SOUTHFORK COMMERCIAL ADDITION

DRAINAGE REPORT

POE & ASSOCIATES, INC.
CONSULTING ENGINEERS
5940 E. Central, Suite 200 ■ Wichita, KS 67208-4242
Phone 316/685-4114 ■ FAX 316/685-4444

DECEMBER 2011

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:	SOUTHFORK COMMERCIAL ADDITION				
Total Area of Project:	50.4 **acres**				
Development Type:	Commercial	**Other:**			
Developer Name:	Southfork Investments, LLC	**Contact:**	Jay S. Maxwell	**Phone:**	1-316-219-8551
Email:	jmaxwell2@pixius.com (1634 East Central, Wichita, KS 67214)				
Engineer Name:	Poe & Associates, Inc.	**Contact:**	Jason P. Dickman, P.E.	**Phone:**	1-316-685-4114
Email:	jason.dickman@poeandassociates.com (5940 East Central, Suite #200, Wichita, KS 67208)				

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 Information**		
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	

Drainage Plan Checklist			
#	Plan Element Description	Element Included?	Explanation/Notes
2.2	**Existing Conditions Hydrology and Hydraulics Analysis**		
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.	Yes	
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**		

Drainage Plan Checklist			
#	Plan Element Description	Element Included?	Explanation/Notes
3.3.1	Narrative of the hydrologic analysis methodology used (e.g., unit hydrograph or other approved methods).	Yes	
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	Yes	
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.	Yes	
4.3	Delineation of predevelopment regulatory floodplain/floodway limits using FEMA's current GIS database; limits to be per elevation and scaled location.	Yes	
4.4	Delineation of postdevelopment regulatory floodplain/floodway limits; limits to be per elevation and scaled location, with project limits shown.	Yes	
4.5	Floodway data table and discharges.	Yes	
4.6	Hydrologic and hydraulic study information for local floodplain analysis, unnumbered Zone A elevation determinations and floodplain map revisions or required permits.	Yes	
4.7	Regulatory floodway and four natural profile models (10, 50, 100 and 500-year) for existing and postdevelopment conditions.	Yes	
4.8	Floodplains and floodways located within a reserve, where necessary.	Yes	

Drainage Plan Checklist			
#	Plan Element Description	Element Included?	Explanation/Notes
4.9	Floodplain cut and fill calculations for volume sensitive basins.	Yes	
4.10	Demonstrate that floodway elevations and velocities do not increase due to construction in the floodway ("No Rise Certification").	Yes	
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.	Yes	
6.3	Title block including subdivision name and phase and dated revision documentation.	Yes	
6.4	Future phases shown but cross-hatched as information only.	Yes	
6.5	Scale, not greater than 1-inch = 60 feet.	No	1"=100'
6.6	North arrow.	Yes	
6.7	Index or legend key.	Yes	
6.8	Benchmarks (minimum of 2) used for site control (NAVD 88 vertical datum).	Yes	
6.9	Existing contours of entire site with contour interval of one foot.	Yes	
6.10	Proposed contours for channels, ponds, and other permanent stormwater management facilities, with contour interval of one foot.	Yes	
6.11	Spot elevations shown to the nearest tenth of a foot for critical locations, including lot and property boundaries.	Yes	
6.12	Proposed lot and street layout.	Yes	
6.13	Locations of underground storm drains.	Yes	
6.14	Overflow locations for storms exceeding storm drain capacity, with elevations.	Yes	
6.15	Top elevations of storm drains at all inlets, manholes, and flow line elevations for all outfalls.	Yes	
6.16	Locations of open ditches and lakes.	Yes	
6.17	Flow direction arrows.	Yes	
6.18	Proposed flow line elevations of all open ditches at maximum 100 foot intervals, and 100-year flood elevations thereon.	Yes	
6.19	Ponds: Location, bottom elevation, normal pool elevation, 100-year flood elevation, emergency overflow elevation.	Yes	
6.20	Proposed top-of-curb elevations at points where drainage will be required to flow over the curb.	Yes	
6.21	Platted minimum building opening elevation for each lot, in table form for all lots (excluding basement floor elevations).	Yes	
6.22	Standard foundation and elevation detail for slab on grade, full basement, view-out, partial view-out and/or walk-out construction.	Yes	
6.23	Top of foundation elevation for each lot.	Yes	
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.	Yes	
6.25	Indicate that all lots are above the 100-year flood elevation.	Yes	
6.26	Indicate that grading around structures conforms to perimeter drainage requirements.	Yes	
6.27	Indicate that backyard drainage grading conforms to backyard drainage requirements.	Yes	
6.28	Adjacent subdivision lot lines, with lot labels and subdivision names.	Yes	
6.29	Boundaries and labels for all easements, rights-of-way and reserves.	Yes	
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.*"	Yes	
End of Checklist			

1.0 General Information

1.1 Drainage Plan Files

See enclosed CD and paper copies of Drainage Plan (Exhibit 1-1), Preliminary Grading Plan (Exhibit 1-2), and One-Step Final Plat (Exhibit 1-3).

1.2 Professional Engineer's Seal

Final report includes sealed and signed cover sheet along with sealed and signed final drainage plan sheet.

1.3 Site Location Map

See Exhibit 1-4 for USGS Map and 1-5 for Aerial Photo of this area. The Southfork Commercial Addition is a more than 50-acre tract of land located in the North Half of Section 21-T28S-R1E in the City of Wichita, Sedgwick County, Kansas. The area includes un-platted tracts inside the city. The site is bounded on the north by 47th Street South, on the east by Hydraulic, on the south by 55th Street South, and on the west by Broadway.

1.4 Narrative of Development

The property is currently zoned to allow Limited Commercial on the north end and Single Family (SF-5) types of use for the remainder of the property (refer to Exhibit 1-6 for Zoning information). It is anticipated that this site will be developed as a General Commercial (GC) subdivision, which includes a mix of both commercial and residential areas. A Community Unit Plan (CUP 2011-00011, DP-249, Exhibit 1-7) is also proposed for this site. Typically, assumptions for design flows in a commercial area include up to 85% impervious area and a residential area would include impervious areas of up to 65%. A proposed detention pond in this area shall occupy the southeast corner of the property where detention currently exists.

Presently, the entire area remains vacant prior to any future development. As shown in the Drainage Plan (Exhibit 1-1), the drainage is split into three areas. Run-off from each area inside the property takes over land routes to the adjacent Riverside Drainage Canal to the west and an existing detention area in the southeast part of the property adjacent to the turnpike. The only off-site run-off considered comes from the east of the property and combines over land and pipe flows into the Riverside Drainage Canal. According to the NRCS Soil Survey, the predominant soil types within the property are Waldeck Sandy Loam and Pratt Loamy Fine Sand series material. See Exhibit 1-8 for NRCS Soil Survey map and information showing existing soil types and descriptions.

The site lies adjacent to a FEMA Floodway (refer to Exhibit 1-9 for FIRM Panel 0504E and 0505E, Wichita, Sedgwick County, Kansas, February 2, 2007). Note that this area is currently under review by FEMA for a flood map revision. The map revision considered this site as fully developed and filled above the proposed Base Flood Elevation of 1270 just south of the 47th Street South bridge over the Riverside Drainage Channel. No impact on storm

water shall be addressed in the summary of runoff calculations text. The site does not contain wetland or riparian areas, and thus the development has no impact in that regard.

1.5 Discussion of Off-Site Conditions

Multi-family and single-family areas are located directly south and northeast of this site. General commercial and mobile home uses lie to the west. To the east and northwest lie limited industrial uses. (See Exhibit 1-6) The original, modern land use for the site was a mixture of commercial, residential, and agricultural uses.

Total developed on-site drainage area equals 50.4 acres. The site development would route off-site drainage directly to the Riverside Drainage Canal to give a total drainage area of 88.75 acres for this drainage analysis report. Land use within the drainage basins varies from open space, limited industrial, general commercial, and residential in character. The natural grades convey storm water away from the subject property. Storm water is presently conveyed off-site through the previously discussed storm water sewer systems (See Exhibit 1-1).

1.6 Summary of Runoff Calculations

	KTA to Channel Existing Conditions (24-Hour Storm) CN= 90.5 Tc(min)= 24.1 Area(Ac)= 41.01						KTA to Channel Proposed Conditions (24-Hour Storm) CN= 90.8 Tc(min)= 21.9 Area(Ac)= 39.88					
	1-Year	2-Year	5-Year	10-Year	25-Year	100-Year	1-Year	2-Year	5-Year	10-Year	25-Year	100-Year
Flow (cfs)	74.63	100.45	134.96	160.76	195.02	246.07	82.05	110.66	147.42	174.86	211.25	265.47

	Site to Channel Existing Conditions (24-Hour Storm) CN= 65.6 Tc(min)= 39.2 Area(Ac)= 38.97						Site to Channel Proposed Conditions (24-Hour Storm) CN= 90.0 Tc(min)= 15.0 Area(Ac)= 10.03					
	1-Year	2-Year	5-Year	10-Year	25-Year	100-Year	1-Year	2-Year	5-Year	10-Year	25-Year	100-Year
Flow (cfs)	10.15	20.88	38.60	53.40	74.55	108.38	23.53	31.58	42.31	50.32	60.96	76.80

	Site to Pond Existing Conditions (24-Hour Storm) CN= 76.8 Tc(min)= 17.2 Area(Ac)= 8.77						Site to Pond Proposed Conditions (24-Hour Storm) CN= 84.8 Tc(min)= 15.0 Area(Ac)= 38.84					
	1-Year	2-Year	5-Year	10-Year	25-Year	100-Year	1-Year	2-Year	5-Year	10-Year	25-Year	100-Year
Flow (cfs)	9.65	15.05	22.92	29.10	37.55	50.47	72.95	103.03	144.13	175.25	216.83	279.08

Using the SCS Method, calculations were made to determine the existing flows from this site. Both the existing and proposed site drainage is split into three areas as shown on the attached Drainage Plan, Exhibit 1-1. Off-site drainage is considered, and shall be routed around the north property line and does not enter this study site. Each area is evaluated based on existing and proposed conditions.

On-site time of concentration was estimated for all separate drainage areas as shown in the summary table above. The KTA to Channel area's T_c was estimated to be approximately 24 minutes based upon the TR-55 method and that becomes 21.9 minutes for the post-development condition. The two on-site drainage basins were calculated as 39.2 minutes from the site to the channel and 17.2 minutes from the site to the existing detention pond. These on-site areas will use a 15 minute T_c for the proposed condition. On-site detention to meet storage requirements as shown on the drainage plan shall be designed for the final development. It is assumed that immediate downstream capacities are adequate to handle

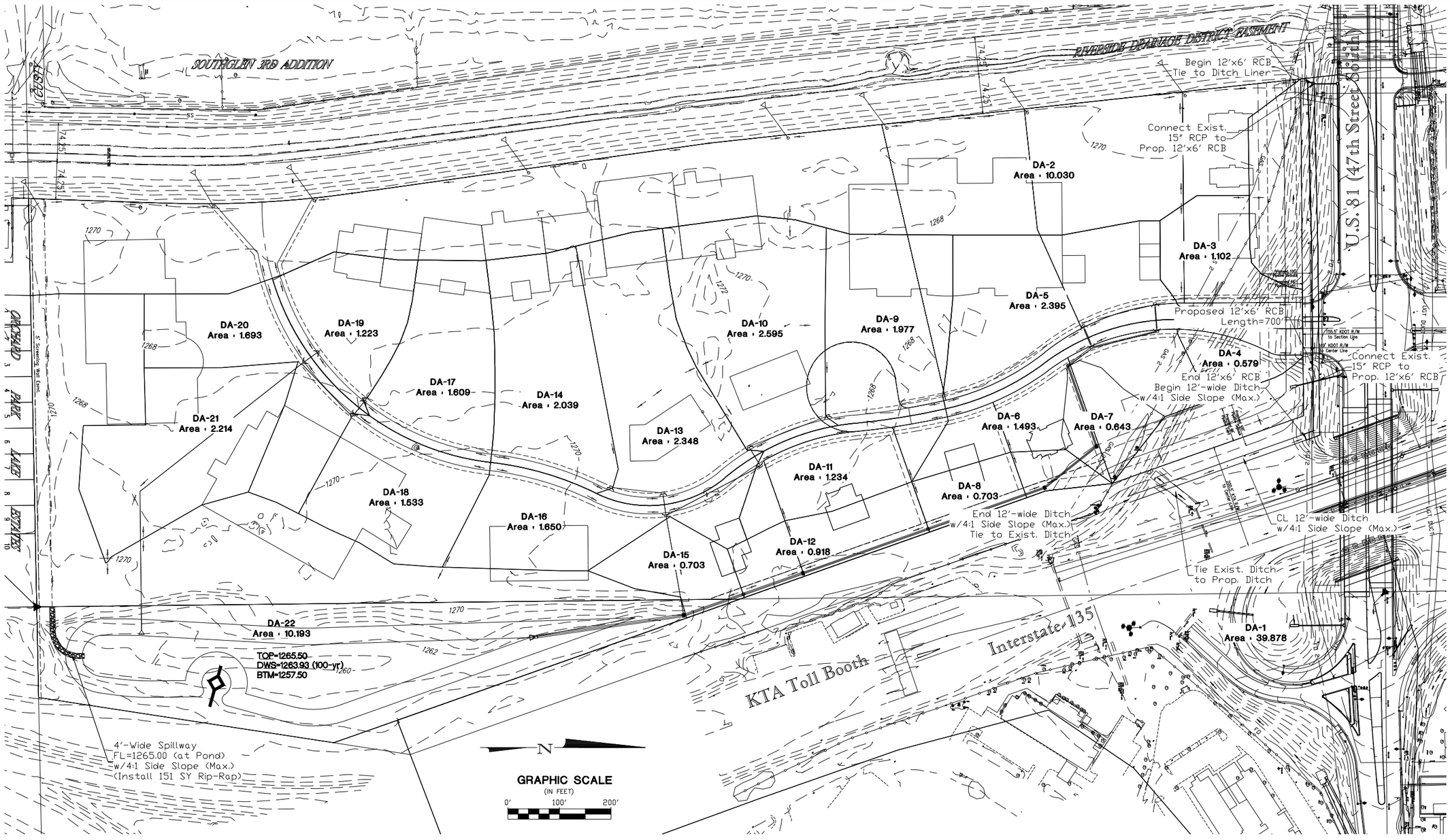
current flows leaving this site. The final design of on-site drainage systems shall comply with current City of Wichita design criteria.

1.7 Narrative Description of Permanent Best Management Practices

The contractor shall provide stabilized construction entrance prior to any street paving. A buffer of 10 feet of undisturbed native vegetation shall be maintained around perimeter of site where possible. Earthwork stockpiles shall be maintained away from any ponds. Fuel storage and refueling of equipment shall not be allowed around any ponds, drainage channels, or other waterways. Sediment barriers will be placed at storm sewer inlets and rock rip-rap at outlets. Sediment barriers (type determined by owner or contractor) shall be used to prevent sediment from flowing off site. Disturbed earth shall be stabilized where construction activity ceases for at least 21 days with owner's choice of mulch, temporary seed (Rye grass) during the planting season or other suitable BMP device. BMP devices shall be in place until there is a good stand of grass. Disturbed portions of the site where construction activities permanently cease shall be stabilized with permanent seed no later than 21 days after the last construction activity in that area (during the planting season only). The permanent seed shall consist of fescue or grass chosen by the owner. BMP devices shall be used at back of curb/edge of pavement until vegetation is 75% established.

SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 1-1



NOTES:

1. Cross-drainage agreements shall be required at the time of platting.
2. All outlets to the Riverside Drainage Channel shall conform to City of Wichita water quality requirements, to include installing any pipe in the canal as shown rotated 30° from perpendicular.
3. Detailed site grading and final drainage plans to be designed by a licensed professional engineer at the time of building permit.
4. Minimum Pad Elevation = 1272.0 (NAVD 88)
5. Storm sewer easements will be provided at the time of building permit only as needed to allow drainage to discharge across adjacent lots.
6. Any revised drainage plan must be approved by storm water engineer prior to building permits being issued.
7. Any storm water detention areas required may be revised when the final plans for the development are completed but the runoff amounts will be at or below the pre-development discharge rates. The filed final drainage report shall show discharge rates and stage/storage/discharge curves for any on-site detention areas.
8. The detention pond as shown is proposed. The final pond location, configuration, and design will need to be resolved at the time of building permit.

CALCULATION NOTES:

1. Determination of Q's was made using the SCS method.
2. Curve Numbers weighted based on hydrologic soil groups.

Existing Conditions (24-Hour Storm)								
Site	Area	CN	1-Year	2-Year	5-Year	10-Year	25-Year	100-Year
KTA to Channel	41.01	90.5	74.63	100.45	134.96	160.76	195.02	246.07
Site to Channel	38.97	65.6	10.15	20.88	38.60	53.40	74.55	105.38
Site to Pond	8.77	76.8	9.65	15.05	22.92	29.10	37.65	50.47

Developed Conditions (24-Hour Storm)								
Site	Area	CN	1-Year	2-Year	5-Year	10-Year	25-Year	100-Year
KTA to Channel	39.88	90.8	82.05	110.66	147.42	174.86	211.25	265.47
Site to Channel	10.03	90.0	23.53	31.58	42.31	50.32	60.96	76.80
Site to Pond	38.84	84.8	72.95	103.03	144.13	175.25	216.83	279.08

Stage-Storage-Discharge Table

Stage (ele)	Storage (acre-ft)	Discharge (cfs)*
1257.50	0.00	0
1258.50	1.55	3.303
1259.50	3.28	3.614
1260.50	5.20	4.088
1261.50	7.31	4.455
1262.50	9.62	4.866
1263.50	12.14	5.250
1264.00	14.01	5.508
1265.00	14.87	5.725
1265.50	17.82	10.880

DWS=1263.93
44'W Dr. Cuertius Weir

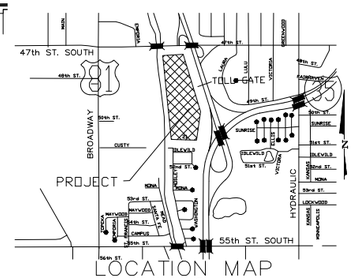
* Discharge rate includes pond infiltration rate of 2"/hr

LEGEND:

- 1 1/2" Pipe Found
- Moering B&C Found
- Section Corner Found
- 5/8" Bar w/Poe Cap Set

BENCHMARK:

Bench Mark #77
Top of Right-of-Way Marker in Fence Line @ End of Ramp, East Bound 47th to Southbound I-35.
Elevation 1271.13 NGVD88



SOUTHFORK COMMERCIAL ADDITION

A TRACT IN THE NORTH HALF OF SECTION 21-T28S-R1E WICHITA, SEDGWICK COUNTY, KANSAS

PROPOSED DRAINAGE PLAN

2011

SURVEY NOTES:

Field Survey work completed on November 4, 2009.
Topography by photogrammetric methods from aerial photographs taken on August 11, 2007.
Horizontal datum NAD 83 modified to ground
Vertical datum NAVD 88

PROPERTY OWNER/ SUBDIVIDER:

Southfork Investments, L.L.C. of Sedgwick County, in the State of Kansas.

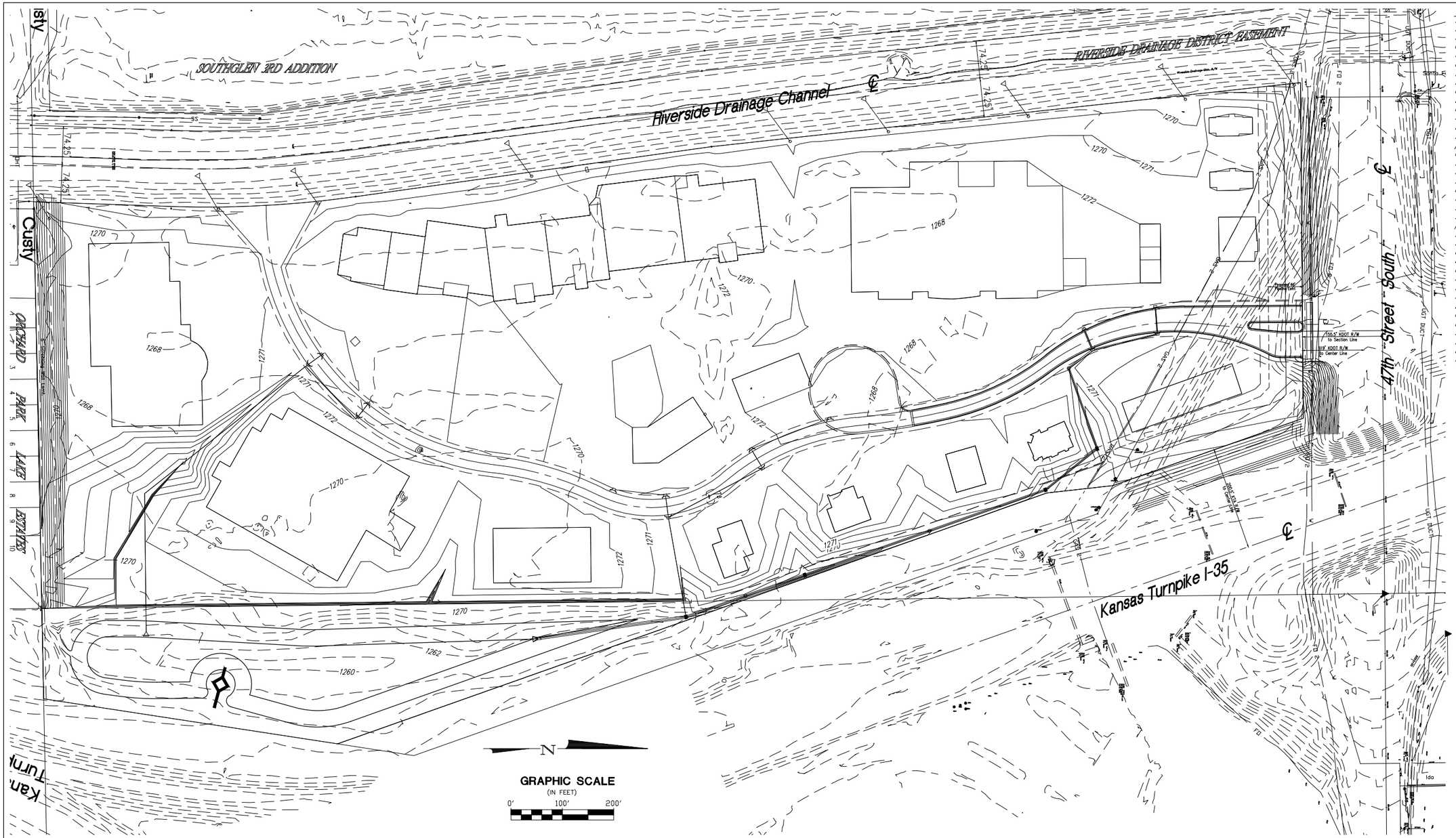
JASON P. DICK 18137 LICENSED PROFESSIONAL ENGINEER KANSAS

POE & ASSOCIATES, INC.
CONSULTING ENGINEERS
5940 E. Central, Suite 200 ■ Wichita, KS 67208-4242
Phone 316/685-4114 ■ FAX 316/685-4444

858\Plat Southfork\DA-Proposed

SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 1-2



SOUTHFORK COMMERCIAL ADDITION

A TRACT IN THE NORTH HALF OF SECTION 21-T28S-R1E
WICHITA, SEDGWICK COUNTY, KANSAS

PRELIMINARY GRADING PLAN

2011

LEGAL DESCRIPTION:
A Tract of land in the North Half of Section 21, Township 28 South, Range 1 East of the Sixth Principal Meridian, Sedgwick County, Kansas, Commencing at the Northwest Corner of the Northwest Quarter of Section 21, Township 28 South, Range 1 East of the Sixth Principal Meridian, Sedgwick County, Kansas, thence along an assumed bearing of N89°31'13"E on the North line of said Northwest Quarter for 2295.74 feet to a point, thence S0°28'47"E for 155.50 feet to the point of beginning on the Kansas Department of Transportation right-of-way line as described in the Quit Claim Deed recorded as DOC.#/FLM-PG: 291620.38, thence S19°28'47"E a distance of 393.37 feet to a point on the Kansas Department of Transportation right-of-way line as described in the Deed recorded in Deed Book 1.351 at page 253, thence S 6°26'53"E a distance of 129.68 feet, thence S19°28'47"E a distance of 1465.35 feet to a point on the right-of-way line of the Kansas Turnpike Authority as described in condemnation case A-55279, thence along said Kansas Turnpike Authority right-of-way line S8°42'58"W a distance of 579.10 feet to a point on the South line of the Northeast Quarter of Section 21, Township 28 South, Range 1 East, thence S88°50'51"W along the South line of said Northeast Quarter a distance of 176.00 feet to the Southwest corner of said Northeast Quarter, thence S88°50'53"W along the South line of the Northwest Quarter of Section 21, Township 28 South, Range 1 East a distance of 792.71 feet to a point on the East line of the Riverside Drainage District easement as recorded in Deed Book 432 at page 162, thence N2°31'29"E along said Riverside Drainage District easement a distance of 263.56 feet to a point of curvature, thence continuing along the Riverside Drainage District easement along a curve to the left, having a radius of 2084.33 feet a delta angle of 10°01'53", for an arc distance of 364.93 feet to a point of tangency, thence continuing along said Riverside Drainage District easement N8°00'24"W a distance of 699.38 feet to a point, thence continuing along said Riverside Drainage District easement N6°12'07"W a distance of 1154.42 feet to a point on the Kansas Department of Transportation right-of-way line as described in the Quit Claim Deed recorded as DOC.#/FLM-PG: 291620.38, thence along said Kansas Department of Transportation right-of-way line bearing N89°31'13"E a distance of 653.73 feet to the point of beginning. Said tract contains 50.389 acres, more or less

NOTES
Field Survey work completed on November 4, 2009.
Topography by photogrammetric methods from aerial photographs taken on August 11, 2007.
Horizontal datum NAD 83 modified to ground
Vertical datum NAVD 88

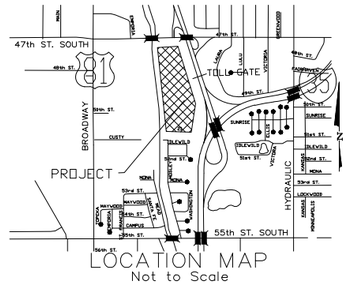
A drainage plan has been developed for the subdivision and all drainage easements, rights-of-way, or reserves shall remain at the established grades and remain unobstructed to allow for conveyance of stormwater.

LEGEND

- 1 1/2" Pipe Found
- Moering B&C Found
- Section Corner Found
- 5/8" Bar w/Poe Cap Set

BENCHMARK:
Bench Mark #77
Top of Right-of-Way Marker in Fence Line @ End of Ramp, East Bound 47th to Southbound I-35.
Elevation 1271.13 NGVD88

PROPERTY OWNER/SUBDIVIDER:
Southfork Investments, L.L.C. of Sedgwick County, in the State of Kansas.



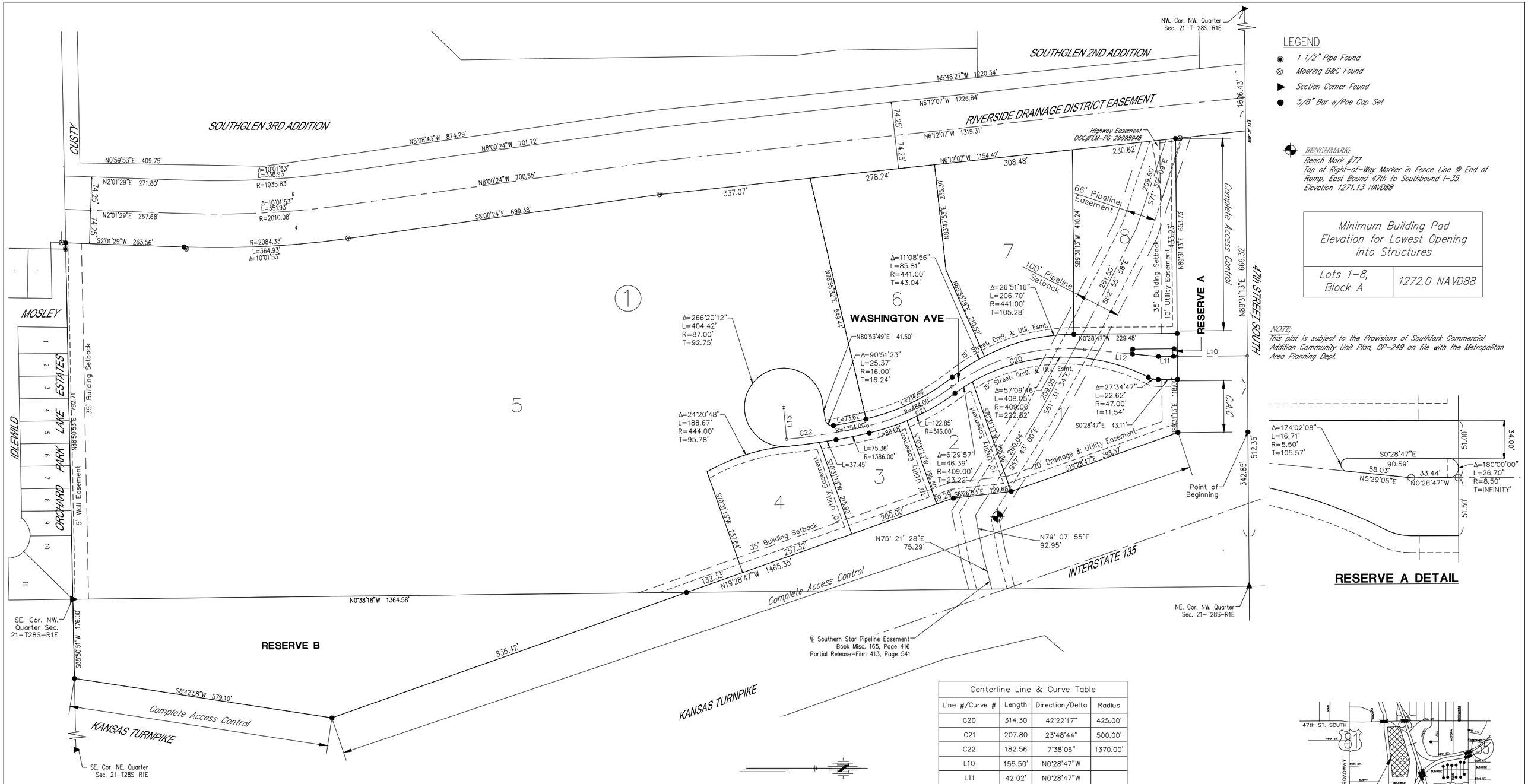
LOCATION MAP
Not to Scale

JASON P. DIXON
LICENSED
18137
KANSAS
PROFESSIONAL ENGINEER

POE & ASSOCIATES, INC.
CONSULTING ENGINEERS
5940 E. Central, Suite 200 ■ Wichita, KS 67208-4242
Phone 316/685-4114 ■ FAX 316/685-4444

SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 1-3



RESERVE A DETAIL

LEGEND

- 1 1/2" Pipe Found
- Moering B&C Found
- Section Corner Found
- 5/8" Bar w/Poe Cap Set

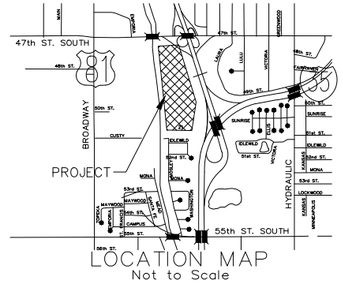
BENCHMARK:
Bench Mark #77
Top of Right-of-Way Marker in Fence Line @ End of Ramp, East Bound 47th to Southbound I-35.
Elevation 1271.13 NAVD88

Minimum Building Pad Elevation for Lowest Opening into Structures	
Lots 1-8, Block A	1272.0 NAVD88

NOTE:
This plat is subject to the Provisions of Southfork Commercial Addition Community Unit Plan, DP-249 on file with the Metropolitan Area Planning Dept.

Scale 1" = 100'

Centerline Line & Curve Table			
Line #/Curve #	Length	Direction/Delta	Radius
C20	314.30	42°22'17"	425.00'
C21	207.80	23°48'44"	500.00'
C22	182.56	7°38'06"	1370.00'
L10	155.50'	N0°28'47"W	
L11	42.02'	N0°28'47"W	
L12	164.71'	N5°29'05"E	
L13	71.00'	N84°33'38"E	



LOCATION MAP
Not to Scale

ONE STEP FINAL PLAT

SOUTHFORK COMMERCIAL ADDITION

TO
WICHITA, SEDGWICK COUNTY, KANSAS

Date of Preparation: 1/27/2012

POE & ASSOCIATES, INC.
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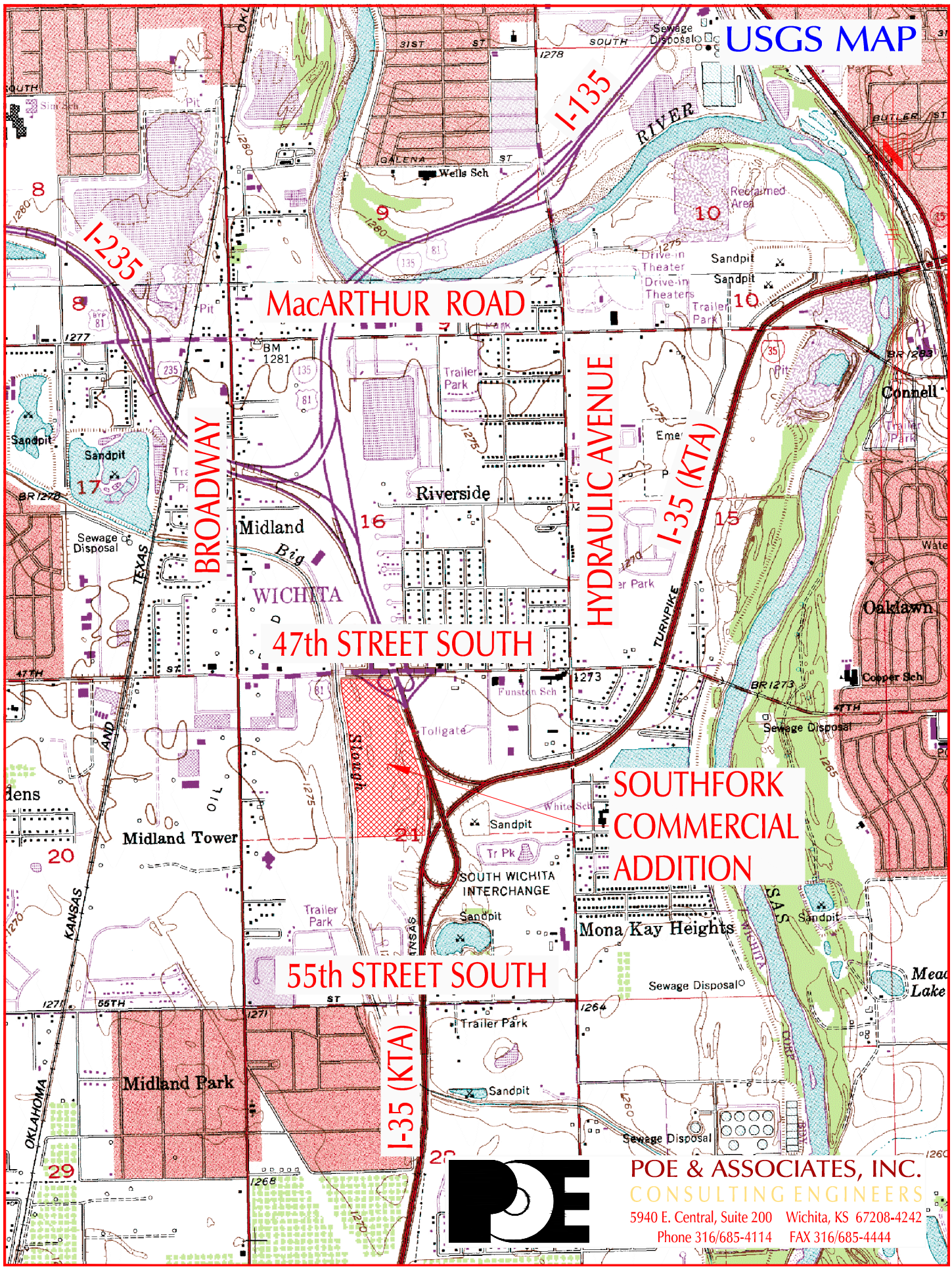
Phone 316/685-4114 ■ FAX 316/685-4444

SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 1-4


USGS MAP
MacARTHUR ROAD
47th STREET SOUTH
55th STREET SOUTH
BROADWAY
HYDRAULIC AVENUE
I-135
I-235
I-35 (KTA)
SOUTHFORK
COMMERCIAL
ADDITION
RIVER
Riverside
Midland
WICHITA
Midland Tower
Midland Park
Mona Kay Heights
Oaklawn
Connell
SOUTH WICHITA
INTERCHANGE
Wells Sch
Funston Sch
Copper Sch
Sandpit
Trailer Park
Sewage Disposal
Tollgate
Reclaimed Area
Drive-in Theater
Drive-in Theaters
TURNPIKE
TEXAS
KANSAS
OKLAHOMA
Big Slough
BM 1281
POE & ASSOCIATES, INC.
CONSULTING ENGINEERS
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SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 1-5

POE & ASSOCIATES, INC.
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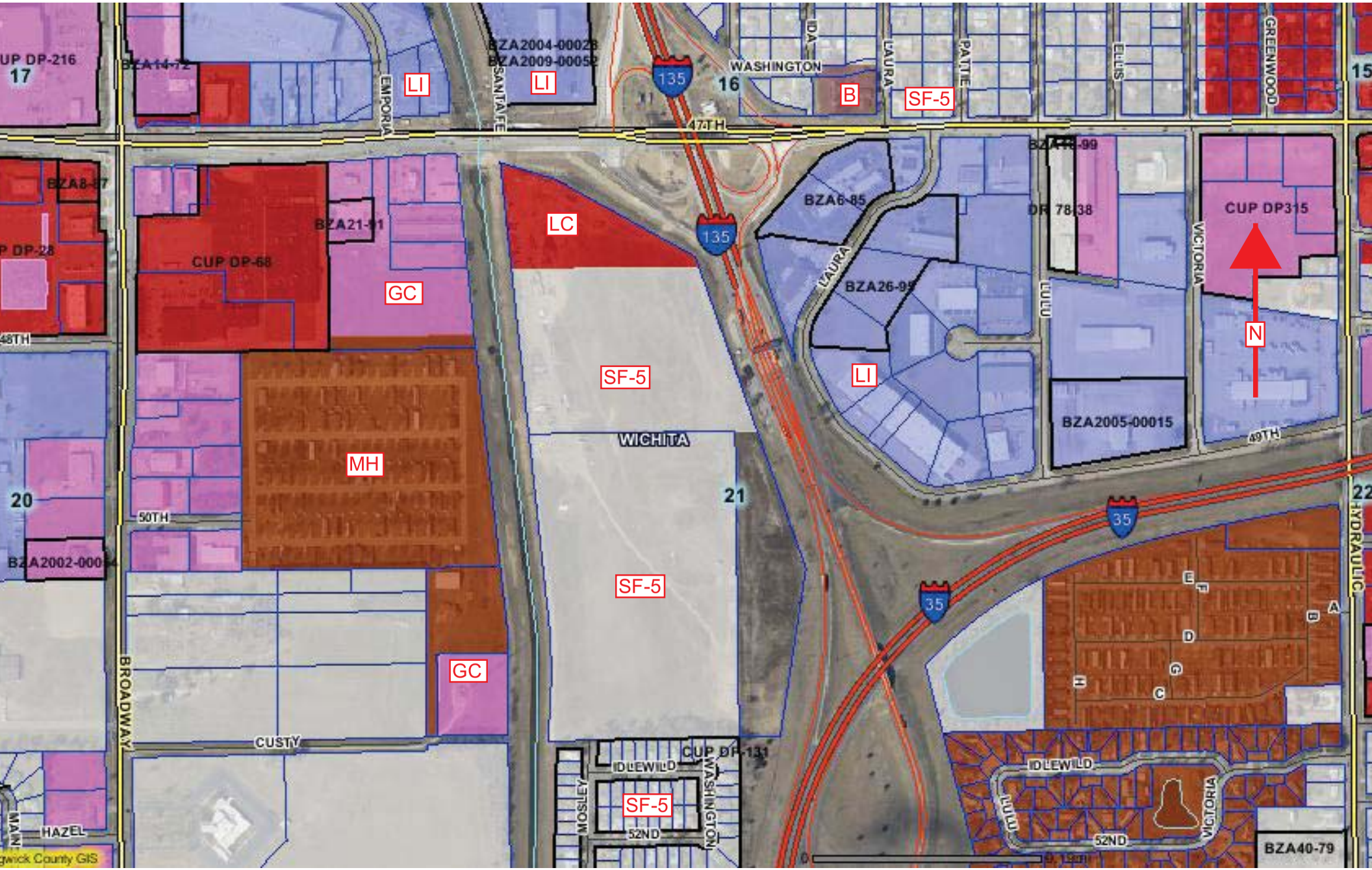
SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 1-6


LI
LI
B
SF-5
LC
GC
SF-5
MH
SF-5
GC
SF-5
LI
CUP DP-68
CUP DP315
BZA6-85
BZA26-95
BZA2005-00015
BZA2004-00023
BZA2009-00052
BZA14-72
BZA21-91
BZA2002-00054
CUP DP-131
WASHINGTON
EMPORIA
SANTA FE
IDA
LAURA
PATTIE
ELLIS
GREENWOOD
VICTORIA
LULU
MOSLEY
BROADWAY
MAIN
474TH
49TH
50TH
48TH
CUSTY
HAZEL
IDLEWILD
52ND
HYDRAULIC
135
35
16
17
20
21
22
N
BZA40-79

SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 1-7

GRAPHIC SCALE

150 0 75 150 300

(IN FEET)
1"= 150'

POE and ASSOCIATES, INC.
CONSULTING ENGINEERS
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GENERAL PROVISIONS

1. THIS DEVELOPMENT CONTAINS 50.4 ACRES, MORE OR LESS.
2. THE DEVELOPMENT CONTAINS EIGHT (8) PARCELS PERMITTING GENERAL COMMERCIAL USES. SEE PARCEL DESCRIPTION (GENERAL PROVISION NO. 31) FOR SPECIFIC USES.
3. ALL UTILITIES SHALL BE INSTALLED UNDERGROUND.
4. SIGNAGE WILL BE PERMITTED AS ALLOWED BY THE SIGN CODE, CITY CODE TITLE 24.04, WITH THE FOLLOWING ADDITIONAL CONDITIONS/LIMITATIONS:
   A. NO PORTABLE SIGNS SHALL BE PERMITTED.
   B. TEMPORARY ADVERTISING DECORATION OR BANNER-TYPE SIGNS AS ALLOWED BY THE SIGN CODE, EXCLUDING TINSEL OR PENNANT STREAMERS OR OTHER SIMILAR DECORATION, SHALL BE PERMITTED, BUT SHALL BE LIMITED TO NO MORE THAN 36 SQUARE FEET IN SIZE, TO NO MORE THAN 15 DAY PLACEMENTS, AND TO NO MORE THAN THREE SUCH BANNER OR ADVERTISING DECORATION SIGNS IN THE CUP AT ANY TIME. ANY ADVERTISING DECORATION OR BANNER SIGNS SHALL BE SECURELY ATTACHED TO A BUILDING, WALL OR FENCE.
   C. NO BUILDING WALL SIGNS IN PARCEL 5 FACING RESIDENTIAL SHALL BE PERMITTED.
5. ALL DRAINAGE WAYS AND DRAINAGE EASEMENTS SHALL BE CONFIRMED AT THE TIME OF PLATTING. A SPECIFIC LOT GRADING PLAN WILL BE PREPARED IN CONFORMANCE WITH THE GENERAL DRAINAGE CONCEPT PLAN FOR REVIEW PRIOR TO THE ISSUANCE OF A BUILDING PERMIT.
6. ANY OPEN SPACE, SIGNS, LOGOS, DRAINAGE FACILITIES, DRIVES OR PARKING AREAS CONTAINED WITHIN THE DESCRIBED PARCELS SHALL BE PRIVATELY OWNED AND MAINTAINED. IF MULTIPLE OWNERSHIP OCCURS AN AGREEMENT PROVIDING FOR THE MAINTENANCE OF RESERVES, OPEN SPACE, INTERNAL DRIVES, PARKING AREAS, DRAINAGE IMPROVEMENTS, ETC., SHALL BE FILED WITH THE PLAT.
7. PARKING SHALL BE PROVIDED IN ACCORDANCE WITH THE UNIFIED ZONING CODE OF THE CITY OF WICHITA. ALL PARKING AND DRIVES SHALL BE HARD SURFACED WITH CONCRETE OR ASPHALT.
8. FIRE LANES:
   A. FIRE LANES SHALL BE IN ACCORDANCE WITH THE APPROPRIATE FIRE CODE OF THE CITY OF WICHITA. NO PARKING SHALL BE ALLOWED IN SAID FIRE LANES, ALTHOUGH THEY MAY BE USED FOR PASSENGER LOADING AND UNLOADING.
   B. DURING BUILDING PERMIT REVIEW THE FIRE CHIEF OR HIS DESIGNATED REPRESENTATIVE SHALL REVIEW AND APPROVE THE SITE PLAN REGARDING FIRE LANE(S) AND FIRE HYDRANT LOCATION, PRIOR TO CONSTRUCTION.
9. ACCESS CONTROL: AS SHOWN ON THE RECORDED PLAT. IF THE ACCESS CONTROLS OF THE RECORDED PLAT ARE ALTERED BY AN APPROVED VACATION ORDER OF THE WICHITA CITY COUNCIL THE C.U.P. SHALL BE CONSIDERED TO HAVE BEEN ADJUSTED ACCORDINGLY.
10. CROSS LOT CIRCULATION AND INTERNAL ACCESS SHALL BE PROVIDED AT THE TIME OF PLATTING. AN INTERNAL CIRCULATION DRIVE SHALL PROVIDE CROSS-LOT ACCESS ALONG THE LINE BETWEEN OUT PARCELS AND THE MAIN PARCEL WITHIN THE CUP.
11. THE TRANSFER OF TITLE ON ALL OR ANY PORTION OF THE LAND INCLUDED IN THE C.U.P. DOES NOT CONSTITUTE A TERMINATION OF THE PLAN OR ANY PORTION THEREOF, BUT SAID PLAN SHALL RUN WITH THE LAND AND BE BINDING UPON THE PRESENT OWNERS, THEIR SUCCESSORS AND ASSIGNS AND THEIR LESSEES UNLESS AMENDED. ANY MAJOR CHANGES IN THIS DEVELOPMENT PLAN SHALL BE SUBMITTED TO THE PLANNING COMMISSION FOR ITS CONSIDERATION.
12. NO DEVELOPMENT OF THE CUP SHALL OCCUR UNTIL MUNICIPAL WATER AND SEWER SERVICES HAVE BEEN EXTENDED TO SERVE THE SITE.
13. ALL LIGHTS SHALL BE SHIELDED TO REFLECT LIGHT DOWNWARD OR DIRECT LIGHT AWAY FROM RESIDENTIAL AREAS. LIGHT POLES ON PARCELS SHALL BE LIMITED TO 25 FEET IN HEIGHT. ALL PARKING LOT LIGHTING WITHIN THE CUP SHALL SHARE CONSISTENT DESIGN (I.E. FIXTURES, POLES, LAMP BASES). LIGHTING HEIGHT SHALL BE LIMITED TO 15 FEET WHEN WITHIN 200 FEET OF RESIDENTIAL ZONING.
14. TRASH RECEPTACLES SHALL BE APPROPRIATELY SCREENED TO REASONABLY HIDE THEM FROM GROUND VIEW. SCREENING SHALL BE CONSTRUCTED OF MATERIALS AND/OR LANDSCAPING COMPATIBLE WITH AND COMPLEMENTARY TO THE EXTERIOR OF THE BUILDINGS TO WHICH THE TRASH RECEPTACLE PROVIDES SERVICE. LOADING DOCKS AND SERVICE AREAS SHALL ALSO BE SCREENED FROM KTA AND THE SOUTH PROPERTY LINE , WITH SCREENING WALLS AND/OR LANDSCAPING APPROVED BY THE PLANNING DIRECTOR.
15. ON ALL PARCELS ROOF-TOP EQUIPMENT SHALL BE SCREENED FROM GROUND LEVEL VIEW FROM ADJACENT RESIDENTIAL AREAS; NO ROOF-TOP FENCING ALLOWED.
16. DEVELOPMENT OF ALL PARCELS WITHIN THE CUP SHALL COMPLY WITH THE LANDSCAPE ORDINANCE OF THE CITY OF WICHITA. A LANDSCAPE PLAN SHALL BE PREPARED BY A STATE OF KANSAS REGISTERED LANDSCAPE ARCHITECT FOR THE REQUIRED LANDSCAPING, INDICATING THE TYPE, LOCATION AND SPECIFICATIONS OF ALL PLANT MATERIAL. THIS PLAN SHALL BE SUBMITTED TO THE PLANNING DEPARTMENT FOR THEIR REVIEW AND APPROVAL PRIOR TO ISSUANCE OF A BUILDING PERMIT.
17. THE ZONING ADMINISTRATOR SHALL HAVE THE AUTHORITY TO INCREASE THE NUMBER OF BUILDINGS AS MAY BE NECESSARY WITHOUT ADJUSTMENT TO THE CUP SO LONG AS THE MAXIMUM BUILDING COVERAGE IS NOT EXCEEDED.
18. OFFSITE SIGN BILLBOARDS SHALL BE LIMITED TO NO MORE THAN THREE(3) SIGNS FOR THE ENTIRE CUP. WINDOW SIGNAGE SHALL COVER NO MORE THAN 25 PERCENT OF THE WINDOW AREA.
19. A FINANCIAL GUARANTEE FOR THE PLANT MATERIAL APPROVED ON THE LANDSCAPE PLAN FOR THAT PORTION OF THE CUP BEING DEVELOPED SHALL BE REQUIRED PRIOR TO ISSUANCE OF ANY OCCUPANCY PERMIT, IF THE REQUIRED LANDSCAPING HAS NOT BEEN PLANTED.
20. ALL PARCELS IN THE CUP SHALL SHARE A SIMILAR OR COMPATIBLE PLANT PALETTE, AS DETERMINED BY THE REGISTERED LANDSCAPE ARCHITECT PREPARING REQUIRED PLAN.
21. ALL BUILDINGS SHALL HAVE CONSISTENT EXTERIOR BUILDING MATERIALS WITH CONSISTENT ARCHITECTURAL CHARACTER, FORM, COLOR, AND TEXTURE. BUILDING WALLS SHALL BE BROKEN UP BY PROJECTIONS, RECESSES, CHANGES IN ROOF LINE, AND CHANGES IN COLORS, TEXTURES AND/OR MATERIALS, RELATING TO INTERIOR BUILDING FUNCTIONS WHERE FEASIBLE. BUILDINGS SHOULD HAVE A RECOGNIZABLE "BASE" AND "TOP". PREFABRICATED METAL PANELS SHALL NOT BE PERMITTED ON THE SIDE OF BUILDINGS FACING I-35 OR 47TH STREET SOUTH AND SHALL NOT BE THE PREDOMINANT WALL MATERIAL ON ANY OTHER SIDE OF THE BUILDING.
22. BUILDINGS IN PARCELS ALONG THE ARTERIAL STREETS SHOULD BE SITED WITH A PRIMARY BUILDING FACADE ALONG THE STREET AND NO MORE THAN ONE DRIVING AISLE. MINIMUM SETBACK ALONG ARTERIAL STREETS MAY BE REDUCED TO A MINIMUM OF 20 FEET IF THE FRONT YARD AREA IS LANDSCAPED. A MINIMUM OF 50 PERCENT OF THE BUILDING FRONTAGE FACING THE ARTERIAL STREETS MUST HAVE WINDOWS OR DOOR OPENINGS.
23. GAS ISLANDS, ATMS, BANK DRIVE-THROUGH WINDOWS, OVERHEAD DOORS AND SIMILAR UTILITARIAN ITEMS SHALL BE SCREENED OR SITED BEHIND BUILDINGS TO MINIMIZE THEIR VIEW FROM THE STREET.
24. A SIX (6) FOOT HIGH MASONRY WALL SHALL BE CONSTRUCTED ALONG THE SOUTHERN LINE OF PARCEL 6 WHEN ANY PORTION(S) OF PARCEL 6 IS DEVELOPED. NO UTILITIES SHALL BE PLACED WITHIN THE 5 FOOT WALL EASEMENT.
25. EXTENSIVE USE OF BACKLIT CANOPIES AND NEON OR FLUORESCENT TUBE LIGHTING ON BUILDINGS IS NOT PERMITTED.
26. THIS C.U.P. DOCUMENT IS GENERAL IN CHARACTER AND WILL REQUIRE THE SUBMISSION OF A SITE PLAN AND A LANDSCAPE PLAN FOR EACH PARCEL OR PORTION THEREOF. THIS SITE PLAN WILL REQUIRE ADMINISTRATIVE APPROVAL AT THE PLAN REVIEW STAGE PRIOR TO ISSUANCE OF A BUILDING PERMIT. THE SITE PLAN SHALL SHOW LAND USE RELATIONSHIPS, ACCESS POINTS AND/OR CONTROL SETBACKS, INTERIOR CIRCULATION, PARKING, SCREENING AND OTHER SIMILAR DESIGN CONSIDERATIONS.
27. PRIOR TO ISSUING BUILDING PERMITS FOR EACH PARCEL OR PORTION THEREOF, A PLAN FOR VEHICULAR CIRCULATION AND A PEDESTRIAN WALK SYSTEM SHALL BE SUBMITTED AND APPROVED BY THE DIRECTOR OF PLANNING. THE PLAN SHALL LINK SIDEWALKS ALONG 47TH STREET SOUTH WITH THE MAJOR ENTRANCES TO THE DEVELOPMENT, AND SHALL LINK WITH THE PROPOSED BUILDINGS WITHIN THE DEVELOPMENT. THE SITE PEDESTRIAN CIRCULATION SYSTEM, WHICH MAY BE CONSTRUCTED INCREMENTALLY, SHALL BE APPROVED BY THE ZONING ADMINISTRATOR. WALKWAYS ACROSS PARKING LOTS SHALL BE DESIGNATED BY CHANGES IN MATERIAL, TEXTURE AND COLOR.
28. THE DEVELOPMENT OF THIS PROPERTY SHALL PROCEED IN ACCORDANCE WITH THE DEVELOPMENT PLAN AS RECOMMENDED FOR APPROVAL BY THE PLANNING COMMISSION AND APPROVED BY THE GOVERNING BODY, AND ANY SUBSTANTIAL DEVIATION OF THE PLAN, AS DETERMINED BY THE ZONING ADMINISTRATOR AND THE DIRECTOR OF PLANNING, SHALL CONSTITUTE A VIOLATION OF THE BUILDING PERMIT AUTHORIZING CONSTRUCTION OF THE PROPOSED DEVELOPMENT.
29. THE FOLLOWING USES SHALL BE PROHIBITED IN ALL PARCELS: CEMETERY, CORRECTIONAL PLACEMENT RESIDENCES, AND NIGHT CLUB IN THE CITY. ANY USES ALLOWED ONLY BY CONDITIONAL USE SHALL NOT BE ALLOWED EXCEPT BY CUP AMENDMENT. THE FOLLOWING USES SHALL BE PROHIBITED WITHIN 200 FEET OF RESIDENTIALLY ZONED PROPERTY: SERVICE STATIONS, CONVENIENCE STORES WITH GAS ISLANDS, RESTAURANTS WITH DRIVE-IN OR DRIVE-TROUGH FACILITIES AND VEHICLE REPAIR.
30. COMMUNICATION TOWERS SHALL BE PERMITTED ONLY BY A SEPARATE CUP AMENDMENT.
31. ALL LOADING, SERVICE AND OUTSIDE STORAGE AREAS SHALL BE SCREENED FROM 47TH STREET, KTA/I-135, AND NEARBY NON-COMMERCIAL PROPERTIES.
32. PARCEL DESCRIPTIONS:

PARCEL NO. 1
PROPOSED USES: ALL PERMITTED USES IN THE "GC" GENERAL COMMERCIAL ZONING DISTRICT EXCEPT: TAVERNS, NIGHT CLUBS, DRINKING ESTABLISHMENTS OR ADULT ENTERTAINMENT

NET AREA – 92,088 SQ. FT. (2.11 ACRES)
MAXIMUM BUILDING COVERAGE – 27,626 SQ. FT. (30% MAX.)
TOTAL NUMBER OF BUILDINGS – 2
PARKING – SEE GENERAL PROVISION NUMBER 7
MAXIMUM BUILDING HEIGHT-45 FEET
GROSS FLOOR AREA RATIO: 40%

PARCEL NO. 2
PROPOSED USES: SAME AS PARCEL 1

NET AREA – 36,663 SQ. FT. (0.84 ACRES)
MAXIMUM BUILDING COVERAGE –10,999 SQ. FT. (30% MAX.)
TOTAL NUMBER OF BUILDINGS – 2
PARKING – SEE GENERAL PROVISION NUMBER 7
MAXIMUM BUILDING HEIGHT-35 FEET
GROSS FLOOR AREA RATIO: 40%

PARCEL NO. 3
PROPOSED USES: SAME AS PARCEL 1

NET AREA – 40,412 SQ. FT. (0.93 ACRES)
MAXIMUM BUILDING COVERAGE –12,124 SQ. FT. (30% MAX.)
TOTAL NUMBER OF BUILDINGS – 2
PARKING – SEE GENERAL PROVISION NUMBER 7
MAXIMUM BUILDING HEIGHT-35 FEET
GROSS FLOOR AREA RATIO: 40%

PARCEL NO. 4
PROPOSED USES: SAME AS PARCEL 1

NET AREA – 60,829 SQ. FT. (1.40 ACRES)
MAXIMUM BUILDING COVERAGE –60,829 SQ. FT. (30% MAX.)
TOTAL NUMBER OF BUILDINGS – 2
PARKING – SEE GENERAL PROVISION NUMBER 7
MAXIMUM BUILDING HEIGHT-35 FEET
GROSS FLOOR AREA RATIO: 40%

PARCEL NO. 5
PROPOSED USES: SAME AS PARCEL 1

NET AREA – 1,319,537 SQ. FT. (30.29 ACRES)
MAXIMUM BUILDING COVERAGE –527,815 SQ. FT. (40% MAX.)
TOTAL NUMBER OF BUILDINGS – 5
PARKING – SEE GENERAL PROVISION NUMBER 7
MAXIMUM BUILDING HEIGHT-35 FEET
GROSS FLOOR AREA RATIO: 40%

PARCEL NO. 6
PROPOSED USES: SAME AS PARCEL 1

NET AREA – 134,896 SQ. FT. (3.10 ACRES)
MAXIMUM BUILDING COVERAGE –40,469 SQ. FT. (30% MAX.)
TOTAL NUMBER OF BUILDINGS – 2
PARKING – SEE GENERAL PROVISION NUMBER 7
MAXIMUM BUILDING HEIGHT-55 FEET
GROSS FLOOR AREA RATIO: 40%

PARCEL NO. 7
PROPOSED USES: SAME AS PARCEL 1

NET AREA – 114,011 SQ. FT. (2.62 ACRES)
MAXIMUM BUILDING COVERAGE –34,203 SQ. FT. (30% MAX.)
TOTAL NUMBER OF BUILDINGS – 2
PARKING – SEE GENERAL PROVISION NUMBER 7
MAXIMUM BUILDING HEIGHT-35 FEET
GROSS FLOOR AREA RATIO: 40%

PARCEL NO.8
PROPOSED USES: SAME AS PARCEL 1

NET AREA – 96,777 SQ. FT. (2.22 ACRES)
MAXIMUM BUILDING COVERAGE –29,033 SQ. FT. (30% MAX.)
TOTAL NUMBER OF BUILDINGS – 2
PARKING – SEE GENERAL PROVISION NUMBER 7
MAXIMUM BUILDING HEIGHT-35 FEET
GROSS FLOOR AREA RATIO: 40%

LEGAL DESCRIPTION

A TRACT OF LAND DESCRIBED AS FOLLOWS;

A TRACT OF LAND IN THE NORTH HALF OF SECTION 21, TOWNSHIP 28 SOUTH, RANGE 1 EAST OF THE SIXTH PRINCIPAL MERIDIAN, SEDGWICK COUNTY, KANSAS. COMMENCING AT THE NORTHWEST CORNER OF THE NORTHWEST QUARTER OF SECTION 21, TOWNSHIP 28 SOUTH, RANGE 1 EAST OF THE SIXTH PRINCIPAL MERIDIAN, SEDGWICK COUNTY, KANSAS, THENCE ALONG AN ASSUMED BEARING OF N89° 31' 13"E ON THE NORTH LINE OF SAID NORTHWEST QUARTER FOR 2295.74 FEET TO A POINT, THENCE S0° 28' 47"E FOR 155.50 FEET TO THE POINT OF BEGINNING ON THE KANSAS DEPARTMENT OF TRANSPORTATION RIGHT-OF-WAY LINE AS DESCRIBED IN THE QUIT CLAIM DEED RECORDED AS DOC.#/FLM-PG: 29162038, THENCE S19°28'47"E A DISTANCE OF 393.37 FEET TO A POINT ON THE KANSAS DEPARTMENT OF TRANSPORTATION RIGHT-OF-WAY LINE AS DESCRIBED IN THE DEED RECORDED IN DEED BOOK 1351 AT PAGE 253, THENCE S 6°26'53"E A DISTANCE OF 129.68 FEET, THENCE S19°28'47"E A DISTANCE OF 1465.35 FEET TO A POINT ON THE RIGHT-OF-WAY LINE OF THE KANSAS TURNPIKE AUTHORITY AS DESCRIBED IN CONDEMNATION CASE A-55279, THENCE ALONG SAID KANSAS TURNPIKE AUTHORITY RIGHT-OF-WAY LINE S8°42'58"W A DISTANCE OF 579.10 FEET TO A POINT ON THE SOUTH LINE OF THE NORTHEAST QUARTER OF SECTION 21, TOWNSHIP 28 SOUTH, RANGE 1 EAST, THENCE S88°50'51"W ALONG THE SOUTH LINE OF SAID NORTHEAST QUARTER A DISTANCE OF 176.00 FEET TO THE SOUTHWEST CORNER OF SAID NORTHEAST QUARTER, THENCE S88°50'53"W ALONG THE SOUTH LINE OF THE NORTHWEST QUARTER OF SECTION 21, TOWNSHIP 28 SOUTH, RANGE 1 EAST A DISTANCE OF 792.71 FEET TO A POINT ON THE EAST LINE OF THE RIVERSIDE DRAINAGE DISTRICT EASEMENT AS RECORDED IN DEED BOOK 432 AT PAGE 162, THENCE N2°01'29"E ALONG SAID RIVERSIDE DRAINAGE DISTRICT EASEMENT A DISTANCE OF 263.66 FEET TO A POINT OF CURVATURE, THENCE CONTINUING ALONG THE RIVERSIDE DRAINAGE DISTRICT EASEMENT ALONG A CURVE TO THE LEFT, HAVING A RADIUS OF 2084.33 FEET A DELTA ANGLE OF 10°01'53", FOR AN ARC DISTANCE OF 364.93 FEET TO A POINT OF TANGENCY, THENCE CONTINUING ALONG SAID RIVERSIDE DRAINAGE DISTRICT EASEMENT N8°00'24"W A DISTANCE OF 699.38 FEET TO A POINT, THENCE CONTINUING ALONG SAID RIVERSIDE DRAINAGE DISTRICT EASEMENT N6°12'07"W A DISTANCE OF 1154.42 FEET TO A POINT ON THE KANSAS DEPARTMENT OF TRANSPORTATION RIGHT-OF-WAY LINE AS DESCRIBED IN THE QUIT CLAIM DEED RECORDED AS DOC.#/FLM-PG: 29162038, THENCE ALONG SAID KANSAS DEPARTMENT OF TRANSPORTATION RIGHT-OF-WAY LINE BEARING N89°31'13"E A DISTANCE OF 653.73 FEET TO THE POINT OF BEGINNING.

SOUTHFORK COMMERCIAL ADDITION

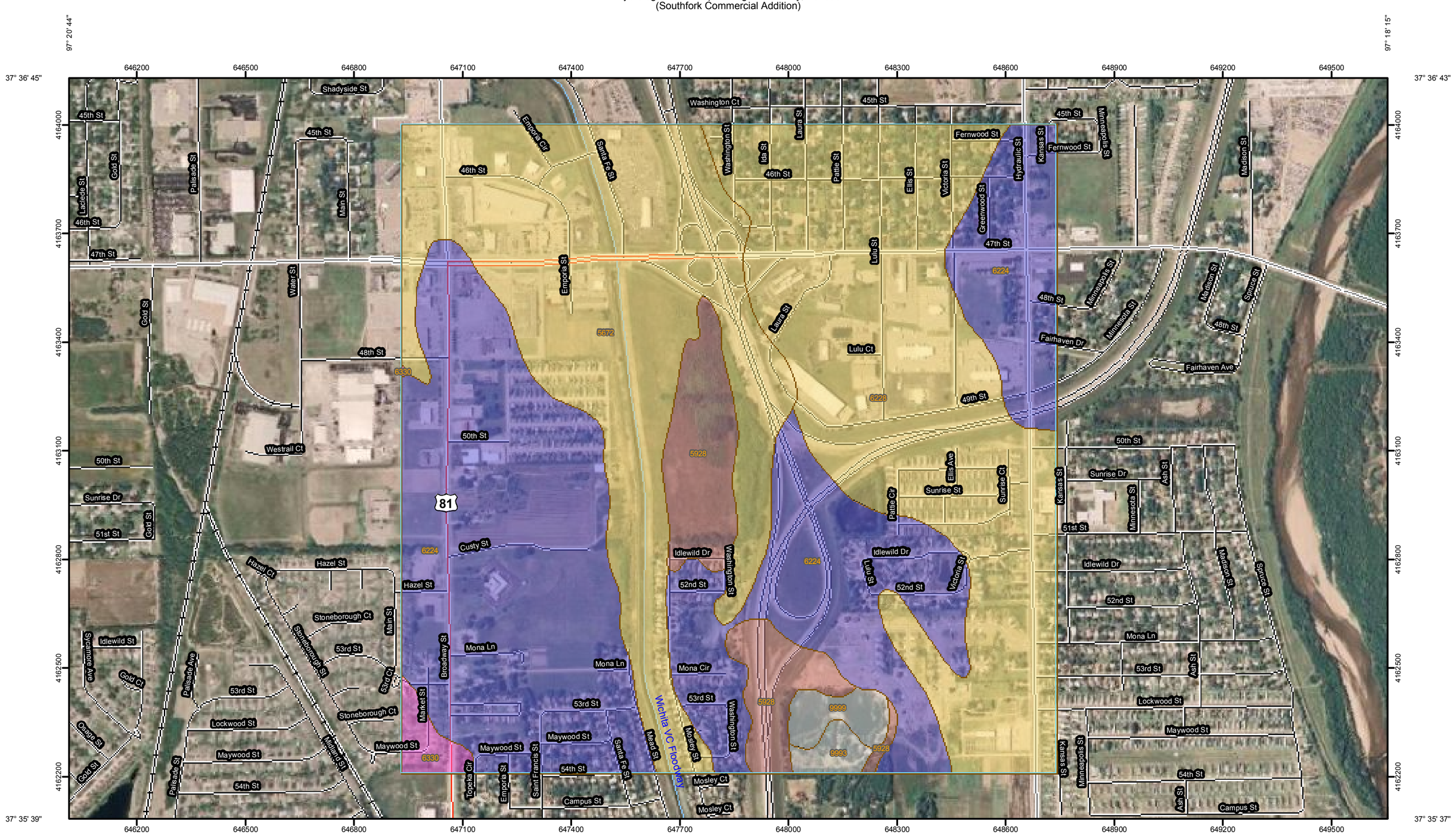
COMMUNITY UNIT PLAN (DP-249)

DATE OF PREPARATION 1/27/2012

1. CUP adjustment 08/08/2011 to revise parcel sizes in accordance with the plat.

SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 1-8



Map Scale: 1:10,100 if printed on B size (11" x 17") sheet.

N

0 150 300 600 900 Meters

0 500 1,000 2,000 3,000 Feet

MAP LEGEND

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

Soils
- Soil Map Units

Soil Ratings
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Political Features
- Cities

Water Features
- Streams and Canals

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

MAP INFORMATION

Map Scale: 1:10,100 if printed on B size (11" × 17") sheet.

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 14N NAD83

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

Soil Survey Area: Sedgwick County, Kansas
Survey Area Data: Version 7, Nov 30, 2010

Date(s) aerial images were photographed: 6/20/2006

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

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Sedgwick County, Kansas (KS173)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
5672	Waldeck sandy loam, occasionally flooded	C	200.1	25.0%
5928	Pratt loamy fine sand, 1 to 5 percent slopes	A	46.8	5.9%
6224	Canadian fine sandy loam, rarely flooded	B	309.9	38.7%
6228	Canadian-Waldeck fine sandy loams, rarely flooded	C	222.5	27.8%
6330	Carwile fine sandy loam, 0 to 1 percent slopes	D	7.0	0.9%
9993	Pits		5.4	0.7%
9999	Water		8.5	1.1%
Totals for Area of Interest			**800.3**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: All Components

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "All Components" returns the lowest or highest attribute value among all components of the map unit, depending on the corresponding "tie-break" rule. In this case, the "tie-break" rule indicates whether the lowest or highest value among all components should be returned. For this aggregation method, percent composition ties cannot occur.

The result returned by this aggregation method represents either the minimum or maximum value of the corresponding attribute throughout the map unit. The result may well be based on a map unit component of very minor extent.

Component Percent Cutoff: None Specified

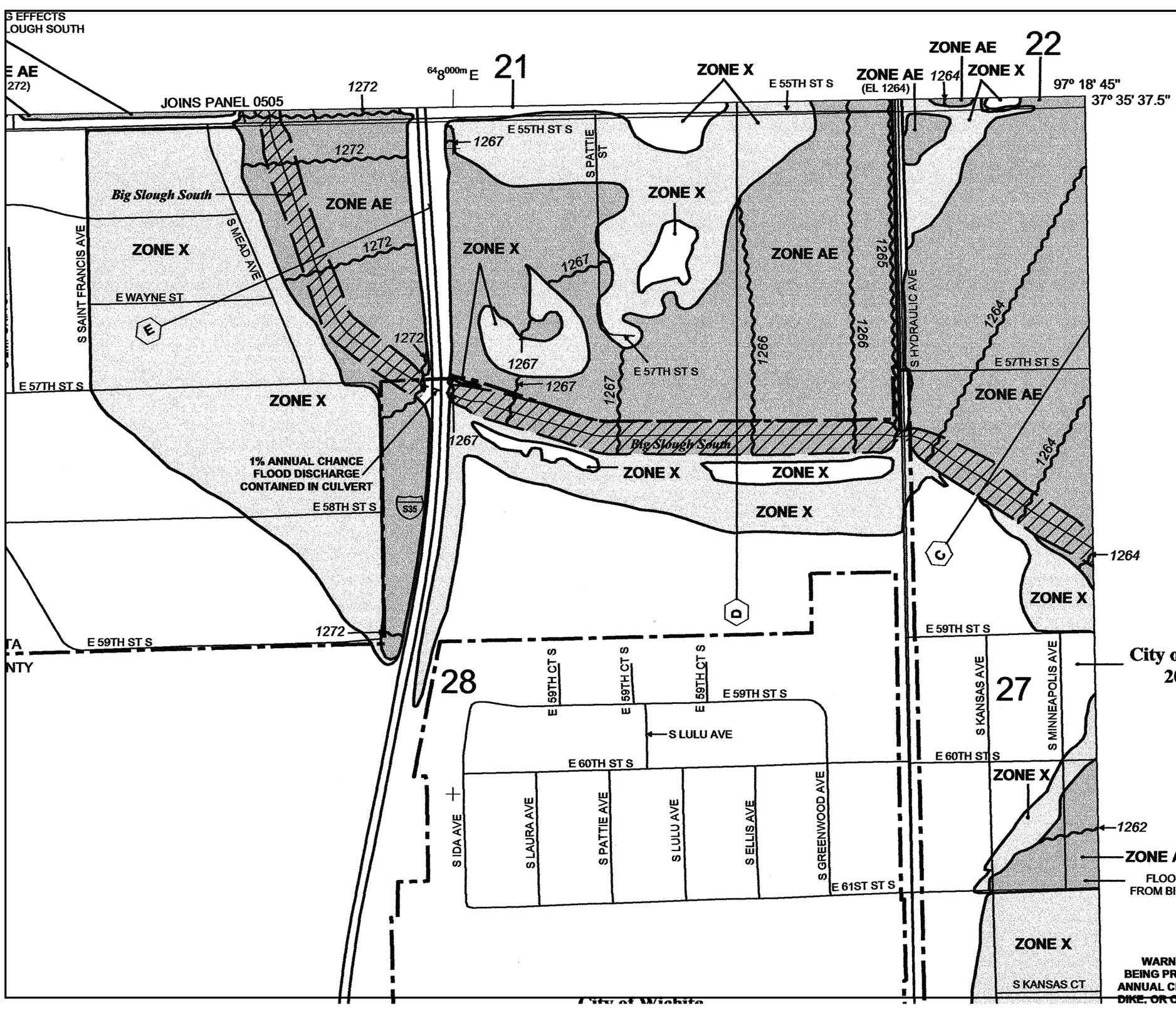
Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Higher

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 1-9



MAP SCALE 1" = 500'

500 1000 FEET

0 150 300 METERS

PANEL 0504E

FIRM

FLOOD INSURANCE RATE MAP

SEDGWICK COUNTY, KANSAS AND INCORPORATED AREAS

PANEL 504 OF 700

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
AYSVILLE, CITY OF	200324	0504	E
EDGWICK COUNTY	200321	0504	E
ICHITA, CITY OF	200328	0504	E

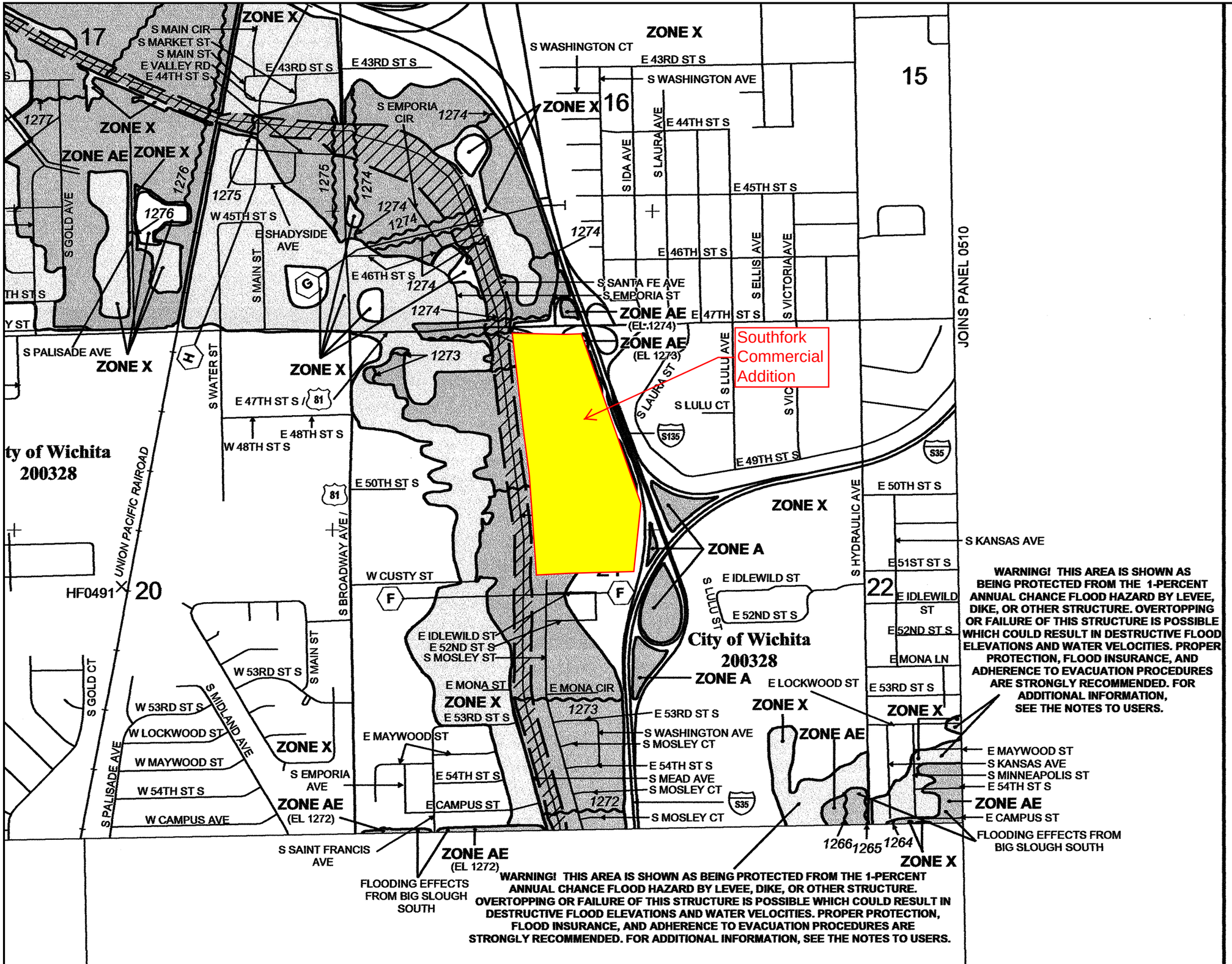
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
20173C0504E

EFFECTIVE DATE
FEBRUARY 2, 2007

Federal Emergency Management Agency

WARNING! THIS ARE
BEING PROTECTED FRO
ANNUAL CHANCE FLOOD
DIKE, OR OTHER STRUCT



MAP SCALE 1" = 1000'

500 0 1000 200

300 0 300

PANEL 0505E

FIRM

FLOOD INSURANCE RATE MAP

SEDGWICK COUNTY, KANSAS AND INCORPORATED AREAS

PANEL 505 OF 700

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HAYSVILLE, CITY OF	200324	0505	E
SEDGWICK COUNTY	200321	0505	E
WICHITA, CITY OF	200328	0505	E

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
20173C0505E

EFFECTIVE DATE
FEBRUARY 2, 2007

Federal Emergency Management Agency

2.0 Existing Conditions Information

2.1 Existing Conditions Drainage Map

See Existing Conditions Drainage Map on Exhibit 2-1.

2.1.1 On-Site and Off-Site Topography

The existing topography is shown on Exhibit 2-1.

2.1.2 On-Site and Off-Site Drainage Features

Exhibit 2-1 shows any water features within the site.

2.1.3 Storm Sewer System Components

Flow within the site is carried by overland flow, of which a majority is sheet flow. Curb inlets along the south side of 47th Street South (2 inlets) drain the south side of 47th Street adjacent to the north property line with run-off going into the Riverside Drainage Channel through the KTA highway ditch. The southwest (Site to Pond) area sheet drains west and south into the existing detention pond.

2.1.4 Location and Boundaries of Natural Features

The site does not contain wetlands, lakes, but a dry detention pond occupies the southwest corner of the property.

2.1.5 Location, Dimensions, and Elevations of Existing Bridges and Culvert Crossings

A KTA highway drainage ditch crosses the northeast corner of the property. This ditch contains a 48" CMP under a temporary construction entrance at the northwest corner of the site. 47th Street has two bridges located at the east and west limits of the north property line over I-135 and the Riverside Drainage Channel; respectively. Two small RCPs drain the south side of 47th Street into the existing highway ditch and to the Riverside Channel west of the site.

2.1.6 Location of Existing Utilities

Locates shall be called in prior to any excavation in this area. The site contains various utilities along the north side of the property. A sanitary sewer main runs along the west bank of the Riverside Drainage Channel. A 12" water main is found along the south side of 47th Street South. Underground fiber optic lines and a telephone duct bank are located within the right-of-way of 47th Street South as well. A 20" high pressure gas pipeline owned by Southern Star Central Gas Pipeline occupies a 66' easement inside a 100' right-of way along the old KDOT right-of-way cutting across the northeast corner of the property as shown on

the existing condition drainage map. Signal poles are located at the north proposed entrance to the property and were recently installed as part to the 47th Street improvements.

2.1.7 Groundwater Elevations

This property is near a zone to the east identified by the City Engineers' office as likely to have groundwater at some or all times within 10 feet of the ground surface elevation. Building with specially engineered foundations or with the lowest floor opening above groundwater is recommended, and owners seeking building permits on this property will be similarly advised. More detailed information on recorded groundwater elevations in the vicinity of this property is available in the City Engineers' office.

2.1.8 Delineation of Predominate Soils Based on USDA Soil Surveys

The predominant soil type is a Waldeck Sandy Loam (5672) series material, which is found in about 48% of the overall existing drainage areas. The drainage basin also contains 28.5% of Pratt Loamy Fine Sand (5928) soil and just over 22% of Canadian-Waldeck Fine Sandy Loams (6228). A very small area of Canadian Fine Sandy Loam (6224) is found at the south end to the turnpike basin. See Exhibit 1-6 for NRCS Soil Survey map and information showing existing soil types and descriptions. These soils are classified as Hydrologic Group C (5672), Group A (5928), Group B (6228), and Group C (6224) soils. The Hydrologic Groups are used to select curve numbers for the runoff calculations in both the existing and developed conditions.

2.1.9 Land Use Types per NRCS Nomenclature

The current land use type can be classified as an open pasture grazing area. Previous use of the land included cultivated crops.

2.1.10 Footprint of Existing Impervious Areas

Currently, the property is completely cleared for development. No impervious areas exist inside the property, but the KTA to Channel drainage area contains developed sites with typical impervious areas of up to 85% coverage as well as the turnpike, I-135, and 47th Street South pavement.

2.1.11 Internal Drainage Sub-Basin Boundaries

The total area of Southfork Commercial Addition encompasses 50.4 acres. The west basin denoted as Site to Channel is nearly 39 acres and part of the 41-acre KTA to Channel basin runs across the northeast corner of the property as shown on the existing plan. The remainder of the on-site area of just under nine acres covers the southwest area of the site.

2.1.12 Time of Concentration Flow Paths

The existing condition drainage plan shows the general flow paths for each drainage area in the basin. The site drainage is all collected in the current Riverside Drainage Channel and the on-site detention area. The flow to these areas is mostly sheet flow with minor concentrated flow at the lower ends of the basins. The KTA drainage flows from the 47th Street South storm sewer system and into a highway ditch running across the northeast corner of the property. The ditch ultimately drains into the Riverside Channel.

2.2 Existing Conditions Hydrology and Hydraulics Analysis

2.2.1 Narrative of the Hydrologic Analysis Methodology

The runoff method used to determine storm water flows was the SCS method. Supporting data and calculation results are shown on Exhibit 2-2. The analysis was completed using the SCS method. The 1, 2, 5, 10, 25, & 100 year, 24-hour storm events were evaluated.

2.2.2 Summary Table of Drainage Sub-Basin Hydrologic Parameters

Drainage Basin	Area (Acres)	Curve Number	T_c (min)
KTA to Channel	41.01	90.5	24.1
Site to Channel	38.97	65.6	39.2
Site to Pond	8.77	76.8	17.2

2.2.3 Table of Existing Condition Runoff Curve Numbers

For the existing condition, the curve numbers were weighted based on area of their respective hydrologic soil groups over the site. The results are shown in the table below.

KTA to Channel		Hydrologic	Area		% of Area	CN
Soil #	Soil Information	Group	Square Feet	Acres	%	Existing
5672	Waldeck sandy loam, occasionally flooded	C	795366.57	18.259	44.53%	91.0
5928	Pratt loamy fine sand, 1 to 5 percent slopes	A	79532.20	1.826	4.45%	81.0
6224	Canadian fine sandy loam, rarely flooded	B	60143.29	1.381	3.37%	88.0
6228	Canadian-Waldeck fine sandy loam, rarely flooded	C	851192.36	19.541	47.65%	91.0
		TOTALS	1786234.42	41.006	100.00%	90.5

Site to Channel		Hydrologic	Area		% of Area	CN
Soil #	Soil Information	Group	Square Feet	Acres	%	Proposed
5672	Waldeck sandy loam, occasionally flooded	C	722800.54	16.593	42.57%	80.0
5928	Pratt loamy fine sand, 1 to 5 percent slopes	A	974971.46	22.382	57.43%	55.0
		TOTALS	1697772.00	38.975	100.00%	65.6

Site to Pond		Hydrologic	Area		% of Area	CN
Soil #	Soil Information	Group	Square Feet	Acres	%	Proposed
5672	Waldeck sandy loam, occasionally flooded	C	332916.27	7.643	87.19%	80.0
5928	Pratt loamy fine sand, 1 to 5 percent slopes	A	48930.19	1.123	12.81%	55.0
		TOTALS	381846.46	8.766	100.00%	76.8

2.2.4 Table of Existing Condition Times of Concentration

Area	T_c (min)
KTA to Channel	24.1
Site to Channel	39.2
Site to Pond	17.2

Supporting data and calculations are found on the time of concentration worksheet attached as Exhibit 2-3.

2.2.5 Summary Table of Rainfall Data

Rainfall information shown in Exhibit 2-4.

2.2.6 Cross-Section Data of Existing Open Channels

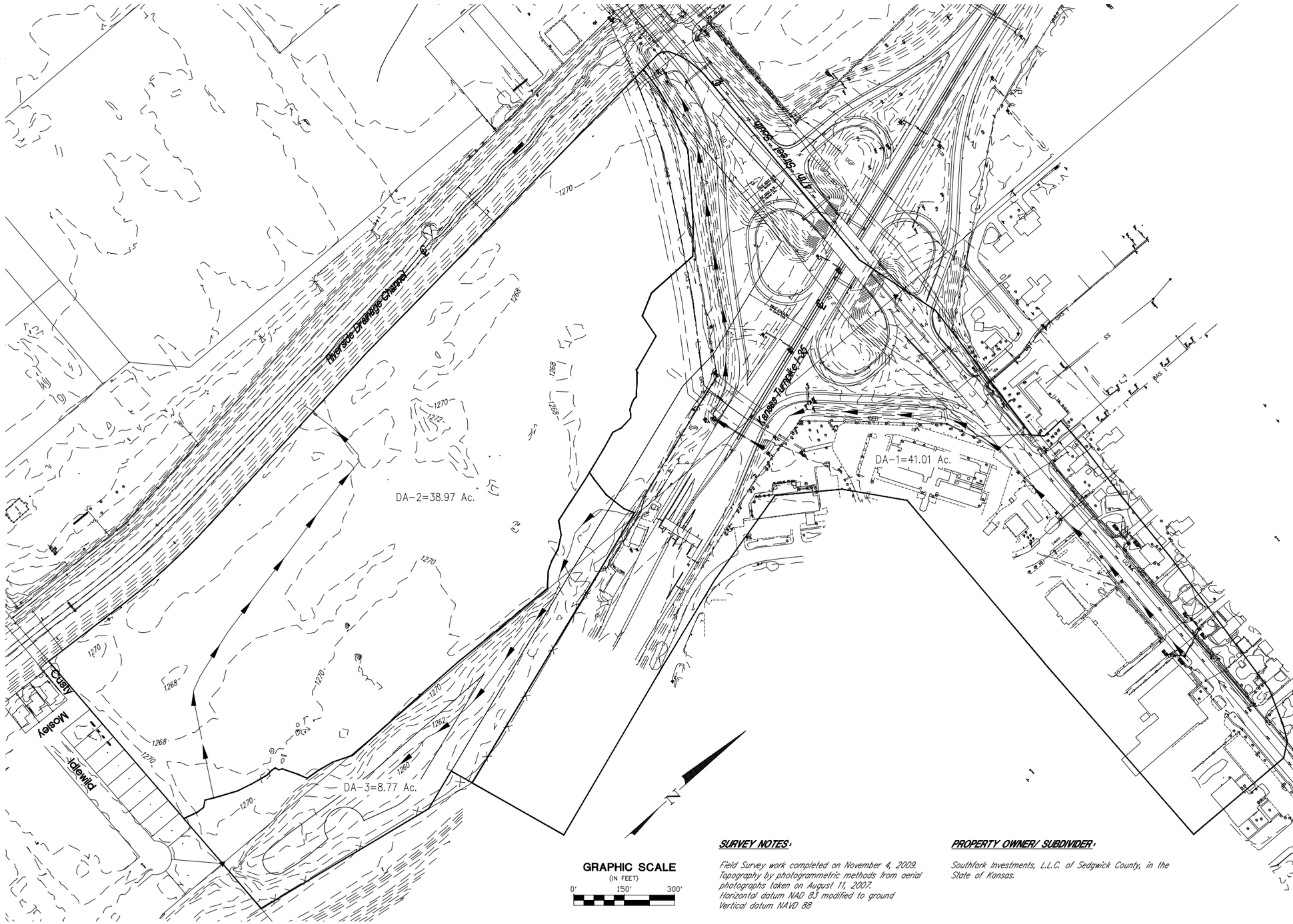
Located through the northeast corner of the property; the KTA highway ditch is a roughly 8'-wide flat-bottom channel with typical 4:1 side slopes draining to the Riverside Drainage Channel located outside the west property line of the site.

2.2.7 Existing Condition Hydrologic and Hydraulic Analyses

Existing condition analysis report attached as Exhibit 2-2.

SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 2-1



GRAPHIC SCALE
(IN FEET)
0' 150' 300'

SURVEY NOTES:

Field Survey work completed on November 4, 2009.
Topography by photogrammetric methods from aerial photographs taken on August 11, 2007.
Horizontal datum NAD 83 modified to ground
Vertical datum NAVD 88

PROPERTY OWNER/ SUBDIVIDER:

Southfork Investments, L.L.C. of Sedgwick County, in the State of Kansas.

SOUTHFORK COMMERCIAL ADDITION

A TRACT IN THE NORTH HALF OF SECTION 21, T28S, R1E
WICHITA, SEDGWICK COUNTY, KANSAS

2011
EXISTING CONDITION DRAINAGE PLAN

NOTES:

1. *Cross-drainage agreements shall be required at the time of platting.*
2. *All outlets to the Riverside Drainage Channel shall conform to City of Wichita water quality requirements, to include installing any pipe in the canal as shown rotated 30° from perpendicular.*
3. *Detailed site grading and final drainage plans to be designed by a licensed professional engineer at the time of building permit.*
4. *Minimum Pad Elevation = 1272.0 (MSL)*
5. *Storm sewer easements will be provided at the time of building permit only as needed to allow drainage to discharge across adjacent lots.*
6. *Any revised drainage plan must be approved by storm water engineer prior to building permits being issued.*
7. *Any storm water detention areas required may be revised when the final plans for the development are completed but the runoff amounts will be at or below the pre-development discharge rates. The filed final drainage report shall show discharge rates and stage/storage/discharge curves for any on-site detention areas.*
8. *The detention pond as shown is proposed. The final pond location, configuration, and design will need to be resolved at the time of building permit.*

CALCULATION NOTES:

1. *Determination of Q's was made using the SCS method.*
2. *Curve Numbers weighted based on hydrologic soil groups.*

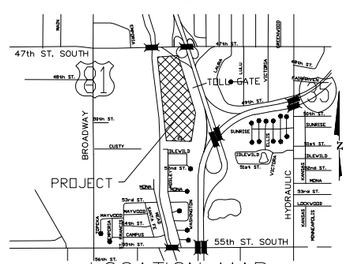
Existing Conditions (24-Hour Storm)								
Site	Area	CN	1-Year	2-Year	5-Year	10-Year	25-Year	100-Year
KTA to Channel	41.01	90.5	74.63	100.45	134.96	160.76	195.02	246.07
Site to Channel	38.97	65.6	10.15	20.88	38.60	53.40	74.55	108.38
Site to Pond	8.77	76.8	9.65	15.05	22.92	29.10	37.55	50.47

LEGEND:

- *1 1/2" Pipe Found*
- *Moering B&C Found*
- *Section Corner Found*
- *5/8" Bar w/Poe Cap Set*

BENCHMARK:

Bench Mark #77
Top of Right-of-Way Marker in Fence Line @ End of Ramp, East Bound 47th to Southbound I-35.
Elevation 1271.13 NGVD88



LOCATION MAP
Not to Scale

POE & ASSOCIATES, INC.
CONSULTING ENGINEERS
5940 E. Central, Suite 200 ■ Wichita, KS 67208-4242
Phone 316/685-4114 ■ FAX 316/685-4444

JASON P. DIONNE
LICENSED
18137
KANSAS
PROFESSIONAL ENGINEER
31 January 2011

858\Plat Southfork\DA-Proposed

SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 2-2

Hydraflow Table of Contents

P:\858\Southfork Drainage\Existing Condition.gpw

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Friday, Jan 27, 2012

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	------	74.63	100.45	-------	134.96	160.76	195.02	220.59	246.07	Exist KTA
2	SCS Runoff	------	10.15	20.88	-------	38.60	53.40	74.55	91.21	108.38	Exist to Channel
3	SCS Runoff	------	9.652	15.05	-------	22.92	29.10	37.55	43.98	50.47	Exist to Pond

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	74.63	2	728	274,651	------	------	------	Exist KTA
2	SCS Runoff	10.15	2	740	69,127	------	------	------	Exist to Channel
3	SCS Runoff	9.652	2	726	31,477	------	------	------	Exist to Pond

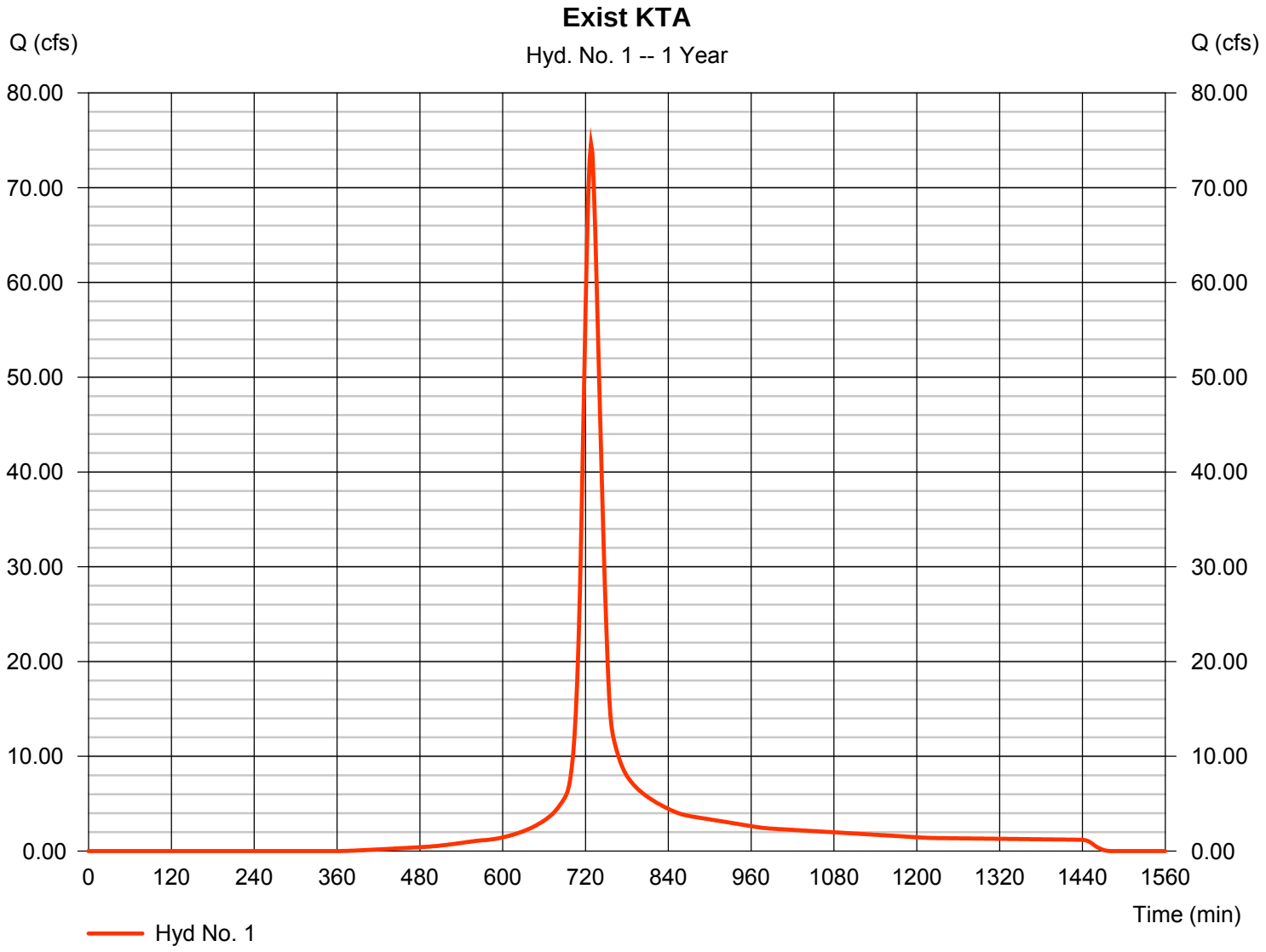
Hydrograph Report

Hyd. No. 1

Exist KTA

Hydrograph type	= SCS Runoff	Peak discharge	= 74.63 cfs
Storm frequency	= 1 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 274,651 cuft
Drainage area	= 41.010 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 24.10 min
Total precip.	= 2.88 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(18.260 x 91) + (1.830 x 81) + (1.380 x 88) + (19.540 x 91)] / 41.010



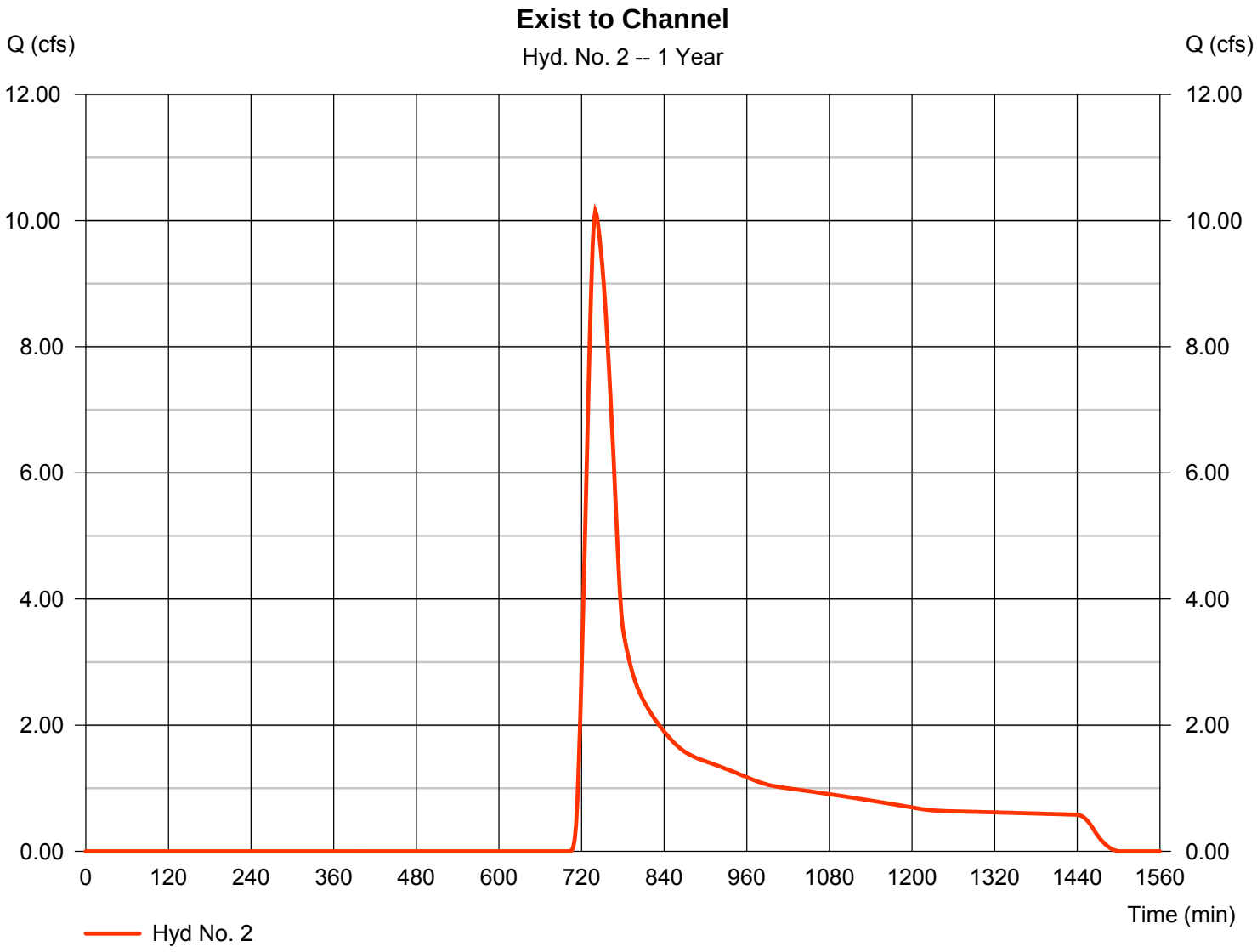
Hydrograph Report

Hyd. No. 2

Exist to Channel

Hydrograph type	= SCS Runoff	Peak discharge	= 10.15 cfs
Storm frequency	= 1 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 69,127 cuft
Drainage area	= 38.970 ac	Curve number	= 66*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 39.20 min
Total precip.	= 2.88 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(16.590 x 80) + (22.380 x 55)] / 38.970



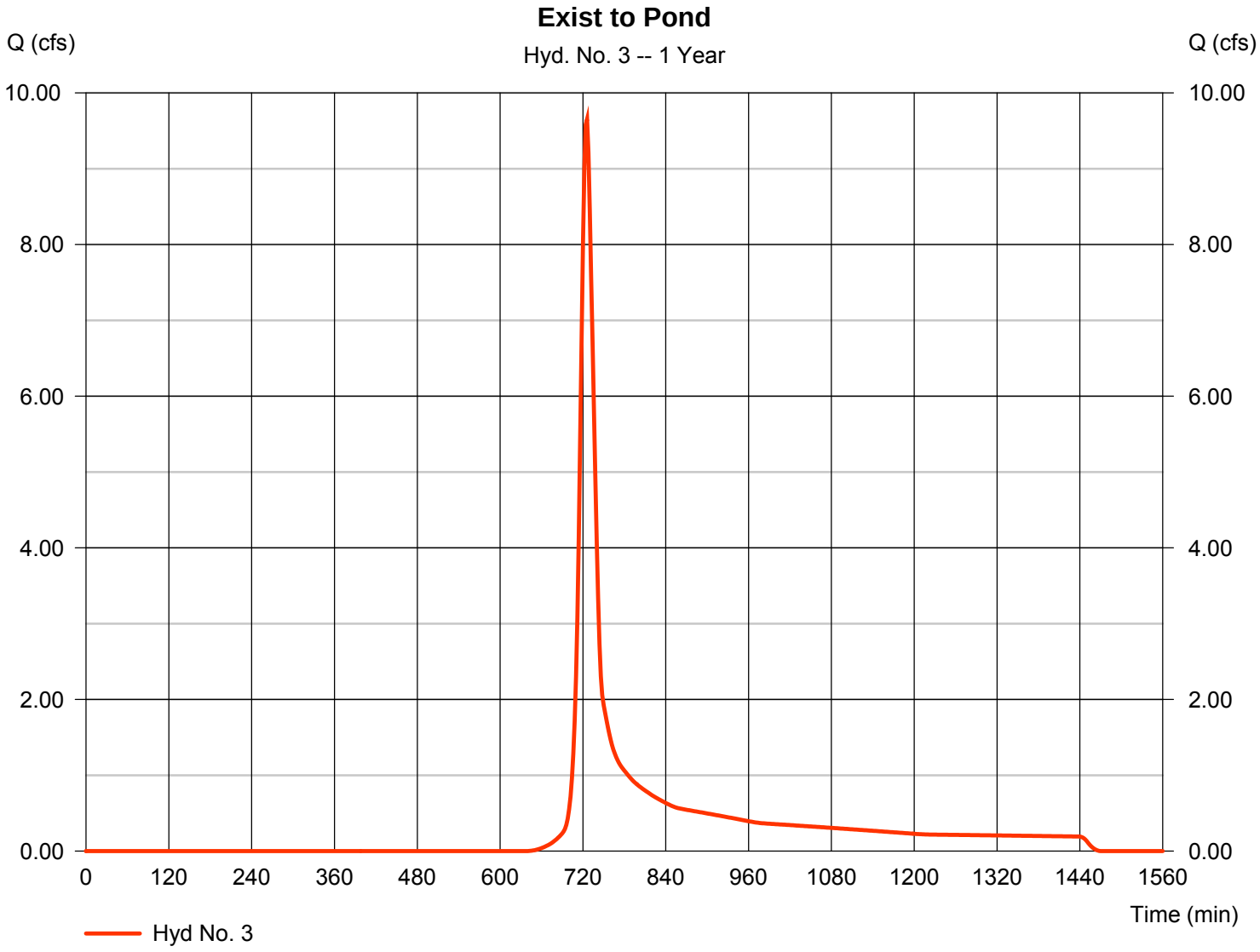
Hydrograph Report

Hyd. No. 3

Exist to Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 9.652 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 31,477 cuft
Drainage area	= 8.770 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 17.20 min
Total precip.	= 2.88 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(7.650 x 80) + (1.120 x 55)] / 8.770



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	100.45	2	728	372,461	------	------	------	Exist KTA
2	SCS Runoff	20.88	2	740	120,979	------	------	------	Exist to Channel
3	SCS Runoff	15.05	2	724	47,918	------	------	------	Exist to Pond

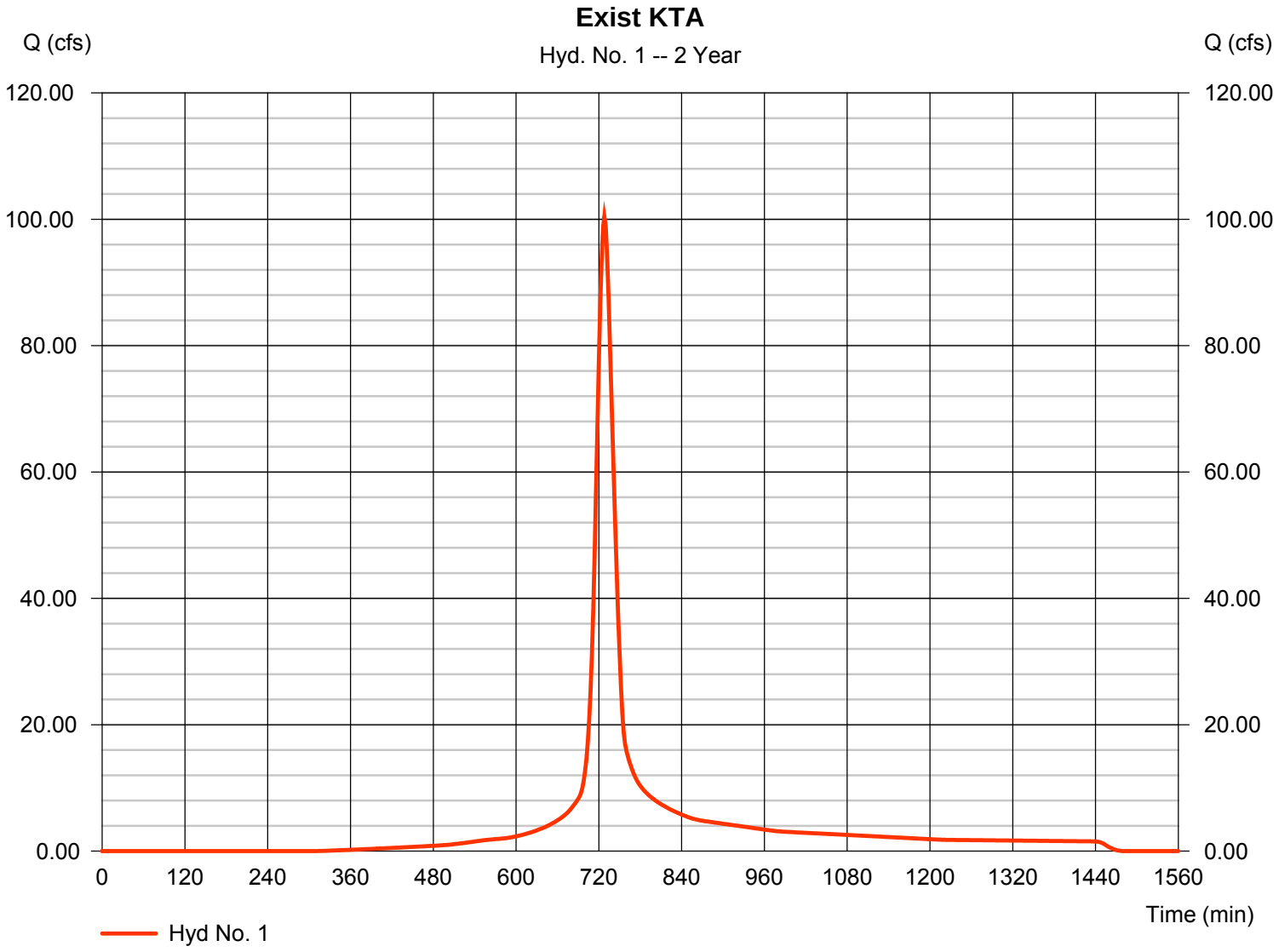
Hydrograph Report

Hyd. No. 1

Exist KTA

Hydrograph type	= SCS Runoff	Peak discharge	= 100.45 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 372,461 cuft
Drainage area	= 41.010 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 24.10 min
Total precip.	= 3.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(18.260 x 91) + (1.830 x 81) + (1.380 x 88) + (19.540 x 91)] / 41.010



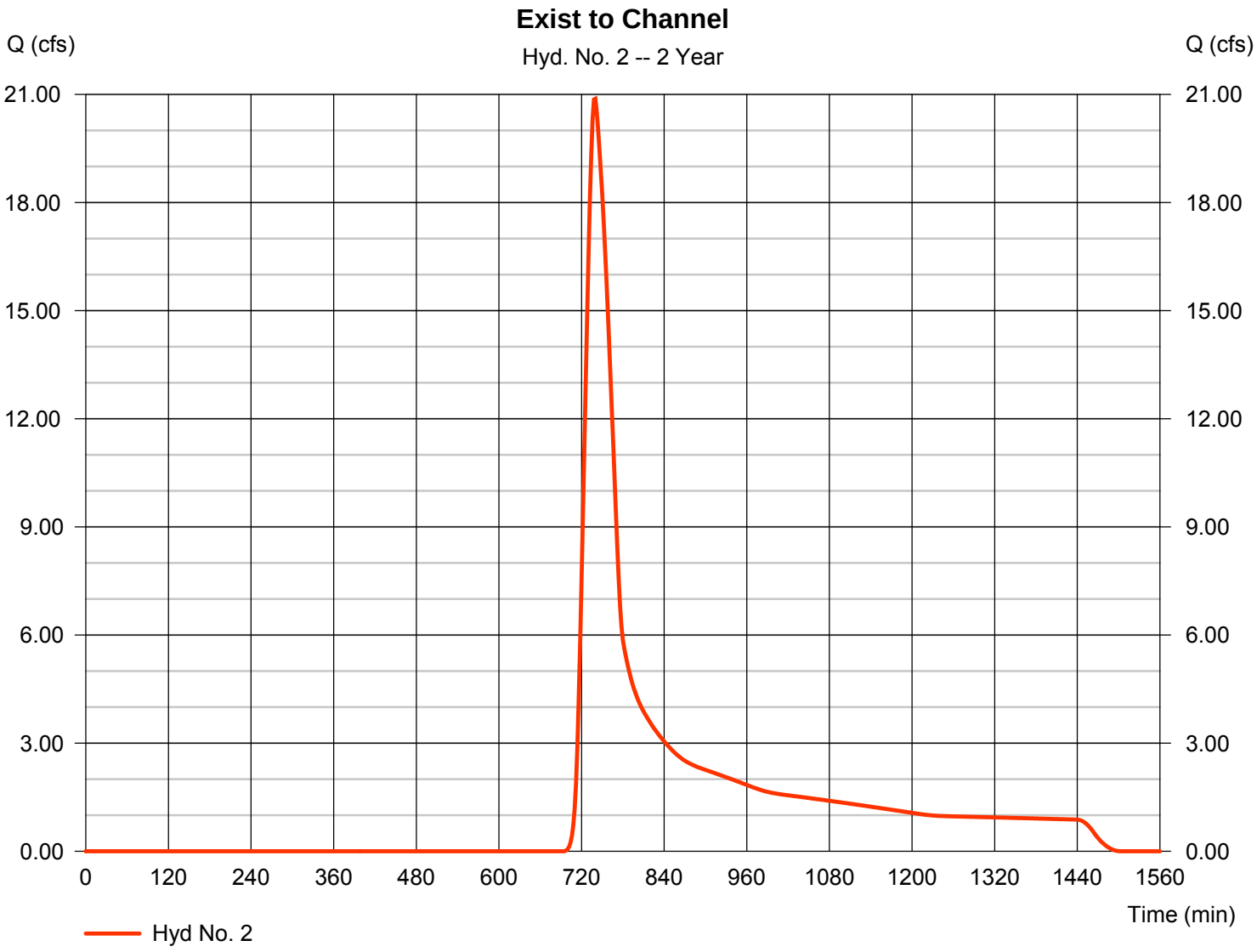
Hydrograph Report

Hyd. No. 2

Exist to Channel

Hydrograph type	= SCS Runoff	Peak discharge	= 20.88 cfs
Storm frequency	= 2 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 120,979 cuft
Drainage area	= 38.970 ac	Curve number	= 66*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 39.20 min
Total precip.	= 3.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(16.590 x 80) + (22.380 x 55)] / 38.970



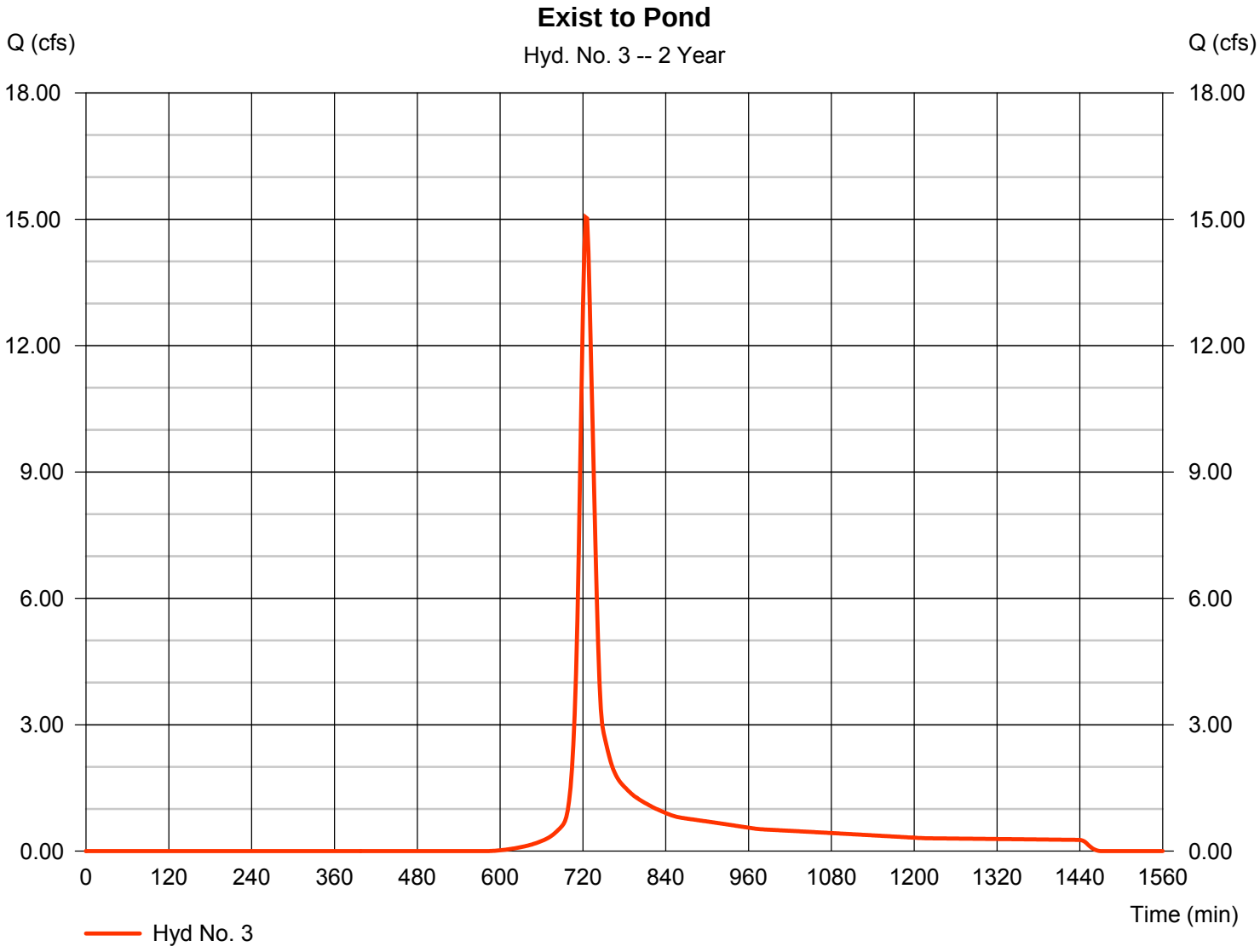
Hydrograph Report

Hyd. No. 3

Exist to Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 15.05 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 47,918 cuft
Drainage area	= 8.770 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 17.20 min
Total precip.	= 3.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(7.650 x 80) + (1.120 x 55)] / 8.770



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	134.96	2	728	506,039	------	------	------	Exist KTA
2	SCS Runoff	38.60	2	738	203,017	------	------	------	Exist to Channel
3	SCS Runoff	22.92	2	724	71,929	------	------	------	Exist to Pond

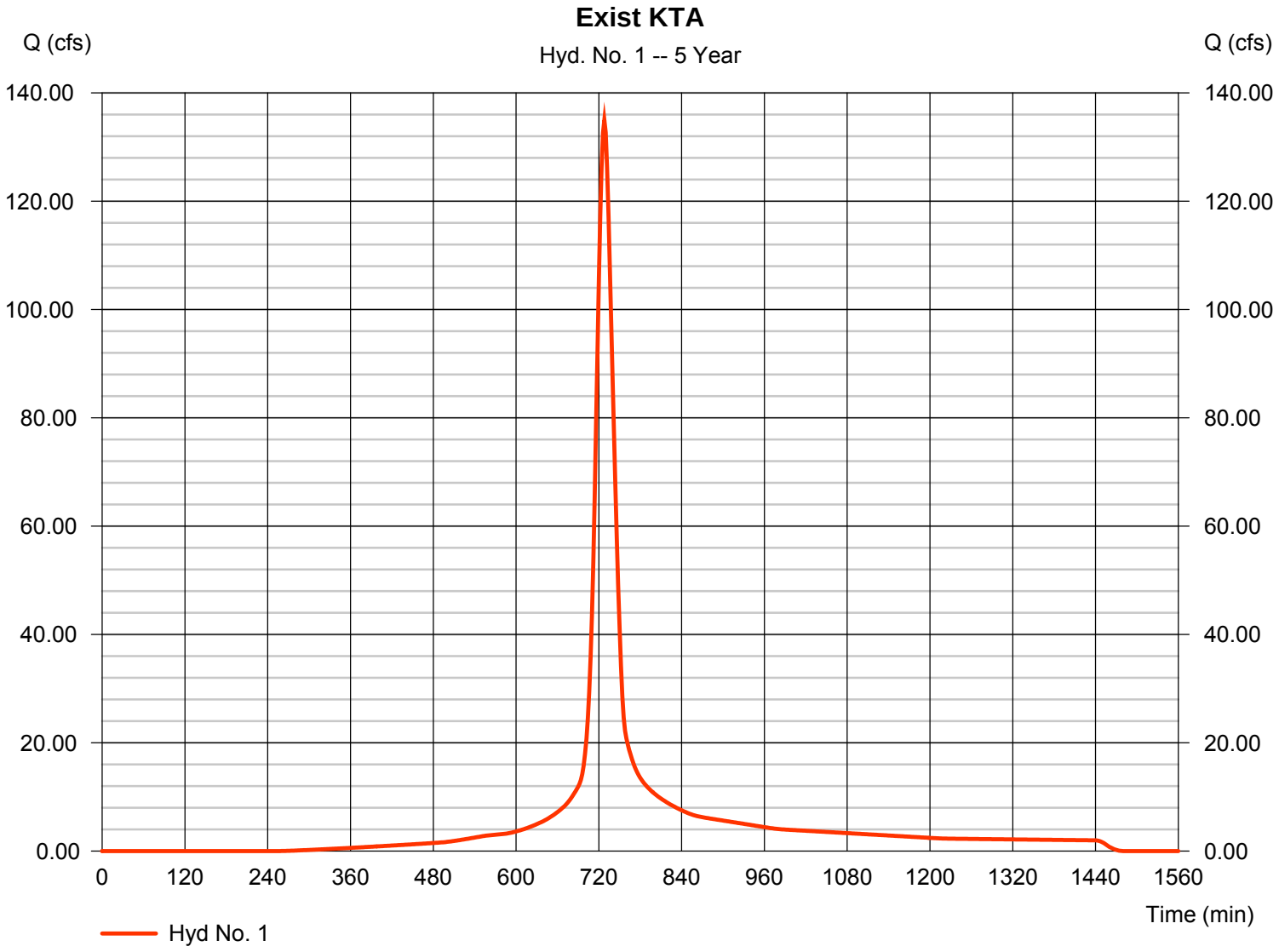
Hydrograph Report

Hyd. No. 1

Exist KTA

Hydrograph type	= SCS Runoff	Peak discharge	= 134.96 cfs
Storm frequency	= 5 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 506,039 cuft
Drainage area	= 41.010 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 24.10 min
Total precip.	= 4.56 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(18.260 x 91) + (1.830 x 81) + (1.380 x 88) + (19.540 x 91)] / 41.010



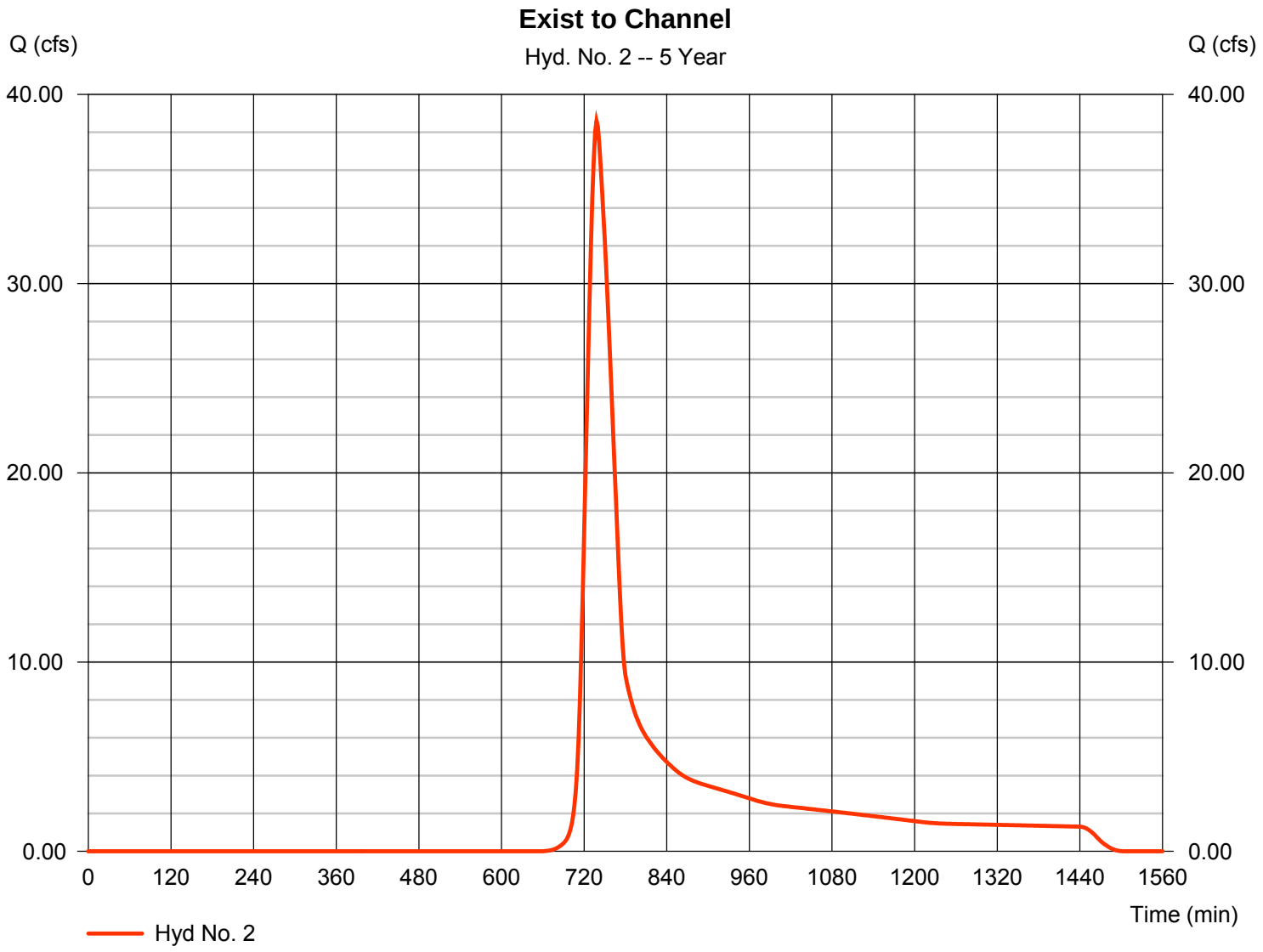
Hydrograph Report

Hyd. No. 2

Exist to Channel

Hydrograph type	= SCS Runoff	Peak discharge	= 38.60 cfs
Storm frequency	= 5 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 203,017 cuft
Drainage area	= 38.970 ac	Curve number	= 66*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 39.20 min
Total precip.	= 4.56 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(16.590 x 80) + (22.380 x 55)] / 38.970



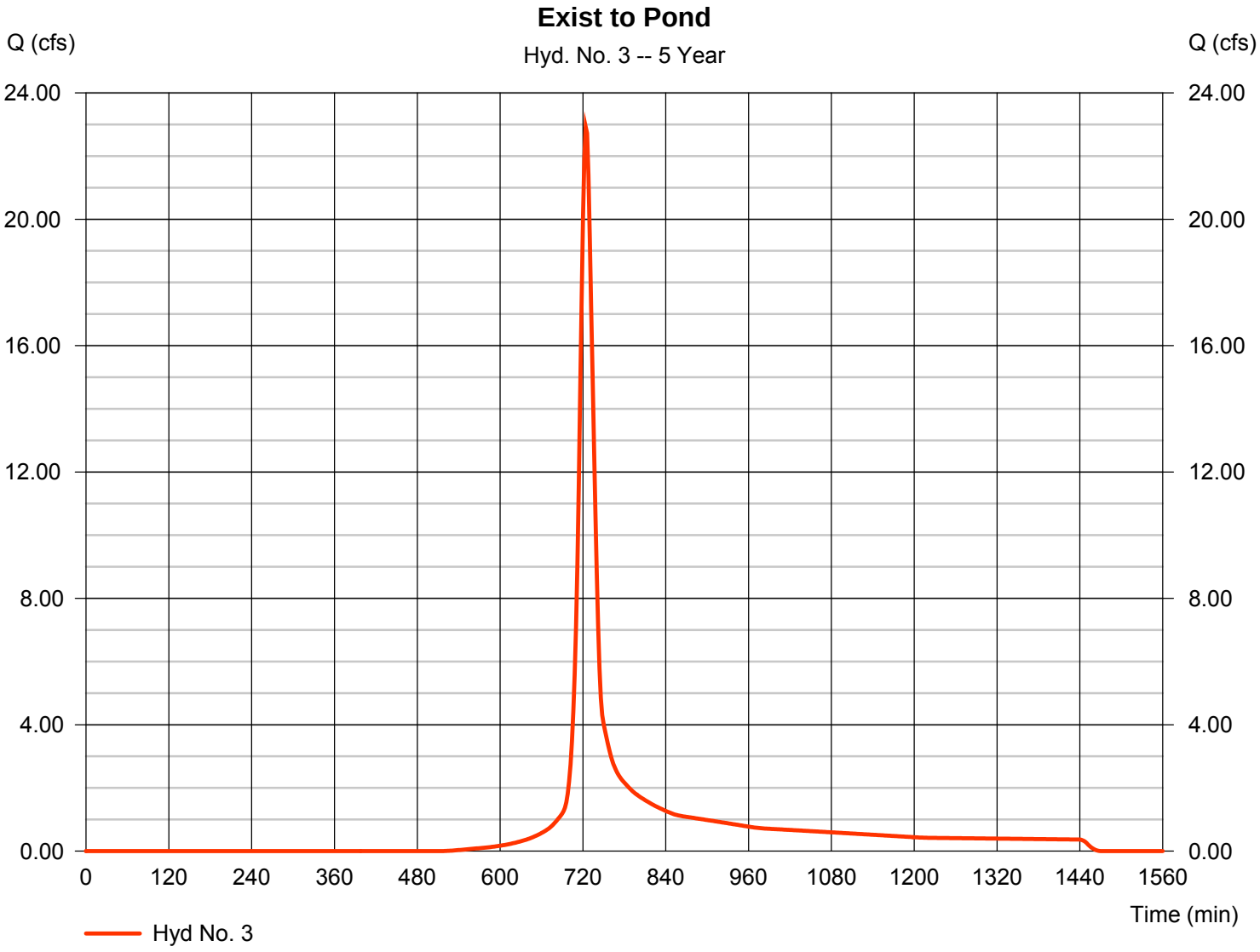
Hydrograph Report

Hyd. No. 3

Exist to Pond

Hydrograph type	=	SCS Runoff	Peak discharge	=	22.92 cfs
Storm frequency	=	5 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	71,929 cuft
Drainage area	=	8.770 ac	Curve number	=	77*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	17.20 min
Total precip.	=	4.56 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(7.650 x 80) + (1.120 x 55)] / 8.770



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	160.76	2	728	607,672	------	------	------	Exist KTA
2	SCS Runoff	53.40	2	738	271,749	------	------	------	Exist to Channel
3	SCS Runoff	29.10	2	724	91,014	------	------	------	Exist to Pond

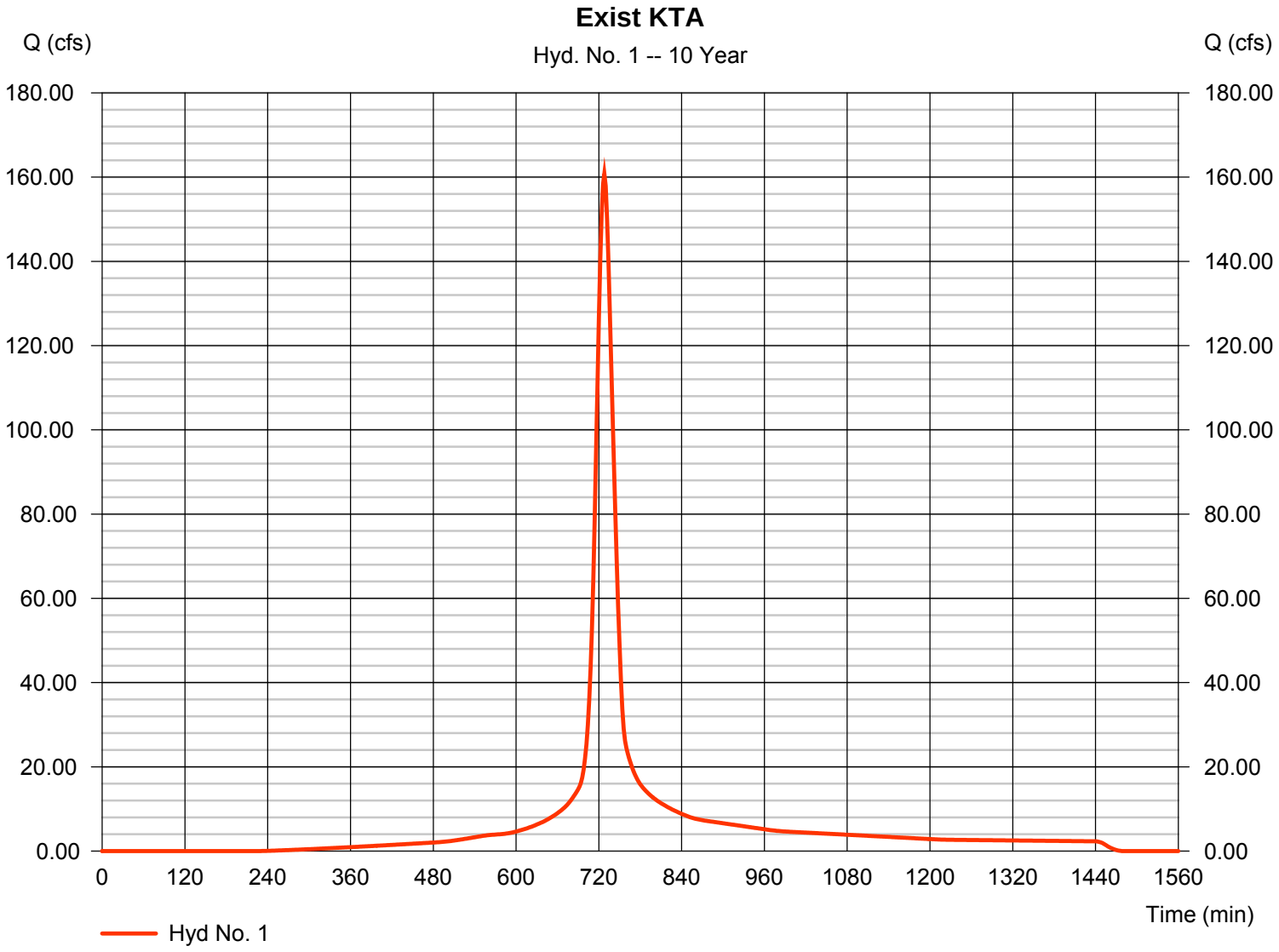
Hydrograph Report

Hyd. No. 1

Exist KTA

Hydrograph type	= SCS Runoff	Peak discharge	= 160.76 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 607,672 cuft
Drainage area	= 41.010 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 24.10 min
Total precip.	= 5.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(18.260 x 91) + (1.830 x 81) + (1.380 x 88) + (19.540 x 91)] / 41.010



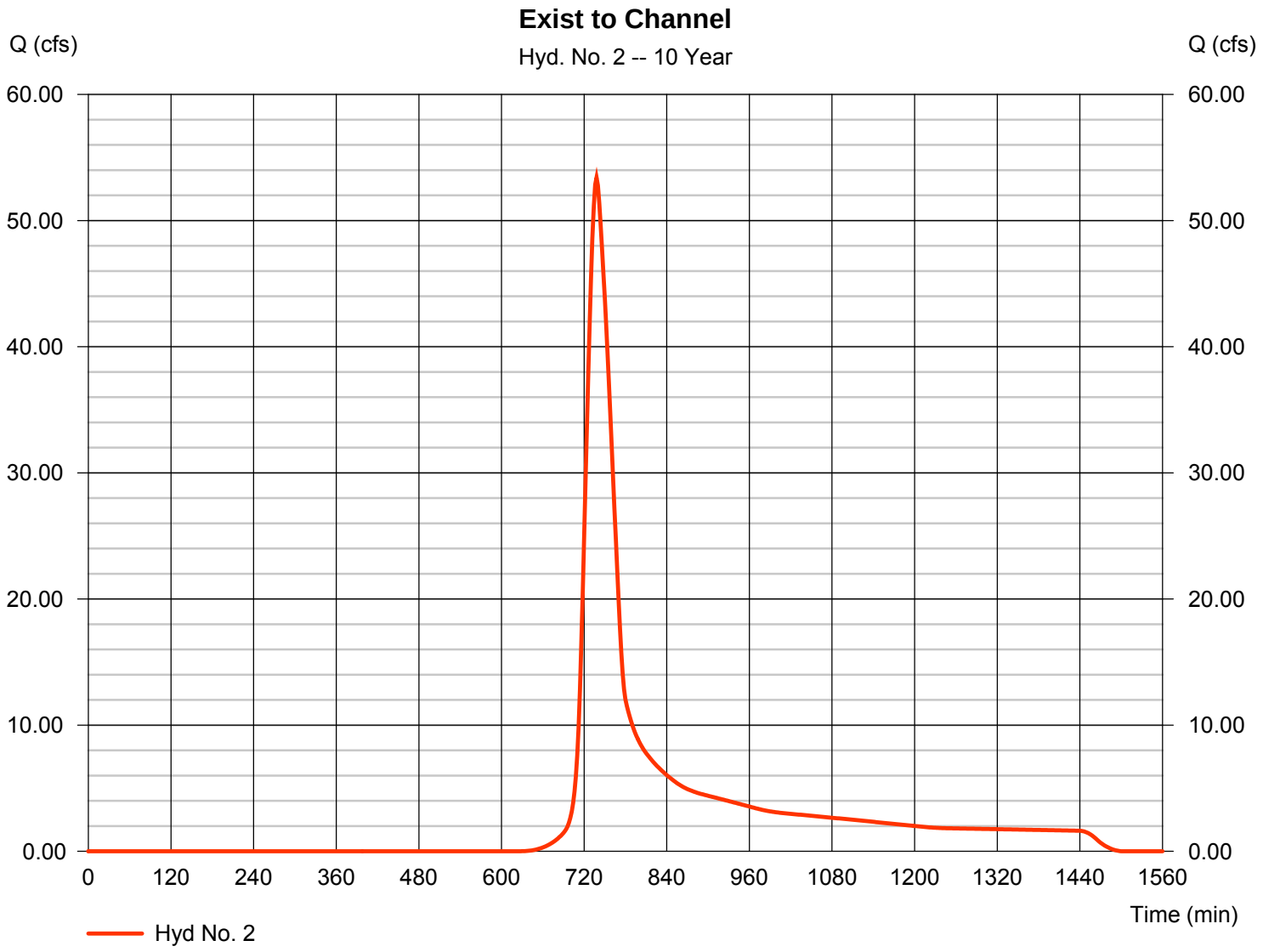
Hydrograph Report

Hyd. No. 2

Exist to Channel

Hydrograph type	=	SCS Runoff	Peak discharge	=	53.40 cfs
Storm frequency	=	10 yrs	Time to peak	=	738 min
Time interval	=	2 min	Hyd. volume	=	271,749 cuft
Drainage area	=	38.970 ac	Curve number	=	66*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	39.20 min
Total precip.	=	5.28 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(16.590 x 80) + (22.380 x 55)] / 38.970



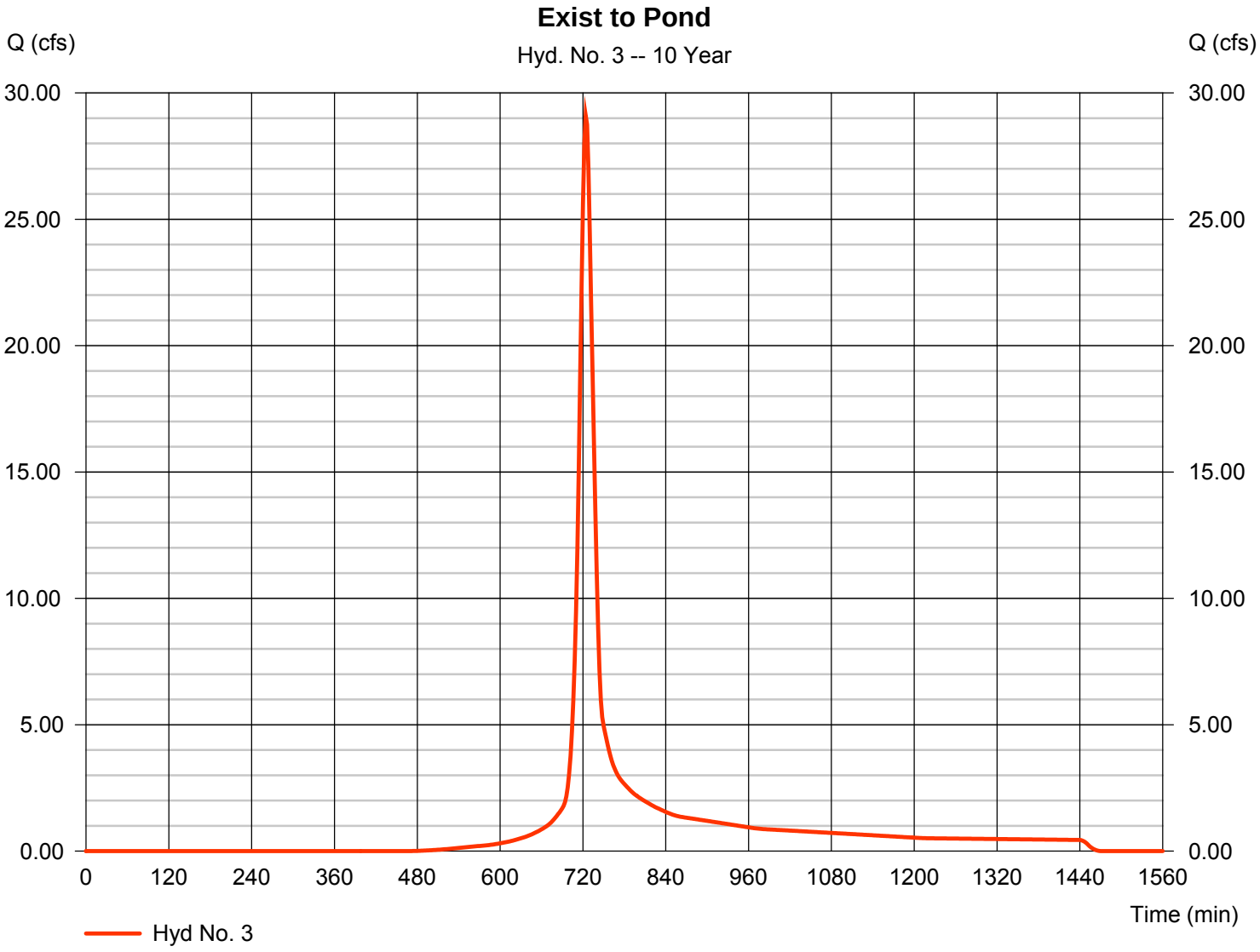
Hydrograph Report

Hyd. No. 3

Exist to Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 29.10 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 91,014 cuft
Drainage area	= 8.770 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 17.20 min
Total precip.	= 5.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(7.650 x 80) + (1.120 x 55)] / 8.770



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	195.02	2	728	744,402	------	------	------	Exist KTA
2	SCS Runoff	74.55	2	738	370,554	------	------	------	Exist to Channel
3	SCS Runoff	37.55	2	724	117,455	------	------	------	Exist to Pond

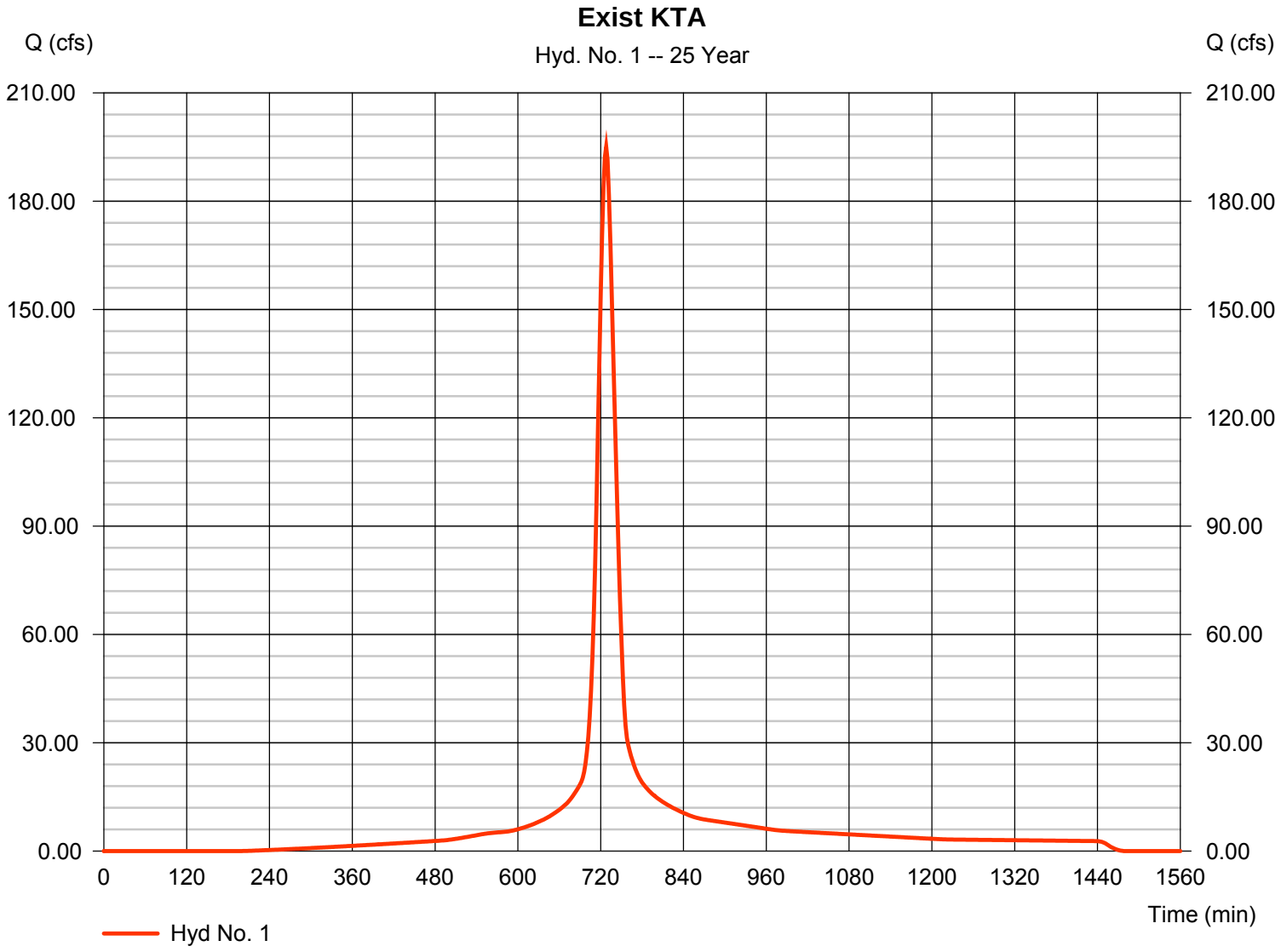
Hydrograph Report

Hyd. No. 1

Exist KTA

Hydrograph type	= SCS Runoff	Peak discharge	= 195.02 cfs
Storm frequency	= 25 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 744,402 cuft
Drainage area	= 41.010 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 24.10 min
Total precip.	= 6.24 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(18.260 x 91) + (1.830 x 81) + (1.380 x 88) + (19.540 x 91)] / 41.010



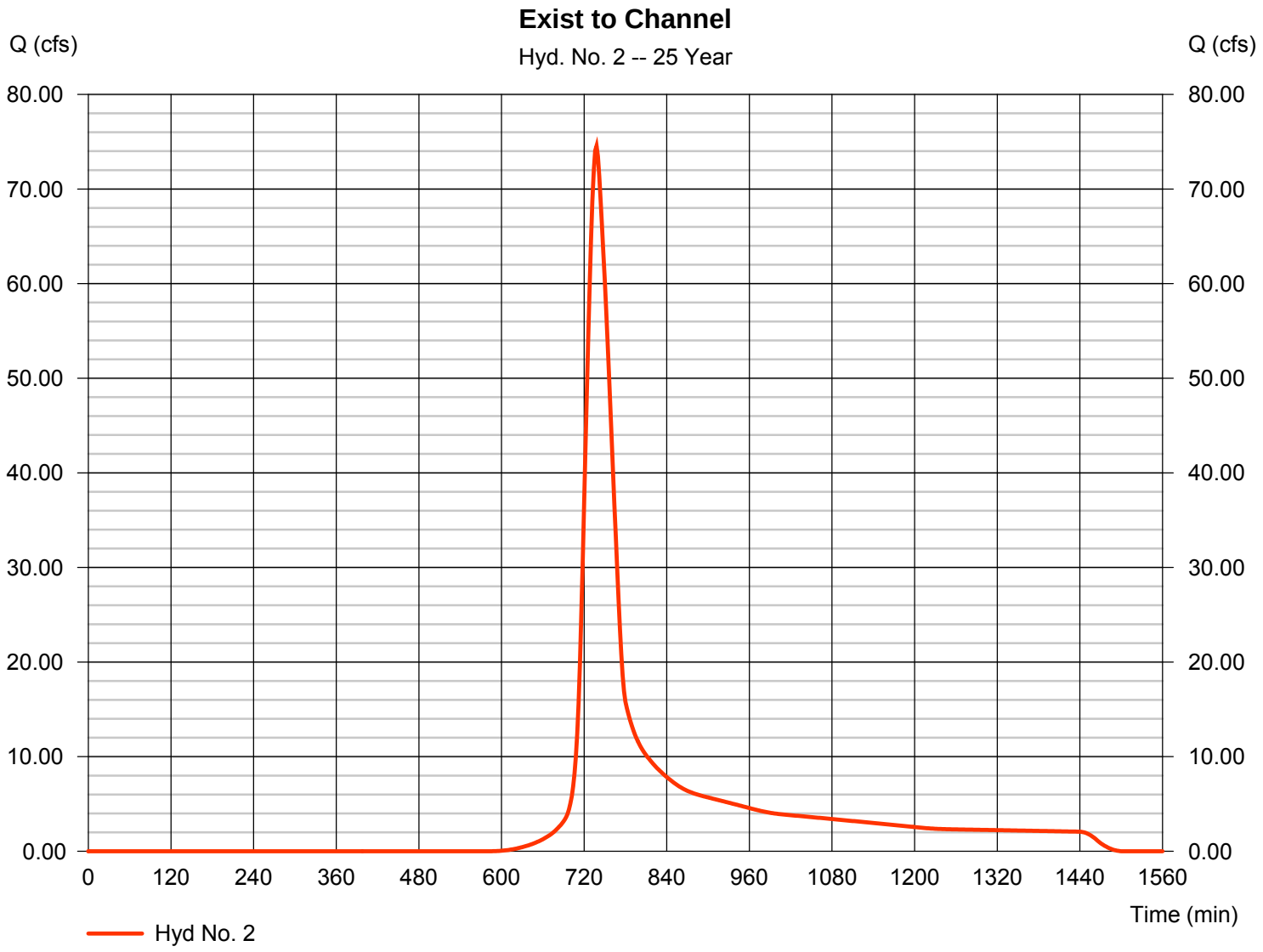
Hydrograph Report

Hyd. No. 2

Exist to Channel

Hydrograph type	= SCS Runoff	Peak discharge	= 74.55 cfs
Storm frequency	= 25 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 370,554 cuft
Drainage area	= 38.970 ac	Curve number	= 66*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 39.20 min
Total precip.	= 6.24 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(16.590 x 80) + (22.380 x 55)] / 38.970



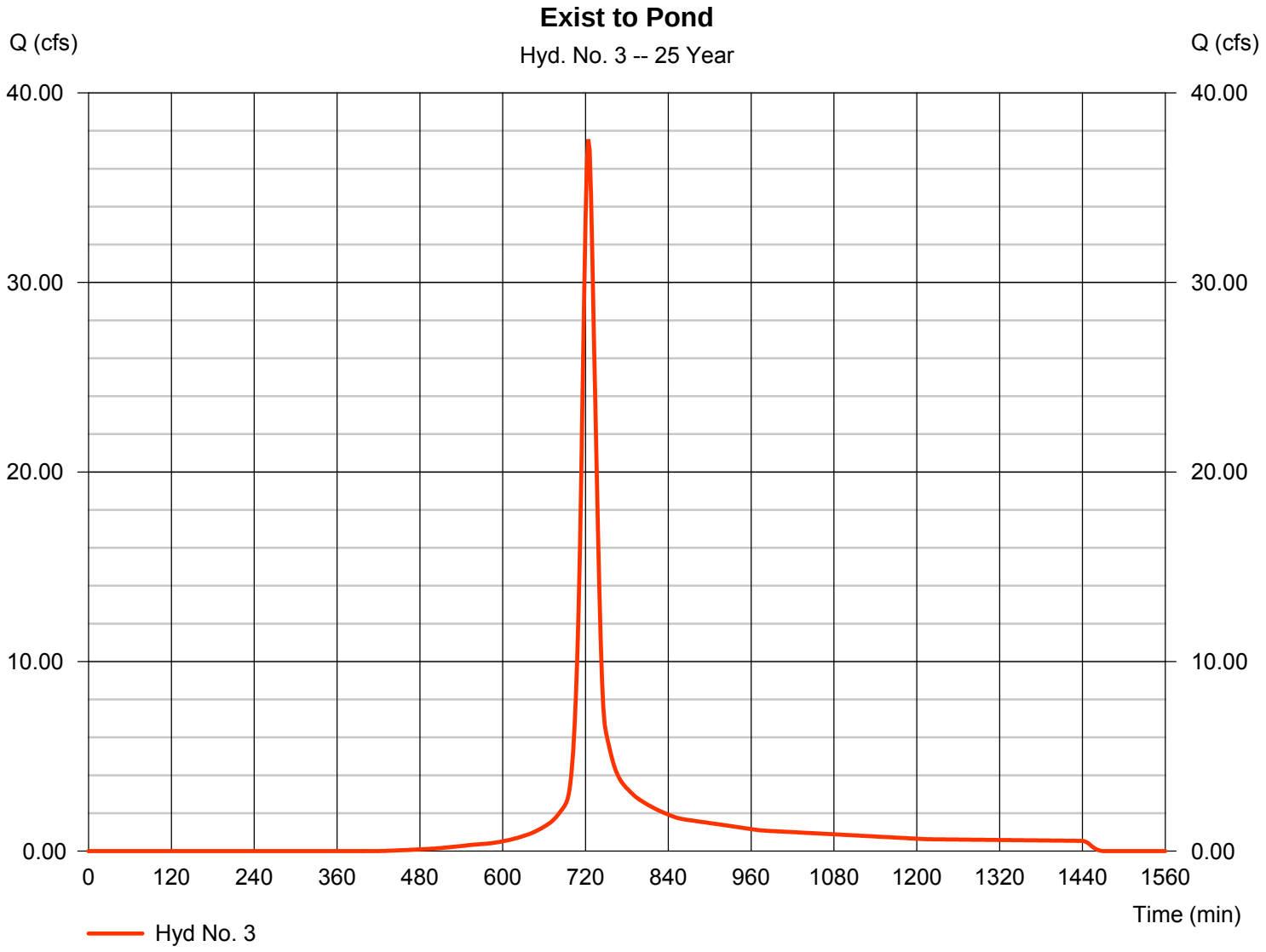
Hydrograph Report

Hyd. No. 3

Exist to Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 37.55 cfs
Storm frequency	= 25 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 117,455 cuft
Drainage area	= 8.770 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 17.20 min
Total precip.	= 6.24 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(7.650 x 80) + (1.120 x 55)] / 8.770



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	246.07	2	728	951,156	------	------	------	Exist KTA
2	SCS Runoff	108.38	2	738	530,047	------	------	------	Exist to Channel
3	SCS Runoff	50.47	2	724	158,591	------	------	------	Exist to Pond

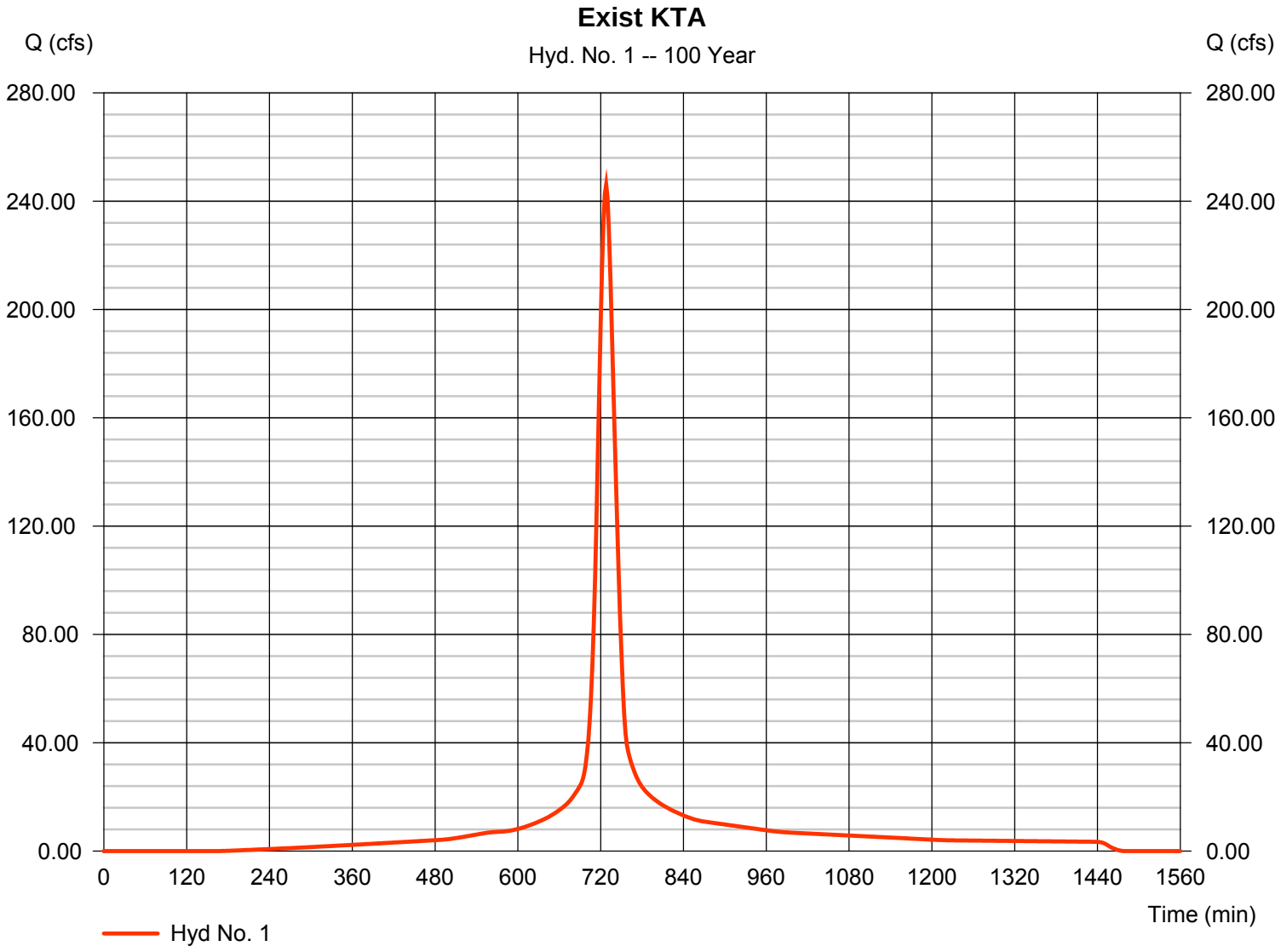
Hydrograph Report

Hyd. No. 1

Exist KTA

Hydrograph type	= SCS Runoff	Peak discharge	= 246.07 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 951,156 cuft
Drainage area	= 41.010 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 24.10 min
Total precip.	= 7.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(18.260 x 91) + (1.830 x 81) + (1.380 x 88) + (19.540 x 91)] / 41.010



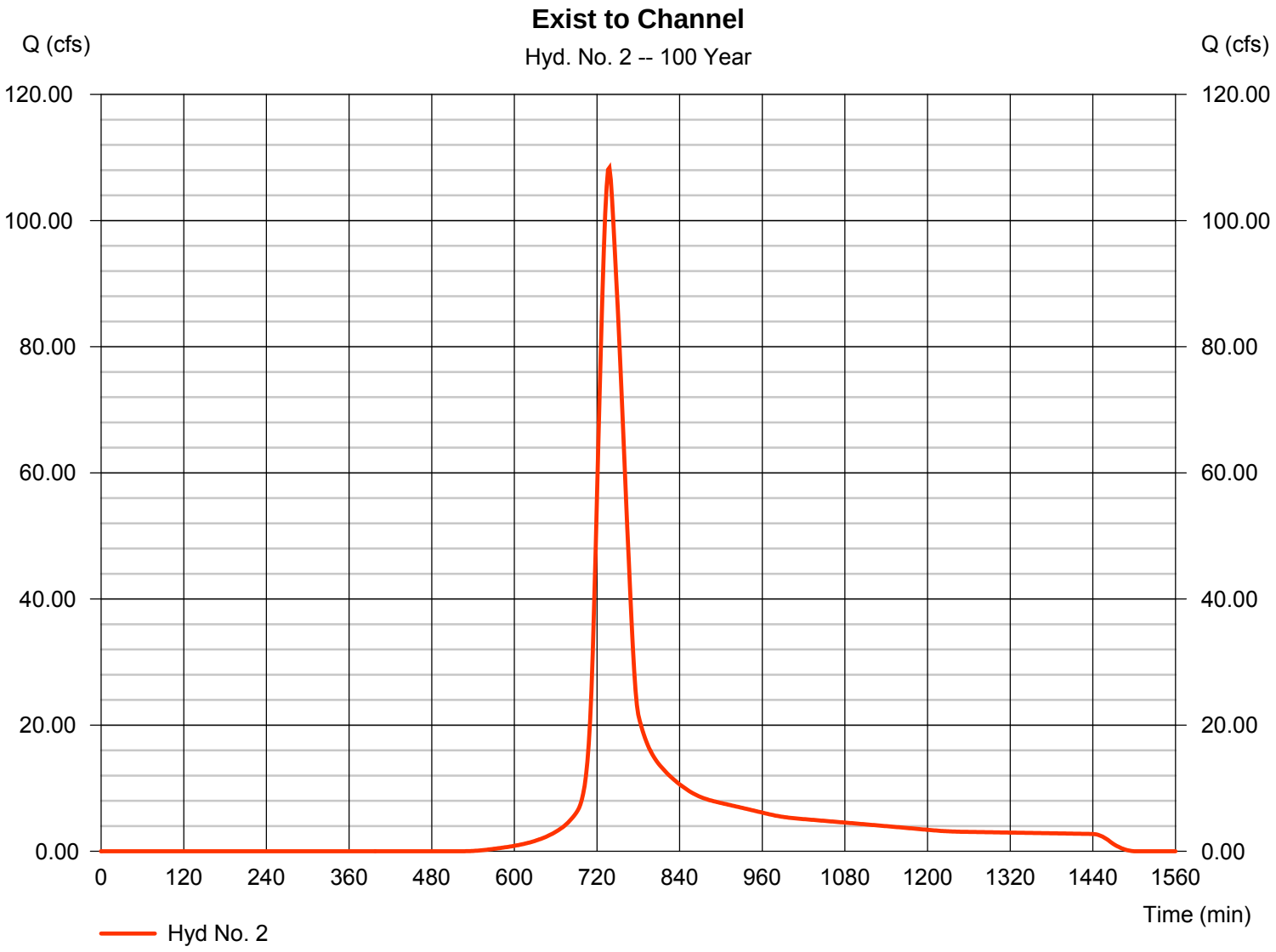
Hydrograph Report

Hyd. No. 2

Exist to Channel

Hydrograph type	= SCS Runoff	Peak discharge	= 108.38 cfs
Storm frequency	= 100 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 530,047 cuft
Drainage area	= 38.970 ac	Curve number	= 66*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 39.20 min
Total precip.	= 7.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(16.590 x 80) + (22.380 x 55)] / 38.970



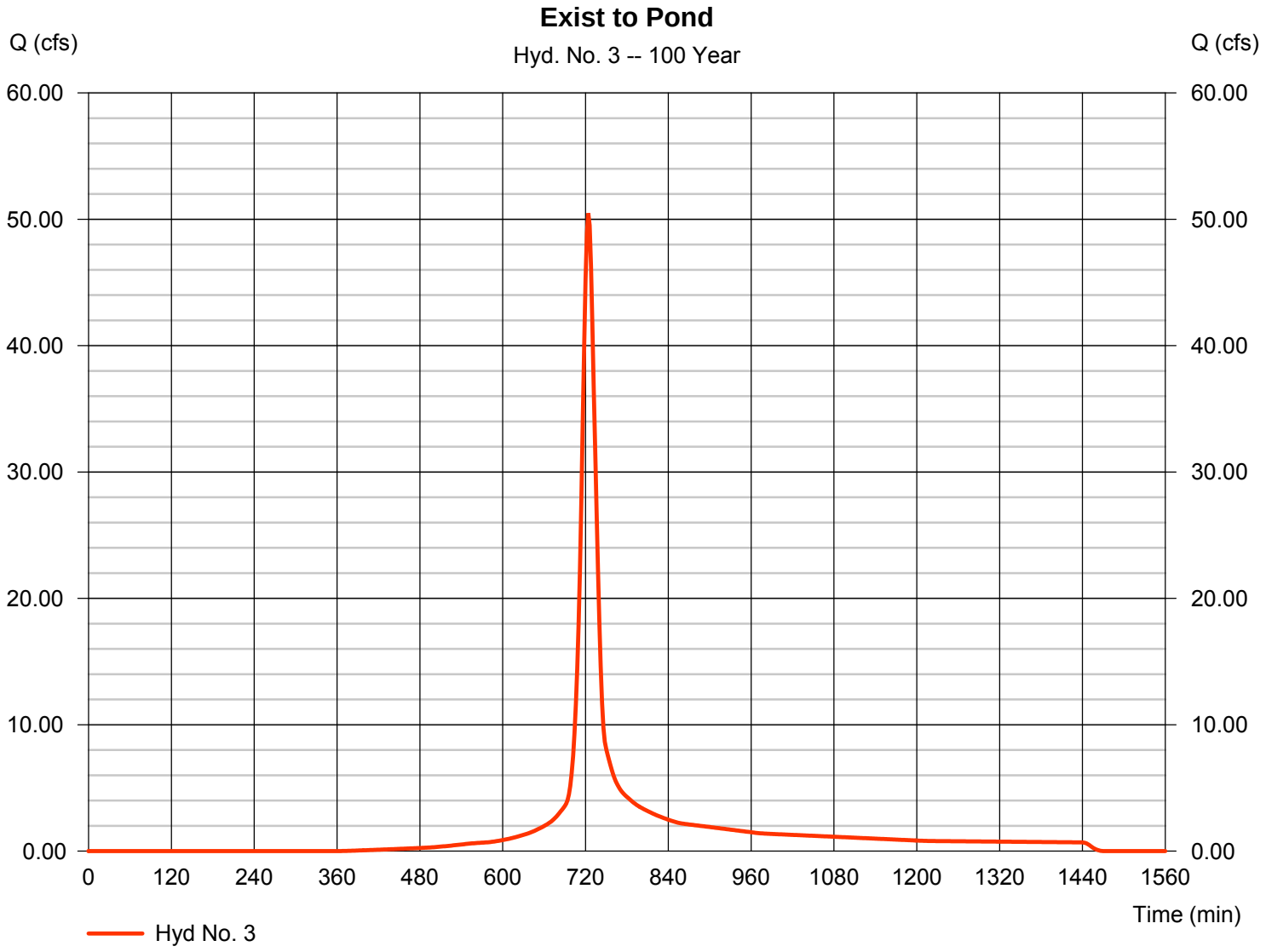
Hydrograph Report

Hyd. No. 3

Exist to Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 50.47 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 158,591 cuft
Drainage area	= 8.770 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 17.20 min
Total precip.	= 7.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(7.650 x 80) + (1.120 x 55)] / 8.770



SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 2-3

Project	SOUTHFORK COMMERCIAL ADDITION
Feature	EXISTING DRAINAGE
Analyst	Jason P. Dickman, P.E.
Version	20110418
Notes	… 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	KTA to Channel	8	6.8	0.0	9.1	8.2	0.0	0.0	24.1	3057	8	0.27	2.11	14.5	0.241	40.01
2	Site to Channel	2	11.2	27.9	0.0	0.0	0.0	0.0	39.2	1373	6	0.40	0.58	23.5	0.392	38.97
3	Site to Pond	2	16.0	0.0	1.2	0.0	0.0	0.0	17.2	1138	11	0.97	1.10	10.3	0.172	8.77
4	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
5	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
6	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
7	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
8	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
9	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
10	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
11	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
12	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
13	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
14	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	0.00	0.82	16.4	0.273	500
15	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
16	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
17	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
18	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
19	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
20	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
21	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
22	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
23	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
24	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
25	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
26	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500

Subbasin Name	KTA to Channel
Drainage Area (ac)	40.01
Drainage Area (sq mi)	0.062515625

Sheet Flow

							Total
selected>>	Select (0 or 1)	1	0	0	0	0	1 segments
	Length (ft)	105	1	1	1	1	105 feet length
	Top Elevation (ft)	1272	1	1	1	1	
	Bottom Elevation (ft)	1268	1	1	1	1	
	Cover	0.13, Range, natural	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "n"						
	Sheet Flow "n" (dim)	0.130	0.000	0.000	0.000	0.000	
	2-yr, 24-hr Rainfall (ins)	3.50	3.50	3.50	3.50	3.50	
	Drop (ft)	4	0	0	0	0	4 feet drop
	Slope (ft/ft)	0.0371	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	3.71	0.00	0.00	0.00	0.00	
	Velocity (fps)	0.26					
	Travel Time (hrs)	0.113					
	Travel Time (mins)	6.78					6.8 mins travel

Shallow Concentrated Flow

							Total
	Select (0 or 1)	0	0	0	0	0	0 segments
	Length (ft)	100	1	1	1	1	0 feet length
	Top Elevation (ft)	30	1	1	1	1	
	Bottom Elevation (ft)	30	1	1	1	1	
	Cover	7, Short grass pasture	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "K"						
	Surface Coeff (dim)	7.00	0.00	0.00	0.00	0.00	
	Drop (ft)	0	0	0	0	0	0 feet drop
	Slope (ft/ft)	0.0000	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	0.00	0.00	0.00	0.00	0.00	
	Velocity (fps)						
	Travel Time (mins)						0.0 mins travel

selected>>

Open Channel Ditch Flow

							Total
	Select (0 or 1)	1	1	0	0	0	2 segments
	Length (ft)	582	1052	1	1	1	### feet length
	Top Elevation (ft)	1265.7	1264.23	1	1	1	
	Bottom Elevation (ft)	1265.23	1263.32	1	1	1	
	Channel Lining	0.03, Grassed	0.03, Grassed	Choose Lining Type	Choose Lining Type	Choose Lining Type	
	Bottom Width (ft)	6.00	8.00	1.00	1.00	1.00	
	Left Side Slope (H:V)	4.00	4.00	1.00	1.00	1.00	
	Right Side Slope (H:V)	4.00	4.00	1.00	1.00	1.00	
	Depth (ft)	6.00	5.00	1.00	1.00	1.00	
	Specify alternate "n"						
	Manning "n" (dim)	0.030	0.030	0.000	0.000	0.000	
	Drop (ft)	0	1	0	0	0	1.4 feet drop
	Slope (ft/ft)	0.0008	0.0009	0.0000	0.0000	0.0000	
	Slope (%)	0.08	0.09	0.00	0.00	0.00	
	Flow Area (sq ft)	180.00	140.00	2.00	2.00	2.00	
	Wet Perimeter (ft)	55.48	49.23	3.83	3.83	3.83	
	Hydraulic Radius (ft)	3.24	2.84	0.52	0.52	0.52	
	Velocity (fps)	3.09	2.93				
	Normal Flow (cfs)	556.8	410.5				
selected>>	Travel Time (mins)	3.14	5.98				9.1 mins travel

Open Channel Pipe Flow

							Total
	Select (0 or 1)	1	1	1	1	1	5 segments
	Length (ft)	131	400	404	215	168	### feet length
	Top Elevation (ft)	1267.9	1267.02	66.48	65.96	1265.23	
	Bottom Elevation (ft)	1267.02	1266.48	66.2	65.7	1264.23	
	Pipe Material	0.014, Concrete w/some debris	0.014, Concrete w/some debris	0.014, Concrete w/some debris	0.014, Concrete w/some debris	0.024, Corrugated Metal	
	Diameter (ins)	18.00	24.00	30.00	36.00	48.00	
	Flow Depth (ins)	18.00	24.00	30.00	36.00	48.00	
	Specify alternate "n"						
	Manning "n" (dim)	0.014	0.014	0.014	0.014	0.024	
	Drop (ft)	1	1	0	0	1	3 feet drop
	Slope (ft/ft)	0.0067	0.0013	0.0007	0.0012	0.0060	
	Slope (%)	0.67	0.13	0.07	0.12	0.60	
	Theta (radians)	6.283	6.283	6.283	6.283	6.283	
	Flow Area (sq ft)	1.77	3.14	4.91	7.07	12.57	
	Wet Perimeter (ft)	4.71	6.28	7.85	9.42	12.57	
	Hydraulic Radius (ft)	0.38	0.50	0.63	0.75	1.00	
	Velocity (fps)	4.54	2.46	2.05	3.06	4.79	
	Normal Flow (cfs)	8.0	7.7	10.1	21.6	60.2	
	Travel Time (mins)	0.48	2.71	3.29	1.17	0.58	8.2 mins travel

Open Channel General Flow

							Total
	Select (0 or 1)	0	0	0	0	0	0 segments
	Length (ft)	150	1	1	1	1	0 feet length
	Top Elevation (ft)	30	1	1	1	1	
	Bottom Elevation (ft)	26	1	1	1	1	
	Hydraulic Radius (ft)	2.30	1.00	1.00	1.00	1.00	
	Channel Lining	0.025, Clean Earth	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "n"						
	Manning "n" (dim)	0.025	0.000	0.000	0.000	0.000	
	Drop (ft)	4	0	0	0	0	0 feet drop
	Slope (ft/ft)	0.0267	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	2.67	0.00	0.00	0.00	0.00	
	Velocity (fps)						
	Travel Time (mins)						0.0 mins travel

Other (Computed Separately)

							Total
	Select (0 or 1)	0	0	0	0	0	0 segments
	Length (ft)	500	1	1	1	1	0 feet length
	Drop (ft)	10	1	1	1	1	0 feet drop
	Velocity (fps)	2.00	1.00	1.00	1.00	1.00	
	Slope (ft/ft)	0.0200	1.0000	1.0000	1.0000	1.0000	
	Slope (%)	2.00	100.00	100.00	100.00	100.00	
	Travel Time (mins)						0.0 mins travel

Total for Subbasin

Segments	8
Length (ft)	3057
Drop (ft)	8
Slope (ft/ft)	0.0027

Subbasin Name	Site to Channel
Drainage Area (ac)	38.97
Drainage Area (sq mi)	0.060890625

Sheet Flow

selected>>							Total
	Select (0 or 1)	1	0	0	0	0	1 segments
	Length (ft)	300	1	1	1	1	300 feet length
	Top Elevation (ft)	1271	1	1	1	1	
	Bottom Elevation (ft)	1268	1	1	1	1	
	Cover	0.05, Fallow soil, no residue	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "n"						
	Sheet Flow "n" (dim)	0.050	0.000	0.000	0.000	0.000	
	2-yr, 24-hr Rainfall (ins)	3.50	3.50	3.50	3.50	3.50	
	Drop (ft)	4	0	0	0	0	4 feet drop
	Slope (ft/ft)	0.0127	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	1.27	0.00	0.00	0.00	0.00	
	Velocity (fps)	0.44					
	Travel Time (hrs)	0.187					
	Travel Time (mins)	11.25					11.2 mins travel

Shallow Concentrated Flow

selected>>							Total
	Select (0 or 1)	1	0	0	0	0	1 segments
	Length (ft)	1073	1	1	1	1	### feet length
	Top Elevation (ft)	1267.6	1	1	1	1	
	Bottom Elevation (ft)	1266	1	1	1	1	
	Cover	16.1, Unpaved	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "K"						
	Surface Coeff (dim)	16.10	0.00	0.00	0.00	0.00	
	Drop (ft)	2	0	0	0	0	1.7 feet drop
	Slope (ft/ft)	0.0016	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	0.16	0.00	0.00	0.00	0.00	
	Velocity (fps)	0.64					
	Travel Time (mins)	27.91					27.9 mins travel

Open Channel Ditch Flow

						Total
Select (0 or 1)	0	0	0	0	0	0 segments
Length (ft)	650	1145	1	1	1	0 feet length
Top Elevation (ft)	65.7	64.23	1	1	1	
Bottom Elevation (ft)	65.23	62.8	1	1	1	
Channel Lining	0.03, Grassed	0.05, Rough Natural Stream	Choose Lining Type	Choose Lining Type	Choose Lining Type	
Bottom Width (ft)	6.00	8.00	1.00	1.00	1.00	
Left Side Slope (H:V)	4.00	3.00	1.00	1.00	1.00	
Right Side Slope (H:V)	3.00	3.00	1.00	1.00	1.00	
Depth (ft)	6.00	8.00	1.00	1.00	1.00	
Specify alternate "n"						
Manning "n" (dim)	0.030	0.050	0.000	0.000	0.000	
Drop (ft)	0	1	0	0	0	0 feet drop
Slope (ft/ft)	0.0007	0.0012	0.0000	0.0000	0.0000	
Slope (%)	0.07	0.12	0.00	0.00	0.00	
Flow Area (sq ft)	162.00	256.00	2.00	2.00	2.00	
Wet Perimeter (ft)	49.71	58.60	3.83	3.83	3.83	
Hydraulic Radius (ft)	3.26	4.37	0.52	0.52	0.52	
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

Open Channel Pipe Flow

						Total
Select (0 or 1)	0	0	0	0	0	0 segments
Length (ft)	131	400	352	215	182	0 feet length
Top Elevation (ft)	67.9	67.02	66.48	65.96	65.23	
Bottom Elevation (ft)	67.02	66.48	66.2	65.7	64.23	
Pipe Material	0.017, Rough concrete	0.017, Rough concrete	0.017, Rough concrete	0.017, Rough concrete	0.024, Corrugated Metal	
Diameter (ins)	18.00	24.00	30.00	36.00	48.00	
Flow Depth (ins)	18.00	24.00	30.00	36.00	48.00	
Specify alternate "n"						
Manning "n" (dim)	0.017	0.017	0.017	0.017	0.024	
Drop (ft)	1	1	0	0	1	0 feet drop
Slope (ft/ft)	0.0067	0.0013	0.0008	0.0012	0.0055	
Slope (%)	0.67	0.13	0.08	0.12	0.55	
Theta (radians)	6.283	6.283	6.283	6.283	6.283	
Flow Area (sq ft)	1.77	3.14	4.91	7.07	12.57	
Wet Perimeter (ft)	4.71	6.28	7.85	9.42	12.57	
Hydraulic Radius (ft)	0.38	0.50	0.63	0.75	1.00	
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

Open Channel General Flow

						Total
Select (0 or 1)	0	0	0	0	0	0 segments
Length (ft)	150	1	1	1	1	0 feet length
Top Elevation (ft)	30	1	1	1	1	
Bottom Elevation (ft)	26	1	1	1	1	
Hydraulic Radius (ft)	2.30	1.00	1.00	1.00	1.00	
Channel Lining	0.025, Clean Earth	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
Specify alternate "n"						
Manning "n" (dim)	0.025	0.000	0.000	0.000	0.000	
Drop (ft)	4	0	0	0	0	0 feet drop
Slope (ft/ft)	0.0267	0.0000	0.0000	0.0000	0.0000	
Slope (%)	2.67	0.00	0.00	0.00	0.00	
Velocity (fps)						
Travel Time (mins)						0.0 mins travel

Other (Computed Separately)

						Total
Select (0 or 1)	0	0	0	0	0	0 segments
Length (ft)	500	1	1	1	1	0 feet length
Drop (ft)	10	1	1	1	1	0 feet drop
Velocity (fps)	2.00	1.00	1.00	1.00	1.00	
Slope (ft/ft)	0.0200	1.0000	1.0000	1.0000	1.0000	
Slope (%)	2.00	100.00	100.00	100.00	100.00	
Travel Time (mins)						0.0 mins travel

Total for Subbasin

Segments	2
Length (ft)	1373
Drop (ft)	6
Slope (ft/ft)	0.0040

Subbasin Name	Site to Pond
Drainage Area (ac)	8.77
Drainage Area (sq mi)	0.013703125

Sheet Flow

selected>>							Total
	Select (0 or 1)	1	0	0	0	0	1 segments
	Length (ft)	258	1	1	1	1	258 feet length
	Top Elevation (ft)	1271	1	1	1	1	
	Bottom Elevation (ft)	1270	1	1	1	1	
	Cover	0.05, Fallow soil, no residue	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "n"						
	Sheet Flow "n" (dim)	0.050	0.000	0.000	0.000	0.000	
	2-yr, 24-hr Rainfall (ins)	3.50	3.50	3.50	3.50	3.50	
	Drop (ft)	1	0	0	0	0	1 feet drop
	Slope (ft/ft)	0.0039	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	0.39	0.00	0.00	0.00	0.00	
	Velocity (fps)	0.27					
	Travel Time (hrs)	0.267					
	Travel Time (mins)	16.01					16.0 mins travel

Shallow Concentrated Flow

							Total
	Select (0 or 1)	0	0	0	0	0	0 segments
	Length (ft)	200	1	1	1	1	0 feet length
	Top Elevation (ft)	30	1	1	1	1	
	Bottom Elevation (ft)	22	1	1	1	1	
	Cover	7, Short grass pasture	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "K"						
	Surface Coeff (dim)	7.00	0.00	0.00	0.00	0.00	
	Drop (ft)	8	0	0	0	0	0 feet drop
	Slope (ft/ft)	0.0400	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	4.00	0.00	0.00	0.00	0.00	
	Velocity (fps)						
	Travel Time (mins)						0.0 mins travel

selected>>

Open Channel Ditch Flow

							Total
	Select (0 or 1)	1	0	0	0	0	1 segments
	Length (ft)	880	1	1	1	1	880 feet length
	Top Elevation (ft)	1270	1	1	1	1	
	Bottom Elevation (ft)	1260	1	1	1	1	
	Channel Lining	0.03, Grassed	Choose Lining Type	Choose Lining Type	Choose Lining Type	Choose Lining Type	
	Bottom Width (ft)	25.00	0.00	1.00	1.00	1.00	
	Left Side Slope (H:V)	4.00	1.00	1.00	1.00	1.00	
	Right Side Slope (H:V)	4.00	1.00	1.00	1.00	1.00	
	Depth (ft)	5.00	1.00	1.00	1.00	1.00	
	Specify alternate "n"						
	Manning "n" (dim)	0.030	0.000	0.000	0.000	0.000	
	Drop (ft)	10	0	0	0	0	10 feet drop
	Slope (ft/ft)	0.0114	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	1.14	0.00	0.00	0.00	0.00	
	Flow Area (sq ft)	225.00	1.00	2.00	2.00	2.00	
	Wet Perimeter (ft)	66.23	2.83	3.83	3.83	3.83	
	Hydraulic Radius (ft)	3.40	0.35	0.52	0.52	0.52	
	Velocity (fps)	11.96					
	Normal Flow (cfs)	2692.1					
	Travel Time (mins)	1.23					1.2 mins travel

Open Channel Pipe Flow

							Total
	Select (0 or 1)	0	0	0	0	0	0 segments
	Length (ft)	100	1	1	1	1	0 feet length
	Top Elevation (ft)	20	1	1	1	1	
	Bottom Elevation (ft)	18	1	1	1	1	
	Pipe Material	0.017, Rough concrete	Choose Material Type	Choose Material Type	Choose Material Type	Choose Material Type	
	Diameter (ins)	24.00	1.00	1.00	1.00	1.00	
	Flow Depth (ins)	24.00	1.00	1.00	1.00	1.00	
	Specify alternate "n"						
	Manning "n" (dim)	0.017	0.000	0.000	0.000	0.000	
	Drop (ft)	2	0	0	0	0	0 feet drop
	Slope (ft/ft)	0.0200	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	2.00	0.00	0.00	0.00	0.00	
	Theta (radians)	6.283	6.283	6.283	6.283	6.283	
	Flow Area (sq ft)	3.14	0.01	0.01	0.01	0.01	
	Wet Perimeter (ft)	6.28	0.26	0.26	0.26	0.26	
	Hydraulic Radius (ft)	0.50	0.02	0.02	0.02	0.02	
	Velocity (fps)						
	Normal Flow (cfs)						
	Travel Time (mins)						0.0 mins travel

Open Channel General Flow

							Total
	Select (0 or 1)	0	0	0	0	0	0 segments
	Length (ft)	150	1	1	1	1	0 feet length
	Top Elevation (ft)	30	1	1	1	1	
	Bottom Elevation (ft)	26	1	1	1	1	
	Hydraulic Radius (ft)	2.30	1.00	1.00	1.00	1.00	
	Channel Lining	0.025, Clean Earth	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "n"						
	Manning "n" (dim)	0.025	0.000	0.000	0.000	0.000	
	Drop (ft)	4	0	0	0	0	0 feet drop
	Slope (ft/ft)	0.0267	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	2.67	0.00	0.00	0.00	0.00	
	Velocity (fps)						
	Travel Time (mins)						0.0 mins travel

Other (Computed Separately)

							Total
	Select (0 or 1)	0	0	0	0	0	0 segments
	Length (ft)	500	1	1	1	1	0 feet length
	Drop (ft)	10	1	1	1	1	0 feet drop
	Velocity (fps)	2.00	1.00	1.00	1.00	1.00	
	Slope (ft/ft)	0.0200	1.0000	1.0000	1.0000	1.0000	
	Slope (%)	2.00	100.00	100.00	100.00	100.00	
	Travel Time (mins)						0.0 mins travel

Total for Subbasin

Segments	2
Length (ft)	1138
Drop (ft)	11
Slope (ft/ft)	0.0097

SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 2-4

1988 Drainage Criteria Manual
City of Wichita, Kansas
Rainfall Intensity Table for Sedgwick County, KS

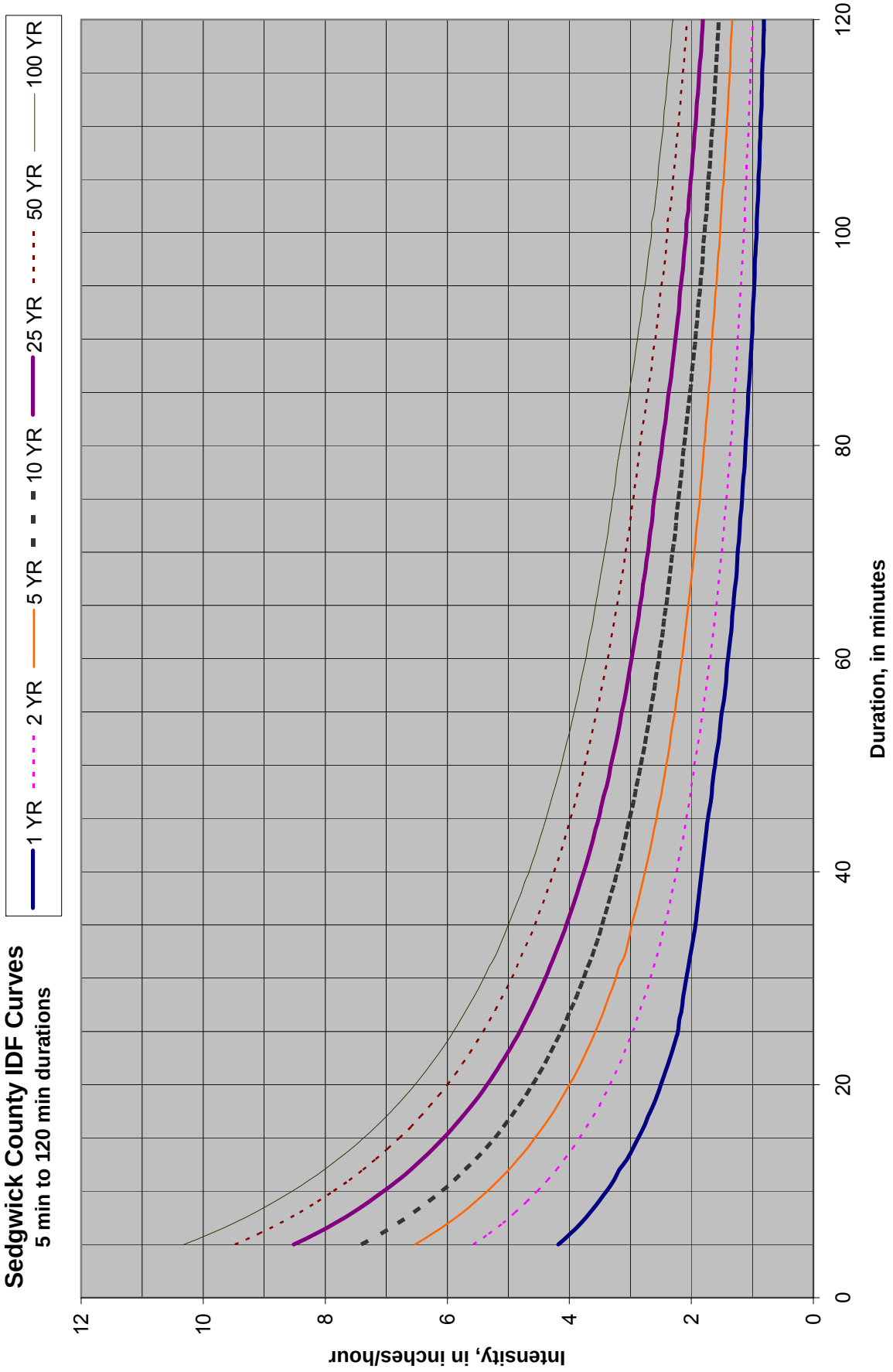
The following tabulation contains rainfall intensity in inches per hour as derived from ESSA Weather Bureau Technical Paper 40 Modified to NWS Hydro-35, 1977 During First Hour.

Table 1 Rainfall Intensity Table (Duration 15 min – 120 min)

DURATION, in hours	DURATION, in minutes	RETURN PERIOD						
		1 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
0.0833	5	4.18	5.57	6.53	7.41	8.52	9.48	10.32
0.1000	6	3.99	5.32	6.25	7.09	8.16	9.09	9.89
0.1167	7	3.81	5.09	5.99	6.81	7.84	8.74	9.50
0.1333	8	3.66	4.89	5.75	6.55	7.55	8.42	9.15
0.1500	9	3.52	4.70	5.54	6.31	7.28	8.13	8.83
0.1667	10	3.39	4.52	5.34	6.09	7.04	7.86	8.54
0.1833	11	3.27	4.36	5.16	5.89	6.81	7.61	8.27
0.2000	12	3.18	4.21	4.99	5.71	6.60	7.38	8.02
0.2167	13	3.05	4.08	4.84	5.53	6.41	7.17	7.79
0.2333	14	2.96	3.95	4.69	5.37	6.23	6.97	7.57
0.2500	15	2.87	3.83	4.56	5.22	6.06	6.78	7.37
0.2667	16	2.78	3.72	4.43	5.08	5.90	6.60	7.18
0.2833	17	2.71	3.61	4.31	4.95	5.75	6.44	7.00
0.3000	18	2.63	3.51	4.20	4.83	5.61	6.29	6.84
0.3167	19	2.56	3.42	4.10	4.71	5.47	6.14	6.68
0.3333	20	2.50	3.33	4.00	4.60	5.35	6.00	6.53
0.3500	21	2.44	3.25	3.90	4.50	5.23	5.87	6.39
0.3667	22	2.38	3.17	3.81	4.40	5.12	5.75	6.26
0.3833	23	2.32	3.10	3.73	4.31	5.01	5.63	6.13
0.4000	24	2.27	3.03	3.65	4.22	4.91	5.52	6.01
0.4167	25	2.22	2.96	3.57	4.13	4.81	5.41	5.90
0.4333	26	2.20	2.90	3.50	4.05	4.72	5.31	5.79
0.4500	27	2.16	2.84	3.43	3.98	4.63	5.21	5.69
0.4667	28	2.14	2.78	3.37	3.90	4.55	5.12	5.59
0.4833	29	2.11	2.72	3.30	3.83	4.47	5.03	5.49
0.5000	30	2.08	2.67	3.24	3.76	4.39	4.94	5.40
0.5167	31	2.05	2.62	3.19	3.70	4.32	4.86	5.32
0.5333	32	2.02	2.57	3.10	3.63	4.25	4.79	5.22
0.5500	33	1.99	2.52	3.05	3.57	4.18	4.71	5.14
0.5667	34	1.96	2.48	3.01	3.51	4.11	4.63	5.07
0.5833	35	1.93	2.44	2.98	3.46	4.05	4.56	5.00
0.6000	36	1.91	2.39	2.93	3.41	3.99	4.50	4.93
0.6167	37	1.89	2.35	2.88	3.36	3.93	4.43	4.86
0.6333	38	1.87	2.32	2.84	3.31	3.87	4.37	4.79
0.6500	39	1.85	2.28	2.80	3.26	3.82	4.31	4.73
0.6667	40	1.83	2.24	2.76	3.22	3.76	4.25	4.66
0.6833	41	1.81	2.21	2.72	3.17	3.71	4.19	4.60
0.7000	42	1.79	2.18	2.68	3.13	3.66	4.13	4.54
0.7167	43	1.77	2.14	2.64	3.09	3.61	4.08	4.49
0.7333	44	1.75	2.11	2.61	3.05	3.57	4.03	4.43

DURATION, in hours	DURATION, in minutes	RETURN PERIOD						
		1 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
0.7500	45	1.73	2.08	2.57	3.01	3.52	3.98	4.38
0.7667	46	1.70	2.05	2.54	2.97	3.48	3.93	4.33
0.7833	47	1.67	2.02	2.50	2.93	3.44	3.88	4.28
0.8000	48	1.66	2.00	2.47	2.90	3.39	3.84	4.23
0.8167	49	1.64	1.97	2.44	2.86	3.35	3.79	4.18
0.8333	50	1.61	1.95	2.41	2.83	3.32	3.75	4.13
0.8500	51	1.59	1.92	2.38	2.79	3.28	3.71	4.09
0.8667	52	1.56	1.89	2.35	2.76	3.24	3.67	4.05
0.8833	53	1.54	1.86	2.33	2.73	3.20	3.63	4.00
0.9000	54	1.52	1.84	2.30	2.70	3.17	3.59	3.96
0.9167	55	1.50	1.81	2.27	2.67	3.14	3.55	3.92
0.9333	56	1.47	1.79	2.25	2.64	3.10	3.51	3.88
0.9500	57	1.45	1.76	2.22	2.61	3.07	3.48	3.84
0.9667	58	1.43	1.74	2.20	2.59	3.04	3.44	3.81
0.9833	59	1.42	1.72	2.18	2.56	3.01	3.41	3.77
1.0000	60	1.40	1.69	2.15	2.53	2.98	3.37	3.73
1.0167	61	1.38	1.67	2.13	2.51	2.95	3.34	3.70
1.0333	62	1.36	1.65	2.11	2.48	2.92	3.31	3.67
1.0500	63	1.34	1.63	2.09	2.46	2.89	3.28	3.63
1.0667	64	1.33	1.61	2.07	2.44	2.86	3.25	3.60
1.0833	65	1.31	1.59	2.05	2.41	2.84	3.22	3.57
1.1000	66	1.30	1.57	2.03	2.39	2.81	3.19	3.54
1.1167	67	1.28	1.56	2.01	2.37	2.79	3.16	3.51
1.1333	68	1.26	1.54	1.99	2.35	2.76	3.13	3.48
1.1500	69	1.25	1.52	1.97	2.33	2.74	3.10	3.45
1.1667	70	1.24	1.50	1.95	2.31	2.71	3.08	3.42
1.1833	71	1.22	1.49	1.93	2.28	2.69	3.05	3.39
1.2000	72	1.21	1.47	1.92	2.26	2.67	3.02	3.36
1.2167	73	1.20	1.46	1.90	2.25	2.64	3.00	3.34
1.2333	74	1.18	1.44	1.88	2.23	2.63	2.98	3.31
1.2500	75	1.17	1.43	1.86	2.21	2.61	2.95	3.29
1.2667	76	1.16	1.41	1.85	2.19	2.58	2.93	3.26
1.2833	77	1.15	1.40	1.83	2.17	2.55	2.90	3.24
1.3000	78	1.13	1.38	1.82	2.15	2.53	2.88	3.22
1.3167	79	1.12	1.37	1.80	2.14	2.50	2.86	3.19
1.3333	80	1.11	1.36	1.79	2.12	2.48	2.84	3.16
1.3500	81	1.10	1.34	1.77	2.10	2.46	2.82	3.13
1.3667	82	1.09	1.33	1.76	2.08	2.43	2.79	3.10
1.3833	83	1.08	1.32	1.74	2.06	2.41	2.76	3.07
1.4000	84	1.07	1.31	1.73	2.04	2.39	2.74	3.04
1.4167	85	1.07	1.30	1.72	2.02	2.37	2.71	3.01
1.4333	86	1.05	1.28	1.70	2.00	2.34	2.69	2.99
1.4500	87	1.04	1.27	1.69	1.99	2.32	2.66	2.96
1.4667	88	1.03	1.26	1.68	1.97	2.30	2.64	2.93
1.4833	89	1.02	1.25	1.68	1.95	2.28	2.62	2.91
1.5000	90	1.01	1.24	1.66	1.93	2.26	2.59	2.88
1.5167	91	1.00	1.23	1.65	1.92	2.24	2.57	2.86
1.5333	92	1.00	1.22	1.63	1.90	2.22	2.55	2.83
1.5500	93	0.99	1.21	1.62	1.89	2.20	2.53	2.81
1.5667	94	0.98	1.20	1.61	1.87	2.19	2.51	2.79
1.5833	95	0.97	1.19	1.59	1.85	2.17	2.49	2.76

DURATION, in hours	DURATION, in minutes	RETURN PERIOD						
		1 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
1.6000	96	0.96	1.18	1.58	1.84	2.15	2.46	2.74
1.6167	97	0.96	1.17	1.57	1.82	2.13	2.44	2.72
1.6333	98	0.95	1.16	1.56	1.81	2.12	2.42	2.70
1.6500	99	0.94	1.15	1.54	1.80	2.10	2.41	2.67
1.6667	100	0.93	1.14	1.53	1.78	2.08	2.39	2.65
1.6833	101	0.93	1.13	1.52	1.77	2.08	2.39	2.65
1.7000	102	0.92	1.13	1.51	1.75	2.05	2.35	2.61
1.7167	103	0.91	1.12	1.50	1.74	2.04	2.33	2.59
1.7333	104	0.90	1.11	1.49	1.73	2.02	2.31	2.57
1.7500	105	0.90	1.10	1.47	1.72	2.01	2.30	2.55
1.7667	106	0.89	1.09	1.46	1.70	1.99	2.28	2.54
1.7833	107	0.88	1.09	1.45	1.69	1.98	2.26	2.52
1.8000	108	0.88	1.08	1.44	1.68	1.96	2.25	2.50
1.8167	109	0.87	1.07	1.43	1.67	1.95	2.23	2.48
1.8333	110	0.87	1.06	1.42	1.65	1.93	2.21	2.46
1.8500	111	0.86	1.06	1.41	1.64	1.92	2.20	2.45
1.8667	112	0.85	1.05	1.40	1.63	1.91	2.18	2.43
1.8833	113	0.85	1.04	1.39	1.62	1.89	2.17	2.41
1.9000	114	0.84	1.03	1.38	1.61	1.88	2.15	2.40
1.9167	115	0.84	1.03	1.37	1.60	1.87	2.14	2.38
1.9333	116	0.83	1.02	1.36	1.59	1.86	2.12	2.36
1.9500	117	0.82	1.01	1.36	1.58	1.84	2.11	2.35
1.9667	118	0.82	1.01	1.35	1.57	1.83	2.09	2.33
1.9833	119	0.81	1.00	1.34	1.56	1.82	2.08	2.32
2.0000	120	0.81	0.99	1.33	1.55	1.81	2.07	2.30


Sedgwick County IDF Curves
5 min to 120 min durations
1 YR
2 YR
5 YR
10 YR
25 YR
50 YR
100 YR
Intensity, in inches/hour
0
2
4
6
8
10
12
Duration, in minutes
0
20
40
60
80
100
120

3.0 Post-Development Conditions Information

3.1 Post-Development Conditions Drainage Map

3.1.1 Proposed Project Boundary

The one-step final plat showing property boundaries is included as Exhibit 1-3.

3.1.2 On-Site and Off-Site Topography

Topography in the area is shown on the drainage plan, Exhibit 1-1.

3.1.3 Existing On-Site and Off-Site Drainage Features Remaining

The southwest detention pond shall be expanded and serve as detention for the proposed development. The storm sewer system along 47th Street draining the KTA to Channel basin remains unchanged until to highway ditch is re-routed. Also, the two small RCPs draining south from 47th Street South shall remain and be connected to a proposed 12'x6' RCB in the street right-of-way.

3.1.4 Location and Description of Off-Site Through-Drainage Conveyances

The highway ditch for the KTA shall be re-routed along the east and north property lines within the 47th Street South dedicated right-of-way. A planned 12'x6' RCB shall occupy part of the ditch along the north property line.

3.1.5 Footprint of Proposed Impervious Areas

Conceptual impervious areas are shown on the site layout. The total impervious area for the developed condition, estimated based on actual land use, is estimated at 85% of the drainage areas. Therefore, the total impervious area on the entire site could be up to 42.84 acres.

3.1.6 Location of Proposed Utilities

Proposed utilities shall be laid out as part of future construction plans to be submitted to the City for review. This shall include the extension of water and sewer mains to serve the proposed development and run along the planned Washington Street right-of-way. Storm sewer extensions to convey drainage within the site are shown on the proposed drainage plan map (Exhibit 1-1). The plat (Exhibit 1-3) shows proposed easements, which will be the location for any future utilities.

3.1.7 Delineation of Predominant Soils

The predominant soil type is discussed in section 2.1.8. See Exhibit 1-6 for NRCS Soil Survey map and information showing existing soil types and descriptions.

3.1.8 Land Use Cover per NRCS Nomenclature

All undisturbed areas within the site currently have fair grass cover and minimal concentrations of trees and shrubs. The dry detention area along the east boundary and along the south property line contains a good cover of trees.

3.1.9 Internal Drainage Sub-Basin Boundaries

The proposed drainage plan (Exhibit 1-1) delineates the proposed internal sub-basins and Exhibit 3-1 shows a table of the areas.

3.1.10 Proposed Limits of Land Disturbing Activity

Clearing and grading shall be done only as needed for development and will be established upon any submittal for site improvements.

3.1.11 Time of Concentration Flow Paths

The proposed drainage plan in Exhibit 1-1 shows the general flow paths for each drainage area in the three main basins. The sub-basin site drainage is collected in proposed storm sewer systems as shown and drains into the proposed detention pond to the southwest corner of the property. Overflow beyond the design level of the pond flows to a proposed channel along the south property line and into the current Riverside Drainage Channel. The flow to these areas is mostly sheet flow with minor concentrated flow at the lower ends of the basins. The KTA drainage flows from the 47th Street South storm sewer system and into a highway ditch that shall be re-routed through a 12'x6' RCB and around the north end of the property. The ditch ultimately drains into the Riverside Channel.

3.2 Proposed Conveyances Map

3.2.1 On-Site and Off-Site Drainage Features Proposed

Existing conveyance systems are shown on Exhibit 1-1.

3.2.2 Storm Sewer System Components

Proposed changes to existing systems are discussed in Section 3.1.11 and further lot development would include adding grated inlets at sump areas as needed in proposed parking areas and connecting to the proposed storm sewer system along Washington Street and/or the east property line. The drainage plan shows the location of proposed changes required for the detention pond. Any additional storm sewer designs shall comply with the latest City of Wichita design criteria to convey any added site runoff.

3.2.3 Stormwater Flow for Sub-Basin or Drainage Area > 40 Acres

Proposed drainage areas and sub-basin do not exceed 40 acres.

3.2.4 Location of Stormwater Management Facilities

The existing detention area located in the southwest corner of the site shall be expanded to reduce proposed run-off and outlet in a manner similar to the existing flows controls

3.2.5 Proposed Energy Dissipaters and Other Channel Protection Devices

The outlet for the proposed detention pond shall be lined with rip-rap to dissipate energy and limit erosion.

3.2.6 Locations and Dimensions of Proposed Channel, Bridge, and Culvert Crossings

A proposed 4'-wide pond outlet channel will run along the south side of the property as shown on the drainage plan. Also, a 12'x6' RCB shall run along to north side of the property in the 47th Street South right-of-way to facilitate re-routing the KTA drainage basin flows.

3.2.7 Normal Pool and 100-Year Pool Elevations for Ponds and Lakes

The dry detention pond shall have a design water surface elevation of 1264.2 based on a 4'-wide outlet weir at an elevation of 1265.0 and a pond over flow channel with a width of 4' and elevation of 1265.0 at the pond control weir. See Exhibit 1-1 for layout of the pond. Maximum ponding within future parking areas shall be limited to 0.5' above the inlet tops.

3.2.8 Permanent Concrete Outfall Control Structures for Ponds

As mentioned above, the pond control structure is designed as a 4'-wide concrete weir wall at the pond outlet. The weir should be a Cipoletti shape and be at least nine-inches thick with reinforcing steel. The flow line of the weir shall be set at an elevation of 1265.0

3.2.9 Emergency Overflow Spillways and Top of Berm Elevations for Ponds

Overflow from the pond shall continue past the weir wall and into the proposed four-foot-wide ditch as shown on the drainage plan. The top of berm elevation around to pond shall be no less than a 1265.5.

3.2.10 Floodplains, Ponds, and Stormwater Management Facilities Located in Reserves

A FEMA CLOMR is pending for the Riverside Drainage Channel and includes this site at or above the proposed base flood elevation. Detention pond shall be within a reserve as shown by the plat. The Drainage Plan shows this proposed reserve area for the pond as well. It is expected that the final location of the pond be determined as part of the final design and grading plans for the property. Changes to this Drainage Plan must be approved by the appropriate governing body prior to issuing any building permit to ensure that drainage requirements are met.

3.3 Post-Development Conditions Hydrology and Hydraulics

3.3.1 Narrative of the Hydrologic Analysis Methodology

The analysis was completed using the SCS Hydrograph method. The 1, 2, 5, 10, 25, & 100 year, 24-hour storm events were evaluated. The analysis information appears in Exhibit 3-2.

3.3.2 Summary Table of Drainage Sub-Basin Hydrologic Parameters

Drainage Basin	Area (Acres)	Curve Number	T_c (min)
KTA to Channel	39.88	90.8	21.9
Site to Channel	10.03	90.0	15.0
Site to Pond	38.84	84.8	15.0

3.3.3 Table of Post-Development Condition Runoff Curve Numbers

For the post-development condition, the curve numbers were weighted based on area of their respective hydrologic soil groups over the site and include adjustment for impervious areas. The results are shown in the table below.

KTA to Channel		Hydrologic	Area		% of Area	CN
Soil #	Soil Information	Group	Square Feet	Acres	%	Existing
5672	Waldeck sandy loam, occasionally flooded	C	811735.31	18.635	46.73%	91.0
5928	Pratt loamy fine sand, 1 to 5 percent slopes	A	14023.28	0.322	0.81%	81.0
6224	Canadian fine sandy loam, rarely flooded	B	60143.29	1.381	3.46%	88.0
6228	Canadian-Waldeck fine sandy loam, rarely flooded	C	851192.36	19.541	49.00%	91.0
		TOTALS	1737094.24	39.878	100.00%	90.8

Site to Channel		Hydrologic	Area		% of Area	CN
Soil #	Soil Information	Group	Square Feet	Acres	%	Proposed
5672	Waldeck sandy loam, occasionally flooded	C	393867.54	9.042	90.16%	91.0
5928	Pratt loamy fine sand, 1 to 5 percent slopes	A	43008.56	0.987	9.84%	81.0
		TOTALS	436876.10	10.029	100.00%	90.0

Site to Pond		Hydrologic	Area		% of Area	CN
Soil #	Soil Information	Group	Square Feet	Acres	%	Proposed
5672	Waldeck sandy loam, occasionally flooded	C	645481.25	14.818	38.15%	91.0
5928	Pratt loamy fine sand, 1 to 5 percent slopes	A	1046582.00	24.026	61.85%	81.0
		TOTALS	1692063.25	38.844	100.00%	84.8

3.3.4 Table of Post-Development Condition Times of Concentration

Area	T_c (min)
KTA to Channel	21.9
Site to Channel	15.0
Site to Pond	15.0

Supporting data and calculations are found on the time of concentration worksheet attached as Exhibit 3-3.

3.3.5 Cross-Sections and Other Diagrams of Hydraulic Features

All proposed channels/ditches shall have maximum side slopes of 4:1.

3.3.6 Hydrologic and Hydraulic Analyses

Post-development condition analysis report attached as Exhibit 3-2.

3.3.7 Downstream Peak Discharge Assessment (10% Rule)

The drainage area in this study is near the bottom of the Big Slough South (Riverside Drainage Channel) contributing basin. Continuing a basin to the end of the said basin would yield less than 504 acres to evaluate the 10% rule.

3.3.8 Stage-Storage-Discharge Curves

Storage curve was computed for the volume of water that could be stored for proposed runoff within the southwest drainage area. Exhibit 3-2 includes design information for the detention pond along with all hydrograph data. The resulting stage-storage-discharge table is shown on the Drainage Plan as well (Exhibit 1-1). All storm events' proposed outflow through the pond give a significant decrease in post-developed flows in relation to existing flows as discussed for an overall reduction of flows to the Riverside Drainage Channel.

3.3.9 Pond Contours on the Master Grading Plan

The detention pond and proposed location is shown on the Drainage Plan (Exhibit 1-1). The pond shall be constructed with the initial phase of development and will be shown as part of the master grading plan.

3.3.10 One Foot of Freeboard Above the 100-Year, 24-Hour High Water Level

The freeboard for the detention facility is a minimum of one foot (1') above the proposed design water surface elevation. The top of the pond in the design calculations was set to an elevation of 1265.50. The HWL designed for the pond is 1263.93.

3.3.11 Runoff Discharge Comparison

No relevant impacts are noted from this analysis. With the dry detention system, flows are not increasing out of that system and therefore have no impact on the downstream existing pond.

3.4 Stormwater Quantity Control Sizing

3.4.1 Hydraulic Sizing Calculations

Storm water controls will include appropriate inlet and pipe networks at locations to be finalized as part of the construction plans. The proposed layouts and calculations are shown in Exhibit 3-4. These networks will convey the five-year storm at a minimum. Sump locations in specific drainage areas will have flows routed overland to other low points and carried through the remainder of the system.

3.4.2 Table of Stormwater Quantity Management Controls

Exhibit 3-4 includes a summary table of the proposed storm sewer networks.

3.4.3 Typical Details

All structures shall conform to City of Wichita standards.

3.5 Stormwater Quality Management Facilities

3.5.1 Table of Stormwater Quality Management Facilities

Facilities are listed in Exhibit 3-5.

3.5.2 Maintenance Responsibility of Stormwater Management Facilities

The maintenance of storm water management facilities shall be the responsibility of the owner and shall be transferred to new owner upon the sale of any part thereof.

3.5.3 Water Quality Volume

Water quality volume calculated on Exhibit 3-6. All future lot developments shall address specific water quality requirements for each outlet to the Riverside Drainage Channel.

3.5.4 % TSS Removal Value

Values for each basin shown on Exhibit 3-5.

3.5.5 Channel Protection Volume

Values for each basin shown on Exhibit 3-6.

3.5.6 Water Quality Volume and Channel Protection Volume Orifice Sizing

Outlet for these volumes shall be based on infiltration rate on the detention pond. Typical rate for site soils is 1 to 2 in/hr which gives the required detention time of 24 to 24 hours as shown below.

	Area	Acre	Storage	Total Acre-feet	Infiltration Flow (in/hr)	Stage	Time (sec)	Cummulative Time (sec)	
1267.50	153469.00	3.52	3.41	24.40	7.11	10.00	0		
1266.50	143275.00	3.29	3.18	20.99	6.63	9.00	0		
1265.50	133342.00	3.06	2.95	17.82	6.17	8.00	21611	21611	6.0 hours
1264.50	123669.00	2.84	2.73	14.87	5.73	7.00	21598	43208	12.0 hours
1263.50	114257.00	2.62	2.52	12.14	5.29	6.00	21590	64799	18.0 hours
1262.50	105105.00	2.41	2.31	9.62	4.87	5.00	21591	86389	24.0 hours
1261.50	96234.00	2.21	2.11	7.31	4.46	4.00	21580	107969	30.0 hours
1260.50	87657.00	2.01	1.92	5.20	4.06	3.00	21583	129553	36.0 hours
1259.50	79365.00	1.82	1.73	3.28	3.67	2.00	21607	151160	42.0 hours
1258.50	71354.00	1.64	1.55	1.55	3.30	1.00	21624	172784	48.0 hours
1257.50	63619.00	1.46	0.00	0.00	0.00	0.00	0	172784	48.0 hours

3.5.7 Additional Calculations

No additional calculations at this time.

3.5.8 Typical Details

All structures shall conform to City of Wichita standards.

SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 3-1

SOUTHFORK COMMERCIAL ADDITION SUB-BASIN AREAS

EXISTING

Parcel Name	Square Feet	Acres
1	1,786,234.42	41.01
2	1,697,772.00	38.97
3	381,846.46	8.77

KTA to Channel	41.01
Site to Channel	38.97
Site to Pond	8.77
Total	88.75

PROPOSED

Parcel Name	Square Feet	Acres
DA-1	1,737,094.24	39.88
DA-2	436,876.10	10.03
DA-3	47,995.10	1.10
DA-4	25,218.40	0.58
DA-5	104,327.27	2.40
DA-6	65,017.45	1.49
DA-7	28,017.34	0.64
DA-8	30,640.71	0.70
DA-9	86,107.90	1.98
DA-10	113,035.18	2.59
DA-11	53,740.75	1.23
DA-12	40,005.17	0.92
DA-13	102,269.10	2.35
DA-14	88,834.48	2.04
DA-15	30,642.47	0.70
DA-16	71,864.17	1.65
DA-17	70,071.10	1.61
DA-18	66,784.58	1.53
DA-19	53,283.92	1.22
DA-20	73,764.02	1.69
DA-21	96,429.14	2.21
DA-22	444,014.99	10.19

KTA to Channel	39.88
Site to Channel	10.03
Site to Pond	38.84
Total	88.75

SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 3-2

Hydraflow Table of Contents

P:\858\Southfork Drainage\Proposed Condition.gpw

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	------	83.05	110.66	-------	147.42	174.86	211.25	238.41	265.47	Prop KTA
2	SCS Runoff	------	23.53	31.58	-------	42.31	50.32	60.96	68.89	76.80	Prop to Channel
3	SCS Runoff	------	72.95	103.03	-------	144.13	175.25	216.83	247.99	279.08	Prop to Pond
4	Reservoir	3	3.546	3.834	-------	4.230	4.527	4.914	5.199	5.479	Pond Outflow

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	83.05	2	726	288,749	------	------	------	Prop KTA
2	SCS Runoff	23.53	2	722	66,533	------	------	------	Prop to Channel
3	SCS Runoff	72.95	2	722	204,543	------	------	------	Prop to Pond
4	Reservoir	3.546	2	838	204,523	3	1259.15	116,743	Pond Outflow

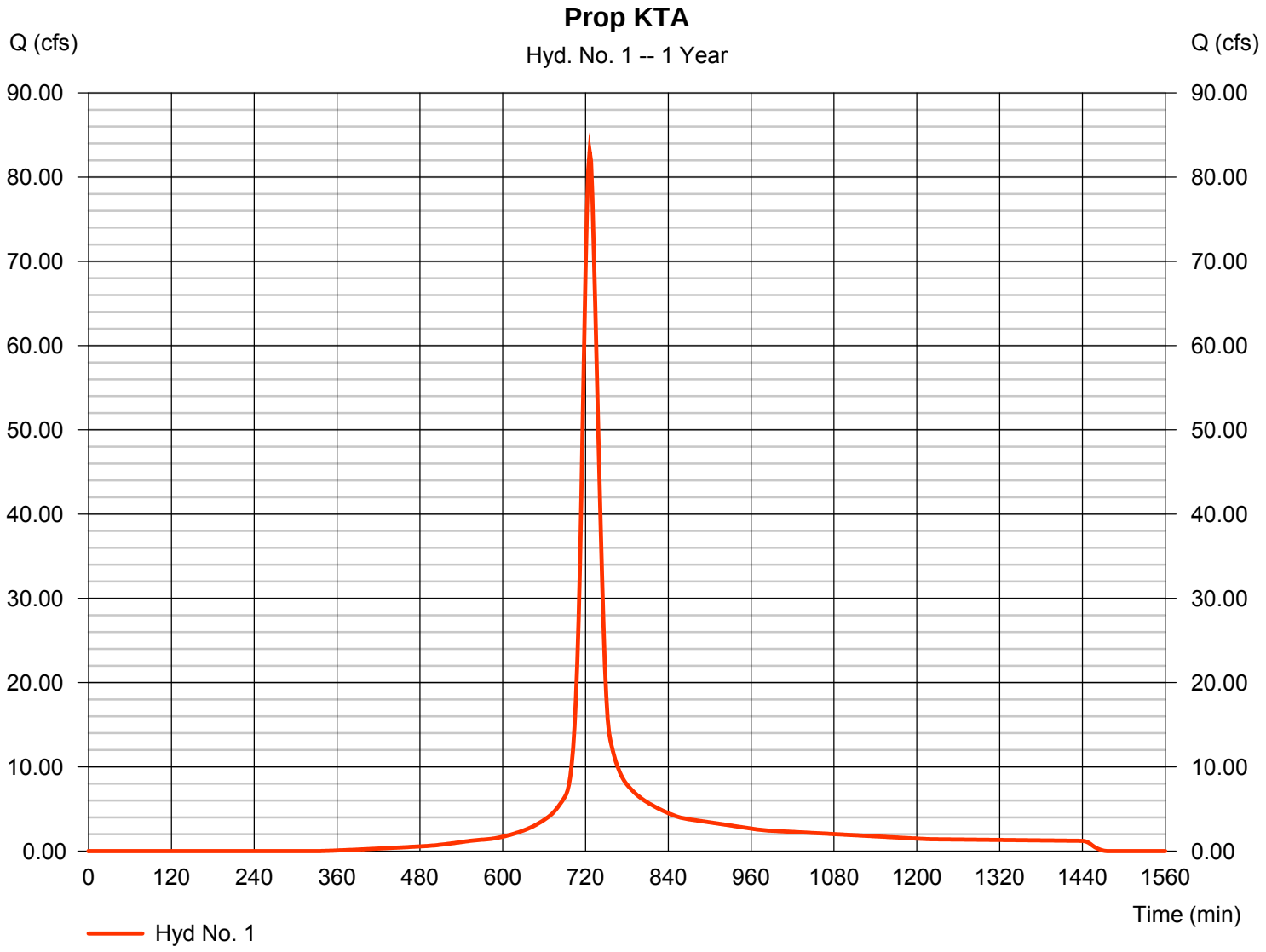
Hydrograph Report

Hyd. No. 1

Prop KTA

Hydrograph type	= SCS Runoff	Peak discharge	= 83.05 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 288,749 cuft
Drainage area	= 39.880 ac	Curve number	= 91*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.90 min
Total precip.	= 2.88 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(18.630 x 91) + (0.320 x 81) + (1.380 x 88) + (19.550 x 91)] / 39.880



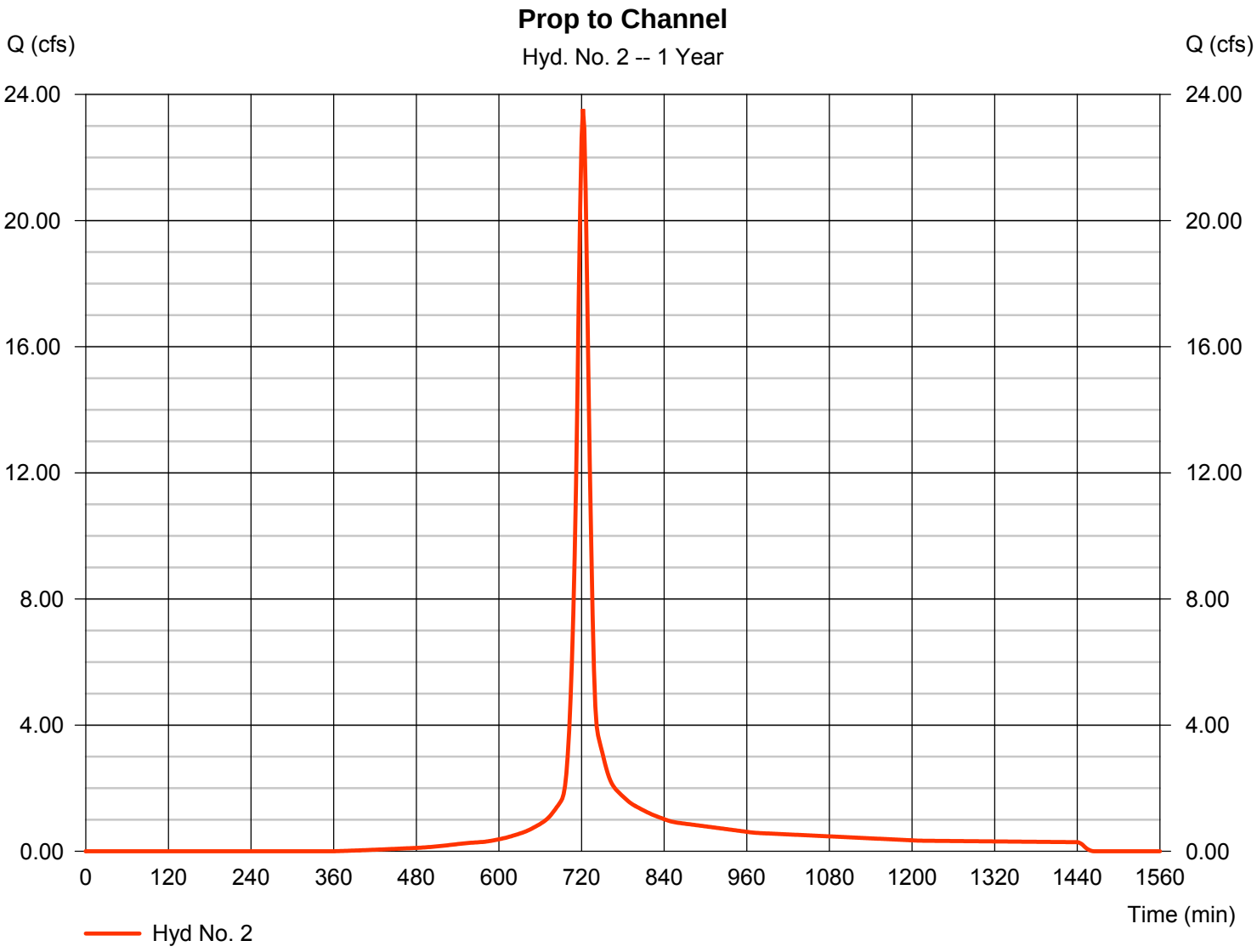
Hydrograph Report

Hyd. No. 2

Prop to Channel

Hydrograph type	= SCS Runoff	Peak discharge	= 23.53 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 66,533 cuft
Drainage area	= 10.030 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.88 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(9.040 x 91) + (0.990 x 81)] / 10.030



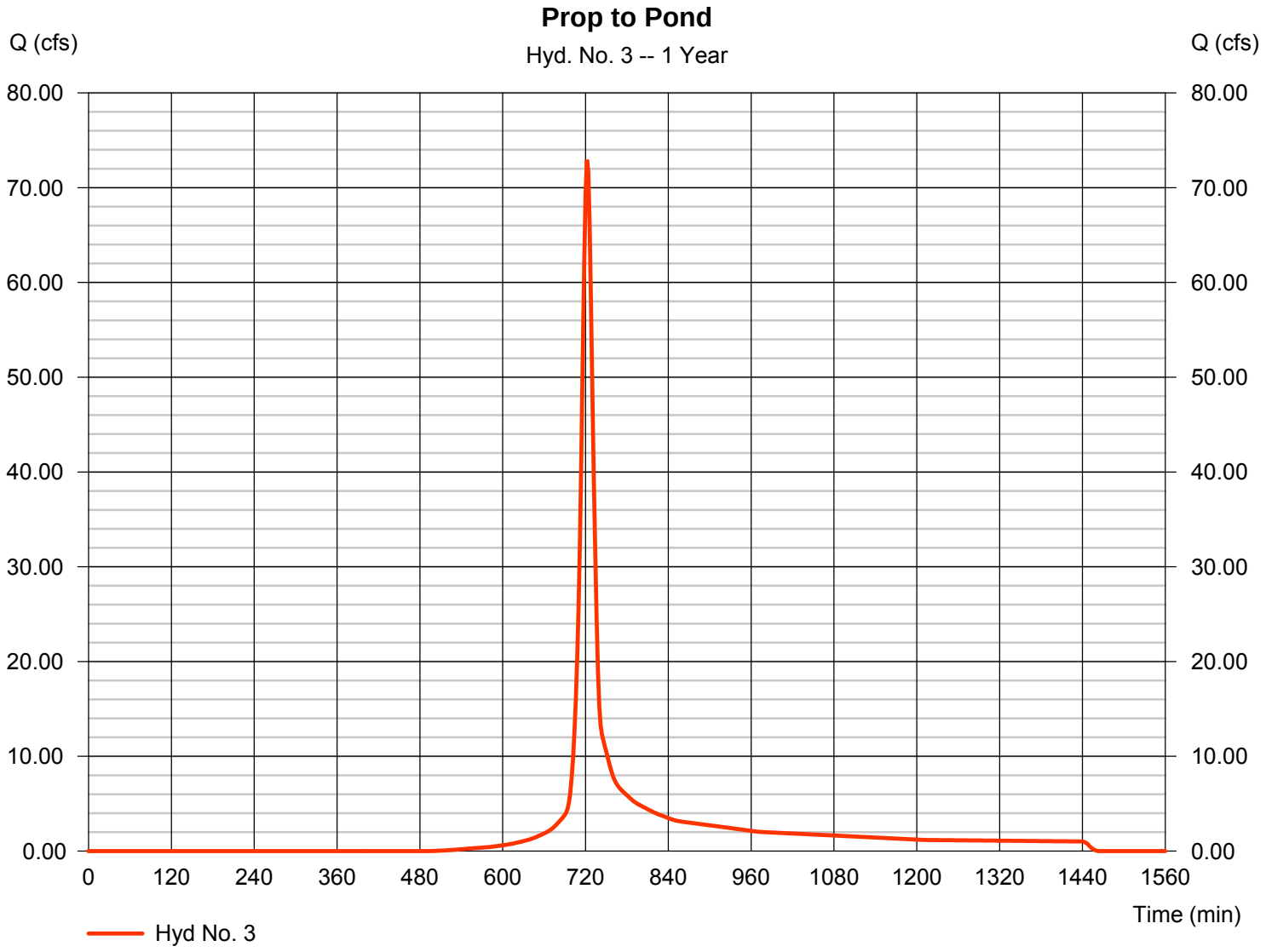
Hydrograph Report

Hyd. No. 3

Prop to Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 72.95 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 204,543 cuft
Drainage area	= 38.840 ac	Curve number	= 85*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.88 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(14.820 x 91) + (24.020 x 81)] / 38.840



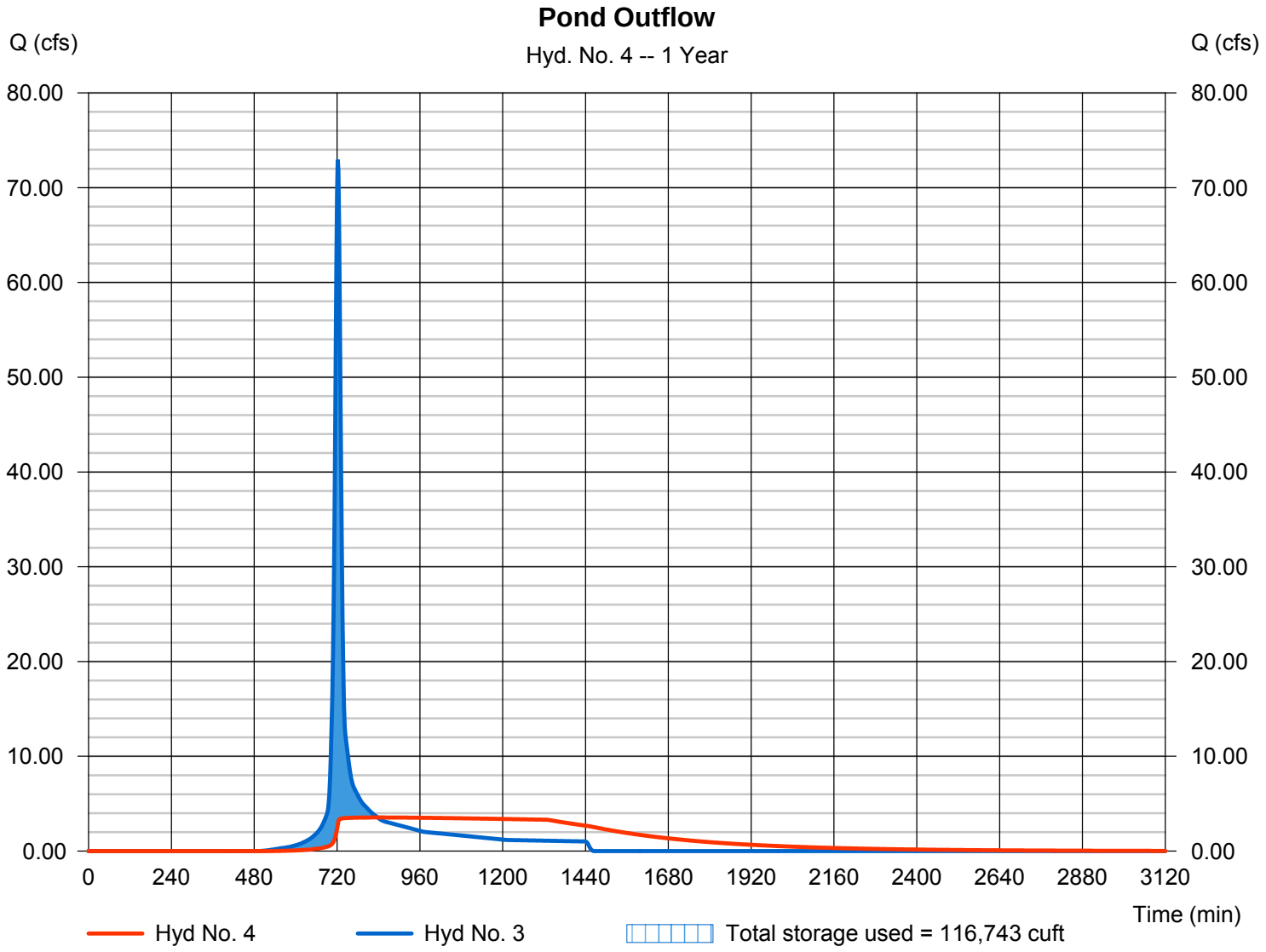
Hydrograph Report

Hyd. No. 4

Pond Outflow

Hydrograph type	= Reservoir	Peak discharge	= 3.546 cfs
Storm frequency	= 1 yrs	Time to peak	= 838 min
Time interval	= 2 min	Hyd. volume	= 204,523 cuft
Inflow hyd. No.	= 3 - Prop to Pond	Max. Elevation	= 1259.15 ft
Reservoir name	= POND	Max. Storage	= 116,743 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond No. 1 - POND

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 1257.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1257.50	63,619	0	0
1.00	1258.50	71,354	67,487	67,487
2.00	1259.50	79,365	75,360	142,846
3.00	1260.50	87,657	83,511	226,357
4.00	1261.50	96,234	91,946	318,303
5.00	1262.50	105,105	100,670	418,972
6.00	1263.50	114,257	109,681	528,653
7.00	1264.50	123,669	118,963	647,616
8.00	1265.50	133,342	128,506	776,122
9.00	1266.50	143,275	138,309	914,430
10.00	1267.50	153,469	148,372	1,062,802

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	Inactive	Inactive	Inactive	Inactive
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 1	1	0	1
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	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	Yes

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	Inactive	Inactive	0.00
Crest El. (ft)	= 1265.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Ciplti	Ciplti	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 2.000 (by Contour)

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 cuft	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	1257.50	---	---	---	---	0.00	---	---	---	0.000	---	0.000
0.10	6,749	1257.60	---	---	---	---	0.00	---	---	---	0.330	---	0.330
0.20	13,497	1257.70	---	---	---	---	0.00	---	---	---	0.661	---	0.661
0.30	20,246	1257.80	---	---	---	---	0.00	---	---	---	0.991	---	0.991
0.40	26,995	1257.90	---	---	---	---	0.00	---	---	---	1.321	---	1.321
0.50	33,743	1258.00	---	---	---	---	0.00	---	---	---	1.652	---	1.652
0.60	40,492	1258.10	---	---	---	---	0.00	---	---	---	1.982	---	1.982
0.70	47,241	1258.20	---	---	---	---	0.00	---	---	---	2.312	---	2.312
0.80	53,989	1258.30	---	---	---	---	0.00	---	---	---	2.643	---	2.643
0.90	60,738	1258.40	---	---	---	---	0.00	---	---	---	2.973	---	2.973
1.00	67,487	1258.50	---	---	---	---	0.00	---	---	---	3.303	---	3.303
1.10	75,022	1258.60	---	---	---	---	0.00	---	---	---	3.340	---	3.340
1.20	82,558	1258.70	---	---	---	---	0.00	---	---	---	3.378	---	3.378
1.30	90,094	1258.80	---	---	---	---	0.00	---	---	---	3.415	---	3.415
1.40	97,630	1258.90	---	---	---	---	0.00	---	---	---	3.452	---	3.452
1.50	105,166	1259.00	---	---	---	---	0.00	---	---	---	3.489	---	3.489
1.60	112,702	1259.10	---	---	---	---	0.00	---	---	---	3.526	---	3.526
1.70	120,238	1259.20	---	---	---	---	0.00	---	---	---	3.563	---	3.563
1.80	127,774	1259.30	---	---	---	---	0.00	---	---	---	3.600	---	3.600
1.90	135,310	1259.40	---	---	---	---	0.00	---	---	---	3.637	---	3.637
2.00	142,846	1259.50	---	---	---	---	0.00	---	---	---	3.674	---	3.674
2.10	151,197	1259.60	---	---	---	---	0.00	---	---	---	3.713	---	3.713
2.20	159,548	1259.70	---	---	---	---	0.00	---	---	---	3.751	---	3.751
2.30	167,899	1259.80	---	---	---	---	0.00	---	---	---	3.789	---	3.789
2.40	176,250	1259.90	---	---	---	---	0.00	---	---	---	3.828	---	3.828
2.50	184,602	1260.00	---	---	---	---	0.00	---	---	---	3.866	---	3.866
2.60	192,953	1260.10	---	---	---	---	0.00	---	---	---	3.905	---	3.905
2.70	201,304	1260.20	---	---	---	---	0.00	---	---	---	3.943	---	3.943
2.80	209,655	1260.30	---	---	---	---	0.00	---	---	---	3.981	---	3.981
2.90	218,006	1260.40	---	---	---	---	0.00	---	---	---	4.020	---	4.020
3.00	226,357	1260.50	---	---	---	---	0.00	---	---	---	4.058	---	4.058
3.10	235,552	1260.60	---	---	---	---	0.00	---	---	---	4.098	---	4.098

Continues on next page...

POND

Stage / Storage / Discharge Table

Stage ft	Storage cuft	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
3.20	244,746	1260.70	---	---	---	---	0.00	---	---	---	4.138	---	4.138
3.30	253,941	1260.80	---	---	---	---	0.00	---	---	---	4.177	---	4.177
3.40	263,135	1260.90	---	---	---	---	0.00	---	---	---	4.217	---	4.217
3.50	272,330	1261.00	---	---	---	---	0.00	---	---	---	4.257	---	4.257
3.60	281,524	1261.10	---	---	---	---	0.00	---	---	---	4.296	---	4.296
3.70	290,719	1261.20	---	---	---	---	0.00	---	---	---	4.336	---	4.336
3.80	299,913	1261.30	---	---	---	---	0.00	---	---	---	4.376	---	4.376
3.90	309,108	1261.40	---	---	---	---	0.00	---	---	---	4.416	---	4.416
4.00	318,303	1261.50	---	---	---	---	0.00	---	---	---	4.455	---	4.455
4.10	328,369	1261.60	---	---	---	---	0.00	---	---	---	4.496	---	4.496
4.20	338,436	1261.70	---	---	---	---	0.00	---	---	---	4.537	---	4.537
4.30	348,503	1261.80	---	---	---	---	0.00	---	---	---	4.578	---	4.578
4.40	358,570	1261.90	---	---	---	---	0.00	---	---	---	4.620	---	4.620
4.50	368,637	1262.00	---	---	---	---	0.00	---	---	---	4.661	---	4.661
4.60	378,704	1262.10	---	---	---	---	0.00	---	---	---	4.702	---	4.702
4.70	388,771	1262.20	---	---	---	---	0.00	---	---	---	4.743	---	4.743
4.80	398,838	1262.30	---	---	---	---	0.00	---	---	---	4.784	---	4.784
4.90	408,905	1262.40	---	---	---	---	0.00	---	---	---	4.825	---	4.825
5.00	418,972	1262.50	---	---	---	---	0.00	---	---	---	4.866	---	4.866
5.10	429,940	1262.60	---	---	---	---	0.00	---	---	---	4.908	---	4.908
5.20	440,908	1262.70	---	---	---	---	0.00	---	---	---	4.951	---	4.951
5.30	451,876	1262.80	---	---	---	---	0.00	---	---	---	4.993	---	4.993
5.40	462,844	1262.90	---	---	---	---	0.00	---	---	---	5.035	---	5.035
5.50	473,813	1263.00	---	---	---	---	0.00	---	---	---	5.078	---	5.078
5.60	484,781	1263.10	---	---	---	---	0.00	---	---	---	5.120	---	5.120
5.70	495,749	1263.20	---	---	---	---	0.00	---	---	---	5.163	---	5.163
5.80	506,717	1263.30	---	---	---	---	0.00	---	---	---	5.205	---	5.205
5.90	517,685	1263.40	---	---	---	---	0.00	---	---	---	5.247	---	5.247
6.00	528,653	1263.50	---	---	---	---	0.00	---	---	---	5.290	---	5.290
6.10	540,549	1263.60	---	---	---	---	0.00	---	---	---	5.333	---	5.333
6.20	552,446	1263.70	---	---	---	---	0.00	---	---	---	5.377	---	5.377
6.30	564,342	1263.80	---	---	---	---	0.00	---	---	---	5.420	---	5.420
6.40	576,238	1263.90	---	---	---	---	0.00	---	---	---	5.464	---	5.464
6.50	588,135	1264.00	---	---	---	---	0.00	---	---	---	5.508	---	5.508
6.60	600,031	1264.10	---	---	---	---	0.00	---	---	---	5.551	---	5.551
6.70	611,927	1264.20	---	---	---	---	0.00	---	---	---	5.595	---	5.595
6.80	623,824	1264.30	---	---	---	---	0.00	---	---	---	5.638	---	5.638
6.90	635,720	1264.40	---	---	---	---	0.00	---	---	---	5.682	---	5.682
7.00	647,616	1264.50	---	---	---	---	0.00	---	---	---	5.725	---	5.725
7.10	660,467	1264.60	---	---	---	---	0.00	---	---	---	5.770	---	5.770
7.20	673,317	1264.70	---	---	---	---	0.00	---	---	---	5.815	---	5.815
7.30	686,168	1264.80	---	---	---	---	0.00	---	---	---	5.860	---	5.860
7.40	699,018	1264.90	---	---	---	---	0.00	---	---	---	5.905	---	5.905
7.50	711,869	1265.00	---	---	---	---	0.00	---	---	---	5.949	---	5.949
7.60	724,719	1265.10	---	---	---	---	0.42	---	---	---	5.994	---	6.415
7.70	737,570	1265.20	---	---	---	---	1.19	---	---	---	6.039	---	7.230
7.80	750,421	1265.30	---	---	---	---	2.19	---	---	---	6.084	---	8.273
7.90	763,271	1265.40	---	---	---	---	3.37	---	---	---	6.128	---	9.498
8.00	776,122	1265.50	---	---	---	---	4.71	---	---	---	6.173	---	10.88
8.10	789,952	1265.60	---	---	---	---	6.19	---	---	---	6.219	---	12.41
8.20	803,783	1265.70	---	---	---	---	7.80	---	---	---	6.265	---	14.07
8.30	817,614	1265.80	---	---	---	---	9.53	---	---	---	6.311	---	15.84
8.40	831,445	1265.90	---	---	---	---	11.37	---	---	---	6.357	---	17.73
8.50	845,276	1266.00	---	---	---	---	13.32	---	---	---	6.403	---	19.72
8.60	859,107	1266.10	---	---	---	---	15.37	---	---	---	6.449	---	21.82
8.70	872,938	1266.20	---	---	---	---	17.51	---	---	---	6.495	---	24.00
8.80	886,769	1266.30	---	---	---	---	19.74	---	---	---	6.541	---	26.29
8.90	900,599	1266.40	---	---	---	---	22.07	---	---	---	6.587	---	28.65
9.00	914,430	1266.50	---	---	---	---	24.47	---	---	---	6.633	---	31.10
9.10	929,267	1266.60	---	---	---	---	26.96	---	---	---	6.680	---	33.64
9.20	944,104	1266.70	---	---	---	---	29.52	---	---	---	6.727	---	36.25
9.30	958,942	1266.80	---	---	---	---	32.17	---	---	---	6.775	---	38.94
9.40	973,779	1266.90	---	---	---	---	34.89	---	---	---	6.822	---	41.71
9.50	988,616	1267.00	---	---	---	---	37.67	---	---	---	6.869	---	44.54
9.60	1,003,453	1267.10	---	---	---	---	40.53	---	---	---	6.916	---	47.45
9.70	1,018,290	1267.20	---	---	---	---	43.46	---	---	---	6.963	---	50.43
9.80	1,033,128	1267.30	---	---	---	---	46.46	---	---	---	7.011	---	53.47
9.90	1,047,965	1267.40	---	---	---	---	49.53	---	---	---	7.058	---	56.58
10.00	1,062,802	1267.50	---	---	---	---	52.65	---	---	---	7.105	---	59.76

...End

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	110.66	2	726	388,404	------	------	------	Prop KTA
2	SCS Runoff	31.58	2	722	90,227	------	------	------	Prop to Channel
3	SCS Runoff	103.03	2	722	289,188	------	------	------	Prop to Pond
4	Reservoir	3.834	2	884	289,167	3	1259.92	177,652	Pond Outflow

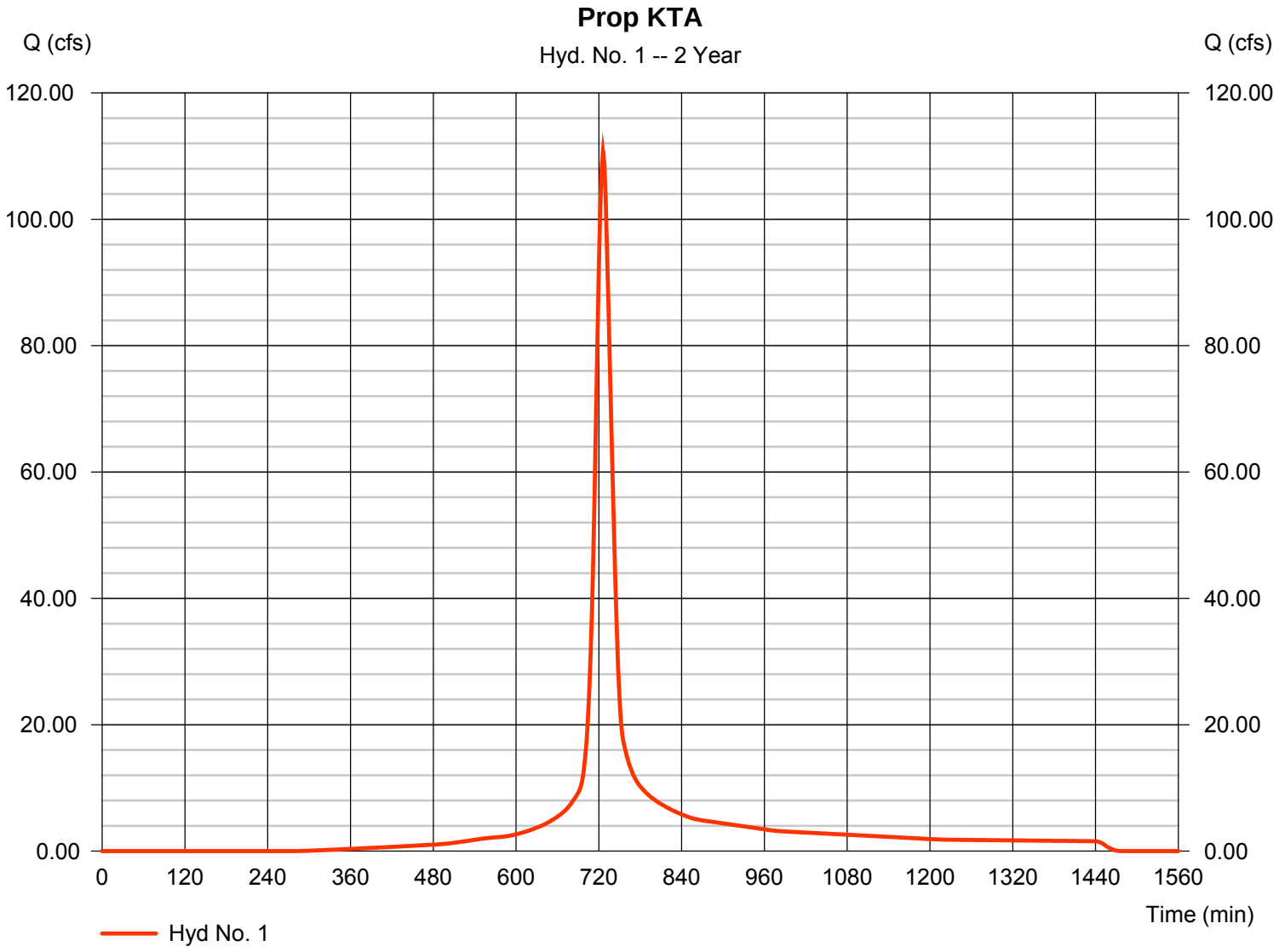
Hydrograph Report

Hyd. No. 1

Prop KTA

Hydrograph type	= SCS Runoff	Peak discharge	= 110.66 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 388,404 cuft
Drainage area	= 39.880 ac	Curve number	= 91*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.90 min
Total precip.	= 3.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(18.630 x 91) + (0.320 x 81) + (1.380 x 88) + (19.550 x 91)] / 39.880



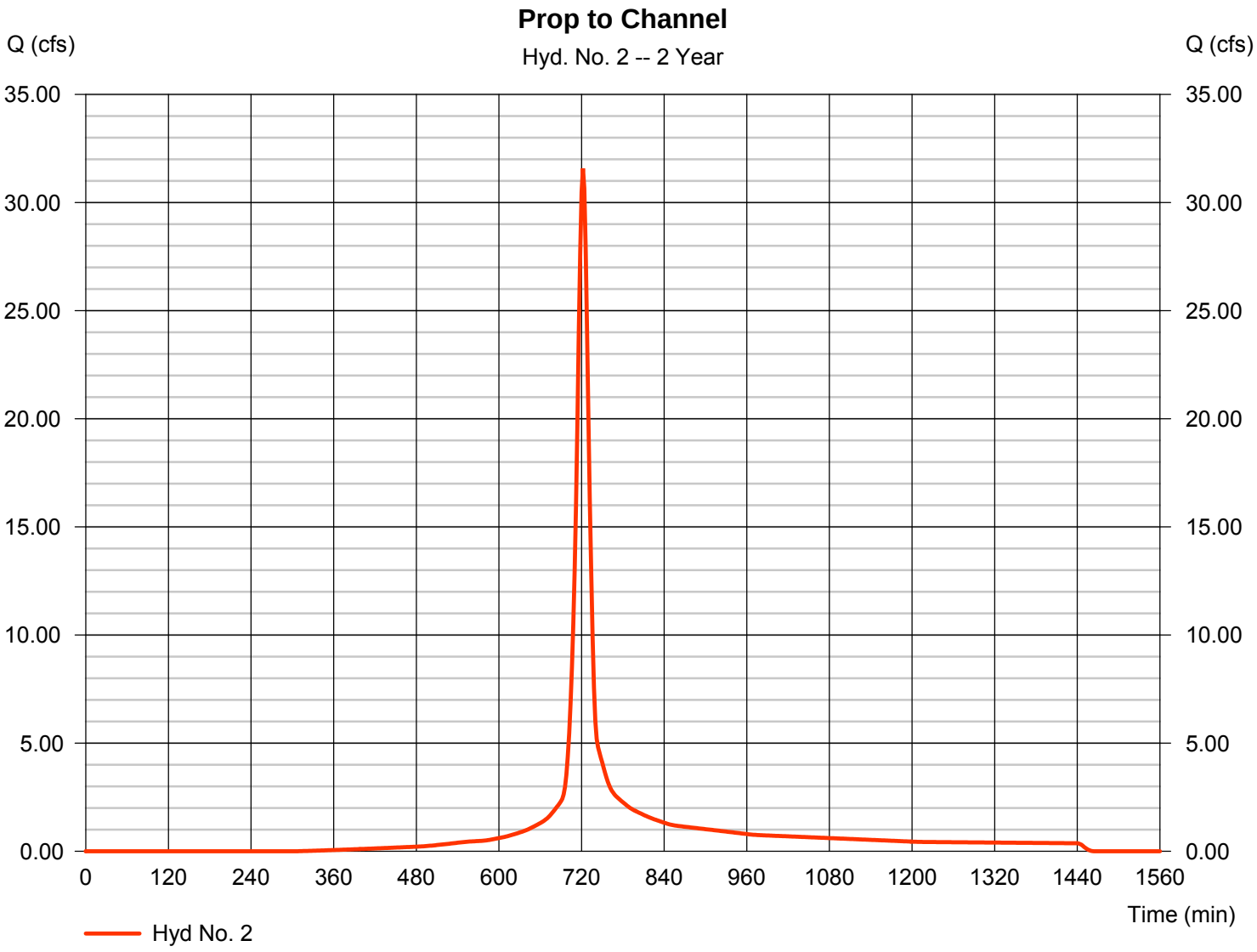
Hydrograph Report

Hyd. No. 2

Prop to Channel

Hydrograph type	= SCS Runoff	Peak discharge	= 31.58 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 90,227 cuft
Drainage area	= 10.030 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(9.040 x 91) + (0.990 x 81)] / 10.030



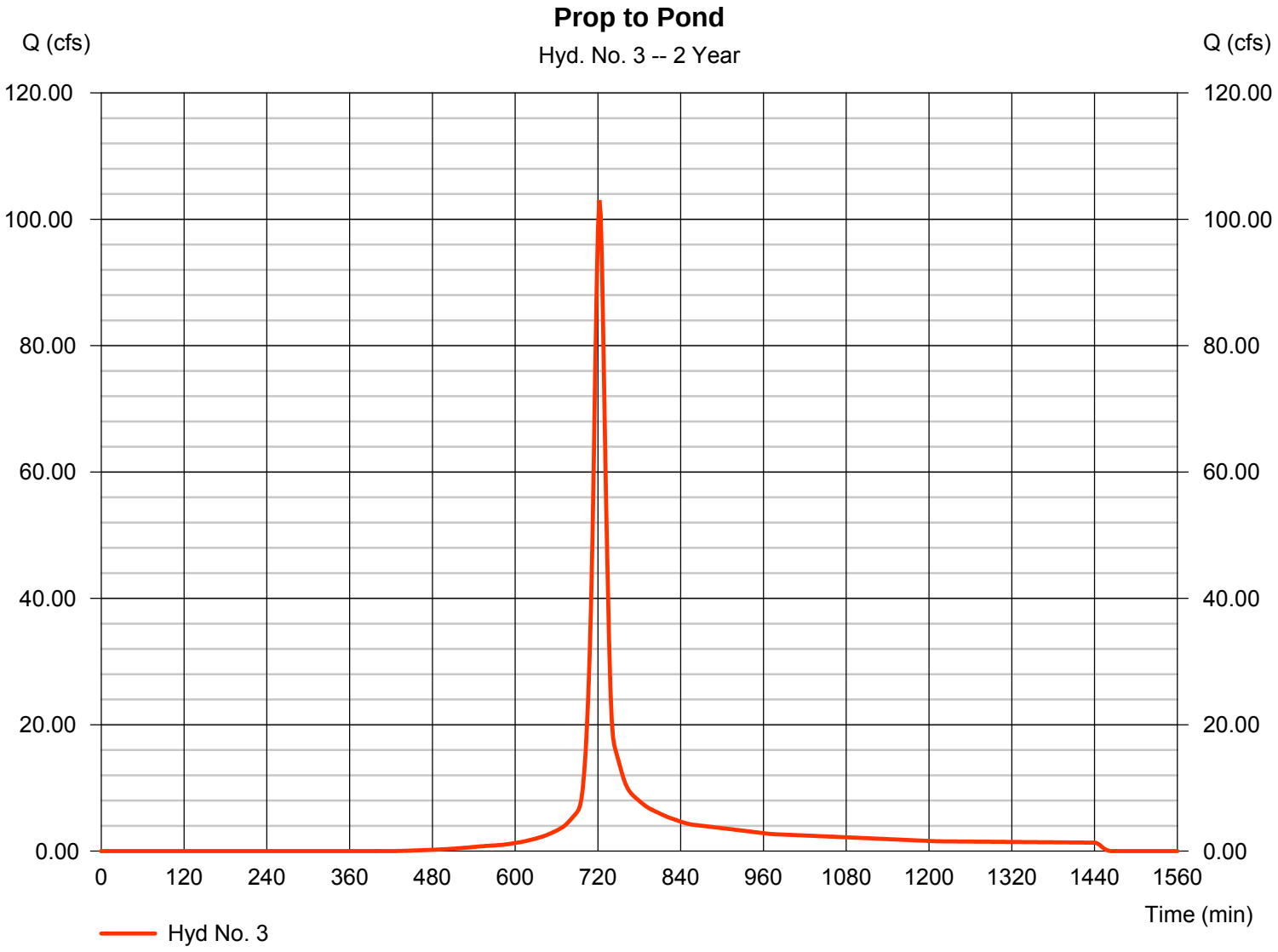
Hydrograph Report

Hyd. No. 3

Prop to Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 103.03 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 289,188 cuft
Drainage area	= 38.840 ac	Curve number	= 85*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(14.820 x 91) + (24.020 x 81)] / 38.840



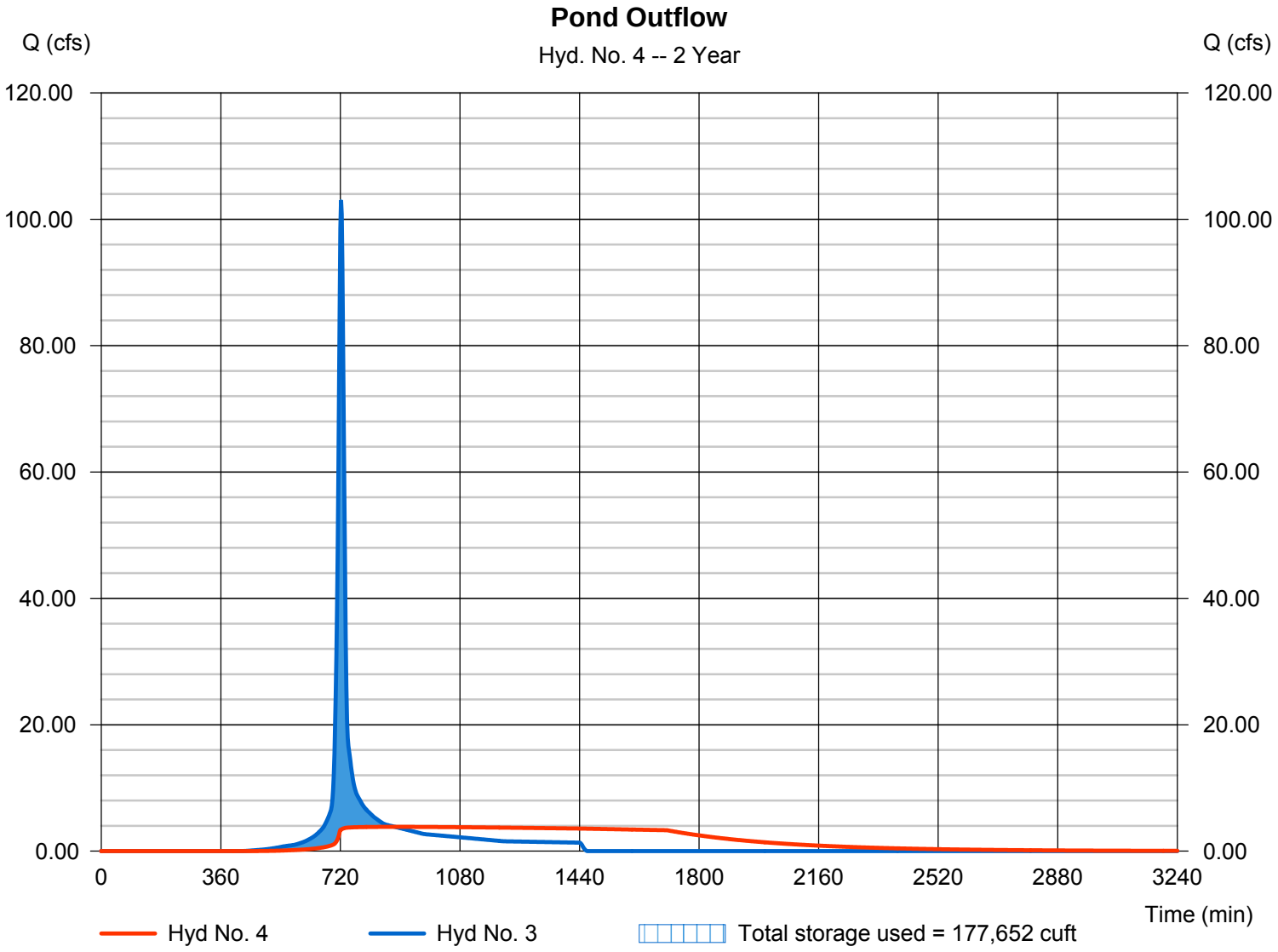
Hydrograph Report

Hyd. No. 4

Pond Outflow

Hydrograph type	= Reservoir	Peak discharge	= 3.834 cfs
Storm frequency	= 2 yrs	Time to peak	= 884 min
Time interval	= 2 min	Hyd. volume	= 289,167 cuft
Inflow hyd. No.	= 3 - Prop to Pond	Max. Elevation	= 1259.92 ft
Reservoir name	= POND	Max. Storage	= 177,652 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	147.42	2	726	523,971	------	------	------	Prop KTA
2	SCS Runoff	42.31	2	722	122,585	------	------	------	Prop to Channel
3	SCS Runoff	144.13	2	722	407,422	------	------	------	Prop to Pond
4	Reservoir	4.230	2	934	407,402	3	1260.93	266,261	Pond Outflow

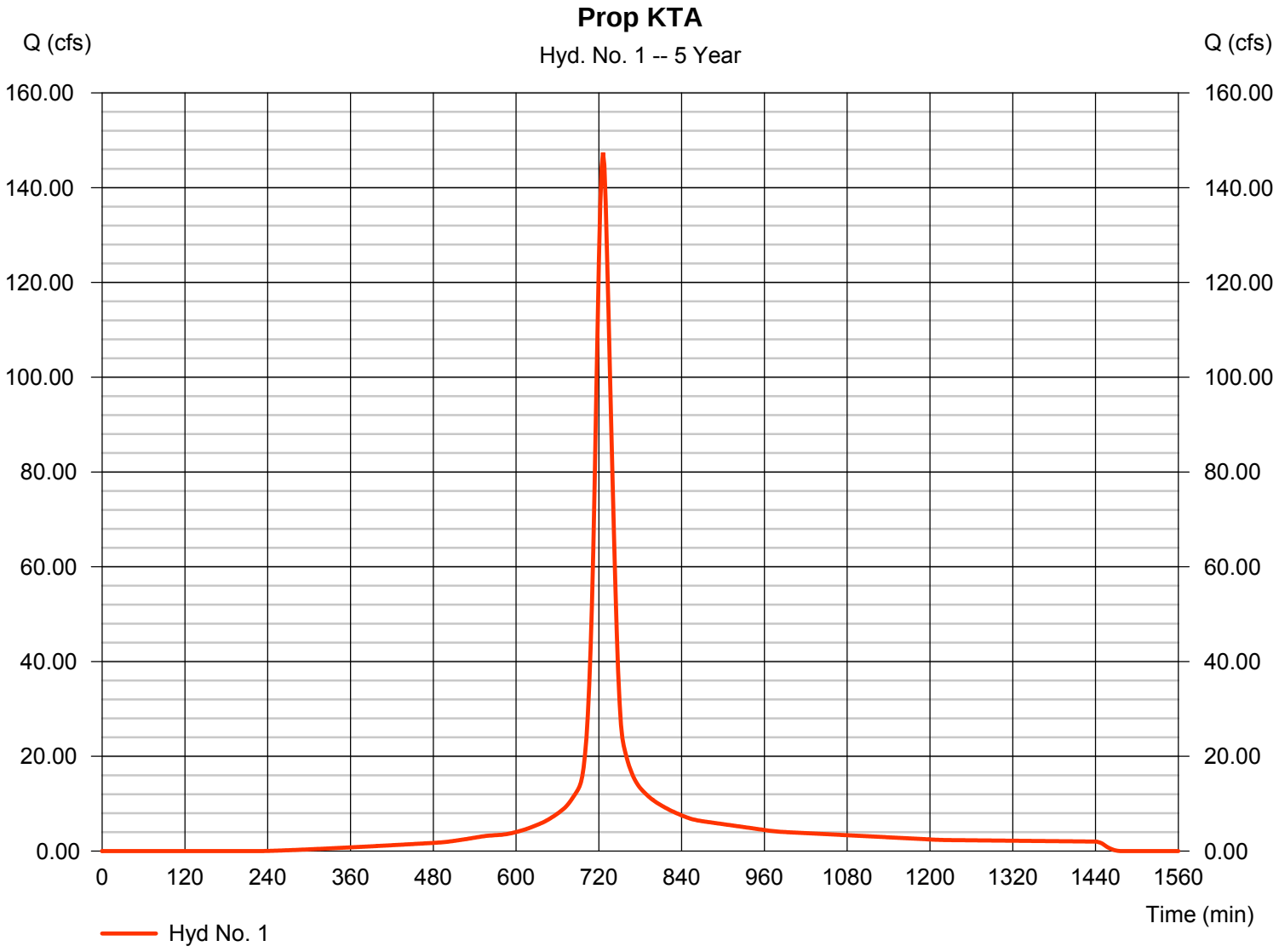
Hydrograph Report

Hyd. No. 1

Prop KTA

Hydrograph type	=	SCS Runoff	Peak discharge	=	147.42 cfs
Storm frequency	=	5 yrs	Time to peak	=	726 min
Time interval	=	2 min	Hyd. volume	=	523,971 cuft
Drainage area	=	39.880 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.90 min
Total precip.	=	4.56 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(18.630 x 91) + (0.320 x 81) + (1.380 x 88) + (19.550 x 91)] / 39.880



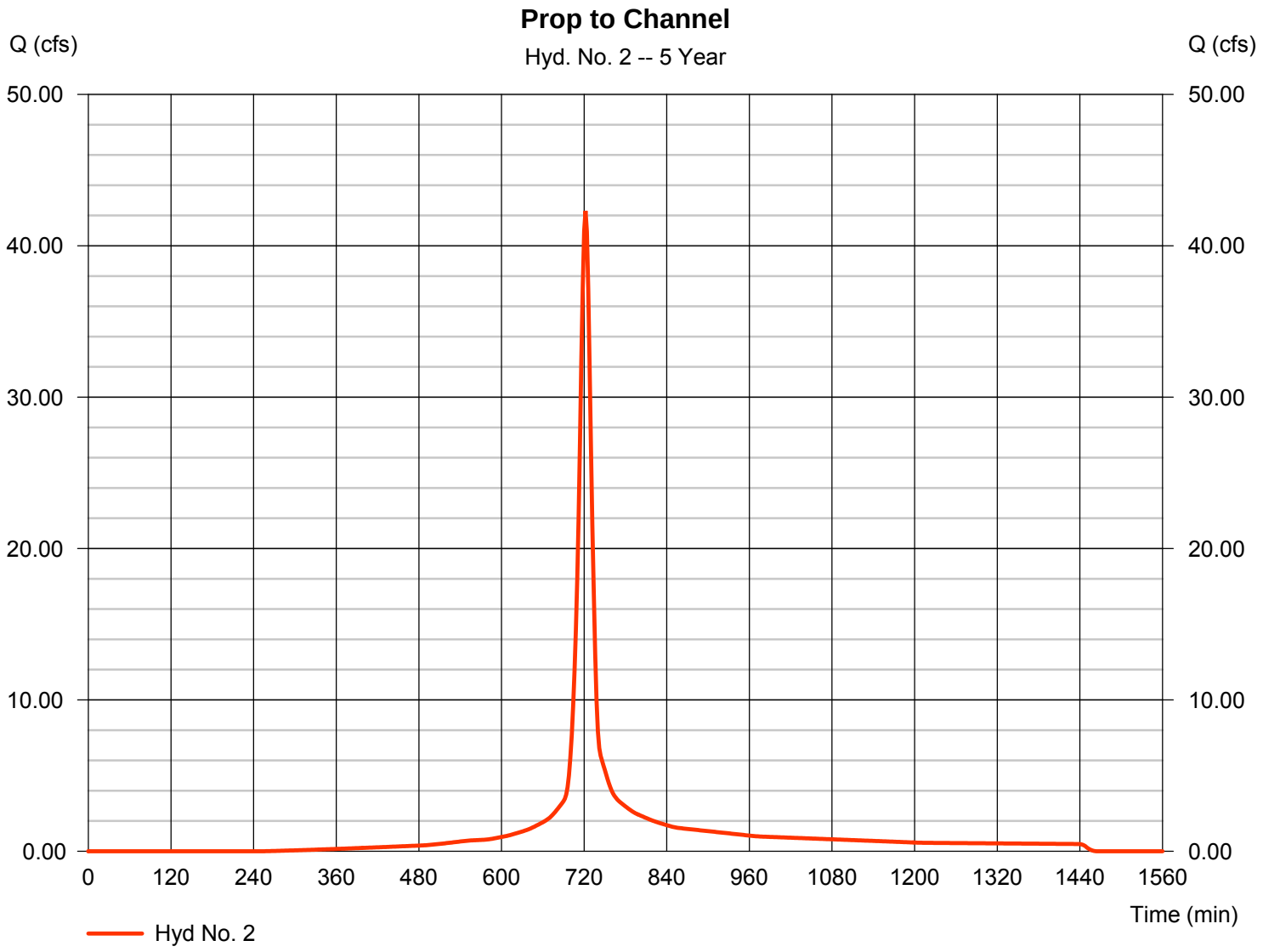
Hydrograph Report

Hyd. No. 2

Prop to Channel

Hydrograph type	= SCS Runoff	Peak discharge	= 42.31 cfs
Storm frequency	= 5 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 122,585 cuft
Drainage area	= 10.030 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.56 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(9.040 x 91) + (0.990 x 81)] / 10.030



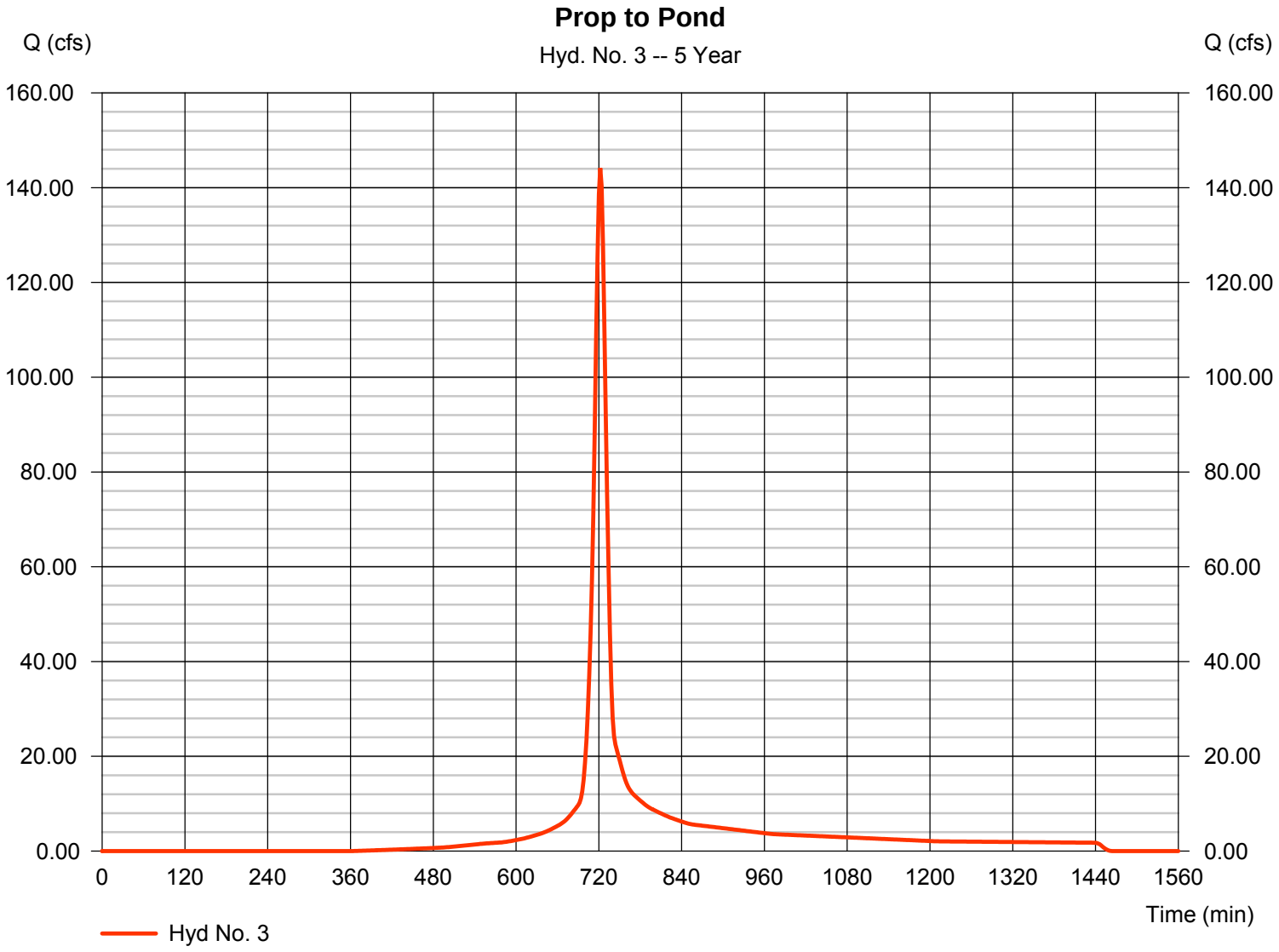
Hydrograph Report

Hyd. No. 3

Prop to Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 144.13 cfs
Storm frequency	= 5 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 407,422 cuft
Drainage area	= 38.840 ac	Curve number	= 85*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.56 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(14.820 x 91) + (24.020 x 81)] / 38.840



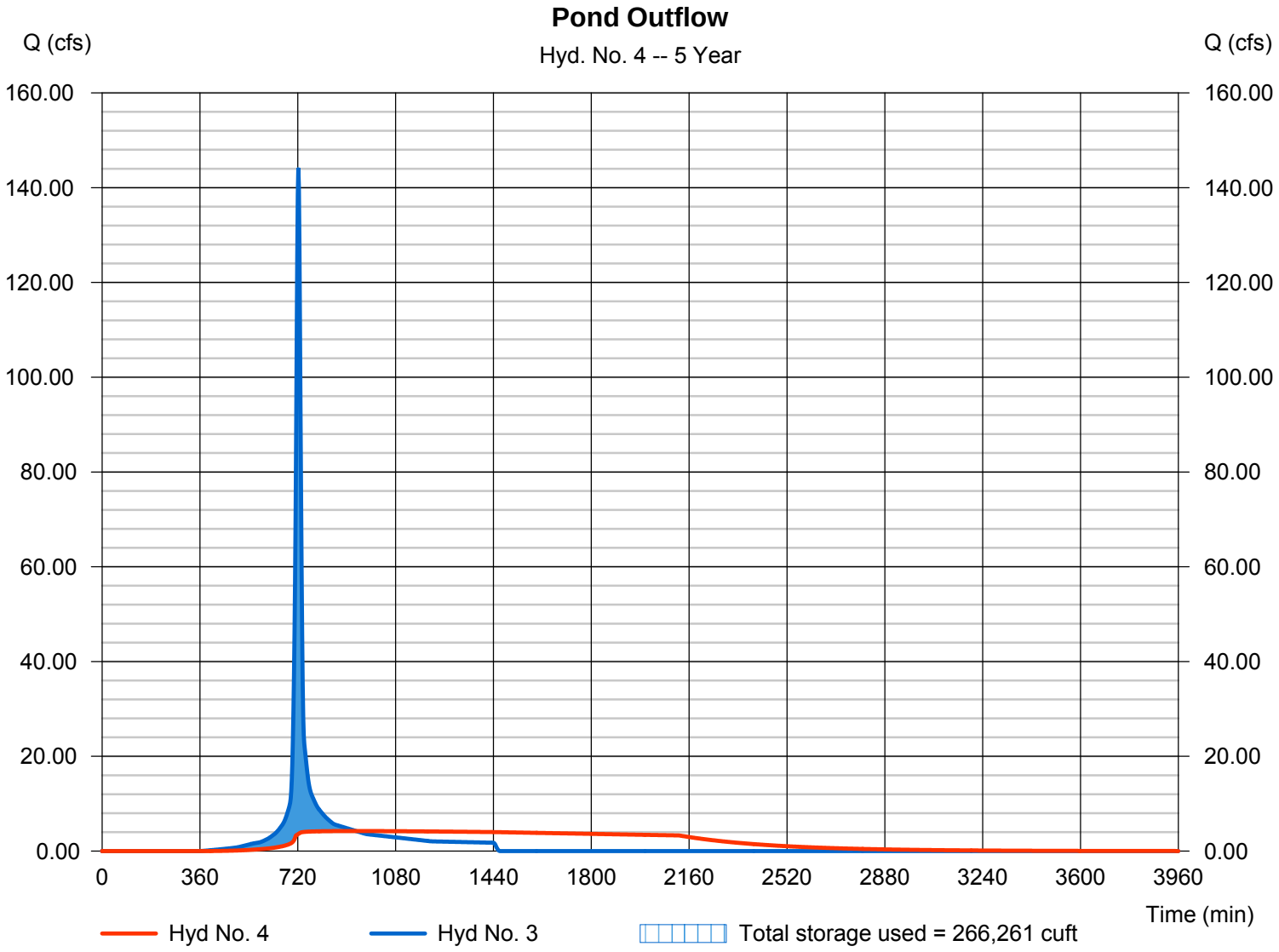
Hydrograph Report

Hyd. No. 4

Pond Outflow

Hydrograph type	= Reservoir	Peak discharge	= 4.230 cfs
Storm frequency	= 5 yrs	Time to peak	= 934 min
Time interval	= 2 min	Hyd. volume	= 407,402 cuft
Inflow hyd. No.	= 3 - Prop to Pond	Max. Elevation	= 1260.93 ft
Reservoir name	= POND	Max. Storage	= 266,261 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	174.86	2	726	626,868	------	------	------	Prop KTA
2	SCS Runoff	50.32	2	722	147,206	------	------	------	Prop to Channel
3	SCS Runoff	175.25	2	722	498,684	------	------	------	Prop to Pond
4	Reservoir	4.527	2	958	498,664	3	1261.68	335,889	Pond Outflow

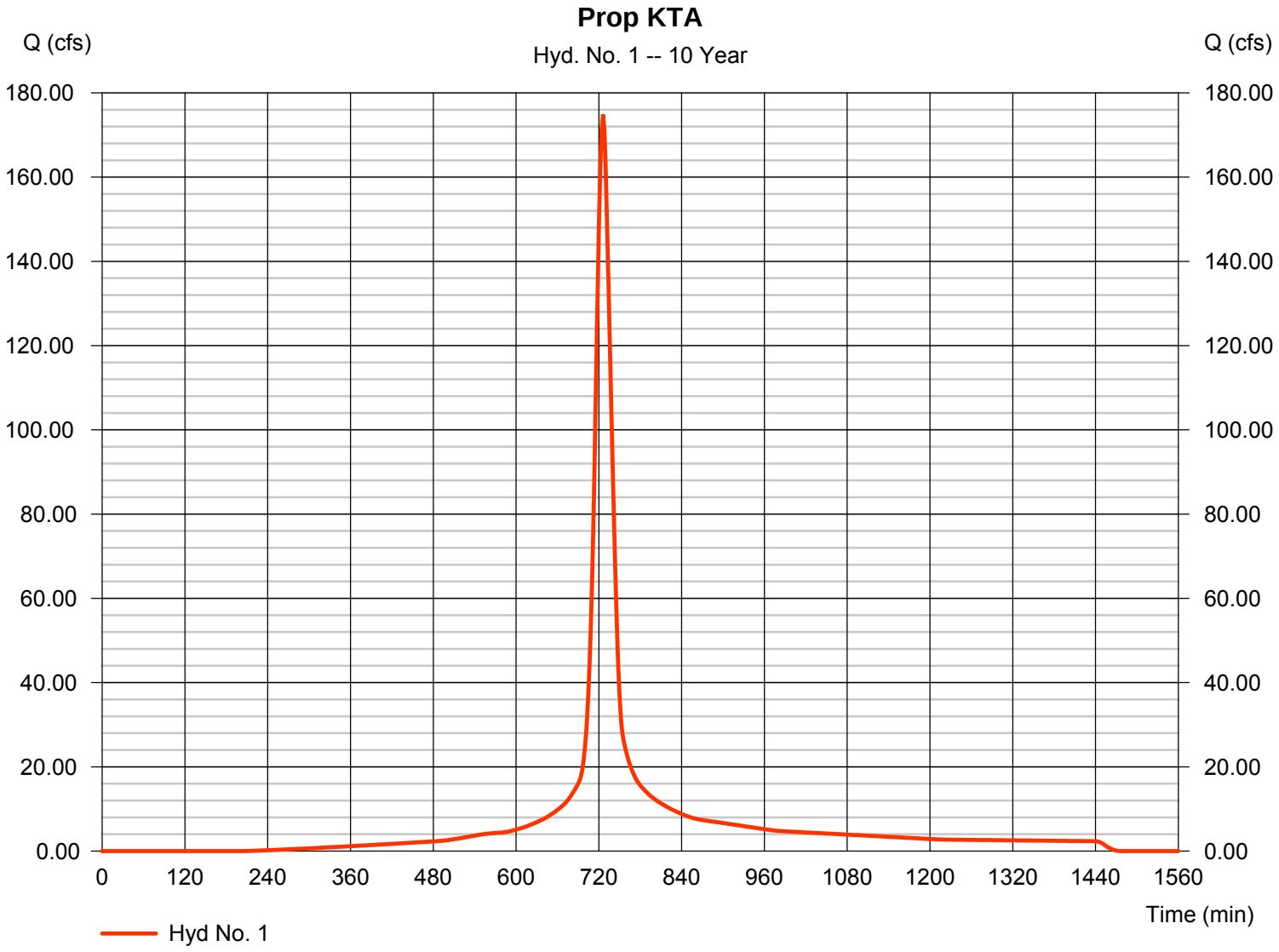
Hydrograph Report

Hyd. No. 1

Prop KTA

Hydrograph type	= SCS Runoff	Peak discharge	= 174.86 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 626,868 cuft
Drainage area	= 39.880 ac	Curve number	= 91*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.90 min
Total precip.	= 5.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(18.630 x 91) + (0.320 x 81) + (1.380 x 88) + (19.550 x 91)] / 39.880



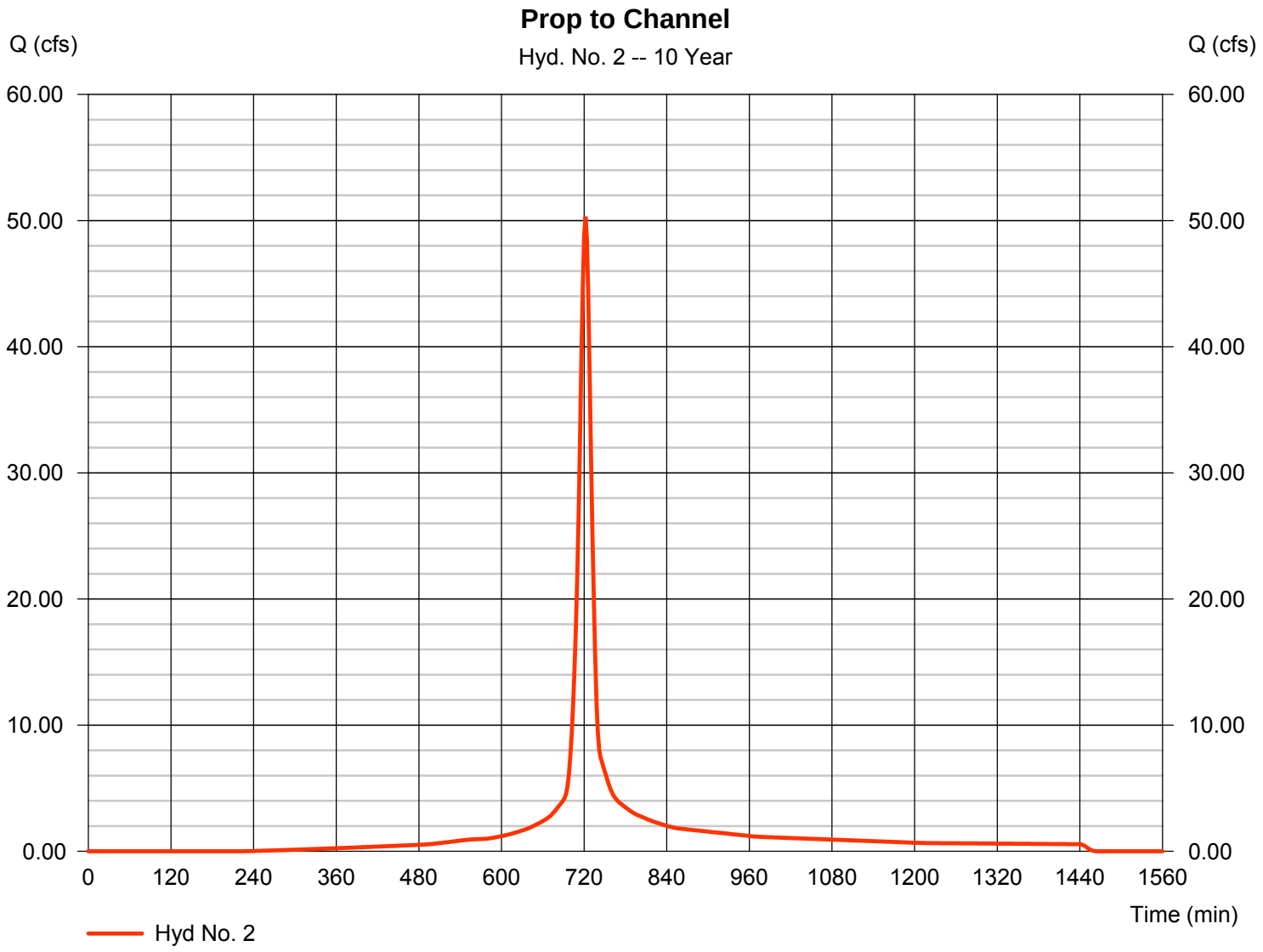
Hydrograph Report

Hyd. No. 2

Prop to Channel

Hydrograph type	= SCS Runoff	Peak discharge	= 50.32 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 147,206 cuft
Drainage area	= 10.030 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(9.040 x 91) + (0.990 x 81)] / 10.030



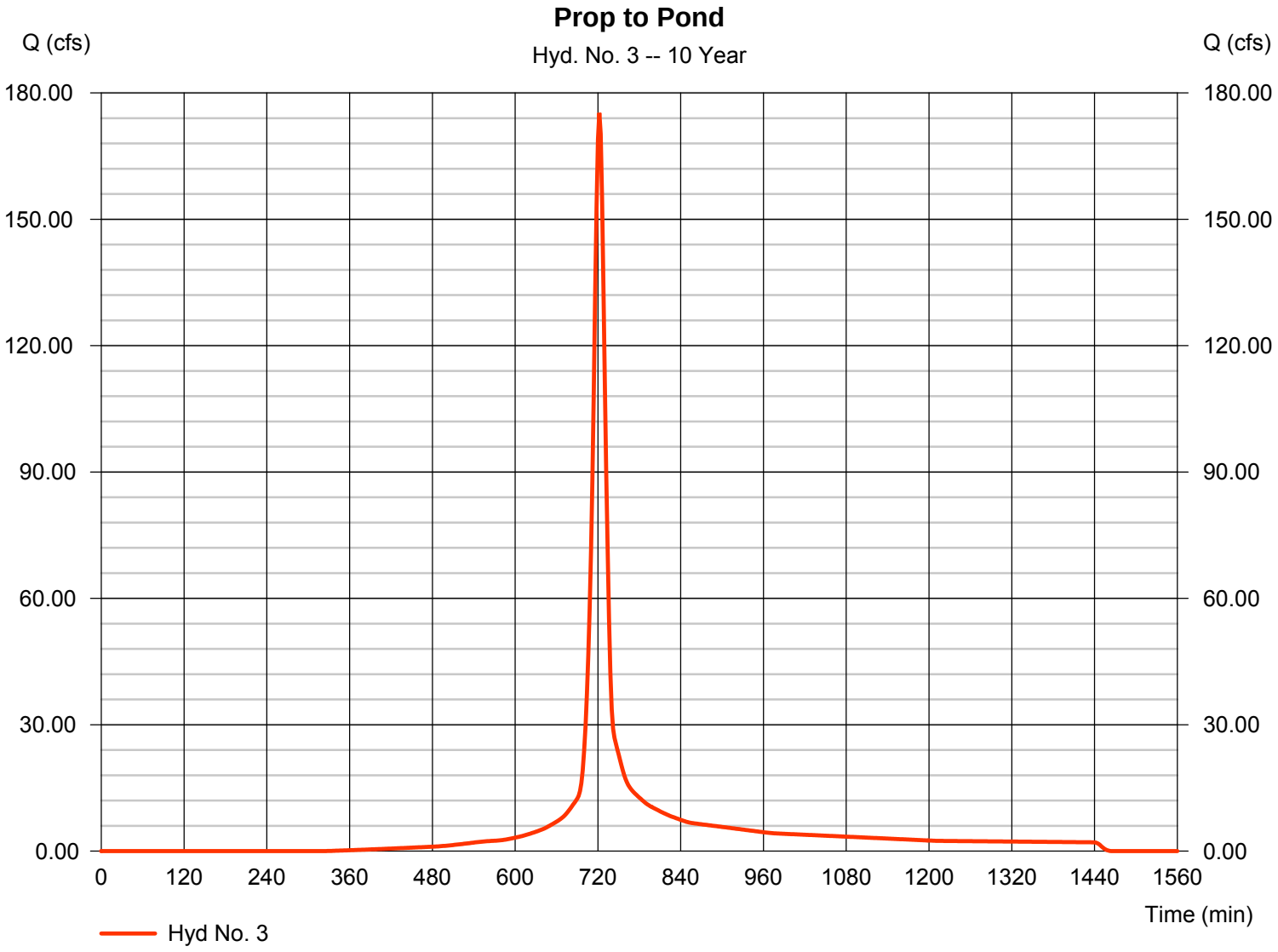
Hydrograph Report

Hyd. No. 3

Prop to Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 175.25 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 498,684 cuft
Drainage area	= 38.840 ac	Curve number	= 85*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(14.820 x 91) + (24.020 x 81)] / 38.840



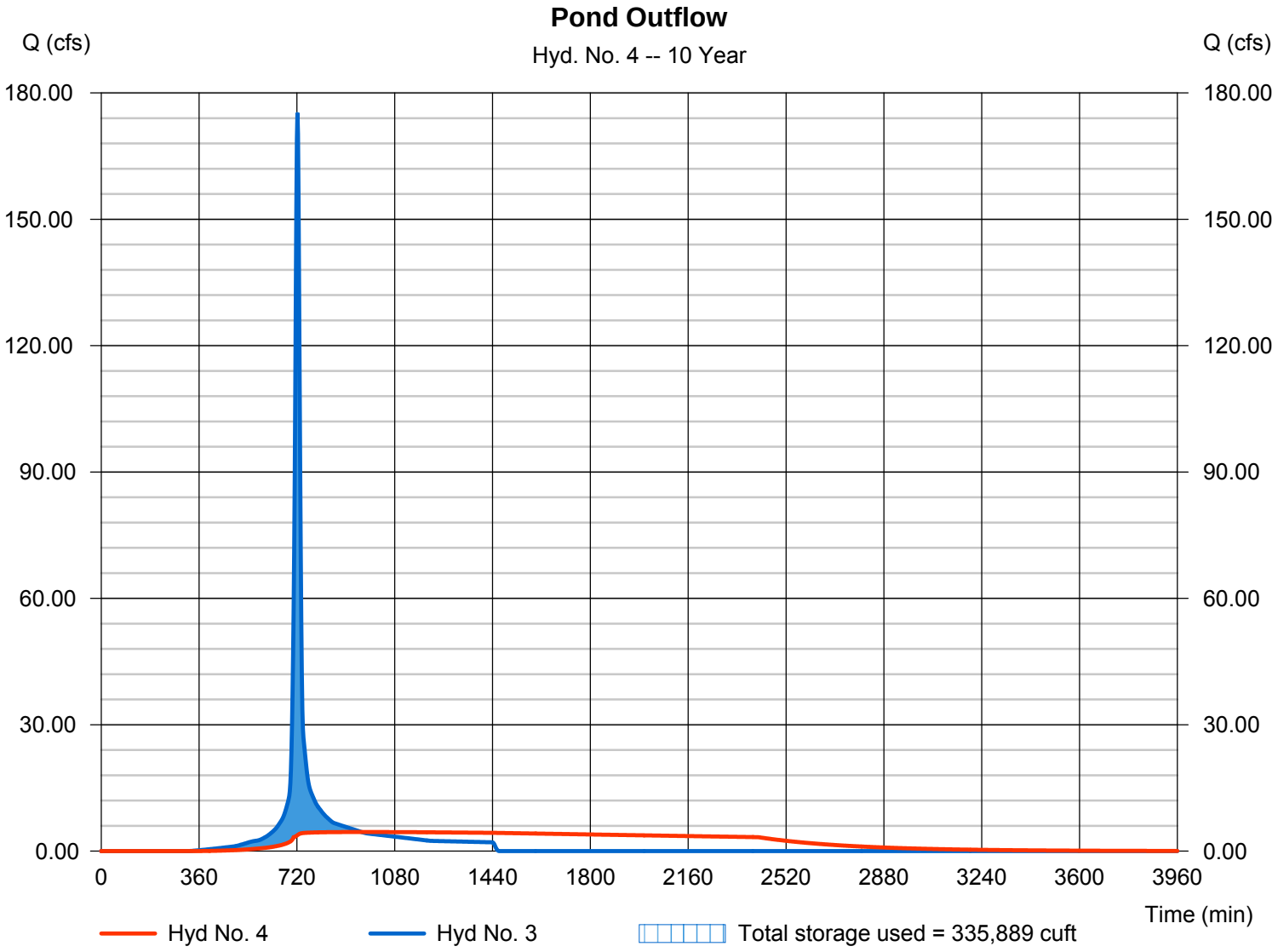
Hydrograph Report

Hyd. No. 4

Pond Outflow

Hydrograph type	= Reservoir	Peak discharge	= 4.527 cfs
Storm frequency	= 10 yrs	Time to peak	= 958 min
Time interval	= 2 min	Hyd. volume	= 498,664 cuft
Inflow hyd. No.	= 3 - Prop to Pond	Max. Elevation	= 1261.68 ft
Reservoir name	= POND	Max. Storage	= 335,889 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	211.25	2	726	765,083	------	------	------	Prop KTA
2	SCS Runoff	60.96	2	722	180,328	------	------	------	Prop to Channel
3	SCS Runoff	216.83	2	722	622,624	------	------	------	Prop to Pond
4	Reservoir	4.914	2	994	622,603	3	1262.61	431,465	Pond Outflow

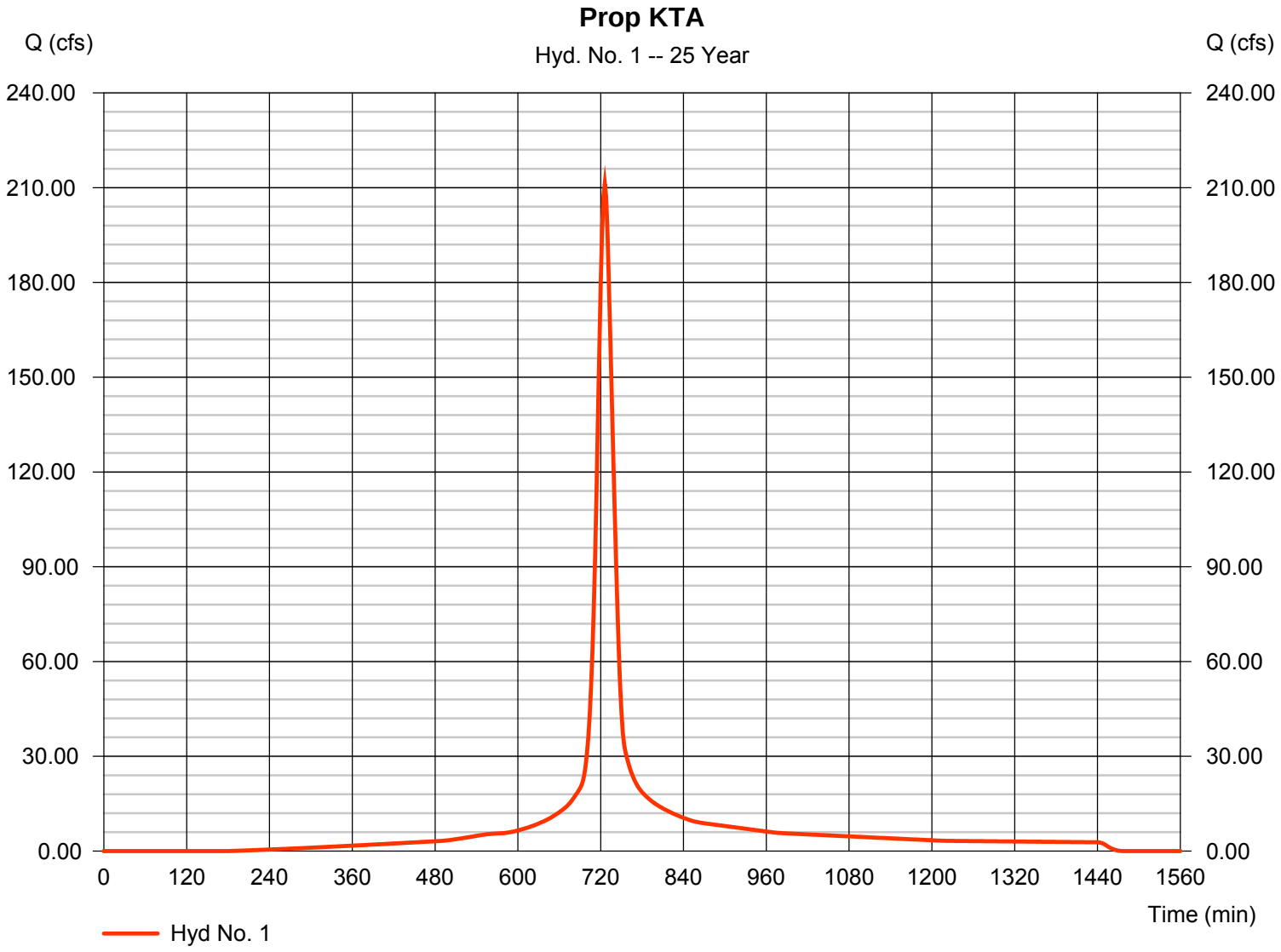
Hydrograph Report

Hyd. No. 1

Prop KTA

Hydrograph type	= SCS Runoff	Peak discharge	= 211.25 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 765,083 cuft
Drainage area	= 39.880 ac	Curve number	= 91*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.90 min
Total precip.	= 6.24 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(18.630 x 91) + (0.320 x 81) + (1.380 x 88) + (19.550 x 91)] / 39.880



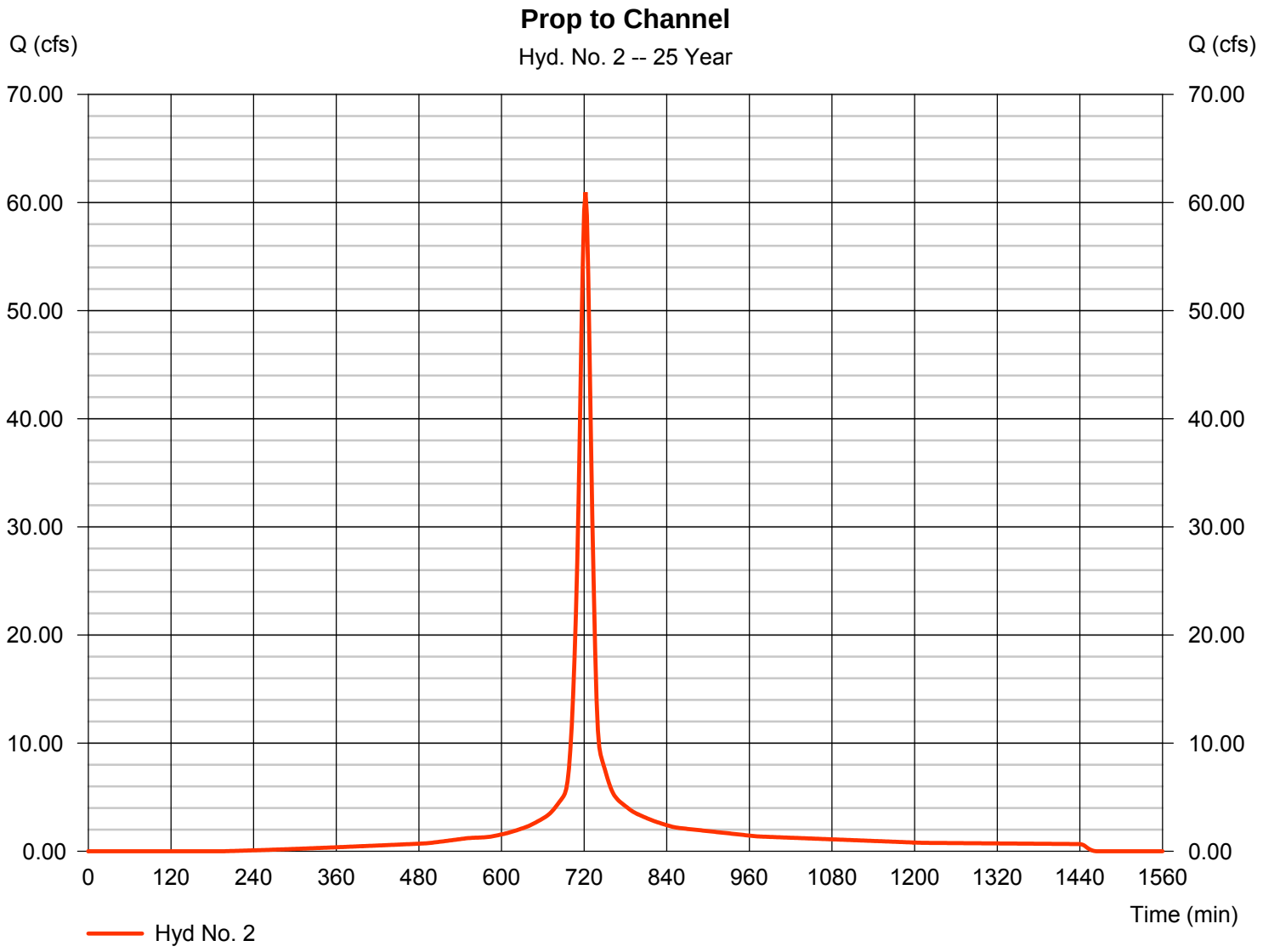
Hydrograph Report

Hyd. No. 2

Prop to Channel

Hydrograph type	= SCS Runoff	Peak discharge	= 60.96 cfs
Storm frequency	= 25 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 180,328 cuft
Drainage area	= 10.030 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.24 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(9.040 x 91) + (0.990 x 81)] / 10.030



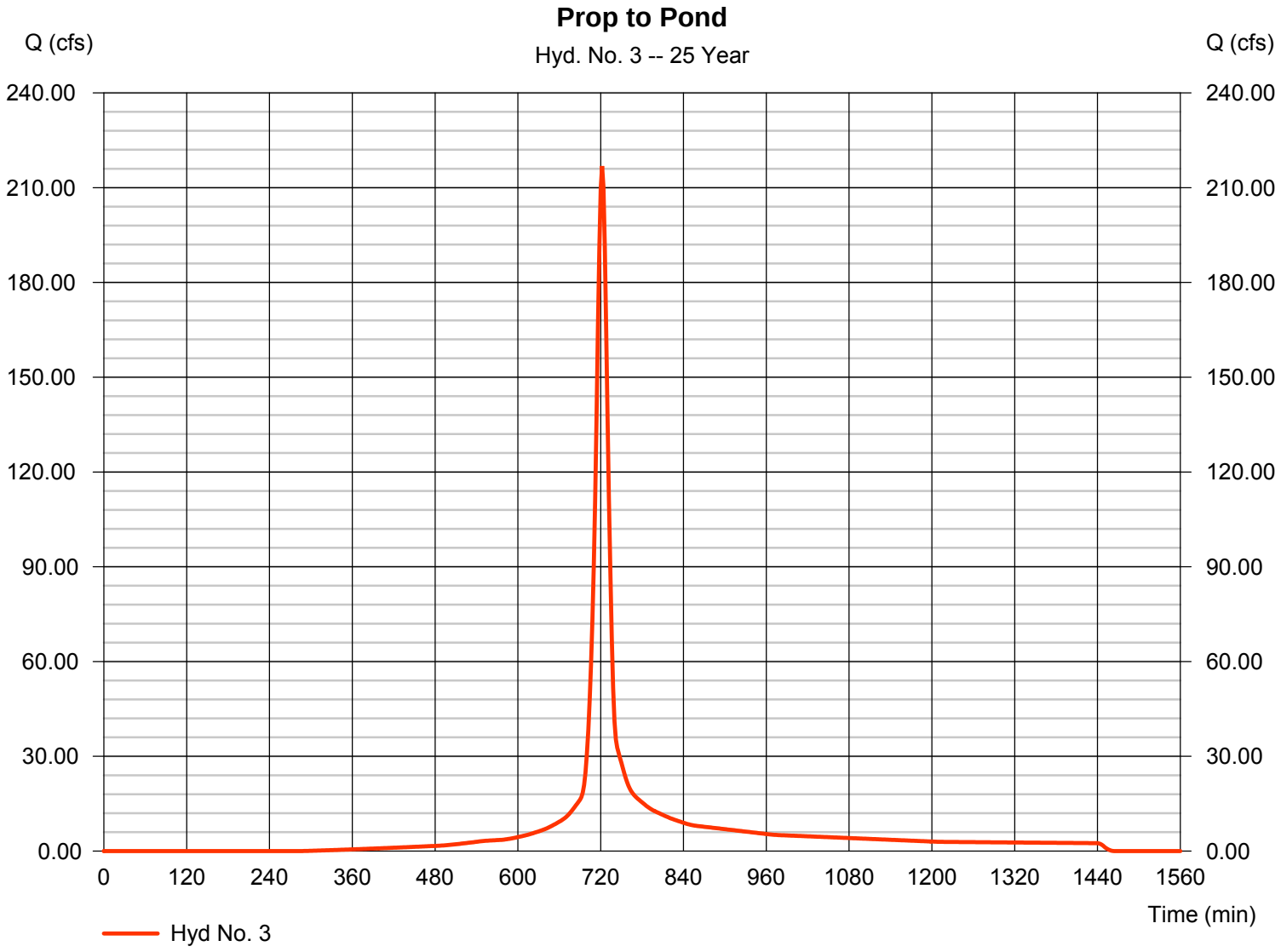
Hydrograph Report

Hyd. No. 3

Prop to Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 216.83 cfs
Storm frequency	= 25 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 622,624 cuft
Drainage area	= 38.840 ac	Curve number	= 85*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.24 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(14.820 x 91) + (24.020 x 81)] / 38.840



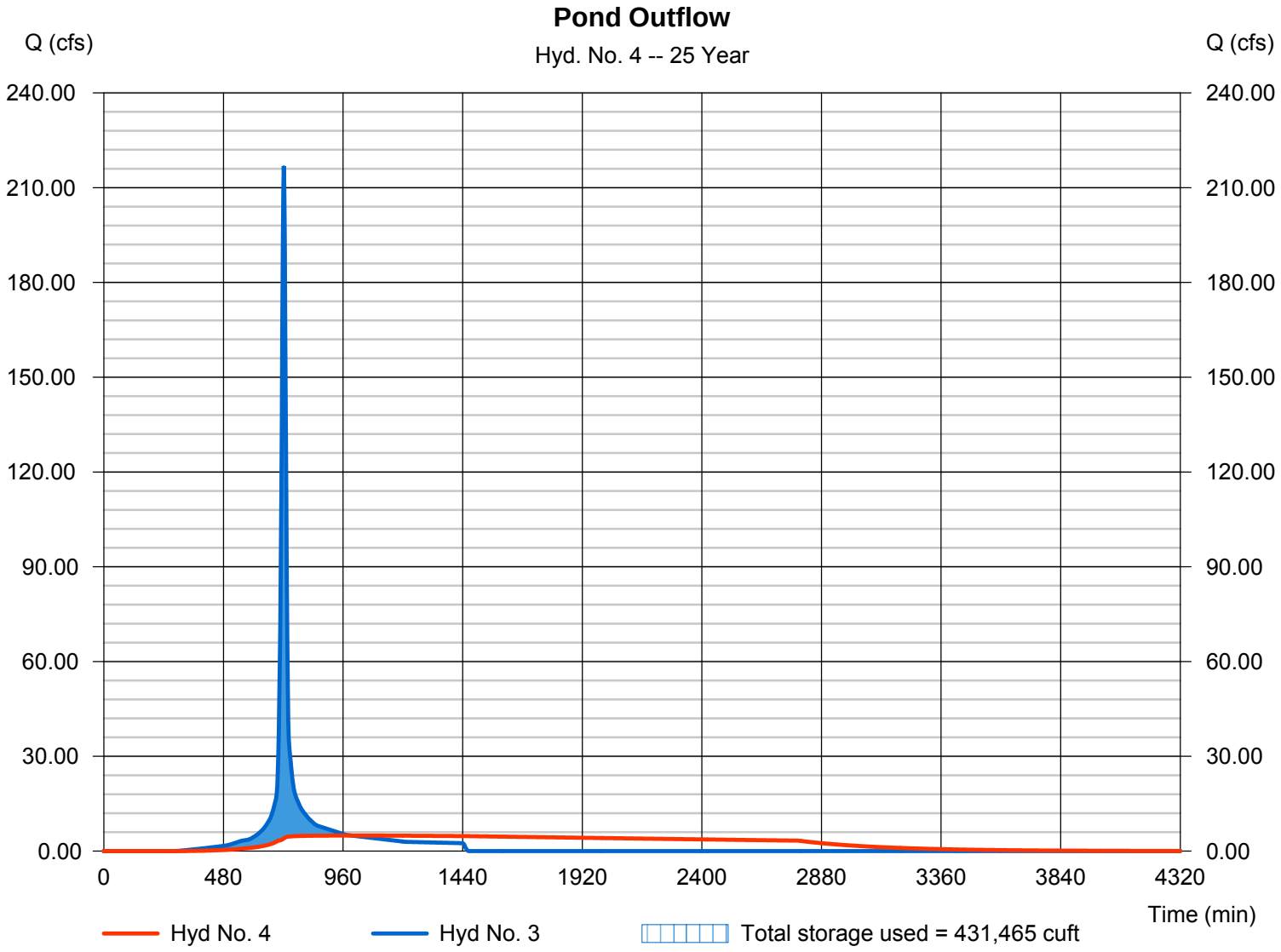
Hydrograph Report

Hyd. No. 4

Pond Outflow

Hydrograph type	= Reservoir	Peak discharge	= 4.914 cfs
Storm frequency	= 25 yrs	Time to peak	= 994 min
Time interval	= 2 min	Hyd. volume	= 622,603 cuft
Inflow hyd. No.	= 3 - Prop to Pond	Max. Elevation	= 1262.61 ft
Reservoir name	= POND	Max. Storage	= 431,465 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	265.47	2	726	973,782	------	------	------	Prop KTA
2	SCS Runoff	76.80	2	722	230,413	------	------	------	Prop to Channel
3	SCS Runoff	279.08	2	722	811,711	------	------	------	Prop to Pond
4	Reservoir	5.479	2	1054	811,665	3	1263.93	580,288	Pond Outflow

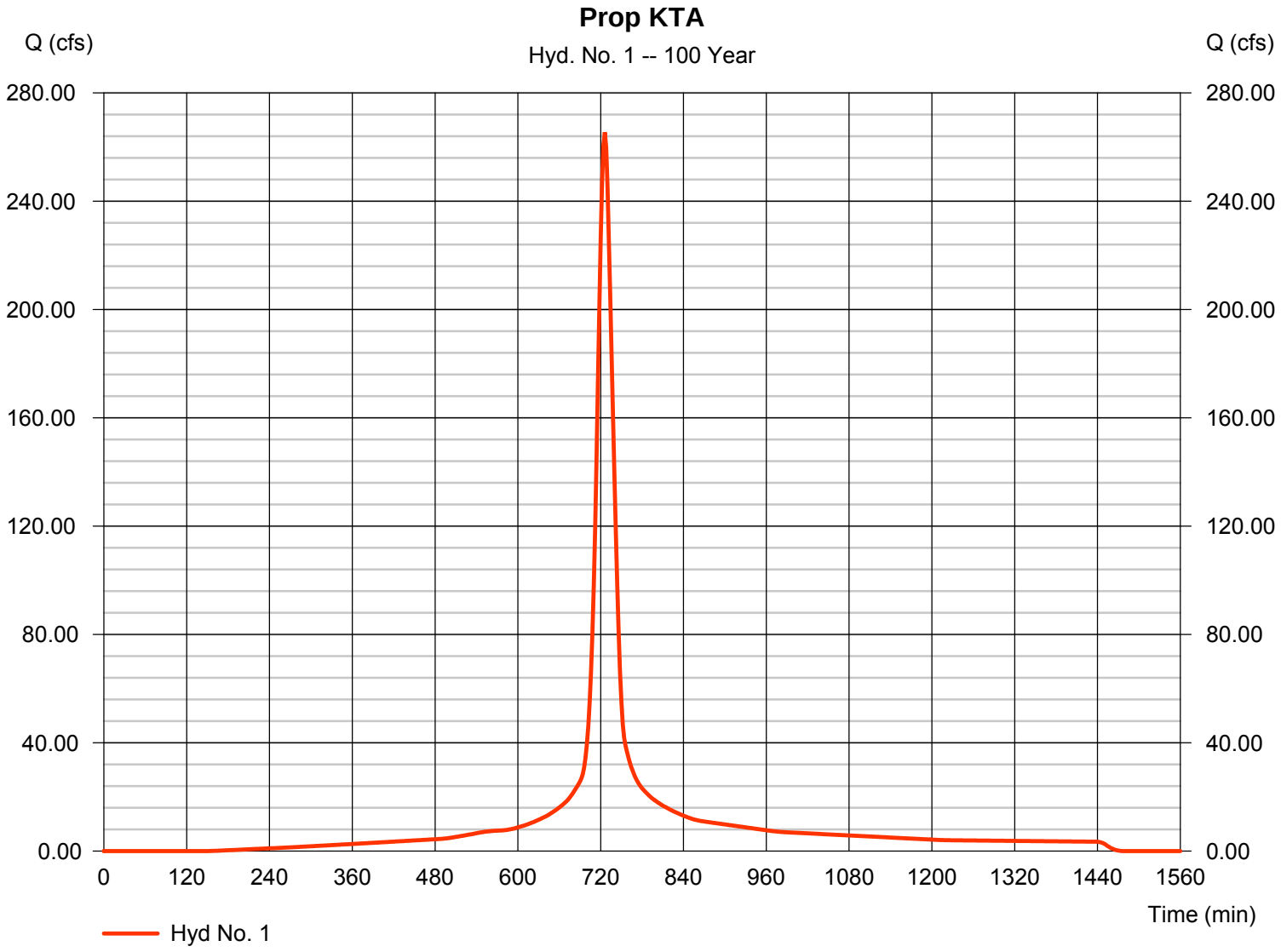
Hydrograph Report

Hyd. No. 1

Prop KTA

Hydrograph type	= SCS Runoff	Peak discharge	= 265.47 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 973,782 cuft
Drainage area	= 39.880 ac	Curve number	= 91*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.90 min
Total precip.	= 7.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(18.630 x 91) + (0.320 x 81) + (1.380 x 88) + (19.550 x 91)] / 39.880



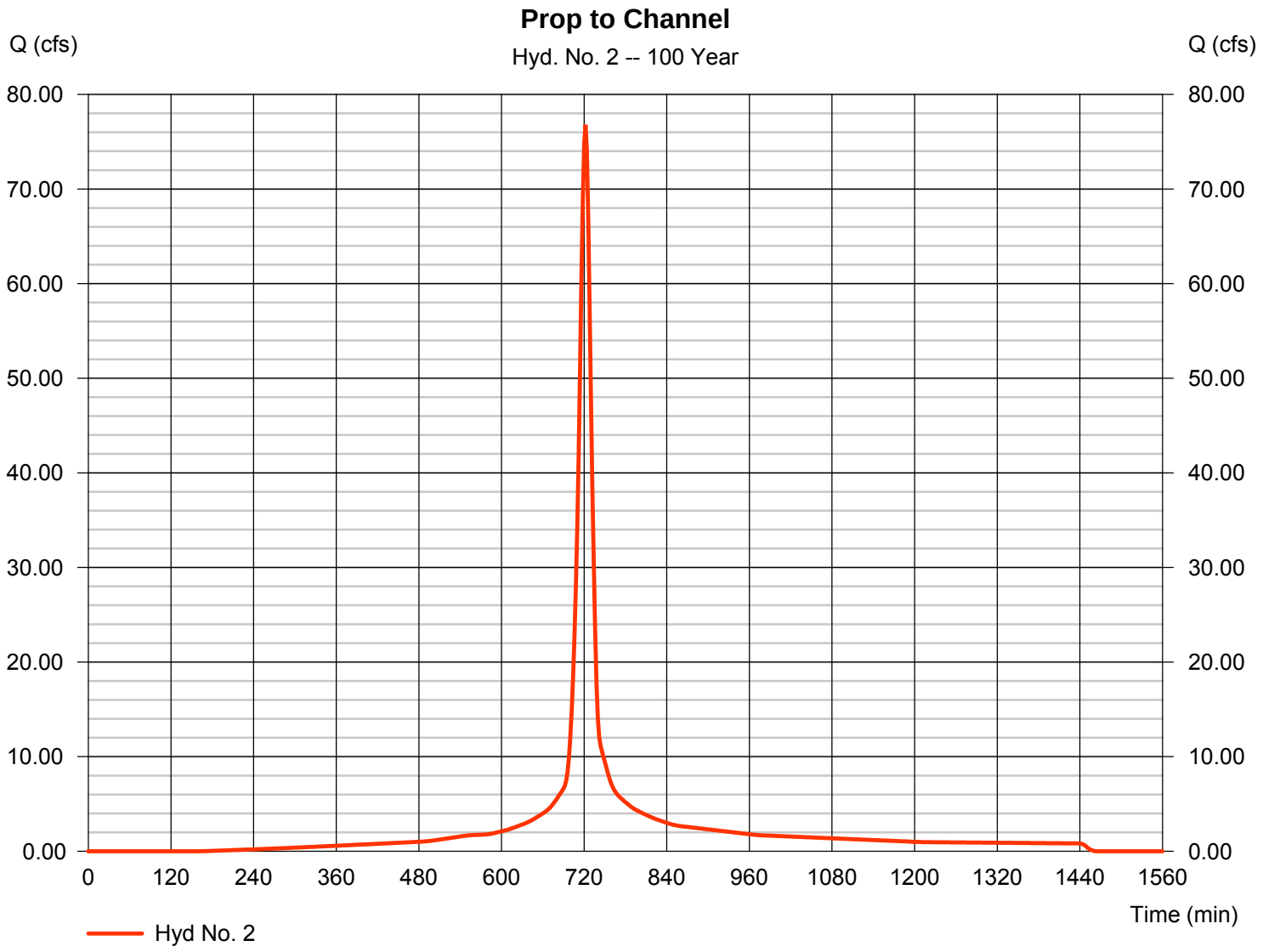
Hydrograph Report

Hyd. No. 2

Prop to Channel

Hydrograph type	= SCS Runoff	Peak discharge	= 76.80 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 230,413 cuft
Drainage area	= 10.030 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 7.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(9.040 x 91) + (0.990 x 81)] / 10.030



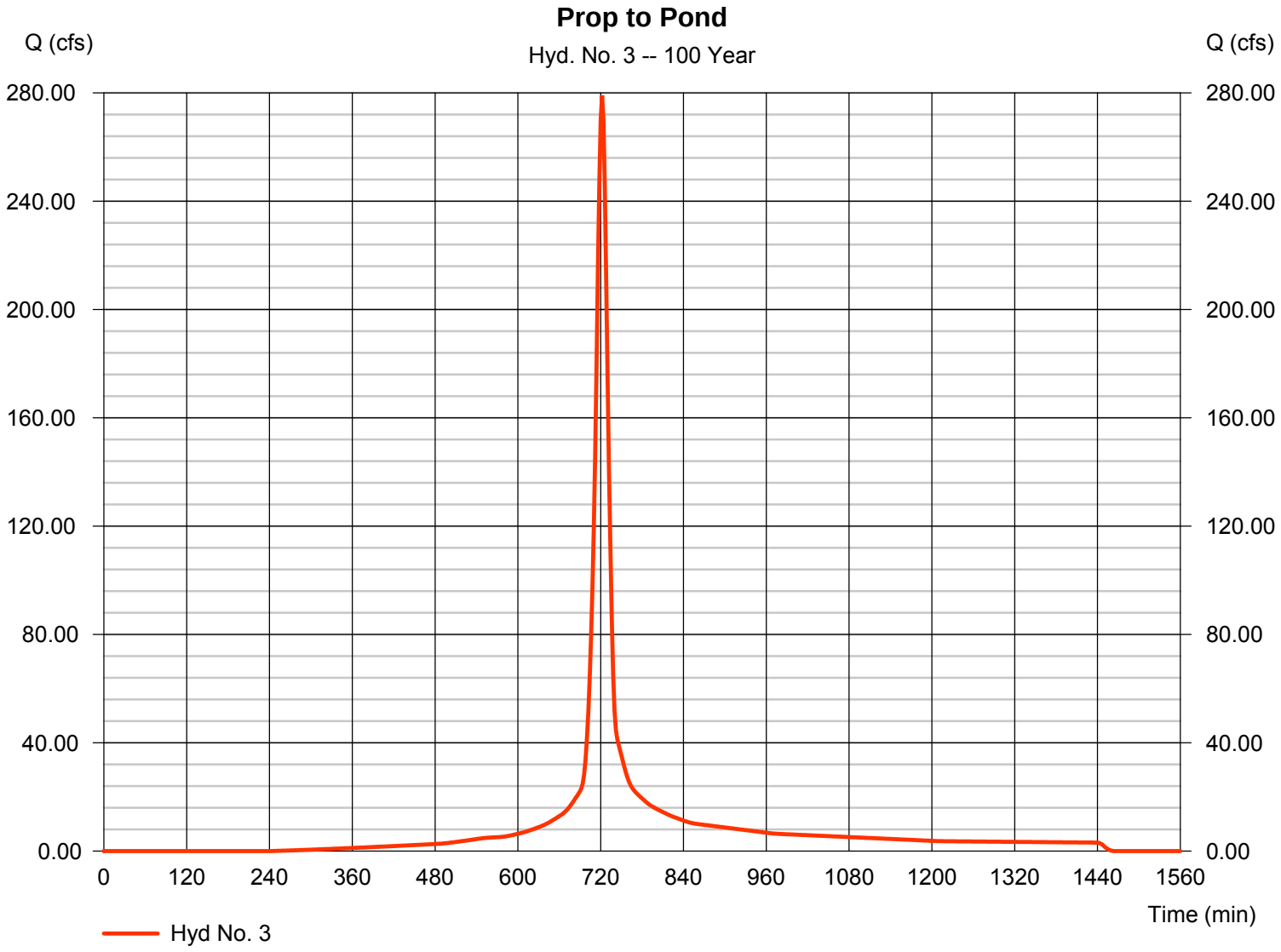
Hydrograph Report

Hyd. No. 3

Prop to Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 279.08 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 811,711 cuft
Drainage area	= 38.840 ac	Curve number	= 85*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 7.68 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(14.820 x 91) + (24.020 x 81)] / 38.840



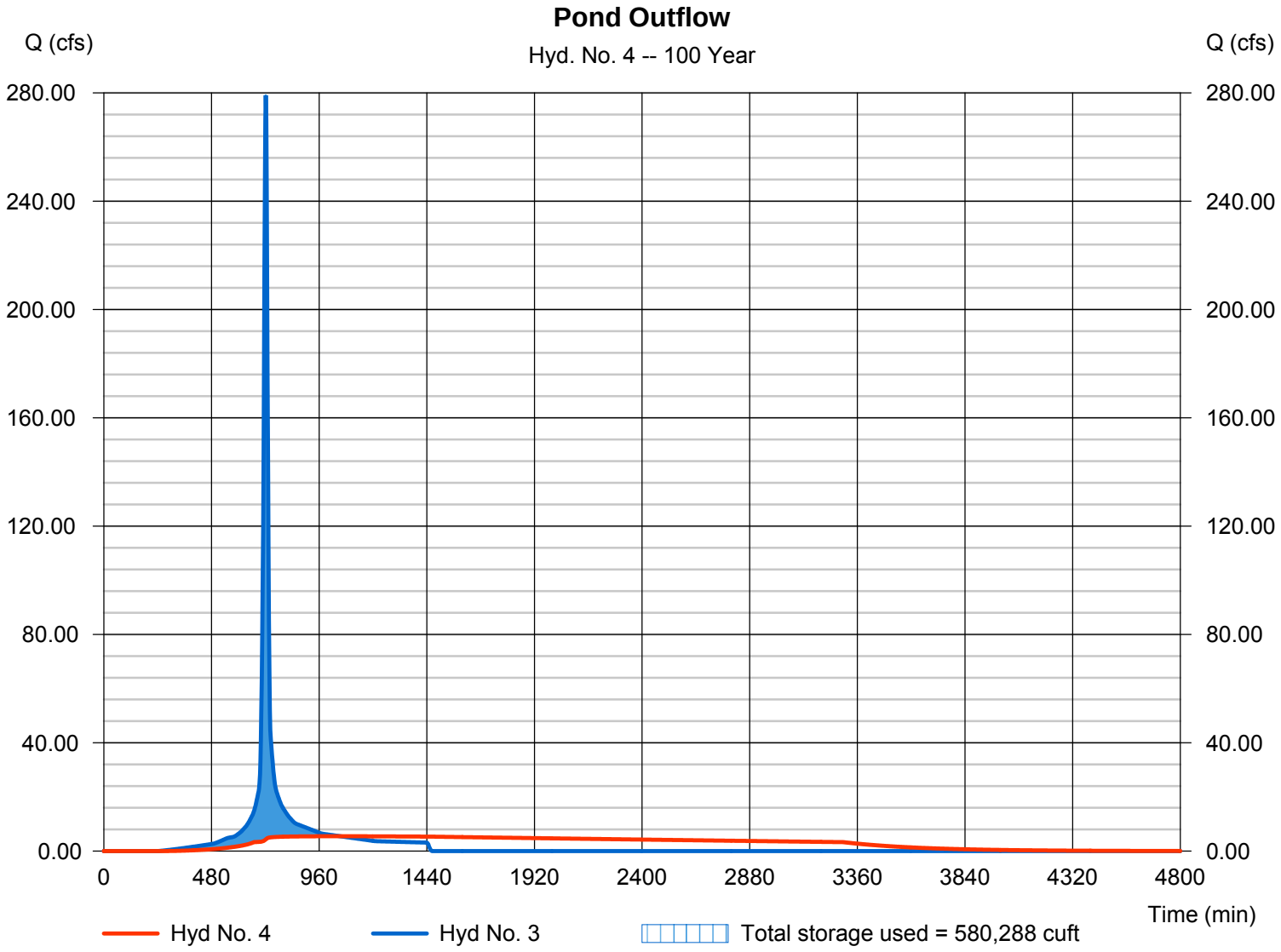
Hydrograph Report

Hyd. No. 4

Pond Outflow

Hydrograph type	= Reservoir	Peak discharge	= 5.479 cfs
Storm frequency	= 100 yrs	Time to peak	= 1054 min
Time interval	= 2 min	Hyd. volume	= 811,665 cuft
Inflow hyd. No.	= 3 - Prop to Pond	Max. Elevation	= 1263.93 ft
Reservoir name	= POND	Max. Storage	= 580,288 cuft

Storage Indication method used. Outflow includes exfiltration.



SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 3-3

Project	SOUTHFORK COMMERCIAL ADDITION
Feature	PROPOSED DRAINAGE
Analyst	Jason P. Dickman, P.E.
Version	20110418
Notes	… 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	KTA to Channel	9	6.8	0.0	6.9	8.2	0.0	0.0	21.9	2569	8	0.30	1.96	13.1	0.219	39.88
2	Site to Channel	2	3.7	0.0	0.0	0.1	0.0	0.0	3.8	370	4	1.08	1.62	2.3	0.038	10.03
3	Site to Pond	8	1.5	0.0	0.7	3.3	0.1	0.0	5.6	1659	13	0.79	4.93	3.4	0.056	38.84
4	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
5	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
6	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
7	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
8	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
9	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
10	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
11	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
12	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
13	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
14	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	0.00	0.82	16.4	0.273	500
15	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
16	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
17	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
18	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
19	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
20	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
21	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
22	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
23	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
24	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
25	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
26	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500

Subbasin Name	KTA to Channel
Drainage Area (ac)	39.88
Drainage Area (sq mi)	0.0623125

Sheet Flow

							Total
selected>>	Select (0 or 1)	1	0	0	0	0	1 segments
	Length (ft)	105	1	1	1	1	105 feet length
	Top Elevation (ft)	1272	1	1	1	1	
	Bottom Elevation (ft)	1268	1	1	1	1	
	Cover	0.13, Range, natural	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "n"						
	Sheet Flow "n" (dim)	0.130	0.000	0.000	0.000	0.000	
	2-yr, 24-hr Rainfall (ins)	3.50	3.50	3.50	3.50	3.50	
	Drop (ft)	4	0	0	0	0	4 feet drop
	Slope (ft/ft)	0.0371	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	3.71	0.00	0.00	0.00	0.00	
	Velocity (fps)	0.26					
	Travel Time (hrs)	0.113					
	Travel Time (mins)	6.78					6.8 mins travel

Shallow Concentrated Flow

							Total
	Select (0 or 1)	0	0	0	0	0	0 segments
	Length (ft)	1073	1	1	1	1	0 feet length
	Top Elevation (ft)	1267.6	1	1	1	1	
	Bottom Elevation (ft)	1266	1	1	1	1	
	Cover	7, Short grass pasture	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "K"						
	Surface Coeff (dim)	7.00	0.00	0.00	0.00	0.00	
	Drop (ft)	2	0	0	0	0	0 feet drop
	Slope (ft/ft)	0.0016	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	0.16	0.00	0.00	0.00	0.00	
	Velocity (fps)						
	Travel Time (mins)						0.0 mins travel

selected>>

Open Channel Ditch Flow

							Total
	Select (0 or 1)	1	1	1	0	0	3 segments
	Length (ft)	582	200	364	1	1	### feet length
	Top Elevation (ft)	1265.7	1264.5	1264.42	1	1	
	Bottom Elevation (ft)	1265.23	1264.42	1264.04	1	1	
	Channel Lining	0.03, Grassed	0.03, Grassed	0.03, Grassed	Choose Lining Type	Choose Lining Type	
	Bottom Width (ft)	6.00	8.00	12.00	1.00	1.00	
	Left Side Slope (H:V)	4.00	4.00	4.00	1.00	1.00	
	Right Side Slope (H:V)	4.00	4.00	4.00	1.00	1.00	
	Depth (ft)	6.00	5.00	4.00	1.00	1.00	
	Specify alternate "n"						
	Manning "n" (dim)	0.030	0.030	0.030	0.000	0.000	
	Drop (ft)	0	0	0	0	0	0.9 feet drop
	Slope (ft/ft)	0.0008	0.0004	0.0010	0.0000	0.0000	
	Slope (%)	0.08	0.04	0.10	0.00	0.00	
	Flow Area (sq ft)	180.00	140.00	112.00	2.00	2.00	
	Wet Perimeter (ft)	55.48	49.23	44.98	3.83	3.83	
	Hydraulic Radius (ft)	3.24	2.84	2.49	0.52	0.52	
	Velocity (fps)	3.09	1.99	2.95			
	Normal Flow (cfs)	556.8	279.1	330.2			
selected>>	Travel Time (mins)	3.14	1.67	2.06			6.9 mins travel

Open Channel Pipe Flow

							Total
	Select (0 or 1)	1	1	1	1	1	5 segments
	Length (ft)	131	400	404	215	168	### feet length
	Top Elevation (ft)	1267.9	1267.02	66.48	65.96	1265.23	
	Bottom Elevation (ft)	1267.02	1266.48	66.2	65.7	1264.23	
	Pipe Material	0.014, Concrete w/some debris	0.014, Concrete w/some debris	0.014, Concrete w/some debris	0.014, Concrete w/some debris	0.024, Corrugated Metal	
	Diameter (ins)	18.00	24.00	30.00	36.00	48.00	
	Flow Depth (ins)	18.00	24.00	30.00	36.00	48.00	
	Specify alternate "n"						
	Manning "n" (dim)	0.014	0.014	0.014	0.014	0.024	
	Drop (ft)	1	1	0	0	1	3 feet drop
	Slope (ft/ft)	0.0067	0.0013	0.0007	0.0012	0.0060	
	Slope (%)	0.67	0.13	0.07	0.12	0.60	
	Theta (radians)	6.283	6.283	6.283	6.283	6.283	
	Flow Area (sq ft)	1.77	3.14	4.91	7.07	12.57	
	Wet Perimeter (ft)	4.71	6.28	7.85	9.42	12.57	
	Hydraulic Radius (ft)	0.38	0.50	0.63	0.75	1.00	
	Velocity (fps)	4.54	2.46	2.05	3.06	4.79	
	Normal Flow (cfs)	8.0	7.7	10.1	21.6	60.2	
	Travel Time (mins)	0.48	2.71	3.29	1.17	0.58	8.2 mins travel

Open Channel General Flow

							Total
	Select (0 or 1)	0	0	0	0	0	0 segments
	Length (ft)	700	1	1	1	1	0 feet length
	Top Elevation (ft)	1264.03	1	1	1	1	
	Bottom Elevation (ft)	1263.35	1	1	1	1	
	Hydraulic Radius (ft)	2.00	1.00	1.00	1.00	1.00	
	Channel Lining	0.012, Smooth Concrete	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "n"						
	Manning "n" (dim)	0.012	0.000	0.000	0.000	0.000	
	Drop (ft)	1	0	0	0	0	0 feet drop
	Slope (ft/ft)	0.0010	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	0.10	0.00	0.00	0.00	0.00	
	Velocity (fps)						
	Travel Time (mins)						0.0 mins travel

Other (Computed Separately)

							Total
	Select (0 or 1)	0	0	0	0	0	0 segments
	Length (ft)	500	1	1	1	1	0 feet length
	Drop (ft)	10	1	1	1	1	0 feet drop
	Velocity (fps)	2.00	1.00	1.00	1.00	1.00	
	Slope (ft/ft)	0.0200	1.0000	1.0000	1.0000	1.0000	
	Slope (%)	2.00	100.00	100.00	100.00	100.00	
	Travel Time (mins)						0.0 mins travel

Total for Subbasin

Segments	9
Length (ft)	2569
Drop (ft)	8
Slope (ft/ft)	0.0030

Subbasin Name	Site to Channel
Drainage Area (ac)	10.03
Drainage Area (sq mi)	0.015671875

Sheet Flow

							Total
selected>>	Select (0 or 1)	1	0	0	0	0	1 segments
	Length (ft)	300	1	1	1	1	300 feet length
	Top Elevation (ft)	1272	1	1	1	1	
	Bottom Elevation (ft)	1269	1	1	1	1	
	Cover	0.011, Concrete, asphalt, etc.	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "n"						
	Sheet Flow "n" (dim)	0.011	0.000	0.000	0.000	0.000	
	2-yr, 24-hr Rainfall (ins)	3.50	3.50	3.50	3.50	3.50	
	Drop (ft)	3	0	0	0	0	3 feet drop
	Slope (ft/ft)	0.0100	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	1.00	0.00	0.00	0.00	0.00	
	Velocity (fps)	1.36					
	Travel Time (hrs)	0.061					
	Travel Time (mins)	3.68					3.7 mins travel

Shallow Concentrated Flow

							Total
	Select (0 or 1)	0	0	0	0	0	0 segments
	Length (ft)	200	1	1	1	1	0 feet length
	Top Elevation (ft)	30	1	1	1	1	
	Bottom Elevation (ft)	22	1	1	1	1	
	Cover	7, Short grass pasture	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "K"						
	Surface Coeff (dim)	7.00	0.00	0.00	0.00	0.00	
	Drop (ft)	8	0	0	0	0	0 feet drop
	Slope (ft/ft)	0.0400	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	4.00	0.00	0.00	0.00	0.00	
	Velocity (fps)						
	Travel Time (mins)						0.0 mins travel

Open Channel Ditch Flow

							Total
	Select (0 or 1)	0	0	0	0	0	0 segments
	Length (ft)	100	1	1	1	1	0 feet length
	Top Elevation (ft)	50	1	1	1	1	
	Bottom Elevation (ft)	47	1	1	1	1	
	Channel Lining	0.03, Grassed	Choose Lining Type	Choose Lining Type	Choose Lining Type	Choose Lining Type	
	Bottom Width (ft)	25.00	0.00	1.00	1.00	1.00	
	Left Side Slope (H:V)	3.00	1.00	1.00	1.00	1.00	
	Right Side Slope (H:V)	3.00	1.00	1.00	1.00	1.00	
	Depth (ft)	3.00	1.00	1.00	1.00	1.00	
	Specify alternate "n"						
	Manning "n" (dim)	0.030	0.000	0.000	0.000	0.000	
	Drop (ft)	3	0	0	0	0	0 feet drop
	Slope (ft/ft)	0.0300	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	3.00	0.00	0.00	0.00	0.00	
	Flow Area (sq ft)	102.00	1.00	2.00	2.00	2.00	
	Wet Perimeter (ft)	43.97	2.83	3.83	3.83	3.83	
	Hydraulic Radius (ft)	2.32	0.35	0.52	0.52	0.52	
	Velocity (fps)						
	Normal Flow (cfs)						
selected>>	Travel Time (mins)						0.0 mins travel

Open Channel Pipe Flow

							Total
	Select (0 or 1)	1	0	0	0	0	1 segments
	Length (ft)	70	1	1	1	1	70 feet length
	Top Elevation (ft)	1266	1	1	1	1	
	Bottom Elevation (ft)	1265	1	1	1	1	
	Pipe Material	0.012, Smooth concrete	Choose Material Type	Choose Material Type	Choose Material Type	Choose Material Type	
	Diameter (ins)	24.00	1.00	1.00	1.00	1.00	
	Flow Depth (ins)	24.00	1.00	1.00	1.00	1.00	
	Specify alternate "n"						
	Manning "n" (dim)	0.012	0.000	0.000	0.000	0.000	
	Drop (ft)	1	0	0	0	0	1 feet drop
	Slope (ft/ft)	0.0143	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	1.43	0.00	0.00	0.00	0.00	
	Theta (radians)	6.283	6.283	6.283	6.283	6.283	
	Flow Area (sq ft)	3.14	0.01	0.01	0.01	0.01	
	Wet Perimeter (ft)	6.28	0.26	0.26	0.26	0.26	
	Hydraulic Radius (ft)	0.50	0.02	0.02	0.02	0.02	
	Velocity (fps)	9.35					
	Normal Flow (cfs)	29.4					
	Travel Time (mins)	0.12					0.1 mins travel

Open Channel General Flow

							Total
	Select (0 or 1)	0	0	0	0	0	0 segments
	Length (ft)	150	1	1	1	1	0 feet length
	Top Elevation (ft)	30	1	1	1	1	
	Bottom Elevation (ft)	26	1	1	1	1	
	Hydraulic Radius (ft)	2.30	1.00	1.00	1.00	1.00	
	Channel Lining	0.025, Clean Earth	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "n"						
	Manning "n" (dim)	0.025	0.000	0.000	0.000	0.000	
	Drop (ft)	4	0	0	0	0	0 feet drop
	Slope (ft/ft)	0.0267	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	2.67	0.00	0.00	0.00	0.00	
	Velocity (fps)						
	Travel Time (mins)						0.0 mins travel

Other (Computed Separately)

							Total
	Select (0 or 1)	0	0	0	0	0	0 segments
	Length (ft)	500	1	1	1	1	0 feet length
	Drop (ft)	10	1	1	1	1	0 feet drop
	Velocity (fps)	2.00	1.00	1.00	1.00	1.00	
	Slope (ft/ft)	0.0200	1.0000	1.0000	1.0000	1.0000	
	Slope (%)	2.00	100.00	100.00	100.00	100.00	
	Travel Time (mins)						0.0 mins travel

Total for Subbasin

Segments	2
Length (ft)	370
Drop (ft)	4
Slope (ft/ft)	0.0108

Subbasin Name	Site to Pond
Drainage Area (ac)	38.84
Drainage Area (sq mi)	0.0606875

Sheet Flow

							Total
selected>>	Select (0 or 1)	1	0	0	0	0	1 segments
	Length (ft)	100	1	1	1	1	100 feet length
	Top Elevation (ft)	1272	1	1	1	1	
	Bottom Elevation (ft)	1271	1	1	1	1	
	Cover	0.011, Concrete, asphalt, etc.	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "n"						
	Sheet Flow "n" (dim)	0.011	0.000	0.000	0.000	0.000	
	2-yr, 24-hr Rainfall (ins)	3.50	3.50	3.50	3.50	3.50	
	Drop (ft)	1	0	0	0	0	1 feet drop
	Slope (ft/ft)	0.0100	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	1.00	0.00	0.00	0.00	0.00	
	Velocity (fps)	1.09					
	Travel Time (hrs)	0.025					
	Travel Time (mins)	1.53					1.5 mins travel

Shallow Concentrated Flow

							Total
	Select (0 or 1)	0	0	0	0	0	0 segments
	Length (ft)	200	1	1	1	1	0 feet length
	Top Elevation (ft)	30	1	1	1	1	
	Bottom Elevation (ft)	22	1	1	1	1	
	Cover	7, Short grass pasture	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "K"						
	Surface Coeff (dim)	7.00	0.00	0.00	0.00	0.00	
	Drop (ft)	8	0	0	0	0	0 feet drop
	Slope (ft/ft)	0.0400	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	4.00	0.00	0.00	0.00	0.00	
	Velocity (fps)						
	Travel Time (mins)						0.0 mins travel

Open Channel Ditch Flow

							Total
selected>>							
	Select (0 or 1)	1	0	0	0	0	1 segments
	Length (ft)	100	1	1	1	1	100 feet length
	Top Elevation (ft)	1271	1	1	1	1	
	Bottom Elevation (ft)	1270	1	1	1	1	
	Channel Lining	0.03, Grassed	Choose Lining Type	Choose Lining Type	Choose Lining Type	Choose Lining Type	
	Bottom Width (ft)	14.00	0.00	1.00	1.00	1.00	
	Left Side Slope (H:V)	0.50	1.00	1.00	1.00	1.00	
	Right Side Slope (H:V)	50.00	1.00	1.00	1.00	1.00	
	Depth (ft)	0.55	1.00	1.00	1.00	1.00	
	Specify alternate "n"						
	Manning "n" (dim)	0.030	0.000	0.000	0.000	0.000	
	Drop (ft)	1	0	0	0	0	1 feet drop
	Slope (ft/ft)	0.0100	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	1.00	0.00	0.00	0.00	0.00	
	Flow Area (sq ft)	15.34	1.00	2.00	2.00	2.00	
	Wet Perimeter (ft)	42.12	2.83	3.83	3.83	3.83	
	Hydraulic Radius (ft)	0.36	0.35	0.52	0.52	0.52	
	Velocity (fps)	2.53					
	Normal Flow (cfs)	38.8					
selected>>	Travel Time (mins)	0.66					0.7 mins travel

Open Channel Pipe Flow

							Total
	Select (0 or 1)	1	1	1	1	1	5 segments
	Length (ft)	54	130	382	497	246	### feet length
	Top Elevation (ft)	1268.45	1267.39	1264.43	1261.51	1259.86	
	Bottom Elevation (ft)	1267.89	1264.94	1262.11	1260.36	1259.25	
	Pipe Material	0.012, Smooth concrete	0.012, Smooth concrete	0.012, Smooth concrete	0.012, Smooth concrete	0.012, Smooth concrete	
	Diameter (ins)	18.00	24.00	36.00	42.00	48.00	
	Flow Depth (ins)	18.00	24.00	36.00	42.00	48.00	
	Specify alternate "n"						
	Manning "n" (dim)	0.012	0.012	0.012	0.012	0.012	
	Drop (ft)	1	2	2	1	1	7.1 feet drop
	Slope (ft/ft)	0.0104	0.0188	0.0061	0.0023	0.0025	
	Slope (%)	1.04	1.88	0.61	0.23	0.25	
	Theta (radians)	6.283	6.283	6.283	6.283	6.283	
	Flow Area (sq ft)	1.77	3.14	7.07	9.62	12.57	
	Wet Perimeter (ft)	4.71	6.28	9.42	11.00	12.57	
	Hydraulic Radius (ft)	0.38	0.50	0.75	0.88	1.00	
	Velocity (fps)	6.58	10.74	7.99	5.46	6.18	
selected>>	Normal Flow (cfs)	11.6	33.7	56.5	52.6	77.7	
	Travel Time (mins)	0.14	0.20	0.80	1.52	0.66	3.3 mins travel

Open Channel General Flow

							Total
	Select (0 or 1)	1	0	0	0	0	1 segments
	Length (ft)	150	1	1	1	1	150 feet length
	Top Elevation (ft)	30	1	1	1	1	
	Bottom Elevation (ft)	26	1	1	1	1	
	Hydraulic Radius (ft)	1.25	1.00	1.00	1.00	1.00	
	Channel Lining	0.012, Smooth Concrete	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "n"						
	Manning "n" (dim)	0.012	0.000	0.000	0.000	0.000	
	Drop (ft)	4	0	0	0	0	4 feet drop
	Slope (ft/ft)	0.0267	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	2.67	0.00	0.00	0.00	0.00	
	Velocity (fps)	23.53					
	Travel Time (mins)	0.11					0.1 mins travel

Other (Computed Separately)

							Total
	Select (0 or 1)	0	0	0	0	0	0 segments
	Length (ft)	500	1	1	1	1	0 feet length
	Drop (ft)	10	1	1	1	1	0 feet drop
	Velocity (fps)	2.00	1.00	1.00	1.00	1.00	
	Slope (ft/ft)	0.0200	1.0000	1.0000	1.0000	1.0000	
	Slope (%)	2.00	100.00	100.00	100.00	100.00	
	Travel Time (mins)						0.0 mins travel

Total for Subbasin

Segments	8
Length (ft)	1659
Drop (ft)	13
Slope (ft/ft)	0.0079

SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 3-4

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2011 Plan

Project File: RCB.stm	Number of lines: 3	Date: 1/27/2012

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	413.000	0.000	None	0.00	0.00	0.00	0.0	1263.33	0.10	1263.74	72X144	Box	0.015	0.15	1285.50	Pipe - (R1)
2	1	269.387	0.000	MH	0.00	0.00	0.00	0.0	1263.74	0.10	1264.01	72X144	Box	0.015	0.96	1271.85	Pipe - (R2)
3	2	17.786	71.000	Hdwl	147.42	0.00	0.00	21.9	1264.01	0.11	1264.03	72X144	Box	0.015	1.00	1271.87	Pipe - (R3)

Project File: RCB.stm

Number of lines: 3

Date: 1/27/2012

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	Structure - (55)	None	1285.50	n/a	n/a	n/a	72x144	Box	1263.74	72x144	Box	1263.74
2	Structure - (53)	Manhole	1271.85	Rect	12.00	1.00	72x144	Box	1264.01	72x144	Box	1264.01
3	Structure - (52)	OpenHeadwall	1271.87	n/a	n/a	n/a	72x144	Box	1264.03			

Project File: RCB.stm | Number of Structures: 3 | Run Date: 1/27/2012

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	Pipe - (R1)	147.4	72x144	Box	413.000	1263.33	1263.74	0.099	1267.17	1267.30	0.03	1267.33	End	None
2	Pipe - (R2)	147.4	72x144	Box	269.387	1263.74	1264.01	0.100	1267.58	1267.66	0.17	1267.83	1	Manhole
3	Pipe - (R3)	147.4	72x144	Box	17.786	1264.01	1264.03	0.113	1267.85	1267.86	0.16	1268.02	2	OpenHeadwall

Project File: RCB.stm

Number of lines: 3

Run Date: 1/27/2012

NOTES: Return period = 5 Yrs.

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len	Drainage Area C1 = 0.2 C2 = 0.5 C3 = 0.9			Time of conc	Time of Flow in sect	Inten (I)	Total CA	Add Q / Total Flow	Inlet elev	Elev of HGL / Elev of Crown / Elev of Invert			Rise / Span	HGL / Pipe	ADD / Full Flow		Date: 1/27/2012 / Frequency: 5 yrs / Proj: RCB.stm
					Increment (ac)	Sub-Total (ac)	Sum CA							Up	Down	Fall	Size	Slope	Vel	Cap	
				(ft)				(min)	(min)	(in/hr)		Q (cfs)	(ft)	(ft)	(ft)	(ft)	(in)	(%)	(ft/s)	(cfs)	Line description
1	End	None	0.015	413.000	0.00	0.00	0.00	23.36	2.07	0.00	0.00	0.00	1285.50	1267.30	1267.17	0.13	72	0.03	3.33	147.4	Pipe - (R1)
					0.00	0.00	0.00					147.4		1269.74	1269.33		144	0.10	4.96	356.8	
					0.00	0.00	0.00							1263.74	1263.33	0.41	Box				
2	1	MH	0.015	269.387	0.00	0.00	0.00	21.99	1.37	0.00	0.00	0.00	1271.85	1267.66	1267.58	0.08	72	0.03	3.29	147.4	Pipe - (R2)
					0.00	0.00	0.00					147.4		1270.01	1269.74		144	0.10	4.98	358.6	
					0.00	0.00	0.00							1264.01	1263.74	0.27	Box				
3	2	Hdwl	0.015	17.786	0.00	0.00	0.00	21.90	0.09	0.00	0.00	147.4	1271.87	1267.86	1267.85	0.01	72	0.06	3.21	147.4	Pipe - (R3)
					0.00	0.00	0.00					147.4		1270.03	1270.01		144	0.11	5.28	380.0	
					0.00	0.00	0.00							1264.03	1264.01	0.02	Box				

NOTES: Intensity = 52.62 / (Inlet time + 11.20) ^ 0.75 (in/hr)

Project File: RCB.stm

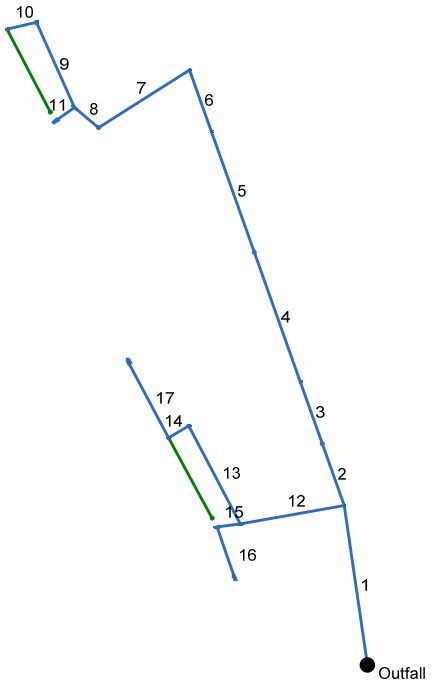
Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	72 144 B	147.4	1263.33	1267.17	3.84	46.03	3.20	0.16	1267.33	0.034	413.000	1263.74	1267.30	3.56	42.68	3.45	0.19	1267.48	0.042	0.038	0.155	0.15	0.03
2	72 144 B	147.4	1263.74	1267.58	3.84	46.03	3.20	0.16	1267.74	0.034	269.387	1264.01	1267.66	3.65	43.77	3.37	0.18	1267.83	0.039	0.036	0.098	0.96	0.17
3	72 144 B	147.4	1264.01	1267.85	3.84	46.03	3.20	0.16	1268.01	0.034	17.786	1264.03	1267.86	3.83	45.92	3.21	0.16	1268.02	0.034	0.034	0.006	1.00	0.16

Project File: RCB.stm | Number of lines: 3 | Run Date: 1/27/2012

; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2011 Plan



Project File: SWD1.stm	Number of lines: 17	Date: 1/27/2012

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	301.388	-98.238	DrGrt	0.00	0.70	0.95	15.0	1257.50	0.25	1258.25	60	Cir	0.015	1.50	1263.98	Pipe - (1)
2	1	122.733	-11.242	MH	0.00	0.00	0.95	15.0	1259.25	0.25	1259.56	48	Cir	0.015	0.15	1267.98	Pipe - (2)
3	2	122.733	0.000	DrGrt	0.00	0.92	0.95	15.0	1259.56	0.25	1259.87	48	Cir	0.015	0.50	1265.35	Pipe - (3)
4	3	257.316	0.000	MH	0.00	0.00	0.95	15.0	1260.37	0.25	1261.01	42	Cir	0.015	0.15	1270.20	Pipe - (4)
5	4	240.000	0.000	DrGrt	0.00	0.71	0.95	15.0	1261.01	0.25	1261.61	42	Cir	0.015	0.50	1265.95	Pipe - (5)
6	5	121.780	0.000	DrGrt	0.00	0.64	0.95	15.0	1262.11	0.60	1262.84	36	Cir	0.015	1.50	1268.07	Pipe - (6)
7	6	201.020	-103.032	MH	0.00	0.00	0.95	15.0	1262.84	0.62	1264.08	36	Cir	0.015	0.96	1269.12	Pipe - (7)
8	7	58.850	72.679	Curb	0.00	1.49	0.95	15.0	1264.08	0.61	1264.44	36	Cir	0.015	1.46	1268.97	Pipe - (8)
9	8	174.266	25.872	Curb	0.00	0.58	0.67	15.0	1265.44	1.12	1267.39	24	Cir	0.015	1.48	1270.11	Pipe - (9)
10	9	56.330	-79.169	Curb	0.00	1.10	0.67	15.0	1267.89	0.99	1268.45	18	Cir	0.015	1.00	1270.95	Pipe - (10)
11	8	44.330	-75.913	Curb	0.00	2.40	0.95	15.0	1264.94	0.54	1265.18	30	Cir	0.015	1.00	1268.79	Pipe - (11)
12	1	196.694	-91.817	Curb	0.00	1.65	0.95	15.0	1259.25	0.40	1260.04	48	Cir	0.015	1.44	1269.01	Pipe - (12)
13	12	207.141	72.399	Curb	0.00	1.23	0.67	15.0	1261.04	0.40	1261.87	36	Cir	0.015	1.50	1268.74	Pipe - (13)
14	13	43.773	-93.297	Curb	0.00	2.60	0.67	15.0	1261.97	0.41	1262.15	36	Cir	0.015	1.50	1269.00	Pipe - (14)
15	12	43.773	2.396	Curb	0.00	2.35	0.95	15.0	1261.04	0.41	1261.22	36	Cir	0.015	1.50	1269.01	Pipe - (15)
16	15	100.000	-101.356	Curb	0.00	2.04	0.67	15.0	1262.22	0.50	1262.72	24	Cir	0.015	1.00	1269.61	Pipe - (16)
17	14	161.000	93.026	Curb	0.00	1.98	0.67	15.0	1263.15	0.50	1263.96	24	Cir	0.015	1.00	1269.60	Pipe - (17)

Project File: SWD1.stm | Number of lines: 17 | Date: 1/27/2012

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	Structure - (13)	DropGrate	1263.98	Rect	4.00	4.00	60	Cir	1258.25	48 48	Cir Cir	1259.25 1259.25
2	Structure - (30)	Manhole	1267.98	Cir	4.00	4.00	48	Cir	1259.56	48	Cir	1259.56
3	Structure - (114)	DropGrate	1265.35	Rect	4.00	4.00	48	Cir	1259.87	42	Cir	1260.37
4	Structure - (113)	Manhole	1270.20	Cir	4.00	4.00	42	Cir	1261.01	42	Cir	1261.01
5	Structure - (111)	DropGrate	1265.95	Rect	4.00	4.00	42	Cir	1261.61	36	Cir	1262.11
6	Structure - (109)	DropGrate	1268.07	Rect	4.00	4.00	36	Cir	1262.84	36	Cir	1262.84
7	Structure - (18)	Manhole	1269.12	Cir	4.00	4.00	36	Cir	1264.08	36	Cir	1264.08
8	Structure - (17)	Curb-Horiz	1268.97	Rect	11.33	4.33	36	Cir	1264.44	24 30	Cir Cir	1265.44 1264.94
9	Structure - (16)	Curb-Horiz	1270.11	Rect	6.33	4.33	24	Cir	1267.39	18	Cir	1267.89
10	Structure - (15)	Curb-Horiz	1270.95	Rect	6.33	4.33	18	Cir	1268.45			
11	Structure - (19)	Curb-Horiz	1268.79	Rect	11.33	4.33	30	Cir	1265.18			
12	Structure - (22)	Curb-Horiz	1269.01	Rect	11.33	4.33	48	Cir	1260.04	36 36	Cir Cir	1261.04 1261.04
13	Structure - (21)	Curb-Horiz	1268.74	Rect	6.33	4.33	36	Cir	1261.87	36	Cir	1261.97
14	Structure - (20)	Curb-Horiz	1269.00	Rect	6.33	4.33	36	Cir	1262.15	24	Cir	1263.15
15	Structure - (23)	Curb-Horiz	1269.01	Rect	11.33	4.33	36	Cir	1261.22	24	Cir	1262.22
16	Structure - (24)	Curb-Horiz	1269.61	Rect	11.33	4.33	24	Cir	1262.72			
17	Structure - (25)	Curb-Horiz	1269.60	Rect	11.33	4.33	24	Cir	1263.96			

Project File: SWD1.stm | Number of Structures: 17 | Run Date: 1/27/2012

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	Pipe - (1)	67.66	60	Cir	301.388	1257.50	1258.25	0.249	1261.15	1261.47	0.60	1262.07	End	DropGrate
2	Pipe - (2)	28.70	48	Cir	122.733	1259.25	1259.56	0.253	1262.07	1262.14	0.03	1262.17	1	Manhole
3	Pipe - (3)	29.11	48	Cir	122.733	1259.56	1259.87	0.253	1262.17	1262.26	0.11	1262.37	2	DropGrate
4	Pipe - (4)	26.06	42	Cir	257.316	1260.37	1261.01	0.249	1262.37	1262.97	0.05	1263.02	3	Manhole
5	Pipe - (5)	26.64	42	Cir	240.000	1261.01	1261.61	0.250	1263.02	1263.59	0.17	1263.77	4	DropGrate
6	Pipe - (6)	23.90	36	Cir	121.780	1262.11	1262.84	0.599	1263.77	1264.40	n/a	1264.40	5	DropGrate
7	Pipe - (7)	21.54	36	Cir	201.020	1262.84	1264.08	0.617	1264.40	1265.56	0.57	1265.56	6	Manhole
8	Pipe - (8)	21.63	36	Cir	58.850	1264.08	1264.44	0.612	1265.56	1265.93	0.87	1266.80	7	Curb-Horiz
9	Pipe - (9)	5.17	24	Cir	174.266	1265.44	1267.39	1.119	1266.80	1268.20	n/a	1268.20 j	8	Curb-Horiz
10	Pipe - (10)	3.41	18	Cir	56.330	1267.89	1268.45	0.994	1268.53	1269.16	0.27	1269.16	9	Curb-Horiz
11	Pipe - (11)	10.54	30	Cir	44.330	1264.94	1265.18	0.542	1266.80	1266.82	0.15	1266.96	8	Curb-Horiz
12	Pipe - (12)	40.00	48	Cir	196.694	1259.25	1260.04	0.402	1262.07	1262.30	0.67	1262.97	1	Curb-Horiz
13	Pipe - (13)	17.56	36	Cir	207.141	1261.04	1261.87	0.401	1262.97	1263.35	0.60	1263.95	12	Curb-Horiz
14	Pipe - (14)	13.93	36	Cir	43.773	1261.97	1262.15	0.411	1263.95	1263.97	0.23	1264.19	13	Curb-Horiz
15	Pipe - (15)	16.45	36	Cir	43.773	1261.04	1261.22	0.411	1262.97	1263.01	0.33	1263.33	12	Curb-Horiz
16	Pipe - (16)	6.32	24	Cir	100.000	1262.22	1262.72	0.500	1263.33	1263.64	0.32	1263.95	15	Curb-Horiz
17	Pipe - (17)	6.13	24	Cir	161.000	1263.15	1263.96	0.503	1264.19	1264.84	0.33	1265.17	14	Curb-Horiz

Project File: SWD1.stm | Number of lines: 17 | Run Date: 1/27/2012

NOTES: Return period = 5 Yrs. ; j - Line contains hyd. jump.

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len	Drainage Area			Time of conc	Time of Flow in sect	Inten (I)	Total CA	Add Q	Inlet elev	Elev of HGL			Rise	HGL	ADD		Date: 1/27/2012
					C1 = 0.2 C2 = 0.5 C3 = 0.9							Total Flow		Elev of Crown			Span	Pipe	Full Flow		Frequency: 5 yrs
					Increment (ac)	Sub-Total (ac)	Sum CA					Q		Elev of Invert Up	Down	Fall	Size	Slope	Vel	Cap	Proj: SWD1.stm
				(ft)				(min)	(min)	(in/hr)		(cfs)	(ft)	(ft)	(ft)	(ft)	(in)	(%)	(ft/s)	(cfs)	Line description
1	End	DrGrt	0.015	301.388	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	20.12	1.06	4.05	16.70	0.00 67.66	1263.98	1261.47 1263.25 1258.25	1261.15 1262.50 1257.50	0.33 0.75	60 60 Cir	0.11 0.25	4.73 5.74	67.66 112.6	Pipe - (1)
2	1	MH	0.015	122.733	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	19.48	0.64	4.11	6.98	0.00 28.70	1267.98	1262.14 1263.56 1259.56	1262.07 1263.25 1259.25	0.07 0.31	48 48 Cir	0.06 0.25	3.19 4.98	28.70 62.57	Pipe - (2)
3	2	DrGrt	0.015	122.733	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	18.90	0.58	4.17	6.98	0.00 29.11	1265.35	1262.26 1263.87 1259.87	1262.17 1263.56 1259.56	0.09 0.31	48 48 Cir	0.07 0.25	3.53 4.98	29.11 62.56	Pipe - (3)
4	3	MH	0.015	257.316	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	17.98	0.92	4.27	6.10	0.00 26.06	1270.20	1262.97 1264.51 1261.01	1262.37 1263.87 1260.37	0.60 0.64	42 42 Cir	0.23 0.25	4.65 4.52	26.06 43.49	Pipe - (4)
5	4	DrGrt	0.015	240.000	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	17.13	0.85	4.36	6.10	0.00 26.64	1265.95	1263.59 1265.11 1261.61	1263.02 1264.51 1261.01	0.57 0.60	42 42 Cir	0.24 0.25	4.70 4.53	26.64 43.60	Pipe - (5)
6	5	DrGrt	0.015	121.780	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	16.80	0.33	4.40	5.43	0.00 23.90	1268.07	1264.40 1265.84 1262.84	1263.77 1265.11 1262.11	0.63 0.73	36 36 Cir	0.52 0.60	6.21 6.33	23.90 44.75	Pipe - (6)
7	6	MH	0.015	201.020	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	16.24	0.56	4.47	4.82	0.00 21.54	1269.12	1265.56 1267.08 1264.08	1264.40 1265.84 1262.84	1.16 1.24	36 36 Cir	0.58 0.62	6.01 6.42	21.54 45.40	Pipe - (7)
8	7	Curb	0.015	58.850	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	16.08	0.16	4.49	4.82	0.00 21.63	1268.97	1265.93 1267.44 1264.44	1265.56 1267.08 1264.08	0.37 0.36	36 36 Cir	0.63 0.61	6.20 6.40	21.63 45.21	Pipe - (8)
9	8	Curb	0.015	174.266	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	15.21	0.87	4.60	1.13	0.00 5.17	1270.11	1268.20 1269.39 1267.39	1266.80 1267.44 1265.44	1.40 1.95	24 24 Cir	0.80 1.12	3.33 6.60	5.17 20.74	Pipe - (9)
10	9	Curb	0.015	56.330	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	15.00	0.21	4.62	0.74	0.00 3.41	1270.95	1269.16 1269.95 1268.45	1268.53 1269.39 1267.89	0.63 0.56	18 18 Cir	1.11 0.99	4.47 5.13	3.41 9.07	Pipe - (10)

NOTES: Intensity = 61.49 / (Inlet time + 12.70) ^ 0.78 (in/hr)

Project File: SWD1.stm

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len	Drainage Area			Time of conc	Time of Flow in sect	Inten (I)	Total CA	Add Q	Inlet elev	Elev of HGL			Rise	HGL	ADD		Date: 1/27/2012
					C1 = 0.2 C2 = 0.5 C3 = 0.9							Total Flow		Elev of Crown			Span	Pipe	Full Flow		Frequency: 5 yrs
														Elev of Invert							Proj: SWD1.stm
					Increment (ac)	Sub-Total (ac)	Sum CA					Q		Up	Down	Fall	Size	Slope	Vel	Cap	
				(ft)				(min)	(min)	(in/hr)		(cfs)	(ft)	(ft)	(ft)	(ft)	(in)	(%)	(ft/s)	(cfs)	Line description
11	8	Curb	0.015	44.330	0.00	0.00	0.00	15.00	0.25	4.62	2.28	0.00	1268.79	1266.82	1266.80	0.02	30	0.04	2.90	10.54	Pipe - (11)
					0.00	0.00	0.00					10.54		1267.68	1267.44		30	0.54	5.33	26.16	
					0.00	0.00	0.00							1265.18	1264.94	0.24	Cir				
12	1	Curb	0.015	196.694	0.00	0.00	0.00	16.69	0.68	4.42	9.06	0.00	1269.01	1262.30	1262.07	0.23	48	0.12	4.85	40.00	Pipe - (12)
					0.00	0.00	0.00					40.00		1264.04	1263.25		48	0.40	6.28	78.90	
					0.00	0.00	0.00							1260.04	1259.25	0.79	Cir				
13	12	Curb	0.015	207.141	0.00	0.00	0.00	15.89	0.79	4.51	3.89	0.00	1268.74	1263.35	1262.97	0.38	36	0.18	4.36	17.56	Pipe - (13)
					0.00	0.00	0.00					17.56		1264.87	1264.04		36	0.40	5.18	36.59	
					0.00	0.00	0.00							1261.87	1261.04	0.83	Cir				
14	13	Curb	0.015	43.773	0.00	0.00	0.00	15.65	0.25	4.54	3.07	0.00	1269.00	1263.97	1263.95	0.02	36	0.04	2.97	13.93	Pipe - (14)
					0.00	0.00	0.00					13.93		1265.15	1264.97		36	0.41	5.24	37.07	
					0.00	0.00	0.00							1262.15	1261.97	0.18	Cir				
15	12	Curb	0.015	43.773	0.00	0.00	0.00	15.42	0.20	4.57	3.60	0.00	1269.01	1263.01	1262.97	0.04	36	0.08	3.59	16.45	Pipe - (15)
					0.00	0.00	0.00					16.45		1264.22	1264.04		36	0.41	5.24	37.06	
					0.00	0.00	0.00							1261.22	1261.04	0.18	Cir				
16	15	Curb	0.015	100.000	0.00	0.00	0.00	15.00	0.42	4.62	1.37	0.00	1269.61	1263.64	1263.33	0.30	24	0.30	4.01	6.32	Pipe - (16)
					0.00	0.00	0.00					6.32		1264.72	1264.22		24	0.50	4.41	13.86	
					0.00	0.00	0.00							1262.72	1262.22	0.50	Cir				
17	14	Curb	0.015	161.000	0.00	0.00	0.00	15.00	0.65	4.62	1.33	0.00	1269.60	1264.84	1264.19	0.65	24	0.40	4.15	6.13	Pipe - (17)
					0.00	0.00	0.00					6.13		1265.96	1265.15		24	0.50	4.43	13.90	
					0.00	0.00	0.00							1263.96	1263.15	0.81	Cir				

NOTES: Intensity = 61.49 / (Inlet time + 12.70) ^ 0.78 (in/hr)

Project File: SWD1.stm

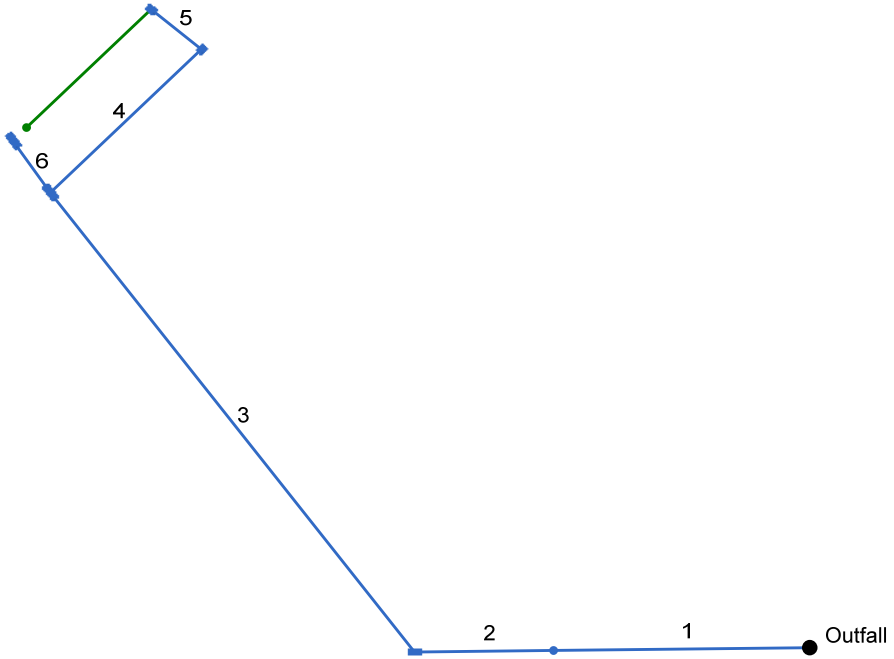
Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	60	67.66	1257.50	1261.15	3.65	15.34	4.41	0.30	1261.45	0.115	301.388	1258.25	1261.47	3.22	13.38	5.06	0.40	1261.87	0.161	0.138	0.416	1.50	0.60
2	48	28.70	1259.25	1262.07	2.82	9.47	3.03	0.14	1262.21	0.075	122.733	1259.56	1262.14	2.58	8.58	3.34	0.17	1262.32	0.095	0.085	0.104	0.15	0.03
3	48	29.11	1259.56	1262.17	2.61	8.68	3.35	0.17	1262.34	0.095	122.733	1259.87	1262.26	2.39	7.84	3.72	0.21	1262.48	0.123	0.109	0.133	0.50	0.11
4	42	26.06	1260.37	1262.37	2.00	5.68	4.59	0.33	1262.70	0.231	257.316	1261.01	1262.97	1.96	5.53	4.71	0.35	1263.31	0.247	0.239	0.616	0.15	0.05
5	42	26.64	1261.01	1263.02	2.01	5.71	4.67	0.34	1263.36	0.238	240.000	1261.61	1263.59	1.98	5.62	4.74	0.35	1263.94	0.248	0.243	0.583	0.50	0.17
6	36	23.90	1262.11	1263.77	1.66	4.00	5.97	0.55	1264.32	0.492	121.780	1262.84	1264.40	1.56**	3.71	6.44	0.65	1265.04	0.602	0.547	n/a	1.50	n/a
7	36	21.54	1262.84	1264.40	1.56	3.71	5.81	0.52	1264.92	0.489	201.020	1264.08	1265.56	1.48**	3.47	6.20	0.60	1266.16	0.582	0.536	n/a	0.96	0.57
8	36	21.63	1264.08	1265.56	1.48	3.47	6.23	0.60	1266.16	0.587	58.850	1264.44	1265.93	1.49**	3.50	6.17	0.59	1266.52	0.573	0.580	0.341	1.46	0.87
9	24	5.17	1265.44	1266.80	1.35	2.27	2.28	0.08	1266.88	0.108	174.266	1267.39	1268.20 j	0.81**	1.18	4.37	0.30	1268.49	0.598	0.353	n/a	1.48	n/a
10	18	3.41	1267.89	1268.53	0.64*	0.71	4.77	0.35	1268.88	0.994	56.330	1268.45	1269.16	0.70**	0.82	4.18	0.27	1269.43	0.695	0.844	n/a	1.00	0.27
11	30	10.54	1264.94	1266.80	1.85	3.91	2.70	0.11	1266.91	0.108	44.330	1265.18	1266.82	1.63	3.40	3.10	0.15	1266.96	0.151	0.130	0.058	1.00	0.15
12	48	40.00	1259.25	1262.07	2.82	9.47	4.23	0.28	1262.35	0.145	196.694	1260.04	1262.30	2.26	7.32	5.46	0.46	1262.76	0.276	0.210	0.414	1.44	0.67
13	36	17.56	1261.04	1262.97	1.93	4.80	3.66	0.21	1263.18	0.167	207.141	1261.87	1263.35	1.48	3.47	5.06	0.40	1263.75	0.388	0.277	0.575	1.50	0.60
14	36	13.93	1261.97	1263.95	1.98	4.94	2.82	0.12	1264.07	0.098	43.773	1262.15	1263.97	1.82	4.47	3.12	0.15	1264.12	0.125	0.112	0.049	1.50	0.23
15	36	16.45	1261.04	1262.97	1.93	4.80	3.43	0.18	1263.15	0.146	43.773	1261.22	1263.01	1.79	4.39	3.75	0.22	1263.22	0.184	0.165	0.072	1.50	0.33
16	24	6.32	1262.22	1263.33	1.11	1.80	3.52	0.19	1263.53	0.291	100.000	1262.72	1263.64	0.92	1.40	4.51	0.32	1263.95	0.565	0.428	0.428	1.00	0.32
17	24	6.13	1263.15	1264.19	1.04	1.65	3.71	0.21	1264.41	0.342	161.000	1263.96	1264.84	0.88**	1.34	4.59	0.33	1265.17	0.606	0.474	0.763	1.00	0.33

Project File: SWD1.stm | Number of lines: 17 | Run Date: 1/27/2012

Notes: * Normal depth assumed.; ** Critical depth.; j-Line contains hyd. jump. ; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2011 Plan



Project File: SWD5.stm	Number of lines: 6	Date: 1/27/2012

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	174.345	179.362	MH	0.00	0.00	0.95	15.0	1257.00	0.50	1257.87	48	Cir	0.015	0.15	1270.64	Pipe - (23) (1)
2	1	94.598	0.000	DrGrt	0.00	2.21	0.95	15.0	1258.07	0.50	1258.54	48	Cir	0.015	1.24	1265.90	Pipe - (23)
3	2	399.880	52.342	Curb	0.00	1.47	0.95	15.0	1259.54	0.60	1261.94	36	Cir	0.015	1.49	1267.00	Pipe - (22)
4	3	142.000	84.656	Curb	0.00	1.53	0.95	15.0	1262.44	0.60	1263.29	30	Cir	0.015	1.50	1267.70	Pipe - (21)
5	4	43.773	-97.823	Curb	0.00	1.61	0.95	15.0	1264.29	1.01	1264.73	18	Cir	0.015	1.00	1267.70	Pipe - (20)
6	3	43.773	2.479	Curb	0.00	1.22	0.95	15.0	1263.44	1.01	1263.88	18	Cir	0.015	1.00	1267.00	Pipe - (24)

Project File: SWD5.stm

Number of lines: 6

Date: 1/27/2012

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	Structure - (33)	Manhole	1270.64	Cir	4.00	4.00	48	Cir	1257.87	48	Cir	1258.07
2	Structure - (27)	DropGrate	1265.90	Rect	8.00	4.00	48	Cir	1258.54	36	Cir	1259.54
3	Structure - (26)	Curb-Horiz	1267.00	Rect	11.33	4.33	36	Cir	1261.94	30 18	Cir Cir	1262.44 1263.44
4	Structure - (25)	Curb-Horiz	1267.70	Rect	6.33	4.33	30	Cir	1263.29	18	Cir	1264.29
5	Structure - (24)	Curb-Horiz	1267.70	Rect	6.33	4.33	18	Cir	1264.73			
6	Structure - (29)	Curb-Horiz	1267.00	Rect	11.33	4.33	18	Cir	1263.88			

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	Pipe - (23) (1)	33.43	48	Cir	174.345	1257.00	1257.87	0.499	1259.86	1259.95	0.06	1260.01	End	Manhole
2	Pipe - (23)	33.67	48	Cir	94.598	1258.07	1258.54	0.497	1260.01	1260.27	0.81	1261.08	1	DropGrate
3	Pipe - (22)	25.09	36	Cir	399.880	1259.54	1261.94	0.600	1261.15	1263.54	n/a	1264.53 j	2	Curb-Horiz
4	Pipe - (21)	13.74	30	Cir	142.000	1262.44	1263.29	0.599	1264.53	1264.71	0.53	1265.24	3	Curb-Horiz
5	Pipe - (20)	7.07	18	Cir	43.773	1264.29	1264.73	1.005	1265.28	1265.75	0.48	1266.23	4	Curb-Horiz
6	Pipe - (24)	5.36	18	Cir	43.773	1263.44	1263.88	1.005	1264.53	1264.76	n/a	1264.76 j	3	Curb-Horiz

Project File: SWD5.stm | Number of lines: 6 | Run Date: 1/27/2012

NOTES: Return period = 5 Yrs. ; j - Line contains hyd. jump.

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len	Drainage Area			Time of conc	Time of Flow in sect	Inten (I)	Total CA	Add Q	Inlet elev	Elev of HGL			Rise	HGL	ADD		Date: 1/27/2012
					C1 = 0.2 C2 = 0.5 C3 = 0.9							Total Flow		Elev of Crown			Span	Pipe	Full Flow		Frequency: 5 yrs
					Increment (ac)	Sub-Total (ac)	Sum CA					Q		Elev of Invert Up	Down	Fall	Size	Slope	Vel	Cap	Proj: SWD5.stm
				(ft)				(min)	(min)	(in/hr)		(cfs)	(ft)	(ft)	(ft)	(ft)	(in)	(%)	(ft/s)	(cfs)	Line description
1	End	MH	0.015	174.345	0.00	0.00	0.00	17.01	0.68	4.38	7.64	0.00	1270.64	1259.95	1259.86	0.09	48	0.05	4.28	33.43	Pipe - (23) (1)
					0.00	0.00	0.00					33.43		1261.87	1261.00		48	0.50	7.00	87.94	
					0.00	0.00	0.00							1257.87	1257.00	0.87	Cir				
2	1	DrGrt	0.015	94.598	0.00	0.00	0.00	16.75	0.26	4.41	7.64	0.00	1265.90	1260.27	1260.01	0.26	48	0.27	6.03	33.67	Pipe - (23)
					0.00	0.00	0.00					33.67		1262.54	1262.07		48	0.50	6.98	87.76	
					0.00	0.00	0.00							1258.54	1258.07	0.47	Cir				
3	2	Curb	0.015	399.880	0.00	0.00	0.00	15.73	1.02	4.53	5.54	0.00	1267.00	1263.54	1261.15	2.40	36	0.60	6.52	25.09	Pipe - (22)
					0.00	0.00	0.00					25.09		1264.94	1262.54		36	0.60	6.33	44.78	
					0.00	0.00	0.00							1261.94	1259.54	2.40	Cir				
4	3	Curb	0.015	142.000	0.00	0.00	0.00	15.13	0.60	4.61	2.98	0.00	1267.70	1264.71	1264.53	0.18	30	0.13	3.96	13.74	Pipe - (21)
					0.00	0.00	0.00					13.74		1265.79	1264.94		30	0.60	5.60	27.50	
					0.00	0.00	0.00							1263.29	1262.44	0.85	Cir				
5	4	Curb	0.015	43.773	0.00	0.00	0.00	15.00	0.13	4.62	1.53	0.00	1267.70	1265.75	1265.28	0.47	18	1.07	5.62	7.07	Pipe - (20)
					0.00	0.00	0.00					7.07		1266.23	1265.79		18	1.01	5.16	9.12	
					0.00	0.00	0.00							1264.73	1264.29	0.44	Cir				
6	3	Curb	0.015	43.773	0.00	0.00	0.00	15.00	0.16	4.62	1.16	0.00	1267.00	1264.76	1264.53	0.23	18	0.53	4.42	5.36	Pipe - (24)
					0.00	0.00	0.00					5.36		1265.38	1264.94		18	1.01	5.16	9.13	
					0.00	0.00	0.00							1263.88	1263.44	0.44	Cir				

NOTES: Intensity = 61.49 / (Inlet time + 12.70) ^ 0.78 (in/hr)

Project File: SWD5.stm

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	48	33.43	1257.00	1259.86	2.85	9.60	3.48	0.19	1260.04	0.098	174.345	1257.87	1259.95	2.08	6.60	5.07	0.40	1260.35	0.253	0.176	0.306	0.15	0.06
2	48	33.67	1258.07	1260.01	1.94	6.04	5.57	0.48	1260.49	0.325	94.598	1258.54	1260.27	1.73**	5.19	6.49	0.65	1260.92	0.489	0.407	0.385	1.24	0.81
3	36	25.09	1259.54	1261.15	1.61*	3.85	6.51	0.66	1261.81	0.600	399.880	1261.94	1263.54 j	1.60**	3.85	6.52	0.66	1264.21	0.602	0.601	2.404	1.49	0.99
4	30	13.74	1262.44	1264.53	2.09	4.38	3.13	0.15	1264.68	0.144	142.000	1263.29	1264.71	1.42	2.88	4.78	0.35	1265.06	0.393	0.269	0.382	1.50	0.53
5	18	7.07	1264.29	1265.28	0.99*	1.24	5.70	0.51	1265.79	1.005	43.773	1264.73	1265.75	1.02**	1.28	5.54	0.48	1266.23	0.934	0.969	0.424	1.00	0.48
6	18	5.36	1263.44	1264.53	1.09	1.38	3.90	0.24	1264.77	0.450	43.773	1263.88	1264.76 j	0.88**	1.08	4.95	0.38	1265.14	0.813	0.631	n/a	1.00	0.38

Project File: SWD5.stm | Number of lines: 6 | Run Date: 1/27/2012

Notes: * Normal depth assumed.; ** Critical depth.; j-Line contains hyd. jump. ; c = cir e = ellip b = box

SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 3-5

Total TSS Removal

Project	SOUTHFORK COMMERCIAL ADDITION
Feature	PROPOSED DRAINAGE
Version	20110418
Analyst	Jason P. Dickman, P.E.
Note	

It is the responsibility of the engineer using this spreadsheet to verify its accuracy and applicability to the specific design.

Upper Limit on % Removal	100.0

BMP List

BMP Name	BMP ID	% TSS Removal
Null - No Treatment	0	0
Storm Water Wet Pond	1	80
Storm Water Wet ED Pond	2	80
Dry ED Pond	3	60
Underground Dry Basin	4	0
Enhanced Swale	5	90
Engineered Grass Channel	6	50
Infiltration Trench	7	90
Soakage Trench	8	90
Filter Strip	9	50
Surface Sand Filter	10	80
Organic Filter	11	80
Bioretention Area	12	85
Storm Water Wetland	13	75
Alum Treatment	14	90
Natural Area	15	100
Buffer	16	80
	17	
	18	
	19	
	20	
	21	
	22	
	23	
	24	
	25	
	26	
	27	
	28	

Catchment Information

Catchment ID >>>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Name >>>	KTA to Channel	Site to Channel	Site to Pond												
Area (acres) >>>	39.88	10.03	38.84												
	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs
	16	16	3												
Enter ID for each BMP that is downstream of the catchment, in sequence, beginning upstream >>>			16												
(See "Rules", below)															
Computed % Removal >>>	80.0	80.0	92.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Catchment Information

Catchment ID >>>	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Name >>>															
Area (acres) >>>															
	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs	BMP IDs
Enter ID for each BMP that is downstream of the catchment, in sequence, beginning upstream >>>															
(See "Rules", below)															
Computed % Removal >>>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Summary of TSS Removal Analysis

Catchment Name	Catchment ID	Area (acres)	% TSS Removal
KTA to Channel	1	39.88	80.0
Site to Channel	2	10.03	80.0
Site to Pond	3	38.84	92.0
	4		
	5		
	6		
	7		
	8		
	9		
	10		
	11		
	12		
	13		
	14		
	15		
	16		
	17		
	18		
	19		
	20		
	21		
	22		
	23		
	24		
	25		
	26		
	27		
	28		
	29		
	30		
Total Basin		**88.75**	**85.3**

Overview

This spreadsheet computes the overall % TSS removal for a basin made up of catchments.
Up to 30 catchments may be included in the basin.
Up to 30 types of BMPs may be specified. (A null BMP for untreated catchments is also provided.)
Up to 10 effective BMPs for each catchment may be employed.

Rules

1. BMPs for each catchment are identified by BMP ID, starting with the most upstream BMP and proceeding downstream.
2. If a specific BMP is claimed to be effective for a catchment, the BMP must be sized for the WQv for that catchment.
3. If a specific BMP is claimed to be effective for more than one catchment, the BMP must be sized for the total WQv of all of those catchments.
4. BMPs for a catchment must be in continuous sequence; cannot skip a BMP (i.e., claim a BMP is effective, skip a BMP, then claim the next BMP is effective for that catchment).
5. Each catchment is defined independently of the other catchments. Multiple catchments can flow through a specific BMP; however, see Rule 3.

Parallel

$$TSS_{site} = \frac{\sum_1^n (TSS_1 A_1 + TSS_2 A_2 + ... + TSS_n A_n)}{\sum_1^n (A_1 + A_2 + ... + A_n)}$$

where:
TSS_n = TSS removal for each water quality control located on-site (%)
A_n = the area draining to each control, excluding reduction areas (acres)

Series

$$TSS_{train} = TSS_A + TSS_B - \frac{(TSS_A * TSS_B)}{100}$$

where:
TSS_{train} = total TSS removal for series (%)
TSS_A = % TSS removal of the first (upstream) control (%)
TSS_B = % TSS removal of the second (downstream) control (%)

Flow-Through

$$TSS_{train} = \frac{TSS_A A_A + TSS_B A_B + \frac{TSS_B A_A (100 - TSS_A)}{100}}{A_A + A_B}$$

where:
TSS_{train} = total TSS removal for treatment train (%)
TSS_A = % TSS removal of the first (upstream) control (%)
TSS_B = % TSS removal of the second (downstream) control (%)
A_A = Area draining to control A
A_B = Area draining to control B

SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 3-6

SITE TO CHANNEL WATER QUALITY PROTECTION VOLUME
(Stormwater Manual, Chapter4)

WQv= PRvA/12 (Assuming HSG C soils)

P= 1.2 INCHES

A= 10.03 ACRES

	COEF	AREA	%
Rvu	0.04	0.5015	5%
Rvd	0.22	1.003	10%
Rvi	0.95	8.5255	85%

Rv= 0.8315

WQv= 0.83 ACRE-FEET Water Quality Protection Volume

Qwv= 1.2Rv= 0.998 INCHES Water Quality Protection Volume

CN= 90.0

Tc= 0.25 HOURS

S= 1.11 INCHES

Ia= 0.22 INCHES

Ia/P= 0.19

qu= 850 cfs/mi2/in (Figure 4-6)

Qwq= 13.29 cfs Water Quality Peak Flow

CHANNEL PROTECTION VOLUME

1-YEAR VOLUME= 1.53 ACRE-FEET Channel Protection Volume

SITE TO POND WATER QUALITY PROTECTION VOLUME
(Stormwater Manual, Chapter4)

WQv= PRvA/12 (Assuming HSG C soils)

P= 1.2 INCHES

A= 38.84 ACRES

	COEF	AREA	%
Rvu	0.04	1.942	5%
Rvd	0.22	3.884	10%
Rvi	0.95	33.014	85%

Rv= 0.8315

WQv= 3.23 ACRE-FEET Water Quality Protection Volume

Pond Stage is 1259.5 for 3.28 acre-feet of storage

Qwv= 1.2Rv= 0.998 INCHES Water Quality Protection Volume

CN= 84.8

Tc= 0.25 HOURS

S= 1.79 INCHES

Ia= 0.36 INCHES

Ia/P= 0.30

qu= 630 cfs/mi2/in (Figure 4-6)

Qwq= 38.15 cfs Water Quality Peak Flow

CHANNEL PROTECTION VOLUME

1-YEAR VOLUME= 4.70 ACRE-FEET Channel Protection Volume

4.0 Floodplains

4.1 Source of Flood Profile

Current FEMA mapping attached as Exhibit 1-9. CLOMR information available from PEC.

4.2 Nearest Base Flood Elevations

Porposed base flood elevations are 1270 at the north end and 1269 at the south end of the property.

4.3 Delineation of Pre-Development Regulatory Floodplain/Floodway Limits

Current FEMA mapping attached as Exhibit 1.9.

4.4 Delineation of Post-Development Regulatory Floodplain/Floodway Limits

Proposed FEMA mapping attached as Exhibit 4-1.

4.5 Floodplain Data Table and Discharges

Data, based on PEC's submitted study, at the south end of property as follows:

Q10=2030 cfs at elevation of 1265.87
Q50=3430 cfs at elevation of 1268.05
Q100=4227 cfs at elevation of 1269.07
Q500=5500 cfs at elevation of 1270.81

4.6 Hydrologic and Hydraulic Study Information

CLOMR information is available from PEC.

4.7 Provide regulatory floodway and four natural profile models (10, 50, 100, & 500-yr) for existing and future watershed conditions

CLOMR information is available from PEC.

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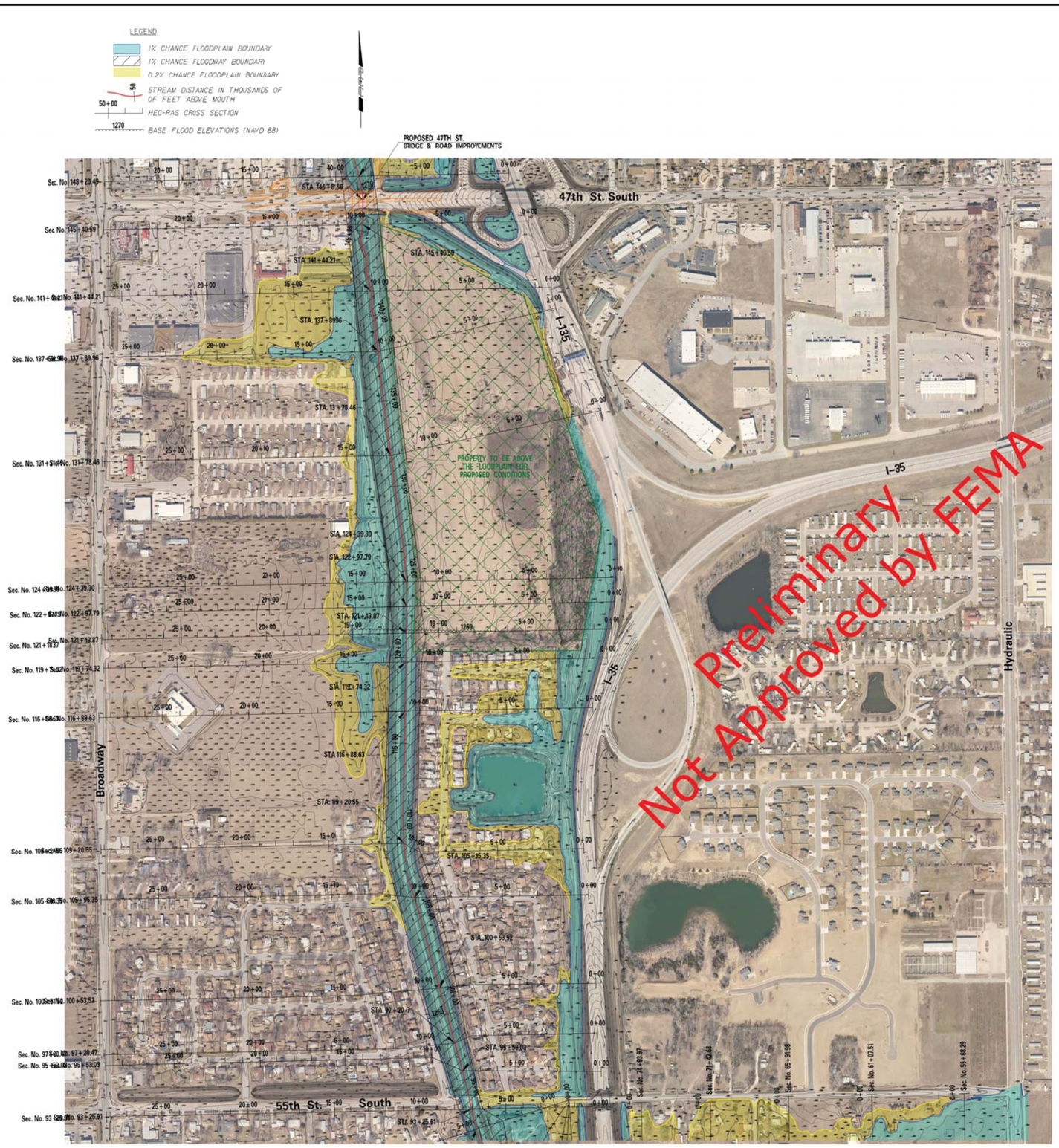
4.8 Floodplains and Floodways Located within a Reserve

Not applicable to this development.

SOUTHFORK COMMERCIAL ADDITION

EXHIBIT 4-1



PROPOSED PLAT AND CONSTRUCTION

SHEET 13 OF 13

Scale: 100' 0 200' 400'		THE CITY OF WICHITA	FLOOD INSURANCE STUDY UPDATE 2002 BIG SLOUGH (SOUTH) PROFESSIONAL ENGINEERING CONSULTANTS, P.A.	5540
DATE OF PHOTOGRAPHY: March, 2008	REVISIONS:			SECTION 21 T 28S – R 1E

Plotted By: svb Date: 4-8-2009 #TMES
File: c:/2007/07422/cgn/Proposed Plat & Construction-Sec. 21.dgn

5.0 Federal, State, and Local Permits

5.1 US Army Corps of Engineers Regulatory Program Permits

Not applicable to this development.

5.2 Kansas Department of Agriculture Division of Water Resources Permits

Not applicable to this development.

5.3 Federal Emergency Management Agency (FEMA) Letter of Map Changes

CLOMR information is available from PEC.

6.0 Preliminary Master Grading Plan

See Exhibit 1-2 for Preliminary Grading Plan.