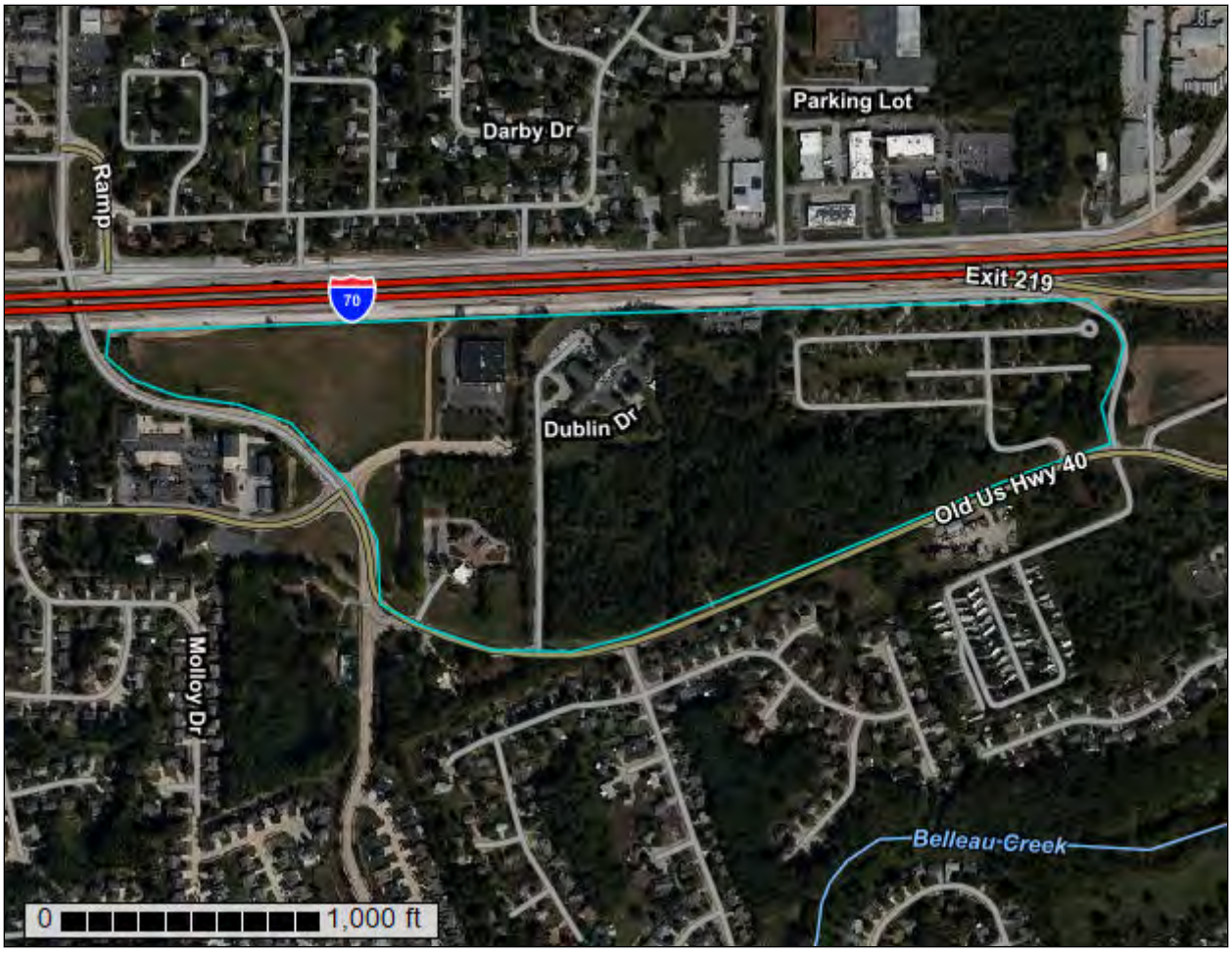
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for St. Charles County, Missouri

The Villas at Aragon



April 18, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

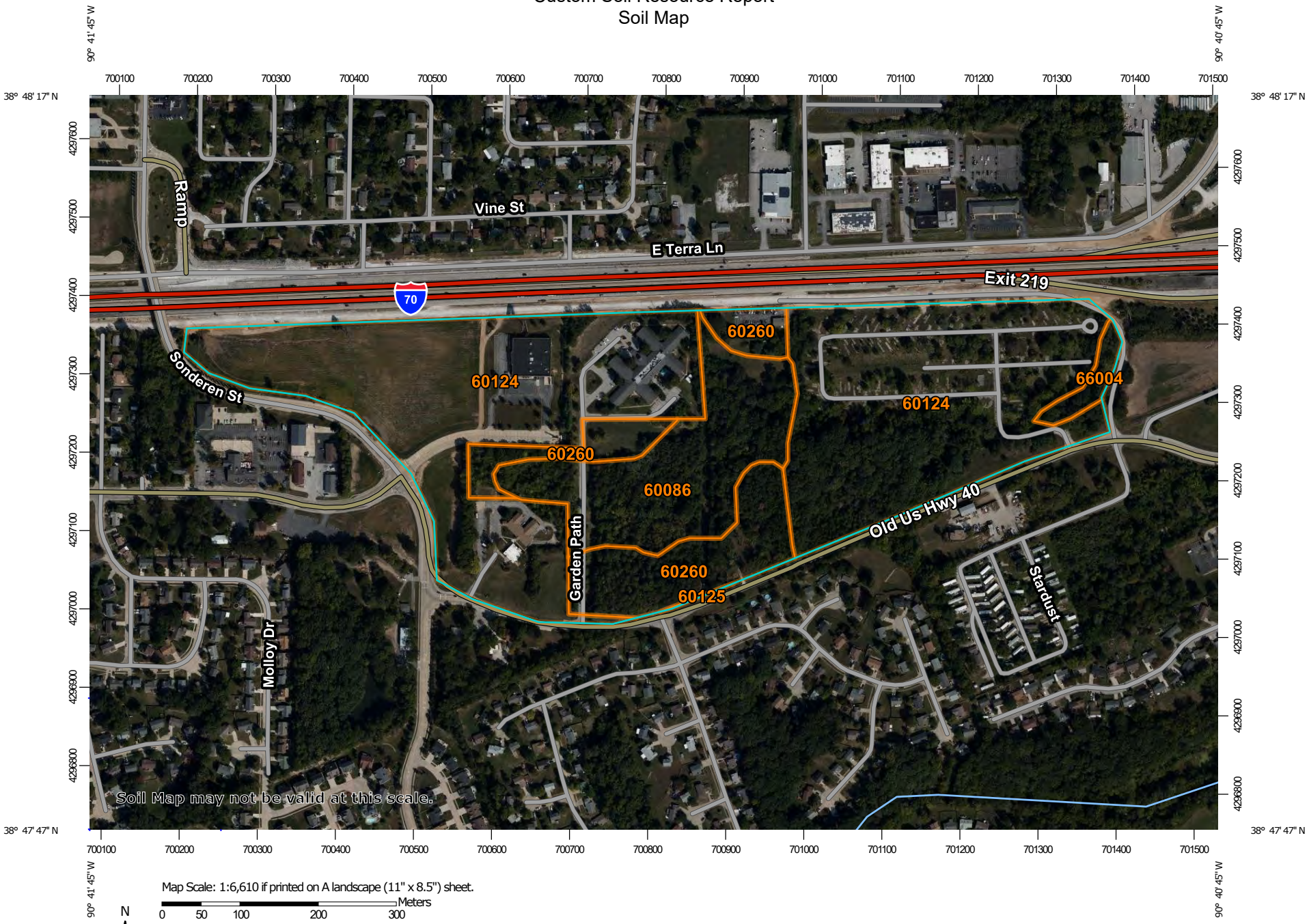
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:6,610 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 300 600 1200 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: St. Charles County, Missouri
Survey Area Data: Version 22, Sep 7, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 17, 2018—Oct 24, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
60086	Crider silt loam, 9 to 14 percent slopes, eroded	11.9	15.8%
60124	Harvester-Urban land complex, 2 to 9 percent slopes	52.2	69.3%
60125	Harvester-Urban land complex, 9 to 14 percent slopes	0.0	0.0%
60260	Weller silt loam, 5 to 9 percent slopes	10.2	13.5%
66004	Dockery silt loam, 0 to 2 percent slopes, frequently flooded	1.0	1.4%
Totals for Area of Interest		**75.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

St. Charles County, Missouri

60086—Crider silt loam, 9 to 14 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2qp53
Elevation: 410 to 900 feet
Mean annual precipitation: 37 to 47 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 184 to 228 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Crider and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crider

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over residuum weathered from dolomite

Typical profile

Ap - 0 to 11 inches: silt loam
Bt1 - 11 to 37 inches: silty clay loam
2Bt2 - 37 to 60 inches: silty clay loam

Properties and qualities

Slope: 9 to 14 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F115BY005MO - Loamy Upland Woodland
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

60124—Harvester-Urban land complex, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: 6604
Elevation: 440 to 690 feet
Mean annual precipitation: 37 to 47 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 184 to 228 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Harvester and similar soils: 60 percent
Urban land: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Harvester

Setting

Landform: Hillslopes, ridges
Landform position (two-dimensional): Footslope, backslope, summit
Landform position (three-dimensional): Base slope, side slope, interfluve
Down-slope shape: Linear
Across-slope shape: Linear, convex
Parent material: Loess

Typical profile

C1 - 0 to 5 inches: silt loam
C2 - 5 to 80 inches: silty clay loam

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.57 in/hr)
Depth to water table: About 30 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F115BY061MO - Anthropic Deep Loess Upland
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Description of Urban Land

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

60125—Harvester-Urban land complex, 9 to 14 percent slopes

Map Unit Setting

National map unit symbol: 2qp5n
Elevation: 440 to 970 feet
Mean annual precipitation: 37 to 47 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 184 to 228 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Harvester and similar soils: 70 percent
Urban land: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Harvester

Setting

Landform: Hillslopes, ridges
Landform position (two-dimensional): Footslope, backslope, summit
Landform position (three-dimensional): Base slope, side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Loess

Typical profile

C1 - 0 to 5 inches: silt loam
C2 - 5 to 80 inches: silty clay loam

Properties and qualities

Slope: 9 to 14 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.57 in/hr)
Depth to water table: About 30 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F115BY061MO - Anthropic Deep Loess Upland
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Description of Urban Land

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

60260—Weller silt loam, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2qp7b
Elevation: 700 to 1,350 feet
Mean annual precipitation: 37 to 47 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 184 to 228 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Weller and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Weller

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess

Typical profile

Ap - 0 to 7 inches: silt loam
BE - 7 to 13 inches: silt loam
Bt - 13 to 47 inches: silty clay loam
Btg - 47 to 80 inches: silt loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: F115BY001MO - Deep Loess Upland Woodland
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

66004—Dockery silt loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2qp85
Elevation: 350 to 900 feet
Mean annual precipitation: 37 to 47 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 184 to 228 days
Farmland classification: Not prime farmland

Map Unit Composition

Dockery and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dockery

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

Ap - 0 to 10 inches: silt loam
C - 10 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: FrequentOccasional

Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 12.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Ecological site: F109XY030MO - Loamy Floodplain Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Racoon

Percent of map unit: 5 percent
Landform: Flood-plain steps
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

Dockery

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf