Preliminary Stormwater Management Plan

prepared for

Hook and Ward Mixed Use

Lee's Summit, MO 64081

October 9, 2025
Revised: November 10, 2025
Revised: December, 8, 2025
Revised January 28, 2026

prepared by

SCHLAGEL
ENGINEERS PLANNERS SURVEYORS LANDSCAPE ARCHITECTS

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Schlagel & Associates Project 20-205

for

Griffin Riley Property Group
21 SE 29th Terrace
Lee's Summit, Missouri 64082

Executive Summary

October 9, 2025

Sue Pyles, P.E.
220 SE Green Street
Lee’s Summit, MO 64063

RE: Hook and Ward Mixed Use
SW Hook Road & SW Ward Road
Lee’s Summit, MO 64081

Dear Ms. Pyles,

We are submitting the enclosed preliminary stormwater management study in support of the site development plans for the multi-phase development Hook and Ward Mixed Use. Included in this development are a proposed Single-family and Multi-family development, proposed townhomes, and commercial use. This report has been prepared to address permitting requirements and provides preliminary design calculations for the required storm water detention and BMP facilities. We have modeled the existing site conditions as they existed at the time this report was prepared.

The proposed site is a 125.05-acre mixed use parcel located in Lee’s Summit, MO at the intersection of SW Hook Road and SW Ward Road. The proposed development has been analyzed and designed to meet the APWA Comprehensive Control Strategy, which entails limiting post-development peak discharge rates from the site for the 2-Year, 10-Year, and 100-Year design storm events. One Extended Wet Detention Basin (EDDB) is being proposed with this development. Two previously constructed extended dry detention basins are currently located downstream of the proposed site and will be utilized for detention requirements. All basins have been designed to detain the mentioned events as well as provided 40-hour detention of runoff from the local 90% mean annual event. Additionally, to reduce downstream flooding concerns, additional detention has been provided to allow passage of the 100-year rainfall event through the existing outlet structure pipe in the event the primary outlet control device becomes clogged. All elements of the enclosed drainage system will be designed and constructed in accordance with all City of Lee’s Summit, Missouri, requirements.

This project includes requesting a waiver for a small area located in the northeast corner of the site to allow free-release off-site without additional detention facilities to be implemented.

Sincerely,

Schlagel & Associates, P.A.

Nick Augustine, E.I.T.
Design Engineer

Mark Breuer, P.E.
Project Engineer

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1.0 GENERAL INFORMATION

Griffin Riley Property Group is proposing to develop the 125.05 acres of land located in Section 20, Township 47 North, Range 31 West, Jackson County, Missouri. The property is located at the intersection of SW Hook Road and SW Ward Road. The proposed development consists of single-family lots, townhomes, and commercial use along with associated infrastructure. Currently, two existing dry detention basins exist on-site as part of the stormwater improvements performed by the City of Lee’s Summit in 2014.

1.1 OBJECTIVE

The intent of this report is to provide information pertaining to the existing and proposed watersheds, identifying and addressing any downstream drainage issues, determine and address any detention requirements, provide 40-hour extended detention of runoff from the local 90% mean annual event, and address permitting requirements. This study provides the preliminary design calculations for the development of the facilities and associated infrastructure.

1.2 METHODOLOGY

The following were utilized in the assessment, preparation and analysis of watersheds in this design concept plan: *Section 5600, 2011, Storm Drainage Systems & Facilities* of the Standard Specifications & Design Criteria of the Kansas City Metropolitan Chapter of the American Public Works Association; *City of Lee’s Summit, Missouri Design Criteria (2011 Revision), Storm Drainage Systems & Facilities,* prepared by the City of Lee’s Summit, Missouri, Public Works Department.

Watersheds for the site were defined according to soil cover and type, tributary area, and runoff times of concentration. Soil cover was determined from inspection of the site and aerial photography. A soil survey for the project area was obtained from the United States Department of Agriculture, Natural Resources Conservation Service (NRCS), website and was utilized in determining soil type. The entire NRCS Soil Resource

Report can be found in Appendix B. Watershed size was determined from both aerial topography and topographical survey, and by the proposed grading plan.

Times of concentration were compiled according to *NRCS TR-55 Urban Hydrology for Small Watersheds (1986)* methodology for sheet flow, shallow concentrated flow, and channel flow. For this report, sheet flow travel lengths were modeled at a total distance of 100’. Travel times for channel flows were determined using the length and velocity of the open channel. *HydroCAD-10* was utilized to model the runoff. All storm events were modeled using *SCS 24-hour Type II* distributions and were modeled for 2-Year, 10-Year, and 100-Year storm events.

* * * * *

2.0 EXISTING CONDITIONS ANALYSIS

The site lies within the East Fork Little Blue River Watershed. The existing site contains 4 watersheds which have release points located in the northeast, northwest, and southern boundary of the site. Offsite stormwater comes into the site from north and southeast and drains to the release points located in the northwest and southeast release points, respectively.

2.1 TRIBUTARY AREAS

The existing drainage tributary map is provided in Appendix A, Figure A.1. The site release points have been identified as East RP, West RP, Northwest RP and Northeast RP. The area has been delineated according to the existing topography and an annotation callout of East DA – Onsite, East DA – Offsite, East Bypass, West DA – Onsite, West DA – Offsite, Northwest DA, Northwest DA – Offsite, and Northeast DA , on Figure A.2, have been provided for the watersheds that drain to the release points.

2.2 CURVE NUMBER AND TIME OF CONCENTRATION

The existing curve numbers and time of concentrations for each area have been established based on the procedures outlined in *NRCS TR-55 Urban Hydrology for Small Watersheds (1986)*. Existing curve numbers were based upon aerial photography, site inspection, and the soil types present on site.

The NRCS Soil Resource Report indicated that a Hydrologic Soil Group (HSG) of C was present on site. A current aerial photograph can be found in Appendix A; it depicts the existing cover conditions. Table 2-1 found in section 2.3 Existing Flow Rates summarizes the curve numbers for each of the watershed areas.

The cover types for existing conditions were considered to be “Contoured Row Crops” in poor condition for the on-site area and off-site area. Procedures outlined in *NRCS TR-55 Urban Hydrology for Small Watersheds* recommends utilizing a curve number of 84 for HSG C contoured row crops.

Time of concentration flow paths were based upon sheet flow and shallow concentrated flow for the existing conditions. Sheet flow lengths were limited to where a grade break occurred. Flow was then considered shallow concentrated flow until a channel was visible either from the USGS topographic map or the aerial photograph, and then from that point was considered channel flow determined by the length of the channel and the velocity of flow.

2.3 EXISTING FLOW RATES

Existing flow rates were determined for the 2-Year, 10-Year, and 100-Year design storms. Offsite runoff is included in the calculations for Table 2-1 below for existing site conditions. Appropriate runoff coefficient curve numbers were based upon aerial photography, site inspection, and the soil types present on site. Detailed calculations with composite curve numbers and time of concentration can be found in the HydroCAD Model Output in Appendix B.

Table 2-1 - Existing Flow Rates

Drainage Sub-Basin	Area, AC	CN	Storm Event	Runoff, CFS
West DA - Onsite	54.09	84	2-YEAR	76.73
			10-YEAR	140.5
			100-YEAR	227.29
West DA - Offsite	6.31	84	2-YEAR	17.48
			10-YEAR	31.46
			100-YEAR	50.32
East DA - Onsite	27.83	84	2-YEAR	56.06
			10-YEAR	96.84
			100-YEAR	156.1
East DA - Offsite	19.55	84	2-YEAR	37.28
			10-YEAR	68.03
			100-YEAR	109.66
East Bypass	2.32	84	2-YEAR	6.52
			10-YEAR	11.74
			100-YEAR	18.72
Northwest DA	28.9	84	2-YEAR	57.1
			10-YEAR	104.19
			100-YEAR	167.92
Northwest DA - Offsite	2.4	84	2-YEAR	4.6
			10-YEAR	8.39
			100-YEAR	13.52
Northeast DA	10.99	84	2-YEAR	28.83
			10-YEAR	52.02
			100-YEAR	83.35

2.4 DOWNSTREAM DRAINAGE ISSUES

The existing downstream drainage system has been reviewed with this development plan. A FEMA FIRMette is included in Appendix A. The project lies outside of the identified FEMA floodplain per map 29095C0532G, dated January 20, 2017. The residential properties adjacent to the south of the proposed development has previously had drainage issues. In 2014, the City of Lee's Summit incorporated the two existing extended dry detention basins previously as part of the Stormwater Improvements Plans to help mitigate downstream flooding issues associated with the adjacent single family development. In 2020, Lamp Rynearson implemented additional stormwater improvements to add additional stormwater infrastructure to help mitigate flooding concerns.

2.5 AGENCY REVIEW

Permitting requirements of the following agencies were reviewed as part of the existing conditions analysis.

2.5.1 Corps of Engineers Review

The National Wetlands Inventory (NWI) map was reviewed for the site and there are no identified wetlands located within the project site. The NWI map can be found in Appendix A.

2.5.2 FEMA Requirements

No FEMA identified floodplain is located on the proposed property per Flood Insurance Rate Map Panel No. 29095C0532G, dated January 20, 2017 . There is currently no work proposed in the regulated floodplain. Please see the attached FEMA FIRMette in Appendix A.

2.5.3 Missouri Department of Natural Resources

All land disturbance activities will be permitted in accordance with the City of Lee's Summit, MO specifications as well as the Missouri Department of Water Pollution Control general permit under the National Pollution Discharge Elimination System (NPDES) and an authorized Notice of Intent (NOI) application form. The disturbance of the site is greater than one acre; therefore, NPDES and NOI applications are required with the future permitting of the site in compliance with local, state and federal guidelines.

* * * * *

3.0 PROPOSED CONDITIONS ANALYSIS

With the proposed development, the site watershed will be divided into four sub-basins for analysis. Stormwater runoff will be conveyed through the site via open sheet flow, shallow concentrated flow, enclosed storm sewer, one extended wet detention basin, and two existing extended dry detention basins. All detention facilities have been designed to detain the 2-Year, 10- Year, and 100-Year storm events.

All components of the overland and enclosed storm sewer systems will meet or exceed the specifications provided in *Section 5600 – Storm Drainage Systems & Facilities* of the *Standard Specifications and Design Criteria* compiled by the Kansas City Metropolitan Chapter of the American Public Works Association.

3.1 TRIBUTARY AREAS

For the East RP, sub-catchments East DA – Onsite and East DA – Offsite will be collected by the existing extended dry detention basin located in the southeast corner of the site. All flows routed through the basin are released to an existing storm inlet structure located to the south in Tract G of Meadows at Summit Ridge, 4th Plat. West RP sub-catchments West DA – Onsite and West DA – Offsite will be collected by the existing dry detention basin located in the southwest corner of the site. Flows routed through the basin are released to an existing stormwater structure located in Tract H of Meadows at Summit Ridge, 5th Plat. Sub-catchments Northwest DA and Northwest DA – Offsite flow to NW RP and are collected by a proposed extended dry detention basin located along the eastern property line. Flows routed through the proposed basin will be released to the existing storm sewer located along SW Ward Road, where it flows to the west. For the NE RP, flows sheet flow off-site to the northeast as they currently do.

3.2 CURVE NUMBER AND TIME OF CONCENTRATION

Curve numbers for the proposed development were developed in a similar manner as the existing conditions. Hydrologic Soil Group (HSG) of D was utilized for post-development conditions. Cover types for the proposed conditions were considered to be 1/8 acre lots, Multi-Family, Single Family lots, and urban commercial in good condition.

Time of concentration was established in a similar manner as the existing conditions. Shallow concentrated flow lengths were shortened and considered paved. Detailed calculations with composite curve numbers and time of concentration can be found in the HydroCAD Model Output in Appendix B. Appendix A, Figure A.2 depicts the proposed drainage conditions.

3.3 PROPOSED FLOW RATES

Proposed flow rates were determined for the 2-Year, 10-Year, and 100-Year design storms for un-detained condition. Detailed calculations can be found in the HydroCAD Model Output Report in Appendix B.

Table 3-1 – HydroCAD Runoff Conditions

Drainage Sub-Basin	Area, AC	CN	Storm Event	Runoff, CFS
West DA - Onsite	56.1	92	2-YEAR	167.5
			10-YEAR	271.3
			100-YEAR	407.87
West DA - Offsite	6.31	84	2-YEAR	17.48
			10-YEAR	31.46
			100-YEAR	50.32
East DA - Onsite	31.59	92	2-YEAR	89.89
			10-YEAR	145.72
			100-YEAR	219.18
East DA - Offsite	19.55	84	2-YEAR	37.28
			10-YEAR	68.03
			100-YEAR	109.66
East Bypass	2.32	92	2-YEAR	8.38
			10-YEAR	13.52
			100-YEAR	20.28
Northwest DA	28.9	93	2-YEAR	104.16
			10-YEAR	166.33
			100-YEAR	248.1
Northwest DA - Offsite	2.4	84	2-YEAR	4.6
			10-YEAR	8.39
			100-YEAR	13.52
Northeast DA	5.14	92	2-YEAR	17.7
			10-YEAR	28.6
			100-YEAR	42.94

3.4 DETENTION ANALYSIS

The runoff hydrographs utilized to determine the peak flow volumes for each tributary area were determined using *TR-55* methodology and *HydroCAD-10*. For the 2-Year, 10-Year, and 100-Year storm events, the complete hydrograph routing and model output can be found in the HydroCAD Model Output Report in Appendix B.

The site will need to provide detention that meets the requirement under the Comprehensive Control release rates under Section 5608.4C1a and 5608.4C1b of the APWA. This entails limiting post-development peak discharge rates from the site for the 2-Year, 10-Year, and 100-Year design storm events, as well as providing 40-Hour extended detention of runoff from the local 90% mean annual event. The post-development peak discharge rates from the site shall not exceed the following:

- 50% storm peak rate less than or equal to 0.5 cfs per site acre
- 10% storm peak rate less than or equal to 2.0 cfs per site acre
- 1% storm peak rate less than or equal to 3.0 cfs per site acre

The sub-catchment for the NE release point does not meet the requirements of the comprehensive control plan, however it does not exceed existing site condition release rates. Therefore, we are requesting a waiver to allow for free release off-site without additional detention facilities to be implemented due to site limitations

Table 3-1 – HydroCAD Runoff Conditions are shown in Table 3-3.B - Required & Proposed Runoff Comparison. The proposed post-development design release rates are shown next to the allowable release rates for comparison.

Table 3-2.B – Allowable Release Rate Calculations

Release Point	Area, AC	Storm Event	Allowable Onsite Release Rate, CFS (A)	Allowable Offsite Release Rate, CFS (B)	Allowable Release Rate, CFS (A+B)	Existing Site Release Rate, CFS
West RP	62.66	2-YEAR	31.33	17.48	48.81	33.36
		10-YEAR	125.32	31.46	156.78	50.77
		100-YEAR	187.98	50.32	238.3	68.73
East RP	53.46	2-YEAR	26.73	37.28	64.01	35.55
		10-YEAR	106.92	68.03	174.95	46.34
		100-YEAR	160.38	109.66	270.04	65.48
NW RP	32.2	2-YEAR	16.1	4.6	20.7	61.69
		10-YEAR	64.4	8.39	72.79	112.58
		100-YEAR	96.6	13.52	110.12	181.44
NE RP	5.14	2-YEAR	2.57	0	2.57	28.83
		10-YEAR	10.28	0	10.28	52.02
		100-YEAR	15.42	0	15.42	83.35

Table 3-3.B - Required & Proposed Runoff Comparison

Release Point	Area, AC	Storm Event	Allowable Release Rate, CFS	Proposed Release Rate, CFS
West RP	62.66	2-YEAR	48.81	46.13
		10-YEAR	156.78	59.38
		100-YEAR	238.3	102.46
East RP	53.46	2-YEAR	64.01	40.37
		10-YEAR	174.95	49.44
		100-YEAR	270.04	66.47
NW RP	28.9	2-YEAR	20.7	14.66
		10-YEAR	72.79	53.43
		100-YEAR	110.12	66.52
NE RP	5.14	2-YEAR	2.57	17.7
		10-YEAR	10.28	28.6
		100-YEAR	15.42	42.94

Please note: Site release rates are not a direct addition of sub-basin runoff due to differences in the time peak as well as storage effects within the basins.

Proposed stormwater drainage structures will be located throughout the site to capture and convey proposed stormwater runoff to both wet and dry detention basins. The Water Quality volume for all proposed basins will be released over 40 hours. Water quality outlet structures have been provided for each basin and have been designed to meet the allowable release rates provided in Table 3-2 for the 2, 10, and 100-year storm events. The water quality storm event will be controlled by a V-notch weir for the proposed extended wet detention basin. Please refer to the Stormwater Improvement Plans provided in Appendix A for design of the water quality structures for the existing dry detention basins.

For each basin, the primary control device was removed from the HydroCAD model to simulate a clogged condition. For this clogged condition, detention storage has been provided to allow passage of the 100-year rainfall event through the existing outlet structure pipe without the use of an earthen weir overflow. The analysis of the existing dams were also included. With the primary control device assumed clogged, the 100-year storm event was able to be contained within both basins. With the proposed grading of the site, re-grading of the basins will be required to keep the 100-year clogged WSE a minimum of 20’ off the property line. In addition to this, earthen weir emergency spillways will be provided for each basin per Section 5600 of the Design and Construction Manual. Each emergency spillway will be set at least 0.5 feet above the 100-year clogged water surface elevation and designed to carry the 100-year storm event. An additional 1 foot of freeboard will be provided from the water surface elevation in the spillway and the top of dam Reconstruction of the existing dams will be required to meet freeboard requirements. Details will be provided with final construction documents. Table 3-4 summarizes the results of this analysis.

Table 3-4 – Emergency Spillway Analysis

	Storm Event	Inflow to Basin (CFS)	Emergency Spillway Elevation (FT)	Emergency Spillway Length (FT)	Clogged Surface Elevation
EWDB #1	1% (100 Year)	262.18	1009	150	1009.67
East Basin	1% (100 Year)	324.66	1014	460	1014.53
West Basin	1% (100 Year)	454.65	1004	460	1003.89

Additionally, erosion control procedures will be designed and implemented at the outlets to reduce impact on the site downstream.

* * * * *

4.0 SUMMARY AND RECOMMENDATIONS

The proposed drainage site is a 125.05-acre mixed use parcel of land located in Lee’s Summit, MO at the intersection of SW Hook Road and SW Ward Road. The proposed development has been analyzed and designed to meet the APWA Comprehensive Control Strategy, which entails limiting post-development peak discharge rates from the site for the 2-Year, 10-Year, and 100-Year design storm events. One extended wet detention basin and two existing extended dry detention basins have been designed to detain the mentioned events as well as provided 40-hour detention of runoff from the local 90% mean annual event. All elements of the enclosed drainage system will be designed and constructed in accordance with all City of Lee’s Summit, Missouri, requirements.

* * * *

APPENDIX A

-Existing Site Aerial Photograph

-Existing Drainage Map

-Proposed Drainage Map

-EWDB Water Quality Design

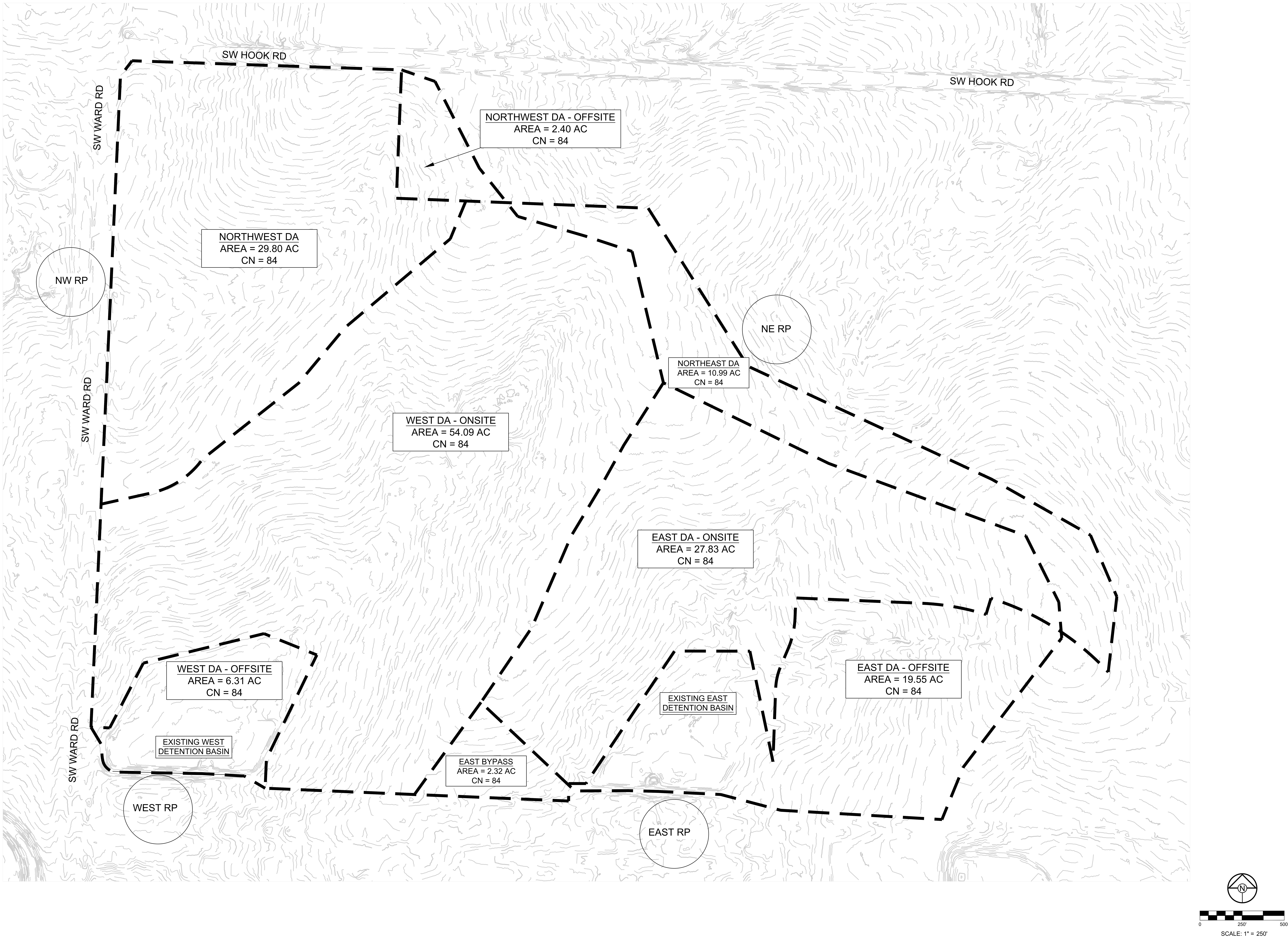
-FEMA FIRMette

-National Wetlands Inventory

-Stormwater Improvements-Southwest 33rd Street Detention Basins

-Stormwater Improvements-SW 34th Street & SW Pinnell Drive


SW HOOK RD
SW WARD RD
SW WINDEMERE DR
SW REGATTA DR
SW 34 ST



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Kansas State Certificates of Authority
#E-296 #LA-29 #LS-54

PREPARED BY:

SCHLAGEL & ASSOCIATES, P.A.

WARD AND HOOK MIXED USE
HYDRO MAPS

SW WARD RD & SW HOOK RD LEE'S SUMMIT, MO

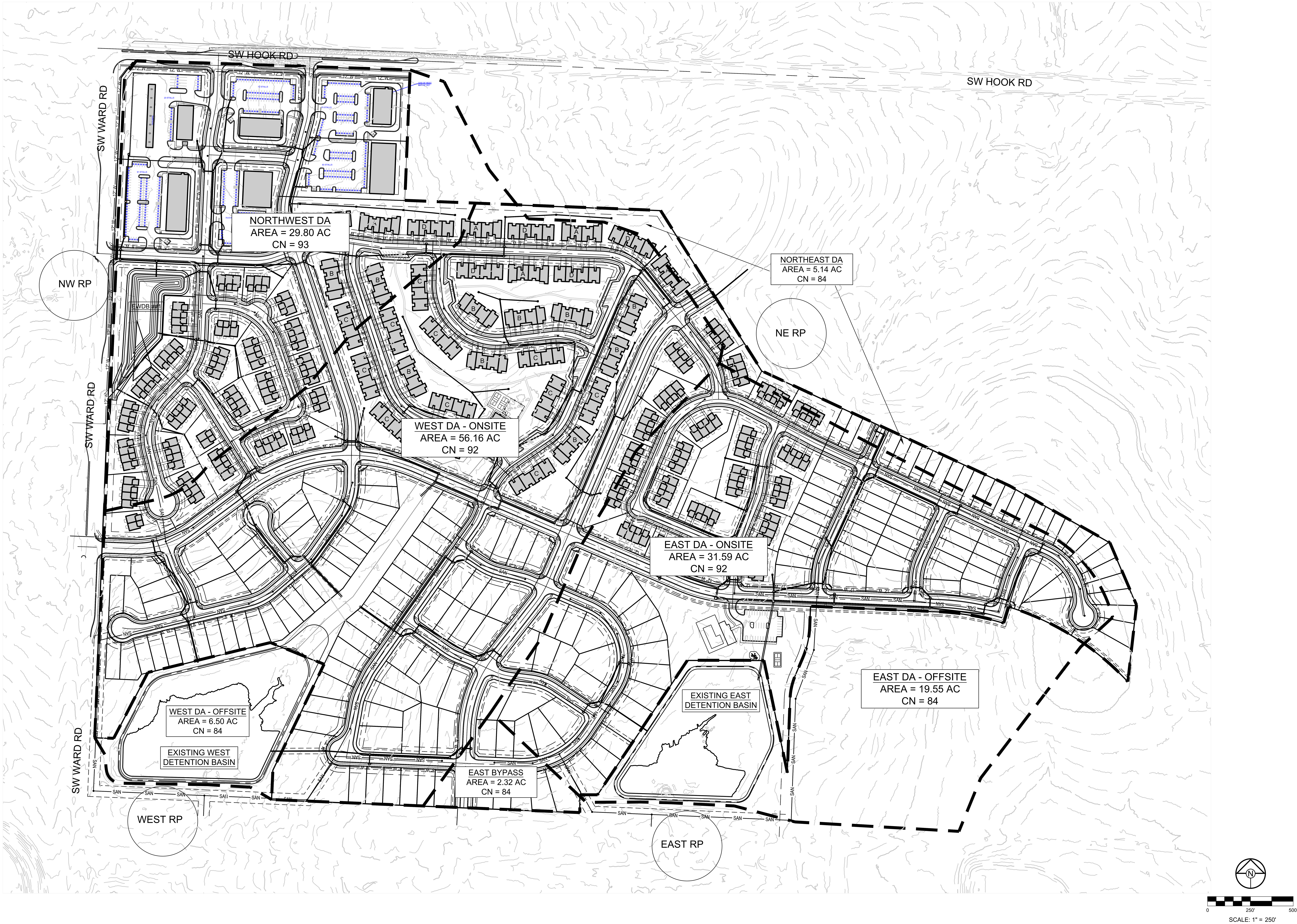
REVISION DATE	DESCRIPTION
1 DATE	DESCRIPTION 1
2	
3	
4	
5	
6	
7	
8	
9	

DRAWN BY:	CHECKED BY:	DATE PREPARED:	PROJ. NUMBER:
NCA	MAB	04/11/2025	25-019

EXISTING
DRAINAGE MAP

SHEET

A1



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SCHLAGEL & ASSOCIATES, P.A.

WARD AND HOOK MIXED USE
HYDRO MAPS

SW WARD RD & SW HOOK RD LEE'S SUMMIT, MO

REVISION	DATE	DESCRIPTION
1		DESCRIPTION 1
2		
3		
4		
5		
6		
7		
8		
9		

DRAWN BY: NCA
CHECKED BY: MAB
DATE PREPARED: 04/11/2025
PROJ. NUMBER: 25-019

PROPOSED DRAINAGE MAP

SHEET
A2

Extended Wet Detention Basin #1

Water Quality Volume Calculation

WQV = P * Weighted RV

WQV - Water Quality Volume (watershed-inches)
P - Rainfall Event (1.37 inches in Kansas City)
RV - Volumetric Runoff Coefficient

RV = 0.05 + 0.009(I)

I - Percent Site Imperviousness (%)

I. Determine Weighted RV & Weighted Rational C Coefficient

Cover Type	% Impervious	Area (Ac.)	Total Impervious Area (Ac.)	Rational Runoff Coefficient	RV	C * Area	RV * Area
Urban Commercial	85	13.57	11.53	0.81	0.815	10.9917	11.05955
MultiFamily/Townhomes	65	16.23	10.55	0.66	0.635	10.7118	10.30605
			0.00		0.05	0	0
Total		**29.80**	**22.08**			**21.704**	**21.3656**

Rv = Sum(Rv*A)/Total Area = 21.36 / 29.8 = 0.717

C = Sum(C*A)/Total Area = 21.7 / 29.8 = 0.728

II. Determine Water Quality Volume

WQV = P * Rv = 1.37 * 0.71696(**0.982 in**

III. Determine Total Water Quality Volume

Total Watershed Area (AT) = 29.8 acres
WQV = 0.982 in

WQV = (29.8 * 0.982)/12 = **2.44 ac-ft**

Extended Wet Detention Basin #1

Design Worksheet

SW Hood Rd & SW Ward Rd

I. Basin Water Quality Volume		
Tributary Area to EWDB, A_T	A_T =	29.80 acres
Water Qualtity Volume, WQ_V - See Attached Calculations	WQ_V =	2.439 ac-ft
IIa. Permanent Pool Volume - Method 1		
Average 14 Day Wet Season Rainfal, R_{14}	R_{14} =	2.2 in
Rational Runoff Coefficient, C	C =	0.728
Permanent Pool Volume by Method 1, V_{P1}	V_{P1} =	3.979 ac-ft
$V_{P1} = (C*A_T*R_{14})/12$		
IIb. Permanent Pool Volume - Method 2		
Ratio of Basin Volume to Runoff Volume, $V_{B/R}$	$V_{B/R}$ =	4
(From Figure 12; $V_{B/R}$ should be >= 4.0)		
Mean Storm Depth, Sd	Sd =	0.6 in
Impervious Tributary Area, Ai	Ai =	22.08 acres
Permanent Pool Volume by Method 2, V_{P2}	V_{P2} =	4.417 ac-ft
$V_{P2} = (V_{B/R}*Sd*Ai)/12$		
IIc. Permanent Pool Design Volume		
Design Permanent Pool Volume, V_P	V_P =	5.30 ac-ft
(Larger of V_{P1} and V_{P2} plus 20%)		
Average Permanent Pool Depth, Z_P	Z_P =	10 ft
Permanent Pool Surface Area, A_P	A_P =	1.120 ac
IIId. Water Quality Outlet - V-Notch Weir		
Depth of Water Quality Volume Above Permanent Pool, Z_{WQ}	Z_{WQ} =	2.5 ft
Average Head of Water Quality Pool Volume Over Invert of V-Notch, H_{WQ}	H_{WQ} =	1.2 ft
$H_{WQ} = 0.50 * Z_{WQ}$		
Average Water Quality Pool Outflow Rate, Q_{WQ}	Q_{WQ} =	0.74 cfs

Q_{WQ} = (WQ_V * 43560)/(40*3600)

V-Notch Weir Coefficient, Cv	Cv	2.62
V-Notch Weir Angle $\Theta = 2*(180/\Pi)*\arctan(Q_{WQ}/(Cv*H_{QW}\text{^}5/2))$ - Not < 20 degrees	Θ =	20.0 deg
V-Notch Weir Top Width, WV $Wv = 2*Z_{WQ}*\tan(\Theta/2)$	Wv =	0.88 ft

not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Missouri State Plane West Zone (FIPS zone 2403). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from the U.S.D.A Farm Service National Agriculture ImageryProgram (NAIP) dated 2014. Produced at scale of 1:24,000.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations** and **floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary
0.2% Annual Chance Floodplain Boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.

513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A Cross section line
23 — 23 Transect line
Culvert
Bridge
45° 02' 08", 93° 02' 12" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
3100000 FT 5000-foot ticks: Missouri State Plane West Zone (FIPS Zone 2403), Transverse Mercator projection
DX5510 × Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 29, 2006

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
January 20, 2017 - to change Special Flood Hazard Areas.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0532G

FIRM
FLOOD INSURANCE RATE MAP
JACKSON COUNTY, MISSOURI
AND INCORPORATED AREAS

PANEL 532 OF 625
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LEE'S SUMMIT, CITY OF	290174	0532	G

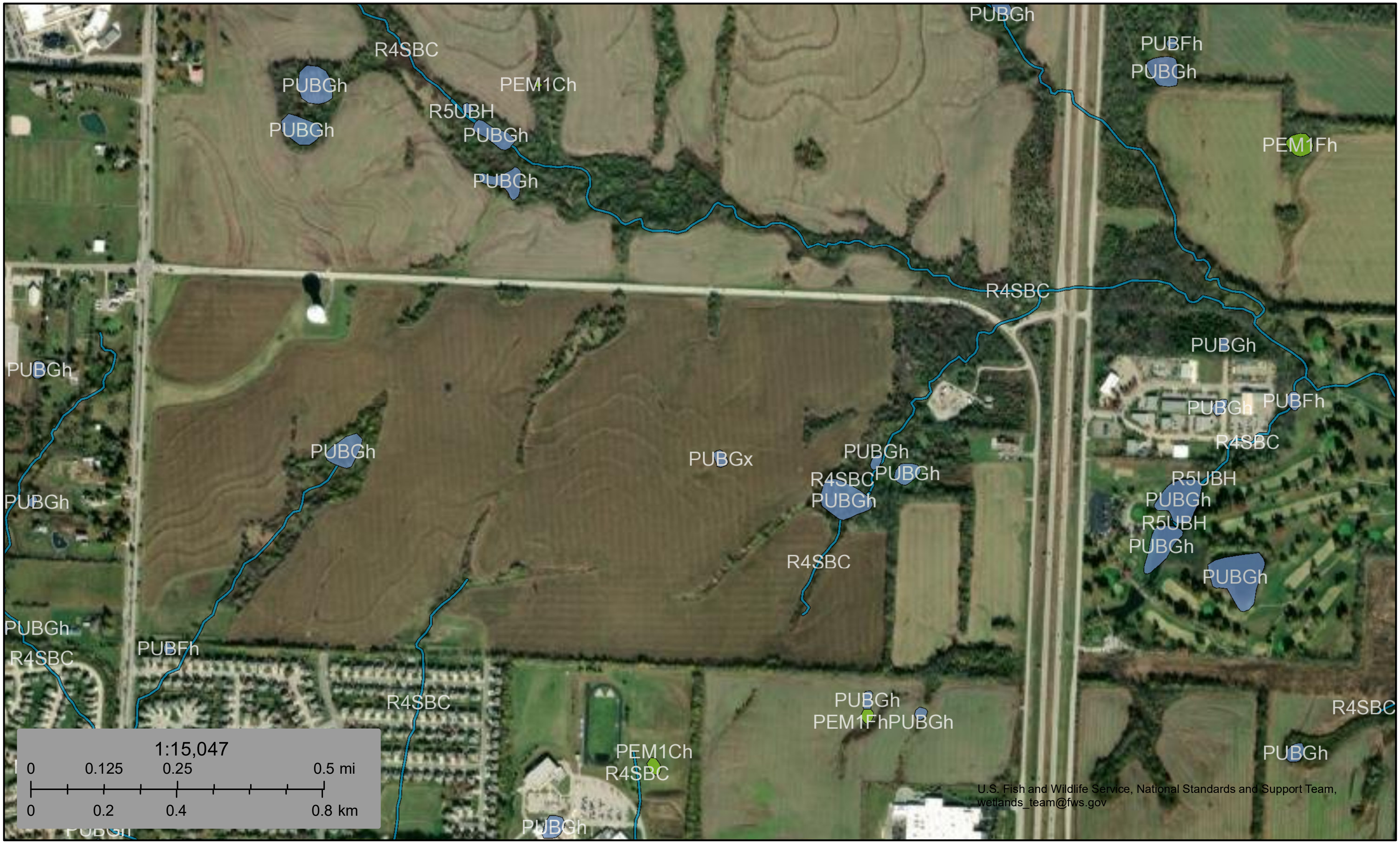
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
29095C0532G

U.S. Fish and Wildlife Service

National Wetlands Inventory

Wetland Map



April 4, 2025

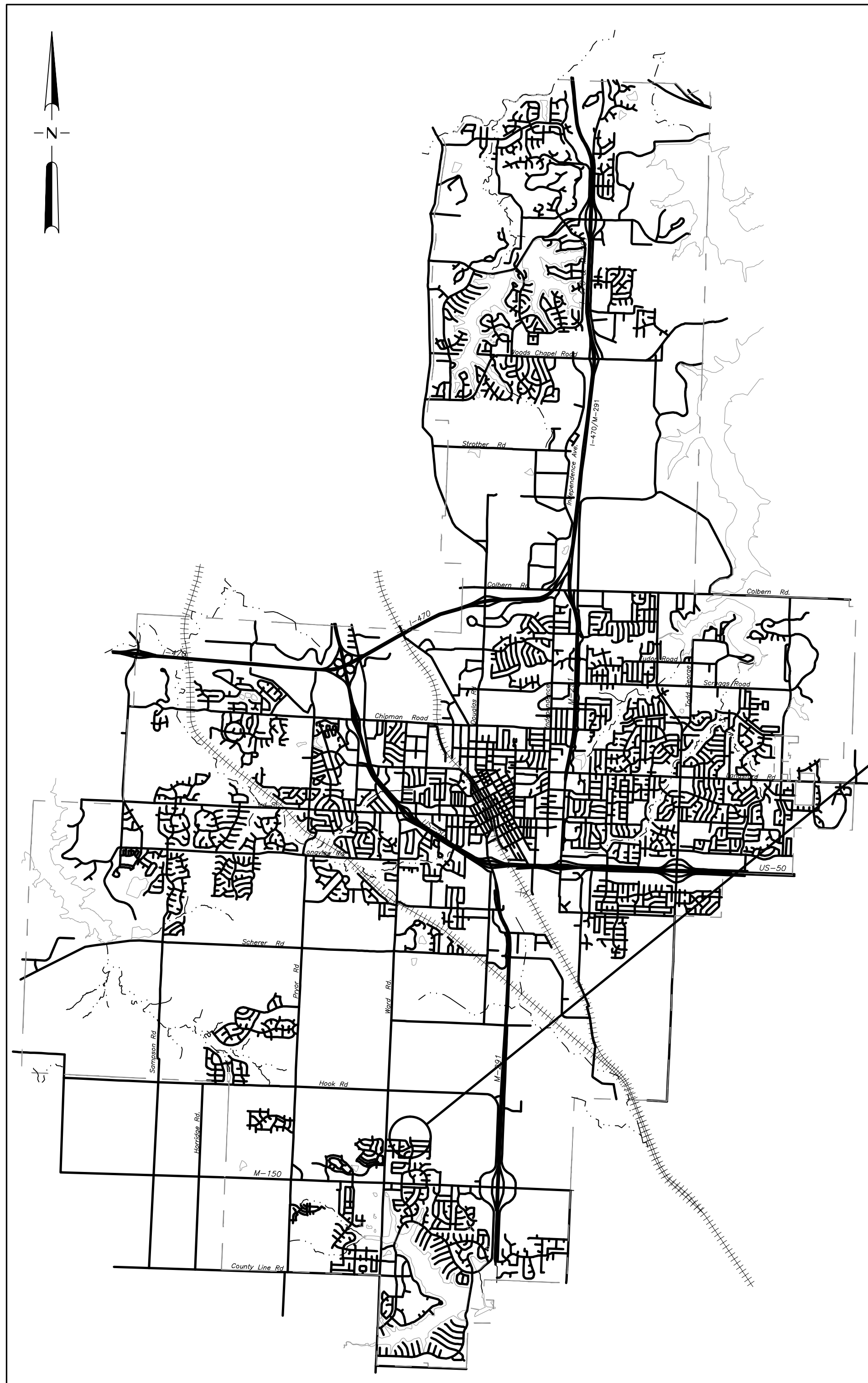
Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

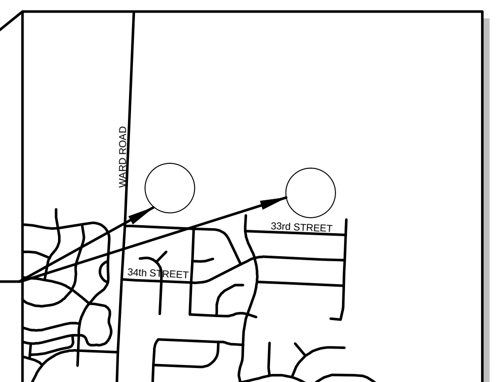
STORMWATER IMPROVEMENTS
SOUTHWEST 33RD STREET DETENTION BASINS
CITY OF LEE'S SUMMIT, MISSOURI

SPRING 2014
ACTIVITY NO. 5433813-19C



CITY MAP

PROJECT LOCATION



SHEET INDEX

UTILITY COMPANIES

BEFORE EXCAVATING CALL: 1-800-DIG-RITE

WATER/SEWER	LEE'S SUMMIT WATER UTILITIES (816) 969-1900 220 SE GREEN ST. LEE'S SUMMIT, MO 64063	TELEPHONE	AT&T MARTY LOPER (816) 325-5609 215 N SPRING ST. INDEPENDENCE, MO 64050
GAS	MISSOURI GAS ENERGY BECCA ORR (816) 969-2230 3025 SE CLOVER DR. LEE'S SUMMIT, MO 64082	CABLE	TIME WARNER TROY PREWITT (816) 508-7287 6500 WINCHESTER AVE KANSAS CITY, MISSOURI 64133
ELECTRIC	KCP&L HEATH LENAHAN (816) 251-2647 1300 SE HAMBLEN RD. LEE'S SUMMIT, MO 64081	STREETS & STORMWATER	PUBLIC WORKS OPERATIONS DIVISION (816) 969-1870 1971 SE HAMBLEN RD. LEE'S SUMMIT, MO 64082

CITY OF LEE'S SUMMIT, MO
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION
220 S.E. GREEN STREET
LEE'S SUMMIT, MO 64063

NOTE: KNOWN UNDERGROUND UTILITIES IN THE VICINITY OF THE WORK ARE SHOWN ON THESE PLANS, ALTHOUGH OTHERS MAY EXIST. THE LOCATIONS SHOWN ARE BELIEVED TO BE REASONABLY CORRECT, BUT DO NOT PURPORT TO BE ABSOLUTELY SO. BEFORE STARTING WORK, THE CONTRACTOR SHALL GIVE NOTICE TO AND OBTAIN INFORMATION FROM EACH OWNER AND OPERATOR OF EXISTING UNDERGROUND FACILITIES IN ACCORDANCE WITH THE MISSOURI UNDERGROUND FACILITY SAFETY AND DAMAGE PREVENTION STATUTE (RSMO CHAPTER 319.015 – 319.050).

MISSOURI ONE CALL SYSTEM, INC.
1-800-344-7483
STOP-CALL BEFORE YOU DIG!

CAD NO. 33RD ST Cover.dwg
DATE.TIME 20131104

General Notes for Capital Improvements Projects

(Rev. December 17, 2013 by RTN)

1) Preliminary Information:

a) Consult Paragraph 6.12 of the EJCDC General Conditions (C-700) for a complete list of record documents that the Contractor shall maintain on site.

b) Permits required for this Work can be found in Section 1010 of the General Requirements (Division 1).

c) Construction of the Work shown or implied by this set of Drawings shall not be initiated unless all preliminary contract obligations are met, and the Owner is notified of the intent to start the Work. See Section 1020 of Division 1.

d) All work shall be confined within the construction limits or as otherwise directed by the Owner.

e) Property lines shown are the construction limits.

f) Any work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor. Submittal procedures and requirements can be found in Paragraph 6.17 of C-700 and Sections 1115 and 1116 of Division 1.

g) Owner is defined as the City of Lee's Summit.

2) Coordination and Notifications:

a) Any time references listed in Paragraph 2 are typical timelines. Consult Section 1105 of Division 1 for project specific timelines, coordination and notification processes.

b) The removal of trees, sheds, fencing or other items on private property are not authorized on this project. Contractor shall notify the Owner immediately if any such work is proposed. The Owner requires at least 14 calendar days to notify property owner or resident, in order to give them an opportunity to salvage these items.

c) Contractor shall not be allowed to work weekends or holidays without requesting prior approval from Owner three working days in advance.

d) By Ordinance 17-42, working hours within the City of Lee's Summit are 7:00 a.m. to 10:00 p.m. Requests to work beyond these hours must be filed with the Owner one week in advance.

3) Survey:

a) In accordance with Paragraph 4.05 of C-700, Owner or Engineer shall provide engineering surveys to establish reference points for construction which in their judgment are necessary to enable Contractor to perform the Work. Contractor is responsible for laying out the work and shall set those stakes necessary to construct this Project. No direct payment will be made for this work, unless listed in the bid tab.

b) In accordance with Paragraph 4.05 of C-700, Contractor shall reset any permanent reference points, property corners and property monuments that are disturbed during construction. These points and monuments shall be reset by a Registered Land Surveyor in accordance with state law. No direct payment will be made for this work.

4) Underground Facilities:

a) Information regarding underground facilities is approximate and was compiled using information provided by the facility owner. Consult Paragraph 4.04 of C-700 for further information.

b) Unless bored, all underground utilities (including the Contractor's work) that cross under proposed street pavements shall be in place prior to the placement of the new pavement.

5) Water, Storm & Sanitary Sewer:

a) Water may be purchased from the City's Water Utilities Department.

b) All manholes, valve lids, meter lids, fire hydrants and air relief assemblies within the construction limits shall be relocated or adjusted to grade by the Contractor in accordance with the specifications. All valve risers in pavement (whether adjusted, replaced or placed) shall be cast iron and conform to the Specifications. No direct payment will be made for this work, unless listed in the bid tab.

6) Install trash rack per Manufacturer"s recommendations.

7) Environmental & Safety

a) Contractor shall use adequate dust control measures during all phases of the Work. Consult Section 1145 in Division 1.

b) Siltation and erosion control shall be the responsibility of the Contractor. Contractor shall be responsible for maintaining erosion control systems, replacing damaged or failed erosion control devices and inspecting the site in order to repair the erosion control systems within 24 hours after a signification rain event. Grading adjacent to pavements shall be left three inches below the top of pavement until immediately before sod or seed is placed. Erosion and sediment control must be in place prior to the disturbance of the ground. Field adjustments to erosion and sediment control may be required depending on the site conditions.

c) Contractor shall maintain the Storm Water Pollution Prevention Plan (SWPPP) on site in accordance with DNR regulations.

d) Property maintenance information can be found in Section 1145 of Division 1.

8) Grading, Removals & Damaged Items

a) Information on salvaged material can be found in Section 1150 of Division 1.

b) No burning is allowed on the site.

c) Driveways, parking lots, sidewalks, fences, irrigation systems and other items disturbed or damaged by the Contractor shall be restored at the Contractor's expense to a condition equal to or better than existing before damage occurred. Unless waived by Owner, all items requiring replacement shall be replaced with new materials, and all materials are subject to Owner's approval. No direct payment will be made for this work, unless listed in the bid tab.

d) Roof drains, under drains, septic lines and other small drainage lines not shown on the Drawings that are uncovered or damaged shall be repaired, and the point of discharge shall be placed no closer than five feet to any adjoining property line including the Right-of-Way line (Section 16-413 of the Code of Ordinances). Unless directed by the City Engineer, no drain lines shall be connected to the storm sewer system. Materials and location are subject to Owner's approval. If no unit price is in the bid, then payment will be negotiated per the Contract Documents.

e) Materials that may be classified as unsuitable or require undergrading shall be determined by the Owner or the Owner's representative. Contractor shall not make this determination. Clearing and Grubbing within the foot print of the detention basin berms shall include tree roots to a depth of three (3) feet.

f) The grading operation within each basin may be adjusted to obtain more or less material, as required, for construction of the adjacent berm. Materials obtained in each basin shall be used for the construction of that berm, i.e., there shall not be hauling of materials from one basin to the other. The extent of grading for each basin shall be held within the property lines shown on the drawings. Flow line elevations in each basin shall be held as shown in the plans.

9) Traffic:

a) Unless directed in the Contract Documents or Drawings, Contractor shall maintain traffic and pedestrian access at all times.

b) Appropriate traffic control devices, signage and pavement markings shall be established and maintained throughout the project in accordance with the Contract Documents and the MUTCD.

LEGEND

TVR	CABLE TV RISER
CMP	CORRUGATED METAL PIPE
B/L	BUILDING SETBACK LINE
(DND)	DO NOT DISTURB
EB	ELECTRIC BOX
ET	ELECTRIC TRANSFORMER
ER	ELECTRIC RISER
FH	FIRE HYDRANT
F/L	FLOWLINE
	GATE
MH	MANHOLE
SMH	SEWER MANHOLE
SP	SIGN POST
TR	TELEPHONE RISER
T/W	TOP OF WALL
UGM	UNGROUND GAS MARKER
WV	WATER VALVE
U.E.	UTILITY EASEMENT
X	FENCE
UTV	UNDERGROUND CABLE T.V.
UE	UNDERGROUND ELECTRIC
S	UNDERGROUND SEWER LINE

VERTICAL & HORIZONTAL CONTROLS

CONTROL PT. NO. 1
SET NAIL
N. 980804505
E. 2820355445
ELEV. = 1023.15
SEE SHEET 7

CONTROL PT. NO. 2
SET NAIL
N. 980803309
E. 2820064941
ELEV. = 1014.91
SEE SHEET 7

CONTROL PT. NO. 5
FOUND STEEL ROD W/ CAP
N. 980651059
E. 2819085575
ELEV. = 1017.32
SEE SHEET 3

CONTROL PT. NO. 6
FOUND STEEL ROD W/ CAP
N. 980602722
E. 2820235255
ELEV. = 1017.12
SEE SHEET 7

CONTROL PT. NO. 17
SET NAIL
N. 980868287
E. 2818755267
ELEV. = 1021.41
SEE SHEET 4

CONTROL PT. NO. 50
SET ASC STEEL ROD W/ CAP
N. 980891612
E. 2817800960
ELEV. = 1000.99
SEE SHEET 4

CONTROL PT. NO. 51
SET ASC STEEL ROD W/ CAP
N. 981593.788
E. 2817822.352
ELEV. = 1019.60
SEE SHEET 4

FORCE MAIN MANHOLE #1
N. 980887.93
E. 2818171.10
ELEV. = 997.46
SEE SHEET 4

FORCE MAIN MANHOLE #2
N. 980822.31
E. 2819761.37
ELEV. = 1007.49
SEE SHEET 7

LEE'S SUMMIT MISSOURI
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063

Project: PROJECT NO. 79801-19C
SOUTHWEST 33RD ST DETENTION BASINS
CITY OF LEE'S SUMMIT. JACKSON COUNTY, MO

Sheet Name: GENERAL NOTES & LEGEND

Drawn By: JN
Checked By: RTN

LEE'S SUMMIT
MISSOURI
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063

Project:
PROJECT NO. 5433813-19C
SOUTHEEST 33RD ST DETENTION BASINS
CITY OF LEE'S SUMMIT, JACKSON COUNTY, MO

Sheet Name:
OVERALL PLAN

Drawn By: JN .
Checked By: RTN.
Date: 01/14
Proj No: 5433813-19C

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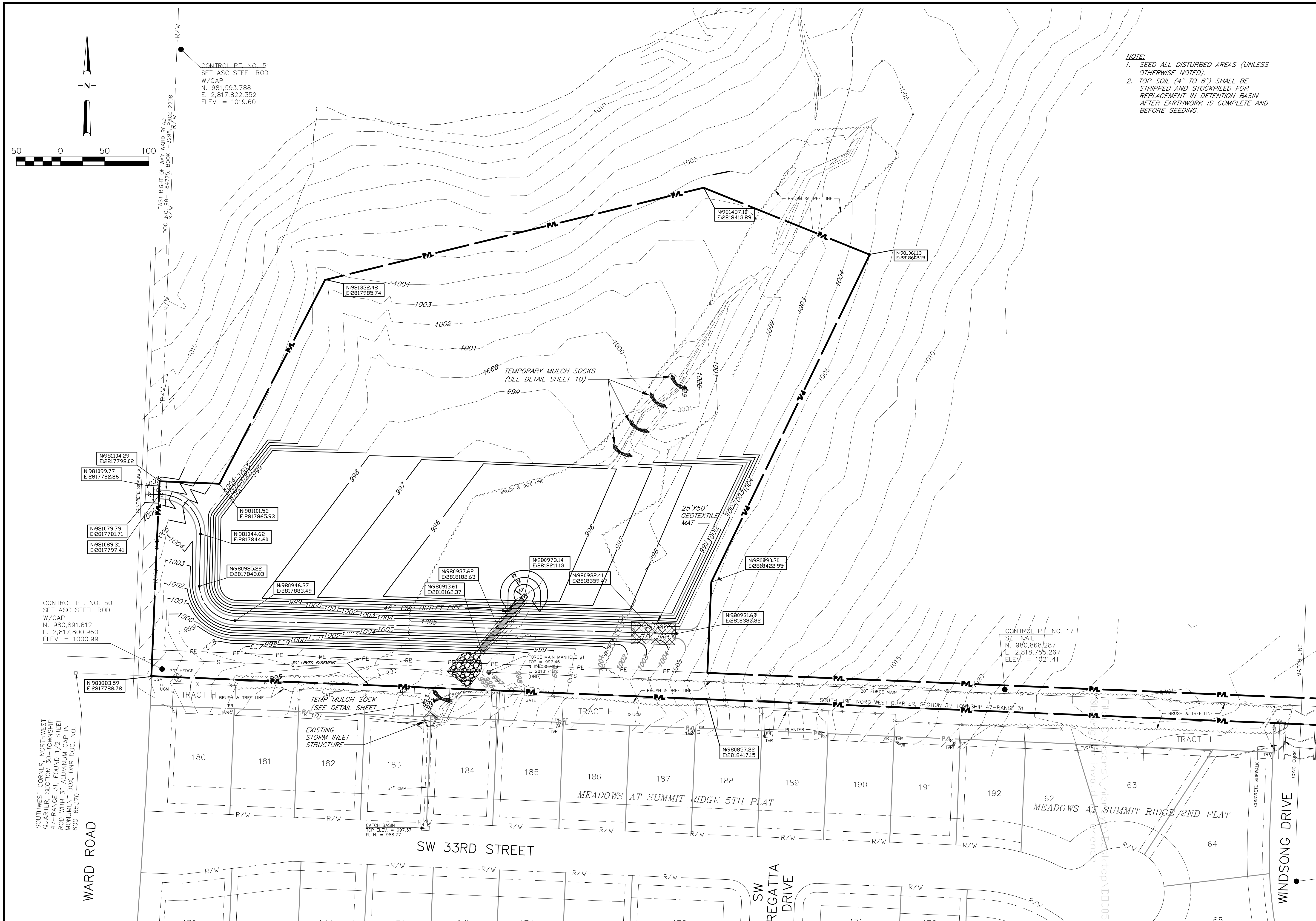

LEE'S SUMMIT MISSOURI

PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063

Project: PROJECT NO. 5433813-19C
SOUTHEEST 33RD ST DETENTION BASINS
CITY OF LEE'S SUMMIT, JACKSON COUNTY, MO

Sheet Name: WEST BASIN

Drawn By: JN.
Checked By: RTN
Date: 02/14
Proj No: 5433813-19C

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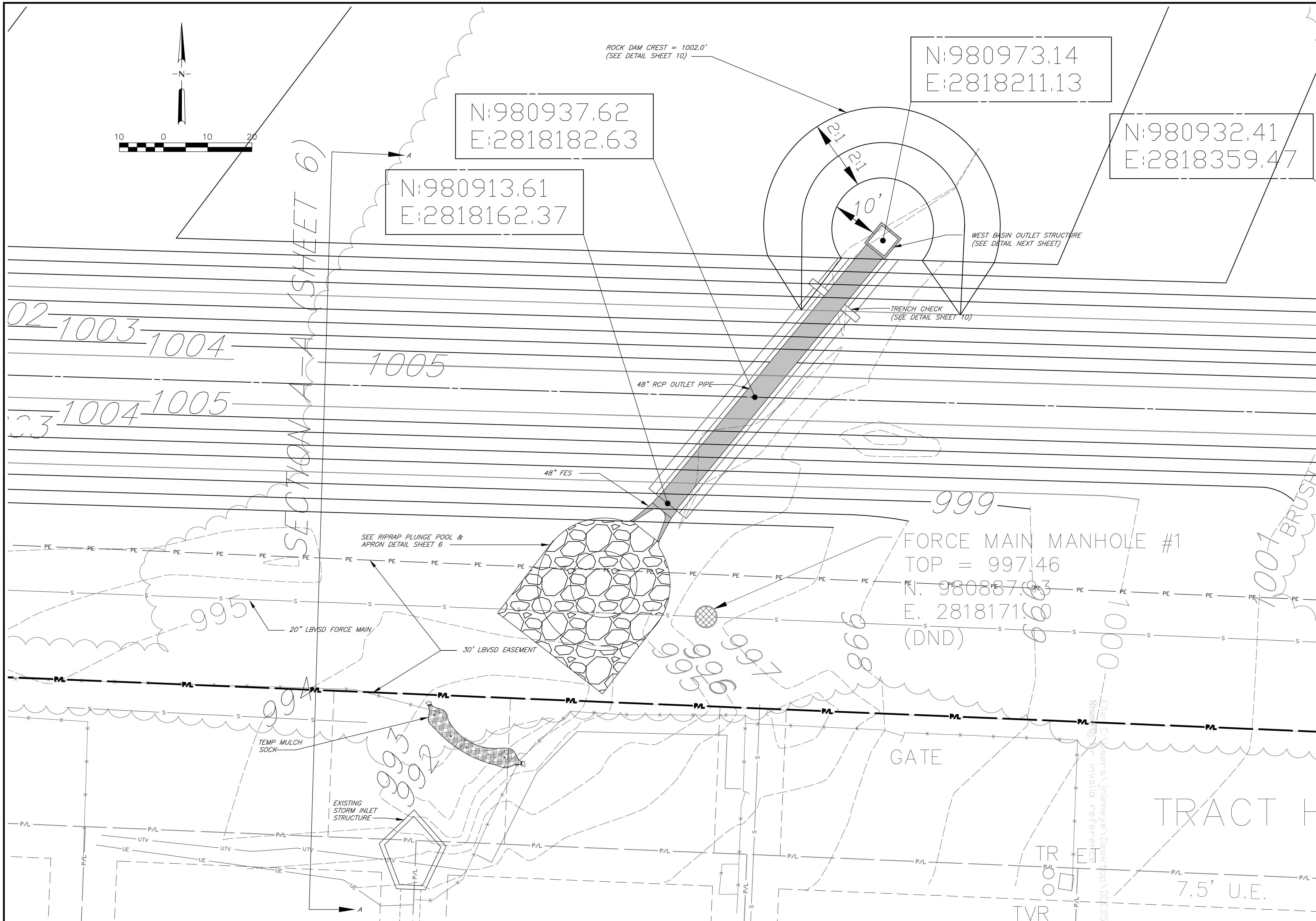

LS LEE'S SUMMIT MISSOURI

PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063

Project: PROJECT NO. 5433813-19C
SOUTHEEST 33RD ST DETENTION BASINS
CITY OF LEE'S SUMMIT. JACKSON COUNTY, MO

Sheet Name: WEST BASIN DETAILS

Drawn By: JN.
Checked By: RTN
Date: 01/14
Proj No: 5433813-19C

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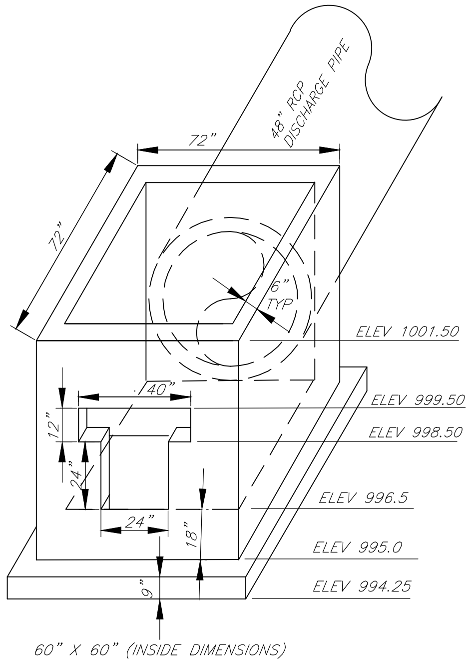
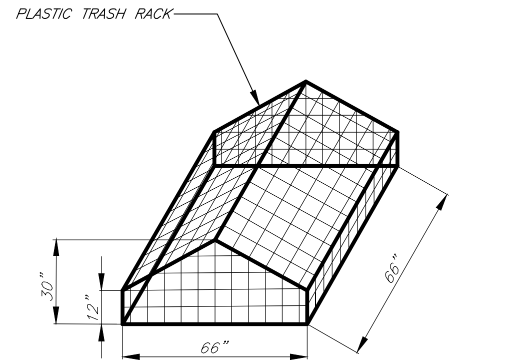
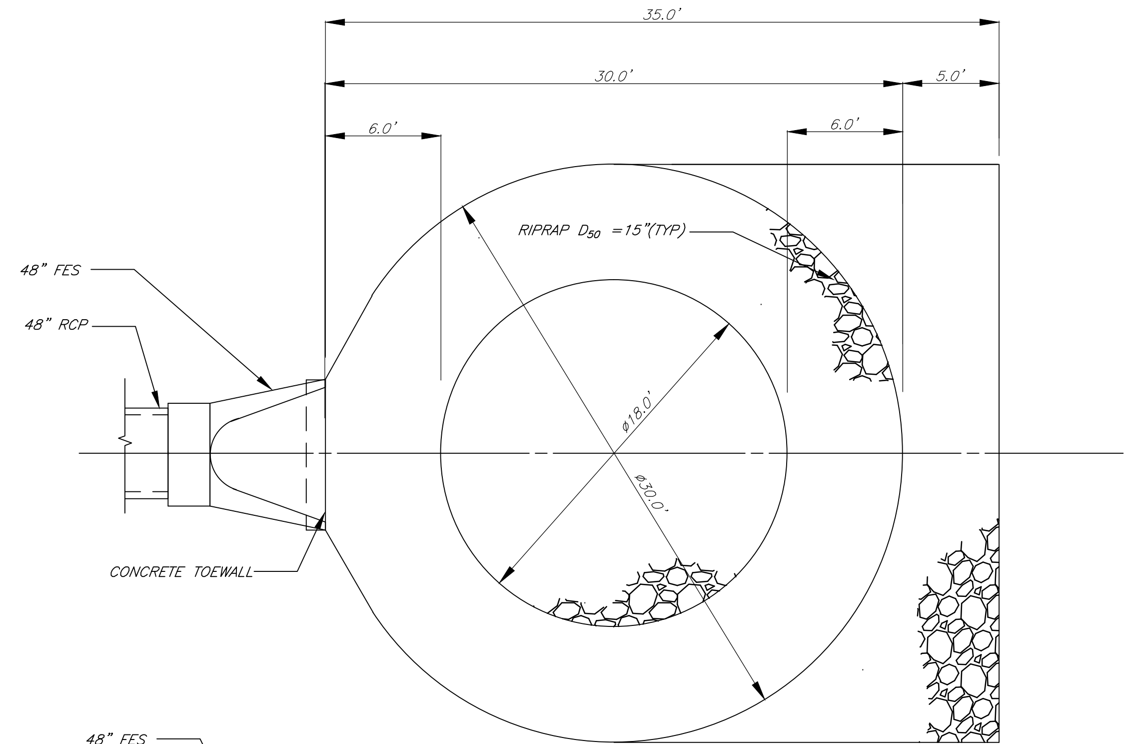


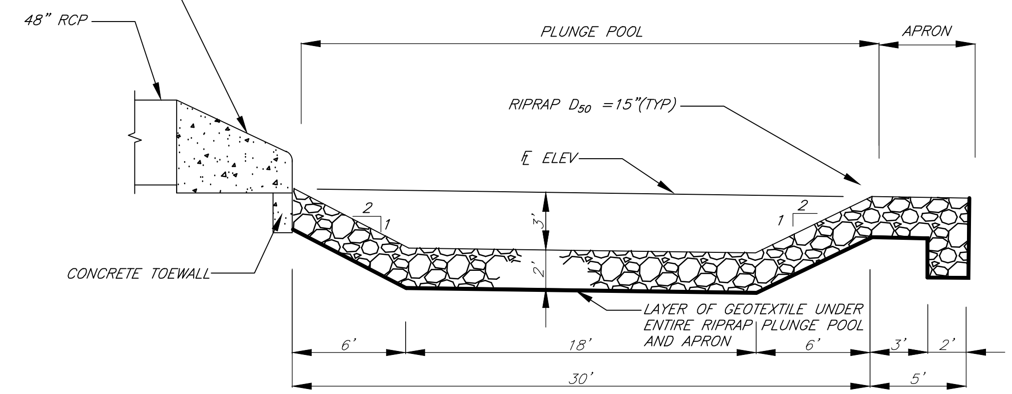
WEST BASIN OUTLET STRUCTURE
NTS



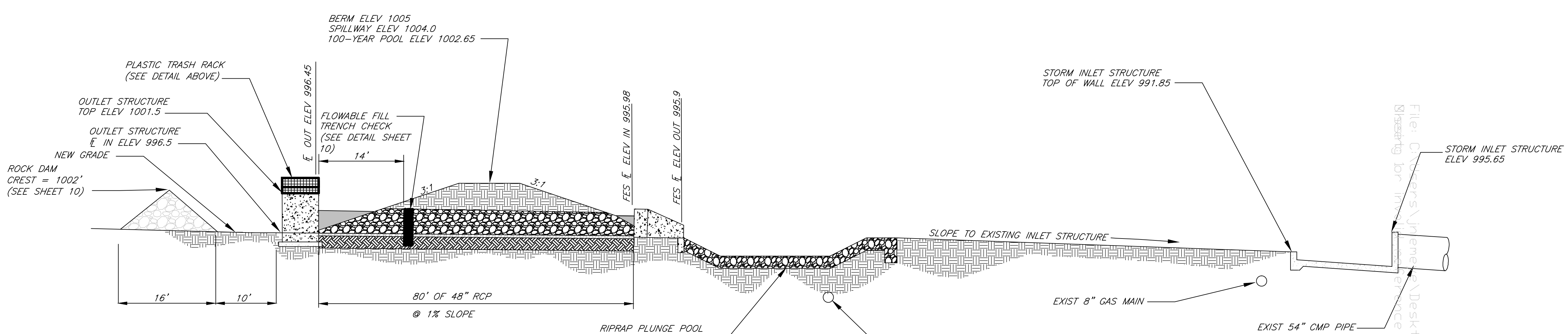
TRASH RACK FOR OUTLET STRUCTURE
NTS

NOTES:
1. OUTLET STRUCTURE SHALL BE REINFORCED WITH #4 REBAR 12" ON CENTER EACH WAY.
2. OUTLET STRUCTURE SHALL BE CONSTRUCTED OF KCMMB4K CONCRETE.
3. INSTALL TRASH RACK PER MANUFACTURER'S RECOMMENDATIONS.





RIPRAP PLUNGE POOL & APRON
NTS



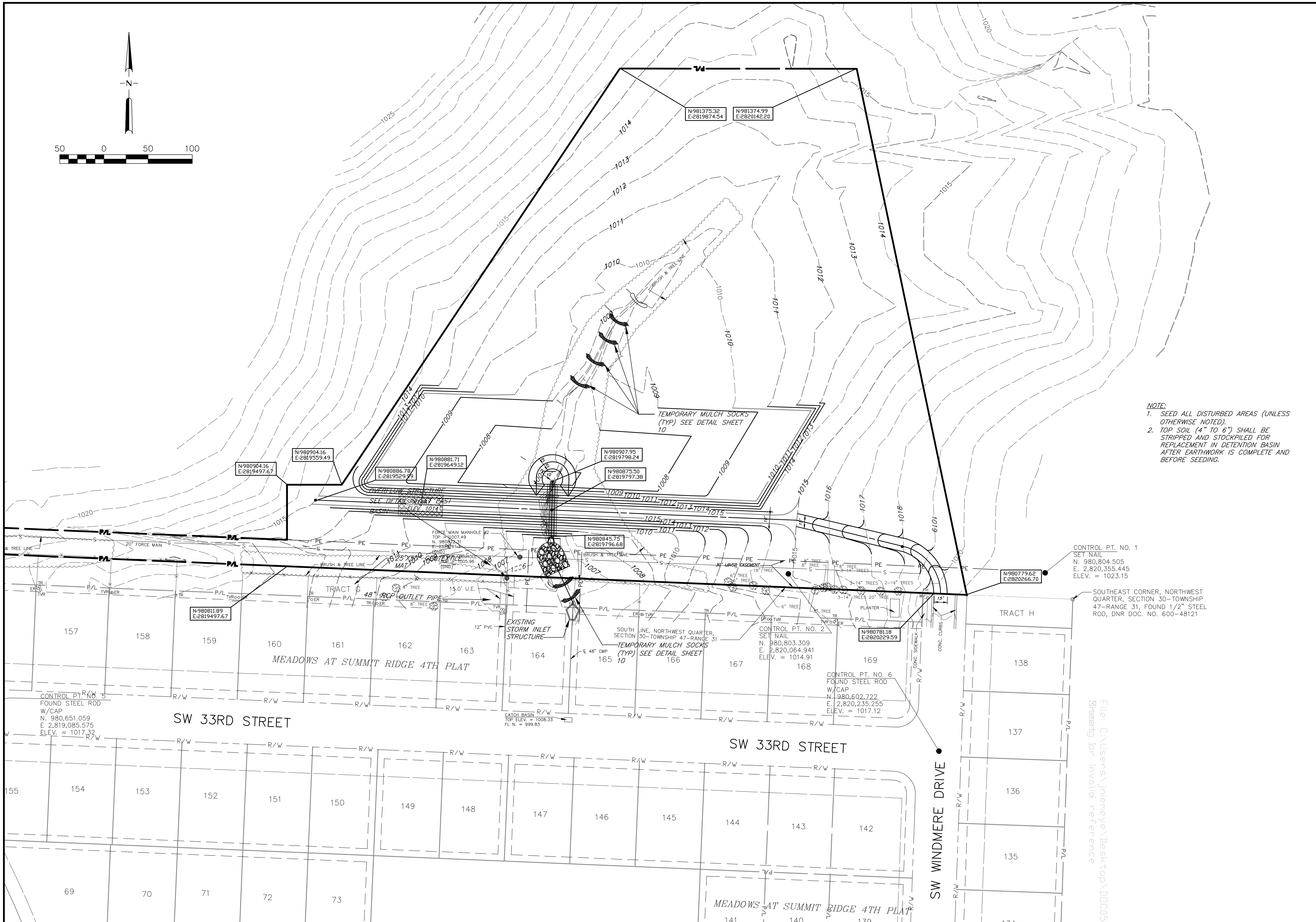
WEST SECTION A-A
SCALE: 1" = 10'

LEE'S SUMMIT
MISSOURI
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063

PROJECT NO. 5433813-19C
SOUTHEEST 33RD ST DETENTION BASINS
CITY OF LEE'S SUMMIT. JACKSON COUNTY, MO

WEST BASIN SECTION A-A

Drawn By: JN .
Checked By: RTN.
Date: 01/14
Proj No. 5433813-19C
6 OF 10



LEE'S SUMMIT
MISSOURI

PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063

Project: PROJECT NO. 5433813-19C
SOUTHEEST 33RD ST DETENTION BASINS
CITY OF LEE'S SUMMIT, JACKSON COUNTY, MO

Sheet Name: EAST BASIN

Drawn By: JN
Checked By: RTN
Date: 01/14
Proj No: 5433813-19C

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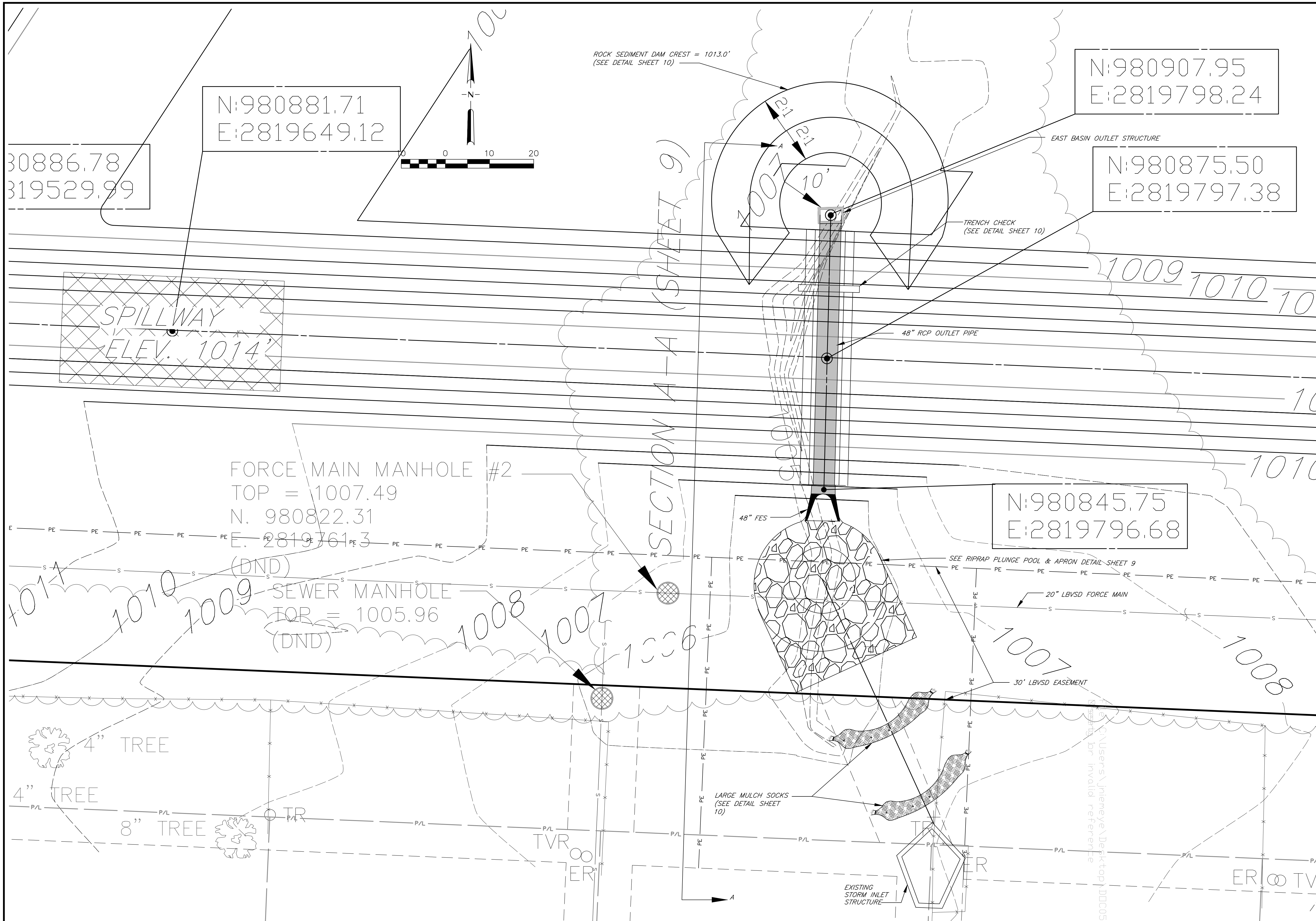

LEE'S SUMMIT
MISSOURI

PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063

PROJECT NO. 5433813-19C
SOUTHEEST 33RD ST DETENTION BASINS
CITY OF LEE'S SUMMIT. JACKSON COUNTY, MO

EAST BASIN DETAILS

Drawn By: JN.
Checked By: RTN
Date: 01/14
Proj No: 5433813-19C

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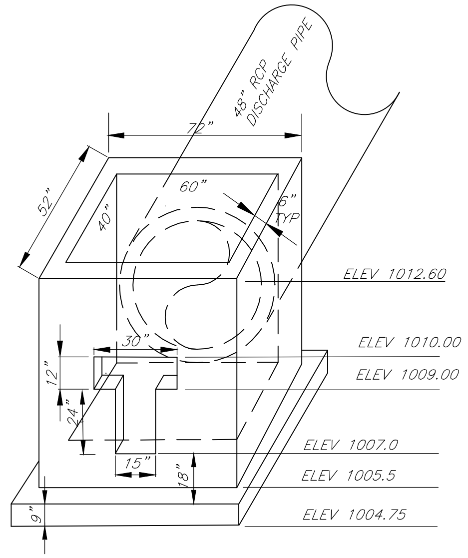
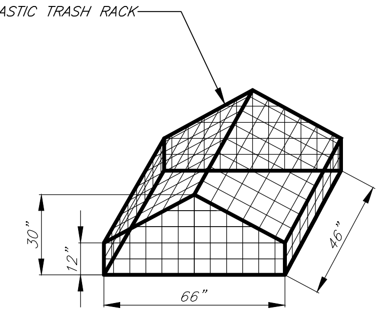


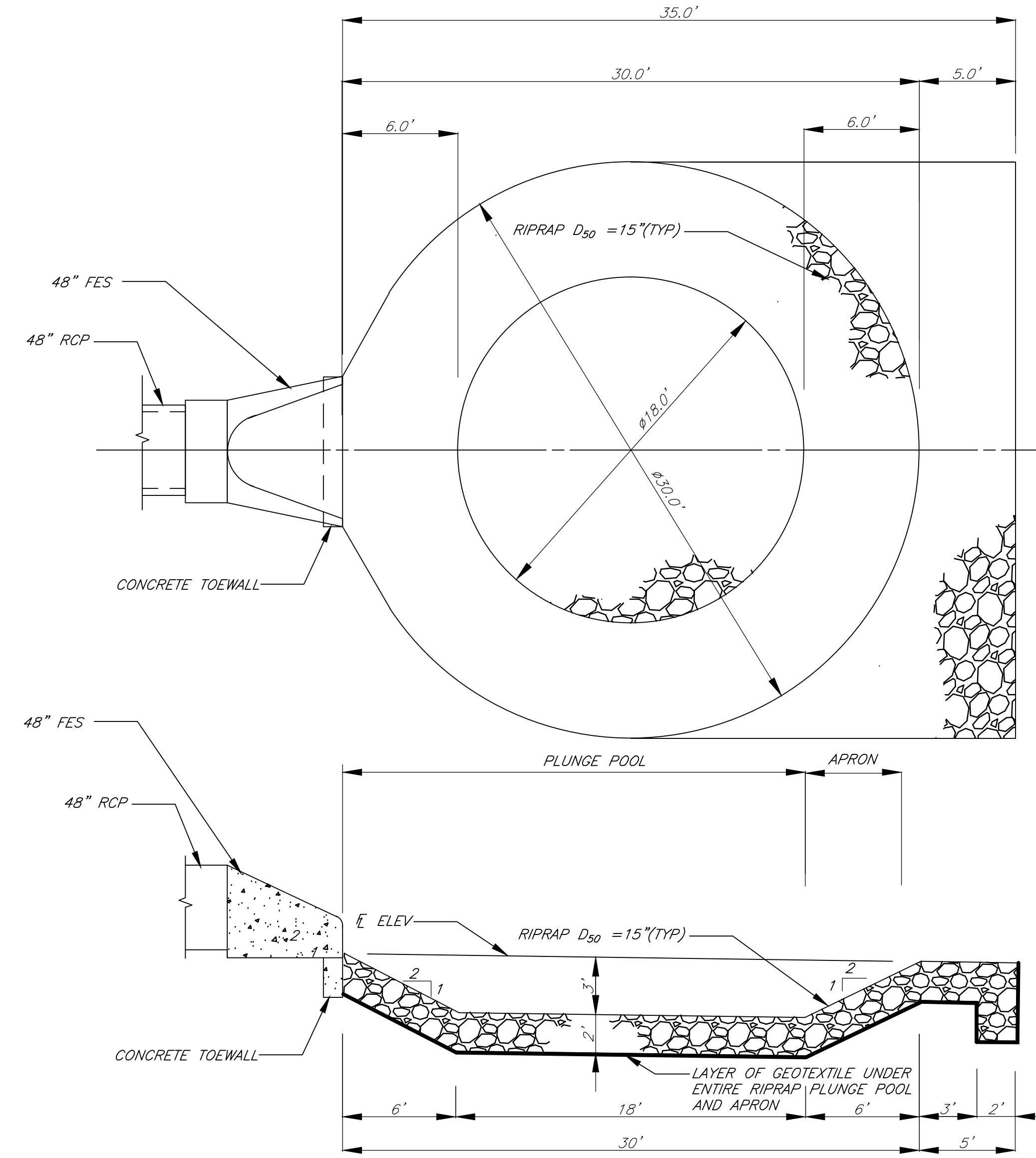
60" X 40" (INSIDE DIMENSIONS)

EAST BASIN OUTLET STRUCTURE
NTS

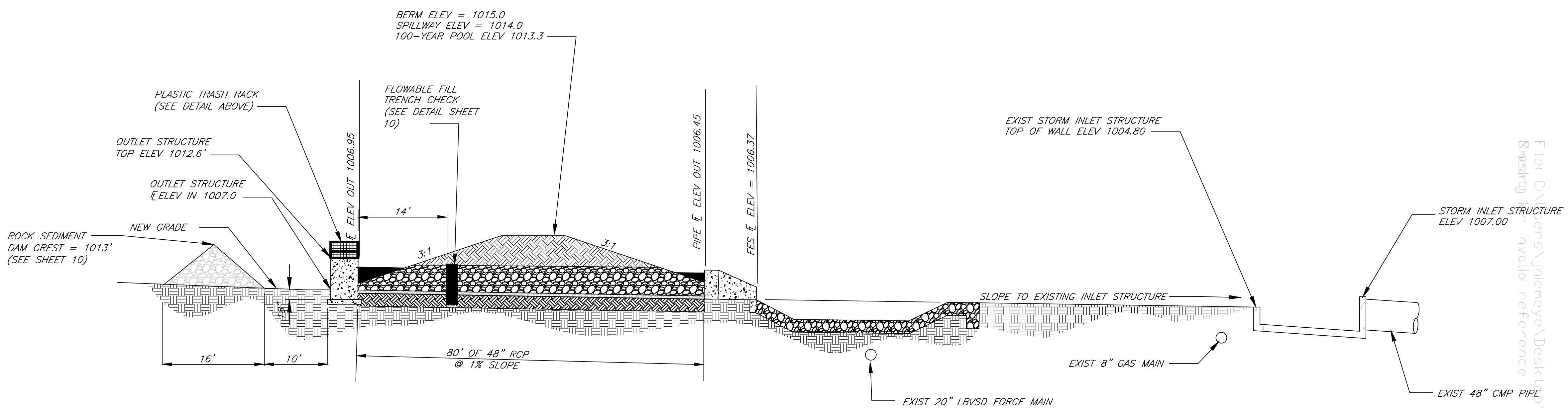


TRASH RACK FOR OUTLET STRUCTURE
NTS

NOTES:
1. OUTLET STRUCTURE SHALL BE REINFORCED WITH #4 REBAR 12" ON CENTER EACH WAY
2. OUTLET STRUCTURE SHALL BE CONSTRUCTED OF KCMMB4K CONCRETE.
3. INSTALL PLASTIC TRASH RACK PER MANUFACTURER'S RECOMMENDATIONS.



RIPRAP PLUNGE POOL & APRON
NTS



EAST BASIN SECTION A-A
SCALE: 1" = 10'

LEE'S SUMMIT MISSOURI
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063

PROJECT NO. 5433813-19C
SOUTHEEST 33RD ST DETENTION BASINS
CITY OF LEE'S SUMMIT. JACKSON COUNTY, MO

EAST BASIN SECTION A-A

Drawn By: JN.
Checked By: RTN
Date: 01/14
Proj No: 5433813-19C

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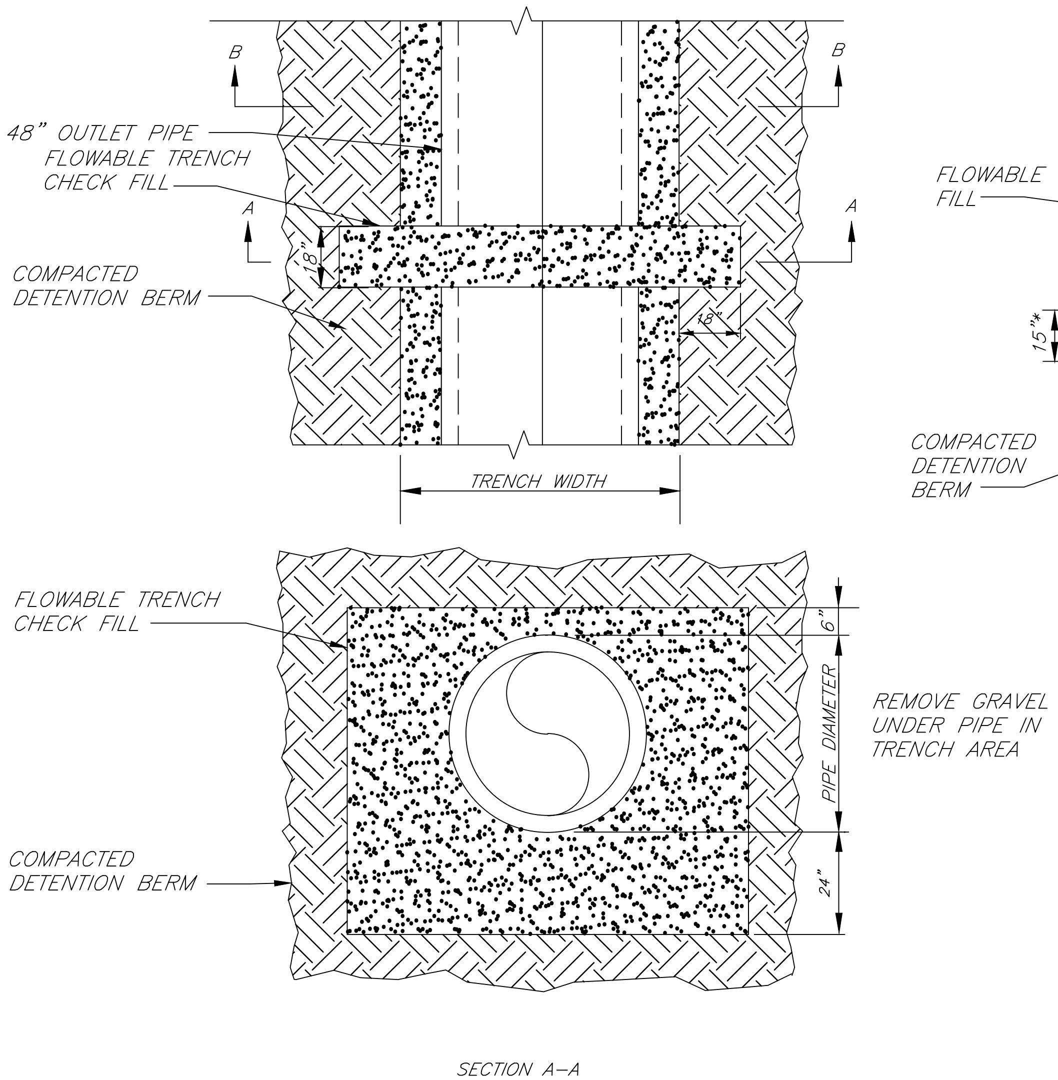
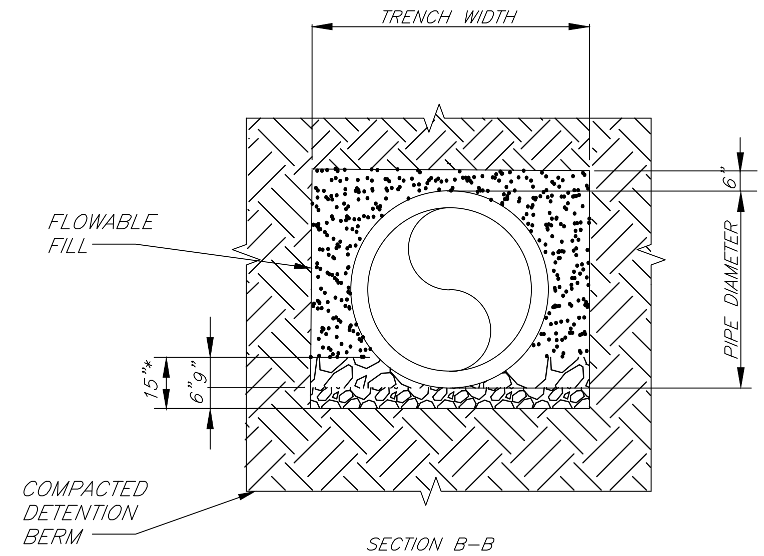
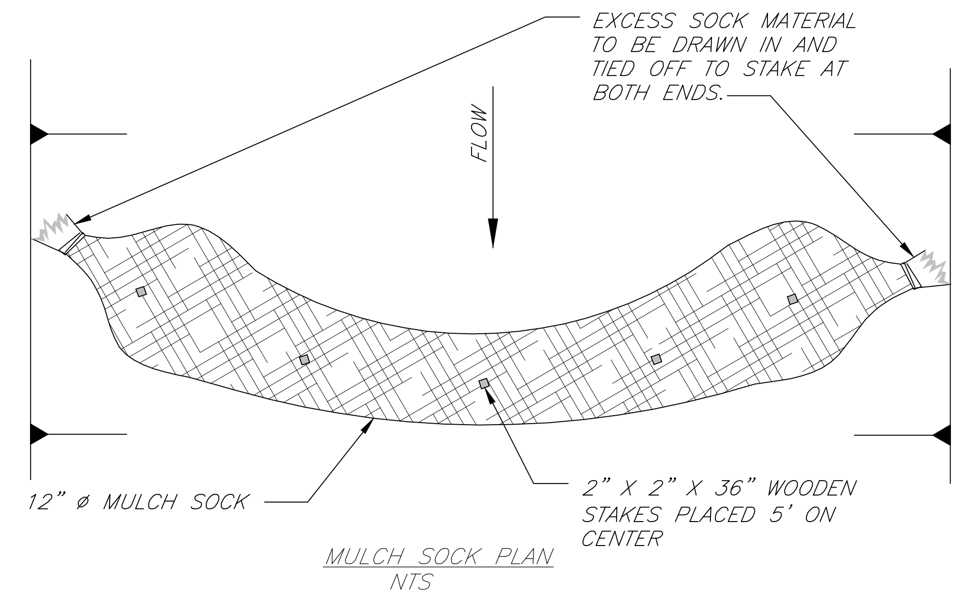


TRENCH CHECK
NTS

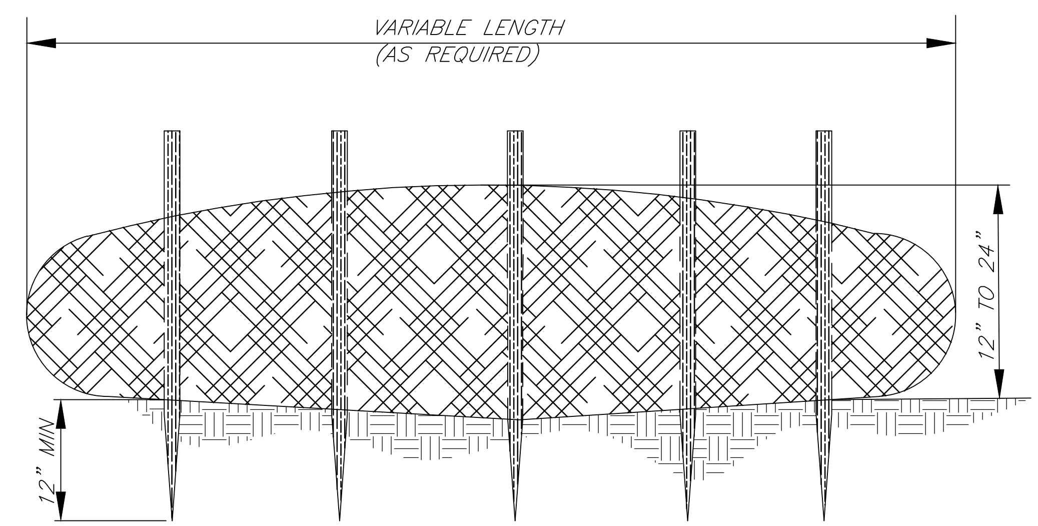


TYPICAL PIPE EMBEDMENT
NTS

* 6" COMPACTED AGGREGATE
9" LOOSE AGGREGATE

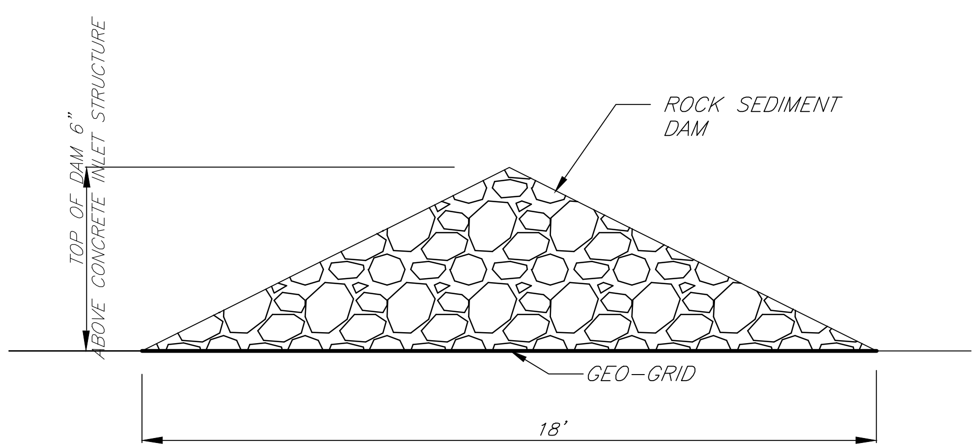


MULCH SOCK PLAN
NTS



TEMPORARY LARGE MULCH SOCK ELEVATION
NTS

NOTES:
1. FILL SOCK WITH DOUBLE GROUND WOOD MULCH 24" MAX DIAMETER.
2. SEDIMENT SHOULD BE REMOVED FROM BEHIND MULCH SOCK WHEN SILT REACHES ½ SOCK DIAMETER.
3. AFTER COMPLETION OF CONSTRUCTION, CUT & REMOVE SOCKS AND STAKES. DISPERSE MULCH ON-SITE PER INSPECTOR'S DIRECTIONS.



18" D_{50} ROCK DAM PERMANENT CROSS SECTION
NTS

LEE'S SUMMIT
MISSOURI
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063

PROJECT NO. 8433813-19C
SOUTHEEST 33RD ST DETENTION BASINS
CITY OF LEE'S SUMMIT. JACKSON COUNTY, MO

DETAILS

Drawn By: JN .
Checked By: RTN.
Date: 01/14
Proj No. 5433813-19C
10 OF 10

10

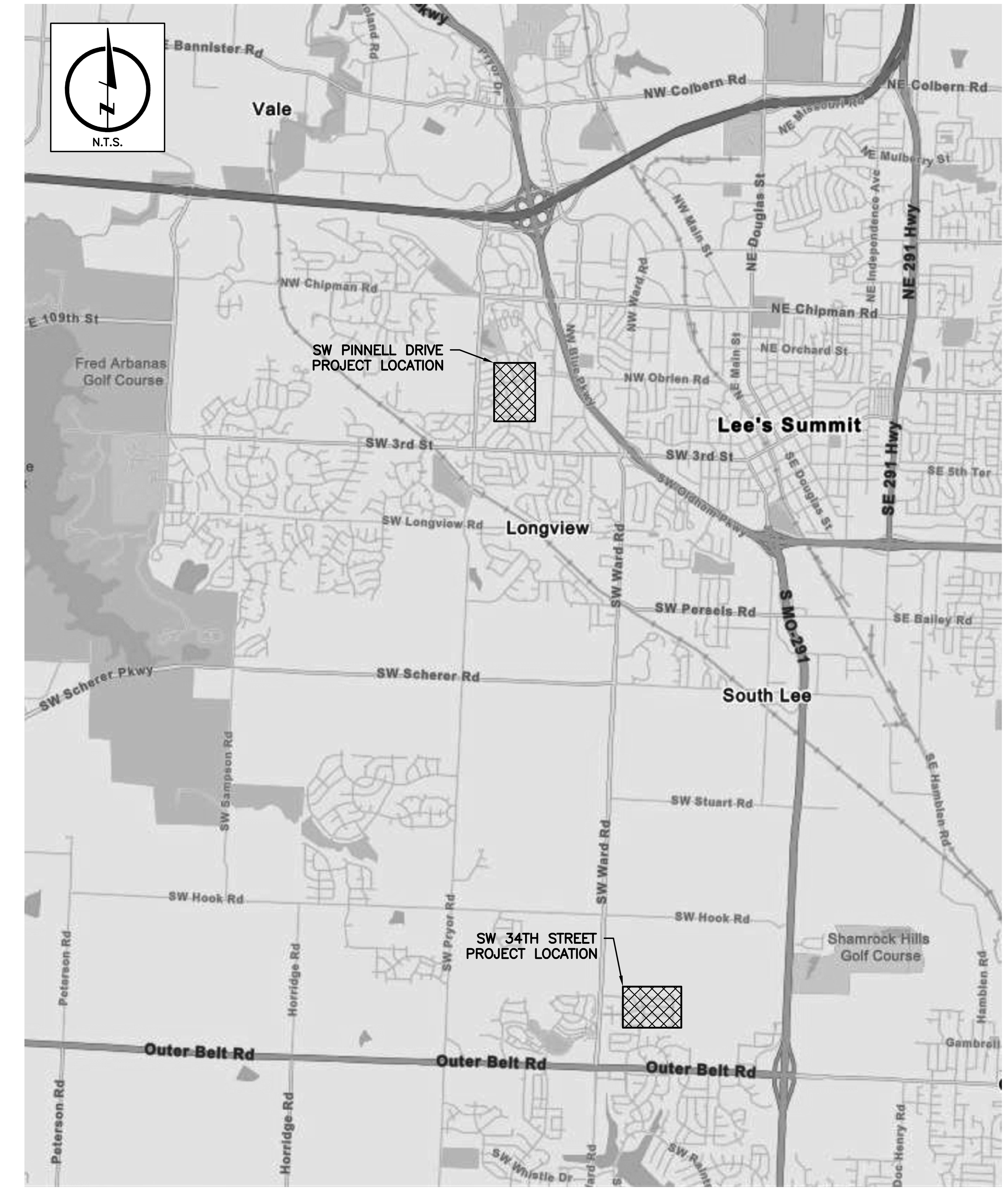
STORMWATER IMPROVEMENTS
SW 34TH STREET AND SW PINNELL DRIVE
LEE'S SUMMIT, JACKSON COUNTY, MISSOURI

CITY PROJECT NO. 543-32272C

LAMP RYNEARSON NO. 0319054.01

MISSOURI
STATE LOCATION MAP

INDEX OF SHEETS



LOCATION MAP

GAS
SPIRE ENERGY
PEGGY BURNS–YOCUM
(816) 969–2218
CHRIS GUNDERSON
(816) 266–1501
3025 SE CLOVER DR.
LEE'S SUMMIT, MO 64082
peggy.burns–yocum@spireenergy.com

ELECTRICITY
EVERGY
DOUG DAVIN
(816) 347–4320
401 SE BAILEY RD.
LEE'S SUMMIT, MO 64081
doug.davin@evergy.com

TELEPHONE
AT&T
RON GIPFERT
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2121 E 63RD ST
KANSAS CITY, MO 64130
rg7910@att.com
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(INSTALLATION AND REPAIR)
1–800–288–2020

WATER & WASTEWATER
LEE'S SUMMIT WATER UTILITIES
(816) 969–1900
1200 SE HAMBLEN RD.
LEE'S SUMMIT, MO 64081

STREETS & STORMWATER
PUBLIC WORKS OPERATIONS DIVISION
(816) 969–1870
1971 SE HAMBLEN RD.
LEE'S SUMMIT, MO 64082

SCHOOLS
LS R–7 SCHOOL DISTRICT
TRANSPORTATION
KEITH HENRY
(816) 986–2405

LS R–7 SCHOOL DISTRICT
FIBER OPTICS
KINZIE WOODERSON
(816) 986–1050

CABLE
COMCAST
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3400 NW DUNCAN RD.
BLUE SPRINGS, MO 64015
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GOOGLE FIBER
ANDREA SAKLA
(415) 736–9962
908 BROADWAY BLVD.
KANSAS CITY, MO 64105
kc–google–uc@google.com

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8221 W 119TH ST.
OVERLAND PARK, KS 66213
troy.prewitt@charter.com
steven.baxter@charter.com

CALL OR CLICK 3 DAYS BEFORE YOU DIG!
MISSOURI ONE CALL SYSTEM 1-800-DIG-RITE OR 811
www.mo1call.com

ALL UTILITIES ARE SHOWN BASED ON THE INFORMATION AVAILABLE TO THE ENGINEER. THERE IS NO GUARANTEE ALL FACILITIES ARE SHOWN OR THAT THE LOCATION, DEPTH, AND SIZE OF EACH FACILITY IS CORRECT. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES AND SERVICE LINES PRIOR TO CONSTRUCTION. COORDINATE NECESSARY RELOCATIONS WITH UTILITY COMPANIES.

AsBuilt
03/14/2023

APPROVED: [signature] DATE: 06–17–2020
MARK DANIEL MCGHEE JR., PE
LAMP RYNEARSON

APPROVED: ______________ DATE: ______

LAMP RYNEARSON
9001 STATE LINE RD., STE. 200
KANSAS CITY, MO 64114
816.361.0440
LampRynearson.com

MISSOURI CERTIFICATE OF AUTHORITY NO. – 2013011903

0319054.01 06–17–2020 STORM DRAINAGE IMPROVEMENTS CITY OF LEE'S SUMMIT, MISSOURI

GENERAL NOTES FOR CAPITAL IMPROVEMENTS PROJECTS

(REV. DECEMBER 12, 2012)

1) PRELIMINARY INFORMATION:

a) CONSULT PARAGRAPH 7.12 OF THE EJCDC GENERAL CONDITIONS (C–700) FOR A COMPLETE LIST OF RECORD DOCUMENTS THAT THE CONTRACTOR SHALL MAINTAIN ON SITE.

b) PERMITS REQUIRED FOR THIS WORK CAN BE FOUND IN SECTION 1010 OF THE GENERAL REQUIREMENTS (DIVISION 1).

c) CONSTRUCTION OF THE WORK SHOWN OR IMPLIED BY THIS SET OF DRAWINGS SHALL NOT BE INITIATED UNLESS ALL PRELIMINARY CONTRACT OBLIGATIONS ARE MET, AND THE OWNER IS NOTIFIED OF THE INTENT TO START THE WORK. SEE SECTION 1020 OF DIVISION 1.

d) ALL WORK SHALL BE CONFINED WITHIN THE CONSTRUCTION LIMITS OR AS OTHERWISE DIRECTED BY THE OWNER.

e) ANY WORK PERFORMED PRIOR TO ENGINEER'S REVIEW AND APPROVAL OF THE PERTINENT SUBMITTAL WILL BE AT THE SOLE EXPENSE AND RESPONSIBILITY OF CONTRACTOR. SUBMITTAL PROCEDURES AND REQUIREMENTS CAN BE FOUND IN PARAGRAPH 7.16 OF C–700 AND SECTIONS 1115 AND 1116 OF DIVISION 1.

f) OWNER IS DEFINED AS THE CITY OF LEE'S SUMMIT.

2) COORDINATION AND NOTIFICATIONS:

a) ANY TIME REFERENCES LISTED IN PARAGRAPH 2 ARE TYPICAL TIMELINES. CONSULT SECTION 1105 OF DIVISION 1 FOR PROJECT SPECIFIC TIMELINES, COORDINATION AND NOTIFICATION PROCESSES.

b) PRIOR TO ANY STREET CLOSURES, APPROPRIATE NOTIFICATIONS WILL BE DISTRIBUTED. THE CLOSURES OF ARTERIAL AND COLLECTOR STREETS WILL TYPICALLY CAUSE THE OWNER TO GENERATE A PRESS RELEASE AND DETOUR MAP. THIS IS TYPICALLY 14 CALENDAR DAYS.

c) THE REMOVAL OF TREES, SHEDS, FENCING OR OTHER ITEMS ON PRIVATE PROPERTY ARE NOT AUTHORIZED ON THIS PROJECT. CONTRACTOR SHALL NOTIFY THE OWNER IMMEDIATELY IF ANY SUCH WORK IS PROPOSED. THE OWNER REQUIRES AT LEAST 14 CALENDAR DAYS TO NOTIFY PROPERTY OWNER OR RESIDENT, IN ORDER TO GIVE THEM AN OPPORTUNITY TO SALVAGE THESE ITEMS.

d) PRIOR TO DRIVEWAY DEMOLITION AND RECONSTRUCTION, CONTRACTOR SHALL NOTIFY AND COORDINATE WITH THE PROPERTY OWNER OR RESIDENT. THIS IS TYPICALLY 2 WORKING DAYS.

e) PRIOR TO SHUTTING DOWN A WATER MAIN, CONTRACTOR SHALL SEEK APPROVAL FROM THE OWNER THEN FOLLOW THE NOTIFICATION PROCESS. THIS IS TYPICALLY 7 CALENDAR DAYS.

f) CONTRACTOR SHALL NOT BE ALLOWED TO WORK WEEKENDS OR HOLIDAYS WITHOUT REQUESTING PRIOR APPROVAL FROM OWNER THREE WORKING DAYS IN ADVANCE.

g) BY ORDINANCE 17–42, WORKING HOURS WITHIN THE CITY OF LEE'S SUMMIT ARE 7:00 A.M. TO 10:00 P.M. REQUESTS TO WORK BEYOND THESE HOURS MUST BE FILED WITH THE OWNER ONE WEEK IN ADVANCE.

3) SURVEY:

a) IN ACCORDANCE WITH PARAGRAPH 4.03 OF C–700, OWNER OR ENGINEER SHALL PROVIDE ENGINEERING SURVEYS TO ESTABLISH REFERENCE POINTS FOR CONSTRUCTION WHICH IN THEIR JUDGMENT ARE NECESSARY TO ENABLE CONTRACTOR TO PERFORM THE WORK. CONTRACTOR IS RESPONSIBLE FOR LAYING OUT THE WORK AND SHALL SET THOSE STAKES NECESSARY TO CONSTRUCT THIS PROJECT. NO DIRECT PAYMENT WILL BE MADE FOR THIS WORK, UNLESS LISTED IN THE BID TAB.

b) IN ACCORDANCE WITH PARAGRAPH 4.03 OF C–700, CONTRACTOR SHALL RESET ANY PERMANENT REFERENCE POINTS, PROPERTY CORNERS AND PROPERTY MONUMENTS THAT ARE DISTURBED DURING CONSTRUCTION. THESE POINTS AND MONUMENTS SHALL BE RESET BY A REGISTERED LAND SURVEYOR IN ACCORDANCE WITH STATE LAW. NO DIRECT PAYMENT WILL BE MADE FOR THIS WORK.

4) UNDERGROUND FACILITIES:

a) INFORMATION REGARDING UNDERGROUND FACILITIES IS APPROXIMATE AND WAS COMPILED USING INFORMATION PROVIDED BY THE FACILITY OWNER. CONSULT PARAGRAPH 5.05 OF C–700 FOR FURTHER INFORMATION.

b) UNLESS BORED, ALL UNDERGROUND UTILITIES (INCLUDING THE CONTRACTOR'S WORK) THAT CROSS UNDER PROPOSED STREET PAVEMENTS SHALL BE IN PLACE PRIOR TO THE PLACEMENT OF THE NEW PAVEMENT.

5) WATER, STORM & SANITARY SEWER:

a) WATER CAN BE PURCHASED FROM THE CITY'S WATER UTILITIES DEPARTMENT.

b) ALL MANHOLES, VALVE LIDS, METER LIDS, FIRE HYDRANTS AND AIR RELIEF ASSEMBLIES WITHIN THE CONSTRUCTION LIMITS SHALL BE RELOCATED OR ADJUSTED TO GRADE BY THE CONTRACTOR IN ACCORDANCE WITH THE SPECIFICATIONS. ALL VALVE RISERS IN PAVEMENT (WHETHER ADJUSTED, REPLACED OR PLACED) SHALL BE CAST IRON AND CONFORM TO THE SPECIFICATIONS. NO DIRECT PAYMENT WILL BE MADE FOR THIS WORK, UNLESS LISTED IN THE BID TAB.

c) CONTRACTOR SHALL PROVIDE BYPASS PUMPING OF SEWAGE FLOWS AROUND EACH SEGMENT OF PIPE THAT IS TO BE REPLACED OR REFURBISHED. CONTRACTOR SHALL HAVE ALL MATERIALS, EQUIPMENT AND LABOR NECESSARY TO COMPLETE WORK ON THE PIPE SEGMENT PRIOR TO ISOLATING THE SEWER SEGMENT AND BEGINNING BYPASS PUMPING OPERATIONS. NO DIRECT PAYMENT WILL BE MADE FOR THIS WORK, UNLESS LISTED IN THE BID TAB.

6) ENVIRONMENTAL & SAFETY:

a) CONTRACTOR SHALL USE ADEQUATE DUST CONTROL MEASURES DURING ALL PHASES OF THE WORK. CONSULT SECTION 1145 IN DIVISION 1.

b) SILTATION AND EROSION CONTROL SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING EROSION CONTROL SYSTEMS, REPLACING DAMAGED OR FAILED EROSION CONTROL DEVICES AND INSPECTING THE SITE IN ORDER TO REPAIR THE EROSION CONTROL SYSTEMS WITHIN 24 HOURS AFTER A SIGNIFICATION RAIN EVENT. GRADING ADJACENT TO PAVEMENTS SHALL BE LEFT THREE INCHES BELOW THE TOP OF PAVEMENT UNTIL IMMEDIATELY BEFORE SOD OR SEED IS PLACED. EROSION AND SEDIMENT CONTROL MUST BE IN PLACE PRIOR TO THE DISTURBANCE OF THE GROUND. FIELD ADJUSTMENTS TO EROSION AND SEDIMENT CONTROL MAY BE REQUIRED DEPENDING ON THE SITE CONDITIONS.

c) UNLESS WAIVED IN SECTION 1010, CONTRACTOR SHALL MAINTAIN THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) ON SITE IN ACCORDANCE WITH DNR REGULATIONS.

d) PROPERTY MAINTENANCE INFORMATION CAN BE FOUND IN SECTION 1145 OF DIVISION 1.

7) GRADING, REMOVALS & DAMAGED ITEMS:

a) INFORMATION ON SALVAGED MATERIAL CAN BE FOUND IN SECTION 1150 OF DIVISION 1.

b) NO BURNING IS ALLOWED ON THE SITE.

c) DRIVEWAYS, PARKING LOTS, SIDEWALKS, FENCES, IRRIGATION SYSTEMS AND OTHER ITEMS DISTURBED OR DAMAGED BY THE CONTRACTOR SHALL BE RESTORED AT THE CONTRACTOR'S EXPENSE TO A CONDITION EQUAL TO OR BETTER THAN EXISTING BEFORE DAMAGE OCCURRED. UNLESS WAIVED BY OWNER, ALL ITEMS REQUIRING REPLACEMENT SHALL BE REPLACED WITH NEW MATERIALS, AND ALL MATERIALS ARE SUBJECT TO OWNER'S APPROVAL. NO DIRECT PAYMENT WILL BE MADE FOR THIS WORK, UNLESS LISTED IN THE BID TAB.

d) ALL FENCE REPLACEMENT SHOULD BE RELOCATED TO THE PROPERTY LINES, UNLESS THE EXISTING FENCE WAS LOCATED INSIDE OF THE PROPERTY LINES. FENCE INSIDE OF PROPERTY LINES SHOULD BE PLACED IN ITS ORIGINAL LOCATION. GATES AND FENCE CORNERS SHALL BE RE-ESTABLISHED AT THE ORIGINAL LOCATIONS, UNLESS INDICATED BY THE DRAWINGS. REMOVALS SHALL BE AS SHOWN ON THE DRAWINGS OR AS APPROVED BY OWNER. REMOVALS NOT APPROVED BY OWNER WILL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

e) ROOF DRAINS, UNDER DRAINS, SEPTIC LINES AND OTHER SMALL DRAINAGE LINES NOT SHOWN ON THE DRAWINGS THAT ARE UNCOVERED OR DAMAGED SHALL BE REPAIRED, AND THE POINT OF DISCHARGE SHALL BE PLACED NO CLOSER THAN FIVE FEET TO ANY ADJOINING PROPERTY LINE INCLUDING THE RIGHT–OF–WAY LINE (CHAPTER 16–201 SECTION 302.2 OF THE PROPERTY MAINTENANCE CODE). UNLESS DIRECTED BY THE CITY ENGINEER, NO DRAIN LINES SHALL BE CONNECTED TO THE STORM SEWER SYSTEM. MATERIALS AND LOCATION ARE SUBJECT TO OWNER'S APPROVAL. IF NO UNIT PRICE IS IN THE BID, THEN PAYMENT WILL BE NEGOTIATED PER THE CONTRACT DOCUMENTS.

f) MATERIALS THAT MAY BE CLASSIFIED AS UNSUITABLE OR REQUIRE UNDERGRADING SHALL BE DETERMINED BY THE OWNER OR THE OWNER'S REPRESENTATIVE. CONTRACTOR SHALL NOT MAKE THIS DETERMINATION.

8) TRAFFIC:

a) UNLESS DIRECTED IN THE CONTRACT DOCUMENTS OR DRAWINGS, CONTRACTOR SHALL MAINTAIN TRAFFIC AND PEDESTRIAN ACCESS AT ALL TIMES.

b) APPROPRIATE TRAFFIC CONTROL DEVICES, SIGNAGE AND PAVEMENT MARKINGS SHALL BE ESTABLISHED AND MAINTAINED THROUGHOUT THE PROJECT IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND THE MUTCD.

ADDITIONAL CONSTRUCTION NOTES:

1. PRIOR TO THE BEGINNING OF CONSTRUCTION THE CONTRACTOR SHALL ATTEND A PRE–CONSTRUCTION MEETING TO ADDRESS ANY ISSUES. THIS MEETING SHALL INCLUDE THE PROJECT MANAGER, CONSTRUCTION SITE FOREMAN, CITY PROJECT MANAGER, ENGINEER AND IMPACTED UTILITY COMPANIES.

2. THE CONTRACTOR SHALL THOROUGHLY REVIEW AND BECOME FAMILIAR WITH THE SPECIFICATIONS AND SPECIAL PROVISIONS OF THE CONTRACT DOCUMENTS PRIOR TO BEGINNING CONSTRUCTION ON THIS PROJECT.

3. LOCAL TRAFFIC ON ALL STREETS SHALL BE CARRIED THROUGH CONSTRUCTION, TO THE EXTENT PRACTICABLE. DETOURS SHALL ONLY BE USED WITH PRIOR APPROVAL FROM THE CITY.

4. CONTRACTOR SHALL REMOVE AND REPLACE OR RELOCATE ALL STREET SIGNS LOCATED WITHIN THE LIMITS OF GRADING. (NO DIRECT PAY).

5. A COPY OF THE SWPPP SHALL BE KEPT ON SITE AT ALL TIMES. MONITORING REPORTS AND ANY FIELD REVISIONS TO THE PLANS SHALL BE KEPT IN THE ON SITE REPORT. THE CONTRACTOR IS RESPONSIBLE FOR INSPECTION AND MONITORING REPORTS.

6. EXCEPT WHERE NECESSARY TO INSTALL EROSION AND SEDIMENT CONTROL DEVICES, CLEARING ACTIVITIES SHALL NOT BEGIN UNTIL ALL PROPER EROSION AND SEDIMENT CONTROL DEVICES HAVE BEEN INSTALLED AND THE SOIL STABILIZED.

7. CONTRACTOR TO REVIEW AND ADHERE TO ALL PROVISIONS ON EASEMENTS, IF ANY, PROVIDED TO CONTRACTOR BY OWNER.

8. THE CONTRACTOR SHALL AT NO TIME LEAVE EQUIPMENT, MATERIALS OR DEBRIS AT LOCATIONS THAT COULD OBSTRUCT INTERSECTION SIGHT DISTANCE, IMPEDE PEDESTRIAN TRAFFIC, OBSTRUCT ANY EXISTING CAPACITY OF STORM SEWER SYSTEM, IMPEDE VEHICULAR TRAFFIC, OR CAUSE FLOODING OR EROSION TO RESIDENCES.

9. CONTRACTOR SHALL MINIMIZE THE TIME BETWEEN DRIVEWAY REMOVAL AND REPLACEMENT. CONTRACTOR SHALL PROVIDE ROCK FOR VEHICULAR ACCESS ON SAME DAY DRIVEWAY IS REMOVED UNLESS APPROVED BY CITY.

10. DRIVEWAYS SHALL BE REMOVED AND REPLACED TO EXISTING JOINTS, UNLESS OTHERWISE NOTED.

11. SAW CUTS FOR MATERIAL REMOVAL SHALL BE FULL DEPTH.

12. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL UTILITY LOCATIONS. CONTACT MISSOURI ONE–CALL AT 811 OR MO1CALL.COM AT LEAST 2 FULL BUSINESS DAYS PRIOR TO EXCAVATION.

13. THE INFORMATION SHOWN ON THESE PLANS CONCERNING THE TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING ALL UTILITY COMPANIES FOR FIELD LOCATION OF ALL UNDERGROUND UTILITY LINES PRIOR TO COMMENCEMENT OF WORK AND FOR MAKING HIS/HER OWN VERIFICATION AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. THE CONTRACTOR SHALL NOTIFY ALL THOSE UTILITY COMPANIES WHICH HAVE FACILITIES IN THE VICINITY 72 HOURS PRIOR TO CONSTRUCTION.

14. THE CONTRACTOR SHALL EXCAVATE TO POSITIVELY ESTABLISH UTILITIES AHEAD OF STORM SEWER CONSTRUCTION.

15. THE CONTRACTOR SHALL PROTECT EXISTING UTILITIES AT ALL TIMES. RELOCATION OF EXISTING UTILITIES BY CONTRACTOR MUST BE COORDINATED WITH AND APPROVED BY THE UTILITY OWNER, CITY, AND ENGINEER.

16. RESTORATION OF ANY AREAS OUTSIDE OF THE GRADING LIMITS THAT ARE DISTURBED DURING UTILITY RELOCATION, SHALL BE REPAIRED BY THE UTILITY. CONTRACTOR SHALL COORDINATE SAID WORK.

17. CONTRACTOR SHALL MAINTAIN DRAINAGE DURING CONSTRUCTION AND IS RESPONSIBLE FOR ANY DEWATERING NECESSARY FOR CONSTRUCTION. DEWATERING SHALL BE SUBSIDIARY TO OTHER BID ITEMS.

18. OPEN PITS SHALL NOT BE LEFT AT THE END OF A WORK DAY. ALL EXCAVATIONS SHALL BE BACKFILLED OR COMPLETELY ENCLOSED WITH TEMPORARY FENCING.

QUANTITIES

SW 34th Street Stormwater Improvements

Item No.	Item Description	Unit	Quantity
1	Mobilization	L.S.	1
2	Clearing and Grubbing	L.S.	1
3	Demolition and Removal	L.S.	1
4	Unclassified Excavation	L.S.	1
5	Waste (Haul Off)	L.S.	1
6	Pipe (15" Polypropylene)	L.F.	64
7	Pipe (18" Polypropylene)	L.F.	102
8	Inlet (Area) (4'x4')	EA	2
9	Inlet (Area) (6'x4')	EA	1
10	Pipe Inlet Connection	EA	1
11	Sidewalk (Concrete) (4") (Remove and Replace)	S.F.	50
12	Fence (Wood) (6')	L.F.	241
13	Sodding	S.Y.	1,365
14	Temporary Inlet Filter	E.A.	3
15	Silt Fence	L.F.	30
16	Wattle or Biodegradable Log Ditch Check	E.A.	3
17	Construction Staking	L.S.	1

SW Pinnell Drive Stormwater Improvements

Item No.	Item Description	Unit	Quantity
1	Mobilization	L.S.	1
2	Clearing and Grubbing	L.S.	1
3	Demolition and Removal	L.S.	1
4	Unclassified Excavation	L.S.	1
5	Waste (Haul Off)	L.S.	1
6	Pipe (6" PVC) (SDR26)	L.F.	42
7	Pipe (12" RCP)	L.F.	6
8	Pipe (15" RCP)	L.F.	66
9	Pipe (18" RCP)	L.F.	335
10	Pipe (18" Polypropylene)	L.F.	429
11	Pipe (28"x18" RCPA)	L.F.	230
12	Inlet (Curb) (5'x3')	EA	1
13	Inlet (Curb) (5'x4')	EA	1
14	Inlet (Curb) (5'x5')	EA	1
15	Inlet (Curb) (8'x4')	EA	1
16	Inlet (Curb) (Modified) (5'x5')	EA	3
17	Inlet (Area) (4'x4')	EA	3
18	Junction Box (4'x4')	EA	1
19	Junction Box (9'x4')	EA	1
20	Pipe Collar	EA	1
21	Concrete Encasement	L.F.	40
22	Modified Type 1 Street Repair	S.Y.	458
23	Milling	S.Y.	2,598
24	Overlay (2") (Type 5-01)	S.Y.	2,598
25	Curb and Gutter (CG-2) (Remove and Replace)	L.F.	471
26	Driveway Repair (Concrete) (6")	S.Y.	135
27	Sidewalk (Concrete) (4") (Remove and Replace)	S.F.	485
28	Fence (Chain Link) (6') (Temporary)	L.F.	565
29	Fence (Chain Link) (4')	L.F.	85
30	Seeding (Temporary)	A.C.	1.5
31	Sodding	S.Y.	5,578
32	Traffic Control	L.S.	1
33	Temporary Inlet Filter	E.A.	10
34	Silt Fence	L.F.	190
35	Wattle or Biodegradable Log Ditch Check	E.A.	11
36	Construction Staking	L.S.	1

ABBREVIATION LEGEND:

EX.	EXISTING
PP	POLYPROPYLENE PIPE
RCP	REINFORCED CONCRETE PIPE
CONC	CONCRETE
SDE	PROPOSED STORM DRAINAGE EASEMENT
UE	UTILITY EASEMENT
TCE	PROPOSED TEMPORARY CONSTRUCTION EASEMENT
NDP	NO DIRECT PAYMENT (SUBSIDIARY TO OTHER BID ITEMS)

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AsBuilt
03/14/2023

STATE OF MISSOURI
MARK DANIEL MCGHEE JR.
NUMBER PE-2008019568
PROFESSIONAL ENGINEER

MARK DANIEL MCGHEE JR.
PE-2008019568

GENERAL NOTES AND QUANTITIES SHEET

STORM DRAINAGE IMPROVEMENTS
CITY OF LEE'S SUMMIT, MISSOURI

REVISIONS
06–17–2020 FINAL PLANS
07–06–2020 ADDENDUM NO. 1

DESIGNER / DRAFTER
MDM/AJM
DATE
06–17–2020
PROJECT NUMBER
0319054.01
CITY PROJECT NUMBER
543–32272C
MISSOURI AUTHORIZATION NUMBER
2013011903

SHEET

DESCRIPTION:

TOPOGRAPHIC SURVEY OF LOTS 72 AND 73, MEADOWS AT SUMMIT RIDGE 2ND PLAT, PART OF LOT 127, MEADOWS AT SUMMIT RIDGE 3RD PLAT, AND PART OF LOTS 150 AND 151, MEADOWS AT SUMMIT RIDGE 4TH PLAT.

UTILITY INFORMATION:

THE INFORMATION CONCERNING THE EXISTENCE, LOCATION, SIZE OR TYPE OF MATERIALS OF UNDERGROUND UTILITIES SHOWN HEREON, WHICH ARE NOT VISIBLE FROM THE SURFACE, HAS BEEN COMPILED FROM THE RECORDS OF THE VARIOUS UTILITY COMPANIES OR OTHER SOURCES OF INFORMATION ALONG WITH FIELD LOCATIONS OF PAINTED MARKINGS BY MISSOURI ONE CALL, TICKET NUMBER 192133616. THIS INFORMATION IS NOT TO BE CONSTRUED AS ACCURATE, COMPLETE NOR EXACT. ANY INFORMATION CONCERNING UNDERGROUND UTILITIES SHOWN HEREON MUST BE CONFIRMED BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION ACTIVITY.

EASEMENTS:

THE EASEMENTS SHOWN HEREON WERE TAKEN FROM THE PLATS OF MEADOWS AT SUMMIT RIDGE 2ND PLAT AND MEADOWS AT SUMMIT RIDGE 3RD PLAT. THE PLAT OF MEADOWS AT SUMMIT RIDGE 4TH PLAT APPEARS TO SHOW EASEMENT LINES. HOWEVER, THE LINES ARE NOT LABELED. NO ADDITIONAL EASEMENT RESEARCH HAS BEEN DONE BY ANDERSON SURVEY COMPANY.

NOTES:

THE ELEVATIONS SHOWN HEREON ARE BASED ON NAVD88 DATUM.

LEGEND

A/C	AIR CONDITIONER
B/L	BUILDING SETBACK LINE
CMP	CORRUGATED METAL PIPE
DRN	DRAIN
EB	ELECTRIC BOX
EM	ELECTRIC METER
FF	FINISHED FLOOR
FH	FIRE HYDRANT
℄	FLOWLINE
GATE	GATE
GM	GAS METER
HDPE	PLASTIC PIPE
MB	MAILBOX
MH	MANHOLE
PVC	PLASTIC PIPE
TR	TELEPHONE RISER
TVR	TELEVISION RISER
TRS	TRANSFORMER
TOW	TOP OF WALL
U/E	UTILITY EASEMENT
UV	UTILITY VAULT
WM	WATER METER
FBD	FLAT BOTTOM DITCH
G	GAS
SS	SANITARY SEWER LINE
	STORM SEWER LINE
UE	UNDERGROUND ELECTRIC
UFO	UNDERGROUND FIBER OPTIC
UTV	UNDERGROUND TELEVISION
W	WATER
X	FENCE

PROJECT CONTROL

CP #1
FOUND 1/2" STEEL ROD IN ℄ OF STREET AT PC OF CURVE
NORTH: 980352.170
EAST: 2819291.602
ELEVATION:1007.42

CP #2
SET NAIL IN ℄ OF STREET AT EXTENSION OF WEST LINE LOT 72
NORTH: 980345.874
EAST: 2819441.391
ELEVATION:1004.36

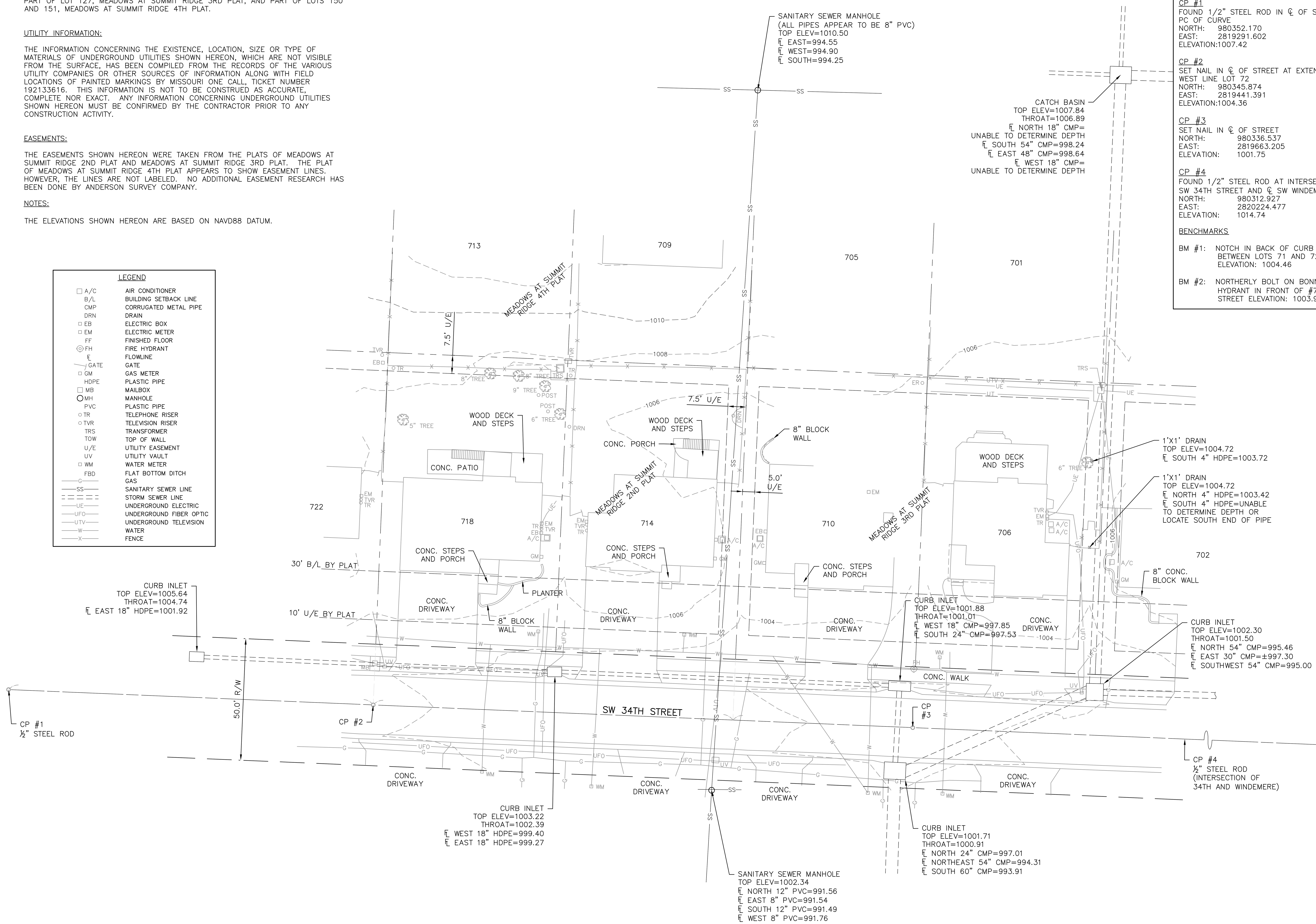
CP #3
SET NAIL IN ℄ OF STREET
NORTH: 980336.537
EAST: 2819663.205
ELEVATION: 1001.75

CP #4
FOUND 1/2" STEEL ROD AT INTERSECTION OF ℄ SW 34TH STREET AND ℄ SW WINDEMERE DRIVE
NORTH: 980312.927
EAST: 2820224.477
ELEVATION: 1014.74

BENCHMARKS

BM #1: NOTCH IN BACK OF CURB AT LOT LINE BETWEEN LOTS 71 AND 72
ELEVATION: 1004.46

BM #2: NORTHERLY BOLT ON BONNET OF FIRE HYDRANT IN FRONT OF #710 SW 34TH STREET ELEVATION: 1003.98



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0 20 40

AsBuilt
03/14/2023

MARK DANIEL MCGHEE JR.
PE-2008019568

SW 34TH STREET
EXISTING CONDITIONS PLAN SHEET

STORM DRAINAGE IMPROVEMENTS
CITY OF LEE'S SUMMIT, MISSOURI

REVISIONS

DESIGNER / DRAFTER
MDM/AJM
DATE
06-17-2020
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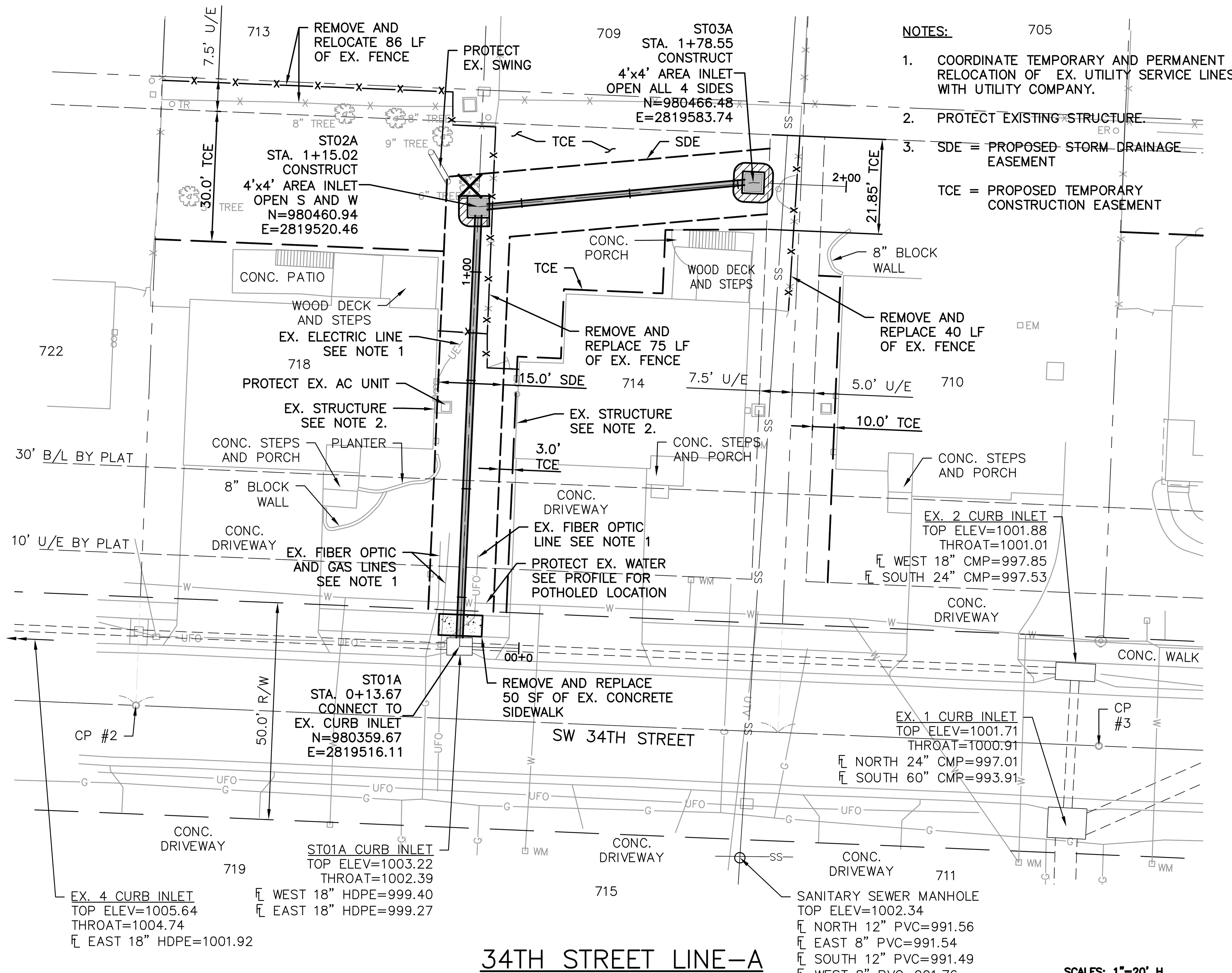
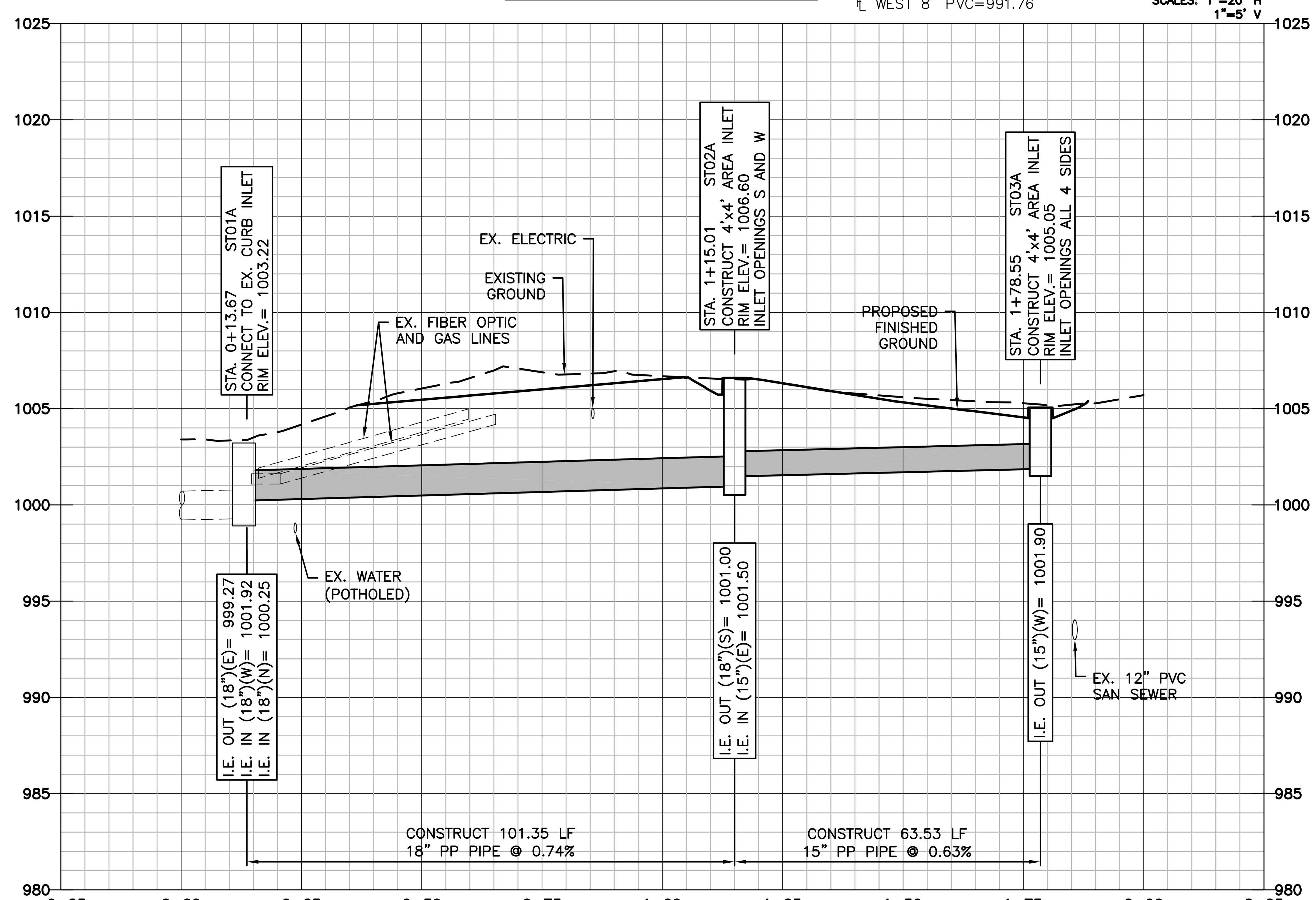
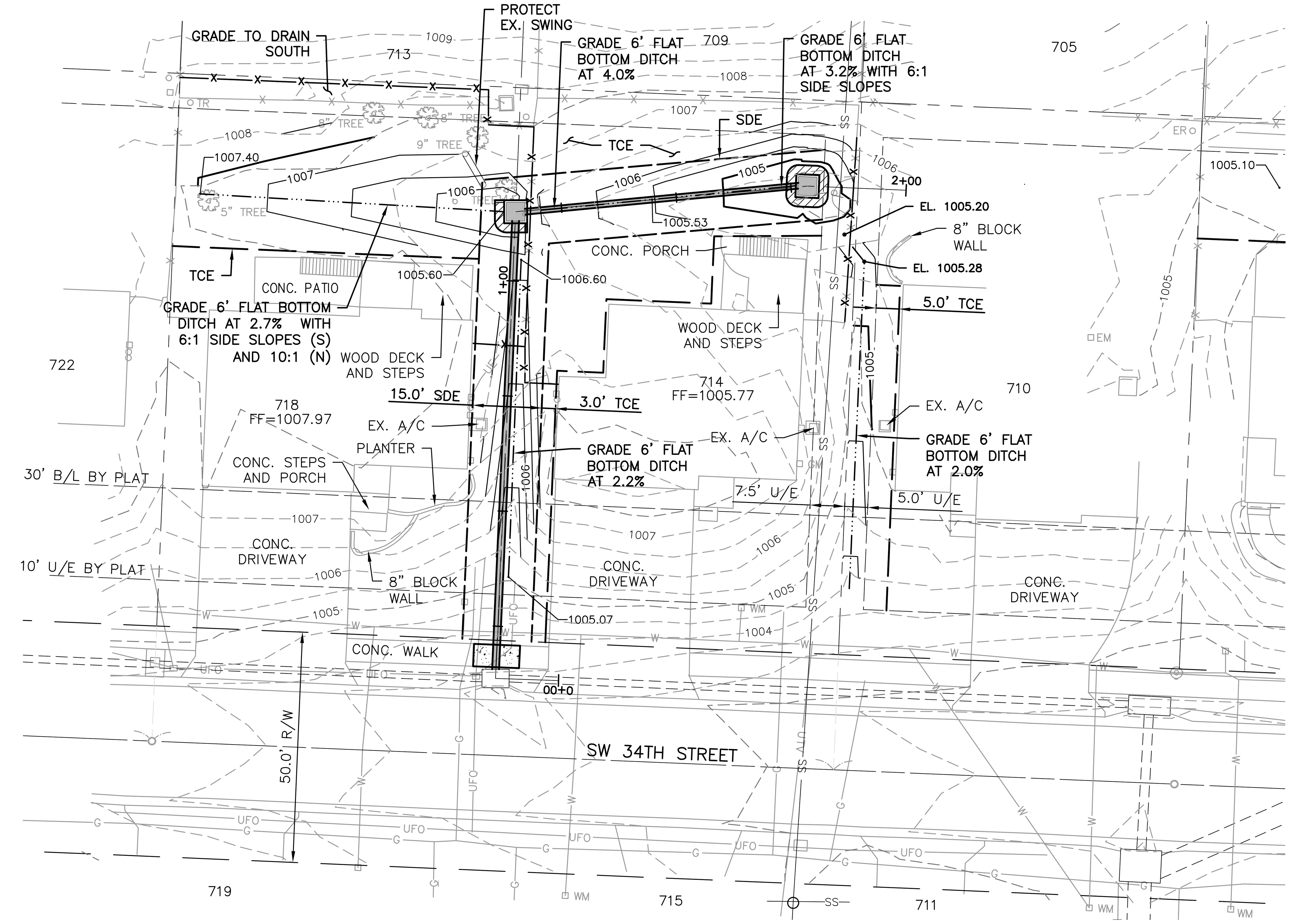
2013011903
SHEET



34TH STREET LINE-A

SCALES: 1"=20' H
1"=5' V





GRADING PLAN

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03/14/2023

MARK DANIEL MCGHEE JR.
PE-2008019568

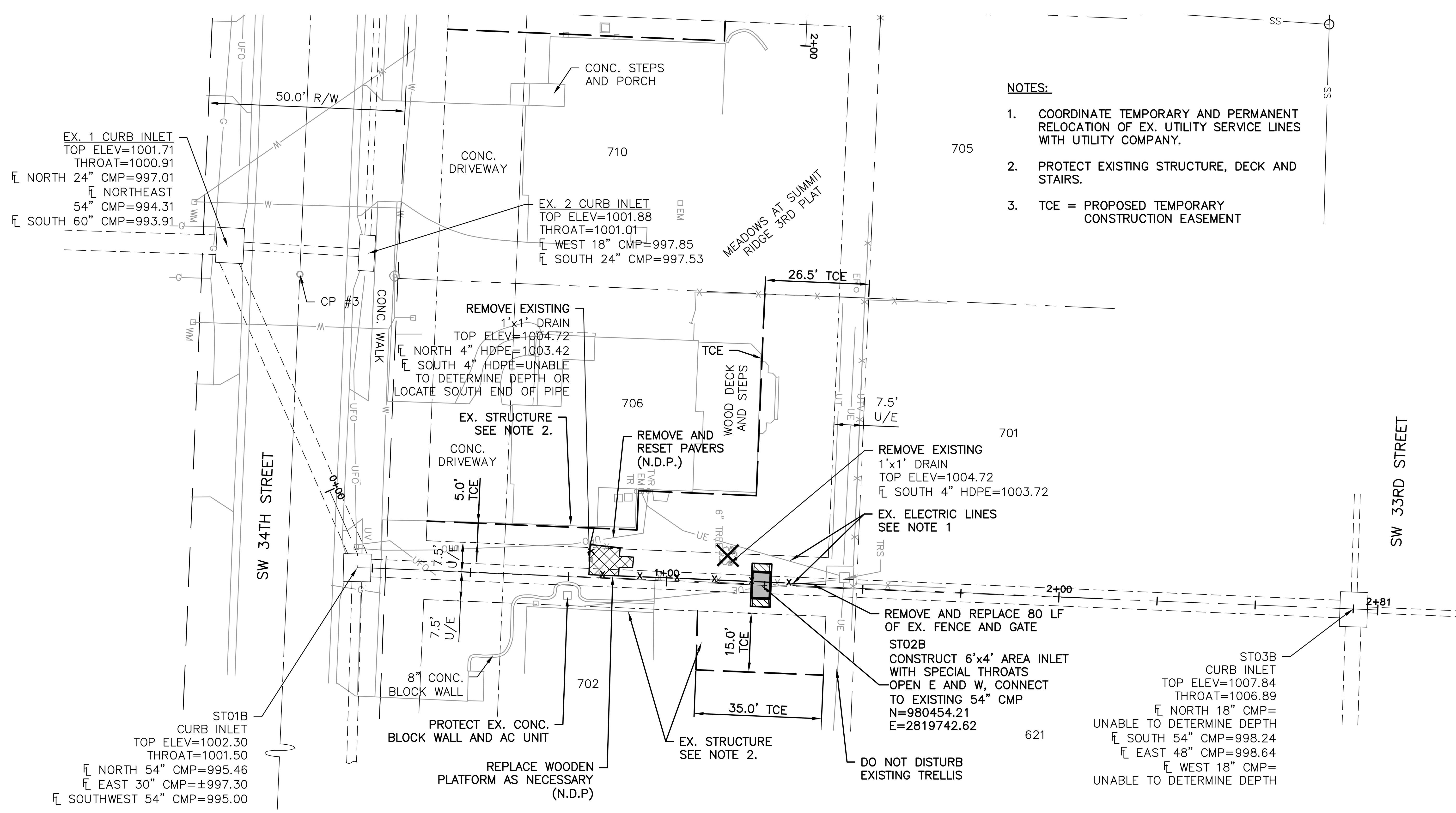
SW 34TH STREET LINE-A
STORM SEWER PLAN/PROFILE
AND GRADING PLAN SHEET

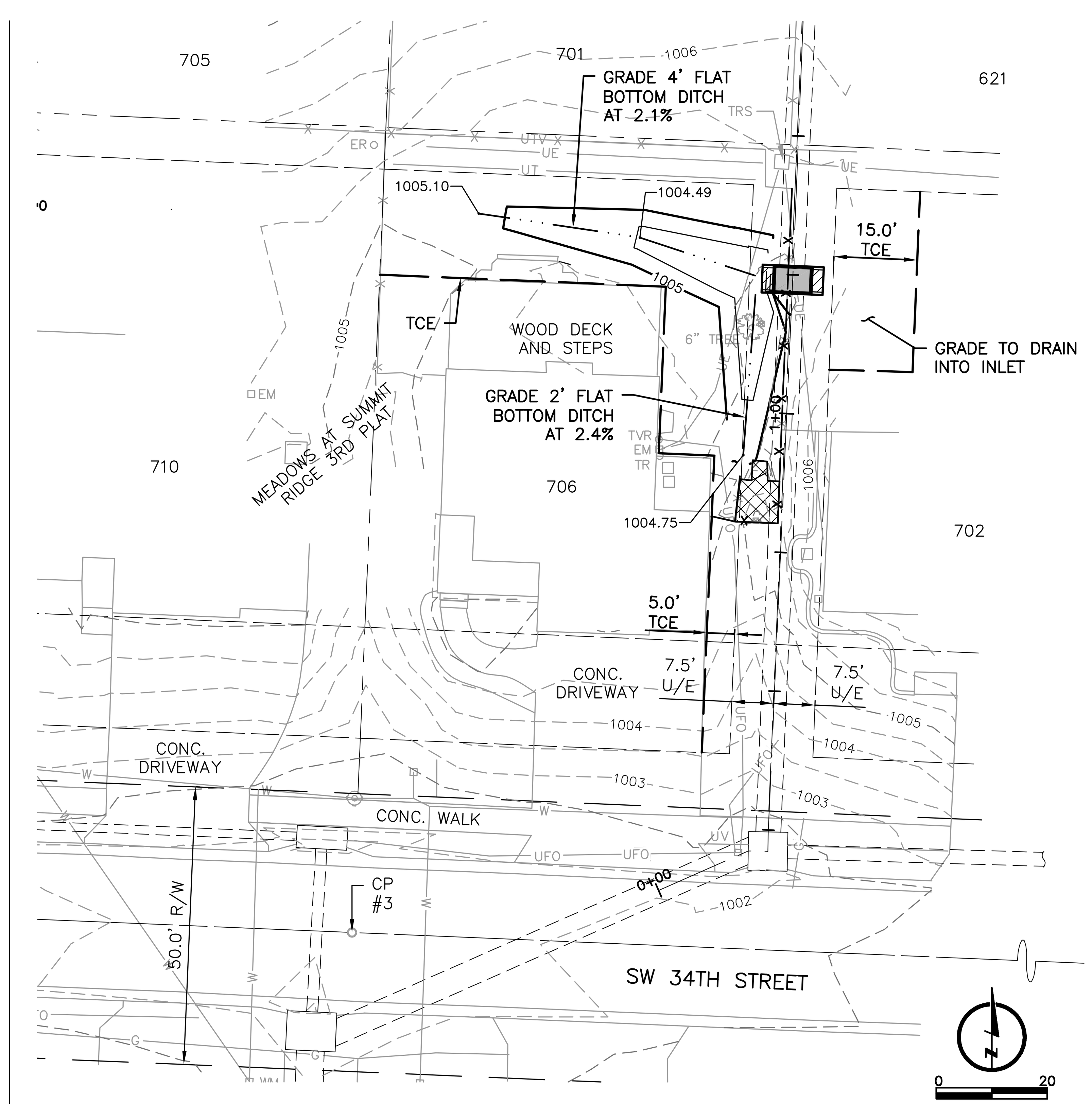
STORM DRAINAGE IMPROVEMENTS
CITY OF LEE'S SUMMIT, MISSOURI

REVISIONS

DESIGNER / DRAFTER
MDM/AJM
DATE
06-17-2020
PROJECT NUMBER
0319054.01
CITY PROJECT NUMBER
543-32272C
MISSOURI AUTHORIZATION NUMBER
2013011903

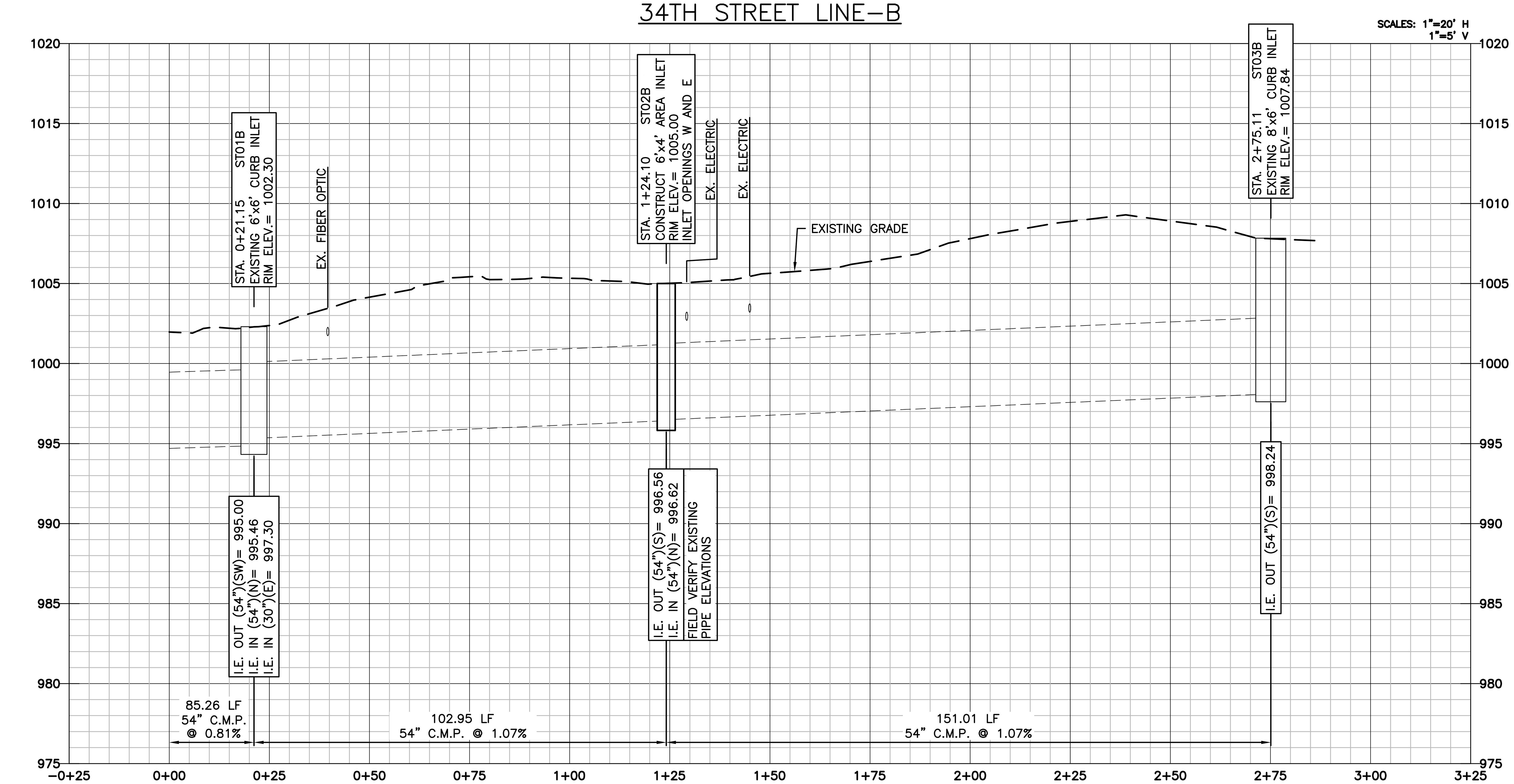
SHEET
04 OF 20

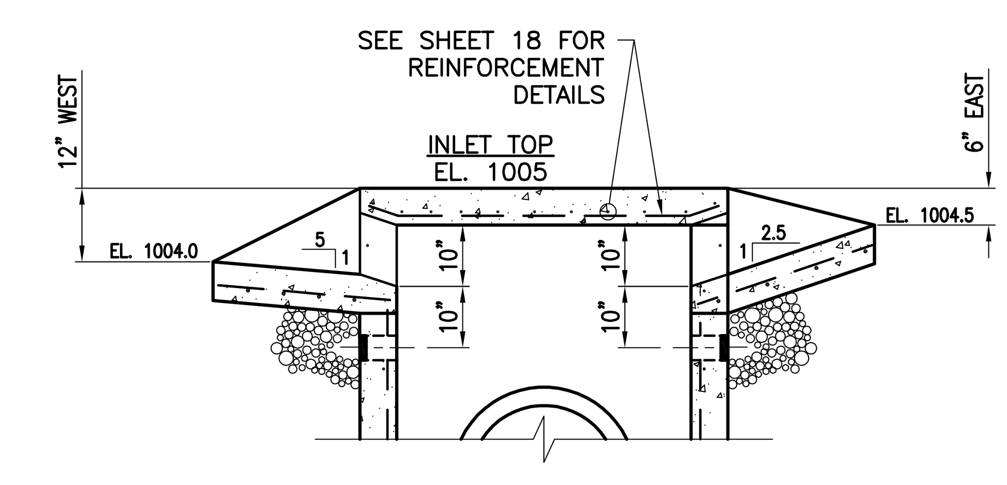




GRADING PLAN

34TH STREET LINE–B





AREA INLET
6'x4' WITH SPECIAL THROATS
SEE SHEET 18 FOR ADDITIONAL INLET DETAIL

L:\Engineering\0319054 Lees Summit MO Stormwater Projects\DRAWINGS\BASE MODELS\0319054 – BASE – 34TH STREET.dwg, 6/16/2020 2:26:57 PM, JAMIE MCMURRY, LAMP RYNEARSON

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SW 34TH STREET LINE–B
STORM SEWER PLAN/PROFILE
AND GRADING PLAN SHEET

STORM DRAINAGE IMPROVEMENTS
CITY OF LEE'S SUMMIT, MISSOURI

REVISIONS

DESIGNER / DRAFTER: MDM/AJM
DATE: 06–17–2020
PROJECT NUMBER: 0319054.01
CITY PROJECT NUMBER: 543–32272C
MISSOURI AUTHORIZATION NUMBER: 2013011903

SHEET

STORM CALCULATIONS

SW 34TH STREET																		
Rational Method																		
Time of Concentration Calculations "Tc"																		
Drainage Area Parameters			Inlet Time Ti (First 100')				Inlet Time Ti (Beyond 100')							Travel Time Tt					Time of Concentration
Individual Drainage Area Name	Area (Acres) "A"	Runoff Coefficient "C" **	Length (ft.) "L"	Drop (ft.) "ΔH"	Slope "S"	Inlet Time (min.) Ti=1.8(1.1-C)L^0.5/S^0.33	Length (ft) "L"	Drop (ft) ΔH	Slope "S"	Surface Type (Paved (P) or Unpaved (U))	Velocity (Paved Surface greater than 50%) V=20.3282*S^1/2	Velocity (unpaved Surface greater than 50%) V=16.1345*S^1/2	Shallow concentrated flow travel time = L/3600 V	Length (ft.) "L"	Drop (ft.) "ΔH"	Slope (ft./ft.) "S"	Velocity (ft/s) V=AxS^0.67	Travel Time (min.) Tt=L/(60xV)	Tc = Ti + Tt (min.)
ST03A	0.25	0.51	100.00	3.50	0.0350	6.99	11.00	0.20	0.0182	u	0.00	2.18	0.08	59.52	0.40	0.0067	2.10	0.47	7.55
ST02A	1.13	0.51	100.00	3.00	0.0300	7.36	254.00	8.00	0.0315	u	0.00	2.86	1.48	97.86	1.00	0.0102	2.78	0.59	9.43
ST01A	0.20	0.90	100.00	1.00	0.0100	5.00	53.00	0.75	0.0142	P	2.42	0.00	0.37	135.00	1.42	0.0105	2.84	0.79	6.16
Upstream inlet	0.64	0.90	100.00	2.00	0.0200	5.00	373.00	9.00	0.0241	P	3.16	0.00	1.97	142.50	2.52	0.0177	4.02	0.59	7.56
ST02B	0.35	0.51	100.00	3.00	0.0300	7.36	8.00	0.20	0.0250	u	0.00	2.55	0.05	102.95	1.10	0.0107	2.87	0.60	8.01

Rational Method																					
Flow Calculations "Q"																					
Individual Drainage Area Name	Area "A" x Runoff Coefficient "C" CA	Time of Concentration "Tc"	Design "Tc" 5 ≤ Tc ≤ 60 min.	Rainfall Intensity "I2" in in/hr 5 ≤ Tc ≤ 15 min. I2=119/(Tc+17)	Rainfall Intensity "I2" in in/hr 15 < Tc ≤ 60 min. I2=134/(Tc+21.4)	2-Year Flow Q_2= CxI_2xA	Rainfall Intensity "I_5" in in/hr 5 ≤ Tc ≤ 15 min. I_5=154/(Tc+18.8)	Rainfall Intensity "I_5" in in/hr 15 < Tc ≤ 60 min. I_5=182/(Tc+25)	5-Year Flow Q_5= CxI_5xA	Rainfall Intensity "I10" in in/hr 5 ≤ Tc ≤ 15 min. I10=175/(Tc+18.8)	Rainfall Intensity "I10" in in/hr 15 < Tc ≤ 60 min. I10=214/(Tc+26.7)	10-Year Flow Q_{10} =CI_{10}A	Rainfall Intensity "I_{25}" in in/hr 5 ≤ Tc ≤ 15 min. I_{25}=203/(Tc+18.8)	Rainfall Intensity "I_{25}" in in/hr 15 < Tc ≤ 60 min. I_{25}=262/(Tc+28.8)	25-Year Flow Q_{25}= 1.1xCI_{25}xA	Rainfall Intensity "I_{50}" in in/hr 5 ≤ Tc ≤ 15 min. I_{50}=233/(Tc+19.8)	Rainfall Intensity "I_{50}" in in/hr 15 < Tc ≤ 60 min. I_{50}=296/(Tc+29.6)	50-Year Flow Q_{50}= 1.2xCI_{50}xA	Rainfall Intensity "I100" in in/hr Tc < 15 min. I100=256/(Tc+19.8)	Rainfall Intensity "I100" in in/hr Tc > 15 min. I100=331/(Tc+30)	100-Year Flow Q_{100}= 1.25xCI_{100}A
ST03A	0.1275	7.55	7.55	4.8469923		0.6	5.8441122		0.7	6.6410366		0.8	7.70		1.1	8.52		1.3	9.36		1.5
ST02A	0.7038	9.43	9.43	4.5027289		3.2	5.4554953		3.8	6.1994265		4.4	7.19		5.6	7.97		6.7	8.76		7.7
ST01A	1.4598	10.22	10.22	4.3714678		6.4	5.3063234		7.7	6.029913		8.8	6.99		11.2	7.76		13.6	8.53		15.6
Upstream inlet	0.576	7.56	7.56	4.8452444		2.8	5.8421486		3.4	6.6388052		3.8	7.70		4.9	8.52		5.9	9.36		6.7
ST02B	0.1785	8.01	8.01	4.757222		0.8	5.7431402		1.0	6.5262957		1.2	7.57		1.5	8.38		1.8	9.20		2.1

Inlet	Pipe Size Out	100 YEAR HGL	Inlet Rim El
		Assumed	
ST01A	18"	1003.37	1003.37
ST02A	18"	1003.92	1006.6
ST03A	15"	1004.63	1005.05
ST02B	54"	SEE NOTE	1005.00

LEGEND

- EXISTING STORM SEWER
- EXISTING STORM SEWER STRUCTURE
- NEW STORM SEWER
- NEW STORM SEWER STRUCTURE
- DRAINAGE AREA BOUNDARY
- RIGHT OF WAY LINE
- PROPERTY LINE
- EXISTING CONTOURS

STORMWATER CALCULATION NOTES:

1. THE PIPE CONVEYANCE CAPACITY OF THE MAIN STORMWATER DRAINAGE SYSTEM WAS REVIEWED, TAKING INTO ACCOUNT THE DISCHARGE FROM THE EXISTING DETENTION BASIN ON THE AGRICULTURAL PROPERTY TO THE NORTH OF MEADOWS AT SUMMIT RIDGE. THE BASIN REDUCES THE PEAK 1% STORM DISCHARGE RATE BELOW THE CAPACITY OF THE EXISTING SYSTEM.

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SW 34TH STREET
DRAINAGE AREA MAP SHEET

STORM DRAINAGE IMPROVEMENTS
CITY OF LEE'S SUMMIT, MISSOURI

REVISIONS

DESIGNER / DRAFTER
MDM/AJM
DATE
06-17-2020
PROJECT NUMBER
0319054.01
CITY PROJECT NUMBER
543-32272C
MISSOURI AUTHORIZATION NUMBER
2013011903

UTILITY INFORMATION:

THE INFORMATION CONCERNING THE EXISTENCE, LOCATION, SIZE OR TYPE OF MATERIALS OF UNDERGROUND UTILITIES SHOWN HEREON, WHICH ARE NOT VISIBLE FROM THE SURFACE, HAS BEEN COMPILED FROM THE RECORDS OF THE VARIOUS UTILITY COMPANIES OR OTHER SOURCES OF INFORMATION ALONG WITH FIELD LOCATIONS OF PAINTED MARKINGS BY MISSOURI ONE CALL, TICKET NUMBERS 192171761 &192171809. THIS INFORMATION IS NOT TO BE CONSTRUED AS ACCURATE, COMPLETE NOR EXACT. ANY INFORMATION CONCERNING UNDERGROUND UTILITIES SHOWN HEREON MUST BE CONFIRMED BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION ACTIVITY.

NOTES:

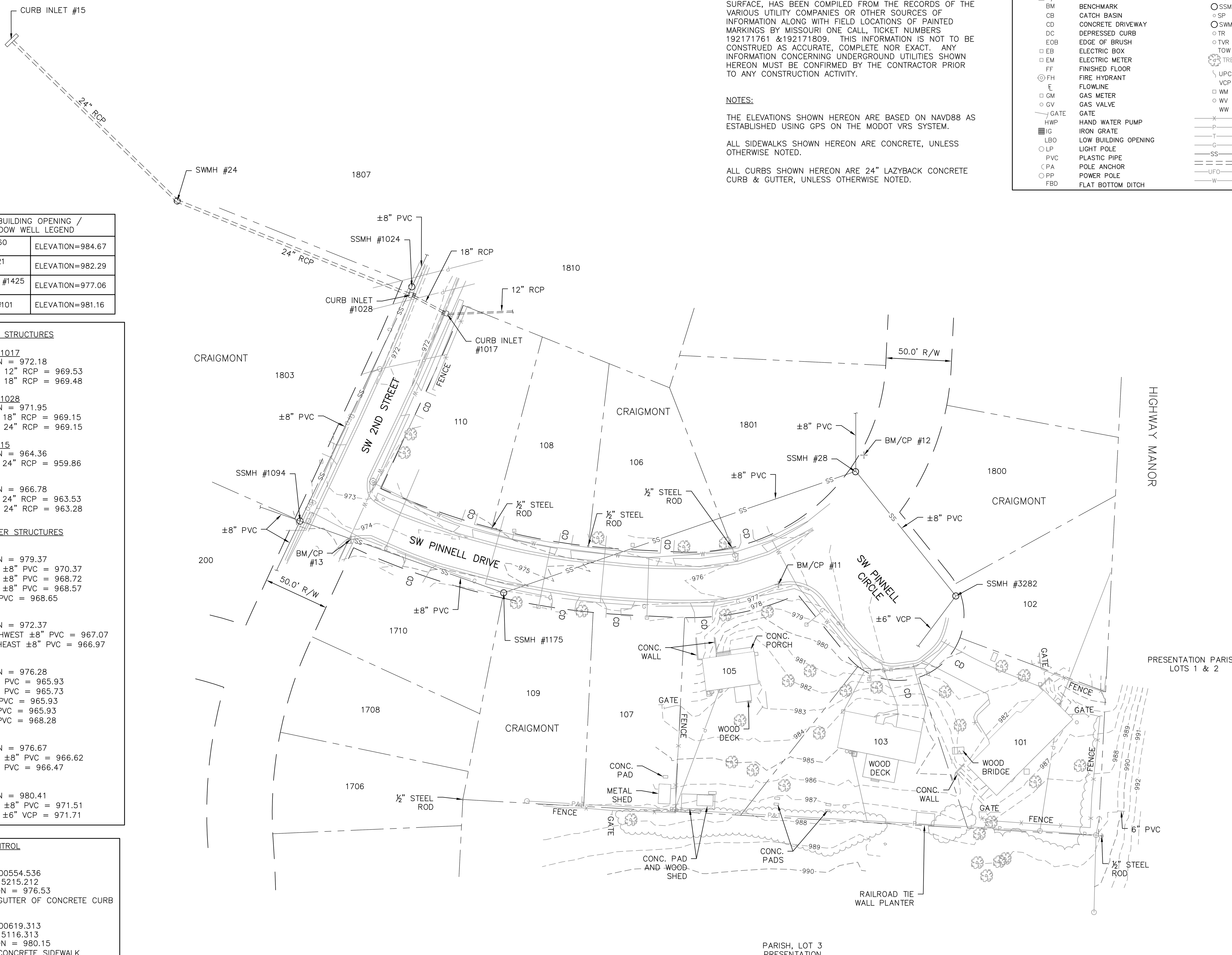
THE ELEVATIONS SHOWN HEREON ARE BASED ON NAVD88 AS ESTABLISHED USING GPS ON THE MODOT VRS SYSTEM.

ALL SIDEWALKS SHOWN HEREON ARE CONCRETE, UNLESS OTHERWISE NOTED.

ALL CURBS SHOWN HEREON ARE 24" LAZYBACK CONCRETE CURB & GUTTER, UNLESS OTHERWISE NOTED.

LEGEND

A/C	AIR CONDITIONER	RCP	REINFORCED CONCRETE PIPE
BM	BENCHMARK	SSMH	SANITARY SEWER MANHOLE
CB	CATCH BASIN	SP	SIGN POST
CD	CONCRETE DRIVEWAY	SWMH	STORM WATER MANHOLE
DC	DEPRESSED CURB	TR	TELEPHONE RISER
EOB	EDGE OF BRUSH	TVR	TELEVISION RISER
EB	ELECTRIC BOX	TOW	TOP OF WALL
EM	ELECTRIC METER	TREE(S)	TREE(S)
FF	FINISHED FLOOR	UPC	UNKNOWN PIPE CONNECTION
FH	FIRE HYDRANT	VCP	VITRIFIED CLAY PIPE
℄	FLOWLINE	WM	WATER METER
GM	GAS METER	WV	WATER VALVE
GV	GAS VALVE	WW	WINDOW WELL
GATE	GATE	—x—	FENCE
HWP	HAND WATER PUMP	—P—	OVERHEAD POWER LINE
IG	IRON GRATE	—T—	OVERHEAD TELEPHONE LINE
LBO	LOW BUILDING OPENING	—G—	GAS LINE
LP	LIGHT POLE	—SS—	SANITARY SEWER LINE
PVC	PLASTIC PIPE	= = =	STORM WATER LINE
PA	POLE ANCHOR	—UFO—	UNDERGROUND FIBER OPTIC LINE
PP	POWER POLE	—W—	WATER LINE
FBD	FLAT BOTTOM DITCH		



LOW BUILDING OPENING / WINDOW WELL LEGEND	
LBO/WW #3060 HOUSE #103	ELEVATION=984.67
LBO/WW #3121 HOUSE #105	ELEVATION=982.29
LBO/GARAGE #1425 HOUSE #105	ELEVATION=977.06
LBO HOUSE #101	ELEVATION=981.16

STORM SEWER STRUCTURES

CURB INLET #1017
TOP ELEVATION = 972.18
℄ NORTHWEST 12" RCP = 969.53
℄ SOUTHWEST 18" RCP = 969.48

CURB INLET #1028
TOP ELEVATION = 971.95
℄ NORTHEAST 18" RCP = 969.15
℄ SOUTHWEST 24" RCP = 969.15

CURB INLET #15
TOP ELEVATION = 964.36
℄ NORTHEAST 24" RCP = 959.86

SWMH #24
TOP ELEVATION = 966.78
℄ NORTHEAST 24" RCP = 963.53
℄ SOUTHWEST 24" RCP = 963.28

SANITARY SEWER STRUCTURES

SSMH #28
TOP ELEVATION = 979.37
℄ NORTHEAST ±8" PVC = 970.37
℄ NORTHEAST ±8" PVC = 968.72
℄ SOUTHEAST ±8" PVC = 968.57
℄ WEST ±8" PVC = 968.65

SSMH #1024
TOP ELEVATION = 972.37
℄ WEST NORTHWEST ±8" PVC = 967.07
℄ EAST SOUTHEAST ±8" PVC = 966.97

SSMH #1094
TOP ELEVATION = 976.28
℄ NORTH ±8" PVC = 965.93
℄ SOUTH ±8" PVC = 965.73
℄ WEST ±8" PVC = 965.93
℄ EAST ±8" PVC = 965.93
℄ EAST ±8" PVC = 968.28

SSMH #1175
TOP ELEVATION = 976.67
℄ NORTHWEST ±8" PVC = 966.62
℄ SOUTH ±8" PVC = 966.47

SSMH #3282
TOP ELEVATION = 980.41
℄ SOUTHWEST ±8" PVC = 971.51
℄ SOUTHEAST ±6" VCP = 971.71

PROJECT CONTROL

BM/CP #11
NORTH = 1000554.536
EAST = 2815215.212
TOP ELEVATION = 976.53
CUT "+" IN GUTTER OF CONCRETE CURB

BM/CP #12
NORTH = 1000619.313
EAST = 2815116.313
TOP ELEVATION = 980.15
CUT "+" IN CONCRETE SIDEWALK

BM/CP #13
NORTH = 1000228.323
EAST = 2815180.564
TOP ELEVATION = 974.33
CUT "+" IN GUTTER OF CONCRETE CURB

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SW PINNELL DRIVE
EXISTING CONDITION PLAN SHEET

STORM DRAINAGE IMPROVEMENTS
CITY OF LEE'S SUMMIT, MISSOURI

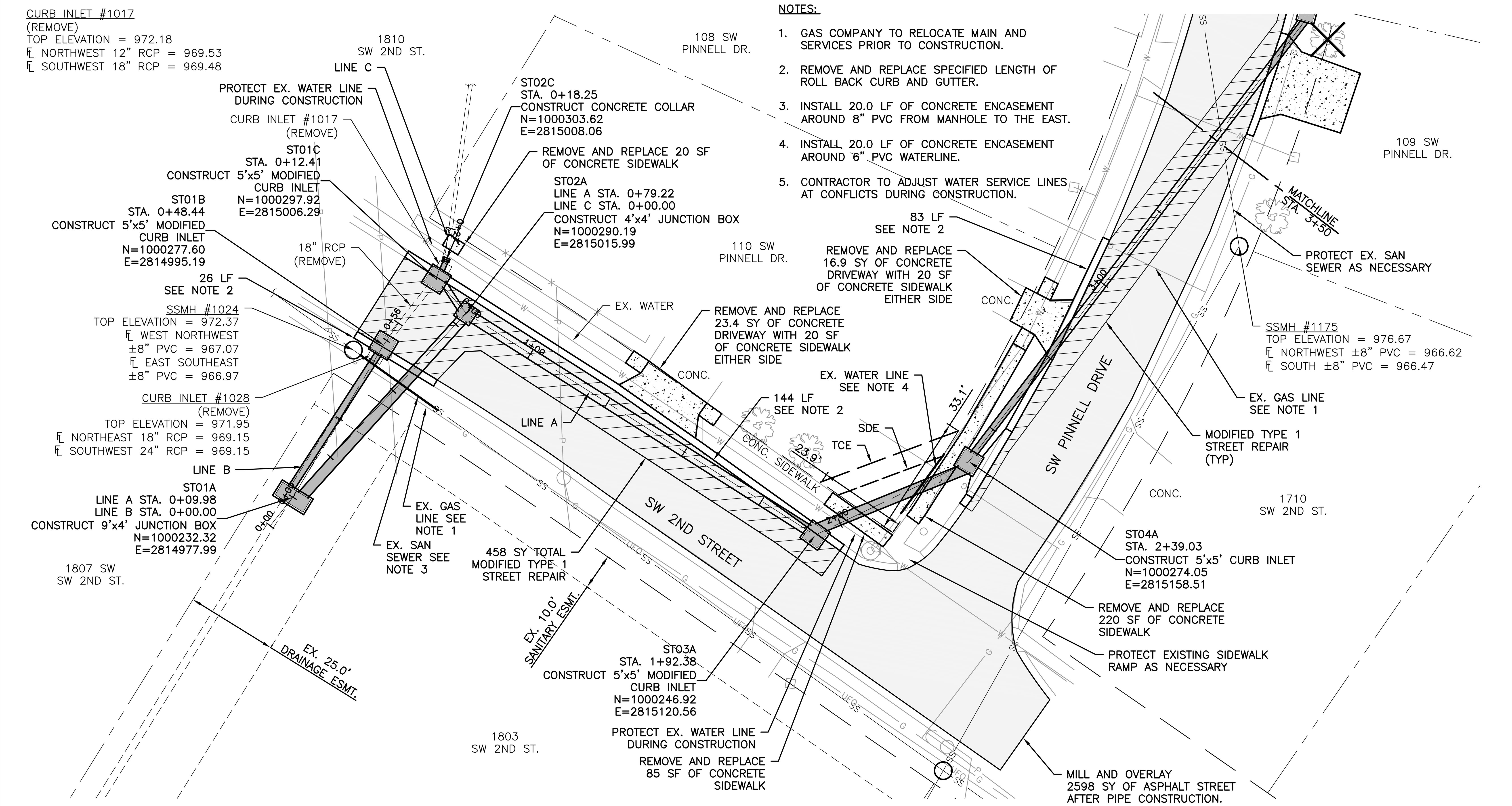
REVISIONS

DESIGNER / DRAFTER
MDM/AJM
DATE
06-17-2020
PROJECT NUMBER
0319054.01
BOOK AND PAGE
543-32272C
MISSOURI AUTHORIZATION NUMBER
2013011903

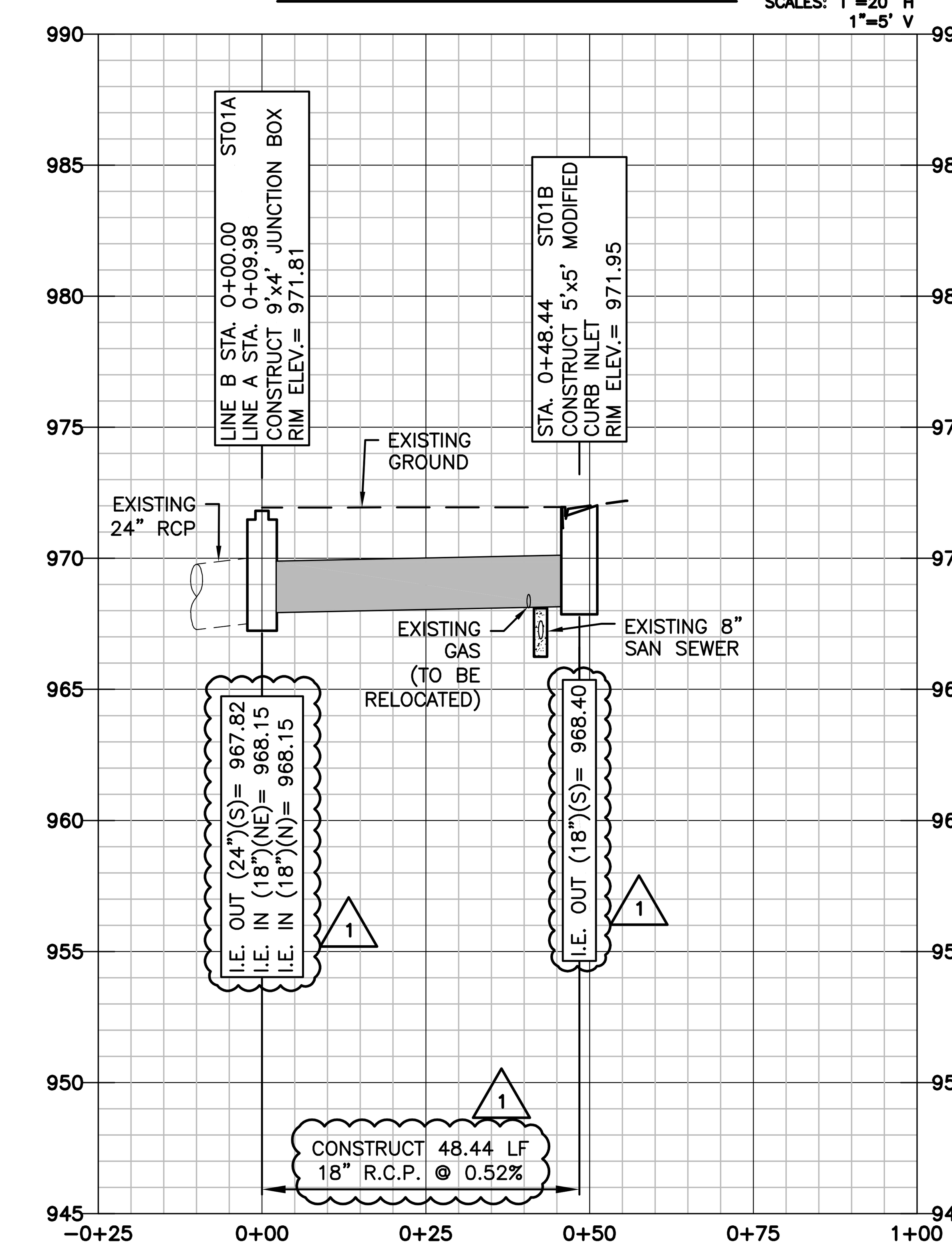
SHEET
07 OF 20

NOTES:

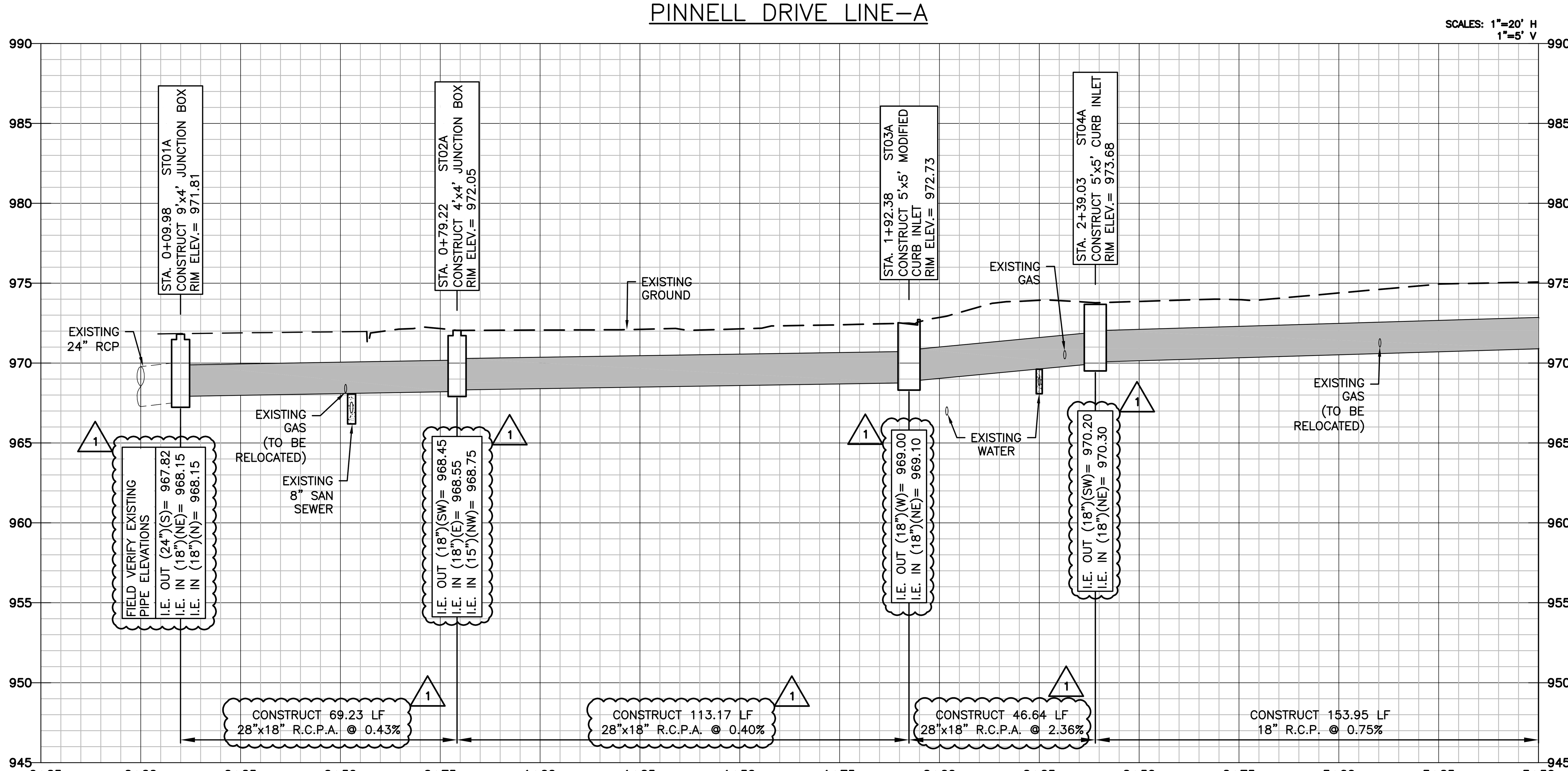
1. GAS COMPANY TO RELOCATE MAIN AND SERVICES PRIOR TO CONSTRUCTION.
2. REMOVE AND REPLACE SPECIFIED LENGTH OF ROLL BACK CURB AND GUTTER.
3. INSTALL 20.0 LF OF CONCRETE ENCASEMENT AROUND 8" PVC FROM MANHOLE TO THE EAST.
4. INSTALL 20.0 LF OF CONCRETE ENCASEMENT AROUND 6" PVC WATERLINE.
5. CONTRACTOR TO ADJUST WATER SERVICE LINES AT CONFLICTS DURING CONSTRUCTION.



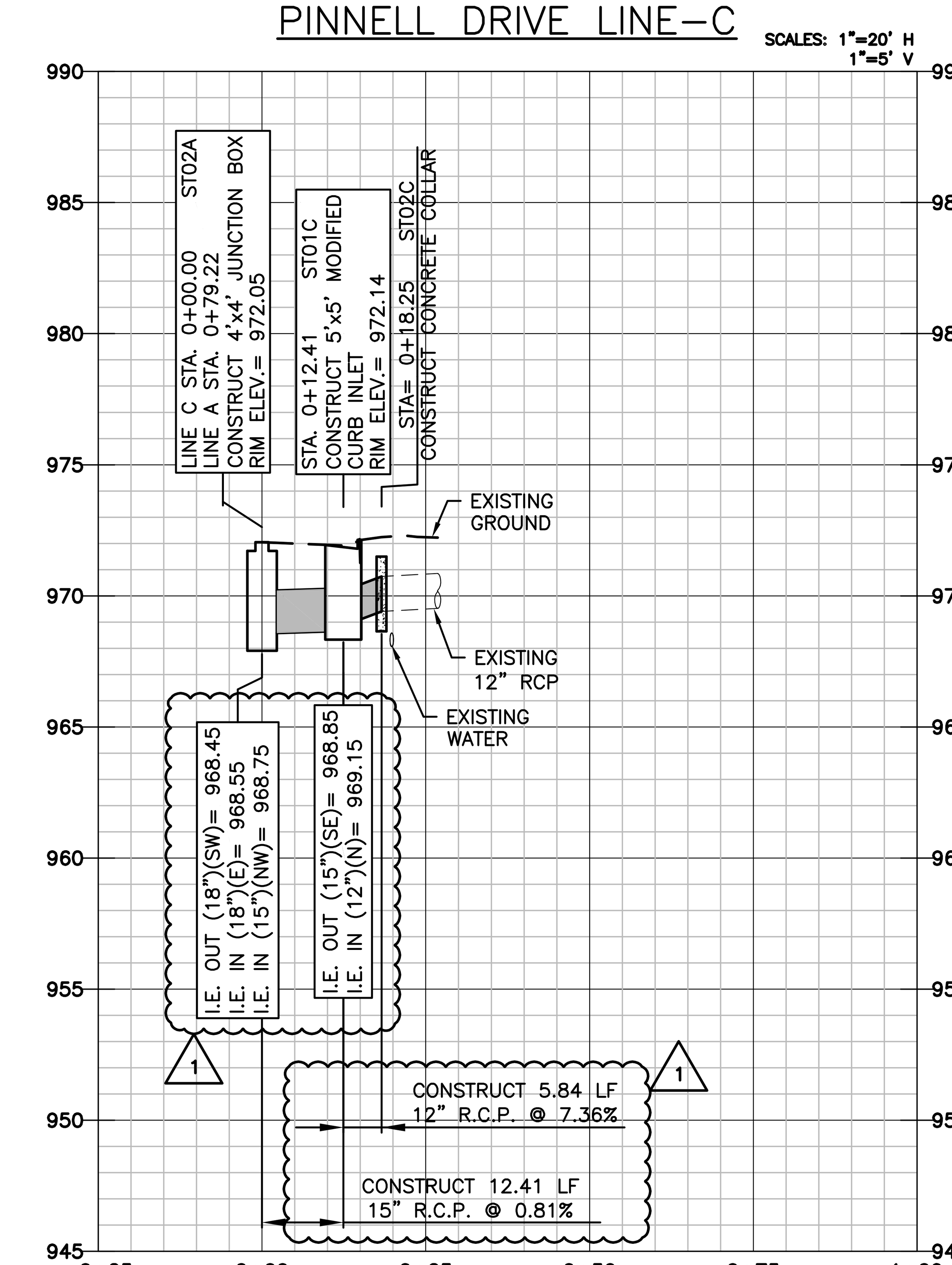
PINNELL DRIVE LINE-B



PINNELL DRIVE LINE-A



PINNELL DRIVE LINE-C



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SW PINNELL DRIVE LINES A–C
STORM SEWER PLAN/PROFILE SHEET

STORM DRAINAGE IMPROVEMENTS
CITY OF LEE'S SUMMIT, MISSOURI

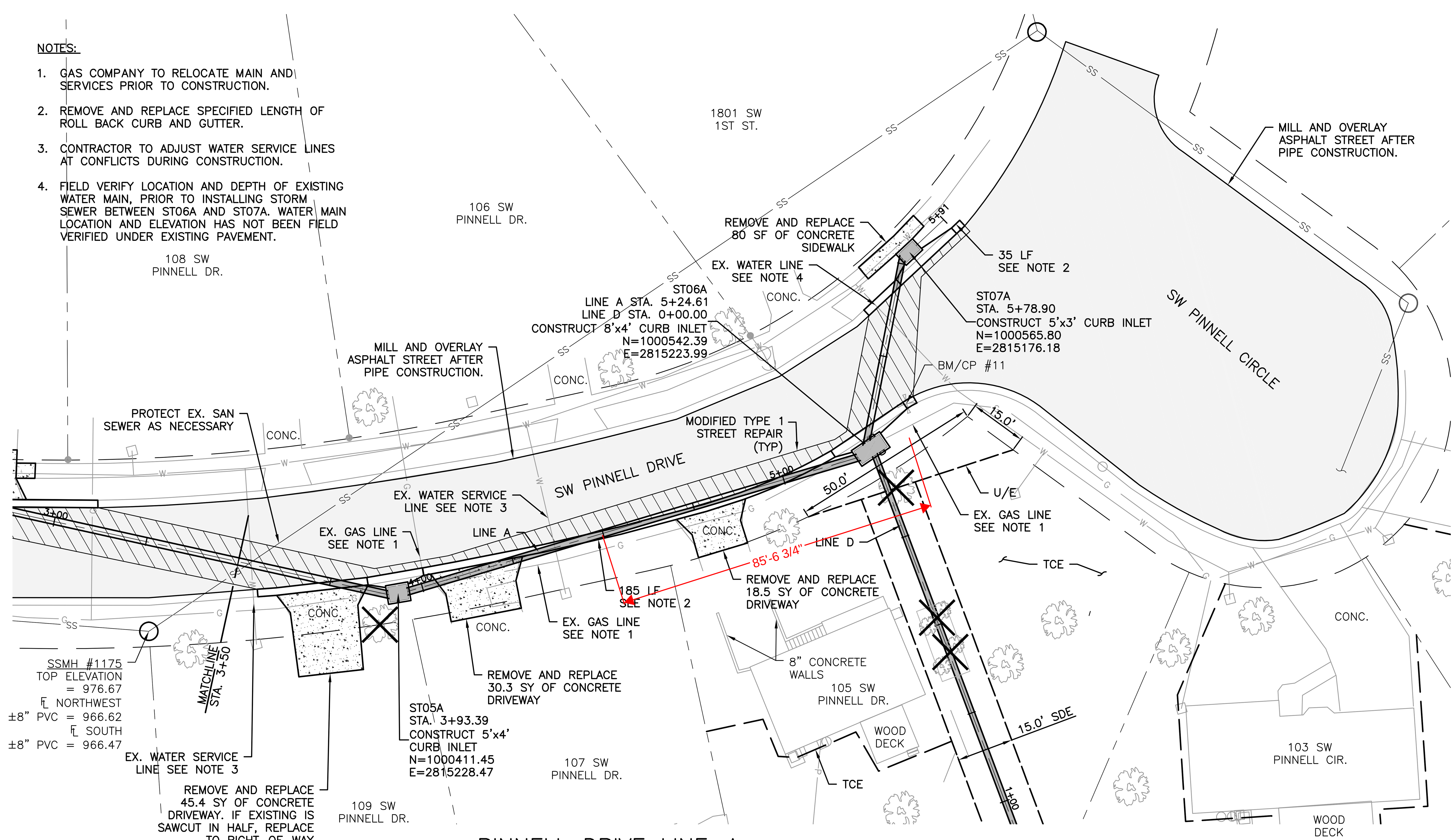
REVISIONS	
06-17-2020	FINAL PLANS
07-06-2020	ADDENDUM NO. 1
09-10-2020	REVISION 1

DESIGNER / DRAFTER: MDM/AJM
DATE: 06-17-2020
PROJECT NUMBER: 0319054.01
CITY PROJECT NUMBER: 543-32272C
MISSOURI AUTHORIZATION NUMBER: 2013011903

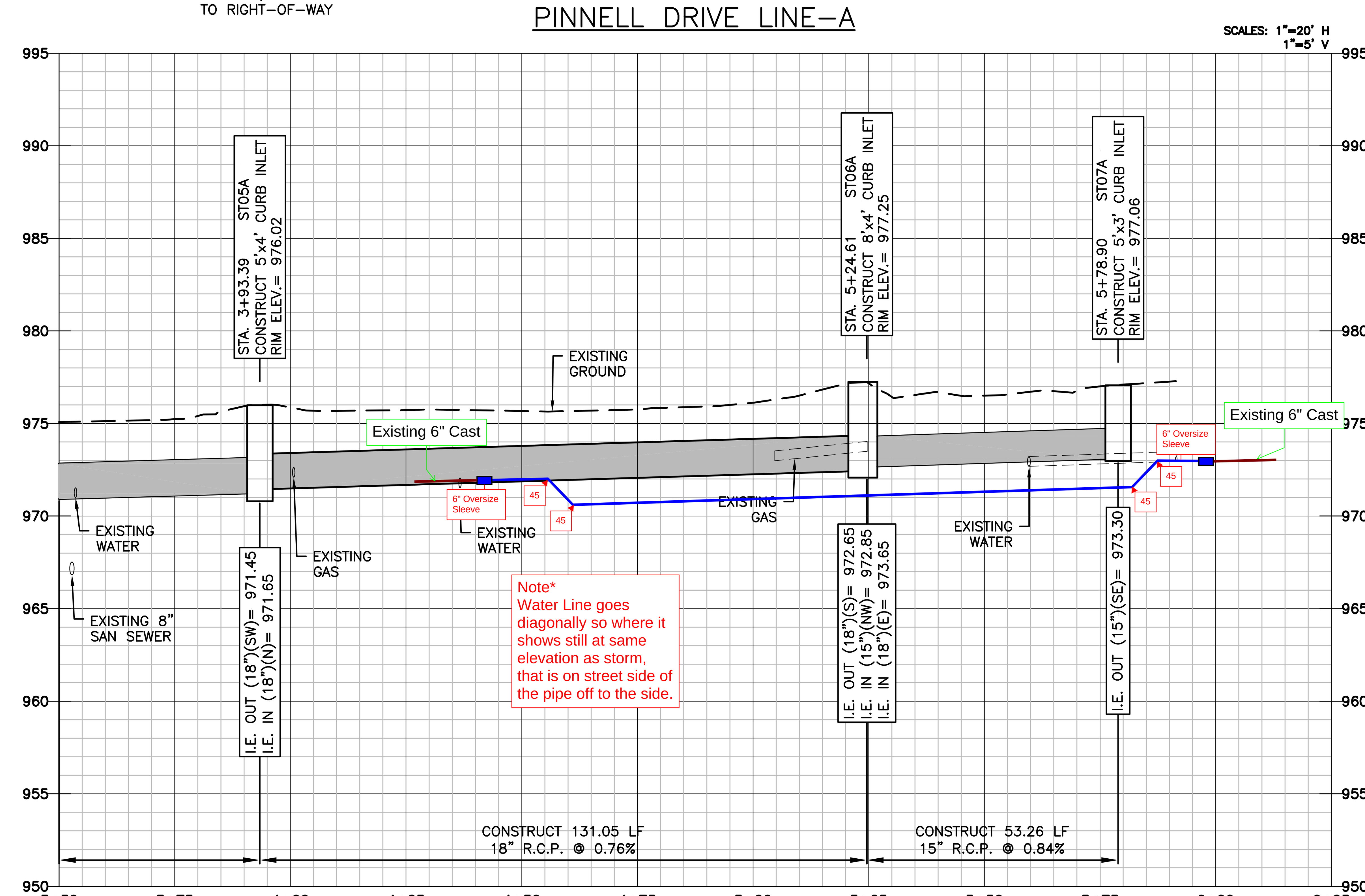
SHEET

NOTES:

1. GAS COMPANY TO RELOCATE MAIN AND SERVICES PRIOR TO CONSTRUCTION.
2. REMOVE AND REPLACE SPECIFIED LENGTH OF ROLL BACK CURB AND GUTTER.
3. CONTRACTOR TO ADJUST WATER SERVICE LINES AT CONFLICTS DURING CONSTRUCTION.
4. FIELD VERIFY LOCATION AND DEPTH OF EXISTING WATER MAIN, PRIOR TO INSTALLING STORM SEWER BETWEEN ST06A AND ST07A. WATER MAIN LOCATION AND ELEVATION HAS NOT BEEN FIELD VERIFIED UNDER EXISTING PAVEMENT.



PINNELL DRIVE LINE-A



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SW PINNELL DRIVE LINE-A
STORM SEWER PLAN/PROFILE SHEET

STORM DRAINAGE IMPROVEMENTS
CITY OF LEE'S SUMMIT, MISSOURI

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SHEET

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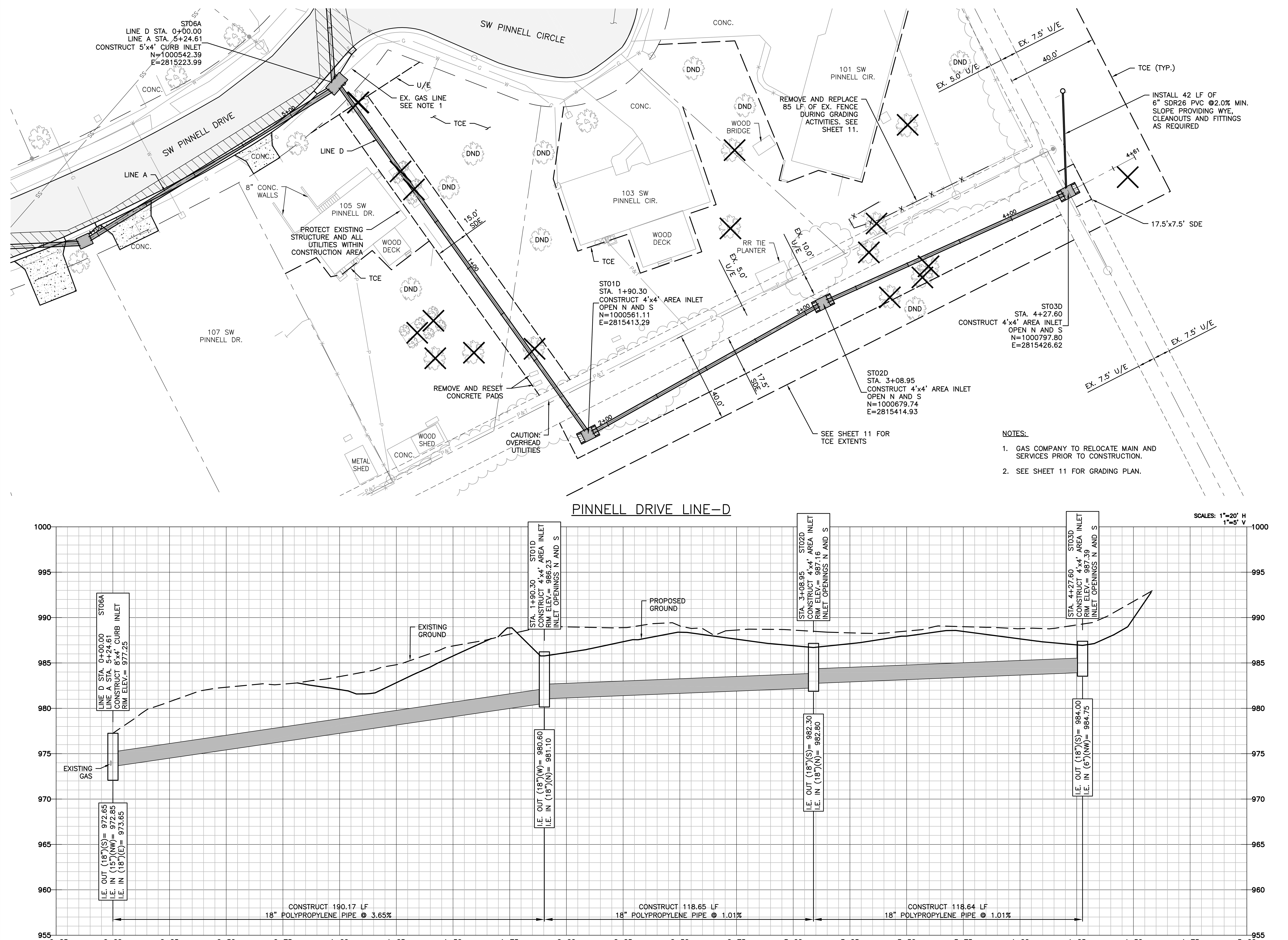

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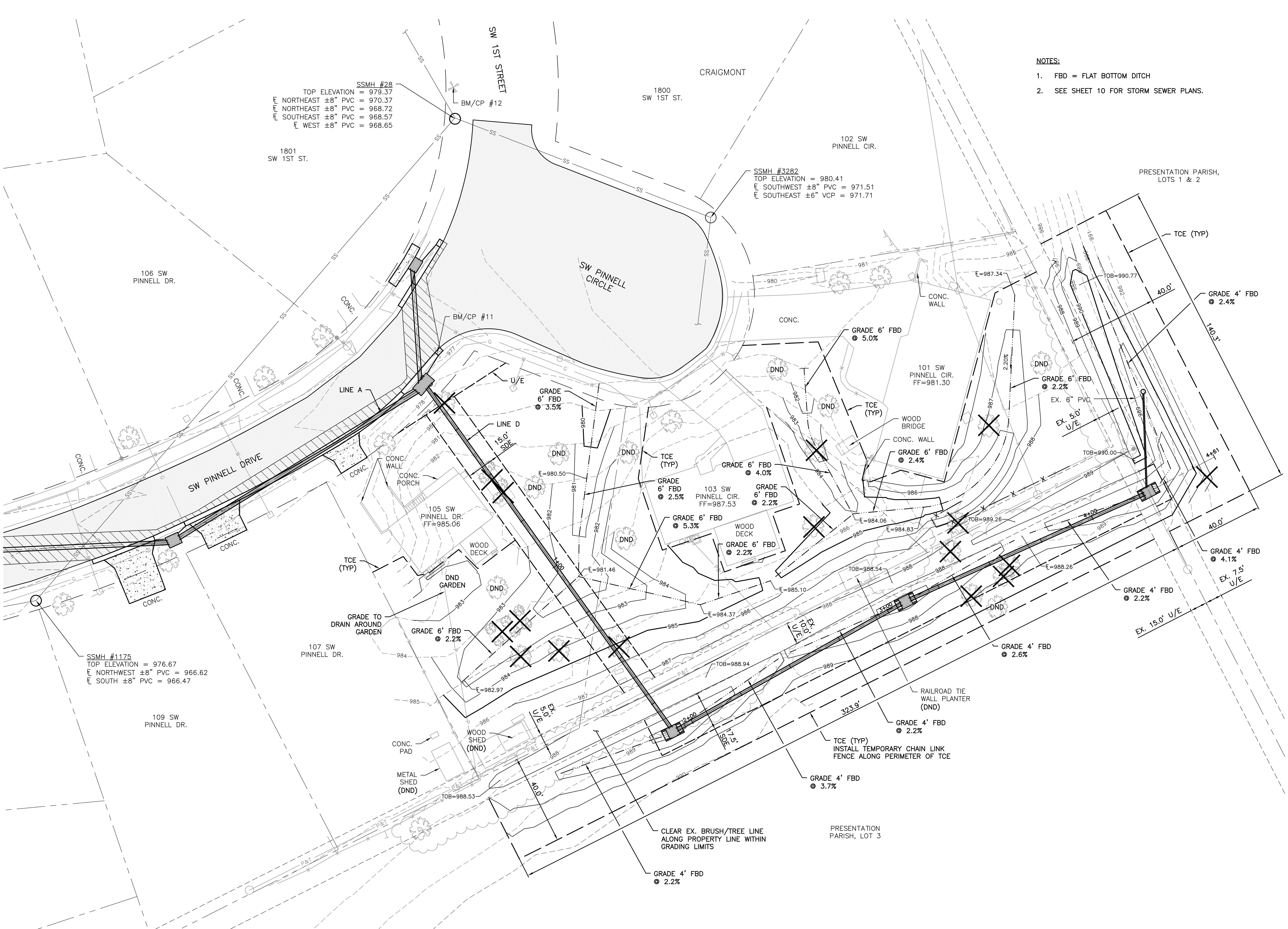
SW PINNELL DRIVE LINE-D
STORM SEWER PLAN/PROFILE SHEET

STORM DRAINAGE IMPROVEMENTS
CITY OF LEE'S SUMMIT, MISSOURI

REVISIONS

DESIGNER / DRAFTER: MDM/AJM
DATE: 06-17-2020
PROJECT NUMBER: 0319054.01
CITY PROJECT NUMBER: 543-32272C
MISSOURI AUTHORIZATION NUMBER: 2013011903
SHEET: 10 OF 20



NOTES:

1. FBD = FLAT BOTTOM DITCH
2. SEE SHEET 10 FOR STORM SEWER PLANS.

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SW PINNELL DRIVE GRADING PLAN SHEET

STORM DRAINAGE IMPROVEMENTS
CITY OF LEE'S SUMMIT, MISSOURI

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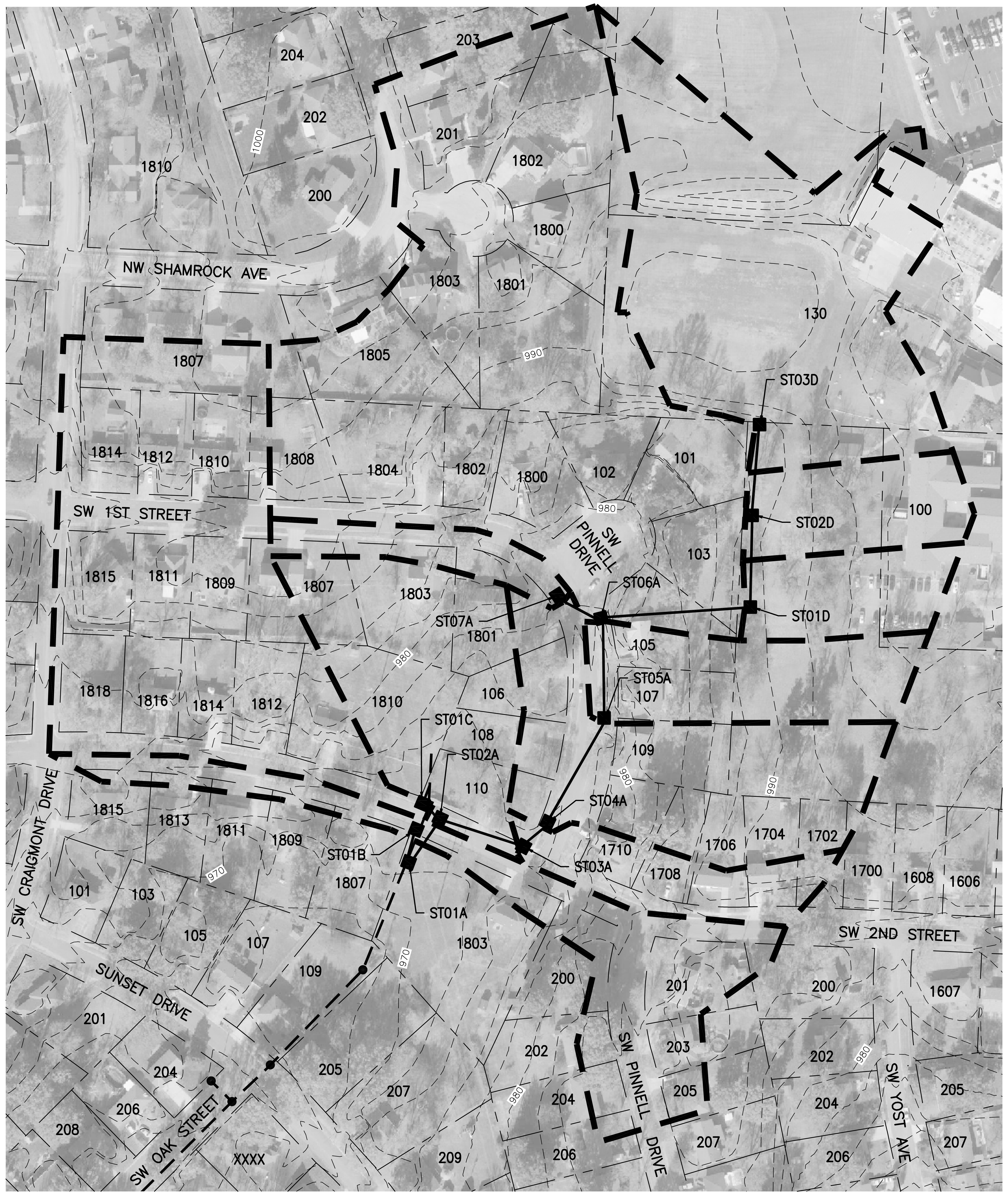
SHEET
11 OF 20



LEGEND

- EXISTING STORM SEWER
- EXISTING STORM SEWER STRUCTURE
- NEW STORM SEWER
- NEW STORM SEWER STRUCTURE
- DRAINAGE AREA BOUNDARY
- RIGHT OF WAY LINE
- PROPERTY LINE
- EXISTING CONTOURS

STORMWATER CALCULATION NOTES:

1. THE EXISTING STORMWATER PIPE SYSTEM DOWNSTREAM OF SW 2ND STREET HAS LIMITED CAPACITY WHEN ACCOUNTING FOR INLET CONTROL. PROPOSED DESIGN INTERCEPTS FLOW FROM UPSTREAM WATERSHED AND IMPROVES SPREAD CONDITIONS ALONG SW 2ND STREET, SW PINNELL DRIVE, AND THE INTERSECTION. DOWNSTREAM STORMWATER SYSTEM CAN APPROXIMATELY CONVEY THE 10% STORM WITH PROPOSED IMPROVEMENTS.

STORM CALCULATIONS

Rational Method

Time of Concentration Calculations "Tc"

Drainage Area Parameters			Inlet Time Ti (First 100')				Inlet Time Ti (Beyond 100')							Travel Time Tt					Time of Concentration
Individual Drainage Area Name	Area (Acres) "A"	Runoff Coefficient "C"	Length (ft.) "L"	Drop (ft.) "ΔH"	Slope "S"	Inlet Time (min.) Ti=1.8(1.1-C)L^0.5/S^0.33	Length (ft) "L"	Drop (ft) ΔH	Slope "S"	Surface Type (Paved (P) or Unpaved (U))	Velocity (Paved Surface greater than 50%) V=20.3282*S^1/2	Velocity (unpaved Surface greater than 50%) V=16.1345*S^1/2	Shallow concentrated flow travel time = L/3600 V	Length (ft.) "L"	Drop (ft.) "ΔH"	Slope (ft./ft.) "S"	Velocity (ft/s) V=AxS^0.67	Travel Time (min.) Tt=L/(60xV)	**Tc = Ti + Tt (min.)**
ST03D	3.38	0.4	100.00	9.00	0.090	6.06	198	5	0.025	U	0.00	2.56	1.29	118.64	0.80	0.007	2.10	0.94	8.28
ST02D	0.75	0.4	100.00	2.00	0.020	10.00	190	8	0.042	U	0.00	3.31	0.96	118.65	1.00	0.008	2.44	0.81	11.77
ST01D	0.65	0.4	100.00	2.00	0.020	10.00	187	7	0.037	U	0.00	3.12	1.00	190.17	8.30	0.044	7.36	0.43	11.43
ST07A	0.43	0.51	100.00	2.00	0.020	8.43	306	9	0.029	P	3.49	0.00	1.46	53.26	0.45	0.008	2.45	0.36	10.25
ST06A	6.52	0.51	100.00	1.50	0.015	9.28	517.34	12.50	0.024	P	3.16	0.00	2.73	131.05	1.00	0.008	2.29	0.96	12.96
ST05A	0.97	0.51	100.00	2.00	0.020	8.43	758.25	20.00	0.026	U	0.00	2.62	4.82	153.87	1.15	0.007	2.26	1.14	14.39
ST04A	1.99	0.51	100.00	2.00	0.020	8.43	329.00	17.00	0.052	U	0.00	3.67	1.50	46.64	0.40	0.009	2.47	0.31	10.24
ST03A	0.69	0.51	100.00	4.00	0.040	6.69	361.00	13.00	0.036	P	3.86	0.00	1.56	113.17	0.75	0.007	2.08	0.91	9.16
ST01C	5.64	0.51	100.00	1.00	0.010	10.62	1140.00	23.00	0.020	U	0.00	2.29	8.29	5.84	0.15	0.026	5.16	0.02	18.93
ST02A	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.000	P	0.00	0.00	0.00	69.23	0.78	0.011	2.97	0.39	0.39
ST01B	1.78	0.51	100.00	0.75	0.008	11.69	471.00	12.25	0.026	P	3.28	0.00	2.39	48.44	0.40	0.008	2.41	0.33	14.42
ST01A	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.00	0.00	P	0.00	0.00	0.00	145.5	1.5	0.010	2.80	0.87	0.87

Rational Method

Flow Calculations "Q"

Individual Drainage Area Name	Area "A" x Runoff Coefficient "C" CA	Time of Concentration "Tc"	Design "Tc" 5 ≤ Tc ≤ 60 min.	Rainfall Intensity "I2" in in/hr 5 ≤ Tc ≤ 15 min. I2=119/(Tc+17)	Rainfall Intensity "I2" in in/hr 15 < Tc ≤ 60 min. I2=134/(Tc+21.4)	2-Year Flow Q_2= CxI_2xA	Rainfall Intensity "I_5" in in/hr 5 ≤ Tc ≤ 15 min. I_5=154/(Tc+18.8)	Rainfall Intensity "I_5" in in/hr 15 < Tc ≤ 60 min. I_5=182/(Tc+25)	5-Year Flow Q_5= CxI_5xA	Rainfall Intensity "I10" in in/hr 5 ≤ Tc ≤ 15 min. I10=175/(Tc+18.8)	Rainfall Intensity "I10" in in/hr 15 < Tc ≤ 60 min. 10=214/(Tc+26.7)	10-Year Flow Q_{10} =CI_{10}A	Rainfall Intensity "I_{25}" in in/hr 5 ≤ Tc ≤ 15 min. I_{25}=203/(Tc+18.8)	Rainfall Intensity "I_{25}" in in/hr 15 < Tc ≤ 60 min. I_{25}=262/(Tc+28.8)	25-Year Flow Q_{25}= 1.1xCxI_{25}xA	Rainfall Intensity "I_{50}" in in/hr 5 ≤ Tc ≤ 15 min. I_{50}=233/(Tc+19.8)	Rainfall Intensity "I_{50}" in in/hr 15 < Tc ≤ 60 min. I_{50}=296/(Tc+29.6)	50-Year Flow Q_{50}= 1.2xCxI_{50}xA	Rainfall Intensity "I100" in in/hr Tc < 15 min. I100=256/(Tc+19.8)	Rainfall Intensity "I100" in in/hr Tc > 15 min. I100=331/(Tc+30)	100-Year Flow Q_{100}= 1.25xCI_{100} A
ST03D	1.35	8.28	8.28	4.71		6.36	5.69		7.69	6.46		8.74	7.50		11.15	8.30		13.46	9.12		15.41
ST02D	1.65	11.77	11.77	4.14		6.83	5.04		8.32	5.73		9.46	6.64		12.07	7.38		14.63	8.11		16.75
ST01D	1.91	11.43	11.43	4.19		8.01	5.09		9.75	5.79		11.08	6.72		14.13	7.46		17.13	8.20		19.61
ST07A	0.22	10.25	10.25	4.37		0.96	5.30		1.16	6.02		1.32	6.99		1.68	7.75		2.04	8.52		2.33
ST06A	5.46	12.39	12.39	4.05		22.10	4.94		26.95	5.61		30.63	6.51		39.08	7.24		47.41	7.95		54.26
ST05A	5.95	14.39	14.39	3.79		22.56	4.64		27.61	5.27		31.38	6.12		40.04	6.82		48.66	7.49		55.70
ST04A	6.97	14.70	14.70	3.75		26.15	4.60		32.02	5.22		36.39	6.06		46.43	6.75		56.45	7.42		64.61
ST03A	7.32	15.61	15.61		3.62	26.49		4.48	32.79		5.06	37.00		5.90	47.48		6.55	57.48		7.26	66.37
ST01C	2.88	18.93	18.93		3.32	9.56		4.14	11.91		4.69	13.49		5.49	17.36		6.10	21.05		6.76	24.32
ST02A	10.19	18.93	18.93		3.32	33.86		4.14	42.22		4.69	47.80		5.49	61.54		6.10	74.59		6.76	86.18
ST01B	0.91	14.42	14.42	3.79		3.43	4.64		4.20	5.27		4.77	6.11		6.09	6.81		7.40	7.48		8.47
ST01A	11.10	19.80	19.80		3.25	36.10		4.06	45.09		4.60	51.07		5.39	65.81		5.99	79.80		6.65	92.20

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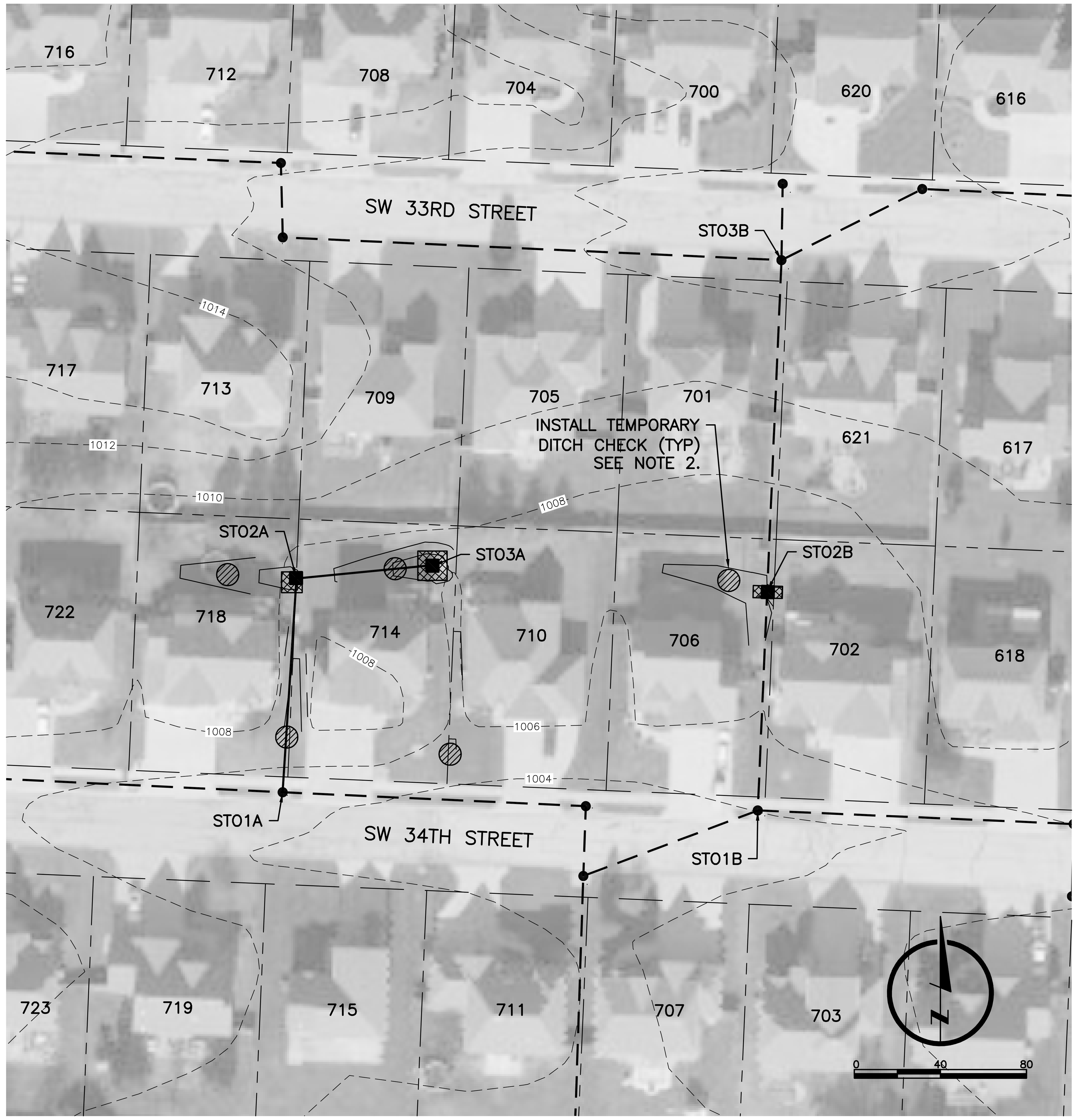
SW PINNELL DRIVE
DRAINAGE AREA MAP SHEET

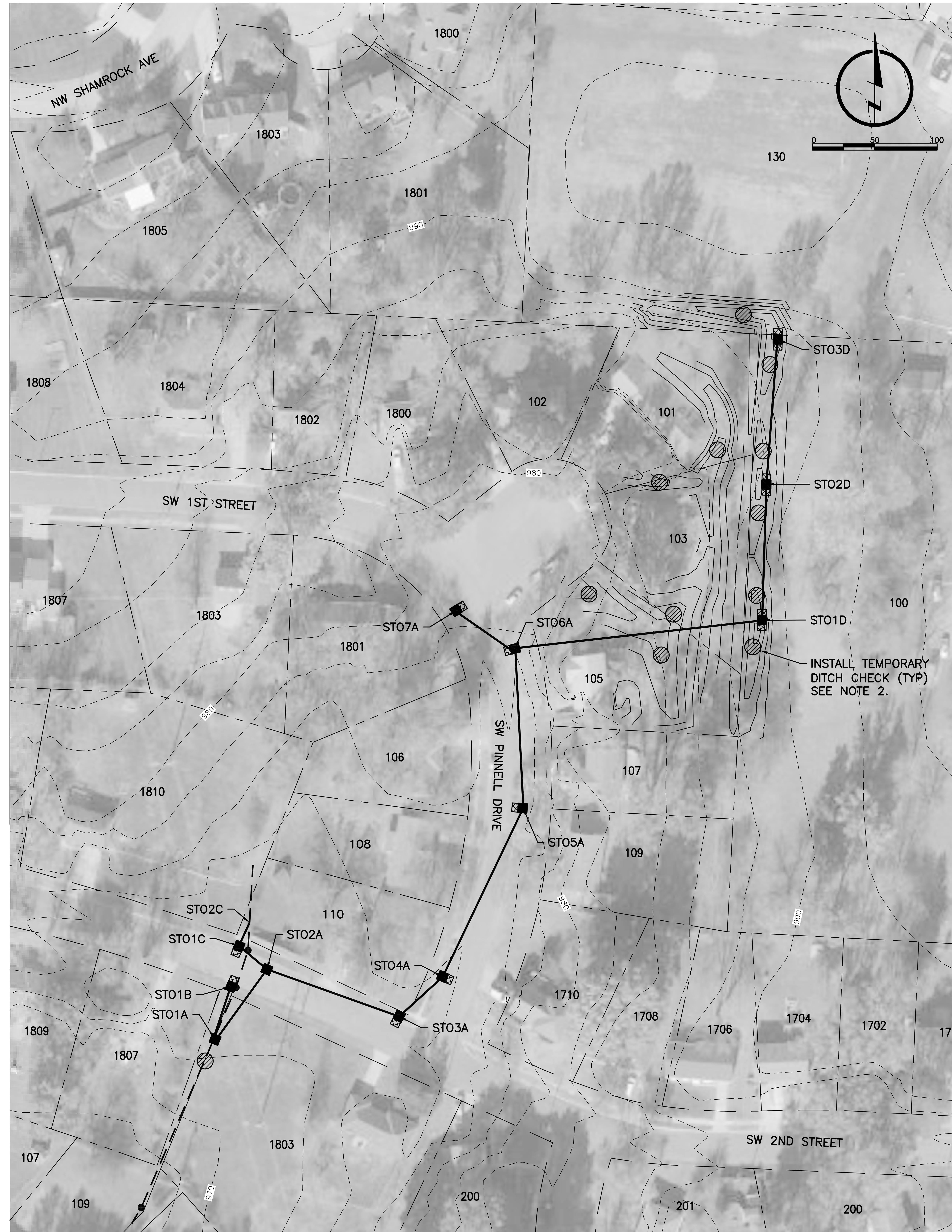
STORM DRAINAGE IMPROVEMENTS
CITY OF LEE'S SUMMIT, MISSOURI

REVISIONS

DESIGNER / DRAFTER
MDM/AJM
DATE
06-17-2020
PROJECT NUMBER
0319054.01
CITY PROJECT NUMBER
543-32272C
MISSOURI AUTHORIZATION NUMBER
2013011903

SHEET





NOTES:

1. REFER TO STORMWATER POLLUTION PREVENTION PLAN FOR ADDITIONAL REQUIREMENTS AND BEST MANAGEMENT PRACTICES.
2. PROVIDE TEMPORARY DITCH CHECKS ON NEWLY GRADED SWALES, REMOVE TEMPORARY DITCH CHECKS DURING FINAL RESTORATION WHEN SOD IS INSTALLED.

LEGEND

- EXISTING STORM SEWER
- EXISTING STORM SEWER STRUCTURE
- NEW STORM SEWER
- NEW STORM SEWER STRUCTURE
- RIGHT OF WAY LINE
- PROPERTY LINE
- EXISTING CONTOURS
- DITCH CHECKS
- INLET FILTER

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SW 34TH STREET AND SW PINNELL DRIVE
EROSION CONTROL PLAN SHEET

STORM DRAINAGE IMPROVEMENTS
CITY OF LEE'S SUMMIT, MISSOURI

REVISIONS

DESIGNER / DRAFTER
MDM/AJM
DATE
06-17-2020
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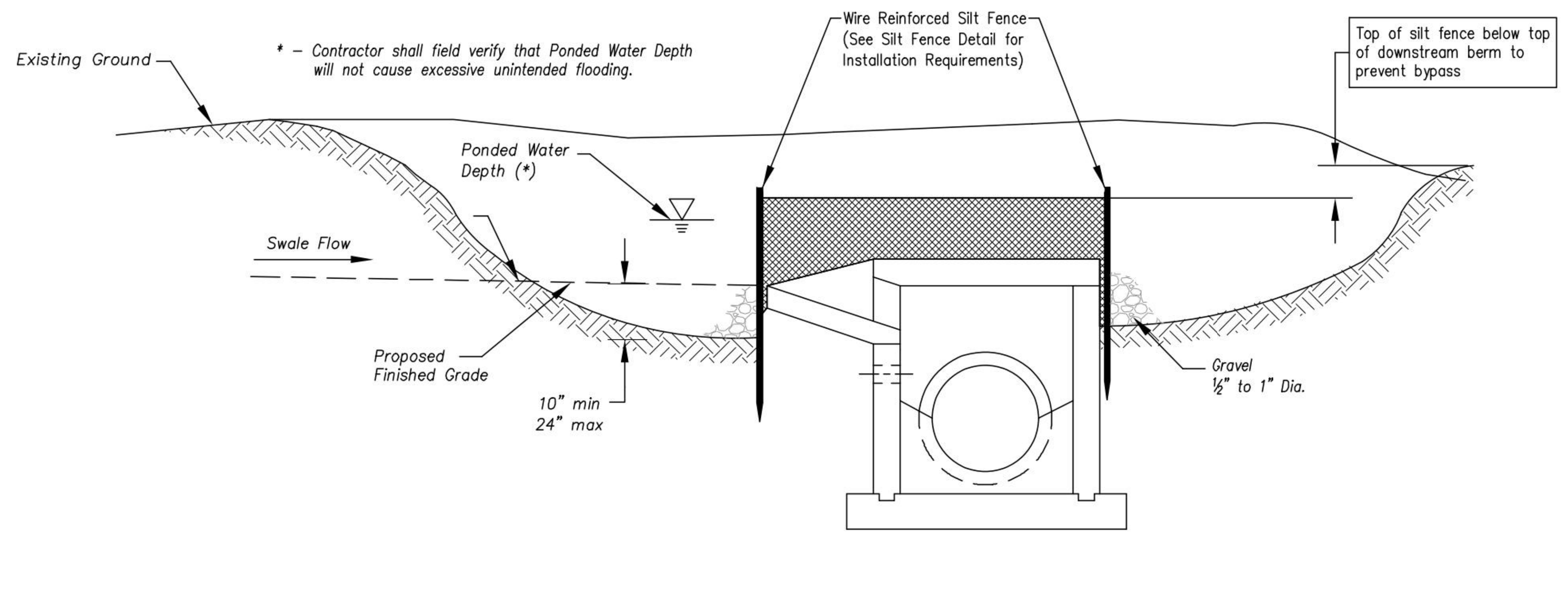
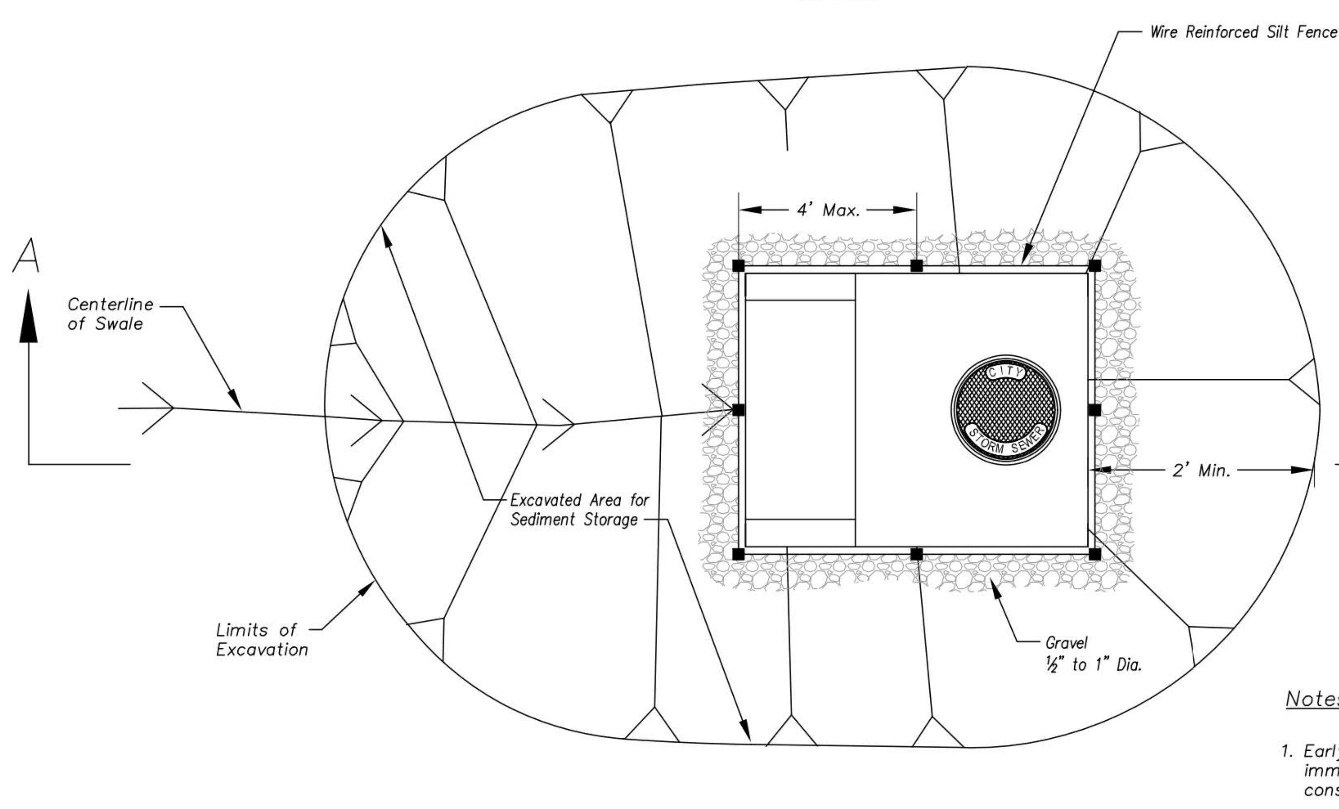
2013011903

SHEET
13 OF 20



Section A–A

Not to Scale



Plan

Not to Scale

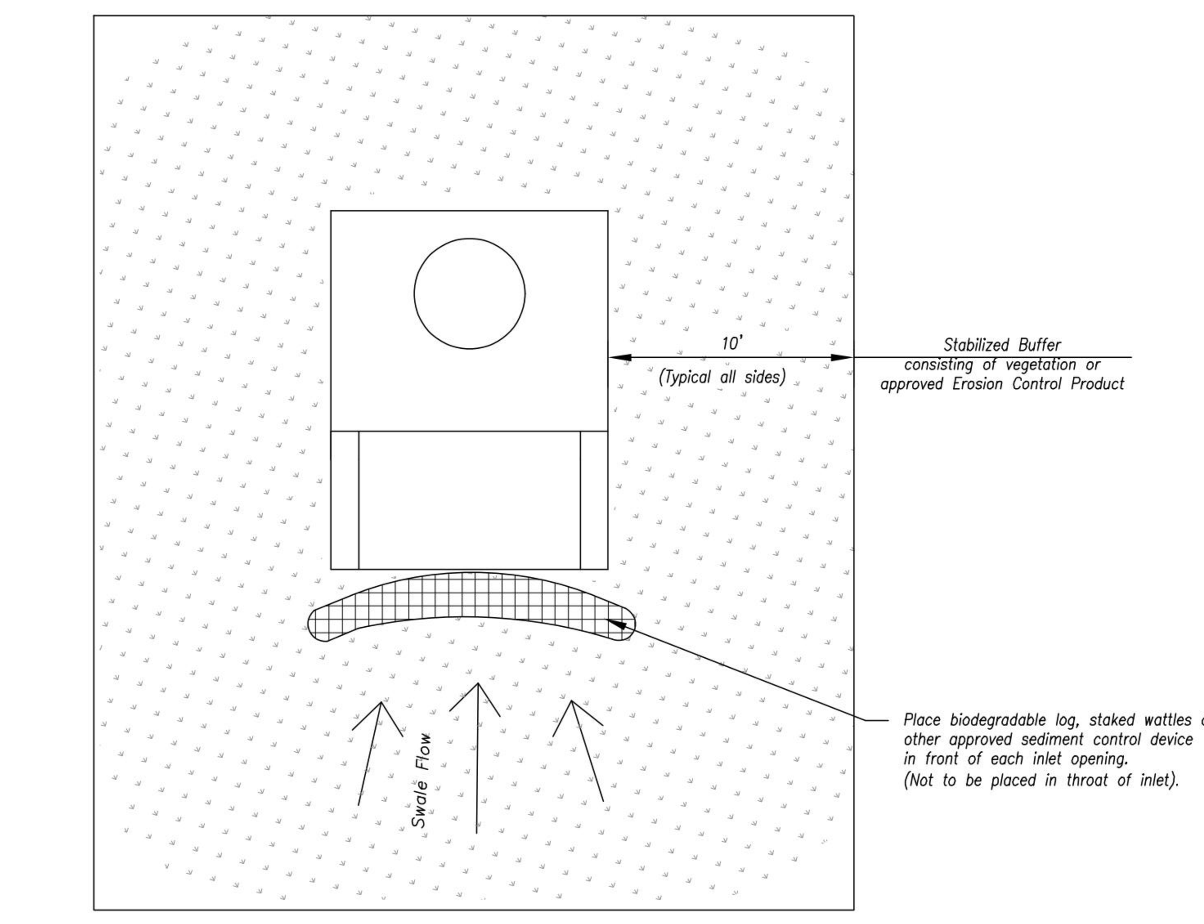
MODIFIED FROM 2015 OVERLAND PARK STANDARD DETAILS FOR EROSION AND SEDIMENT CONTROL.

EARLY STAGE AREA INLET
(All open boxes and inlets not at final grade)

Notes:

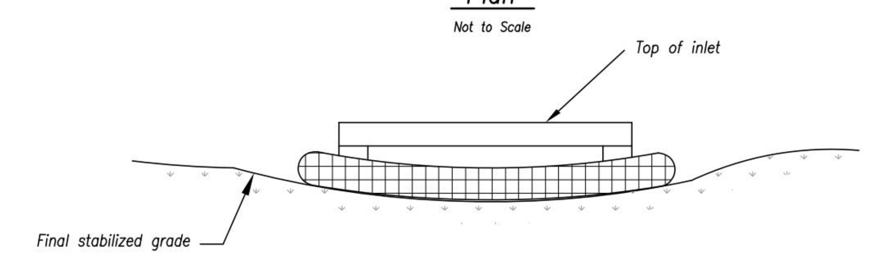
1. Early Stage Area Inlet Sediment Barrier to be installed immediately after inlet or junction box is constructed.
2. Silt fence shall remain in place until excavated area is removed and Late Stage Area Inlet is being installed.
3. Backfill excavated area ONLY after final grading of the site. Stabilization of the site is to immediately follow.
4. Wire reinforced silt fence may be used in place of silt fence attached to wood frame.

AMERICAN PUBLIC WORKS ASSOCIATION	
Kansas City Metro Chapter APWA	KANSAS CITY METRO CHAPTER
AREA INLET AND JUNCTION BOX PROTECTION	STANDARD DRAWING NUMBER ESC-07 ADOPTED: 10/24/2016



Plan

Not to Scale

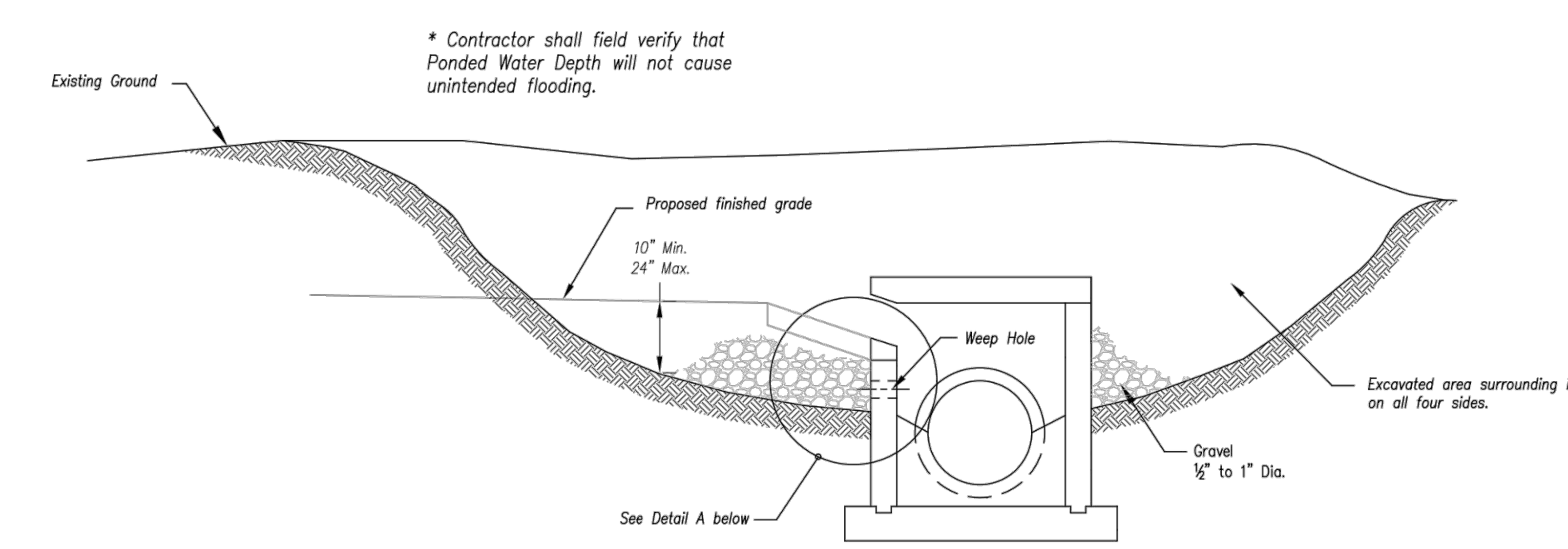


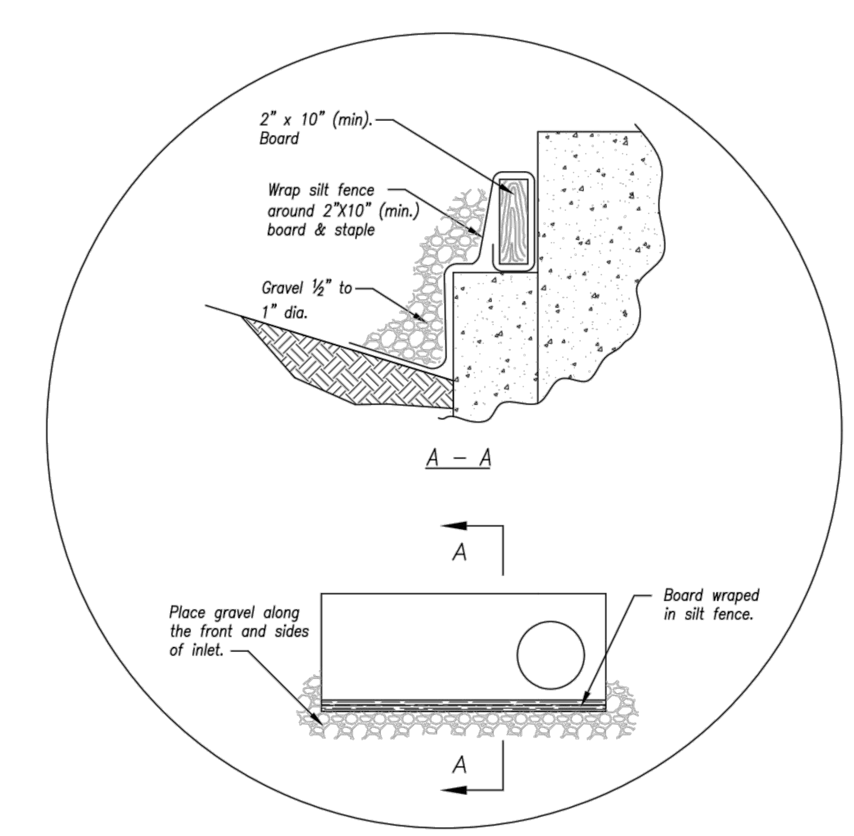
Front View

LATE STAGE AREA INLET
(Area inlets at final grade and existing inlets)

Maintenance:

1. Remove deposited sediment from excavated storage areas when available storage has been reduced by 20%.
2. Remove deposited sediment from filter socks or similar when any accumulation of sediment is visible.
3. Repair or replace as necessary to maintain function and integrity of installation.





Detail A

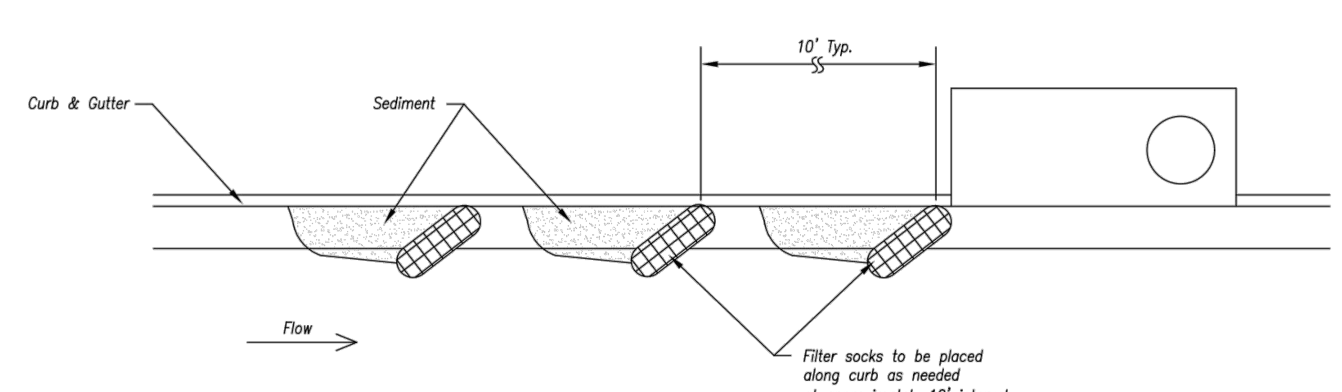
EARLY STAGE CURB INLET
(Open Box and Prior to Pouring Curb and Inlet Throat)

Notes:

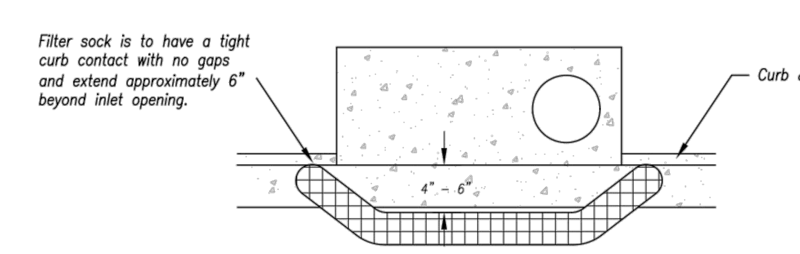
1. Immediately following inlet construction and prior to construction of curb and inlet throat, protect inlet opening by installing 2" X 10" (min.) board wrapped in silt fence. Structures shall have excavated storage area on all four sides to allow settling of sediment (Early Stage Curb Inlet).
2. When inlet is completed and curb poured, filter socks or approved equal should be used (Late Stage Curb Inlet). Straw wattles are not approved for curb inlet use.
3. Contractor to field verify ponding water shall not create a traffic hazard.

Maintenance:

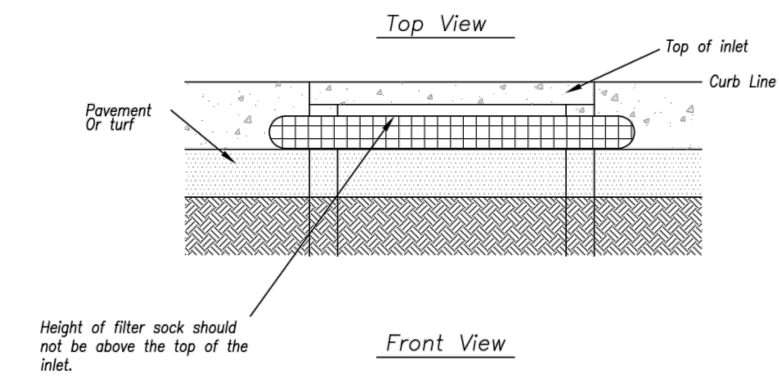
1. Remove deposited sediment from excavated storage areas when available storage has been reduced by 20%.
2. Remove deposited sediment from filter socks or similar when any accumulation of sediment is visible.
3. Repair or replace as necessary to maintain function and integrity of installation.



On Grade Curb Inlet Protection



Top View



Front View

Sump Inlet Sediment Filter

LATE STAGE CURB INLET
(After Pouring Curb and Inlet Throat)

MODIFIED FROM 2015 OVERLAND PARK STANDARD DETAILS FOR EROSION AND SEDIMENT CONTROL.

AMERICAN PUBLIC WORKS ASSOCIATION	
Kansas City Metro Chapter APWA	KANSAS CITY METRO CHAPTER
CURB INLET PROTECTION	STANDARD DRAWING NUMBER ESC-06 ADOPTED: 10/24/2016

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PE-2008019568

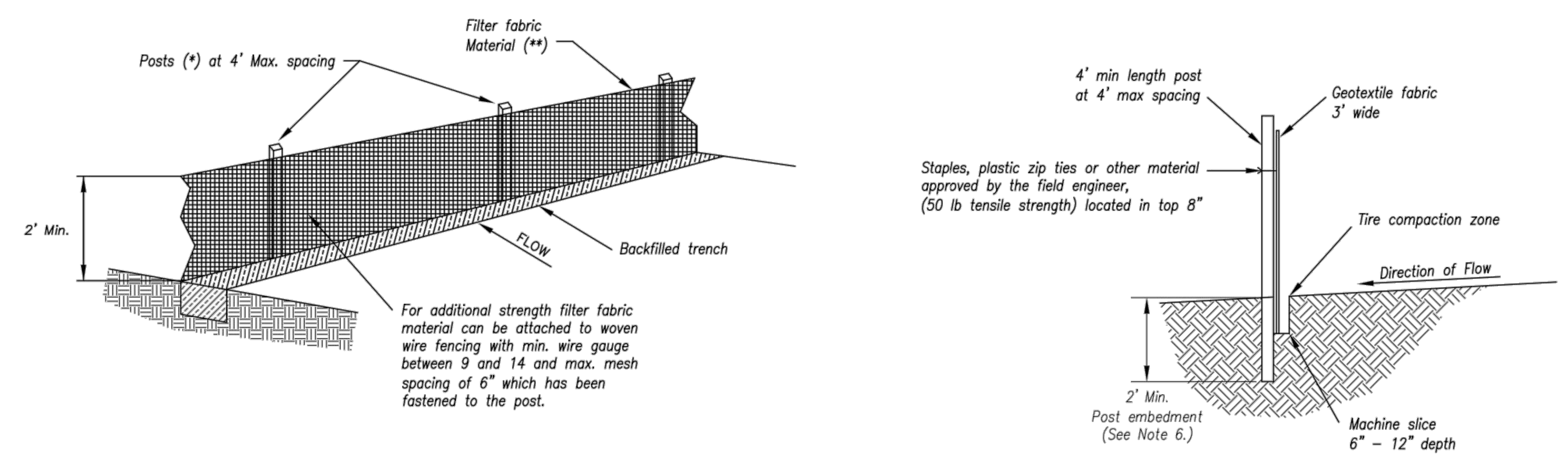
EROSION CONTROL DETAIL SHEET

STORM DRAINAGE IMPROVEMENTS
CITY OF LEE'S SUMMIT, MISSOURI

REVISIONS

DESIGNER / DRAFTER: MDM/AJM
DATE: 06-17-2020
PROJECT NUMBER: 0319054.01
BOOK AND PAGE: 543-32272C
2013011903

SHEET



(*) POSTS

- MIN. LENGTH 4'
- HARDWOOD 1 3/16" x 1 3/16"
- NO.2 SOUTHERN PINE 2 5/8" x 2 5/8"
- STEEL 1.33 LB/FT

(**) – Geotextile Fabric shall meet the requirements of AASHTO M288

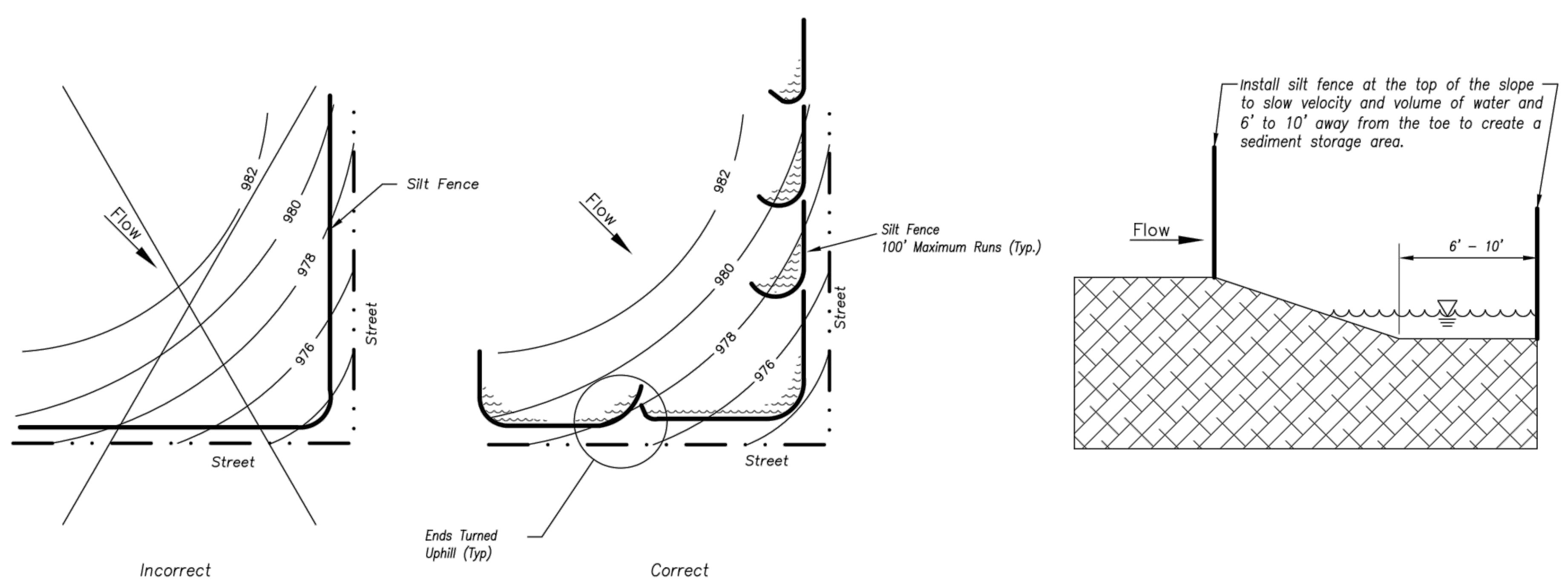
SILT FENCE DETAILS
Not to Scale

Notes:

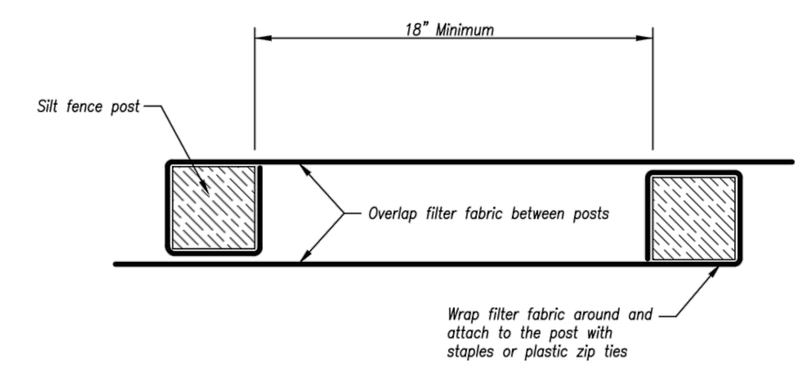
1. In order to contain water, the ends of the silt fence must be turned uphill (Figure A).
2. Long perimeter runs of silt fence must be limited to 100'. Runs should be broken up into several smaller segments to minimize water concentrations (Figure A).
3. Long slopes should be broken up with intermediate rows of silt fence to slow runoff velocities.
4. Attach fabric to upstream side of post.
5. Install posts a minimum of 2' into the ground.
6. Trenching will only be allowed for small or difficult installation, where slicing machine cannot be reasonably used.

Maintenance:

1. Remove and dispose of sediment deposits when the deposit approaches 1/3 the height of silt fence.
2. Repair as necessary to maintain function and structure.



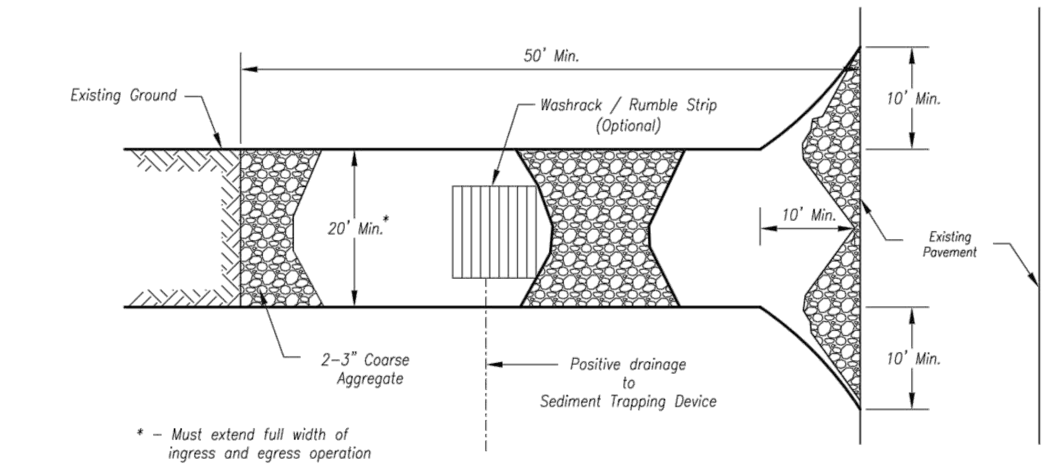
SILT FENCE LAYOUT
Not to Scale



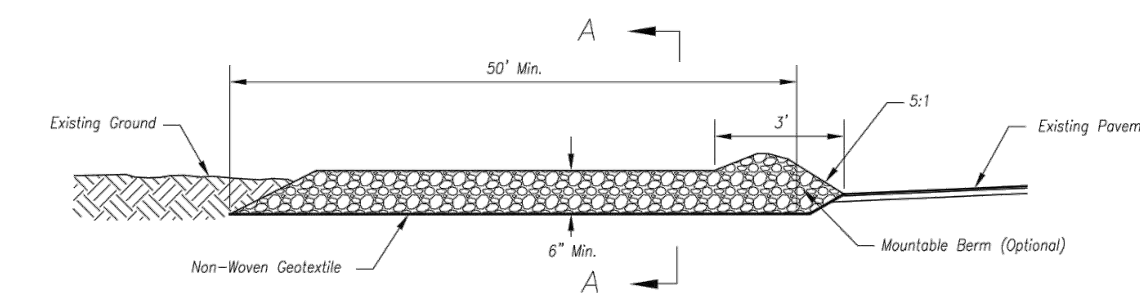
JOINING FENCE SECTIONS
Not to Scale

Modified from 2015 Overland Park Standard Details for Erosion and Sediment Control.

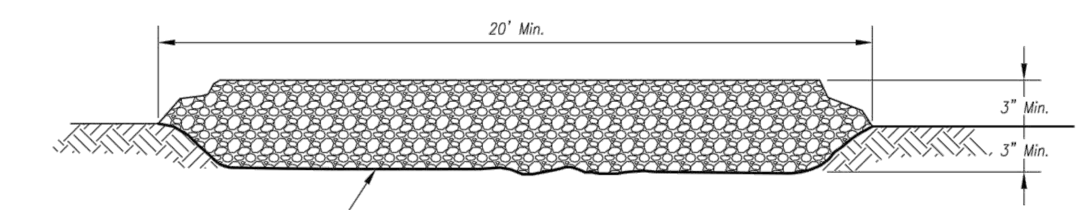
AMERICAN PUBLIC WORKS ASSOCIATION
KANSAS CITY METRO CHAPTER
SILT FENCE
STANDARD DRAWING NUMBER ESC-03
ADOPTED: 10/24/2016



Plan View
Not to Scale



Side Elevation
Not to Scale



Section A–A
Not to Scale

Notes for Construction Entrance:

1. Avoid locating on steep slopes, at curves on public roads, or downhill of disturbed area.
2. Remove all vegetation and other unsuitable material from the foundation area, grade, and crown for positive drainage.
3. If slope towards the public road exceeds 2%, construct a 6– to 8–inch high ridge with 3H:1V side slopes across the foundation approximately 15 feet from the edge of the public road to divert runoff from it.
4. Install pipe under the entrance if needed to maintain drainage ditches along public roads.
5. Place stone to dimensions and grade as shown on plans. Leave surface sloped for drainage.
6. Divert all surface runoff and drainage from the entrance to a sediment control device.
7. If conditions warrant, place geotextile fabric on the graded foundation to improve stability.

Maintenance for Construction Entrance:

1. Reshape entrance as needed to maintain function and integrity of Installation. Top dress with clean aggregate as needed.

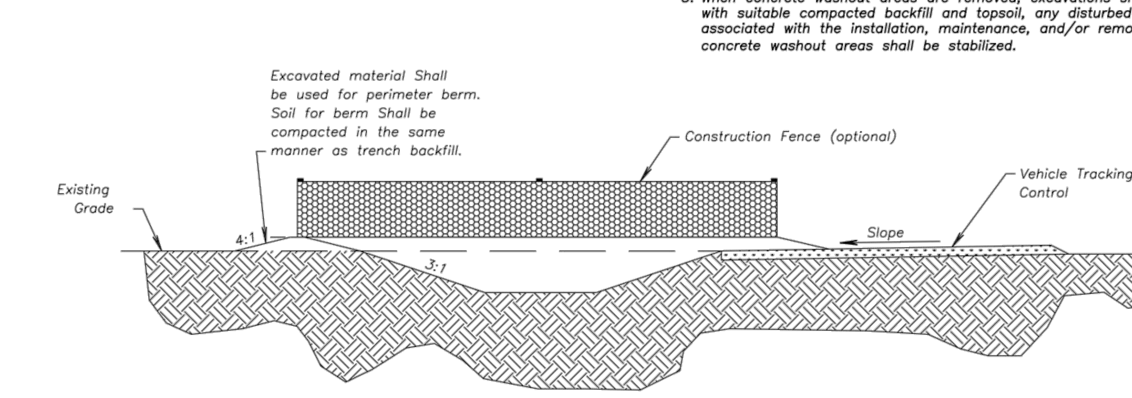
CONSTRUCTION ENTRANCE

Notes for Concrete Washout:

1. Concrete washout areas shall be installed prior to any concrete placement on site.
2. Concrete washout area shall include a flat subsurface pit sized relative to the amount of concrete to be placed on site. The slopes leading out of the subsurface pit shall be 3:1. The vehicle tracking pad shall be sloped towards the concrete washout area.
3. Vehicle tracking control is required at the access point to all concrete washout areas.
4. Signs shall be placed at the construction site entrance, washout area and elsewhere as necessary to clearly indicate the location(s) of the concrete washout area(s) to operators of concrete truck and pump rigs.
5. A one–piece impervious liner may be required along the bottom and sides of the subsurface pit in sandy or gravelly soils.

Maintenance for Concrete Washout:

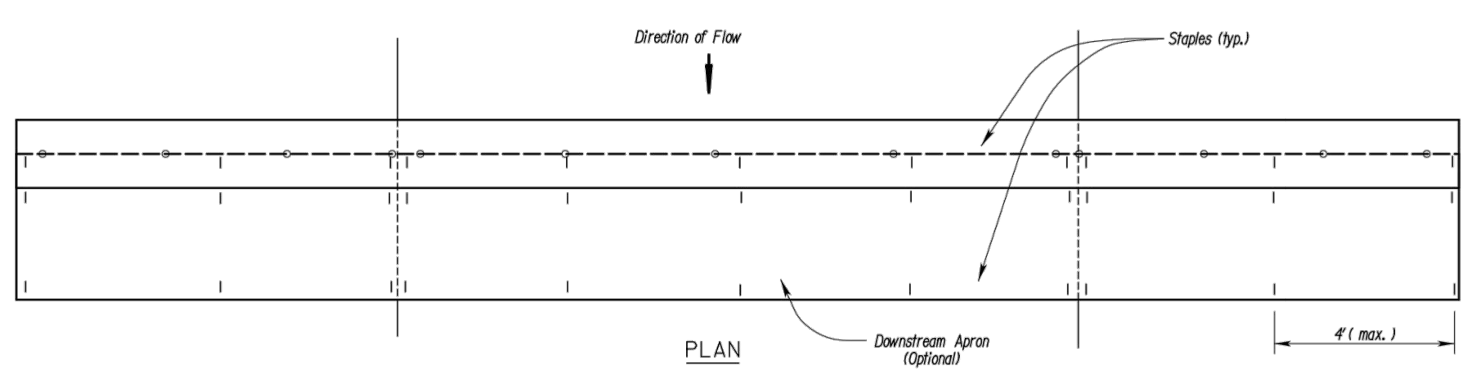
1. Concrete washout materials shall be removed once the materials have filled the washout to approximately 75% full.
2. Concrete washout areas shall be enlarged as necessary to maintain capacity for wasted concrete.
3. Concrete washout water, wasted pieces of concrete and all other debris in the subsurface pit shall be transported from the job site in a water–tight container and disposed of properly.
4. Concrete washout areas shall remain in place until all concrete for the project is placed.
5. When concrete washout areas are removed, excavations shall be filled with suitable compacted backfill and topsoil, any disturbed areas associated with the installation, maintenance, and/or removal of the concrete washout areas shall be stabilized.



CONCRETE WASHOUT

CONSTRUCTION ENTRANCE MODIFIED FROM 2015 OVERLAND PARK STANDARD DETAILS FOR EROSION AND SEDIMENT CONTROL; CONCRETE WASHOUT MODIFIED FROM 2009 CITY OF GREAT BEND STANDARD DRAWINGS.

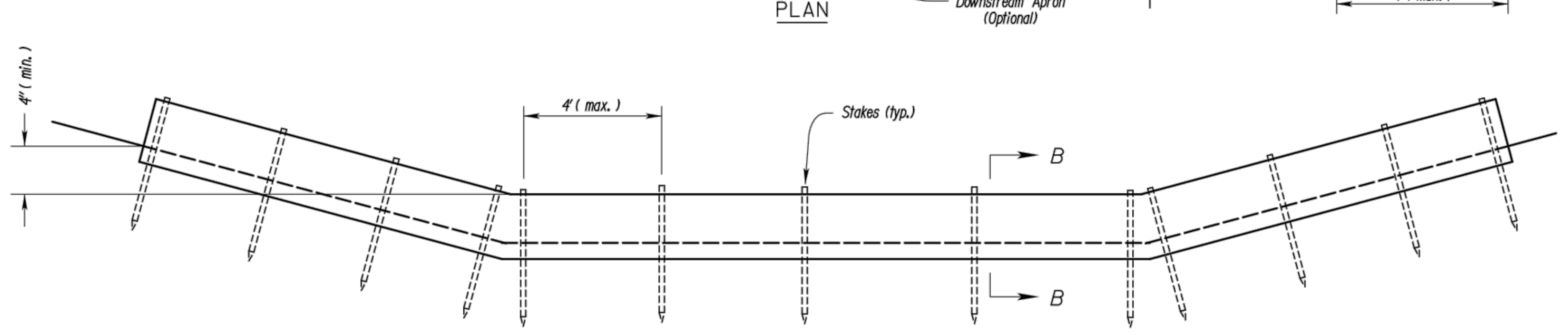
AMERICAN PUBLIC WORKS ASSOCIATION
KANSAS CITY METRO CHAPTER
CONSTRUCTION ENTRANCE AND CONCRETE WASHOUT
STANDARD DRAWING NUMBER ESC-01
ADOPTED: 10/24/2016



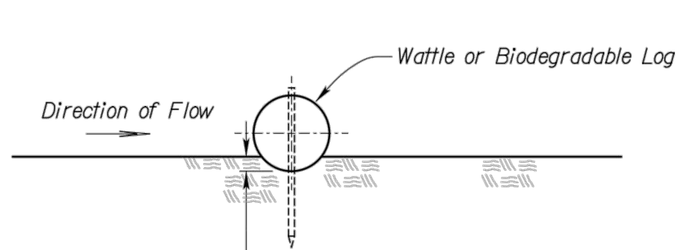
PLAN

Notes for Wattles and Biodegradable Log Ditch Check:

1. Use as many biodegradable log sections as necessary to ensure water does not flow around end of ditch check.
2. Overlap sections a minimum of 18"
3. Stakes shall be per manufacturer's instructions. Length of stakes shall be a minimum of 2 times the diameter of the log or 24" minimum.
4. Use Erosion Control (Class 1) (Type C) as the downstream apron when directed by the Engineer.
5. Use 9" diameter logs when used with Erosion Control (Class 2) (Any Type) channel lining. Smaller diameter logs may be used with Erosion Control (Class 2) (Any Type) channel lining as directed by the Engineer.



TYPICAL ELEVATION



SECTION B - B

Alternative Type Ditch Check Spacing

Ditch Centerline Slope (%)	Spacing Interval (Feet)
1.0	200
2.0	100
3.0	65
4.0	50
5.0	40
6.0	33

Note: Use this spacing for all except Rock Ditch Checks.

WATTLES OR BIODEGRADABLE LOG DITCH CHECKS
OR Filter Sock Ditch Check
NO SCALE
Modified from Kansas Department of Transportation Standard Details for Erosion Control and Sediment Control.

AMERICAN PUBLIC WORKS ASSOCIATION
KANSAS CITY METRO CHAPTER
~~SILT FENCE AND~~ WATTLE/ BIODEGRADABLE LOG DITCH CHECKS
STANDARD DRAWING NUMBER ESC-09
ADOPTED: 10/24/2016

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EROSION CONTROL DETAIL SHEET

STORM DRAINAGE IMPROVEMENTS
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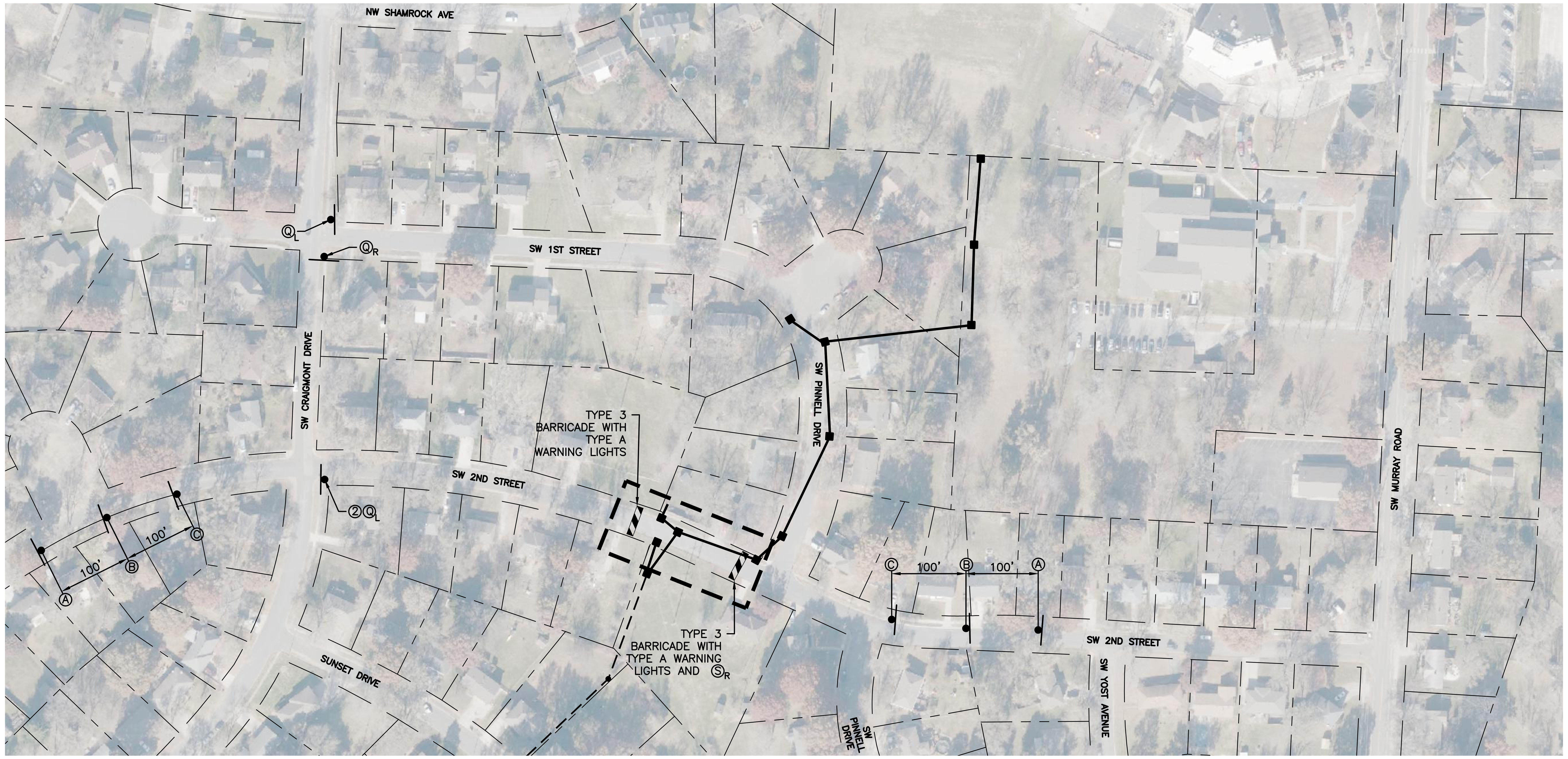
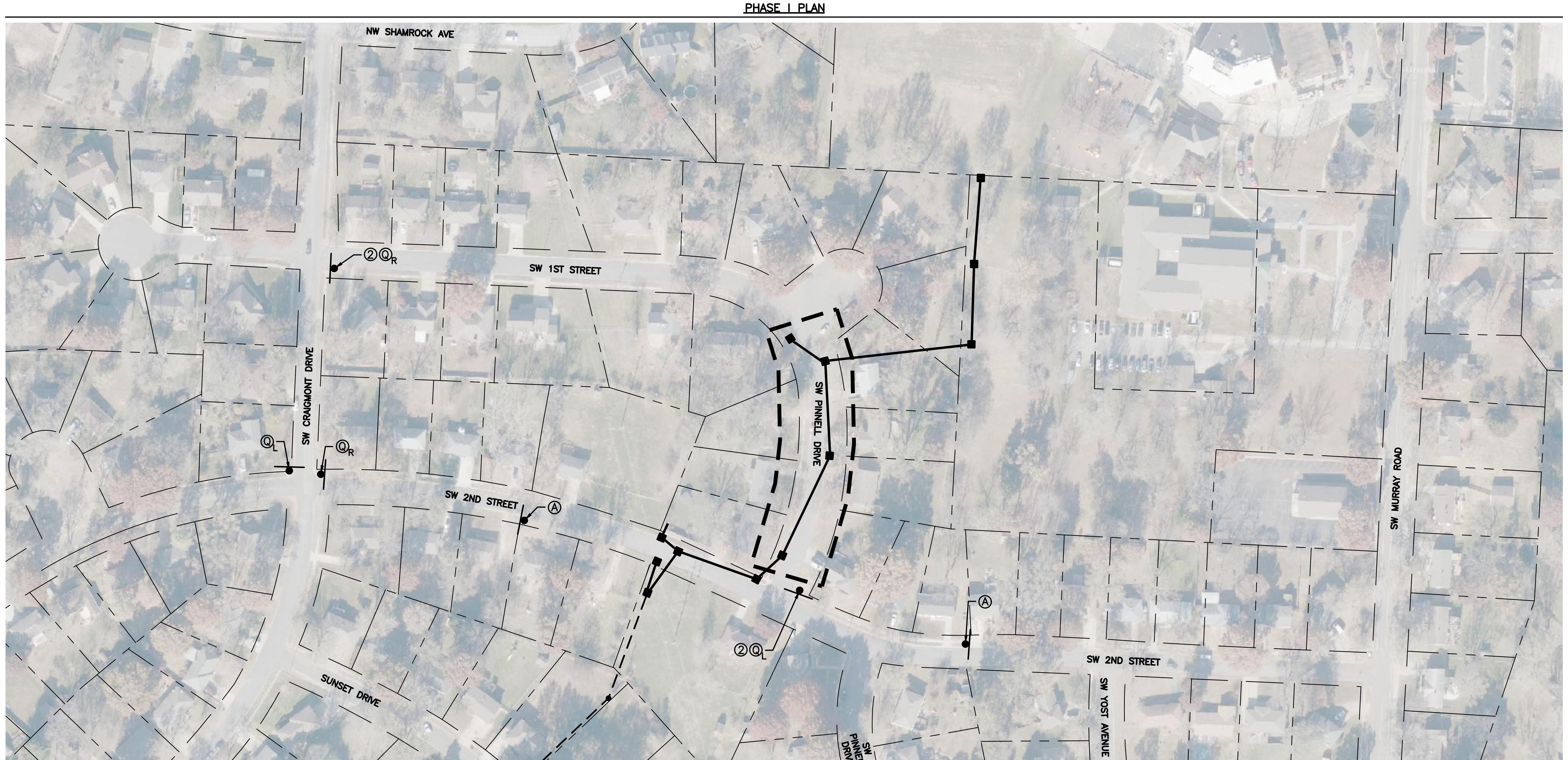


PHASE I PLAN



PHASE II PLAN

NOTE:

1. REFER TO CITY OF LEE'S SUMMIT STANDARD SPECIFICATION SECTION 3000 – TRAFFIC CONTROL, FOR ADDITIONAL REQUIREMENTS.

LEGEND

- EXISTING STORM SEWER
- EXISTING STORM SEWER STRUCTURE
- NEW STORM SEWER
- NEW STORM SEWER STRUCTURE
- RIGHT OF WAY LINE
- PROPERTY LINE
- SIGN SYMBOL
- TYPE 3 BARRICADE
- WORK AREA
- Ⓐ SEE SIGN LEGEND

SIGN LEGEND

- ROAD WORK AHEAD — 36" × 36" — Ⓐ W20–1
- ROAD CLOSED AHEAD — 36" × 36" — Ⓑ W20–3
- DETOUR AHEAD — 36" × 36" — Ⓒ W20–2
- DETOUR → — 30" × 24" — Ⓠ L M4–9(L); Ⓠ R M4–9(R)
- DETOUR → — 48" × 18" — Ⓢ R M4–10(R)
- ROAD CLOSED TO THRU TRAFFIC — 60" × 30" — ② R11–4

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0 100 200

AsBuilt
03/14/2023

MARK DANIEL MCGHEE JR.
PE-2008019568

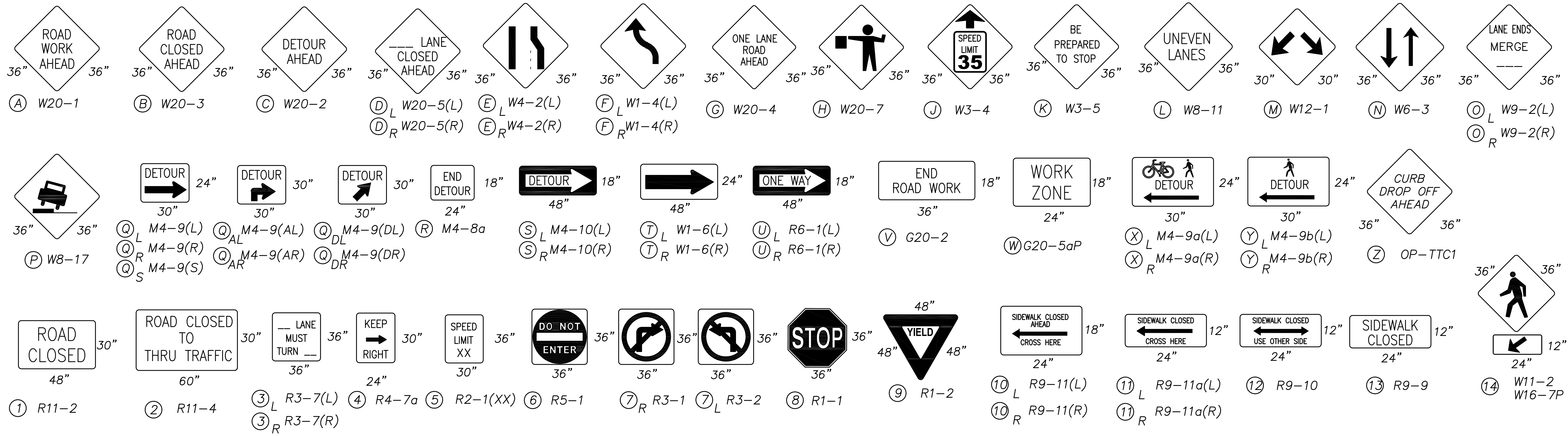
SW PINNELL DRIVE TRAFFIC CONTROL PLAN SHEET

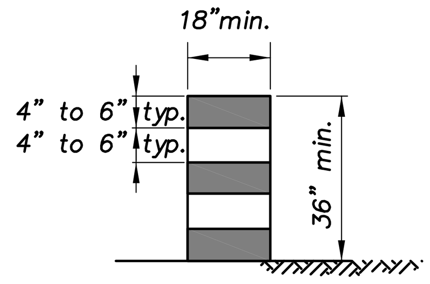
STORM DRAINAGE IMPROVEMENTS
CITY OF LEE'S SUMMIT, MISSOURI

REVISIONS

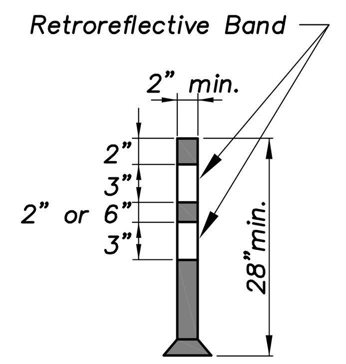
DESIGNER / DRAFTER: MDM/AJM
DATE: 06-17-2020
PROJECT NUMBER: 0319054.01
CITY PROJECT NUMBER: 543-32272C
MISSOURI AUTHORIZATION NUMBER: 2013011903

SHEET

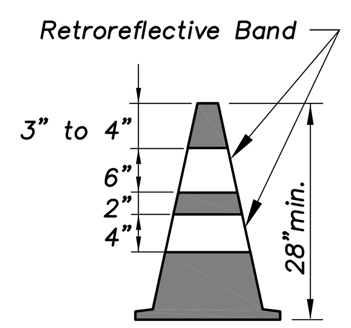




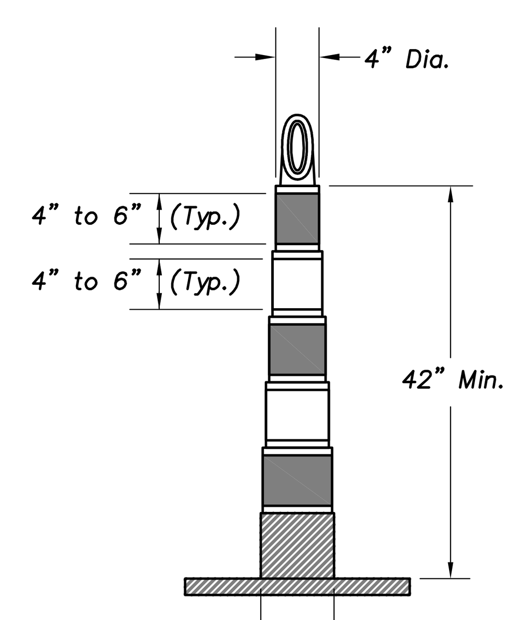
Drum

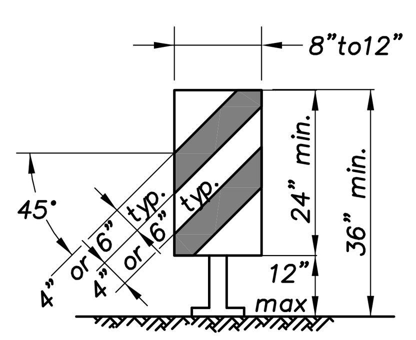


Tubular Marker

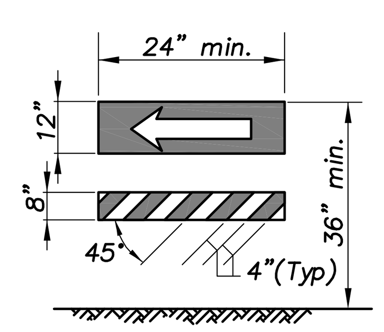


28" Cone

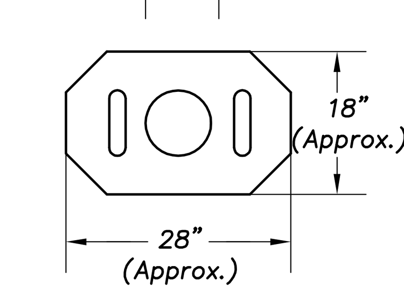




Vertical Panel



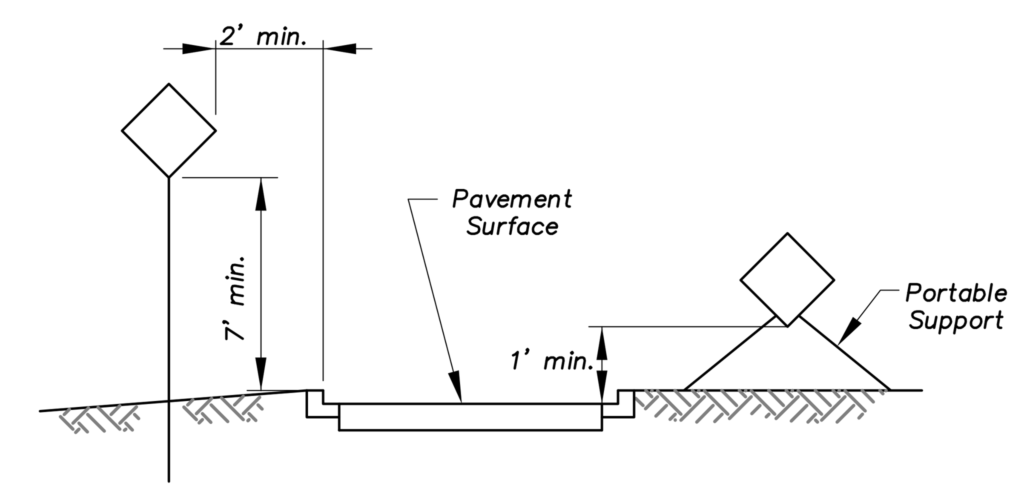
Direction Indicator Barricade
(See Note 16)



Conical Delineator

LEGEND

- CMS — Changeable Message Sign
- Arrow Board
- Type 3 Barricade (T3)
- Type 2 Barricade (T2)
- Type 1 Barricade (T1)
- Detectable Pedestrian Barricade/Channelizer
- Traffic or Pedestrian Signal
- Pavement Marking To Be Removed
- Work Area
- Sign Code
- Sign Symbol
- Channelizing Device
- Flagger
- Arrow Board Support
- Direction of Traffic
- Directional Indicator Barricade
- Tubular Markers
- ○



Typical Sign Placement

Length and Device Spacing for Lane Closure

Speed Limit	Minimum Taper Length (L)**			Min. No. of Devices for Taper	Maximum Device Spacing
M.P.H.	Lane Width in Feet 10	11	12	(12FT. Lane)	In Feet
20	70	75	80	5	20
25	105	115	125	6	25
30	150	165	180	7	30
35	205	225	245	8	35
40	270	295	320	9	40
45	450	495	540	13	45
50	500	550	600	13	50
55	550	605	660	13	55

$L = S \times W$ $S \geq 45$ MPH
$L = S^2 \times W/60$ $S \leq 40$ MPH

L = Minimum Taper Length (Feet)
W = Width of Offset (Feet)
S = Posted Speed Limits Prior to Construction (MPH)

Note: Length of downstream taper to be between 50' and 100' with device spacing of 20'.

Type	Min. Size	Min. # of Elements	Usage
A	48"x24"	12	Speed Limit ≤ 30 MPH
B	60"x30"	13	Speed Limit = 35, 40, 45 MPH
C	96"x48"	15	Speed Limit ≥ 50 MPH

Arrow board shall be set in the sequential chevron or flashing arrow mode for lane closures.

Arrow board shall be set in the flashing caution mode for shoulder work, roadside work near the shoulder, or temporary closing of one lane on a two-lane, two-way roadway.

Arrow Board

Signs *

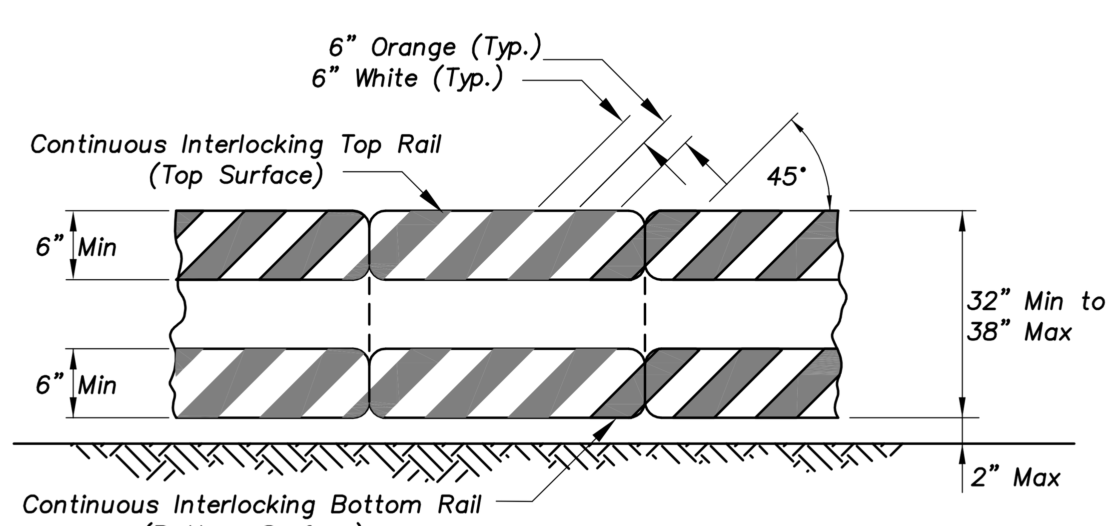
* sizes shown are for conventional roadways.

Subscript Codes

L – Left
R – Right
S – Straight
AL – Advance Left
AR – Advance Right
DL – Diagonal Left
DR – Diagonal Right

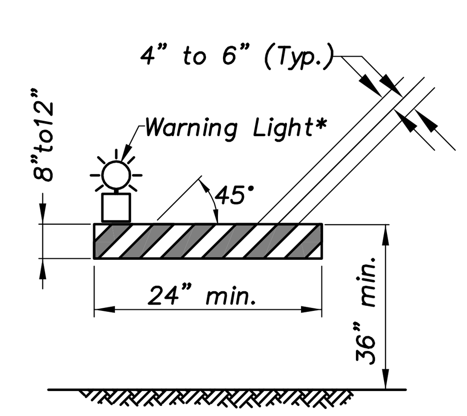
Advance Warning Sign Spacing Table

Road Type	Minimum Distance Between Signs A	B	C	D
Urban (Speed Limit ≤ 30 MPH)	100'	100'	100'	100'
Urban (Speed Limit ≥ 35 MPH)	350'	350'	350'	150'
Rural (Speed Limit ≤ 40 MPH)	350'	350'	350'	200'
	500'	500'	500'	200'

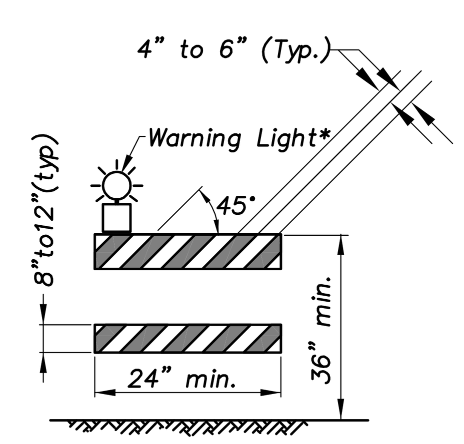


Notes:
1. Adjacent sections shall have the same base color (orange, white, or yellow).
2. Adjacent sections shall be interlocked together.
3. Stripes are Optional.

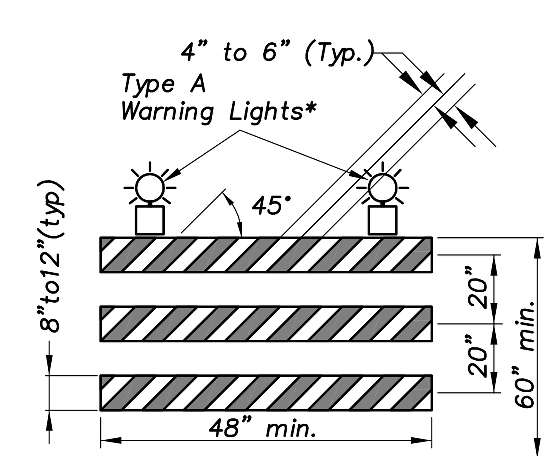
Detectable Pedestrian Barricade/Channelizer



Type 1 Barricade

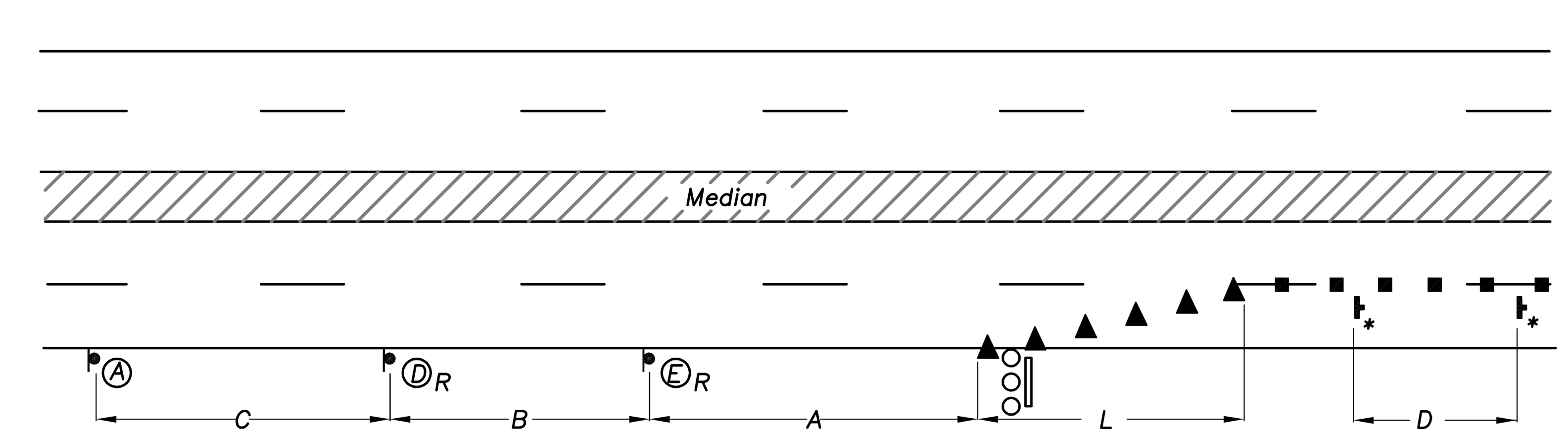


Type 2 Barricade



Type 3 Barricade

*Optional during daylight hours (See general note #15)



Typical Sign Spacing

Note: * Applies to any subsequent sign in the work zone.

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AsBuilt
03/14/2023

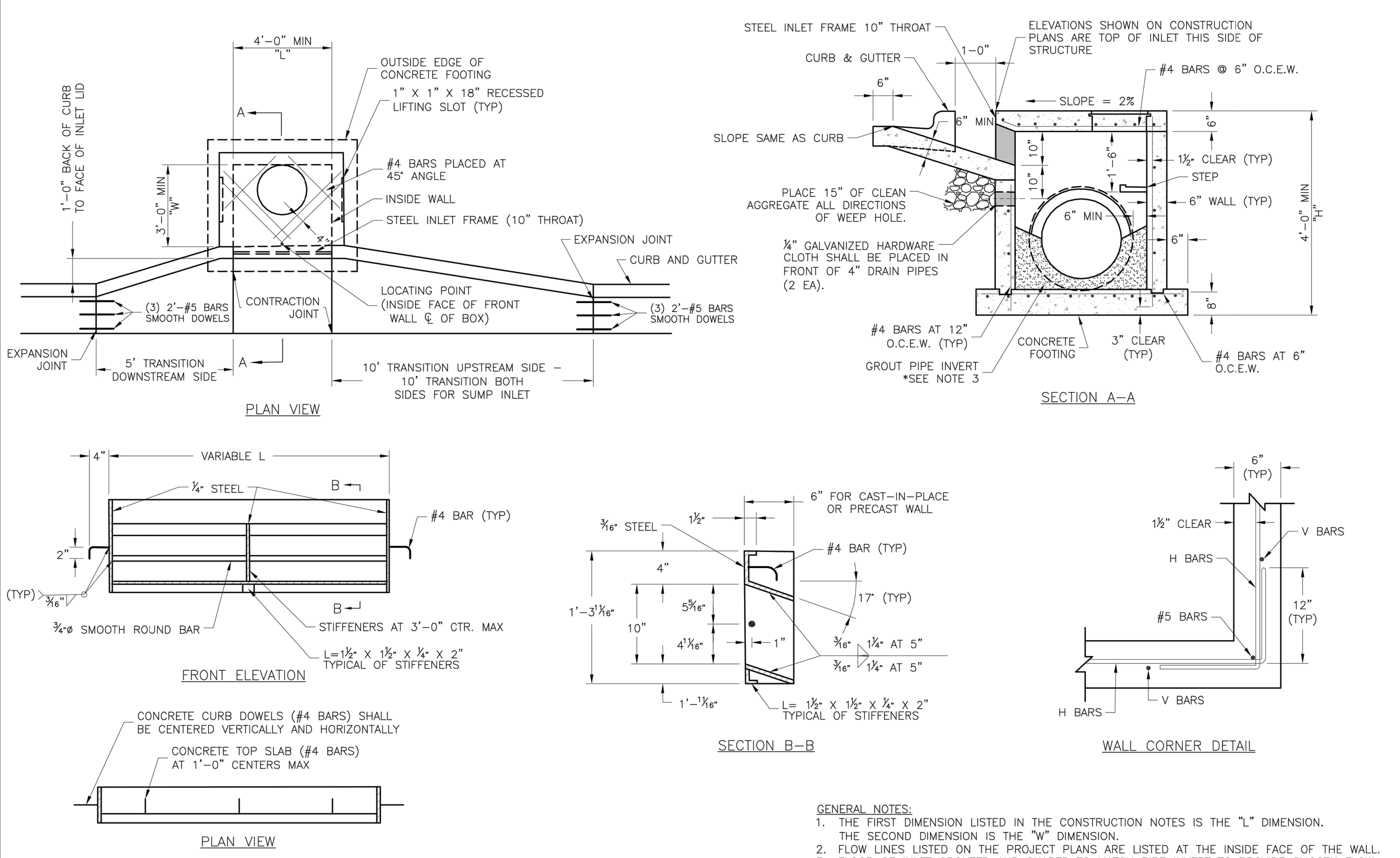
MARK DANIEL MCGHEE JR.
PE-2008019568

TRAFFIC CONTROL DETAIL SHEET

STORM DRAINAGE IMPROVEMENTS
CITY OF LEE'S SUMMIT, MISSOURI

REVISIONS

DESIGNER / DRAFTER: MDM/AJM
DATE: 06-17-2020
PROJECT NUMBER: 0319054.01
BOOK AND PAGE: 543-32272C
MISSOURI AUTHORIZATION NUMBER: 2013011903



STEEL FRAME NOTES:

1. ALL WELDS SHALL BE PERFORMED IN ACCORDANCE WITH APPROPRIATE AWS SPECIFICATIONS AND PROCEDURES.
2. ALL WELDS ON EXPOSED SURFACES SHALL BE DRESSED SO AS TO PROVIDE A PLEASING FINISHED APPEARANCE.
3. THE ENTIRE FRAME SHALL BE PAINTED A SINGLE COAT OF CHEM–PRIME #37H–78 PRIMER (GRAY) OR EQUAL.

GENERAL NOTES:

1. THE FIRST DIMENSION LISTED IN THE CONSTRUCTION NOTES IS THE "L" DIMENSION. THE SECOND DIMENSION IS THE "W" DIMENSION.
2. FLOW LINES LISTED ON THE PROJECT PLANS ARE LISTED AT THE INSIDE FACE OF THE WALL.
3. FLOOR OF INLET GROUTED AND SHAPED TO MATCH PIPE INVERT TO PROVIDE SMOOTH FLOW.
4. LOCATE MH RING AND COVER ON BLANK WALL IF POSSIBLE.
5. STEPS SHALL BE SPACED AT 1'–4" O.C. VERTICALLY ON BLANK WALL IF POSSIBLE.
6. BEVEL ALL EXPOSED EDGES WITH ¾"CHAMFER OR ½" TOOLED EDGE.
7. ON–GRADE INLETS SHALL CONFORM TO THE STREET GRADE AND SUMP INLETS SHALL BE LEVEL.
8. PRECAST LIDS SHALL BE PINNED, SEALED WITH NON–SHRINKABLE GROUT AND REMOVABLE FOR FUTURE MAINTENANCE.
9. LIFTING RINGS SHALL BE REMOVED AND SEALED WITH NON–SHRINKABLE GROUT
10. FOR RING AND COVER SEE THE STORMWATER APPROVED PRODUCT LIST.

LS LEE'S SUMMIT MISSOURI

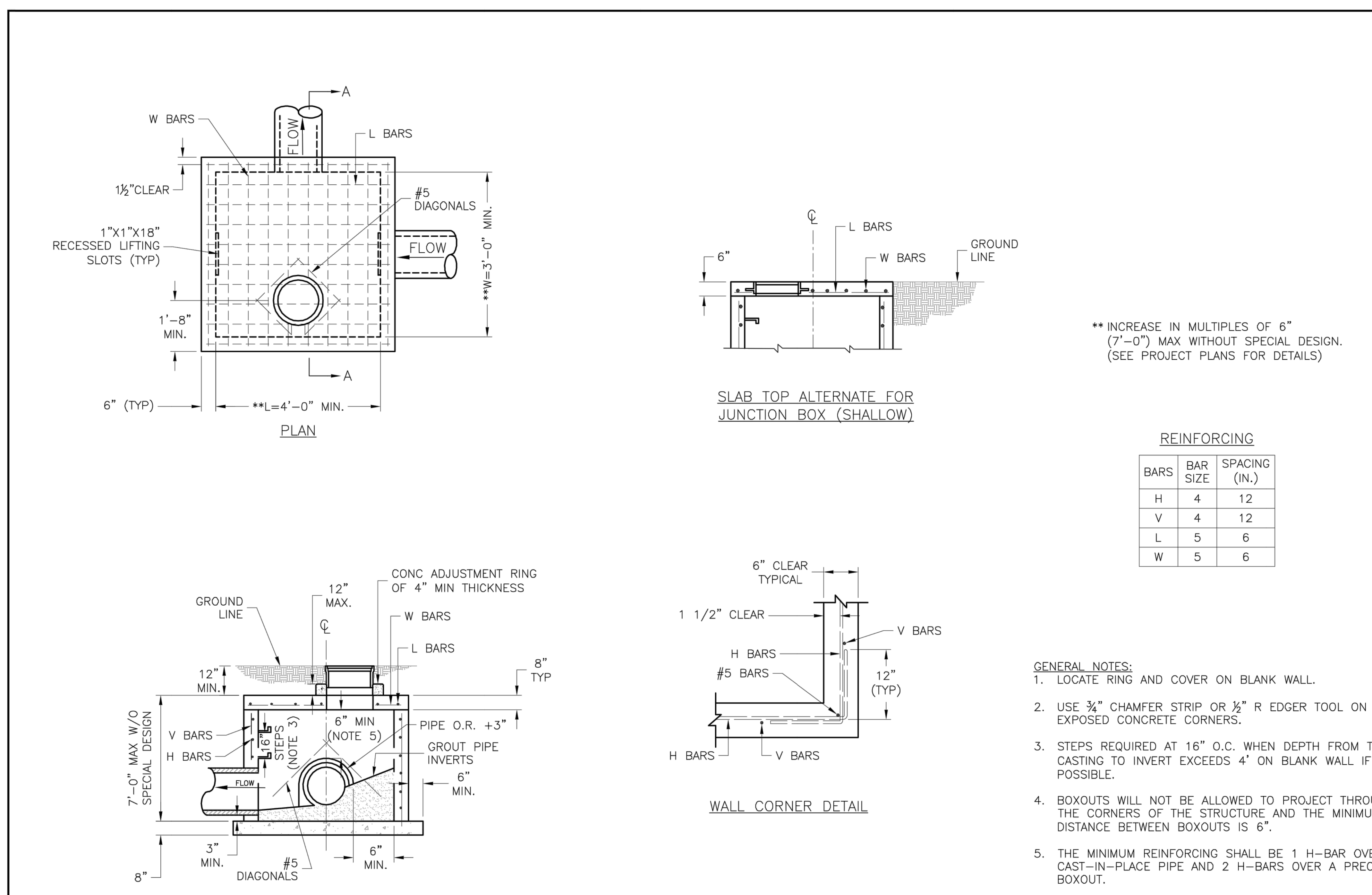
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063

STANDARD DETAILS
CITY OF LEE'S SUMMIT, MO
LEE'S SUMMIT, JACKSON COUNTY, MO

CURB INLET DETAIL

Drawn By: MJF
Checked By: DL
Date: 04/17
Proj. #:

STM-1



** INCREASE IN MULTIPLES OF 6" (7'-0") MAX WITHOUT SPECIAL DESIGN. (SEE PROJECT PLANS FOR DETAILS)

REINFORCING

BARS	BAR SIZE	SPACING (IN.)
H	4	12
V	4	12
L	5	6
W	5	6

GENERAL NOTES:

1. LOCATE RING AND COVER ON BLANK WALL.
2. USE ¾" CHAMFER STRIP OR ½" R EDGER TOOL ON ALL EXPOSED CONCRETE CORNERS.
3. STEPS REQUIRED AT 16" O.C. WHEN DEPTH FROM TOP OF CASTING TO INVERT EXCEEDS 4' ON BLANK WALL IF POSSIBLE.
4. BOXOUTS WILL NOT BE ALLOWED TO PROJECT THROUGH THE CORNERS OF THE STRUCTURE AND THE MINIMUM DISTANCE BETWEEN BOXOUTS IS 6".
5. THE MINIMUM REINFORCING SHALL BE 1 H–BAR OVER A CAST–IN–PLACE PIPE AND 2 H–BARS OVER A PRECAST BOXOUT.
8. PRECAST LIDS SHALL BE PINNED, SEALED WITH NON–SHRINKABLE GROUT AND REMOVABLE FOR FUTURE MAINTENANCE.
9. REINFORCING OF COVERS IN STREETS REQUIRE SPECIAL DESIGN.
10. FOR RING AND COVER SEE THE STORMWATER APPROVED PRODUCT LIST.

LS LEE'S SUMMIT MISSOURI

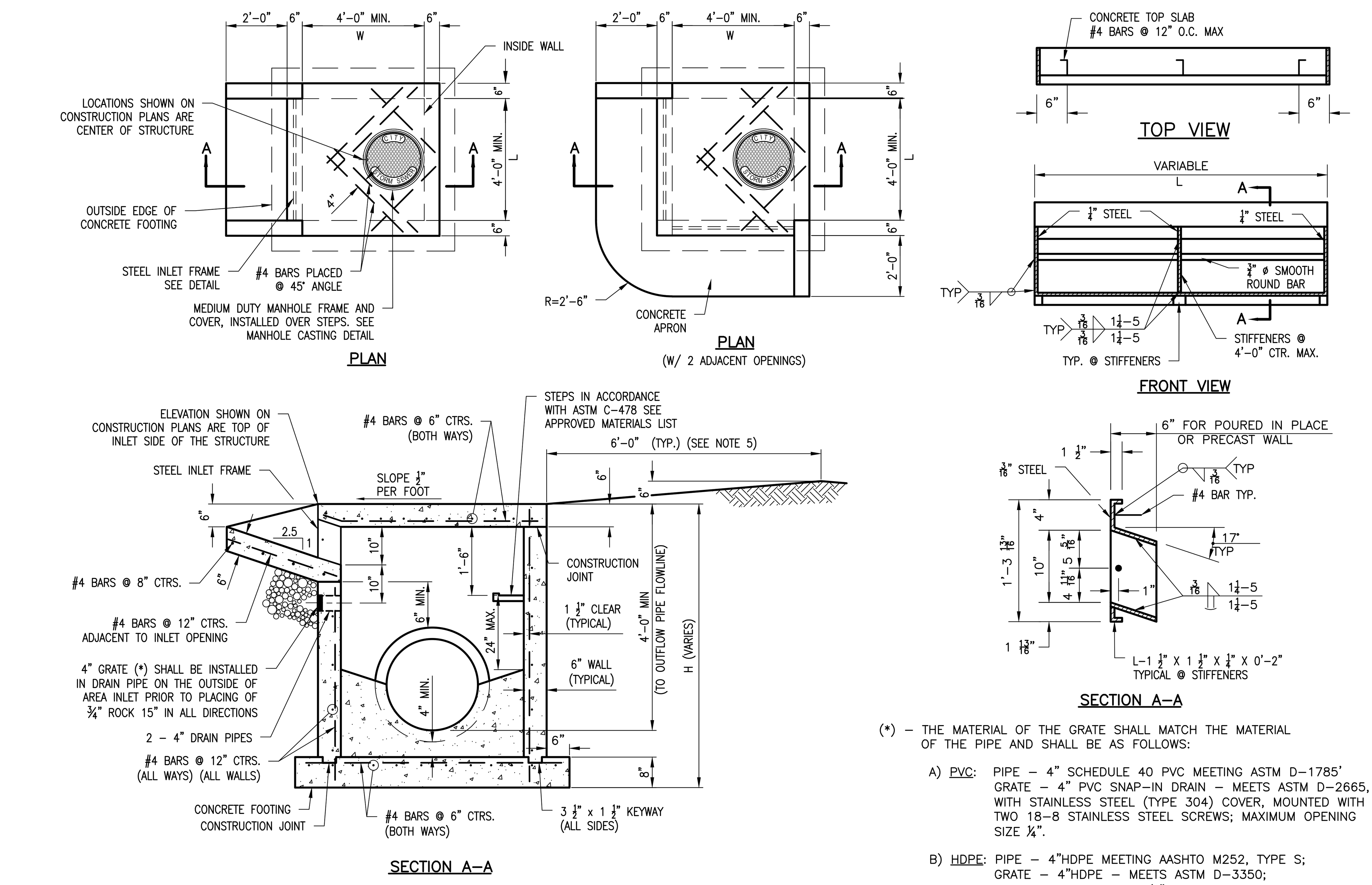
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063

STANDARD DETAILS
CITY OF LEE'S SUMMIT, MO
LEE'S SUMMIT, JACKSON COUNTY, MO

JUNCTION BOX DETAIL

Drawn By: MJF
Checked By: DL
Date: 04/17
Proj. #:

STM-3



AREA INLET

(*) – THE MATERIAL OF THE GRATE SHALL MATCH THE MATERIAL OF THE PIPE AND SHALL BE AS FOLLOWS:

A) PVC: PIPE – 4" SCHEDULE 40 PVC MEETING ASTM D–1785' GRATE – 4" PVC SNAP–IN DRAIN – MEETS ASTM D–2665, WITH STAINLESS STEEL (TYPE 304) COVER, MOUNTED WITH TWO 18–8 STAINLESS STEEL SCREWS; MAXIMUM OPENING SIZE ¼".

B) HDPE: PIPE – 4"HDPE MEETING AASHTO M252, TYPE S; GRATE – 4"HDPE – MEETS ASTM D–3350; MAXIMUM OPENING SIZE ¼".

AREA INLET NOTES

GENERAL

1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH LOCAL CODES AND ORDINANCES
2. ALL STORM SEWER STRUCTURES SHALL BE PRE–CAST OR POURED IN PLACE. IF PRE–CAST STRUCTURES ARE USED, THE TOPS SHALL BE POURED IN PLACE AND THE WALL STEEL SHALL BE LEFT EXPOSED TO A HEIGHT 2" BELOW THE FINISH TOP ELEVATION, OR AS DIRECTED BY THE ENGINEER.
3. PRE–CAST SHOP DRAWINGS ARE TO BE APPROVED BY THE ENGINEER. PRE–CAST SHOP DRAWINGS ARE TO BE SUBMITTED IN ACCORDANCE WITH THE CONTRACT REQUIREMENTS.
4. DO NOT SCALE THESE DRAWINGS FOR DIMENSIONS OR CLEARANCES. ANY QUESTIONS REGARDING DIMENSIONS SHALL BE BROUGHT TO THE ATTENTION OF THE CITY ENGINEER PRIOR TO CONSTRUCTION.
5. BERM LOCATION AND ELEVATION MAY VARY. SEE GRADING PLAN FOR EXACT LOCATION.
6. THE FIRST DIMENSION LISTED IN THE CONSTRUCTION NOTES IS THE "L" DIMENSION. THE SECOND DIMENSION IS THE "W" DIMENSION. THE CONCRETE THICKNESS AND REINFORCEMENT SHOWN IS FOR BOXES WITH ("L"+"H") AND ("W"+"H") LESS THAN OR EQUAL TO 20. FOR BOXES WITH EITHER OF THESE CALCULATIONS GREATER THAN 20, A SPECIAL DESIGN IS REQUIRED.

CONCRETE

7. CONCRETE USED IN THIS WORK SHALL BE KCMMB4K, AS APPROVED BY THE KANSAS CITY METROPOLITAN MATERIALS BOARD, AND SHALL MEET THE REQUIREMENTS OF THE LOCAL JURISDICTION.
8. INLET FLOORS SHALL BE SHAPED WITH NON–REINFORCED CONCRETE INVERTS TO PROVIDE SMOOTH FLOW.
9. BEVEL ALL EXPOSED EDGES WITH ¾" TRIANGULAR MOLDING.

REINFORCING STEEL

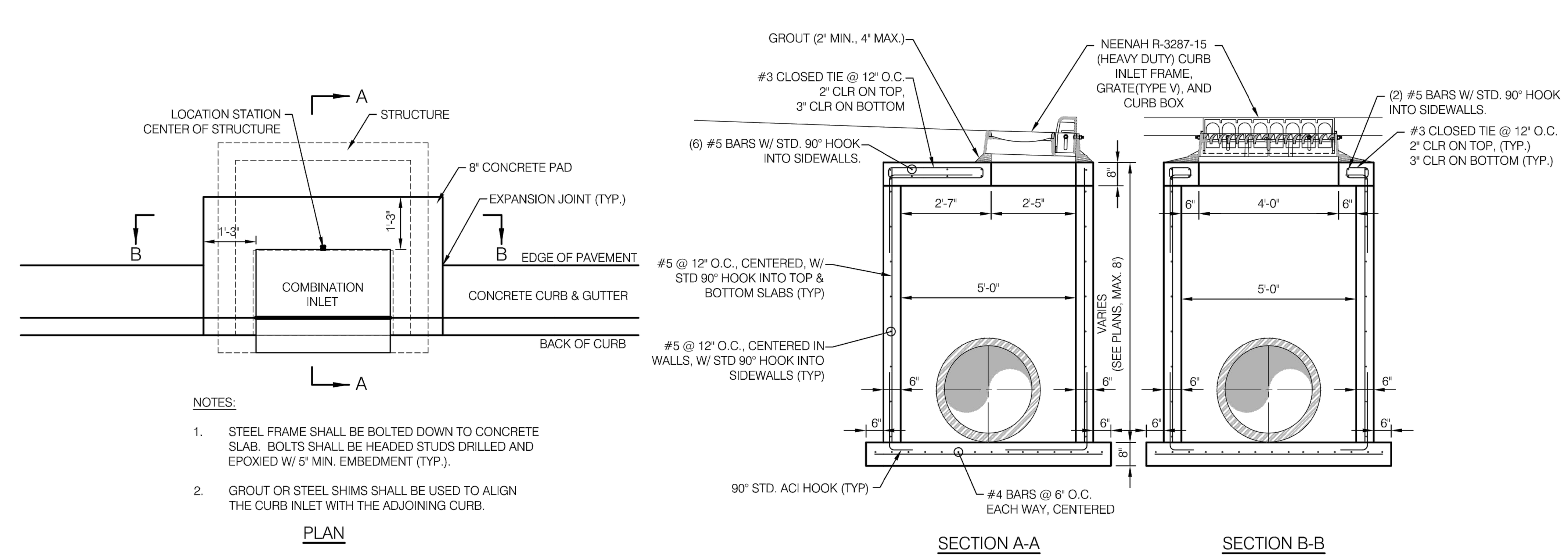
10. REINFORCING STEEL SHALL BE NEW BILLET, MINIMUM GRADE 40 AS PER ASTM A615, AND SHALL BE BENT COLD.
11. ALL DIMENSIONS RELATIVE TO REINFORCING STEEL ARE TO CENTERLINE OF BARS. 2" CLEARANCE SHALL BE PROVIDED THROUGHOUT UNLESS NOTED OTHERWISE. TOLERANCE OF +/– ⅛" SHALL BE PERMITTED.
12. ALL LAP SPLICES NOT SHOWN SHALL BE A MINIMUM OF 40 BAR DIAMETERS IN LENGTH.
13. ALL REINFORCING STEEL SHALL BE SUPPORTED ON FABRICATED STEEL BAR SUPPORTS @ 3'–0" MAXIMUM SPACING.
14. ALL DOWELS SHALL BE ACCURATELY PLACED AND SECURELY TIED IN PLACE PRIOR TO PLACEMENT OF BOTTOM SLAB CONCRETE. STICKING OF DOWELS INTO FRESH OR PARTIALLY HARDENED CONCRETE WILL NOT BE ACCEPTABLE.

CONSTRUCTION

15. THE BOTTOM SLAB SHALL BE AT LEAST 24 HOURS OLD BEFORE PLACING SIDEWALL CONCRETE. ALL SIDEWALL FORMS SHALL REMAIN IN PLACE A MINIMUM OF 24 HOURS AFTER SIDEWALLS ARE POURED BEFORE REMOVAL, AND AFTER REMOVAL SHALL BE IMMEDIATELY TREATED WITH MEMBRANE CURING COMPOUND.
16. PIPE CONNECTIONS TO PRE–CAST STRUCTURES SHALL HAVE A MINIMUM OF 6" OF CONCRETE AROUND THE ENTIRE PIPE WITHIN 2' OF THE STRUCTURE.
17. TAMPED BACKFILL SHALL BE USED AROUND STRUCTURES, EXCEPT UNDER PAVED AREAS. TAMPED BACKFILL SHALL BE FINELY DIVIDED JOB EXCAVATED MATERIAL FREE FROM DEBRIS, ORGANIC MATERIAL AND STONES, COMPACTED TO 95% MAXIMUM DENSITY AS DETERMINED BY AASHTO STANDARD, METHOD T–99.

AREA INLET FRAME NOTES

1. ALL WELDS SHALL BE PERFORMED IN ACCORDANCE WITH APPROPRIATE AWS SPECIFICATIONS AND PROCEDURES.
2. ALL WELDS ON EXPOSED SURFACES SHALL BE DRESSED SO AS TO PROVIDE A PLEASING FINISHED APPEARANCE.
3. ALL FLAT STEEL SHALL BE 7 GAGE OR ³⁄₁₆" THICK.
4. THE ENTIRE FRAME SHALL BE HOT DIP ZINC COATED IN ACCORDANCE WITH ASTM A–123.



NOTES:

1. STEEL FRAME SHALL BE BOLTED DOWN TO CONCRETE SLAB. BOLTS SHALL BE HEADED STUDS DRILLED AND EPOXIED W/ 5" MIN. EMBEDMENT (TYP.).
2. GROUT OR STEEL SHIMS SHALL BE USED TO ALIGN THE CURB INLET WITH THE ADJOINING CURB.

MODIFIED CURB INLET

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03/14/2023

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DETAIL SHEET

STORM DRAINAGE IMPROVEMENTS
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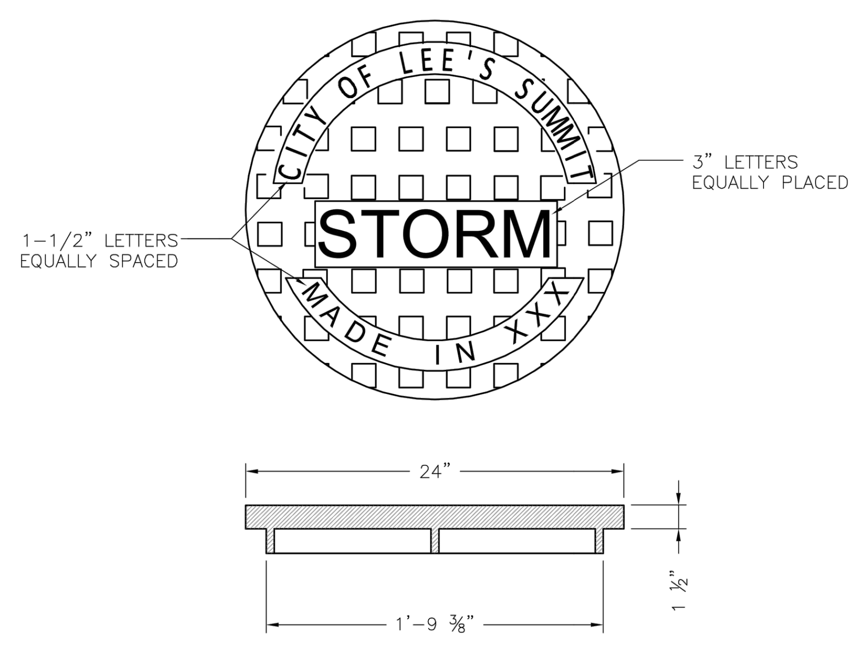
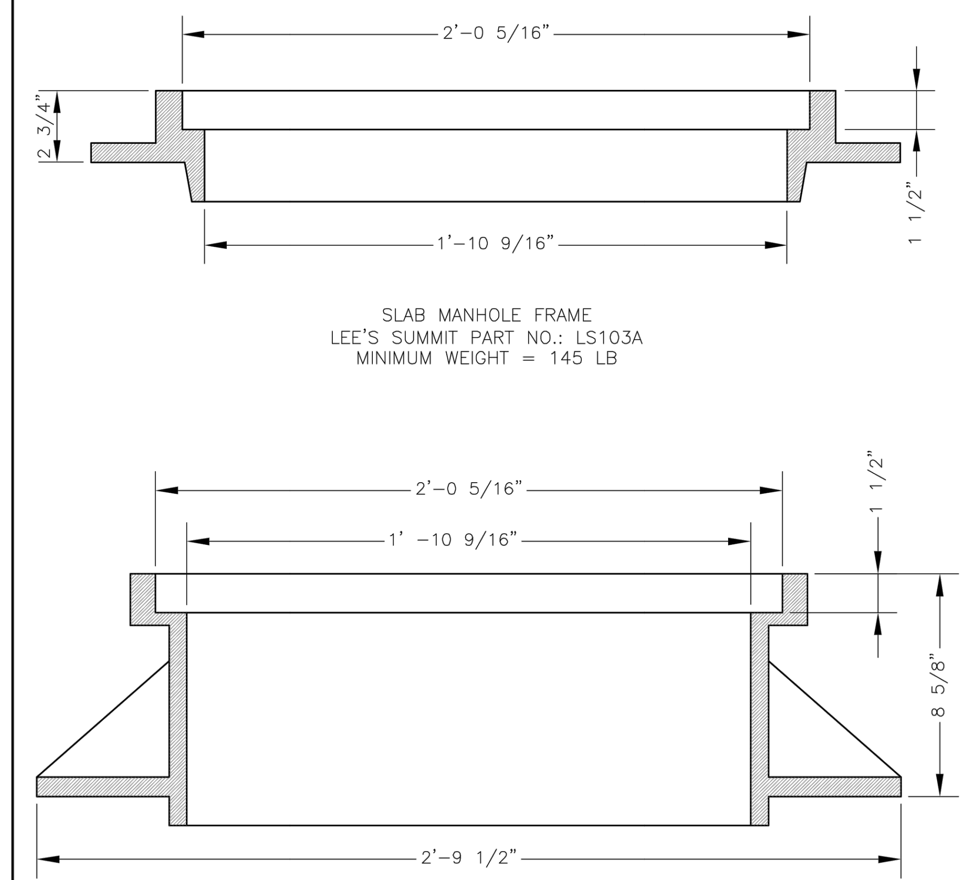
SHEET
18 OF 20



STANDARD 24" MANHOLE COVER
MINIMUM WEIGHT = 160 LB
NOTE: PICK HOLES NOT SHOWN

*COVER AND FRAME MODEL INFORMATION REFER TO THE STORMWATER APPROVED PRODUCT LIST.

LEE'S SUMMIT MISSOURI
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063
Date: 04/17 | Drawn By: MJF | Checked By: DL
STORM MANHOLE COVER DETAIL — STM-6

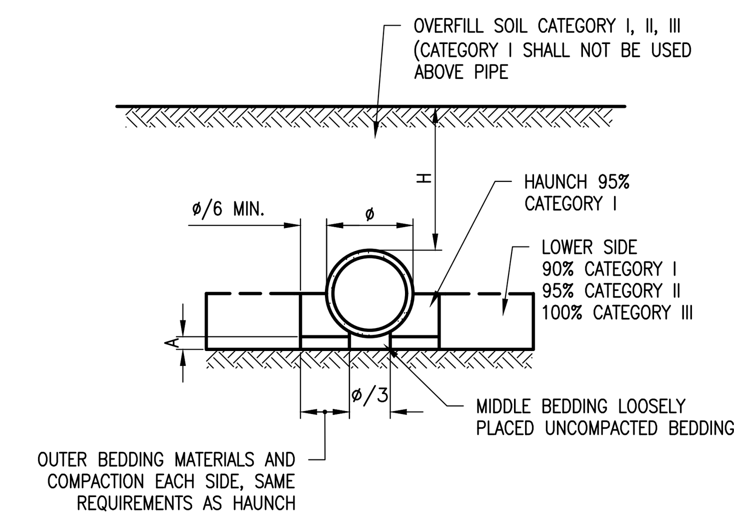


SLAB MANHOLE FRAME
LEE'S SUMMIT PART NO.: LS103A
MINIMUM WEIGHT = 145 LB

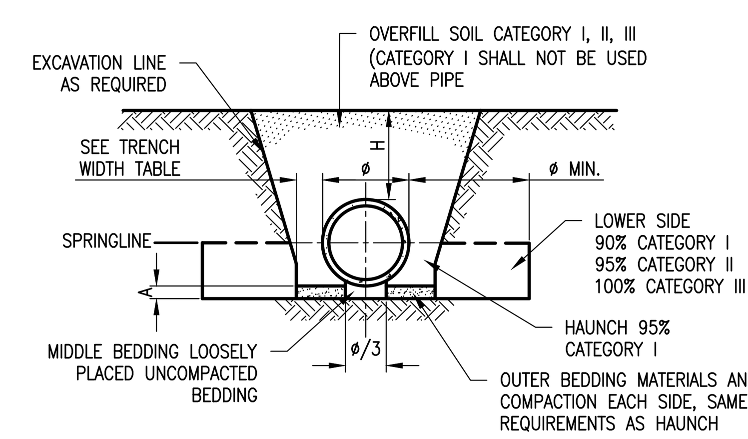
STANDARD 24" MANHOLE FRAME
LEE'S SUMMIT PART NO.: LS101A
MINIMUM WEIGHT = 250 LB

*COVER AND FRAME MODEL INFORMATION REFER TO THE STORMWATER APPROVED PRODUCTS LIST.

LEE'S SUMMIT MISSOURI
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063
Date: 04/17 | Drawn By: MJF | Checked By: DL
STORM MANHOLE FRAME DETAIL — STM-7



EMBANKMENT INSTALLATION



TRENCH INSTALLATION
RCP INSTALLATION
TYPE 1

RCP INSTALLATION NOTES:

1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH LOCAL CODES AND ORDINANCES.
2. CATEGORY I MATERIAL SHALL BE CRUSHED STONE OR SILICEOUS GRAVEL MEETING THE REQUIREMENTS OF SECTION 1107 OF THE STANDARD SPECIFICATIONS, AGGREGATE DESIGNATION PB-2.
3. COMPACTION AND SOIL SYMBOLS - I.E. "95% CATEGORY I" - REFERS TO CATEGORY I SOIL MATERIAL WITH MINIMUM STANDARD PROCTOR COMPACTION OF 95%.
4. REMOVABLE FLOWABLE FILL IS REQUIRED FOR THE FULL DEPTH OF THE TRENCH ABOVE THE SPRINGLINE IN ANY PAVED PORTION OF THE RIGHT OF WAY, INCLUDING THE AREA WITHIN EXISTING OR FUTURE PUBLIC STREET PAVEMENT, UNDER EXISTING OR FUTURE CURB AND GUTTER, MEDIAN, ASPHALT PATH, PARKING LOTS, CONCRETE SIDEWALK. ALSO UNDER EXISTING CONCRETE, ASPHALT, OR GRAVEL DRIVEWAY APPROACH AND UNDER ANY FUTURE DRIVEWAY APPROACH, WHEN THE LOCATION IS KNOWN. FLOWABLE FILL SHALL BE CONSIDERED SUBSIDIARY TO THE PIPE INSTALLATION.
5. TAMPED BACKFILL SHALL BE USED AT ALL OTHER LOCATIONS UNLESS OTHERWISE NOTED. TAMPED BACKFILL SHALL BE FINELY DIVIDED JOB EXCAVATED MATERIAL FREE FROM DEBRIS, ORGANIC MATERIAL AND STONES, COMPACTED TO 95% MAXIMUM DENSITY AS DETERMINED BY AASHTO STANDARD, METHOD T-99.
6. GRANULAR FILL MAY BE SUBSTITUTED FOR ALL OR PART OF TAMPED BACKFILL. GRANULAR FILL SHALL BE AB-3, AS SPECIFIED IN THE STANDARD SPECIFICATIONS, COMPACTED TO A MINIMUM OF 95% OF OPTIMUM DENSITY, WITHIN 0 TO MINUS 2 PERCENT OF OPTIMUM MOISTURE, TO THE SURFACE OF THE EXISTING SUBGRADE.
7. SEE STREET REPAIR DETAILS FOR ADDITIONAL BACKFILL REQUIREMENTS UNDER STREETS ROADWAYS, CURBS, SIDEWALKS AND OTHER STRUCTURES IN RIGHT-OF-WAY.

TRENCH INSTALLATION NOTES:

1. THE TRENCH TOP ELEVATION SHALL BE NO LOWER THAN 0.1 H BELOW FINISHED GRADE OR, FOR ROADWAYS, ITS TOP SHALL BE NO LOWER THAN AN ELEVATION OF 1' BELOW THE BOTTOM OF THE PAVEMENT BASE MATERIAL.
2. SOIL IN OUTER BEDDING AND HAUNCH ZONES SHALL BE COMPACTED TO AT LEAST THE SAME COMPACTION AS SPECIFIED FOR THE MAJORITY OF SOIL IN THE BACKFILL ZONE.
3. THE TRENCH WIDTH SHALL BE WIDER THAN SHOWN IF REQUIRED FOR ADEQUATE SPACE TO ATTAIN THE SPECIFIED COMPACTION IN THE HAUNCH AND BEDDING ZONES.
4. FOR TRENCH WALLS THAT ARE WITHIN 10 DEGREES OF VERTICAL, THE COMPACTION OR FIRMNESS OF THE SOIL IN THE TRENCH WALLS AND LOWER SIDE ZONE NEED NOT BE CONSIDERED.
5. FOR TRENCH WALLS WITH GREATER THAN 10 DEGREE SLOPES THAT CONSIST OF EMBANKMENT, THE LOWER SIDE SHALL BE COMPACTED TO AT LEAST THE SAME COMPACTION AS SPECIFIED FOR THE SOIL IN THE OVERFILL ZONE.

EMBANKMENT INSTALLATION NOTES:

1. SOIL IN THE OUTER BEDDING, HAUNCH AND LOWER SIDE ZONES SHALL BE COMPACTED TO AT LEAST THE SAME COMPACTION AS THE MAJORITY OF SOIL IN THE OVERFILL ZONE.
2. A SUBTRENCH IS DEFINED AS A TRENCH WITH ITS TOP BELOW FINISHED GRADE BY MORE THAN 0.1 H OR, FOR ROADWAYS, ITS TOP IS AT AN ELEVATION LOWER THAN 1' BELOW THE BOTTOM OF THE PAVEMENT BASE MATERIAL.
3. THE MINIMUM WIDTH OF A SUBTRENCH SHALL BE 1.33 ø OR WIDER IF REQUIRED FOR ADEQUATE SPACE TO ATTAIN THE SPECIFIED COMPACTION IN THE HAUNCH AND BEDDING ZONES.
4. FOR SUBTRENCHES WITH WALLS OF NATURAL SOIL, ANY PORTION OF THE LOWER SIDE ZONE IN THE SUBTRENCH WALL SHALL BE AT LEAST AS FIRM AS AN EQUIVALENT SOIL PLACED TO THE COMPACTION REQUIREMENTS SPECIFIED FOR THE LOWER SIDE ZONE AND AS FIRM AS THE MAJORITY OF SOIL IN THE OVERFILL ZONE, OR SHALL BE REMOVED AND REPLACED WITH SOIL COMPACTED TO THE SPECIFIED LEVEL.

REPRESENTATIVE SOIL TYPES

SIDD Soil	USCS	AASHTO
Gravelly Sand (Category I)	SW, SP, GW, GP	A1, A3
Sandy Silt (Category II)	GM, SM, ML, Also GC, SC with less than 20% passing #200 sieve	A2, A4
Silty Clay (Category III)	CL, MH, GC, SC CH	A5, A6

TABLE OF FILL DEPTHS BELOW PIPE

Diameter (ø)	"A" min. in Soil	"A" min. in Rock
60" & smaller	3"	6"
66" & larger	6"	12"

PB-2 GRADATION

Sieve	% Retained
3/4 in	0 - 20
3/8 in	40 - 70
No. 4	75 - 100
No. 8	95 - 100

TRENCH WIDTH TABLE

Pipe Size (inches)	Minimum Side Wall Clearance (inches)
12 - 30	6
33 - 42	9
48 - 60	12
66 - 90	18
96 - 108	24

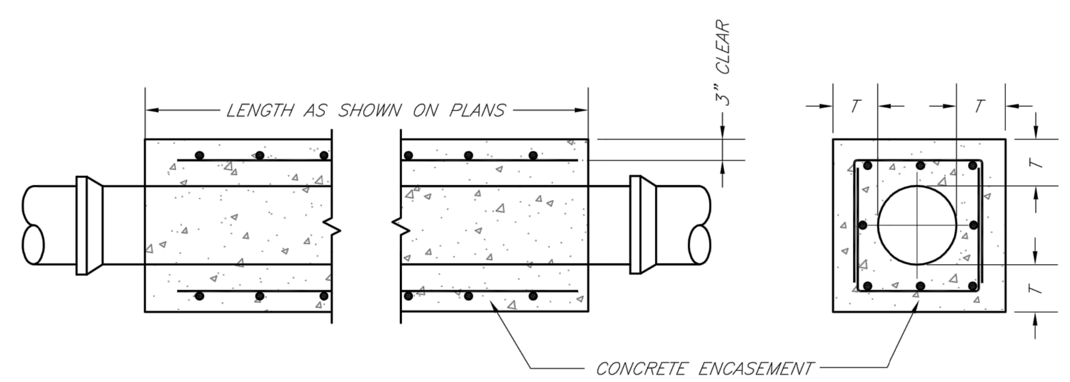
LAMP RYNEARSON
9001 STATE LINE RD., STE. 200
KANSAS CITY, MO 64114
816.361.0440
LampRynearson.com

AsBuilt 03/14/2023

MARK DANIEL MCGHEE JR.
PE-2008019568

DETAIL SHEET

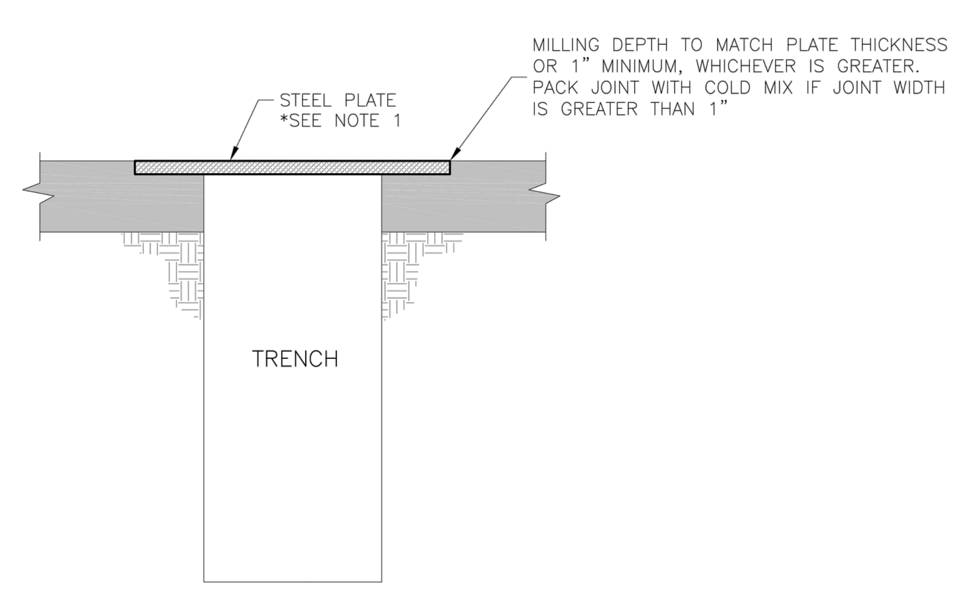
STORM DRAINAGE IMPROVEMENTS
CITY OF LEE'S SUMMIT, MISSOURI



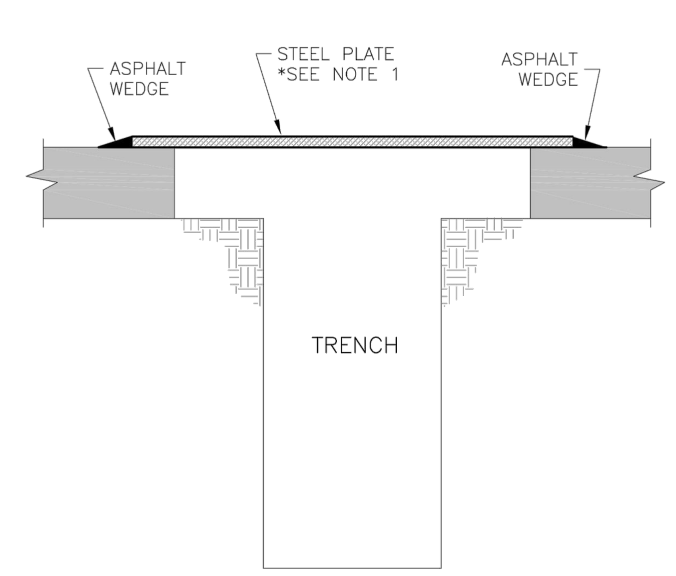
NOTES:

1. FOR PIPES LESS THAN 15", T = 6" MIN.
2. FOR PIPES 15" THRU 36", T = 8" MIN.
3. INTERMEDIATE BELLS SHALL BE ENCASED.
4. REINFORCING STEEL SHALL BE #4 @ 12" O.C. EACH WAY WITH A MINIMUM REBAR LAP OF 12".

LEE'S SUMMIT MISSOURI
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063
Date: 02/13 | Drawn By: JN | Checked By: DL | FILE: SAN-7 | Rev: 1/14 | Rev:
SANITARY PIPE ENCASEMENT



TYPE "A" PLATING
NOT TO SCALE
(CITY POSTED SPEEDS OF 35 MPH AND GREATER)

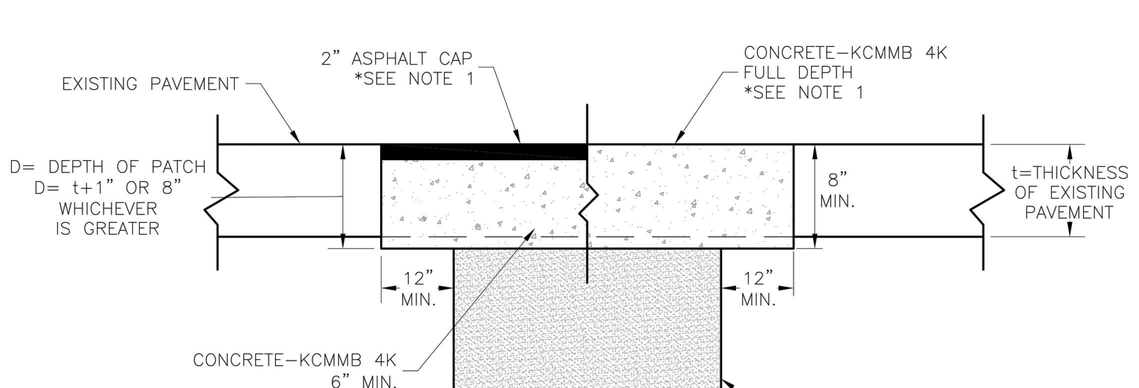


TYPE "B" PLATING
NOT TO SCALE
(CITY POSTED SPEEDS OF 30 MPH OR LESS)

GENERAL NOTES:

1. THE CONTRACTOR SHALL PROVIDE ADEQUATE OVERLAP OF PLATE ON ASPHALT TO ASSURE NO SLIPPAGE OF PLATE AND NO COLLAPSING OF TRENCH.
2. ALL PLATES SHALL BE ANCHORED SO PLATES DO NOT MOVE OR SHIFT UNDER TRAFFIC.

LEE'S SUMMIT MISSOURI
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063
Date: 04/17 | Drawn By: MJF | Checked By: DL
TRENCHING PLATE DETAIL — GEN-6

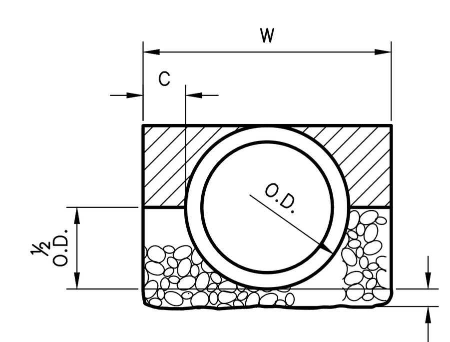


NOTE:

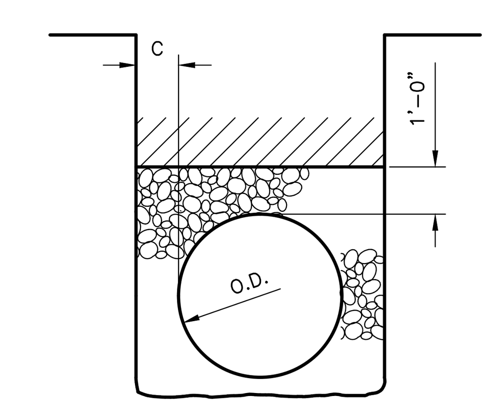
1. ASPHALT CAP OR FULL DEPTH CONCRETE SHALL BE DETERMINED BY CITY INSPECTOR.

TRENCHING/PATCHING DETAIL
NOT TO SCALE

LEE'S SUMMIT MISSOURI
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063
Date: 04/17 | Drawn By: MJF | Checked By: DL
TRENCHING/PATCHING ROADWAYS DETAIL — GEN-5



R.C.P.
CLASS B BEDDING



FLEXIBLE PIPE BEDDING

NOTES:

1. A & C = ABSOLUTE MIN. CLEARANCE FROM PIPE WALL TO ANY PROJECTION OF TRENCH BOTTOM OR WALL.

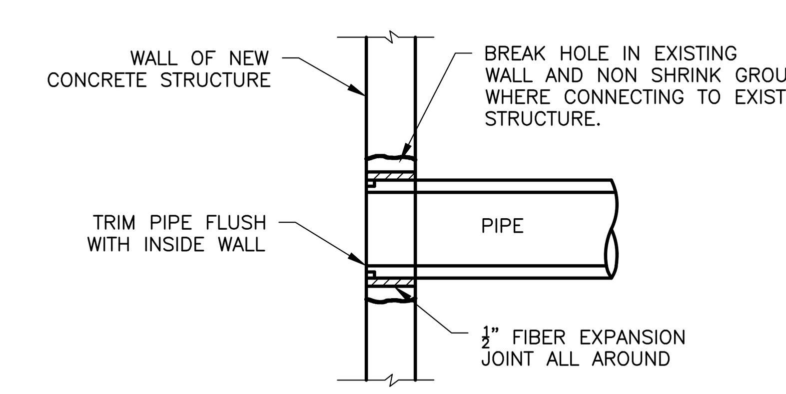
   A = (EARTH EXCAVATION) 2", CLASS B.
   A = (ROCK EXCAVATION) 6", CLASS B.
   C = 8" MINIMUM

2. W = TRENCH WITH AT A LEVEL 6" ABOVE TOP OF PIPE.

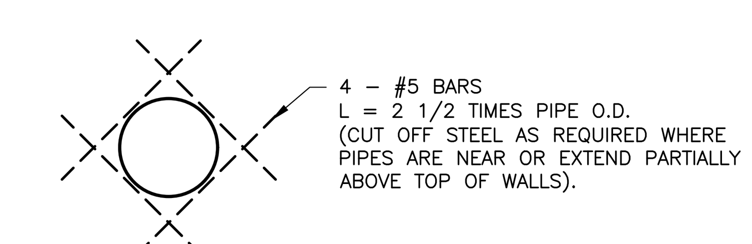
   W = MINIMUM OF 16" PLUS (O.D., O.S. OR S).
   W = MAXIMUM OF 24" PLUS (O.D., O.S. OR S).

3. WHERE SCREEDING SHOWN, FORM BED WITH SCREED CUT TO EXACT SHAPE OF PIPE BOTTOM.
4. = GRANULAR FILL SEE SPECIFICATIONS
5. = BACKFILL TO TOP OF PIPE SEE SPECIFICATIONS
6. ALL BEDDING CLASS B.
7. SEE SPECIFICATIONS FOR TRENCH BOTTOM STABILIZATION, IF REQUIRED.
8. SEE ROADWAY TRENCH DETAILS IF IN ROADWAY.

PIPE EMBEDMENT DETAILS



AT EXISTING STRUCTURE



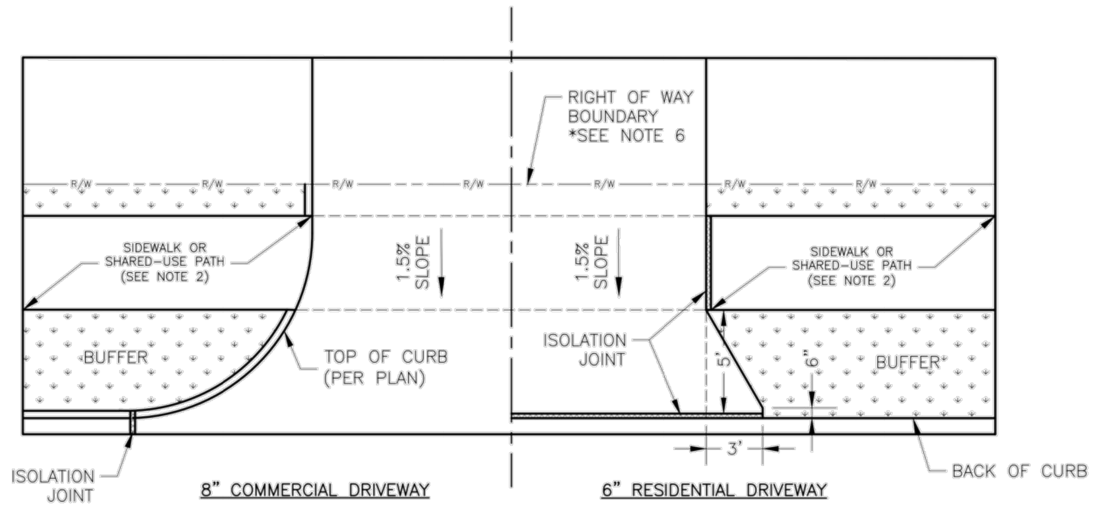
ADD'L. REINF. AT NEW CONC. STRUCTURE

PIPE CONNECTION TO CONCRETE STRUCTURE
(NO DIRECT PAYMENT)

REVISIONS

DESIGNER / DRAFTER: MDM/AJM
DATE: 06-17-2020
PROJECT NUMBER: 0319054.01
BOOK AND PAGE: 543-32272C
MISSOURI AUTHORIZATION NUMBER: 2013011903

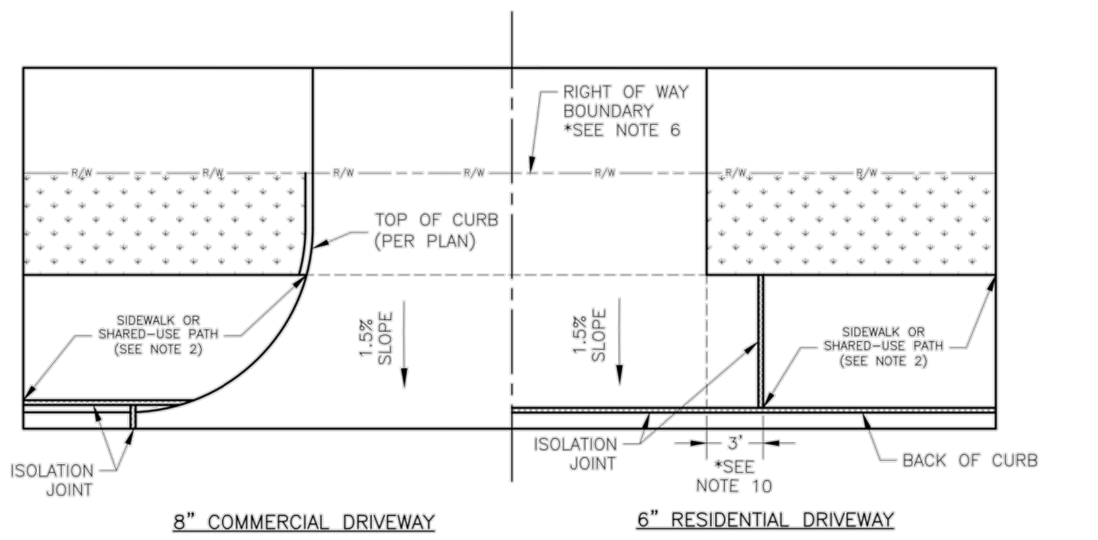
SHEET
19 OF 20



8" COMMERCIAL DRIVEWAY

6" RESIDENTIAL DRIVEWAY

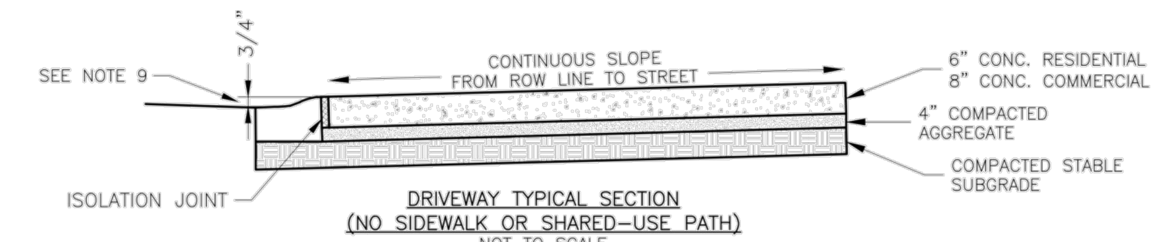
DRIVEWAY WITH BUFFER
NOT TO SCALE



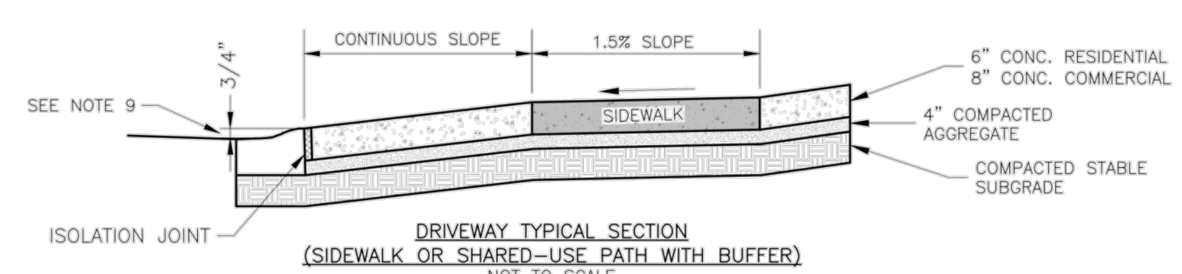
8" COMMERCIAL DRIVEWAY

6" RESIDENTIAL DRIVEWAY

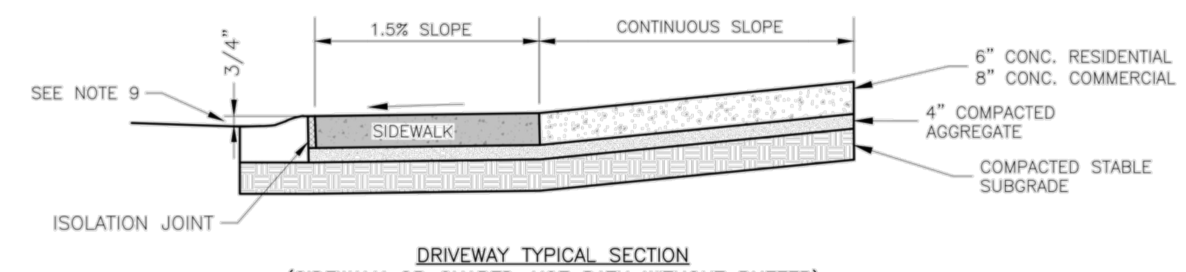
DRIVEWAY WITHOUT BUFFER
NOT TO SCALE



DRIVEWAY TYPICAL SECTION
(NO SIDEWALK OR SHARED-USE PATH)
NOT TO SCALE



DRIVEWAY TYPICAL SECTION
(SIDEWALK OR SHARED-USE PATH WITH BUFFER)
NOT TO SCALE



DRIVEWAY TYPICAL SECTION
(SIDEWALK OR SHARED-USE PATH WITHOUT BUFFER)
NOT TO SCALE

GENERAL NOTES

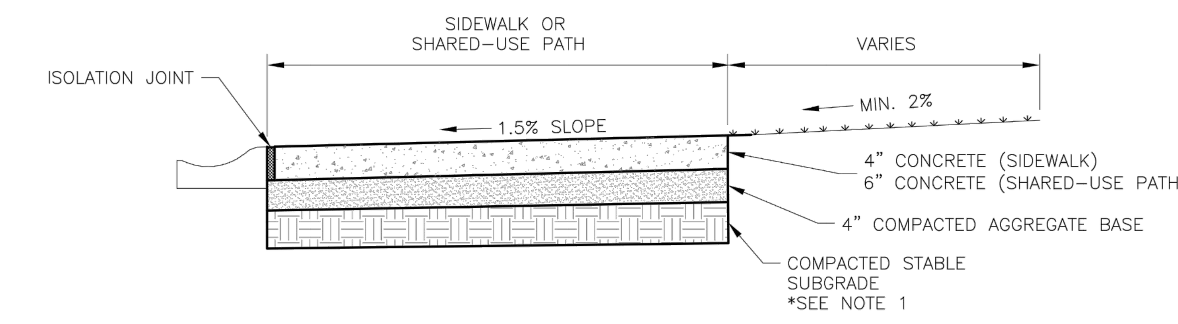
1. SUBGRADE SHALL BE STABLE, COMPACTED EARTH AND SHALL BE OVERLAYED WITH 4" COMPACTED DENSE GRADED AGGREGATE BASE.
2. ALL DRIVE APPROACHES SHALL MEET CURRENT PUBLIC RIGHT OF WAY ACCESSIBILITY GUIDELINES (PROWAG) FOR SLOPE REQUIREMENTS WHEN SIDEWALK IS REQUIRED (SEE ADA RAMP RETROFIT DETAIL GEN-3B, SIDEWALK/SHARED USE PATH RAMP AT DRIVEWAY DETAIL).
3. JOINT AT BACK OF CURB LINE SHALL BE AN ISOLATION JOINT FOR RESIDENTIAL DRIVEWAYS.
4. KCMMB 4K CONCRETE MIX IS REQUIRED FOR ALL CURBS.
5. COMMERCIAL DRIVEWAYS, IN THE PUBLIC RIGHT OF WAY, SHALL BE KCMMB 4K CONCRETE MIX.
6. RESIDENTIAL DRIVEWAYS, IN THE PUBLIC RIGHT OF WAY, KCMMB 4K CONCRETE MIX IS RECOMMENDED. OTHER CONCRETE MIXES NEEDS TO BE APPROVED BY CITY INSPECTOR.
7. A JOINT MUST BE INSTALLED AT THE RIGHT OF WAY BOUNDARY FOR PROPERTY DELINEATION.
8. WHITE CURING COMPOUND MUST BE APPLIED UNIFORMLY TO THE CONCRETE SURFACE IMMEDIATELY AFTER FINAL FINISHING.
9. ¾" FROM TOP OF CURB TO FLOWLINE AT DRIVEWAY (TYPE CG-1 CURB ONLY). MUST MAINTAIN ORIGINAL FLOWLINE OF CURB.
10. SIDEWALK ADJOINING CURB SHALL BE 6" THICK, EXTENDING 3' FROM THE DRIVEWAY.
11. THE MAXIMUM WIDTH OF A RESIDENTIAL DRIVEWAY IS 36 FEET WITHIN THE RIGHT OF WAY.

LEE'S SUMMIT MISSOURI
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063

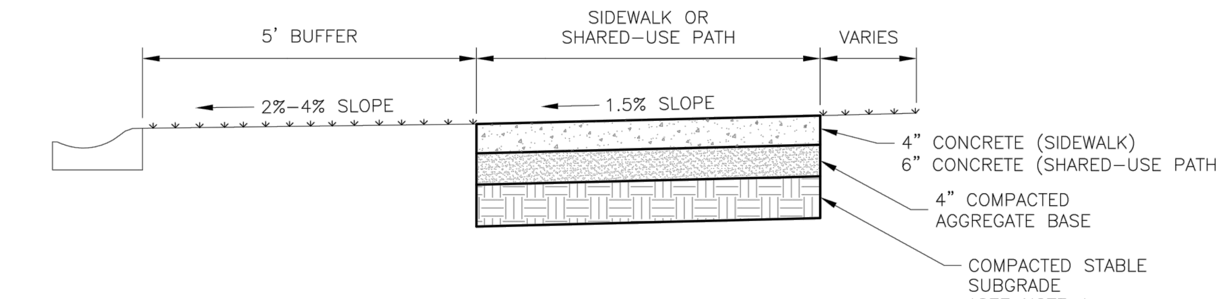
Project: STANDARD DETAILS CITY OF LEE'S SUMMIT, MO LEE'S SUMMIT, JACKSON COUNTY, MO
Sheet Name: DRIVEWAY DETAIL

Drawn By: MJF
Checked By: DL
Date: 04/17
Proj. #:

GEN-1



SIDEWALK/SHARED-USE PATH WITHOUT BUFFER
NOT TO SCALE



SIDEWALK/SHARED-USE PATH WITH BUFFER
NOT TO SCALE

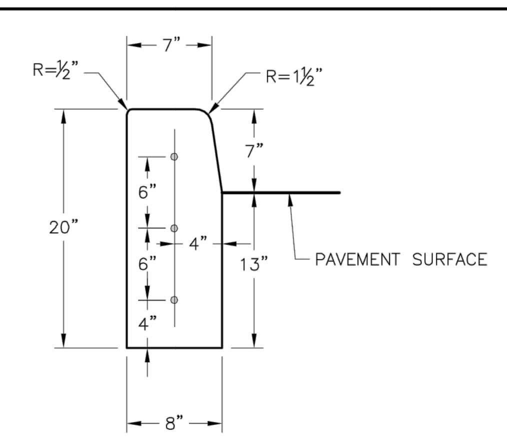
GENERAL NOTES:

1. SUBGRADE MUST BE OF STABLE, COMPACTED EARTH AND SHALL BE OVERLAYED WITH 4" COMPACTED DENSE GRADED AGGREGATE BASE.
2. 1.5% CROSS SLOPE MUST BE MAINTAINED THROUGH DRIVEWAYS.
3. KCMMB 4K CONCRETE MIX SHALL BE REQUIRED FOR ALL SIDEWALKS/SHARED-USE PATHS OR AS APPROVED BY THE CITY INSPECTOR.
4. ALL SIDEWALK/SHARED-USE PATHS SHALL MEET CURRENT PUBLIC RIGHT OF WAY ACCESSIBILITY GUIDELINES (PROWAG).
5. AN ISOLATION JOINT SHALL BE PLACED AT A MAXIMUM OF 150 FT. CONSTRUCTION JOINTS SHALL BE PLACED THE SAME WIDTH OF SIDEWALK/SHARED-USE PATHS, BUT NO GREATER THAN 10 FT.
6. AN ISOLATION JOINT SHALL BE PLACED WHERE THE SIDEWALK/SHARED-USE PATHS MEETS A RESIDENTIAL DRIVEWAY.
7. SHARED-USE PATHS WIDTH SHALL BE 10 FT. WIDE.
8. SIDEWALK/SHARED-USE PATHS FINISHING SHALL BE FULL BROOM FINISH OR AS DIRECTED BY CITY INSPECTOR.
9. WHITE CURING COMPOUND MUST BE APPLIED UNIFORMLY TO THE CONCRETE SURFACE IMMEDIATELY AFTER FINAL FINISHING.

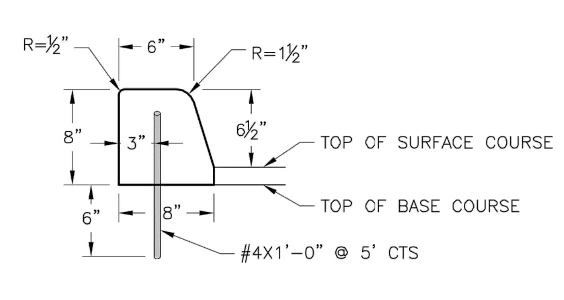
LEE'S SUMMIT MISSOURI
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063
SIDEWALK/SHARED-USE PATH DETAIL

Date: 04/17
Drawn By: MJF
Checked By: DL

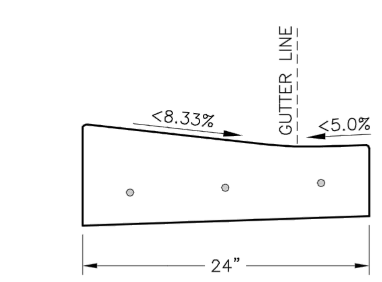
GEN-2



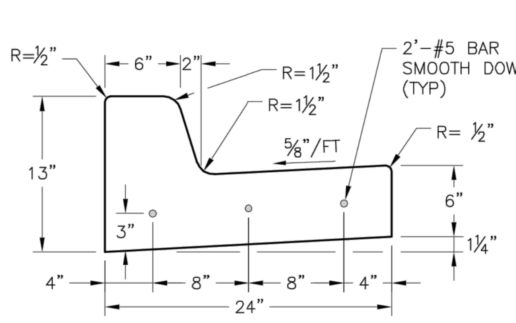
STRAIGHT CURB
(TYPE C-1)



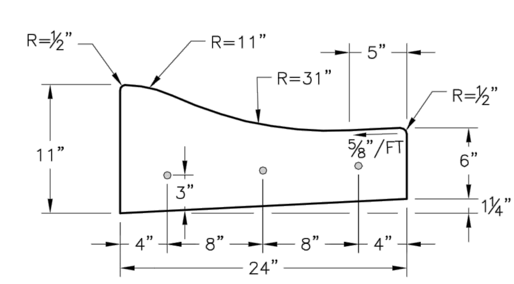
DOWELLED CURB
(TYPE DC)



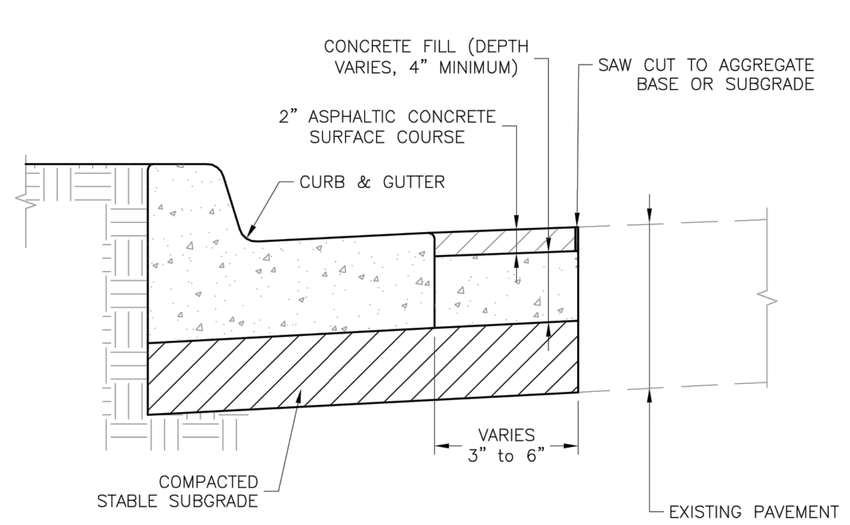
CURB & GUTTER DETAIL AT RAMP
(ADA SLOPE REQUIREMENTS)



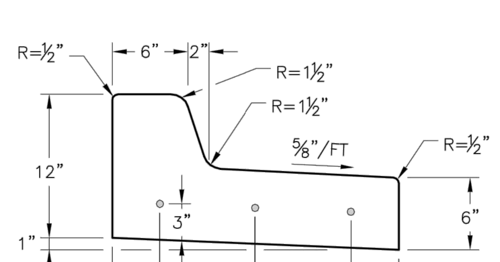
STRAIGHT BACK CURB & GUTTER
(TYPE CG-1)



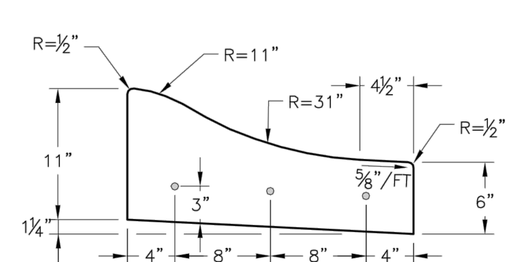
ROLL BACK CURB & GUTTER
(TYPE CG-2)



CURB REPLACEMENT DETAIL



STRAIGHT BACK DRY CURB & GUTTER
(TYPE CG-1 DRY)



ROLL BACK DRY CURB & GUTTER
(TYPE CG-2 DRY)

GENERAL NOTES

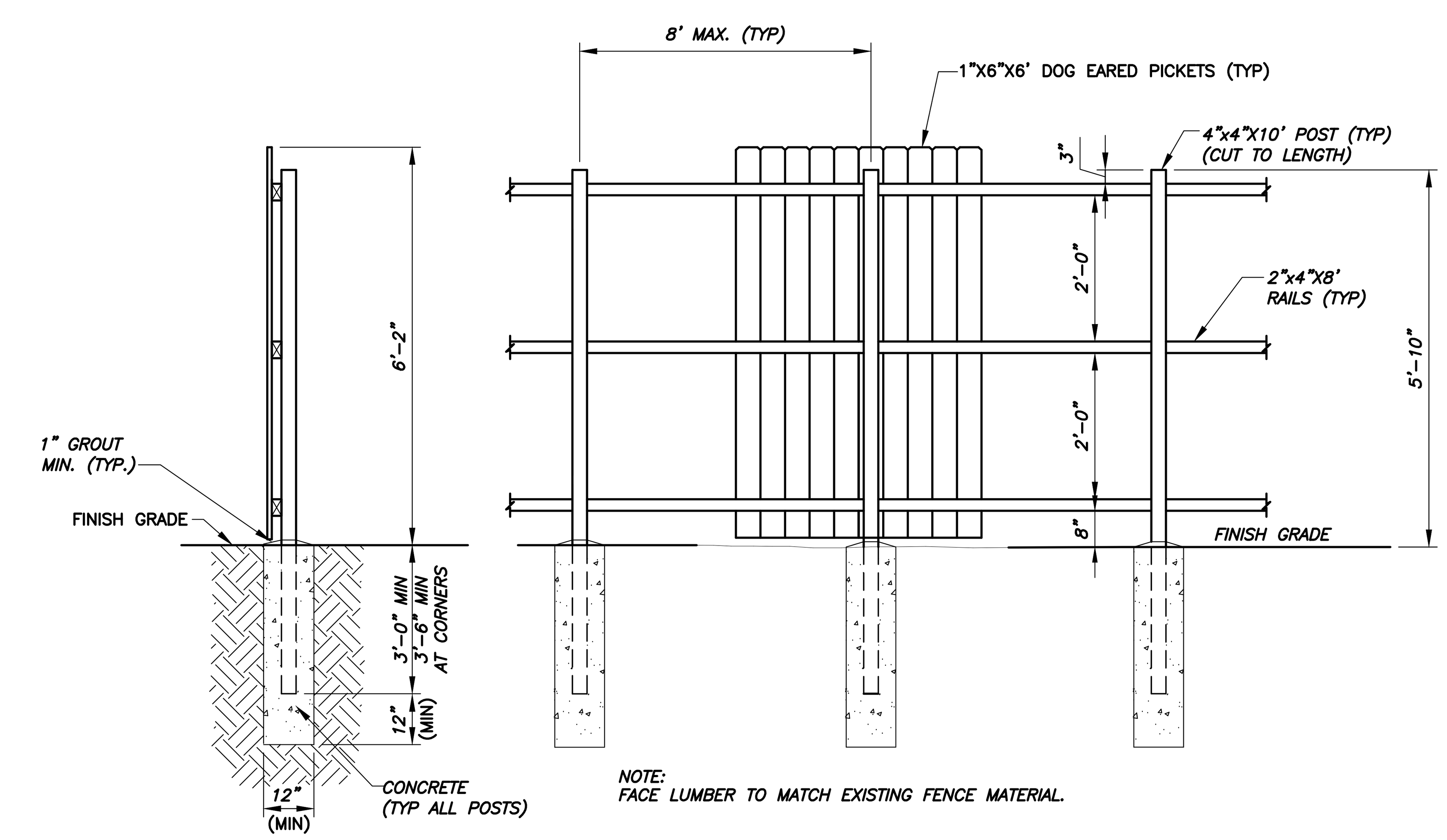
1. ¾" ISOLATION JOINTS WITH 3 (2'-#5 BAR) SMOOTH DOWELS SHALL BE PLACED AT RADIUS POINTS AND AT 150' INTERVALS. THESE DOWEL BARS SHALL BE GREASED AND WRAPPED ON ONE END WITH EXPANSION TUBES.
2. 3" DEEP CONTRACTION JOINTS SHALL BE INSTALLED AT APROXIMATELY 10' INTERVALS. THESE JOINTS SHALL PASS ACROSS THE ENTIRE CURB SECTION.
3. CONCRETE FILL SHALL HAVE UNIFORM AND SMOOTH FINISH
4. KCMMB 4K CONCRETE SHALL BE USED FOR ALL CURB.
5. ASPHALTIC CONCRETE SURFACE COURSE SHALL CONFORM TO STANDARD SPECIFICATIONS SECTION 2205.2.
6. CURBS FOR NEW STREETS SHALL BE BUILT ON ASPHALT OR AGGREGATE BASE AS SHOWN IN TYPICAL SECTION DETAIL.
7. WHITE CURING COMPOUND MUST BE APPLIED UNIFORMLY TO THE CONCRETE SURFACE IMMEDIATELY AFTER FINAL FINISHING.

LEE'S SUMMIT MISSOURI
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063

Project: STANDARD DETAILS CITY OF LEE'S SUMMIT, MO LEE'S SUMMIT, JACKSON COUNTY, MO
Sheet Name: CURB & GUTTER DETAIL

Drawn By: MJF
Checked By: DL
Date: 04/17
Proj. #:

GEN-4



SECTION

ELEVATION

6'-0" SCREEN PRIVACY FENCE DETAIL
N.T.S.

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KANSAS CITY, MO 64114
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03/14/2023

MARK DANIEL MCGHEE JR.
PE-2008019568

DETAIL SHEET

STORM DRAINAGE IMPROVEMENTS
CITY OF LEE'S SUMMIT, MISSOURI

REVISIONS

DESIGNER / DRAFTER
MDM/AJM
DATE
06-17-2020
PROJECT NUMBER
0319054.01
BOOK AND PAGE
543-32272C
MISSOURI AUTHORIZATION NUMBER
2013011903

SHEET
20 OF 20

APPENDIX B

-NRCS Soil Resource Report

-HydroCAD Model Output Report

United States Department of Agriculture

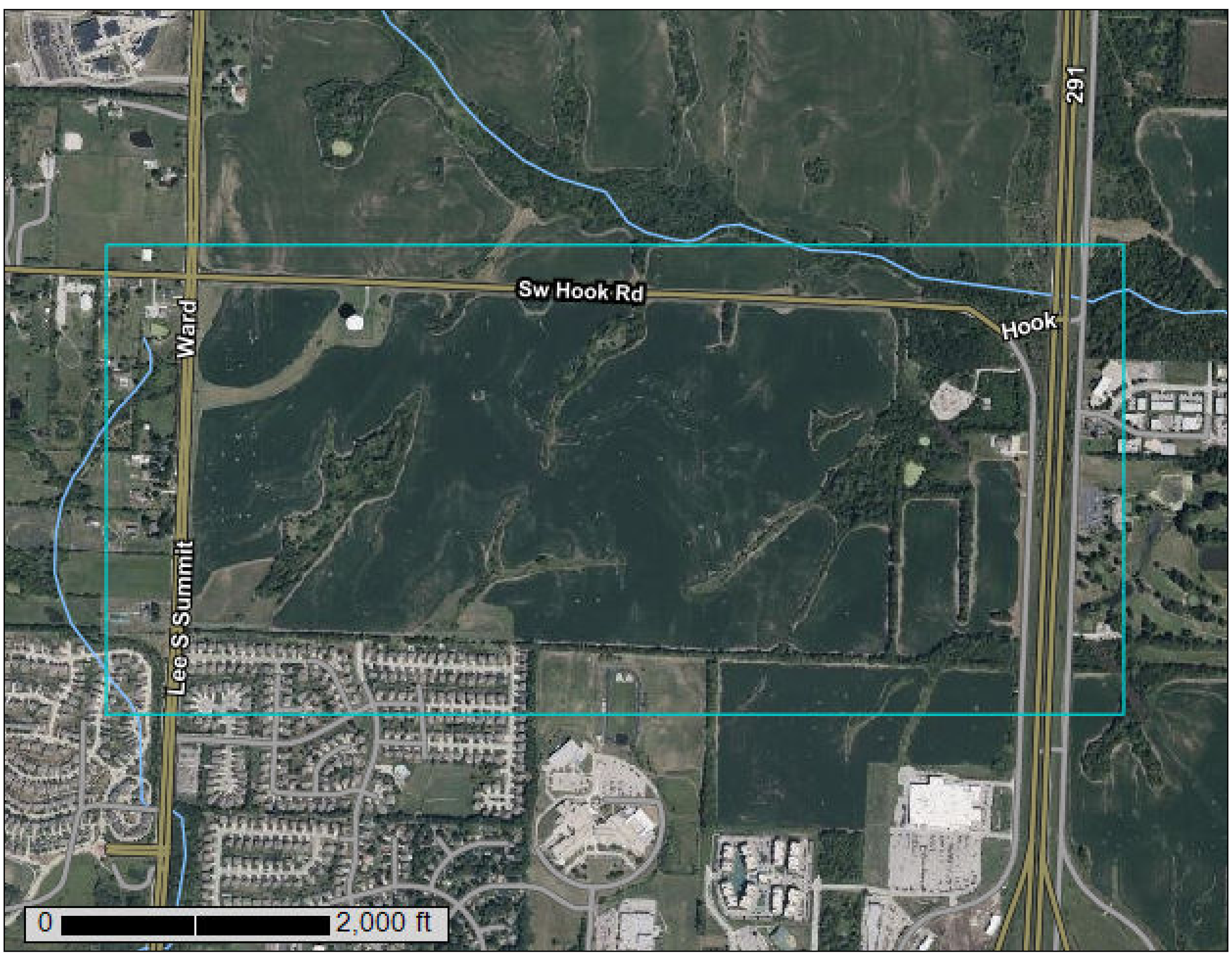
NRCS

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

Jackson County, Missouri



April 9, 2025

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.

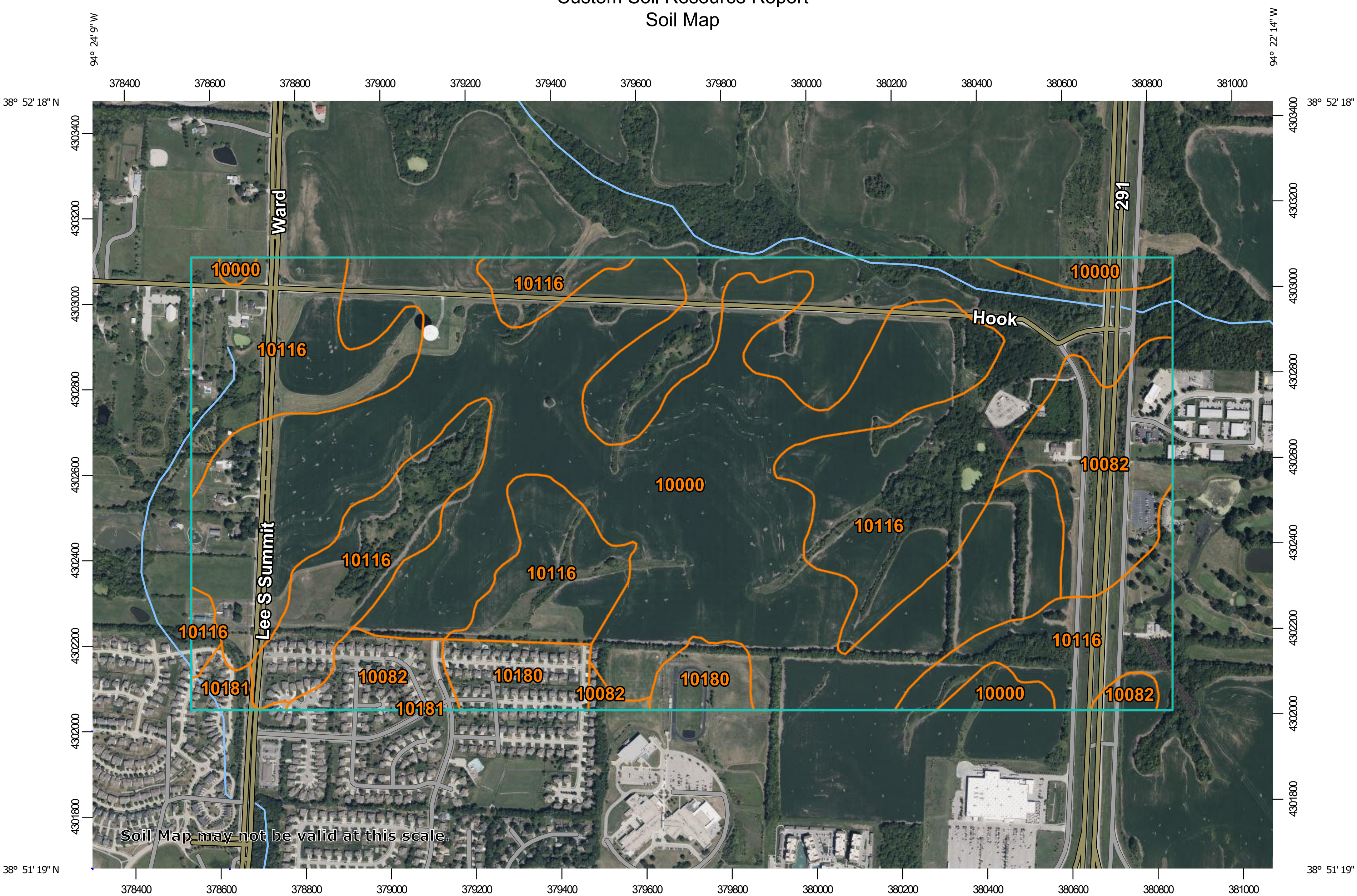
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree 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.

Soil Map



Map Scale: 1:12,700 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 150, 300, 600, 900

Feet: 0, 500, 1000, 2000, 3000

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: Jackson County, Missouri
Survey Area Data: Version 27, Aug 27, 2024

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

Date(s) aerial images were photographed: Aug 30, 2022—Sep 8, 2022

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
10000	Arisburg silt loam, 1 to 5 percent slopes	276.6	45.7%
10082	Arisburg-Urban land complex, 1 to 5 percent slopes	53.4	8.8%
10116	Sampsel silty clay loam, 2 to 5 percent slopes	249.9	41.3%
10180	Udarents-Urban land-Sampsel complex, 2 to 5 percent slopes	21.3	3.5%
10181	Udarents-Urban land-Sampsel complex, 5 to 9 percent slopes	4.2	0.7%
Totals for Area of Interest		**605.4**	**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.

Jackson County, Missouri

10000—Arisburg silt loam, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2w22b
Elevation: 610 to 1,130 feet
Mean annual precipitation: 39 to 43 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 177 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Arisburg and similar soils: 87 percent
Minor components: 13 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arisburg

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess

Typical profile

Ap - 0 to 6 inches: silt loam
A - 6 to 13 inches: silt loam
Bt - 13 to 19 inches: silty clay loam
Btg - 19 to 56 inches: silty clay loam
BCg - 56 to 79 inches: silty clay loam

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 18 to 30 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 11.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R107XB007MO - Loess Upland Prairie
Hydric soil rating: No

Minor Components

Greenton

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

Sharpsburg

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

Haig

Percent of map unit: 3 percent
Landform: Flats
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R109XY001MO - Claypan Summit Prairie
Hydric soil rating: Yes

10082—Arisburg-Urban land complex, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2w7ld
Elevation: 750 to 1,130 feet
Mean annual precipitation: 39 to 45 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 177 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Arisburg and similar soils: 61 percent
Urban land: 30 percent
Minor components: 9 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arisburg

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess

Typical profile

Ap - 0 to 6 inches: silt loam
A - 6 to 13 inches: silt loam
Bt - 13 to 19 inches: silty clay loam
Btg - 19 to 56 inches: silty clay loam
BCg - 56 to 79 inches: silty clay loam

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 18 to 30 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 11.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R107XB007MO - Loess Upland Prairie
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

Minor Components

Sharpsburg

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

Sampsel

Percent of map unit: 3 percent

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Concave
Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna
Hydric soil rating: Yes

Greenton

Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

10116—Sampsel silty clay loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2qkzy
Elevation: 600 to 1,300 feet
Mean annual precipitation: 33 to 41 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 177 to 220 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Sampsel and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sampsel

Setting

Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Convex, concave
Parent material: Residuum weathered from shale

Typical profile

Ap - 0 to 11 inches: silty clay loam
Bt - 11 to 80 inches: silty clay

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Poorly 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 0 to 18 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 8.4 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna
Hydric soil rating: No

Minor Components

Grundy
Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

Snead
Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna
Hydric soil rating: No

10180—Udarents-Urban land-Sampsel complex, 2 to 5 percent slopes

Map Unit Setting
National map unit symbol: 1n85h
Elevation: 600 to 900 feet
Mean annual precipitation: 33 to 43 inches
Mean annual air temperature: 50 to 57 degrees F
Frost-free period: 175 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Udarents and similar soils: 46 percent
Urban land: 39 percent
Sampsel and similar soils: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udarents

Setting

Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mine spoil or earthy fill

Typical profile

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

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very 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: 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: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R107XB002MO - Deep Loess Upland Prairie
Hydric soil rating: No

Description of Urban Land

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Across-slope shape: Convex

Interpretive groups

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

Description of Sampsel

Setting

Landform: Hillslopes
Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from shale

Typical profile
Ap - 0 to 13 inches: silty clay loam
Bt - 13 to 80 inches: silty clay

Properties and qualities
Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly 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 0 to 18 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 8.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna
Hydric soil rating: No

10181—Udarents-Urban land-Sampsel complex, 5 to 9 percent slopes

Map Unit Setting
National map unit symbol: 1n85g
Elevation: 600 to 900 feet
Mean annual precipitation: 33 to 43 inches
Mean annual air temperature: 50 to 57 degrees F
Frost-free period: 175 to 220 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Udarents and similar soils: 46 percent
Urban land: 39 percent
Sampsel and similar soils: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udarents

Setting
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope

Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mine spoil or earthy fill

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

Properties and qualities
Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very 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: 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: Moderate (about 9.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R107XB002MO - Deep Loess Upland Prairie
Hydric soil rating: No

Description of Urban Land

Setting
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Across-slope shape: Convex

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

Description of Sampsel

Setting
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from shale

Typical profile
Ap - 0 to 13 inches: silty clay loam
Bt - 13 to 80 inches: silty clay

Properties and qualities
Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly 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 0 to 18 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 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna
Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

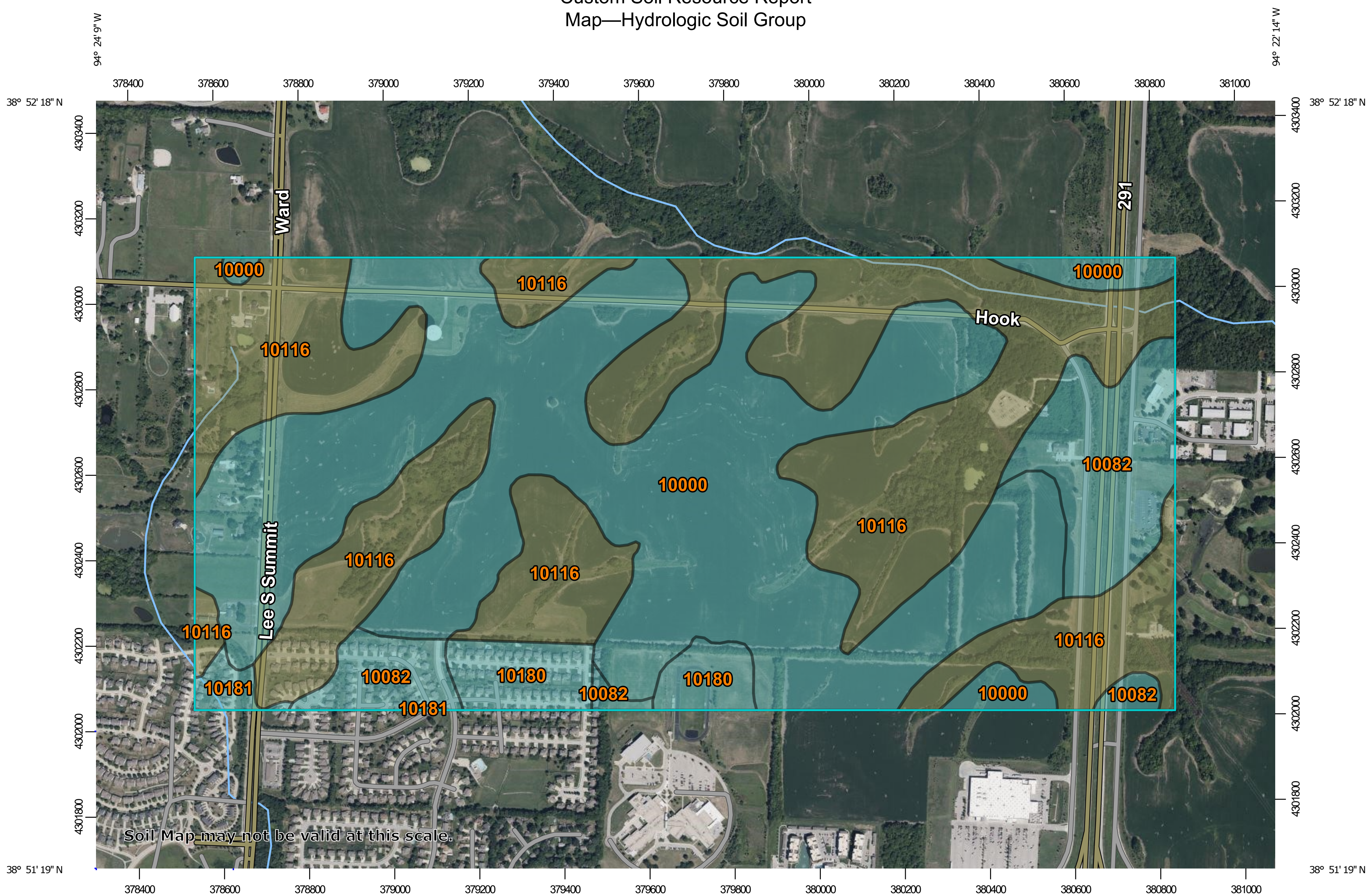
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Map—Hydrologic Soil Group



Map Scale: 1:12,700 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 150, 300, 600, 900

Feet: 0, 500, 1000, 2000, 3000

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 Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

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: Jackson County, Missouri
Survey Area Data: Version 27, Aug 27, 2024

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

Date(s) aerial images were photographed: Aug 30, 2022—Sep 8, 2022

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.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10000	Arisburg silt loam, 1 to 5 percent slopes	C	276.6	45.7%
10082	Arisburg-Urban land complex, 1 to 5 percent slopes	C	53.4	8.8%
10116	Sampsel silty clay loam, 2 to 5 percent slopes	C/D	249.9	41.3%
10180	Udarents-Urban land-Sampsel complex, 2 to 5 percent slopes	C	21.3	3.5%
10181	Udarents-Urban land-Sampsel complex, 5 to 9 percent slopes	C	4.2	0.7%
Totals for Area of Interest			**605.4**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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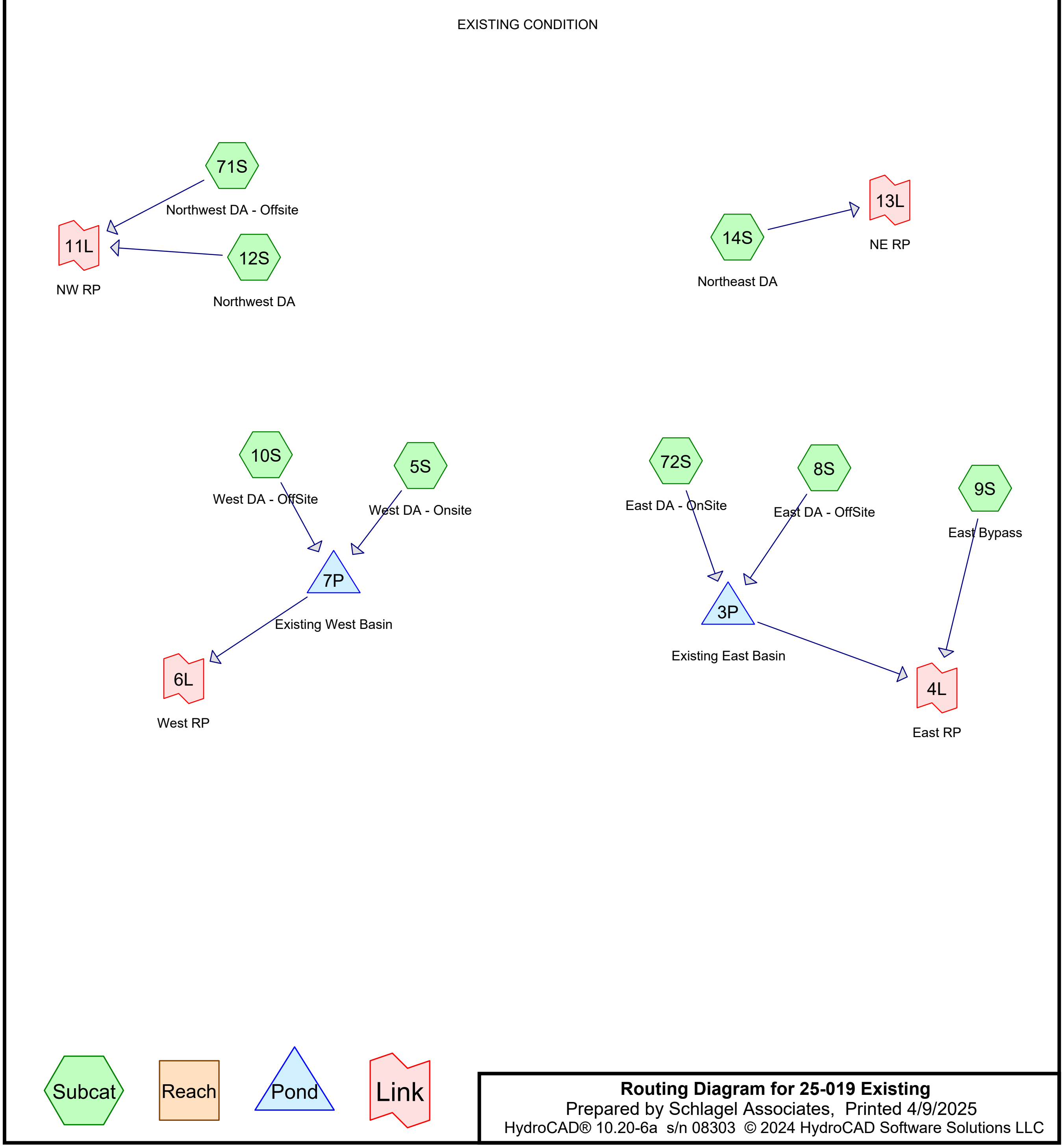
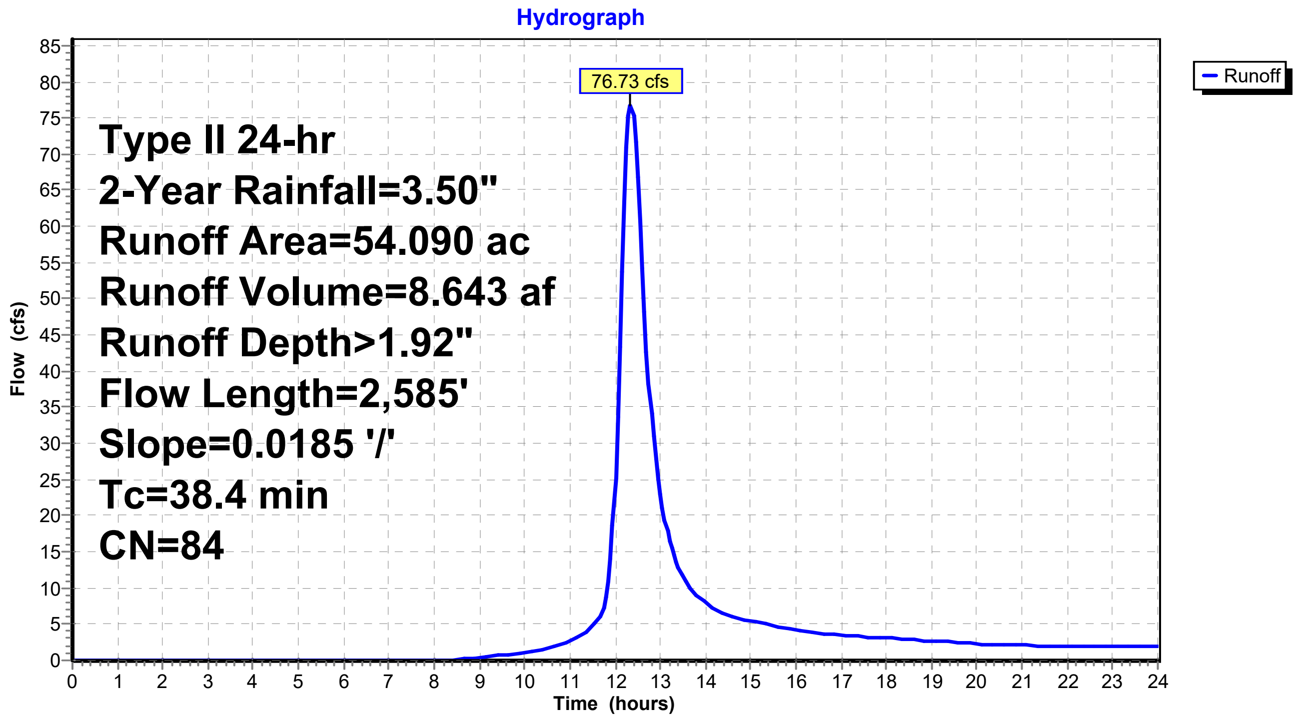


Routing Diagram for 25-019 Existing
Prepared by Schlagel Associates, Printed 4/9/2025
HydroCAD® 10.20-6a s/n 08303 © 2024 HydroCAD Software Solutions LLC

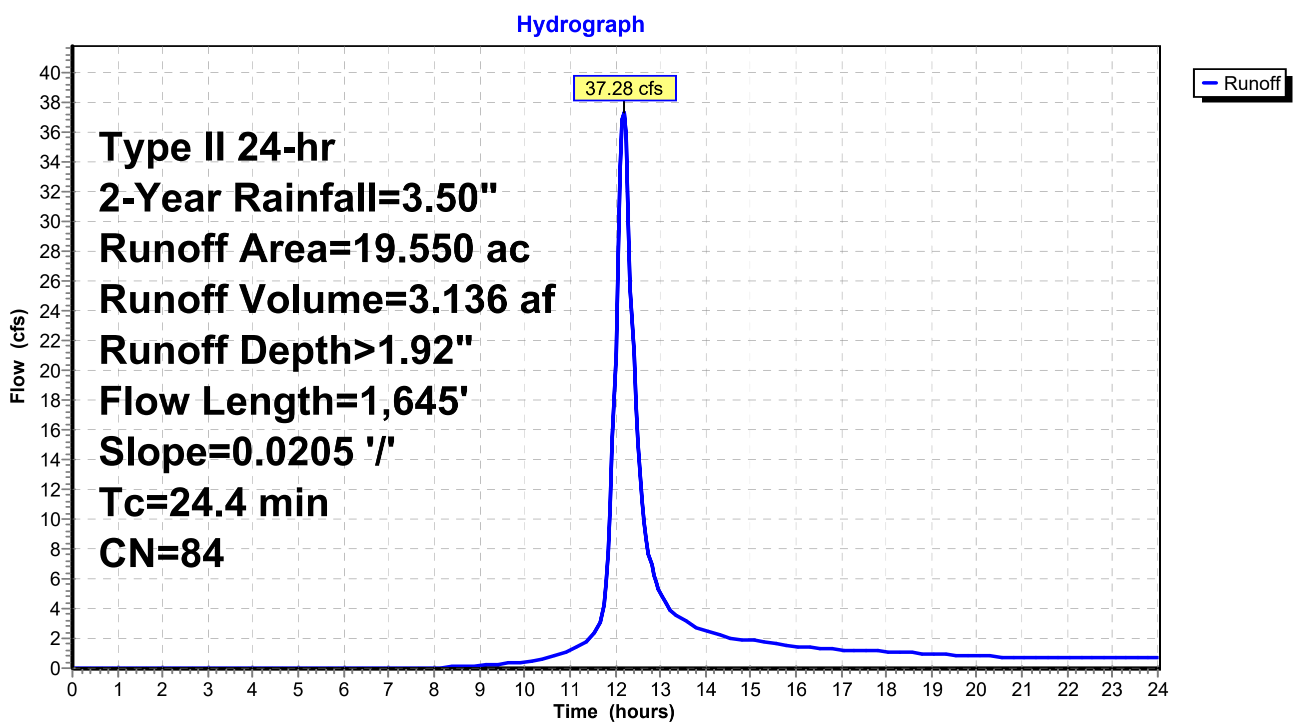
Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type II 24-hr		Default	24.00	1	3.50	2
2	10-Year	Type II 24-hr		Default	24.00	1	5.30	2
3	100-Year	Type II 24-hr		Default	24.00	1	7.70	2

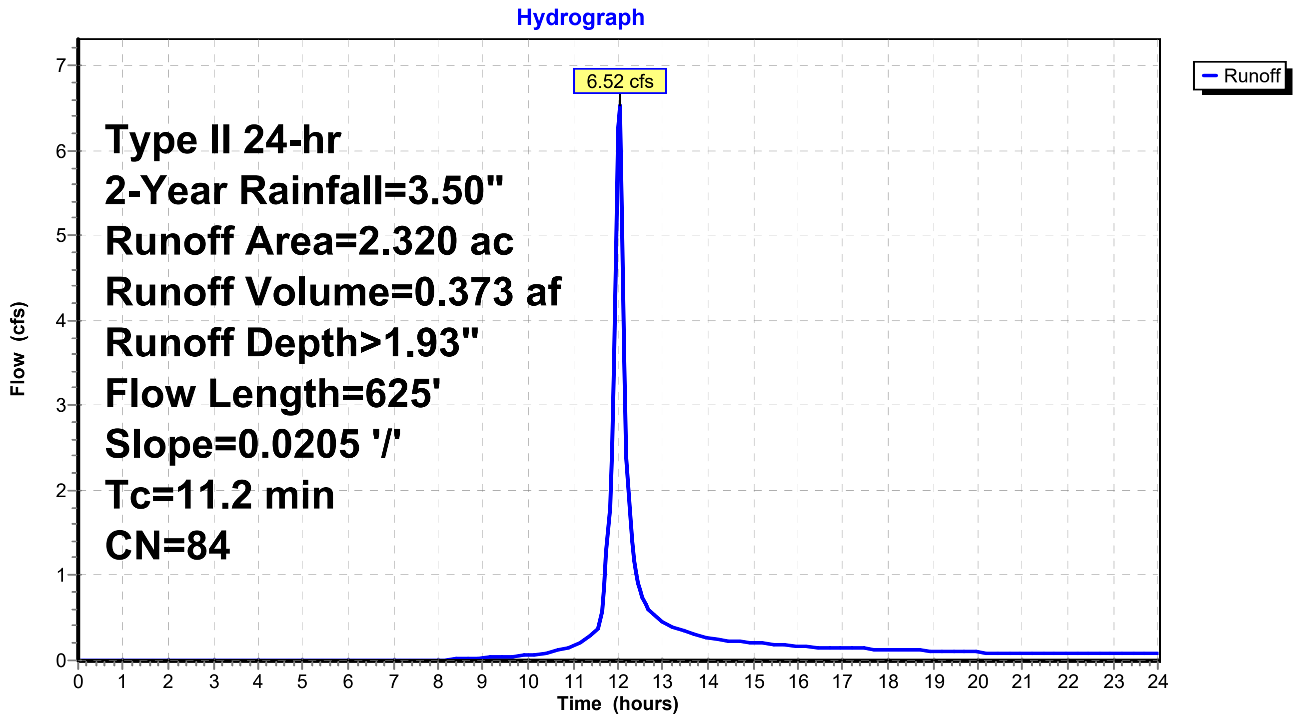
Subcatchment 5S: West DA - Onsite



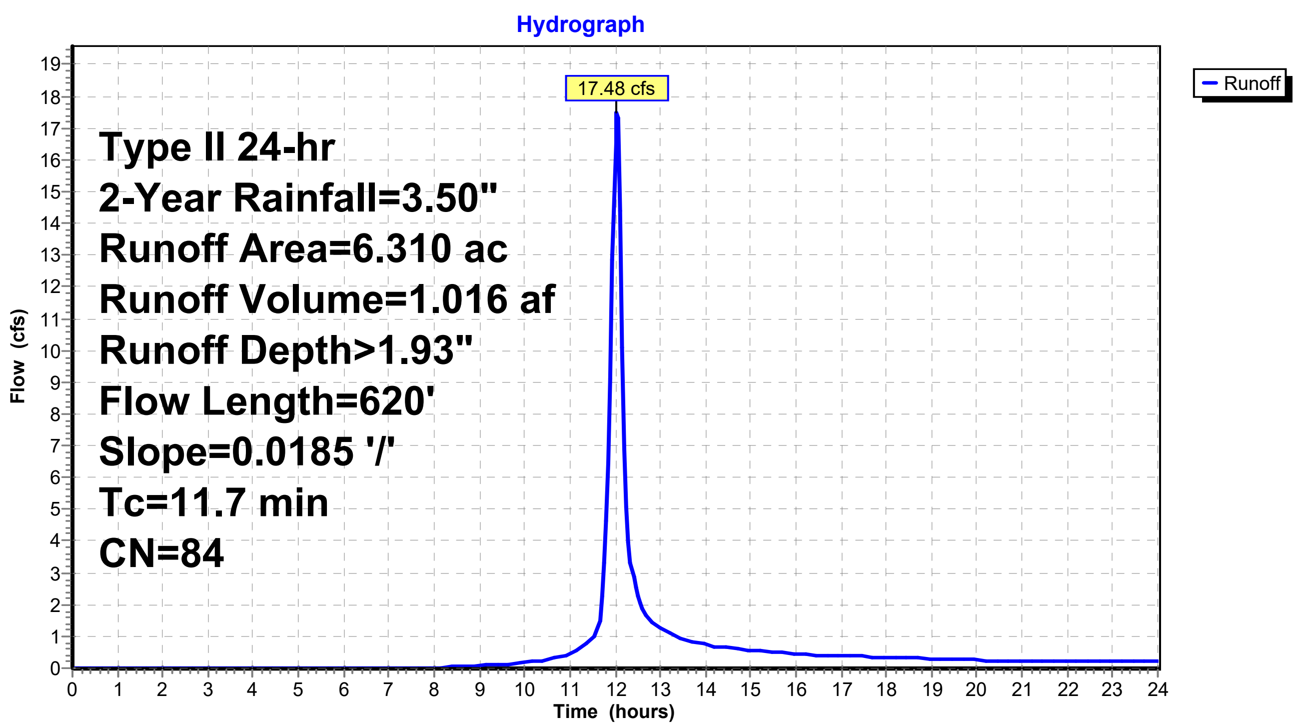
Subcatchment 8S: East DA - OffSite



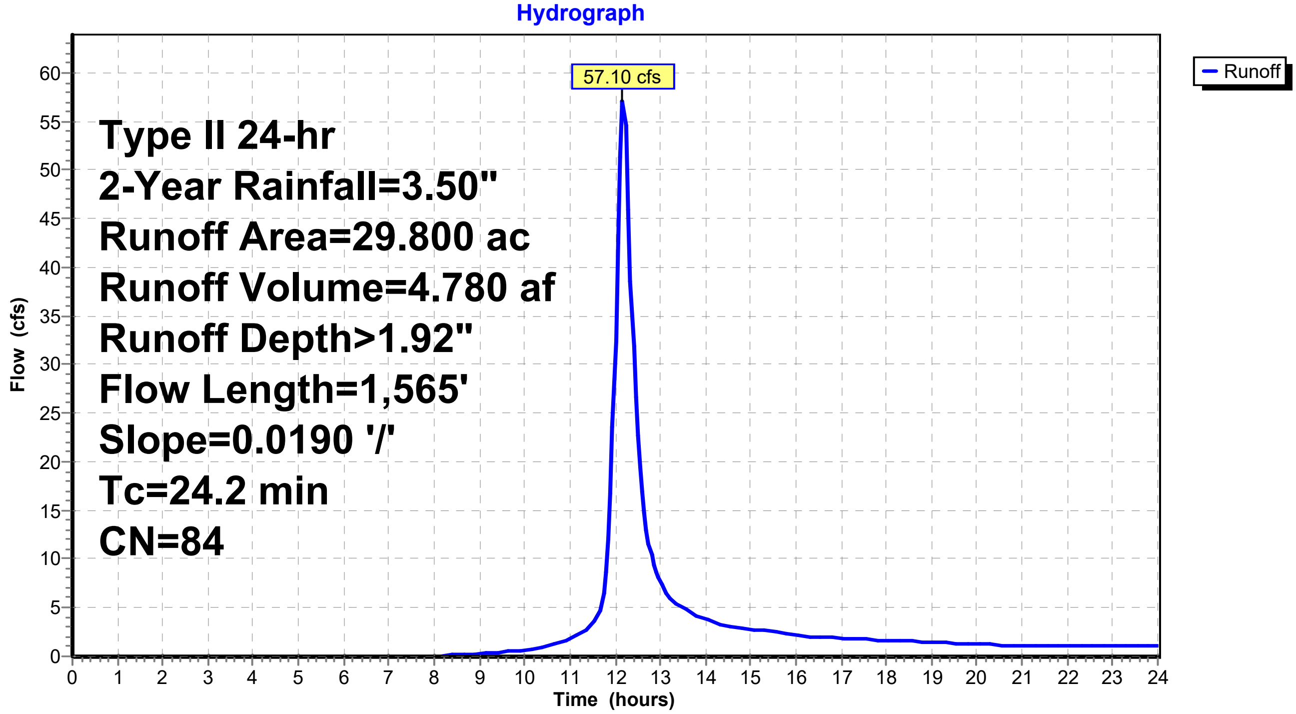
Subcatchment 9S: East Bypass



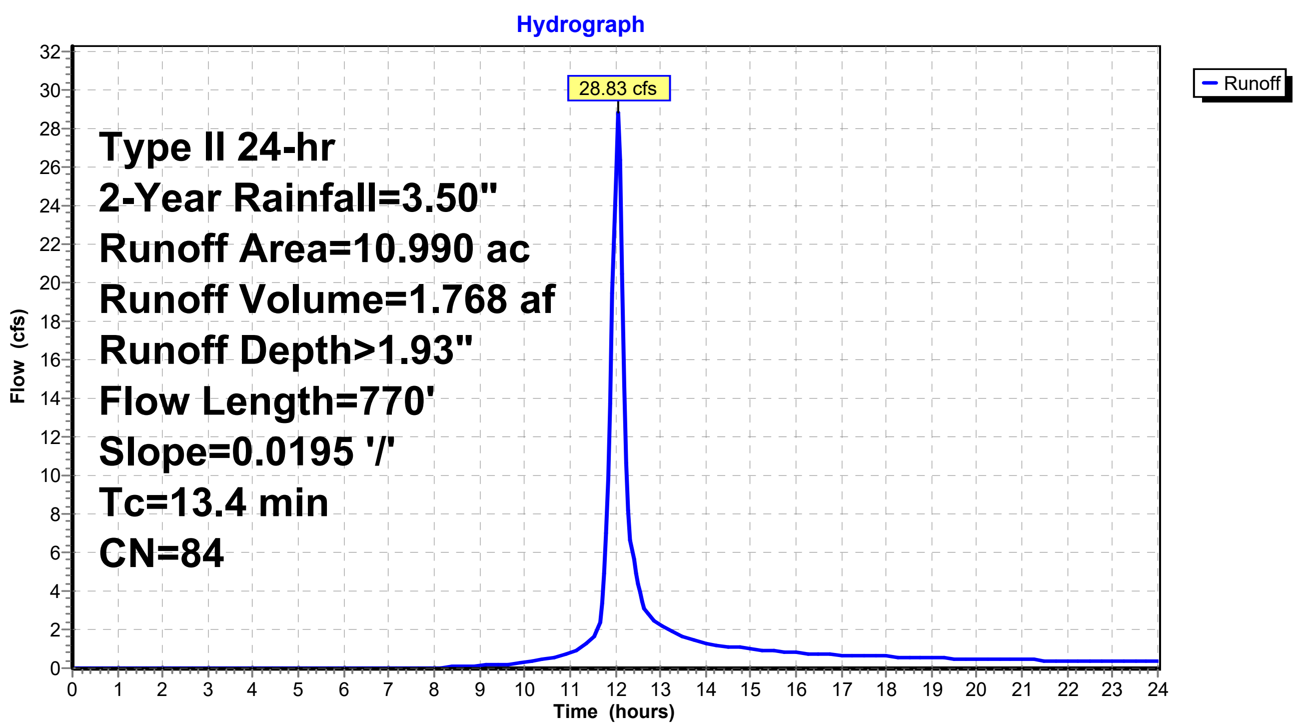
Subcatchment 10S: West DA - OffSite



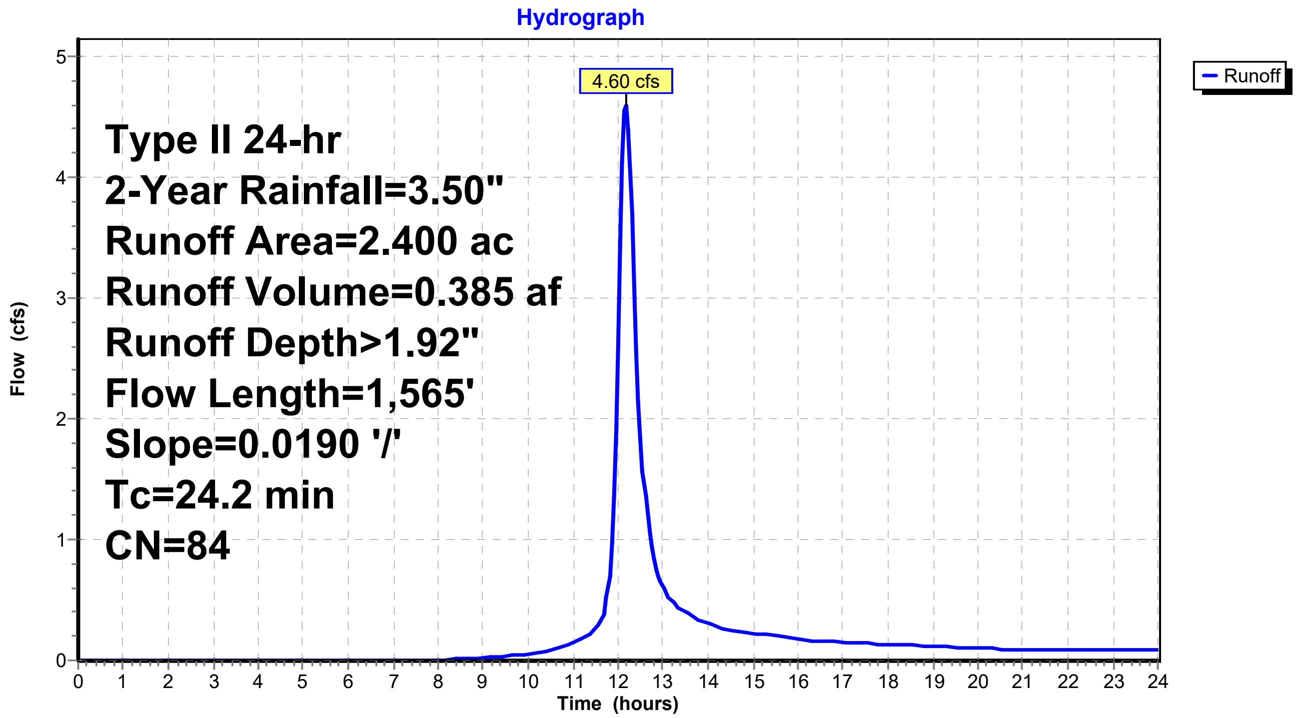
Subcatchment 12S: Northwest DA



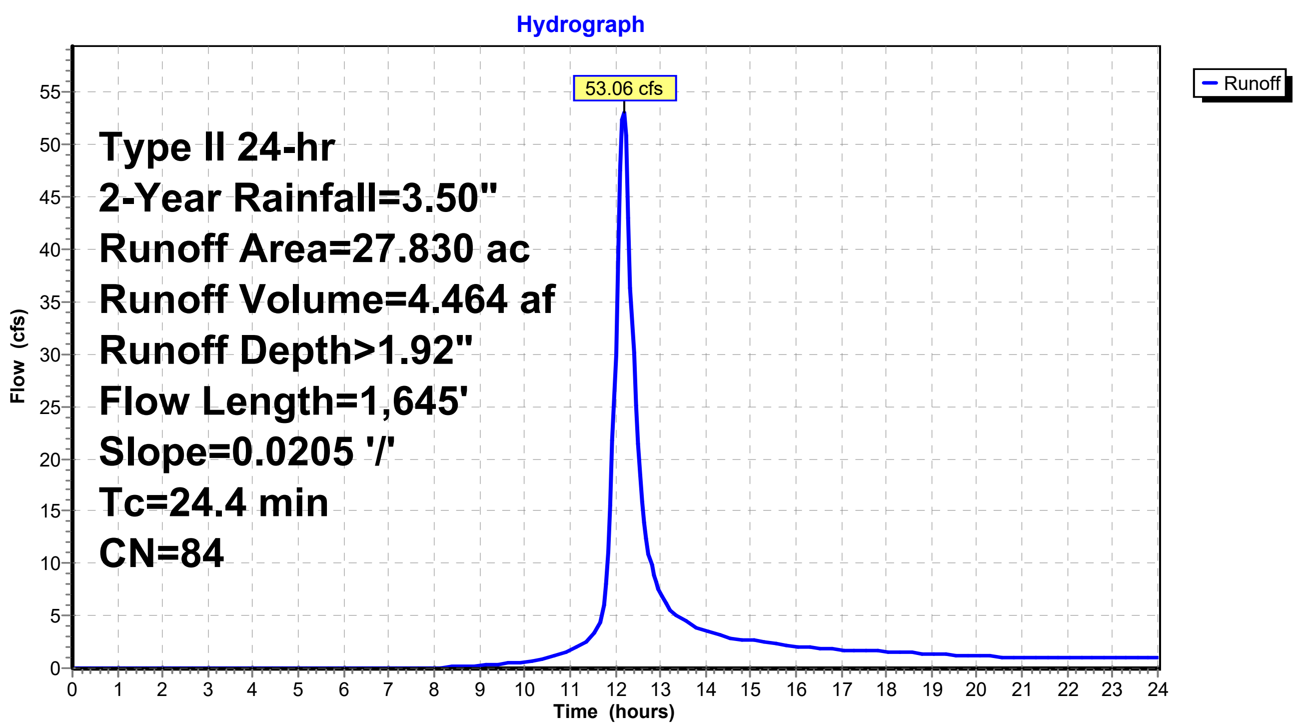
Subcatchment 14S: Northeast DA



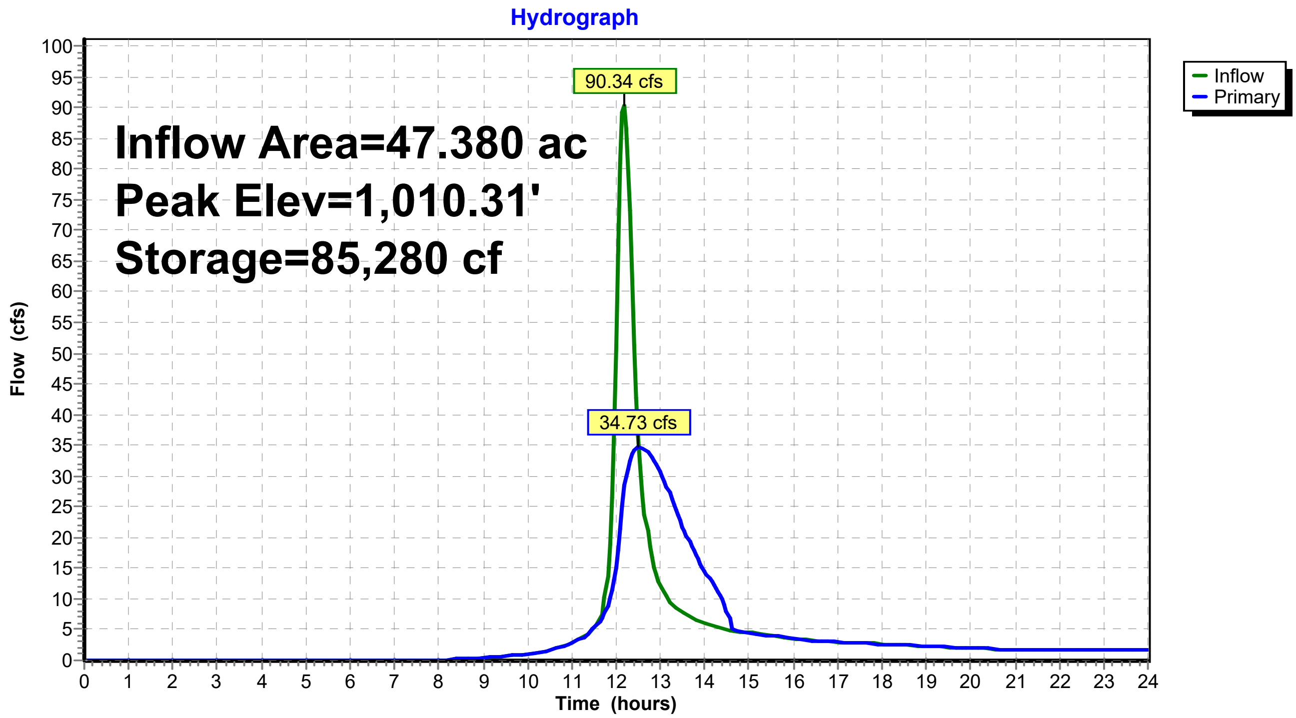
Subcatchment 71S: Northwest DA - Offsite



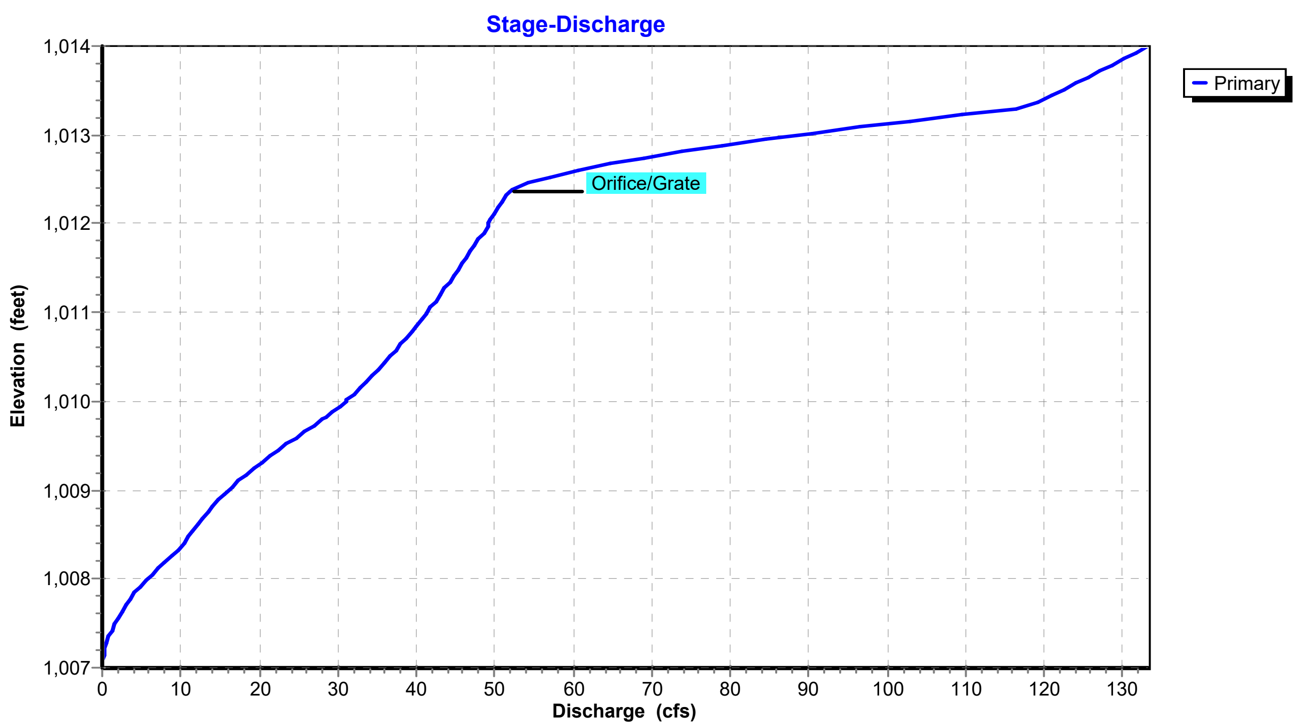
Subcatchment 72S: East DA - OnSite



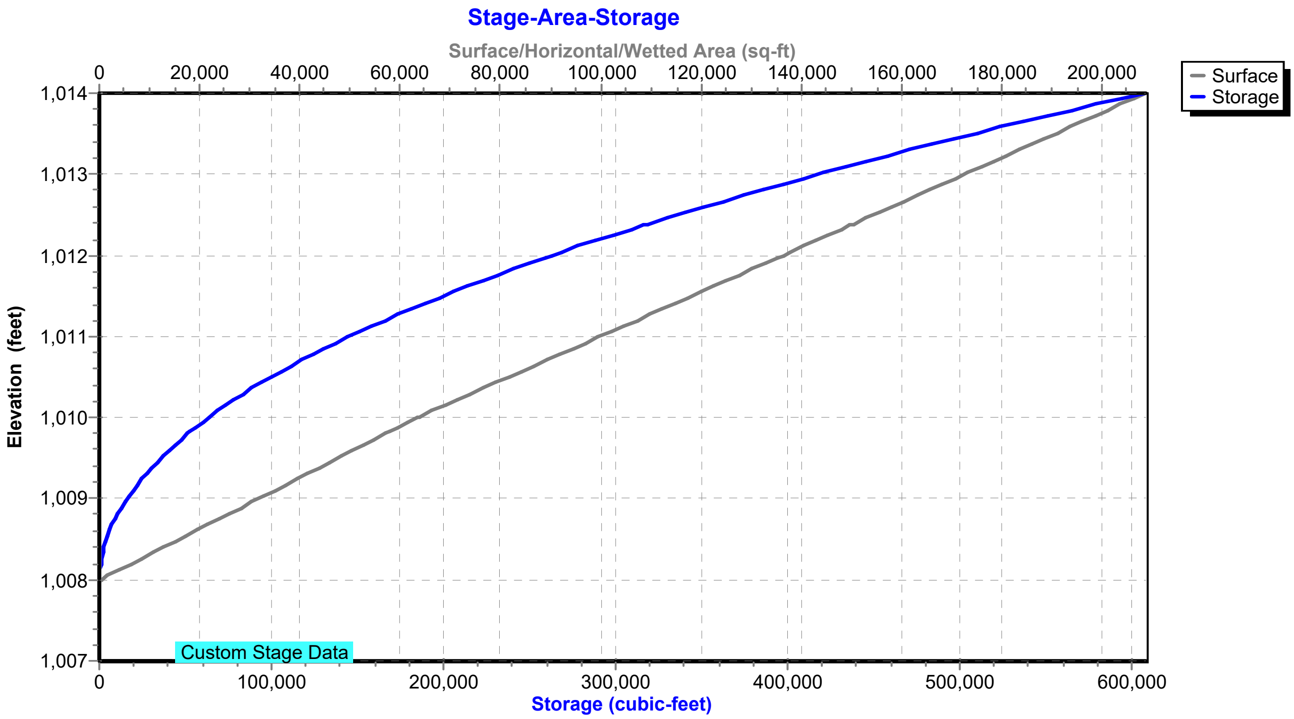
Pond 3P: Existing East Basin



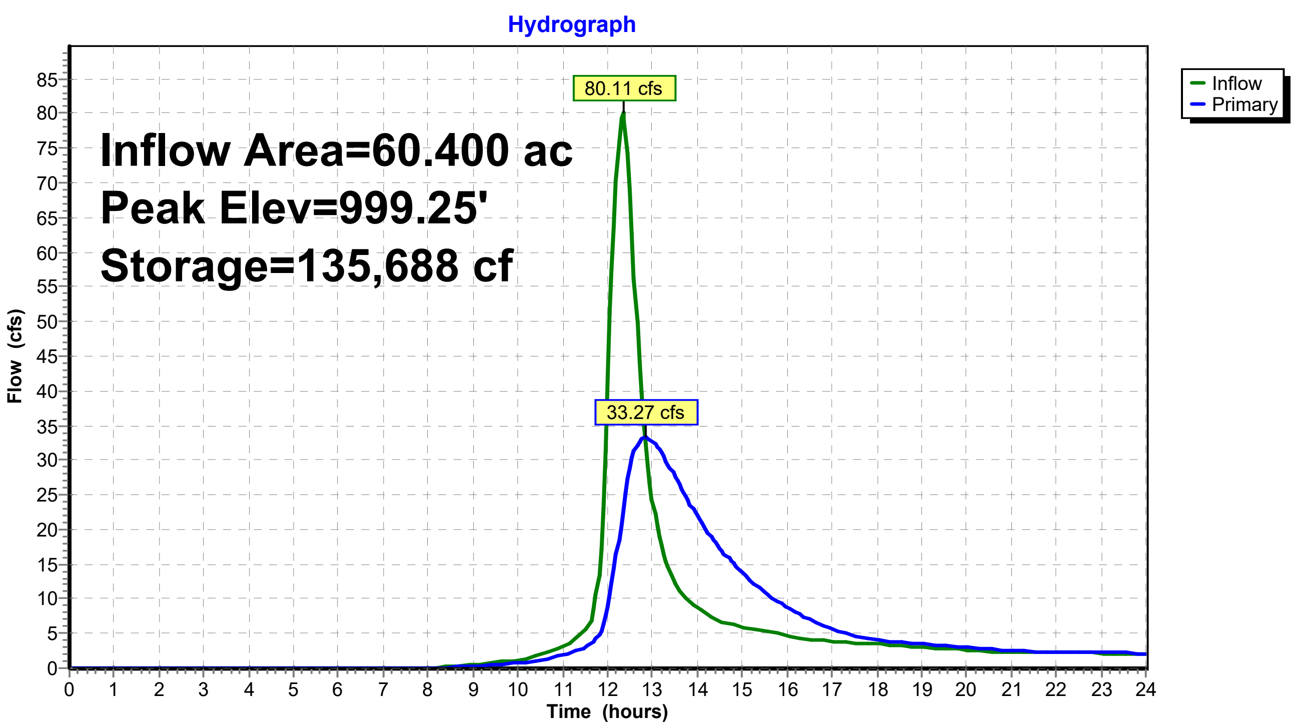
Pond 3P: Existing East Basin

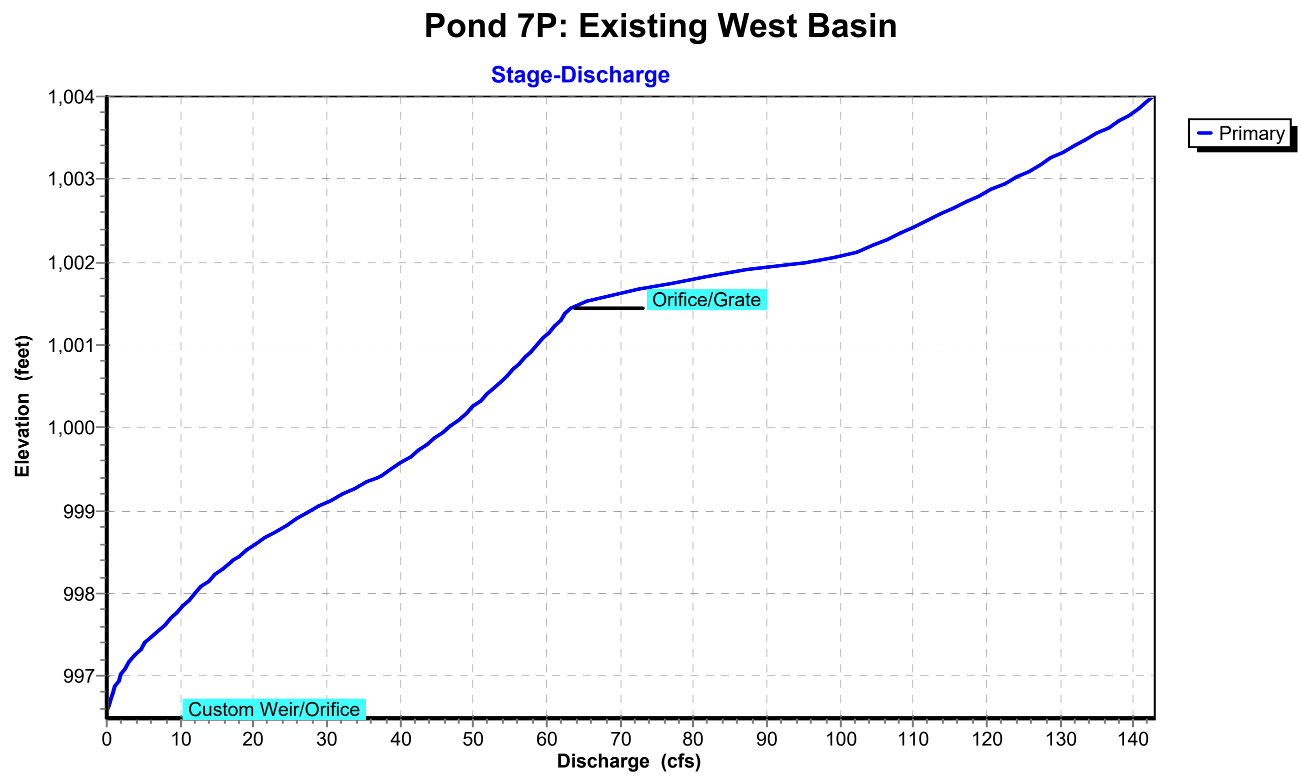


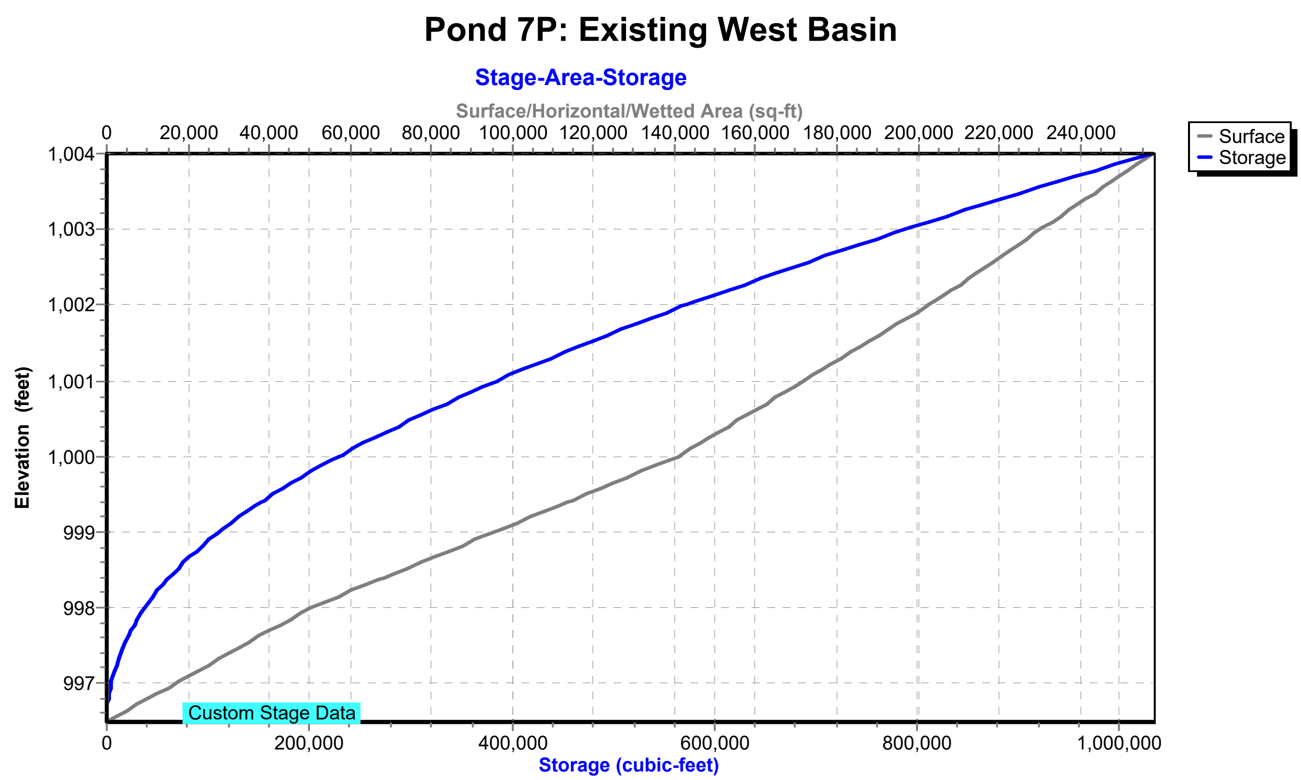
Pond 3P: Existing East Basin



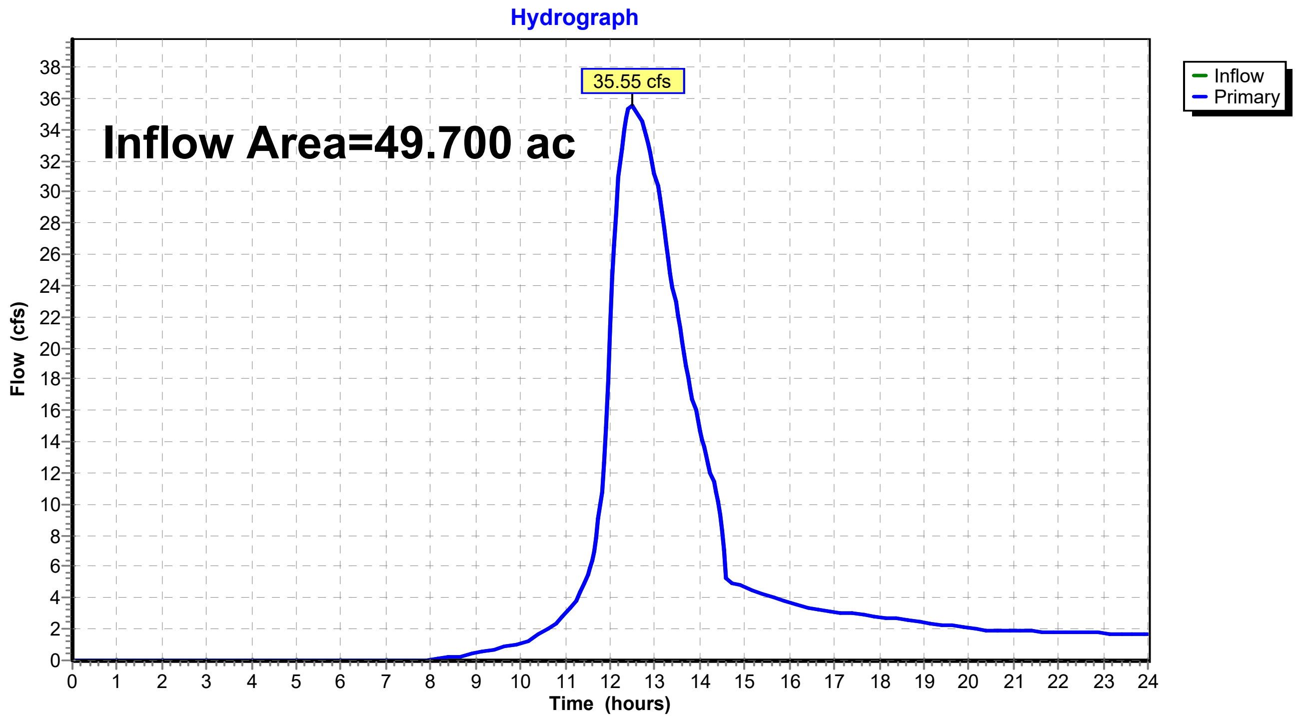
Pond 7P: Existing West Basin



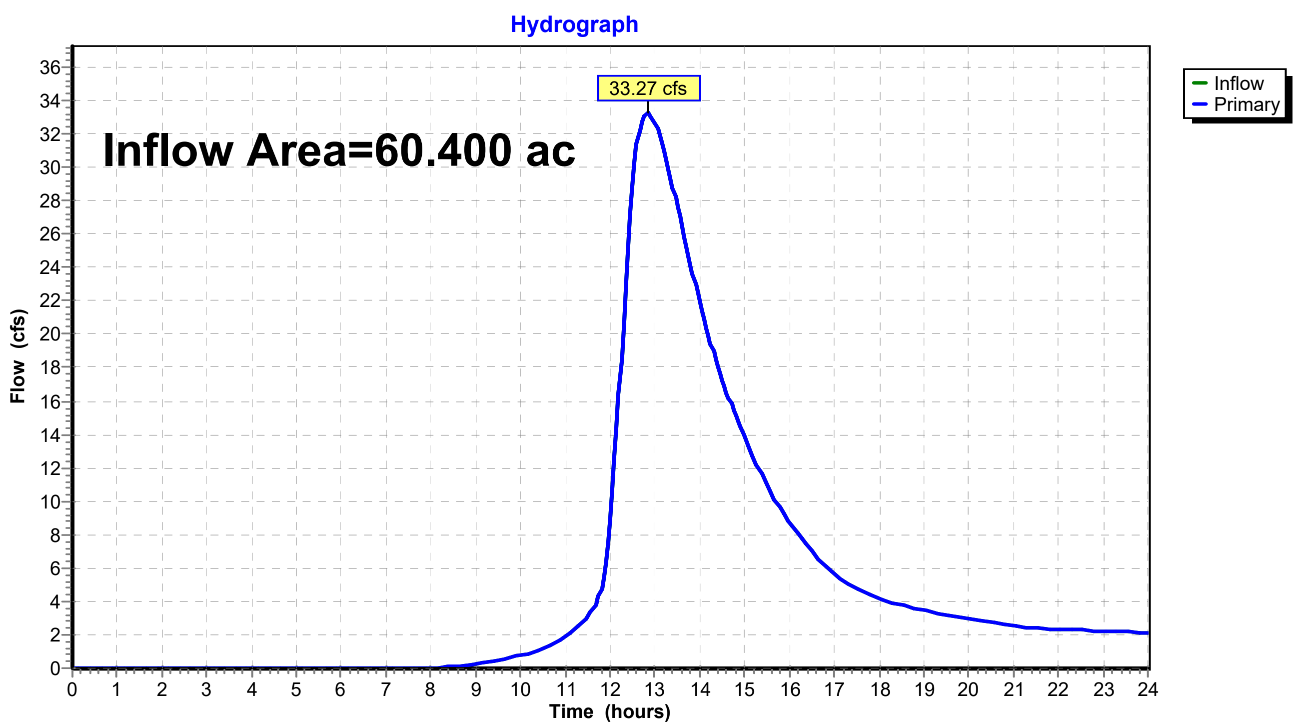

Pond 7P: Existing West Basin
Stage-Discharge
Primary
Orifice/Grate
Custom Weir/Orifice
Elevation (feet)
Discharge (cfs)
1,004
1,003
1,002
1,001
1,000
999
998
997
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140


Pond 7P: Existing West Basin
Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
Surface
Storage
Custom Stage Data
Elevation (feet)
Storage (cubic-feet)
0
20,000
40,000
60,000
80,000
100,000
120,000
140,000
160,000
180,000
200,000
220,000
240,000
1,004
1,003
1,002
1,001
1,000
999
998
997
200,000
400,000
600,000
800,000
1,000,000

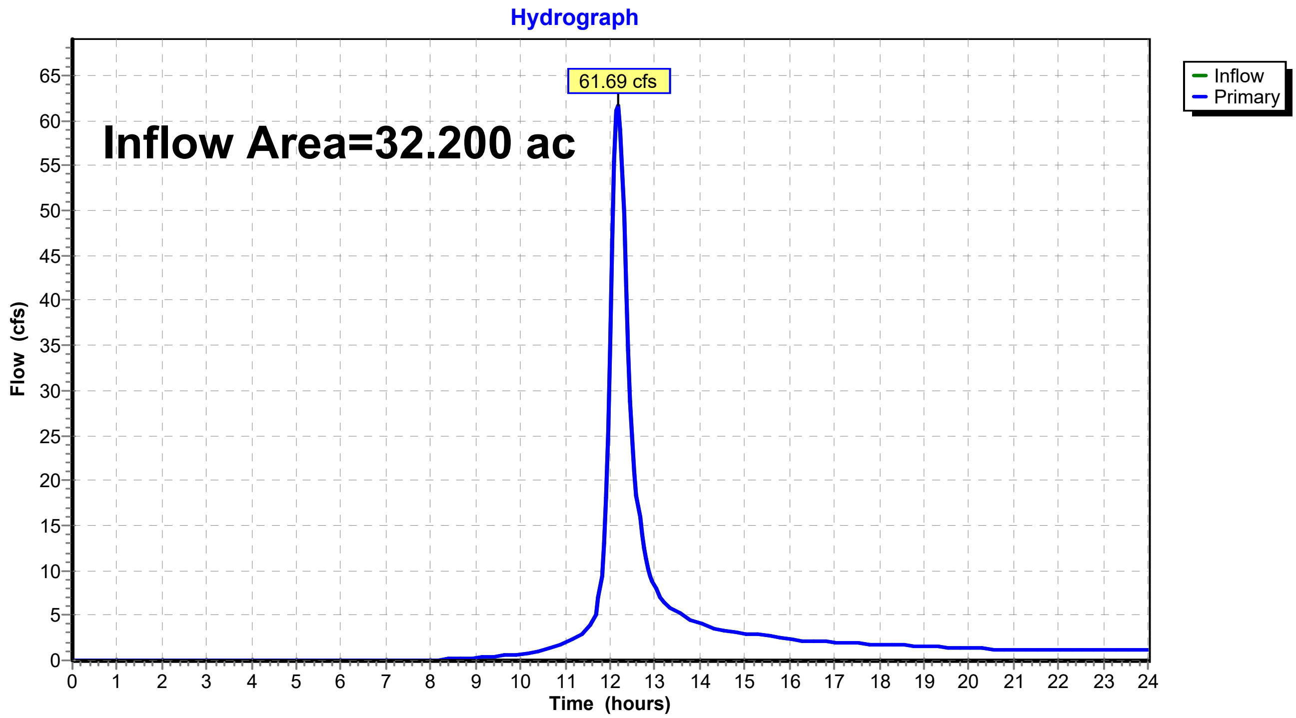
Link 4L: East RP



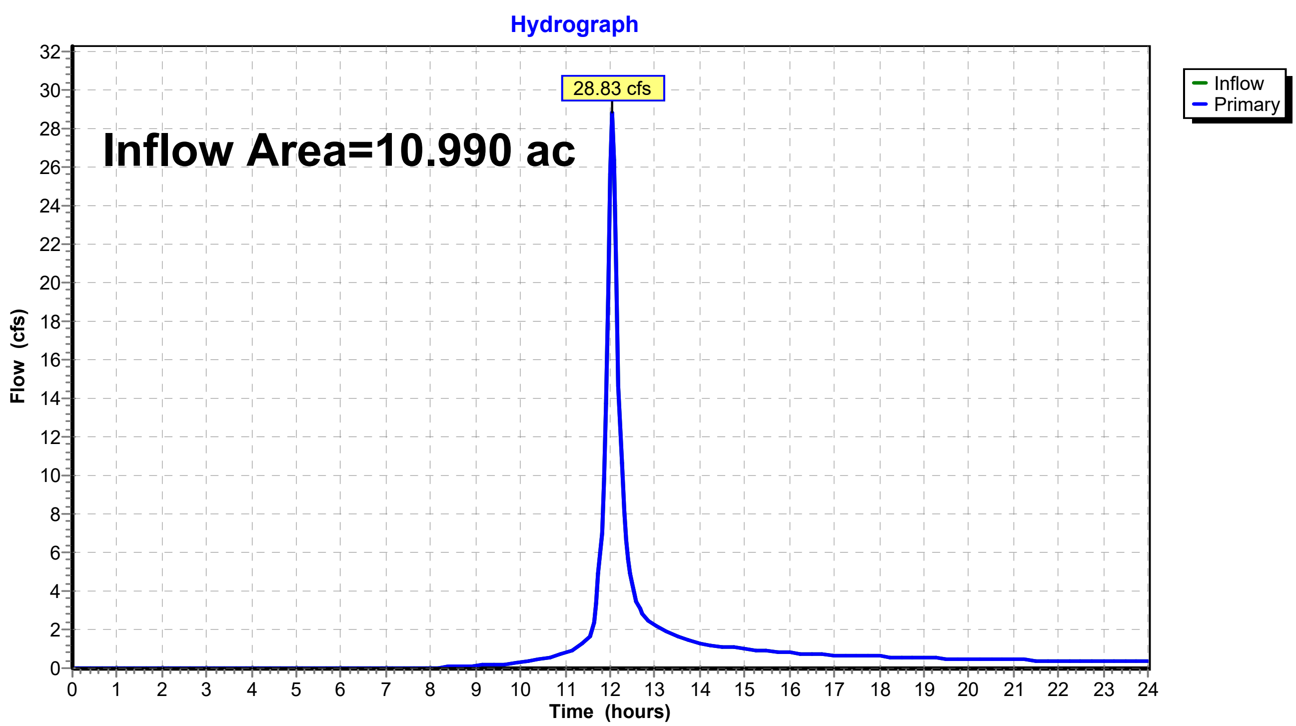
Link 6L: West RP



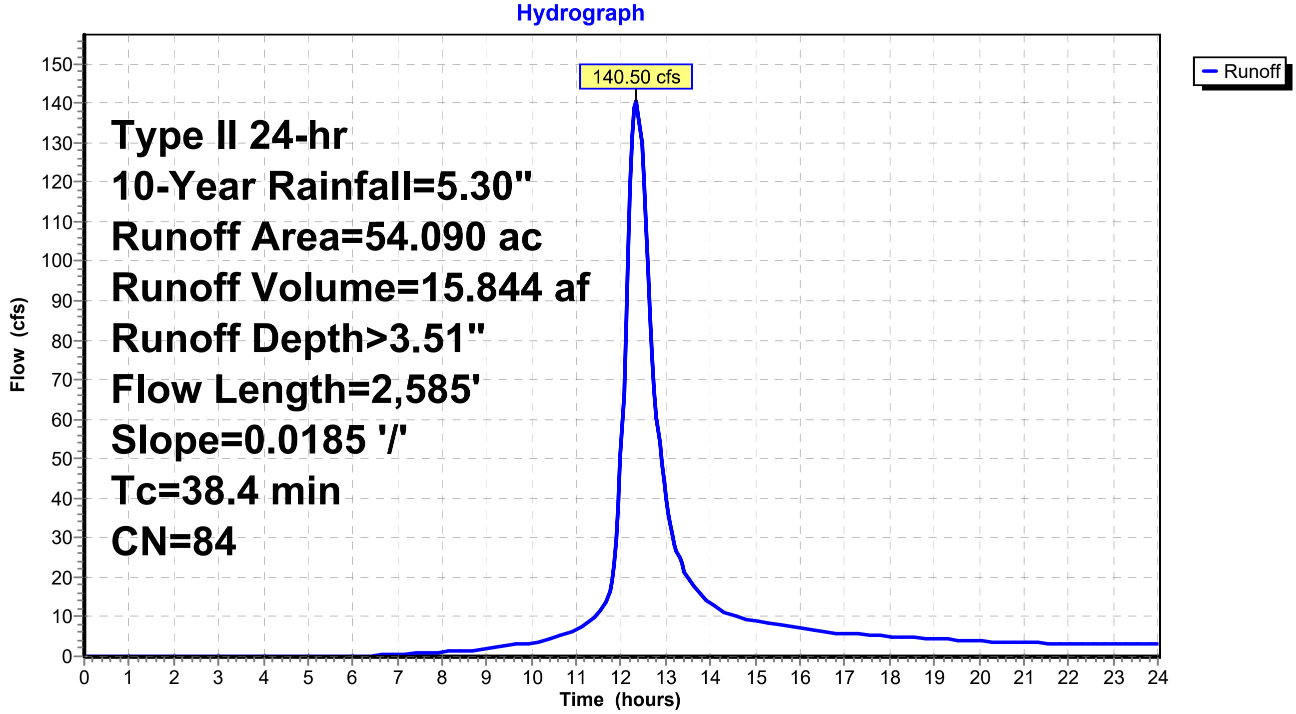
Link 11L: NW RP



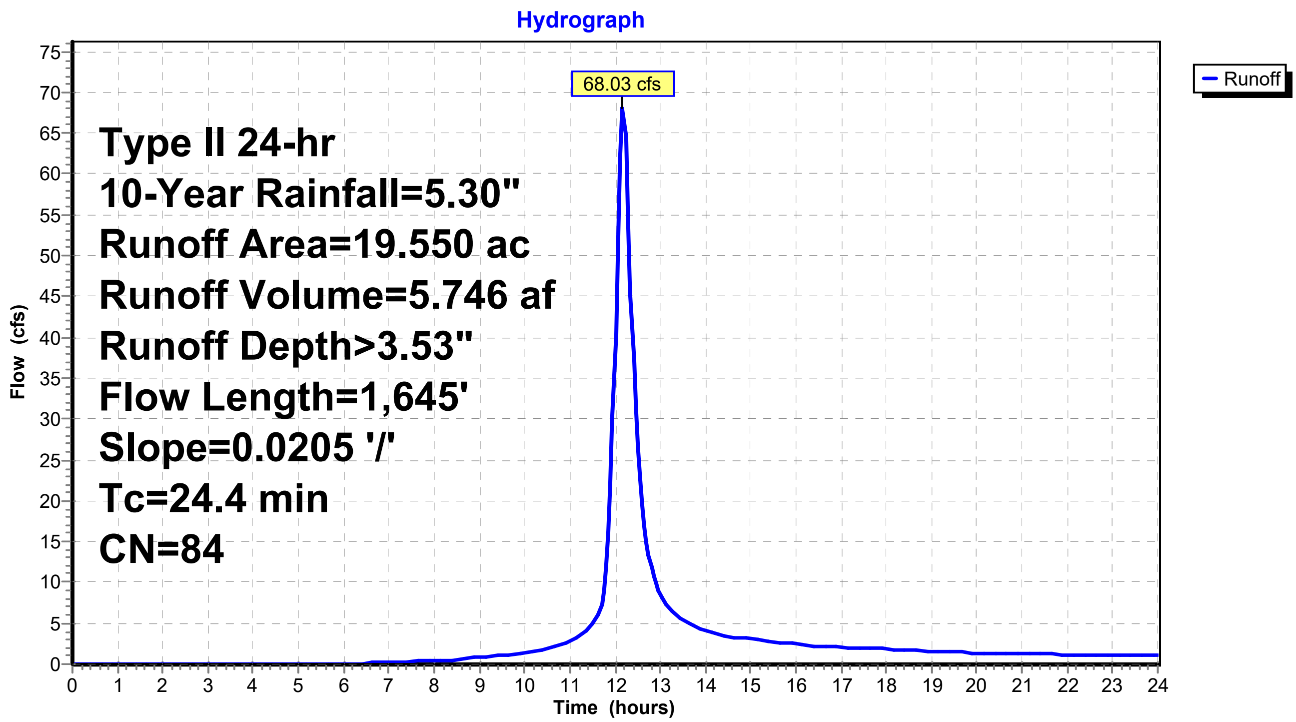
Link 13L: NE RP



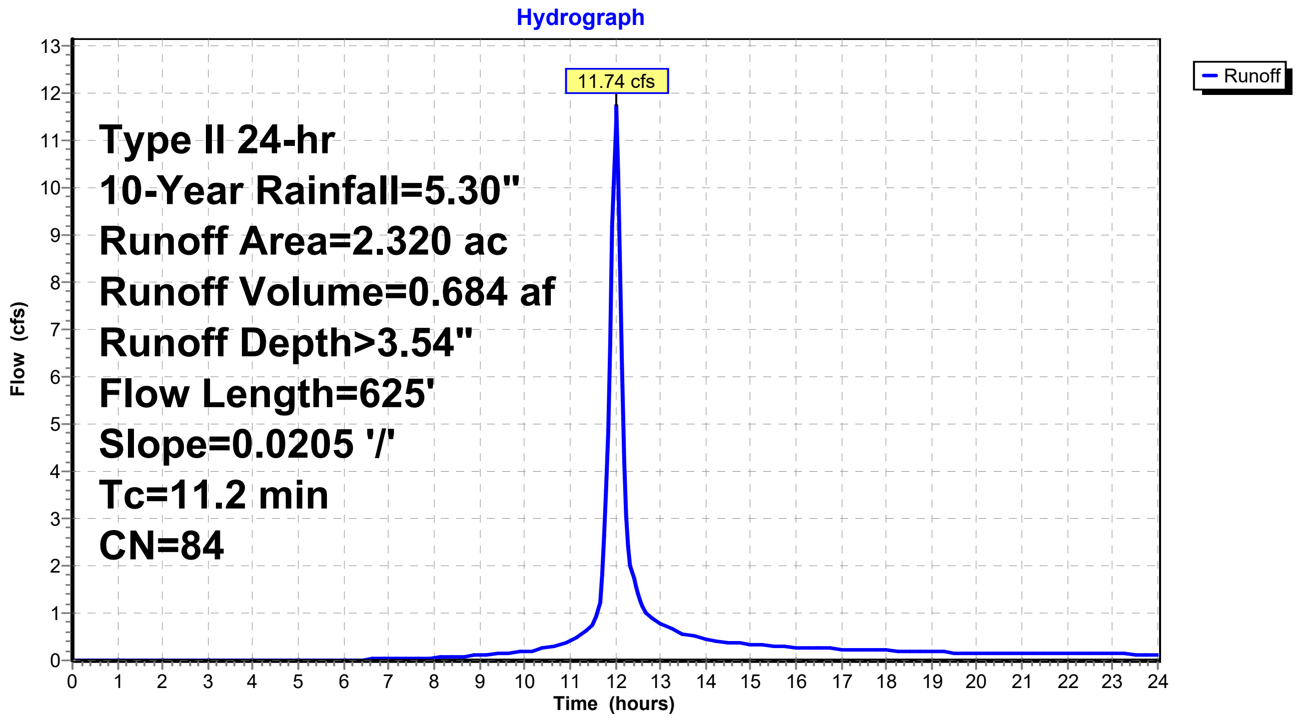
Subcatchment 5S: West DA - Onsite



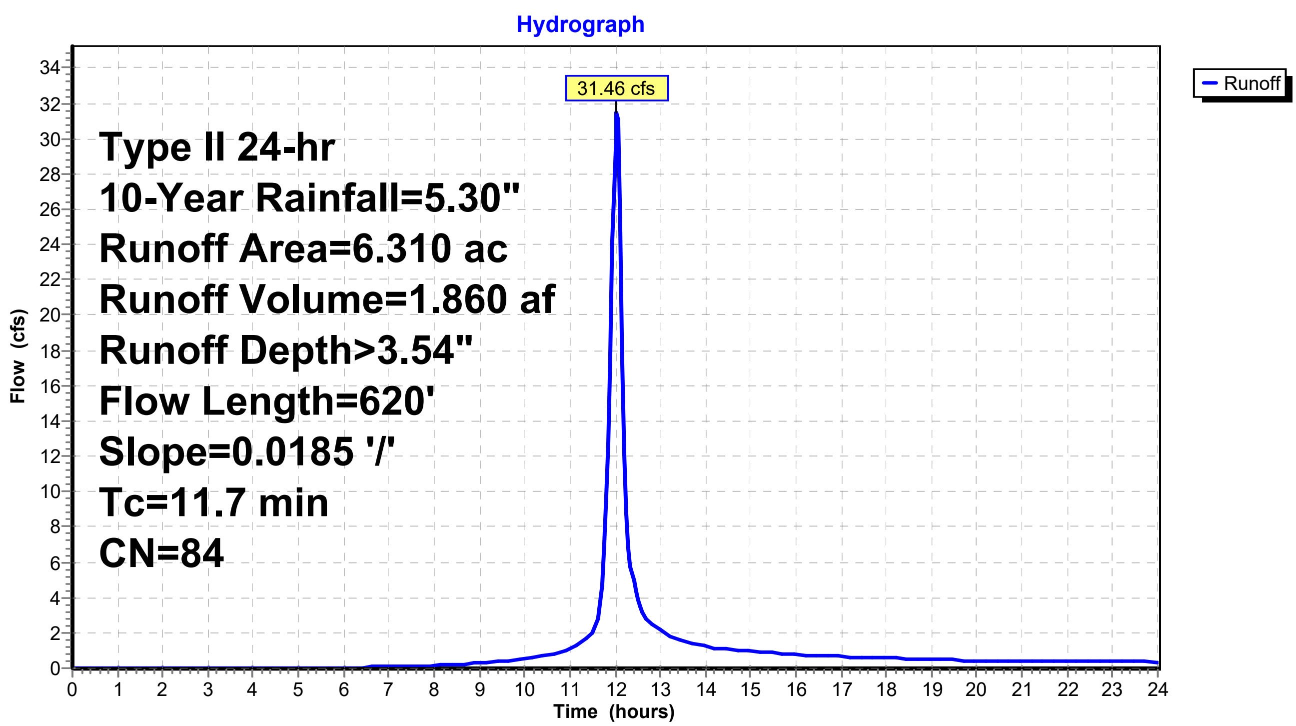
Subcatchment 8S: East DA - OffSite



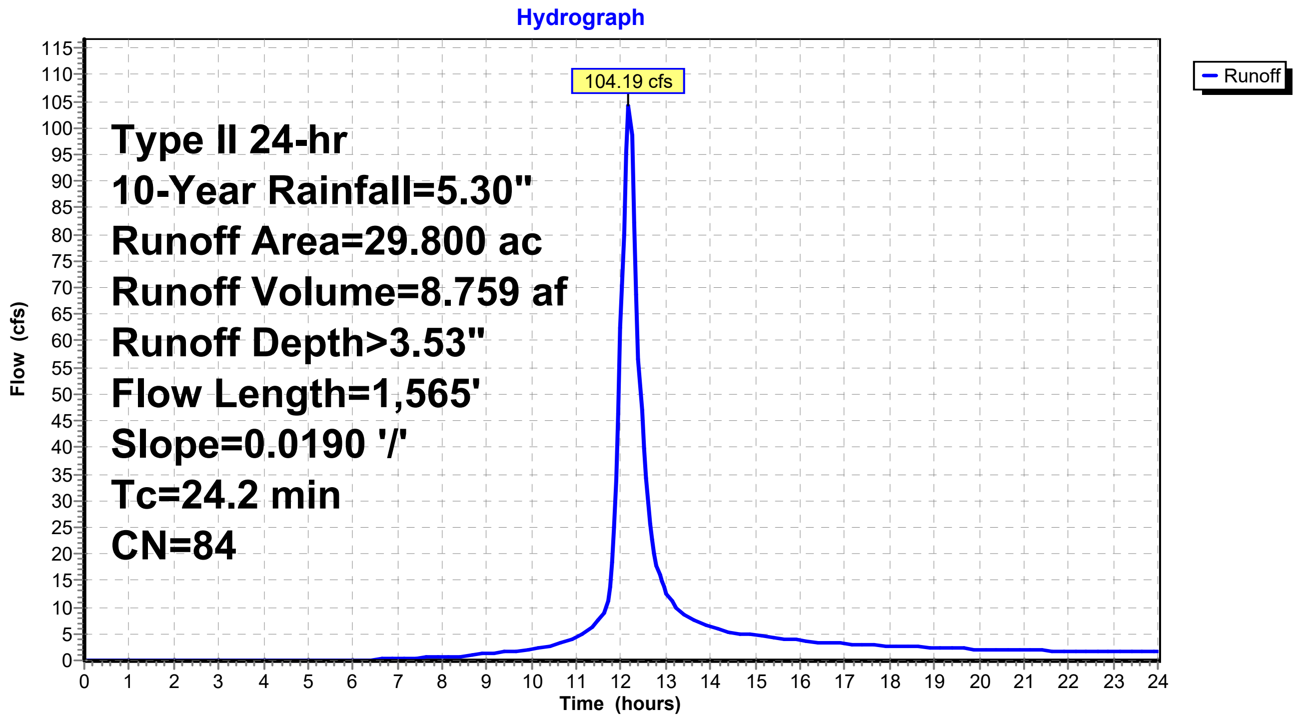
Subcatchment 9S: East Bypass



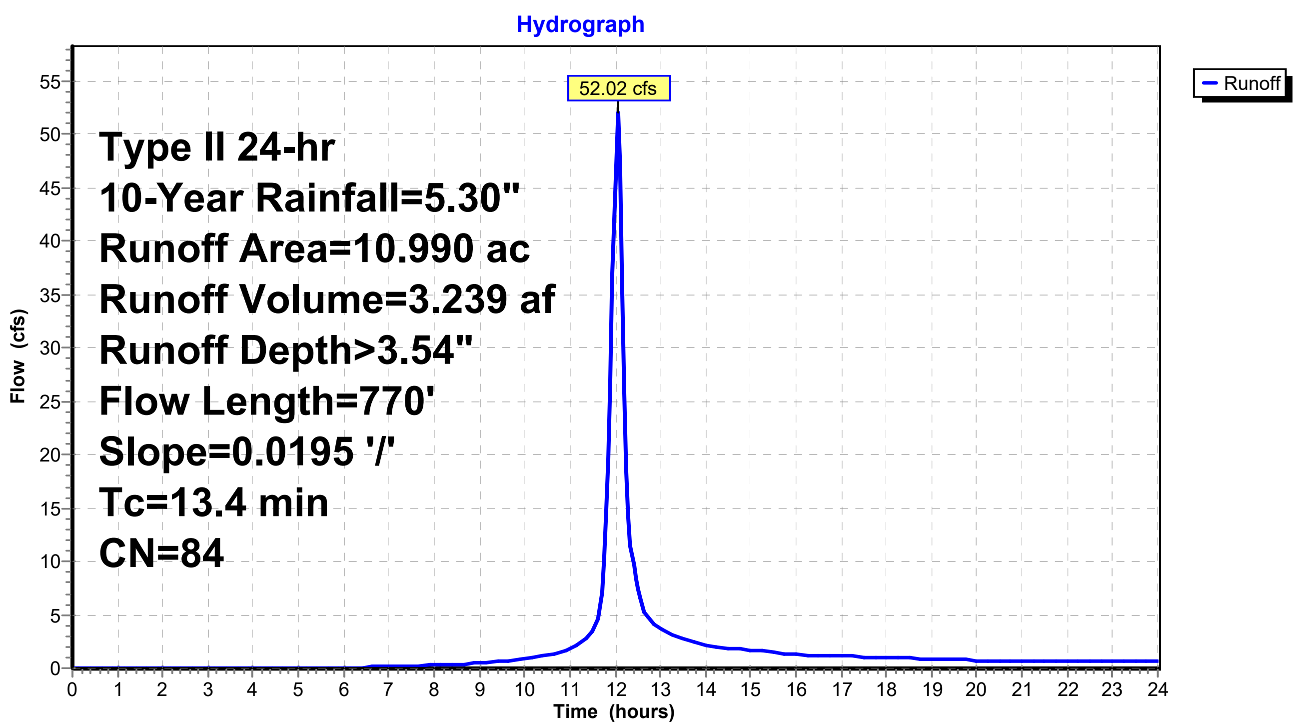
Subcatchment 10S: West DA - OffSite



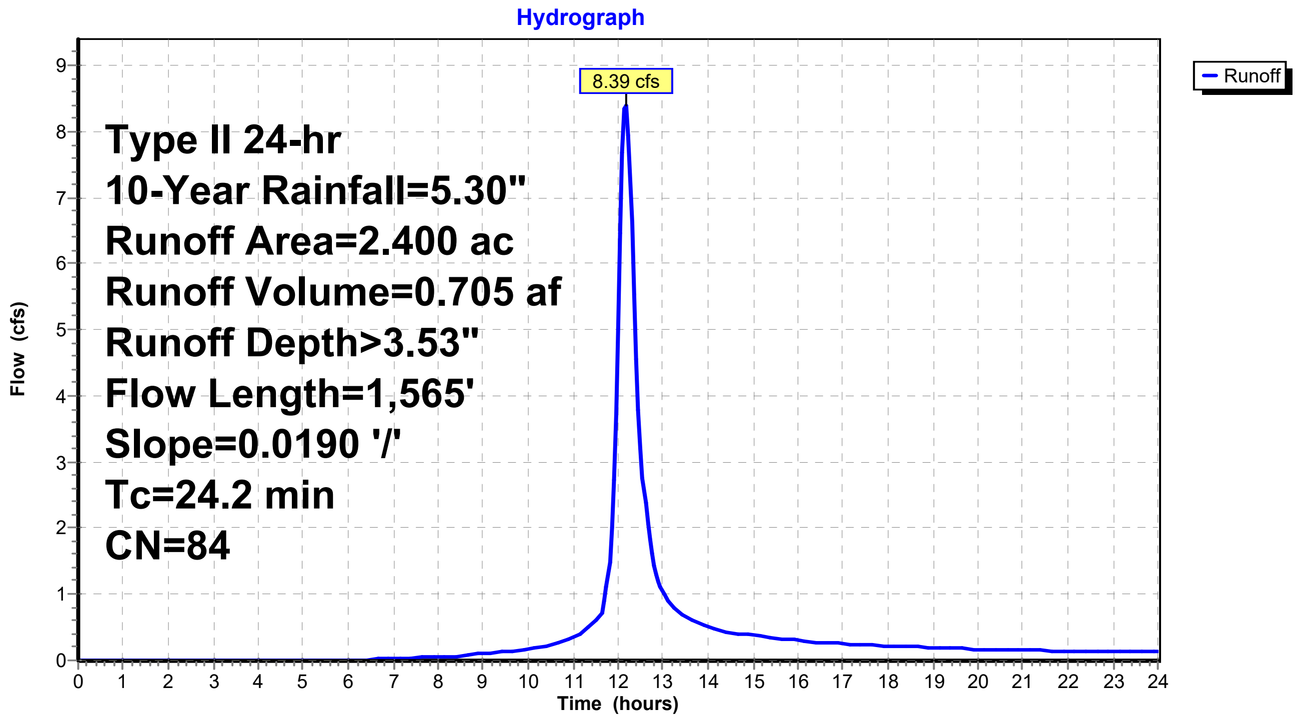
Subcatchment 12S: Northwest DA



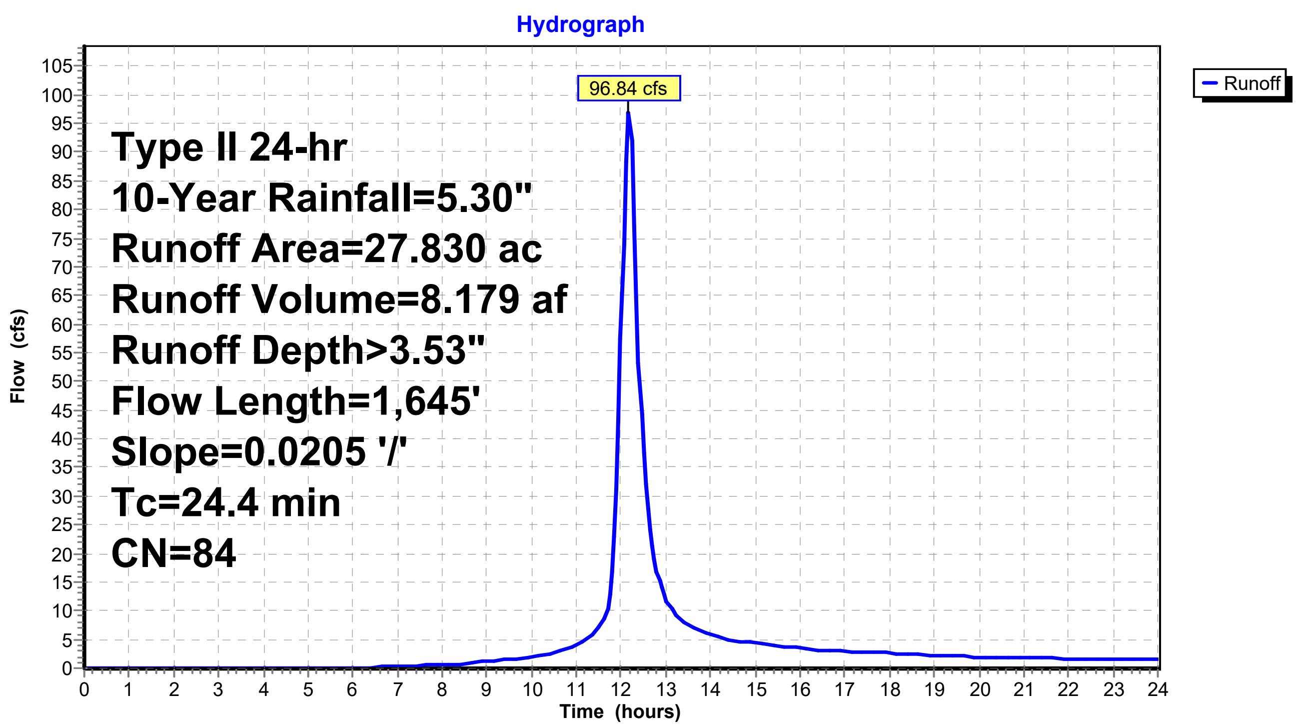
Subcatchment 14S: Northeast DA



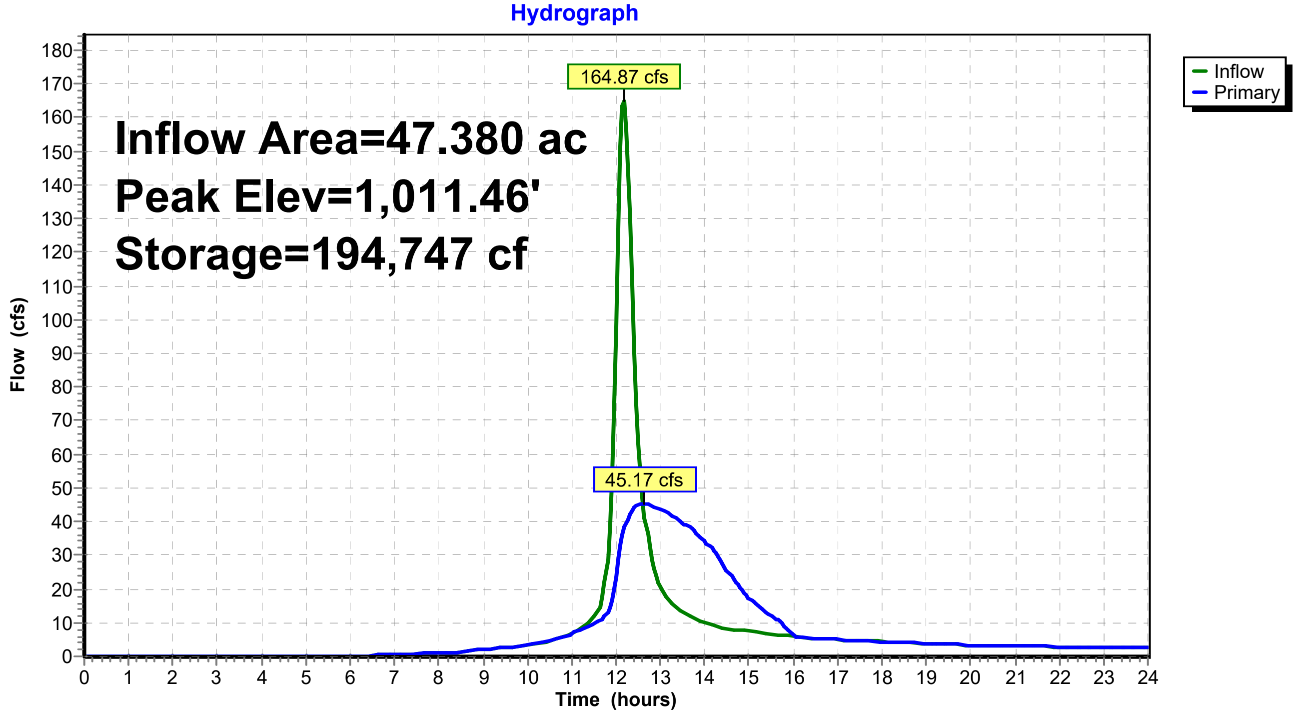
Subcatchment 71S: Northwest DA - Offsite



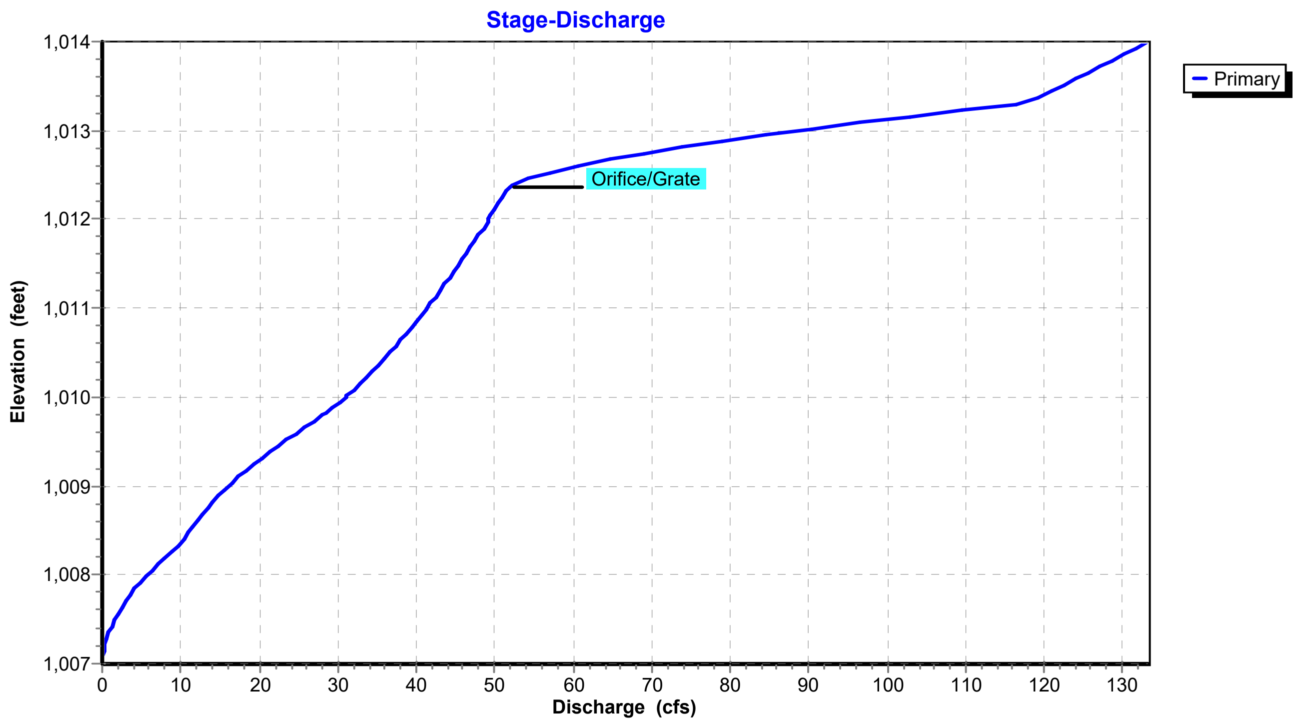
Subcatchment 72S: East DA - OnSite



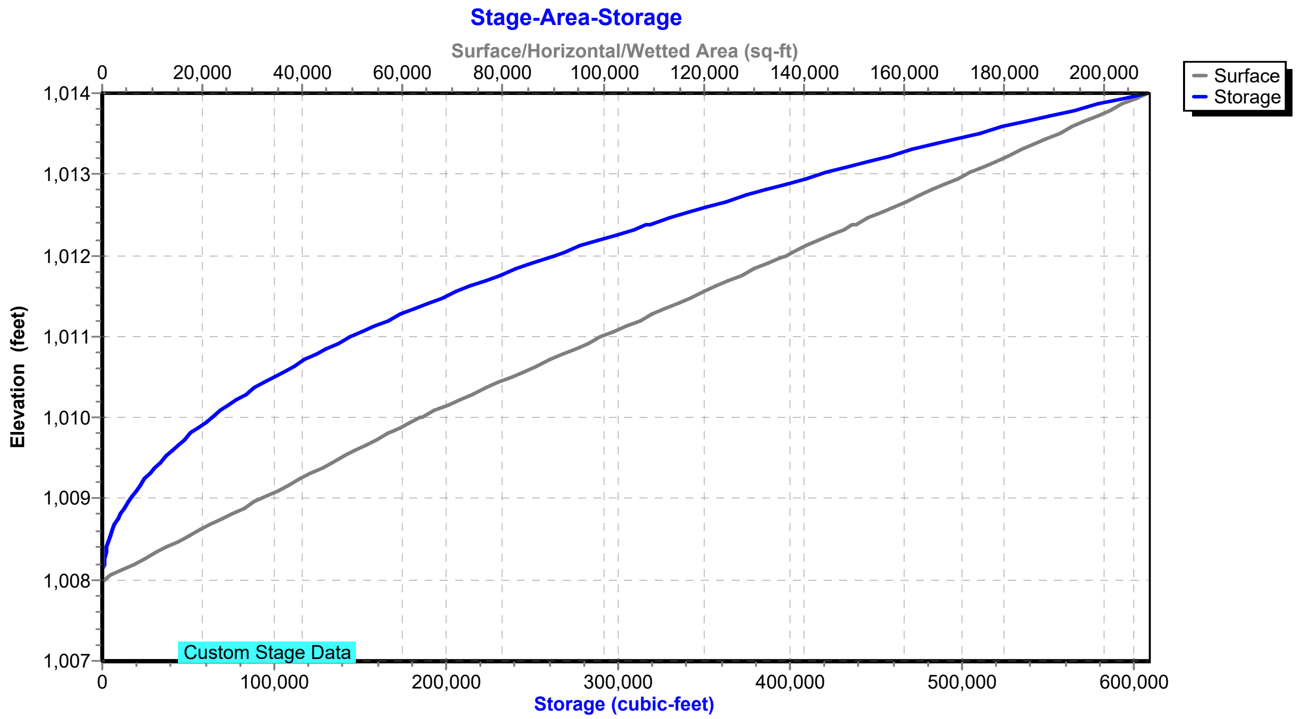
Pond 3P: Existing East Basin



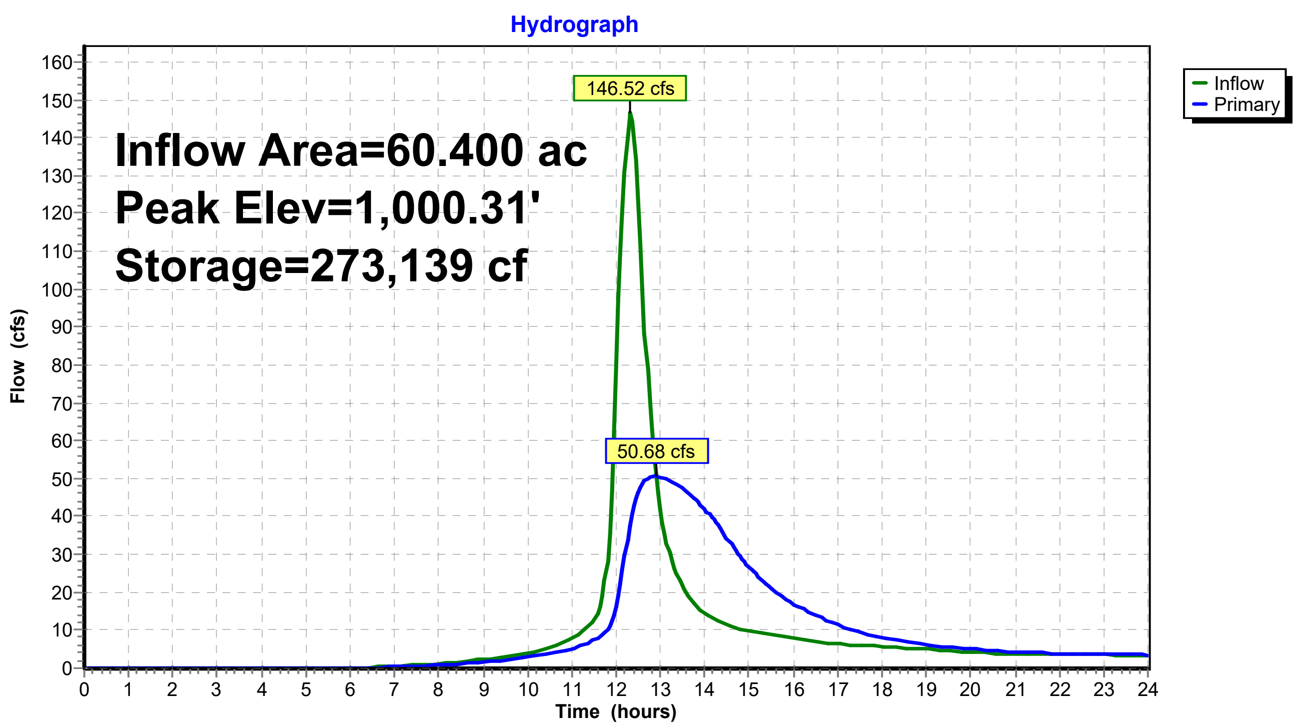
Pond 3P: Existing East Basin



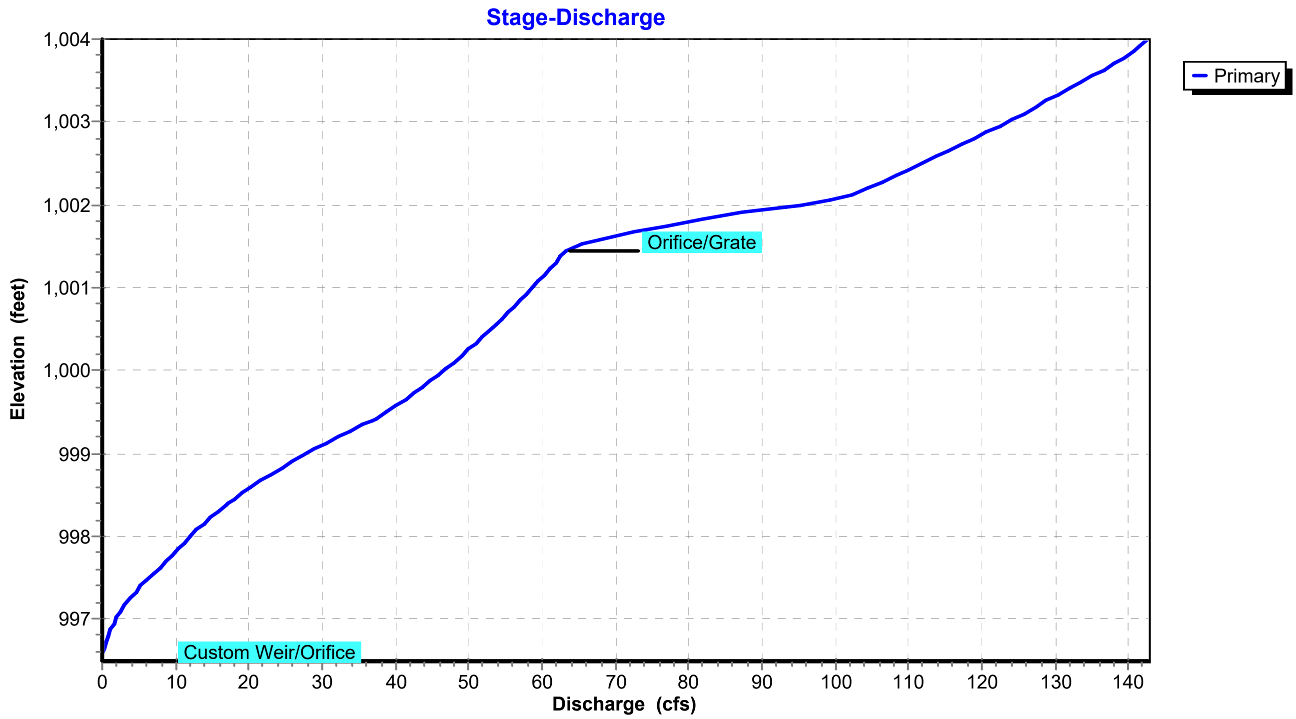
Pond 3P: Existing East Basin



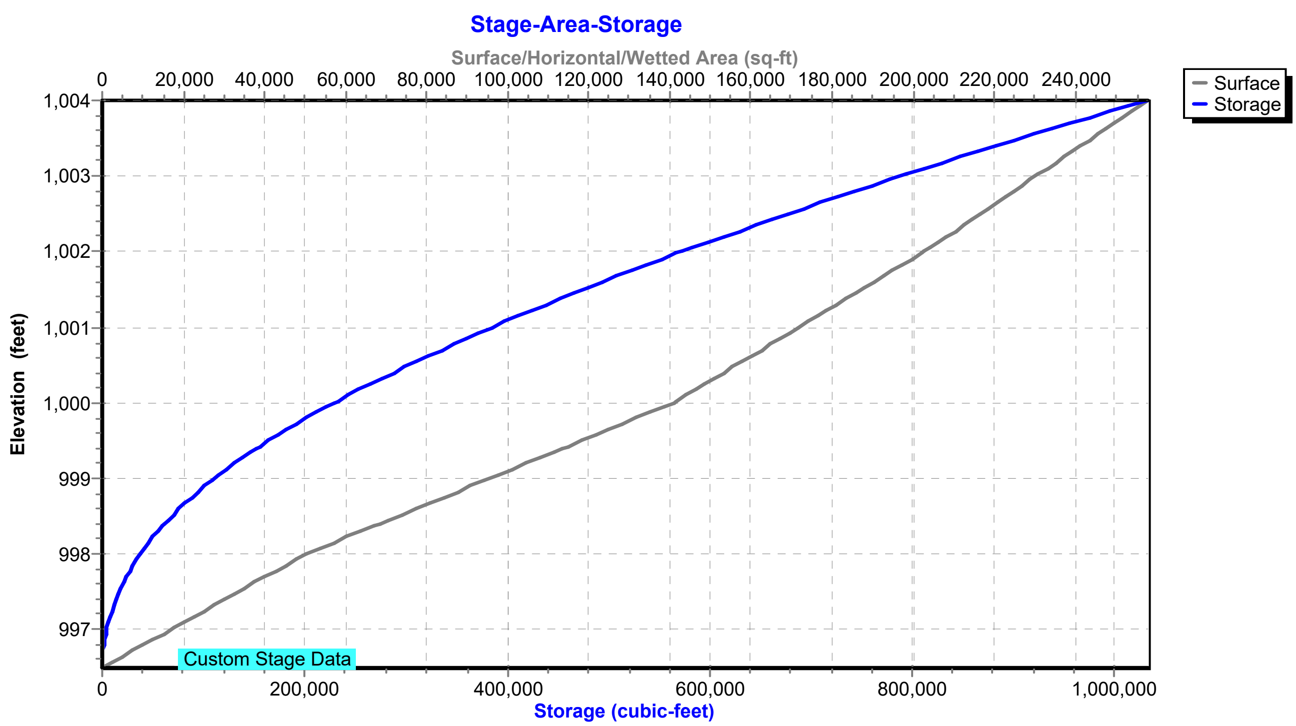
Pond 7P: Existing West Basin



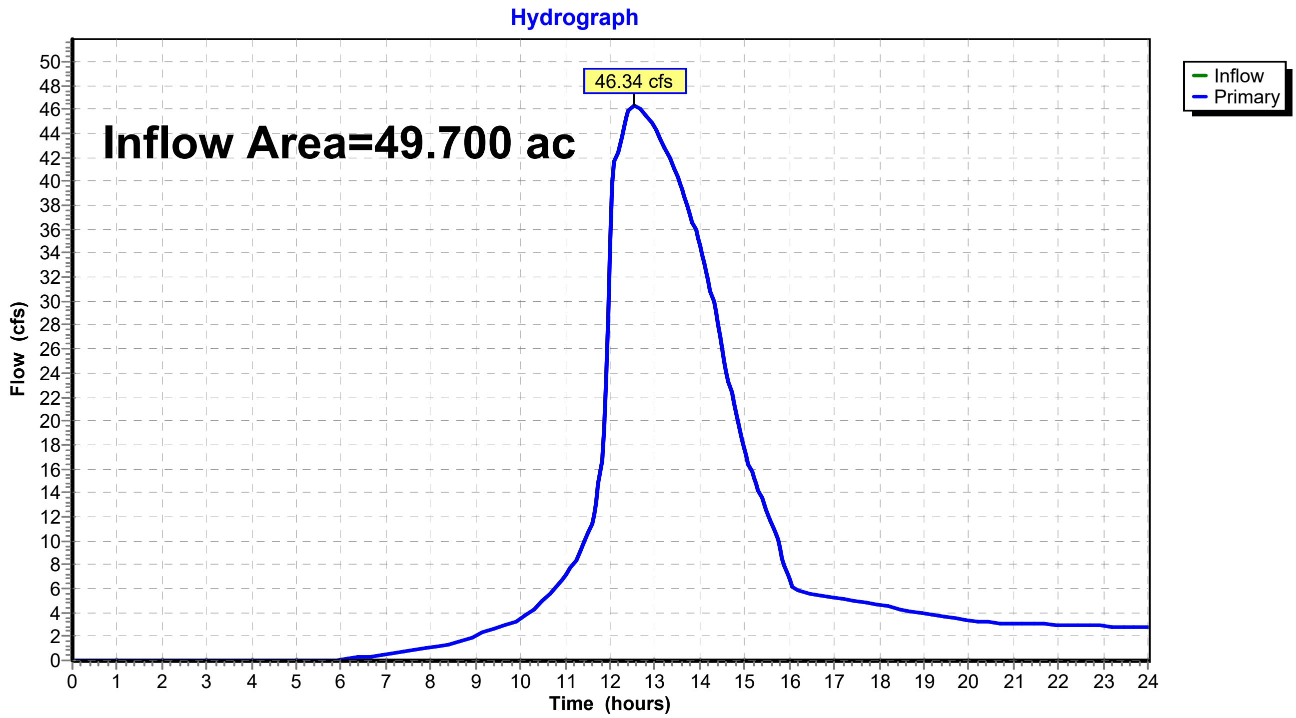
Pond 7P: Existing West Basin



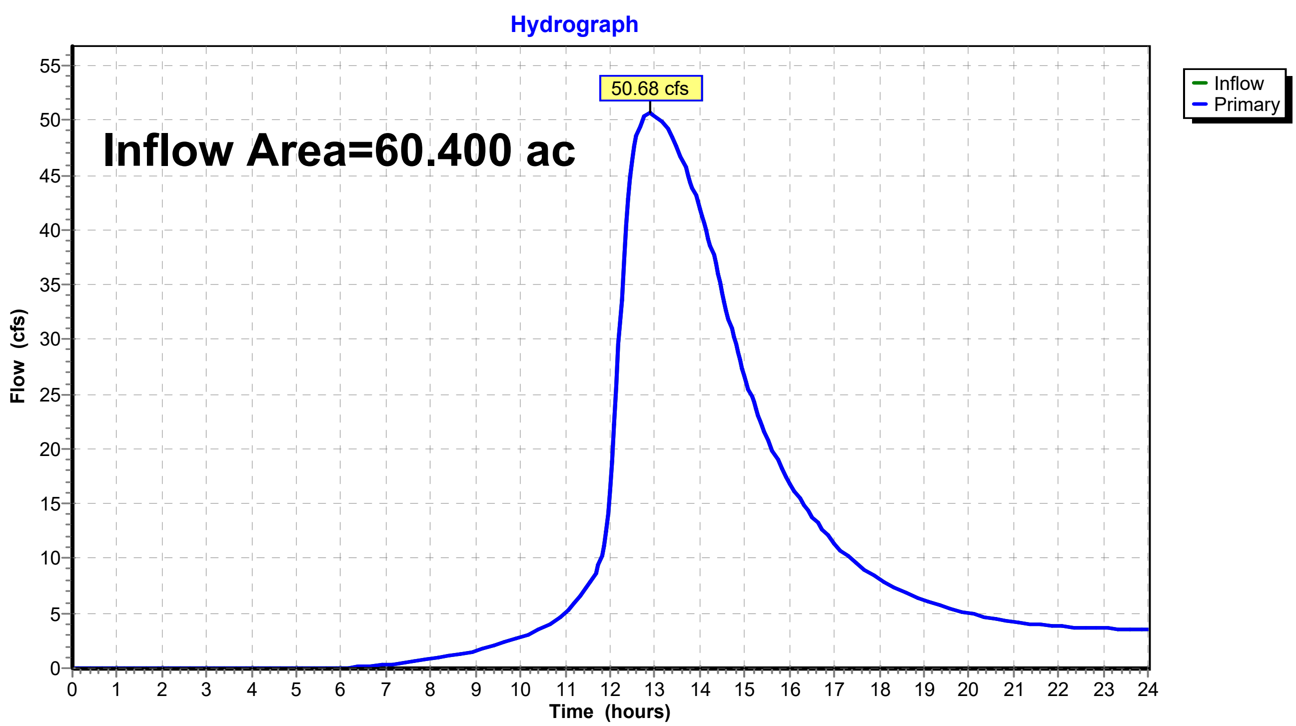
Pond 7P: Existing West Basin



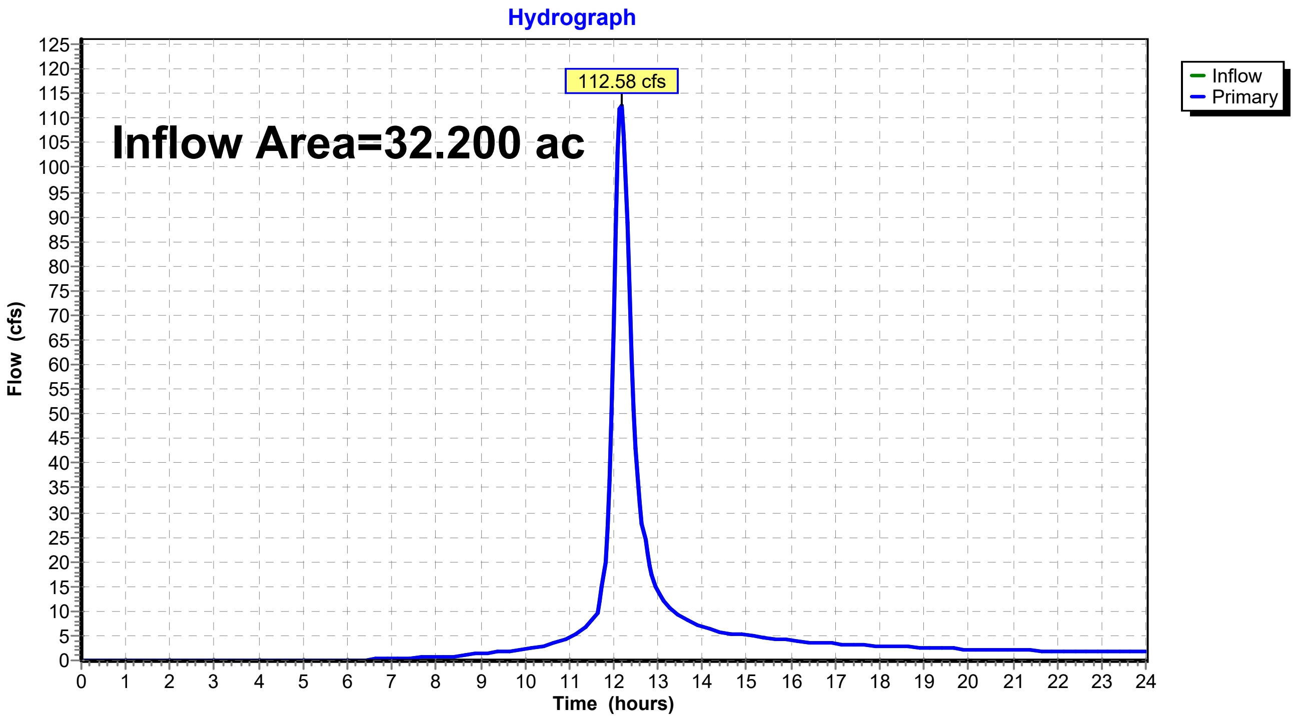
Link 4L: East RP



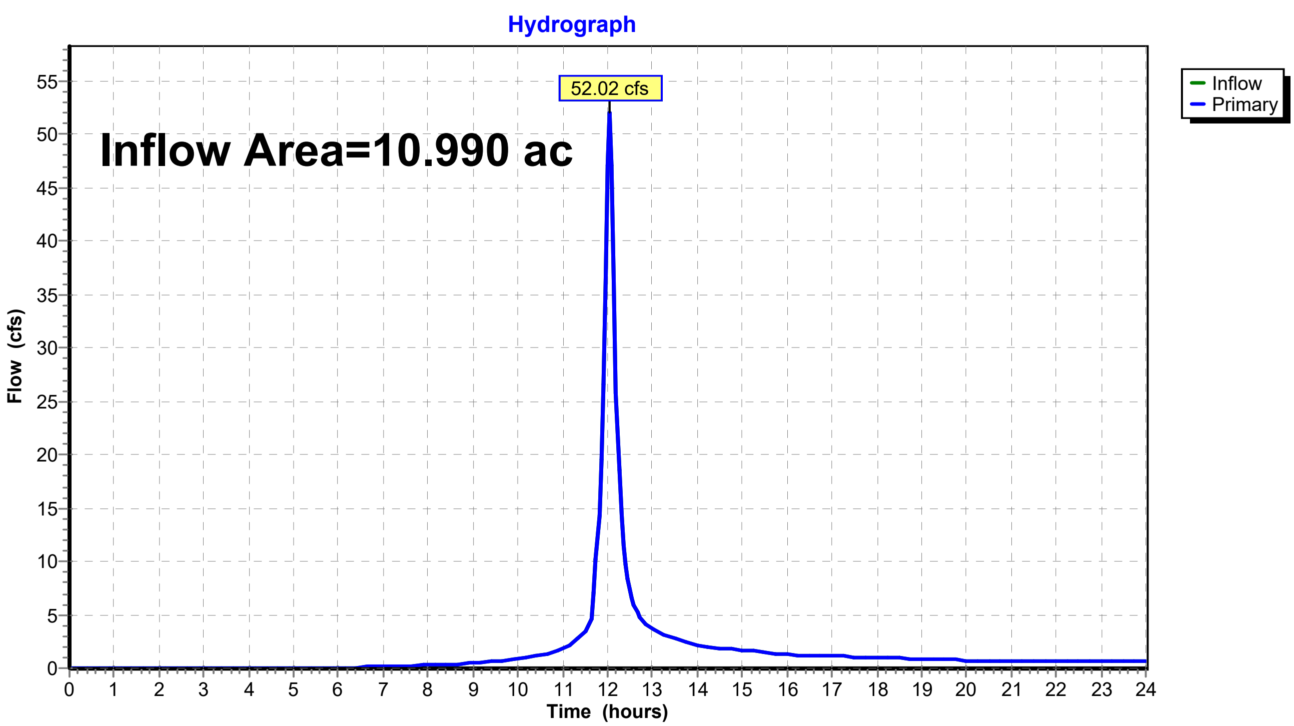
Link 6L: West RP



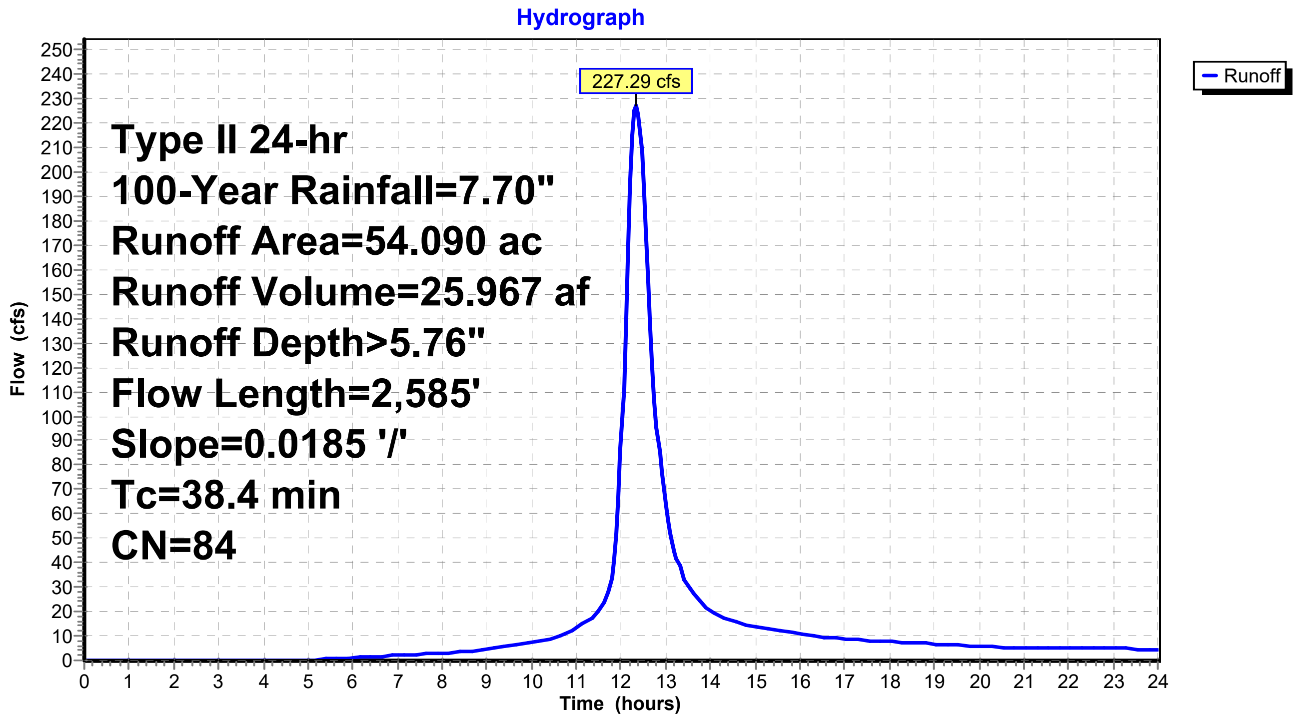
Link 11L: NW RP



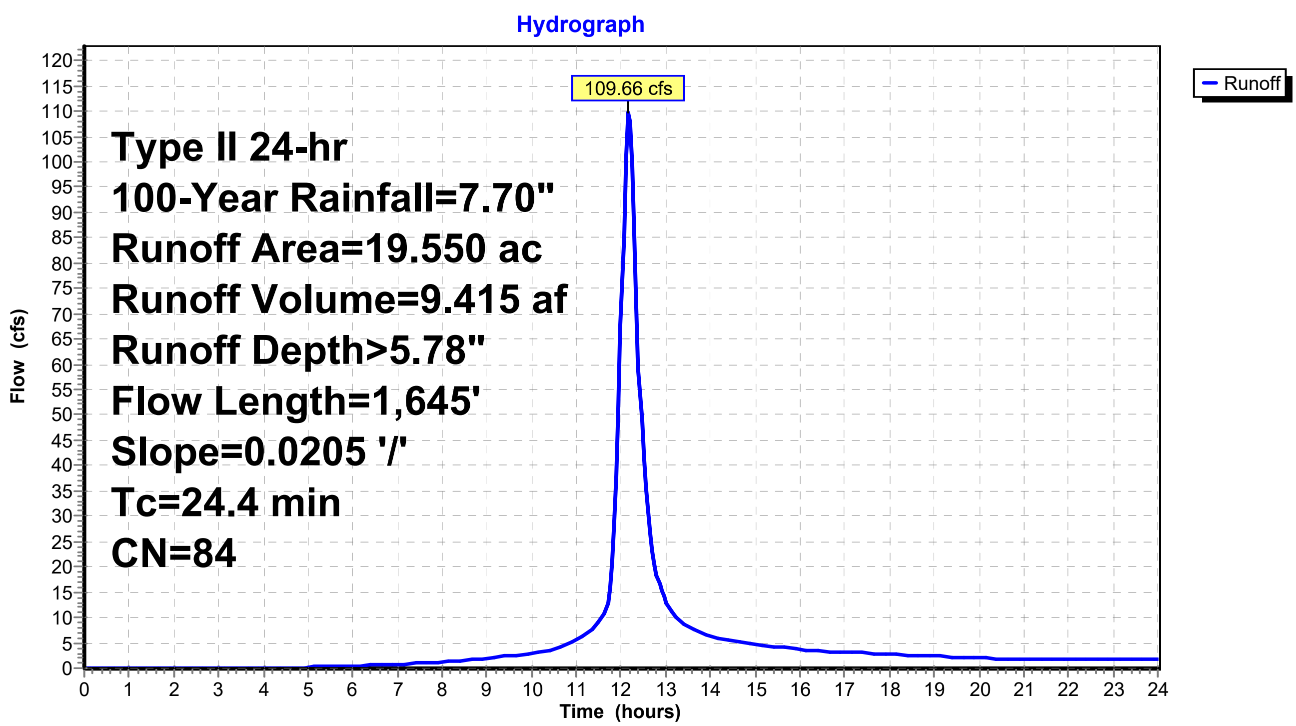
Link 13L: NE RP



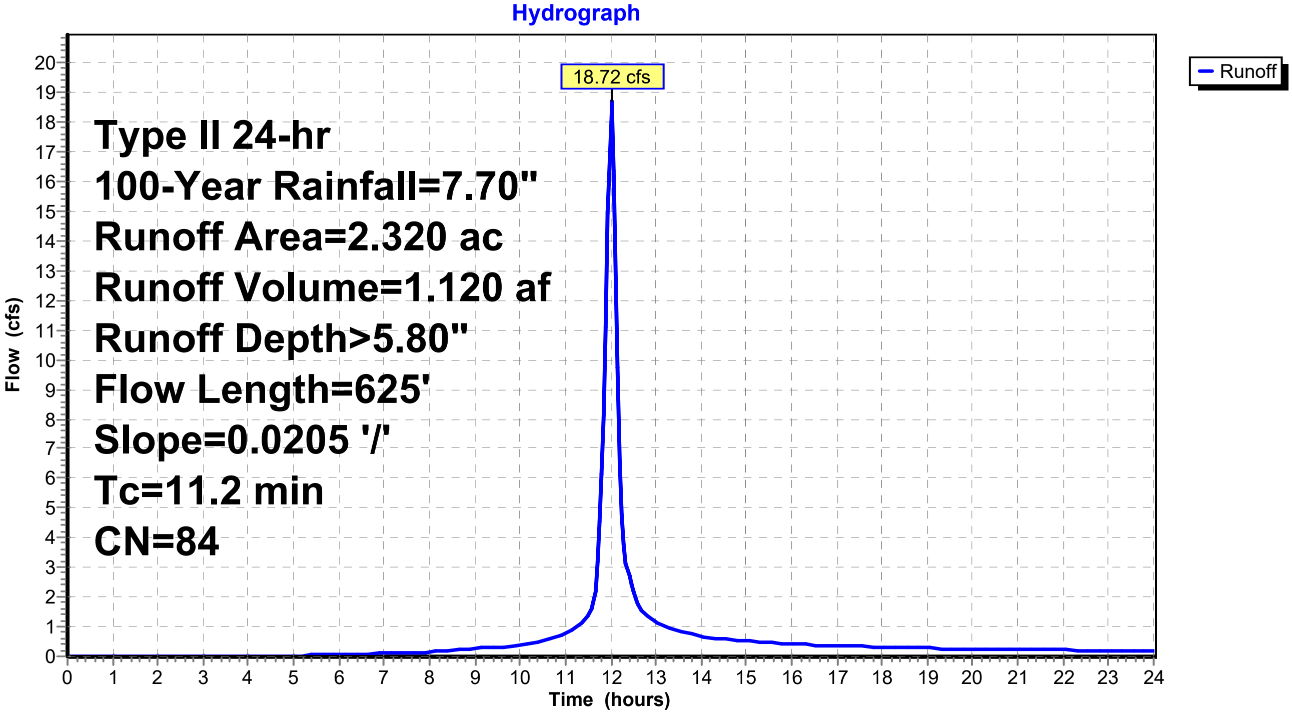
Subcatchment 5S: West DA - Onsite



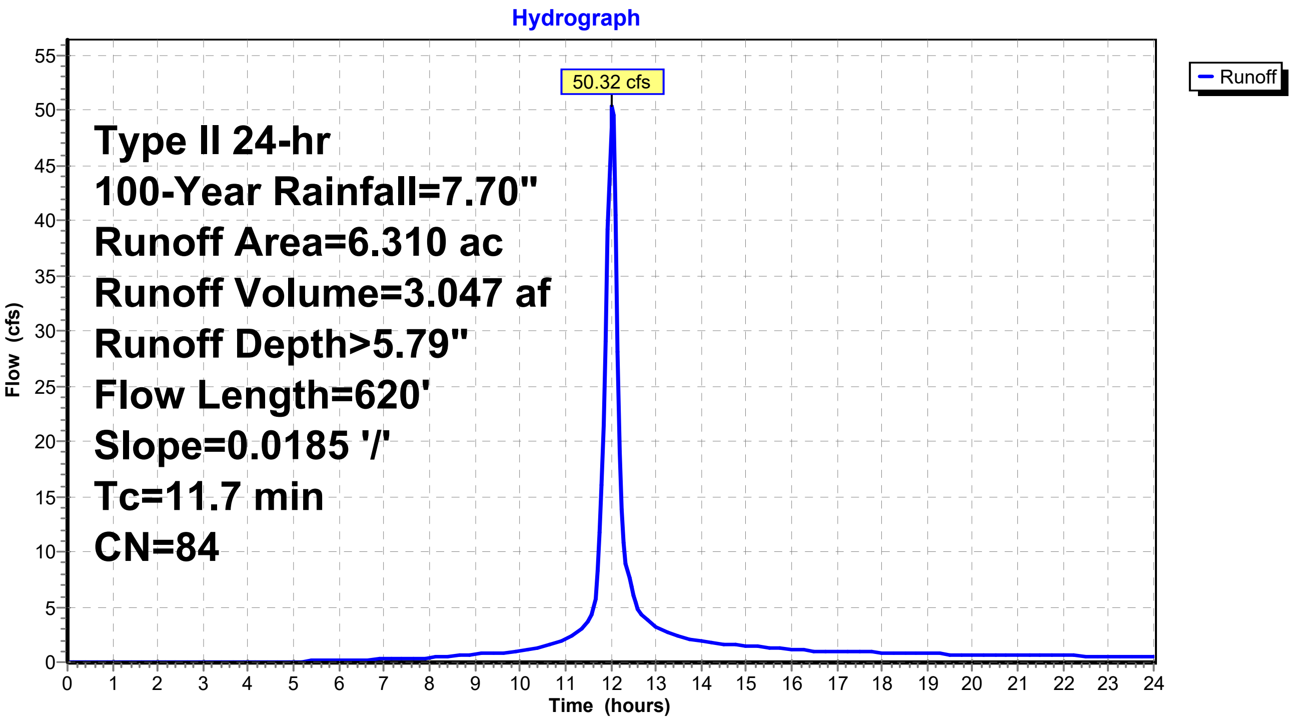
Subcatchment 8S: East DA - OffSite



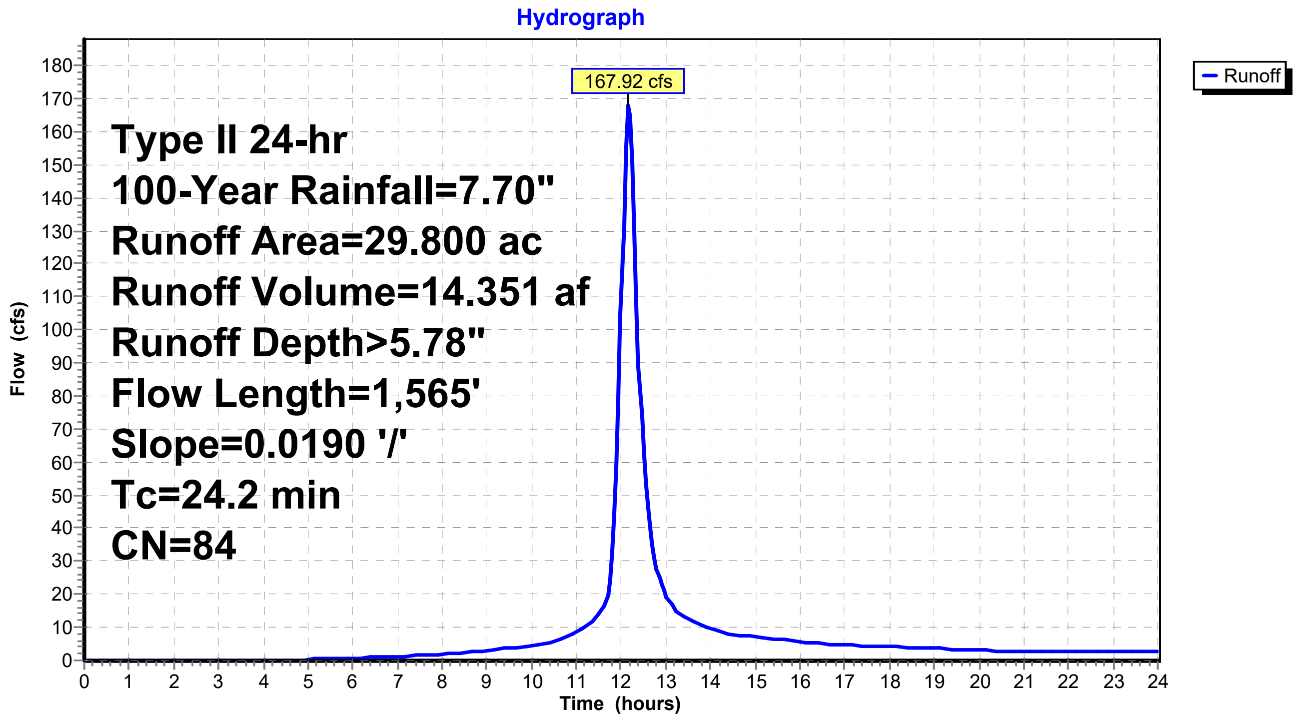
Subcatchment 9S: East Bypass



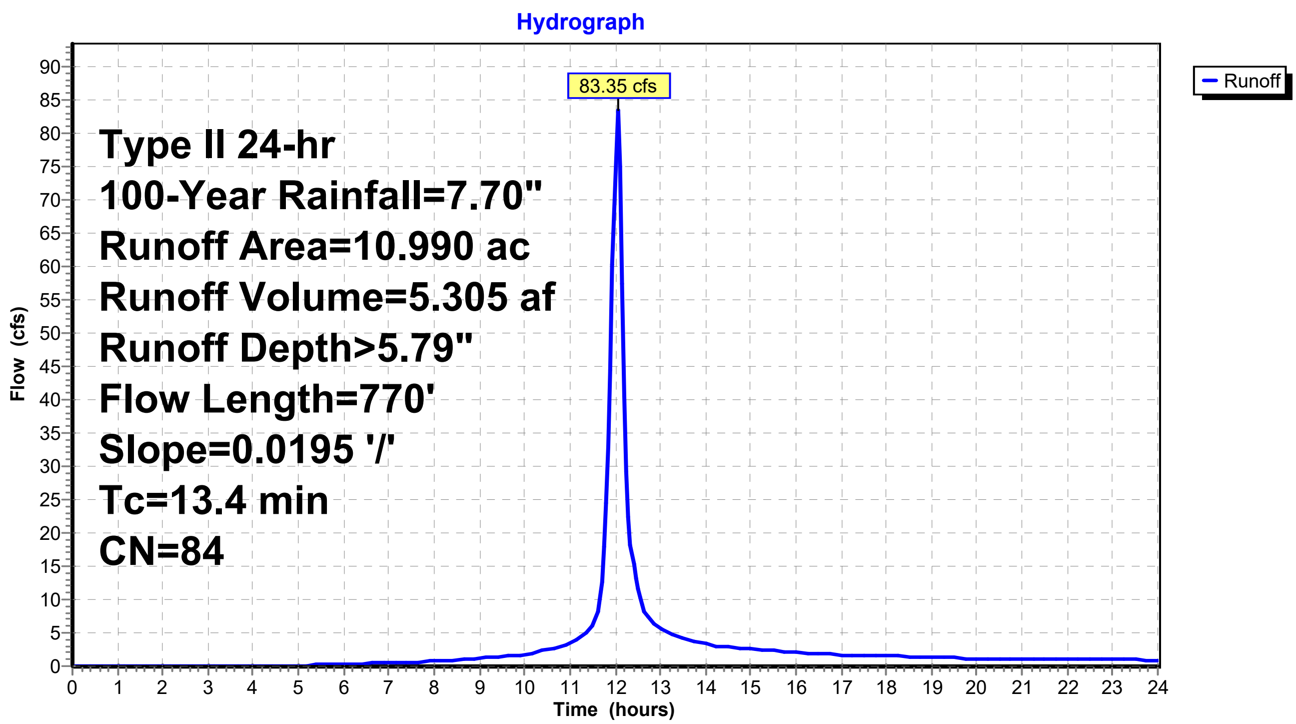
Subcatchment 10S: West DA - OffSite



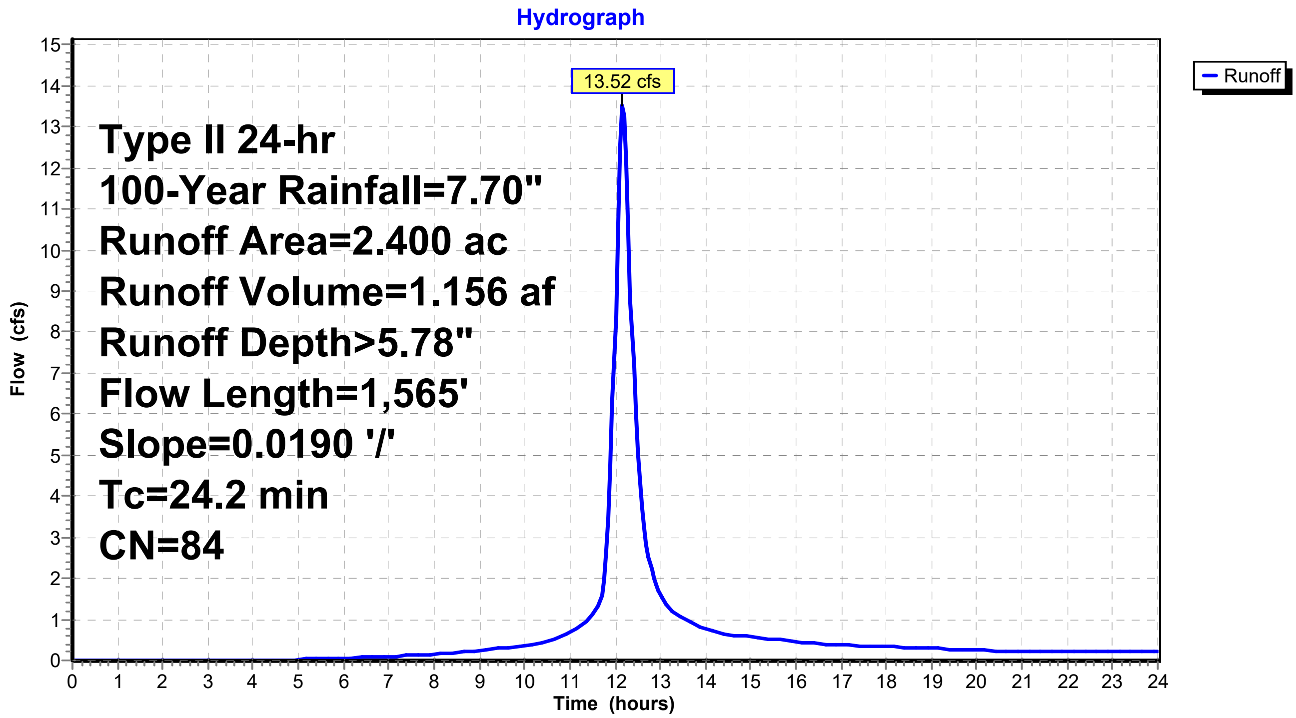
Subcatchment 12S: Northwest DA



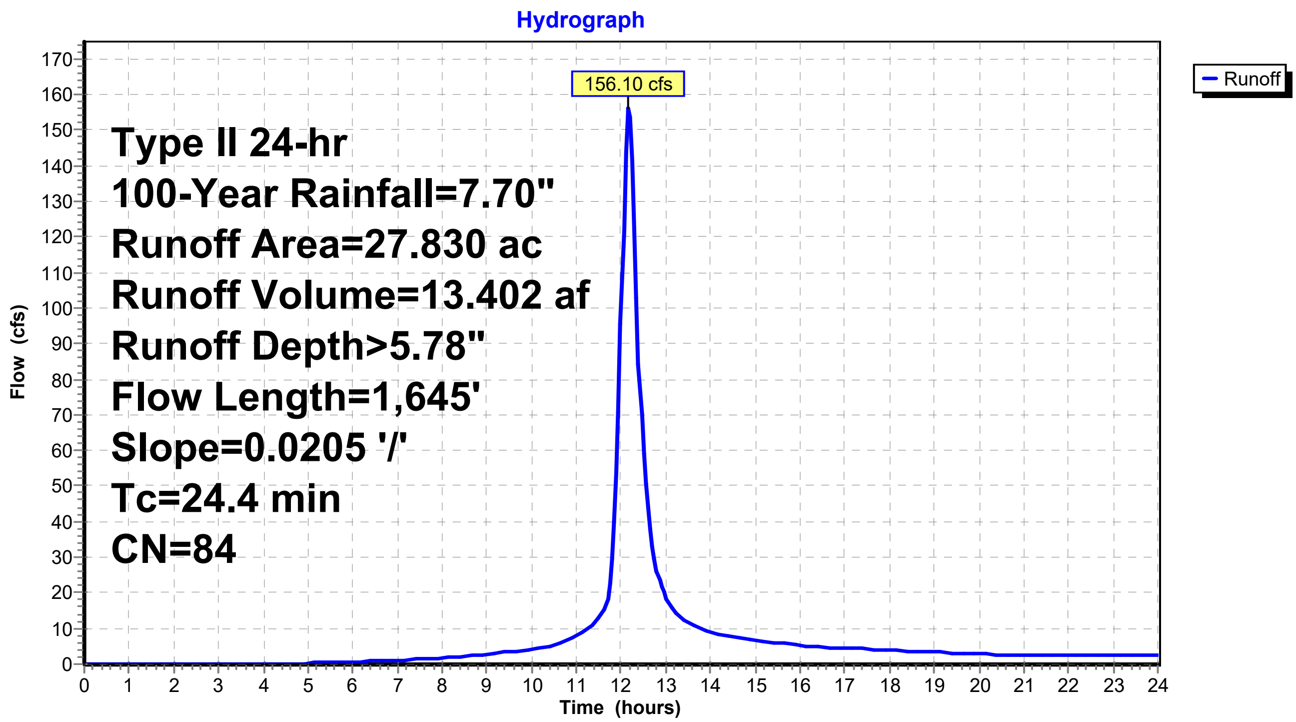
Subcatchment 14S: Northeast DA



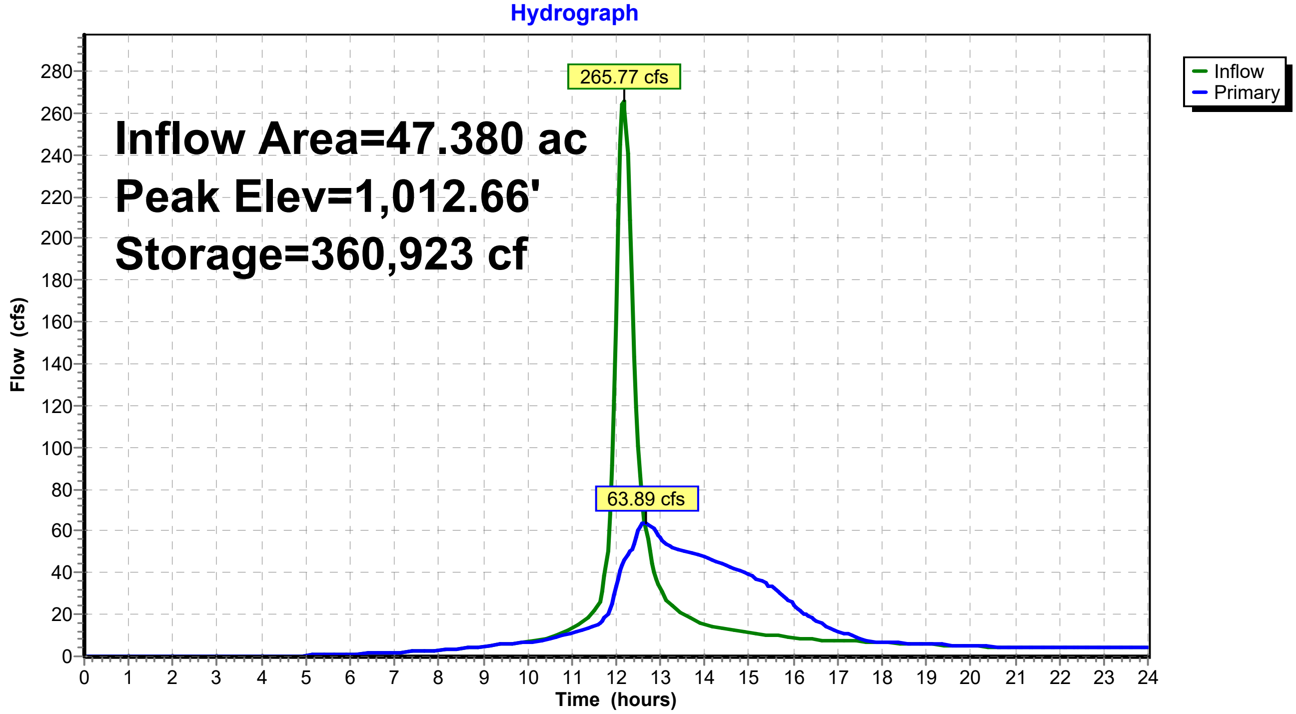
Subcatchment 71S: Northwest DA - Offsite



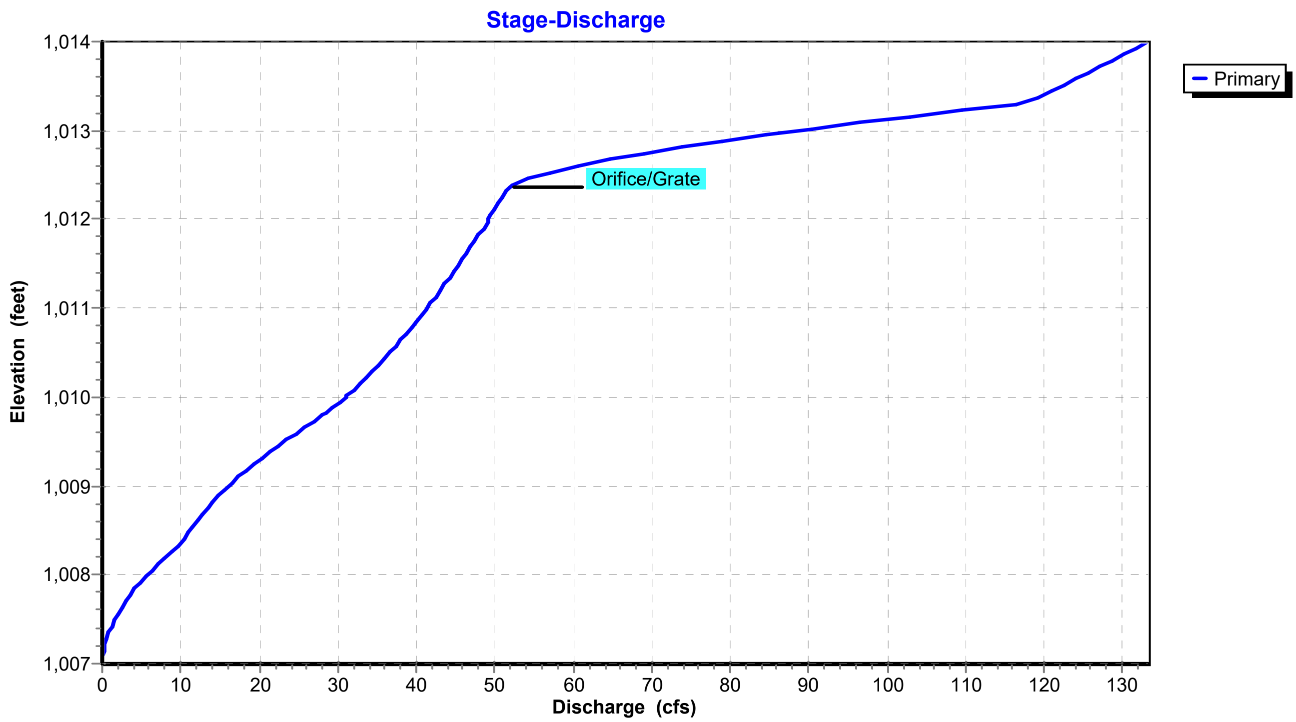
Subcatchment 72S: East DA - OnSite



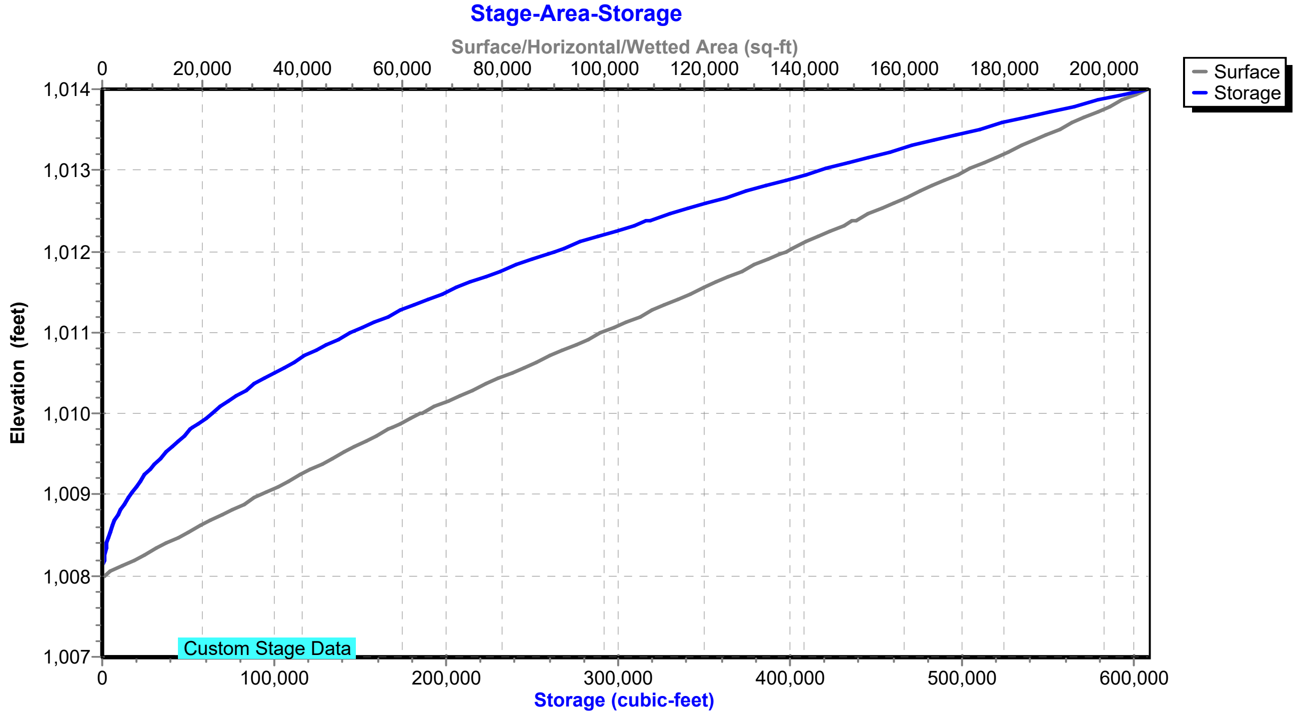
Pond 3P: Existing East Basin



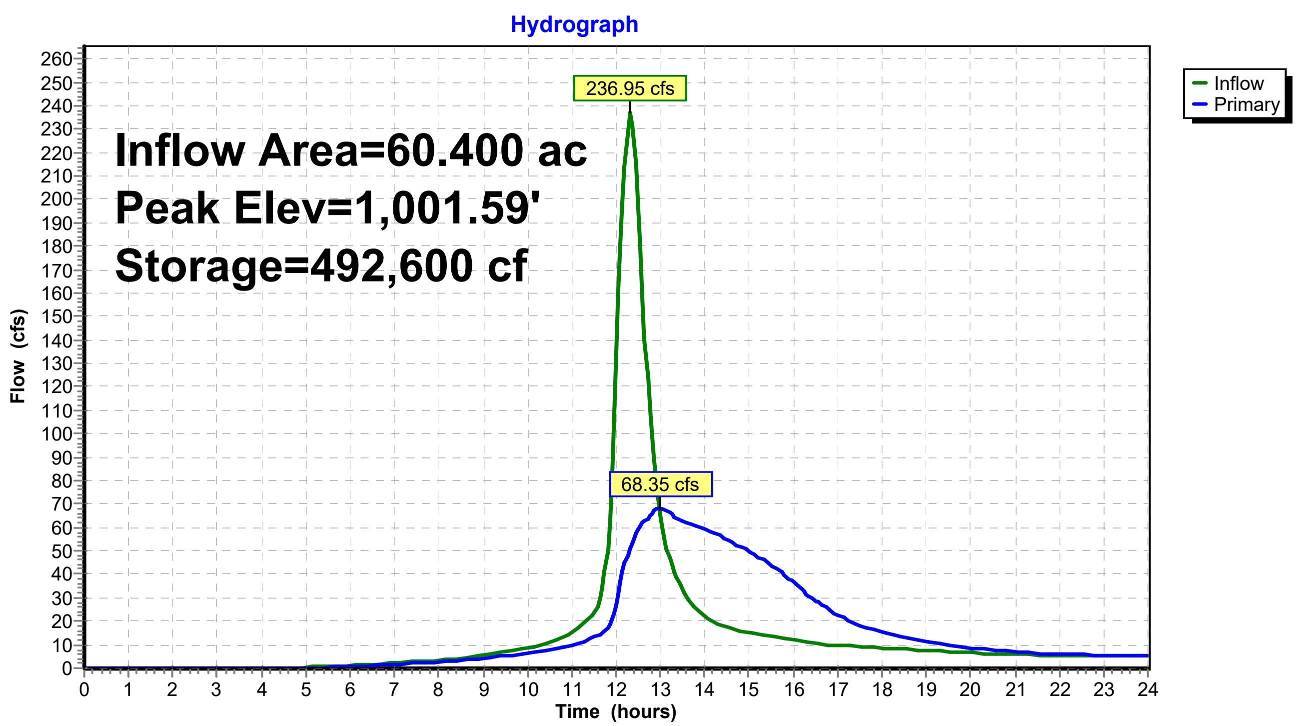
Pond 3P: Existing East Basin



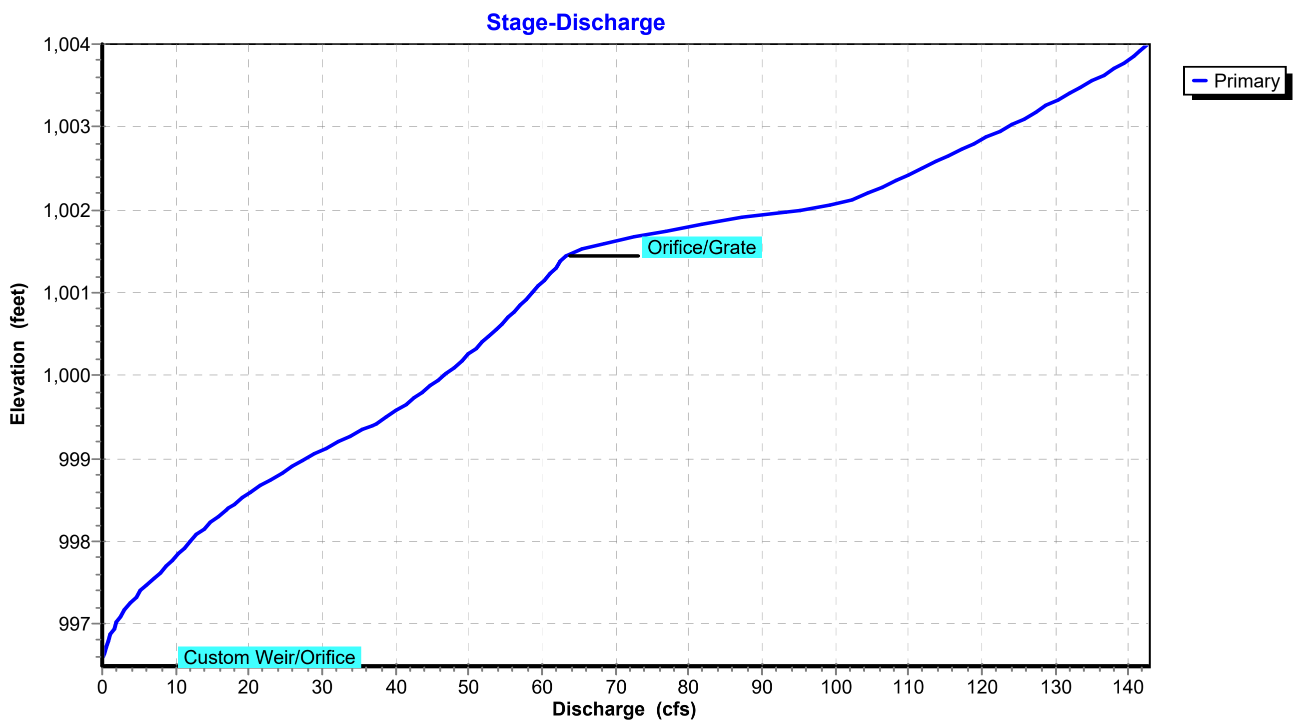
Pond 3P: Existing East Basin



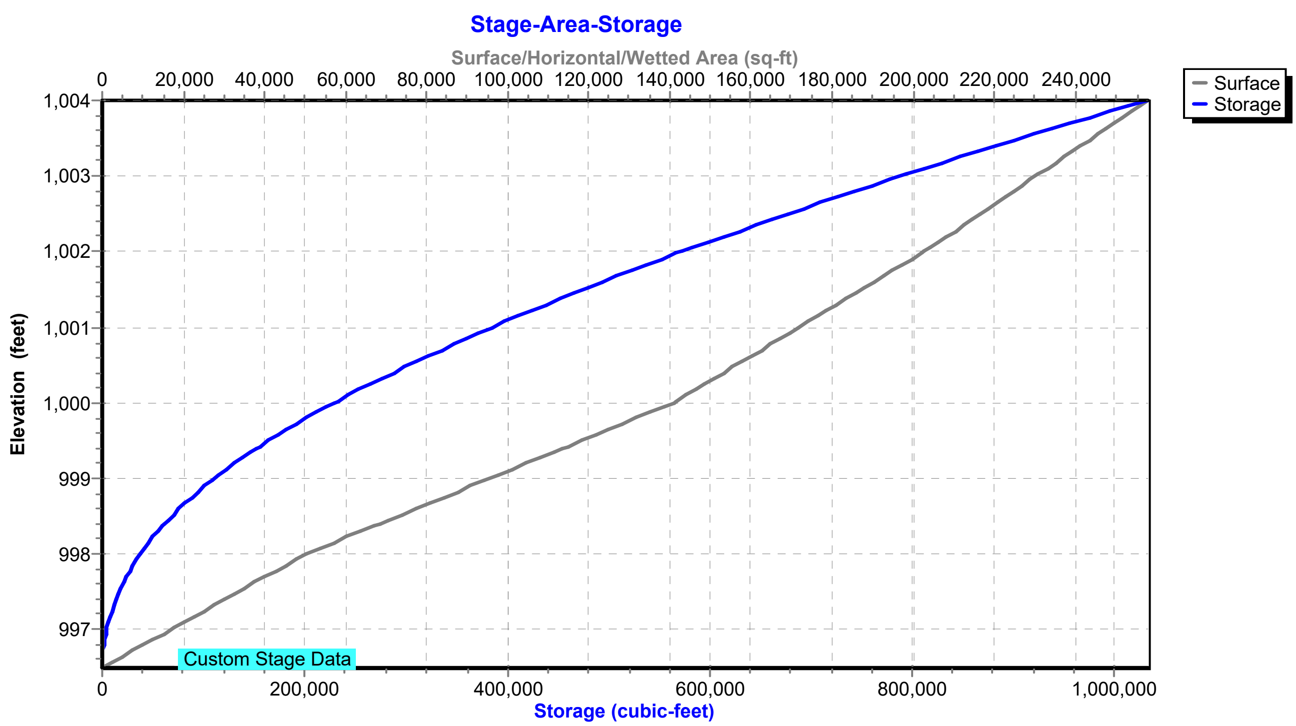
Pond 7P: Existing West Basin



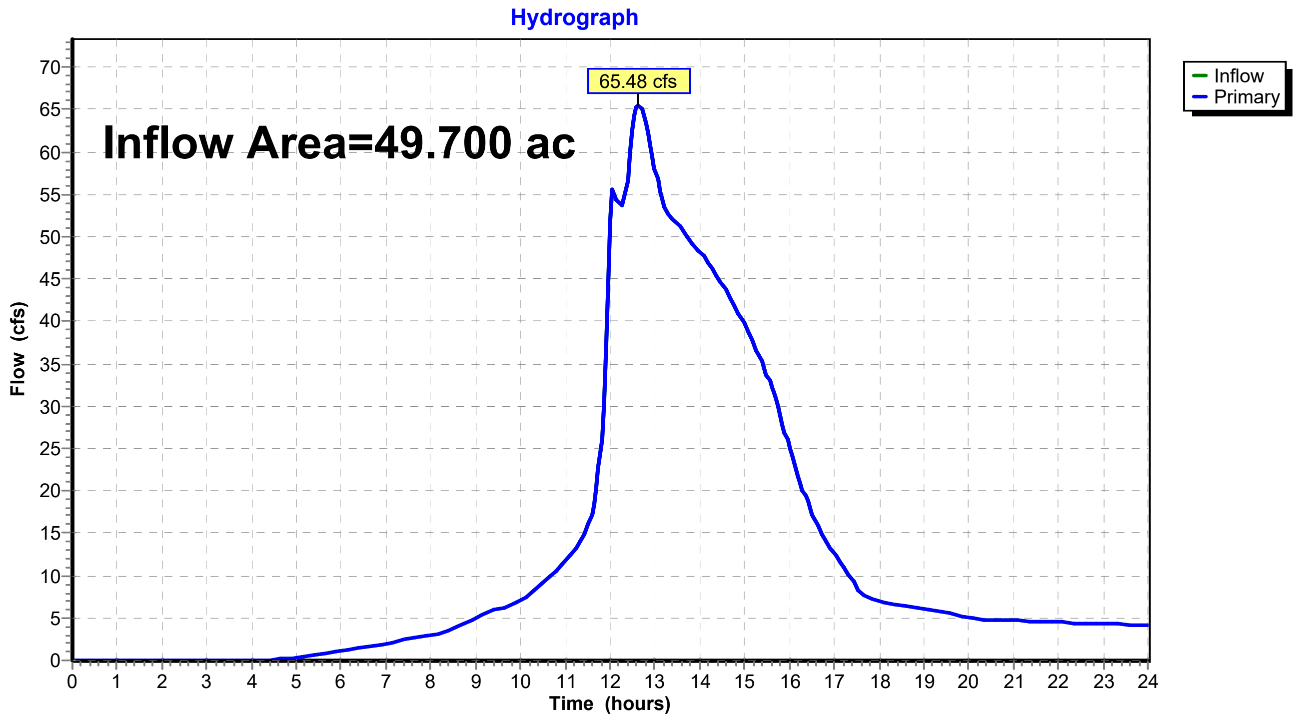
Pond 7P: Existing West Basin



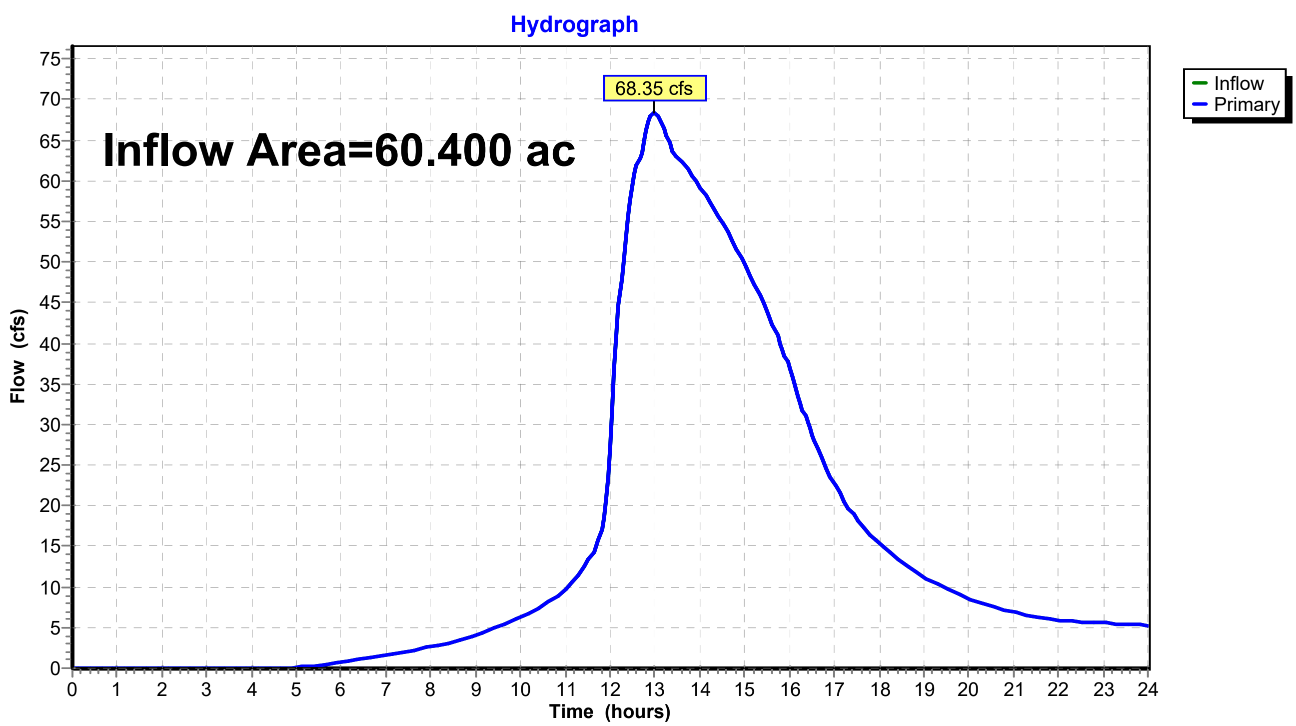
Pond 7P: Existing West Basin



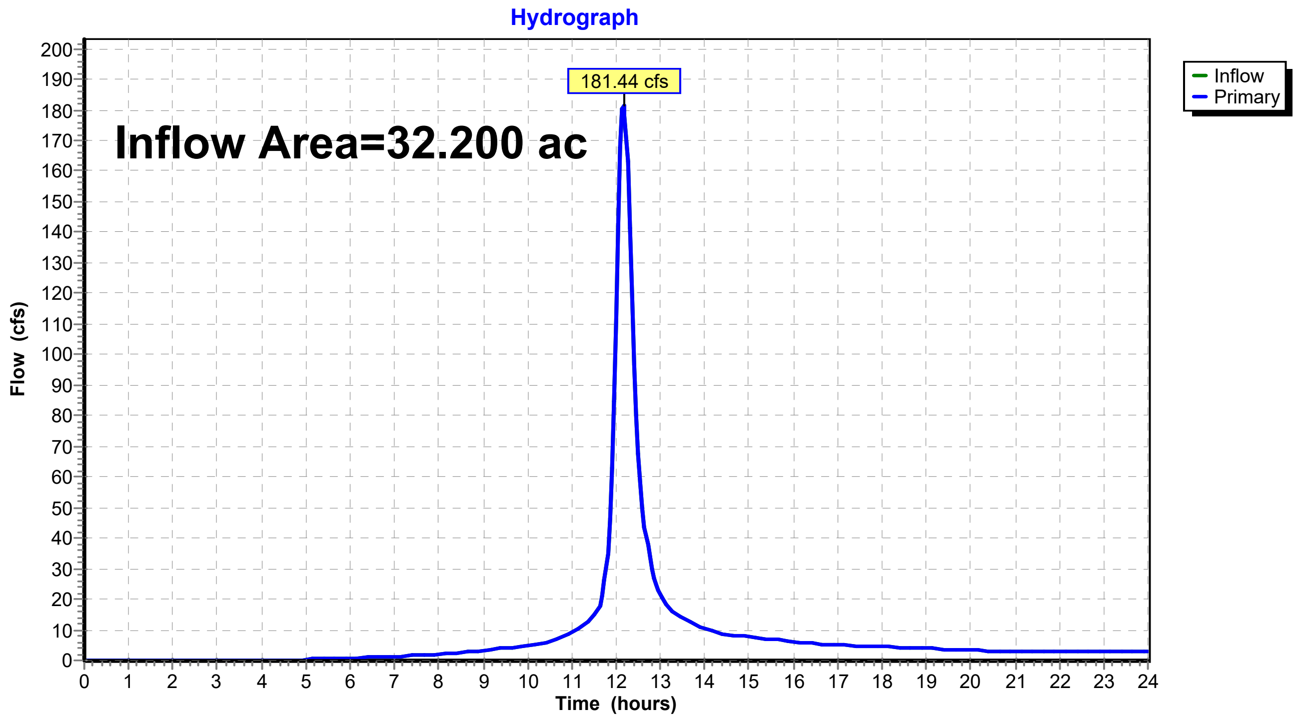
Link 4L: East RP



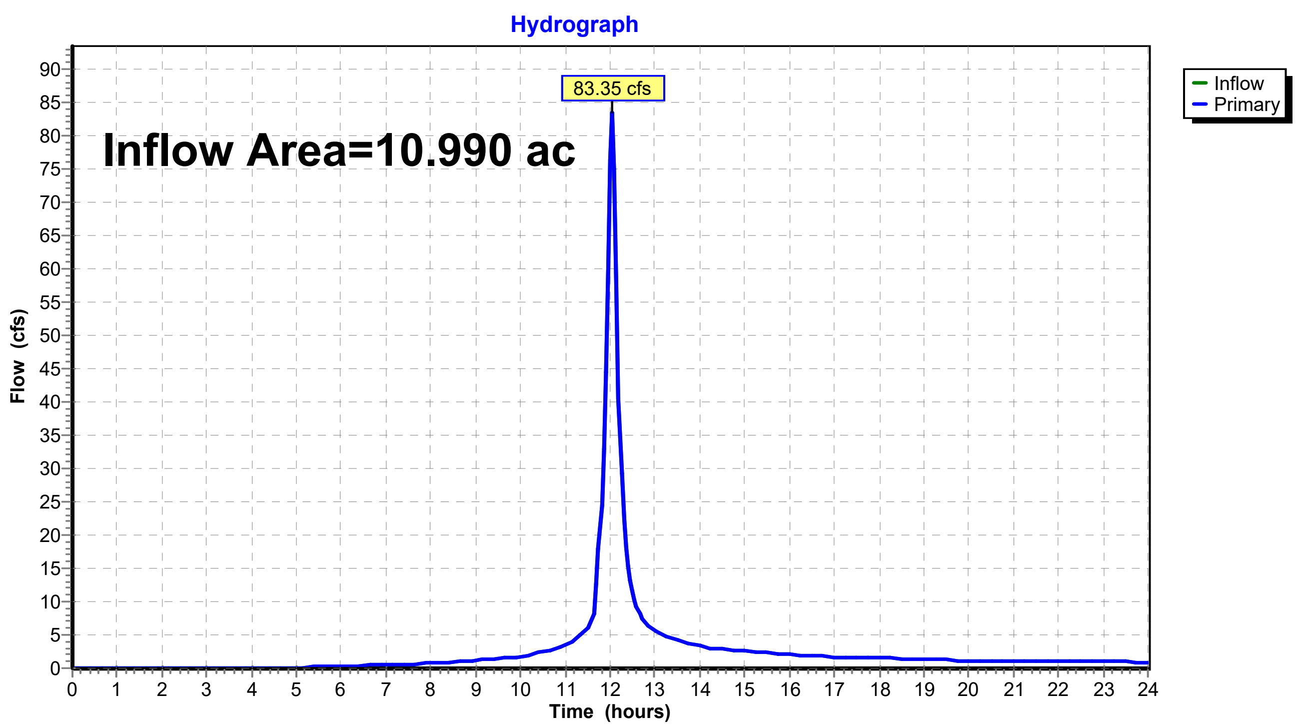
Link 6L: West RP

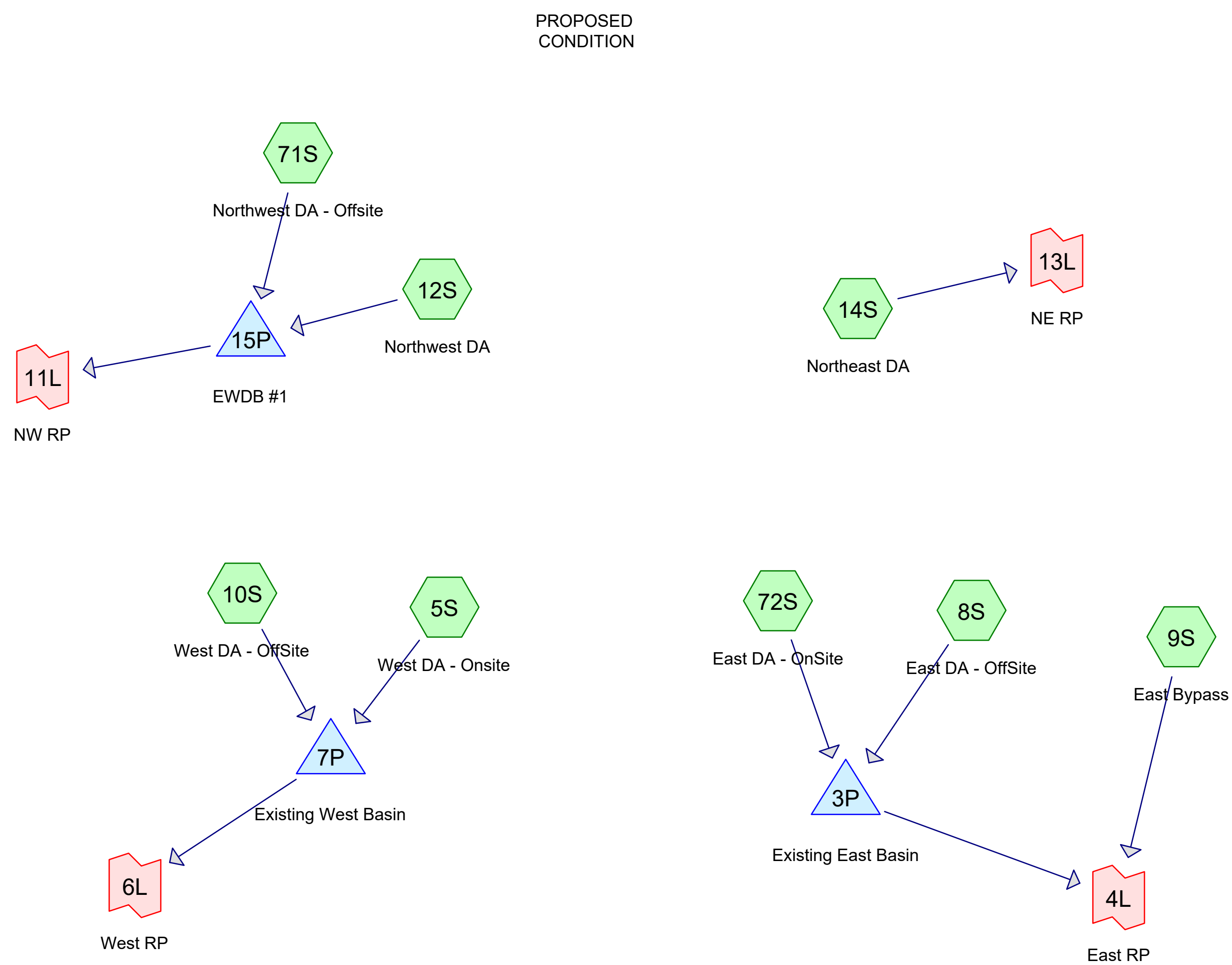


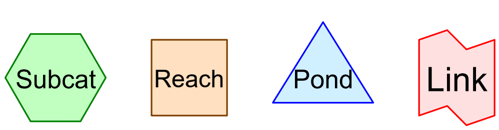
Link 11L: NW RP



Link 13L: NE RP







Routing Diagram for 25-019 Proposed
Prepared by Schlagel Associates, Printed 1/28/2026
HydroCAD® 10.20-8a s/n 08303 © 2025 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type II 24-hr		Default	24.00	1	3.50	2
2	10-Year	Type II 24-hr		Default	24.00	1	5.30	2
3	100-Year	Type II 24-hr		Default	24.00	1	7.70	2
4	WQV	Type II 24-hr		Default	24.00	1	1.37	2

Summary for Subcatchment 5S: West DA - Onsite

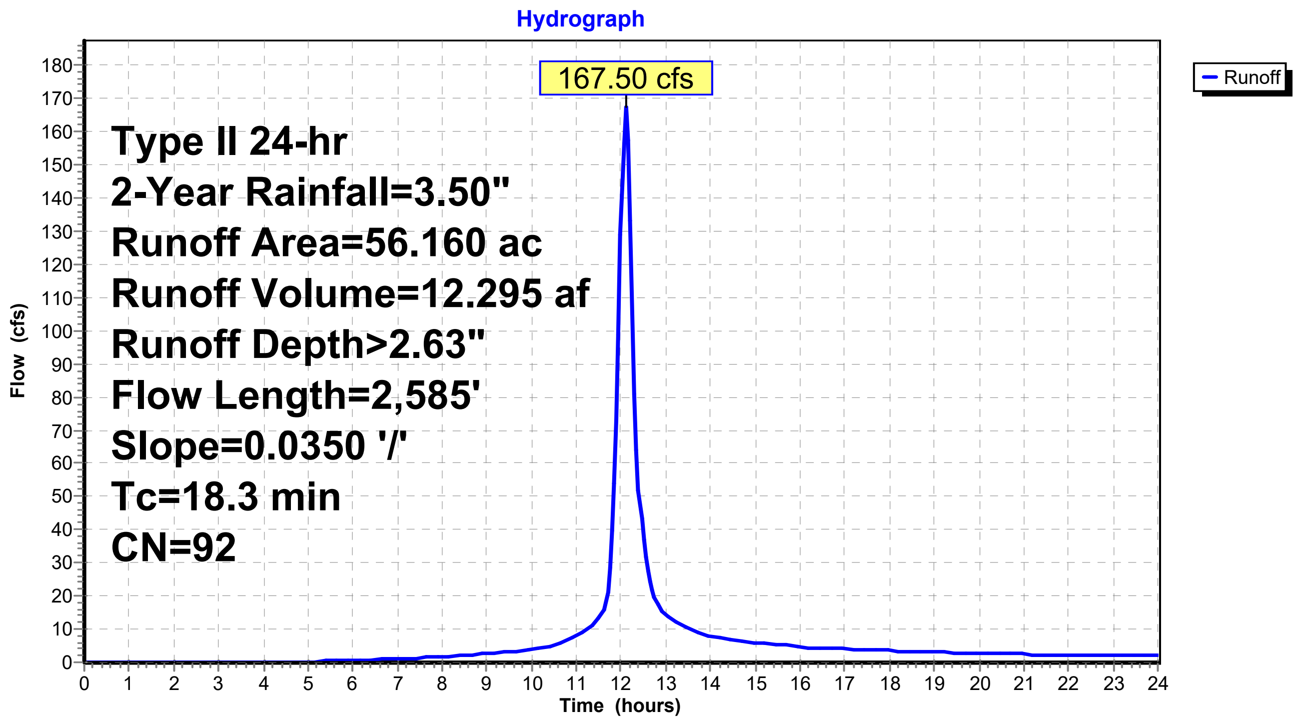
Runoff = 167.50 cfs @ 12.10 hrs, Volume= 12.295 af, Depth> 2.63"
Routed to Pond 7P : Existing West Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

Area (ac)	CN	Description
56.160	92	1/8 acre lots, 65% imp, HSG D
19.656		35.00% Pervious Area
36.504		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	100	0.0350	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
10.9	2,485	0.0350	3.80		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
18.3	2,585	Total			

Subcatchment 5S: West DA - Onsite



Summary for Subcatchment 8S: East DA - OffSite

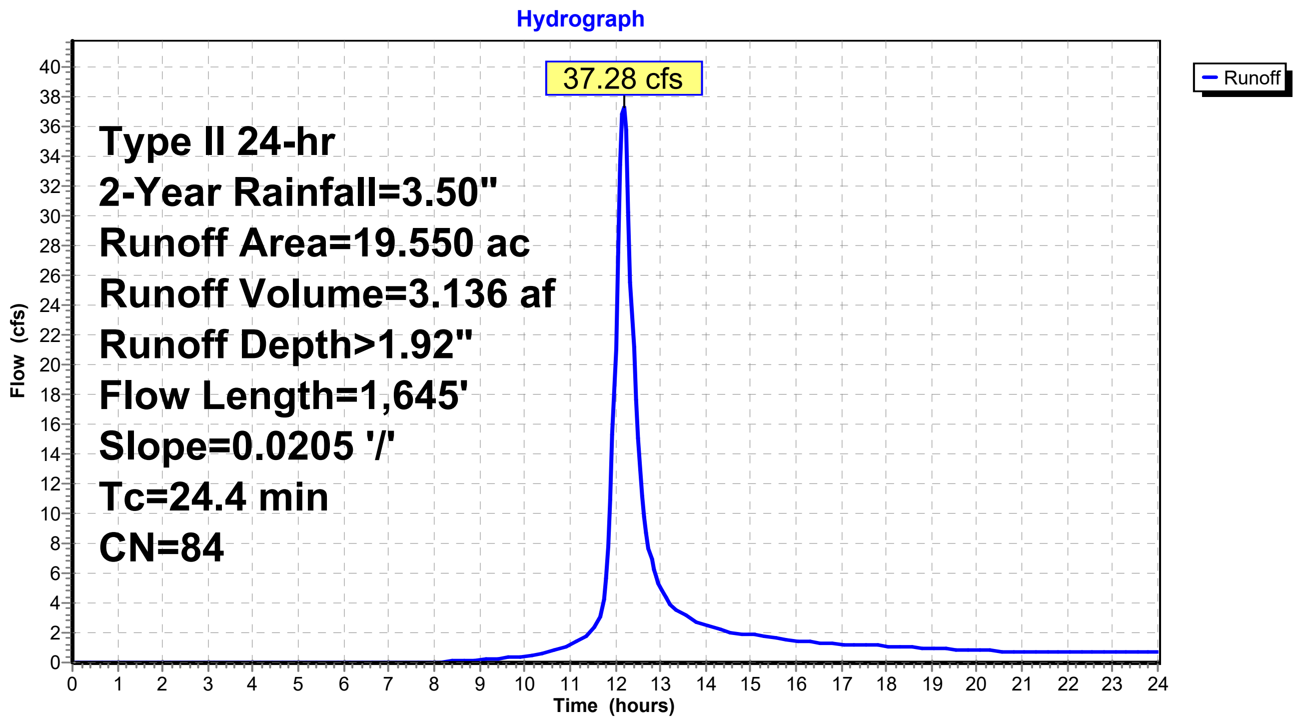
Runoff = 37.28 cfs @ 12.18 hrs, Volume= 3.136 af, Depth> 1.92"
Routed to Pond 3P : Existing East Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

Area (ac)	CN	Description
19.550	84	Row crops, contoured, Poor, HSG C
19.550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	100	0.0205	0.38		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
20.0	1,545	0.0205	1.29		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
24.4	1,645	Total			

Subcatchment 8S: East DA - OffSite



Summary for Subcatchment 9S: East Bypass

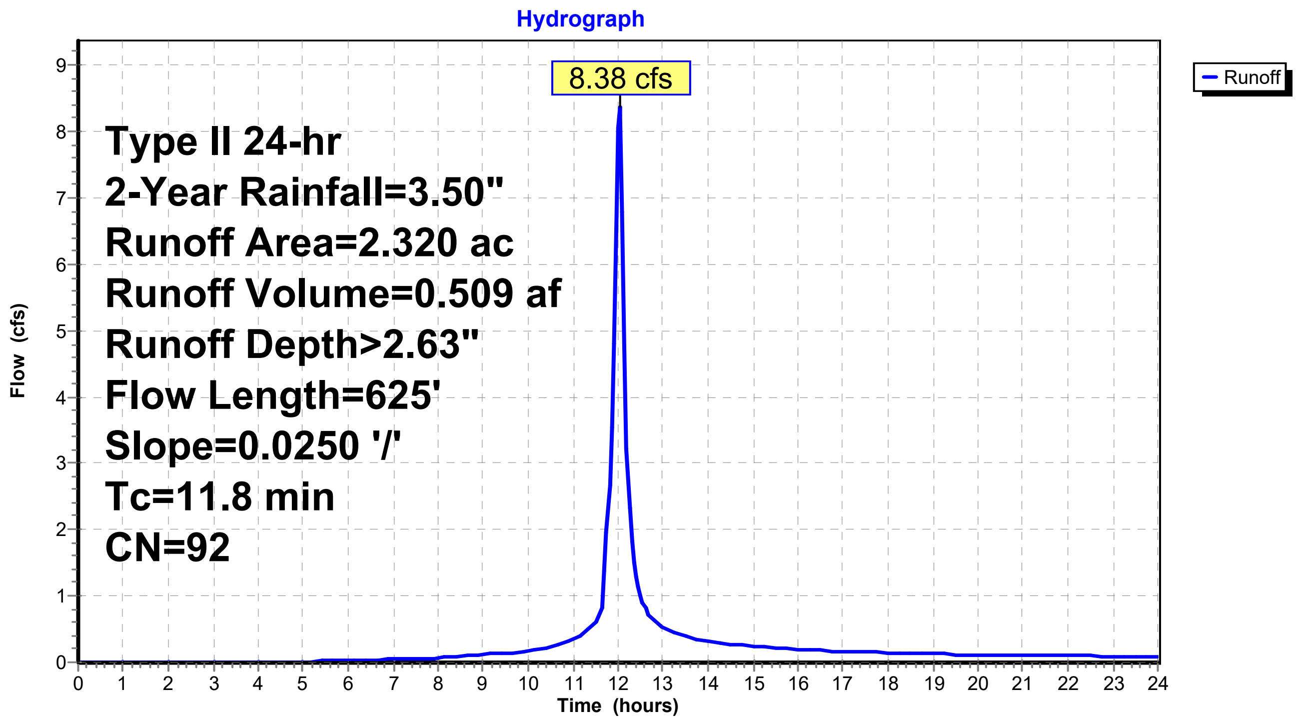
Runoff = 8.38 cfs @ 12.03 hrs, Volume= 0.509 af, Depth> 2.63"
Routed to Link 4L : East RP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

Area (ac)	CN	Description
2.320	92	1/8 acre lots, 65% imp, HSG D
0.812		35.00% Pervious Area
1.508		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0250	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
3.4	525	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.8	625	Total			

Subcatchment 9S: East Bypass



Summary for Subcatchment 10S: West DA - OffSite

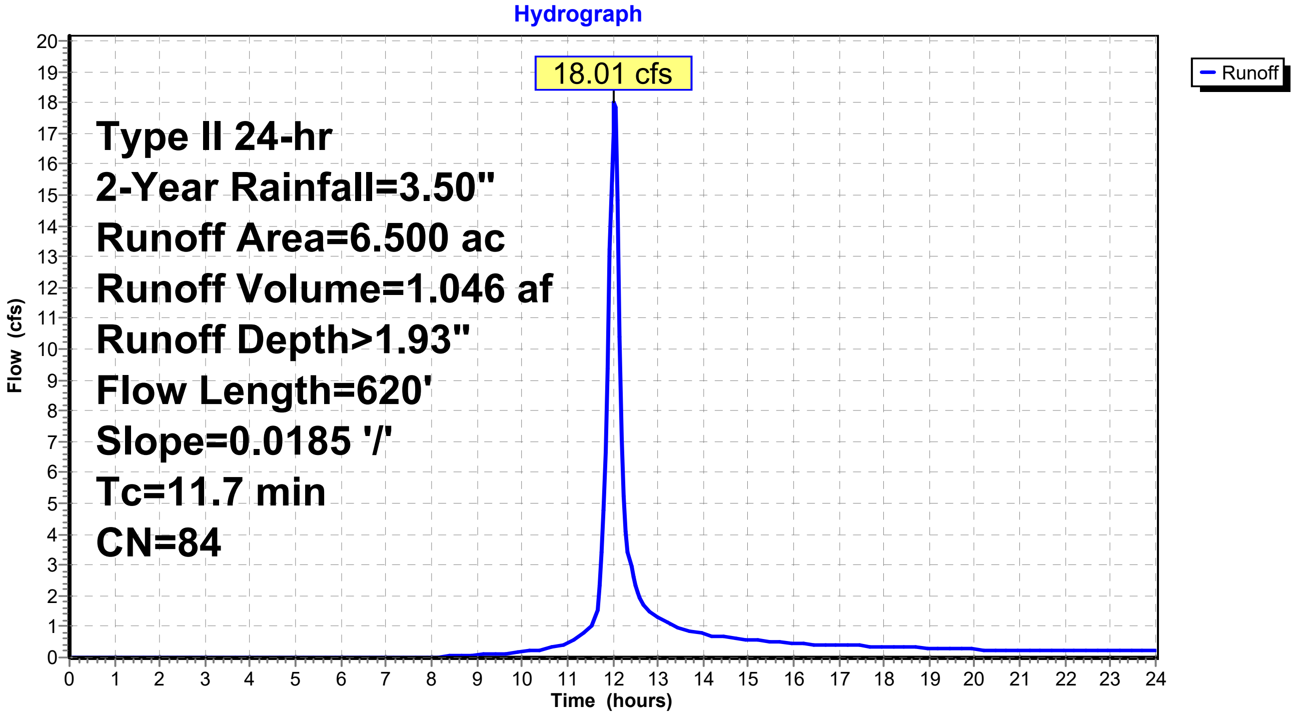
Runoff = 18.01 cfs @ 12.04 hrs, Volume= 1.046 af, Depth> 1.93"
Routed to Pond 7P : Existing West Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

Area (ac)	CN	Description
6.500	84	Row crops, contoured, Poor, HSG C
6.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0185	0.36		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
7.1	520	0.0185	1.22		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
11.7	620	Total			

Subcatchment 10S: West DA - OffSite



Summary for Subcatchment 12S: Northwest DA

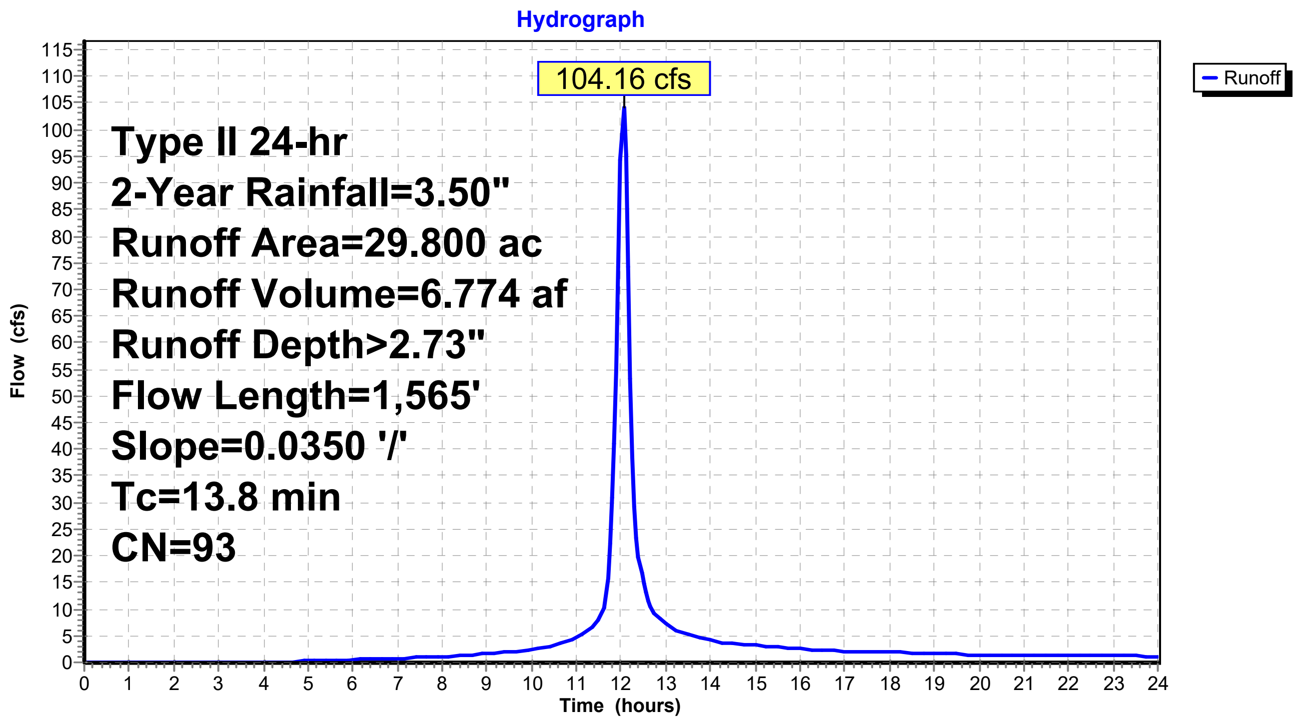
Runoff = 104.16 cfs @ 12.05 hrs, Volume= 6.774 af, Depth> 2.73"
Routed to Pond 15P : EWDB #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

Area (ac)	CN	Description
13.570	95	Urban commercial, 85% imp, HSG D
16.230	92	1/8 acre lots, 65% imp, HSG D
29.800	93	Weighted Average
7.716		25.89% Pervious Area
22.084		74.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	100	0.0350	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
6.4	1,465	0.0350	3.80		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
13.8	1,565	Total			

Subcatchment 12S: Northwest DA



Summary for Subcatchment 14S: Northeast DA

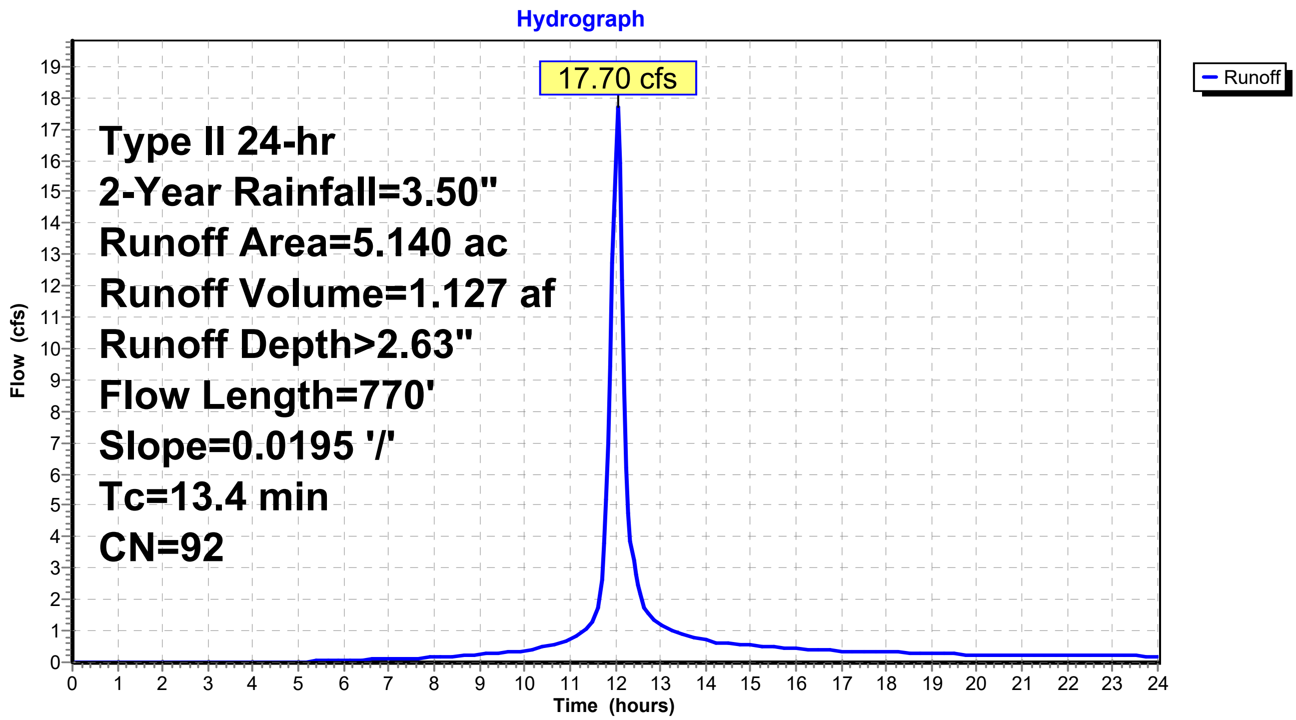
Runoff = 17.70 cfs @ 12.05 hrs, Volume= 1.127 af, Depth> 2.63"
Routed to Link 13L : NE RP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

Area (ac)	CN	Description
5.140	92	1/8 acre lots, 65% imp, HSG D
1.799		35.00% Pervious Area
3.341		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	100	0.0195	0.37		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
8.9	670	0.0195	1.26		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
13.4	770	Total			

Subcatchment 14S: Northeast DA



Summary for Subcatchment 71S: Northwest DA - Offsite

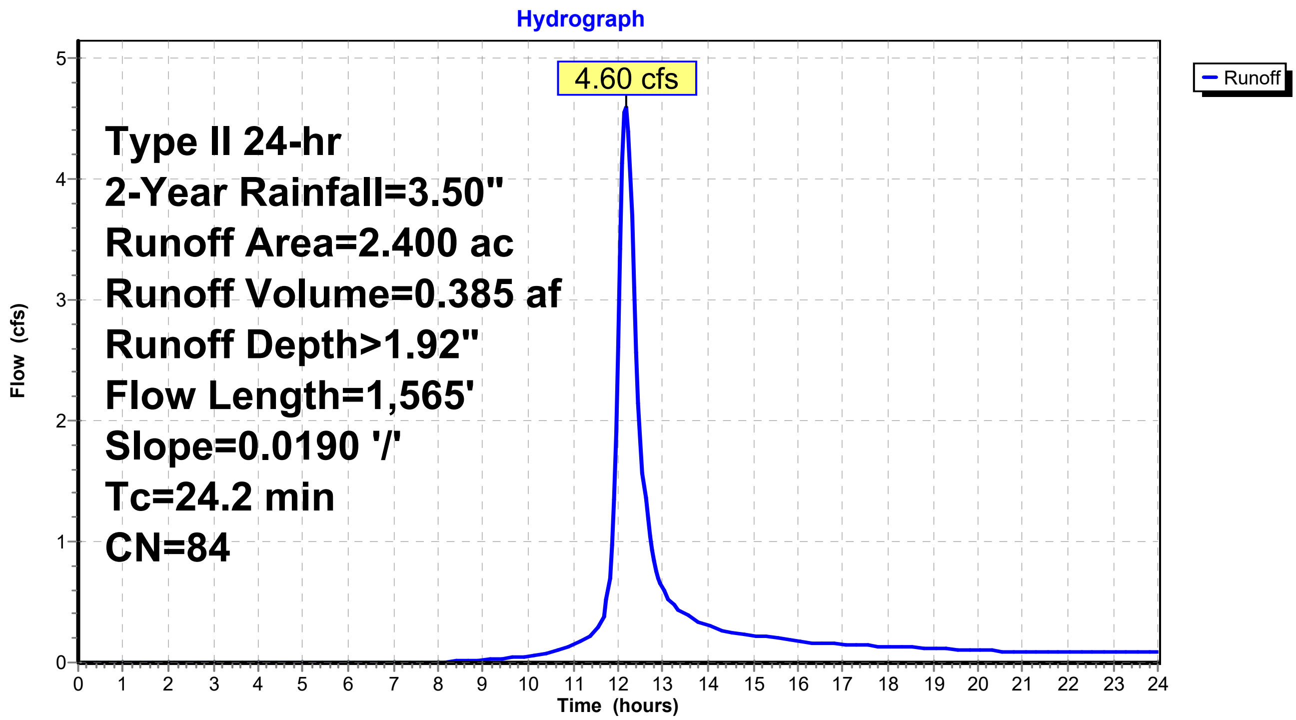
Runoff = 4.60 cfs @ 12.18 hrs, Volume= 0.385 af, Depth> 1.92"
Routed to Pond 15P : EWDB #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

Area (ac)	CN	Description
2.400	84	Row crops, contoured, Poor, HSG C
2.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	100	0.0190	0.37		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
19.7	1,465	0.0190	1.24		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
24.2	1,565	Total			

Subcatchment 71S: Northwest DA - Offsite



Summary for Subcatchment 72S: East DA - OnSite

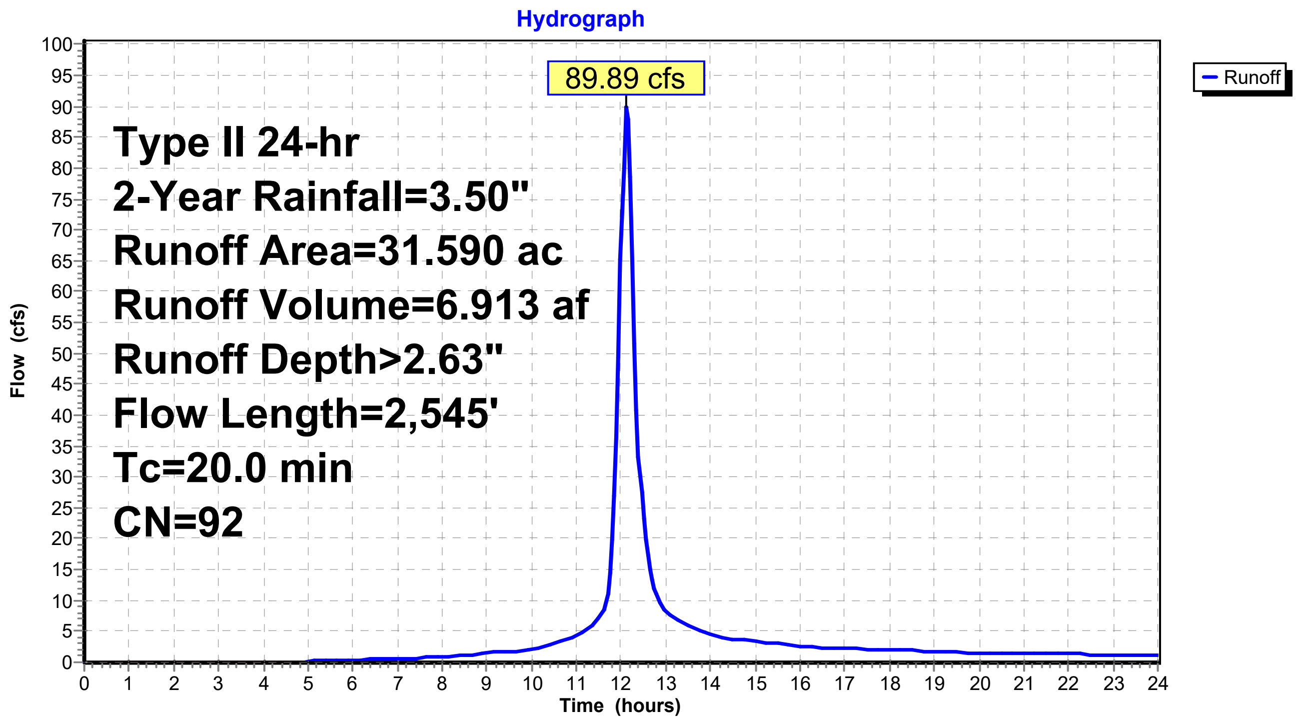
Runoff = 89.89 cfs @ 12.12 hrs, Volume= 6.913 af, Depth> 2.63"
Routed to Pond 3P : Existing East Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

Area (ac)	CN	Description
31.590	92	1/8 acre lots, 65% imp, HSG D
11.056		35.00% Pervious Area
20.533		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0250	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
11.6	2,445	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
20.0	2,545	Total			

Subcatchment 72S: East DA - OnSite



Summary for Pond 3P: Existing East Basin

[44] Hint: Outlet device #2 is below defined storage
[95] Warning: Outlet Device #2 rise exceeded

Inflow Area = 51.140 ac, 40.15% Impervious, Inflow Depth > 2.36" for 2-Year event
Inflow = 125.42 cfs @ 12.13 hrs, Volume= 10.049 af
Outflow = 39.26 cfs @ 12.50 hrs, Volume= 10.048 af, Atten= 69%, Lag= 21.6 min
Primary = 39.26 cfs @ 12.50 hrs, Volume= 10.048 af
Routed to Link 4L : East RP

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,010.77' @ 12.50 hrs Surf.Area= 111,372 sf Storage= 125,662 cf

Plug-Flow detention time= 23.8 min calculated for 10.048 af (100% of inflow)
Center-of-Mass det. time= 23.8 min (836.1 - 812.4)

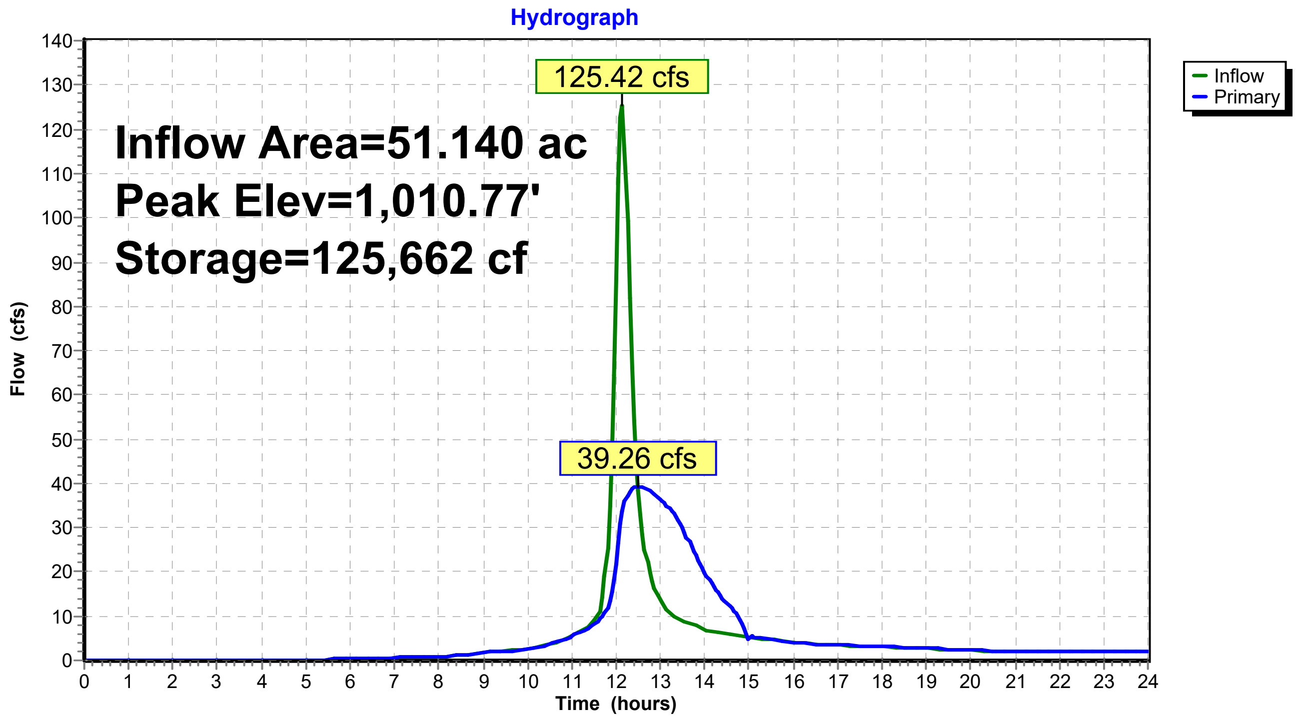
Volume	Invert	Avail.Storage	Storage Description
#1	1,007.00'	714,080 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,007.00	10	0	0
1,008.00	201	106	106
1,010.00	59,816	60,017	60,123
1,012.00	194,481	254,297	314,420
1,014.00	205,179	399,660	714,080

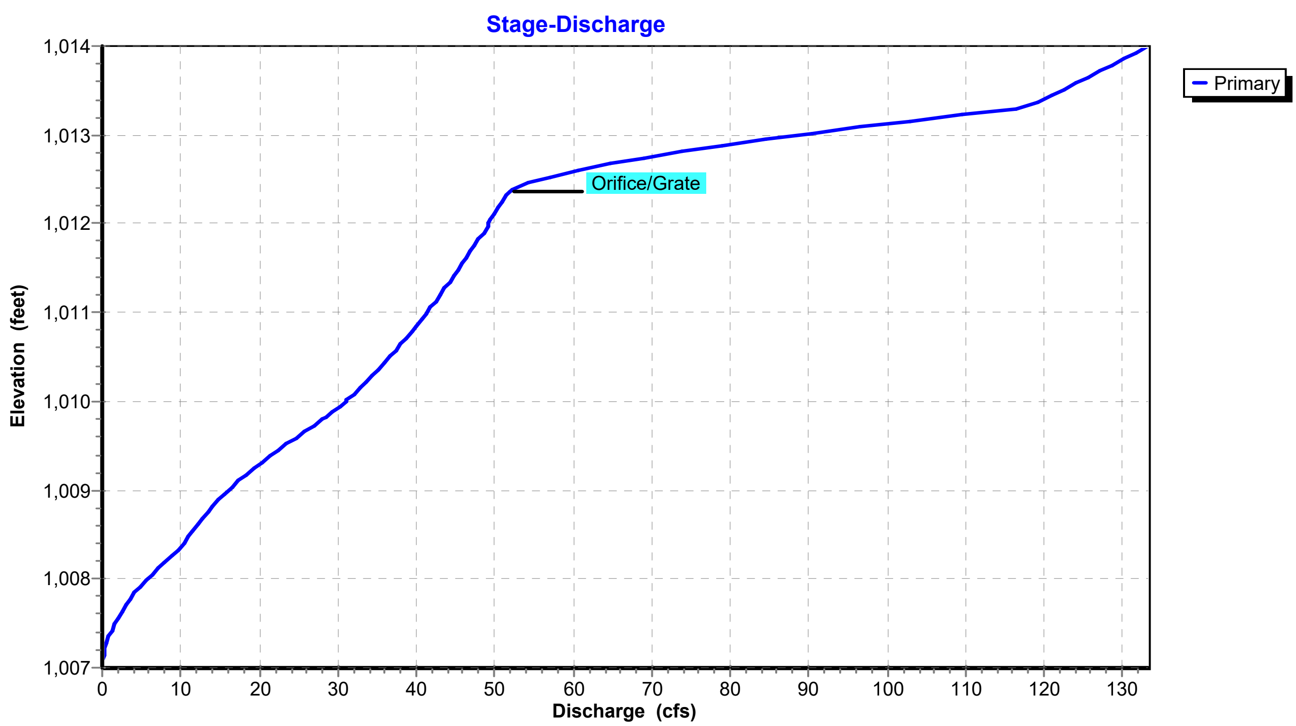
Device	Routing	Invert	Outlet Devices
#1	Primary	1,006.93'	**48.0" Round RCP_Round 48"** L= 65.0' Ke= 0.500 Inlet / Outlet Invert= 1,006.93' / 1,006.82' S= 0.0017 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Device 1	1,006.52'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 1,006.52 1,008.82 1,008.82 1,009.82 Width (feet) 1.25 1.25 2.50 2.50
#3	Device 1	1,012.37'	**60.0" x 60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=39.26 cfs @ 12.50 hrs HW=1,010.77' (Free Discharge)
└─**1=RCP_Round 48"** (Passes 39.26 cfs of 60.60 cfs potential flow)
  ├─**2=Custom Weir/Orifice** (Orifice Controls 39.26 cfs @ 7.30 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

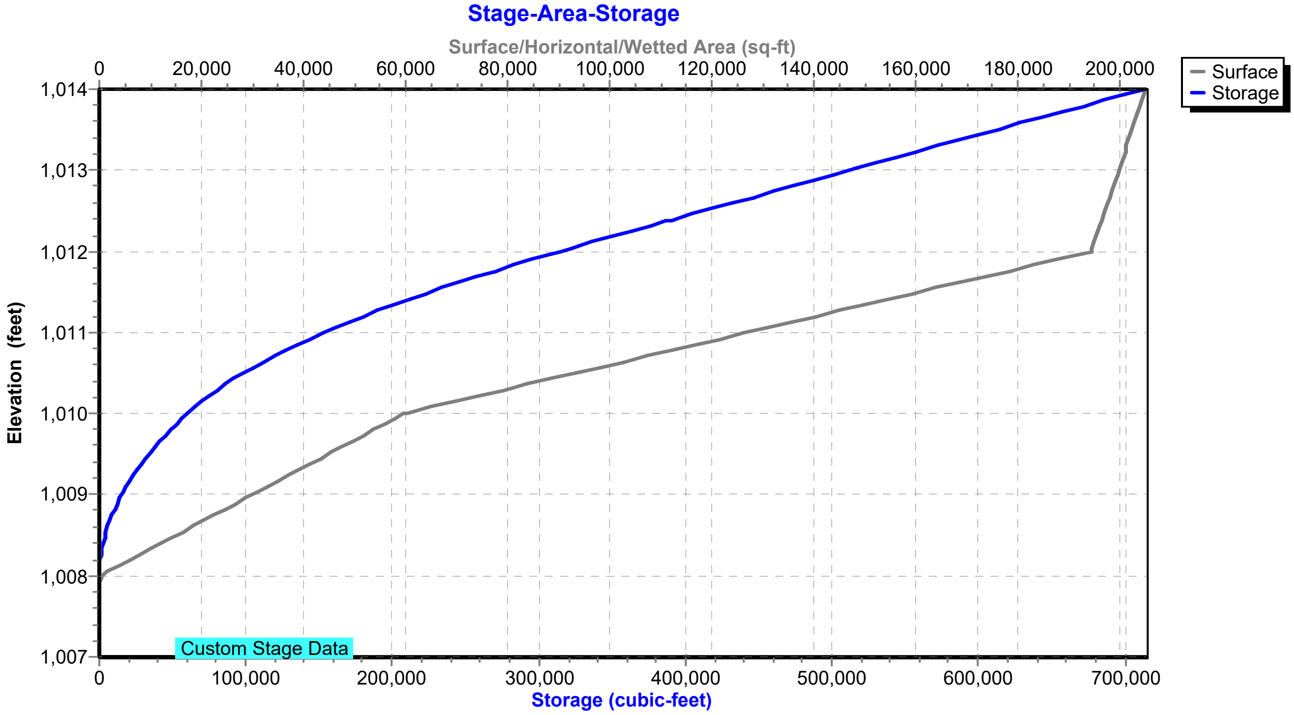
Pond 3P: Existing East Basin



Pond 3P: Existing East Basin



Pond 3P: Existing East Basin



Summary for Pond 7P: Existing West Basin

[95] Warning: Outlet Device #2 rise exceeded

Inflow Area = 62.660 ac, 58.26% Impervious, Inflow Depth > 2.55" for 2-Year event
Inflow = 182.53 cfs @ 12.09 hrs, Volume= 13.341 af
Outflow = 46.13 cfs @ 12.45 hrs, Volume= 13.211 af, Atten= 75%, Lag= 21.6 min
Primary = 46.13 cfs @ 12.45 hrs, Volume= 13.211 af
Routed to Link 6L : West RP

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 999.96' @ 12.45 hrs Surf.Area= 131,699 sf Storage= 216,265 cf

Plug-Flow detention time= 59.3 min calculated for 13.211 af (99% of inflow)
Center-of-Mass det. time= 53.2 min (855.6 - 802.4)

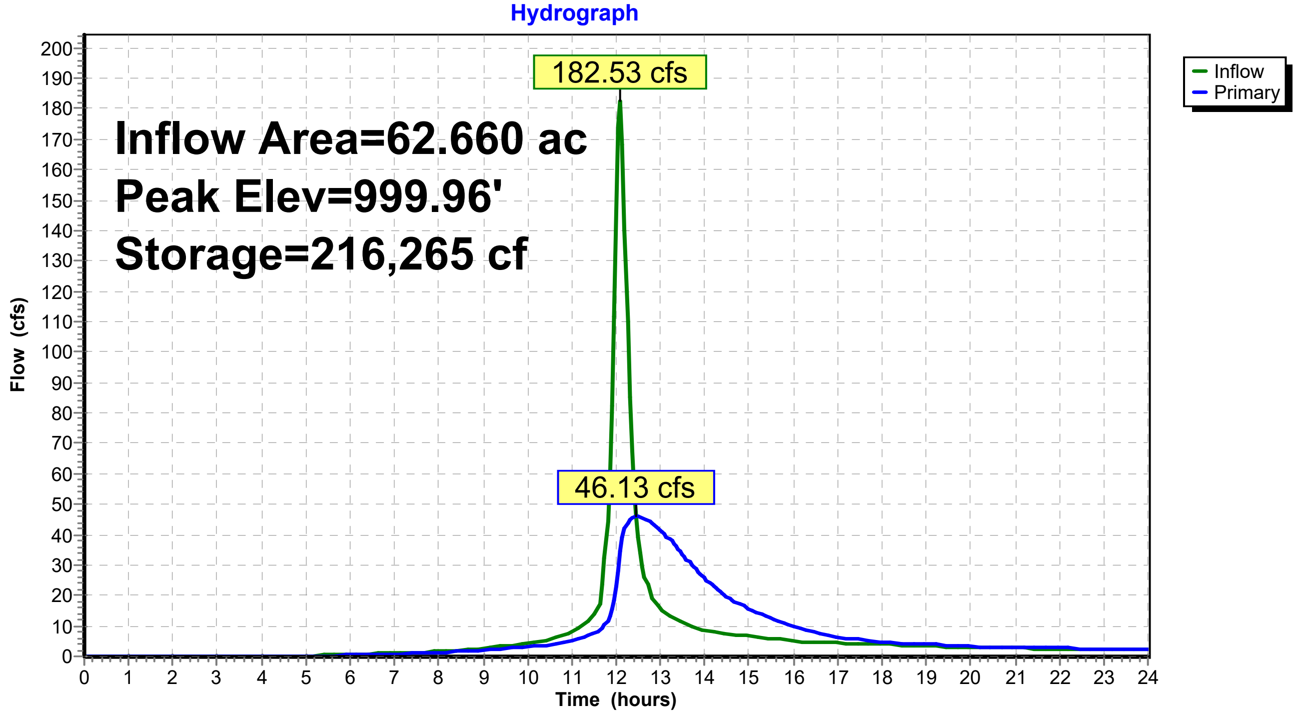
Volume	Invert	Avail.Storage	Storage Description
#1	996.50'	1,043,367 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
996.50	10	0	0
998.00	50,187	37,648	37,648
1,000.00	133,191	183,378	221,026
1,002.00	220,337	353,528	574,554
1,004.00	248,476	468,813	1,043,367

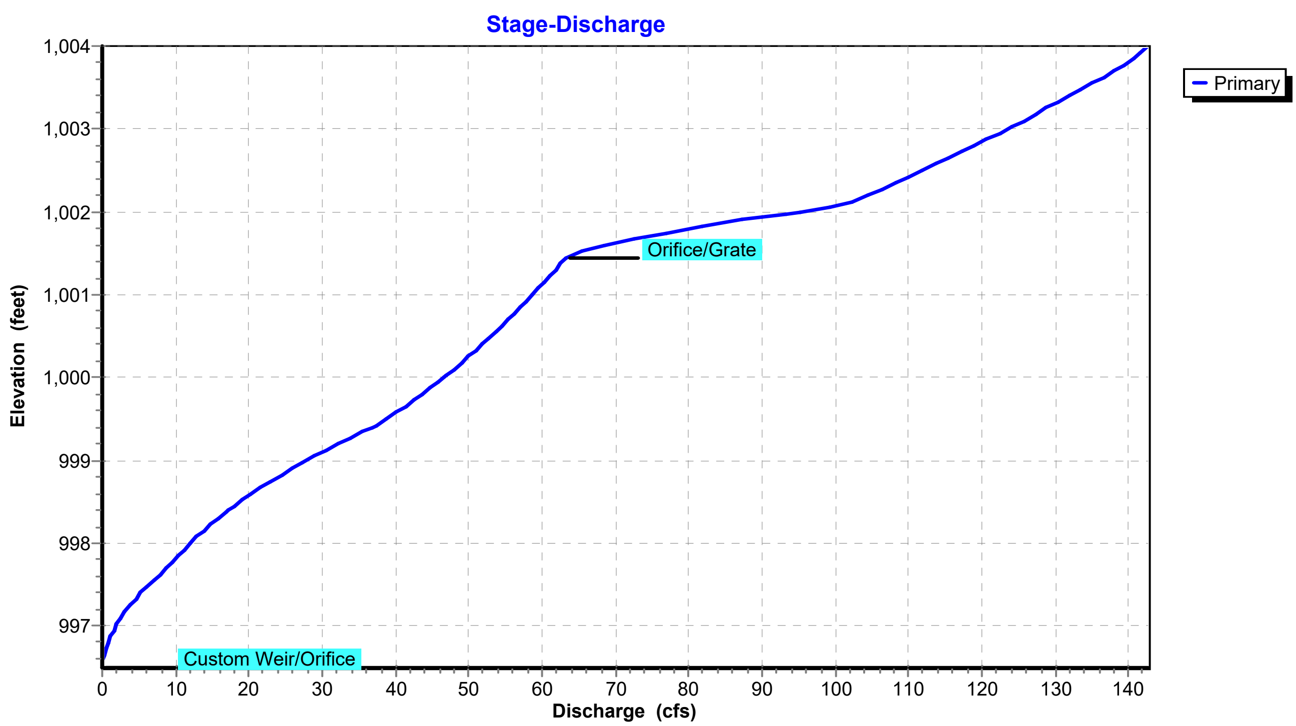
Device	Routing	Invert	Outlet Devices
#1	Primary	996.44'	**48.0" Round RCP_Round 48"** L= 74.4' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 996.44' / 996.20' S= 0.0032 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Device 1	996.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 996.50 998.40 998.40 999.40 Width (feet) 2.00 2.00 3.33 3.33
#3	Device 1	1,001.45'	**60.0" x 60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=46.13 cfs @ 12.45 hrs HW=999.96' (Free Discharge)
└─**1=RCP_Round 48"** (Passes 46.13 cfs of 55.76 cfs potential flow)
  ├─**2=Custom Weir/Orifice** (Orifice Controls 46.13 cfs @ 6.47 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

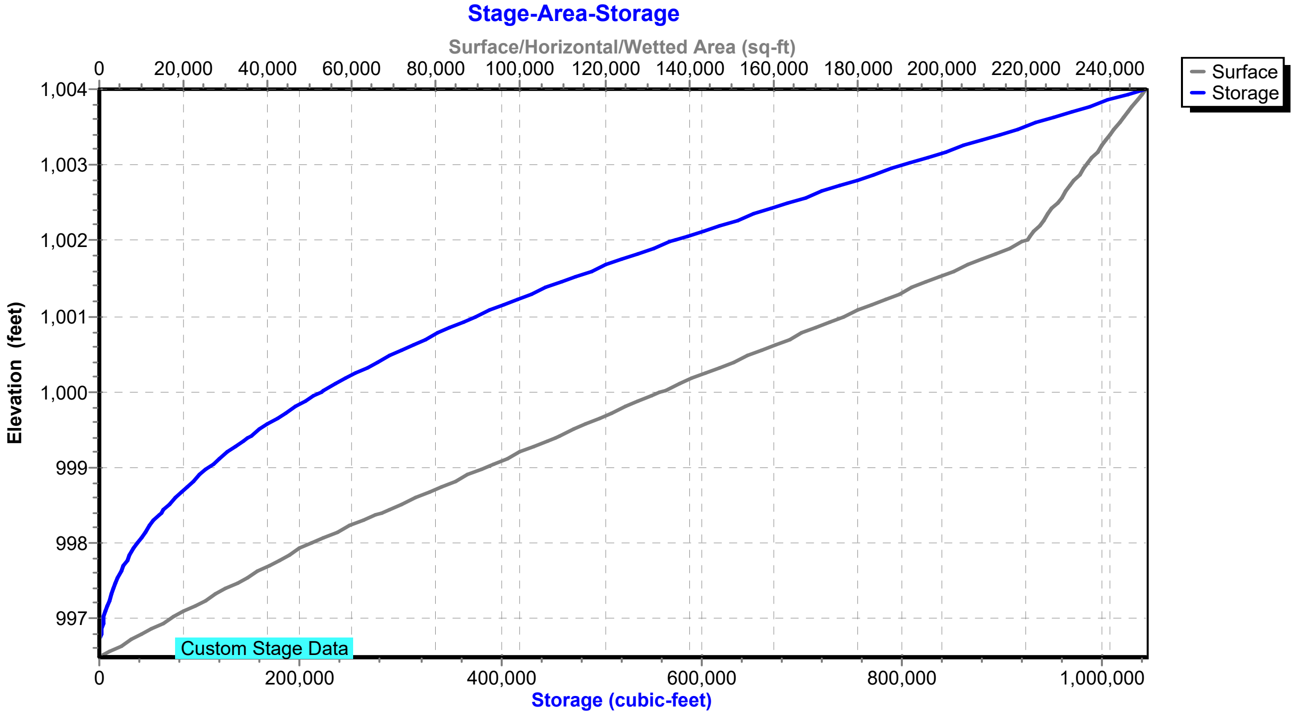
Pond 7P: Existing West Basin



Pond 7P: Existing West Basin



Pond 7P: Existing West Basin



Summary for Pond 15P: EWDB #1

[95] Warning: Outlet Device #2 rise exceeded

Inflow Area = 32.200 ac, 68.58% Impervious, Inflow Depth > 2.67" for 2-Year event
Inflow = 107.61 cfs @ 12.05 hrs, Volume= 7.159 af
Outflow = 14.66 cfs @ 12.55 hrs, Volume= 6.543 af, Atten= 86%, Lag= 29.9 min
Primary = 14.66 cfs @ 12.55 hrs, Volume= 6.543 af
Routed to Link 11L : NW RP

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,005.17' @ 12.55 hrs Surf.Area= 52,367 sf Storage= 158,240 cf

Plug-Flow detention time= 172.9 min calculated for 6.543 af (91% of inflow)
Center-of-Mass det. time= 128.0 min (922.3 - 794.3)

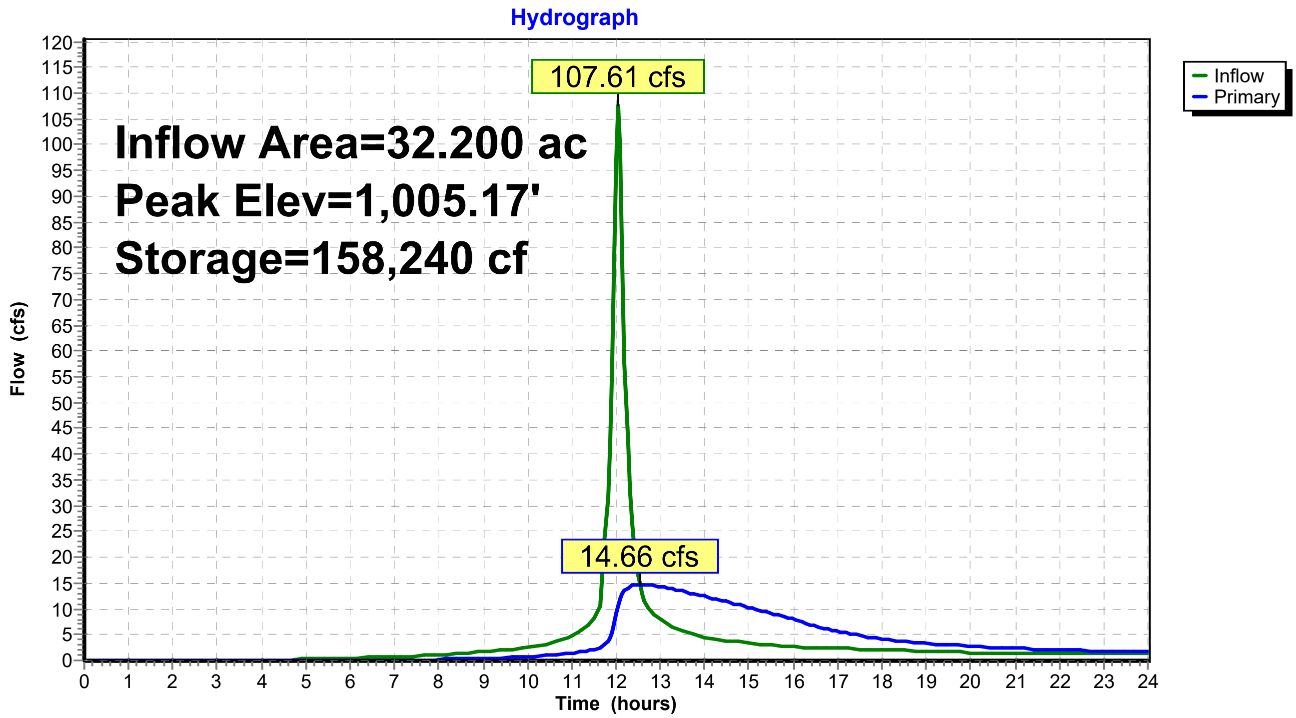
Volume	Invert	Avail.Storage	Storage Description
#1	1,002.00'	412,894 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,002.00	44,842	0	0
1,004.00	52,221	97,063	97,063
1,006.00	52,471	104,692	201,755
1,008.00	52,722	105,193	306,948
1,010.00	53,224	105,946	412,894

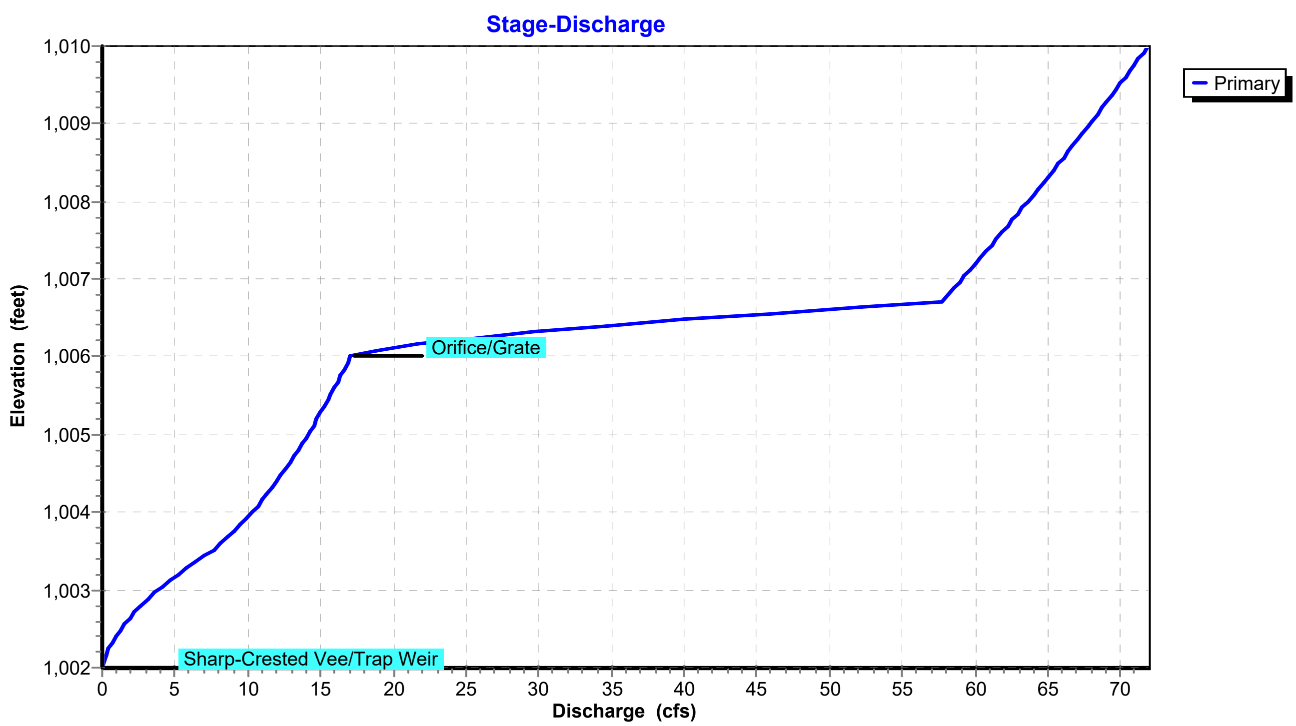
Device	Routing	Invert	Outlet Devices
#1	Primary	999.50'	**30.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 999.50' / 999.25' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	1,002.00'	**20.0 deg x 1.0' long x 1.50' rise Sharp-Crested Vee/Trap Weir** Cv= 2.69 (C= 3.36)
#3	Device 1	1,006.00'	**60.0" x 60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=14.66 cfs @ 12.55 hrs HW=1,005.17' (Free Discharge)
└─**1=Culvert** (Passes 14.66 cfs of 49.69 cfs potential flow)
  ├─**2=Sharp-Crested Vee/Trap Weir** (Orifice Controls 14.66 cfs @ 7.73 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

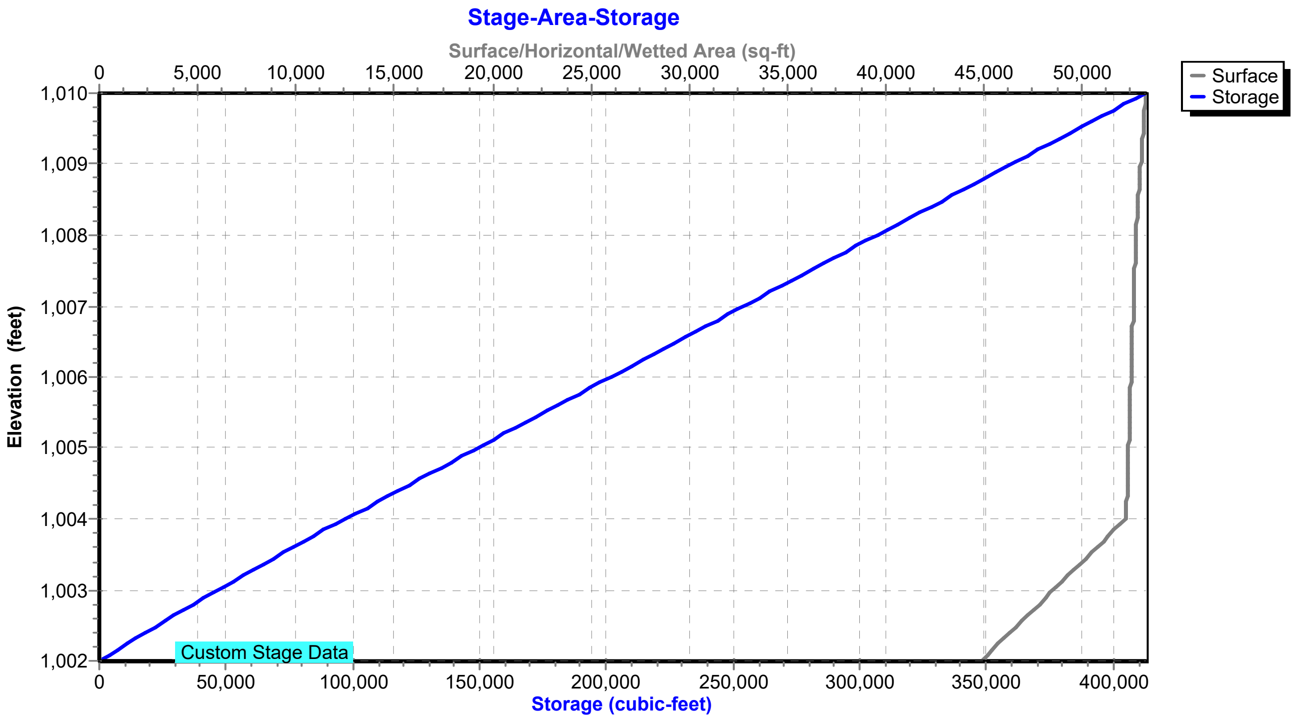
Pond 15P: EWDB #1



Pond 15P: EWDB #1



Pond 15P: EWDB #1

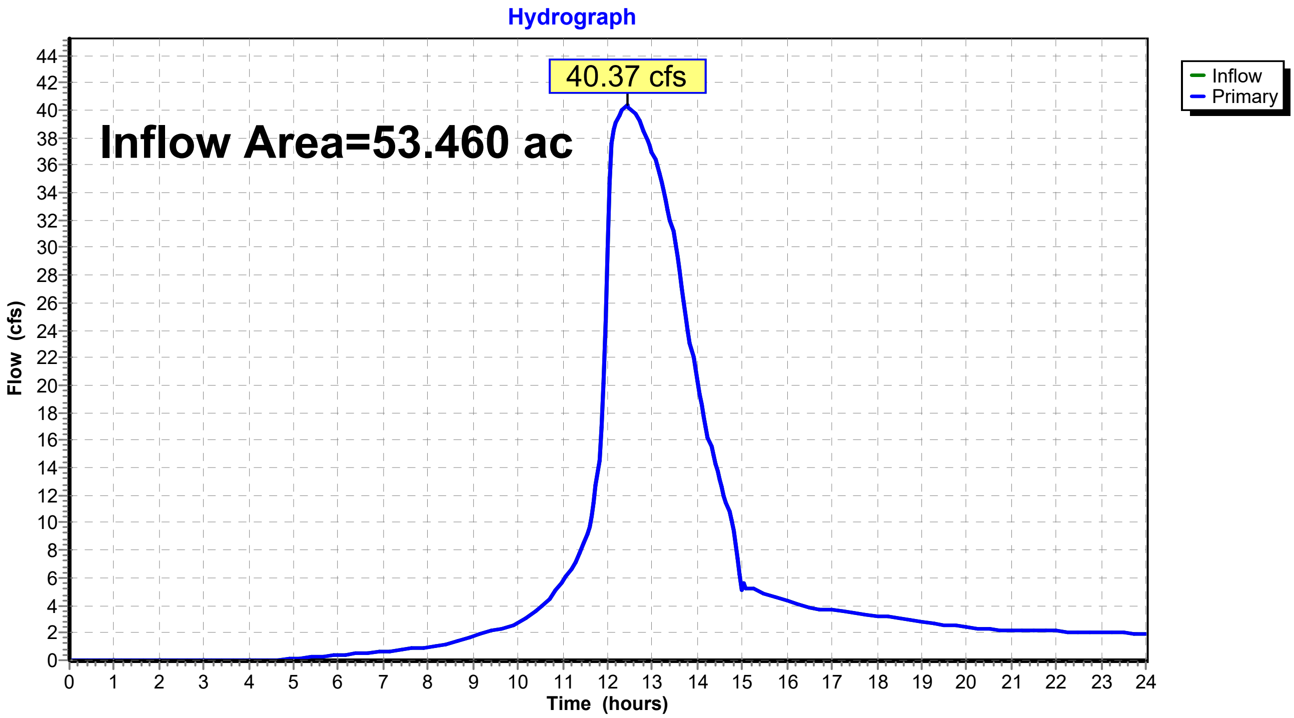


Summary for Link 4L: East RP

Inflow Area =	53.460 ac, 41.23% Impervious,	Inflow Depth > 2.37"	for 2-Year event	
Inflow =	40.37 cfs @	12.43 hrs, Volume=	10.557 af	
Primary =	40.37 cfs @	12.43 hrs, Volume=	10.557 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 4L: East RP

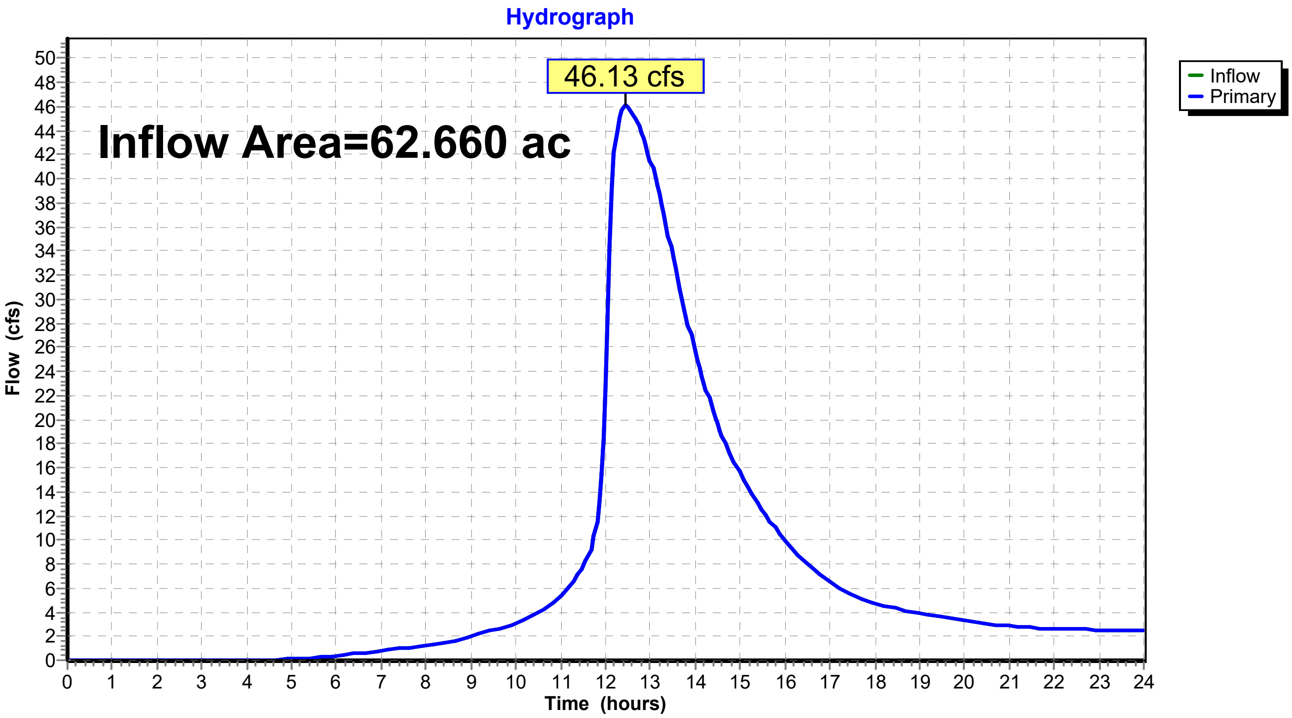


Summary for Link 6L: West RP

Inflow Area = 62.660 ac, 58.26% Impervious, Inflow Depth > 2.53" for 2-Year event
Inflow = 46.13 cfs @ 12.45 hrs, Volume= 13.211 af
Primary = 46.13 cfs @ 12.45 hrs, Volume= 13.211 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

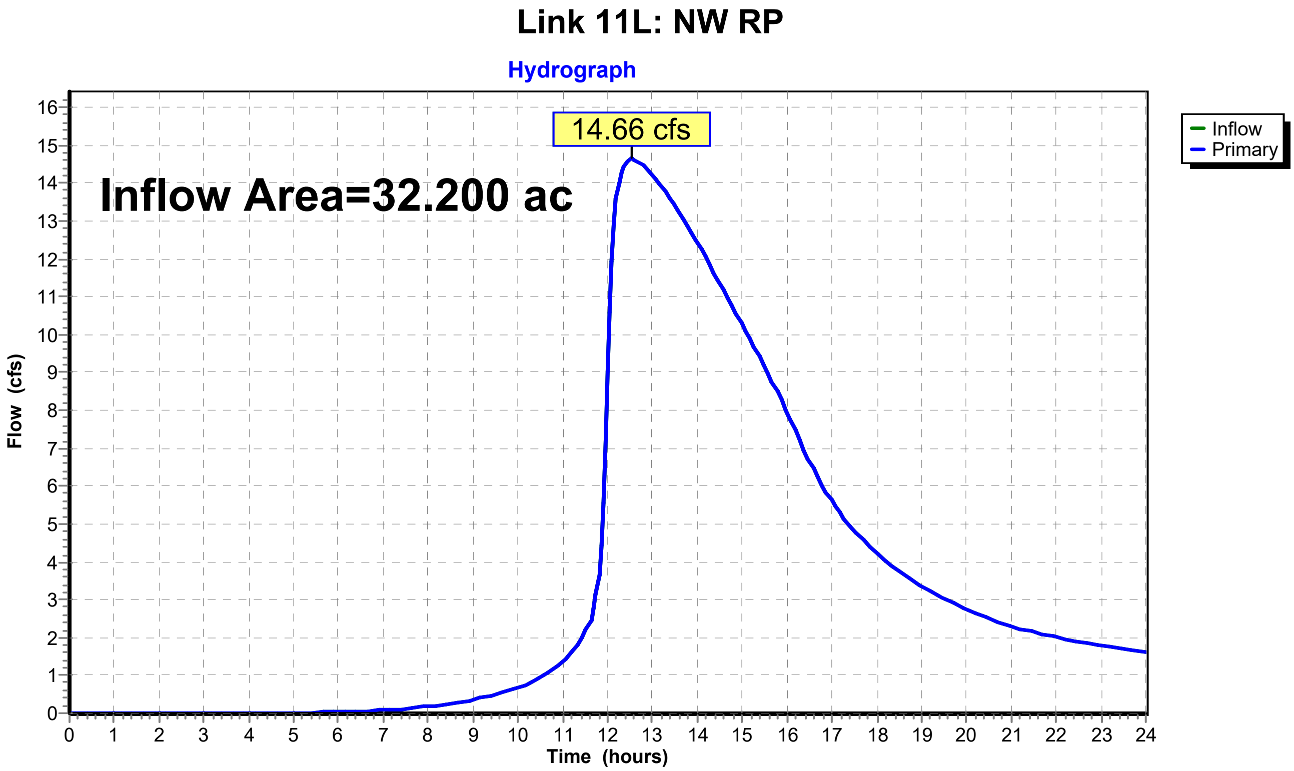
Link 6L: West RP



Summary for Link 11L: NW RP

Inflow Area = 32.200 ac, 68.58% Impervious, Inflow Depth > 2.44" for 2-Year event
Inflow = 14.66 cfs @ 12.55 hrs, Volume= 6.543 af
Primary = 14.66 cfs @ 12.55 hrs, Volume= 6.543 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

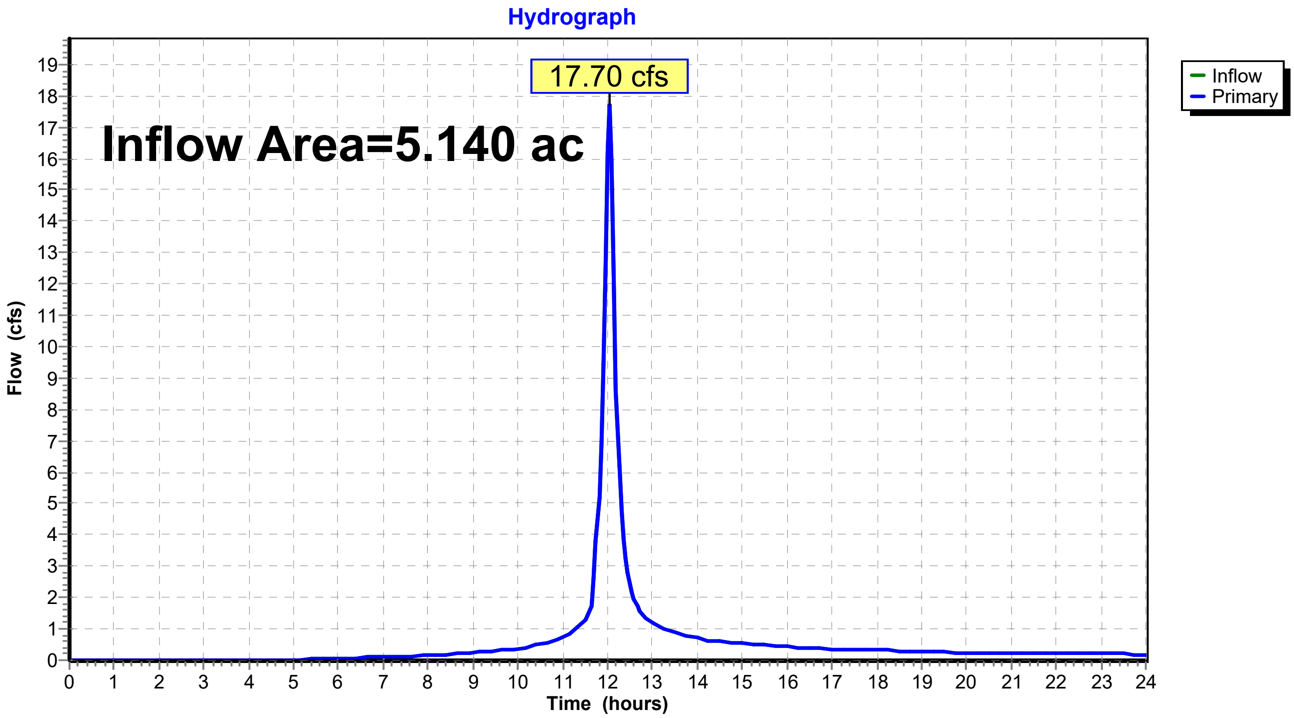


Summary for Link 13L: NE RP

Inflow Area = 5.140 ac, 65.00% Impervious, Inflow Depth > 2.63" for 2-Year event
Inflow = 17.70 cfs @ 12.05 hrs, Volume= 1.127 af
Primary = 17.70 cfs @ 12.05 hrs, Volume= 1.127 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 13L: NE RP



Summary for Subcatchment 5S: West DA - Onsite

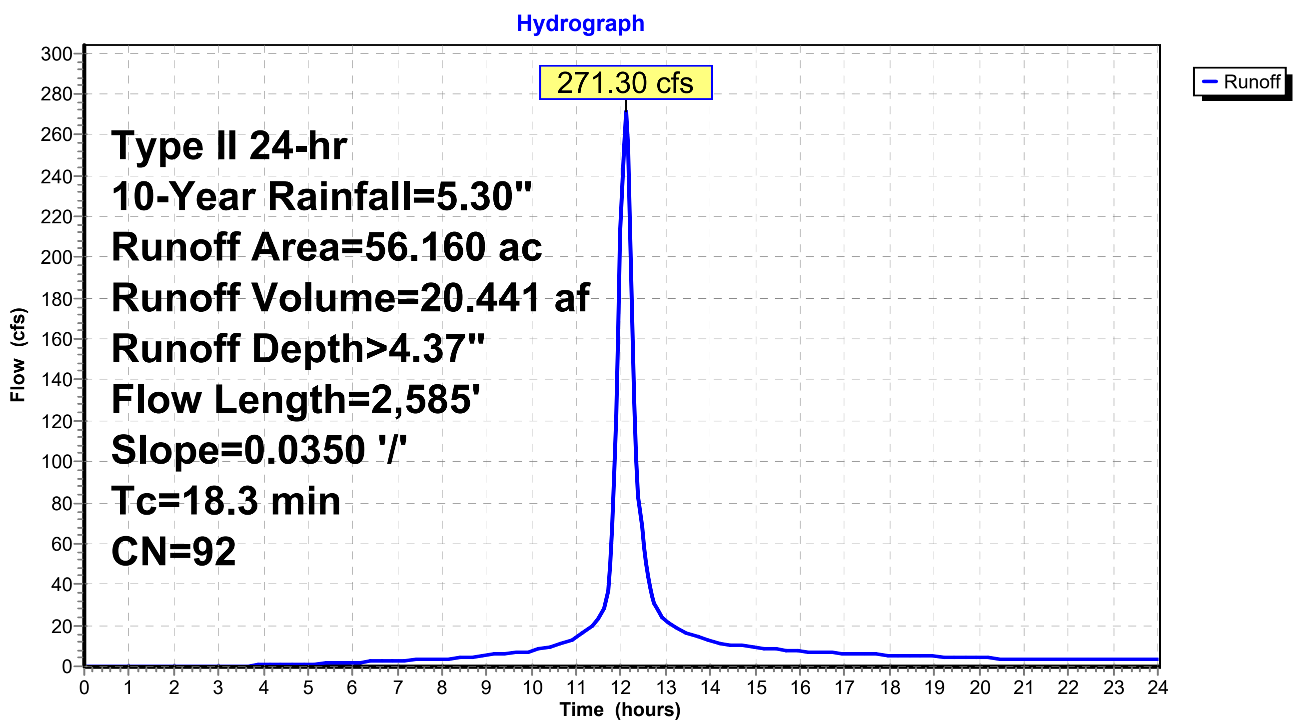
Runoff = 271.30 cfs @ 12.10 hrs, Volume= 20.441 af, Depth> 4.37"
Routed to Pond 7P : Existing West Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.30"

Area (ac)	CN	Description
56.160	92	1/8 acre lots, 65% imp, HSG D
19.656		35.00% Pervious Area
36.504		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	100	0.0350	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
10.9	2,485	0.0350	3.80		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
18.3	2,585	Total			

Subcatchment 5S: West DA - Onsite



Summary for Subcatchment 8S: East DA - OffSite

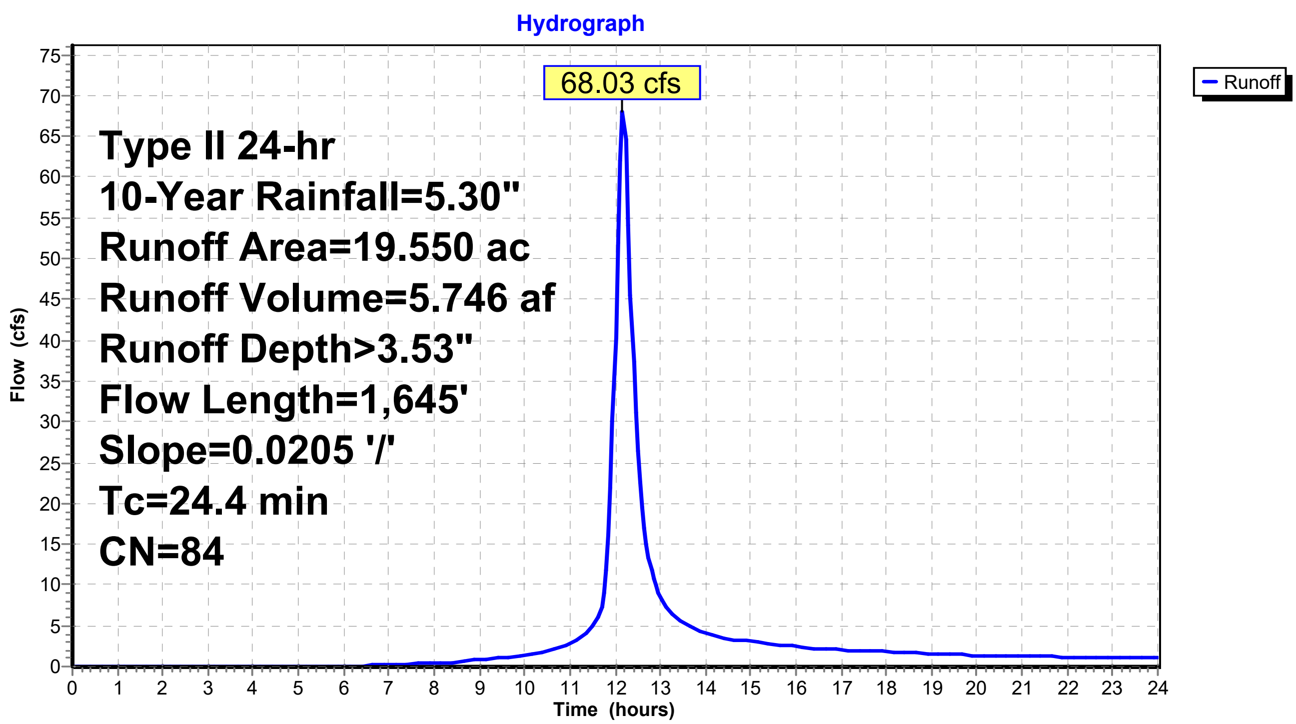
Runoff = 68.03 cfs @ 12.17 hrs, Volume= 5.746 af, Depth> 3.53"
Routed to Pond 3P : Existing East Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.30"

Area (ac)	CN	Description
19.550	84	Row crops, contoured, Poor, HSG C
19.550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	100	0.0205	0.38		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
20.0	1,545	0.0205	1.29		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
24.4	1,645	Total			

Subcatchment 8S: East DA - OffSite



Summary for Subcatchment 9S: East Bypass

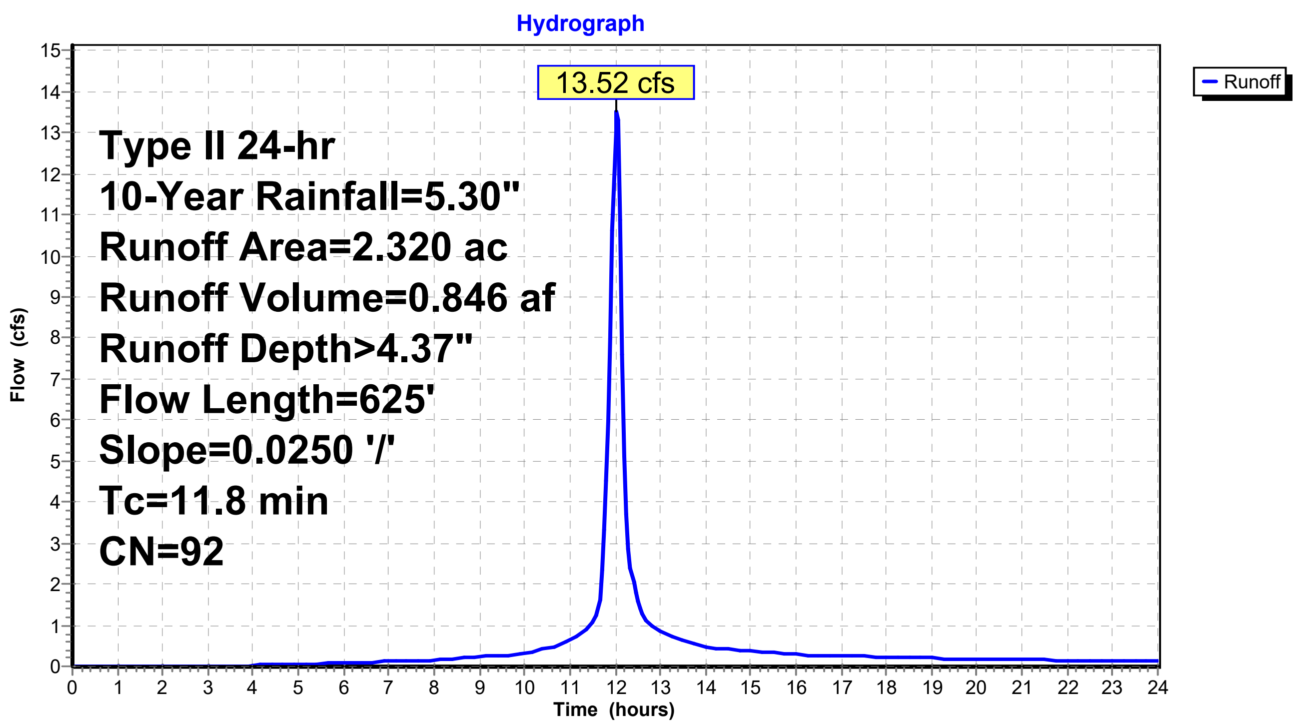
Runoff = 13.52 cfs @ 12.03 hrs, Volume= 0.846 af, Depth> 4.37"
Routed to Link 4L : East RP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.30"

Area (ac)	CN	Description
2.320	92	1/8 acre lots, 65% imp, HSG D
0.812		35.00% Pervious Area
1.508		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0250	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
3.4	525	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.8	625	Total			

Subcatchment 9S: East Bypass



Summary for Subcatchment 10S: West DA - OffSite

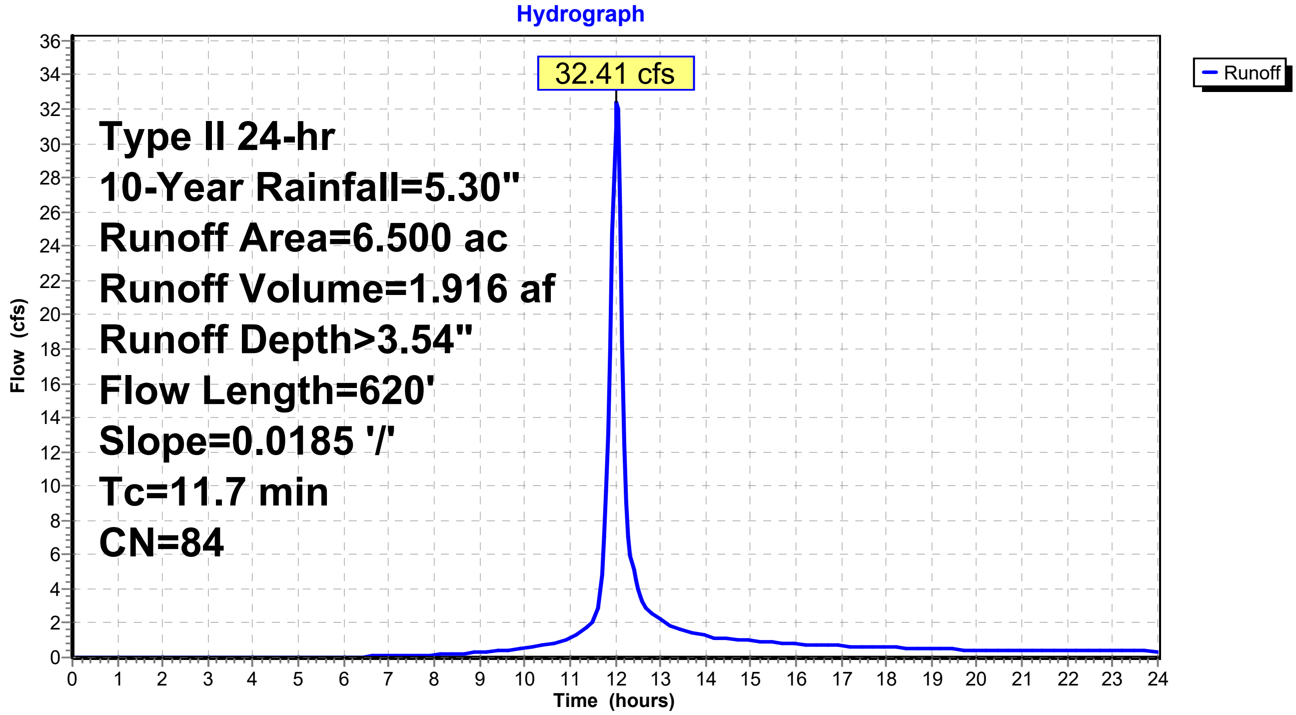
Runoff = 32.41 cfs @ 12.03 hrs, Volume= 1.916 af, Depth> 3.54"
Routed to Pond 7P : Existing West Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.30"

Area (ac)	CN	Description
6.500	84	Row crops, contoured, Poor, HSG C
6.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0185	0.36		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
7.1	520	0.0185	1.22		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
11.7	620	Total			

Subcatchment 10S: West DA - OffSite



Summary for Subcatchment 12S: Northwest DA

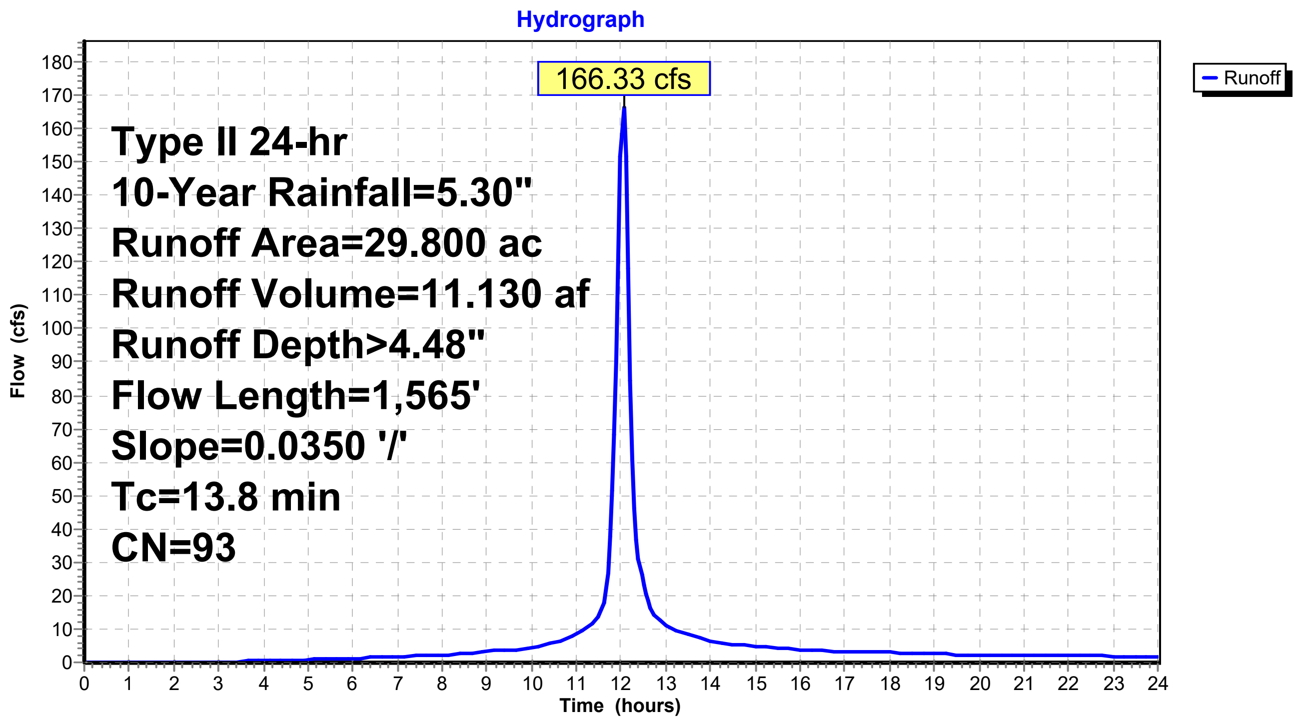
Runoff = 166.33 cfs @ 12.05 hrs, Volume= 11.130 af, Depth> 4.48"
Routed to Pond 15P : EWDB #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.30"

Area (ac)	CN	Description
13.570	95	Urban commercial, 85% imp, HSG D
16.230	92	1/8 acre lots, 65% imp, HSG D
29.800	93	Weighted Average
7.716		25.89% Pervious Area
22.084		74.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	100	0.0350	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
6.4	1,465	0.0350	3.80		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
13.8	1,565	Total			

Subcatchment 12S: Northwest DA



Summary for Subcatchment 14S: Northeast DA

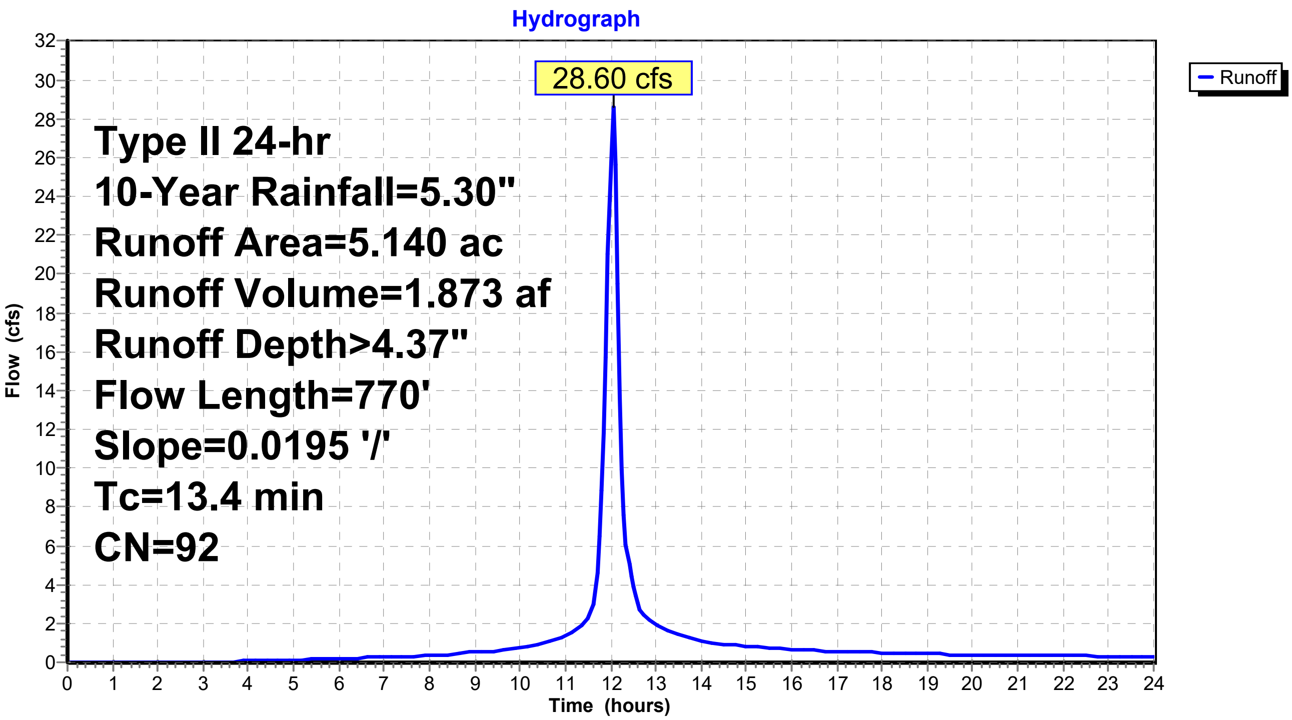
Runoff = 28.60 cfs @ 12.05 hrs, Volume= 1.873 af, Depth> 4.37"
Routed to Link 13L : NE RP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.30"

Area (ac)	CN	Description
5.140	92	1/8 acre lots, 65% imp, HSG D
1.799		35.00% Pervious Area
3.341		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	100	0.0195	0.37		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
8.9	670	0.0195	1.26		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
13.4	770	Total			

Subcatchment 14S: Northeast DA



Summary for Subcatchment 71S: Northwest DA - Offsite

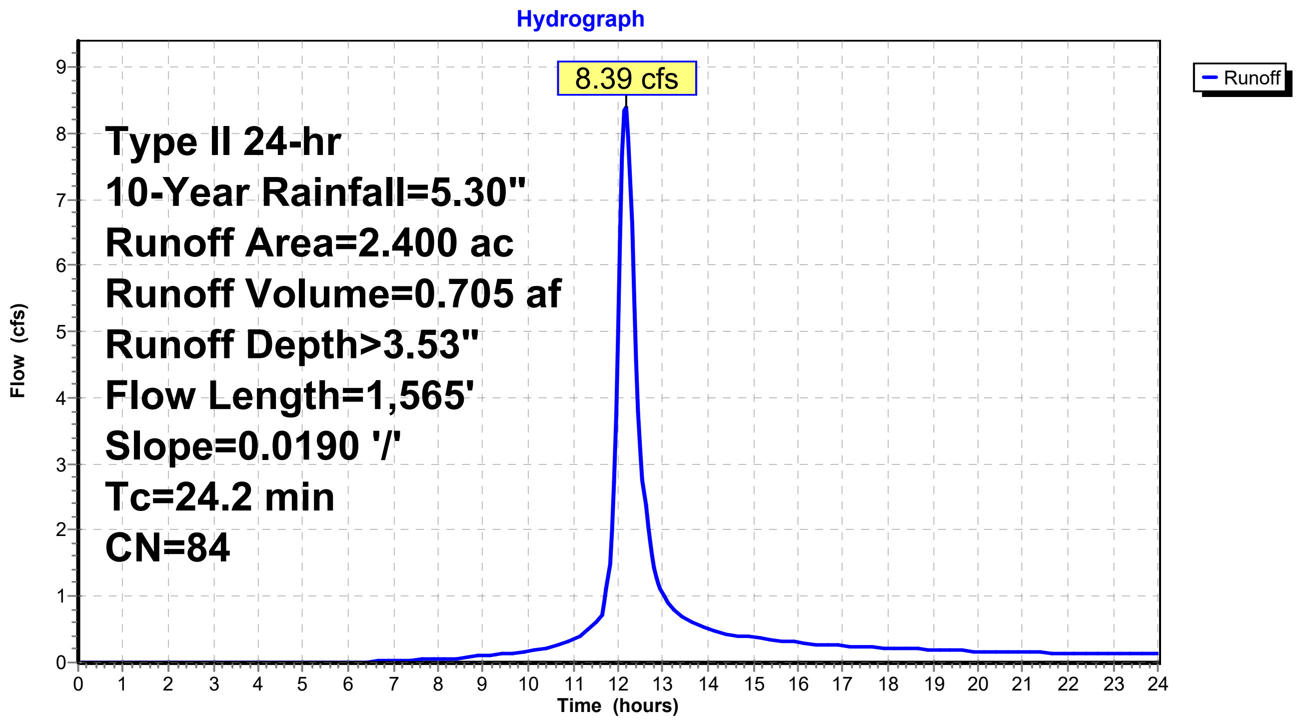
Runoff = 8.39 cfs @ 12.17 hrs, Volume= 0.705 af, Depth> 3.53"
Routed to Pond 15P : EWDB #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.30"

Area (ac)	CN	Description
2.400	84	Row crops, contoured, Poor, HSG C
2.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	100	0.0190	0.37		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
19.7	1,465	0.0190	1.24		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
24.2	1,565	Total			

Subcatchment 71S: Northwest DA - Offsite



Summary for Subcatchment 72S: East DA - OnSite

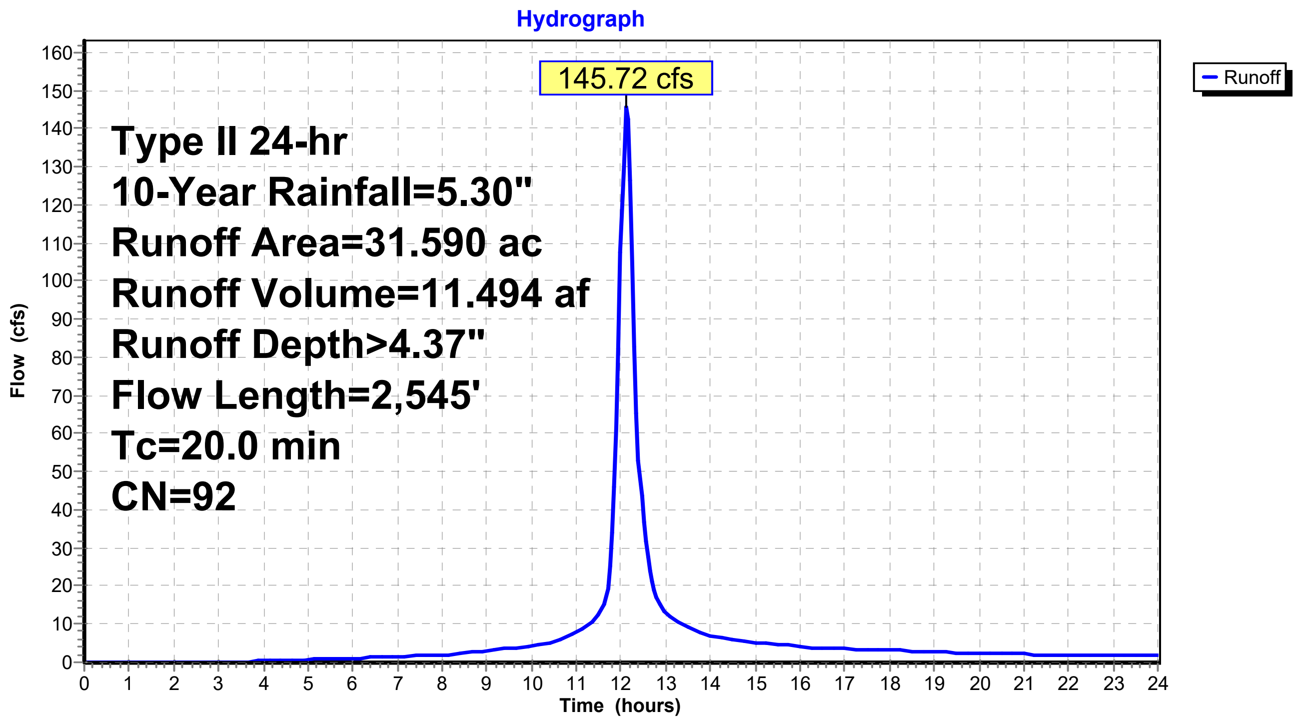
Runoff = 145.72 cfs @ 12.12 hrs, Volume= 11.494 af, Depth> 4.37"
Routed to Pond 3P : Existing East Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=5.30"

Area (ac)	CN	Description
31.590	92	1/8 acre lots, 65% imp, HSG D
11.056		35.00% Pervious Area
20.533		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0250	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
11.6	2,445	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
20.0	2,545	Total			

Subcatchment 72S: East DA - OnSite



Summary for Pond 3P: Existing East Basin

[44] Hint: Outlet device #2 is below defined storage
[95] Warning: Outlet Device #2 rise exceeded

Inflow Area = 51.140 ac, 40.15% Impervious, Inflow Depth > 4.05" for 10-Year event
Inflow = 210.89 cfs @ 12.13 hrs, Volume= 17.240 af
Outflow = 46.98 cfs @ 12.60 hrs, Volume= 17.239 af, Atten= 78%, Lag= 28.2 min
Primary = 46.98 cfs @ 12.60 hrs, Volume= 17.239 af
Routed to Link 4L : East RP

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,011.69' @ 12.60 hrs Surf.Area= 173,629 sf Storage= 257,420 cf

Plug-Flow detention time= 41.8 min calculated for 17.239 af (100% of inflow)
Center-of-Mass det. time= 41.7 min (840.0 - 798.3)

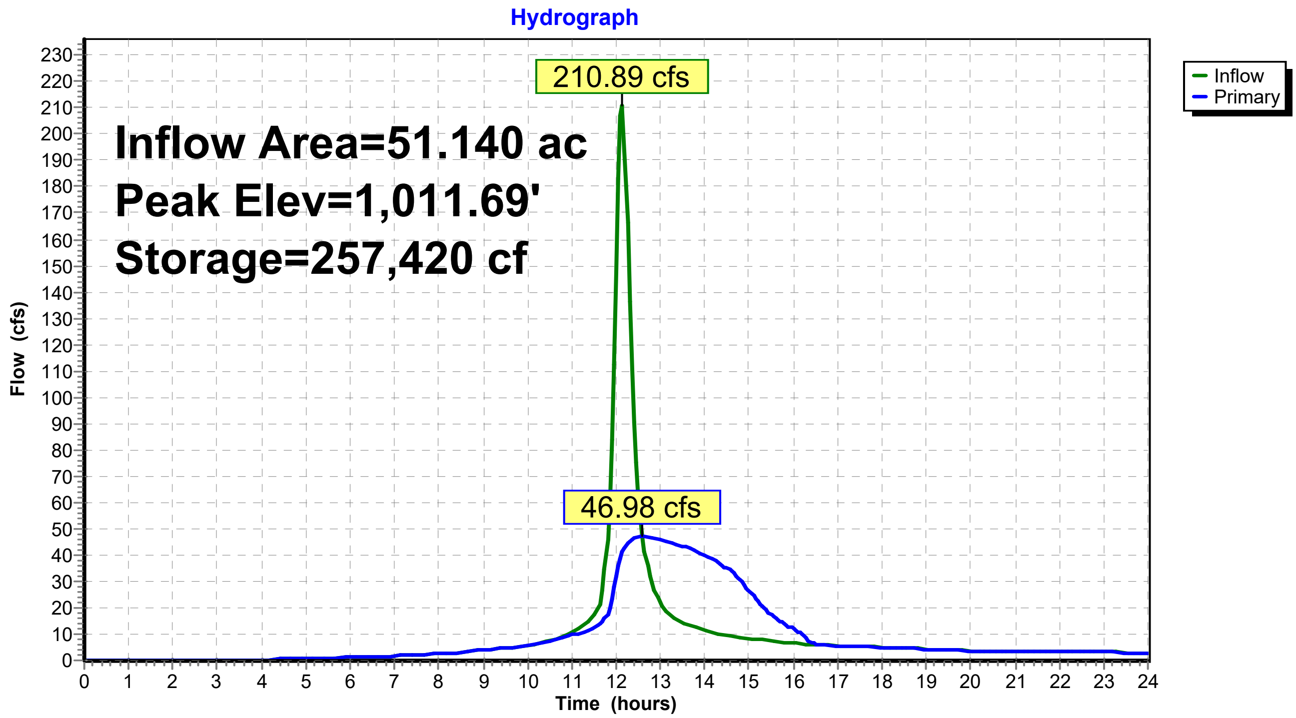
Volume	Invert	Avail.Storage	Storage Description
#1	1,007.00'	714,080 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,007.00	10	0	0
1,008.00	201	106	106
1,010.00	59,816	60,017	60,123
1,012.00	194,481	254,297	314,420
1,014.00	205,179	399,660	714,080

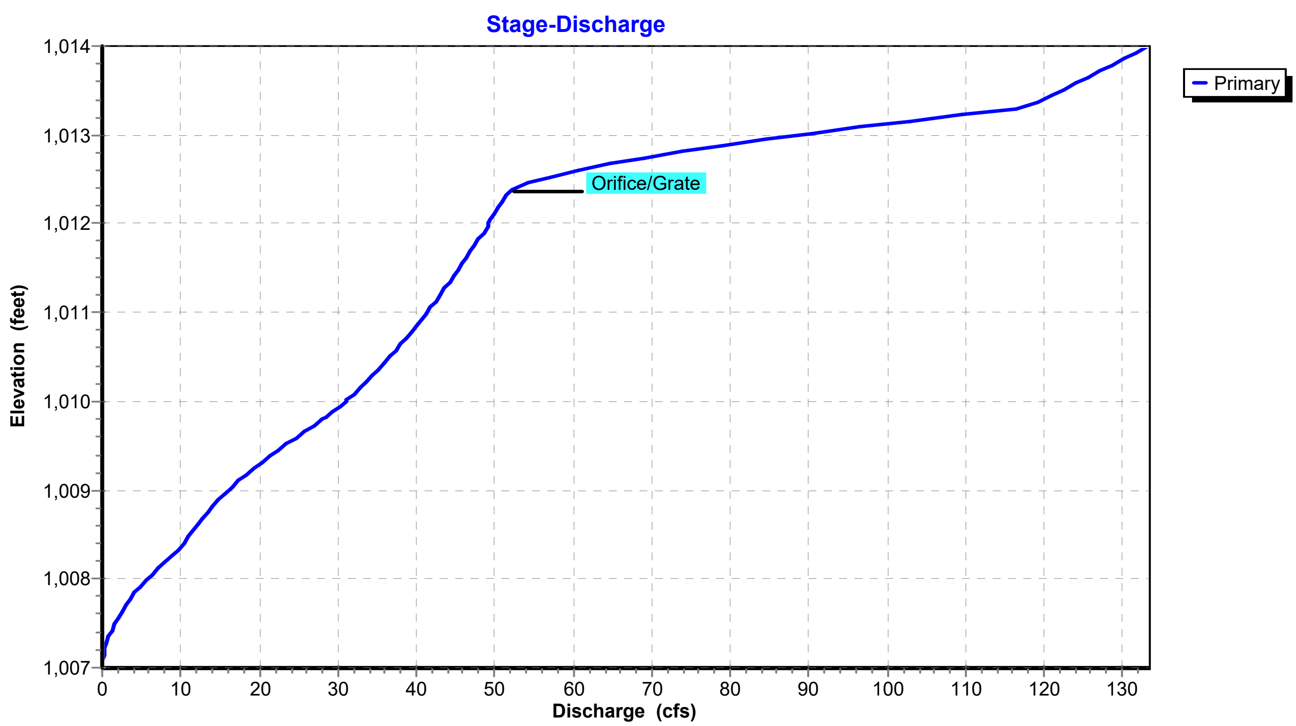
Device	Routing	Invert	Outlet Devices
#1	Primary	1,006.93'	**48.0" Round RCP_Round 48"** L= 65.0' Ke= 0.500 Inlet / Outlet Invert= 1,006.93' / 1,006.82' S= 0.0017 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Device 1	1,006.52'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 1,006.52 1,008.82 1,008.82 1,009.82 Width (feet) 1.25 1.25 2.50 2.50
#3	Device 1	1,012.37'	**60.0" x 60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=46.98 cfs @ 12.60 hrs HW=1,011.69' (Free Discharge)
└─**1=RCP_Round 48"** (Passes 46.98 cfs of 81.82 cfs potential flow)
  ├─**2=Custom Weir/Orifice** (Orifice Controls 46.98 cfs @ 8.74 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

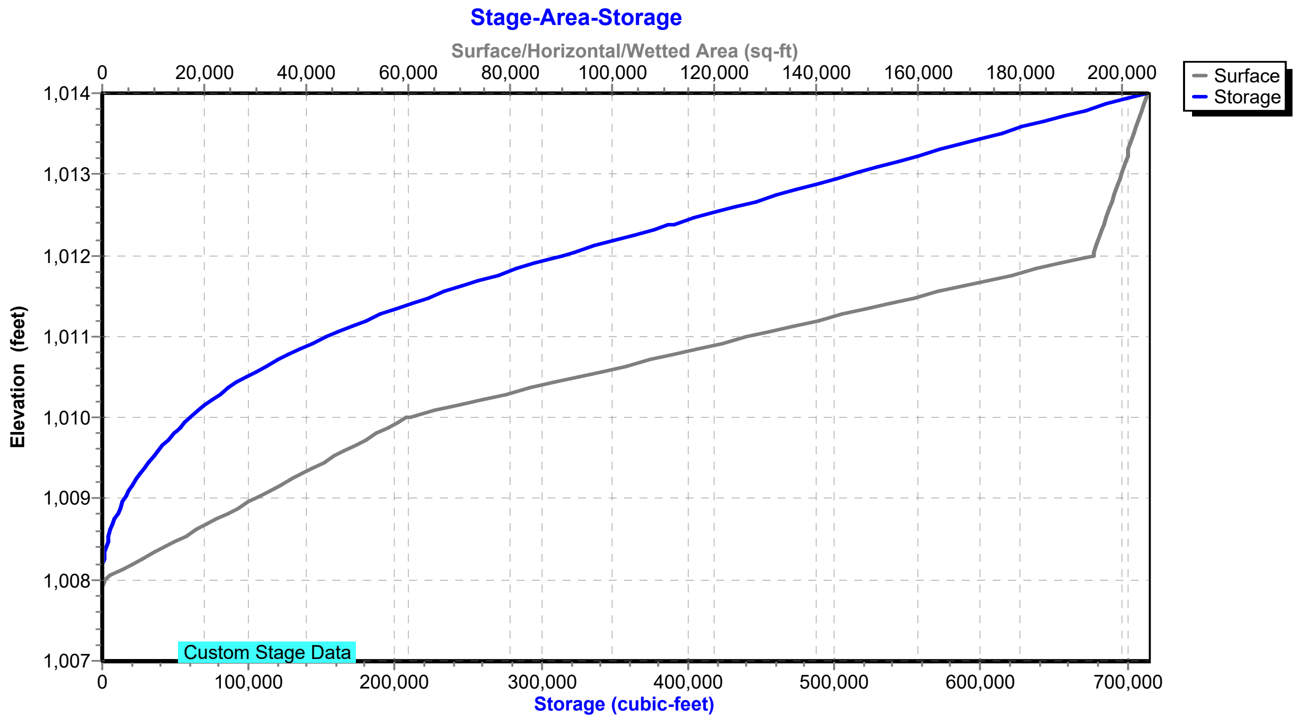
Pond 3P: Existing East Basin



Pond 3P: Existing East Basin



Pond 3P: Existing East Basin



Summary for Pond 7P: Existing West Basin

[95] Warning: Outlet Device #2 rise exceeded

Inflow Area = 62.660 ac, 58.26% Impervious, Inflow Depth > 4.28" for 10-Year event
Inflow = 298.30 cfs @ 12.09 hrs, Volume= 22.358 af
Outflow = 59.38 cfs @ 12.52 hrs, Volume= 22.144 af, Atten= 80%, Lag= 25.7 min
Primary = 59.38 cfs @ 12.52 hrs, Volume= 22.144 af
Routed to Link 6L : West RP

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,001.06' @ 12.52 hrs Surf.Area= 179,495 sf Storage= 387,167 cf

Plug-Flow detention time= 72.6 min calculated for 22.098 af (99% of inflow)
Center-of-Mass det. time= 66.5 min (855.1 - 788.6)

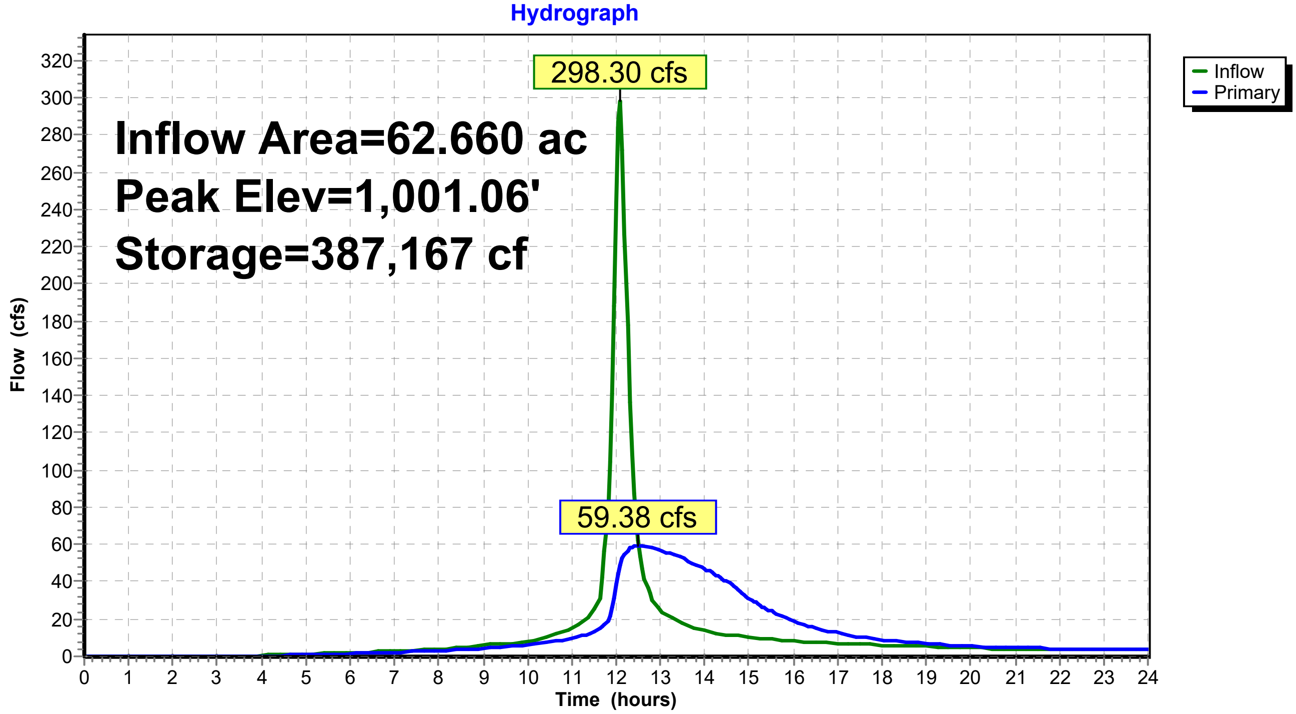
Volume	Invert	Avail.Storage	Storage Description
#1	996.50'	1,043,367 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
996.50	10	0	0
998.00	50,187	37,648	37,648
1,000.00	133,191	183,378	221,026
1,002.00	220,337	353,528	574,554
1,004.00	248,476	468,813	1,043,367

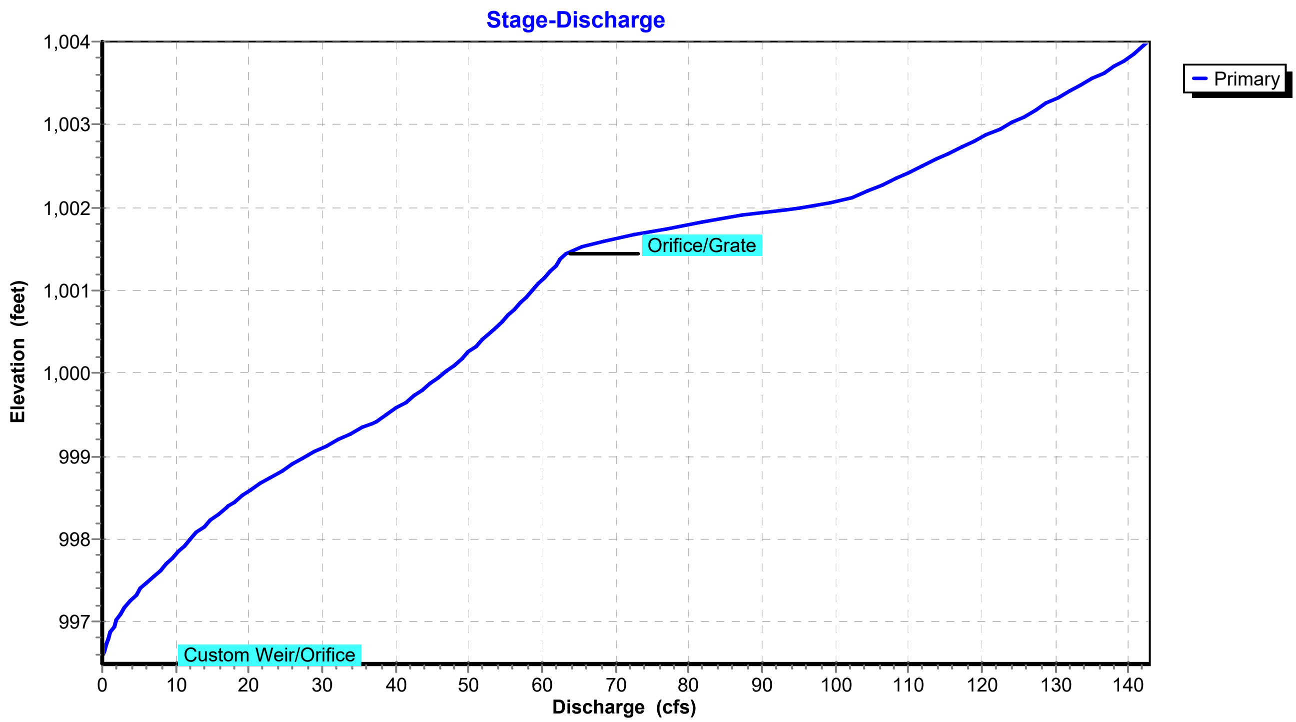
Device	Routing	Invert	Outlet Devices
#1	Primary	996.44'	**48.0" Round RCP_Round 48"** L= 74.4' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 996.44' / 996.20' S= 0.0032 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Device 1	996.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 996.50 998.40 998.40 999.40 Width (feet) 2.00 2.00 3.33 3.33
#3	Device 1	1,001.45'	**60.0" x 60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=59.37 cfs @ 12.52 hrs HW=1,001.06' (Free Discharge)
└─**1=RCP_Round 48"** (Passes 59.37 cfs of 82.06 cfs potential flow)
  ├─**2=Custom Weir/Orifice** (Orifice Controls 59.37 cfs @ 8.33 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

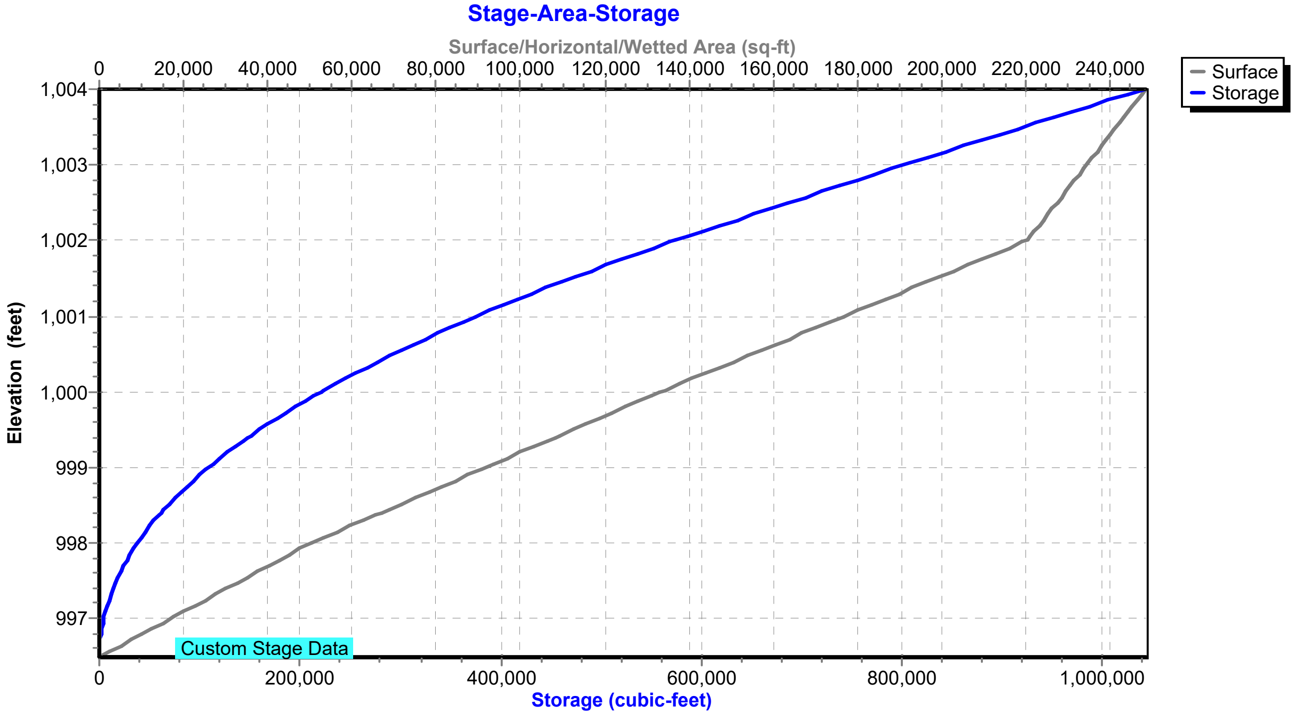
Pond 7P: Existing West Basin



Pond 7P: Existing West Basin



Pond 7P: Existing West Basin



Summary for Pond 15P: EWDB #1

[95] Warning: Outlet Device #2 rise exceeded

Inflow Area = 32.200 ac, 68.58% Impervious, Inflow Depth > 4.41" for 10-Year event
Inflow = 172.80 cfs @ 12.05 hrs, Volume= 11.835 af
Outflow = 53.43 cfs @ 12.31 hrs, Volume= 11.039 af, Atten= 69%, Lag= 15.2 min
Primary = 53.43 cfs @ 12.31 hrs, Volume= 11.039 af
Routed to Link 11L : NW RP

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,006.66' @ 12.31 hrs Surf.Area= 52,554 sf Storage= 236,293 cf

Plug-Flow detention time= 157.6 min calculated for 11.039 af (93% of inflow)
Center-of-Mass det. time= 120.5 min (901.6 - 781.1)

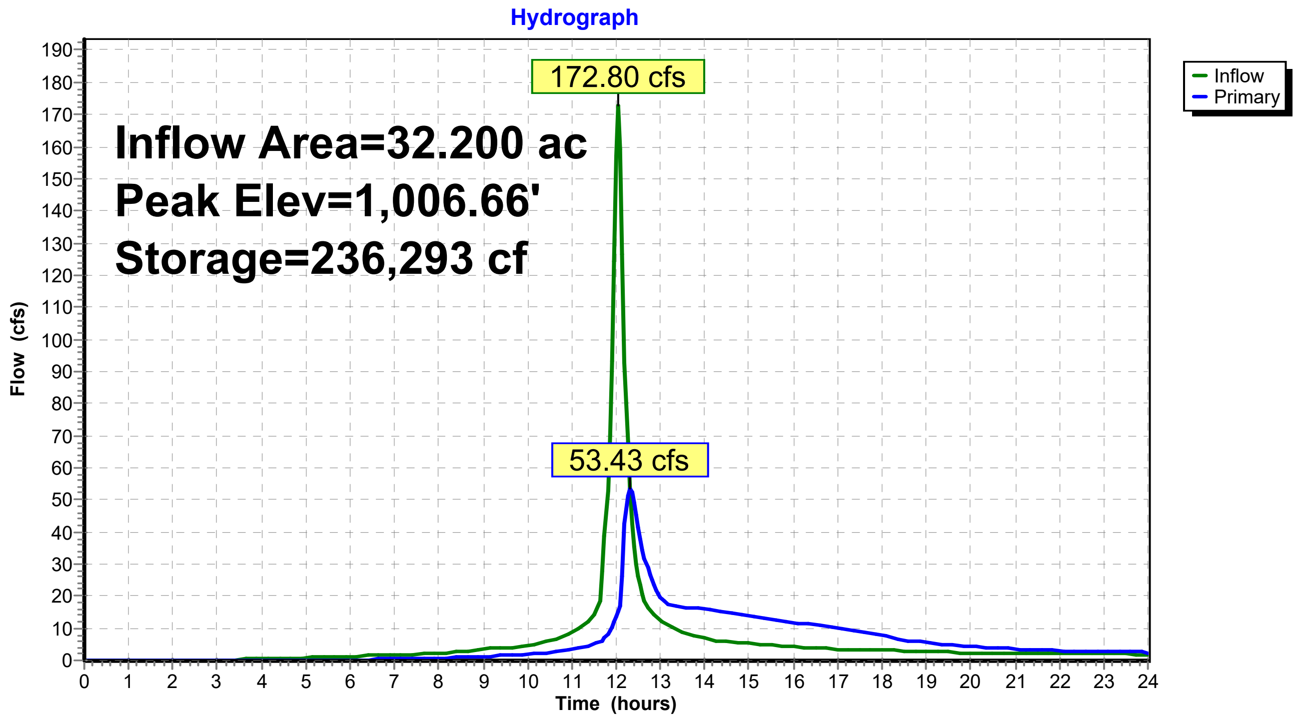
Volume	Invert	Avail.Storage	Storage Description
#1	1,002.00'	412,894 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,002.00	44,842	0	0
1,004.00	52,221	97,063	97,063
1,006.00	52,471	104,692	201,755
1,008.00	52,722	105,193	306,948
1,010.00	53,224	105,946	412,894

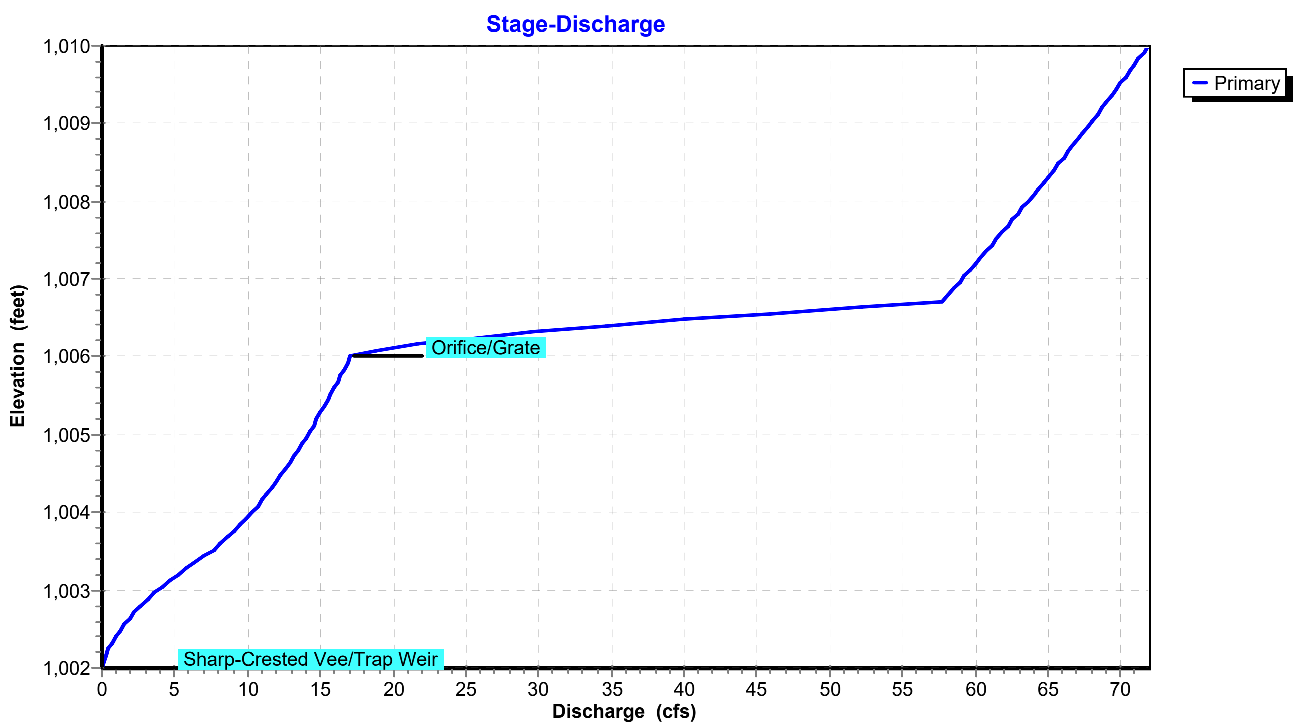
Device	Routing	Invert	Outlet Devices
#1	Primary	999.50'	**30.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 999.50' / 999.25' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	1,002.00'	**20.0 deg x 1.0' long x 1.50' rise Sharp-Crested Vee/Trap Weir** Cv= 2.69 (C= 3.36)
#3	Device 1	1,006.00'	**60.0" x 60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=53.44 cfs @ 12.31 hrs HW=1,006.66' (Free Discharge)
└─**1=Culvert** (Passes 53.44 cfs of 57.44 cfs potential flow)
  ├─**2=Sharp-Crested Vee/Trap Weir** (Orifice Controls 18.75 cfs @ 9.88 fps)
  └─**3=Orifice/Grate** (Weir Controls 34.69 cfs @ 2.65 fps)

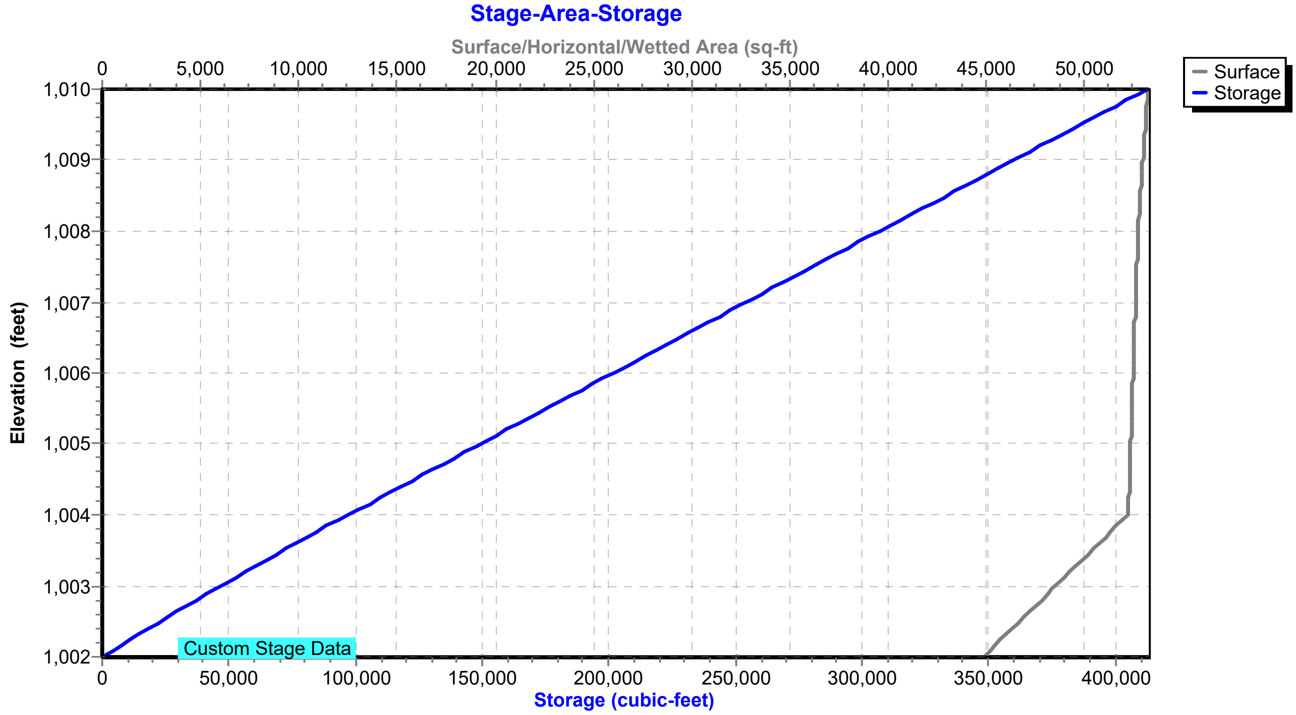
Pond 15P: EWDB #1



Pond 15P: EWDB #1



Pond 15P: EWDB #1

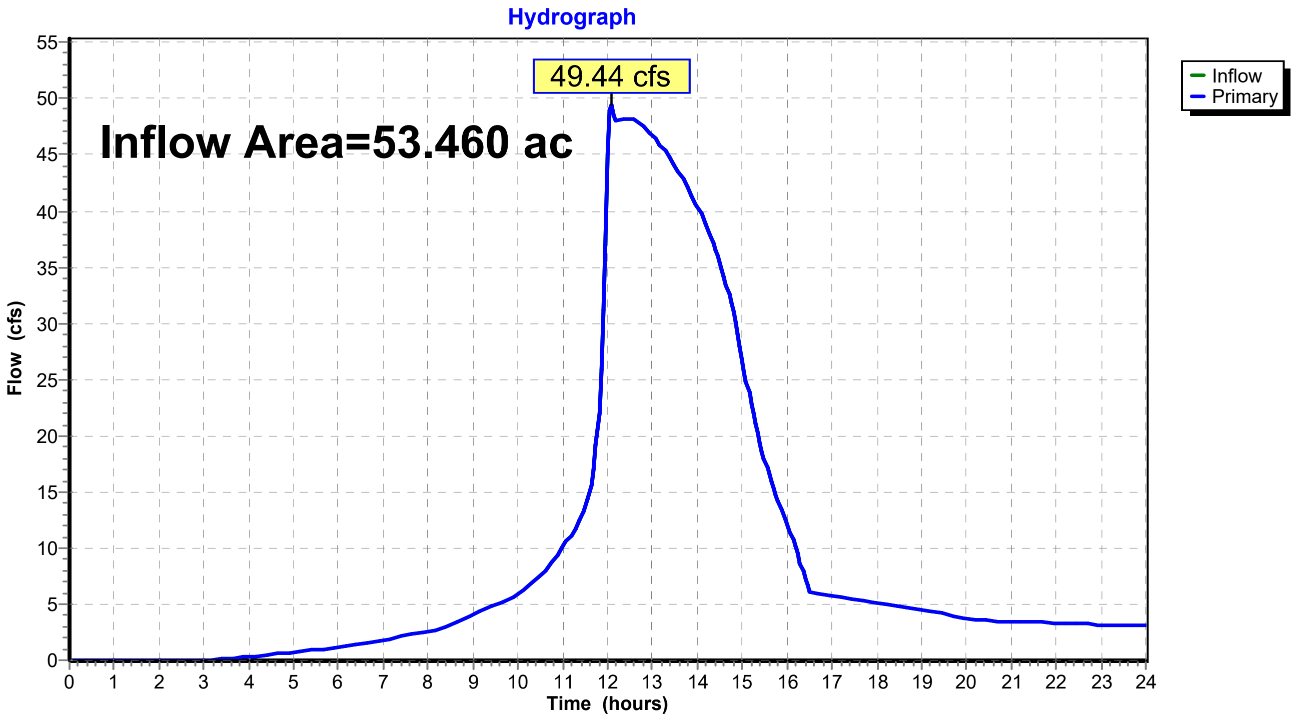


Summary for Link 4L: East RP

Inflow Area = 53.460 ac, 41.23% Impervious, Inflow Depth > 4.06" for 10-Year event
Inflow = 49.44 cfs @ 12.09 hrs, Volume= 18.084 af
Primary = 49.44 cfs @ 12.09 hrs, Volume= 18.084 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 4L: East RP

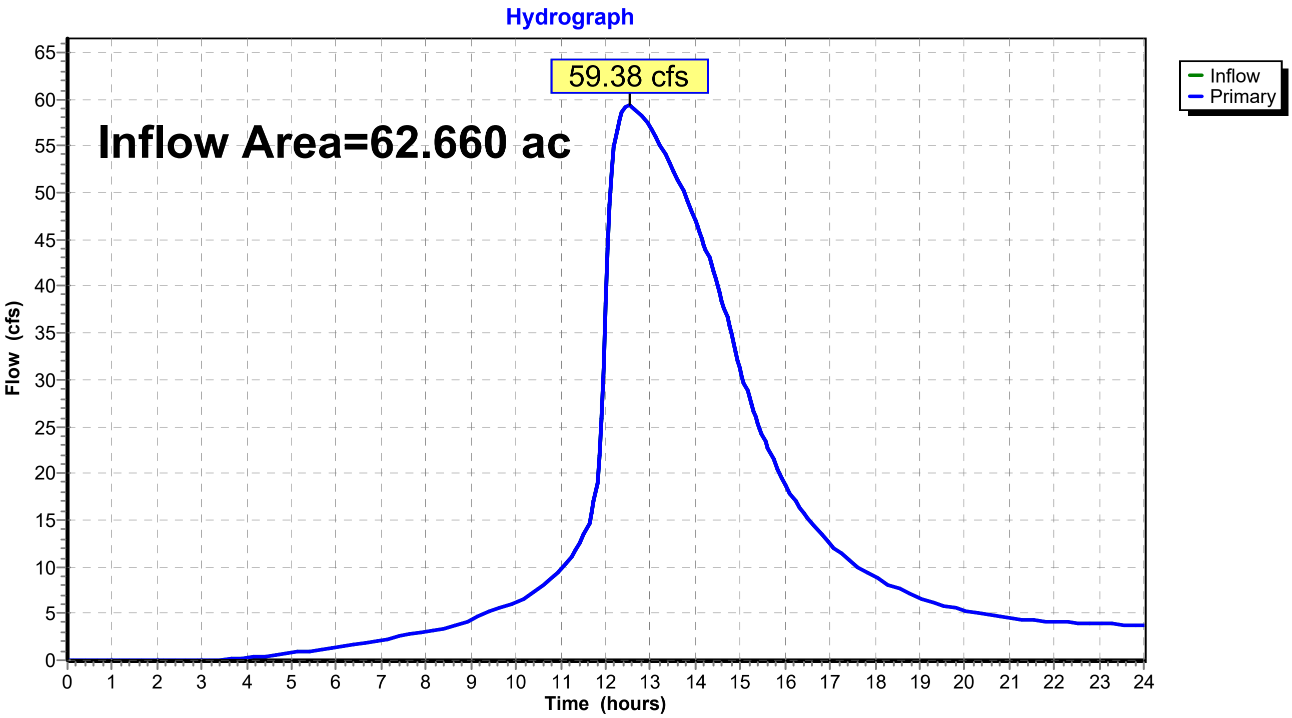


Summary for Link 6L: West RP

Inflow Area = 62.660 ac, 58.26% Impervious, Inflow Depth > 4.24" for 10-Year event
Inflow = 59.38 cfs @ 12.52 hrs, Volume= 22.144 af
Primary = 59.38 cfs @ 12.52 hrs, Volume= 22.144 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

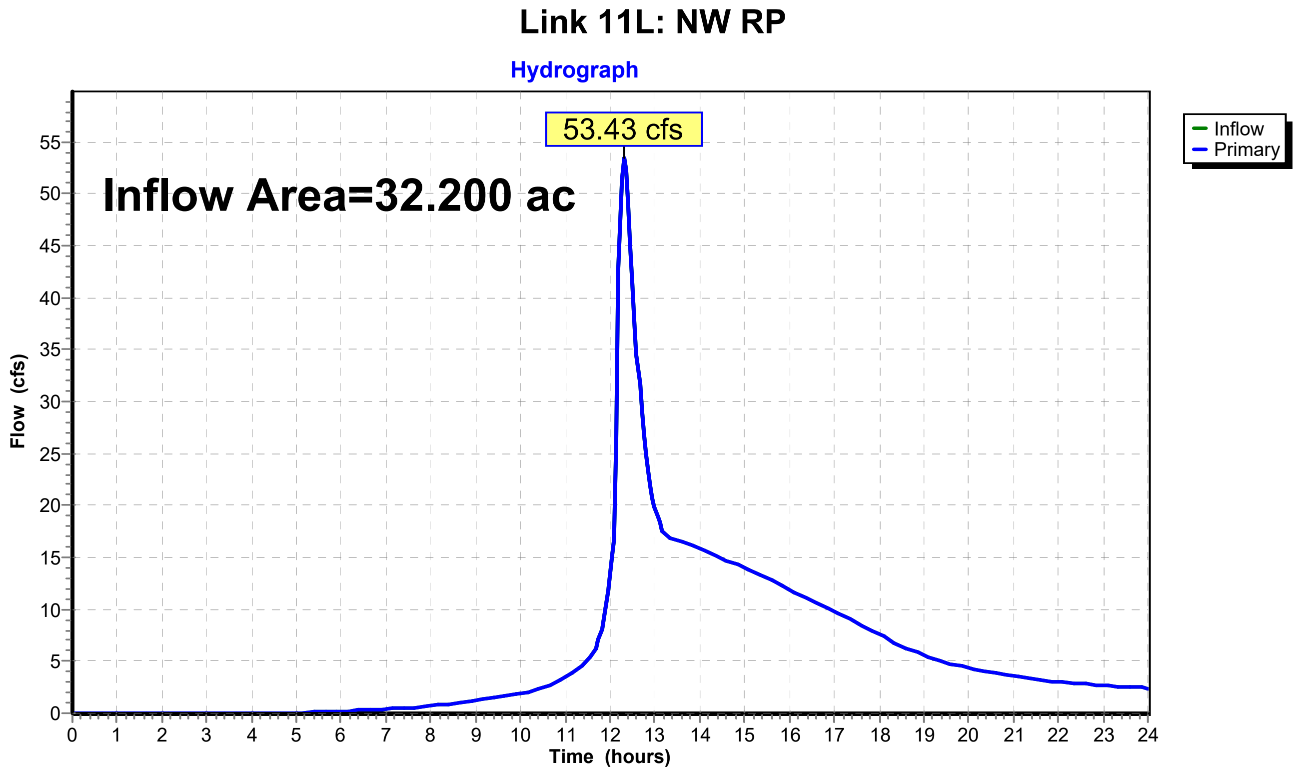
Link 6L: West RP



Summary for Link 11L: NW RP

Inflow Area =	32.200 ac, 68.58% Impervious,	Inflow Depth > 4.11"	for 10-Year event	
Inflow =	53.43 cfs @ 12.31 hrs,	Volume=	11.039 af	
Primary =	53.43 cfs @ 12.31 hrs,	Volume=	11.039 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

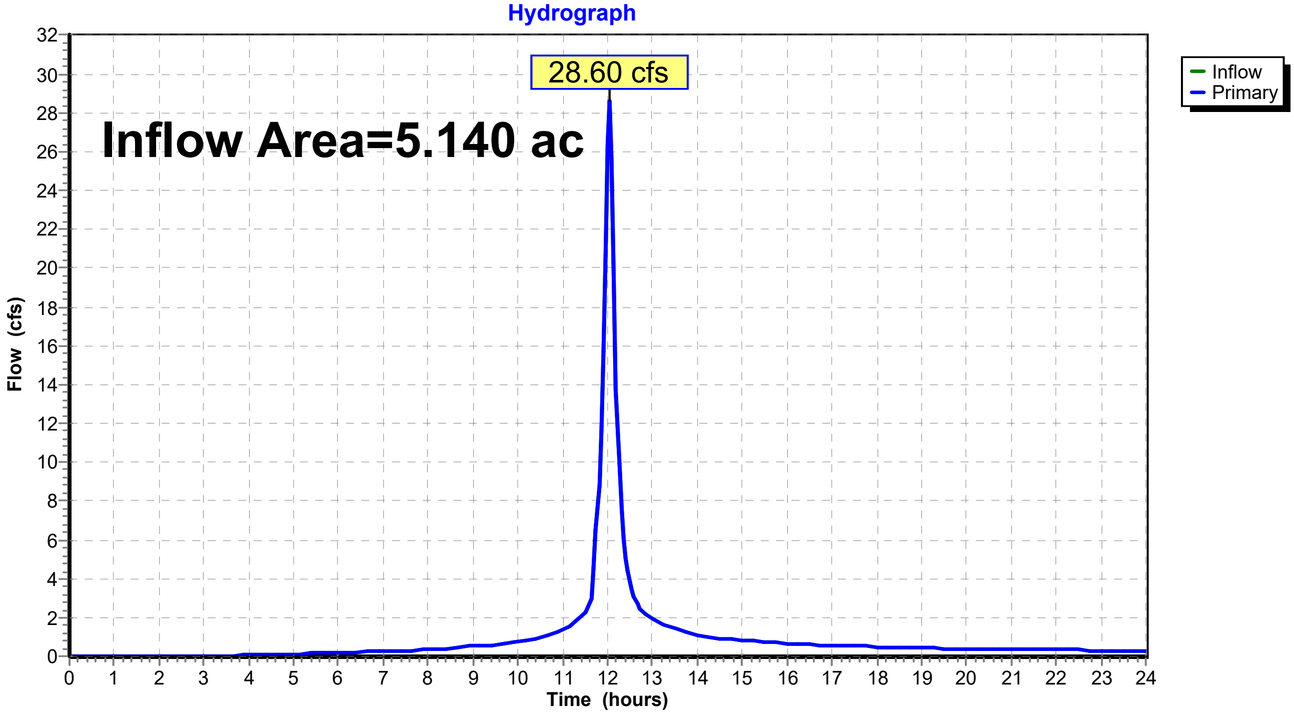


Summary for Link 13L: NE RP

Inflow Area =	5.140 ac,	65.00% Impervious,	Inflow Depth > 4.37"	for 10-Year event
Inflow =	28.60 cfs @	12.05 hrs, Volume=	1.873 af	
Primary =	28.60 cfs @	12.05 hrs, Volume=	1.873 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 13L: NE RP



Summary for Subcatchment 5S: West DA - Onsite

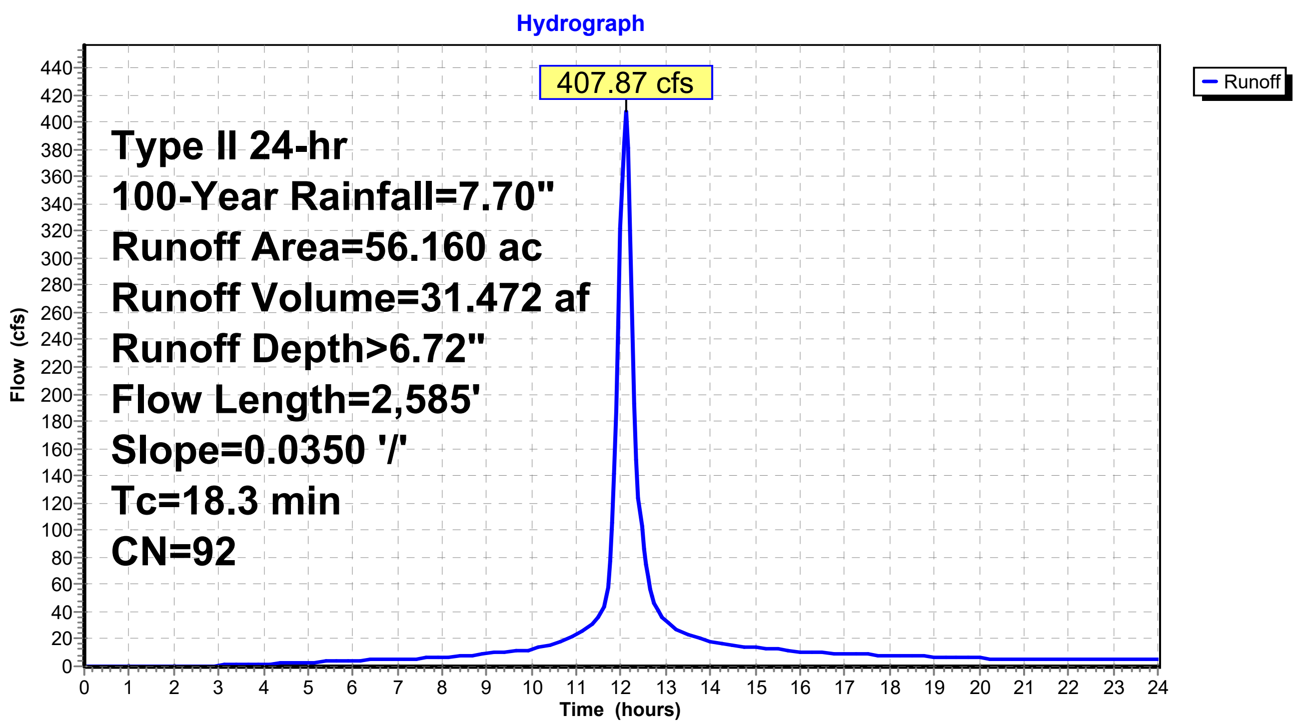
Runoff = 407.87 cfs @ 12.10 hrs, Volume= 31.472 af, Depth> 6.72"
Routed to Pond 7P : Existing West Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.70"

Area (ac)	CN	Description
56.160	92	1/8 acre lots, 65% imp, HSG D
19.656		35.00% Pervious Area
36.504		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	100	0.0350	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
10.9	2,485	0.0350	3.80		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
18.3	2,585	Total			

Subcatchment 5S: West DA - Onsite



Summary for Subcatchment 8S: East DA - OffSite

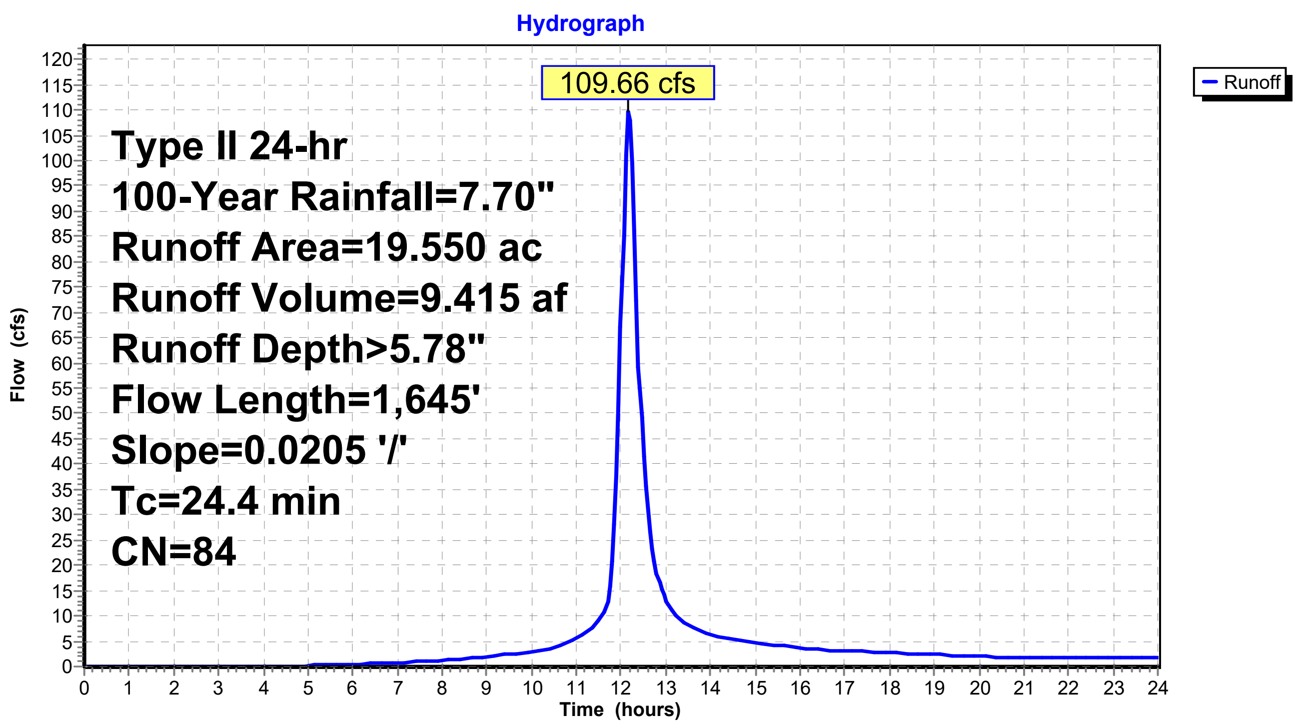
Runoff = 109.66 cfs @ 12.17 hrs, Volume= 9.415 af, Depth> 5.78"
Routed to Pond 3P : Existing East Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.70"

Area (ac)	CN	Description
19.550	84	Row crops, contoured, Poor, HSG C
19.550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	100	0.0205	0.38		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
20.0	1,545	0.0205	1.29		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
24.4	1,645	Total			

Subcatchment 8S: East DA - OffSite



Summary for Subcatchment 9S: East Bypass

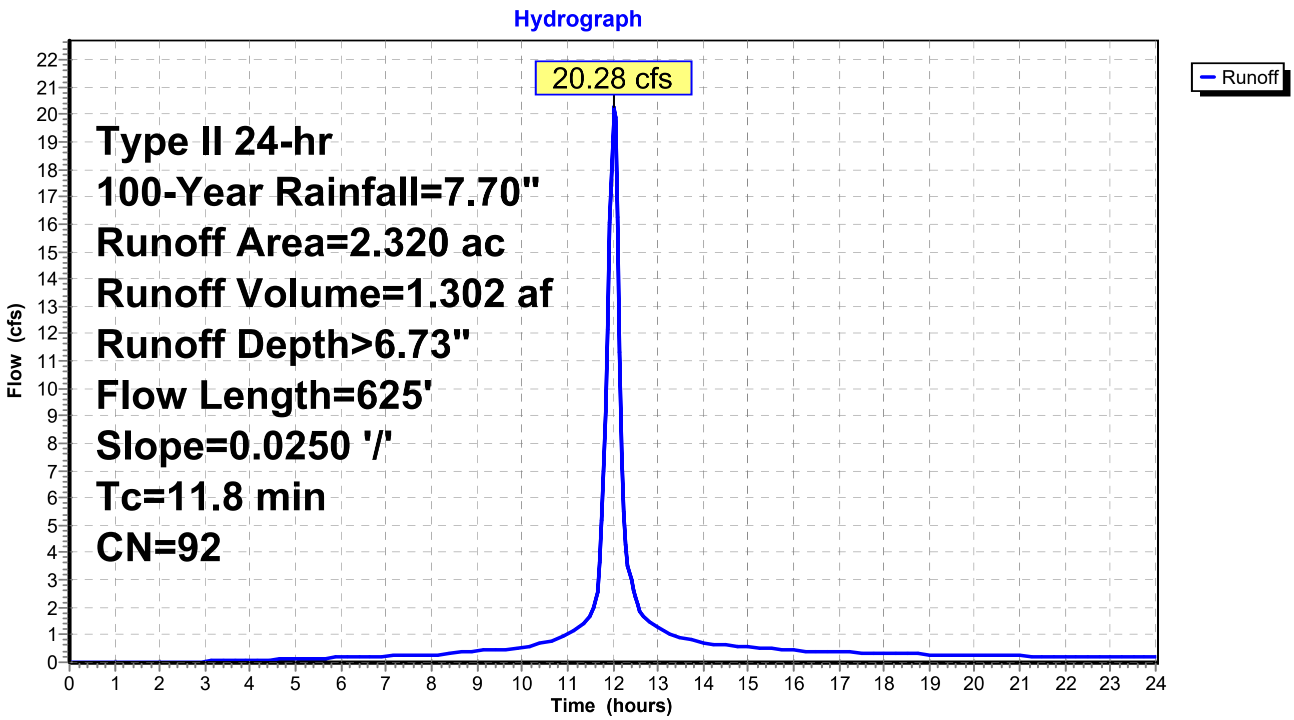
Runoff = 20.28 cfs @ 12.03 hrs, Volume= 1.302 af, Depth> 6.73"
Routed to Link 4L : East RP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.70"

Area (ac)	CN	Description
2.320	92	1/8 acre lots, 65% imp, HSG D
0.812		35.00% Pervious Area
1.508		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0250	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
3.4	525	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.8	625	Total			

Subcatchment 9S: East Bypass



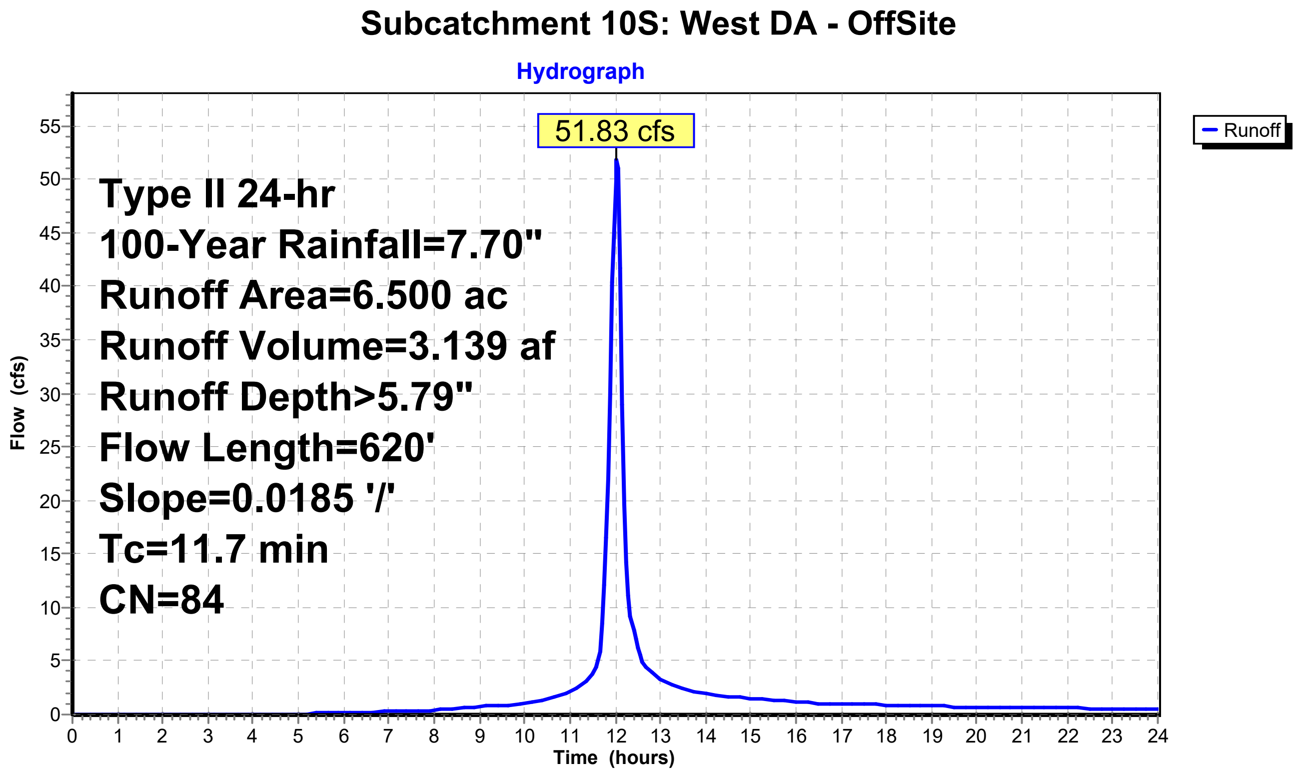
Summary for Subcatchment 10S: West DA - OffSite

Runoff = 51.83 cfs @ 12.03 hrs, Volume= 3.139 af, Depth> 5.79"
Routed to Pond 7P : Existing West Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.70"

Area (ac)	CN	Description
6.500	84	Row crops, contoured, Poor, HSG C
6.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0185	0.36		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
7.1	520	0.0185	1.22		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
11.7	620	Total			



Summary for Subcatchment 12S: Northwest DA

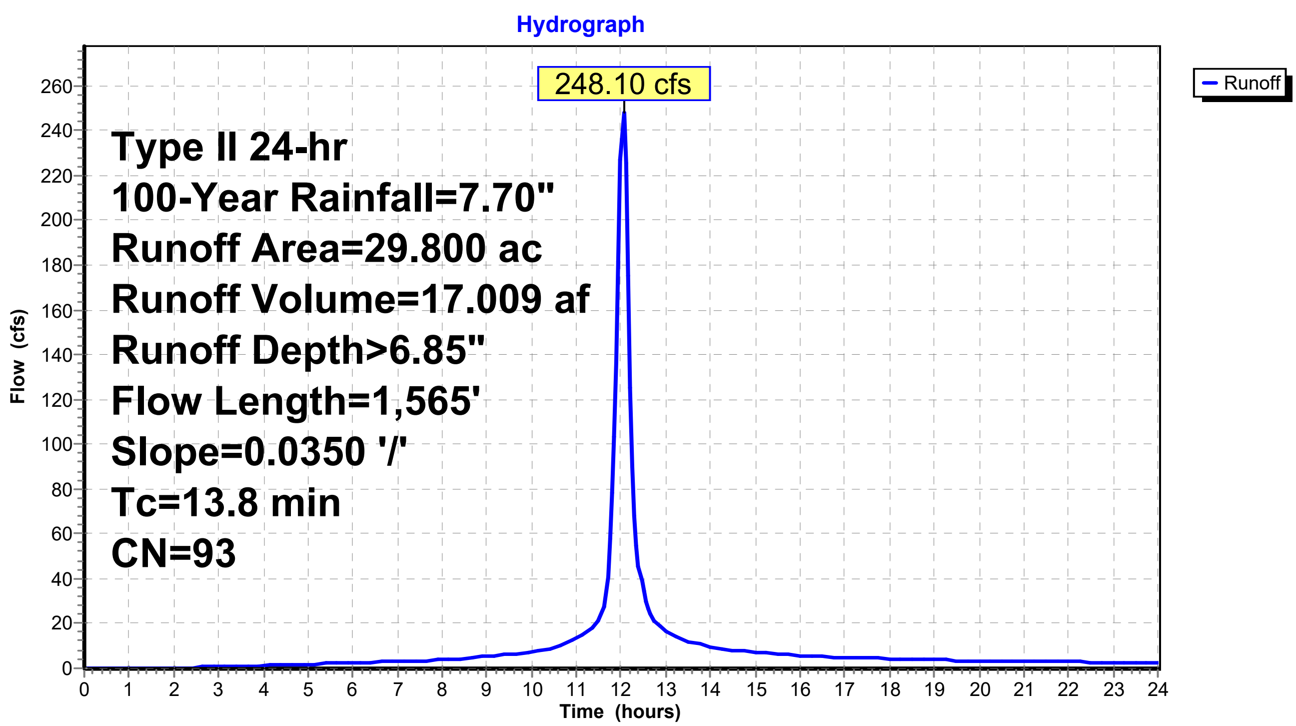
Runoff = 248.10 cfs @ 12.05 hrs, Volume= 17.009 af, Depth> 6.85"
Routed to Pond 15P : EWDB #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.70"

Area (ac)	CN	Description
13.570	95	Urban commercial, 85% imp, HSG D
16.230	92	1/8 acre lots, 65% imp, HSG D
29.800	93	Weighted Average
7.716		25.89% Pervious Area
22.084		74.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	100	0.0350	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
6.4	1,465	0.0350	3.80		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
13.8	1,565	Total			

Subcatchment 12S: Northwest DA



Summary for Subcatchment 14S: Northeast DA

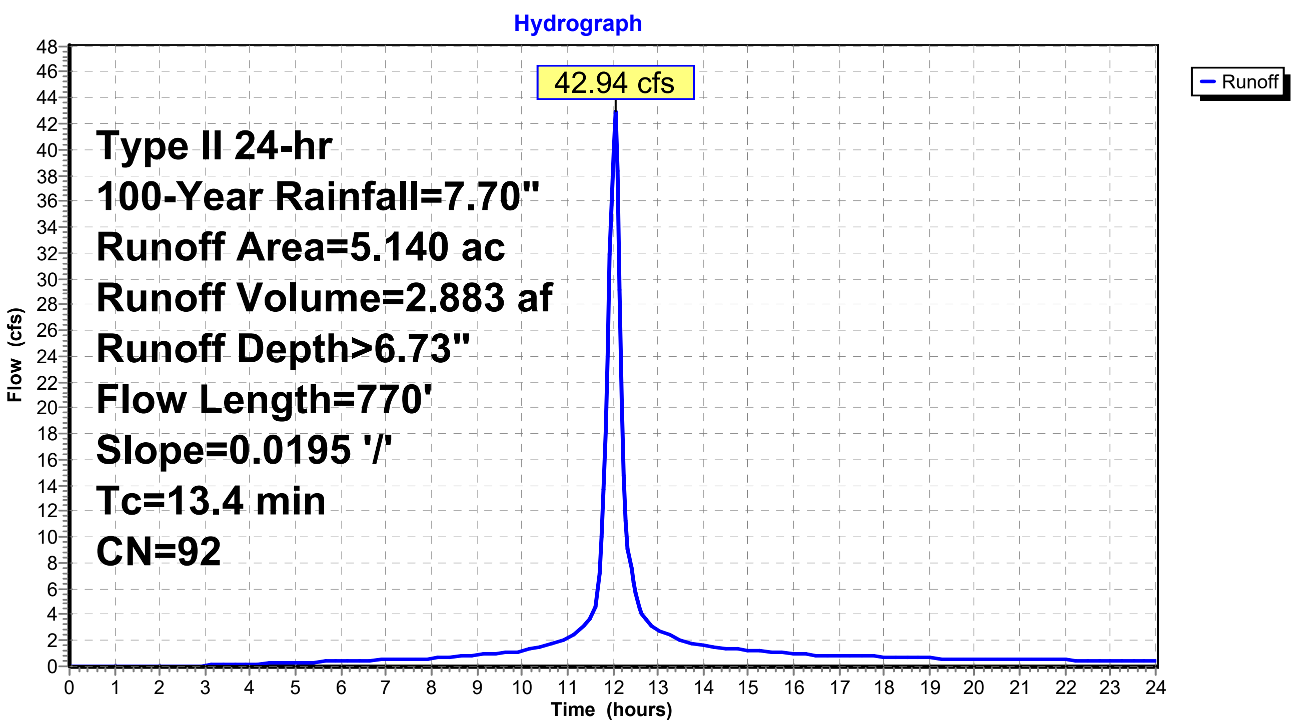
Runoff = 42.94 cfs @ 12.05 hrs, Volume= 2.883 af, Depth> 6.73"
Routed to Link 13L : NE RP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.70"

Area (ac)	CN	Description
5.140	92	1/8 acre lots, 65% imp, HSG D
1.799		35.00% Pervious Area
3.341		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	100	0.0195	0.37		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
8.9	670	0.0195	1.26		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
13.4	770	Total			

Subcatchment 14S: Northeast DA



Summary for Subcatchment 71S: Northwest DA - Offsite

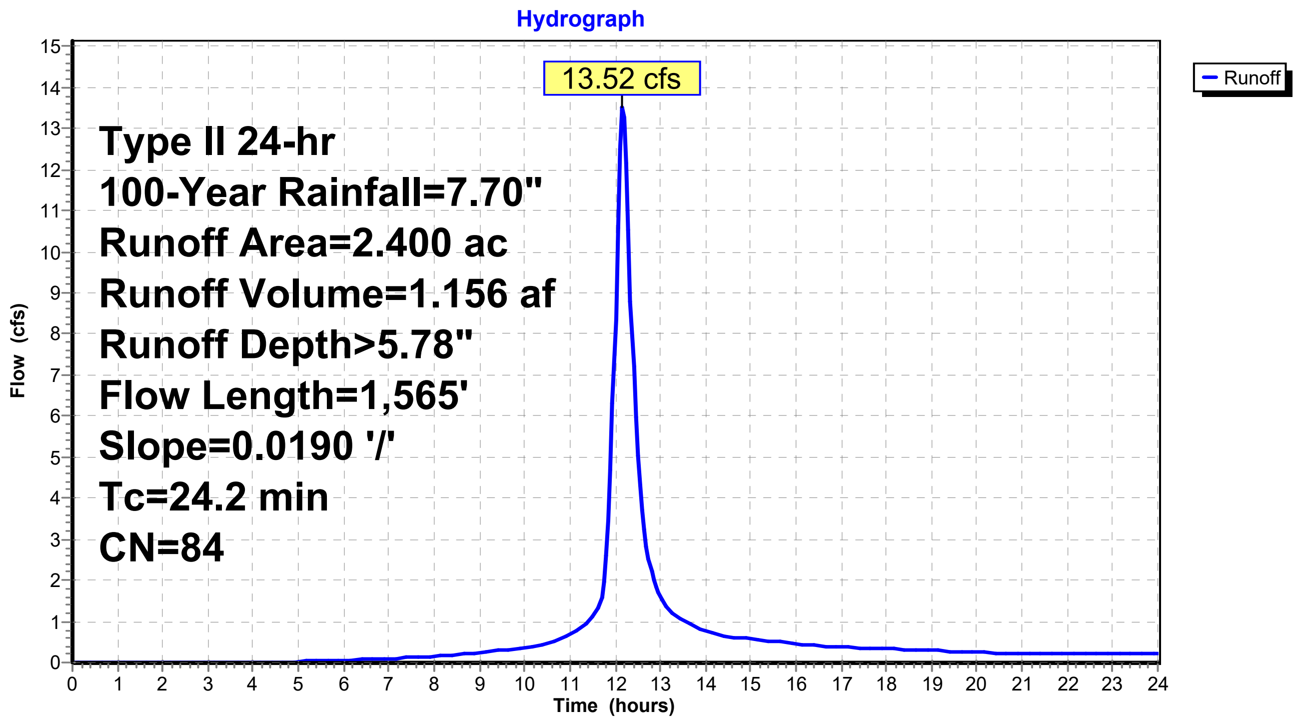
Runoff = 13.52 cfs @ 12.17 hrs, Volume= 1.156 af, Depth> 5.78"
Routed to Pond 15P : EWDB #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.70"

Area (ac)	CN	Description
2.400	84	Row crops, contoured, Poor, HSG C
2.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	100	0.0190	0.37		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
19.7	1,465	0.0190	1.24		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
24.2	1,565	Total			

Subcatchment 71S: Northwest DA - Offsite



Summary for Subcatchment 72S: East DA - OnSite

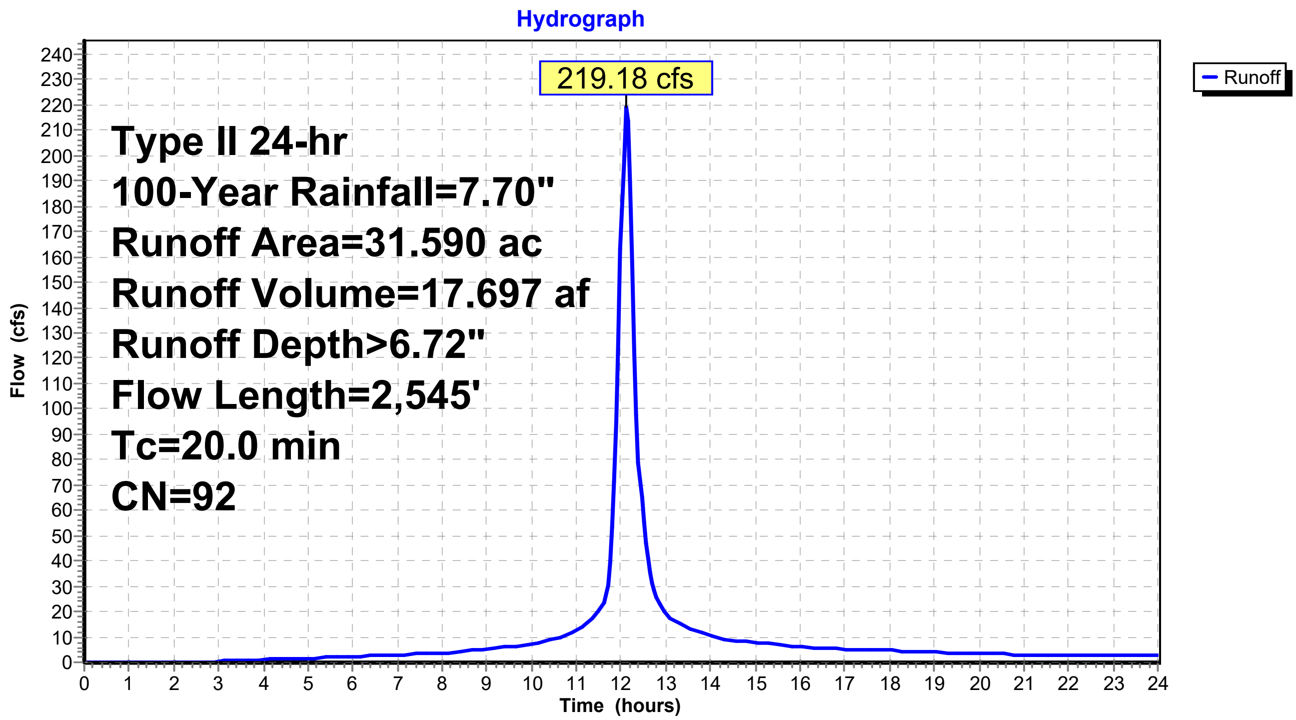
Runoff = 219.18 cfs @ 12.12 hrs, Volume= 17.697 af, Depth> 6.72"
Routed to Pond 3P : Existing East Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.70"

Area (ac)	CN	Description
31.590	92	1/8 acre lots, 65% imp, HSG D
11.056		35.00% Pervious Area
20.533		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0250	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
11.6	2,445	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
20.0	2,545	Total			

Subcatchment 72S: East DA - OnSite



Summary for Pond 3P: Existing East Basin

[44] Hint: Outlet device #2 is below defined storage
[95] Warning: Outlet Device #2 rise exceeded

Inflow Area = 51.140 ac, 40.15% Impervious, Inflow Depth > 6.36" for 100-Year event
Inflow = 324.66 cfs @ 12.13 hrs, Volume= 27.112 af
Outflow = 64.67 cfs @ 12.64 hrs, Volume= 27.110 af, Atten= 80%, Lag= 30.4 min
Primary = 64.67 cfs @ 12.64 hrs, Volume= 27.110 af
Routed to Link 4L : East RP

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,012.67' @ 12.64 hrs Surf.Area= 198,070 sf Storage= 446,124 cf

Plug-Flow detention time= 63.6 min calculated for 27.110 af (100% of inflow)
Center-of-Mass det. time= 63.6 min (850.4 - 786.8)

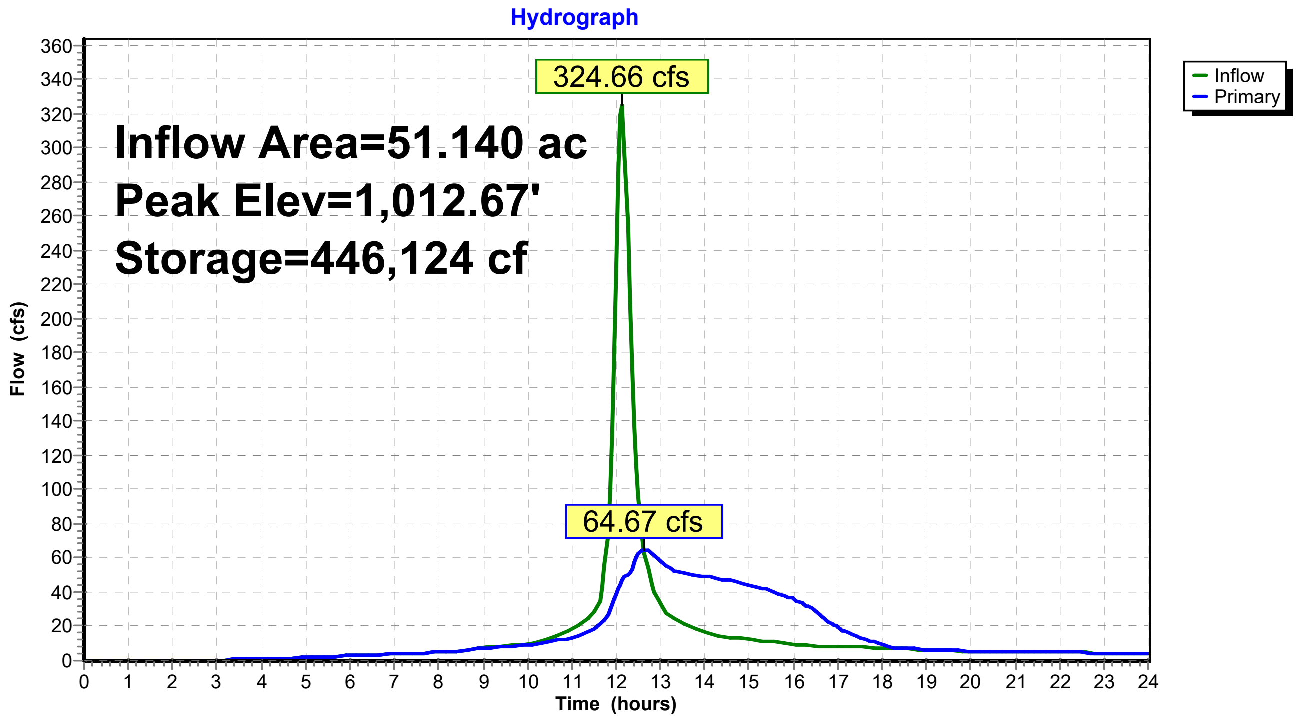
Volume	Invert	Avail.Storage	Storage Description
#1	1,007.00'	714,080 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,007.00	10	0	0
1,008.00	201	106	106
1,010.00	59,816	60,017	60,123
1,012.00	194,481	254,297	314,420
1,014.00	205,179	399,660	714,080

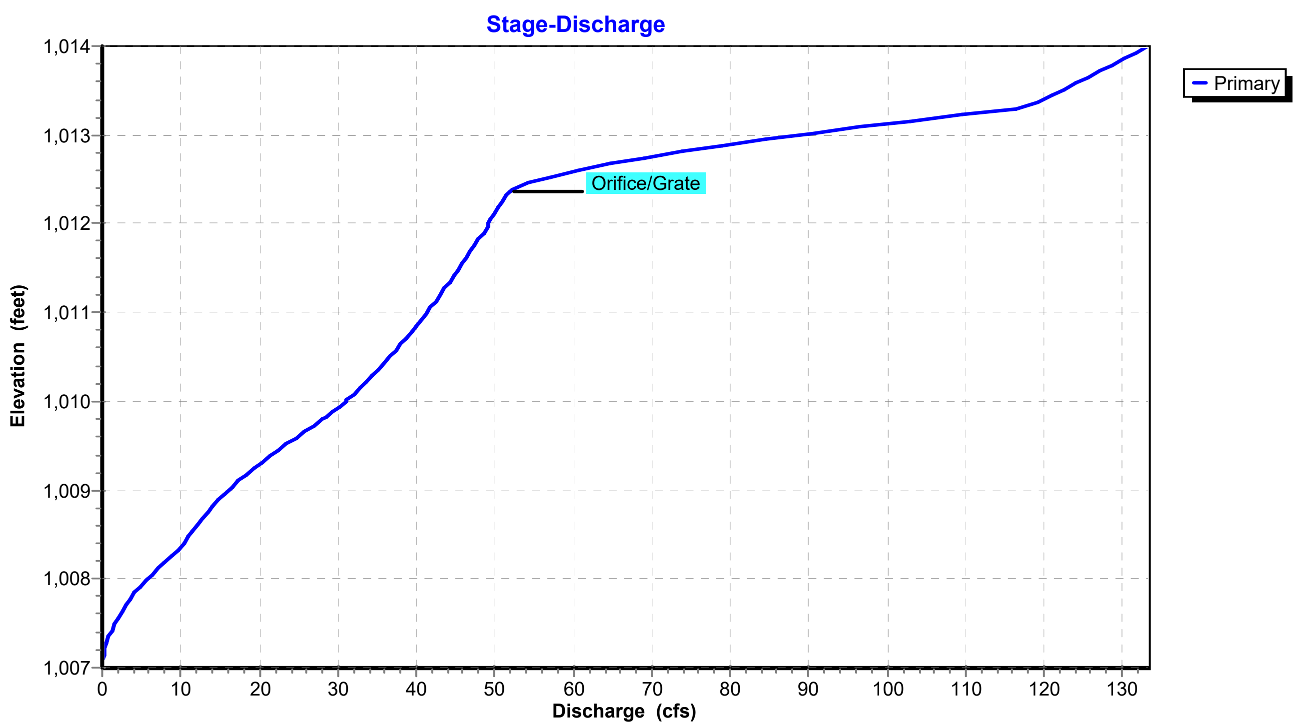
Device	Routing	Invert	Outlet Devices
#1	Primary	1,006.93'	**48.0" Round RCP_Round 48"** L= 65.0' Ke= 0.500 Inlet / Outlet Invert= 1,006.93' / 1,006.82' S= 0.0017 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Device 1	1,006.52'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 1,006.52 1,008.82 1,008.82 1,009.82 Width (feet) 1.25 1.25 2.50 2.50
#3	Device 1	1,012.37'	**60.0" x 60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=64.63 cfs @ 12.64 hrs HW=1,012.67' (Free Discharge)
└─**1=RCP_Round 48"** (Passes 64.63 cfs of 101.64 cfs potential flow)
  ├─**2=Custom Weir/Orifice** (Orifice Controls 53.86 cfs @ 10.02 fps)
  └─**3=Orifice/Grate** (Weir Controls 10.77 cfs @ 1.79 fps)

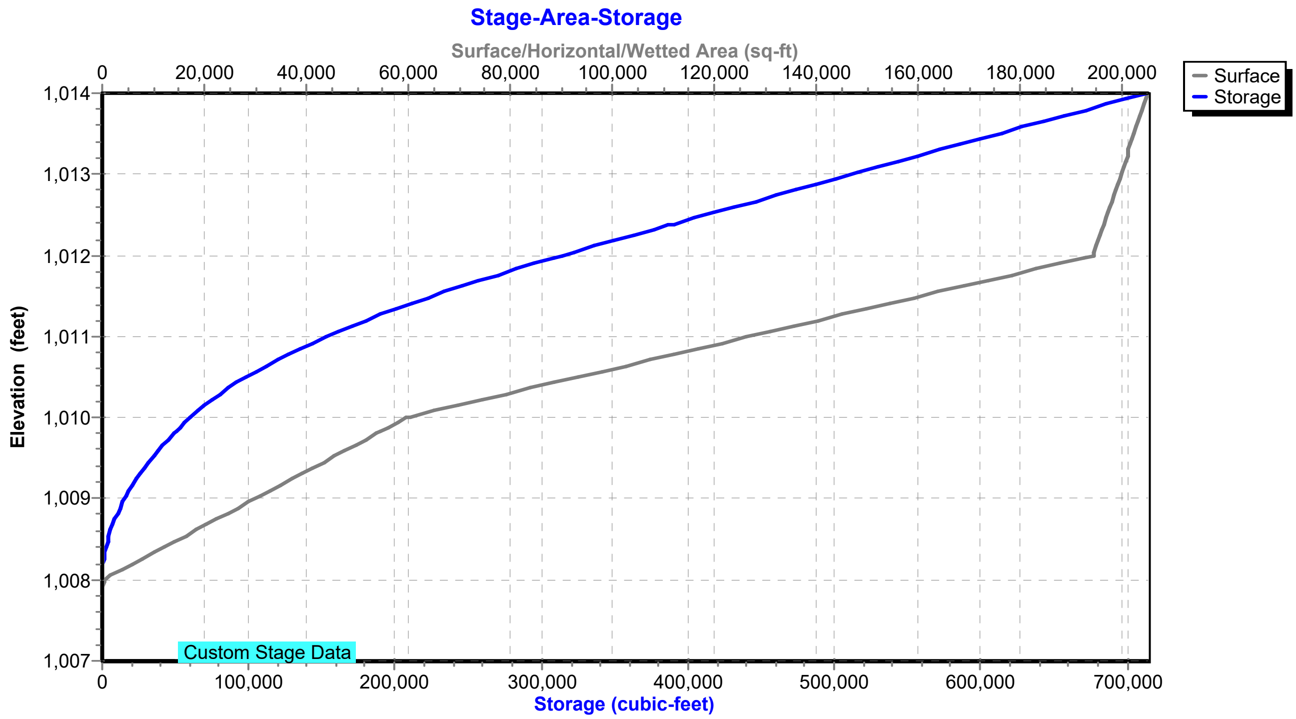
Pond 3P: Existing East Basin



Pond 3P: Existing East Basin



Pond 3P: Existing East Basin



Summary for Pond 7P: Existing West Basin

[95] Warning: Outlet Device #2 rise exceeded

Inflow Area = 62.660 ac, 58.26% Impervious, Inflow Depth > 6.63" for 100-Year event
Inflow = 451.01 cfs @ 12.09 hrs, Volume= 34.611 af
Outflow = 102.46 cfs @ 12.47 hrs, Volume= 34.284 af, Atten= 77%, Lag= 23.1 min
Primary = 102.46 cfs @ 12.47 hrs, Volume= 34.284 af
Routed to Link 6L : West RP

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,002.13' @ 12.47 hrs Surf.Area= 222,134 sf Storage= 602,812 cf

Plug-Flow detention time= 82.1 min calculated for 34.213 af (99% of inflow)
Center-of-Mass det. time= 75.9 min (853.4 - 777.5)

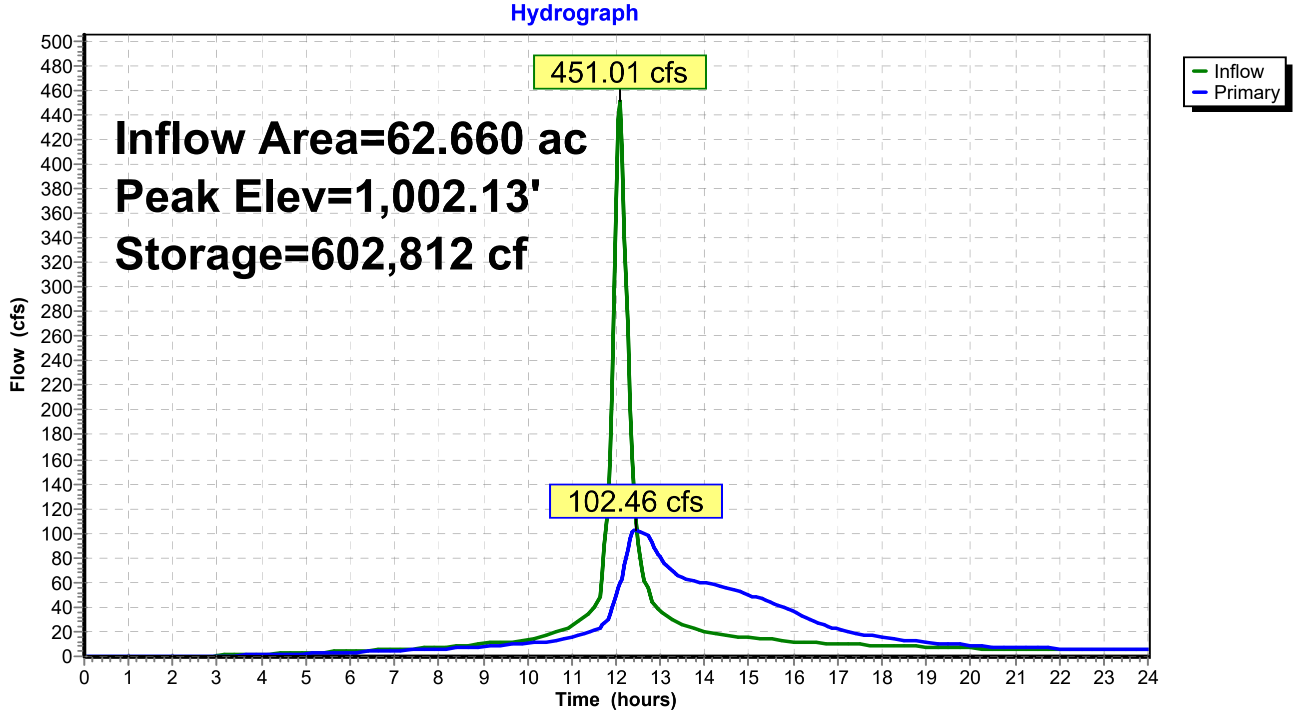
Volume	Invert	Avail.Storage	Storage Description
#1	996.50'	1,043,367 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
996.50	10	0	0
998.00	50,187	37,648	37,648
1,000.00	133,191	183,378	221,026
1,002.00	220,337	353,528	574,554
1,004.00	248,476	468,813	1,043,367

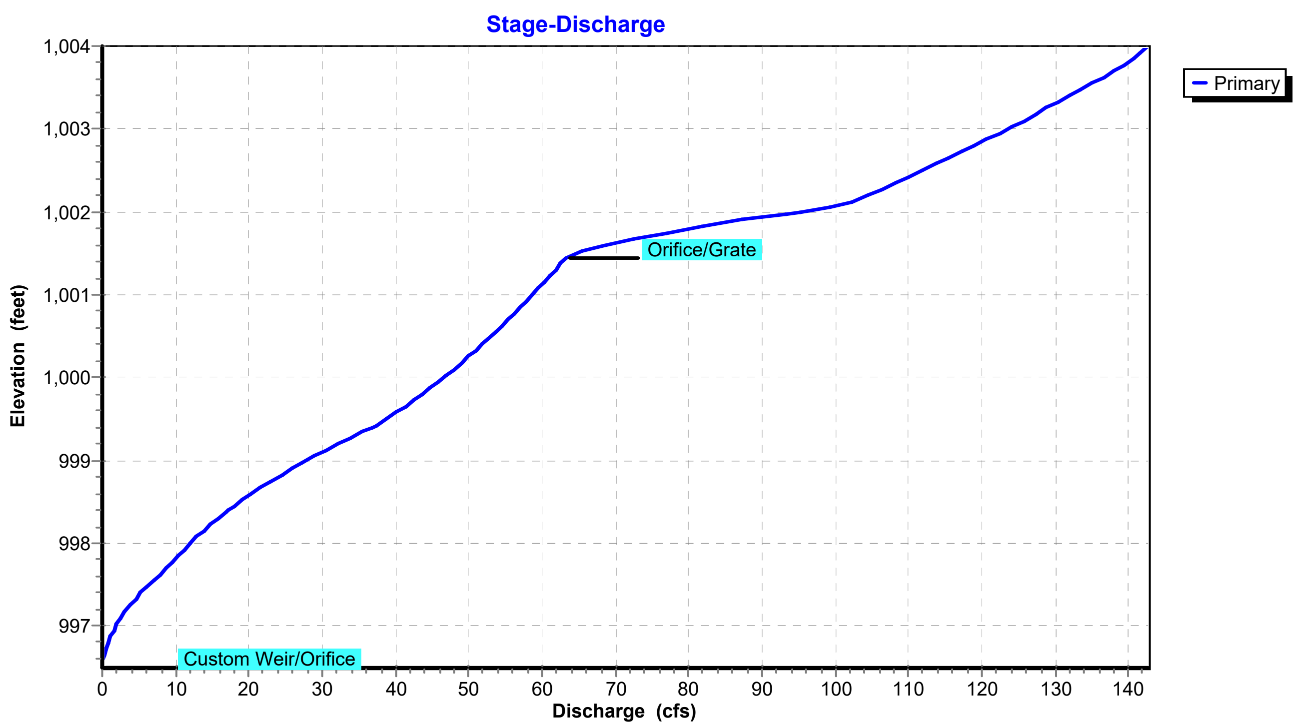
Device	Routing	Invert	Outlet Devices
#1	Primary	996.44'	**48.0" Round RCP_Round 48"** L= 74.4' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 996.44' / 996.20' S= 0.0032 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Device 1	996.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 996.50 998.40 998.40 999.40 Width (feet) 2.00 2.00 3.33 3.33
#3	Device 1	1,001.45'	**60.0" x 60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=102.39 cfs @ 12.47 hrs HW=1,002.13' (Free Discharge)
└─**1=RCP_Round 48"** (Barrel Controls 102.39 cfs @ 8.15 fps)
  ├─**2=Custom Weir/Orifice** (Passes < 69.65 cfs potential flow)
  └─**3=Orifice/Grate** (Passes < 36.33 cfs potential flow)

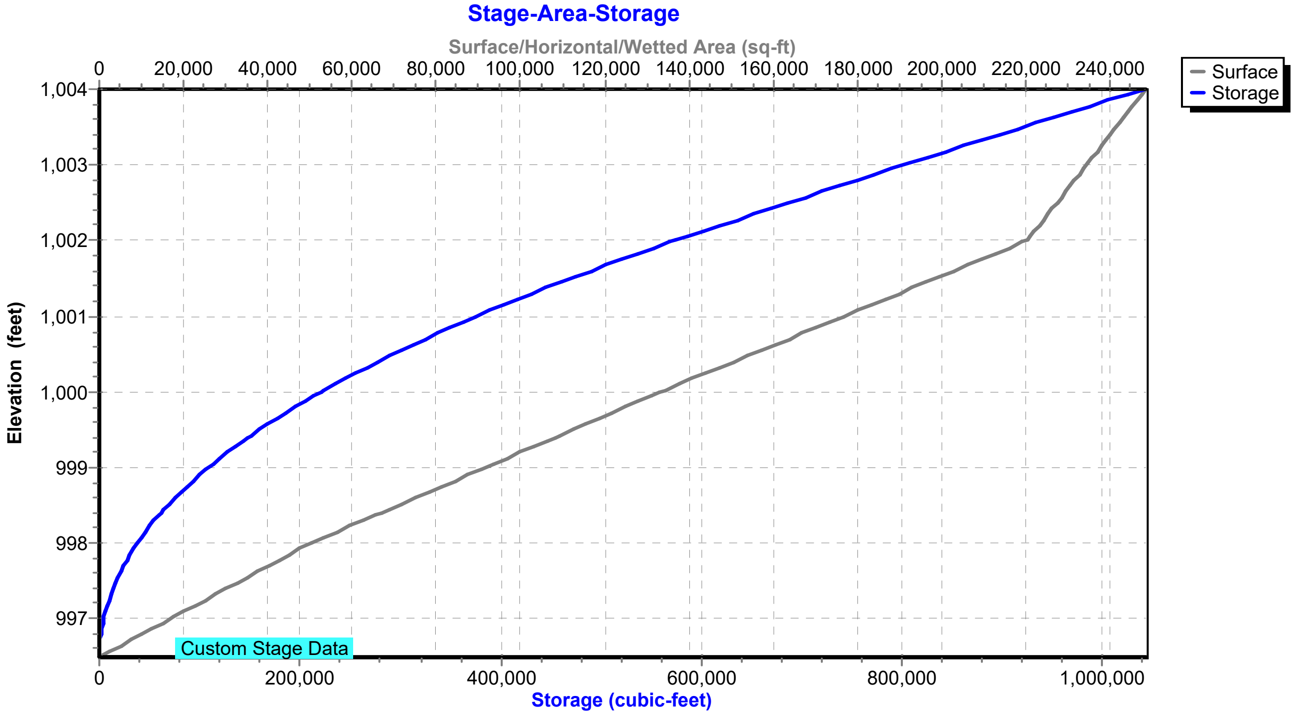
Pond 7P: Existing West Basin



Pond 7P: Existing West Basin



Pond 7P: Existing West Basin



Summary for Pond 15P: EWDB #1

[95] Warning: Outlet Device #2 rise exceeded

Inflow Area = 32.200 ac, 68.58% Impervious, Inflow Depth > 6.77" for 100-Year event
Inflow = 258.71 cfs @ 12.05 hrs, Volume= 18.164 af
Outflow = 66.52 cfs @ 12.34 hrs, Volume= 17.171 af, Atten= 74%, Lag= 17.5 min
Primary = 66.52 cfs @ 12.34 hrs, Volume= 17.171 af
Routed to Link 11L : NW RP

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,008.67' @ 12.34 hrs Surf.Area= 52,891 sf Storage= 342,421 cf

Plug-Flow detention time= 134.4 min calculated for 17.171 af (95% of inflow)
Center-of-Mass det. time= 102.9 min (873.5 - 770.6)

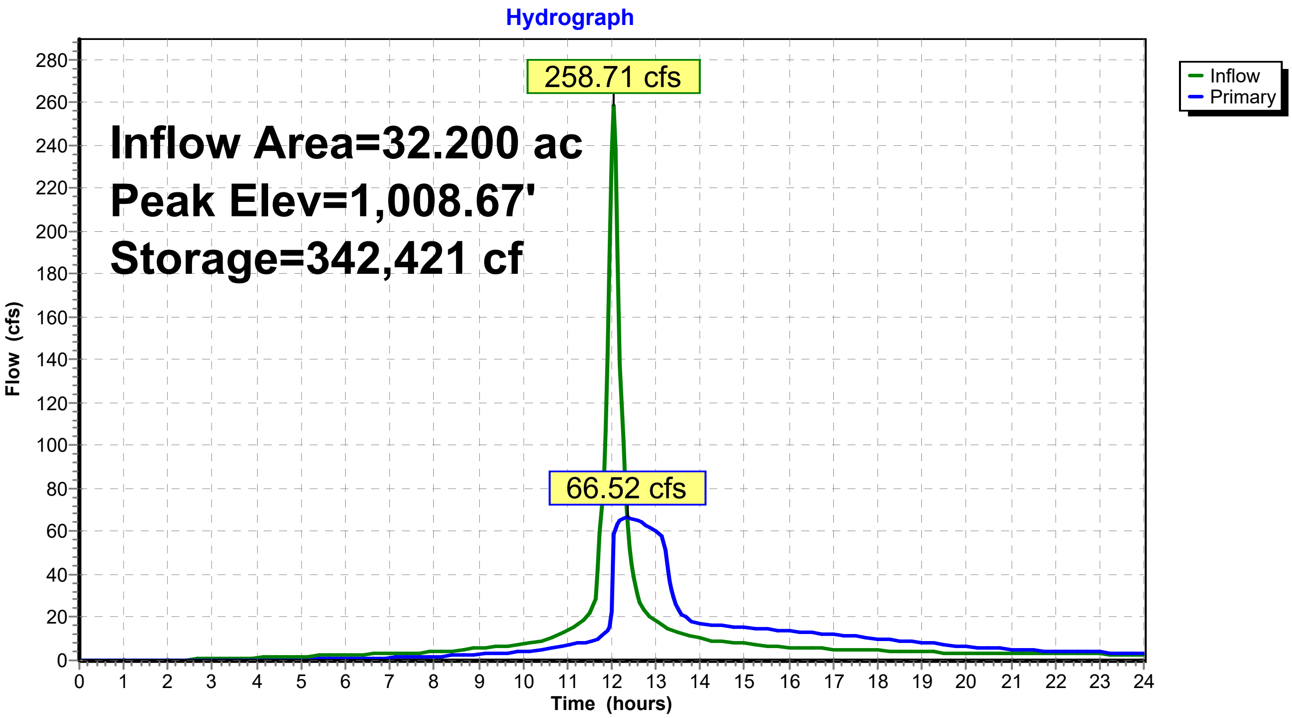
Volume	Invert	Avail.Storage	Storage Description
#1	1,002.00'	412,894 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,002.00	44,842	0	0
1,004.00	52,221	97,063	97,063
1,006.00	52,471	104,692	201,755
1,008.00	52,722	105,193	306,948
1,010.00	53,224	105,946	412,894

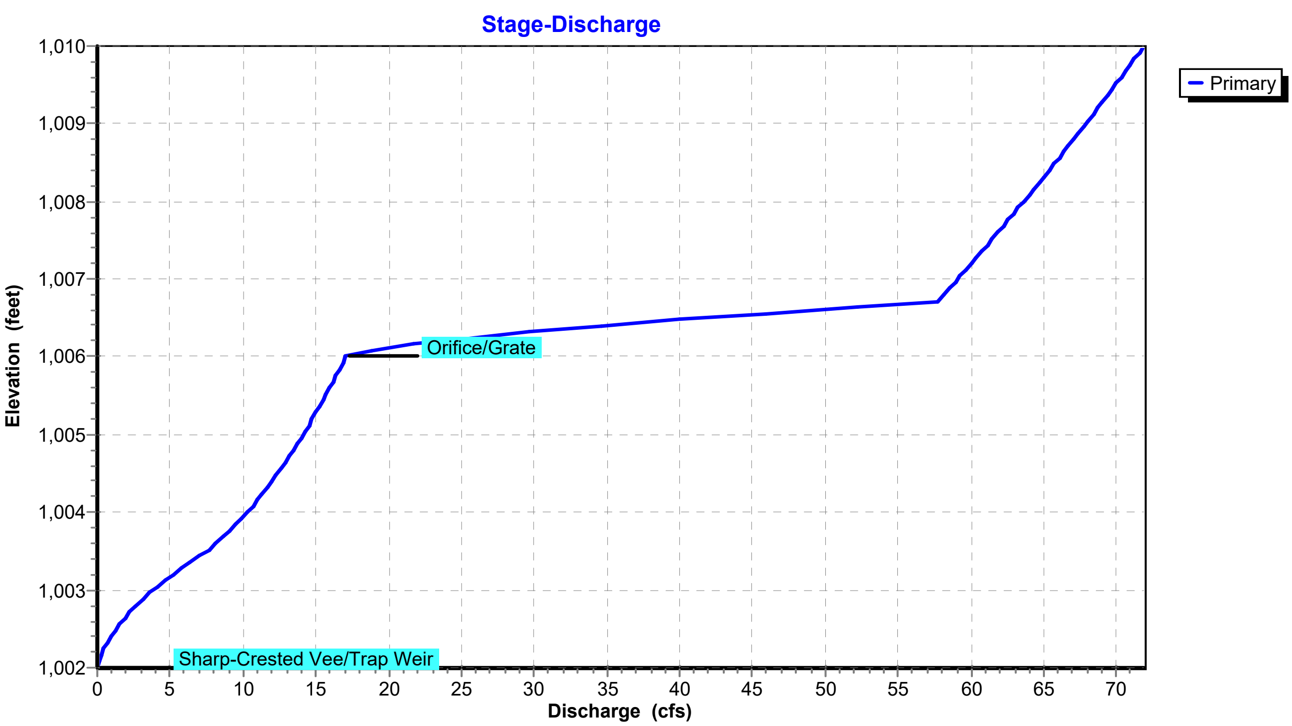
Device	Routing	Invert	Outlet Devices
#1	Primary	999.50'	**30.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 999.50' / 999.25' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	1,002.00'	**20.0 deg x 1.0' long x 1.50' rise Sharp-Crested Vee/Trap Weir** Cv= 2.69 (C= 3.36)
#3	Device 1	1,006.00'	**60.0" x 60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=66.51 cfs @ 12.34 hrs HW=1,008.67' (Free Discharge)
└─**1=Culvert** (Inlet Controls 66.51 cfs @ 13.55 fps)
  ├─**2=Sharp-Crested Vee/Trap Weir** (Passes < 23.16 cfs potential flow)
  └─**3=Orifice/Grate** (Passes < 196.66 cfs potential flow)

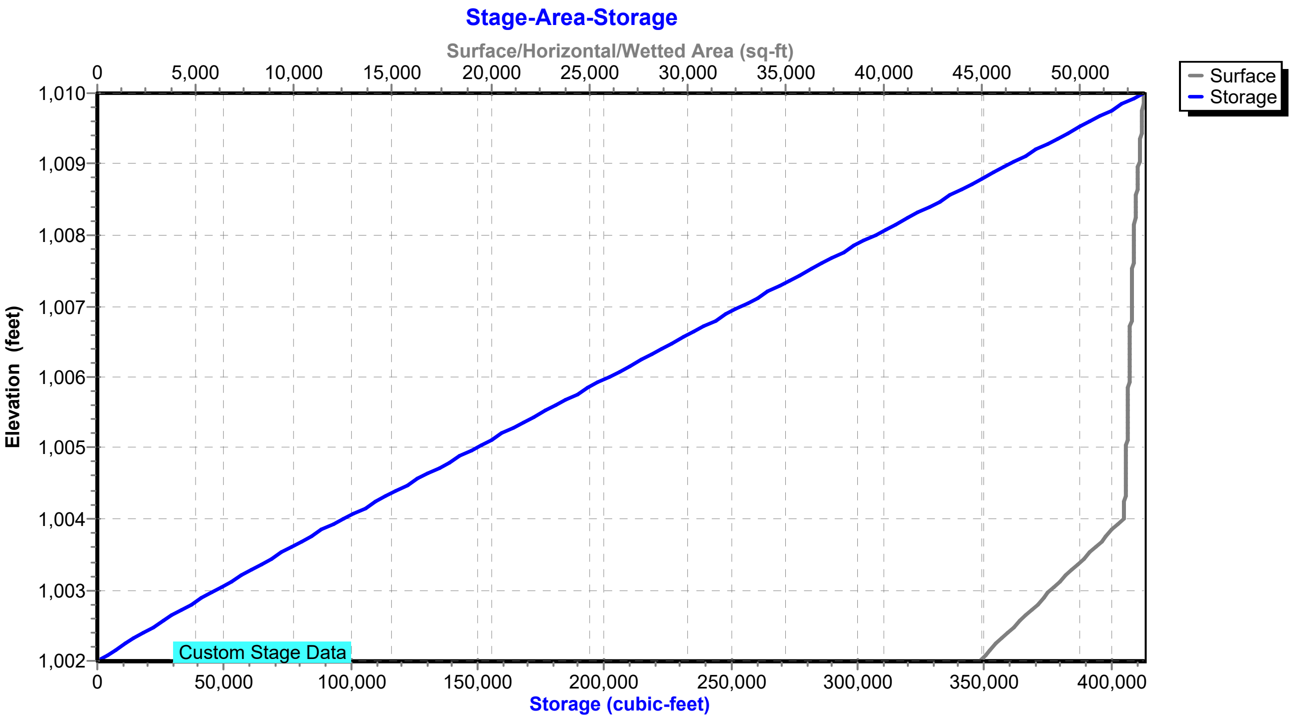
Pond 15P: EWDB #1



Pond 15P: EWDB #1



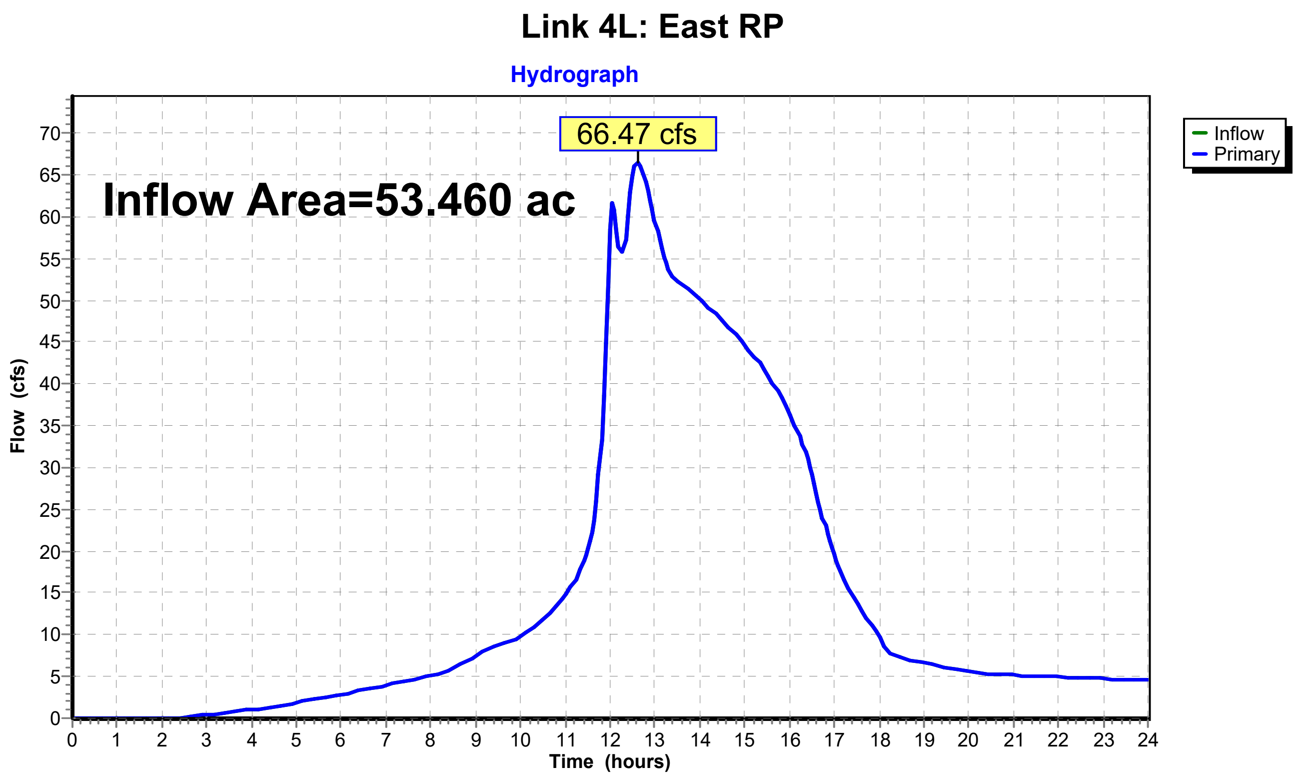
Pond 15P: EWDB #1



Summary for Link 4L: East RP

Inflow Area =	53.460 ac, 41.23% Impervious,	Inflow Depth > 6.38"	for 100-Year event	
Inflow =	66.47 cfs @	12.62 hrs, Volume=	28.412 af	
Primary =	66.47 cfs @	12.62 hrs, Volume=	28.412 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

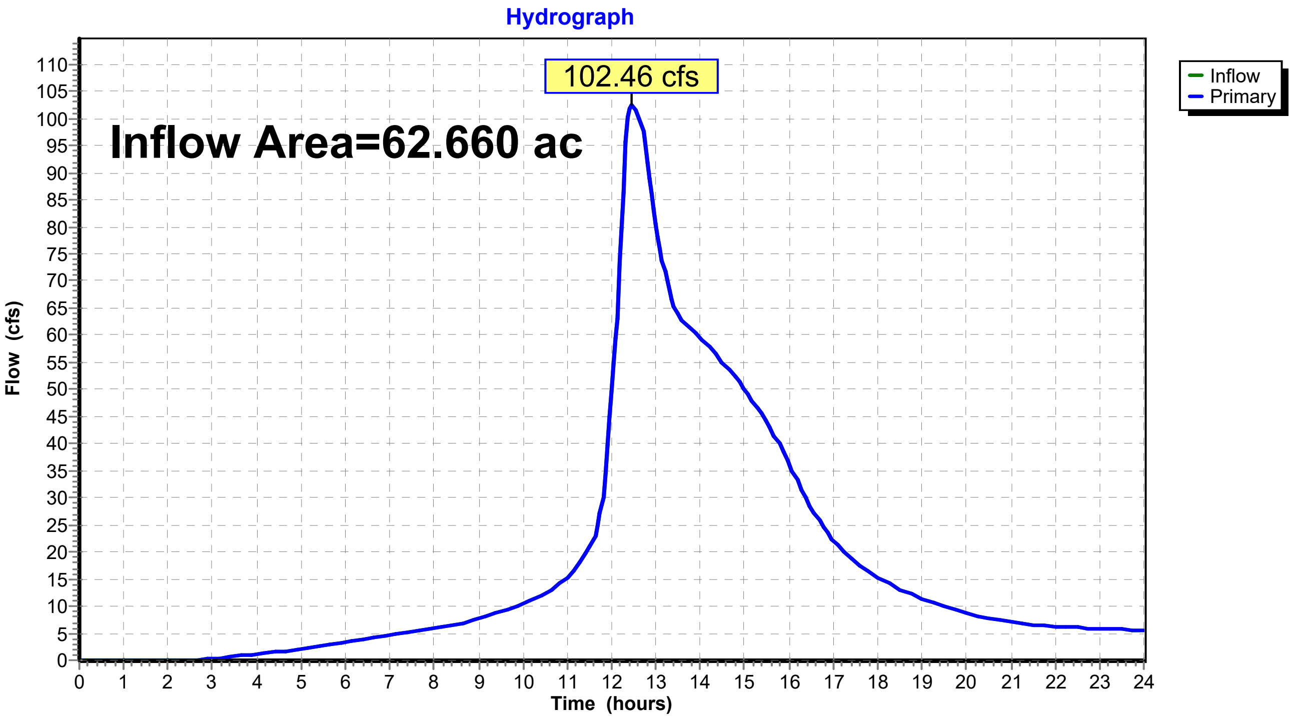


Summary for Link 6L: West RP

Inflow Area =	62.660 ac,	58.26% Impervious,	Inflow Depth > 6.57"	for 100-Year event
Inflow =	102.46 cfs @	12.47 hrs, Volume=	34.284 af	
Primary =	102.46 cfs @	12.47 hrs, Volume=	34.284 af, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

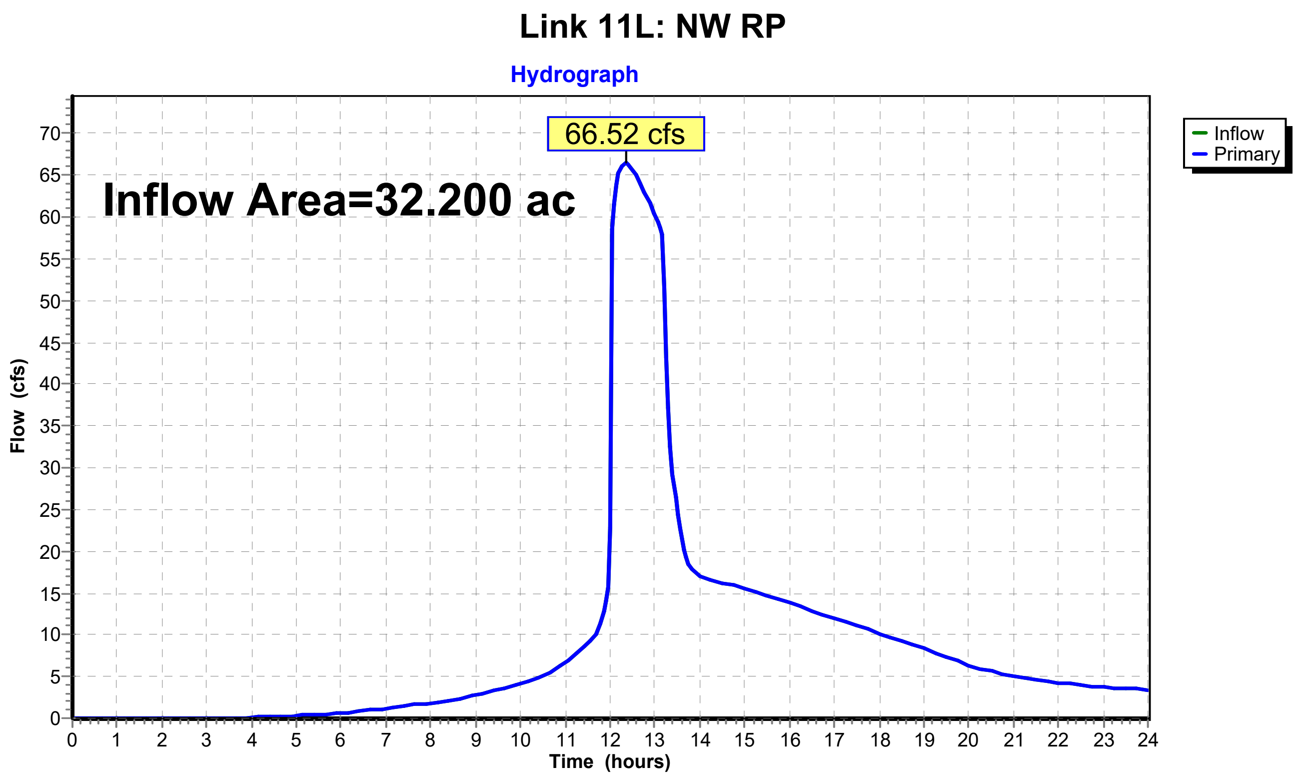
Link 6L: West RP



Summary for Link 11L: NW RP

Inflow Area = 32.200 ac, 68.58% Impervious, Inflow Depth > 6.40" for 100-Year event
Inflow = 66.52 cfs @ 12.34 hrs, Volume= 17.171 af
Primary = 66.52 cfs @ 12.34 hrs, Volume= 17.171 af, Atten= 0%, Lag= 0.0 min

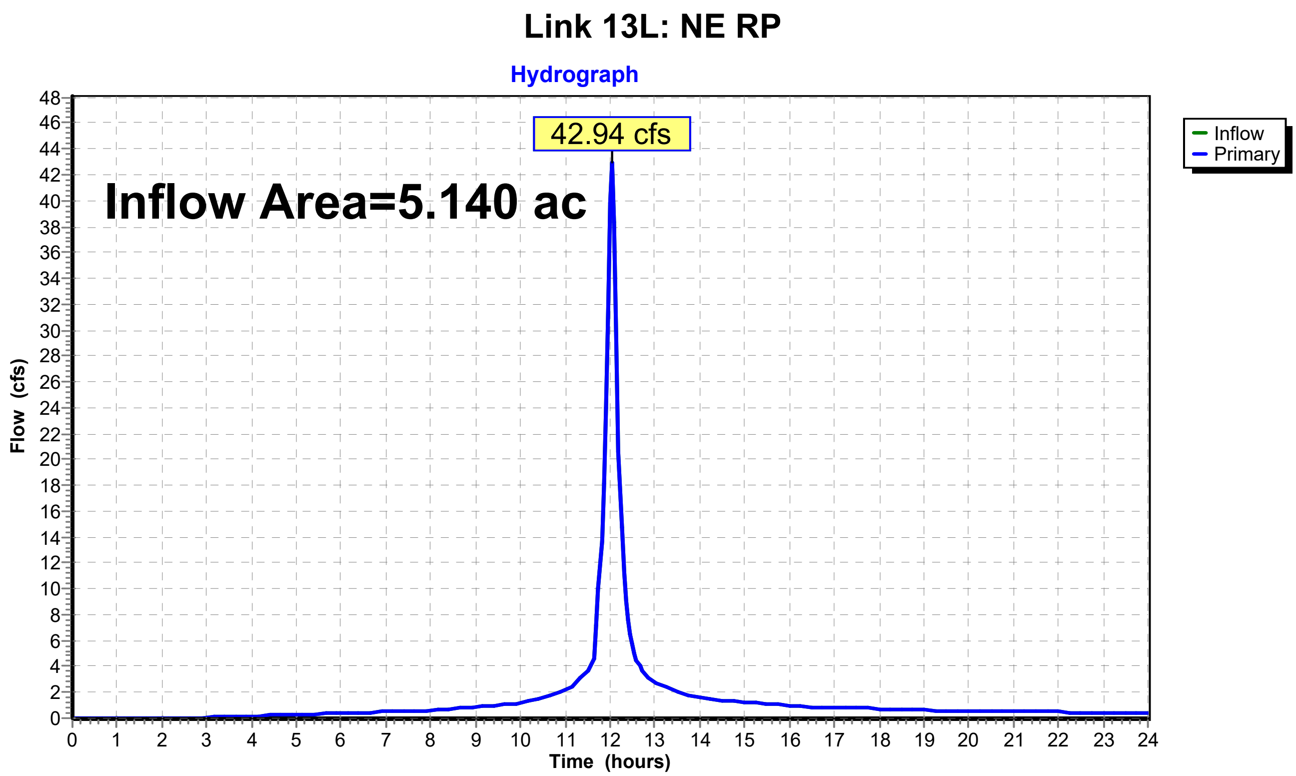
Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs



Summary for Link 13L: NE RP

Inflow Area = 5.140 ac, 65.00% Impervious, Inflow Depth > 6.73" for 100-Year event
Inflow = 42.94 cfs @ 12.05 hrs, Volume= 2.883 af
Primary = 42.94 cfs @ 12.05 hrs, Volume= 2.883 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs



Summary for Subcatchment 5S: West DA - Onsite

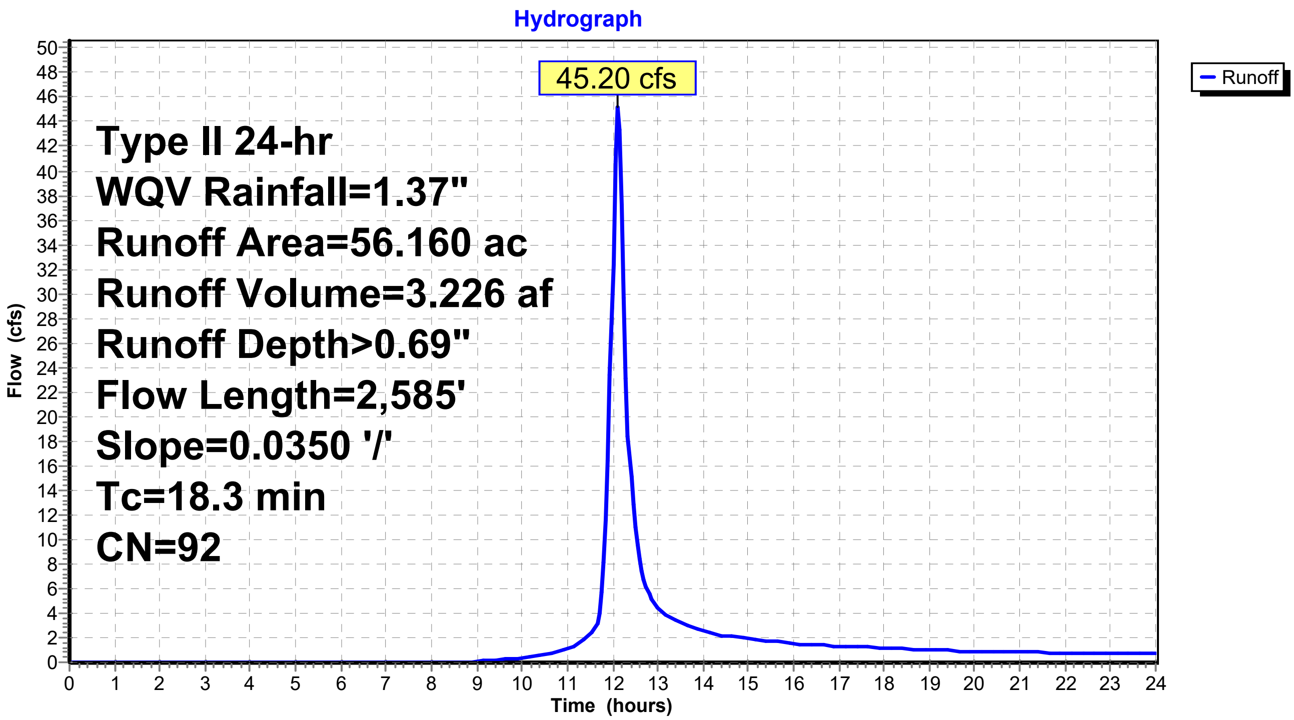
Runoff = 45.20 cfs @ 12.11 hrs, Volume= 3.226 af, Depth> 0.69"
Routed to Pond 7P : Existing West Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr WQV Rainfall=1.37"

Area (ac)	CN	Description
56.160	92	1/8 acre lots, 65% imp, HSG D
19.656		35.00% Pervious Area
36.504		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	100	0.0350	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
10.9	2,485	0.0350	3.80		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
18.3	2,585	Total			

Subcatchment 5S: West DA - Onsite



Summary for Subcatchment 8S: East DA - OffSite

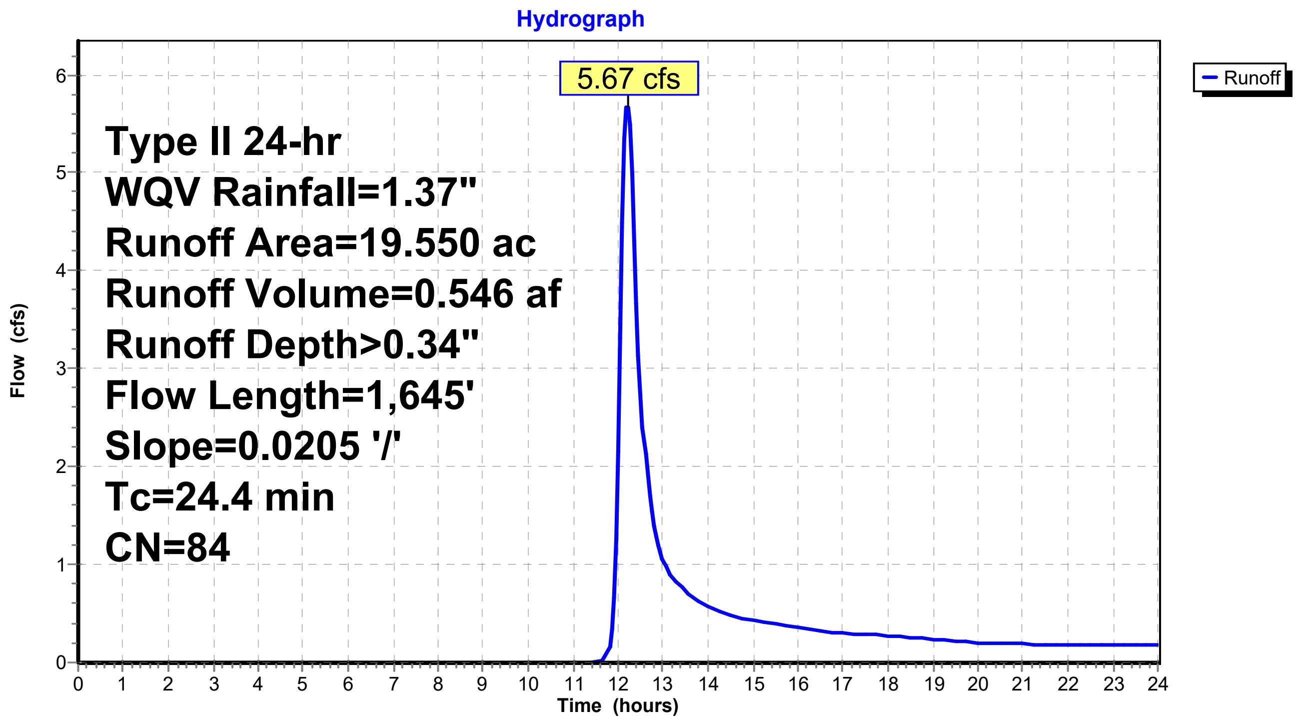
Runoff = 5.67 cfs @ 12.21 hrs, Volume= 0.546 af, Depth> 0.34"
Routed to Pond 3P : Existing East Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr WQV Rainfall=1.37"

Area (ac)	CN	Description
19.550	84	Row crops, contoured, Poor, HSG C
19.550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	100	0.0205	0.38		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
20.0	1,545	0.0205	1.29		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
24.4	1,645	Total			

Subcatchment 8S: East DA - OffSite



Summary for Subcatchment 9S: East Bypass

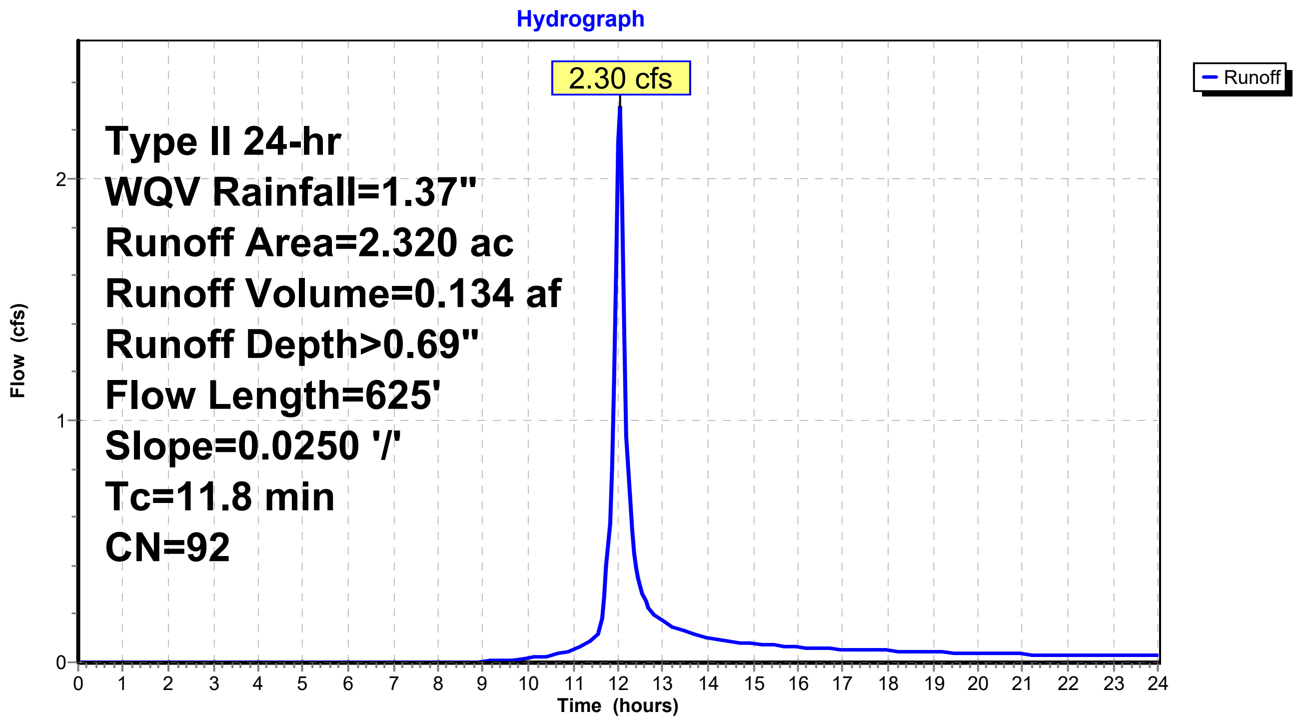
Runoff = 2.30 cfs @ 12.04 hrs, Volume= 0.134 af, Depth> 0.69"
Routed to Link 4L : East RP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr WQV Rainfall=1.37"

Area (ac)	CN	Description
2.320	92	1/8 acre lots, 65% imp, HSG D
0.812		35.00% Pervious Area
1.508		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0250	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
3.4	525	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.8	625	Total			

Subcatchment 9S: East Bypass



Summary for Subcatchment 10S: West DA - OffSite

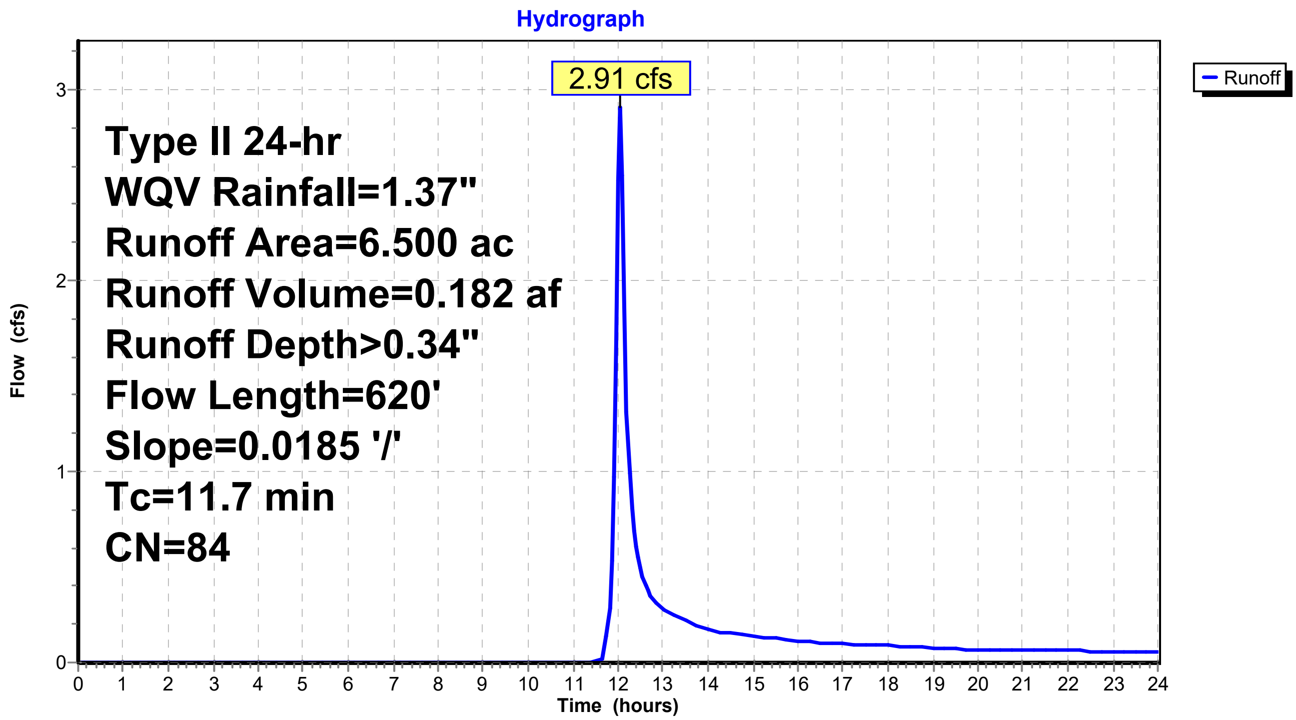
Runoff = 2.91 cfs @ 12.05 hrs, Volume= 0.182 af, Depth> 0.34"
Routed to Pond 7P : Existing West Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr WQV Rainfall=1.37"

Area (ac)	CN	Description
6.500	84	Row crops, contoured, Poor, HSG C
6.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0185	0.36		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
7.1	520	0.0185	1.22		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
11.7	620	Total			

Subcatchment 10S: West DA - OffSite



Summary for Subcatchment 12S: Northwest DA

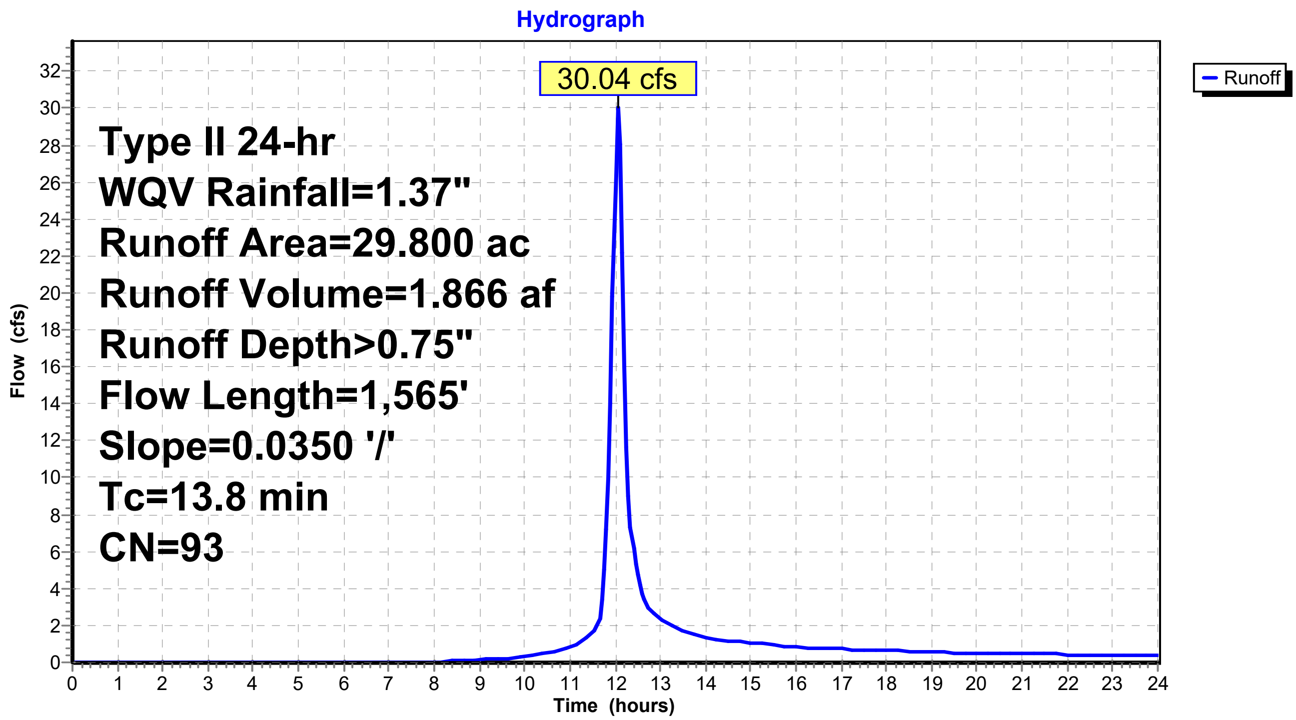
Runoff = 30.04 cfs @ 12.06 hrs, Volume= 1.866 af, Depth> 0.75"
Routed to Pond 15P : EWDB #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr WQV Rainfall=1.37"

Area (ac)	CN	Description
13.570	95	Urban commercial, 85% imp, HSG D
16.230	92	1/8 acre lots, 65% imp, HSG D
29.800	93	Weighted Average
7.716		25.89% Pervious Area
22.084		74.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	100	0.0350	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
6.4	1,465	0.0350	3.80		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
13.8	1,565	Total			

Subcatchment 12S: Northwest DA



Summary for Subcatchment 14S: Northeast DA

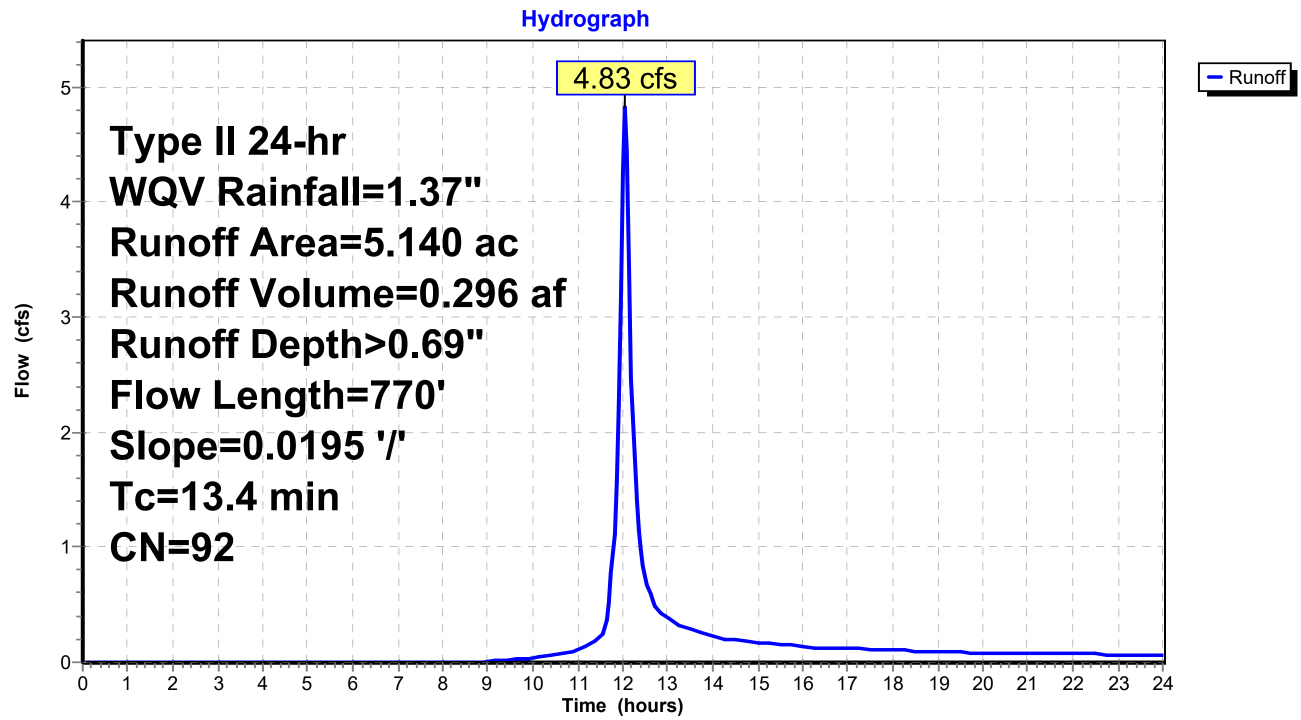
Runoff = 4.83 cfs @ 12.06 hrs, Volume= 0.296 af, Depth> 0.69"
Routed to Link 13L : NE RP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr WQV Rainfall=1.37"

Area (ac)	CN	Description
5.140	92	1/8 acre lots, 65% imp, HSG D
1.799		35.00% Pervious Area
3.341		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	100	0.0195	0.37		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
8.9	670	0.0195	1.26		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
13.4	770	Total			

Subcatchment 14S: Northeast DA



Summary for Subcatchment 71S: Northwest DA - Offsite

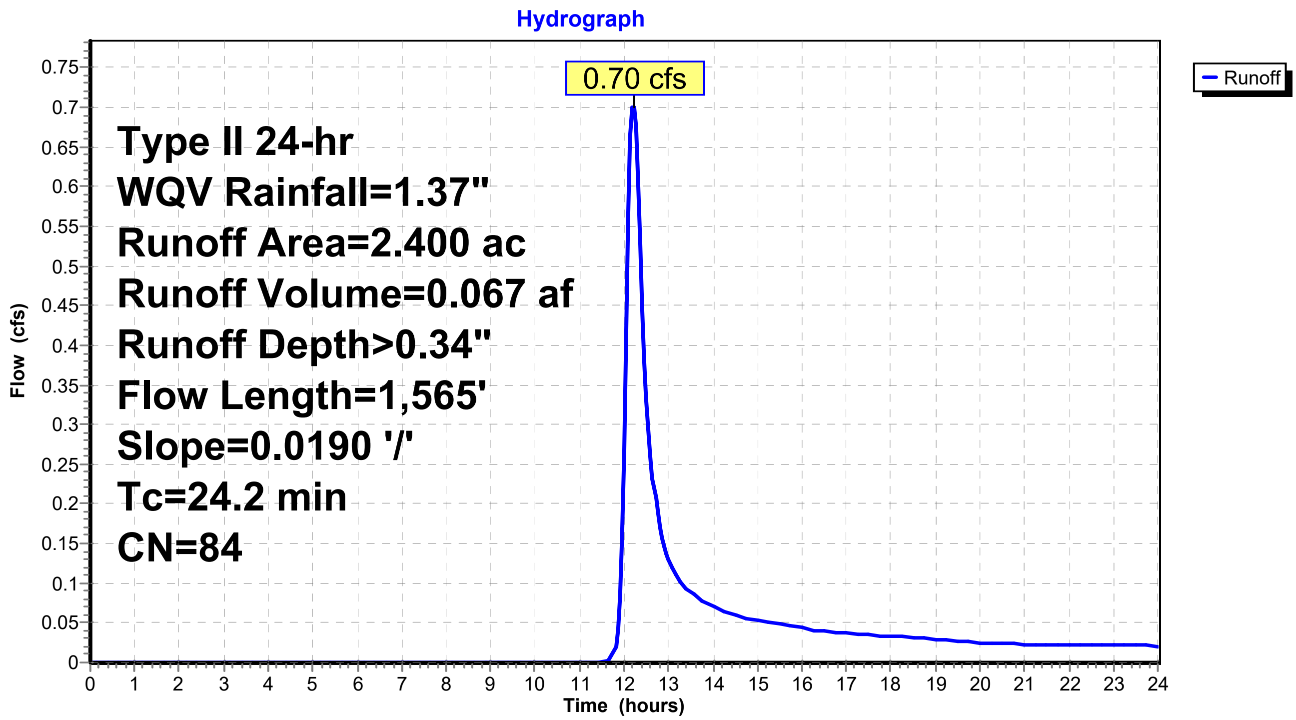
Runoff = 0.70 cfs @ 12.21 hrs, Volume= 0.067 af, Depth> 0.34"
Routed to Pond 15P : EWDB #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr WQV Rainfall=1.37"

Area (ac)	CN	Description
2.400	84	Row crops, contoured, Poor, HSG C
2.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	100	0.0190	0.37		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
19.7	1,465	0.0190	1.24		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
24.2	1,565	Total			

Subcatchment 71S: Northwest DA - Offsite



Summary for Subcatchment 72S: East DA - OnSite

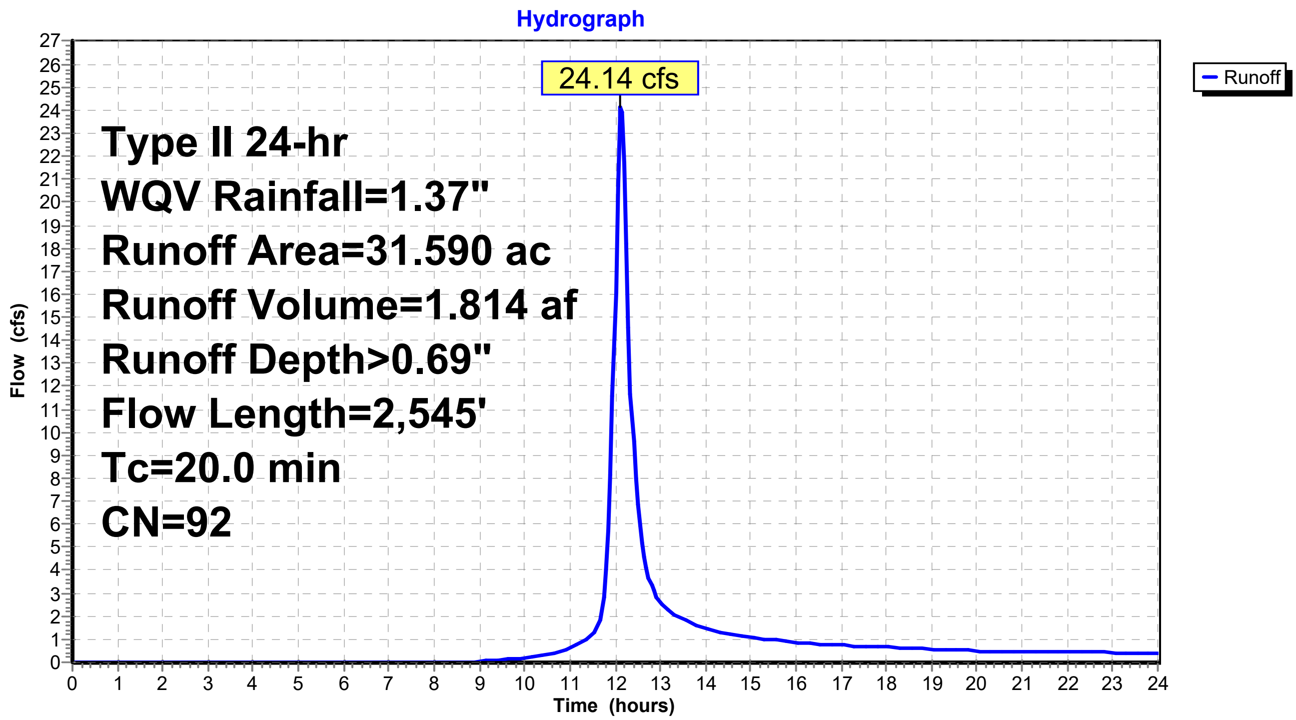
Runoff = 24.14 cfs @ 12.13 hrs, Volume= 1.814 af, Depth> 0.69"
Routed to Pond 3P : Existing East Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr WQV Rainfall=1.37"

Area (ac)	CN	Description
31.590	92	1/8 acre lots, 65% imp, HSG D
11.056		35.00% Pervious Area
20.533		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0250	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
11.6	2,445	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
20.0	2,545	Total			

Subcatchment 72S: East DA - OnSite



Summary for Pond 3P: Existing East Basin

[44] Hint: Outlet device #2 is below defined storage
[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)

Inflow Area = 51.140 ac, 40.15% Impervious, Inflow Depth > 0.55" for WQV event
Inflow = 29.31 cfs @ 12.14 hrs, Volume= 2.360 af
Outflow = 16.07 cfs @ 12.35 hrs, Volume= 2.359 af, Atten= 45%, Lag= 12.6 min
Primary = 16.07 cfs @ 12.35 hrs, Volume= 2.359 af
Routed to Link 4L : East RP

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,009.00' @ 12.35 hrs Surf.Area= 29,864 sf Storage= 15,065 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 5.5 min (855.9 - 850.4)

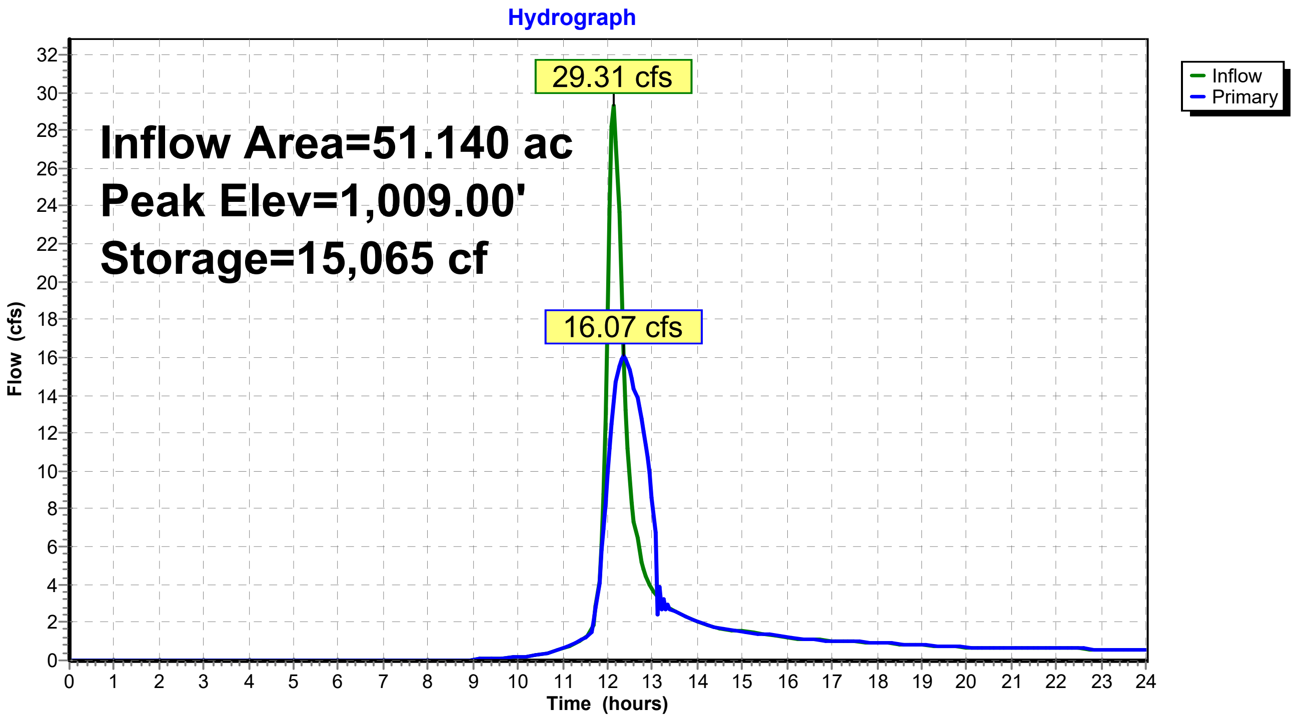
Volume	Invert	Avail.Storage	Storage Description
#1	1,007.00'	714,080 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,007.00	10	0	0
1,008.00	201	106	106
1,010.00	59,816	60,017	60,123
1,012.00	194,481	254,297	314,420
1,014.00	205,179	399,660	714,080

