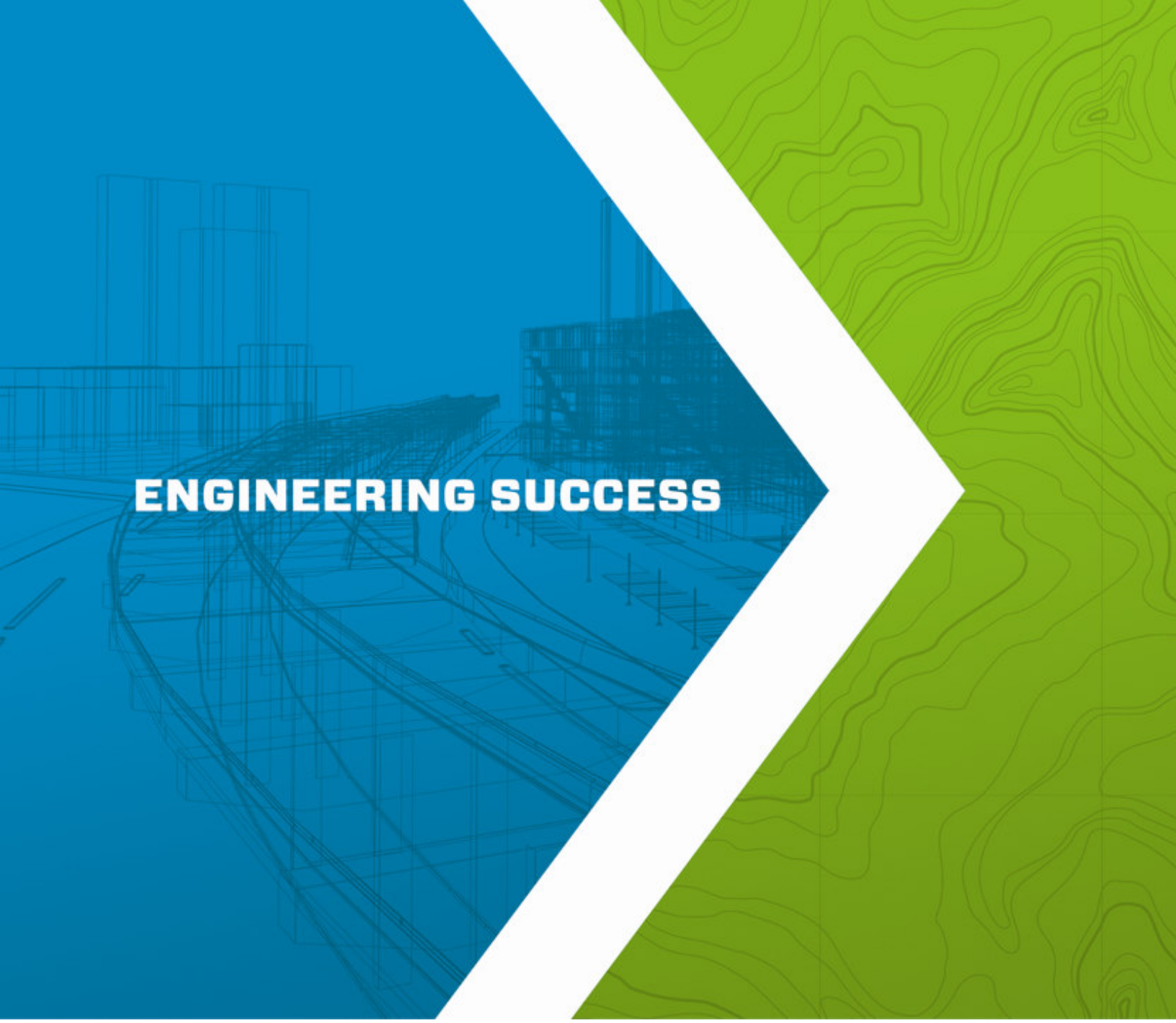
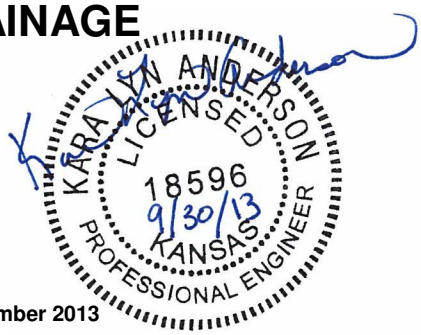


PRELIMINARY DRAINAGE REPORT FOR

Courtyards at Auburn Hills Addition



MKEC

411 N. Webb Rd.
Wichita, KS 67206
316.684.9600

PROJECT NUMBER: 1301010292
DATE: REVISED September 2013
August 2013

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:	Courtyards at Auburn Hills				
Total Area of Project:	20.4 **acres**				
Development Type:	Residential	**Other:**			
Developer Name:	Perfection Signature Properties	**Contact:**	Scott Lehner	**Phone:**	(316) 641-2081
Email:	scott@perfectionbuilders.com				
Engineer Name:	MKEC Engineering Consultants, 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.	yes	
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.).	yes	
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.	yes	
3.5.6	Water quality volume and channel protection volume orifice size calculations.	yes	
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.	yes	
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.	N/A	Will evaluate once DWR model is obtained.
4.3	Delineation of predevelopment regulatory floodplain/floodway limits using FEMA's current GIS database; limits to be per elevation and scaled location.	N/A	
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 west of 135th Street West between US-54 and Maple Avenue. The development has an area of approximately 20.4 acres. The site lies in Section 26, Township 27 South, Range 2 West. The site is shown on the USGS Quadrangle, Appendix A. The site is also shown on the Aerial Photograph, Appendix B.

The site is currently bounded by 135th Street West to the east, Auburn Hills 13th Addition to the west, and unplatted land to the north and south.

Datum

The site is shown in NAVD 88 datum.

Soils

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

- Milan Loam, 1 to 3 percent slopes, HSG "B"
- Milan Clay Loam, 3 to 6 percent slopes, eroded, HSG "B"
- Elandco Silt Loam, frequently flooded, HSG "B"

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

Flood Insurance Rate Map (FIRM)

The site is shown on the FEMA FIRM Panels 20173C0317F and 20173C0336F effective May 2, 2102, Appendix D. The site is in Zone X (unshaded), areas outside of the 0.2% annual chance flood. Unstudied Zone A floodplain is adjacent to the site along the southeast boundary of the site.

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 20-40 feet deep.

Hydrologic Analysis

The project is modeled using the NRCS Curve Number Method in Hydraflow Hydrographs, Appendix E. The rainfall depths used for various design storms are shown in Table 1.

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

Time of Calculation was calculated using the FHWA method as described in the City of Wichita/Sedgwick County Stormwater Manual, Volume 2, Section 4.4. The calculations were done in an Excel Spreadsheet, Appendix F.

Existing Development

Description

The site is currently undeveloped and unplatted land. The site is currently cultivated row crop. No existing improvements exist on site.

Land Use

The current land use of the site is cultivated row crop. There is no impervious area on site. There are small portions of the existing drainage basins that are developed as residential lots approximately ¼-acre in size. The curve number for the undeveloped land is 71.0. The curve number for existing conditions basins range from 71.0 to 72.7 due to existing residential draining onto the site. Curve numbers for the project were calculated in Excel, Appendix G.

Drainage Patterns

The site generally drains to Dry Creek North of Calfskin Creek. The creek flows from southwest to north east along the southeast corner of the property. The Creek is currently unstudied Zone A floodplain. A model of the creek was obtained from the Kansas Division of Water Resources.

The Dry Creek North of Calfskin Creek crosses under 135th Street through existing 2-60" SWS pipes. Near the northeast corner of the site 2-38" pipes convey storm water runoff from the site under 135th Street. The flow from both of these pipes combines approximately 500 feet east of 135th Street. The site has been divided into four drainage basins to analyze existing conditions as shown on the Existing Conditions Drainage Plan, Appendix H. A summary of these basins is shown in Table 2.

Table 2. Existing Basin Summary

	Northwest	Northeast	Central	South
Area (ac)	4.6	2.7	13.0	1.3
CN	72.7	71.0	71.9	71.0
Tc (min)	19.4	17.9	34.1	17.5
1-Year (cfs)	3.5	1.8	6.0	0.9
2-Year (cfs)	5.8	3.1	10.5	1.5
5-Year (cfs)	10.0	5.5	18.5	2.6
10-Year (cfs)	13.0	7.1	24.2	3.4
25-Year (cfs)	17.7	9.8	33.1	4.7
50-Year (cfs)	21.3	11.9	40.1	5.7
100-Year (cfs)	24.6	13.8	46.4	6.7

Northwest

The Northwest Basin drains from southwest to the north. It flows offsite onto unplatted ground and into an existing pond on adjacent land. A small portion of the drainage basin includes existing residential developed as Auburn Hills 13th Addition

Northeast Basin

The Northeast Basin drains from southwest to north east. It exits the site near the northeast corner and flows to an existing 2-38" SWS pipe under 135th Street.

Central Basin

The Central Basin drains from west to east and into Dry Creek North of Calfskin Creek. A small residential area of Auburn Hills 13th Addition drains into this basin.

South Basin

The South Basin is undeveloped agricultural land that sheet flows from northeast to southwest. It flows onto unplatted land and into Dry Creek North of Calfskin Creek.

Utilities

Sanitary Sewer

There is no existing sanitary sewer on site. City of Wichita Project 468-84886, OCA Number 744352, is currently in progress to provide an 8" sanitary sewer connection from Auburn Hills 9th Addition to the site.

Water

There is no existing sanitary sewer on site. City of Wichita Project 448-90596, OCA Number 735490, is currently in progress to provide an 8" water line from Auburn Hills 9th Addition to the northeast corner of the site.

Storm Water

An existing storm water sewer system in Auburn Hills 13th Addition is near the property line north and west of the site. The site drains to 2-60" SWS and 2-36" SWS pipes under 135th Street West.

Other Utilities

There are no existing utilities onsite.

Proposed Development

Description

The proposed site will develop as single family residential with zero lot line patio homes having a minimum of six feet of separation between residences. The development will have 76 residential lots that are approximately 0.15 acres in size. The lot layout is shown on the plat, Appendix I.

Land Use

The land use for the proposed site will be approximately 1/8 acre residential units. A curve number for the 1/8 acre residential development is 91.7. The curve numbers to represent developed conditions for the drainage basins range from 90.8 to 91.7.

Drainage Patterns

The four basins from existing conditions will be altered so that they do not increase runoff onto private adjacent properties, Appendix J. The site will continue to drain into Dry Creek North of Calfskin Creek and to 135th Street as it did under existing conditions. The existing conditions drainage basins have been modeled to represent the proposed site. The site will continue to drain to the same outlet areas as existing conditions.

The 100-year floodplain boundary and elevations at cross sections are shown on the drainage and utility plan that was obtained from the Kansas Division of Water Resources.

Table 3. Proposed Conditions Drainage Basins.

	Northwest	Northeast	Central	South
Area (ac)	1.1	1.3	18.5	0.7
CN	91.7	91.7	90.8	91.7
Tc (min)	10.0	3.8	19.9	4.6
1-Year (cfs)	3.0	4.1	7.4	2.2
2-Year (cfs)	4.0	5.4	9.8	2.9
5-Year (cfs)	5.5	7.4	47.2	4.0
10-Year (cfs)	6.4	8.7	71.5	4.7
25-Year (cfs)	7.9	10.6	100.9	5.7
50-Year (cfs)	9.0	12.1	117.5	6.5
100-Year (cfs)	9.9	13.4	130.6	7.2

Northwest

The Northwest Basin continues to drain to the north onto unplatted ground and into an existing pond on adjacent land. The area of the Northwest Basin has been decreased to decrease the peak flow rates to the adjacent property. The Northwest Basin flows to the north undetained due to the reduction of drainage area. The flow rates for all design storms are decreased from existing conditions, Table 4.

Table 4. Northwest Basin Summary.

	Area	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Existing	4.6	3.5	5.8	10.0	13.0	17.7	21.3	24.6
Proposed	1.1	3.0	4.0	5.5	6.4	7.9	9.0	9.9

Northeast Basin

The drainage area of the Northeast Basin has been decreased from existing conditions. The drainage area was not decreased enough to decrease the peak flow rate from the site in the smaller design storms. The runoff from this basin flows to the east and northeast to an existing stormwater pipe under 135th Street.

Table 5. Northeast Basin Summary.

	Area	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Existing	2.7	1.8	3.1	5.5	7.1	9.8	11.9	13.8
Proposed	1.3	4.1	5.4	7.4	8.7	10.6	12.1	13.4

Central Basin

The Central Basin has increased in drainage area since portions of the Northeast, Northwest, and South Basins have been routed into the Central Basin. The basin continues to drain to the east and will drain to a proposed detention pond in Reserve A, Table 6. The pond will have a 5" pipe as an outlet structure to detain the smaller storms and a larger weir to let the large storms pass. The pond will provide water quality and channel protection volumes. The peak flow rates from the Central Basin have increased in all design storms, Table 7. The Central Basin flows directly into the Dry Creek North of Calfskin Creek.

Table 6. Reserve A Pond Details.

	Flow In (cfs)	Flow Out (cfs)	Elevation (ft)	Volume (ac-ft)
1-Year (cfs)	33.4	0.7	1349.4	1.8
2-Year (cfs)	44.3	5.8	1349.6	2.0
5-Year (cfs)	61.4	40.6	1350.0	2.1
10-Year (cfs)	72.6	61.3	1350.1	2.2
25-Year (cfs)	89.3	84.6	1350.2	2.3
50-Year (cfs)	101.9	99.0	1350.3	2.3
100-Year (cfs)	112.9	110.1	1350.4	2.3

Table 7. Central Basin Summary.

	Area	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Existing	13.0	6.0	10.5	18.5	24.2	33.1	40.1	46.4
Proposed	18.5	7.4	9.8	47.2	71.5	100.9	117.5	130.6

South Basin

The area of the South Basin has decreased due to the development. The South Basin will continue to sheet flow offsite into the Dry Creek North of Calfskin Creek.

Table 8. South Basin Summary.

	Area	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Existing	1.3	0.9	1.5	2.6	3.4	4.7	5.7	6.7
Proposed	0.7	2.2	2.9	4.0	4.7	5.7	6.5	7.2

Downstream Peak Discharge Assessment (10% Rule)

The point where the drainage basin for Dry Creek North to Calfskin Creek crosses under 135th Street is the point at which the drainage basin for the site is less than 10% of the drainage basin, Appendix K. Calculations on the basin were done to determine the impacts of the development at that point. The site does not increase peak flow rates downstream with the proposed development in any design storm, Table 9. Since the site does not increase peak flow rates to Dry Creek North of Calfskin Creek, detention will not be provided. Providing detention would increase peak flow rates to the Creek. Channel protection volume will be provided in the proposed pond in Reserve A.

Table 9. Peak Flow Rates to 135th Street.

Design Storm	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Existing	322	458	679	827	1050	1220	1369
Proposed	319	457	679	825	1045	1213	1360
Change	-0.9%	-0.2%	0.0%	-0.2%	-0.5%	-0.6%	-0.7%

Water Quality

The volume required for water quality is 1.4 acre-feet. The water quality volume for the site is based on 20.4 acres of the site, roughly 65% impervious for 1/8 acre residential development. Water quality volume for this site was calculated using an Excel Spreadsheet, Appendix L. The water quality volume will be provided in a detention pond in Reserve A. Portions of the site will drain through vegetated strips before entering the Dry Creek North of Calfskin Creek.

Channel Protection

The channel protection volume for the development is 1.8 acre-feet. The channel protection volume was calculated in an Excel Spreadsheet, Appendix M. The channel protection volume will be provided in a detention pond in Reserve A.

Permits

U.S. Army Corps of Engineers

The Dry Creek North to Calfskin Creek is jurisdictional waters of the United States. The creek and it's bed and banks will not be modified with the proposed project.

Kansas Department of Agriculture Division of Water Resources

Dry Creek North of the Cowskin Creek will not be modified. If outlet structures are placed within the floodplain, stream obstructions permits will be required. The drainage areas of all other drainage ways on within the site are less than 640 acres; therefore Water Structures permits will not be required.

The proposed pond will have a volume of less than 15 acre-feet; therefore the annual net evaporation from the surface will be less than 15 acre-feet. Water appropriations permitting will not be required.

FEMA

The proposed project will not modify the FEMA floodplain around the Dry Creek North to Calfskin Creek. 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.

Utilities

Sanitary Sewer

A proposed sanitary sewer layout is shown on the Drainage and Utility Plan, Appendix J. The sewer will provide service to all lots.

Water

The proposed water layout is shown on the Drainage and Utility Plan, Appendix J.

Stormwater Sewer

Stormwater Sewer will be designed as shown on the Drainage and Utility Plan, Appendix J. The stormwater sewer system will route stormwater runoff to match basin boundaries as described. The pipe sizes were determined using Hydraflow Storm Sewers, Appendix N. The stormwater sewer system was designed for a minimum of a 2-year design event. The design event is indicated on the Drainage and Utility Plan.

Other Utilities

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

Lot Grading Plan

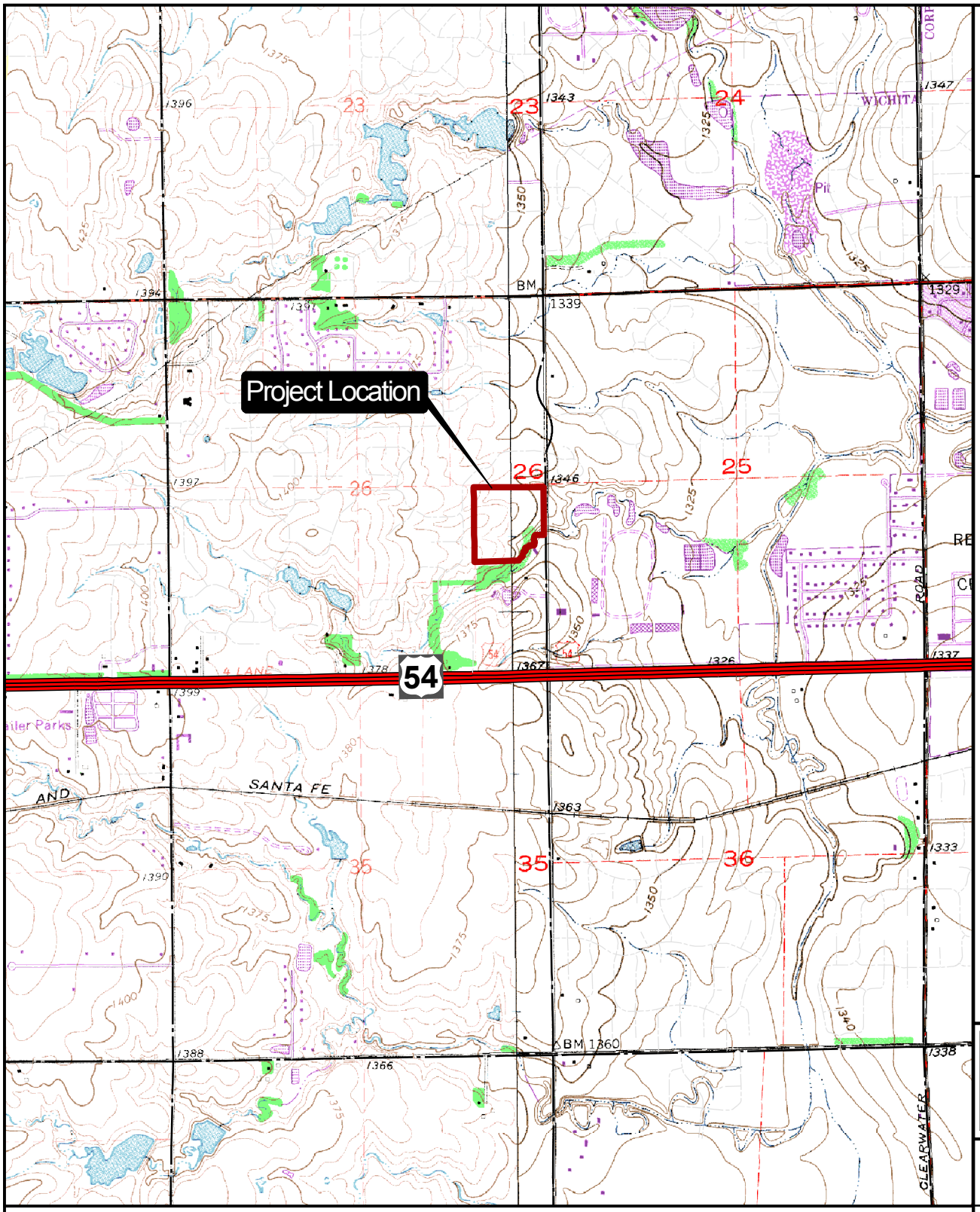
A lot grading plan is being prepared for the property, Appendix O. The lot grading plan will be updated as design plans are prepared.

Summary

The proposed Courtyards at Auburn Hills Addition will develop as single family residential patio homes. The 20.4 acre plat will consist of approximately 76 lots. The site will drain into Dry Creek North of Calfskin Creek. A pond will be constructed to provide channel protection volume and water quality volume. The site does not provide additional detention due to the proximity of the site to the Dry Creek North of Calfskin Creek. The downstream assessment indicated that the site is reducing the peak flow to the Creek and providing additional detention would increase the peak runoff in the Creek.

Stormwater Sewer has been designed to convey a 2-year or larger design storm.

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
COURTYARDS AT AUBURN HILLS

SEC: 26
TWP: T27S
RNG: R2W

PROJECT NO.	1301010292
DATE	7/31/2013
SCALE	1"=2000'

DESIGNED	DRAWN	CHECKED
MKEC	MKEC	MKEC

NO.	REVISION	DATE

SHEET NO.
1 OF 1

Path: J:\Projects\2013\1301010292_Perfection_135th\5-Civil\GIS\USGS Quad Map.mxd - Date: 8/20/2013

Appendix B - Aerial Photograph

SEC: 26
TWP: T27S
RNG: R2W

0 125 250 500
Feet

MKEC
Wichita, KS · 316.684.9600

AERIAL EXHIBIT

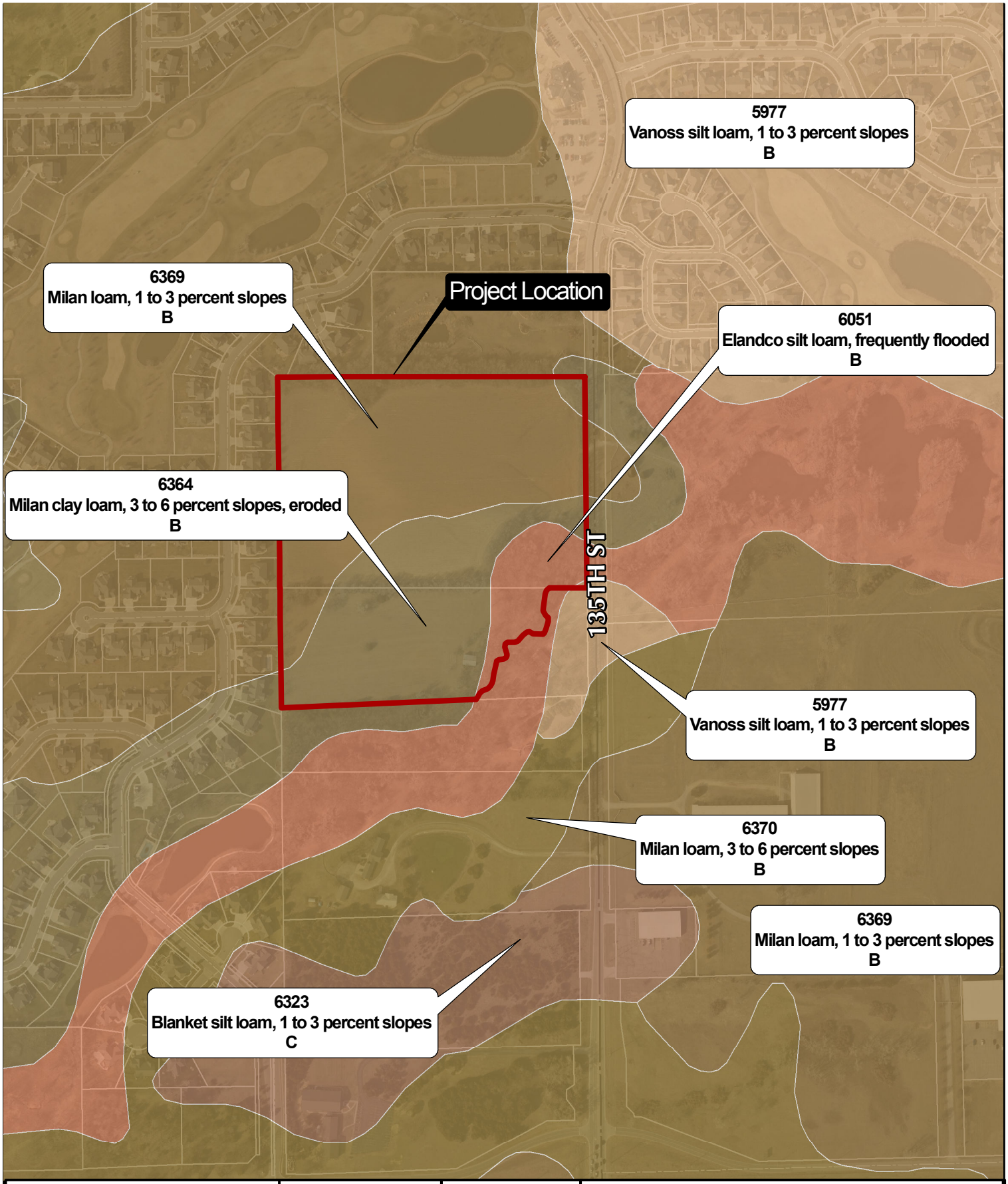
COURTYARDS AT AUBURN HILLS

PROJECT NO.	DATE:	SHEET NO.
1301010292	8/20/2013	1 OF 1

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

Path: J:\Projects\2013\1301010292_Perfection_135th\5-Civil\GIS\Aerial Site Map.mxd - Date: 8/20/2013

Appendix C - Soil Survey



SEC: 26
TWP: T27S
RNG: R2W

0 100 200 400
Feet

MKEC
Wichita, KS · 316.684.9600

NRCS SOIL SURVEY EXHIBIT

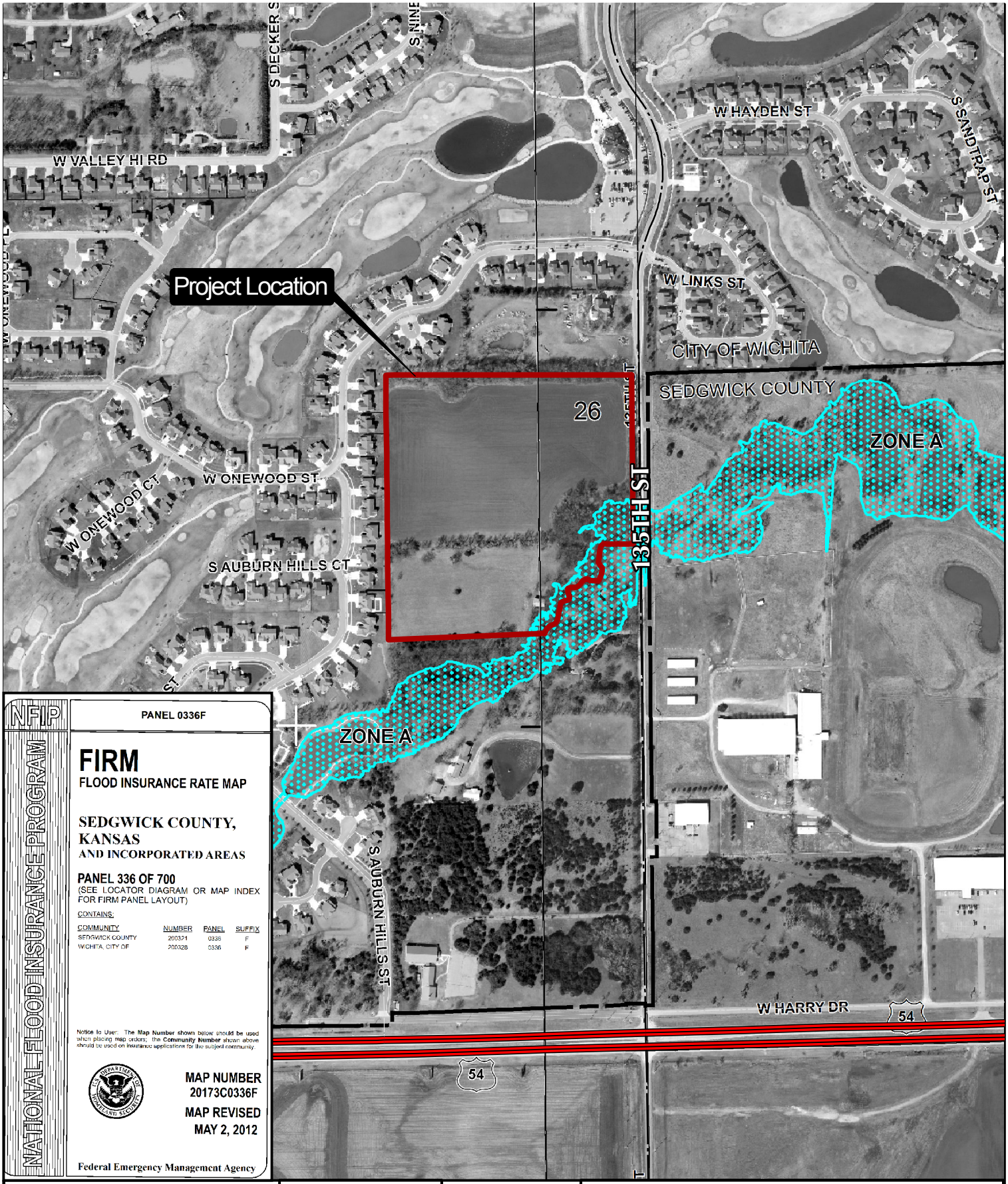
COURTYARDS AT AUBURN HILLS

PROJECT NO.	DATE:	SHEET NO.
1301010292	8/20/2013	1 OF 1

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

Path: J:\Projects\2013\1301010292_Perfection_135th\5-Civil\GIS\NRCS Soil Map.mxd - Date: 8/20/2013

Appendix D - Flood Insurance Rate Map (FIRM)



NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0336F

FIRM

FLOOD INSURANCE RATE MAP

SEDGWICK COUNTY, KANSAS
AND INCORPORATED AREAS

PANEL 336 OF 700
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SEDGWICK COUNTY	200321	0336	F
WICHITA, CITY OF	200328	0336	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
20173C0336F
MAP REVISED
MAY 2, 2012

Federal Emergency Management Agency

SEC: 26
TWP: T27S
RNG: R2W

0 125 250 500
Feet

MKEC
Wichita, KS · 316.684.9600

FEMA FIRM EXHIBIT

COURTYARDS AT AUBURN HILLS

PROJECT NO.	DATE:	SHEET NO.
1301010292	8/20/2013	1 OF 1

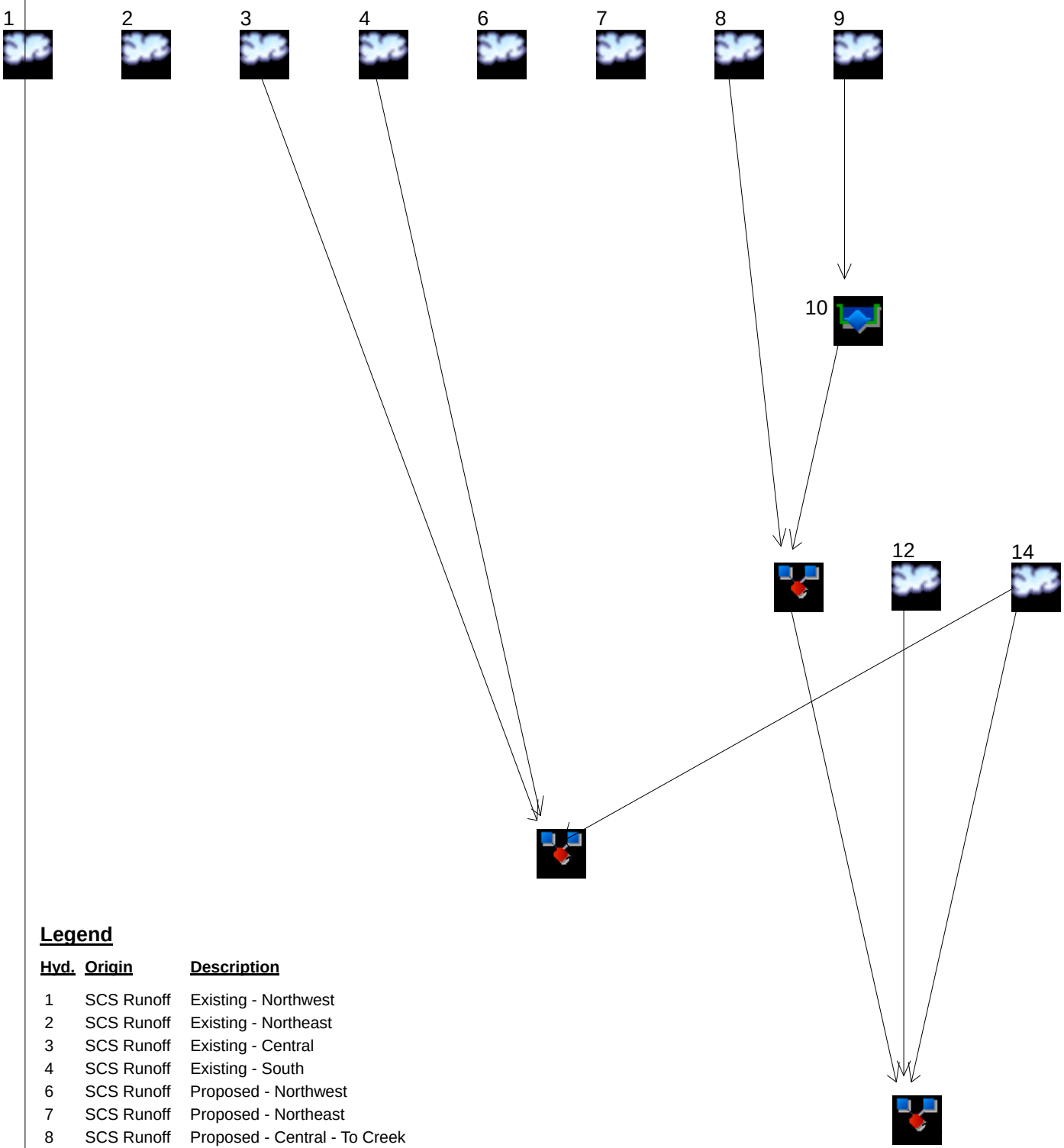
DRAWN BY:	DESIGNED BY:	APPROVED BY:
JGD	JGD	KLA

Path: J:\Projects\2013\1301010292_Perfection_135thS-Civil\GIS\FEMA FIRM Map.mxd - Date: 8/20/2013

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	Existing - Northwest
2	SCS Runoff	Existing - Northeast
3	SCS Runoff	Existing - Central
4	SCS Runoff	Existing - South
6	SCS Runoff	Proposed - Northwest
7	SCS Runoff	Proposed - Northeast
8	SCS Runoff	Proposed - Central - To Creek
9	SCS Runoff	Proposed - Central - To Pond
10	Reservoir	Proposed - Pond
11	Combine	Proposed - Central
12	SCS Runoff	Proposed - South
14	SCS Runoff	Basin to 135th Street
15	Combine	Existing to 135th Street
16	Combine	Proposed to 135th Street

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	------	3.486	5.844	0.038	10.02	13.00	17.65	21.31	24.55	Existing - Northwest
2	SCS Runoff	------	1.770	3.088	0.010	5.445	7.139	9.818	11.93	13.81	Existing - Northeast
3	SCS Runoff	------	6.036	10.51	0.070	18.51	24.17	33.07	40.12	46.41	Existing - Central
4	SCS Runoff	------	0.852	1.487	0.005	2.622	3.437	4.727	5.744	6.650	Existing - South
6	SCS Runoff	------	3.035	3.985	0.852	5.474	6.441	7.883	8.976	9.929	Proposed - Northwest
7	SCS Runoff	------	4.127	5.403	1.186	7.397	8.693	10.62	12.09	13.36	Proposed - Northeast
8	SCS Runoff	------	6.997	9.271	1.847	12.84	15.17	18.63	21.26	23.55	Proposed - Central - To Creek
9	SCS Runoff	------	33.37	44.28	8.725	61.43	72.60	89.26	101.88	112.88	Proposed - Central - To Pond
10	Reservoir	9	0.674	5.810	0.339	40.62	61.27	84.62	98.96	110.13	Proposed - Pond
11	Combine	8, 10	7.445	9.797	2.055	47.15	71.48	100.89	117.50	130.64	Proposed - Central
12	SCS Runoff	------	2.222	2.909	0.639	3.983	4.681	5.721	6.509	7.196	Proposed - South
14	SCS Runoff	------	317.76	450.35	50.19	666.26	810.03	1027.34	1193.17	1338.16	Basin to 135th Street
15	Combine	3, 4, 14	322.18	457.56	50.24	679.02	826.73	1049.77	1220.06	1369.01	Existing to 135th Street
16	Combine	11, 12, 14,	319.34	457.36	50.78	678.82	824.89	1045.06	1213.11	1360.04	Proposed to 135th Street

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	3.486	2	726	0.277	------	------	------	Existing - Northwest
2	SCS Runoff	1.770	2	726	0.146	------	------	------	Existing - Northeast
3	SCS Runoff	6.036	2	736	0.736	------	------	------	Existing - Central
4	SCS Runoff	0.852	2	726	0.070	------	------	------	Existing - South
6	SCS Runoff	3.035	2	720	0.184	------	------	------	Proposed - Northwest
7	SCS Runoff	4.127	2	716	0.198	------	------	------	Proposed - Northeast
8	SCS Runoff	6.997	2	722	0.455	------	------	------	Proposed - Central - To Creek
9	SCS Runoff	33.37	2	724	2.413	------	------	------	Proposed - Central - To Pond
10	Reservoir	0.674	2	1120	2.398	9	1349.35	1.78	Proposed - Pond
11	Combine	7.445	2	722	2.853	8, 10	------	------	Proposed - Central
12	SCS Runoff	2.222	2	716	0.106	------	------	------	Proposed - South
14	SCS Runoff	317.76	2	754	50.981	------	------	------	Basin to 135th Street
15	Combine	322.18	2	754	51.787	3, 4, 14	------	------	Existing to 135th Street
16	Combine	319.34	2	754	53.941	11, 12, 14,	------	------	Proposed to 135th Street

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	5.844	2	726	0.440	------	------	------	Existing - Northwest
2	SCS Runoff	3.088	2	726	0.236	------	------	------	Existing - Northeast
3	SCS Runoff	10.51	2	736	1.180	------	------	------	Existing - Central
4	SCS Runoff	1.487	2	726	0.114	------	------	------	Existing - South
6	SCS Runoff	3.985	2	720	0.245	------	------	------	Proposed - Northwest
7	SCS Runoff	5.403	2	716	0.263	------	------	------	Proposed - Northeast
8	SCS Runoff	9.271	2	722	0.610	------	------	------	Proposed - Central - To Creek
9	SCS Runoff	44.28	2	724	3.234	------	------	------	Proposed - Central - To Pond
10	Reservoir	5.810	2	756	3.217	9	1349.61	1.91	Proposed - Pond
11	Combine	9.797	2	722	3.827	8, 10	------	------	Proposed - Central
12	SCS Runoff	2.909	2	716	0.142	------	------	------	Proposed - South
14	SCS Runoff	450.35	2	754	71.679	------	------	------	Basin to 135th Street
15	Combine	457.56	2	754	72.973	3, 4, 14	------	------	Existing to 135th Street
16	Combine	457.36	2	754	75.647	11, 12, 14,	------	------	Proposed to 135th Street

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	10.02	2	724	0.732	------	------	------	Existing - Northwest
2	SCS Runoff	5.445	2	726	0.401	------	------	------	Existing - Northeast
3	SCS Runoff	18.51	2	736	1.981	------	------	------	Existing - Central
4	SCS Runoff	2.622	2	726	0.193	------	------	------	Existing - South
6	SCS Runoff	5.474	2	720	0.342	------	------	------	Proposed - Northwest
7	SCS Runoff	7.397	2	716	0.368	------	------	------	Proposed - Northeast
8	SCS Runoff	12.84	2	722	0.859	------	------	------	Proposed - Central - To Creek
9	SCS Runoff	61.43	2	724	4.554	------	------	------	Proposed - Central - To Pond
10	Reservoir	40.62	2	732	4.537	9	1349.96	2.07	Proposed - Pond
11	Combine	47.15	2	732	5.396	8, 10	------	------	Proposed - Central
12	SCS Runoff	3.983	2	716	0.198	------	------	------	Proposed - South
14	SCS Runoff	666.26	2	754	105.950	------	------	------	Basin to 135th Street
15	Combine	679.02	2	752	108.124	3, 4, 14	------	------	Existing to 135th Street
16	Combine	678.82	2	752	111.544	11, 12, 14,	------	------	Proposed to 135th Street

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	13.00	2	724	0.940	------	------	------	Existing - Northwest
2	SCS Runoff	7.139	2	724	0.519	------	------	------	Existing - Northeast
3	SCS Runoff	24.17	2	736	2.553	------	------	------	Existing - Central
4	SCS Runoff	3.437	2	724	0.250	------	------	------	Existing - South
6	SCS Runoff	6.441	2	720	0.407	------	------	------	Proposed - Northwest
7	SCS Runoff	8.693	2	716	0.437	------	------	------	Proposed - Northeast
8	SCS Runoff	15.17	2	722	1.025	------	------	------	Proposed - Central - To Creek
9	SCS Runoff	72.60	2	724	5.430	------	------	------	Proposed - Central - To Pond
10	Reservoir	61.27	2	730	5.412	9	1350.10	2.15	Proposed - Pond
11	Combine	71.48	2	728	6.437	8, 10	------	------	Proposed - Central
12	SCS Runoff	4.681	2	716	0.235	------	------	------	Proposed - South
14	SCS Runoff	810.03	2	752	129.082	------	------	------	Basin to 135th Street
15	Combine	826.73	2	752	131.885	3, 4, 14	------	------	Existing to 135th Street
16	Combine	824.89	2	752	135.754	11, 12, 14,	------	------	Proposed to 135th Street

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	17.65	2	724	1.269	------	------	------	Existing - Northwest
2	SCS Runoff	9.818	2	724	0.707	------	------	------	Existing - Northeast
3	SCS Runoff	33.07	2	736	3.460	------	------	------	Existing - Central
4	SCS Runoff	4.727	2	724	0.340	------	------	------	Existing - South
6	SCS Runoff	7.883	2	720	0.504	------	------	------	Proposed - Northwest
7	SCS Runoff	10.62	2	716	0.541	------	------	------	Proposed - Northeast
8	SCS Runoff	18.63	2	722	1.274	------	------	------	Proposed - Central - To Creek
9	SCS Runoff	89.26	2	724	6.754	------	------	------	Proposed - Central - To Pond
10	Reservoir	84.62	2	726	6.736	9	1350.24	2.22	Proposed - Pond
11	Combine	100.89	2	726	8.011	8, 10	------	------	Proposed - Central
12	SCS Runoff	5.721	2	716	0.292	------	------	------	Proposed - South
14	SCS Runoff	1027.34	2	752	164.450	------	------	------	Basin to 135th Street
15	Combine	1049.77	2	752	168.251	3, 4, 14	------	------	Existing to 135th Street
16	Combine	1045.06	2	752	172.752	11, 12, 14,	------	------	Proposed to 135th Street

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	21.31	2	724	1.529	------	------	------	Existing - Northwest
2	SCS Runoff	11.93	2	724	0.857	------	------	------	Existing - Northeast
3	SCS Runoff	40.12	2	734	4.181	------	------	------	Existing - Central
4	SCS Runoff	5.744	2	724	0.413	------	------	------	Existing - South
6	SCS Runoff	8.976	2	720	0.578	------	------	------	Proposed - Northwest
7	SCS Runoff	12.09	2	716	0.621	------	------	------	Proposed - Northeast
8	SCS Runoff	21.26	2	722	1.466	------	------	------	Proposed - Central - To Creek
9	SCS Runoff	101.88	2	724	7.768	------	------	------	Proposed - Central - To Pond
10	Reservoir	98.96	2	726	7.751	9	1350.32	2.27	Proposed - Pond
11	Combine	117.50	2	726	9.216	8, 10	------	------	Proposed - Central
12	SCS Runoff	6.509	2	716	0.335	------	------	------	Proposed - South
14	SCS Runoff	1193.17	2	752	191.776	------	------	------	Basin to 135th Street
15	Combine	1220.06	2	752	196.369	3, 4, 14	------	------	Existing to 135th Street
16	Combine	1213.11	2	752	201.327	11, 12, 14,	------	------	Proposed to 135th Street

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	24.55	2	724	1.763	------	------	------	Existing - Northwest
2	SCS Runoff	13.81	2	724	0.991	------	------	------	Existing - Northeast
3	SCS Runoff	46.41	2	734	4.828	------	------	------	Existing - Central
4	SCS Runoff	6.650	2	724	0.477	------	------	------	Existing - South
6	SCS Runoff	9.929	2	720	0.644	------	------	------	Proposed - Northwest
7	SCS Runoff	13.36	2	716	0.692	------	------	------	Proposed - Northeast
8	SCS Runoff	23.55	2	722	1.634	------	------	------	Proposed - Central - To Creek
9	SCS Runoff	112.88	2	724	8.659	------	------	------	Proposed - Central - To Pond
10	Reservoir	110.13	2	726	8.641	9	1350.38	2.30	Proposed - Pond
11	Combine	130.64	2	726	10.275	8, 10	------	------	Proposed - Central
12	SCS Runoff	7.196	2	716	0.372	------	------	------	Proposed - South
14	SCS Runoff	1338.16	2	752	215.879	------	------	------	Basin to 135th Street
15	Combine	1369.01	2	752	221.185	3, 4, 14	------	------	Existing to 135th Street
16	Combine	1360.04	2	752	226.526	11, 12, 14,	------	------	Proposed to 135th Street

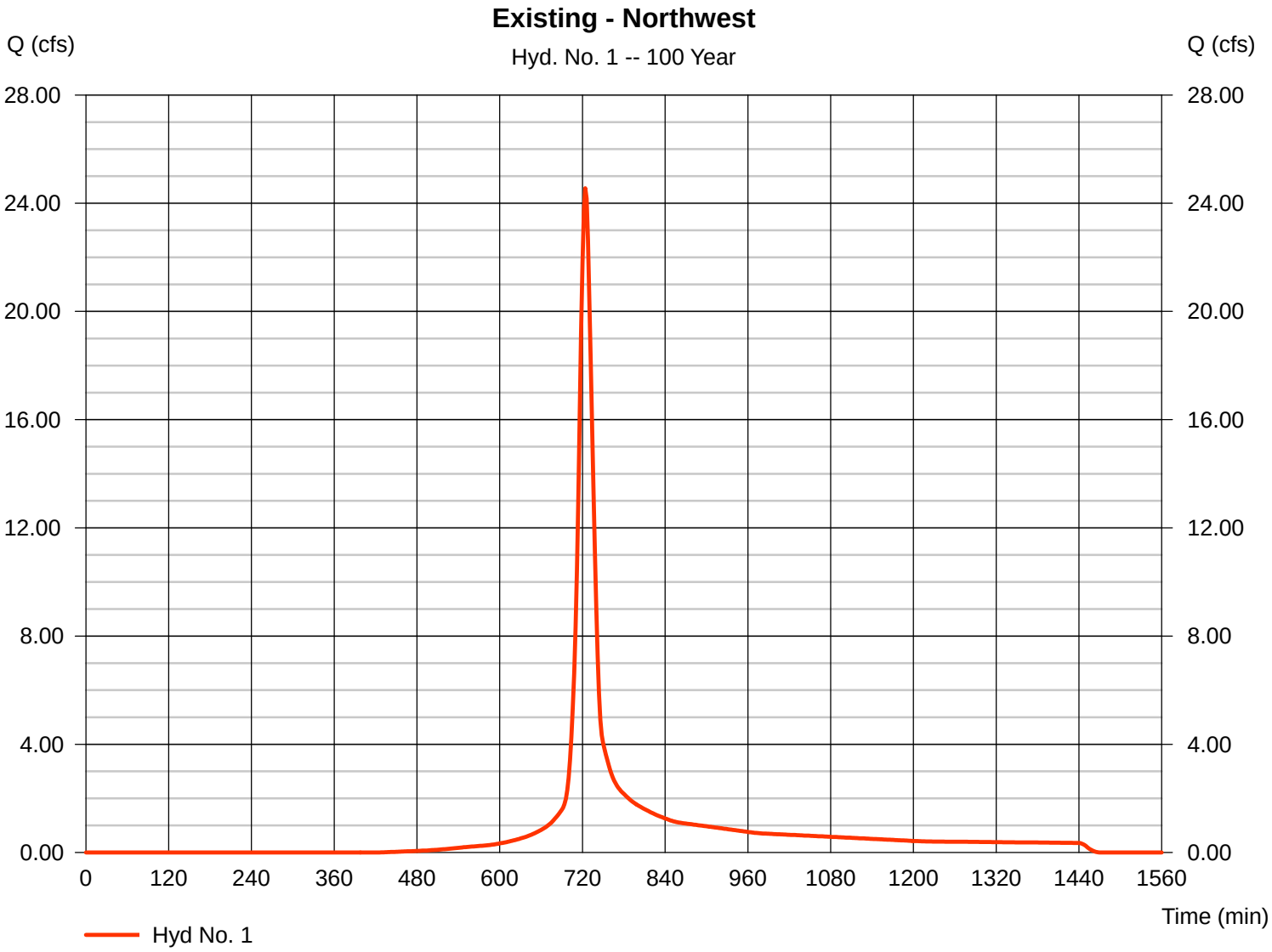
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Aug 22, 2013

Hyd. No. 1

Existing - Northwest

Hydrograph type	=	SCS Runoff	Peak discharge	=	24.55 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	1.763 acft
Drainage area	=	4.600 ac	Curve number	=	72.7
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	19.40 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

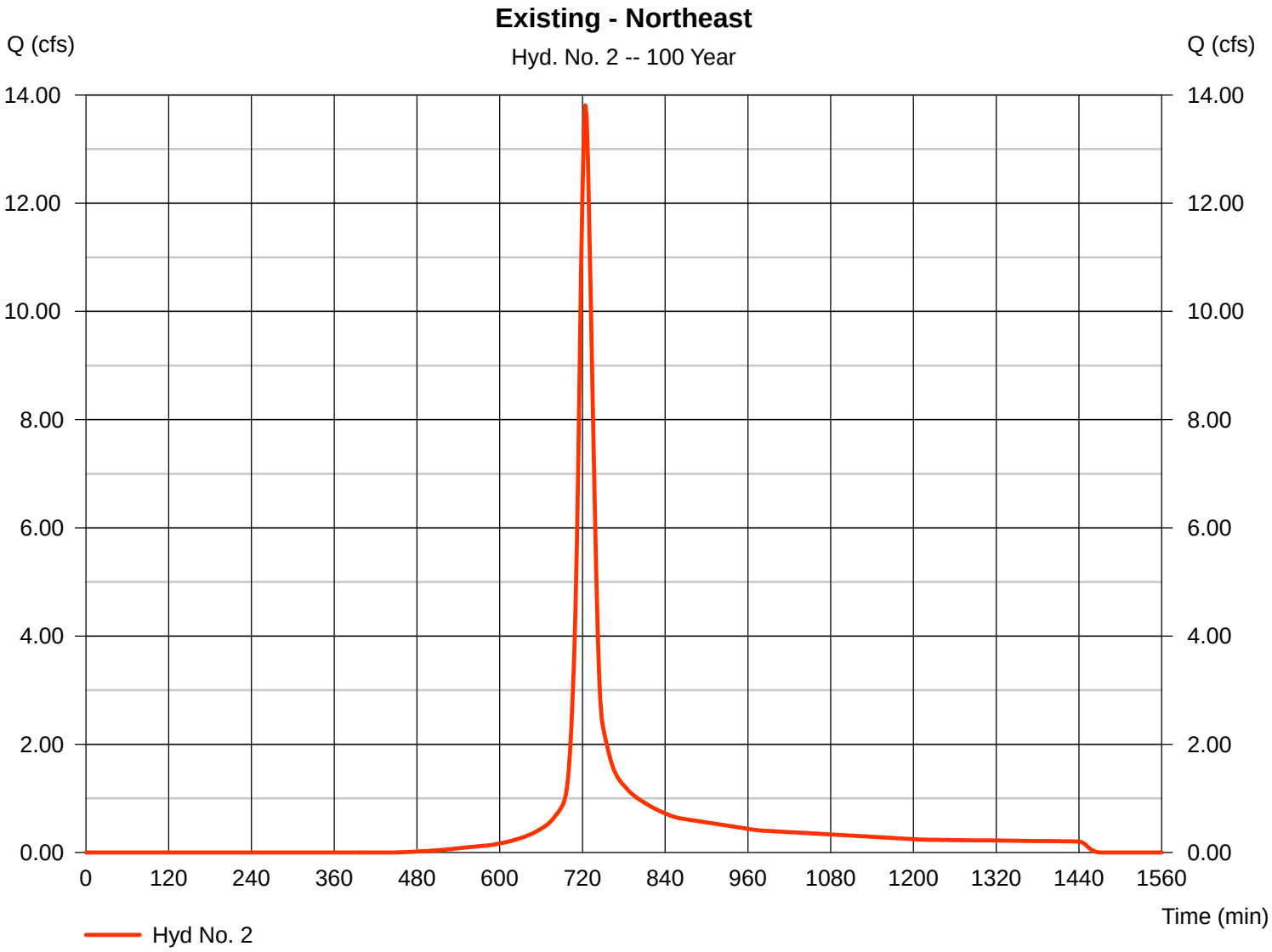


Hydrograph Report

Hyd. No. 2

Existing - Northeast

Hydrograph type	=	SCS Runoff	Peak discharge	=	13.81 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	0.991 acft
Drainage area	=	2.700 ac	Curve number	=	71
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	17.90 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

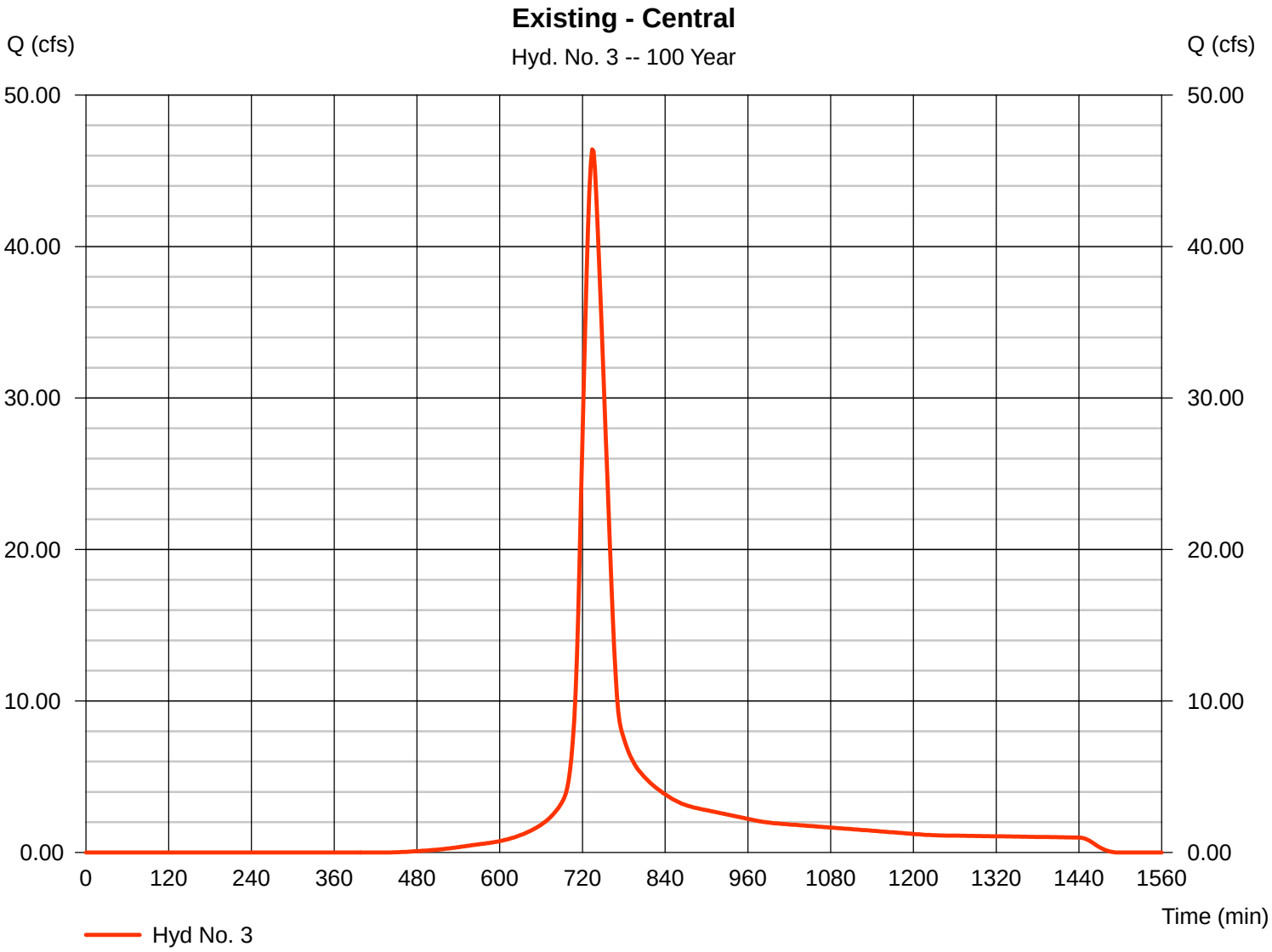


Hydrograph Report

Hyd. No. 3

Existing - Central

Hydrograph type	=	SCS Runoff	Peak discharge	=	46.41 cfs
Storm frequency	=	100 yrs	Time to peak	=	734 min
Time interval	=	2 min	Hyd. volume	=	4.828 acft
Drainage area	=	13.000 ac	Curve number	=	71.9
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	34.10 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

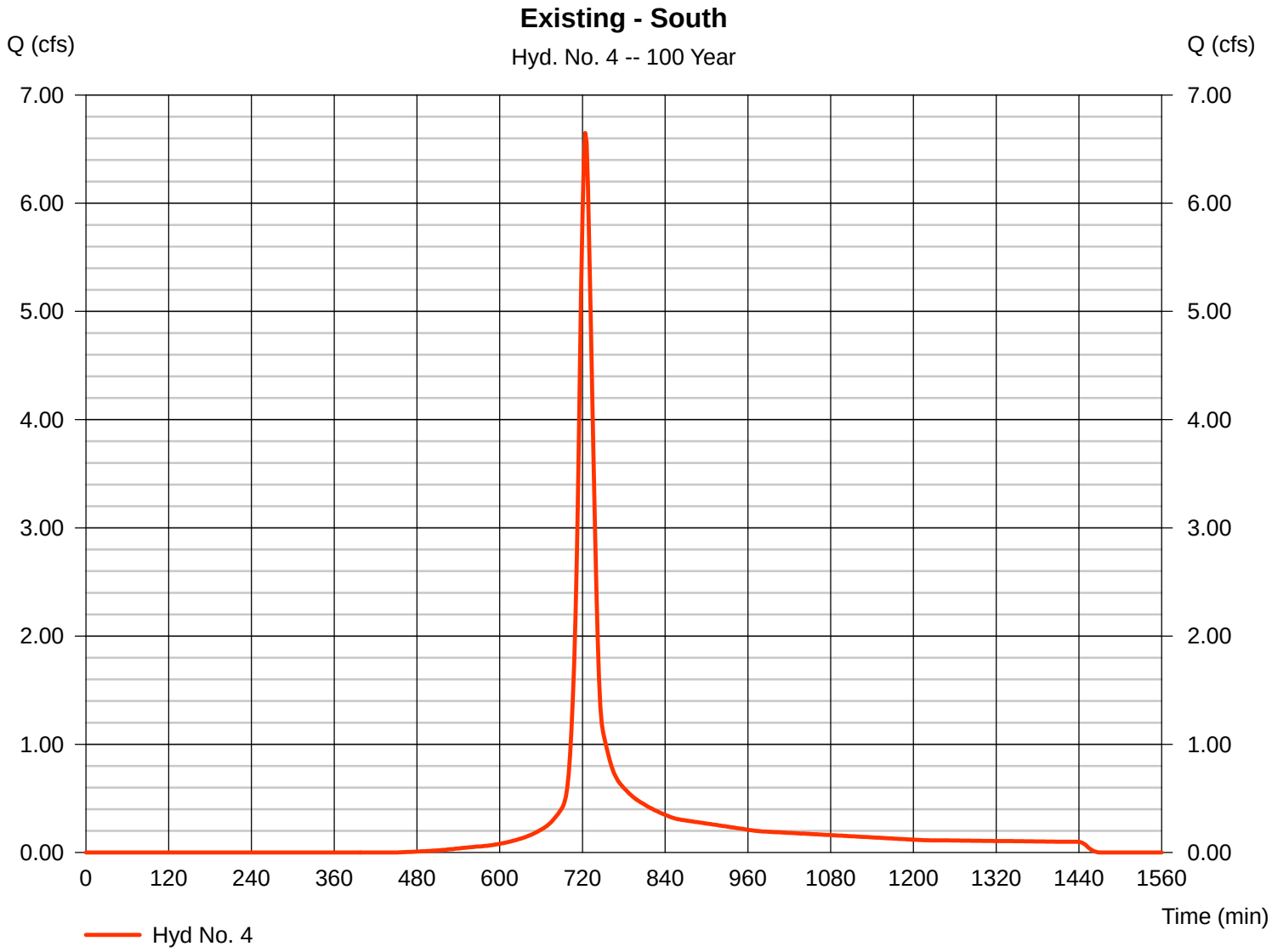


Hydrograph Report

Hyd. No. 4

Existing - South

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.650 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	0.477 acft
Drainage area	=	1.300 ac	Curve number	=	71
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	17.50 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

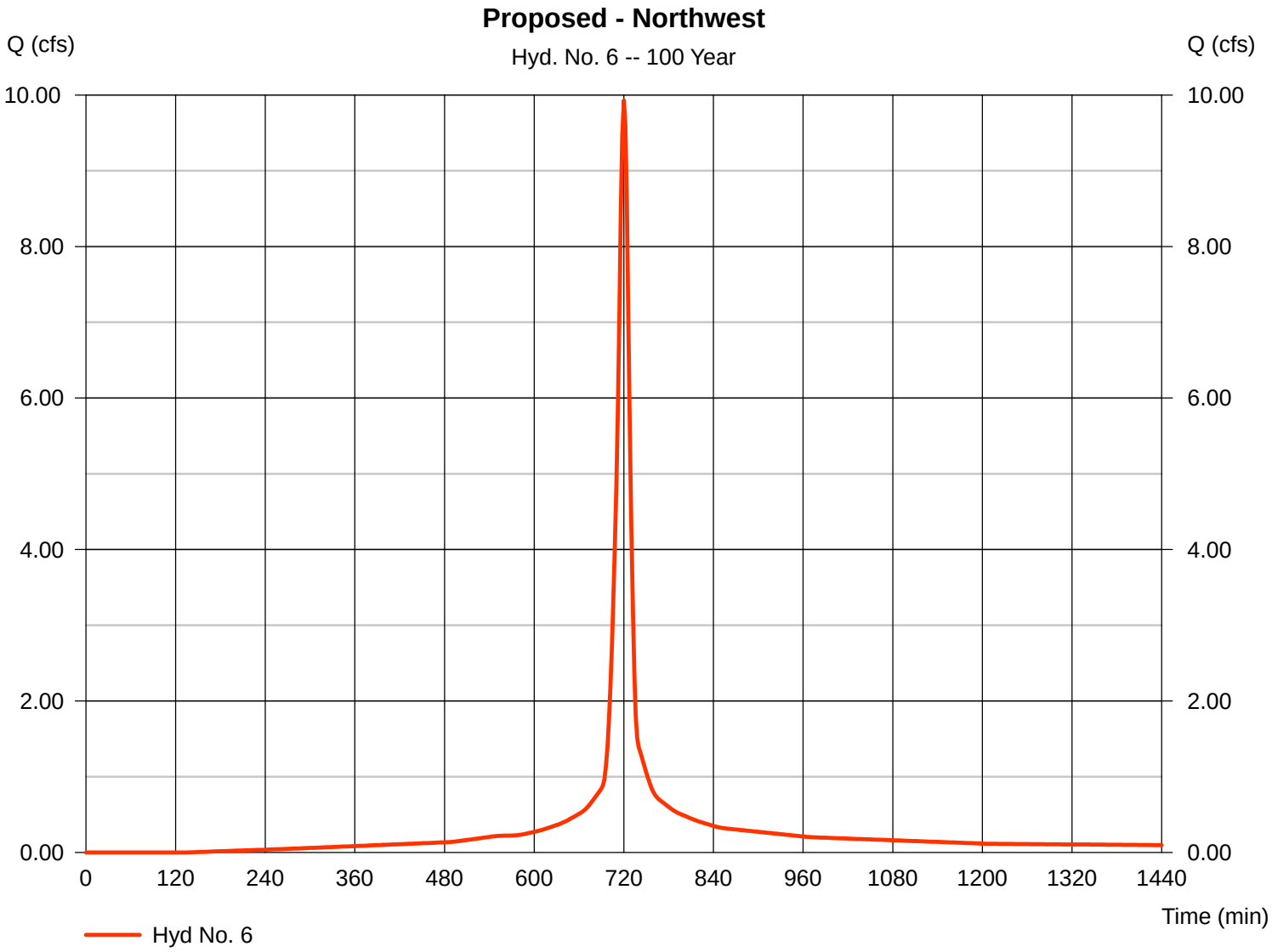


Hydrograph Report

Hyd. No. 6

Proposed - Northwest

Hydrograph type	=	SCS Runoff	Peak discharge	=	9.929 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	0.644 acft
Drainage area	=	1.100 ac	Curve number	=	91.7
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

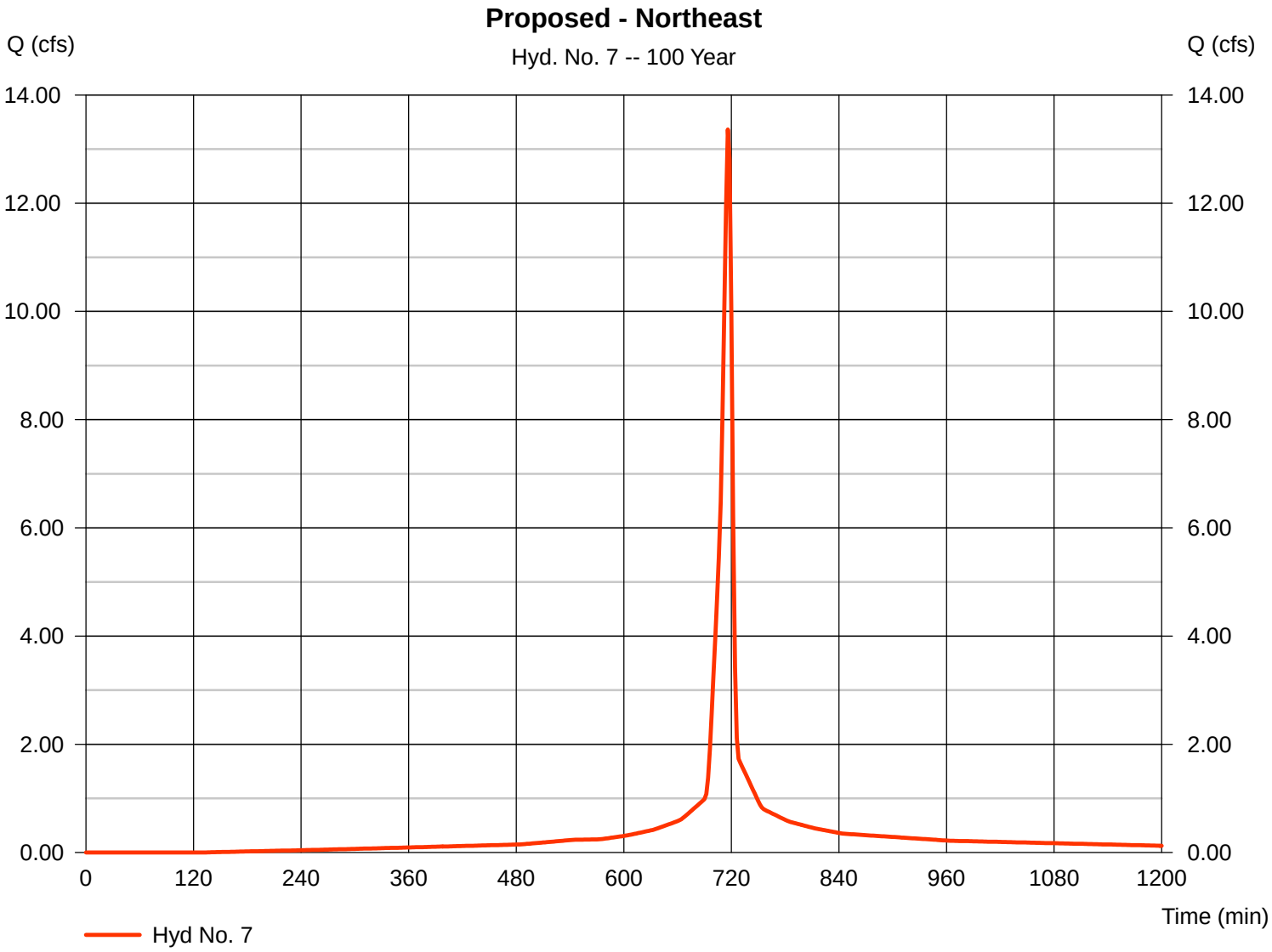


Hydrograph Report

Hyd. No. 7

Proposed - Northeast

Hydrograph type	=	SCS Runoff	Peak discharge	=	13.36 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	0.692 acft
Drainage area	=	1.300 ac	Curve number	=	91.7
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	3.80 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

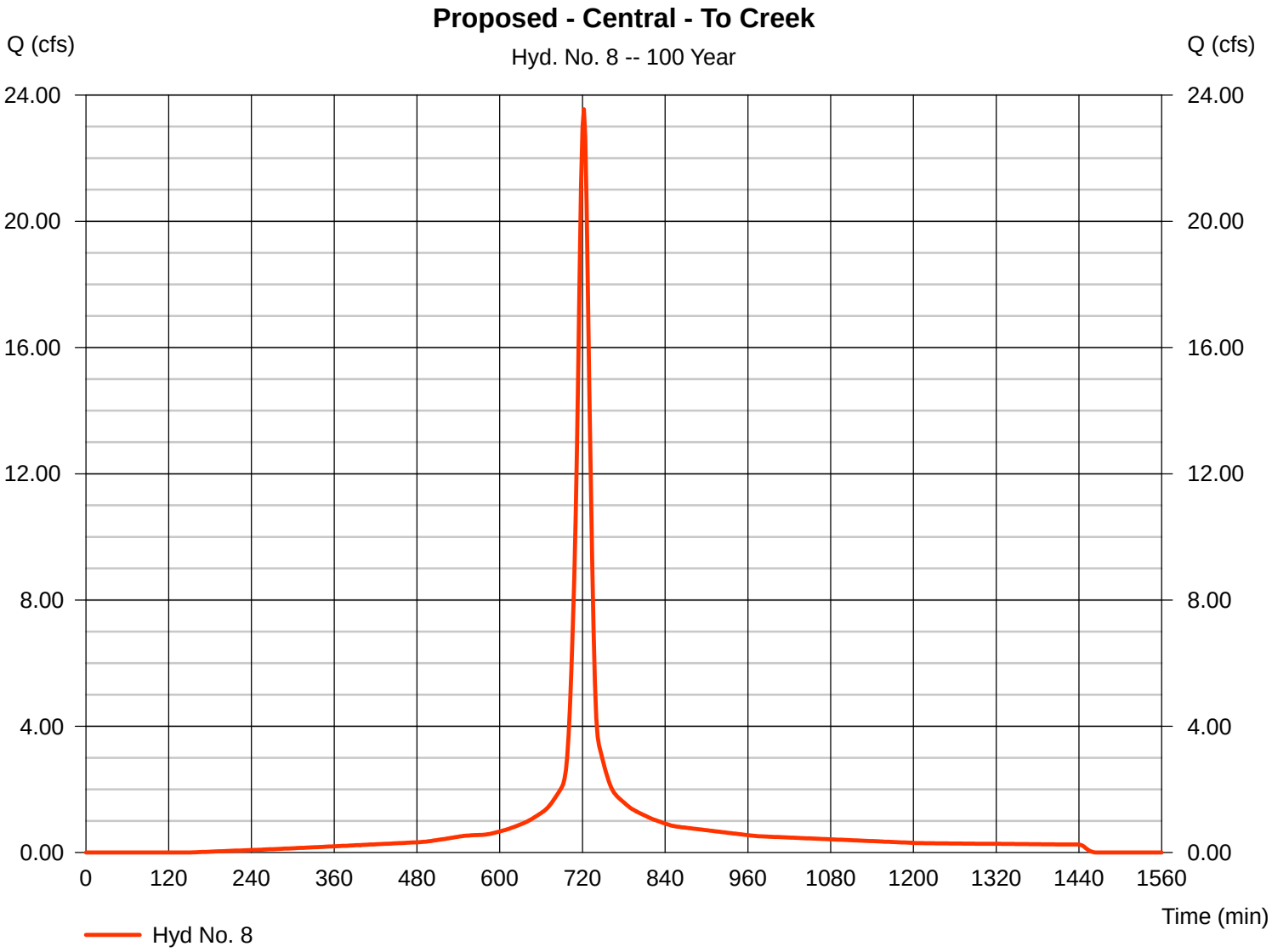


Hydrograph Report

Hyd. No. 8

Proposed - Central - To Creek

Hydrograph type	=	SCS Runoff	Peak discharge	=	23.55 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	1.634 acft
Drainage area	=	3.000 ac	Curve number	=	90.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	15.90 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

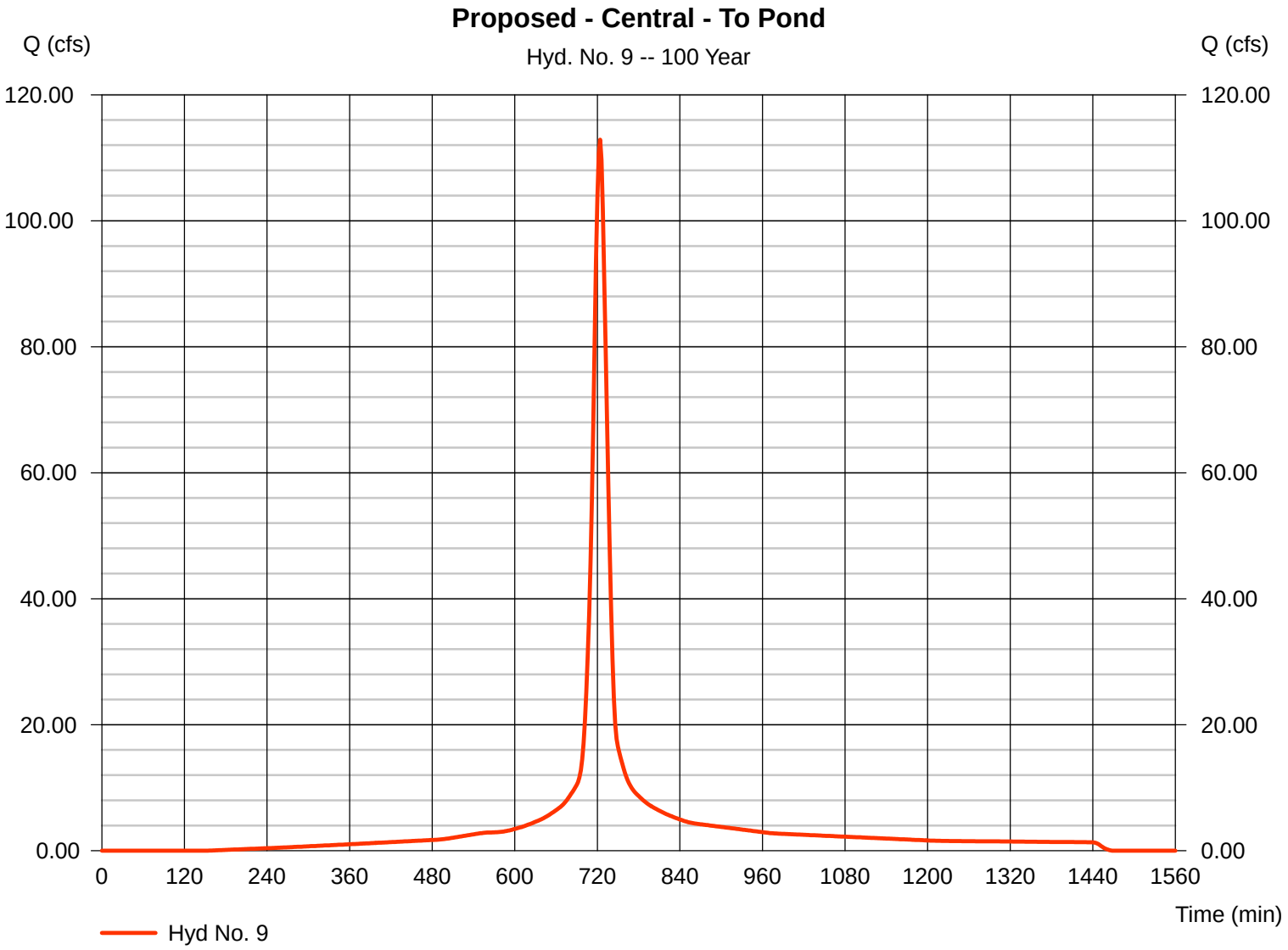


Hydrograph Report

Hyd. No. 9

Proposed - Central - To Pond

Hydrograph type	=	SCS Runoff	Peak discharge	=	112.88 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	8.659 acft
Drainage area	=	15.500 ac	Curve number	=	90.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	19.90 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



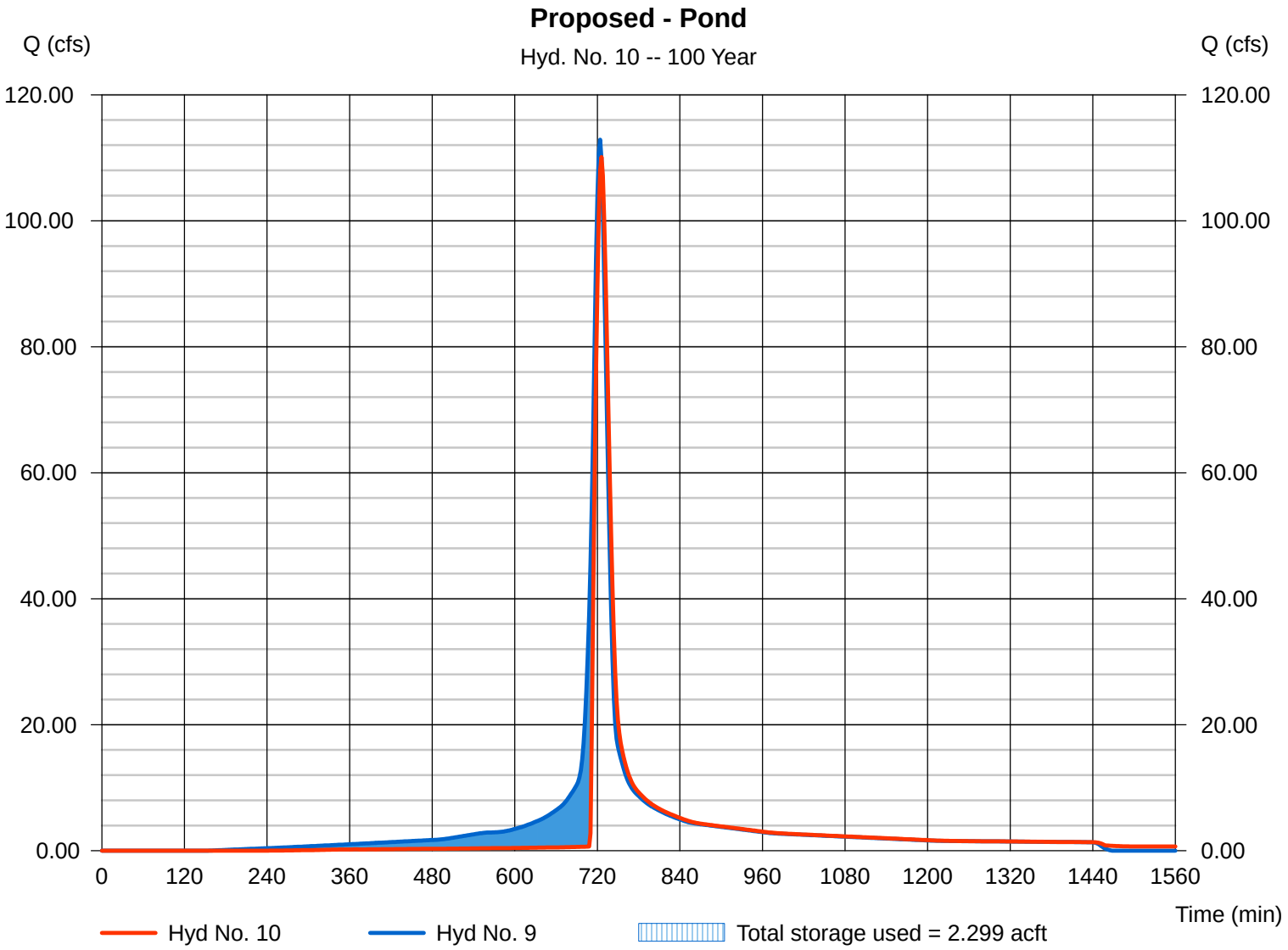
Hydrograph Report

Hyd. No. 10

Proposed - Pond

Hydrograph type	=	Reservoir	Peak discharge	=	110.13 cfs
Storm frequency	=	100 yrs	Time to peak	=	726 min
Time interval	=	2 min	Hyd. volume	=	8.641 acft
Inflow hyd. No.	=	9 - Proposed - Central - To Pond	Max. Elevation	=	1350.38 ft
Reservoir name	=	Reserve A Pond	Max. Storage	=	2.299 acft

Storage Indication method used.



Pond No. 1 - Reserve A Pond

Pond Data

Trapezoid - Bottom L x W = 120.0 x 120.0 ft, Side slope = 3.00:1, Bottom elev. = 1345.00 ft, Depth = 5.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	1345.00	14,400	0.000	0.000
0.55	1345.55	15,203	0.187	0.187
1.10	1346.10	16,028	0.197	0.384
1.65	1346.65	16,874	0.208	0.592
2.20	1347.20	17,742	0.219	0.810
2.75	1347.75	18,632	0.230	1.040
3.30	1348.30	19,544	0.241	1.281
3.85	1348.85	20,478	0.253	1.533
4.40	1349.40	21,433	0.265	1.798
4.95	1349.95	22,410	0.277	2.075
5.50	1350.50	23,409	0.289	2.364

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 5.00	0.00	0.00	0.00
Span (in)	= 5.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1345.00	0.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 0.40	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 40.00	0.00	0.00	0.00
Crest El. (ft)	= 1349.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0.000	1345.00	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.06	0.019	1345.06	0.01 oc	---	---	---	0.00	---	---	---	---	---	0.008
0.11	0.037	1345.11	0.03 oc	---	---	---	0.00	---	---	---	---	---	0.032
0.17	0.056	1345.17	0.07 oc	---	---	---	0.00	---	---	---	---	---	0.069
0.22	0.075	1345.22	0.11 oc	---	---	---	0.00	---	---	---	---	---	0.112
0.28	0.093	1345.28	0.16 oc	---	---	---	0.00	---	---	---	---	---	0.156
0.33	0.112	1345.33	0.19 oc	---	---	---	0.00	---	---	---	---	---	0.195
0.39	0.131	1345.39	0.22 oc	---	---	---	0.00	---	---	---	---	---	0.217
0.44	0.149	1345.44	0.21 oc	---	---	---	0.00	---	---	---	---	---	0.211
0.50	0.168	1345.50	0.22 oc	---	---	---	0.00	---	---	---	---	---	0.224
0.55	0.187	1345.55	0.24 oc	---	---	---	0.00	---	---	---	---	---	0.236
0.61	0.207	1345.61	0.25 oc	---	---	---	0.00	---	---	---	---	---	0.248
0.66	0.226	1345.66	0.26 oc	---	---	---	0.00	---	---	---	---	---	0.260
0.72	0.246	1345.72	0.27 oc	---	---	---	0.00	---	---	---	---	---	0.271
0.77	0.266	1345.77	0.28 oc	---	---	---	0.00	---	---	---	---	---	0.281
0.83	0.285	1345.83	0.29 oc	---	---	---	0.00	---	---	---	---	---	0.291
0.88	0.305	1345.88	0.30 oc	---	---	---	0.00	---	---	---	---	---	0.301
0.94	0.325	1345.94	0.31 oc	---	---	---	0.00	---	---	---	---	---	0.310
0.99	0.345	1345.99	0.32 oc	---	---	---	0.00	---	---	---	---	---	0.319
1.05	0.364	1346.05	0.33 oc	---	---	---	0.00	---	---	---	---	---	0.328
1.10	0.384	1346.10	0.34 oc	---	---	---	0.00	---	---	---	---	---	0.337
1.16	0.405	1346.16	0.35 oc	---	---	---	0.00	---	---	---	---	---	0.345
1.21	0.426	1346.21	0.35 oc	---	---	---	0.00	---	---	---	---	---	0.354
1.27	0.446	1346.27	0.36 oc	---	---	---	0.00	---	---	---	---	---	0.362
1.32	0.467	1346.32	0.37 oc	---	---	---	0.00	---	---	---	---	---	0.370
1.38	0.488	1346.38	0.38 oc	---	---	---	0.00	---	---	---	---	---	0.377
1.43	0.509	1346.43	0.38 oc	---	---	---	0.00	---	---	---	---	---	0.385
1.49	0.529	1346.49	0.39 oc	---	---	---	0.00	---	---	---	---	---	0.392
1.54	0.550	1346.54	0.40 oc	---	---	---	0.00	---	---	---	---	---	0.400
1.60	0.571	1346.60	0.41 oc	---	---	---	0.00	---	---	---	---	---	0.407
1.65	0.592	1346.65	0.41 oc	---	---	---	0.00	---	---	---	---	---	0.414
1.71	0.614	1346.71	0.42 oc	---	---	---	0.00	---	---	---	---	---	0.421
1.76	0.635	1346.76	0.43 oc	---	---	---	0.00	---	---	---	---	---	0.427
1.82	0.657	1346.82	0.43 oc	---	---	---	0.00	---	---	---	---	---	0.434

Continues on next page...

Reserve A Pond

Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
1.87	0.679	1346.87	0.44 oc	---	---	---	0.00	---	---	---	---	---	0.441
1.93	0.701	1346.93	0.45 oc	---	---	---	0.00	---	---	---	---	---	0.447
1.98	0.723	1346.98	0.45 oc	---	---	---	0.00	---	---	---	---	---	0.454
2.04	0.745	1347.04	0.46 oc	---	---	---	0.00	---	---	---	---	---	0.460
2.09	0.767	1347.09	0.47 oc	---	---	---	0.00	---	---	---	---	---	0.466
2.15	0.788	1347.15	0.47 oc	---	---	---	0.00	---	---	---	---	---	0.472
2.20	0.810	1347.20	0.48 oc	---	---	---	0.00	---	---	---	---	---	0.478
2.26	0.833	1347.26	0.48 oc	---	---	---	0.00	---	---	---	---	---	0.484
2.31	0.856	1347.31	0.49 oc	---	---	---	0.00	---	---	---	---	---	0.490
2.37	0.879	1347.37	0.50 oc	---	---	---	0.00	---	---	---	---	---	0.496
2.42	0.902	1347.42	0.50 oc	---	---	---	0.00	---	---	---	---	---	0.502
2.48	0.925	1347.48	0.51 oc	---	---	---	0.00	---	---	---	---	---	0.508
2.53	0.948	1347.53	0.51 oc	---	---	---	0.00	---	---	---	---	---	0.513
2.59	0.971	1347.59	0.52 oc	---	---	---	0.00	---	---	---	---	---	0.519
2.64	0.994	1347.64	0.52 oc	---	---	---	0.00	---	---	---	---	---	0.524
2.70	1.017	1347.70	0.53 oc	---	---	---	0.00	---	---	---	---	---	0.530
2.75	1.040	1347.75	0.54 oc	---	---	---	0.00	---	---	---	---	---	0.535
2.81	1.064	1347.81	0.54 oc	---	---	---	0.00	---	---	---	---	---	0.540
2.86	1.088	1347.86	0.55 oc	---	---	---	0.00	---	---	---	---	---	0.546
2.92	1.112	1347.92	0.55 oc	---	---	---	0.00	---	---	---	---	---	0.551
2.97	1.136	1347.97	0.56 oc	---	---	---	0.00	---	---	---	---	---	0.556
3.03	1.160	1348.03	0.56 oc	---	---	---	0.00	---	---	---	---	---	0.561
3.08	1.184	1348.08	0.57 oc	---	---	---	0.00	---	---	---	---	---	0.567
3.14	1.209	1348.14	0.57 oc	---	---	---	0.00	---	---	---	---	---	0.572
3.19	1.233	1348.19	0.58 oc	---	---	---	0.00	---	---	---	---	---	0.577
3.25	1.257	1348.25	0.58 oc	---	---	---	0.00	---	---	---	---	---	0.582
3.30	1.281	1348.30	0.59 oc	---	---	---	0.00	---	---	---	---	---	0.587
3.36	1.306	1348.36	0.59 oc	---	---	---	0.00	---	---	---	---	---	0.591
3.41	1.331	1348.41	0.60 oc	---	---	---	0.00	---	---	---	---	---	0.596
3.47	1.357	1348.47	0.60 oc	---	---	---	0.00	---	---	---	---	---	0.601
3.52	1.382	1348.52	0.61 oc	---	---	---	0.00	---	---	---	---	---	0.606
3.58	1.407	1348.58	0.61 oc	---	---	---	0.00	---	---	---	---	---	0.611
3.63	1.432	1348.63	0.62 oc	---	---	---	0.00	---	---	---	---	---	0.615
3.69	1.458	1348.69	0.62 oc	---	---	---	0.00	---	---	---	---	---	0.620
3.74	1.483	1348.74	0.62 oc	---	---	---	0.00	---	---	---	---	---	0.625
3.80	1.508	1348.80	0.63 oc	---	---	---	0.00	---	---	---	---	---	0.629
3.85	1.533	1348.85	0.63 oc	---	---	---	0.00	---	---	---	---	---	0.634
3.91	1.560	1348.91	0.64 oc	---	---	---	0.00	---	---	---	---	---	0.638
3.96	1.586	1348.96	0.64 oc	---	---	---	0.00	---	---	---	---	---	0.643
4.02	1.613	1349.02	0.65 oc	---	---	---	0.00	---	---	---	---	---	0.647
4.07	1.639	1349.07	0.65 oc	---	---	---	0.00	---	---	---	---	---	0.652
4.13	1.666	1349.13	0.66 oc	---	---	---	0.00	---	---	---	---	---	0.656
4.18	1.692	1349.18	0.66 oc	---	---	---	0.00	---	---	---	---	---	0.660
4.23	1.719	1349.24	0.66 oc	---	---	---	0.00	---	---	---	---	---	0.665
4.29	1.745	1349.29	0.67 oc	---	---	---	0.00	---	---	---	---	---	0.669
4.34	1.772	1349.35	0.67 oc	---	---	---	0.00	---	---	---	---	---	0.673
4.40	1.798	1349.40	0.68 oc	---	---	---	0.00	---	---	---	---	---	0.678
4.46	1.826	1349.46	0.68 oc	---	---	---	0.00	---	---	---	---	---	0.682
4.51	1.853	1349.51	0.69 oc	---	---	---	0.14	---	---	---	---	---	0.822
4.57	1.881	1349.57	0.69 oc	---	---	---	2.22	---	---	---	---	---	2.907
4.62	1.909	1349.62	0.69 oc	---	---	---	5.55	---	---	---	---	---	6.248
4.67	1.936	1349.68	0.70 oc	---	---	---	9.78	---	---	---	---	---	10.47
4.73	1.964	1349.73	0.70 oc	---	---	---	14.73	---	---	---	---	---	15.43
4.78	1.992	1349.79	0.71 oc	---	---	---	20.31	---	---	---	---	---	21.02
4.84	2.019	1349.84	0.71 oc	---	---	---	26.46	---	---	---	---	---	27.17
4.89	2.047	1349.90	0.71 oc	---	---	---	33.13	---	---	---	---	---	33.85
4.95	2.075	1349.95	0.72 oc	---	---	---	40.20	---	---	---	---	---	40.92
5.01	2.104	1350.01	0.72 oc	---	---	---	47.80	---	---	---	---	---	48.53
5.06	2.133	1350.06	0.73 oc	---	---	---	55.83	---	---	---	---	---	56.56
5.12	2.162	1350.12	0.73 oc	---	---	---	64.26	---	---	---	---	---	64.99
5.17	2.190	1350.17	0.73 oc	---	---	---	73.08	---	---	---	---	---	73.81
5.22	2.219	1350.23	0.74 oc	---	---	---	82.26	---	---	---	---	---	83.00
5.28	2.248	1350.28	0.74 oc	---	---	---	91.81	---	---	---	---	---	92.55
5.33	2.277	1350.34	0.75 oc	---	---	---	101.69	---	---	---	---	---	102.44
5.39	2.306	1350.39	0.75 oc	---	---	---	111.91	---	---	---	---	---	112.66
5.44	2.335	1350.45	0.75 oc	---	---	---	122.45	---	---	---	---	---	123.20
5.50	2.364	1350.50	0.76 oc	---	---	---	133.20	---	---	---	---	---	133.96

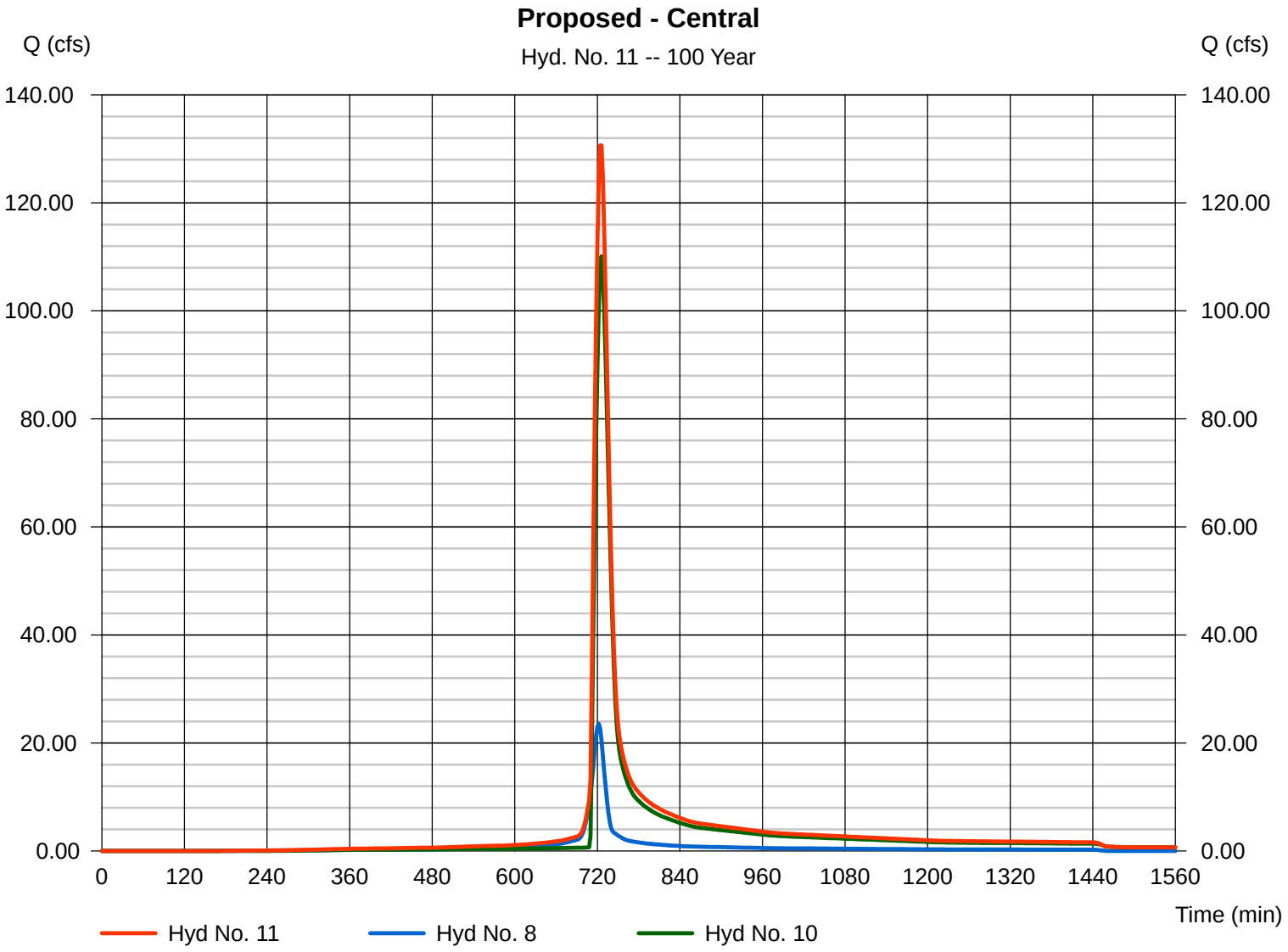
...End

Hydrograph Report

Hyd. No. 11

Proposed - Central

Hydrograph type	=	Combine	Peak discharge	=	130.64 cfs
Storm frequency	=	100 yrs	Time to peak	=	726 min
Time interval	=	2 min	Hyd. volume	=	10.275 acft
Inflow hyds.	=	8, 10	Contrib. drain. area	=	3.000 ac



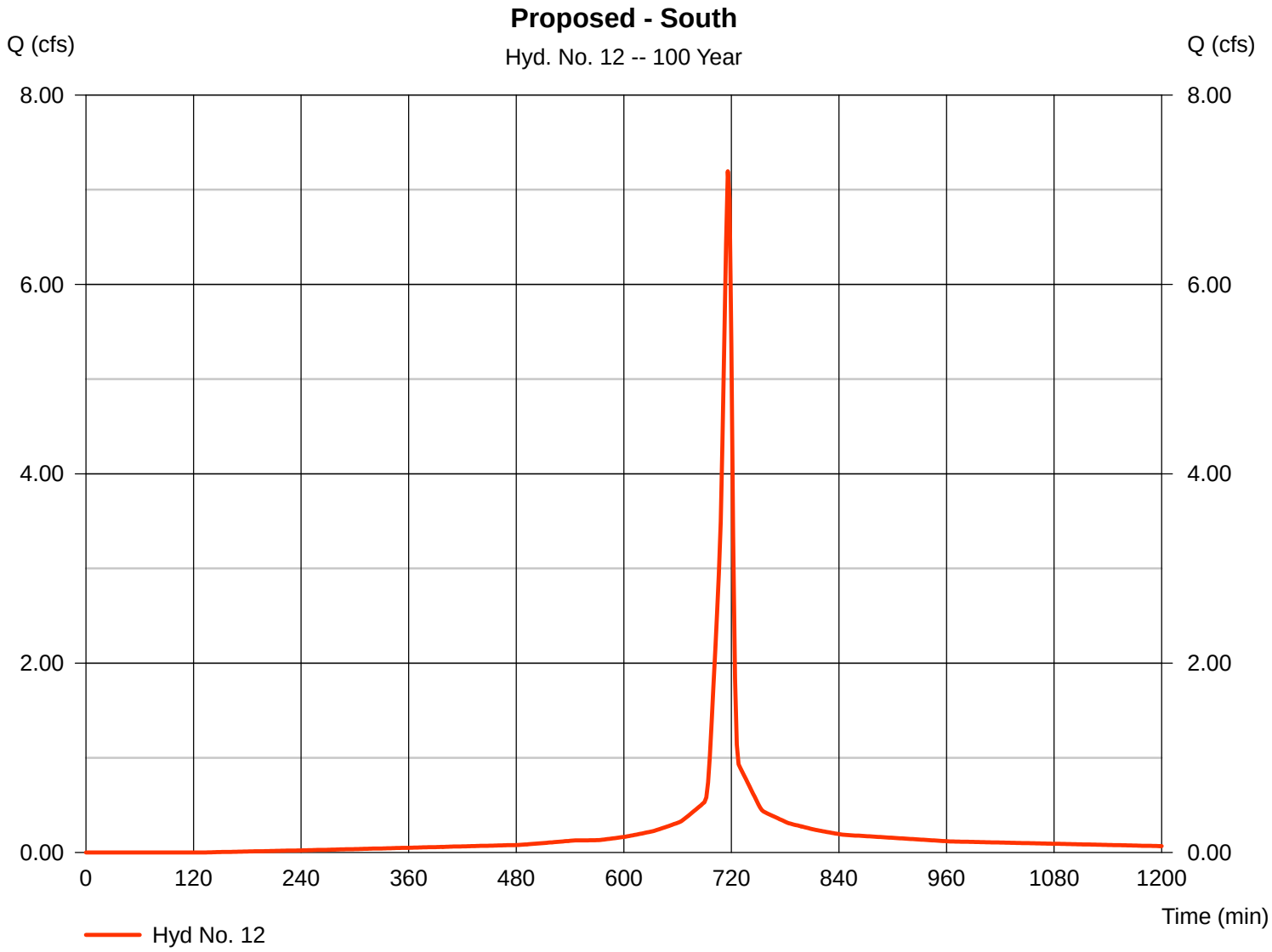
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Aug 22, 2013

Hyd. No. 12

Proposed - South

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.196 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	0.372 acft
Drainage area	=	0.700 ac	Curve number	=	91.7
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	4.60 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

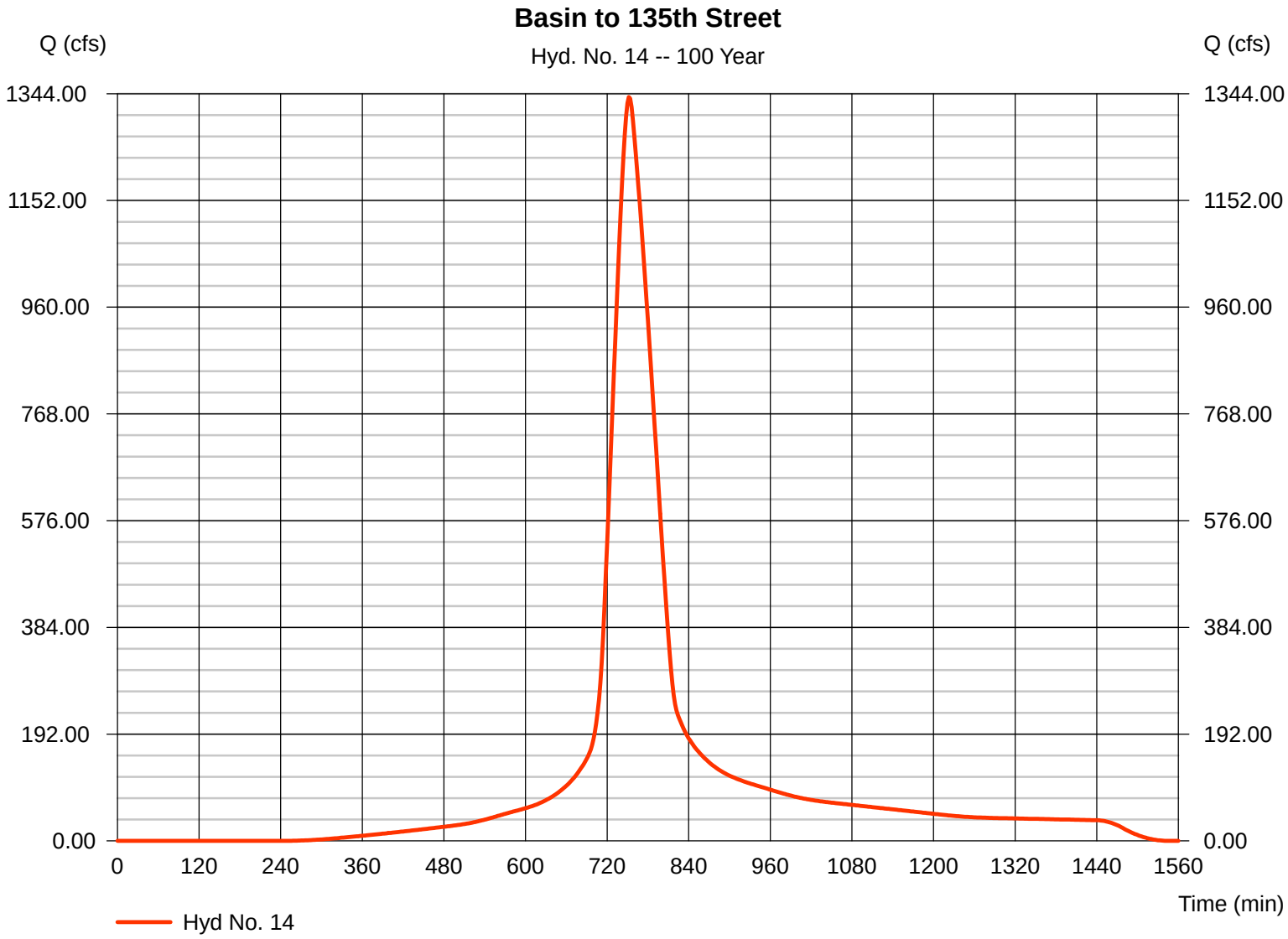


Hydrograph Report

Hyd. No. 14

Basin to 135th Street

Hydrograph type	=	SCS Runoff	Peak discharge	=	1338.16 cfs
Storm frequency	=	100 yrs	Time to peak	=	752 min
Time interval	=	2 min	Hyd. volume	=	215.879 acft
Drainage area	=	433.000 ac	Curve number	=	85
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	65.00 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

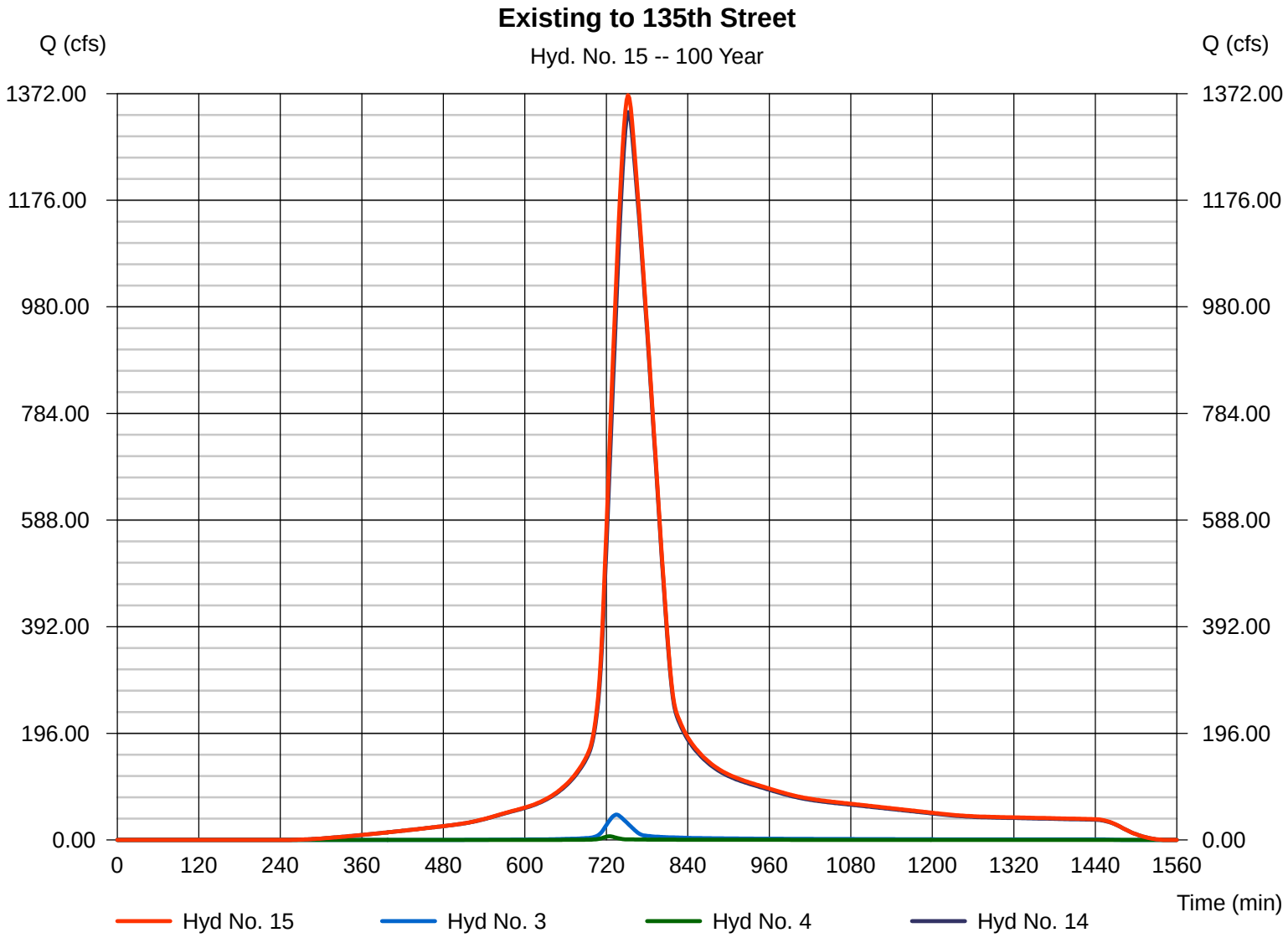


Hydrograph Report

Hyd. No. 15

Existing to 135th Street

Hydrograph type	=	Combine	Peak discharge	=	1369.01 cfs
Storm frequency	=	100 yrs	Time to peak	=	752 min
Time interval	=	2 min	Hyd. volume	=	221.185 acft
Inflow hyds.	=	3, 4, 14	Contrib. drain. area	=	447.300 ac

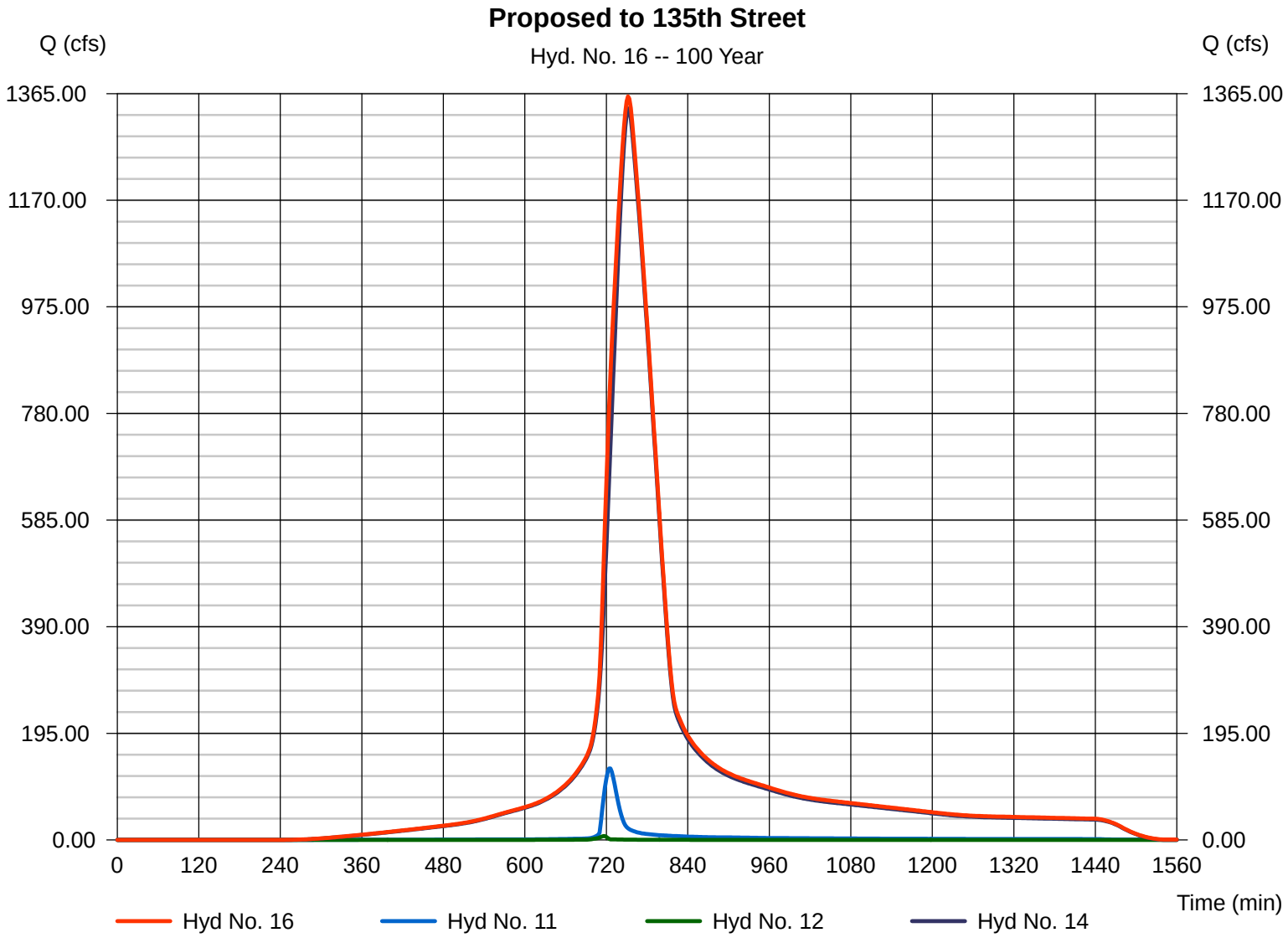


Hydrograph Report

Hyd. No. 16

Proposed to 135th Street

Hydrograph type	=	Combine	Peak discharge	=	1360.04 cfs
Storm frequency	=	100 yrs	Time to peak	=	752 min
Time interval	=	2 min	Hyd. volume	=	226.526 acft
Inflow hyds.	=	11, 12, 14	Contrib. drain. area	=	433.700 ac



Appendix F - Time of Concentration

Project	Courtyards at Auburn Hills
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	Courtyards at Auburn Hil	2	10.3	9.1	0.0	0.0	0.0	0.0	**19.4**	690	13	1.81	0.59	11.7	0.194	4.6
2	Courtyards at Auburn Hil	2	10.8	7.1	0.0	0.0	0.0	0.0	**17.9**	700	16	2.33	0.65	10.8	0.179	2.7
3	Courtyards at Auburn Hil	6	18.0	11.5	0.1	0.2	0.1	4.2	**34.1**	1850	39	2.11	0.90	20.5	0.341	13
4	Courtyards at Auburn Hil	5	10.3	2.6	0.0	0.2	0.1	4.2	**17.5**	1150	34	2.91	1.10	10.5	0.175	1.3
5	Courtyards at Auburn Hil	1	10.0	0.0	0.0	0.0	0.0	0.0	**10.0**	77	2	2.60	0.13	6.0	0.100	0.8
6	Courtyards at Auburn Hil	2	0.9	2.9	0.0	0.0	0.0	0.0	**3.8**	224	4	1.79	0.98	2.3	0.038	1.1
7	Courtyards at Auburn Hil	5	15.9	2.4	0.3	1.4	0.0	0.0	**19.9**	1030	19	1.84	0.86	12.0	0.199	19.1
8	Courtyards at Auburn Hil	1	4.6	0.0	0.0	0.0	0.0	0.0	**4.6**	32	1	3.13	0.12	2.8	0.046	0.6
9	Courtyards at Auburn Hil	3	18.0	16.8	30.1	0.0	0.0	0.0	**65.0**	10100	111	1.10	2.59	39.0	0.650	433

Subbasin Name	Courtyards at Auburn I
Drainage Area (ac)	4.6
Drainage Area (sq mi)	0.0071875

	Sheet Flow					Total
selected>> Select (0 or 1)	1					1 segments
Length (ft)	100					100 feet length
Top Elevation (ft)	1366.0					
Bottom Elevation (ft)	1362.0					
Cover	0.24, Dense grasses					
Specify alternate "n"						
Sheet Flow "n" (dim)	0.240					
2-yr, 24-hr Rainfall (ins)	3.50					
Drop (ft)	4					4 feet drop
Slope (ft/ft)	0.0400					
Slope (%)	4.00					
Velocity (fps)	0.16					
Travel Time (hrs)	0.172					
Travel Time (mins)	10.34					10.3 mins travel

	Shallow Concentrated Flow					Total
selected>> Select (0 or 1)	1					1 segments
Length (ft)	590					590 feet length
Top Elevation (ft)	1362					
Bottom Elevation (ft)	1354					
Cover	9, Cultivated straight row crop					
Specify alternate "K"						
Surface Coeff (dim)	9.00					
Drop (ft)	9					8.5 feet drop
Slope (ft/ft)	0.0144					
Slope (%)	1.44					
Velocity (fps)	1.08					
Travel Time (mins)	9.10					9.1 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)						
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)	690
Drop (ft)	13
Slope (ft/ft)	0.0181
Slope (%)	1.81
Velocity (fps)	0.59
Travel Time (mins)	**19.4**
Lag (mins)	11.7
Lag (hrs)	0.194

Subbasin Name	Courtyards at Auburn I
Drainage Area (ac)	2.7
Drainage Area (sq mi)	0.00421875

	Sheet Flow					Total
selected>> Select (0 or 1)	1					1 segments
Length (ft)	100					100 feet length
Top Elevation (ft)	1361.8					
Bottom Elevation (ft)	1360.0					
Cover	0.17, Cultivated soil, residue < 2					
Specify alternate "n"						
Sheet Flow "n" (dim)	0.170					
2-yr, 24-hr Rainfall (ins)	3.50					
Drop (ft)	2					2 feet drop
Slope (ft/ft)	0.0180					
Slope (%)	1.80					
Velocity (fps)	0.15					
Travel Time (hrs)	0.180					
Travel Time (mins)	10.80					10.8 mins travel

	Shallow Concentrated Flow					Total
selected>> Select (0 or 1)	1					1 segments
Length (ft)	600					600 feet length
Top Elevation (ft)	1360					
Bottom Elevation (ft)	1346					
Cover	9, Cultivated straight row crop					
Specify alternate "K"						
Surface Coeff (dim)	9.00					
Drop (ft)	15					15 feet drop
Slope (ft/ft)	0.0242					
Slope (%)	2.42					
Velocity (fps)	1.40					
Travel Time (mins)	7.15					7.1 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)						
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)	700
Drop (ft)	16
Slope (ft/ft)	0.0233
Slope (%)	2.33
Velocity (fps)	0.65
Travel Time (mins)	**17.9**
Lag (mins)	10.8
Lag (hrs)	0.179

Subbasin Name	Courtyards at Auburn H
Drainage Area (ac)	13
Drainage Area (sq mi)	0.0203125

Sheet Flow

							Total
selected>>	Select (0 or 1)	1					1 segments
	Length (ft)	100					100 feet length
	Top Elevation (ft)	1365.0					
	Bottom Elevation (ft)	1364.0					
	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)	0.0100					
	Slope (%)	1.00					
	Velocity (fps)	0.09					
	Travel Time (hrs)	0.300					
	Travel Time (mins)	18.00					18.0 mins travel

Shallow Concentrated Flow

							Total
selected>>	Select (0 or 1)	1					1 segments
	Length (ft)	900					900 feet length
	Top Elevation (ft)	1364					
	Bottom Elevation (ft)	1345					
	Cover	9, Cultivated straight row crop					
	Specify alternate "K"						
	Surface Coeff (dim)	9.00					
	Drop (ft)	19					19 feet drop
	Slope (ft/ft)	0.0211					
	Slope (%)	2.11					
	Velocity (fps)	1.31					
	Travel Time (mins)	11.47					11.5 mins travel

Open Channel Ditch Flow

							Total
selected>>	Select (0 or 1)	1					1 segments
	Length (ft)	100					100 feet length
	Top Elevation (ft)	1350					
	Bottom Elevation (ft)	1347					
	Channel Lining	0.03, Grassed					
	Bottom Width (ft)	25.00					
	Left Side Slope (H:V)	3.00					
	Right Side Slope (H:V)	3.00					
	Depth (ft)	3.00					
	Specify alternate "n"						
	Manning "n" (dim)	0.030					
	Drop (ft)	3					3 feet drop
	Slope (ft/ft)	0.0300					
	Slope (%)	3.00					
	Flow Area (sq ft)	102.00					
	Wet Perimeter (ft)	43.97					
	Hydraulic Radius (ft)	2.32					
	Velocity (fps)	15.07					
	Normal Flow (cfs)	1537.6					
selected>>	Travel Time (mins)	0.11					0.1 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	6
Length (ft)	1850
Drop (ft)	39
Slope (ft/ft)	0.0211

Subbasin Name	Courtyards at Auburn H
Drainage Area (ac)	1.3
Drainage Area (sq mi)	0.00203125

Sheet Flow

							Total
selected>>	Select (0 or 1)	1					1 segments
	Length (ft)	100					100 feet length
	Top Elevation (ft)	1364.0					
	Bottom Elevation (ft)	1360.0					
	Cover	0.24, Dense grasses					
	Specify alternate "n"						
	Sheet Flow "n" (dim)	0.240					
	2-yr, 24-hr Rainfall (ins)	3.50					
	Drop (ft)	4					4 feet drop
	Slope (ft/ft)	0.0400					
	Slope (%)	4.00					
	Velocity (fps)	0.16					
	Travel Time (hrs)	0.172					
	Travel Time (mins)	10.34					10.3 mins travel

Shallow Concentrated Flow

							Total
selected>>	Select (0 or 1)	1					1 segments
	Length (ft)	300					300 feet length
	Top Elevation (ft)	1360					
	Bottom Elevation (ft)	1347					
	Cover	9, Cultivated straight row crop					
	Specify alternate "K"						
	Surface Coeff (dim)	9.00					
	Drop (ft)	14					14 feet drop
	Slope (ft/ft)	0.0450					
	Slope (%)	4.50					
	Velocity (fps)	1.91					
	Travel Time (mins)	2.62					2.6 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)						
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)	1150
Drop (ft)	34
Slope (ft/ft)	0.0291

Subbasin Name	Courtyards at Auburn H
Drainage Area (ac)	0.8
Drainage Area (sq mi)	0.00125

Sheet Flow

selected>>							Total
	Select (0 or 1)	1					1 segments
	Length (ft)	77					77 feet length
	Top Elevation (ft)	1366.0					
	Bottom Elevation (ft)	1364.0					
	Cover	0.24, Dense grasses					
	Specify alternate "n"						
	Sheet Flow "n" (dim)	0.240					
	2-yr, 24-hr Rainfall (ins)	3.50					
	Drop (ft)	2					2 feet drop
	Slope (ft/ft)	0.0260					
	Slope (%)	2.60					
	Velocity (fps)	0.13					
	Travel Time (hrs)	0.166					
	Travel Time (mins)	9.97					10.0 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)	77
Drop (ft)	2
Slope (ft/ft)	0.0260

Subbasin Name	Courtyards at Auburn H
Drainage Area (ac)	1.1
Drainage Area (sq mi)	0.00171875

Sheet Flow

selected>>							Total
	Select (0 or 1)	1					1 segments
	Length (ft)	80					80 feet length
	Top Elevation (ft)	1350.0					
	Bottom Elevation (ft)	1348.0					
	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)	2					2 feet drop
	Slope (ft/ft)	0.0250					
	Slope (%)	2.50					
	Velocity (fps)	1.50					
	Travel Time (hrs)	0.015					
	Travel Time (mins)	0.89					0.9 mins travel

Shallow Concentrated Flow

selected>>							Total
	Select (0 or 1)	1					1 segments
	Length (ft)	144					144 feet length
	Top Elevation (ft)	1348					
	Bottom Elevation (ft)	1346					
	Cover	7, Short grass pasture					
	Specify alternate "K"						
	Surface Coeff (dim)	7.00					
	Drop (ft)	2					2 feet drop
	Slope (ft/ft)	0.0139					
	Slope (%)	1.39					
	Velocity (fps)	0.82					
	Travel Time (mins)	2.91					2.9 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)	224
Drop (ft)	4
Slope (ft/ft)	0.0179

Subbasin Name	Courtyards at Auburn H
Drainage Area (ac)	19.1
Drainage Area (sq mi)	0.02984375

Sheet Flow

							Total
selected>>	Select (0 or 1)	1					1 segments
	Length (ft)	90					90 feet length
	Top Elevation (ft)	1366.0					
	Bottom Elevation (ft)	1365.0					
	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)	0.0111					
	Slope (%)	1.11					
	Velocity (fps)	0.09					
	Travel Time (hrs)	0.264					
	Travel Time (mins)	15.87					15.9 mins travel

Shallow Concentrated Flow

							Total
selected>>	Select (0 or 1)	1					1 segments
	Length (ft)	100					100 feet length
	Top Elevation (ft)	1365					
	Bottom Elevation (ft)	1364					
	Cover	7, Short grass pasture					
	Specify alternate "K"						
	Surface Coeff (dim)	7.00					
	Drop (ft)	1					1 feet drop
	Slope (ft/ft)	0.0100					
	Slope (%)	1.00					
	Velocity (fps)	0.70					
	Travel Time (mins)	2.38					2.4 mins travel

Open Channel Ditch Flow

							Total
selected>>	Select (0 or 1)	1					1 segments
	Length (ft)	200					200 feet length
	Top Elevation (ft)	1355					
	Bottom Elevation (ft)	1349					
	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)	3.00					
	Specify alternate "n"						
	Manning "n" (dim)	0.030					
	Drop (ft)	6					6 feet drop
	Slope (ft/ft)	0.0300					
	Slope (%)	3.00					
	Flow Area (sq ft)	42.00					
	Wet Perimeter (ft)	23.97					
	Hydraulic Radius (ft)	1.75					
	Velocity (fps)	12.50					
	Normal Flow (cfs)	525.1					
selected>>	Travel Time (mins)	0.27					0.3 mins travel

Open Channel Pipe Flow

						Total
Select (0 or 1)	1	1				2 segments
Length (ft)	520	120				640 feet length
Top Elevation (ft)	1364	1349				
Bottom Elevation (ft)	1355	1347				
Pipe Material	0.017, Rough concrete	0.017, Rough concrete				
Diameter (ins)	24.00	36.00				
Flow Depth (ins)	24.00	36.00				
Specify alternate "n"						
Manning "n" (dim)	0.017	0.017				
Drop (ft)	9	2				11 feet drop
Slope (ft/ft)	0.0173	0.0167				
Slope (%)	1.73	1.67				
Theta (radians)	6.283	6.283				
Flow Area (sq ft)	3.14	7.07				
Wet Perimeter (ft)	6.28	9.42				
Hydraulic Radius (ft)	0.50	0.75				
Velocity (fps)	7.26	9.34				
Normal Flow (cfs)	22.8	66.0				
Travel Time (mins)	1.19	0.21				1.4 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	5
Length (ft)	1030
Drop (ft)	19
Slope (ft/ft)	0.0184

Subbasin Name	Courtyards at Auburn H
Drainage Area (ac)	0.6
Drainage Area (sq mi)	0.0009375

Sheet Flow

selected>>							Total
	Select (0 or 1)	1					1 segments
	Length (ft)	32					32 feet length
	Top Elevation (ft)	1365.0					
	Bottom Elevation (ft)	1364.0					
	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)	0.0313					
	Slope (%)	3.13					
	Velocity (fps)	0.12					
	Travel Time (hrs)	0.076					
	Travel Time (mins)	4.59					4.6 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)	32
Drop (ft)	1
Slope (ft/ft)	0.0313

Subbasin Name	Courtyards at Auburn H
Drainage Area (ac)	433
Drainage Area (sq mi)	0.6765625

Sheet Flow

selected>>							Total
	Select (0 or 1)	1					1 segments
	Length (ft)	100					100 feet length
	Top Elevation (ft)	1450.0					
	Bottom Elevation (ft)	1449.0					
	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)	0.0100					
	Slope (%)	1.00					
	Velocity (fps)	0.09					
	Travel Time (hrs)	0.300					
	Travel Time (mins)	18.00					18.0 mins travel

Shallow Concentrated Flow

selected>>							Total
	Select (0 or 1)	1					1 segments
	Length (ft)	1000					### feet length
	Top Elevation (ft)	1450					
	Bottom Elevation (ft)	1430					
	Cover	7, Short grass pasture					
	Specify alternate "K"						
	Surface Coeff (dim)	7.00					
	Drop (ft)	20					20 feet drop
	Slope (ft/ft)	0.0200					
	Slope (%)	2.00					
	Velocity (fps)	0.99					
	Travel Time (mins)	16.84					16.8 mins travel

Open Channel Ditch Flow

selected>>							Total
	Select (0 or 1)	1					1 segments
	Length (ft)	9000					### feet length
	Top Elevation (ft)	1430					
	Bottom Elevation (ft)	1340					
	Channel Lining	0.05, Rough Natural Stream					
	Bottom Width (ft)	25.00					
	Left Side Slope (H:V)	5.00					
	Right Side Slope (H:V)	5.00					
	Depth (ft)	3.00					
	Specify alternate "n"						
	Manning "n" (dim)	0.050					
	Drop (ft)	90					90 feet drop
	Slope (ft/ft)	0.0100					
	Slope (%)	1.00					
	Flow Area (sq ft)	120.00					
	Wet Perimeter (ft)	55.59					
	Hydraulic Radius (ft)	2.16					
	Velocity (fps)	4.98					
	Normal Flow (cfs)	597.3					
	Travel Time (mins)	30.14					30.1 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)	10100
Drop (ft)	111
Slope (ft/ft)	0.0110

Appendix G - Curve Number

Curve Number Calculations
The Courtyards at Auburn Hills
Existing - Northwest
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%	0.5	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)		0.19	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	4.1	Pre-Developed or Undisturbed Pervious	80		Pre-Developed or Undisturbed Pervious	84	
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80	0.31	Developed or Disturbed Pervious	84		Developed or Disturbed Pervious	88	
Impervious	98	0	Impervious	98	0.19	Impervious	98	0	Impervious	98	0
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	72.7	4.6	Composite Curve Number HSG C (CN)	0.0	0	Composite Curve Number HSG D (CN)	0.0	0

Total Weighted Composite Curve Number (CN)	72.7
Total Area (A) (acres)	4.6

Curve Number Calculations
The Courtyards at Auburn Hills
Existing - Northeast
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	2.7	Pre-Developed or Undisturbed Pervious	80		Pre-Developed or Undisturbed Pervious	84	
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80	0	Developed or Disturbed Pervious	84		Developed or Disturbed Pervious	88	
Impervious	98	0	Impervious	98	0	Impervious	98	0	Impervious	98	0
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	71.0	2.7	Composite Curve Number HSG C (CN)	0.0	0	Composite Curve Number HSG D (CN)	0.0	0

Total Weighted Composite Curve Number (CN)	71.0
Total Area (A) (acres)	2.7

Curve Number Calculations
The Courtyards at Auburn Hills
Existing - Central
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%	0.7	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)		0.266	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	12.3	Pre-Developed or Undisturbed Pervious	80		Pre-Developed or Undisturbed Pervious	84	
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80	0.434	Developed or Disturbed Pervious	84		Developed or Disturbed Pervious	88	
Impervious	98	0	Impervious	98	0.266	Impervious	98	0	Impervious	98	0
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	71.9	13	Composite Curve Number HSG C (CN)	0.0	0	Composite Curve Number HSG D (CN)	0.0	0

Total Weighted Composite Curve Number (CN)	71.9
Total Area (A) (acres)	13

Curve Number Calculations
The Courtyards at Auburn Hills
Existing - Northwest
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	1.3	Pre-Developed or Undisturbed Pervious	80		Pre-Developed or Undisturbed Pervious	84	
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80	0	Developed or Disturbed Pervious	84		Developed or Disturbed Pervious	88	
Impervious	98	0	Impervious	98	0	Impervious	98	0	Impervious	98	0
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	71.0	1.3	Composite Curve Number HSG C (CN)	0.0	0	Composite Curve Number HSG D (CN)	0.0	0

Total Weighted Composite Curve Number (CN)	71.0
Total Area (A) (acres)	1.3

Curve Number Calculations
The Courtyards at Auburn Hills
Proposed - Northwest
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%	1.1	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)		0.715	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		Pre-Developed or Undisturbed Pervious	84	
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80	0.385	Developed or Disturbed Pervious	84		Developed or Disturbed Pervious	88	
Impervious	98	0	Impervious	98	0.715	Impervious	98		Impervious	98	0
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	91.7	1.1	Composite Curve Number HSG C (CN)	0.0	0	Composite Curve Number HSG D (CN)	0.0	0

Total Weighted Composite Curve Number (CN)	91.7
Total Area (A) (acres)	1.1

Curve Number Calculations
The Courtyards at Auburn Hills
Proposed - Northeast
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%	1.3	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)		0.85	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		Pre-Developed or Undisturbed Pervious	84	
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80	0.455	Developed or Disturbed Pervious	84		Developed or Disturbed Pervious	88	
Impervious	98	0	Impervious	98	0.85	Impervious	98		Impervious	98	0
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	91.7	1.30	Composite Curve Number HSG C (CN)	0.0	0	Composite Curve Number HSG D (CN)	0.0	0

Total Weighted Composite Curve Number (CN)	91.7
Total Area (A) (acres)	1.30

Curve Number Calculations
The Courtyards at Auburn Hills
Proposed - Northeast
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%	16.2	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%	1.2	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)		11.0	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	0.7	Pre-Developed or Undisturbed Pervious	80		Pre-Developed or Undisturbed Pervious	84	
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80	6.4	Developed or Disturbed Pervious	84		Developed or Disturbed Pervious	88	
Impervious	98	0	Impervious	98	11.6	Impervious	98		Impervious	98	0
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	90.8	18.7	Composite Curve Number HSG C (CN)	0.0	0	Composite Curve Number HSG D (CN)	0.0	0

Total Weighted Composite Curve Number (CN)	90.8
Total Area (A) (acres)	18.7

Curve Number Calculations
The Courtyards at Auburn Hills
The Courtyards at Auburn Hills
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%	0.6	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)		0.39	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		Pre-Developed or Undisturbed Pervious	84	
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80	0.21	Developed or Disturbed Pervious	84		Developed or Disturbed Pervious	88	
Impervious	98	0	Impervious	98	0.39	Impervious	98		Impervious	98	0
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	91.7	0.60	Composite Curve Number HSG C (CN)	0.0	0	Composite Curve Number HSG D (CN)	0.0	0

Total Weighted Composite Curve Number (CN)	91.7
Total Area (A) (acres)	0.60

Curve Number Calculations
The Courtyards at Auburn Hills
Proposed - Northeast
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%	383	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)		145.5	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	50	Pre-Developed or Undisturbed Pervious	80		Pre-Developed or Undisturbed Pervious	84	
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80	237.5	Developed or Disturbed Pervious	84		Developed or Disturbed Pervious	88	
Impervious	98	0	Impervious	98	145.5	Impervious	98		Impervious	98	0
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	85.0	433.0	Composite Curve Number HSG C (CN)	0.0	0	Composite Curve Number HSG D (CN)	0.0	0

Total Weighted Composite Curve Number (CN)	85.0
Total Area (A) (acres)	433.0

Curve Number Calculations
The Courtyards at Auburn Hills
Proposed - Northeast
Estimate Imperviousness per Land Use

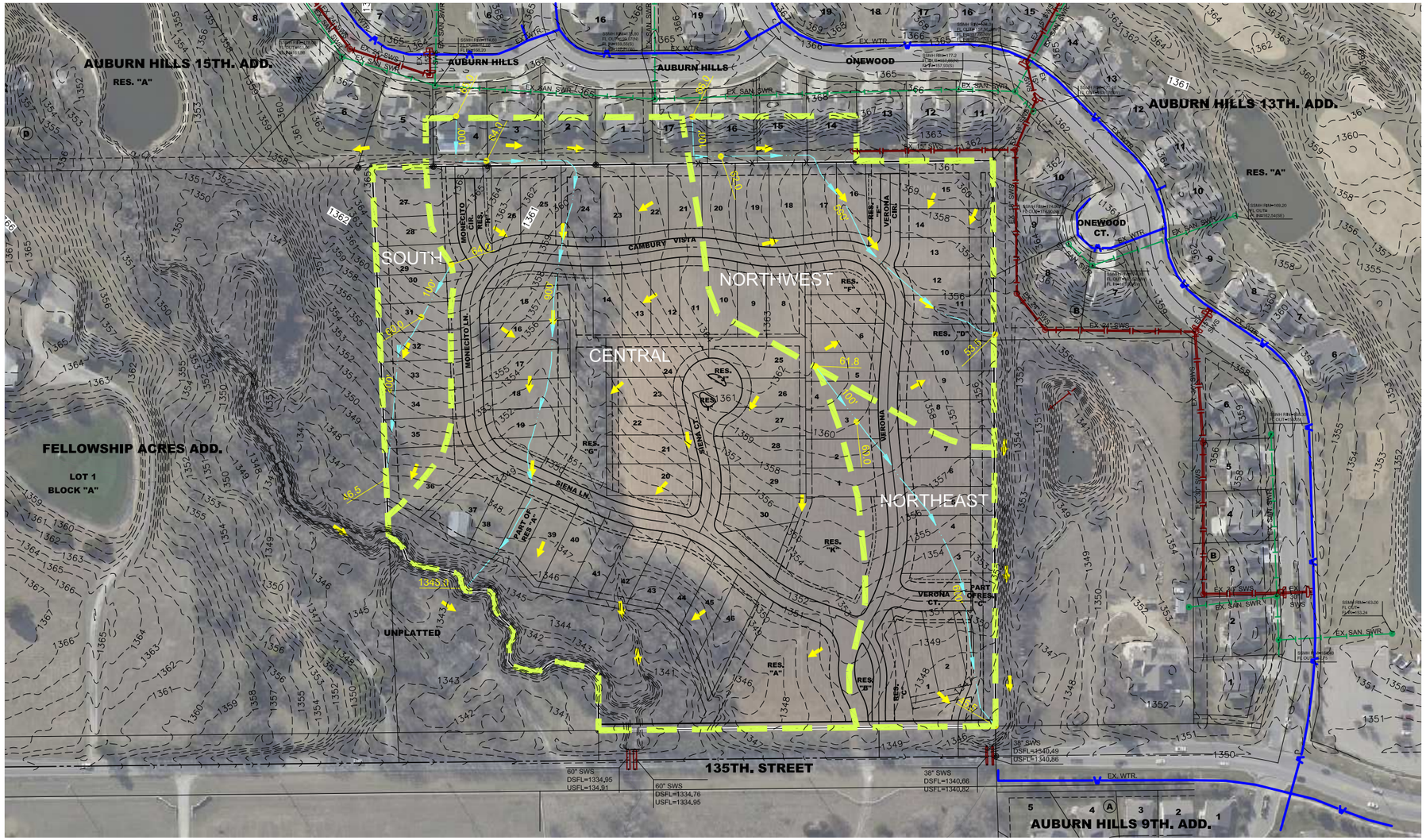
HSG A			HSG B			HSG C			HSG D		
Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)
Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	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%	16.6	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)		10.8	Impervious Area (acres)		0	Impervious Area (acres)		0

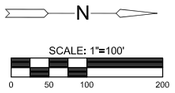
Composite Curve Number (CN)

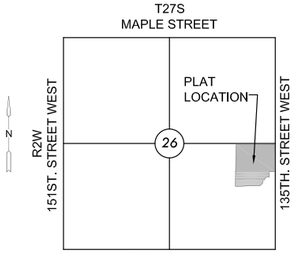
HSG A			HSG B			HSG C			HSG D		
Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)
Pre-Developed or Undisturbed Pervious	55		Pre-Developed or Undisturbed Pervious	71	3.8	Pre-Developed or Undisturbed Pervious	80		Pre-Developed or Undisturbed Pervious	84	
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80	5.8	Developed or Disturbed Pervious	84		Developed or Disturbed Pervious	88	
Impervious	98	0	Impervious	98	10.8	Impervious	98		Impervious	98	0
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	87.8	20.4	Composite Curve Number HSG C (CN)	0.0	0	Composite Curve Number HSG D (CN)	0.0	0

Total Weighted Composite Curve Number (CN)	87.8
Total Area (A) (acres)	20.4

Appendix H - Existing Conditions







VICINITY MAP

No Scale

	NORTHWEST	NORTHEAST	CENTRAL	SOUTH
Area (ac)	4.6	2.7	13.0	1.3
CN	72.7	71.0	71.9	71.0
Tc (min)	19.4	17.9	34.1	17.5
1-Year (cfs)	3.5	1.8	6.0	0.9
2-Year (cfs)	5.8	3.1	10.5	1.5
5-Year (cfs)	10.0	5.5	18.5	2.6
10-Year (cfs)	13.0	7.1	24.2	3.4
25-Year (cfs)	17.7	9.8	33.1	4.7
50-Year (cfs)	21.3	11.9	40.1	5.7
100-Year (cfs)	24.6	13.8	46.4	6.7

LEGEND

- FLOW PATHS
- EXISTING DRAINAGE BOUNDARY
- PROPOSED DRAINAGE BOUNDARY
- FLOW ARROWS
- PROPOSED WATER
- PROPOSED SANITARY SEWER
- PROPOSED STORM WATER SEWER
- EXISTING WATER
- EXISTING SANITARY SEWER
- EXISTING STORM WATER SEWER
- 135TH ST. WEST BOUNDARY
- FLOW PATH ELEVATION
- FLOOD PATH SEGMENT LENGTH

MKEC
Wichita, KS · 316-684-9300

EXISTING DRAINAGE AND UTILITY PLAN FOR

COURTYARDS AT AUBURN

WICHITA, KANSAS

EXIST. DRAINAGE & UTILITY PLAN

PROJECT NO.	1301010292
DATE	AUGUST 2013
SCALE	AS NOTED

DESIGNED	DRAWN	CHECKED
KLA	DM	GJA

NO.	REVISION	DATE
#	----	##/##/##

SHEET NO.

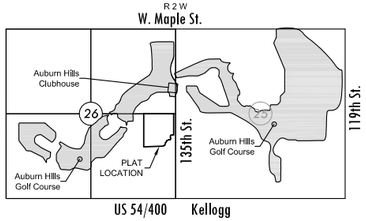
1 OF 1

Appendix I - Plat

FINAL PLAT

COURTYARDS AT AUBURN HILLS

AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS



VICINITY MAP

BENCHMARK

BM ⊕ Top of ⅝" Rebar with MKEC aluminum cap set flush to the ground being 220 feet south of and 75 west of the east ¼ corner of Section 26, T27S, R2W Elev.=1349.81 NAVD88 Datum.

MINIMUM PAD ELEVATIONS *LOWEST OPENINGS*		
LOT	BLOCK	ELEVATION *NAVD88*
35	1	1349.7
36	1	1350.2
37	1	1348.7
38	1	1348.1
39	1	1347.6
40	1	1347.6
41	1	1347.2
42	1	1346.8
43	1	1346.3
44	1	1346.0
45	1	1346.0
46	1	1353.4

N

1"=60' / 1 : 720

0 60 120

Basis of Bearing: Kansas coordinate system of 1983 south zone grid bearing of S00°37'32"E on the east line of the SE ¼, Sec. 36, T27S, R2W, 6th P.M. This plat is surveyed and platted on NAD83 using Kansas state plane south zone coordinates, modified to the surface, having a combined adjustment scale factor of 1.000120014401728

LINE TABLE		
LINE	LENGTH	BEARING
L1	77.79'	N89°22'28"E
L2	104.55'	S83°44'51"W
L3	101.92'	N84°32'01"W
L4	76.42'	S07°03'47"E
L5	44.86'	S10°29'25"W
L6	29.65'	S06°02'29"W
L7	165.88'	N87°21'41"E
L8	163.37'	N24°00'32"E
L9	61.82'	N41°30'34"E
L10	37.55'	N19°24'20"E
L11	5.00'	N70°35'40"W
L12	24.99'	N21°15'20"E
L13	84.58'	N00°16'26"W
L14	6.78'	N45°47'54"W
L15	112.41'	S89°43'34"W
L16	24.67'	S46°42'05"W
L17	87.52'	S87°24'43"W
L18	5.82'	N63°59'45"W
L19	111.87'	S76°08'54"W
L20	34.00'	N13°51'06"W
L21	45.90'	N89°43'34"E
L22	30.39'	S67°03'27"E
L23	47.96'	N89°22'29"E

CENTERLINE CURVE TABLE					
CURVE	LENGTH	RADIUS	CHORD	BEARING	DELTA
C1	92.13'	109.50'	89.43'	S71°37'08"W	48°12'19"
C2	44.31'	400.00'	44.29'	S87°27'08"E	6°20'49"
C3	222.44'	300.00'	217.38'	N75°00'40"W	42°28'58"
C4	122.72'	600.00'	122.51'	N89°36'25"E	11°43'08"
C5	161.05'	90.00'	140.41'	S44°12'06"W	102°31'46"
C6	61.27'	200.00'	61.03'	N01°42'49"E	17°33'12"
C7	111.18'	300.00'	110.55'	S00°07'37"E	21°14'04"
C8	175.78'	600.00'	175.15'	N02°21'05"W	16°47'08"
C9	172.23'	100.00'	151.72'	S43°17'55"E	98°40'48"
C10	105.04'	95.00'	99.77'	N55°41'07"E	63°21'08"
C11	107.38'	350.00'	106.96'	N15°13'12"E	17°34'40"
C12	122.45'	200.00'	120.54'	S23°58'13"W	35°04'42"
C13	115.74'	300.00'	115.02'	N30°27'27"E	22°06'14"
C14	53.72'	109.50'	53.19'	S33°27'39"W	28°06'39"
C15	37.58'	100.00'	37.36'	N10°29'27"E	21°31'46"
C16	38.81'	50.00'	37.84'	N68°02'10"W	44°28'31"
C17	49.74'	70.00'	48.70'	N67°03'24"E	40°42'38"
C18	121.73'	175.00'	119.29'	N83°55'26"W	39°51'21"
C19	69.91'	108.17'	68.70'	S71°12'36"W	37°01'58"
C20	36.47'	90.00'	36.22'	N78°39'56"W	23°12'58"
C21	37.02'	90.00'	36.76'	S78°50'29"E	23°34'04"

NE cor. Lot 10, Blk. B Auburn Hills 13th Addition Fnd. ½" Rebar w/ Baughman Id cap

SW. cor., Lot 9, Blk. B Auburn Hills 13th Addition Fnd. ½" Rebar w/ Baughman Id cap

SE cor. Lot 9, Blk. B Auburn Hills 13th Addition Fnd. ½" Rebar w/ Baughman Id cap

NW. cor., SE. ¼, Sec. 26, T27S, R2W, 6th P.M. Fnd. ⅝" Rebar in thimble

S89°43'34"W 2619.95'(M)

S89°43'34"W 940.00'

NW. cor., SE. ¼, Sec. 26, T27S, R2W, 6th P.M. Fnd. ¾" Pipe w/ Sedgwick County id cap

⅝" rebar w/ MKEC CLS 39 id cap

S0°37'32"E 1032.00'(D)

S0°37'32"E 372.00'

S0°37'32"E 660.00'(D,M) *50' by Deed Doc.#/Fim-Pg: 20329494*

S. 135TH ST.

S89°43'33"W 91.93'(D,M)

⅝" rebar w/ MKEC CLS 39 id cap

S87°24'43"W 614.70'(D)

15' west offset from SE. cor.

SW. cor., SE. ¼, Sec. 26, T27S, R2W, 6th P.M. Fnd. ⅝" rebar in thimble

SE cor. Lot 1, Blk. D Auburn Hills 15th Addition Fnd. ½" Rebar

NE cor. Lot 4, Blk. D Auburn Hills 15th Addition Fnd. ½" Rebar w/ Baughman Id cap

SE cor. Lot 4, Blk. D Auburn Hills 15th Addition Fnd. ½" Rebar w/ Baughman Id cap

E. cor. Lot 5, Blk. D Auburn Hills 15th Addition Fnd. ½" Rebar w/ Baughman Id cap

SE. cor. Lot 5, Blk. D Auburn Hills 15th Addition Fnd. ½" Rebar w/ Baughman Id cap

VERONA CIR.

VERONA

VERONA CT.

SIENA

SIENA CT.

NINEIRON

MONTECITO CIR.

MONTECITO LN.

Res. C

Reserve C

Res. B

Reserve K

Reserve A

Res. D

Res. E

Res. F

Res. G

Res. H

Res. J

Res. I

Part of Reserve A

Part of Reserve A

FLOODWAY

Creek Centerline

Wichita City Limits

Basis of Bearings: Kansas coordinate system of 1983 South Zone S00°37'32"E 2628.69'(M) Complete Access Control

80' Emergency Access Only

131.50' Complete Access Control

One Full Movement Opening 81'

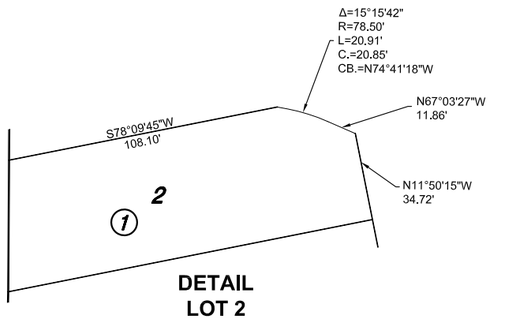
LEGEND

Date of Survey: July, 16 2013

- = 11.5' Rear Lot Setback
- △ = Section Corner Monument Found
- ● = Set ⅝" rebar w/ MKEC CLS 39 id. cap
- ○ = Found ⅝" rebar w/ MKEC CLS 39 id cap or see annotation for type
- ⊠ = Not Set
- · = Not Set
- ⊕ = Benchmark
- (M) = Measured
- (C) = Calculated from measured
- (D) = Described
- (CD) = Calculated from Described
- (P) = Platted

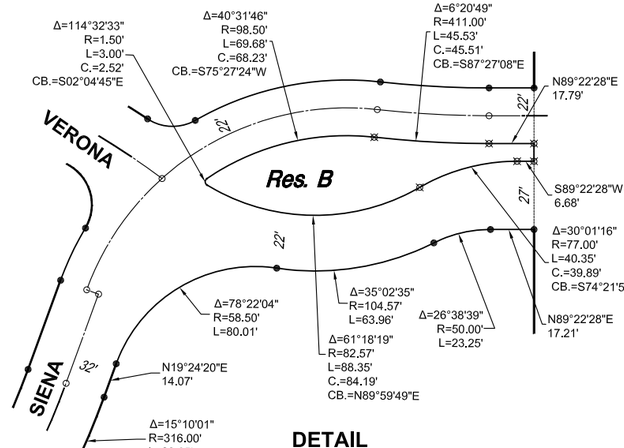
DETAIL LOT 2

1"=30'



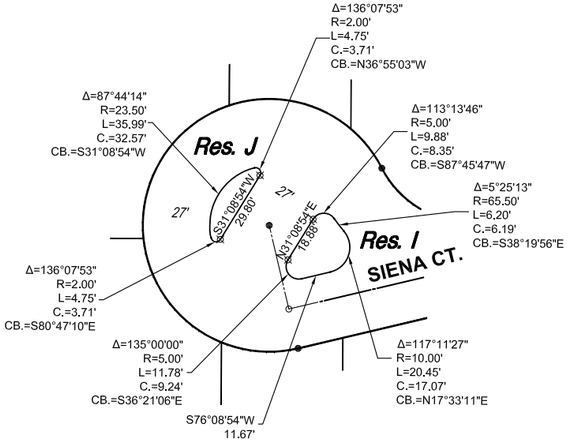
DETAIL RESERVE B

1"=30'



DETAIL RESERVES I & J

1"=30'



GREGORY J. ALLISON LICENSED LS-1257 KANSAS LAND SURVEYOR

MKEC

Wichita, KS • 316.684.9600

J:\Projects\2013\13010\092_Perfection_Courtyards_at_Auburn\Civil\CAD\Plat\13292a.dwg 09/17/2013 11:30:22 AM CST

FINAL PLAT

COURTYARDS AT AUBURN HILLS

AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS

CERTIFICATE OF SURVEY

I, Gregory J. Allison, a registered land surveyor in Kansas, do hereby certify that I have been in responsible charge of surveying and platting of "COURTYARDS AT AUBURN HILLS" an addition to Wichita, Sedgwick County, Kansas, into Lots, Blocks, Reserves and Streets, the same being accurately set forth in the accompanying plat and described herein:

Beginning at the Northeast corner of the Southeast Quarter of Section 26, Township 27 South, Range 2 West; thence West 60 rods; thence South 40 rods; thence East 60 rods; thence North 40 rods to beginning, Sedgwick County, Kansas; EXCEPT the East 50 feet thereof deeded to the City of Wichita, Kansas on Doc#/Flm-Pg: 29329494, TOGETHER WITH,
Beginning at a point 660 feet south of the Northeast corner of the Southeast Quarter of Section 26, Township 27 South, Range 2 West of the 6th P.M., Sedgwick County, Kansas, thence West 990 feet; thence South 372 feet; thence in an Easterly direction 990.8 feet to a point on the East line of said Southeast Quarter, 992 feet South of said Northeast corner of said Southeast Quarter, thence North 332 feet the point of beginning, EXCEPT that part lying East of the center line of the creek.

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 _____, 2013.

GREGORY J. ALLISON LICENSED LS-1257 KANSAS LAND SURVEYOR

Gregory J. Allison, PE, LS #1257
MKEC Engineering Consultants, 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 Lots, Blocks, Reserves and Streets, the same to be known as "COURTYARDS AT AUBURN HILLS" an addition to Wichita, Sedgwick County, Kansas.

The streets are hereby dedicated to and for the use of the public.

Easements for the construction and maintenance of streets, drainage, and utilities, as indicated hereon, are hereby granted to the public. The emergency access easement is non-exclusive and is platted for the ingress and egress of vehicular and pedestrian emergency traffic along and across that part of Reserve C as depicted hereon, and is hereby granted to and for the use of the public. Parking easements are non-exclusive and are granted for short term (overflow) residential parking only. No utility obstructions or other vertical obstructions shall prohibit the placement of paved parking within said parking easement. The parking easements as indicated hereon are hereby granted to and for the use of the public.

Each lot where abutting and adjoining another zero lot line lot within this plat shall provide a 3.5 foot maintenance and access easement for the benefit of the adjoining owner(s), their successors and assigns, and/or their agents, and emergency personnel. The maintenance access easements are hereby platted for the purpose of pedestrian emergency access, construction, maintenance, the extension of the footings and a 2 foot overhang of the structure onto the adjoining lot. Opposite of the zero lot line the minimum side yard setback shall be 6 feet. The residences with the 6 foot side yard setback may be constructed without a fire separation, but only window well and roof encroachments are permitted into the side yard, moreover, no building cantilevers or equipment are permitted in the side yard and sight restrictions shall be maintained on the windows.

All reserve are platted for utilities confined to easements, drainage, landscaping, irrigation, open space, berming, walkways, and monuments (monuments and berming are not allowed within platted floodway). Reserve C is also platted for emergency access. Reserves C, E, F, G, and H are also platted for residential parking. Reserves A, G, and K are platted for private parks and recreation, swimming pool, neighborhood club house, neighborhood amenities, private playground, pond and fountain. A portion of Reserve A is also platted for a floodway. The reserves shall be owned and maintained by the developer and/or a homeowners owner association, and are reserved for the stated uses.

All abutters rights of access to or from 135th Street over and across the east line of "COURTYARDS AT AUBURN HILLS," are hereby granted to the appropriate governing body, provided however two full movement opening as indicated hereon one of which is platted for the exclusive use of emergency access.

The floodway, as indicated, shall be the responsibility of the owners until such time as the appropriate governing body exercising jurisdiction elects to assume the responsibility for the maintenance and improvements of the drainage, provided further, that no structure shall be constructed on or within said floodway, no shall any fill, change of grade, creation of a channel or any work on be carried out without the permission of the City Engineer.

A drainage plan has been developed for this plat. All drainage easements, rights-of-way, or reserves 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.

Perfection Signature Properties, LLC, a Kansas limited liability company
and
Perfection Builders, LLC, a Kansas limited liability company

_____ _____
Scott A. Lehner, Chief Executive Manager / Member Jason R. Ronk, Chief Operations Manager / Member

STATE OF KANSAS, SEDGWICK COUNTY} ss:

This instrument was acknowledged before me on ____ day of _____, 2013, by Scott A. Lehner, Chief Executive Manager, and Jason R. Ronk, Chief Operations Manager, and Members of, Perfection Signature Properties, LLC, a Kansas limited liability company, and Perfection Builders, LLC, a Kansas limited liability company.

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

_____, Notary Public Notary Public:
My Term Expires: _____

MORTGAGE CERTIFICATE

The Fidelity Bank, holder of a mortgage on a portion of the above described property, does hereby consent to the plat of "WATERCRESS VILLAGE THIRD ADDITION."

FIDELITY BANK

_____
Terry Carpenter, Senior Vice President

This instrument was acknowledged before me on ____ day of _____ , 2013, by Terry Carpenter, Senior Vice President, Fidelity Bank.

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

_____, Notary Public
Notary Public:

My Term Expires: _____.

PLANNING COMMISSION CERTIFICATE

This plat of "COURTYARDS AT AUBURN HILLS" has been submitted to and approved by the Wichita-Sedgwick County Metropolitan Area Planning Commission, Wichita, Kansas.

Dated this ____ day of _____, 2013

WICHITA-SEDGWICK COUNTY METROPOLITAN AREA PLANNING COMMISSION

_____, Chair
Don Klausmeyer, Chair

Attest:

_____, Secretary
John L. Schlegel, Secretary

GOVERNING BODY CERTIFICATE

The dedications shown on this plat are hereby accepted and this plat is hereby approved by the governing body of the City of Wichita, Kansas.

Dated this ____ day of _____, 2013

At the direction of the City Council.

_____, Mayor
Carl Brewer, Mayor

Attest:

_____, City Clerk
Karen Sublett, City Clerk

COUNTY SURVEYOR

STATE OF KANSAS, SEDGWICK COUNTY} ss:

Reviewed in accordance with K.S.A. 58-2005 on this ____ day of _____, 2013.

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

TRANSFER RECORD

STATE OF KANSAS, SEDGWICK COUNTY} ss:

Entered on transfer record this ____ day of _____, 2013

_____, County Clerk
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 _____, 2013, at _____ o'clock ___M; and is duly recorded.

_____, Register of Deeds
Bill Meek, Register of Deeds

Attest:

_____, Deputy
Tonya E. Buckingham, Deputy

MKEC
Wichita, KS • 316.684.9600

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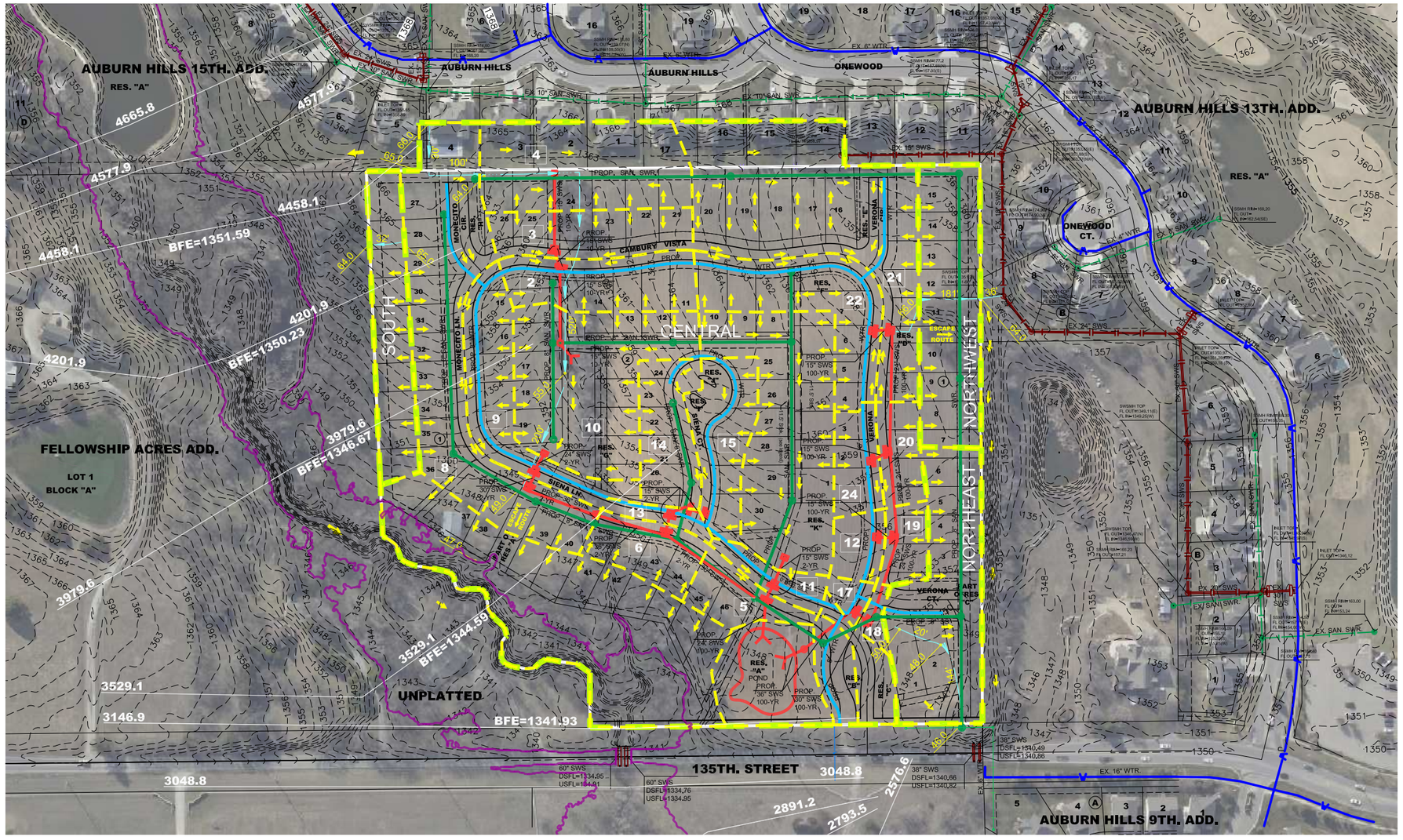
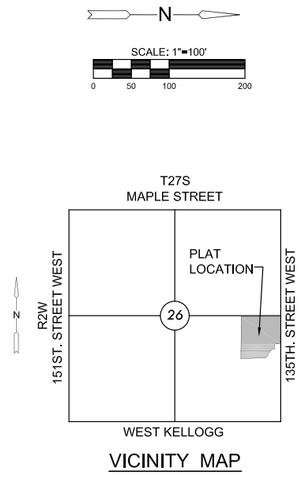
Appendix J - Drainage and Utility Plan





VICINITY MAP

No Scale

BASIN SUMMARY

	Northwest	Northeast	Central	South
Area (ac)	1.1	1.3	18.5	0.7
CN	91.7	91.7	90.8	91.7
Tc (min)	10.0	3.8	19.9	4.6
1-Year (cfs)	3.0	4.1	7.4	2.2
2-Year (cfs)	4.0	5.4	9.8	2.9
5-Year (cfs)	5.5	7.4	47.2	4.0
10-Year (cfs)	6.4	8.7	71.5	4.7

RESERVE "A" POND SUMMARY

	Flow In (cfs)	Flow Out (cfs)	Elevation (ft)	Volume (ac-ft)
1-Year (cfs)	33.4	0.7	1349.4	1.8
2-Year (cfs)	44.3	5.8	1349.6	2.0
5-Year (cfs)	61.4	40.6	1350.0	2.1
10-Year (cfs)	72.6	61.3	1350.1	2.2
25-Year (cfs)	89.3	84.6	1350.2	2.3
50-Year (cfs)	101.9	99.0	1350.3	2.3
100-Year (cfs)	112.9	110.1	1350.4	2.3

LEGEND

- FLOW PATHS
- BASIN DRAINAGE BOUNDARY
- PROPOSED DRAINAGE BOUNDARY
- FLOW ARROWS
- PROPOSED WATER
- PROPOSED SANITARY SEWER
- PROPOSED STORM WATER SEWER
- EXISTING WATER
- EXISTING SANITARY SEWER
- EXISTING STORM WATER SEWER
- 135TH ST. WEST BOUNDARY
- 5 - SWS PIPE SIZING
- 100-YR FLOODPLAIN

MKEC
Wichita, KS • 316-684-9300

PROPOSED DRAINAGE AND UTILITY PLAN FOR

COURTYARDS AT AUBURN

WICHITA, KANSAS

PROP. DRAINAGE & UTILITY PLAN

PROJECT NO.	1301010292
DATE	AUGUST 2013
SCALE	AS NOTED

DESIGNED	DRAWN	CHECKED
KLA	DM	GJA

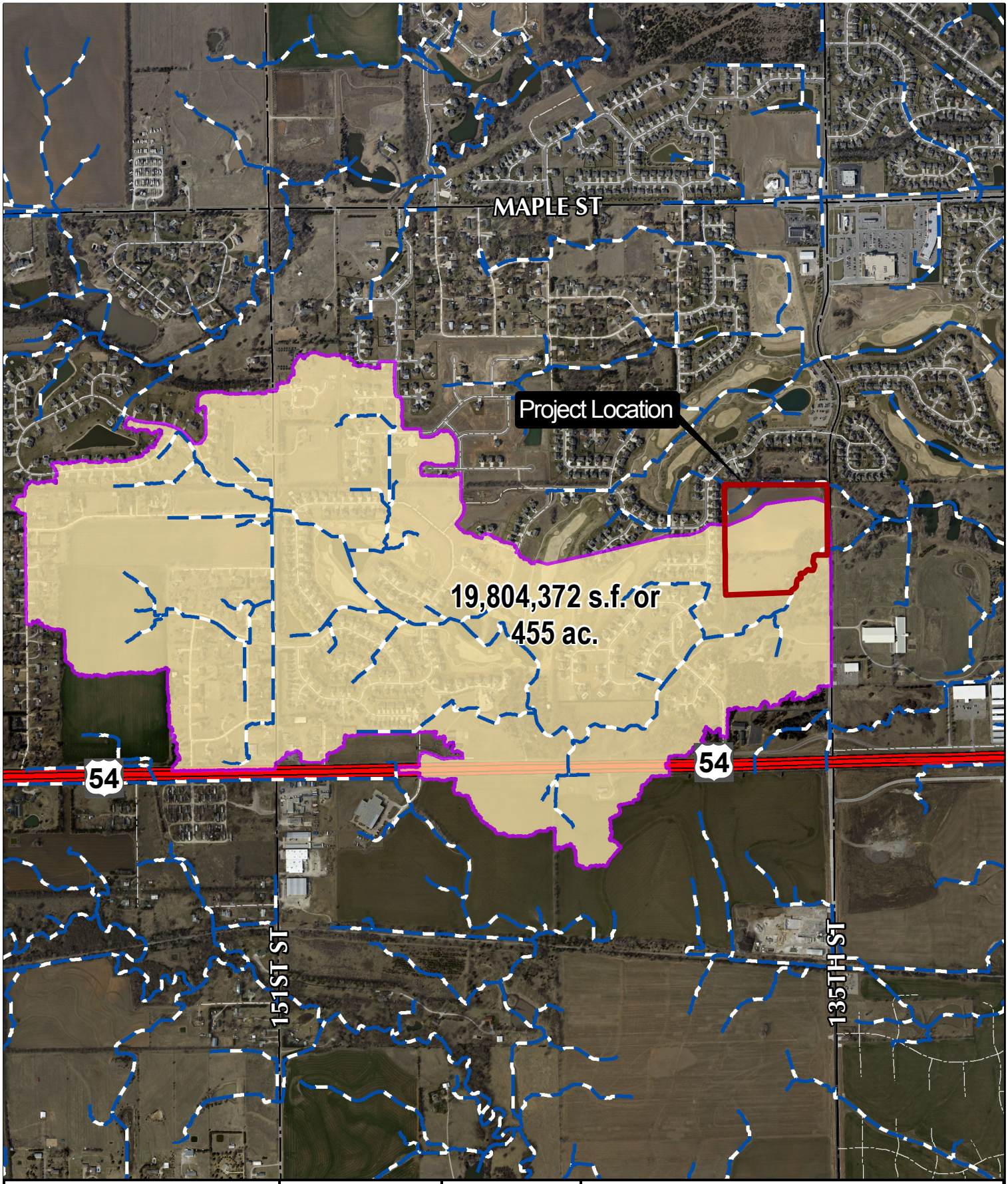
NO.	REVISION	DATE
#	----	##/##/###

SHEET NO.

1 OF 1

J:\PROJECTS\2013\1301010292_PERFECTION_COURTYARDS_AT_AUBURN\5-CIVIL\CAD\DRAINAGE\13292_DUP.DWG

Appendix K - Downstream Evaluation



SEC: 26
TWP: T27S
RNG: R2W

0 300 600 1,200
Feet

MKEC
Wichita, KS · 316.684.9600

DOWNSTREAM EVALUATION
DRAINAGE AREA MAP

COURTYARDS AT AUBURN HILLS

PROJECT NO.	DATE:	SHEET NO.
1301010292	8/20/2013	1 OF 1

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

Path: J:\Projects\2013\1301010292_Perfection_135th\5-Civil\GIS\Drainage Basin Map.mxd - Date: 8/20/2013

Appendix L - Water Quality

Water Quality Volume Calculations
The Courtyards at Auburn Hills

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	7.1	0.22		0.25	7.1
Impervious Cover		0.95		0.95	13.3	0.95		0.95	13.3
Total Area (ac)	0.00		0.00		20.40		0		**20.4**
Volumetric Runoff Coefficient (R_V)	0.00		0.00		0.70		0.00		**0.70**

Rainfall Depth (P) (in)	1.2
Water Quality Protection Volume (WQ_V) (ac-ft)	1.42
Water Quality Protection Volume (Q_{WV}) (in)	0.84
Redevelopment	No

Appendix M - Channel Protection Volume

Channel Protection Volume Calculations
The Courtyards at Auburn Hills

Rainfall Depth (P) (in)	2.80
Volumetric Runoff Coefficient (R_V)	0.70
Total Area (A) (ac)	20.40
Pond and Swamp Areas (% of Drainage Area)	0.00
Pond & Swamp Adjustment Factors (F_P)	1.00
Water Quality Protection Volume (Q_{wv}) (in)	1.95
Curve Number (CN)	87.8
Potential Maximum Abstraction (S)	1.38
Initial Abstraction (I_a)	0.28
Initial Abstraction/Rainfall Depth (I_a/P)	0.10
Time of Concentration (T_c) (min)	19.90
Time of Concentration (T_c) (hr)	0.33
Unit Peak Discharge (qu) (csm/in) (Figure 4-6)	700.00
Water Quality Peak Flow (Q_{wq})(cfs)	43.48
Rainfall Excess (Q) (in)	1.63
Peak Discharge (Q_p)	36.36
Ratio of Outflow to Inflow (q_0/q_i) (Figure 4-17)	0.03
Ratio of Storage Volume to Runoff Volume (V_s/V_r)	0.64
Channel Protection Volume (CP_v) (ac-ft)	1.77
Redevelopment	No

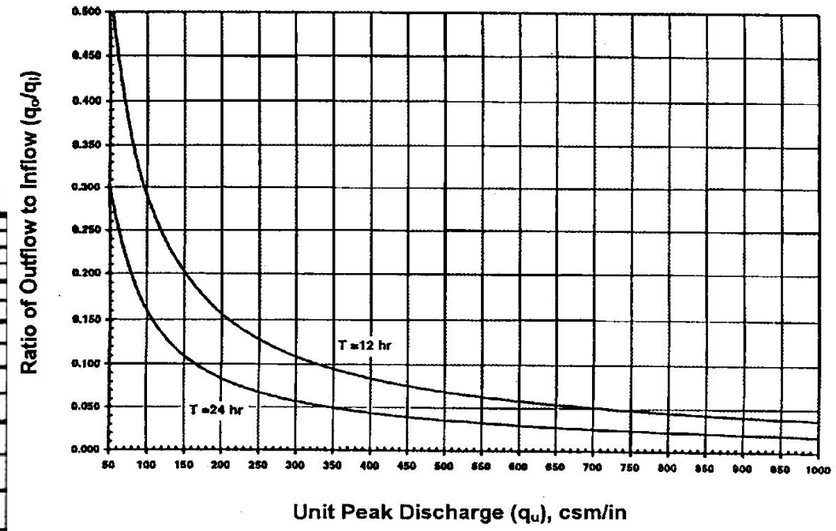


Figure 4-17 Detention Time vs Discharge Ratios
(Source: MDE, 1998)

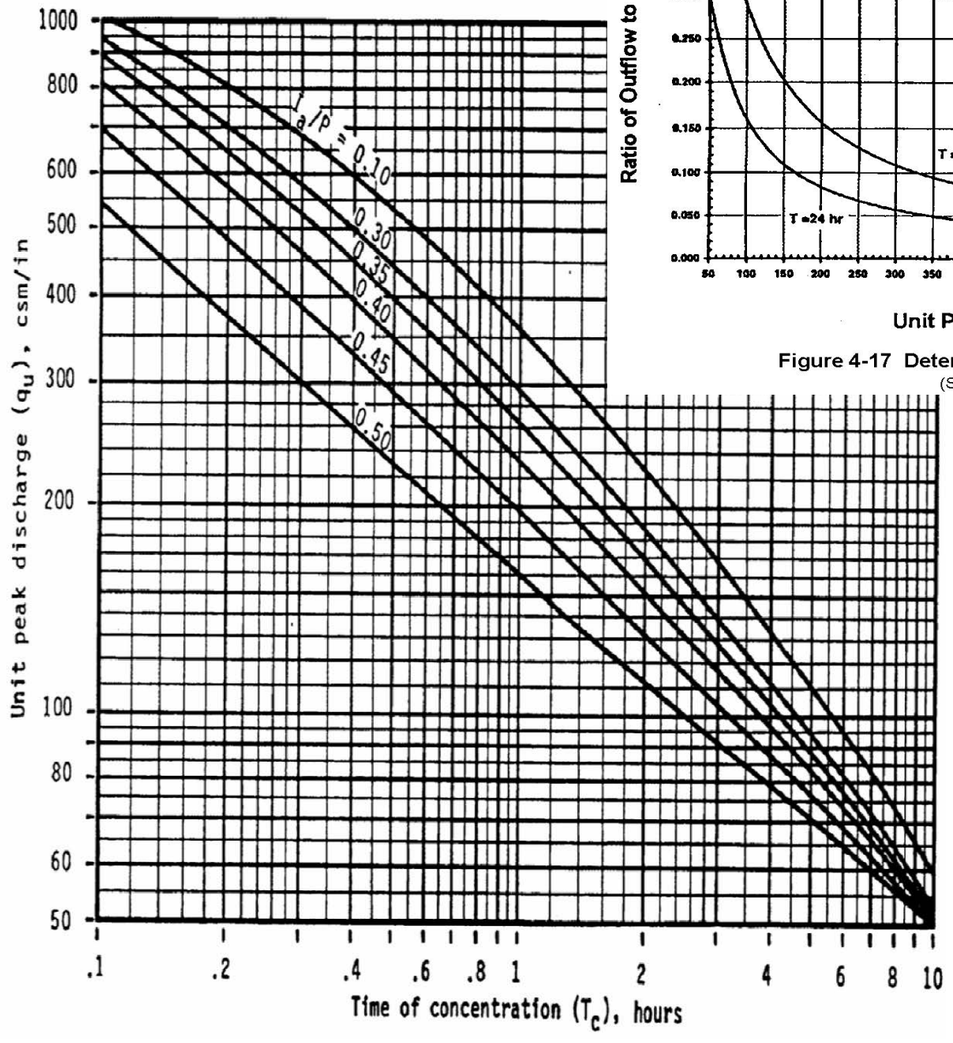
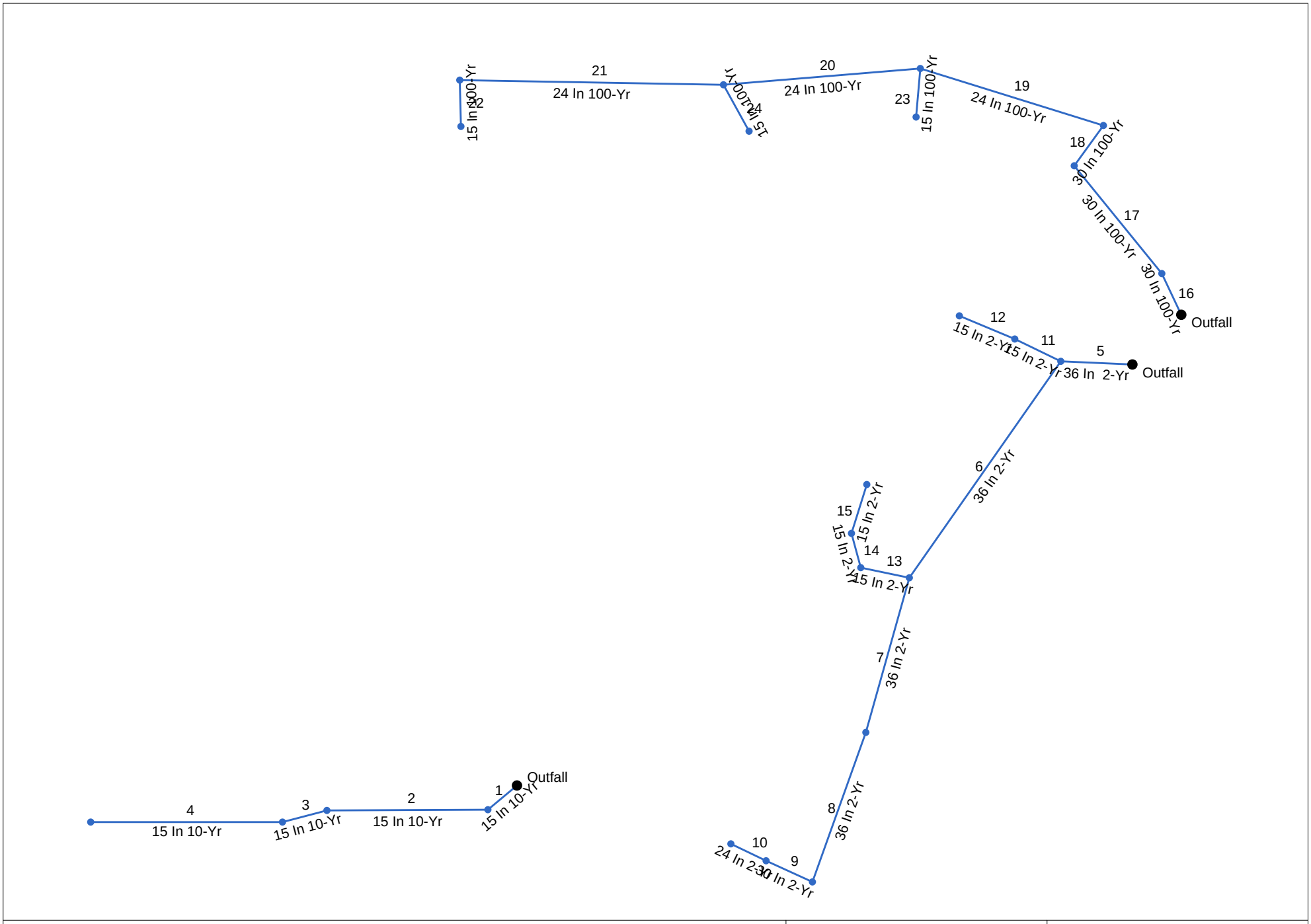


Figure 4-6 SCS Type II Unit Peak Discharge Graph
(Source: SCS, TR-55, Second Edition, June 1986)

Appendix N - Hydraflow Storm Sewers

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2009 Plan



Project File: Courtyards at Aurburn Hills SWS.stm	Number of lines: 24	Date: 08-22-2013

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	28.906	140.140	MH	0.00	0.00	0.59	15.0	1353.00	0.21	1353.06	15	Cir	0.013	0.69	1356.00	15 In 10-Yr
2	1	123.240	39.591	Curb	0.00	0.70	0.59	15.0	1353.20	0.20	1353.45	15	Cir	0.013	0.50	1357.50	15 In 10-Yr
3	2	35.157	-14.453	Curb	0.00	0.60	0.59	15.0	1353.60	0.20	1353.67	15	Cir	0.013	0.50	1357.50	15 In 10-Yr
4	3	146.515	14.752	Genr	0.00	1.20	0.59	15.0	1353.80	0.20	1354.09	15	Cir	0.013	1.00	1362.00	15 In 10-Yr
5	End	54.854	-177.531	Curb	0.00	0.30	0.59	15.0	1344.00	0.20	1344.11	36	Cir	0.013	1.53	1351.00	36 In 2-Yr
6	5	202.151	-57.510	Curb	0.00	0.40	0.59	15.0	1344.30	0.20	1344.70	36	Cir	0.013	1.40	1351.00	36 In 2-Yr
7	6	122.758	-19.271	MH	0.00	0.00	0.59	15.0	1344.80	0.20	1345.05	36	Cir	0.013	0.15	1351.00	36 In 2-Yr
8	7	121.497	4.025	Curb	0.00	2.00	0.59	15.0	1345.20	0.20	1345.44	36	Cir	0.013	1.50	1351.00	36 In 2-Yr
9	8	38.818	94.733	Curb	0.00	0.80	0.59	15.0	1345.60	0.21	1345.68	30	Cir	0.013	0.50	1351.00	30 In 2-Yr
10	9	30.022	1.418	Genr	0.00	4.00	0.59	15.0	1345.80	0.20	1345.86	24	Cir	0.013	1.00	1351.00	24 In 2-Yr
11	5	39.213	23.535	Curb	0.00	0.20	0.59	15.0	1344.30	0.20	1344.38	15	Cir	0.013	0.50	1351.00	15 In 2-Yr
12	11	45.938	-3.328	Genr	0.00	1.60	0.59	15.0	1344.50	0.20	1344.59	15	Cir	0.013	1.00	1351.50	15 In 2-Yr
13	6	37.921	66.922	Curb	0.00	0.20	0.59	15.0	1344.80	0.21	1344.88	15	Cir	0.013	1.36	1351.00	15 In 2-Yr
14	13	27.261	62.863	Curb	0.00	0.50	0.59	15.0	1345.00	0.22	1345.06	15	Cir	0.013	0.89	1351.50	15 In 2-Yr
15	14	39.170	32.686	Curb	0.00	0.60	0.59	15.0	1345.20	0.20	1345.28	15	Cir	0.013	1.00	1351.50	15 In 2-Yr
16	End	34.899	-115.319	MH	0.00	0.00	0.59	15.0	1344.00	0.20	1344.07	30	Cir	0.013	0.28	1350.00	30 In 100-Yr
17	16	106.171	-13.731	Curb	0.00	0.10	0.59	15.0	1344.20	0.20	1344.41	30	Cir	0.013	1.46	1351.00	30 In 100-Yr
18	17	38.056	74.935	Curb	0.00	0.10	0.59	15.0	1344.60	0.21	1344.68	30	Cir	0.013	1.50	1351.00	30 In 100-Yr
19	18	146.731	-108.611	Curb	0.00	0.20	0.59	15.0	1344.80	0.20	1345.09	24	Cir	0.013	1.50	1355.00	24 In 100-Yr
20	19	150.969	-21.998	Curb	0.00	0.30	0.59	15.0	1345.20	0.20	1345.50	24	Cir	0.013	1.50	1358.00	24 In 100-Yr
21	20	201.644	5.734	Curb	0.00	2.20	0.59	15.0	1345.60	0.20	1346.00	24	Cir	0.013	1.50	1357.00	24 In 100-Yr
22	21	35.351	-92.420	Curb	0.00	0.90	0.59	15.0	1346.10	0.20	1346.17	15	Cir	0.013	1.00	1357.00	15 In 100-Yr
23	19	37.351	-102.262	Curb	0.00	0.20	0.59	15.0	1345.20	0.21	1345.28	15	Cir	0.013	1.00	1355.00	15 In 100-Yr

Project File: Courtyards at Aurburn Hills SWS.stm | Number of lines: 24 | Date: 08-22-2013

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
24	20	40.498	-114.099	Curb	0.00	0.30	0.59	15.0	1345.60	0.20	1345.68	15	Cir	0.013	1.00	1358.00	15 In 100-Yr

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	15 In 10-Yr	5.40	15	Cir	28.906	1353.00	1353.06	0.208	1354.19*	1354.39*	0.21	1354.60	End	Manhole
2	15 In 10-Yr	5.51	15	Cir	123.240	1353.20	1353.45	0.203	1354.60*	1355.50*	0.16	1355.65	1	Curb-Horiz
3	15 In 10-Yr	3.99	15	Cir	35.157	1353.60	1353.67	0.199	1355.80*	1355.94*	0.08	1356.02	2	Curb-Horiz
4	15 In 10-Yr	2.72	15	Cir	146.515	1353.80	1354.09	0.198	1356.10*	1356.37*	0.08	1356.44	3	Generic
5	36 In 2-Yr	22.16	36	Cir	54.854	1344.00	1344.11	0.201	1349.60*	1349.66*	0.23	1349.90	End	Curb-Horiz
6	36 In 2-Yr	18.34	36	Cir	202.151	1344.30	1344.70	0.198	1349.94*	1350.10*	0.15	1350.24	5	Curb-Horiz
7	36 In 2-Yr	14.96	36	Cir	122.758	1344.80	1345.05	0.204	1350.28*	1350.34*	0.01	1350.35	6	Manhole
8	36 In 2-Yr	15.26	36	Cir	121.497	1345.20	1345.44	0.198	1350.35*	1350.41*	0.11	1350.52	7	Curb-Horiz
9	30 In 2-Yr	10.84	30	Cir	38.818	1345.60	1345.68	0.206	1350.52*	1350.55*	0.04	1350.59	8	Curb-Horiz
10	24 In 2-Yr	9.08	24	Cir	30.022	1345.80	1345.86	0.200	1350.59*	1350.64*	0.13	1350.77	9	Generic
11	15 In 2-Yr	4.06	15	Cir	39.213	1344.30	1344.38	0.204	1349.90*	1350.05*	0.08	1350.13	5	Curb-Horiz
12	15 In 2-Yr	3.63	15	Cir	45.938	1344.50	1344.59	0.196	1350.17*	1350.31*	0.14	1350.45	11	Generic
13	15 In 2-Yr	2.92	15	Cir	37.921	1344.80	1344.88	0.211	1350.26*	1350.34*	0.12	1350.46	6	Curb-Horiz
14	15 In 2-Yr	2.48	15	Cir	27.261	1345.00	1345.06	0.220	1350.48*	1350.52*	0.06	1350.58	13	Curb-Horiz
15	15 In 2-Yr	1.36	15	Cir	39.170	1345.20	1345.28	0.204	1350.62*	1350.64*	0.02	1350.66	14	Curb-Horiz
16	30 In 100-Yr	8.77	30	Cir	34.899	1344.00	1344.07	0.200	1349.60*	1349.62*	0.01	1349.63	End	Manhole
17	30 In 100-Yr	8.91	30	Cir	106.171	1344.20	1344.41	0.198	1349.63*	1349.68*	0.07	1349.76	16	Curb-Horiz
18	30 In 100-Yr	8.76	30	Cir	38.056	1344.60	1344.68	0.210	1349.76*	1349.77*	0.07	1349.85	17	Curb-Horiz
19	24 In 100-Yr	8.74	24	Cir	146.731	1344.80	1345.09	0.198	1349.85*	1350.07*	0.18	1350.25	18	Curb-Horiz
20	24 In 100-Yr	8.08	24	Cir	150.969	1345.20	1345.50	0.199	1350.27*	1350.46*	0.15	1350.61	19	Curb-Horiz
21	24 In 100-Yr	7.00	24	Cir	201.644	1345.60	1346.00	0.198	1350.64*	1350.83*	0.12	1350.95	20	Curb-Horiz
22	15 In 100-Yr	2.04	15	Cir	35.351	1346.10	1346.17	0.198	1350.98*	1351.02*	0.04	1351.06	21	Curb-Horiz
23	15 In 100-Yr	0.45	15	Cir	37.351	1345.20	1345.28	0.214	1350.37*	1350.37*	0.00	1350.37	19	Curb-Horiz
24	15 In 100-Yr	0.68	15	Cir	40.498	1345.60	1345.68	0.198	1350.71*	1350.72*	0.00	1350.72	20	Curb-Horiz

Project File: Courtyards at Aurburn Hills SWS.stm

Number of lines: 24

Run Date: 08-22-2013

NOTES: Return period = 2 Yrs. ; *Surcharged (HGL above crown).

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	28.906	0.00	2.50	0.59	0.00	1.48	15.0	16.7	3.7	5.40	2.94	4.44	15	0.21	1353.00	1353.06	1354.19	1354.39	1355.00	1356.00	15 In 10-Yr
2	1	123.240	0.70	2.50	0.59	0.41	1.48	15.0	16.0	3.7	5.51	2.91	4.49	15	0.20	1353.20	1353.45	1354.60	1355.50	1356.00	1357.50	15 In 10-Yr
3	2	35.157	0.60	1.80	0.59	0.35	1.06	15.0	15.8	3.8	3.99	2.88	3.25	15	0.20	1353.60	1353.67	1355.80	1355.94	1357.50	1357.50	15 In 10-Yr
4	3	146.515	1.20	1.20	0.59	0.71	0.71	15.0	15.0	3.8	2.72	2.87	2.22	15	0.20	1353.80	1354.09	1356.10	1356.37	1357.50	1362.00	15 In 10-Yr
5	End	54.854	0.30	10.60	0.59	0.18	6.25	15.0	17.9	3.5	22.16	29.86	3.14	36	0.20	1344.00	1344.11	1349.60	1349.66	0.00	1351.00	36 In 2-Yr
6	5	202.151	0.40	8.50	0.59	0.24	5.01	15.0	16.7	3.7	18.34	29.66	2.59	36	0.20	1344.30	1344.70	1349.94	1350.10	1351.00	1351.00	36 In 2-Yr
7	6	122.758	0.00	6.80	0.59	0.00	4.01	15.0	16.1	3.7	14.96	30.10	2.12	36	0.20	1344.80	1345.05	1350.28	1350.34	1351.00	1351.00	36 In 2-Yr
8	7	121.497	2.00	6.80	0.59	1.18	4.01	15.0	15.4	3.8	15.26	29.64	2.16	36	0.20	1345.20	1345.44	1350.35	1350.41	1351.00	1351.00	36 In 2-Yr
9	8	38.818	0.80	4.80	0.59	0.47	2.83	15.0	15.2	3.8	10.84	18.63	2.21	30	0.21	1345.60	1345.68	1350.52	1350.55	1351.00	1351.00	30 In 2-Yr
10	9	30.022	4.00	4.00	0.59	2.36	2.36	15.0	15.0	3.8	9.08	10.11	2.89	24	0.20	1345.80	1345.86	1350.59	1350.64	1351.00	1351.00	24 In 2-Yr
11	5	39.213	0.20	1.80	0.59	0.12	1.06	15.0	15.3	3.8	4.06	2.92	3.31	15	0.20	1344.30	1344.38	1349.90	1350.05	1351.00	1351.00	15 In 2-Yr
12	11	45.938	1.60	1.60	0.59	0.94	0.94	15.0	15.0	3.8	3.63	2.86	2.96	15	0.20	1344.50	1344.59	1350.17	1350.31	1351.00	1351.50	15 In 2-Yr
13	6	37.921	0.20	1.30	0.59	0.12	0.77	15.0	15.4	3.8	2.92	2.97	2.38	15	0.21	1344.80	1344.88	1350.26	1350.34	1351.00	1351.00	15 In 2-Yr
14	13	27.261	0.50	1.10	0.59	0.30	0.65	15.0	15.2	3.8	2.48	3.03	2.02	15	0.22	1345.00	1345.06	1350.48	1350.52	1351.00	1351.50	15 In 2-Yr
15	14	39.170	0.60	0.60	0.59	0.35	0.35	15.0	15.0	3.8	1.36	2.92	1.11	15	0.20	1345.20	1345.28	1350.62	1350.64	1351.50	1351.50	15 In 2-Yr
16	End	34.899	0.00	4.30	0.59	0.00	2.54	15.0	18.8	3.5	8.77	18.36	1.79	30	0.20	1344.00	1344.07	1349.60	1349.62	0.00	1350.00	30 In 100-Yr
17	16	106.171	0.10	4.30	0.59	0.06	2.54	15.0	18.2	3.5	8.91	18.24	1.82	30	0.20	1344.20	1344.41	1349.63	1349.68	1350.00	1351.00	30 In 100-Yr
18	17	38.056	0.10	4.20	0.59	0.06	2.48	15.0	18.0	3.5	8.76	18.81	1.78	30	0.21	1344.60	1344.68	1349.76	1349.77	1351.00	1351.00	30 In 100-Yr
19	18	146.731	0.20	4.10	0.59	0.12	2.42	15.0	17.2	3.6	8.74	10.05	2.78	24	0.20	1344.80	1345.09	1349.85	1350.07	1351.00	1355.00	24 In 100-Yr
20	19	150.969	0.30	3.70	0.59	0.18	2.18	15.0	16.3	3.7	8.08	10.08	2.57	24	0.20	1345.20	1345.50	1350.27	1350.46	1355.00	1358.00	24 In 100-Yr
21	20	201.644	2.20	3.10	0.59	1.30	1.83	15.0	15.2	3.8	7.00	10.07	2.23	24	0.20	1345.60	1346.00	1350.64	1350.83	1358.00	1357.00	24 In 100-Yr
22	21	35.351	0.90	0.90	0.59	0.53	0.53	15.0	15.0	3.8	2.04	2.87	1.67	15	0.20	1346.10	1346.17	1350.98	1351.02	1357.00	1357.00	15 In 100-Yr
23	19	37.351	0.20	0.20	0.59	0.12	0.12	15.0	15.0	3.8	0.45	2.99	0.37	15	0.21	1345.20	1345.28	1350.37	1350.37	1355.00	1355.00	15 In 100-Yr

Project File: Courtyards at Aurburn Hills SWS.stm

Number of lines: 24

Run Date: 08-22-2013

NOTES: Intensity = 76.31 / (Inlet time + 14.30) ^ 0.88; Return period = 2 Yrs. ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
24	20	40.498	0.30	0.30	0.59	0.18	0.18	15.0	15.0	3.8	0.68	2.87	0.56	15	0.20	1345.60	1345.68	1350.71	1350.72	1358.00	1358.00	15 In 100-Yr

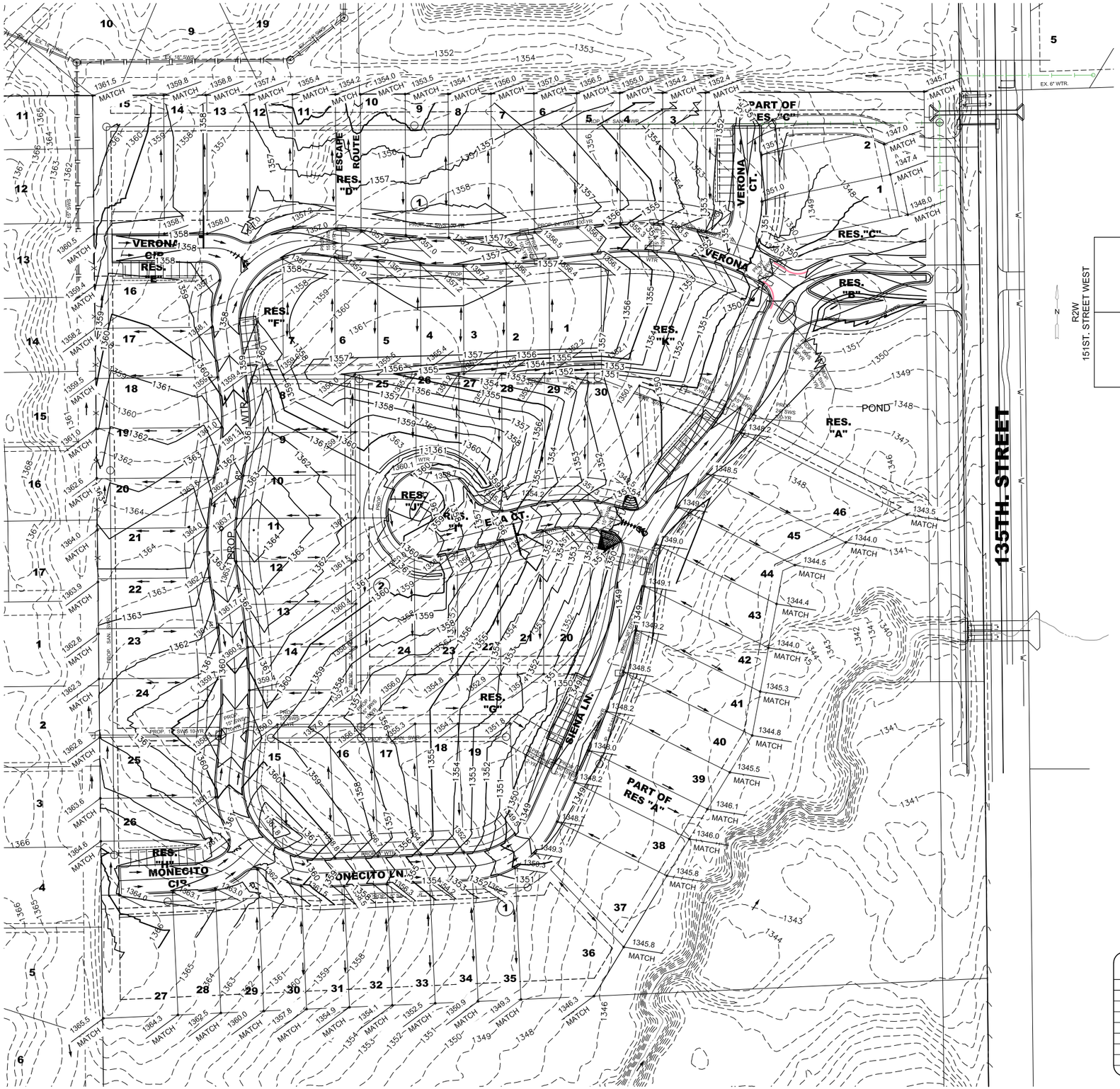
Project File: Courtyards at Aurburn Hills SWS.stm

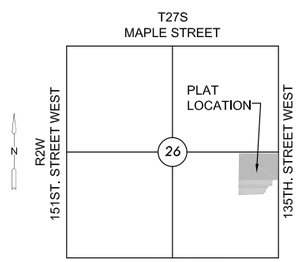
Number of lines: 24

Run Date: 08-22-2013

NOTES: Intensity = 76.31 / (Inlet time + 14.30) ^ 0.88; Return period = 2 Yrs. ; c = cir e = ellip b = box

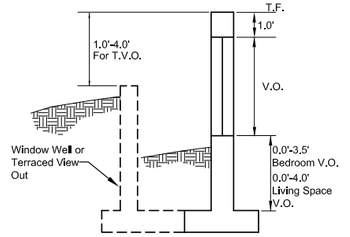
Appendix O - Lot Grading Plan





VICINITY MAP

No Scale



VIEW OUT & TERRACED VIEW OUT DETAIL

LEGEND

6IN - CONIFEROUS TREE & DIAMETER	UGE - UNDERGROUND ELECTRIC LINE
3IN - DECIDUOUS TREE & DIAMETER	OHT - OVERHEAD TELEPHONE
SN - SIGN	OHE - OVERHEAD ELECTRIC
- BUSH	FOC - UNDERGROUND FIBER OPTIC CABLE
- EDGE OF TREES	- SECTION CORNER
- FENCE	- PROPERY CORNER FOUND
SSMH- SANITARY SEWER MANHOLE	BM - BENCHMARK
GM - GAS METER	WO - WALKOUT
POLE, POLE	VO - VIEWOUT
HLP - HIGH LINE POLE	TVO - TERRACED VIEWOUT
- GATE	TWO - TERRACED WALKOUT
- WALL	- MAY REQUIRE THICKER FOOTING AND/OR ENGINEERED FILL UNDER FOOTINGS
LP - LIGHT POLE	50.0 - SPOT ELEV.
FH - FIRE HYDRANT	PAD=1362.8 ADD 2 STEPS TF=1364.8 WO=1357.1 - PROP. HOUSE ELEV.
WV - WATER VALVE	***PAD=1362.8 ADD 2 STEPS TF=1364.8 VO=1357.1*** - EXIST. PLOT PLAN HOUSE ELEV.
WM - WATER METER	MP - MINIMUM PAD
PP - POWER POLE AND GUY ANCHOR	BF - BASEMENT FLOOR
TR - TELEPHONE RISER	TF - TOP OF FOUNDATION
- INLET	PAD - GARAGE PAD
- STORM SEWER PIPE	
W - WATER LINE	
- SANITARY SEWER LINE	
G - GAS LINE	
T - TELEPHONE LINE	
- PROP. CONTOURS	
- EXIST. CONTOURS	

REVISION HISTORY

DATE	REVISION	REASON

MKEC
Wichita, KS • 316-684-9600

PROPOSED DRAINAGE AND UTILITY PLAN FOR

COURTYARDS AT AUBURN

WICHITA, KANSAS

LOT GRADING PLAN

PROJECT NO.	1301010292
DATE	AUGUST 2013
SCALE	AS NOTED

DESIGNED	DRAWN	CHECKED
KLA	DM	GJA

#	----	##/##/###
NO.	REVISION	DATE

SHEET NO.

1 OF 1