ENGINEERING SUCCESS

PRELIMINARY DRAINAGE REPORT FOR

Westgate Village Addition
Wichita, Kansas

MKEC

411 N. Webb Rd.
Wichita, KS 67206
316.684.9600

PROJECT NUMBER: 1401010187
DATE: May 2014

City of Wichita/Sedgwick County
Subdivision Drainage Plan Checklist

Submit completed forms to:
City of Wichita Public Works & Utilities, 455 N. Main 8th Floor, Wichita KS 67202; or
Sedgwick County Stormwater Management, 1144 S. Seneca, Wichita KS 67213.

Project Name:	Westgate Village Third Addition				
Total Area of Project:	1.6 **acres**				
Development Type:	Commercial	**Other:**			
Developer Name:	Equity Ventures	**Contact:**	Craig Lofton	**Phone:**	(785) 272-1398
Email:	clofton@equityventurescd.com				
Engineer Name:	MKEC Engineering, Inc.	**Contact:**	Kara Anderson	**Phone:**	(316) 684-9600
Email:	kanderson@mkec.com				

Directions:

(1) Fill-out this checklist completely and include it with the Drainage Plan submittal. This checklist should be included in the bound copy, behind the cover sheet for the submittal. Incomplete Drainage Plans and checklists will not be accepted.

*(2) Indicate whether a plan element is included or not included in the submittal by choosing "**Yes**" or "**No**" from the dropdown list in the **"Element Included?"** column. The question must be answered for every plan element for this checklist to be considered complete. An explanation must be provided for all **"No"** answers.*

Drainage Plan Checklist

#	Plan Element Description	Element Included?	Explanation/Notes
1.0	**General**		
1.1	Digital copy of drainage plan, including preliminary Master Grading Plan, preliminary plat and proposed plat, in PDF format and one half size, bound, paper copy.	yes	
1.2	Professional Engineer's seal, signature and date on plan cover.	yes	
1.3	Site location map, using color ortho-imagery and showing the project boundaries, a north arrow and an accurate scale.	yes	
1.4	Narrative of the development type, existing conditions and proposed impacts on stormwater runoff, wetlands, riparian zones and floodplains/floodways.	yes	
1.5	Discussion of off-site conditions surrounding the proposed development.	yes	
1.6	Summary table of runoff calculations (pre/post development).	yes	
1.7	Narrative description of the type and function of the permanent structural stormwater management facilities.	yes	
2.0	**Existing Conditions Information**		
2.1	**Existing Conditions Drainage Map**		
2.1.1	On-site and off-site topography: NAVD 88 datum, one-foot contours with spot elevations	yes	
2.1.2	On-site and off-site drainage features, including perennial and intermittent streams (with names labeled), conveyance systems such as open channels, ditches, swales and areas of overland flow. Flow direction must be indicated by arrows.	yes	
2.1.3	Storm sewer system components, including storm drains, inlets, catch basins, gutters, manholes, headwalls, pipes and culverts. Material and size must be noted for all pipes and culverts.	yes	
2.1.4	Location and boundaries of natural features such as wetlands, lakes, ponds with the normal water elevation noted, rock outcroppings, wooded areas and tree rows.	yes	
2.1.5	Location, dimensions and elevations of existing bridges and culvert crossings.	yes	
2.1.6	Location of existing utilities (e.g., water, sewer, gas, electric, cable, etc.) with labels and easement boundaries.	yes	
2.1.7	Groundwater elevations, if applicable.	yes	
2.1.8	Delineation of predominant soil based on USDA soil surveys and/or on-site soil borings; indicate NRCS soil name and Hydrologic Soil Group for undisturbed surface soils.	yes	
2.1.9	Land use types per NRCS nomenclature.	yes	
2.1.10	Footprint of existing impervious areas (labeled, area given in acres).	yes	
2.1.11	Internal drainage subbasin boundaries used for hydrologic calculations (labeled with ID, total area in acres, impervious area in acres and curve number).	yes	
2.1.12	Time of concentration flow paths. Indicate and label each segment separately (i.e., overland flow, shallow concentrated, channel1, channel2, etc.). For each segment, provide the appropriate data to calculate Tc (e.g., length, slope, cover type, paved/unpaved, roughness parameters, geometric properties, etc.).	yes	
2.2	**Existing Conditions Hydrology and Hydraulics Analysis**		

Drainage Plan Checklist			
#	Plan Element Description	Element Included?	Explanation/Notes
2.2.1	Narrative of the hydrologic analysis methodology used (e.g., unit hydrograph or other approved methods).	yes	
2.2.2	A summary table of drainage subbasin hydrologic parameters (subbasin ID, area in acres, curve number, Tc, etc.).	yes	
2.2.3	Table of existing condition runoff curve numbers with supporting data and calculations.	yes	
2.2.4	Table of existing condition times of concentration with supporting data and calculations.	yes	
2.2.5	A summary table of rainfall data used in the hydrologic analysis, and a reference for the source of the data.	yes	
2.2.6	Cross-sections and other diagrams of existing open channels, bridge and culvert sections and other hydraulic features as required to illustrate the basis for hydraulic analysis.	N/A	
2.2.7	Hydrologic and hydraulic analyses for runoff rates, volumes, velocities and elevations. Provide supporting data not specified above and identify assumptions. Include detailed calculations for the 2, 5, 10, 25 & 100-year, 24-hour storm events. Provide results in a tabular form. Provide digital copies of any computer files and models used.	yes	
3.0	**postdevelopment Conditions Information**		
3.1	**postdevelopment Conditions Drainage Map**		
3.1.1	Proposed project boundary.	yes	
3.1.2	on-site and off-site topography: NAVD 88 datum, one-foot contours with spot elevations.	yes	
3.1.3	Existing on-site and off-site drainage features that are to remain after development, including perennial and intermittent streams (with names labeled), conveyance systems such as open channels, ditches, swales and areas of overland flow. Flow direction must be indicated by arrows.	yes	
3.1.4	Location and description of off-site through-drainage conveyances which are confined to an easement, dedication and/or reserve.	yes	
3.1.5	Footprint of proposed impervious areas, including roads, parking lots, buildings and other structures.	yes	
3.1.6	Location of proposed utilities (e.g., water, sewer, gas, electric, cable, etc.) with labels and easement boundaries.	yes	
3.1.7	Delineation of predominant soils, based on anticipated soil textures and NRCS guidelines if different from predevelopment soil conditions; indicate NRCS soil name and Hydrologic Soil Group for surface soils.	yes	
3.1.8	Land use cover per NRCS nomenclature.	yes	
3.1.9	Internal drainage subbasin boundaries used for hydrologic calculations (labeled with ID, total area in acres, impervious area in acres and curve number).	yes	
3.1.10	Proposed limits of land disturbing activity (i.e., grading limits).	yes	
3.1.11	Time of concentration flow paths. Indicate and label each segment separately (i.e., overland flow, shallow concentrated, channel1, channel2, etc.). For each segment, provide the appropriate data to calculate Tc (e.g., length, slope, cover type, paved/unpaved, roughness parameters, geometric properties, etc.).	yes	
3.2	**Proposed Conveyances Map**		
3.2.1	on-site and off-site drainage features, including perennial and intermittent streams (with names labeled), proposed conveyance systems (such as open channels, ditches, swales and areas of overland flow, including backyard drainage). Flow direction must be indicated by arrows.	yes	
3.2.2	Storm sewer system components, including storm drains, inlets, catchbasins, gutters, manholes, headwalls, pipes and culverts. Material and size must be noted for all pipes and culverts.	yes	
3.2.3	For any subbasin or drainage area > 40 acres, show that the stormwater flow is confined to an open channel with required side benches and freeboard, or conformance to applicable policy and design requirements if partially enclosed.	yes	
3.2.4	Location(s) of stormwater management facilities and any associated drainage easements.	yes	
3.2.5	Proposed energy dissipaters and other channel protection devices.	yes	
3.2.6	Location(s) and dimension(s) of proposed channel, bridge and culvert crossings.	yes	
3.2.7	Normal pool and 100-year pool elevations for ponds and lakes.	yes	
3.2.8	Permanent concrete outfall control structure(s) for ponds.	yes	
3.2.9	Emergency overflow spillways and top of berm elevations for ponds and other volume/peak discharge control facilities.	yes	
3.2.10	Floodplains, ponds, and stormwater management facilities located in reserves.	yes	
3.3	**postdevelopment Conditions Hydrology & Hydraulics**		
3.3.1	Narrative of the hydrologic analysis methodology used (e.g., unit hydrograph or other approved methods).	yes	

Drainage Plan Checklist			
#	Plan Element Description	Element Included?	Explanation/Notes
3.3.2	A summary table of drainage subbasin hydrologic parameters (subbasin ID, area in acres, curve number, Tc, etc.).	yes	
3.3.3	Table of postdevelopment condition runoff curve numbers with supporting data and calculations.	yes	
3.3.4	Table of postdevelopment condition times of concentration with supporting data and calculations.	yes	
3.3.5	Cross-sections and other diagrams of existing open channels, bridge and culvert sections and other hydraulic features as	N/A	
3.3.6	Hydrologic and hydraulic analyses for runoff rates, volumes, velocities and elevations. Provide supporting data not specified above and identify assumptions. Include detailed calculations for the 2, 5, 10, 25 & 100-year, 24-hour storm events. Provide results in a tabular form. Provide digital copies of any computer files and models used.	yes	
3.3.7	Downstream peak discharge assessment (10% Rule) results and supporting data and calculations. Provide digital copies of any computer files and models used.	yes	
3.3.8	Stage-storage-discharge or other outlet rating curves and inflow/outflow hydrographs for all ponds.	yes	
3.3.9	Demonstrate that the pond contours on the master grading plan and the stage-storage-discharge data are consistent for all ponds.	yes	
3.3.10	Demonstrate that all ponds have one foot of freeboard above the 100-year, 24-hour high water level.	yes	
3.3.11	Demonstrate that runoff from the proposed project site is discharged in the same manner as prior to development, using level spreaders, energy dissipaters, other devices or grading as required, or identify an appropriate flowage easement.	yes	
3.4	**Stormwater Quantity Control Sizing**		
3.4.1	Hydraulic sizing calculations for all stormwater management controls.	yes	
3.4.2	Table(s) listing all stormwater management controls. Present the types, sizes, elevations, flows, velocities and depths for each control, as applicable. Verify that velocities are self-cleaning and non-erosive.	yes	
3.4.3	Typical details (including cross-sections where applicable) for outlet structures, embankments, spillways, grade control structures, conveyance channels, etc.	yes	
3.5	**Stormwater Quality Management Facilities**		
3.5.1	Table(s) listing all stormwater management facilities. Present the description, % TSS removal value, water quality volume handled, contributing drainage area in acres and contributing impervious area in acres.	no	
3.5.2	Indicate the responsible party for maintenance, as shown in the plat text (i.e., Home Owners Association, Lot Owners Association, property owner, etc.).	no	
3.5.3	Water quality volume (total and by facility), with supporting data and calculations.	yes	
3.5.4	% TSS removal value (total and by facility) with supporting data and calculation. Must be equal to or greater than 80%.	yes	
3.5.5	Channel protection volume with supporting data and calculations.	no	
3.5.6	Water quality volume and channel protection volume orifice size calculations.	no	
3.5.7	Other calculations required for each stormwater management facility as specified in the Wichita/Sedgwick County Stormwater Manual.	yes	
3.5.8	Typical details (including cross-sections where applicable) for outlet structures, embankments, internal grading, forebays and other siltation prefilters, filtration/infiltration media, vegetation, check dams, operational controls, etc.	no	
4.0	**Floodplains**		
4.1	Reference the source of flood profile, floodplain, floodway and stream discharge information.	yes	
4.2	Delineation of nearest base flood elevations.	yes	
4.3	Delineation of predevelopment regulatory floodplain/floodway limits using FEMA's current GIS database; limits to be per elevation and scaled location.	yes	
4.4	Delineation of postdevelopment regulatory floodplain/floodway limits; limits to be per elevation and scaled location, with project limits shown.	N/A	
4.5	Floodway data table and discharges.	N/A	
4.6	Hydrologic and hydraulic study information for local floodplain analysis, unnumbered Zone A elevation determinations and floodplain map revisions or required permits.	N/A	
4.7	Regulatory floodway and four natural profile models (10, 50, 100 and 500-year) for existing and postdevelopment conditions.	N/A	
4.8	Floodplains and floodways located within a reserve, where necessary.	yes	
4.9	Floodplain cut and fill calculations for volume sensitive basins.	N/A	

Drainage Plan Checklist			
#	Plan Element Description	Element Included?	Explanation/Notes
4.10	Demonstrate that floodway elevations and velocities do not increase due to construction in the floodway ("No Rise Certification").	N/A	
5.0	**Federal, State and Local Permits**		
5.1	US Army Corps of Engineers regulatory program permits (Section 404 permit)	yes	
5.2	Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Floodplain Fill, Levee, Water Appropriations, Dam Safety permit, etc.).	yes	
5.3	FEMA letters of map change/revision - LOMA, LOMR, LOMR-f, CLOMR, etc.; shall be included and approved when project modifies the limits of the floodplain/floodway.	yes	
6.0	**Half Scale Preliminary Master Grading Plan**		
6.1	One set of plans and associated PDF of plans.	yes	
6.2	Professional Engineer's seal, signature and date.	N/A	Will be finalized with future plans.
6.3	Title block including subdivision name and phase and dated revision documentation.	N/A	
6.4	Future phases shown but cross-hatched as information only.	N/A	
6.5	Scale, not greater than 1-inch = 60 feet.	N/A	
6.6	North arrow.	N/A	
6.7	Index or legend key.	N/A	
6.8	Benchmarks (minimum of 2) used for site control (NAVD 88 vertical datum).	N/A	
6.9	Existing contours of entire site with contour interval of one foot.	N/A	
6.10	Proposed contours for channels, ponds, and other permanent stormwater management facilities, with contour interval of one foot.	N/A	
6.11	Spot elevations shown to the nearest tenth of a foot for critical locations, including lot and property boundaries.	N/A	
6.12	Proposed lot and street layout.	N/A	
6.13	Locations of underground storm drains.	N/A	
6.14	Overflow locations for storms exceeding storm drain capacity, with elevations.	N/A	
6.15	Top elevations of storm drains at all inlets, manholes, and flow line elevations for all outfalls.	N/A	
6.16	Locations of open ditches and lakes.	N/A	
6.17	Flow direction arrows.	N/A	
6.18	Proposed flow line elevations of all open ditches at maximum 100 foot intervals, and 100-year flood elevations thereon.	N/A	
6.19	Ponds: Location, bottom elevation, normal pool elevation, 100-year flood elevation, emergency overflow elevation.	N/A	
6.20	Proposed top-of-curb elevations at points where drainage will be required to flow over the curb.	N/A	
6.21	Platted minimum building opening elevation for each lot, in table form for all lots (excluding basement floor elevations).	N/A	
6.22	Standard foundation and elevation detail for slab on grade, full basement, view-out, partial view-out and/or walk-out construction.	N/A	
6.23	Top of foundation elevation for each lot.	N/A	
6.24	Notation for builders for each lot as to the type of structure that may be constructed and the view-out, walk-out or pad elevation, as applicable.	N/A	
6.25	Indicate that all lots are above the 100-year flood elevation.	N/A	
6.26	Indicate that grading around structures conforms to perimeter drainage requirements.	N/A	
6.27	Indicate that backyard drainage grading conforms to backyard drainage requirements.	N/A	
6.28	Adjacent subdivision lot lines, with lot labels and subdivision names.	N/A	
6.29	Boundaries and labels for all easements, rights-of-way and reserves.	N/A	
6.30	Statement on proposed final plat: "*A drainage plan has been developed for the subdivision and all drainage easements, rights-of-way, or reserves shall remain at the established grades and remain unobstructed to allow for the conveyance of stormwater.*"	N/A	
End of Checklist			

Table of Contents

General Information

Location

The subject property is in the City of Wichita, Sedgwick County, Kansas. The proposed development is located south of near 13th Street North and Maize Road. The site is bounded by 13th Street North to the south, Westgate Street to the west, and Westgate Village 2nd Addition to the north and east. The development has an area of approximately 1.6 acres. The site lies in the southeast ¼ of the southeast ¼ of the southeast ¼, Section 7, Township 27 South, Range 1 West of the 6th Prime Meridian. The site is shown on the USGS Quadrangle, Appendix A. The site is also shown on the Aerial Photograph, Appendix B.

Datum

The site is shown in NAVD 88 datum.

Soils

According to the NRCS (SCS) Sedgwick County Soil Survey, Appendix C, soils on the site are:

- Blanket silt loam, 0 to 1 percent slopes, HSG "C"

The Hydraulic Soil Group (HSG) used to select runoff coefficients onsite is "B".

The soils found in the drainage basin also include:

- Tabler silty clay loam, 0 to 1 percent slopes, HSG "D"

Composite curve numbers were calculated in basins containing both soil types.

Flood Insurance Rate Map (FIRM)

The site is shown on the FEMA FIRM Panels 20173C0330E effective February 2, 2007, Appendix D. The site is in Zone X (unshaded), areas outside of the of 0.2% annual chance flood.

Groundwater

According to the Kansas Geological Survey Water Well Completion Records (http://www.kgs.ku.edu/Magellan/WaterWell/index.html) the static water level of existing water wells in the vicinity is approximately 19-28 feet deep.

Hydrologic Analysis

The rainfall depths used for various design storms are shown in Table 1. The hydrologic analysis was completed using Hydraflow Hydrographs for AutoCAD 2009, Appendix E.

Table 1. Rainfall Depths (inches) for 24-Hour Design Storms.

Design Storm	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	500-Yr
Sedgwick County	2.8	3.5	4.5	5.2	6.1	6.9	7.8	9.4

The time of concentration for each drainage basin was calculated using the methods described in The City of Wichita/Sedgwick County Stormwater Manual dated March 16, 2011, Volume 2, Section 4.3.3. An excel spreadsheet was used to perform the calculations, Appendix F.

The curve numbers for each drainage basin were calculated using the methods described in The City of Wichita/Sedgwick County Stormwater Manual dated March 16, 2011, Volume 2, Section 4.3.3. An excel spreadsheet was used to perform the calculations, Appendix G.

Existing Development

Description

The site is currently platted, undeveloped land. The site was platted as Lot 2 of Westgate Village 2nd Addition. No existing improvements exist on site.

Land Use

The site is currently open space. There is no impervious area on site. The curve number used to represent the undeveloped site with no impervious area is 80.

Drainage Patterns

The eastern edge of the property is a high point with an elevation of approximately 1350. The site drains to the northwest and south east. The site is shown on he Existing Drainage Basins Exhibit, Appendix H.

Runoff from the offsite to the north, Basin A, drains into an existing channel that was constructed to alleviate flooding concerns in a residential development. Flow from a developed commercial property to the east, Basin B, flows onto the site near the northeast corner. Basin C is undeveloped ground from onsite that flows northwest into the existing channel. Commercial development east of the site flows onto the site near the southeast corner of the site, Basin D. A portion of the site flows directly to the west into the existing channel, Basin E. The flow from Basins A, B, C, D, and E combine to provide detention in the existing channel. Basin F includes Westgate Street that flows into 13th Street. Basin G flows from South of 13th Street to an existing SWS inlet along 13th Street. At this inlet, the drainage area of the site is 10% of the basin area. Basin time of concentrations, curve numbers, and areas are shown in Table 2.

Table 2. Existing Conditions Basin Characteristics.

Basin	Location	Area (ac)	Tc (min.)	CN
Basin A	Offsite to the north	6.1	29.4	88.1
Basin B	Offsite commercial to northeast	0.5	2.6	95.9
Basin C	Onsite north	0.5	16.5	80.0
Basin D	Offsite commercial to southeast	0.4	8.0	95.9
Basin E	Onsite south	1.2	10.0	80.0
Basin F	Offsite Westgate St.	2.8	24.4	90.6
Basin G	Offsite south of 13th St.	4.9	23.8	88.1

The channel flows into an existing 18” RCP with a flow line of 1343.9. The 18” RCP flows into a 15” RCP under Westgate Street. The control structure for the detention in the existing channel was modeled as a 15” RCP with a flow line of 1343.9. Runoff that flows to the northeast enters an existing channel that flows from north to south along the west edge of the property. The runoff that flows to the southeast flows to the channel along the west property line. The top of the channel bank is at an elevation of approximately 1347. The channel drains to an 18” RCP stormwater sewer system with a flow line of 1343.9. When the ponding builds up to an elevation of 1346.9, the storm water runoff overtops the curb and flows into Westgate Street. Overtopping occurs in a 10-year or greater design storm. The peak runoff flow rates are included, Table 3.

Table 3. Peak flow rates (cfs) for Existing Conditions.

Design Storm	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Onsite Basin C	0.7	1.0	1.6	2.0	2.6	3.0	3.4
Onsite Basin E	2.1	3.1	4.8	5.9	7.7	8.9	10.2
To Channel	11.0	15.3	22.3	26.9	33.9	39.2	43.8
To SWS System	6.7	7.6	8.9	9.2	9.3	9.4	9.5
To Westgate Street	0.0	0.0	0.0	6.9	13.1	17.9	22.3
To 10% Point	20.0	25.3	33.7	39.2	55.5	66.2	75.9

Table 4. Existing Channel Details.

Design Storm	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Flow In (cfs)	11.0	15.3	22.3	26.9	33.9	39.2	43.8
Flow Out to SWS (cfs)	6.7	7.6	8.9	9.2	9.3	9.4	9.5
Flow Out to Westgate (cfs)	0.0	0.0	0.0	6.9	13.1	17.9	22.3
Water Surface Elev. (ft)	1346.1	1346.4	1346.9	1347.0	1347.1	1347.1	1347.2
Storage (ac-ft)	0.24	0.38	0.62	0.68	0.78	0.86	0.91
Primary Outlet	15" RCP at 1343.9						
Secondary Outlet	Overtopping embankment/curb approx. 70' wide at 1346.9						

Utilities

Sanitary Sewer

An existing 12" sanitary sewer line flows from east to west along the south side of the property, Appendix I.

Water

A 12" asbestos concrete water line runs through the right-of-way along 13th Street North. An 8" asbestos concrete water line runs along the west side of Westgate Street, Appendix I.

Storm Water

The site drains into an existing 18" stormwater sewer system that flows to the southwest into a system along 13th Street North, Appendix I. The system flows to the west.

Other Utilities

There is existing gas along the south side of the site, Appendix I. Underground telephone runs along the south and west sides of the property. Existing overhead electric is located in the right-of-way along 13th Street North.

Proposed Development

Description

The proposed site will develop as a single commercial lot. The lot will have one commercial building and parking. A detention pond will be located along the north property line. The site is shown on the plat, Appendix J.

Land Use

The land use for the proposed site will be approximately 98 percent impervious for the commercial development. A curve number for the residential and commercial is 95.9 to represent 85% impervious commercial development.

Drainage Patterns

The proposed site will continue to flow into the existing drainage ditch. The ditch will be expanded to a dry detention pond along the north property line of the site. Along the west side of the site the drainage ditch will be widened to provide additional detention. Vertical retaining walls will be constructed along the north edge of the parking lot and the west side of the building to provide the storage volume.

Drainage Basins A, B, D, F, and G will continue to drain as they do under existing conditions, Appendix K. Basins C and E onsite have been modified to reflect the drainage patterns of the proposed site plan, time of concentration has been decreased, and curve numbers have been increased. A summary of the drainage basin characteristics is included, Table 5. Peak flow rates for the proposed basins is included, Table 6.

Basins A, B, C, D, E, and F will drain into the channel/pond. The channel/pond will provide detention for the site without increasing the peak water surface elevation upstream or the peak flow rate downstream, Table 7. The pond and channel will be controlled by the existing 15" RCP under Westgate. The pipe will be extended to the north side of the proposed driveway. A comparison of the flow rates to the 15" RCP is included, Table 8. Percolation tests are being conducted at the location of the proposed pond. The pond will be constructed with a soakage trench and will allow the pond to drain. Due to the flat slopes, a proposed trickle channel will be constructed in the existing channel along Westgate Street to reduce maintenance. The flow into Westgate Street will increase from 0.0 cfs to 0.4 cfs in the 5-year design event, but flow rates in larger events are less than pre-project conditions. A comparison of the flows to Westgate is included, Table 9.

Flow rom offsite basins B and D will be sheet flow to the channel/pond.

Table 5. Proposed Conditions Drainage Basins.

Basin	Location	Area (ac)	Tc (min.)	CN
Basin A	Offsite to the north	6.1	29.4	88.1
Basin B	Offsite commercial to northeast	0.5	2.6	95.9
Basin C	Onsite north	0.6	2.2	95.9
Basin D	Offsite commercial to southeast	0.4	8.0	95.9
Basin E	Onsite south	1.1	2.0	95.9
Basin F	Offsite Westgate St.	2.8	24.4	90.6
Basin G	Offsite south of 13th St.	4.9	23.8	88.1

Table 6. Peak flow rates (cfs) for Proposed Conditions.

Design Storm	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Onsite Basin C	2.4	3.1	4.1	4.7	5.7	6.4	7.0
Onsite Basin E	4.4	5.6	7.4	8.6	10.4	11.8	12.9
To Channel/Pond	14.4	18.8	25.8	30.4	37.4	42.6	47.2
To SWS System	1.3	2.3	5.2	5.7	6.0	6.2	6.3
To Westgate Street	0.0	0.0	0.4	5.3	10.9	15.3	19.2
To 10% Point	13.5	18.9	28.0	34.9	49.2	59.4	68.6

Table 7. Proposed Channel/Pond Details.

Design Storm	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Flow In (cfs)	14.4	118.8	25.8	30.4	37.4	42.6	47.2
Flow Out to SWS (cfs)	1.3	2.3	5.2	5.7	6.0	6.2	6.3
Flow Out to Westgate (cfs)	0.0	0.0	0.4	5.3	10.9	15.3	19.2
Water Surface Elev. (ft)	1346.1	1346.4	1346.9	1347.0	1347.1	1347.2	1347.2
Storage (ac-ft)	0.76	0.98	1.28	1.40	1.58	1.70	1.79
Primary Outlet	15" RCP at 1345.1						
Secondary Outlet	Overtopping embankment/curb approx. 40' wide at 1346.9						

Table 8. Flow to SWS Comparison.

Design Storm	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Existing	6.7	7.6	8.9	9.2	9.3	9.4	9.5
Proposed	1.3	2.3	5.2	5.7	6.0	6.2	6.3
Change	-5.4	-5.3	-3.7	-3.5	-3.3	-3.2	-3.2

Table 9. Flow to Westgate Street Comparison.

Design Storm	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Existing	0.0	0.0	0.0	6.9	13.1	17.9	22.3
Proposed	0.0	0.0	0.4	5.3	10.9	15.3	19.2
Change	0.0	0.0	0.4	-1.6	-2.2	-2.6	-3.1

Downstream Peak Discharge Assessment (10% Rule)

The area of the site is 1.6 acres. An inlet just downstream of the site in 13th Street North has a drainage area of 16.4 acres. The site is less than 10% of the total drainage basin at that point. The runoff to the 10% point has been calculated under existing and proposed conditions, Table 10. Due to the proposed detention, the peak flow rates to the 10% point have not increased with the proposed development.

Table 10. Downstream Peak Discharge comparison.

Design Storm	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Existing	20.0	25.3	33.7	39.2	55.5	66.2	75.9
Proposed	13.5	18.9	28.0	34.9	49.2	59.4	68.6

Water Quality

The volume required for water quality is 0.14 acre-feet. The water quality volume for the site is based on 1.7 acres of the site 85% impervious. Water quality volume for this site was calculated using an Excel Spreadsheet, Appendix L. The water quality volume will be provided in the proposed detention facility. A soakage trench will be provided in the detention pond and will remove 90% of the total suspended solids. Percolation testing is being done to determine if a soakage trench will be feasible. If a soakage trench is not possible, a proprietary device may be used.

Channel Protection

The site is less than five acres of drainage area; therefore downstream channel protection volume is not required.

Utilities

Sanitary Sewer

The site has access to the existing 12" sanitary sewer service along the south side of the property.

Water

The site has access to the existing 12" water line along the south side of the property.

Stormwater Sewer

Stormwater Sewer will be designed as shown on the Drainage and Utility Plan, Appendix I. The existing storm water sewer will be extended under the proposed driveway. A second culvert will be constructed under the northern driveway.

Other Utilities

Easements are provided for electric, telephone, cable, and other utilities.

Lot Grading Plan

Lot grading will be determined at the time of site design. The lot will match exiting grades and improvements around the perimeter, Appendix M.

Permits

U.S. Army Corps of Engineers

The project is not affecting any jurisdictional waters of the U.S. or any wetlands. Permitting through the U.S. Army Corps of Engineers will not be required.

Kansas Department of Agriculture Division of Water Resources

The drainage area of the basin that flows through the project is less than 640 acres; therefore Water Structures permit will not be required.

FEMA

The proposed project does not impact FEMA floodplains. FEMA applications will not be required.

Kansas Department of Health and Environment

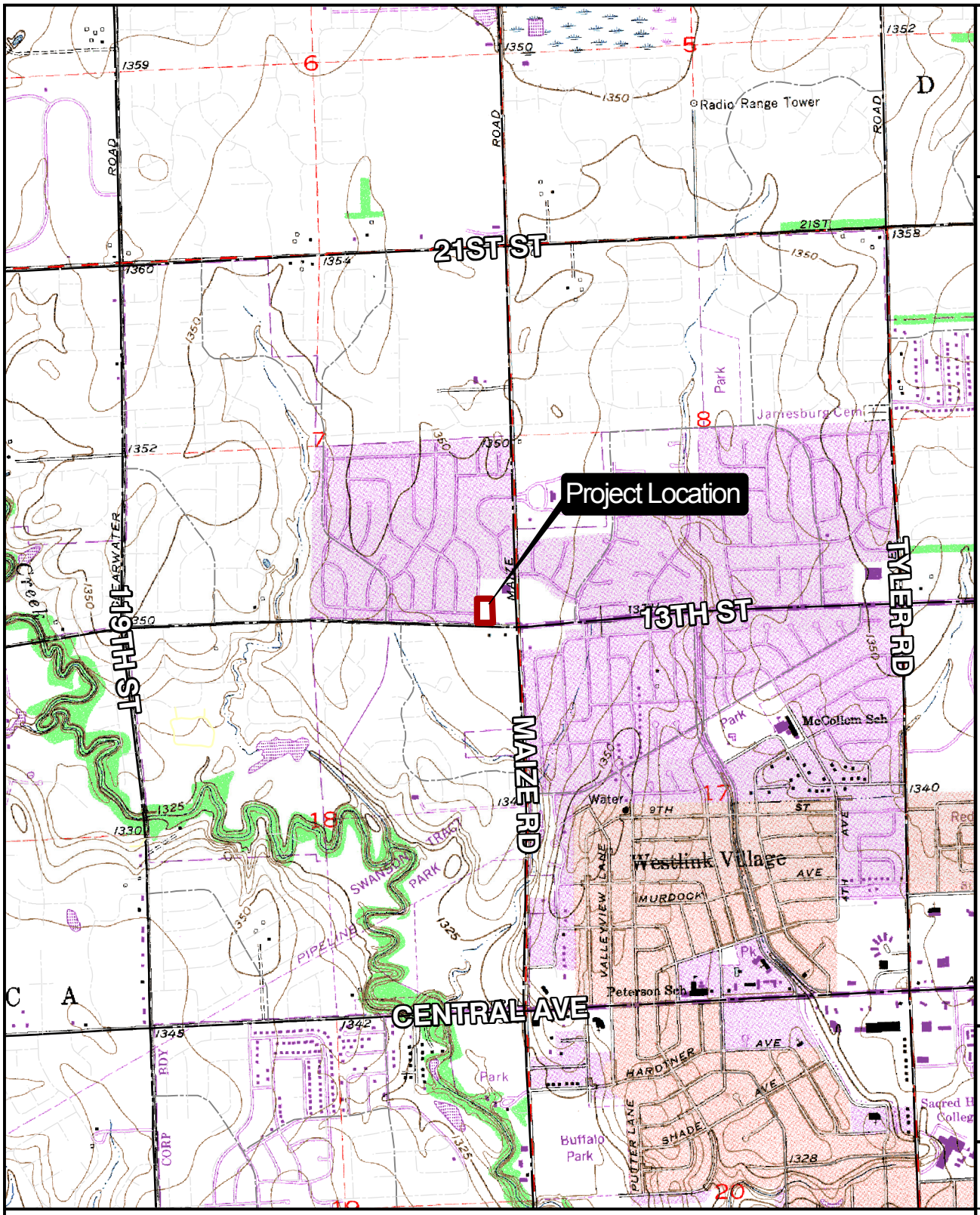
A Notice of Intent (NOI) will be filed with KDHE for coverage under NPDES. A Storm Water Pollution Prevention plan will be prepared and will include the NOI.

Summary

The proposed Westgate Village Third Addition will develop as one commercial lot. The site will continue to drain to the west into the drainage channel. The channel will be expanded and a proposed pond will be constructed on site to provide detention for the development. The existing stormwater sewer system under 13th Street will continue to serve as the control structure for the proposed pond. A soakage trench will be constructed in the pond to obtain the water quality requirement and drain the flat slopes that are proposed. A concrete trickle channel will be constructed in the existing channel due to the flat slopes.

Peak flow rates to the existing stormwater sewer system have decreased with the proposed development. Flow rates to the 10% point have also decreased with the proposed development. The channel/pond does not overtop into Westgate Street during the 1 and 2 year design storms under both existing and proposed conditions. The peak flow rate to Westgate Street has increased form 0.0 cfs to 0.4 cfs in the 5-year design event. The peak flow rate to Westgate Street has decreased in the 10, 50, and 100-year design events.

Appendix A - USGS Quadrangle Map



N

W E

S

1 0.5 0 1 Miles

1,000 500 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 Feet

1 0.5 0 1 Kilometers

MKEC

Wichita, KS · 316.684.9600

USGS QUAD EXHIBIT

WESTGATE VILLAGE THIRD ADDITION

SEC: 7
TWP: T27S
RNG: R1W

PROJECT NO.	1401010187
DATE	5/14/2014
SCALE	1"=2000'

DESIGNED	DRAWN	CHECKED
MKEC	MKEC	MKEC

NO.	REVISION	DATE

SHEET NO.

1 OF 1

Path: J:\Projects\2014\1401010187_EquityVentures Commercial Dev\11-Project Management\05 Civil Docs\Reports\Drainage Report\Individual Files\USGS Quad Exhibit.mxd - Date: 5/14/2014

Appendix B - Aerial Photograph

SEC: 7
TWP: T27S
RNG: R1W

0 25 50 100
Feet

MKEC
Wichita, KS · 316.684.9600

AERIAL EXHIBIT

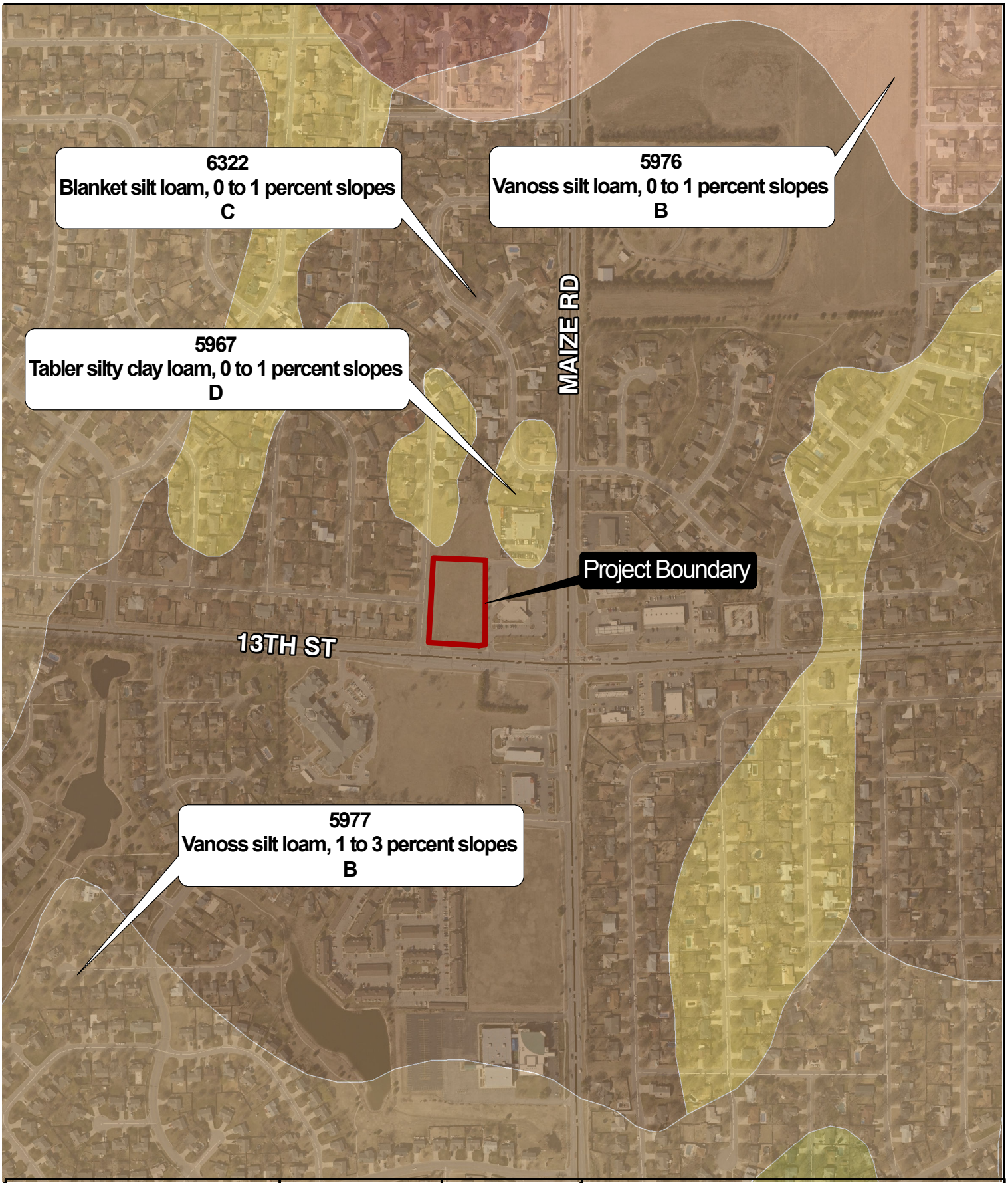
WESTGATE VILLAGE THIRD ADDITION

PROJECT NO.	DATE:	SHEET NO.
1401010187	5/14/2014	1 OF 1

DRAWN BY:	DESIGNED BY:	APPROVED BY:
JGD	JGD	KLA

Path: J:\Projects\2014\1401010187_EquityVentures Commercial Dev\05-Civil\GIS\Aerial Exhibit.mxd - Date: 5/14/2014

Appendix C - Soil Survey



SEC: 7
TWP: T27S
RNG: R1W

0 125 250 500
Feet

MKEC
Wichita, KS · 316.684.9600

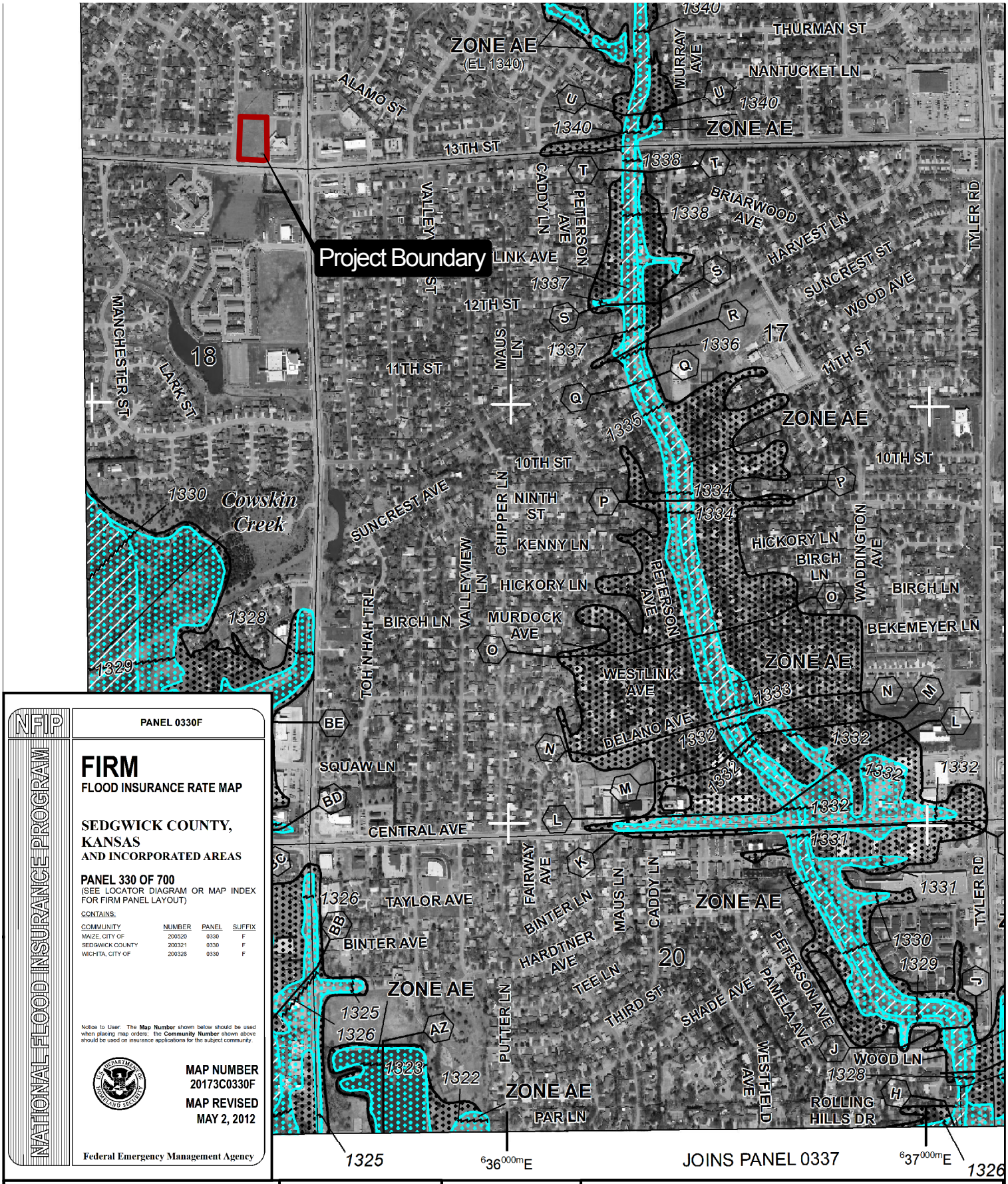
NRCS Soil Survey Exhibit
WESTGATE VILLAGE THIRD ADDITION

PROJECT NO.	DATE:	SHEET NO.
1401010187	5/14/2014	1 OF 1

DRAWN BY:	DESIGNED BY:	APPROVED BY:
JGD	JGD	KLA

Path: J:\Projects\2014\1401010187_EquityVentures Commercial Dev\05-Civil\GIS\NRCS Soil Survey Exhibit.mxd - Date: 5/14/2014

Appendix D - Flood Insurance Rate Map (FIRM)



NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0330F

FIRM

FLOOD INSURANCE RATE MAP

SEDGWICK COUNTY, KANSAS
AND INCORPORATED AREAS

PANEL 330 OF 700
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MAIZE, CITY OF	200520	0330	F
SEDGWICK COUNTY	200321	0330	F
WICHITA, CITY OF	200328	0330	F

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
20173C0330F
MAP REVISED
MAY 2, 2012

Federal Emergency Management Agency

SEC: 7
TWP: T27S
RNG: R1W

0 250 500 1,000
Feet

MKEC
Wichita, KS · 316.684.9600

FEMA FIRM EXHIBIT
WESTGATE VILLAGE THIRD ADDITION

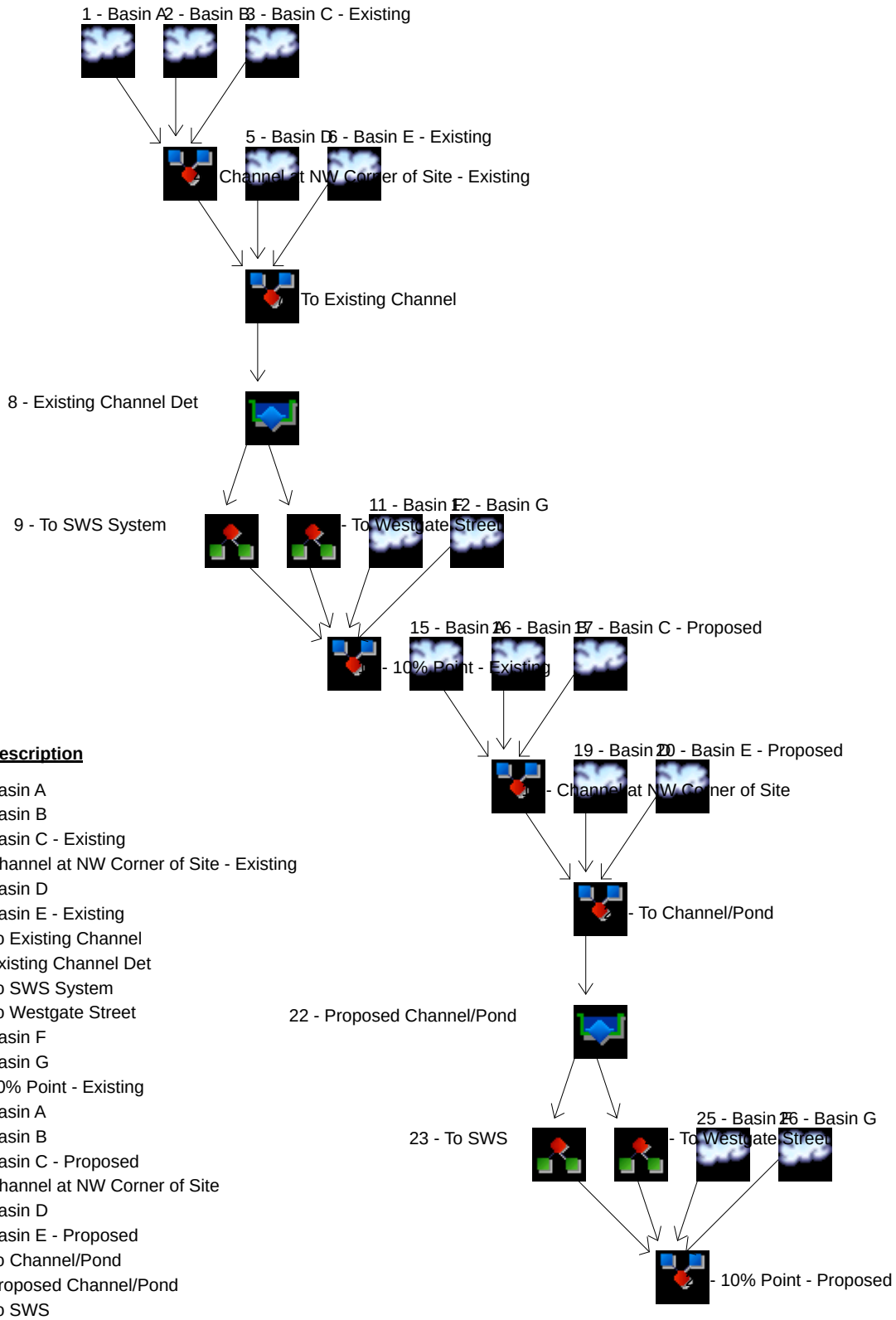
PROJECT NO. 1401010187	DATE: 5/14/2014	SHEET NO.
DRAWN BY: JGD	DESIGNED BY: JGD	APPROVED BY: KLA	1 OF 1

Path: J:\Projects\2014\1401010187_EquityVentures Commercial Dev\05-Civil\GIS\FEMA Floodplain.mxd - Date: 5/14/2014

Appendix E – Hydraflow Hydrographs

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066



Legend

Hyd.	Origin	Description
1	SCS Runoff	Basin A
2	SCS Runoff	Basin B
3	SCS Runoff	Basin C - Existing
4	Combine	Channel at NW Corner of Site - Existing
5	SCS Runoff	Basin D
6	SCS Runoff	Basin E - Existing
7	Combine	To Existing Channel
8	Reservoir	Existing Channel Det
9	Diversion1	To SWS System
10	Diversion2	To Westgate Street
11	SCS Runoff	Basin F
12	SCS Runoff	Basin G
13	Combine	10% Point - Existing
15	SCS Runoff	Basin A
16	SCS Runoff	Basin B
17	SCS Runoff	Basin C - Proposed
18	Combine	Channel at NW Corner of Site
19	SCS Runoff	Basin D
20	SCS Runoff	Basin E - Proposed
21	Combine	To Channel/Pond
22	Reservoir	Proposed Channel/Pond
23	Diversion1	To SWS
24	Diversion2	To Westgate Street
25	SCS Runoff	Basin F
26	SCS Runoff	Basin G
27	Combine	10% Point - Proposed

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	------	9.151	12.50	-------	17.84	21.34	26.58	30.56	34.03	Basin A
2	SCS Runoff	------	2.018	2.549	-------	3.380	3.920	4.728	5.342	5.879	Basin B
3	SCS Runoff	------	0.698	1.041	-------	1.614	2.001	2.591	3.044	3.442	Basin C - Existing
4	Combine	1, 2, 3	9.840	13.48	-------	19.31	23.13	28.86	33.22	37.02	Channel at NW Corner of Site - Existi
5	SCS Runoff	------	1.430	1.809	-------	2.400	2.785	3.360	3.797	4.179	Basin D
6	SCS Runoff	------	2.117	3.119	-------	4.806	5.943	7.669	8.993	10.15	Basin E - Existing
7	Combine	4, 5, 6	11.01	15.30	-------	22.27	26.89	33.86	39.17	43.82	To Existing Channel
8	Reservoir	7	6.754	7.613	-------	8.924	16.08	22.40	27.31	31.84	Existing Channel Det
9	Diversion1	8	6.754	7.613	-------	8.924	9.196	9.336	9.436	9.512	To SWS System
10	Diversion2	8	0.000	0.000	-------	0.000	6.885	13.06	17.87	22.33	To Westgate Street
11	SCS Runoff	------	5.262	7.001	-------	9.738	11.52	14.19	16.21	17.97	Basin F
12	SCS Runoff	------	8.246	11.25	-------	16.04	19.17	23.87	27.43	30.54	Basin G
13	Combine	9, 10, 11, 12	19.95	25.28	-------	33.73	39.24	55.52	66.18	75.86	10% Point - Existing
15	SCS Runoff	------	9.151	12.50	-------	17.84	21.34	26.58	30.56	34.03	Basin A
16	SCS Runoff	------	2.018	2.549	-------	3.380	3.920	4.728	5.342	5.879	Basin B
17	SCS Runoff	------	2.421	3.059	-------	4.056	4.705	5.674	6.411	7.054	Basin C - Proposed
18	Combine	15, 16, 17	9.618	13.09	-------	18.61	22.24	27.66	31.78	35.38	Channel at NW Corner of Site
19	SCS Runoff	------	1.430	1.809	-------	2.400	2.785	3.360	3.797	4.179	Basin D
20	SCS Runoff	------	4.439	5.609	-------	7.436	8.625	10.40	11.75	12.93	Basin E - Proposed
21	Combine	18, 19, 20	14.38	18.81	-------	25.83	30.44	37.35	42.60	47.19	To Channel/Pond
22	Reservoir	21	1.256	2.252	-------	5.653	11.03	16.93	21.55	25.57	Proposed Channel/Pond
23	Diversion1	22	1.256	2.252	-------	5.208	5.697	6.025	6.230	6.389	To SWS
24	Diversion2	22	0.000	0.000	-------	0.444	5.329	10.91	15.32	19.18	To Westgate Street
25	SCS Runoff	------	5.262	7.001	-------	9.738	11.52	14.19	16.21	17.97	Basin F
26	SCS Runoff	------	8.246	11.25	-------	16.04	19.17	23.87	27.43	30.54	Basin G
27	Combine	23, 24, 25, 26	13.51	18.90	-------	28.03	34.92	49.17	59.40	68.60	10% Point - Proposed

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description
1	SCS Runoff	9.151	1	731	0.838	------	------	------	Basin A
2	SCS Runoff	2.018	1	715	0.092	------	------	------	Basin B
3	SCS Runoff	0.698	1	724	0.046	------	------	------	Basin C - Existing
4	Combine	9.840	1	731	0.976	1, 2, 3	------	------	Channel at NW Corner of Site - Existi
5	SCS Runoff	1.430	1	718	0.076	------	------	------	Basin D
6	SCS Runoff	2.117	1	720	0.110	------	------	------	Basin E - Existing
7	Combine	11.01	1	720	1.163	4, 5, 6	------	------	To Existing Channel
8	Reservoir	6.754	1	743	0.931	7	1346.13	0.238	Existing Channel Det
9	Diversion1	6.754	1	743	0.931	8	------	------	To SWS System
10	Diversion2	0.000	1	824	0.000	8	------	------	To Westgate Street
11	SCS Runoff	5.262	1	728	0.432	------	------	------	Basin F
12	SCS Runoff	8.246	1	728	0.673	------	------	------	Basin G
13	Combine	19.95	1	728	2.036	9, 10, 11, 12	------	------	10% Point - Existing
15	SCS Runoff	9.151	1	731	0.838	------	------	------	Basin A
16	SCS Runoff	2.018	1	715	0.092	------	------	------	Basin B
17	SCS Runoff	2.421	1	715	0.110	------	------	------	Basin C - Proposed
18	Combine	9.618	1	731	1.040	15, 16, 17	------	------	Channel at NW Corner of Site
19	SCS Runoff	1.430	1	718	0.076	------	------	------	Basin D
20	SCS Runoff	4.439	1	715	0.202	------	------	------	Basin E - Proposed
21	Combine	14.38	1	716	1.318	18, 19, 20	------	------	To Channel/Pond
22	Reservoir	1.256	1	771	0.236	21	1346.05	0.760	Proposed Channel/Pond
23	Diversion1	1.256	1	771	0.236	22	------	------	To SWS
24	Diversion2	0.000	1	928	0.000	22	------	------	To Westgate Street
25	SCS Runoff	5.262	1	728	0.432	------	------	------	Basin F
26	SCS Runoff	8.246	1	728	0.673	------	------	------	Basin G
27	Combine	13.51	1	728	1.341	23, 24, 25, 26	------	------	10% Point - Proposed

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description
1	SCS Runoff	12.50	1	731	1.148	------	------	------	Basin A
2	SCS Runoff	2.549	1	715	0.118	------	------	------	Basin B
3	SCS Runoff	1.041	1	723	0.068	------	------	------	Basin C - Existing
4	Combine	13.48	1	730	1.335	1, 2, 3	------	------	Channel at NW Corner of Site - Existi
5	SCS Runoff	1.809	1	718	0.098	------	------	------	Basin D
6	SCS Runoff	3.119	1	719	0.162	------	------	------	Basin E - Existing
7	Combine	15.30	1	720	1.595	4, 5, 6	------	------	To Existing Channel
8	Reservoir	7.613	1	746	1.320	7	1346.41	0.375	Existing Channel Det
9	Diversion1	7.613	1	746	1.320	8	------	------	To SWS System
10	Diversion2	0.000	1	850	0.000	8	------	------	To Westgate Street
11	SCS Runoff	7.001	1	728	0.580	------	------	------	Basin F
12	SCS Runoff	11.25	1	728	0.922	------	------	------	Basin G
13	Combine	25.28	1	728	2.822	9, 10, 11, 12	------	------	10% Point - Existing
15	SCS Runoff	12.50	1	731	1.148	------	------	------	Basin A
16	SCS Runoff	2.549	1	715	0.118	------	------	------	Basin B
17	SCS Runoff	3.059	1	715	0.141	------	------	------	Basin C - Proposed
18	Combine	13.09	1	731	1.407	15, 16, 17	------	------	Channel at NW Corner of Site
19	SCS Runoff	1.809	1	718	0.098	------	------	------	Basin D
20	SCS Runoff	5.609	1	715	0.259	------	------	------	Basin E - Proposed
21	Combine	18.81	1	716	1.765	18, 19, 20	------	------	To Channel/Pond
22	Reservoir	2.252	1	760	0.525	21	1346.42	0.981	Proposed Channel/Pond
23	Diversion1	2.252	1	760	0.525	22	------	------	To SWS
24	Diversion2	0.000	1	943	0.000	22	------	------	To Westgate Street
25	SCS Runoff	7.001	1	728	0.580	------	------	------	Basin F
26	SCS Runoff	11.25	1	728	0.922	------	------	------	Basin G
27	Combine	18.90	1	729	2.027	23, 24, 25, 26	------	------	10% Point - Proposed

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description
1	SCS Runoff	17.84	1	731	1.654	------	------	------	Basin A
2	SCS Runoff	3.380	1	715	0.159	------	------	------	Basin B
3	SCS Runoff	1.614	1	723	0.106	------	------	------	Basin C - Existing
4	Combine	19.31	1	730	1.918	1, 2, 3	------	------	Channel at NW Corner of Site - Existi
5	SCS Runoff	2.400	1	718	0.132	------	------	------	Basin D
6	SCS Runoff	4.806	1	719	0.250	------	------	------	Basin E - Existing
7	Combine	22.27	1	720	2.301	4, 5, 6	------	------	To Existing Channel
8	Reservoir	8.924	1	748	1.940	7	1346.90	0.616	Existing Channel Det
9	Diversion1	8.924	1	748	1.940	8	------	------	To SWS System
10	Diversion2	0.000	1	688	0.000	8	------	------	To Westgate Street
11	SCS Runoff	9.738	1	728	0.818	------	------	------	Basin F
12	SCS Runoff	16.04	1	728	1.328	------	------	------	Basin G
13	Combine	33.73	1	728	4.086	9, 10, 11, 12	------	------	10% Point - Existing
15	SCS Runoff	17.84	1	731	1.654	------	------	------	Basin A
16	SCS Runoff	3.380	1	715	0.159	------	------	------	Basin B
17	SCS Runoff	4.056	1	715	0.191	------	------	------	Basin C - Proposed
18	Combine	18.61	1	731	2.004	15, 16, 17	------	------	Channel at NW Corner of Site
19	SCS Runoff	2.400	1	718	0.132	------	------	------	Basin D
20	SCS Runoff	7.436	1	715	0.350	------	------	------	Basin E - Proposed
21	Combine	25.83	1	716	2.486	18, 19, 20	------	------	To Channel/Pond
22	Reservoir	5.653	1	754	1.048	21	1346.91	1.28	Proposed Channel/Pond
23	Diversion1	5.208	1	754	1.044	22	------	------	To SWS
24	Diversion2	0.444	1	754	0.004	22	------	------	To Westgate Street
25	SCS Runoff	9.738	1	728	0.818	------	------	------	Basin F
26	SCS Runoff	16.04	1	728	1.328	------	------	------	Basin G
27	Combine	28.03	1	729	3.194	23, 24, 25, 26	------	------	10% Point - Proposed

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description
1	SCS Runoff	21.34	1	731	1.991	------	------	------	Basin A
2	SCS Runoff	3.920	1	715	0.186	------	------	------	Basin B
3	SCS Runoff	2.001	1	723	0.131	------	------	------	Basin C - Existing
4	Combine	23.13	1	730	2.309	1, 2, 3	------	------	Channel at NW Corner of Site - Existi
5	SCS Runoff	2.785	1	718	0.155	------	------	------	Basin D
6	SCS Runoff	5.943	1	719	0.311	------	------	------	Basin E - Existing
7	Combine	26.89	1	720	2.775	4, 5, 6	------	------	To Existing Channel
8	Reservoir	16.08	1	741	2.384	7	1347.01	0.684	Existing Channel Det
9	Diversion1	9.196	1	741	2.222	8	------	------	To SWS System
10	Diversion2	6.885	1	741	0.162	8	------	------	To Westgate Street
11	SCS Runoff	11.52	1	728	0.976	------	------	------	Basin F
12	SCS Runoff	19.17	1	728	1.600	------	------	------	Basin G
13	Combine	39.24	1	728	4.960	9, 10, 11, 12	------	------	10% Point - Existing
15	SCS Runoff	21.34	1	731	1.991	------	------	------	Basin A
16	SCS Runoff	3.920	1	715	0.186	------	------	------	Basin B
17	SCS Runoff	4.705	1	715	0.224	------	------	------	Basin C - Proposed
18	Combine	22.24	1	731	2.401	15, 16, 17	------	------	Channel at NW Corner of Site
19	SCS Runoff	2.785	1	718	0.155	------	------	------	Basin D
20	SCS Runoff	8.625	1	715	0.410	------	------	------	Basin E - Proposed
21	Combine	30.44	1	716	2.966	18, 19, 20	------	------	To Channel/Pond
22	Reservoir	11.03	1	747	1.444	21	1347.03	1.40	Proposed Channel/Pond
23	Diversion1	5.697	1	747	1.257	22	------	------	To SWS
24	Diversion2	5.329	1	747	0.186	22	------	------	To Westgate Street
25	SCS Runoff	11.52	1	728	0.976	------	------	------	Basin F
26	SCS Runoff	19.17	1	728	1.600	------	------	------	Basin G
27	Combine	34.92	1	728	4.019	23, 24, 25, 26	------	------	10% Point - Proposed

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description
1	SCS Runoff	26.58	1	731	2.504	------	------	------	Basin A
2	SCS Runoff	4.728	1	715	0.227	------	------	------	Basin B
3	SCS Runoff	2.591	1	723	0.171	------	------	------	Basin C - Existing
4	Combine	28.86	1	730	2.902	1, 2, 3	------	------	Channel at NW Corner of Site - Existi
5	SCS Runoff	3.360	1	718	0.189	------	------	------	Basin D
6	SCS Runoff	7.669	1	719	0.405	------	------	------	Basin E - Existing
7	Combine	33.86	1	720	3.497	4, 5, 6	------	------	To Existing Channel
8	Reservoir	22.40	1	739	3.069	7	1347.07	0.783	Existing Channel Det
9	Diversion1	9.336	1	739	2.620	8	------	------	To SWS System
10	Diversion2	13.06	1	739	0.449	8	------	------	To Westgate Street
11	SCS Runoff	14.19	1	727	1.215	------	------	------	Basin F
12	SCS Runoff	23.87	1	728	2.012	------	------	------	Basin G
13	Combine	55.52	1	730	6.295	9, 10, 11, 12	------	------	10% Point - Existing
15	SCS Runoff	26.58	1	731	2.504	------	------	------	Basin A
16	SCS Runoff	4.728	1	715	0.227	------	------	------	Basin B
17	SCS Runoff	5.674	1	715	0.273	------	------	------	Basin C - Proposed
18	Combine	27.66	1	731	3.004	15, 16, 17	------	------	Channel at NW Corner of Site
19	SCS Runoff	3.360	1	718	0.189	------	------	------	Basin D
20	SCS Runoff	10.40	1	715	0.500	------	------	------	Basin E - Proposed
21	Combine	37.35	1	716	3.693	18, 19, 20	------	------	To Channel/Pond
22	Reservoir	16.93	1	744	2.062	21	1347.12	1.58	Proposed Channel/Pond
23	Diversion1	6.025	1	744	1.530	22	------	------	To SWS
24	Diversion2	10.91	1	744	0.532	22	------	------	To Westgate Street
25	SCS Runoff	14.19	1	727	1.215	------	------	------	Basin F
26	SCS Runoff	23.87	1	728	2.012	------	------	------	Basin G
27	Combine	49.17	1	729	5.288	23, 24, 25, 26	------	------	10% Point - Proposed

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description
1	SCS Runoff	30.56	1	731	2.899	------	------	------	Basin A
2	SCS Runoff	5.342	1	715	0.258	------	------	------	Basin B
3	SCS Runoff	3.044	1	723	0.202	------	------	------	Basin C - Existing
4	Combine	33.22	1	730	3.359	1, 2, 3	------	------	Channel at NW Corner of Site - Existi
5	SCS Runoff	3.797	1	718	0.215	------	------	------	Basin D
6	SCS Runoff	8.993	1	719	0.479	------	------	------	Basin E - Existing
7	Combine	39.17	1	720	4.052	4, 5, 6	------	------	To Existing Channel
8	Reservoir	27.31	1	737	3.599	7	1347.11	0.855	Existing Channel Det
9	Diversion1	9.436	1	737	2.915	8	------	------	To SWS System
10	Diversion2	17.87	1	737	0.684	8	------	------	To Westgate Street
11	SCS Runoff	16.21	1	727	1.398	------	------	------	Basin F
12	SCS Runoff	27.43	1	728	2.328	------	------	------	Basin G
13	Combine	66.18	1	730	7.325	9, 10, 11, 12	------	------	10% Point - Existing
15	SCS Runoff	30.56	1	731	2.899	------	------	------	Basin A
16	SCS Runoff	5.342	1	715	0.258	------	------	------	Basin B
17	SCS Runoff	6.411	1	715	0.310	------	------	------	Basin C - Proposed
18	Combine	31.78	1	730	3.467	15, 16, 17	------	------	Channel at NW Corner of Site
19	SCS Runoff	3.797	1	718	0.215	------	------	------	Basin D
20	SCS Runoff	11.75	1	715	0.568	------	------	------	Basin E - Proposed
21	Combine	42.60	1	716	4.250	18, 19, 20	------	------	To Channel/Pond
22	Reservoir	21.55	1	742	2.541	21	1347.18	1.70	Proposed Channel/Pond
23	Diversion1	6.230	1	742	1.713	22	------	------	To SWS
24	Diversion2	15.32	1	742	0.828	22	------	------	To Westgate Street
25	SCS Runoff	16.21	1	727	1.398	------	------	------	Basin F
26	SCS Runoff	27.43	1	728	2.328	------	------	------	Basin G
27	Combine	59.40	1	729	6.267	23, 24, 25, 26	------	------	10% Point - Proposed

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description
1	SCS Runoff	34.03	1	731	3.245	------	------	------	Basin A
2	SCS Runoff	5.879	1	715	0.286	------	------	------	Basin B
3	SCS Runoff	3.442	1	723	0.229	------	------	------	Basin C - Existing
4	Combine	37.02	1	730	3.760	1, 2, 3	------	------	Channel at NW Corner of Site - Existi
5	SCS Runoff	4.179	1	718	0.238	------	------	------	Basin D
6	SCS Runoff	10.15	1	719	0.544	------	------	------	Basin E - Existing
7	Combine	43.82	1	720	4.542	4, 5, 6	------	------	To Existing Channel
8	Reservoir	31.84	1	736	4.068	7	1347.15	0.910	Existing Channel Det
9	Diversion1	9.512	1	736	3.168	8	------	------	To SWS System
10	Diversion2	22.33	1	736	0.899	8	------	------	To Westgate Street
11	SCS Runoff	17.97	1	727	1.559	------	------	------	Basin F
12	SCS Runoff	30.54	1	727	2.607	------	------	------	Basin G
13	Combine	75.86	1	730	8.233	9, 10, 11, 12	------	------	10% Point - Existing
15	SCS Runoff	34.03	1	731	3.245	------	------	------	Basin A
16	SCS Runoff	5.879	1	715	0.286	------	------	------	Basin B
17	SCS Runoff	7.054	1	715	0.343	------	------	------	Basin C - Proposed
18	Combine	35.38	1	730	3.874	15, 16, 17	------	------	Channel at NW Corner of Site
19	SCS Runoff	4.179	1	718	0.238	------	------	------	Basin D
20	SCS Runoff	12.93	1	715	0.628	------	------	------	Basin E - Proposed
21	Combine	47.19	1	716	4.739	18, 19, 20	------	------	To Channel/Pond
22	Reservoir	25.57	1	740	2.963	21	1347.22	1.79	Proposed Channel/Pond
23	Diversion1	6.389	1	740	1.870	22	------	------	To SWS
24	Diversion2	19.18	1	740	1.093	22	------	------	To Westgate Street
25	SCS Runoff	17.97	1	727	1.559	------	------	------	Basin F
26	SCS Runoff	30.54	1	727	2.607	------	------	------	Basin G
27	Combine	68.60	1	729	7.128	23, 24, 25, 26	------	------	10% Point - Proposed

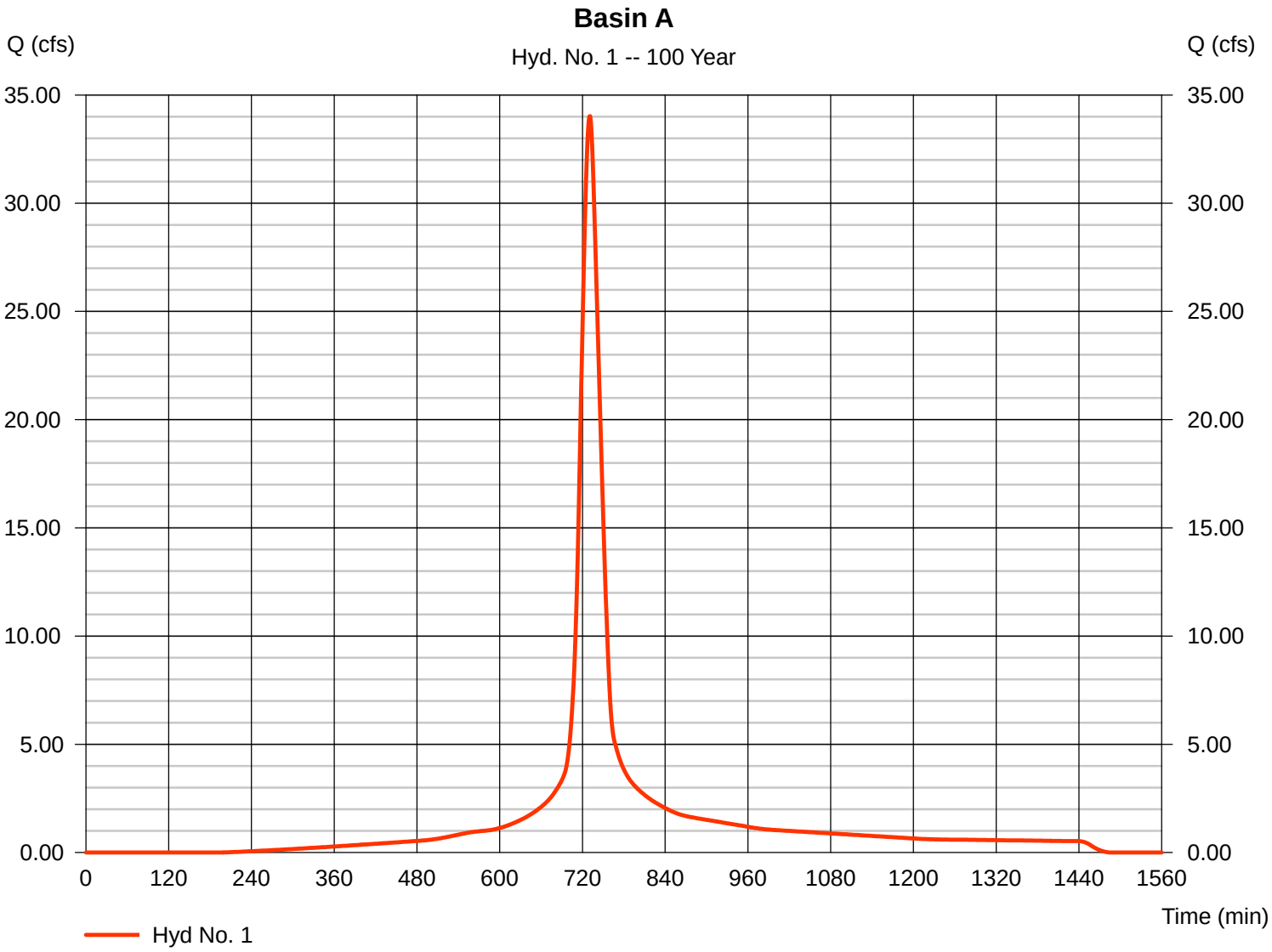
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 — Friday, May 16, 2014

Hyd. No. 1

Basin A

Hydrograph type	=	SCS Runoff	Peak discharge	=	34.03 cfs
Storm frequency	=	100 yrs	Time to peak	=	731 min
Time interval	=	1 min	Hyd. volume	=	3.245 acft
Drainage area	=	6.100 ac	Curve number	=	88.1
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	29.40 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

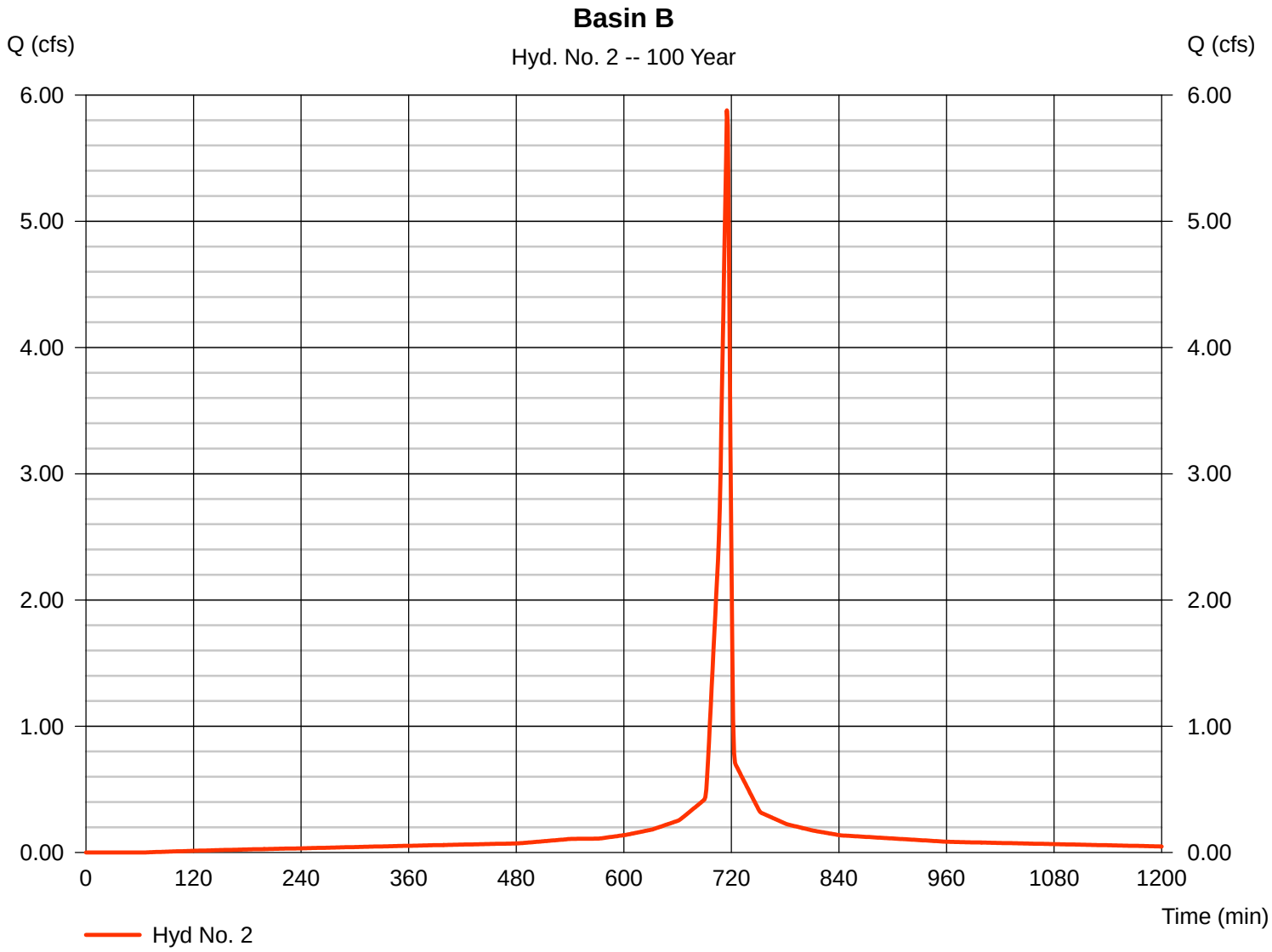


Hydrograph Report

Hyd. No. 2

Basin B

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.879 cfs
Storm frequency	=	100 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	0.286 acft
Drainage area	=	0.500 ac	Curve number	=	95.9
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	2.60 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

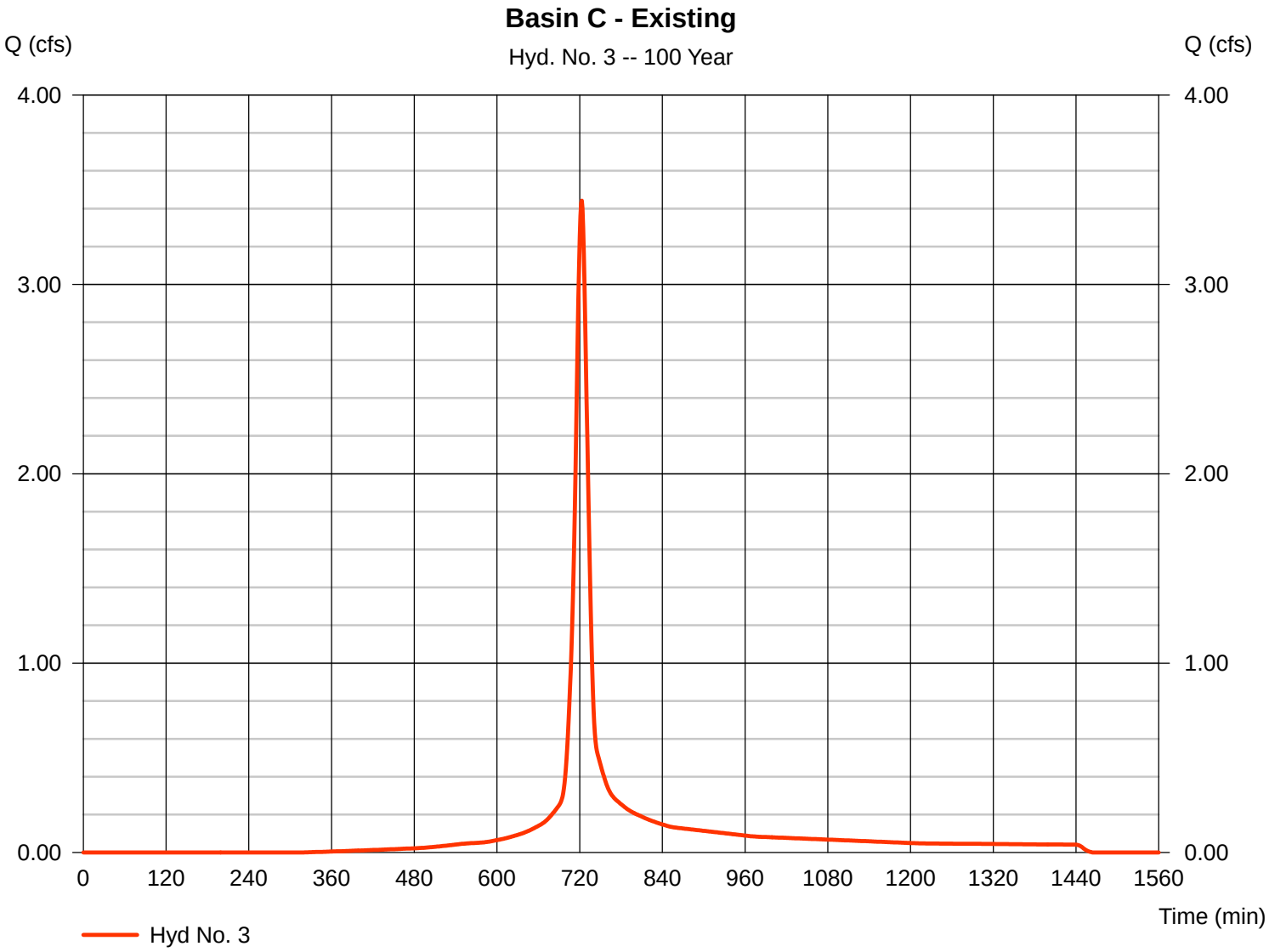


Hydrograph Report

Hyd. No. 3

Basin C - Existing

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.442 cfs
Storm frequency	=	100 yrs	Time to peak	=	723 min
Time interval	=	1 min	Hyd. volume	=	0.229 acft
Drainage area	=	0.500 ac	Curve number	=	80
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	16.50 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

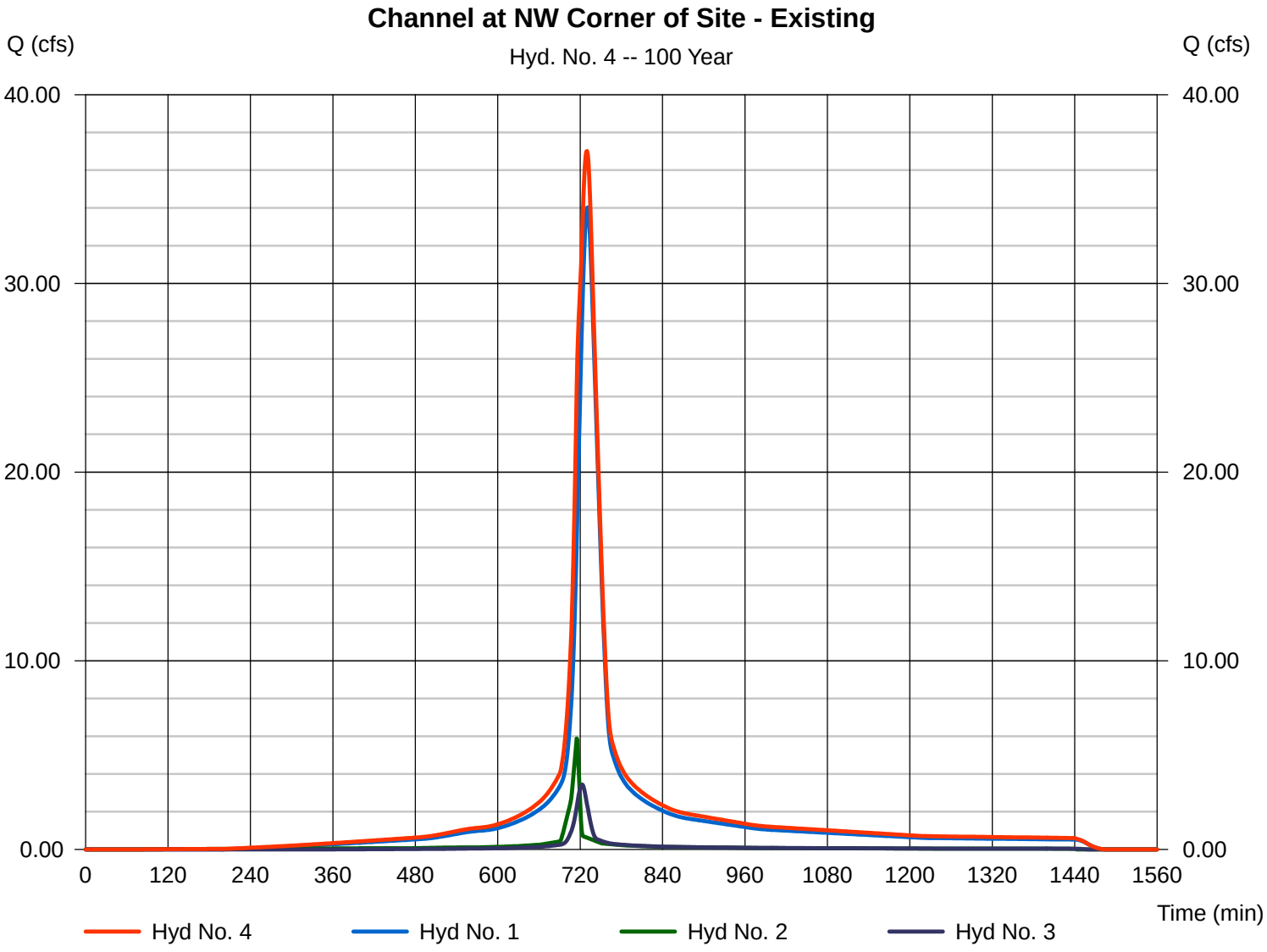


Hydrograph Report

Hyd. No. 4

Channel at NW Corner of Site - Existing

Hydrograph type	=	Combine	Peak discharge	=	37.02 cfs
Storm frequency	=	100 yrs	Time to peak	=	730 min
Time interval	=	1 min	Hyd. volume	=	3.760 acft
Inflow hyds.	=	1, 2, 3	Contrib. drain. area	=	7.100 ac

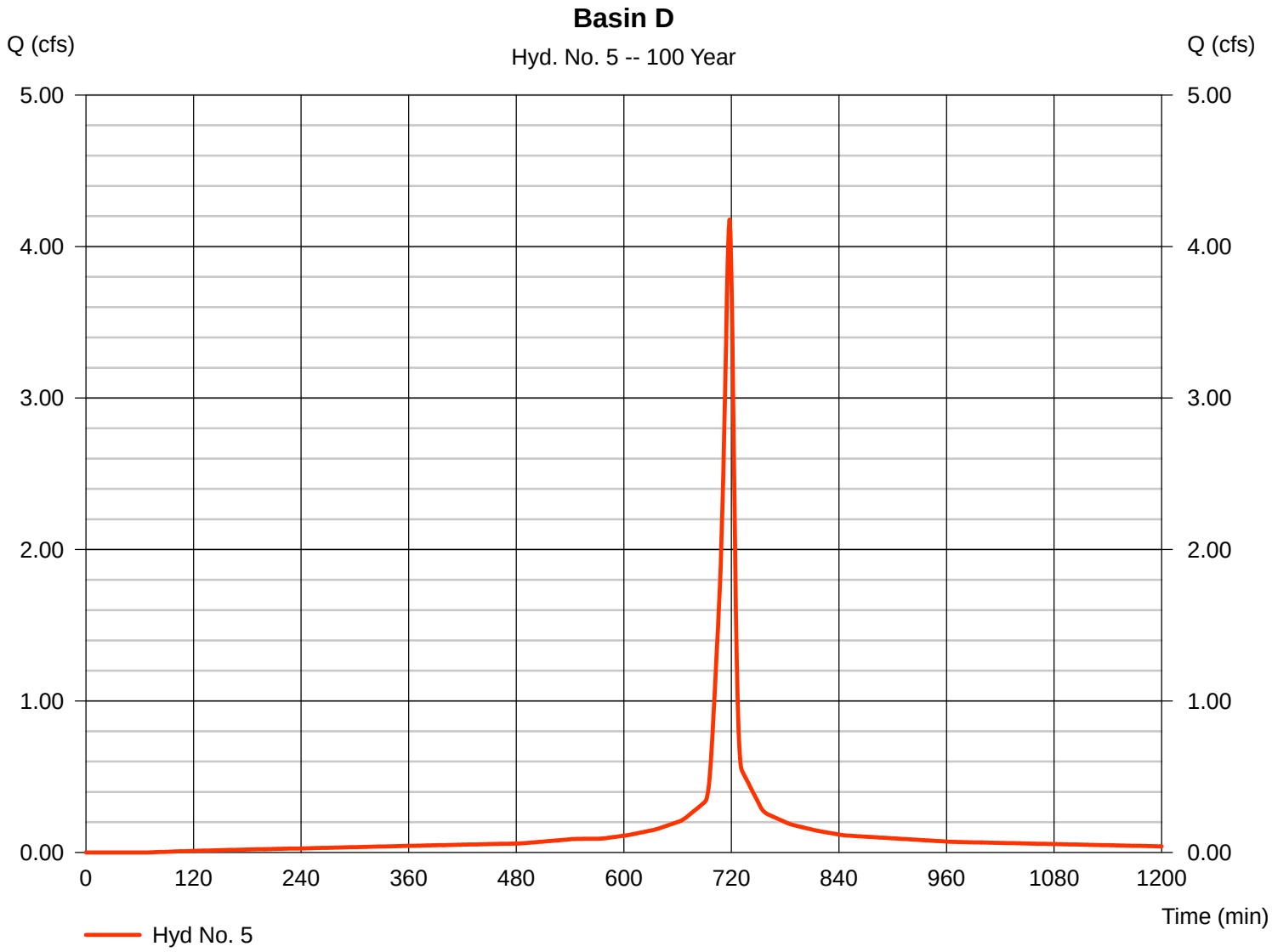


Hydrograph Report

Hyd. No. 5

Basin D

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.179 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	0.238 acft
Drainage area	=	0.400 ac	Curve number	=	95.9
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	8.00 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

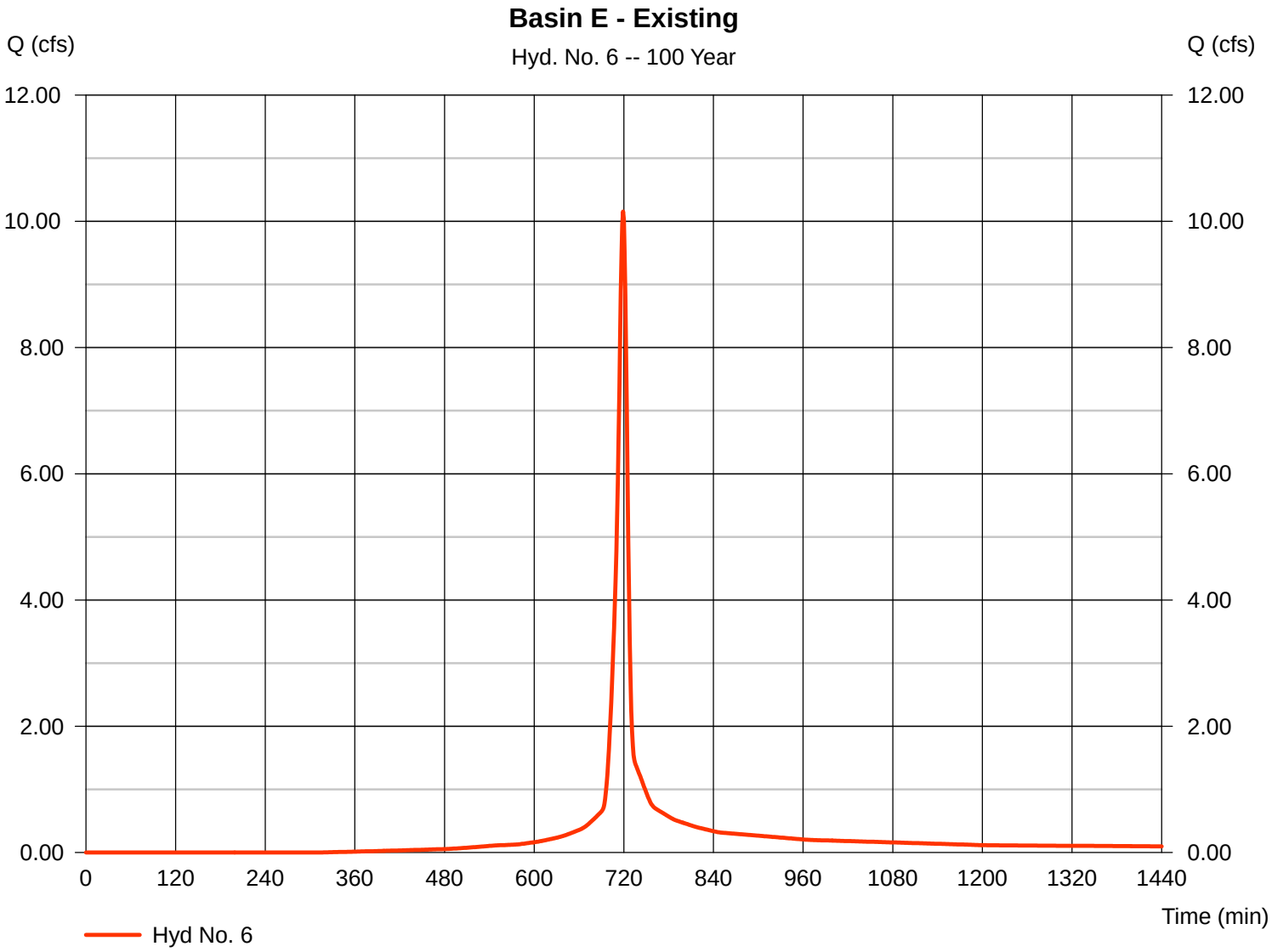


Hydrograph Report

Hyd. No. 6

Basin E - Existing

Hydrograph type	=	SCS Runoff	Peak discharge	=	10.15 cfs
Storm frequency	=	100 yrs	Time to peak	=	719 min
Time interval	=	1 min	Hyd. volume	=	0.544 acft
Drainage area	=	1.200 ac	Curve number	=	80
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	10.00 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

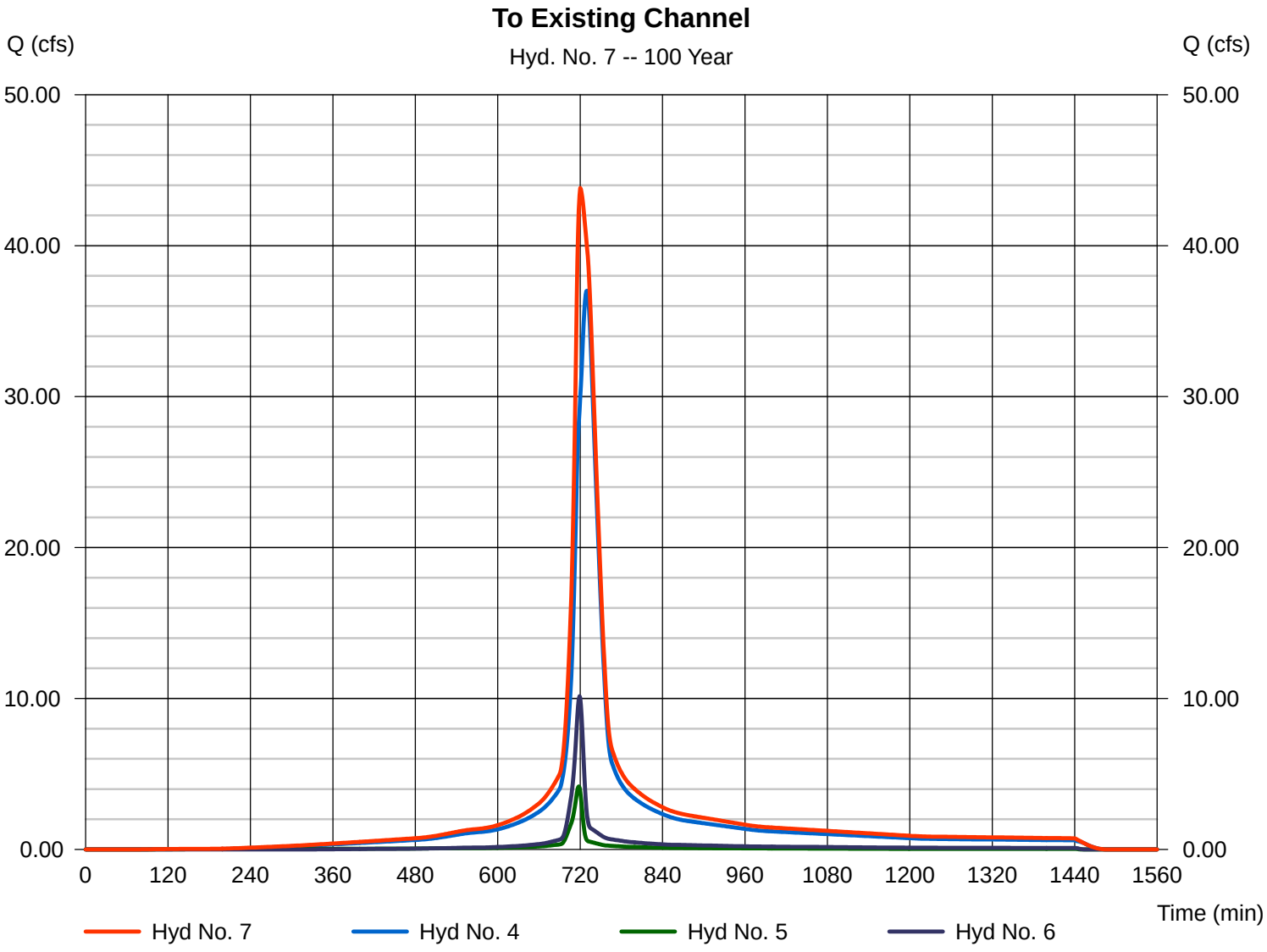


Hydrograph Report

Hyd. No. 7

To Existing Channel

Hydrograph type	=	Combine	Peak discharge	=	43.82 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	4.542 acft
Inflow hyds.	=	4, 5, 6	Contrib. drain. area	=	1.600 ac



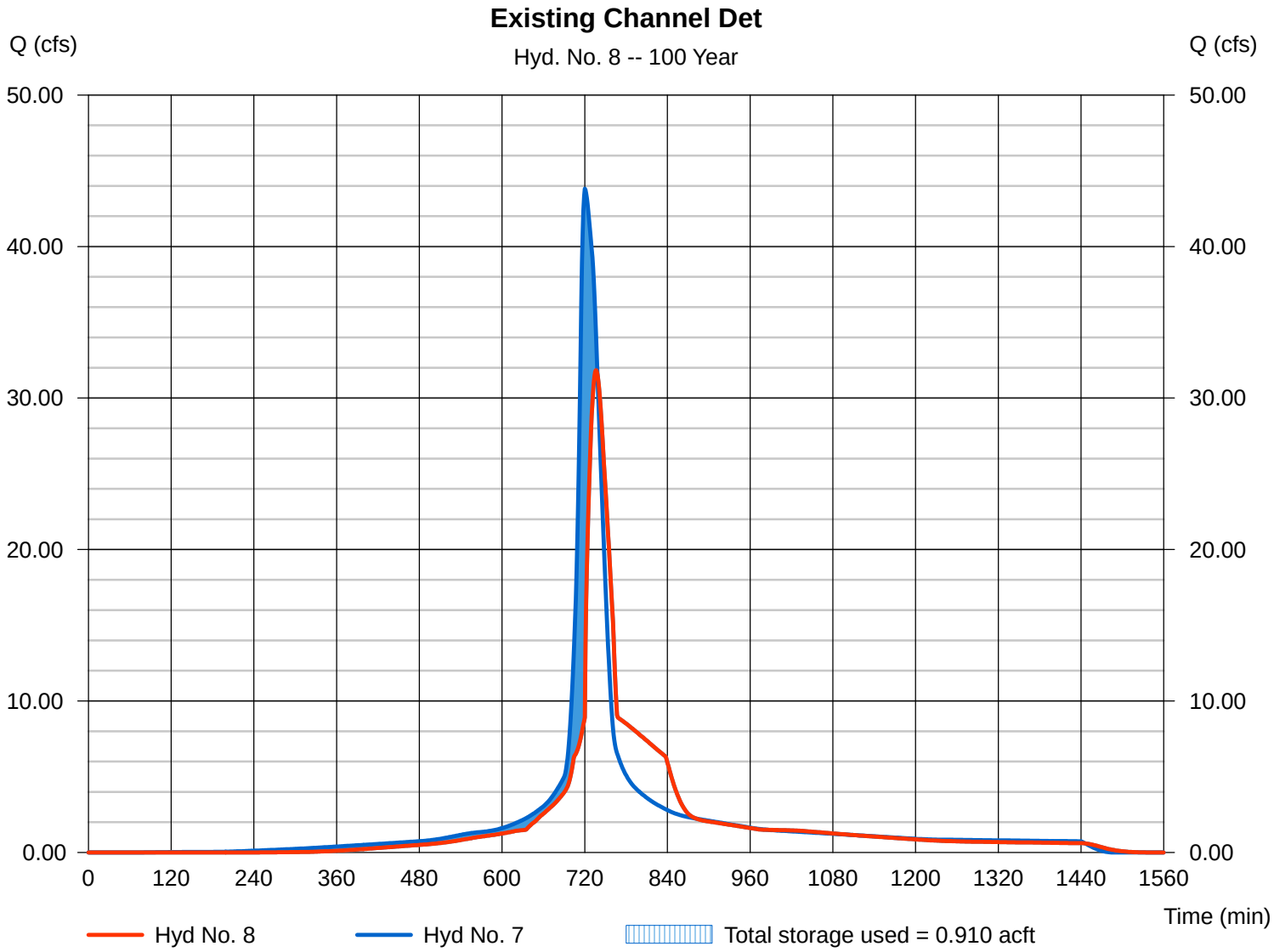
Hydrograph Report

Hyd. No. 8

Existing Channel Det

Hydrograph type	=	Reservoir	Peak discharge	=	31.84 cfs
Storm frequency	=	100 yrs	Time to peak	=	736 min
Time interval	=	1 min	Hyd. volume	=	4.068 acft
Inflow hyd. No.	=	7 - To Existing Channel	Max. Elevation	=	1347.15 ft
Reservoir name	=	Existing Channel	Max. Storage	=	0.910 acft

Storage Indication method used. Exfiltration extracted from Outflow.

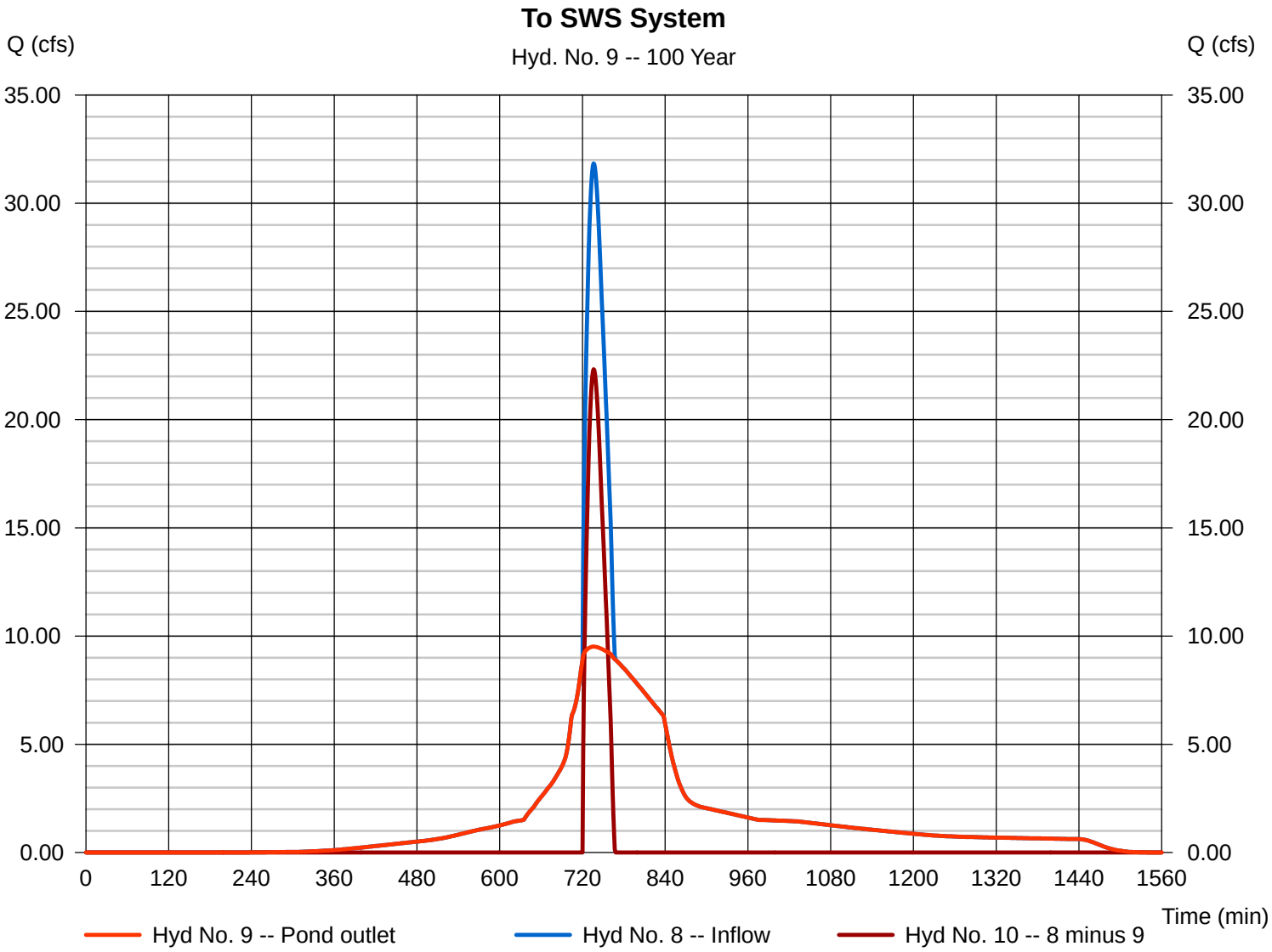


Hydrograph Report

Hyd. No. 9

To SWS System

Hydrograph type	=	Diversion1	Peak discharge	=	9.512 cfs
Storm frequency	=	100 yrs	Time to peak	=	736 min
Time interval	=	1 min	Hyd. volume	=	3.168 acft
Inflow hydrograph	=	8 - Existing Channel Det	2nd diverted hyd.	=	10
Diversion method	=	Pond - Existing Channel	Pond structure	=	Culv/Orf A

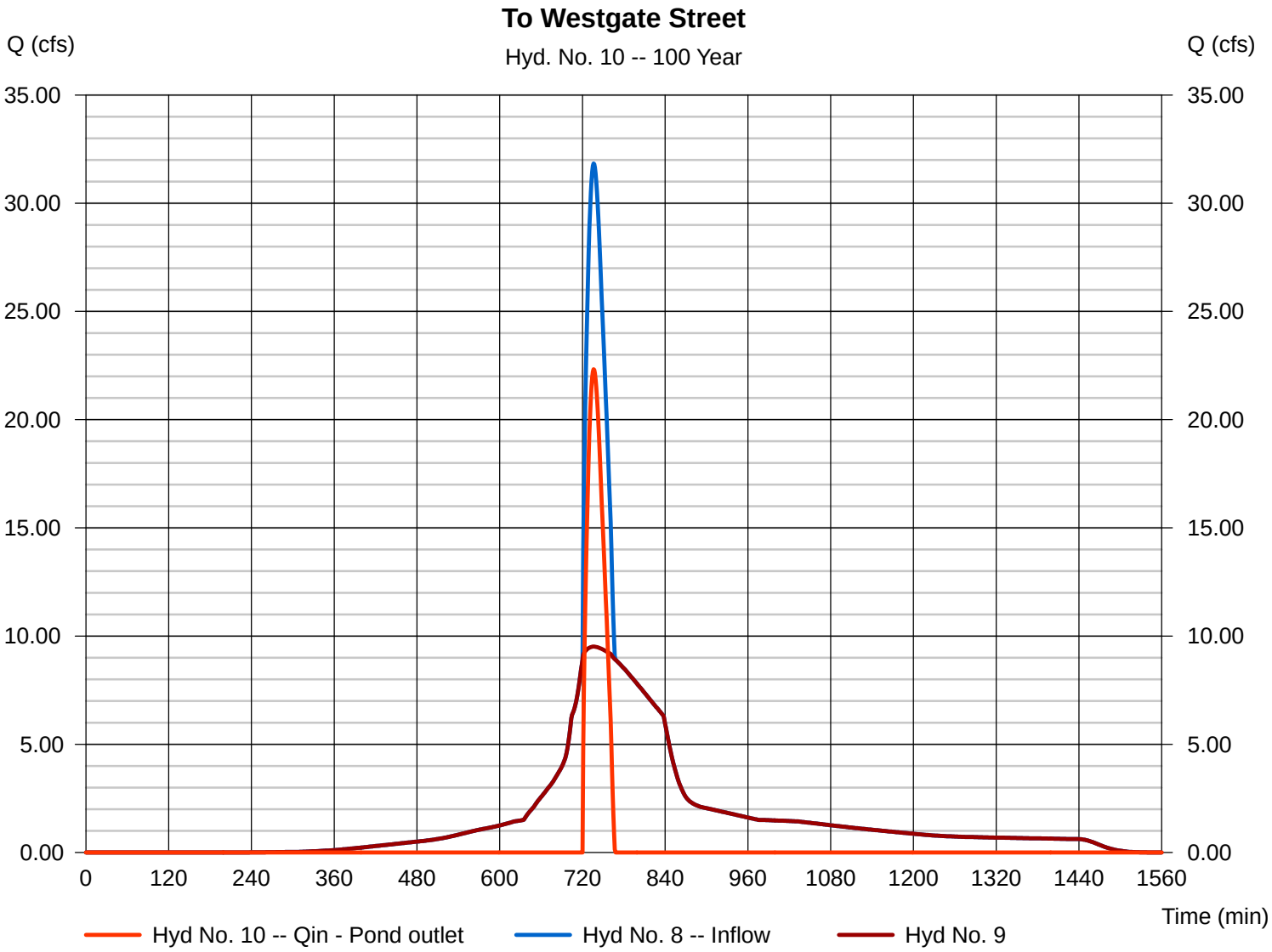


Hydrograph Report

Hyd. No. 10

To Westgate Street

Hydrograph type	=	Diversion2	Peak discharge	=	22.33 cfs
Storm frequency	=	100 yrs	Time to peak	=	736 min
Time interval	=	1 min	Hyd. volume	=	0.899 acft
Inflow hydrograph	=	8 - Existing Channel Det	2nd diverted hyd.	=	9
Diversion method	=	Pond - Existing Channel	Pond structure	=	Culv/Orf A

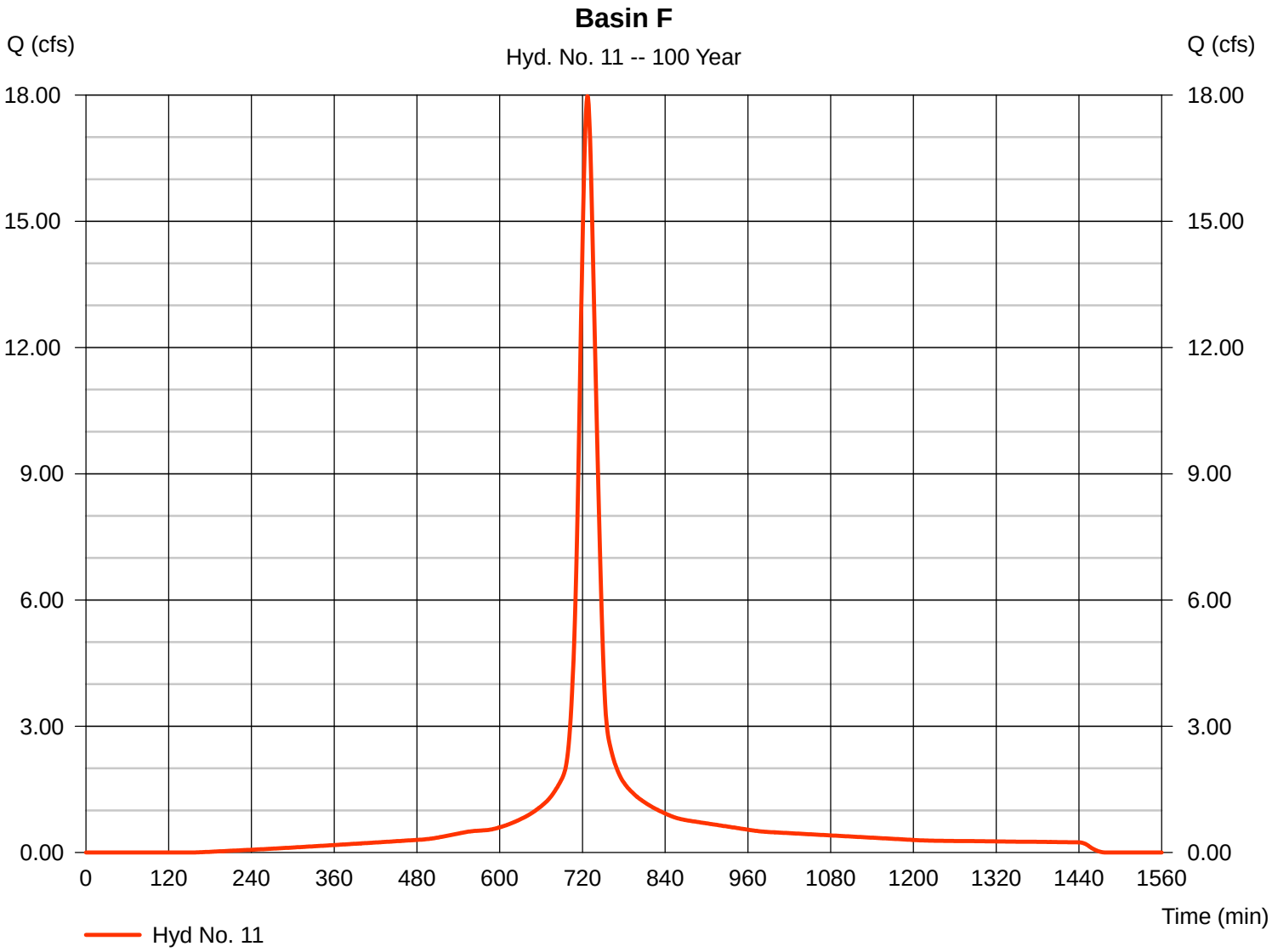


Hydrograph Report

Hyd. No. 11

Basin F

Hydrograph type	=	SCS Runoff	Peak discharge	=	17.97 cfs
Storm frequency	=	100 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	1.559 acft
Drainage area	=	2.800 ac	Curve number	=	90.6
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	24.40 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

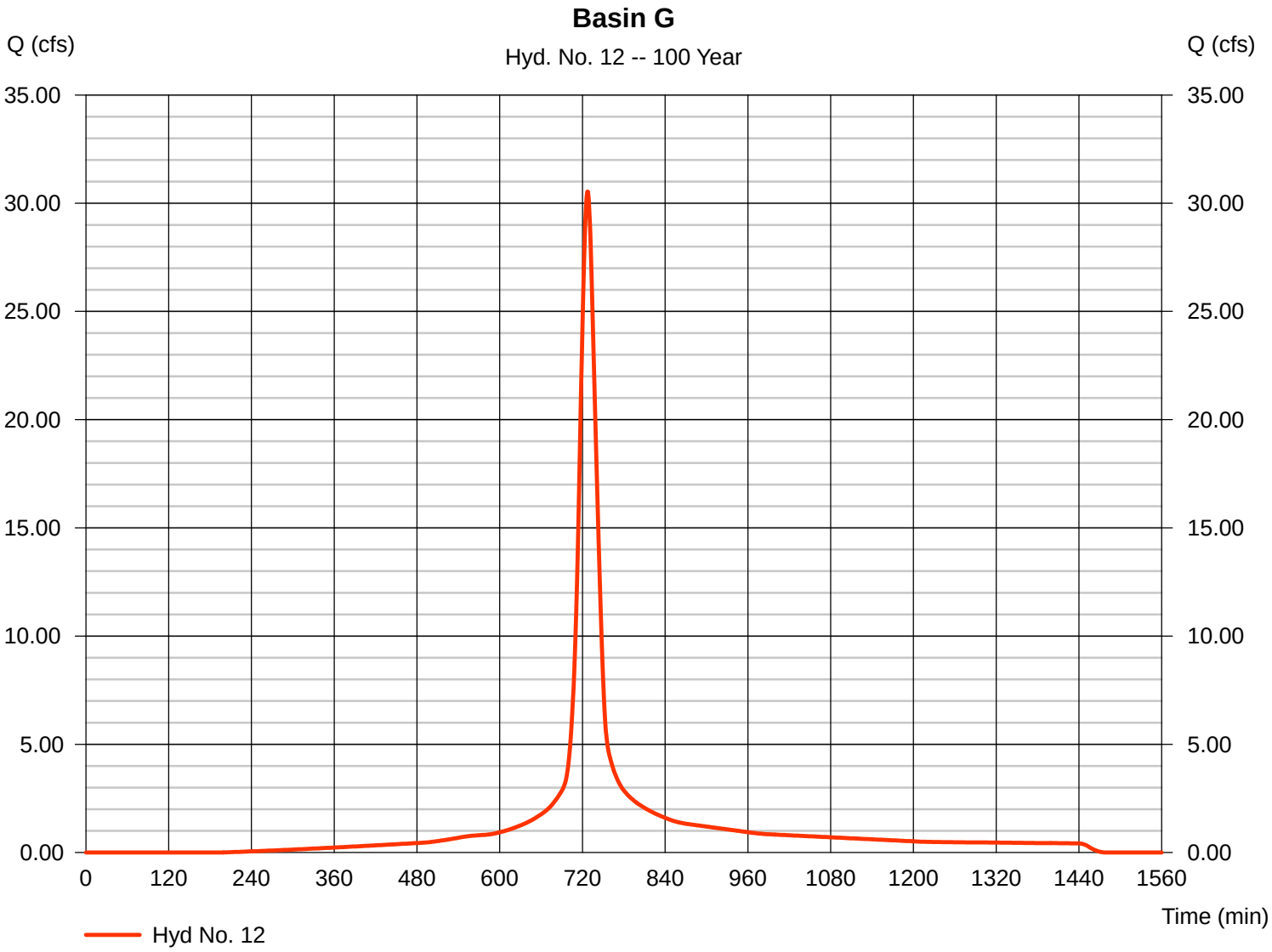


Hydrograph Report

Hyd. No. 12

Basin G

Hydrograph type	=	SCS Runoff	Peak discharge	=	30.54 cfs
Storm frequency	=	100 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	2.607 acft
Drainage area	=	4.900 ac	Curve number	=	88.1
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	23.80 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

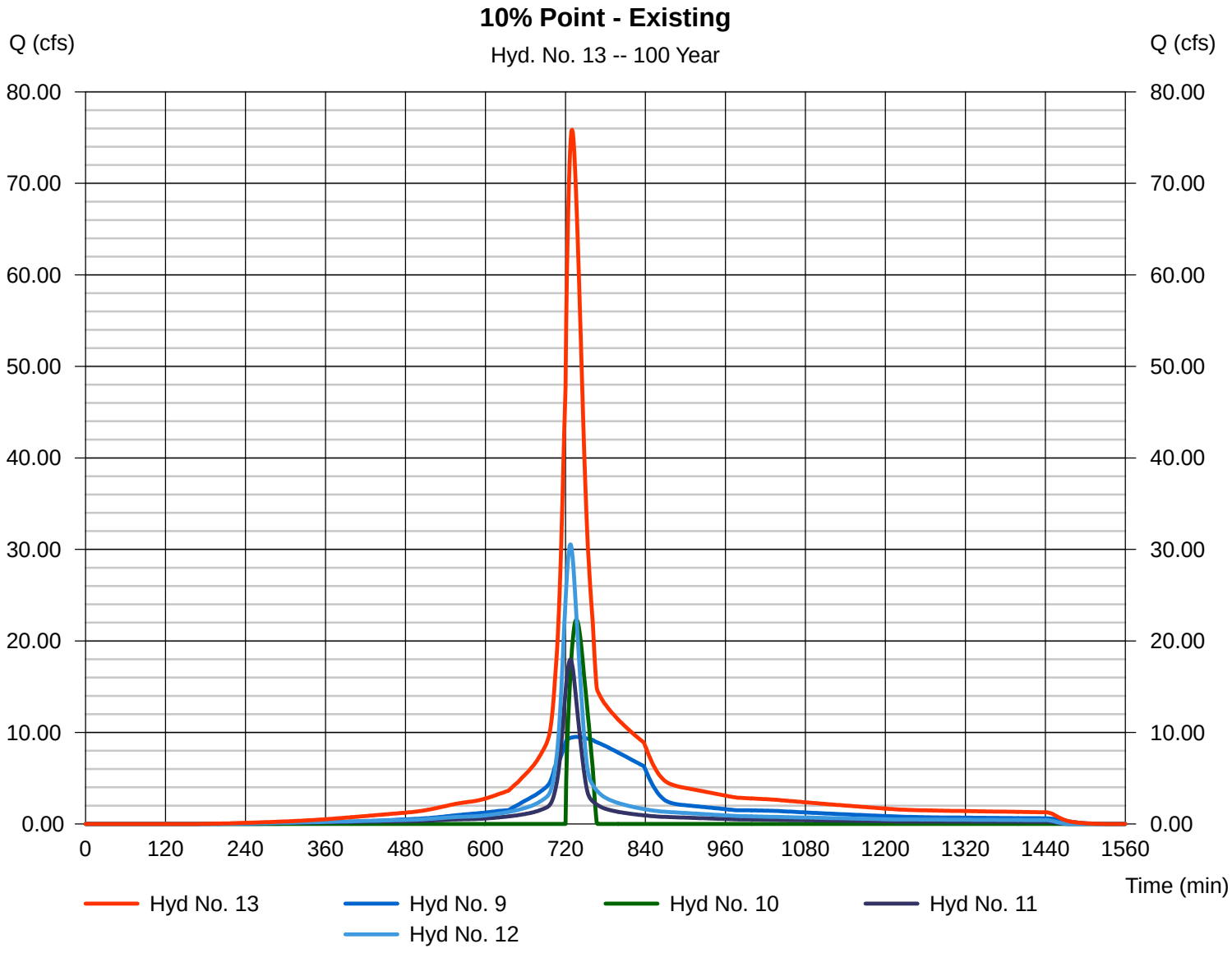


Hydrograph Report

Hyd. No. 13

10% Point - Existing

Hydrograph type	=	Combine	Peak discharge	=	75.86 cfs
Storm frequency	=	100 yrs	Time to peak	=	730 min
Time interval	=	1 min	Hyd. volume	=	8.233 acft
Inflow hyds.	=	9, 10, 11, 12	Contrib. drain. area	=	7.700 ac

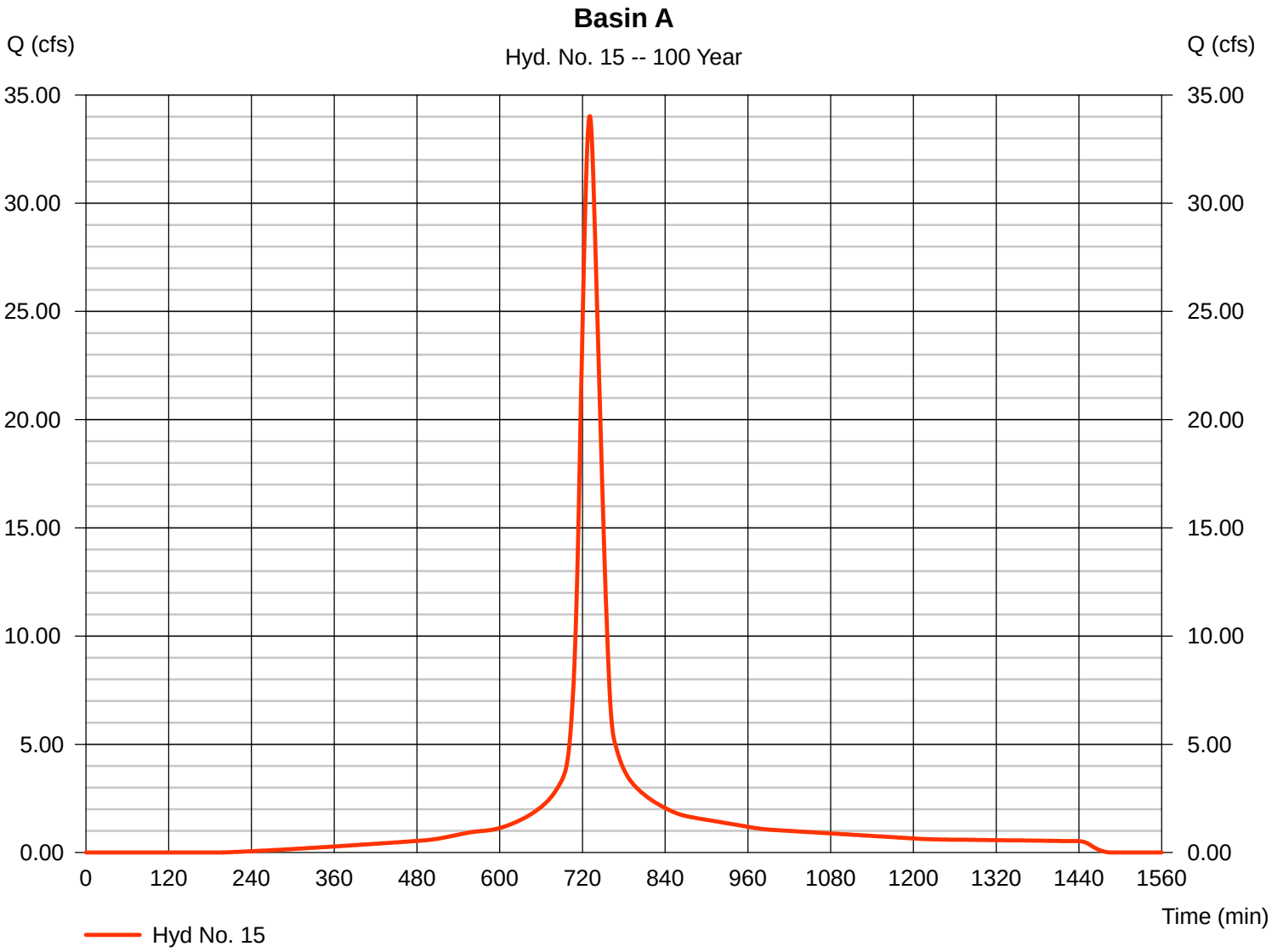


Hydrograph Report

Hyd. No. 15

Basin A

Hydrograph type	=	SCS Runoff	Peak discharge	=	34.03 cfs
Storm frequency	=	100 yrs	Time to peak	=	731 min
Time interval	=	1 min	Hyd. volume	=	3.245 acft
Drainage area	=	6.100 ac	Curve number	=	88.1
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	29.40 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

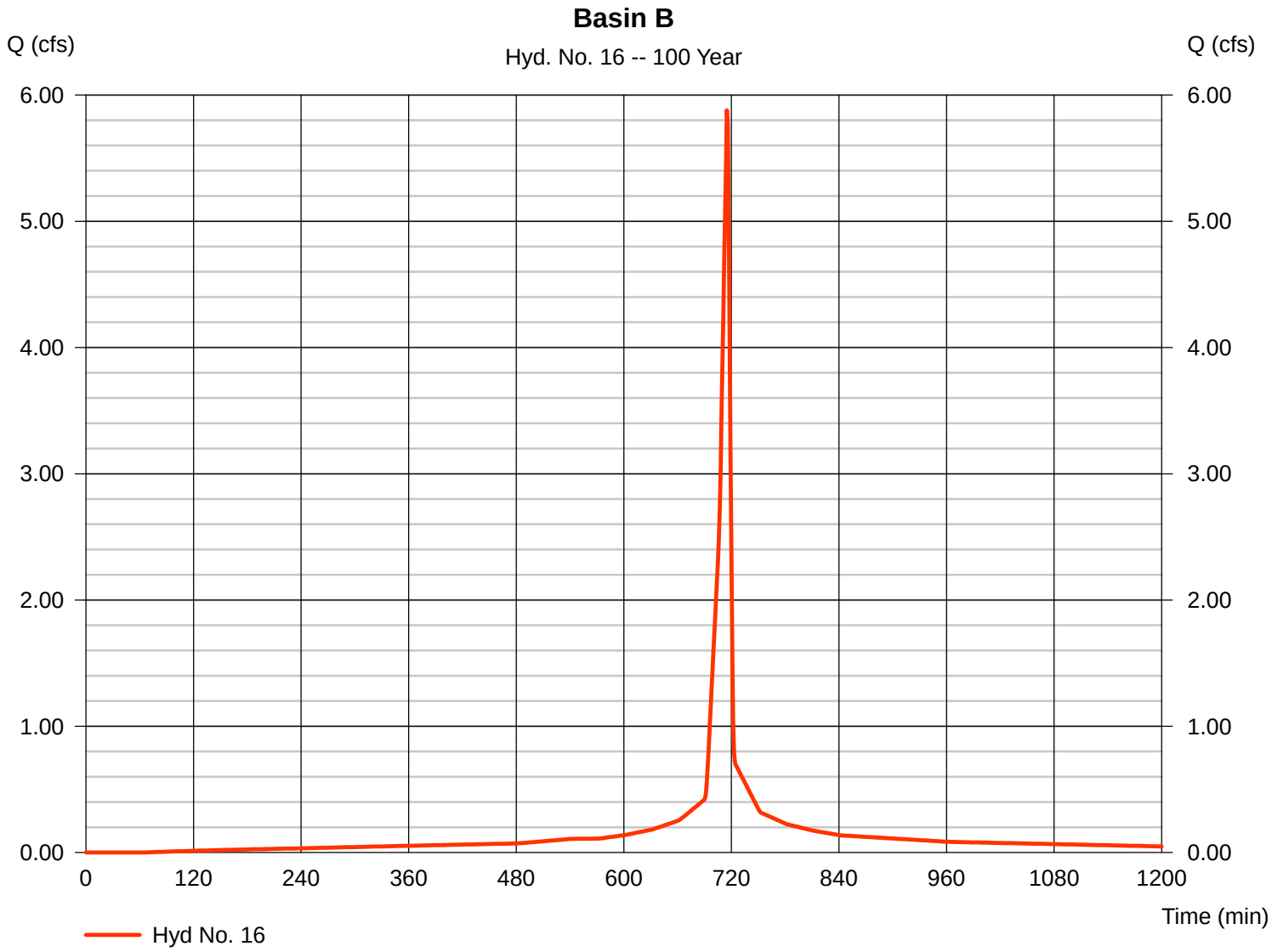


Hydrograph Report

Hyd. No. 16

Basin B

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.879 cfs
Storm frequency	=	100 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	0.286 acft
Drainage area	=	0.500 ac	Curve number	=	95.9
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	2.60 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

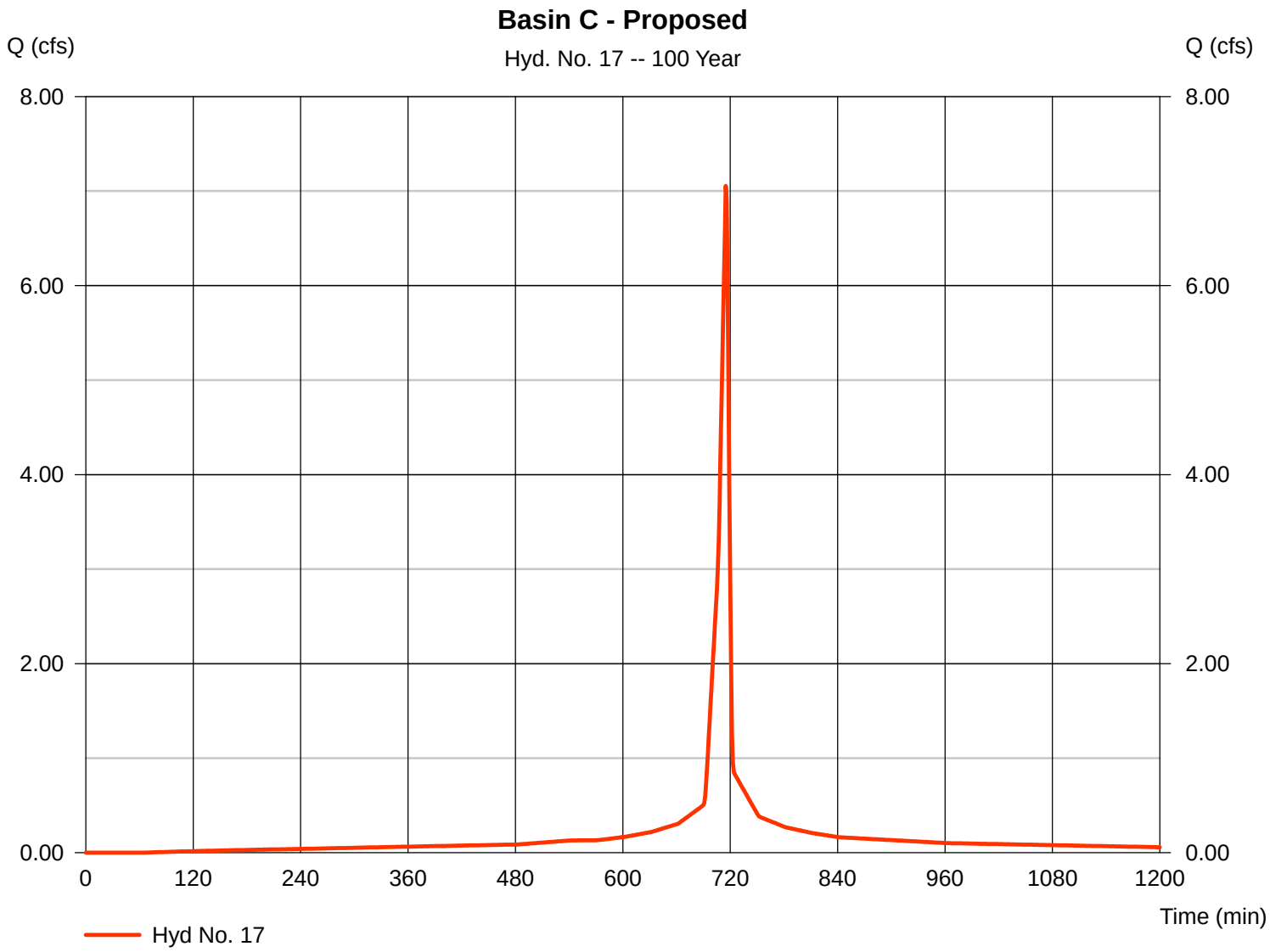


Hydrograph Report

Hyd. No. 17

Basin C - Proposed

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.054 cfs
Storm frequency	=	100 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	0.343 acft
Drainage area	=	0.600 ac	Curve number	=	95.9
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	2.20 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

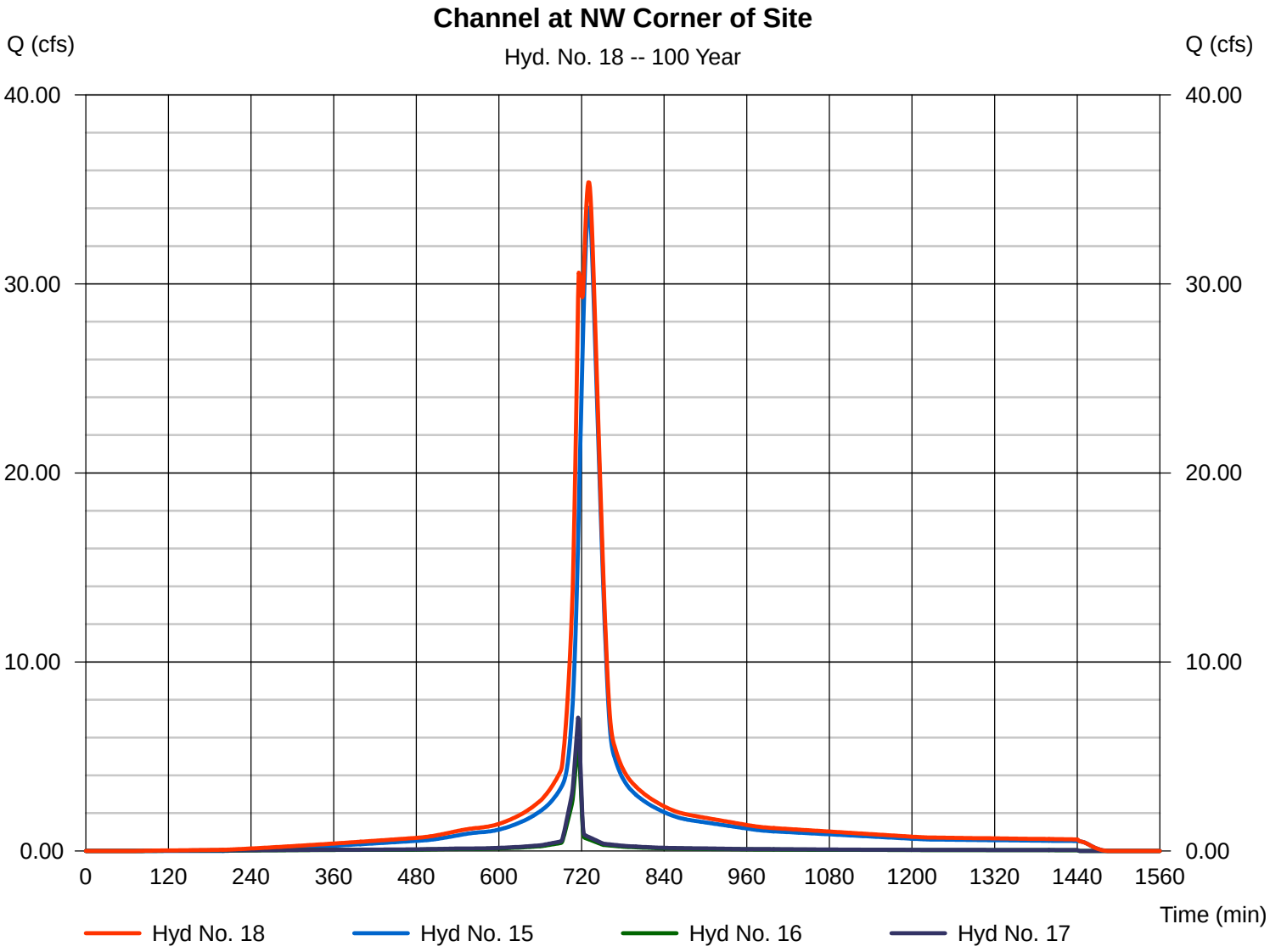


Hydrograph Report

Hyd. No. 18

Channel at NW Corner of Site

Hydrograph type	=	Combine	Peak discharge	=	35.38 cfs
Storm frequency	=	100 yrs	Time to peak	=	730 min
Time interval	=	1 min	Hyd. volume	=	3.874 acft
Inflow hyds.	=	15, 16, 17	Contrib. drain. area	=	7.200 ac

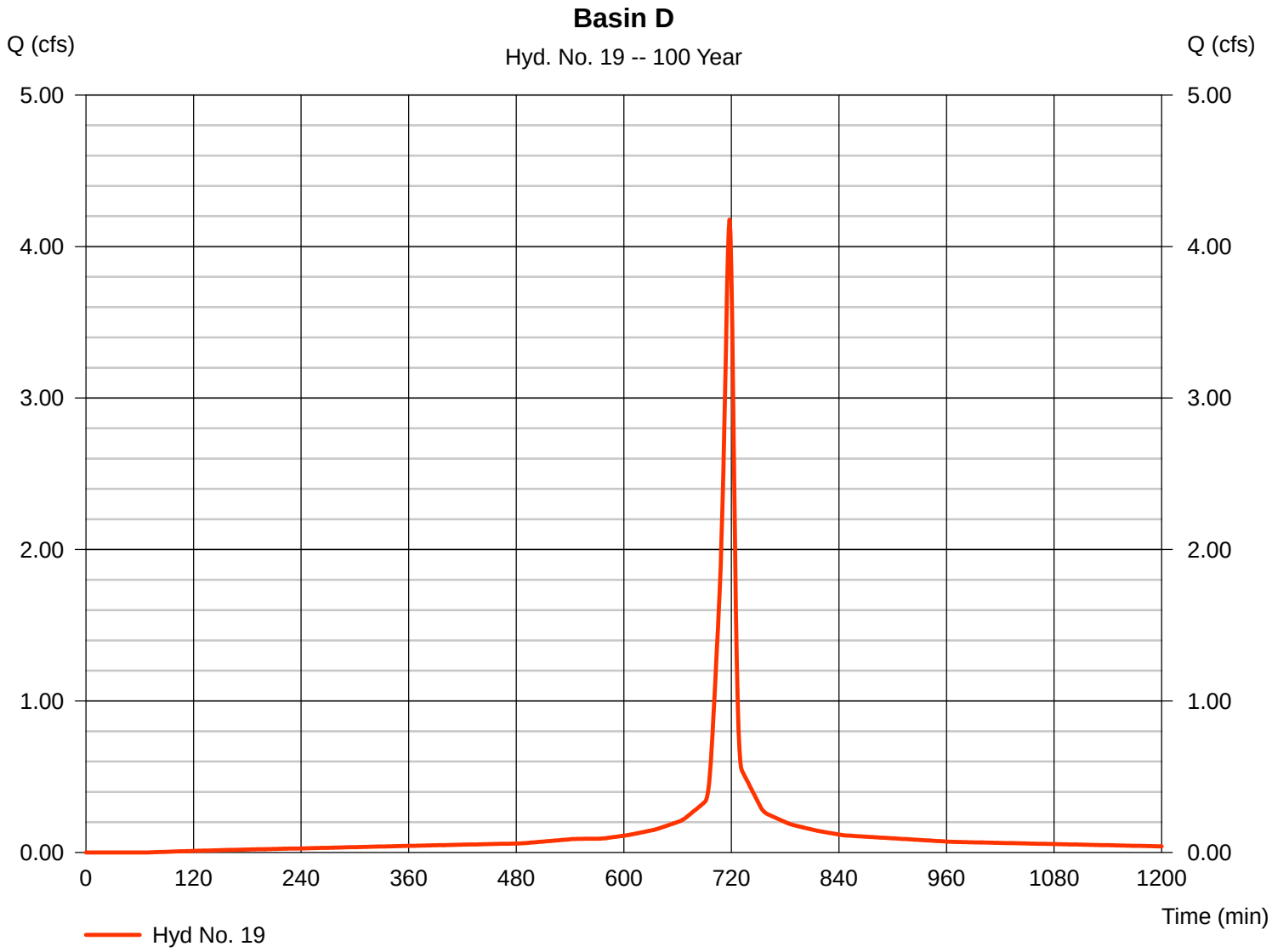


Hydrograph Report

Hyd. No. 19

Basin D

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.179 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	0.238 acft
Drainage area	=	0.400 ac	Curve number	=	95.9
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	8.00 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

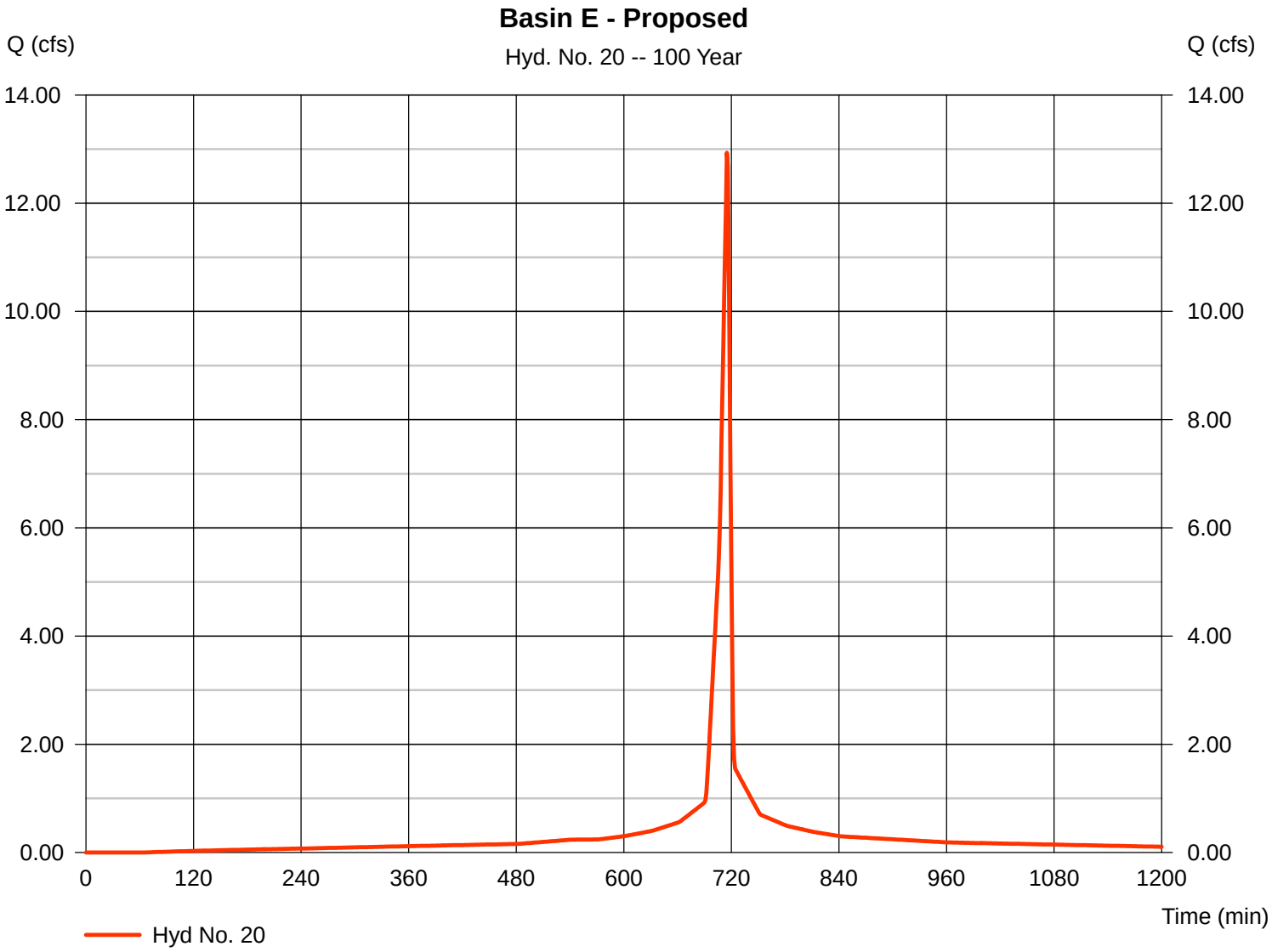


Hydrograph Report

Hyd. No. 20

Basin E - Proposed

Hydrograph type	=	SCS Runoff	Peak discharge	=	12.93 cfs
Storm frequency	=	100 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	0.628 acft
Drainage area	=	1.100 ac	Curve number	=	95.9
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	2.00 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

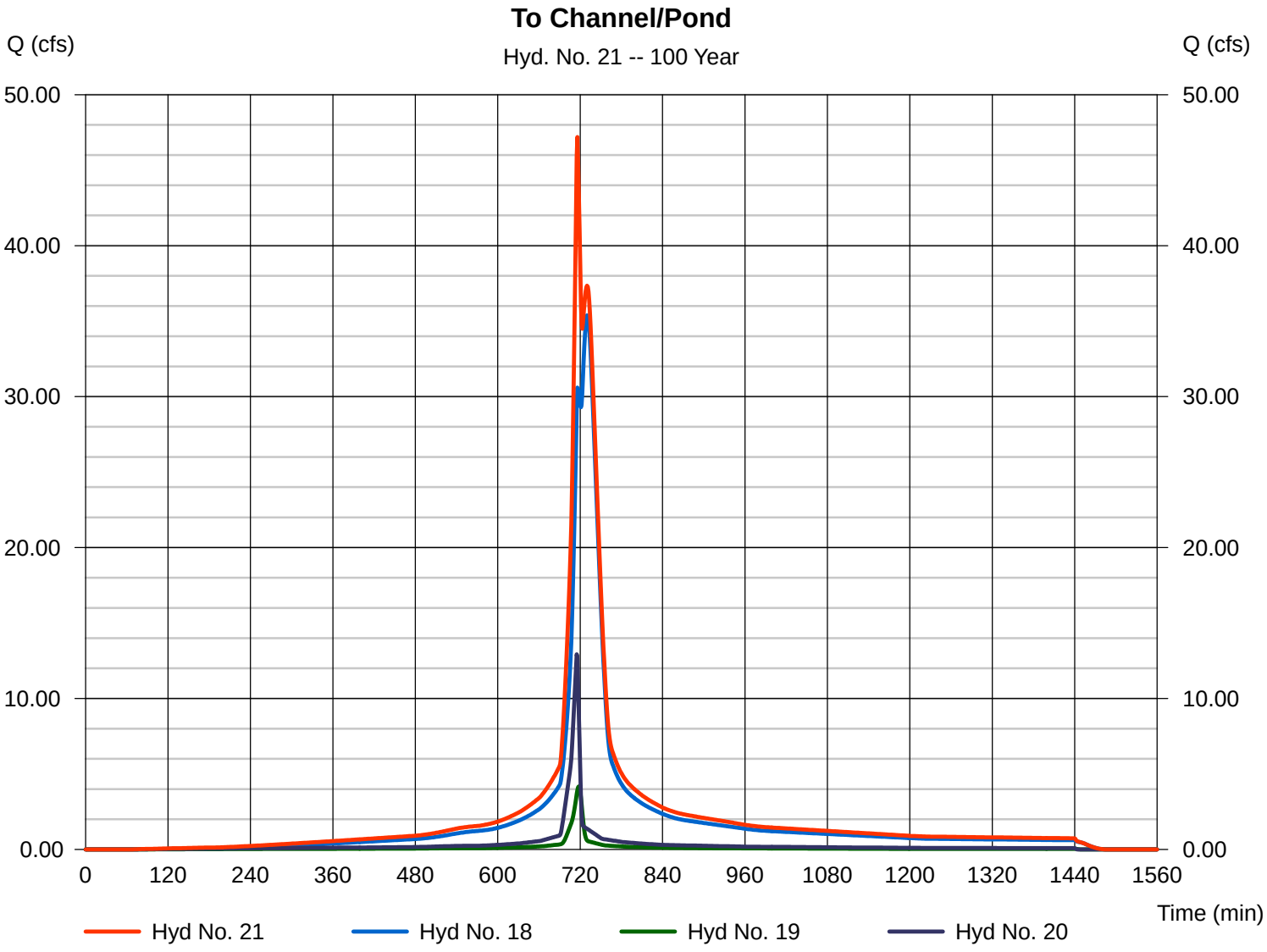


Hydrograph Report

Hyd. No. 21

To Channel/Pond

Hydrograph type	=	Combine	Peak discharge	=	47.19 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	4.739 acft
Inflow hyds.	=	18, 19, 20	Contrib. drain. area	=	1.500 ac



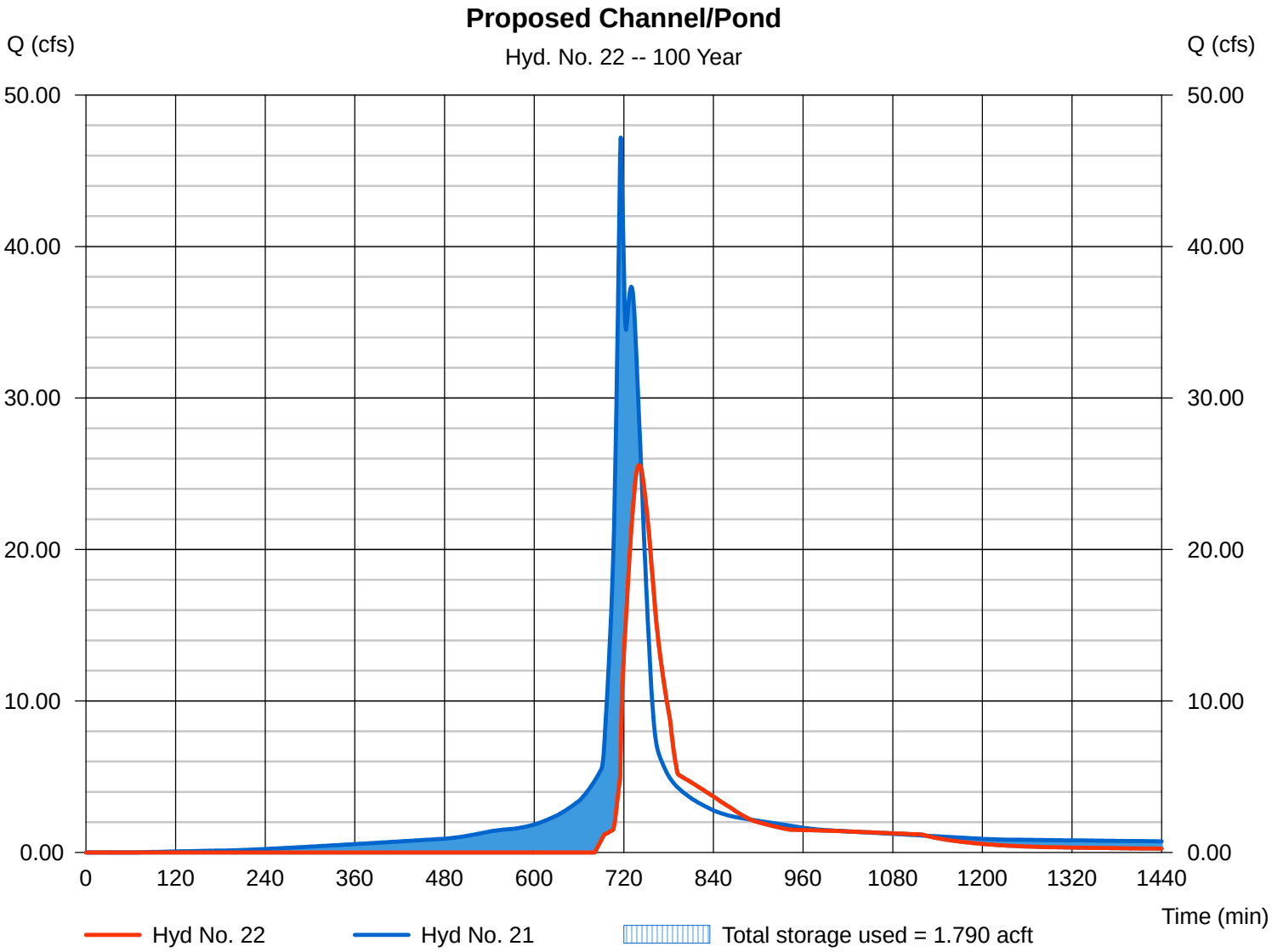
Hydrograph Report

Hyd. No. 22

Proposed Channel/Pond

Hydrograph type	=	Reservoir	Peak discharge	=	25.57 cfs
Storm frequency	=	100 yrs	Time to peak	=	740 min
Time interval	=	1 min	Hyd. volume	=	2.963 acft
Inflow hyd. No.	=	21 - To Channel/Pond	Max. Elevation	=	1347.22 ft
Reservoir name	=	Channel/Pond	Max. Storage	=	1.790 acft

Storage Indication method used. Exfiltration extracted from Outflow.

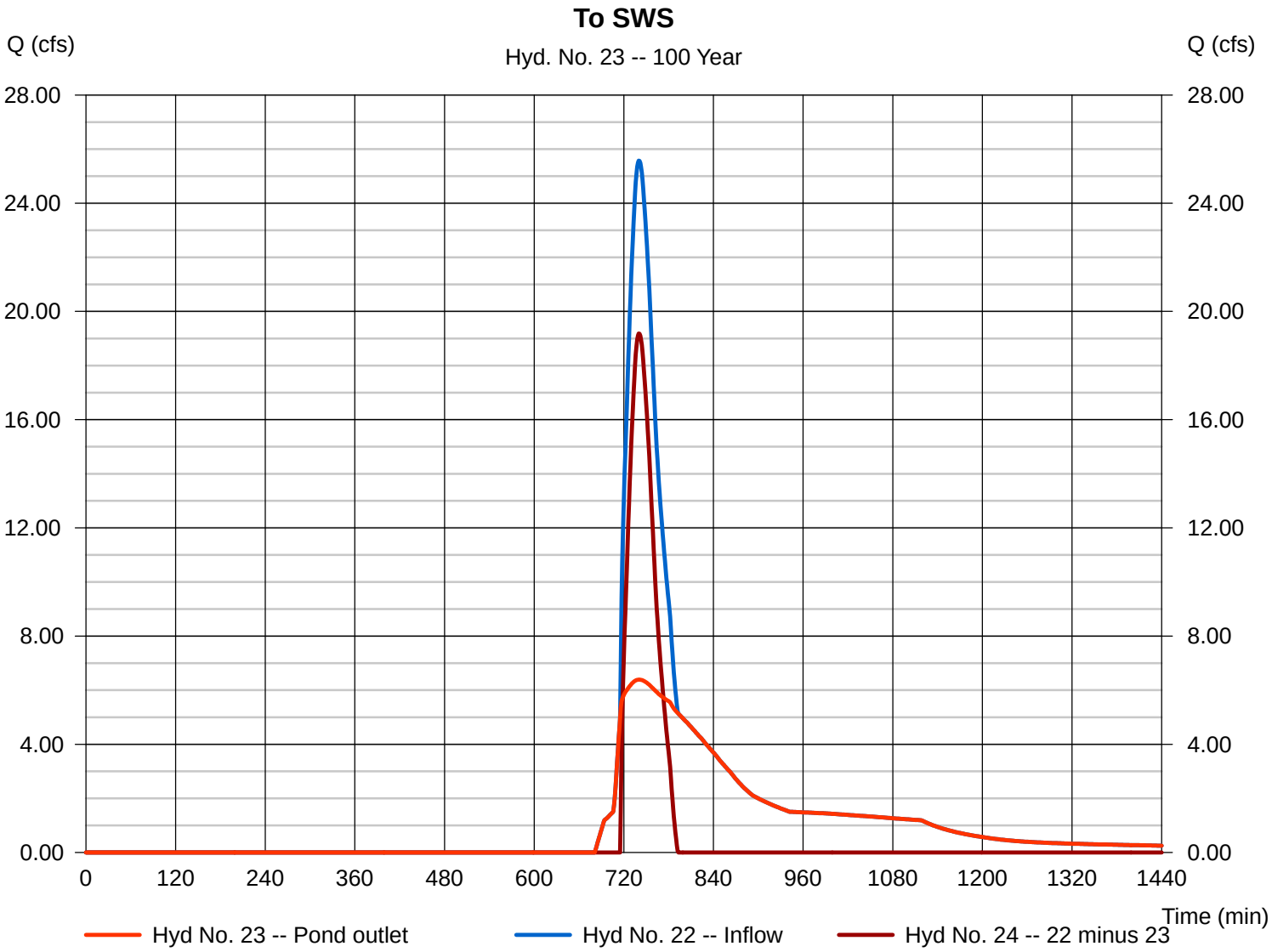


Hydrograph Report

Hyd. No. 23

To SWS

Hydrograph type	=	Diversion1	Peak discharge	=	6.389 cfs
Storm frequency	=	100 yrs	Time to peak	=	740 min
Time interval	=	1 min	Hyd. volume	=	1.870 acft
Inflow hydrograph	=	22 - Proposed Channel/Pond	2nd diverted hyd.	=	24
Diversion method	=	Pond - Channel/Pond	Pond structure	=	Culv/Orf A

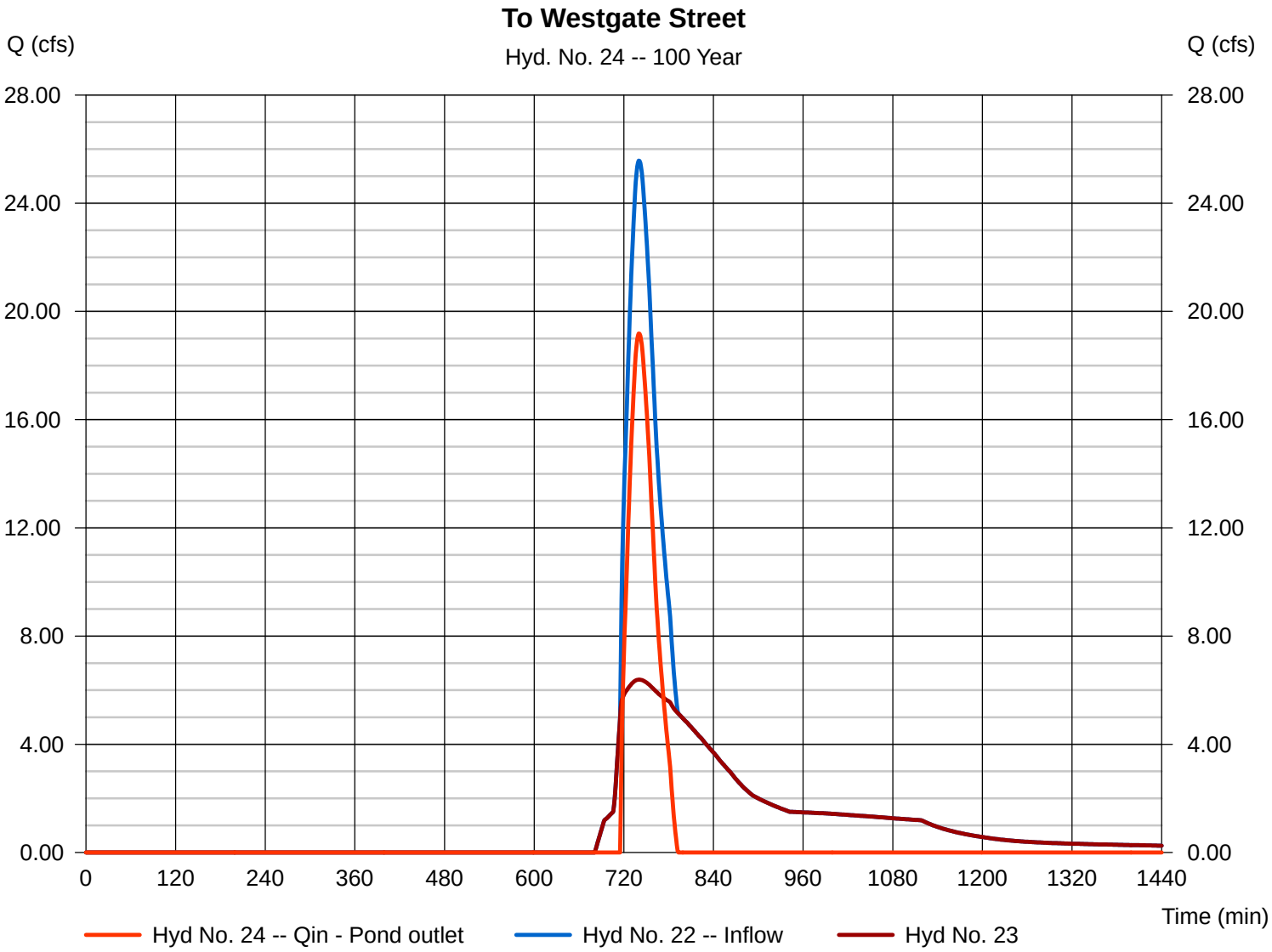


Hydrograph Report

Hyd. No. 24

To Westgate Street

Hydrograph type	=	Diversion2	Peak discharge	=	19.18 cfs
Storm frequency	=	100 yrs	Time to peak	=	740 min
Time interval	=	1 min	Hyd. volume	=	1.093 acft
Inflow hydrograph	=	22 - Proposed Channel/Pond	2nd diverted hyd.	=	23
Diversion method	=	Pond - Channel/Pond	Pond structure	=	Culv/Orf A

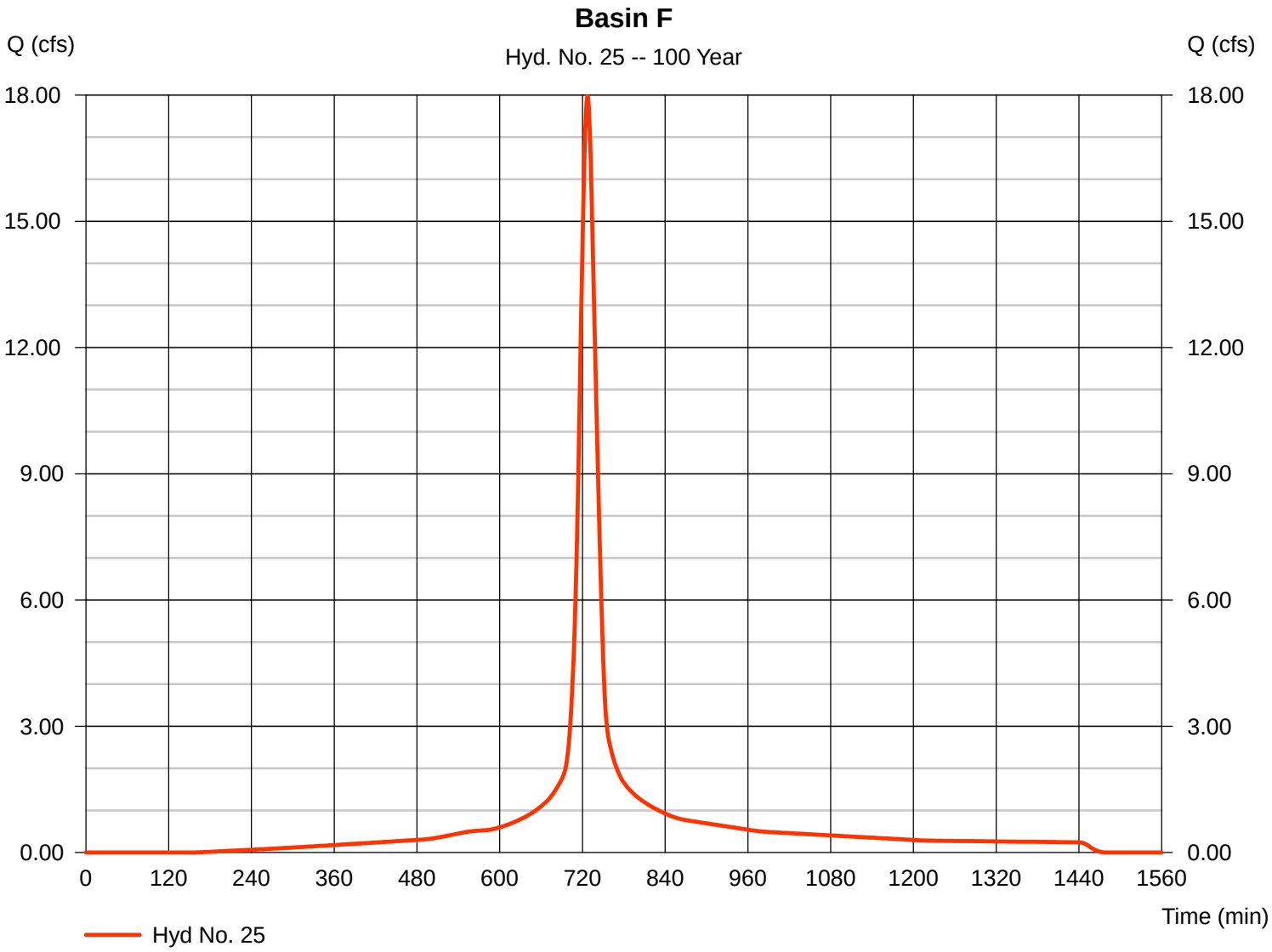


Hydrograph Report

Hyd. No. 25

Basin F

Hydrograph type	=	SCS Runoff	Peak discharge	=	17.97 cfs
Storm frequency	=	100 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	1.559 acft
Drainage area	=	2.800 ac	Curve number	=	90.6
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	24.40 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

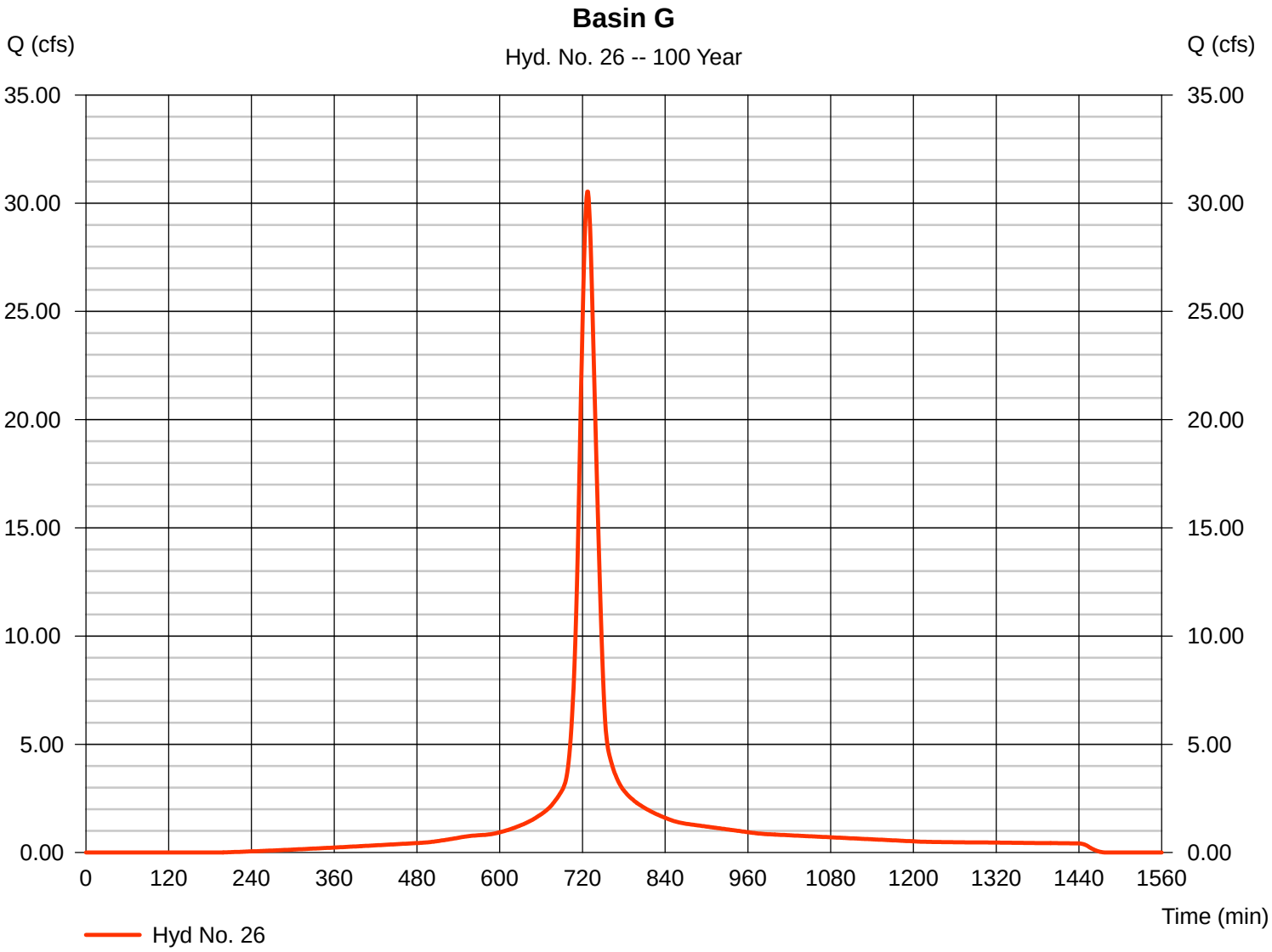


Hydrograph Report

Hyd. No. 26

Basin G

Hydrograph type	=	SCS Runoff	Peak discharge	=	30.54 cfs
Storm frequency	=	100 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	2.607 acft
Drainage area	=	4.900 ac	Curve number	=	88.1
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	23.80 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

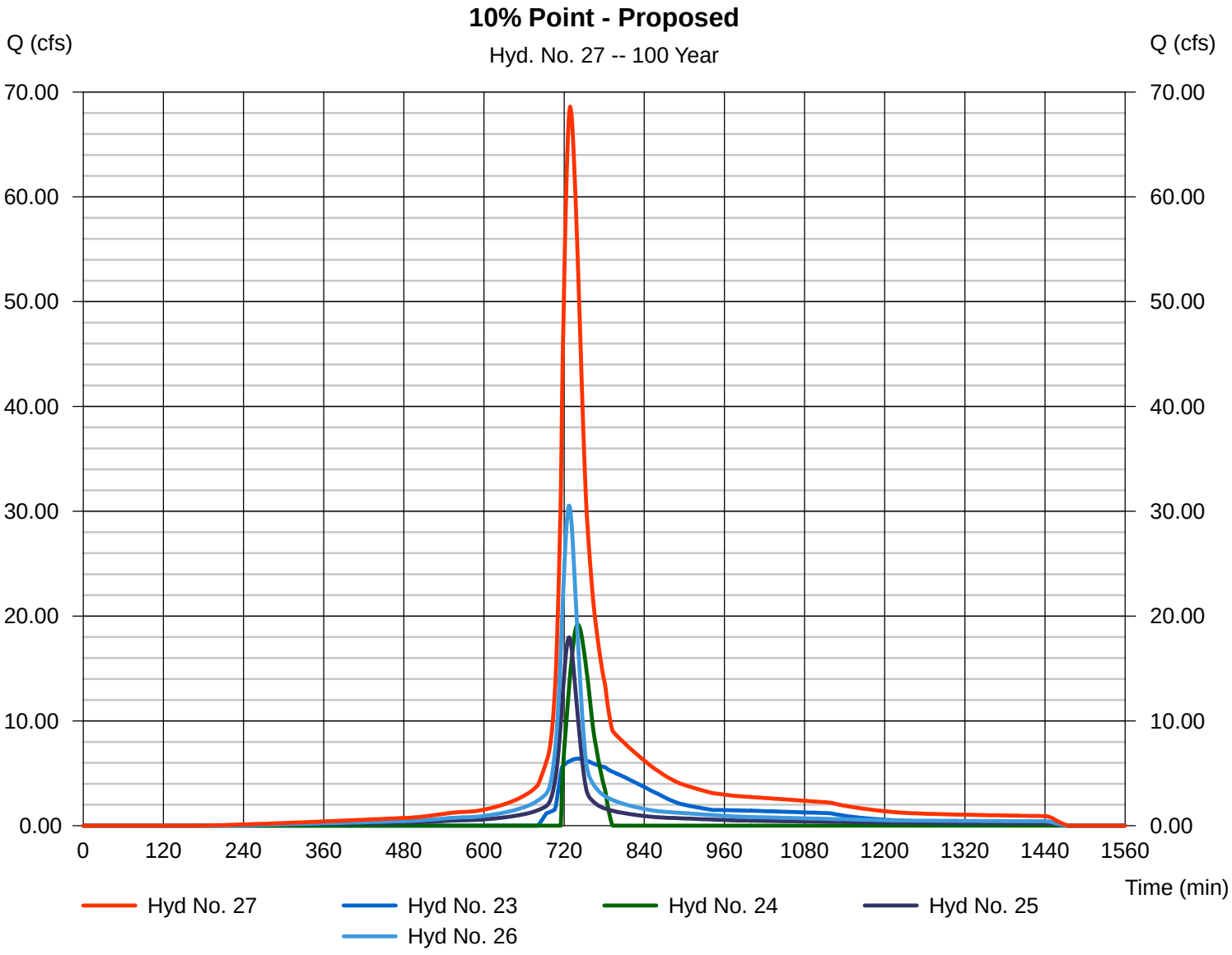


Hydrograph Report

Hyd. No. 27

10% Point - Proposed

Hydrograph type	=	Combine	Peak discharge	=	68.60 cfs
Storm frequency	=	100 yrs	Time to peak	=	729 min
Time interval	=	1 min	Hyd. volume	=	7.128 acft
Inflow hyds.	=	23, 24, 25, 26	Contrib. drain. area	=	7.700 ac



Appendix F – Time of Concentration Calculations

Project	Westgate Village Third Addition
Feature	
Analyst	Kara Anderson
Version	
Notes	

Sheet	Subbasin	Number of Segments	Sheet Flow (mins)	Shallow Concentrated Flow (mins)	Open Channel Ditch Flow (mins)	Open Channel Pipe Flow (mins)	Open Channel General Flow (mins)	Other (mins)	Total Tc (mins)	Length (feet)	Drop (feet)	Avg. Slope (%)	Avg. Vel. (fps)	Lag (mins)	Lag (hours)	Area (acres)
1	A	3	7.8	20.3	1.3	0.0	0.0	0.0	**29.4**	1320	5	0.38	0.75	17.6	0.294	6.1
2	B	2	1.5	1.0	0.0	0.0	0.0	0.0	**2.6**	200	2	1.00	1.30	1.5	0.026	0.5
3	C - Existing	2	15.3	1.2	0.0	0.0	0.0	0.0	**16.5**	240	4	1.67	0.24	9.9	0.165	0.5
4	D	5	1.3	2.1	0.0	0.2	0.1	4.2	**8.0**	1000	18	1.80	2.09	4.8	0.080	0.4
5	E - Existing	2	9.3	0.7	0.0	0.0	0.0	0.0	**10.0**	180	5	2.78	0.30	6.0	0.100	1.2
6	F	2	7.8	16.6	0.0	0.0	0.0	0.0	**24.4**	900	3	0.28	0.61	14.7	0.244	2.8
7	G	1	23.8	0.0	0.0	0.0	0.0	0.0	**23.8**	100	1	0.50	0.07	14.3	0.238	4.9
8	C - Proposed	2	1.3	0.9	0.0	0.0	0.0	0.0	**2.2**	240	4	1.67	1.85	1.3	0.022	0
9	E - Proposed	2	0.8	0.5	0.0	0.0	0.0	0.0	**1.3**	180	5	2.78	2.26	0.8	0.013	0

Subbasin Name	A
Drainage Area (ac)	6.1
Drainage Area (sq mi)	0.00953125

Sheet Flow

selected>>							Total
	Select (0 or 1)	1					1 segments
	Length (ft)	50					50 feet length
	Top Elevation (ft)	1350.0					
	Bottom Elevation (ft)	1349.0					
	Cover	0.24, Dense grasses					
	Specify alternate "n"						
	Sheet Flow "n" (dim)	0.240					
	2-yr, 24-hr Rainfall (ins)	3.50					
	Drop (ft)	1					1 feet drop
	Slope (ft/ft)	0.0200					
	Slope (%)	2.00					
	Velocity (fps)	0.11					
	Travel Time (hrs)	0.131					
	Travel Time (mins)	7.84					7.8 mins travel

Shallow Concentrated Flow

selected>>							Total
	Select (0 or 1)	1					1 segments
	Length (ft)	1000					### feet length
	Top Elevation (ft)	1349					
	Bottom Elevation (ft)	1346					
	Cover	15, Grassed waterway					
	Specify alternate "K"						
	Surface Coeff (dim)	15.00					
	Drop (ft)	3					3 feet drop
	Slope (ft/ft)	0.0030					
	Slope (%)	0.30					
	Velocity (fps)	0.82					
	Travel Time (mins)	20.29					20.3 mins travel

Open Channel Ditch Flow

selected>>							Total
	Select (0 or 1)	1					1 segments
	Length (ft)	270					270 feet length
	Top Elevation (ft)	1346					
	Bottom Elevation (ft)	1345					
	Channel Lining	0.03, Grassed					
	Bottom Width (ft)	5.00					
	Left Side Slope (H:V)	3.00					
	Right Side Slope (H:V)	3.00					
	Depth (ft)	2.00					
	Specify alternate "n"						
	Manning "n" (dim)	0.030					
	Drop (ft)	1					1 feet drop
	Slope (ft/ft)	0.0037					
	Slope (%)	0.37					
	Flow Area (sq ft)	22.00					
	Wet Perimeter (ft)	17.65					
	Hydraulic Radius (ft)	1.25					
	Velocity (fps)	3.50					
	Normal Flow (cfs)	77.0					
	Travel Time (mins)	1.29					1.3 mins travel

Open Channel Pipe Flow

						Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Pipe Material						
Diameter (ins)						
Flow Depth (ins)						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Theta (radians)						
Flow Area (sq ft)						
Wet Perimeter (ft)						
Hydraulic Radius (ft)						
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

Open Channel General Flow

						Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Hydraulic Radius (ft)						
Channel Lining						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Velocity (fps)						
Travel Time (mins)						0.0 mins travel

Other (Computed Separately)

						Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Drop (ft)						0 feet drop
Velocity (fps)						
Slope (ft/ft)						
Slope (%)						
Travel Time (mins)						0.0 mins travel

Total for Subbasin

Segments	3
Length (ft)	1320
Drop (ft)	5
Slope (ft/ft)	0.0038
Slope (%)	0.38
Velocity (fps)	0.75
Travel Time (mins)	**29.4**
Lag (mins)	17.6
Lag (hrs)	0.294

Subbasin Name	B
Drainage Area (ac)	0.5
Drainage Area (sq mi)	0.00078125

selected>>	Sheet Flow						Total
	Select (0 or 1)	1					1 segments
	Length (ft)	100					100 feet length
	Top Elevation (ft)	1350.0					
	Bottom Elevation (ft)	1349.0					
	Cover	0.011, Concrete, asphalt, etc.					
	Specify alternate "n"						
	Sheet Flow "n" (dim)	0.011					
	2-yr, 24-hr Rainfall (ins)	3.50					
	Drop (ft)	1					1 feet drop
	Slope (ft/ft)	0.0100					
	Slope (%)	1.00					
	Velocity (fps)	1.09					
	Travel Time (hrs)	0.025					
	Travel Time (mins)	1.53					1.5 mins travel

selected>>	Shallow Concentrated Flow						Total
	Select (0 or 1)	1					1 segments
	Length (ft)	100					100 feet length
	Top Elevation (ft)	1349					
	Bottom Elevation (ft)	1348					
	Cover	16.1, Unpaved					
	Specify alternate "K"						
	Surface Coeff (dim)	16.10					
	Drop (ft)	1					1 feet drop
	Slope (ft/ft)	0.0100					
	Slope (%)	1.00					
	Velocity (fps)	1.61					
	Travel Time (mins)	1.04					1.0 mins travel

Open Channel Ditch Flow						Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Channel Lining						
Bottom Width (ft)						
Left Side Slope (H:V)						
Right Side Slope (H:V)						
Depth (ft)						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Flow Area (sq ft)						
Wet Perimeter (ft)						
Hydraulic Radius (ft)						
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

Open Channel Pipe Flow						Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Pipe Material						
Diameter (ins)						
Flow Depth (ins)						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Theta (radians)						
Flow Area (sq ft)						
Wet Perimeter (ft)						
Hydraulic Radius (ft)						
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

Open Channel General Flow						Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Hydraulic Radius (ft)						
Channel Lining						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Velocity (fps)						
Travel Time (mins)						0.0 mins travel

Other (Computed Separately)						Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Drop (ft)						0 feet drop
Velocity (fps)						
Slope (ft/ft)						
Slope (%)						
Travel Time (mins)						0.0 mins travel

Total for Subbasin	
Segments	2
Length (ft)	200
Drop (ft)	2
Slope (ft/ft)	0.0100
Slope (%)	1.00
Velocity (fps)	1.30
Travel Time (mins)	**2.6**
Lag (mins)	1.5
Lag (hrs)	0.026

Subbasin Name	C - Existing
Drainage Area (ac)	0.5
Drainage Area (sq mi)	0.00078125

Sheet Flow

selected>>							Total
	Select (0 or 1)	1					1 segments
	Length (ft)	100					100 feet length
	Top Elevation (ft)	1350.0					
	Bottom Elevation (ft)	1348.5					
	Cover	0.24, Dense grasses					
	Specify alternate "n"						
	Sheet Flow "n" (dim)	0.240					
	2-yr, 24-hr Rainfall (ins)	3.50					
	Drop (ft)	2					2 feet drop
	Slope (ft/ft)	0.0150					
	Slope (%)	1.50					
	Velocity (fps)	0.11					
	Travel Time (hrs)	0.255					
	Travel Time (mins)	15.31					15.3 mins travel

Shallow Concentrated Flow

selected>>							Total
	Select (0 or 1)	1					1 segments
	Length (ft)	140					140 feet length
	Top Elevation (ft)	1348.5					
	Bottom Elevation (ft)	1346					
	Cover	15, Grassed waterway					
	Specify alternate "K"						
	Surface Coeff (dim)	15.00					
	Drop (ft)	3					2.5 feet drop
	Slope (ft/ft)	0.0179					
	Slope (%)	1.79					
	Velocity (fps)	2.00					
	Travel Time (mins)	1.16					1.2 mins travel

Open Channel Ditch Flow

						Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Channel Lining						
Bottom Width (ft)						
Left Side Slope (H:V)						
Right Side Slope (H:V)						
Depth (ft)						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Flow Area (sq ft)						
Wet Perimeter (ft)						
Hydraulic Radius (ft)						
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

Open Channel Pipe Flow

						Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Pipe Material						
Diameter (ins)						
Flow Depth (ins)						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Theta (radians)						
Flow Area (sq ft)						
Wet Perimeter (ft)						
Hydraulic Radius (ft)						
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

Open Channel General Flow

						Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Hydraulic Radius (ft)						
Channel Lining						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Velocity (fps)						
Travel Time (mins)						0.0 mins travel

Other (Computed Separately)

						Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Drop (ft)						0 feet drop
Velocity (fps)						
Slope (ft/ft)						
Slope (%)						
Travel Time (mins)						0.0 mins travel

Total for Subbasin

Segments	2
Length (ft)	240
Drop (ft)	4
Slope (ft/ft)	0.0167

Subbasin Name	D
Drainage Area (ac)	0.4
Drainage Area (sq mi)	0.000625

	Sheet Flow					Total
selected>>	Select (0 or 1)	1				1 segments
	Length (ft)	100				100 feet length
	Top Elevation (ft)	1351.0				
	Bottom Elevation (ft)	1349.5				
	Cover	0.011, Concrete, asphalt, etc.				
	Specify alternate "n"					
	Sheet Flow "n" (dim)	0.011				
	2-yr, 24-hr Rainfall (ins)	3.50				
	Drop (ft)	2				2 feet drop
	Slope (ft/ft)	0.0150				
	Slope (%)	1.50				
	Velocity (fps)	1.28				
	Travel Time (hrs)	0.022				
	Travel Time (mins)	1.30				1.3 mins travel

	Shallow Concentrated Flow					Total
selected>>	Select (0 or 1)	1				1 segments
	Length (ft)	150				150 feet length
	Top Elevation (ft)	1349.5				
	Bottom Elevation (ft)	1349				
	Cover	20.3, Paved				
	Specify alternate "K"					
	Surface Coeff (dim)	20.30				
	Drop (ft)	1				0.5 feet drop
	Slope (ft/ft)	0.0033				
	Slope (%)	0.33				
	Velocity (fps)	1.17				
	Travel Time (mins)	2.13				2.1 mins travel

	Open Channel Ditch Flow					Total
	Select (0 or 1)					0 segments
	Length (ft)					0 feet length
	Top Elevation (ft)					
	Bottom Elevation (ft)					
	Channel Lining					
	Bottom Width (ft)					
	Left Side Slope (H:V)					
	Right Side Slope (H:V)					
	Depth (ft)					
	Specify alternate "n"					
	Manning "n" (dim)					
	Drop (ft)					0 feet drop
	Slope (ft/ft)					
	Slope (%)					
	Flow Area (sq ft)					
	Wet Perimeter (ft)					
	Hydraulic Radius (ft)					
	Velocity (fps)					
	Normal Flow (cfs)					
selected>>	Travel Time (mins)					0.0 mins travel

	Open Channel Pipe Flow					Total
	Select (0 or 1)	1				1 segments
	Length (ft)	100				100 feet length
	Top Elevation (ft)	20				
	Bottom Elevation (ft)	18				
	Pipe Material	0.017, Rough concrete				
	Diameter (ins)	24.00				
	Flow Depth (ins)	24.00				
	Specify alternate "n"					
	Manning "n" (dim)	0.017				
	Drop (ft)	2				2 feet drop
	Slope (ft/ft)	0.0200				
	Slope (%)	2.00				
	Theta (radians)	6.283				
	Flow Area (sq ft)	3.14				
	Wet Perimeter (ft)	6.28				
	Hydraulic Radius (ft)	0.50				
	Velocity (fps)	7.81				
selected>>	Normal Flow (cfs)	24.5				
	Travel Time (mins)	0.21				0.2 mins travel

	Open Channel General Flow					Total
	Select (0 or 1)	1				1 segments
	Length (ft)	150				150 feet length
	Top Elevation (ft)	30				
	Bottom Elevation (ft)	26				
	Hydraulic Radius (ft)	2.30				
	Channel Lining	0.025, Clean Earth				
	Specify alternate "n"					
	Manning "n" (dim)	0.025				
	Drop (ft)	4				4 feet drop
	Slope (ft/ft)	0.0267				
selected>>	Slope (%)	2.67				
	Velocity (fps)	16.96				
	Travel Time (mins)	0.15				0.1 mins travel

	Other (Computed Separately)					Total
	Select (0 or 1)	1				1 segments
	Length (ft)	500				500 feet length
	Drop (ft)	10				10 feet drop
	Velocity (fps)	2.00				
	Slope (ft/ft)	0.0200				
	Slope (%)	2.00				
	Travel Time (mins)	4.17				4.2 mins travel

Total for Subbasin

Segments	5
Length (ft)	1000
Drop (ft)	18
Slope (ft/ft)	0.0180

Subbasin Name	E - Existing
Drainage Area (ac)	1.2
Drainage Area (sq mi)	0.001875

Sheet Flow

selected>>							Total
	Select (0 or 1)	1					1 segments
	Length (ft)	80					80 feet length
	Top Elevation (ft)	1351.0					
	Bottom Elevation (ft)	1348.3					
	Cover	0.24, Dense grasses					
	Specify alternate "n"						
	Sheet Flow "n" (dim)	0.240					
	2-yr, 24-hr Rainfall (ins)	3.50					
	Drop (ft)	3					3 feet drop
	Slope (ft/ft)	0.0338					
	Slope (%)	3.38					
	Velocity (fps)	0.14					
	Travel Time (hrs)	0.154					
	Travel Time (mins)	9.26					9.3 mins travel

Shallow Concentrated Flow

selected>>							Total
	Select (0 or 1)	1					1 segments
	Length (ft)	100					100 feet length
	Top Elevation (ft)	1348.3					
	Bottom Elevation (ft)	1346					
	Cover	15, Grassed waterway					
	Specify alternate "K"						
	Surface Coeff (dim)	15.00					
	Drop (ft)	2					2.3 feet drop
	Slope (ft/ft)	0.0230					
	Slope (%)	2.30					
	Velocity (fps)	2.27					
	Travel Time (mins)	0.73					0.7 mins travel

Open Channel Ditch Flow

						Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Channel Lining						
Bottom Width (ft)						
Left Side Slope (H:V)						
Right Side Slope (H:V)						
Depth (ft)						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Flow Area (sq ft)						
Wet Perimeter (ft)						
Hydraulic Radius (ft)						
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

Open Channel Pipe Flow

						Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Pipe Material						
Diameter (ins)						
Flow Depth (ins)						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Theta (radians)						
Flow Area (sq ft)						
Wet Perimeter (ft)						
Hydraulic Radius (ft)						
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

Open Channel General Flow

						Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Hydraulic Radius (ft)						
Channel Lining						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Velocity (fps)						
Travel Time (mins)						0.0 mins travel

Other (Computed Separately)

						Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Drop (ft)						0 feet drop
Velocity (fps)						
Slope (ft/ft)						
Slope (%)						
Travel Time (mins)						0.0 mins travel

Total for Subbasin

Segments	2
Length (ft)	180
Drop (ft)	5
Slope (ft/ft)	0.0278

Subbasin Name	F
Drainage Area (ac)	2.8
Drainage Area (sq mi)	0.004375

	Sheet Flow					Total
selected>> Select (0 or 1)	1					1 segments
Length (ft)	50					50 feet length
Top Elevation (ft)	1350.0					
Bottom Elevation (ft)	1349.0					
Cover	0.24, Dense grasses					
Specify alternate "n"						
Sheet Flow "n" (dim)	0.240					
2-yr, 24-hr Rainfall (ins)	3.50					
Drop (ft)	1					1 feet drop
Slope (ft/ft)	0.0200					
Slope (%)	2.00					
Velocity (fps)	0.11					
Travel Time (hrs)	0.131					
Travel Time (mins)	7.84					7.8 mins travel

	Shallow Concentrated Flow					Total
selected>> Select (0 or 1)	1					1 segments
Length (ft)	850					850 feet length
Top Elevation (ft)	1349					
Bottom Elevation (ft)	1348					
Cover	20.3, Paved					
Specify alternate "K"						
Surface Coeff (dim)	20.30					
Drop (ft)	2					1.5 feet drop
Slope (ft/ft)	0.0018					
Slope (%)	0.18					
Velocity (fps)	0.85					
Travel Time (mins)	16.61					16.6 mins travel

	Open Channel Ditch Flow					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Channel Lining						
Bottom Width (ft)						
Left Side Slope (H:V)						
Right Side Slope (H:V)						
Depth (ft)						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Flow Area (sq ft)						
Wet Perimeter (ft)						
Hydraulic Radius (ft)						
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

	Open Channel Pipe Flow					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Pipe Material						
Diameter (ins)						
Flow Depth (ins)						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Theta (radians)						
Flow Area (sq ft)						
Wet Perimeter (ft)						
Hydraulic Radius (ft)						
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

	Open Channel General Flow					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Hydraulic Radius (ft)						
Channel Lining						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Velocity (fps)						
Travel Time (mins)						0.0 mins travel

	Other (Computed Separately)					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Drop (ft)						0 feet drop
Velocity (fps)						
Slope (ft/ft)						
Slope (%)						
Travel Time (mins)						0.0 mins travel

Total for Subbasin

Segments	2
Length (ft)	900
Drop (ft)	3
Slope (ft/ft)	0.0028

Subbasin Name	G
Drainage Area (ac)	4.9
Drainage Area (sq mi)	0.00765625

	Sheet Flow					Total
selected>> Select (0 or 1)	1					1 segments
Length (ft)	100					100 feet length
Top Elevation (ft)	1346.5					
Bottom Elevation (ft)	1346.0					
Cover	0.24, Dense grasses					
Specify alternate "n"						
Sheet Flow "n" (dim)	0.240					
2-yr, 24-hr Rainfall (ins)	3.50					
Drop (ft)	1					1 feet drop
Slope (ft/ft)	0.0050					
Slope (%)	0.50					
Velocity (fps)	0.07					
Travel Time (hrs)	0.396					
Travel Time (mins)	23.76					23.8 mins travel

	Shallow Concentrated Flow					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Cover						
Specify alternate "K"						
Surface Coeff (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Velocity (fps)						
Travel Time (mins)						0.0 mins travel

	Open Channel Ditch Flow					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Channel Lining						
Bottom Width (ft)						
Left Side Slope (H:V)						
Right Side Slope (H:V)						
Depth (ft)						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Flow Area (sq ft)						
Wet Perimeter (ft)						
Hydraulic Radius (ft)						
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

	Open Channel Pipe Flow					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Pipe Material						
Diameter (ins)						
Flow Depth (ins)						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Theta (radians)						
Flow Area (sq ft)						
Wet Perimeter (ft)						
Hydraulic Radius (ft)						
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

	Open Channel General Flow					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Hydraulic Radius (ft)						
Channel Lining						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Velocity (fps)						
Travel Time (mins)						0.0 mins travel

	Other (Computed Separately)					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Drop (ft)						0 feet drop
Velocity (fps)						
Slope (ft/ft)						
Slope (%)						
Travel Time (mins)						0.0 mins travel

Total for Subbasin

Segments	1
Length (ft)	100
Drop (ft)	1
Slope (ft/ft)	0.0050

Subbasin Name	C - Proposed
Drainage Area (ac)	
Drainage Area (sq mi)	0

	Sheet Flow					Total
selected>> Select (0 or 1)	1					1 segments
Length (ft)	100					100 feet length
Top Elevation (ft)	1350.0					
Bottom Elevation (ft)	1348.5					
Cover	0.011, Concrete, asphalt, etc.					
Specify alternate "n"						
Sheet Flow "n" (dim)	0.011					
2-yr, 24-hr Rainfall (ins)	3.50					
Drop (ft)	2					2 feet drop
Slope (ft/ft)	0.0150					
Slope (%)	1.50					
Velocity (fps)	1.28					
Travel Time (hrs)	0.022					
Travel Time (mins)	1.30					1.3 mins travel

	Shallow Concentrated Flow					Total
selected>> Select (0 or 1)	1					1 segments
Length (ft)	140					140 feet length
Top Elevation (ft)	1348.5					
Bottom Elevation (ft)	1346					
Cover	20.3, Paved					
Specify alternate "K"						
Surface Coeff (dim)	20.30					
Drop (ft)	3					2.5 feet drop
Slope (ft/ft)	0.0179					
Slope (%)	1.79					
Velocity (fps)	2.71					
Travel Time (mins)	0.86					0.9 mins travel

	Open Channel Ditch Flow					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Channel Lining						
Bottom Width (ft)						
Left Side Slope (H:V)						
Right Side Slope (H:V)						
Depth (ft)						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Flow Area (sq ft)						
Wet Perimeter (ft)						
Hydraulic Radius (ft)						
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

	Open Channel Pipe Flow					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Pipe Material						
Diameter (ins)						
Flow Depth (ins)						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Theta (radians)						
Flow Area (sq ft)						
Wet Perimeter (ft)						
Hydraulic Radius (ft)						
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

	Open Channel General Flow					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Hydraulic Radius (ft)						
Channel Lining						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Velocity (fps)						
Travel Time (mins)						0.0 mins travel

	Other (Computed Separately)					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Drop (ft)						0 feet drop
Velocity (fps)						
Slope (ft/ft)						
Slope (%)						
Travel Time (mins)						0.0 mins travel

Total for Subbasin

Segments	2
Length (ft)	240
Drop (ft)	4
Slope (ft/ft)	0.0167

Subbasin Name	E - Proposed
Drainage Area (ac)	
Drainage Area (sq mi)	0

	Sheet Flow					Total
selected>> Select (0 or 1)	1					1 segments
Length (ft)	80					80 feet length
Top Elevation (ft)	1351.0					
Bottom Elevation (ft)	1348.3					
Cover	0.011, Concrete, asphalt, etc.					
Specify alternate "n"						
Sheet Flow "n" (dim)	0.011					
2-yr, 24-hr Rainfall (ins)	3.50					
Drop (ft)	3					3 feet drop
Slope (ft/ft)	0.0338					
Slope (%)	3.38					
Velocity (fps)	1.70					
Travel Time (hrs)	0.013					
Travel Time (mins)	0.79					0.8 mins travel

	Shallow Concentrated Flow					Total
selected>> Select (0 or 1)	1					1 segments
Length (ft)	100					100 feet length
Top Elevation (ft)	1348.3					
Bottom Elevation (ft)	1346					
Cover	20.3, Paved					
Specify alternate "K"						
Surface Coeff (dim)	20.30					
Drop (ft)	2					2.3 feet drop
Slope (ft/ft)	0.0230					
Slope (%)	2.30					
Velocity (fps)	3.08					
Travel Time (mins)	0.54					0.5 mins travel

	Open Channel Ditch Flow					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Channel Lining						
Bottom Width (ft)						
Left Side Slope (H:V)						
Right Side Slope (H:V)						
Depth (ft)						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Flow Area (sq ft)						
Wet Perimeter (ft)						
Hydraulic Radius (ft)						
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

	Open Channel Pipe Flow					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Pipe Material						
Diameter (ins)						
Flow Depth (ins)						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Theta (radians)						
Flow Area (sq ft)						
Wet Perimeter (ft)						
Hydraulic Radius (ft)						
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

	Open Channel General Flow					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Hydraulic Radius (ft)						
Channel Lining						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Velocity (fps)						
Travel Time (mins)						0.0 mins travel

	Other (Computed Separately)					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Drop (ft)						0 feet drop
Velocity (fps)						
Slope (ft/ft)						
Slope (%)						
Travel Time (mins)						0.0 mins travel

Total for Subbasin

Segments	2
Length (ft)	180
Drop (ft)	5
Slope (ft/ft)	0.0278

Appendix G – Curve Number Calculations

Curve Number Calculations
Westgate Village Third Lot 1 Block 1
Proposed Site
Estimate Imperviousness per Land Use

HSG A			HSG B			HSG C			HSG D		
Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)
Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	85%	1.7	Commercial and Business	85%	
Industrial	72%		Industrial	72%		Industrial	72%		Industrial	72%	
Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%	
Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%	
Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%	
Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%	
Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%	
Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%	
Impervious Area (acres)		0	Impervious Area (acres)		0	Impervious Area (acres)		1.445	Impervious Area (acres)		0

Composite Curve Number (CN)

HSG A			HSG B			HSG C			HSG D		
Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)
Pre-Developed or Undisturbed Pervious	55		Pre-Developed or Undisturbed Pervious	71		Pre-Developed or Undisturbed Pervious	80		Pre-Developed or Undisturbed Pervious	84	
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80		Developed or Disturbed Pervious	84	0.255	Developed or Disturbed Pervious	88	
Impervious	98	0	Impervious	98		Impervious	98	1.445	Impervious	98	
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	0.0	0	Composite Curve Number HSG C (CN)	95.9	1.7	Composite Curve Number HSG D (CN)	0.0	0

Total Weighted Composite Curve Number (CN)	95.9
Total Area (A) (acres)	1.7

Curve Number Calculations
Westgate Village Third Addition
Proposed Site
Estimate Imperviousness per Land Use

HSG A			HSG B			HSG C			HSG D		
Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)
Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	85%	0.2
Industrial	72%		Industrial	72%		Industrial	72%		Industrial	72%	
Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%	
Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%	4	Residential 1/4 acre	38%	0.7
Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%	
Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%	
Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%	
Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%	
Impervious Area (acres)		0	Impervious Area (acres)		0	Impervious Area (acres)		1.52	Impervious Area (acres)		0.436

Composite Curve Number (CN)

HSG A			HSG B			HSG C			HSG D		
Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)
Pre-Developed or Undisturbed Pervious	55		Pre-Developed or Undisturbed Pervious	71		Pre-Developed or Undisturbed Pervious	80	1	Pre-Developed or Undisturbed Pervious	84	0.2
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80		Developed or Disturbed Pervious	84	2.48	Developed or Disturbed Pervious	88	0.464
Impervious	98	0	Impervious	98		Impervious	98	1.52	Impervious	98	0.436
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	0.0	0	Composite Curve Number HSG C (CN)	87.5	5	Composite Curve Number HSG D (CN)	91.2	1.1

Total Weighted Composite Curve Number (CN)	88.1
Total Area (A) (acres)	6.1

Curve Number Calculations
Westgate Village Third Addition
Proposed Site
Estimate Imperviousness per Land Use

HSG A			HSG B			HSG C			HSG D		
Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)
Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	85%	0.2	Commercial and Business	85%	
Industrial	72%		Industrial	72%		Industrial	72%		Industrial	72%	
Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%	
Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%	
Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%	
Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%	
Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%	
Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%	
Impervious Area (acres)		0	Impervious Area (acres)		0	Impervious Area (acres)		0.17	Impervious Area (acres)		0

Composite Curve Number (CN)

HSG A			HSG B			HSG C			HSG D		
Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)
Pre-Developed or Undisturbed Pervious	55		Pre-Developed or Undisturbed Pervious	71		Pre-Developed or Undisturbed Pervious	80		Pre-Developed or Undisturbed Pervious	84	
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80		Developed or Disturbed Pervious	84	0.03	Developed or Disturbed Pervious	88	
Impervious	98	0	Impervious	98		Impervious	98	0.17	Impervious	98	
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	0.0	0	Composite Curve Number HSG C (CN)	95.9	0.2	Composite Curve Number HSG D (CN)	0.0	0

Total Weighted Composite Curve Number (CN)	95.9
Total Area (A) (acres)	0.2

Curve Number Calculations
Westgate Village Third Addition
Proposed Site
Estimate Imperviousness per Land Use

HSG A			HSG B			HSG C			HSG D		
Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)
Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	85%	
Industrial	72%		Industrial	72%		Industrial	72%		Industrial	72%	
Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%	
Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%	
Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%	
Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%	
Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%	
Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%	
Impervious Area (acres)		0	Impervious Area (acres)		0	Impervious Area (acres)		0	Impervious Area (acres)		0

Composite Curve Number (CN)

HSG A			HSG B			HSG C			HSG D		
Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)
Pre-Developed or Undisturbed Pervious	55		Pre-Developed or Undisturbed Pervious	71		Pre-Developed or Undisturbed Pervious	80	0.5	Pre-Developed or Undisturbed Pervious	84	
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80		Developed or Disturbed Pervious	84	0	Developed or Disturbed Pervious	88	
Impervious	98	0	Impervious	98		Impervious	98	0	Impervious	98	
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	0.0	0	Composite Curve Number HSG C (CN)	80.0	0.5	Composite Curve Number HSG D (CN)	0.0	0

Total Weighted Composite Curve Number (CN)	80.0
Total Area (A) (acres)	0.5

Curve Number Calculations
Westgate Village Third Addition
Proposed Site
Estimate Imperviousness per Land Use

HSG A			HSG B			HSG C			HSG D		
Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)
Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	85%	0.4	Commercial and Business	85%	
Industrial	72%		Industrial	72%		Industrial	72%		Industrial	72%	
Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%	
Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%	
Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%	
Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%	
Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%	
Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%	
Impervious Area (acres)		0	Impervious Area (acres)		0	Impervious Area (acres)		0.34	Impervious Area (acres)		0

Composite Curve Number (CN)

HSG A			HSG B			HSG C			HSG D		
Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)
Pre-Developed or Undisturbed Pervious	55		Pre-Developed or Undisturbed Pervious	71		Pre-Developed or Undisturbed Pervious	80		Pre-Developed or Undisturbed Pervious	84	
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80		Developed or Disturbed Pervious	84	0.06	Developed or Disturbed Pervious	88	
Impervious	98	0	Impervious	98		Impervious	98	0.34	Impervious	98	
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	0.0	0	Composite Curve Number HSG C (CN)	95.9	0.4	Composite Curve Number HSG D (CN)	0.0	0

Total Weighted Composite Curve Number (CN)	95.9
Total Area (A) (acres)	0.4

Curve Number Calculations
Westgate Village Third Addition
Proposed Site
Estimate Imperviousness per Land Use

HSG A			HSG B			HSG C			HSG D		
Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)
Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	85%	
Industrial	72%		Industrial	72%		Industrial	72%		Industrial	72%	
Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%	
Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%	
Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%	
Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%	
Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%	
Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%	
Impervious Area (acres)		0	Impervious Area (acres)		0	Impervious Area (acres)		0	Impervious Area (acres)		0

Composite Curve Number (CN)

HSG A			HSG B			HSG C			HSG D		
Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)
Pre-Developed or Undisturbed Pervious	55		Pre-Developed or Undisturbed Pervious	71		Pre-Developed or Undisturbed Pervious	80	1.2	Pre-Developed or Undisturbed Pervious	84	
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80		Developed or Disturbed Pervious	84	0	Developed or Disturbed Pervious	88	
Impervious	98	0	Impervious	98		Impervious	98	0	Impervious	98	
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	0.0	0	Composite Curve Number HSG C (CN)	80.0	1.2	Composite Curve Number HSG D (CN)	0.0	0

Total Weighted Composite Curve Number (CN)	80.0
Total Area (A) (acres)	1.2

Curve Number Calculations
Westgate Village Third Addition
Proposed Site
Estimate Imperviousness per Land Use

HSG A			HSG B			HSG C			HSG D		
Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)
Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	85%	
Industrial	72%		Industrial	72%		Industrial	72%		Industrial	72%	
Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%	
Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%	1.4	Residential 1/4 acre	38%	1.4
Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%	
Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%	
Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%	
Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%	
Impervious Area (acres)		0	Impervious Area (acres)		0	Impervious Area (acres)		0.532	Impervious Area (acres)		0.532

Composite Curve Number (CN)

HSG A			HSG B			HSG C			HSG D		
Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)
Pre-Developed or Undisturbed Pervious	55		Pre-Developed or Undisturbed Pervious	71		Pre-Developed or Undisturbed Pervious	80		Pre-Developed or Undisturbed Pervious	84	
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80		Developed or Disturbed Pervious	84	0.868	Developed or Disturbed Pervious	88	0.868
Impervious	98	0	Impervious	98		Impervious	98	0.532	Impervious	98	0.532
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	0.0	0	Composite Curve Number HSG C (CN)	89.3	1.4	Composite Curve Number HSG D (CN)	91.8	1.4

Total Weighted Composite Curve Number (CN)	90.6
Total Area (A) (acres)	2.8

Curve Number Calculations
Westgate Village Third Addition
Proposed Site
Estimate Imperviousness per Land Use

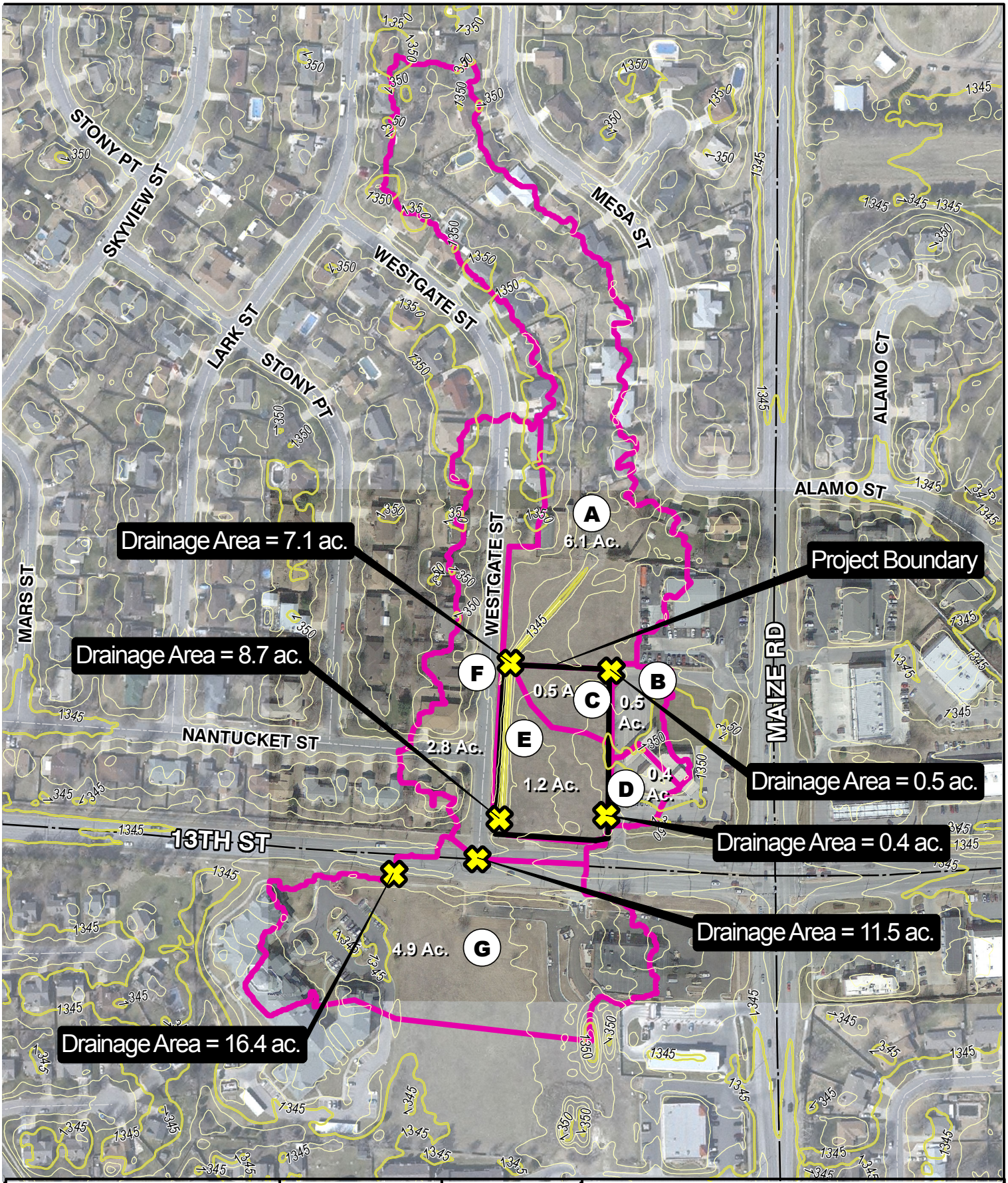
HSG A			HSG B			HSG C			HSG D		
Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)
Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	85%	2.5	Commercial and Business	85%	
Industrial	72%		Industrial	72%		Industrial	72%		Industrial	72%	
Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%	
Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%	
Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%	
Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%	
Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%	
Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%	
Impervious Area (acres)		0	Impervious Area (acres)		0	Impervious Area (acres)		2.125	Impervious Area (acres)		0

Composite Curve Number (CN)

HSG A			HSG B			HSG C			HSG D		
Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)
Pre-Developed or Undisturbed Pervious	55		Pre-Developed or Undisturbed Pervious	71		Pre-Developed or Undisturbed Pervious	80	2.4	Pre-Developed or Undisturbed Pervious	84	
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80		Developed or Disturbed Pervious	84	0.375	Developed or Disturbed Pervious	88	0
Impervious	98	0	Impervious	98		Impervious	98	2.125	Impervious	98	0
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	0.0	0	Composite Curve Number HSG C (CN)	88.1	4.9	Composite Curve Number HSG D (CN)	0.0	0

Total Weighted Composite Curve Number (CN)	88.1
Total Area (A) (acres)	4.9

Appendix H – Existing Drainage Basins



SEC: 7
TWP: T27S
RNG: R1W

0 125 250
Feet

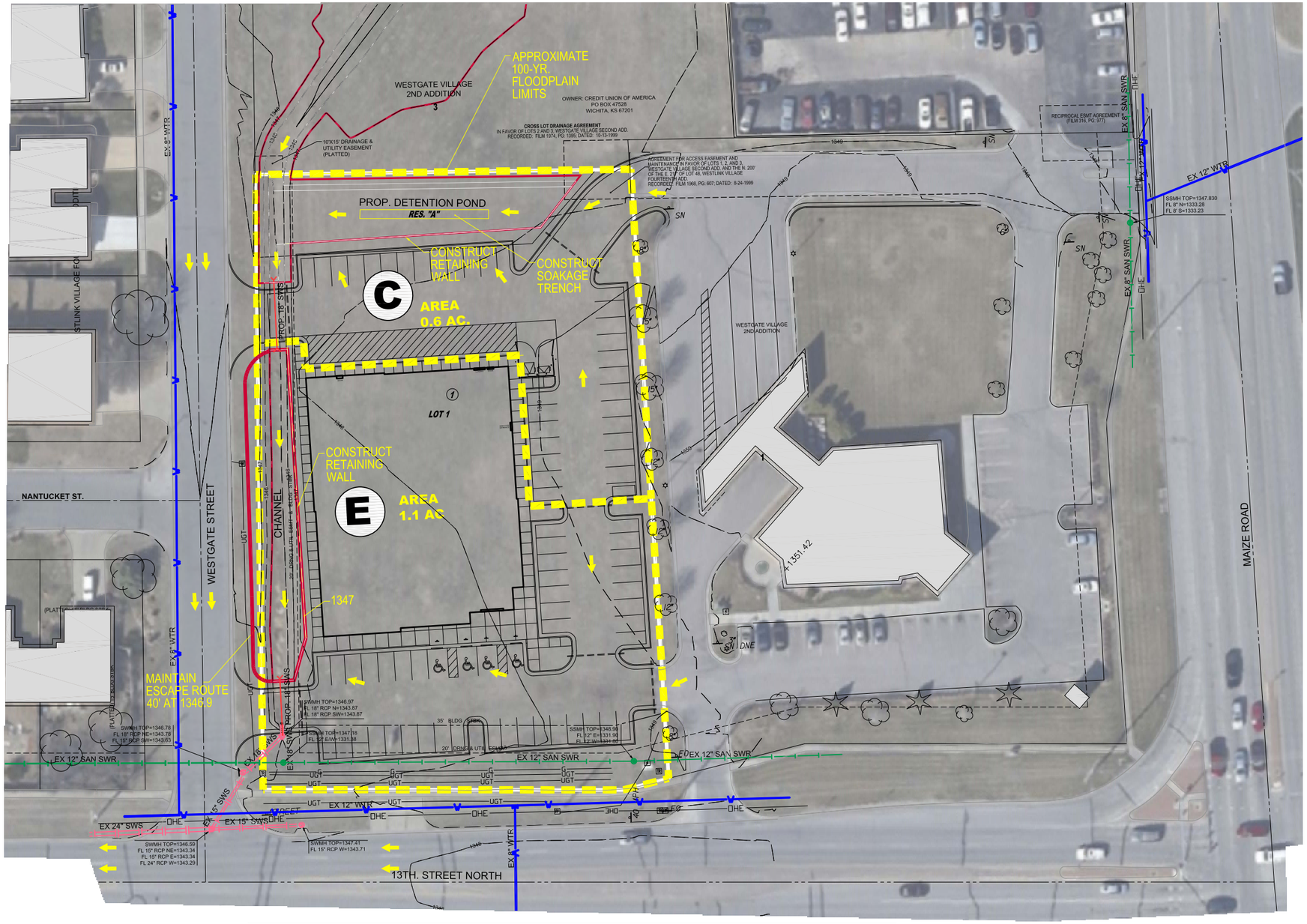
MKEC
Wichita, KS · 316.684.9600

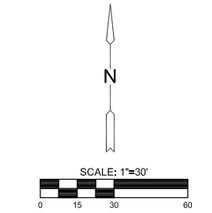
Existing Drainage Basins
WESTGATE VILLAGE THIRD ADDITION

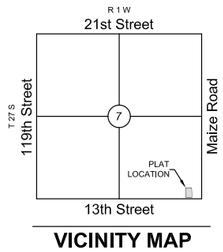
PROJECT NO. 1401010187	DATE: 5/15/2014	SHEET NO.
DRAWN BY: JGD	DESIGNED BY: JGD	APPROVED BY: KLA	1 OF 1

Path: J:\Projects\2014\1401010187_EquityVentures Commercial Dev\05-Civil\GIS\Drainage Basins.mxd - Date: 5/15/2014

Appendix I - Drainage and Utility Plan







VICINITY MAP

LEGEND

- PROPOSED DRAINAGE BOUNDARY
- FLOW ARROWS
- PROPOSED WATER
- PROPOSED SANITARY SEWER
- PROPOSED STORM WATER SEWER
- EXISTING WATER
- EXISTING SANITARY SEWER
- EXISTING STORM WATER SEWER
- WESTGATE VILLAGE THIRD BOUNDARY

Table 7. Proposed Channel/Pond Details.

Design Storm	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Flow In (cfs)	14.4	18.8	25.8	30.4	37.4	42.6	47.2
Flow Out to SWS (cfs)	1.3	2.3	5.2	5.7	6.0	6.2	6.3
Flow Out to Westgate (cfs)	0.0	0.0	0.4	5.3	10.9	15.3	19.2
Water Surface Elev. (ft)	1346.1	1346.4	1346.9	1347.0	1347.1	1347.2	1347.2
Storage (ac-ft)	0.76	0.98	1.28	1.40	1.58	1.70	1.79
Primary Outlet	15" RCP at 1345.1						
Secondary Outlet	Overtopping embankment/curb approx. 40' wide at 1346.9						

J:\PROJECTS\2014\14010187_EQUITYVENTURES COMMERCIAL DEV\05-CIVIL\CAD\DRAINAGE\DRAWINGS\14187_DUP.DWG

MKEC
Wichita, KS · 316-684-9600

DRAINAGE & UTILITY PLAN FOR

WESTGATE VILLAGE THIRD ADDITION

WICHITA, KANSAS

DRAINAGE & UTILITY PLAN

PROJECT NO.	14187
DATE	MAY 2014
SCALE	AS NOTED

DESIGNED	DRAWN	CHECKED
KLA	DM	GJA

NO.	REVISION	DATE

SHEET NO.

1 OF 1

Appendix J - Plat

LEGAL DESCRIPTION

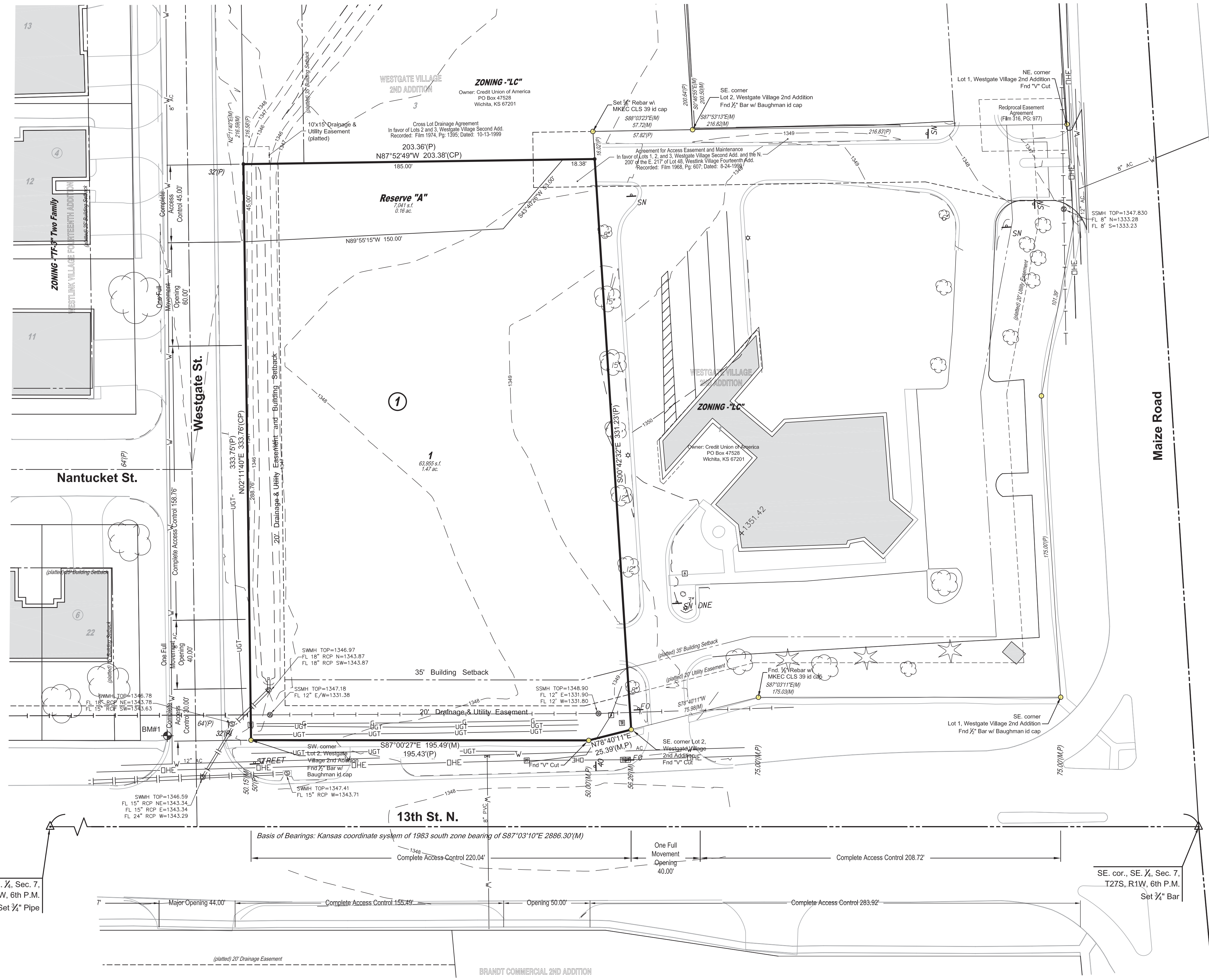
A replat of Lot 2, Westgate Village 2nd Addition, Wichita, Sedgwick County, Kansas.

NOTES

1. LOCATION: Located in west Wichita, west of Maize Road and north of 13th Street in an area of mixed uses having single family housing, multi-family housing, business offices, commercial retail, bank, convenience store and restaurants.
2. LOT TOTAL - 1
3. EXSTING/PROPOSED USES: Existing - Vacant Land
   Proposed - Retail Grocery Store
4. ZONING: Existing - Limited Commercial Zoning District - "LC"
   Proposed - Limited Commercial Zoning - "LC"
   Plat Area: 70,996 sq. ft. or 1.63 acres ±
5. SURVEY DATE: April 2014 (by MKEC)
6. PUBLIC UTILITIES: A municipal sanitary sewer and water is provided along the south side of the property north of 13th Street.
7. ACCESS / ACCESS CONTROLS: Two full movement openings on the west side of property. One full movement openings on the south side of property, as shown hereon.
8. RESERVES: One Reserve
9. FLOOD: According to FEMA FIRM Community Unit Panel 20173C0330F, effective date February 2nd, 2007; this property lies within flood zone "X", *"Areas determined to be outside the 0.2% annual chance floodplain."*
10. DRAINAGE: A drainage report shall accompany this plat and will be submitted to the Public Works & Utilities Department - Stormwater Management Division.
11. BUILDING SETBACKS: As per Zoning District

LEGEND

- Section Corner Monument Found
- Set 5/8" rebar w/ MKEC CLS 39 id. cap or see annotation for type
- Found 5/8" rebar w/ MKEC CLS 39 id cap or see annotation for type
- Benchmark
- (M) - Measured
- (CP) - Calculated from platted
- (P) - Platted
- Water Meter
- WV - Water Valve
- Fire Hydrant
- Stormwater Manhole
- Sanitary Sewer Manhole
- Manhole
- Storm Inlet
- Telephone Manhole
- Telephone Vault
- Telephone Riser
- Telephone Riser
- Light Pole
- Traffic Signal Manhole
- Sign
- Electrical Control Box
- Power Pole
- OHE - Overhead Electric
- G - Gas Line
- Sanitary Sewer Line
- Storm Sewer Line
- UGT - Underground Telephone Line
- W - Water Line
- 1300 - Major Contour
- 1301 - Minor Contour
- Existing Structure

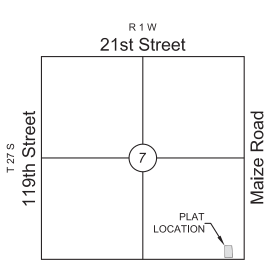


NORTH

1"=30' / 1 : 360

0 30 60

Basis of Bearing: Kansas coordinate system of 1983 south zone grid bearing of S87°03'10"E on the south line of the SE 1/4, Sec. 7, T27S, R1W, 6th P.M. This plat is surveyed and platted on NAVD88-09 using Kansas state plane south zone coordinates, modified to the surface, having a combined adjustment scale factor of 1.000120014401728



VICINITY MAP

BENCH MARK

BM#1 Chiseled square on top of curb at the north return near the Northwest corner of Westgate and 13th Street.
Elev.=1346.63 NAVD 88.

PRELIMINARY PLAT

A portion of the SE. 1/4, Sec. 7, T27S, R1W, 6th P.M.

WESTGATE VILLAGE THIRD ADDITION

DEVELOPER: Equity Ventures Commercial Development, L.C. 3501 SW Fairlawn Road, Suite 200 Topeka, KS 66614 (785) 272-1398

OWNER: Credit Union of America P.O. Box 47528 Wichita, KS 67201 (316) 265-3272

MINIMUM PAD ELEVATION
LOWEST OPENING

LOT	BLOCK	ELEVATION (NAVD88)
1	1	1351.0

Date submitted: May 12th, 2014
Subdivision Hearing: May 29th, 2014

MKEC
Wichita, KS • 316.684.9600

Westgate Village Third Addition

Westgate Village Third Addition

CERTIFICATE OF SURVEY

I, Curtis W. Luttrell, a registered land surveyor in Kansas, do hereby certify that I have been in responsible charge of surveying and platting of "WESTGATE VILLAGE THIRD ADDITION" an addition to Wichita, Sedgwick County, Kansas, into a Lot, and a Block, the same being accurately set forth in the accompanying plat and described herein:

A replat of Lot 2, Westgate Village 2nd Addition, Wichita, Sedgwick County, Kansas.

All streets, easements, rights-of-way, building setbacks, access controls, together with all other public dedications within the above described property, are hereby vacated and replatted by virtue of K.S.A. 12-512b, as amended.

I hereby certify that the details of this plat are correct to the best of my knowledge and belief this ___ day of ________________, 2014.

Curtis W. Luttrell, R.L.S. #1238
MKEC Engineering, Inc.
411 North Webb Road
Wichita, Kansas 67206

OWNER'S CERTIFICATE

Know all men by these presents that we the undersigned property owners of the land above set forth in the Registered Land Surveyor's Certificate, have caused the same to be surveyed and platted into a Lot, and a Block, the same to be known as "WESTGATE VILLAGE THIRD ADDITION" an addition to Wichita, Sedgwick County, Kansas.

Easements for the construction and maintenance of drainage and utilities, as indicated hereon, are hereby granted to the public.

All abutters rights of access to or from 13th Street Avenue over and across the south line of "WESTGATE VILLAGE THIRD ADDITION," are hereby granted to the appropriate governing body, provided however one full movement openings as indicated on adjoining Lot hereon. All abutters rights of access to or from Westgate Street over and across the west line of "WESTGATE VILLAGE THIRD ADDITION," are hereby granted to the appropriate governing body, provided however two full movement openings as indicated hereon.

A drainage plan has been developed for this plat. All drainage easements, rights-of-way, shall remain at established grades or as modified with the approval of the applicable City or County Engineer, and unobstructed to allow for the conveyance of stormwater.

Lot 1, Block 1, shall adhere to the minimum pad elevation table shown hereon.

Reserve "A" is platted for landscaping, irrigation, signs, monuments, walls / fences, parking, drainage, and utilities confined to easements.

Credit Union of America

____
Bob Thurman, President

STATE OF KANSAS, SEDGWICK COUNTY} ss:

This instrument was acknowledged before me on ____ day of ________________, 2014, by Bob Thurman, President, Credit Union of America.

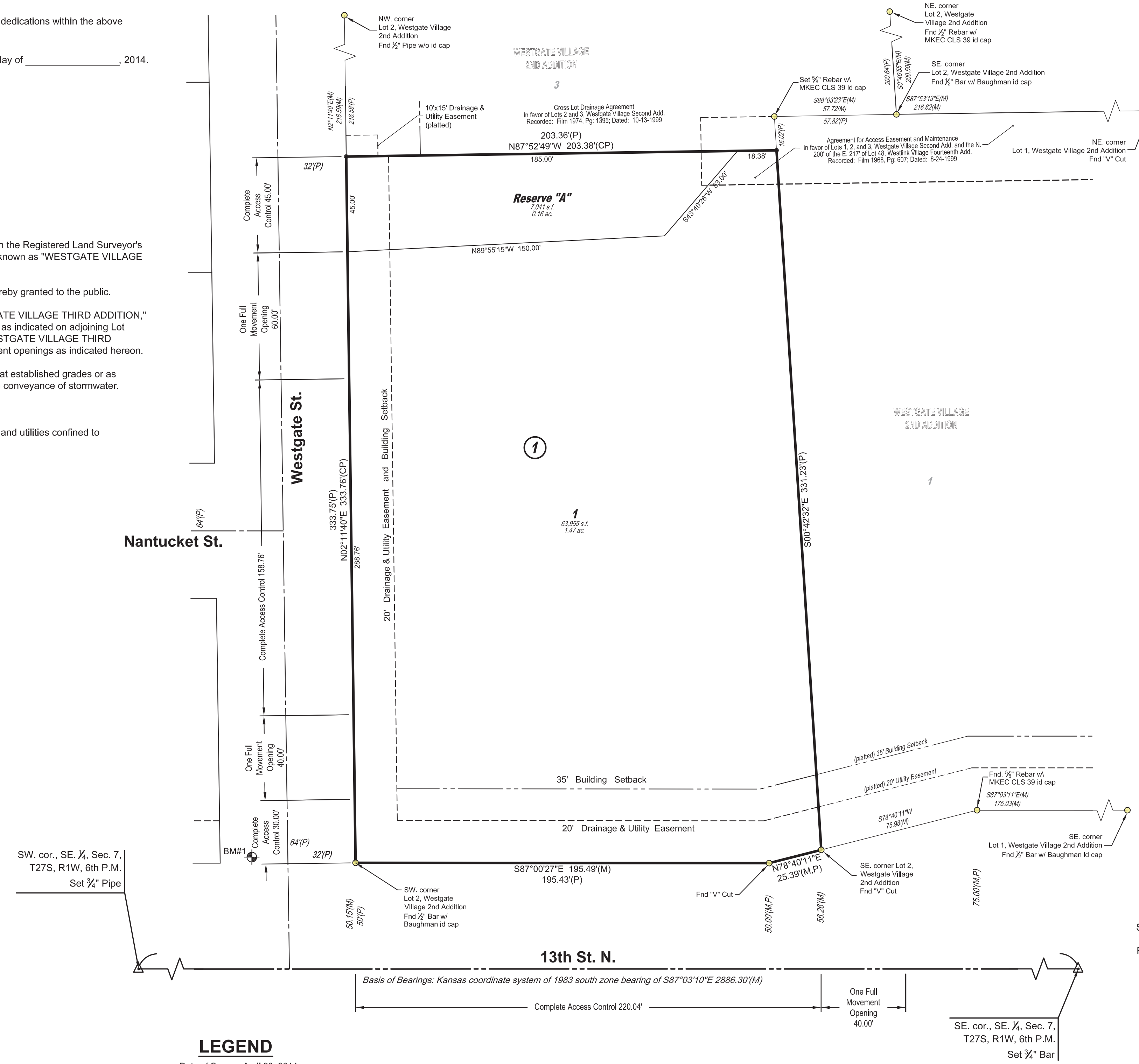
IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, the day and year last above written.

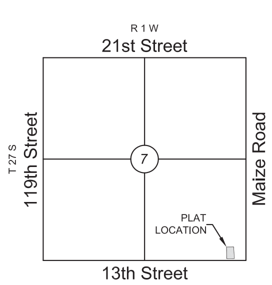
Affix Seal

Notary Public: ________________

My Term Expires: ________________

FINAL PLAT
WESTGATE VILLAGE THIRD ADDITION
AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS





VICINITY MAP

Basis of Bearing: Kansas coordinate system of 1983 south zone grid bearing of S87°03'10"E on the south line of the SE ¼, Sec. 7, T27S, R1W, 6th P.M. This plat is surveyed and platted on NAVD88-09 using Kansas state plane south zone coordinates, modified to the surface, having a combined adjustment scale factor of 1.000120014401728

LEGEND

Date of Survey: April 23, 2014

- △ = Section Corner Monument Found
- ● = Set ⅝" rebar w/ MKEC CLS 39 id. cap or see annotation for type
- ○ = Found ⅝" rebar w/ MKEC CLS 39 id cap or see annotation for type
- ⊕ = Benchmark
- (M) = Measured
- (CP) = Calculated from platted
- (P) = Platted

BENCH MARK

BM#1 Chiseled square on top of curb at the north return near the northwest corner of Westgate and 13th Street.
Elev.=1346.63 NAVD 88.

MINIMUM PAD ELEVATION LOWEST OPENING		
LOT	BLOCK	ELEVATION (NAVD88)
1	1	1351.0

PLANNING COMMISSION CERTIFICATE

This plat of "WESTGATE THIRD ADDITION" has been submitted to and approved by the Wichita-Sedgwick County Metropolitan Area Planning Commission, Wichita, Kansas.

Dated this ____ day of ___________, 2014

WICHITA-SEDGWICK COUNTY METROPOLITAN AREA PLANNING COMMISSION

By________________
Don Klausmeyer, Chair

Attest:

____
John L. Schlegel, Secretary

GOVERNING BODY CERTIFICATE

This Plat approved and all dedications shown hereon, accepted by the Wichita City Council of the City of Wichita, Kansas dated this ____ day of ________________________, 2014.

At the direction of the City Council.

____
Carl Brewer, Mayor

Attest:

____
Karen Sublett, City Clerk

TRANSFER RECORD

STATE OF KANSAS, SEDGWICK COUNTY} ss:

Entered on transfer record this ____ day of ______________________, 2014

____
Kelly B. Arnold, County Clerk

REGISTER OF DEEDS' CERTIFICATE

STATE OF KANSAS, SEDGWICK COUNTY} ss:

This is to certify that this instrument was filed for record in the Register of Deeds Office this day of _________________, 2014 , at _________ o'clock __M; and is duly recorded.

____
Bill Meek, Register of Deeds

Attest:

____
Tonya E. Buckingham, Deputy

COUNTY SURVEYOR

STATE OF KANSAS, SEDGWICK COUNTY} ss:

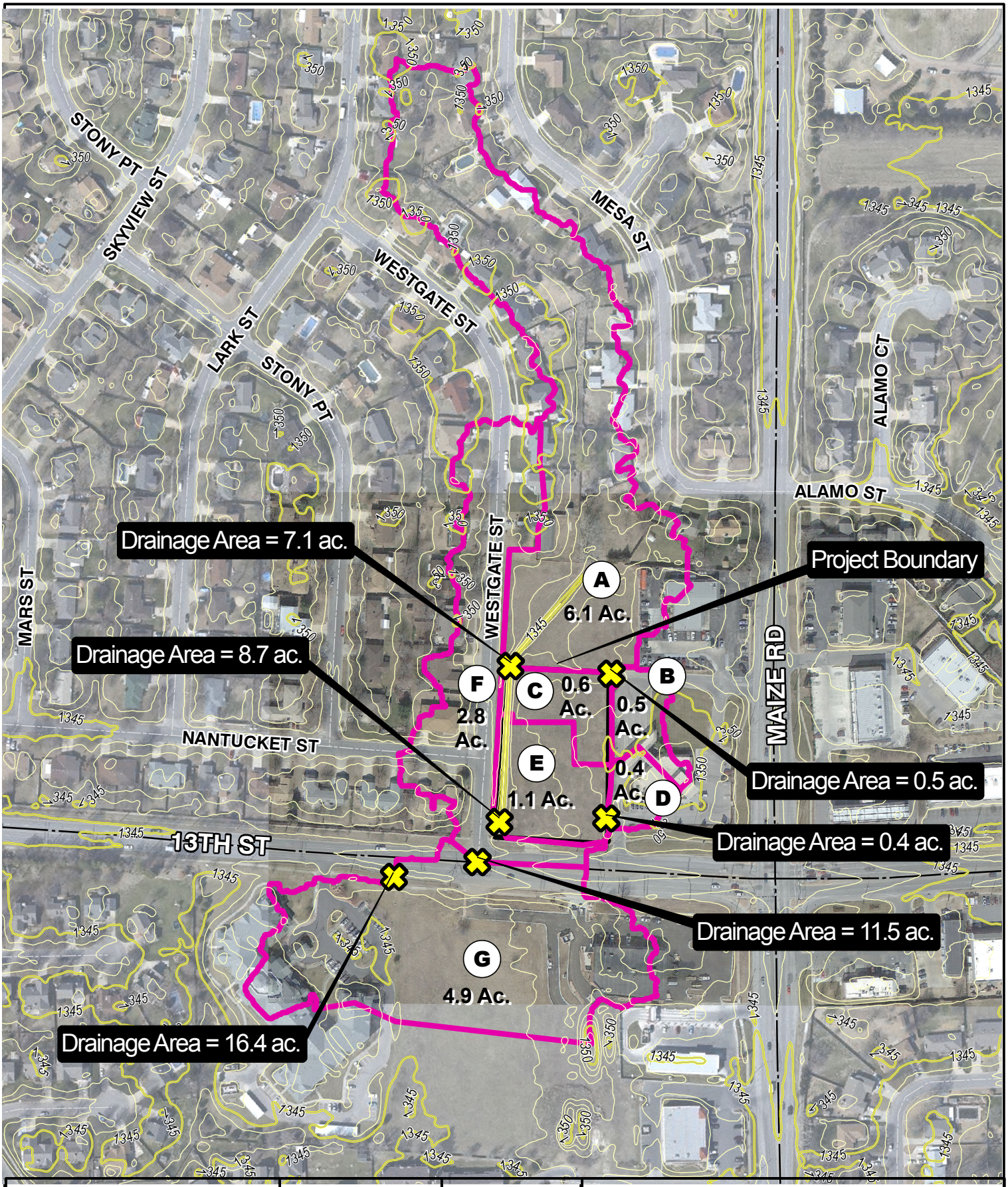
Reviewed in accordance with K.S.A. 58-2005 on this ____ day of _______________, 2014.

________________, Deputy County Surveyor
Tricia L. Robello, LS #1246
Deputy County Surveyor
Sedgwick County, Kansas

MKEC
Wichita, KS • 316.684.9600

Westgate Village Third Addition

Appendix K – Proposed Drainage Basins



SEC: 7
TWP: T27S
RNG: R1W

0 125 250
Feet

MKEC
Wichita, KS · 316.684.9600

Proposed Drainage Basins
WESTGATE VILLAGE THIRD ADDITION

PROJECT NO.	DATE:	SHEET NO.
1401010187	5/16/2014	1 OF 1

DRAWN BY:	DESIGNED BY:	APPROVED BY:
JGD	JGD	KLA

Path: J:\Projects\2014\1401010187_EquityVentures Commercial Dev\05-Civil\GIS\Proposed Drainage Basins.mxd - Date: 5/16/2014

Appendix L - Water Quality

Water Quality Volume Calculations
Westgate Village Third Addition

Proposed Site

Volumentric Runoff Coefficients by Land Use and Hydraulic Soil Group

	Hydrologic Soil Group								Total
	A		B		C		D		
Land Use	**Area (ac)**	**R_V**	**Area (ac)**	**R_V**	**Area (ac)**	**R_V**	**Area (ac)**	**R_V**	**Area (ac)**
Undisturbed		0.02		0.03		0.04		0.05	0
Disturbed Pervious		0.15		0.20	0.255	0.22		0.25	0.255
Impervious Cover		0.95		0.95	1.445	0.95		0.95	1.445
Total Area (ac)	0.00		0.00		1.70		0		**1.7**
Volumetric Runoff Coefficient (R_V)	0.00		0.00		0.84		0.00		**0.84**

Rainfall Depth (P) (in)	1.2
Water Quality Protection Volume (WQ_V) (ac-ft)	0.14
Water Quality Protection Volume (Q_{WV}) (in)	1.01
Redevelopment	No

Appendix M – Lot Grading Plan

N

SCALE: 1"=30'

0 15 30 60

R 1 W

21st Street

T 27 S

119th Street

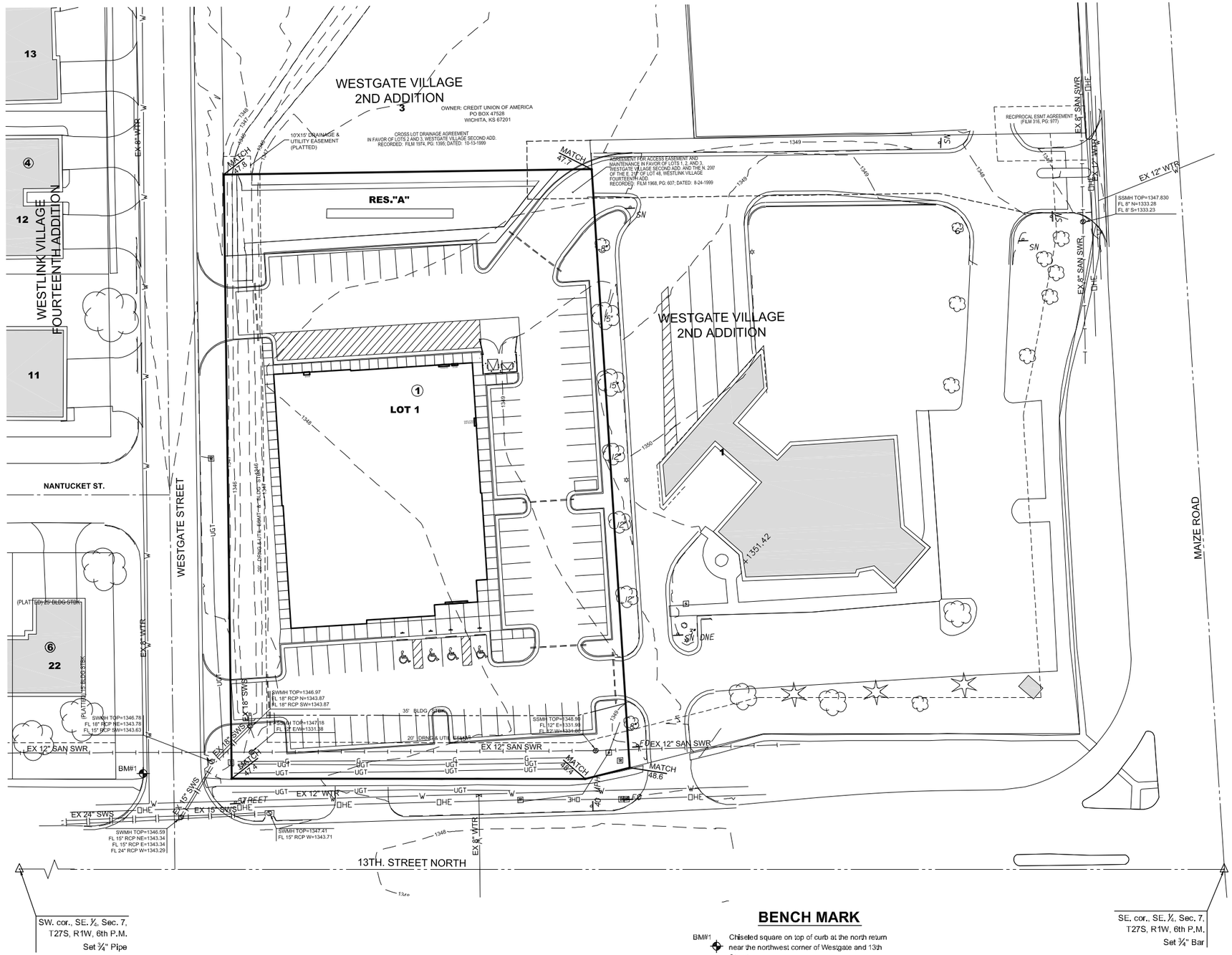
7

Maize Road

PLAT LOCATION

13th Street

VICINITY MAP



LEGEND

- CONIFEROUS TREE & DIAMETER
- DECIDUOUS TREE & DIAMETER
- SIGN
- BUSH
- EDGE OF TREES
- FENCE
- SANITARY SEWER MANHOLE
- GAS METER
- POLE
- HIGH LINE POLE
- GATE
- WALL
- LIGHT POLE
- FIRE HYDRANT
- WATER VALVE
- WATER METER
- POWER POLE AND GUY ANCHOR
- TELEPHONE RISER
- INLET
- STORM SEWER PIPE
- WATER LINE
- SANITARY SEWER LINE
- GAS LINE
- TELEPHONE LINE
- UNDERGROUND ELECTRIC LINE
- OVERHEAD TELEPHONE
- OVERHEAD ELECTRIC
- UNDERGROUND FIBER OPTIC CABLE
- SECTION CORNER
- PROPERY CORNER FOUND
- BENCHMARK
- **WO** - WALKOUT
- **VO** - VIEWOUT
- **TVO** - TERRACED VIEWOUT
- **TWO** - TERRACED WALKOUT
- MAY REQUIRE THICKER FOOTING AND/OR ENGINEERED FILL UNDER FOOTINGS
- SPOT ELEV.
- PROP. HOUSE ELEV.
- EXIST. PLOT PLAN HOUSE ELEV.
- FLOW ARROWS

SW. cor., SE. ¼, Sec. 7, T27S, R1W, 6th P.M.
Set ¾" Pipe

SE. cor., SE. ¼, Sec. 7, T27S, R1W, 6th P.M.
Set ¾" Bar

BENCH MARK

BM#1 Chiseled square on top of curb at the north return near the northwest corner of Westgate and 13th Street.
Elev.=1346.63 NAVD 88.

J:\PROJECTS\2014\14101\0187_EQUITYVENTURES COMMERCIAL DEV\05-CIVIL\CAD\GRD\14187_LGP.DWG

MKEC
Wichita, KS · 316-681-9600

LOT GRADING PLAN FOR

WESTGATE VILLAGE THIRD ADDITION

WICHITA, KANSAS

LOT GRADING PLAN

PROJECT NO.	14187
DATE	MAY 2014
SCALE	AS NOTED

DESIGNED	DRAWN	CHECKED
KLA	DM	GJA

NO.	REVISION	DATE

SHEET NO.

1 OF 1