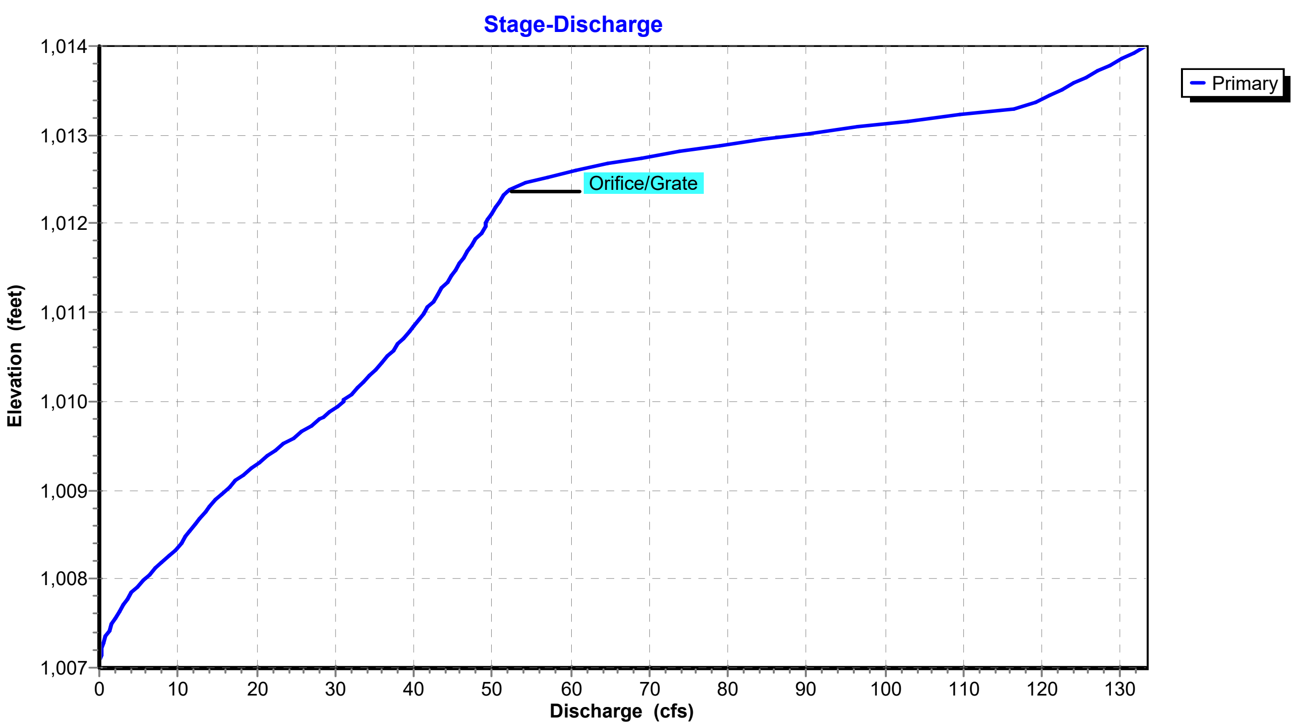
Device	Routing	Invert	Outlet Devices
#1	Primary	1,006.93'	**48.0" Round RCP_Round 48"** L= 65.0' Ke= 0.500 Inlet / Outlet Invert= 1,006.93' / 1,006.82' S= 0.0017 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Device 1	1,006.52'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 1,006.52 1,008.82 1,008.82 1,009.82 Width (feet) 1.25 1.25 2.50 2.50
#3	Device 1	1,012.37'	**60.0" x 60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=16.06 cfs @ 12.35 hrs HW=1,008.99' (Free Discharge)
└─**1=RCP_Round 48"** (Passes 16.06 cfs of 20.65 cfs potential flow)
  ├─**2=Custom Weir/Orifice** (Weir Controls 16.06 cfs @ 4.85 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

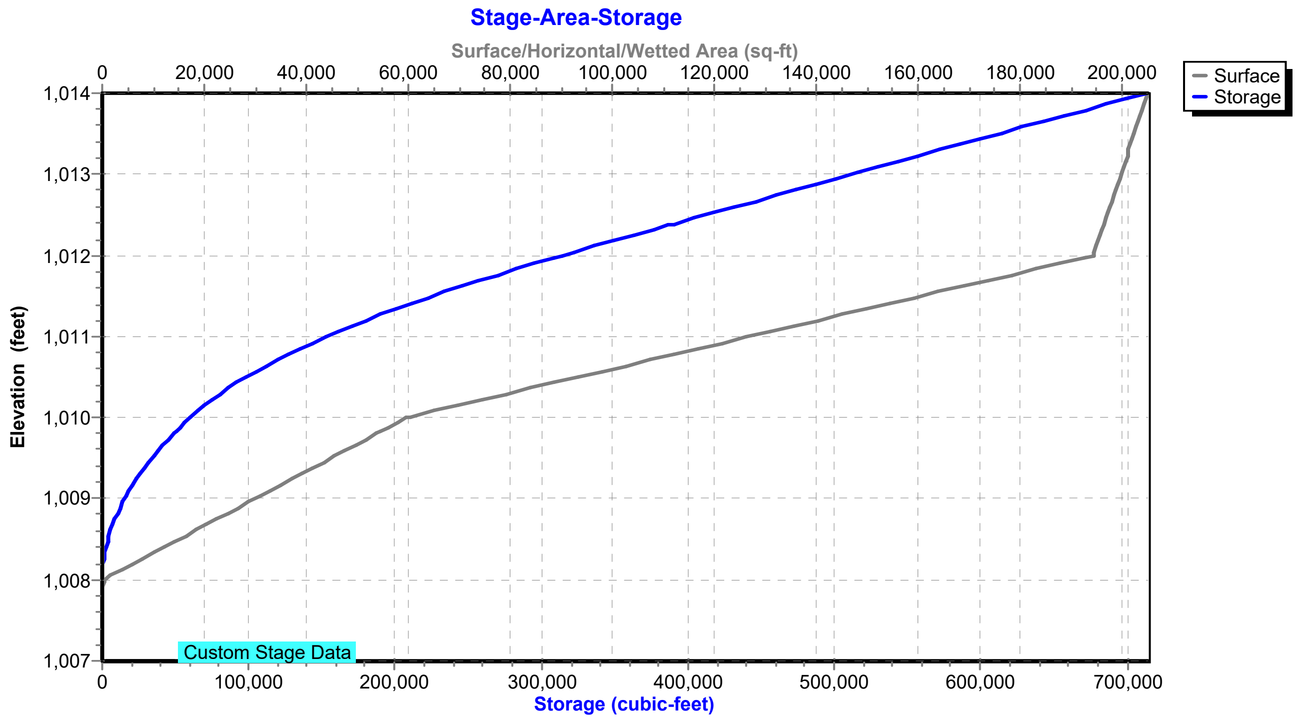
Pond 3P: Existing East Basin



Pond 3P: Existing East Basin



Pond 3P: Existing East Basin



Summary for Pond 7P: Existing West Basin

Inflow Area = 62.660 ac, 58.26% Impervious, Inflow Depth > 0.65" for WQV event
Inflow = 47.67 cfs @ 12.11 hrs, Volume= 3.409 af
Outflow = 14.52 cfs @ 12.43 hrs, Volume= 3.371 af, Atten= 70%, Lag= 19.2 min
Primary = 14.52 cfs @ 12.43 hrs, Volume= 3.371 af
Routed to Link 6L : West RP

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 998.20' @ 12.43 hrs Surf.Area= 58,500 sf Storage= 48,533 cf

Plug-Flow detention time= 45.1 min calculated for 3.364 af (99% of inflow)
Center-of-Mass det. time= 38.6 min (878.7 - 840.1)

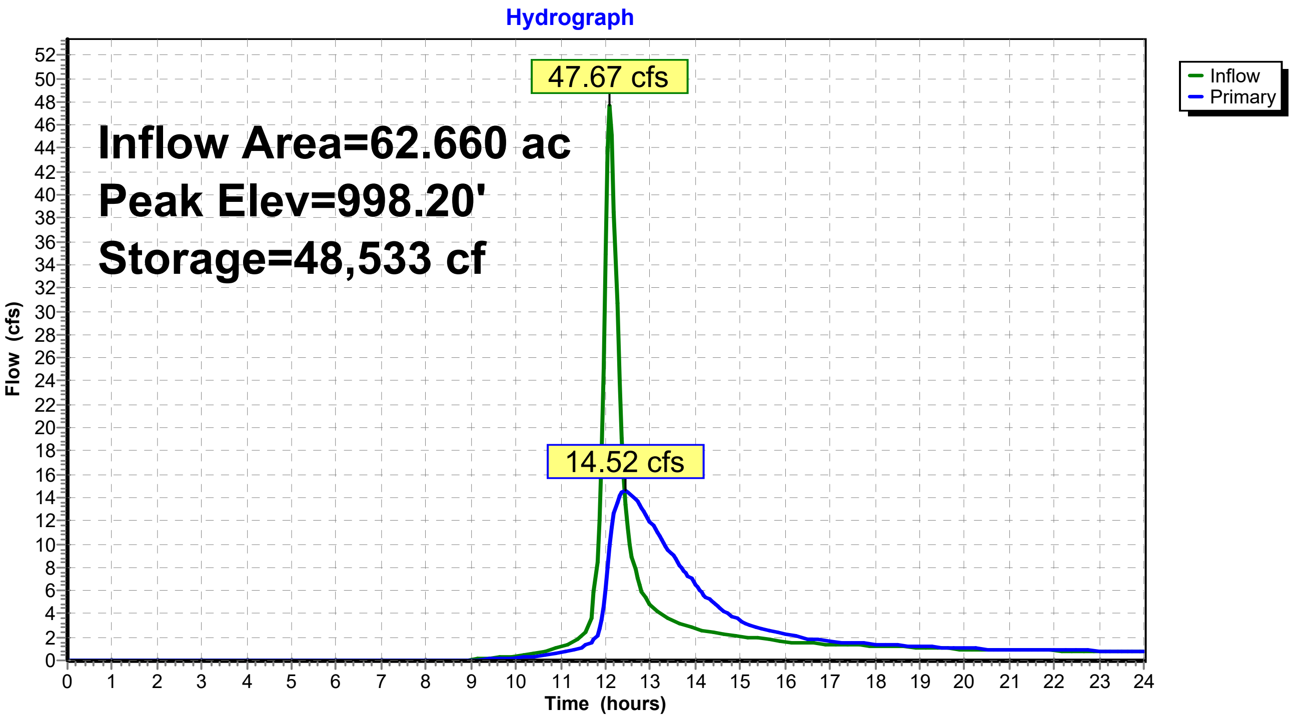
Volume	Invert	Avail.Storage	Storage Description
#1	996.50'	1,043,367 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
996.50	10	0	0
998.00	50,187	37,648	37,648
1,000.00	133,191	183,378	221,026
1,002.00	220,337	353,528	574,554
1,004.00	248,476	468,813	1,043,367

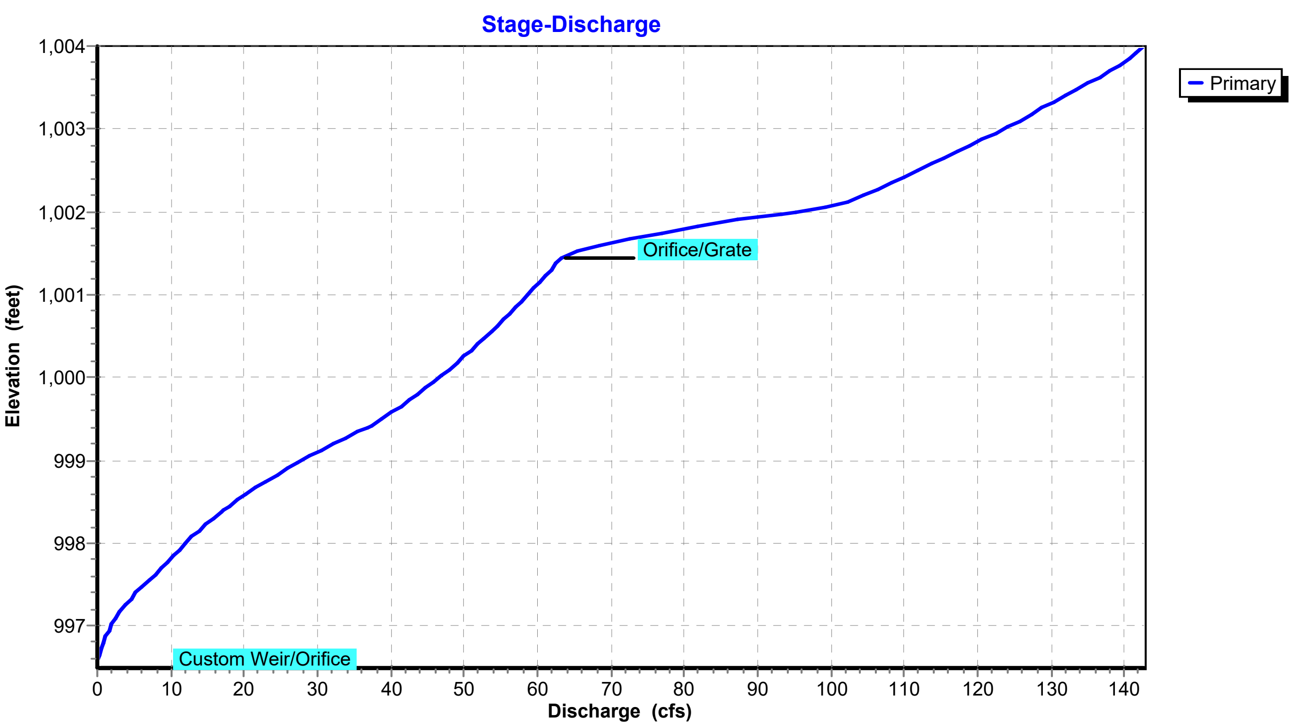
Device	Routing	Invert	Outlet Devices
#1	Primary	996.44'	**48.0" Round RCP_Round 48"** L= 74.4' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 996.44' / 996.20' S= 0.0032 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Device 1	996.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Elev. (feet) 996.50 998.40 998.40 999.40 Width (feet) 2.00 2.00 3.33 3.33
#3	Device 1	1,001.45'	**60.0" x 60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=14.51 cfs @ 12.43 hrs HW=998.20' (Free Discharge)
└─**1=RCP_Round 48"** (Passes 14.51 cfs of 16.70 cfs potential flow)
  ├─**2=Custom Weir/Orifice** (Weir Controls 14.51 cfs @ 4.27 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

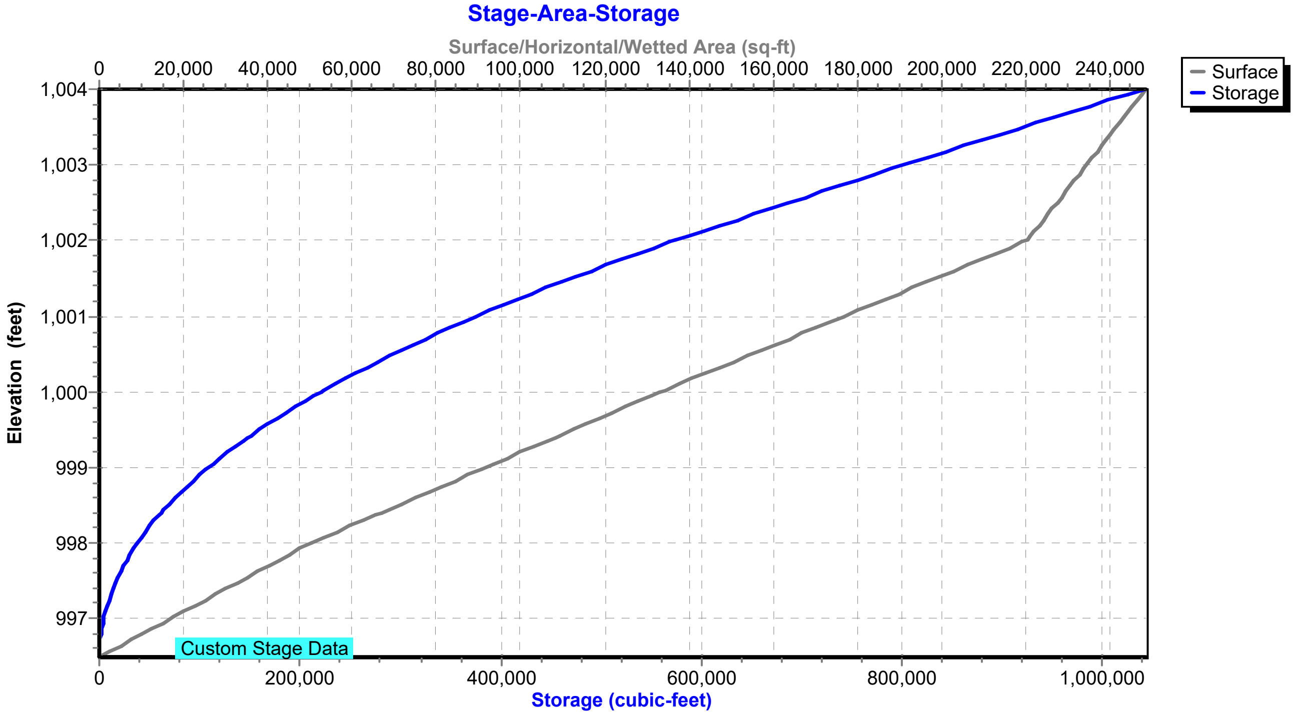
Pond 7P: Existing West Basin



Pond 7P: Existing West Basin



Pond 7P: Existing West Basin



Summary for Pond 15P: EWDB #1

Inflow Area = 32.200 ac, 68.58% Impervious, Inflow Depth > 0.72" for WQV event
Inflow = 30.48 cfs @ 12.06 hrs, Volume= 1.933 af
Outflow = 3.32 cfs @ 12.70 hrs, Volume= 1.600 af, Atten= 89%, Lag= 38.3 min
Primary = 3.32 cfs @ 12.70 hrs, Volume= 1.600 af
Routed to Link 11L : NW RP

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,002.91' @ 12.70 hrs Surf.Area= 48,217 sf Storage= 42,559 cf

Plug-Flow detention time= 219.6 min calculated for 1.600 af (83% of inflow)
Center-of-Mass det. time= 144.7 min (974.8 - 830.1)

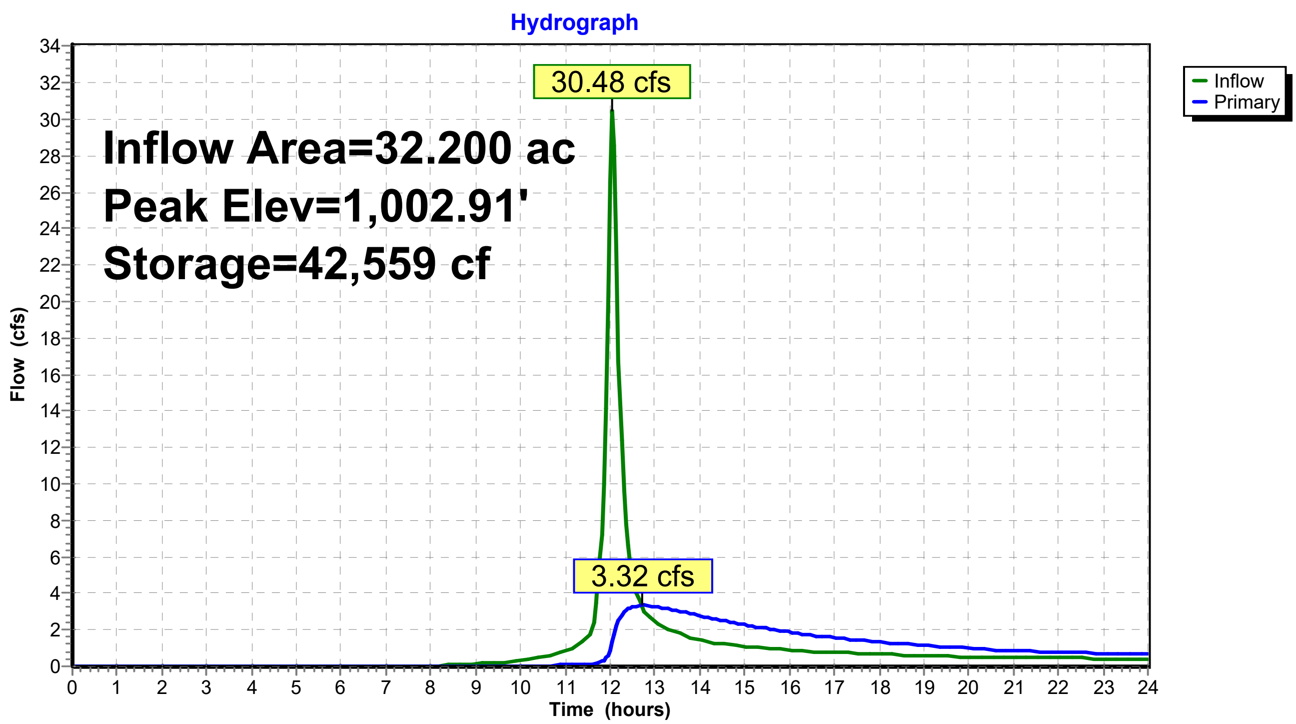
Volume	Invert	Avail.Storage	Storage Description
#1	1,002.00'	412,894 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,002.00	44,842	0	0
1,004.00	52,221	97,063	97,063
1,006.00	52,471	104,692	201,755
1,008.00	52,722	105,193	306,948
1,010.00	53,224	105,946	412,894

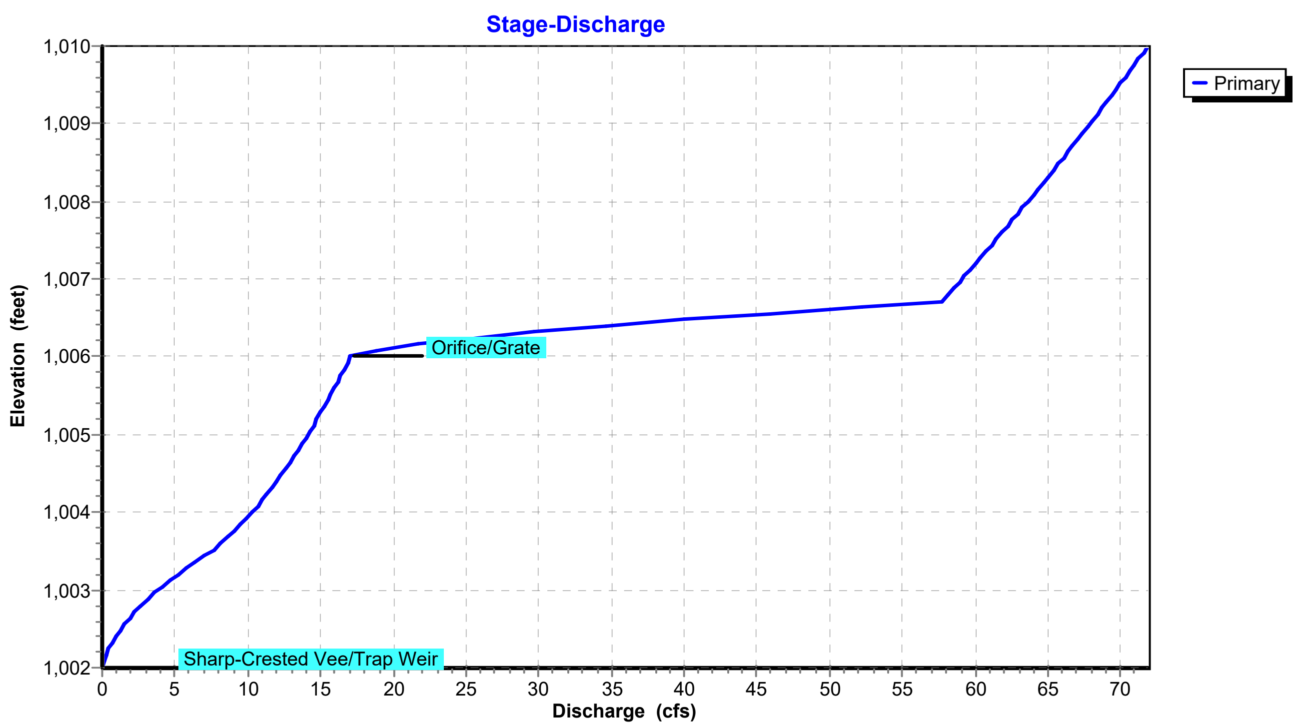
Device	Routing	Invert	Outlet Devices
#1	Primary	999.50'	**30.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 999.50' / 999.25' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	1,002.00'	**20.0 deg x 1.0' long x 1.50' rise Sharp-Crested Vee/Trap Weir** Cv= 2.69 (C= 3.36)
#3	Device 1	1,006.00'	**60.0" x 60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.32 cfs @ 12.70 hrs HW=1,002.91' (Free Discharge)
└─**1=Culvert** (Passes 3.32 cfs of 32.31 cfs potential flow)
  ├─**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 3.32 cfs @ 3.13 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

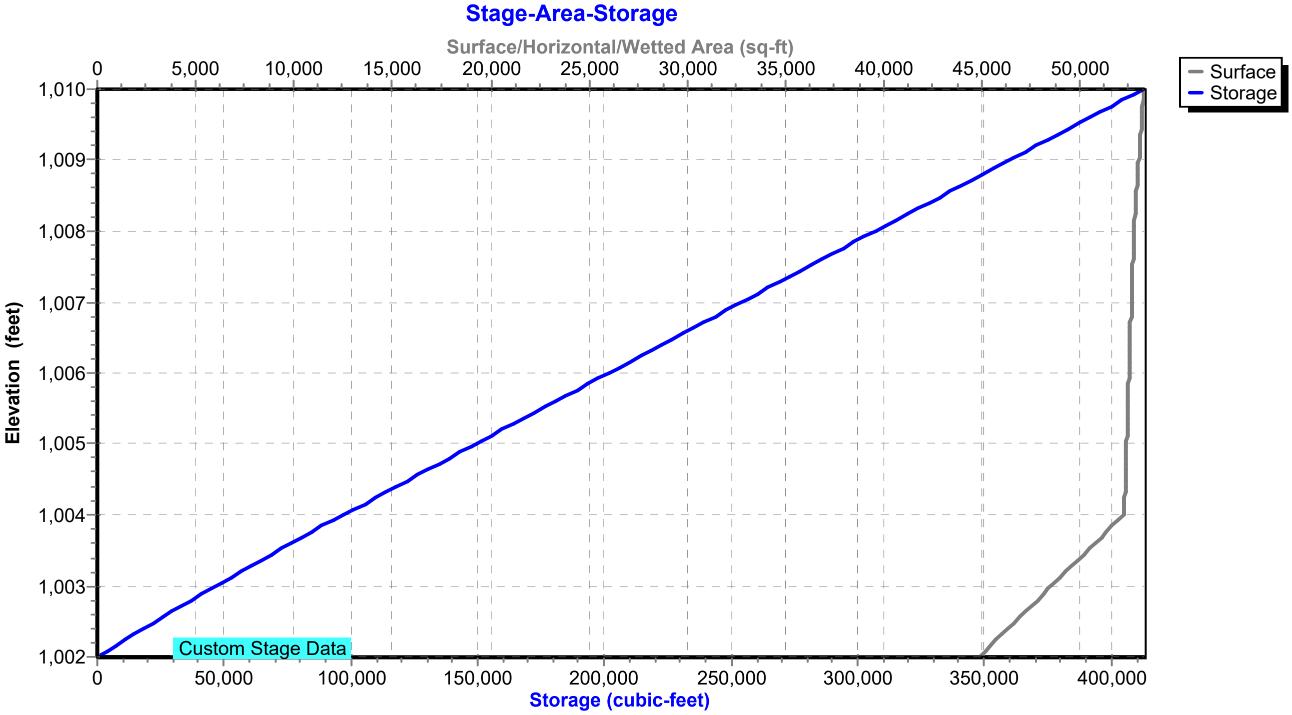
Pond 15P: EWDB #1



Pond 15P: EWDB #1



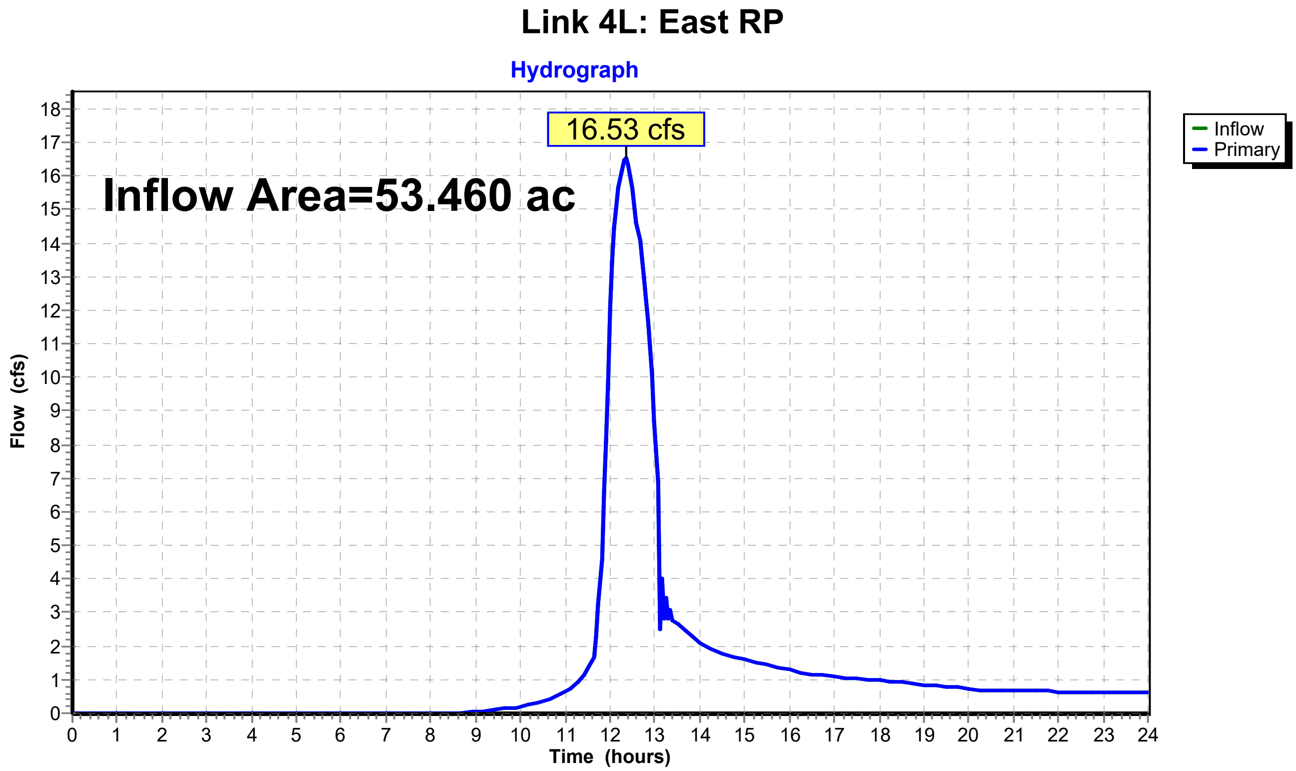
Pond 15P: EWDB #1



Summary for Link 4L: East RP

Inflow Area = 53.460 ac, 41.23% Impervious, Inflow Depth > 0.56" for WQV event
Inflow = 16.53 cfs @ 12.33 hrs, Volume= 2.493 af
Primary = 16.53 cfs @ 12.33 hrs, Volume= 2.493 af, Atten= 0%, Lag= 0.0 min

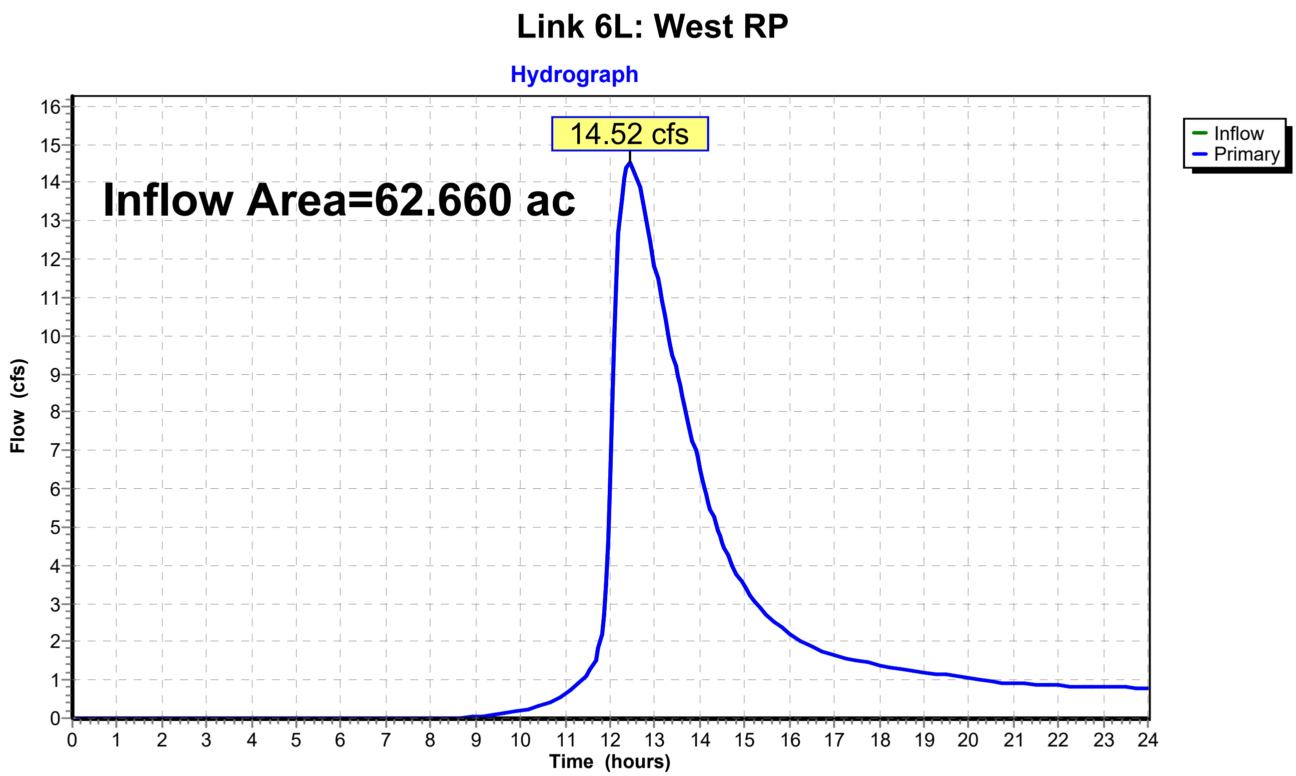
Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs



Summary for Link 6L: West RP

Inflow Area = 62.660 ac, 58.26% Impervious, Inflow Depth > 0.65" for WQV event
Inflow = 14.52 cfs @ 12.43 hrs, Volume= 3.371 af
Primary = 14.52 cfs @ 12.43 hrs, Volume= 3.371 af, Atten= 0%, Lag= 0.0 min

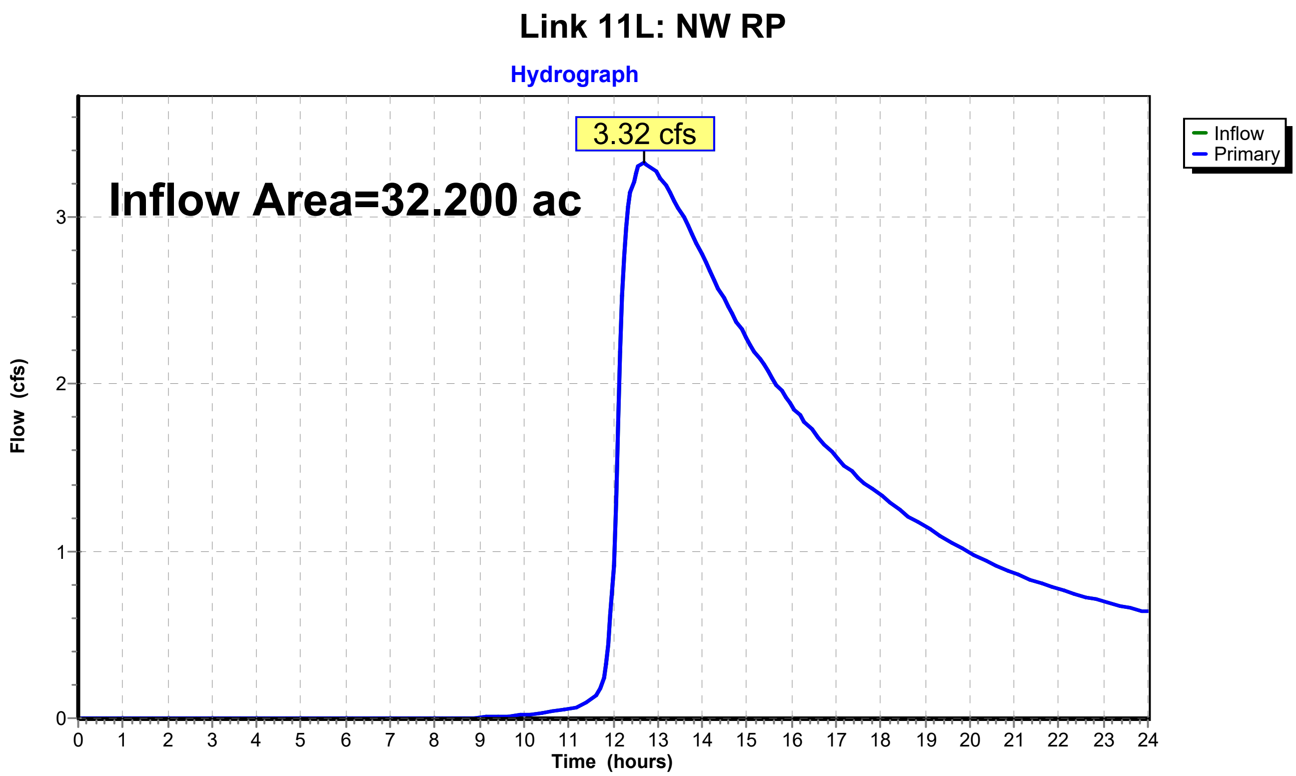
Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs



Summary for Link 11L: NW RP

Inflow Area =	32.200 ac, 68.58% Impervious, Inflow Depth > 0.60"	for WQV event
Inflow =	3.32 cfs @ 12.70 hrs, Volume=	1.600 af
Primary =	3.32 cfs @ 12.70 hrs, Volume=	1.600 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

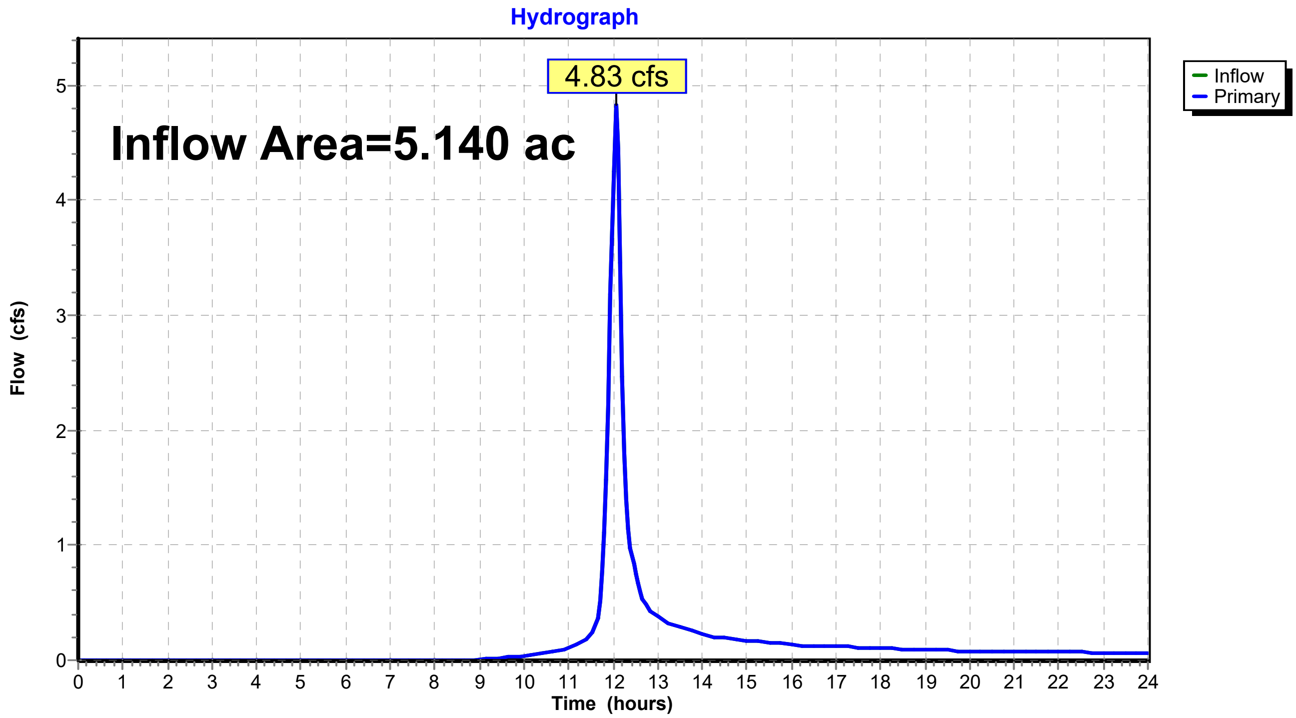


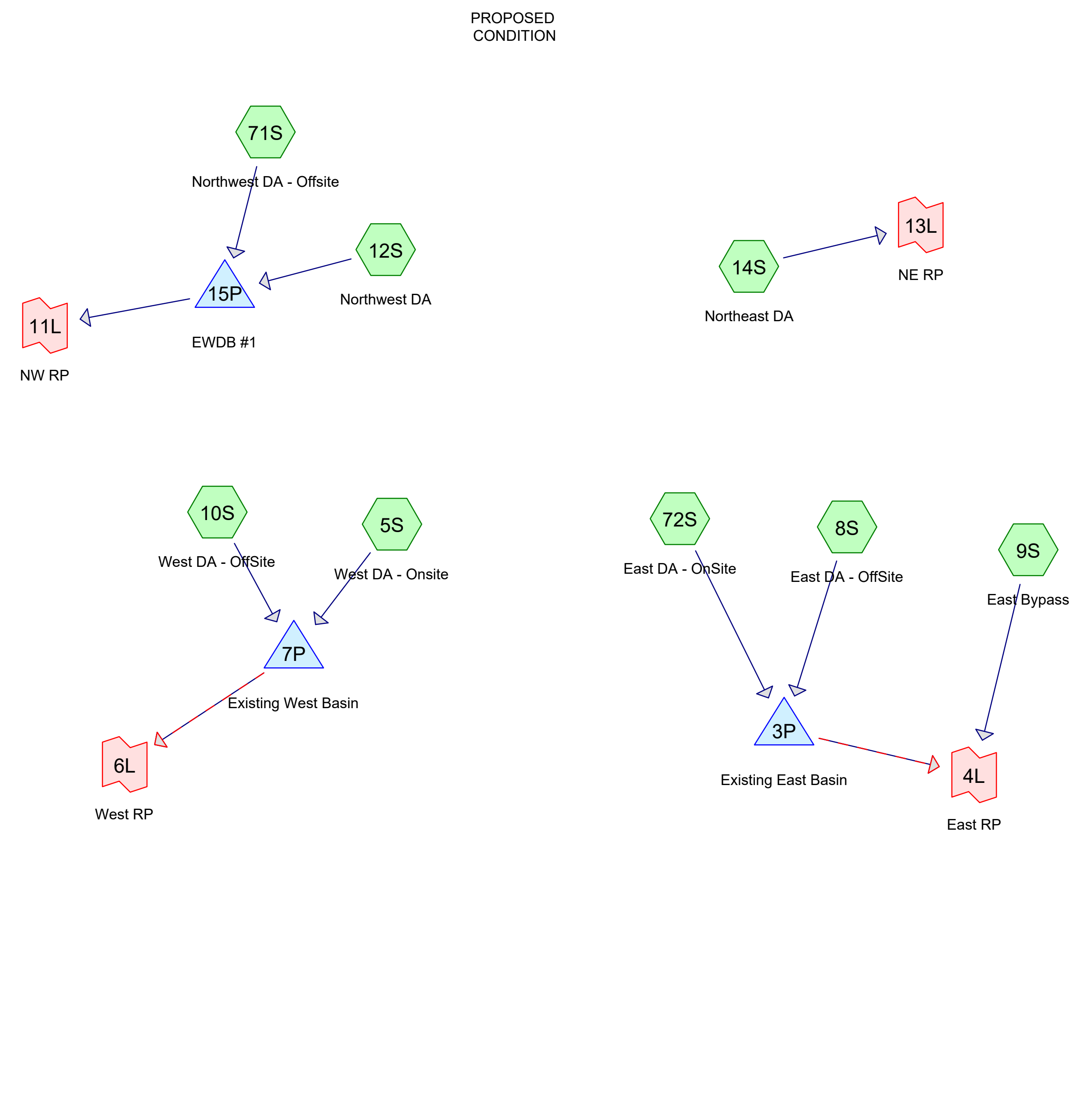
Summary for Link 13L: NE RP

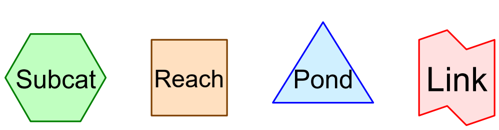
Inflow Area =	5.140 ac, 65.00% Impervious,	Inflow Depth > 0.69"	for WQV event	
Inflow =	4.83 cfs @ 12.06 hrs,	Volume=	0.296 af	
Primary =	4.83 cfs @ 12.06 hrs,	Volume=	0.296 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 13L: NE RP







Routing Diagram for 25-019 Proposed- Clogged
Prepared by Schlagel Associates, Printed 12/5/2025
HydroCAD® 10.20-7a s/n 08303 © 2025 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	100-Year	Type II 24-hr		Default	24.00	1	7.70	2

Summary for Subcatchment 5S: West DA - Onsite

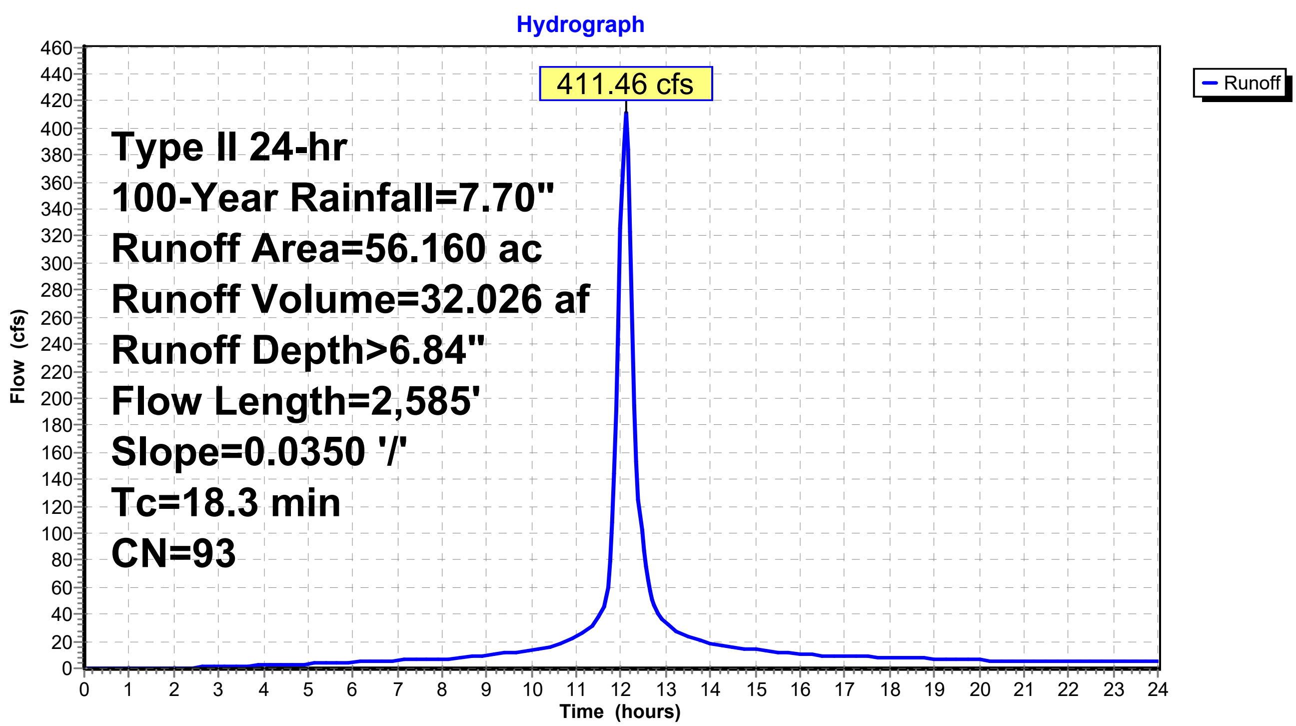
Runoff = 411.46 cfs @ 12.10 hrs, Volume= 32.026 af, Depth> 6.84"
Routed to Pond 7P : Existing West Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.70"

Area (ac)	CN	Description
30.530	92	1/8 acre lots, 65% imp, HSG D
25.630	95	Urban commercial, 85% imp, HSG D
56.160	93	Weighted Average
14.530		25.87% Pervious Area
41.630		74.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	100	0.0350	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
10.9	2,485	0.0350	3.80		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
18.3	2,585	Total			

Subcatchment 5S: West DA - Onsite



Summary for Subcatchment 8S: East DA - OffSite

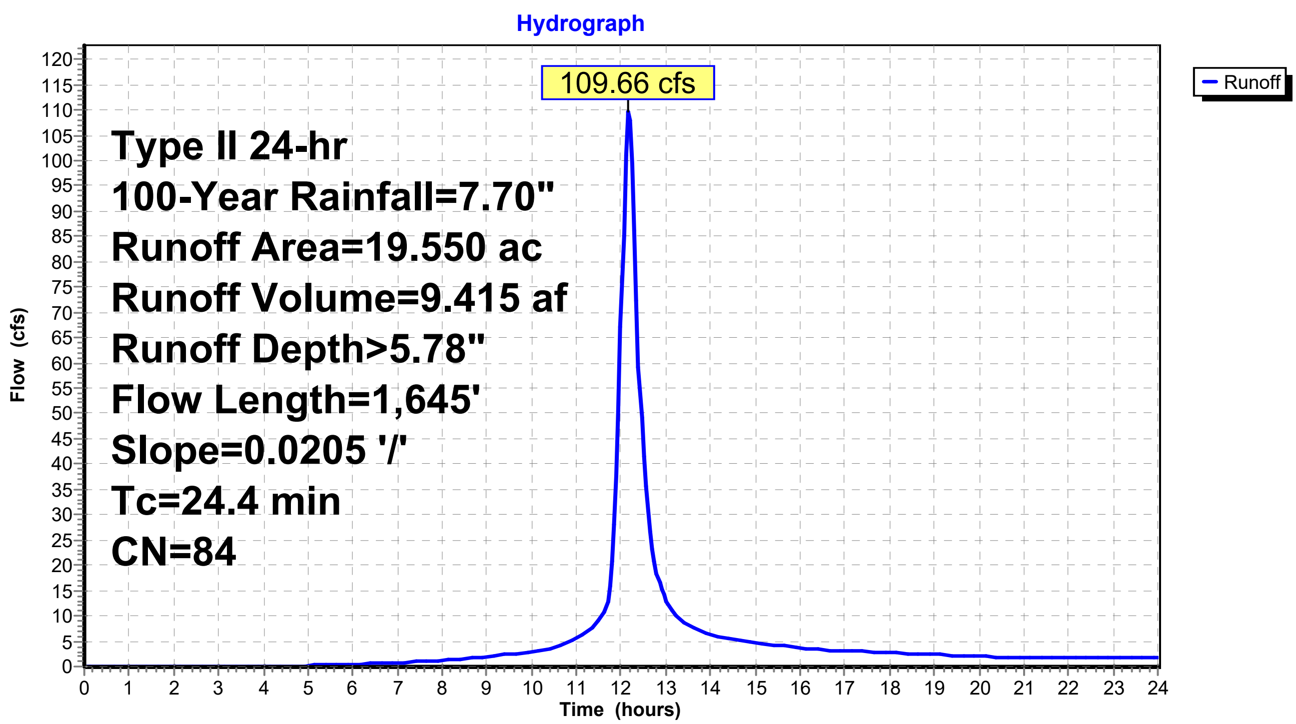
Runoff = 109.66 cfs @ 12.17 hrs, Volume= 9.415 af, Depth> 5.78"
Routed to Pond 3P : Existing East Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.70"

Area (ac)	CN	Description
19.550	84	Row crops, contoured, Poor, HSG C
19.550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	100	0.0205	0.38		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
20.0	1,545	0.0205	1.29		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
24.4	1,645	Total			

Subcatchment 8S: East DA - OffSite



Summary for Subcatchment 9S: East Bypass

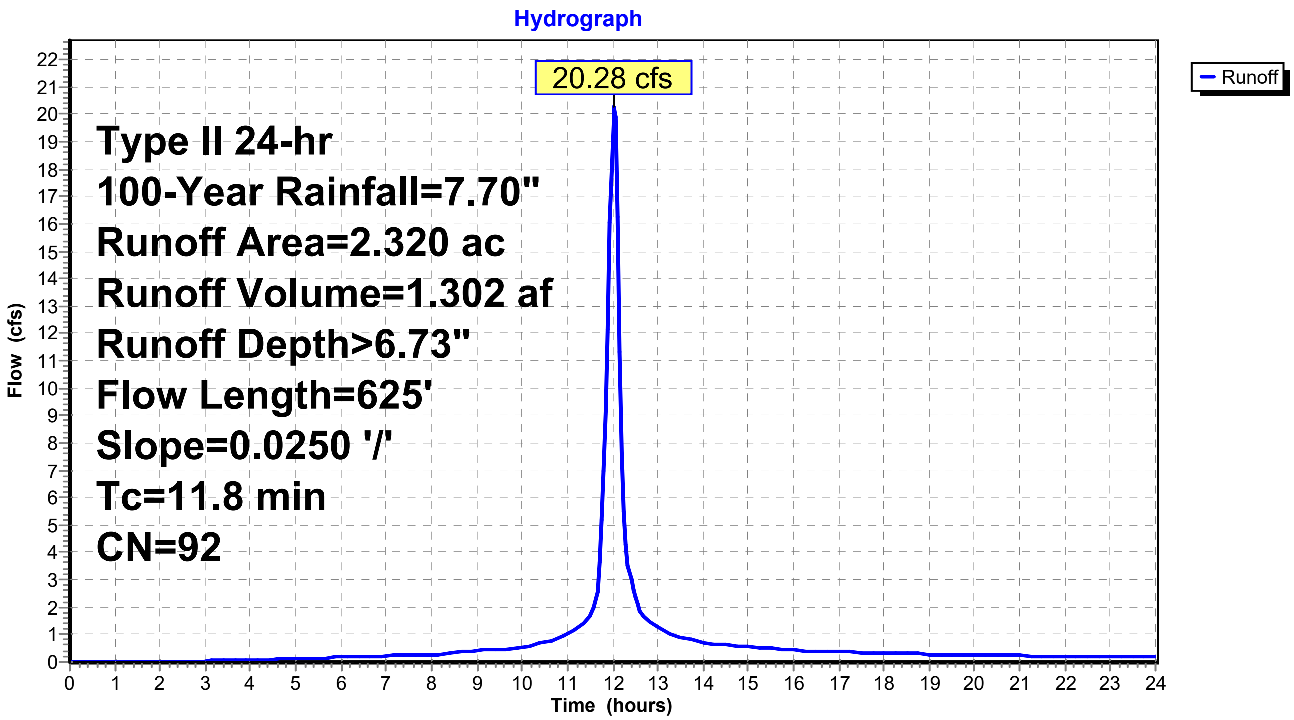
Runoff = 20.28 cfs @ 12.03 hrs, Volume= 1.302 af, Depth> 6.73"
Routed to Link 4L : East RP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.70"

Area (ac)	CN	Description
2.320	92	1/8 acre lots, 65% imp, HSG D
0.812		35.00% Pervious Area
1.508		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0250	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
3.4	525	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.8	625	Total			

Subcatchment 9S: East Bypass



Summary for Subcatchment 10S: West DA - OffSite

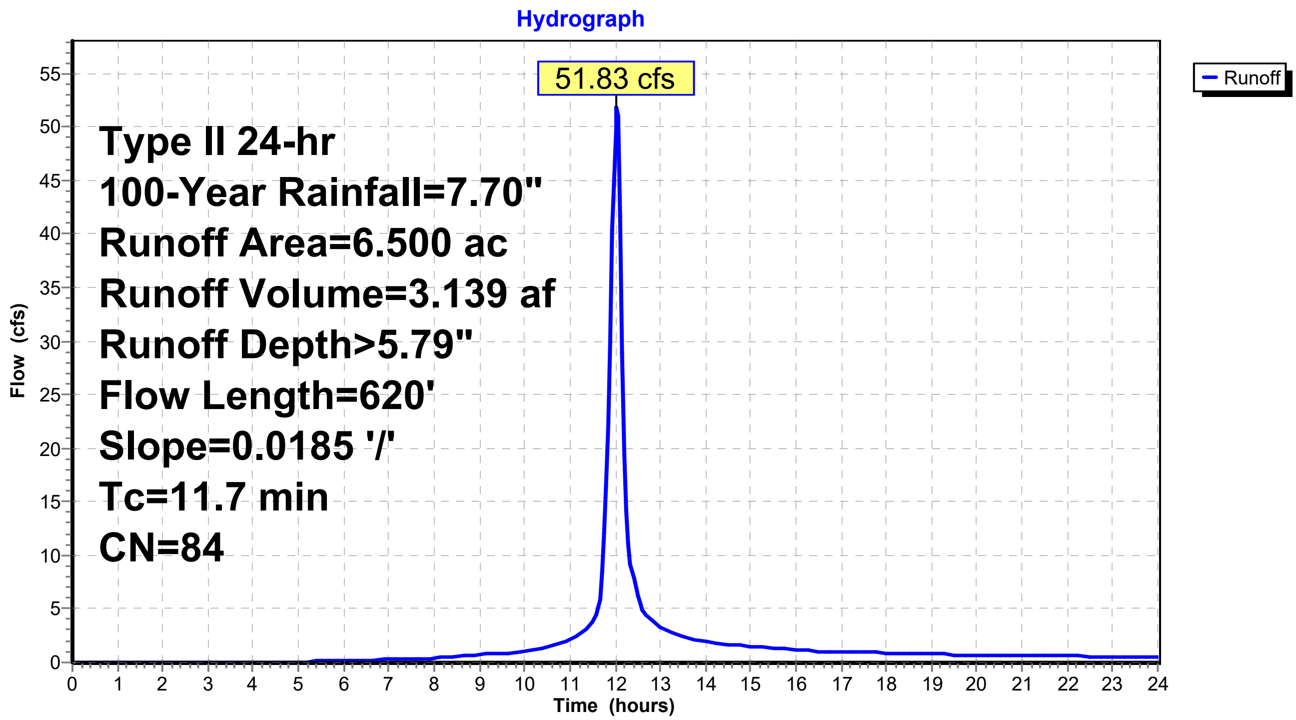
Runoff = 51.83 cfs @ 12.03 hrs, Volume= 3.139 af, Depth> 5.79"
Routed to Pond 7P : Existing West Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.70"

Area (ac)	CN	Description
6.500	84	Row crops, contoured, Poor, HSG C
6.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0185	0.36		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
7.1	520	0.0185	1.22		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
11.7	620	Total			

Subcatchment 10S: West DA - OffSite



Summary for Subcatchment 12S: Northwest DA

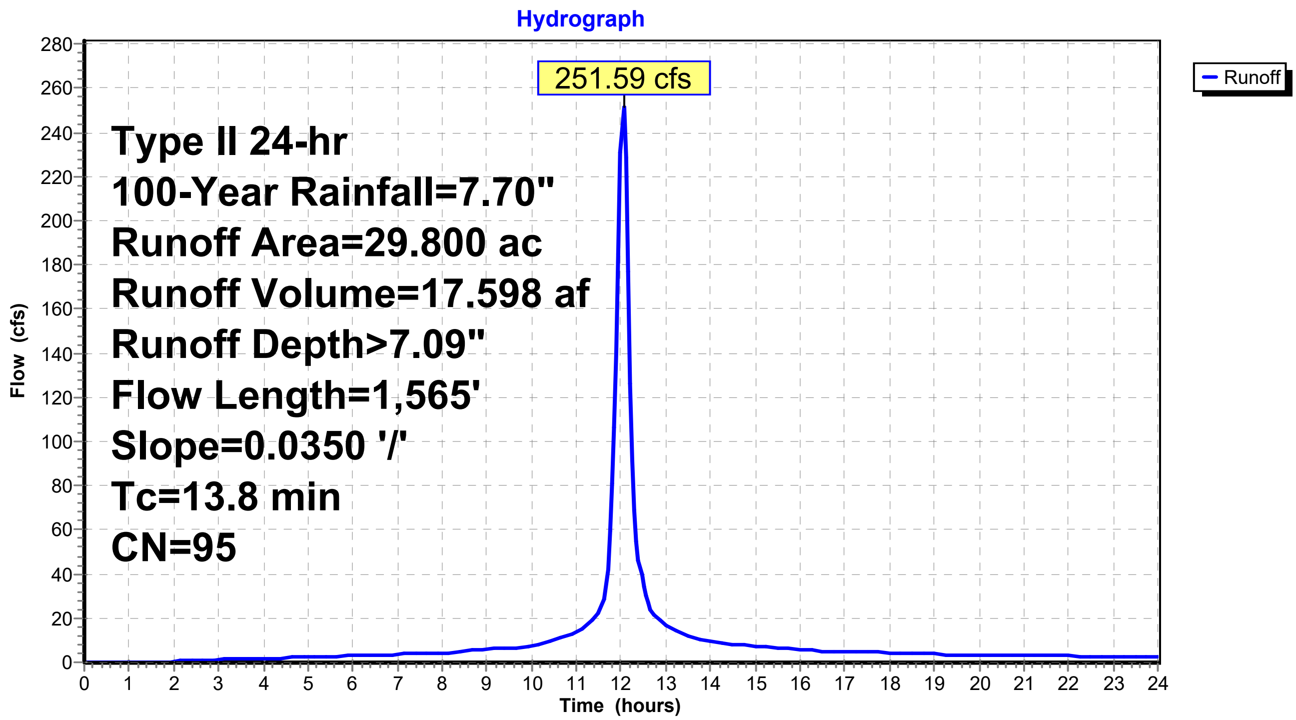
Runoff = 251.59 cfs @ 12.05 hrs, Volume= 17.598 af, Depth> 7.09"
Routed to Pond 15P : EWDB #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.70"

Area (ac)	CN	Description
29.800	95	Urban commercial, 85% imp, HSG D
4.470		15.00% Pervious Area
25.330		85.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	100	0.0350	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
6.4	1,465	0.0350	3.80		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
13.8	1,565	Total			

Subcatchment 12S: Northwest DA



Summary for Subcatchment 14S: Northeast DA

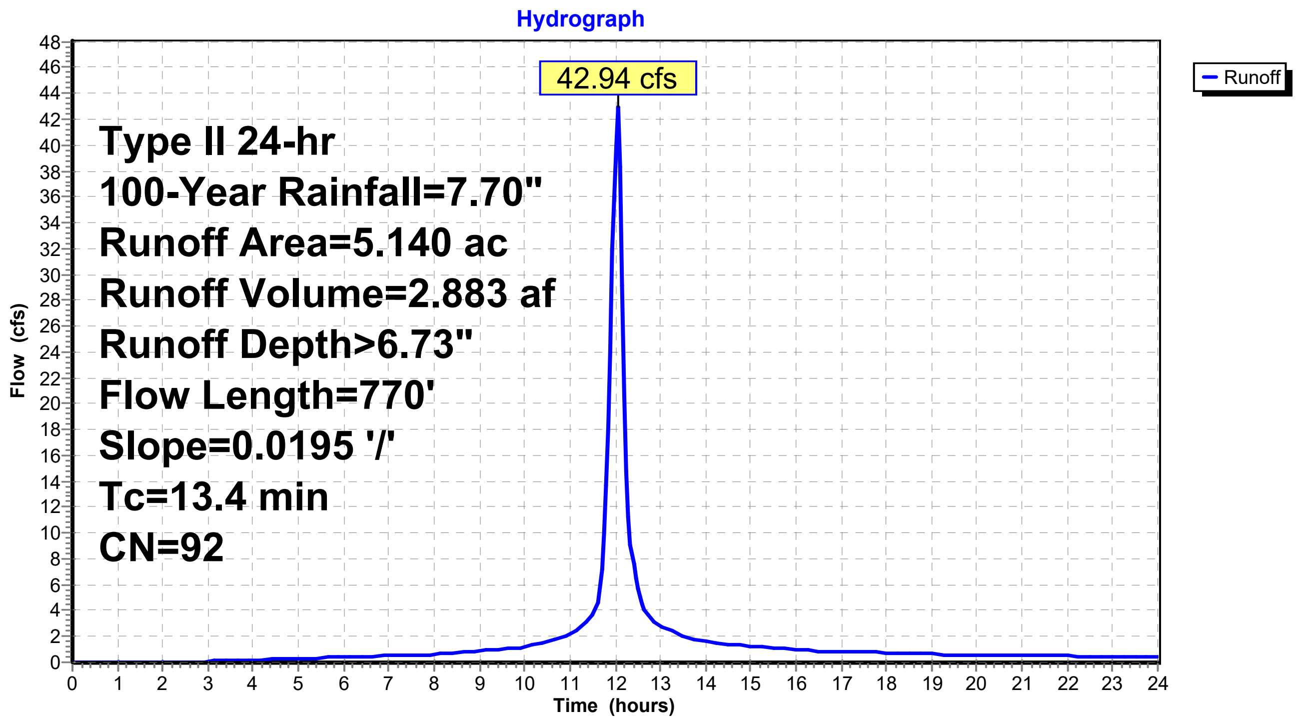
Runoff = 42.94 cfs @ 12.05 hrs, Volume= 2.883 af, Depth> 6.73"
Routed to Link 13L : NE RP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.70"

Area (ac)	CN	Description
5.140	92	1/8 acre lots, 65% imp, HSG D
1.799		35.00% Pervious Area
3.341		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	100	0.0195	0.37		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
8.9	670	0.0195	1.26		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
13.4	770	Total			

Subcatchment 14S: Northeast DA



Summary for Subcatchment 71S: Northwest DA - Offsite

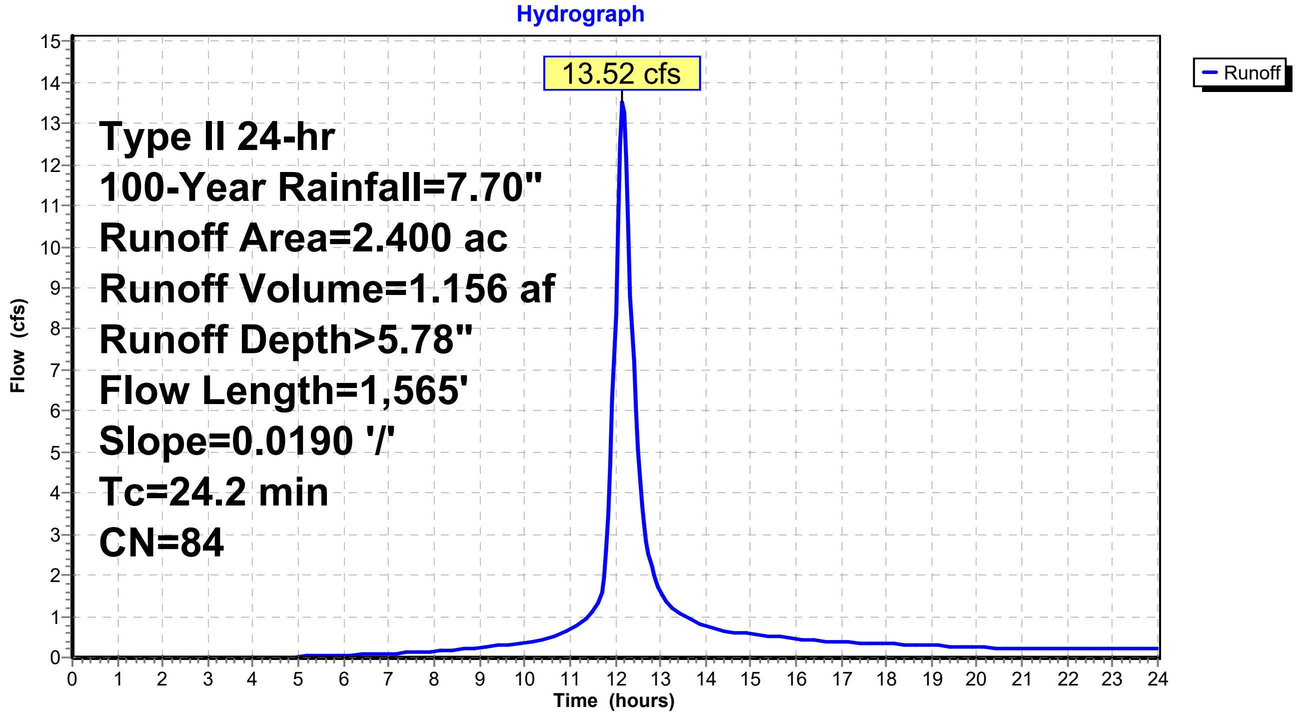
Runoff = 13.52 cfs @ 12.17 hrs, Volume= 1.156 af, Depth> 5.78"
Routed to Pond 15P : EWDB #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.70"

Area (ac)	CN	Description
2.400	84	Row crops, contoured, Poor, HSG C
2.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	100	0.0190	0.37		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 3.60"
19.7	1,465	0.0190	1.24		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
24.2	1,565	Total			

Subcatchment 71S: Northwest DA - Offsite



Summary for Subcatchment 72S: East DA - OnSite

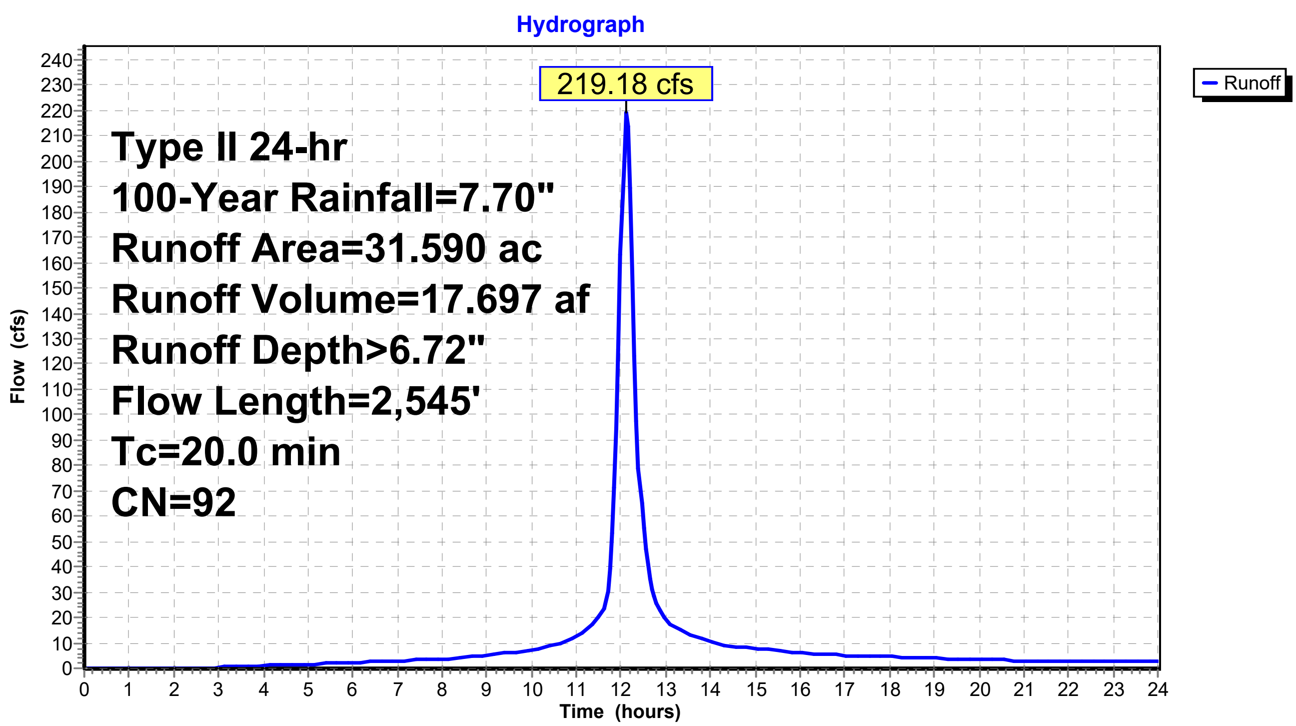
Runoff = 219.18 cfs @ 12.12 hrs, Volume= 17.697 af, Depth> 6.72"
Routed to Pond 3P : Existing East Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.70"

Area (ac)	CN	Description
9.880	92	1/8 acre lots, 65% imp, HSG D
21.710	92	1/8 acre lots, 65% imp, HSG D
31.590	92	Weighted Average
11.056		35.00% Pervious Area
20.533		65.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0250	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.60"
11.6	2,445	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
20.0	2,545	Total			

Subcatchment 72S: East DA - OnSite



Summary for Pond 3P: Existing East Basin

[44] Hint: Outlet device #2 is below defined storage
[92] Warning: Device #3 is above defined storage
[93] Warning: Storage range exceeded by 0.53'
[88] Warning: Qout>Qin may require smaller dt or Finer Routing
[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=2)

Inflow Area = 51.140 ac, 40.15% Impervious, Inflow Depth > 6.36" for 100-Year event
Inflow = 324.66 cfs @ 12.13 hrs, Volume= 27.112 af
Outflow = 367.34 cfs @ 12.11 hrs, Volume= 27.106 af, Atten= 0%, Lag= 0.0 min
Primary = 143.21 cfs @ 12.10 hrs, Volume= 23.960 af
Routed to Link 4L : East RP
Secondary = 222.98 cfs @ 12.11 hrs, Volume= 3.146 af
Routed to Link 4L : East RP

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,014.53' @ 12.10 hrs Surf.Area= 205,179 sf Storage= 69,449 cf

Plug-Flow detention time= 2.8 min calculated for 27.106 af (100% of inflow)
Center-of-Mass det. time= 2.7 min (789.5 - 786.8)

Volume	Invert	Avail.Storage	Storage Description
#1	1,013.66'	69,449 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

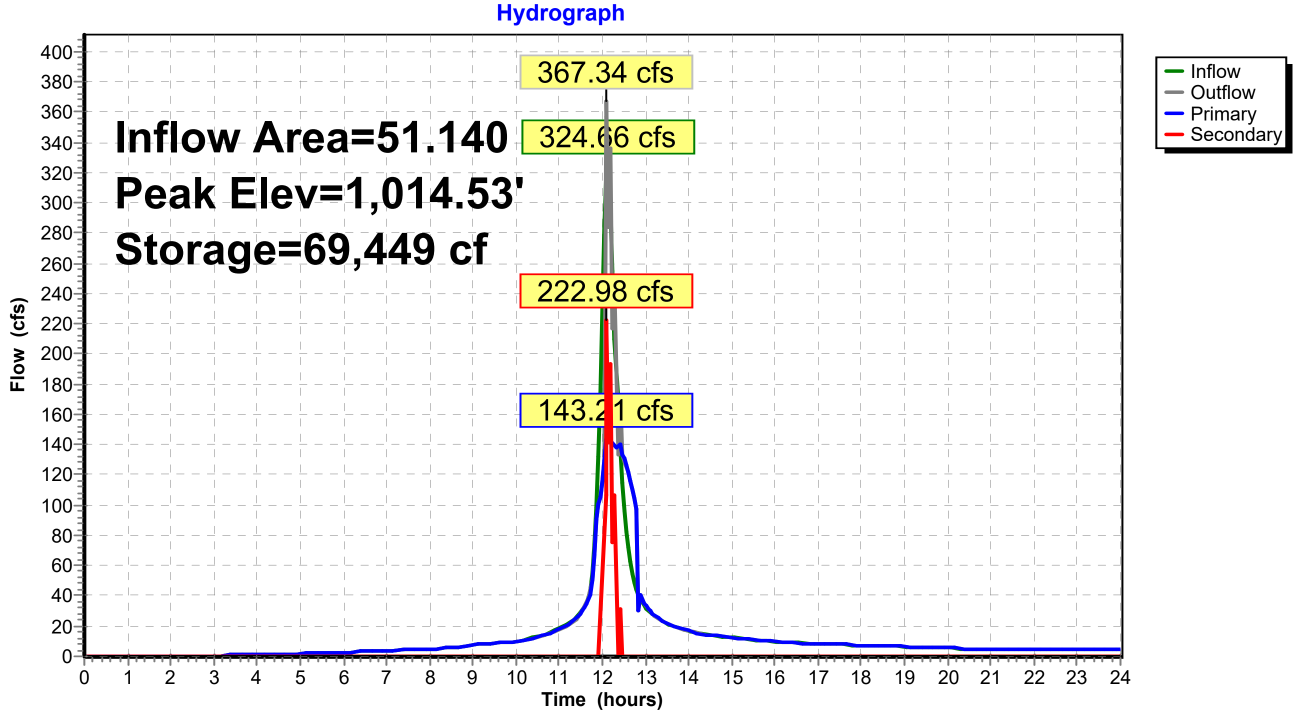
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,013.66	203,344	0	0
1,014.00	205,179	69,449	69,449

Device	Routing	Invert	Outlet Devices
#1	Primary	1,006.93'	**48.0" Round RCP_Round 48"** L= 65.0' Ke= 0.500 Inlet / Outlet Invert= 1,006.93' / 1,006.82' S= 0.0017 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Device 1	1,012.37'	**60.0" x 60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	1,014.30'	**Custom Weir/Orifice, Cv= 3.33 (C= 4.16)** Elev. (feet) 1,014.30 1,016.50 Width (feet) 460.00 472.00

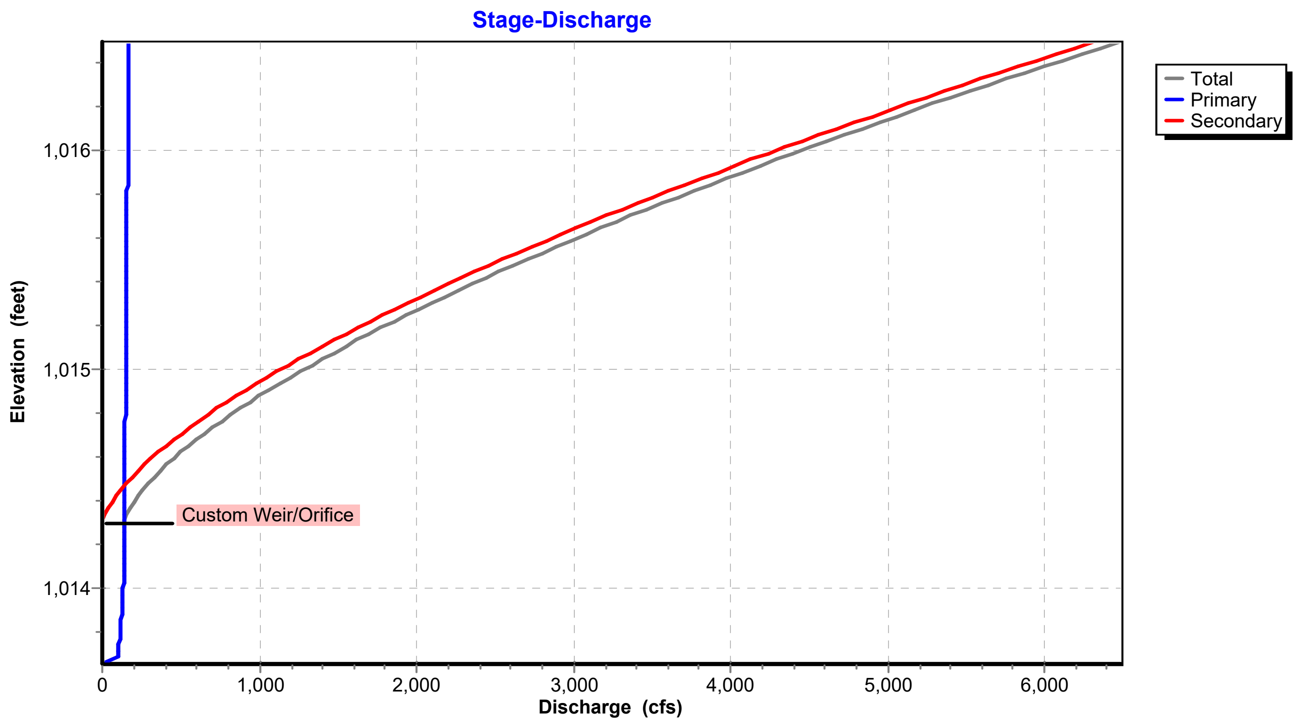
Primary OutFlow Max=143.21 cfs @ 12.10 hrs HW=1,014.53' (Free Discharge)
└─**1=RCP_Round 48"** (Inlet Controls 143.21 cfs @ 11.40 fps)
  └─**2=Orifice/Grate** (Passes 143.21 cfs of 176.99 cfs potential flow)

Secondary OutFlow Max=195.14 cfs @ 12.11 hrs HW=1,014.52' (Free Discharge)
└─**3=Custom Weir/Orifice** (Weir Controls 195.14 cfs @ 1.94 fps)

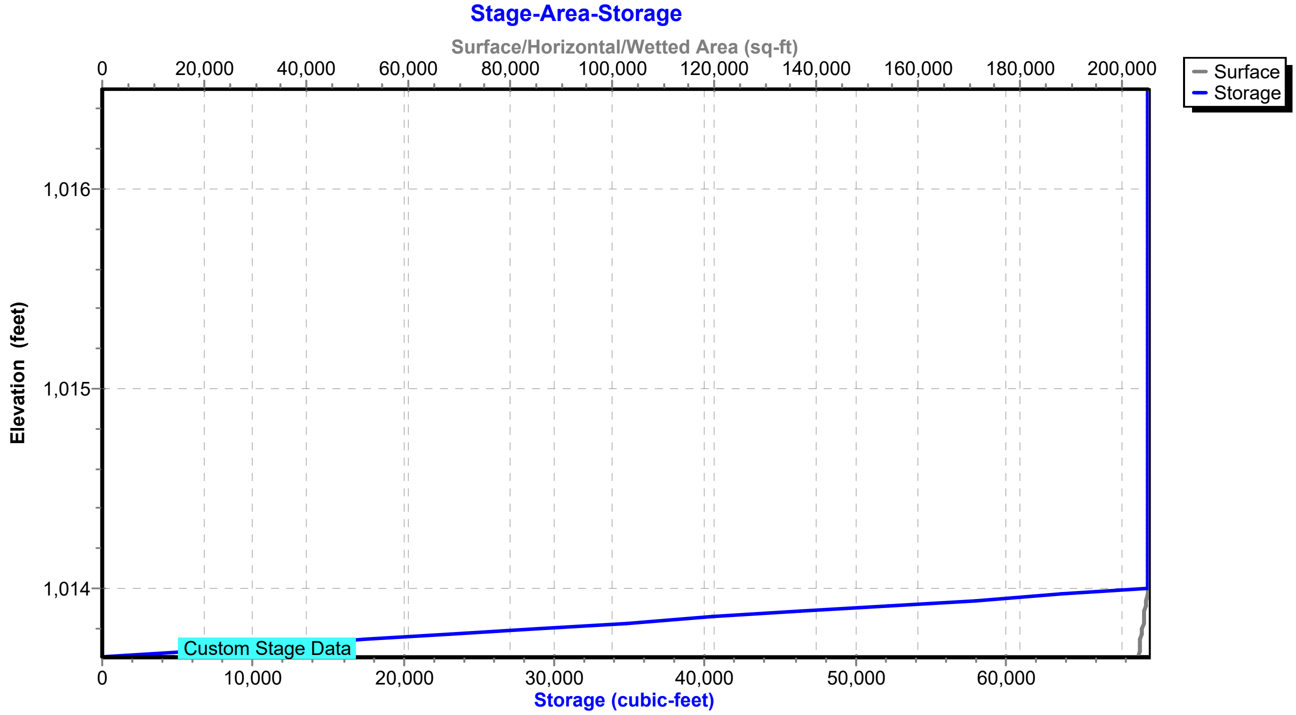
Pond 3P: Existing East Basin



Pond 3P: Existing East Basin



Pond 3P: Existing East Basin



Summary for Pond 7P: Existing West Basin

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 62.660 ac, 66.44% Impervious, Inflow Depth > 6.73" for 100-Year event
Inflow = 454.65 cfs @ 12.09 hrs, Volume= 35.165 af
Outflow = 370.49 cfs @ 12.19 hrs, Volume= 35.159 af, Atten= 19%, Lag= 6.1 min
Primary = 141.29 cfs @ 12.19 hrs, Volume= 31.120 af
Routed to Link 6L : West RP
Secondary = 229.20 cfs @ 12.19 hrs, Volume= 4.039 af
Routed to Link 6L : West RP

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,003.89' @ 12.19 hrs Surf.Area= 246,062 sf Storage= 210,691 cf

Plug-Flow detention time= 5.9 min calculated for 35.159 af (100% of inflow)
Center-of-Mass det. time= 5.8 min (779.7 - 774.0)

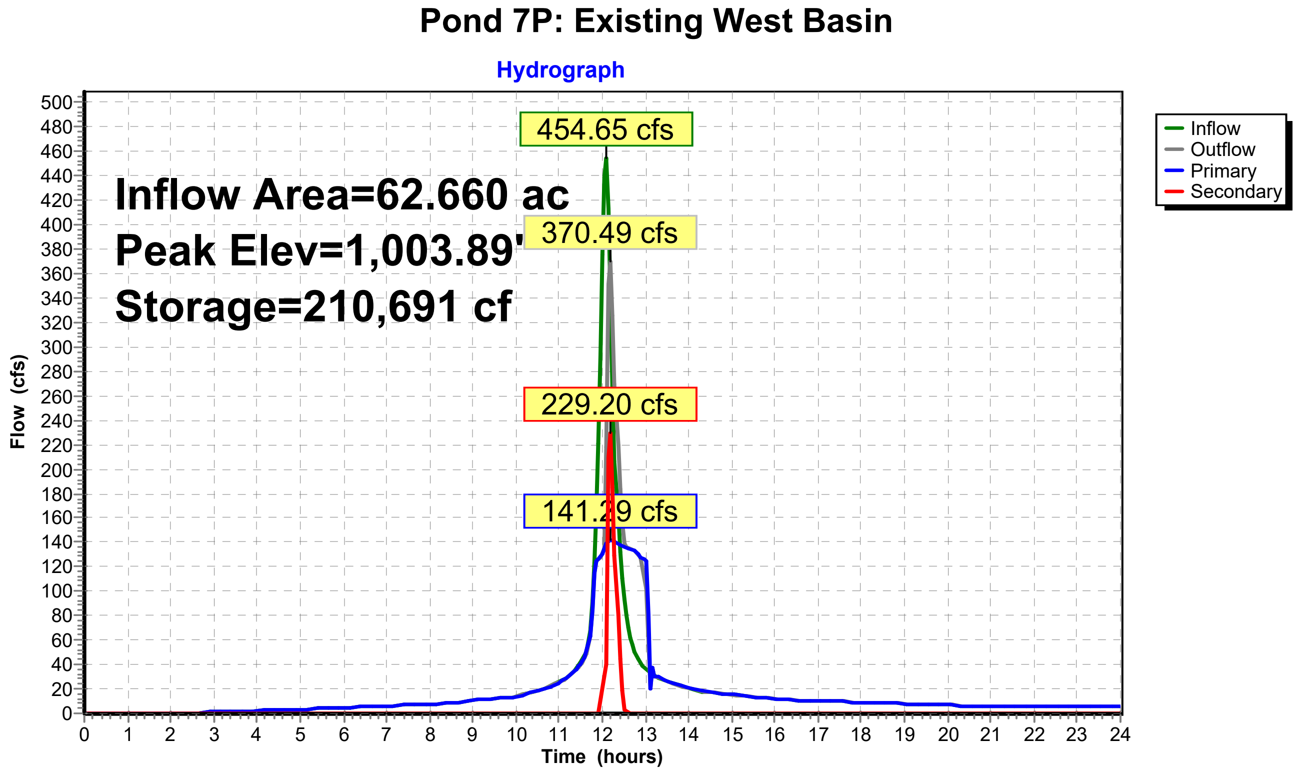
Volume	Invert	Avail.Storage	Storage Description
#1	1,003.00'	237,227 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

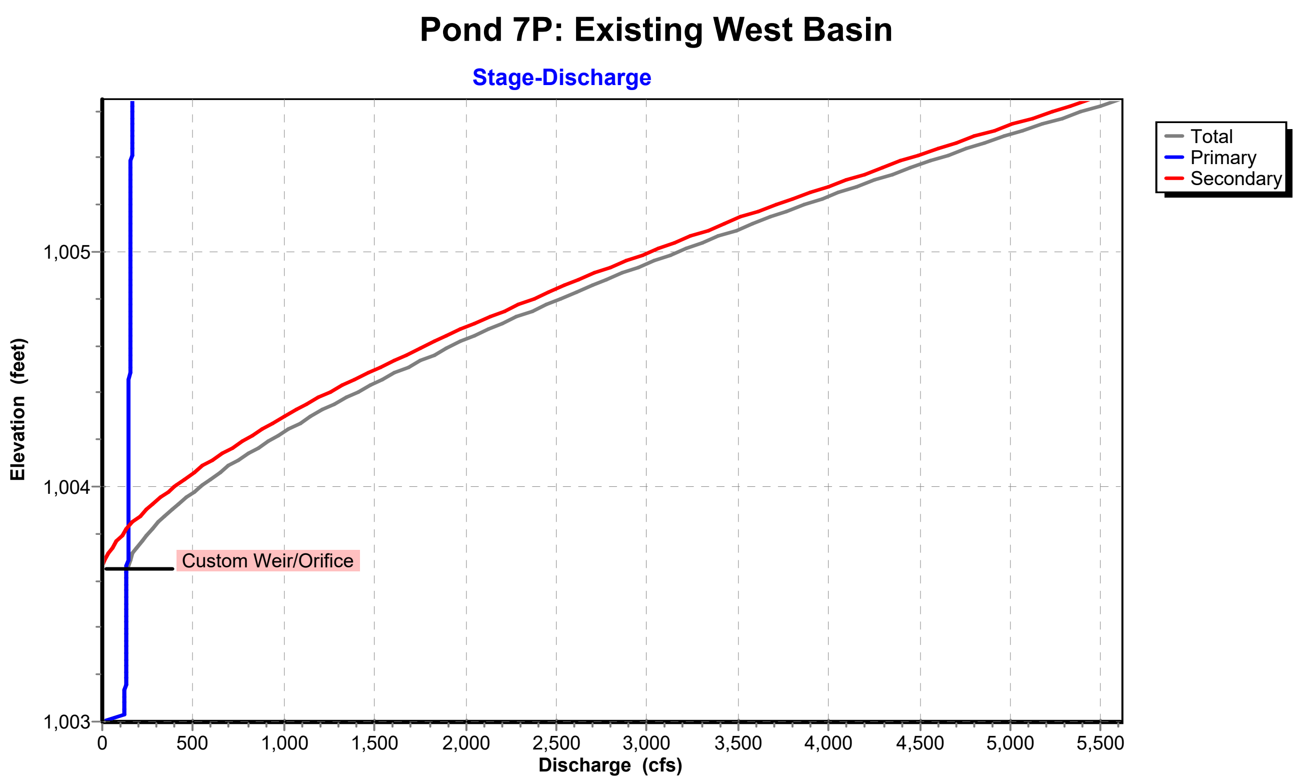
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,003.00	225,977	0	0
1,004.00	248,476	237,227	237,227

Device	Routing	Invert	Outlet Devices
#1	Primary	996.44'	**48.0" Round RCP_Round 48"** L= 74.4' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 996.44' / 996.20' S= 0.0032 '/' Cc= 0.900 n= 0.013, Flow Area= 12.57 sf
#2	Secondary	1,003.65'	**Custom Weir/Orifice, Cv= 3.33 (C= 4.16)** Elev. (feet) 1,003.65 1,005.65 Width (feet) 460.00 466.00

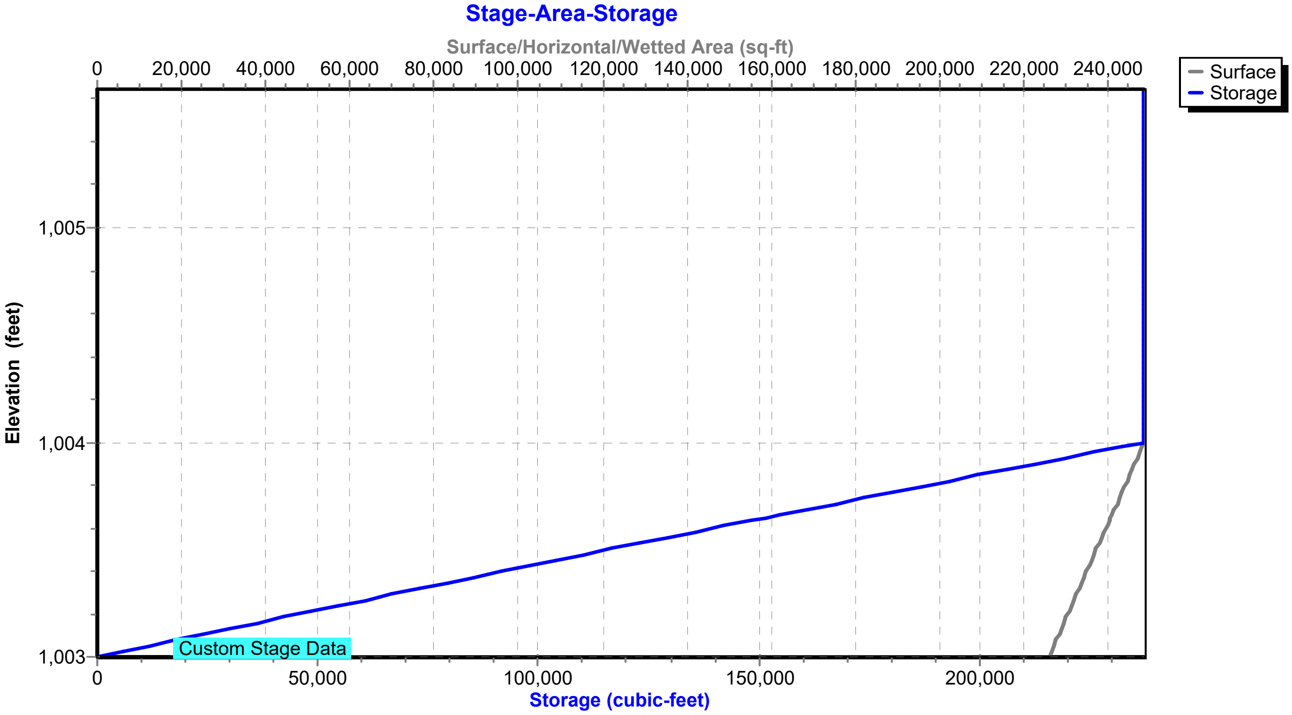
Primary OutFlow Max=141.24 cfs @ 12.19 hrs HW=1,003.89' (Free Discharge)
└—**1=RCP_Round 48"** (Inlet Controls 141.24 cfs @ 11.24 fps)

Secondary OutFlow Max=224.07 cfs @ 12.19 hrs HW=1,003.89' (Free Discharge)
└—**2=Custom Weir/Orifice** (Weir Controls 224.07 cfs @ 2.04 fps)


Pond 7P: Existing West Basin
Hydrograph
454.65 cfs
370.49 cfs
229.20 cfs
141.29 cfs
Inflow Area=62.660 ac
Peak Elev=1,003.89'
Storage=210,691 cf
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)


Pond 7P: Existing West Basin
Stage-Discharge
Total
Primary
Secondary
Custom Weir/Orifice
Elevation (feet)
Discharge (cfs)

Pond 7P: Existing West Basin



Summary for Pond 15P: EWDB #1

[95] Warning: Outlet Device #2 rise exceeded

Inflow Area = 32.200 ac, 78.66% Impervious, Inflow Depth > 6.99" for 100-Year event
Inflow = 262.18 cfs @ 12.05 hrs, Volume= 18.754 af
Outflow = 65.58 cfs @ 12.35 hrs, Volume= 17.679 af, Atten= 75%, Lag= 17.8 min
Primary = 65.58 cfs @ 12.35 hrs, Volume= 17.679 af
Routed to Link 11L : NW RP

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,008.45' @ 12.35 hrs Surf.Area= 60,262 sf Storage= 357,166 cf

Plug-Flow detention time= 143.4 min calculated for 17.642 af (94% of inflow)
Center-of-Mass det. time= 110.5 min (873.0 - 762.5)

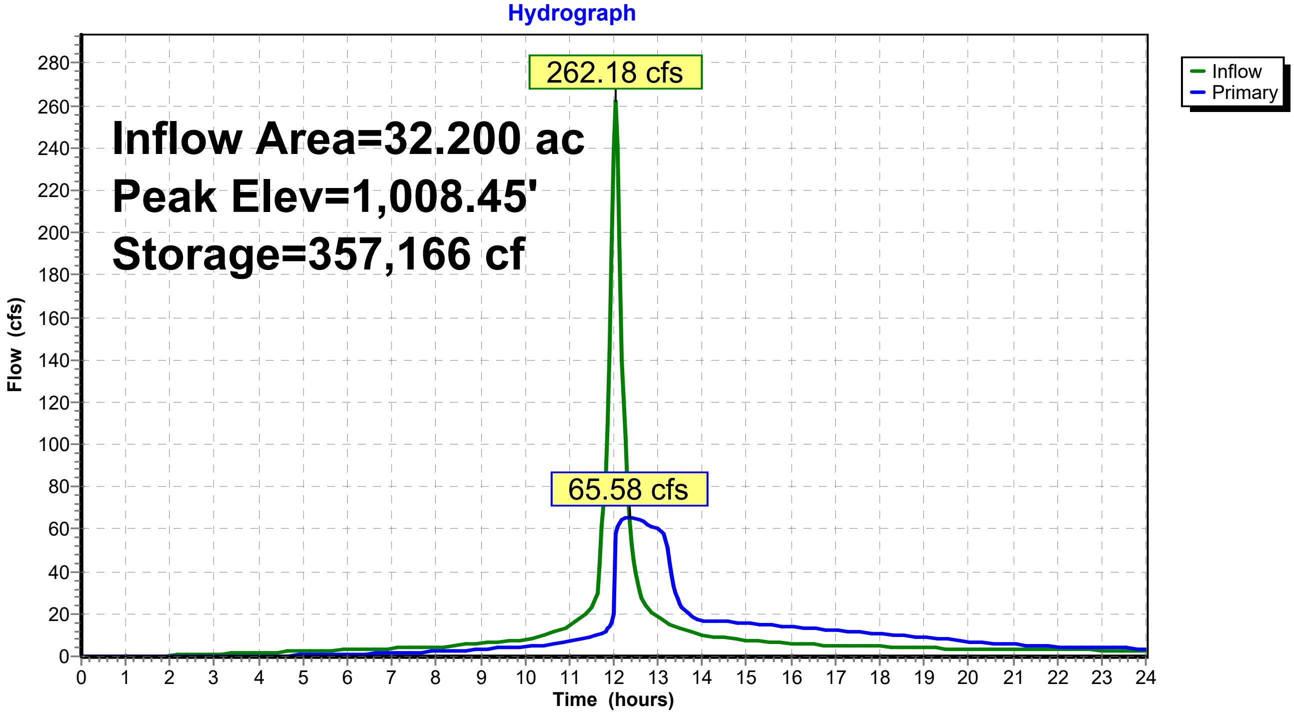
Volume	Invert	Avail.Storage	Storage Description
#1	1,002.00'	390,785 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,002.00	46,771	0	0
1,004.00	56,461	103,232	103,232
1,006.00	56,461	112,922	216,154
1,007.00	56,461	56,461	272,615
1,009.00	61,709	118,170	390,785

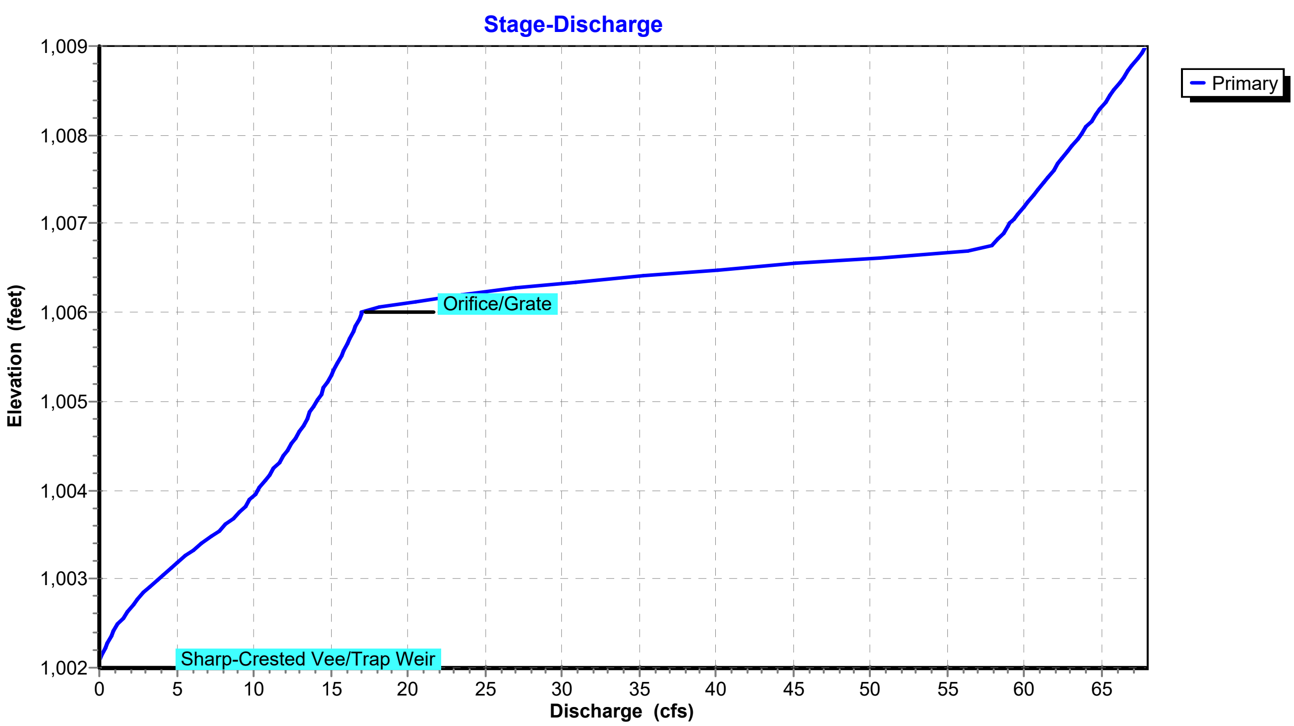
Device	Routing	Invert	Outlet Devices
#1	Primary	999.50'	**30.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 999.50' / 999.25' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	1,002.00'	**20.0 deg x 1.0' long x 1.50' rise Sharp-Crested Vee/Trap Weir** Cv= 2.69 (C= 3.36)
#3	Device 1	1,006.00'	**60.0" x 60.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=65.58 cfs @ 12.35 hrs HW=1,008.45' (Free Discharge)
└─**1=Culvert** (Inlet Controls 65.58 cfs @ 13.36 fps)
  ├─**2=Sharp-Crested Vee/Trap Weir** (Passes < 22.71 cfs potential flow)
  └─**3=Orifice/Grate** (Passes < 188.34 cfs potential flow)

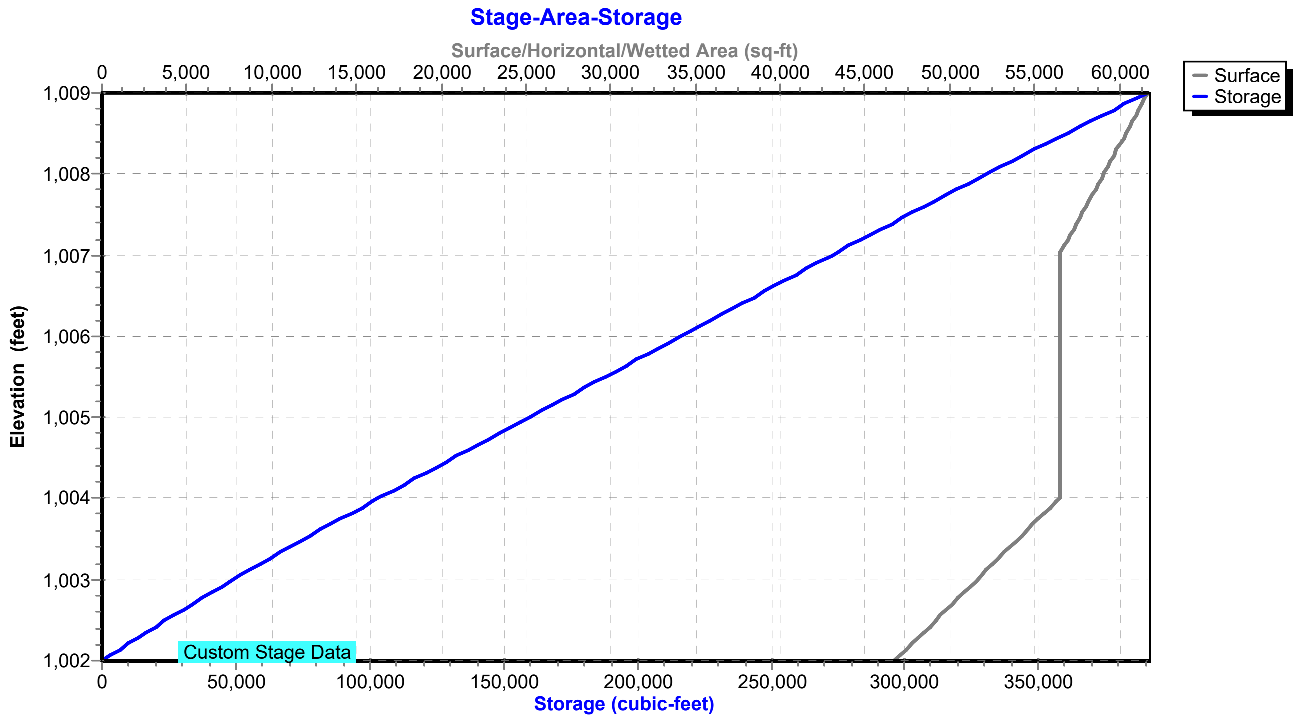
Pond 15P: EWDB #1



Pond 15P: EWDB #1



Pond 15P: EWDB #1

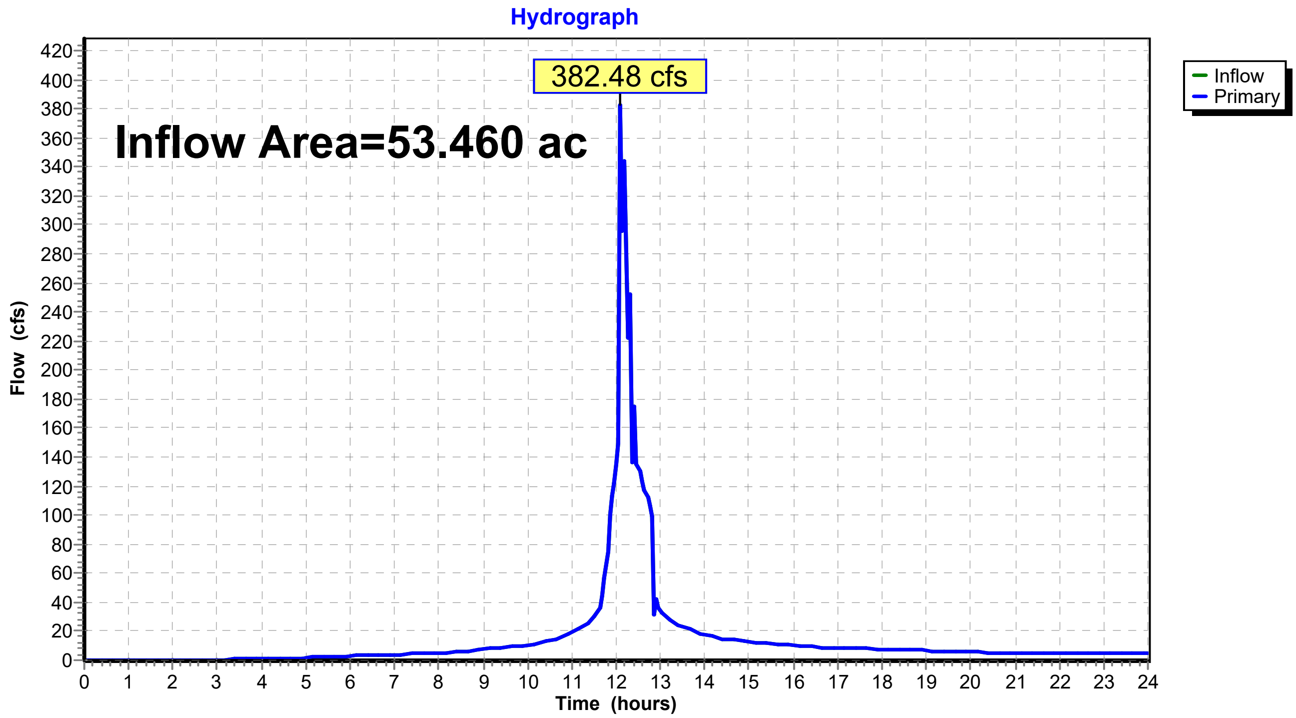


Summary for Link 4L: East RP

Inflow Area = 53.460 ac, 41.23% Impervious, Inflow Depth > 6.38" for 100-Year event
Inflow = 382.48 cfs @ 12.11 hrs, Volume= 28.408 af
Primary = 382.48 cfs @ 12.11 hrs, Volume= 28.408 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 4L: East RP

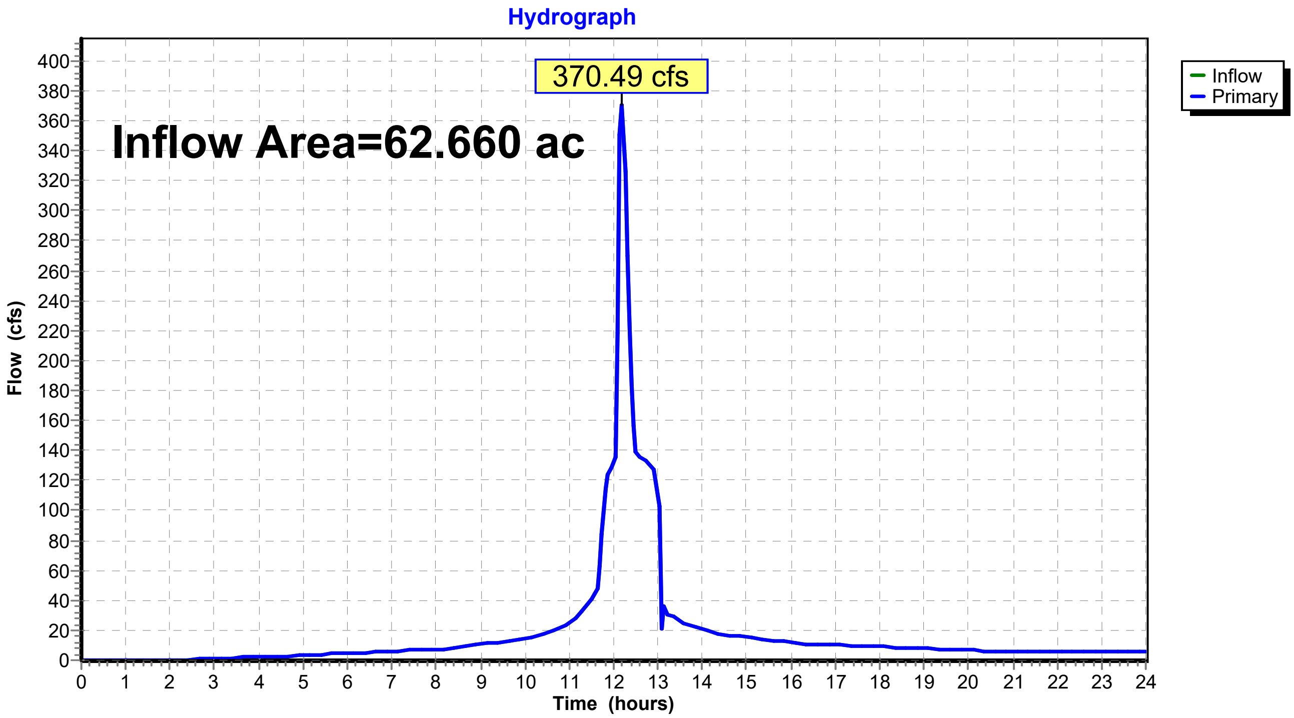


Summary for Link 6L: West RP

Inflow Area = 62.660 ac, 66.44% Impervious, Inflow Depth > 6.73" for 100-Year event
Inflow = 370.49 cfs @ 12.19 hrs, Volume= 35.159 af
Primary = 370.49 cfs @ 12.19 hrs, Volume= 35.159 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

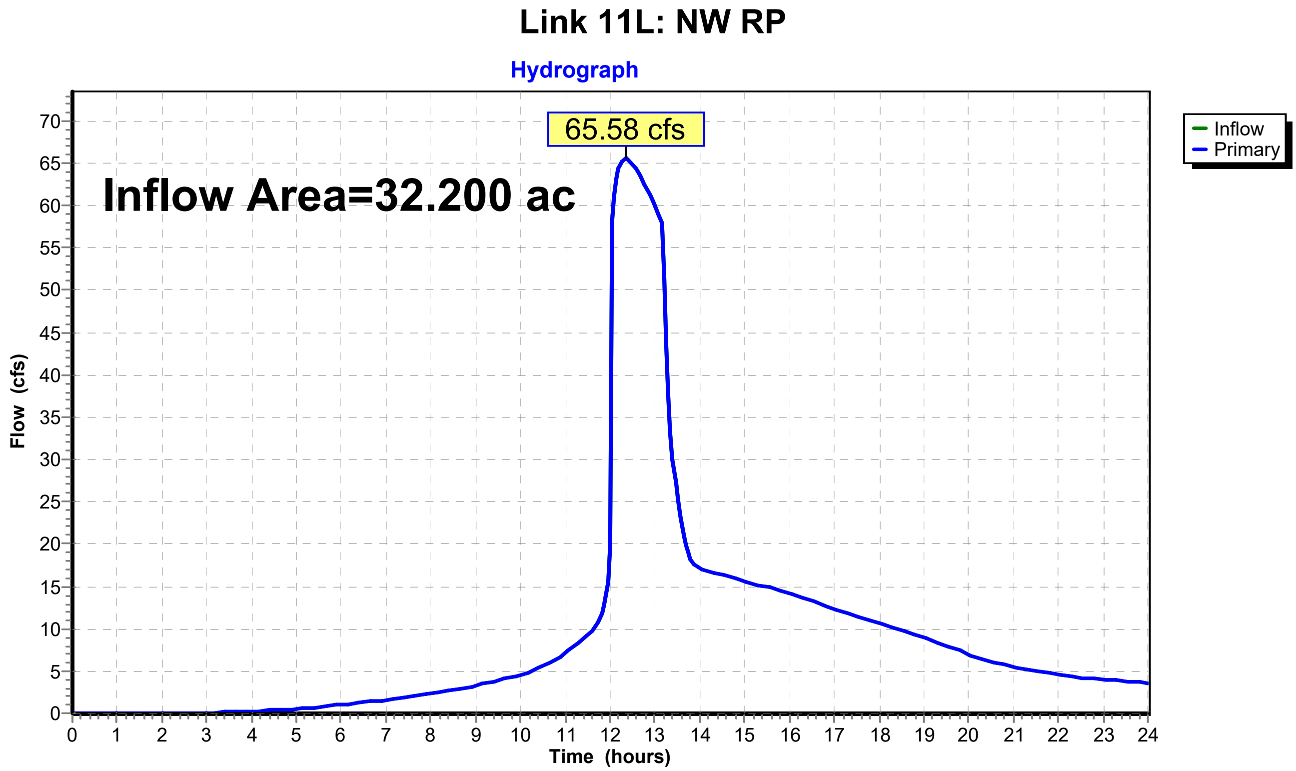
Link 6L: West RP



Summary for Link 11L: NW RP

Inflow Area = 32.200 ac, 78.66% Impervious, Inflow Depth > 6.59" for 100-Year event
Inflow = 65.58 cfs @ 12.35 hrs, Volume= 17.679 af
Primary = 65.58 cfs @ 12.35 hrs, Volume= 17.679 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs



Summary for Link 13L: NE RP

Inflow Area =	5.140 ac,	65.00% Impervious,	Inflow Depth > 6.73"	for 100-Year event
Inflow =	42.94 cfs @	12.05 hrs, Volume=	2.883 af	
Primary =	42.94 cfs @	12.05 hrs, Volume=	2.883 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs