

Drainage Report

Pearson's Farm LLC Addition, To Wichita, Sedgwick County, Kansas



April, 2011



516 S. Market
Wichita, Kansas 67202
(316) 264-0242



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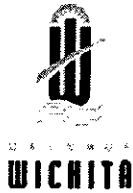
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Tab 1

Tab 1

Drainage Plan Submittal Checklist
Drainage Report
Preliminary Plat
Aerial Photograph/Location Map
USGS map with area highlighted
Proposed Drainage Plan



Drainage Plan Submittal Checklist



Reviewer: _____ Date: _____
 Project Name: Pearson Farm LLC Addition Location: West of Hydraulic on 33rd St. N
 Total Land Area of Ownership: 2.89 Acres
 Type: Residential Commercial Industrial Recreation Municipal Other
 Applicant: Pearson Farm LLC Contact: Dean P. Pearson Phone # (785) 215-7414
 Applicant email: _____
 Surveyor: KE Miller Engineering Contact: Bradley C. Ward Phone # (316) 264-0242
 Surveyor email: brad@kemiller.com
 Engineer: KE Miller Engineering Contact: Kirk Miller Phone # (316) 264-0242
 Engineer email: kirk@kemiller.com

Please check the appropriate box: I = Included; NA = Non-Applicable; R= Required prior to development
 (If "NA" is checked, an explanation must be entered)

Report Format and Content	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
Tab 1. General Information					
1.1 CD of drainage plan, including preliminary Master Grading Plan, preliminary plat, and proposed plat, in PDF format and one half-size paper copy bound with this checklist included behind the cover to Storm Water Management by Thursday at 4 PM two weeks prior to the subdivision committee hearing on the final plat				X	
1.2 Professional Engineer seal, signature and date on cover of report			Cover page of the report	X	
1.3 Site location map, using color ortho photo with project boundaries				X	
1.4 North arrow and scale on site location map				X	
1.5 Discussion of development, existing conditions, and proposed impacts on storm water, wetlands, riparian zones, and floodplain			Report/Prop drainage plan	X	
1.6 Discussion of offsite conditions				X	
1.7 Summary table of runoff calculations (pre/post development); no increase in peak discharge for all storm series			Proposed drainage plan	X	
1.8 Narrative description of the type and function of the permanent structural storm water management facilities			Report/Prop.drainage plan	X	

Report Format and Content	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
Tab 2. Existing Conditions Hydrologic Analysis					
2.1 Existing Conditions Drainage Map					
2.1.1 Drainage map shows existing onsite and offsite topography; one foot contours required with spot elevations (NAVD 88 datum); onsite and offsite drainage delineated by modifying the Wichita/Sedgwick County LIDAR/hydrogeodatabase			Ex. Drainage Map	X	
2.1.2 Map shows existing streams, creeks, and waterways (perennial and intermittent), with names labeled and flow directions indicated by arrows			Ex. Drainage Map	X	
2.1.3 Map shows location and boundaries of natural features such as wetlands, lakes and ponds with the normal water elevation noted, rock outcroppings, wooded areas and tree rows			No such feature		X



Drainage Plan Submittal Checklist



2.1.4 Map shows location of existing conveyance systems such as storm drains, inlets, catch basins, open channels, swales, and areas of overland flow, with flow directions indicated by arrows			Ex. Drainage Map	X	
2.1.5 Map shows existing structural elevations (e.g., pipes, manholes, etc.), and pipe materials and sizes			Ex. Drainage Map	X	
2.1.6 Map shows location, dimensions and elevations of existing bridges or culvert crossings			No Such feature nearby		X
2.1.7 Map shows location of existing utilities (e.g., water, sewer, gas, electric, etc.) with labels and easements			Ex. Drainage Map	X	
2.1.8 Map shows ground water elevations, if applicable			No impairment to GW		X
2.1.9 Map shows delineation of predominant soils based on USDA soil surveys and/or onsite soil borings; indicate NRCS soil name and Hydrologic Soil Group (HSG) for undisturbed surface soils			Report/Proposed Drainage Plan, according to COW Soil map	X	
2.1.10 Map shows existing land-use and cover per NRCS nomenclature			Report/Ex. Drainage Plan	X	
2.1.11 Map shows delineation of subareas (subbasins) for drainage calculations (subarea boundaries, subarea areas, impervious areas)			Ex. Drainage Map	X	
2.1.12 Map notes existing site footprint area and existing total impervious area (acres)			Ex. Drainage Map	X	
2.1.13 Map shows existing conditions time of concentration flow paths (segments, segment lengths, slopes, roughness parameters, and geometric properties if applicable) for each subarea			Ex. Drainage Map	X	
2.2 Existing Conditions Hydrology and Hydraulics Analysis and Results					
2.2.1 Discuss hydrologic analysis methodology used (e.g., unit hydrograph or other approved methods)			Report/Ex. Drainage Map	X	
2.2.2 Provide table of existing subarea areas			Ex. Drainage Map	X	
2.2.3 Provide table of pre-developed runoff curve numbers with supporting calculations			Ex. Drainage Map	X	
2.2.4 Provide table of existing times of concentration with supporting calculations			Ex. Drainage Map	X	
2.2.5 Provide reference to source rainfall data used in the analysis, and a summary table of rainfall data			Report/Ex. Drainage Map	X	
2.2.6 Provide cross-sections and other diagrams of existing open channels and other hydraulic features as required to illustrate basis for analysis			Ex. Drainage Map	X	
2.2.7 Provide existing conditions hydrologic and hydraulic analysis for runoff rates, volumes and velocities, showing assumptions and other support information not already cited in this checklist, including detailed calculations (2, 5, 10, 25 & 100 year, 24-hour storm events); present results in table form; provide copies of any computer files and models used on CD			Report/Ex. Drainage Map	X	

Report Format and Content	Applicant		Engr	
	I	NA	I	NA
Tab 3. Post-Development Hydrologic Analysis				
3.1 Post-Development Drainage Map (portion of existing conditions drainage map covering project site area revised to show items indicated below)				
3.1.1 General Features on Map				
3.1.1.1 Map shows preliminary onsite post-development contours (NAVD 88 datum) and project boundary			Proposed Drainage Plan	X



Drainage Plan Submittal Checklist



3.1.1.2 Map shows any existing onsite features (e.g., structures and channels) noted in Tab 2 that are to remain after development			Proposed Drainage Plan	X	
3.1.1.3 Map shows location of proposed roads, buildings, parking lots and other impervious areas			Proposed Drainage Plan	X	
3.1.1.4 Map shows location of proposed utilities (e.g., water and sewer) and easements			Proposed Drainage Plan	X	
3.1.1.5 Map shows offsite through-drainage confined to an easement, dedication, and/or reserve			Proposed Drainage Plan	X	
3.1.1.6 Map shows delineation of predominant soil HSGs based on anticipated soil textures and NRCS guidelines if post-development soil characteristics will be different from existing soil characteristics			Report/proposed drainage plan	X	
3.1.1.7 Map shows post-development land-use and cover per NRCS nomenclature			Report/Prop Drainage Plan	X	
3.1.1.8 Map shows delineation of subareas (subbasins) for onsite drainage calculations (subarea boundaries, subarea areas, impervious areas and curve numbers)			Report/Prop.Drainage Plan	X	
3.1.1.9 Map shows proposed limits of clearing and grading			Entire Lot	X	
3.1.1.10 Map shows post-development time of concentration flow paths (segments, Tc, segment lengths, slopes, roughness parameters, and geometric properties if applicable) for each project site subarea			Report/Prop Drainage Plan	X	
3.1.2 Locations of Proposed Conveyances and BMPs					
3.1.2.1 Map shows location of proposed conveyance systems (including backyard drainage) such as storm drains, inlets, catch basins, open channels, swales, and areas of overland flow, with flow directions indicated by arrows			Proposed Drainage Plan	X	
3.1.2.2 Map shows proposed structural elevations (e.g., pipes, manholes, etc.), and pipe materials and sizes			Proposed Drainage Plan	X	
3.1.2.3 For any drainage area of 40 acres or more (either onsite or offsite through drainage), map shows the flow confined to an open channel with required side benches and freeboard, or if partially enclosed conforms to applicable policy and design criteria			Not applicable Area less than 40 acres		X
3.1.2.4 Map shows locations of storm water management facilities and 20' wide maintenance access easements			Not applicable single lot		X
3.1.2.5 Map shows proposed energy dissipator and channel protection locations			No such structure		X
3.1.2.6 Map shows location and dimensions of proposed channel, bridge or culvert crossing modifications			No such modifications		X
3.1.2.7 Map shows 100-year pool elevation and normal pool elevation for ponds (see section 3.2)			Proposed Drainage Plan	X	
3.1.2.8 Map shows permanent concrete outfall control structure for ponds			Proposed Drainage Plan	X	
3.1.2.9 Map shows emergency overflow and top of berm elevation for ponds			Proposed Drainage Plan	X	
3.1.2.10 Map shows all floodplains, ponds and storm water management facilities in reserves			Not in floodplain		X
3.2 Post-Development Conditions Hydrology and Hydraulics Analysis and Results					
3.2.1 Discuss hydrologic analysis methodology used (e.g., unit hydrograph or other approved methods)			Report/Prop Drainage Plan	X	
3.2.2 Provide table of existing onsite subarea areas			Proposed Drainage Plan	X	



Drainage Plan Submittal Checklist



3.2.3 Provide table of post-development runoff curve numbers with supporting calculations		Proposed Drainage Plan	X	
3.2.4 Provide table of onsite post-development time of concentrations with supporting calculations		Proposed Drainage Plan	X	
3.2.5 Provide cross-sections and other diagrams of proposed open channels and other hydraulic features as required to illustrate basis for analysis		Proposed Drainage Plan	X	
3.2.6 Provide post-development conditions hydrologic and hydraulic analysis for runoff rates, volumes and velocities, showing assumptions and other support information not already cited in this checklist, including detailed calculations (2, 5, 10, 25 & 100 year, 24-hour storm events). For off-line projects, or on-line projects where project drainage area exceeds 10% of total on-line drainage area, calculations cover the site and extend downstream to a point where the proposed project site drainage area is equal to or less than 10% of the total drainage area at that point. In addition, for on-line projects analysis is extended downstream far enough to ensure no increase in peak flow rates. Present results in table form for all conveyances and structures; provide copies of any computer models used on CD		Proposed Drainage Plan	X	
3.2.7 For ponds, provide stage-storage-discharge or outlet rating curves and inflow-outflow hydrographs		Hydrological Analysis	X	
3.2.8 For ponds, demonstrate that the pond contours on the master grading plan and the stage-storage data are consistent		Proposed Drainage Plan	X	
3.2.9 For ponds, provide one foot of freeboard above the 100-year, 24-hour HWL		Proposed Drainage Plan	X	
3.2.11 Demonstrate that flows discharged from the project site are discharged in the same manner as before development, using level spreaders, other devices, or grading as required, or identify an appropriate flowage easement		Proposed Drainage Plan	X	
3.3 Storm Water Control Sizing				
3.3.1 Based on flows determined from the hydrology and hydraulics analysis, provide hydraulic sizing calculations for storm water controls		Hydrological Analysis	X	
3.3.2 Present, in table form, sizes, elevations, flows, velocities, and depths for each control, as applicable; verify that velocities are self-cleaning and non-erosive		Hydrological Analysis	X	
3.3.3 Provide typical details (including cross-sections where applicable) for outlet structures, embankments, spillways, grade control structures, conveyance channels, inlets, etc.		Proposed Drainage Plan	X	
3.4 Storm Water Management Facilities				
3.4.1 For each storm water management facility, in table form, describe facility, its TSS removal efficiency, total contributing drainage area, total contributing impervious area		Proposed Drainage Plan	X	
3.4.2 Provide 20' wide maintenance access for each facility		Single Lot		X
3.4.3 Maintenance responsibility of facilities specified in the platters text. (i.e., Home Owners Association, Lot Owners Association, or lot owner)		Proposed Drainage Plan	X	
3.4.4 Water quality protection volume calculations		Proposed Drainage Plan	X	
3.4.5 Channel protection volume calculations		Proposed Drainage Plan	X	
3.4.6 Water quality TSS removal calculations showing TSS removal for the site equals or exceeds 80%.		Proposed Drainage Plan	X	



Drainage Plan Submittal Checklist



3.4.8 Water quality and channel protection volume orifice size calculations			Hydrological Analysis	X	
3.4.9 Other calculations required for each facility as specified in the Storm Water Technical Guidance Manual			Proposed Drainage Plan	X	
3.4.10 Plans and typical details for each facility			Proposed Drainage Plan	X	

Report Format and Content	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
Tab 4. Floodplain Submittal					
4.1 Provide source of flood profile, floodplain, floodway, and discharges information			Site is not in floodplain		X
4.2 Delineation of nearest base flood elevations			Attached FIRM Panel	X	
4.3 Delineation of pre-developed regulatory floodplain/floodway limits using FEMA's current GIS database; limits to be per elevation and scaled location			Attached FIRM Panel	X	
4.4 Delineation of post-developed regulatory floodplain and floodway limits; limits to be per elevation and scaled location, with project limits shown					X
4.5 Provide floodway data table and discharges			Not Applicable		X
4.6 Provide all hydrologic and hydraulic study information for local floodplain studies, unnumbered Zone A elevation determinations and floodplain map revisions or required permits			Not Applicable		X
4.7 Provide regulatory floodway and four natural profile models (10, 50,100, and 500-yr) for existing and future watershed conditions			Not Applicable		X
4.8 Floodplains and floodways located within a reserve, where necessary			Not Applicable		X
4.9 Floodplain cut and fill calculations for storage sensitive basins			Not Applicable		X
4.10 Demonstrate that floodway elevations and velocities do not increase due to construction in a floodway ("No Rise Certification")			Not Applicable		X

Report Format and Content	Applicant			Engr	
	I/R	NA	Explanation / Location in Plan	I/R	NA
Tab 5. Federal, State and Local Permits (to be provided prior to construction unless otherwise specified)					
5.1 US Army Corps of Engineers -- regulatory program permits (Section 404 permit)			Not Applicable		X
5.2 Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Flood Plain Fill, Levee, Water Appropriations, Dam Safety permit, etc.)			Not Applicable		X
5.3 Federal Emergency Management Agency (FEMA) Letter of Map Changes (LOMA, LOMR, LOMR-f, CLOMR, etc.); shall be included and approved when project modifies the limits of the floodway			Not Applicable		X

Report Format and Content	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
Tab 6. Half-Scale Preliminary Master Grading Plan					
(One set of plans and a PDF shall be submitted to Storm Water Management. The final approved plan shall be sealed, signed and dated prior to Engineering receiving the final sanitary sewer plans.)			Attached	X	
6.1 Signed and sealed by Professional Engineer				X	
6.2 Title block, includes subdivision name and phase				X	
6.3 Cross hatch out future phases as information only			No future phase at this time		X
6.4 Dated revision documentation above title block				X	
6.5 Scale not greater than 1 inch = 60 feet				X	
6.6 North arrow				X	



Drainage Plan Submittal Checklist



6.7 Index or legend key				X
6.8 Benchmarks (minimum of two) used for site control (NAVD 88 vertical datum)		Pre. plat/ Drainage Plan	X	
6.9 Existing contours of entire site, with contour interval of one foot		Pre. plat/ Drainage Plan	X	
6.10 Proposed contours for channels, ponds, and other permanent storm water management facilities (including ponds), with contour interval of one foot		Proposed Drainage Plan	X	
6.11 Spot elevations shown to nearest tenth of a foot for critical locations			X	
6.12 Proposed street and lot layout		No proposed streets		X
6.13 Underground storm drain locations		Proposed Drainage Plan	X	
6.14 Overflow locations for storms exceeding storm drain capacity		Proposed Drainage Plan	X	
6.15 Top elevations of storm drains at all inlets, manholes, and flow line elevations for all outfalls		Proposed Drainage Plan	X	
6.16 Locations of open ditches and lakes		Proposed Drainage Plan	X	
6.17 Flow direction arrows		Proposed Drainage Plan	X	
6.18 Proposed flow line elevations of all open ditches at maximum 100 feet intervals, and 100 year flood elevations thereon		Proposed Drainage Plan	X	
6.19 Ponds: pond bottom elevation		Proposed Drainage Plan	X	
6.20 Ponds: normal pool elevation		Proposed Drainage Plan	X	
6.21 Ponds: 100 year flood elevation		Proposed Drainage Plan	X	
6.22 Ponds: emergency overflow elevation		Proposed Drainage Plan	X	
6.23 Proposed top-of-curb elevations at points where drainage will be required to flow over the curb		Not Applicable		X
6.24 Platted minimum building opening elevation for each lot, in table form for all lots (excluding basement floor elevations)		Not Applicable		X
6.25 Standard foundation and elevation detail for slab on grade, full basement, view-out, partial view-out and/or walk-out construction		Not Applicable		X
6.26 Each lot: Top of foundation elevation		Not Applicable		X
6.27 Each lot: Notation for builders as to the type of structure that may be constructed and the view-out, walk-out or pad elevation as applicable		Not Applicable		X
6.28 All lots above 100-year flood elevation		Yes	X	
6.29 Grading around structures conforms to perimeter drainage requirements		Proposed Drainage Plan	X	
6.30 Backyard drainage conforms to backyard drainage requirements		Single Lot		X
6.31 Adjacent subdivision lot lines, with lot labels and subdivision names		Single Lot		X
6.32 All easements, right-of-ways and reserves shown		Pre. Plat/Prop Drainage Plan	X	
6.33 Statement on proposed final plat: "A drainage plan has been developed for the subdivision and all drainage easements, right-of-ways, or reserves shall remain at the established grades and unobstructed to allow for the conveyance of storm water." Note that the final Master Grading Plan must have a statement that certifies the plan complies with the approved Final Drainage Plan, or if not, an addendum to the Drainage Plan is included with the final Master Grading Plan.		Final Plat	X	

Drainage Report

Pearson's Farm LLC Addition

Introduction

The subject property is located on north side of 33rd Street North and about ¼ mile west of Hillside Street. The tract of land is approximately 2.89 acres and is currently zoned as limited commercial (LC). This area is undeveloped and unplatted and covered by grass. The proposed use of the land is to develop into a commercial area with addition of a building and parking lot.

Current Conditions

The site is served by city of Wichita utilities. The site is covered by grass and drains to the northeast corner of the property. The soils are of Type D, with an average slope of 1.1%. There is center drain east tributary about 450 ft west of the property. The property is surrounded by undeveloped, limited industrial area. There are limited industrial (LI), developed areas on the east about 500 ft from the property.

The existing drainage pattern indicates that most of the property drains towards the northeast corner of the property which ultimately drains to the Center Drain East Tributary. The north 33rd street ditch, along the south property line of the property also drains to the creek.

According to FIRM, a little northwest portion of property is in Zone X, which is the area of 0.2 % annual chance flood or protected from 1% flood by levees. There are no signs of wetlands and the nearest 100-yr floodplain (Zone A) is about 200 ft west of the property, as indicated on attached FIRM panel in tab 4. The highest established BFE closest to the property is 1333.0 whereas the minimum ground elevation of the property is 1335.0.

The attached plat with topography shows existing features including contours, utilities, and proposed easements. The existing drainage map in tab 2 shows the current flow pattern and runoff calculation.

Proposed Improvements

The proposed improvement of this site is to develop into a commercial use which will include addition of a building and a parking lot. There will be an extended detention basin along the west property line to achieve the current City of Wichita water quantity and quality regulations. An 18" RCP with end section and rip-rap will be used to discharge the runoff from the pond. A small swale will drain the water to the creek as shown in proposed drainage plan attached in tab 3. A surface drainage system will be designed to collect the runoff from the site to the extended detention basin.

The entire site in fully developed condition dictates 100-yr peak runoff of 23.54 cfs. Hydrological models representing the existing and proposed developed conditions were modeled using the HydroCAD 8.00 and the output is attached in hydrological analysis section. An approximate flood detention analysis was developed at the discharge point to the creek and the hydrological output is attached in drainage plan. The calculation for channel protection and water quality volume is attached in proposed drainage plan. The extended detention calculations are attached in hydrological detention.

Attached drainage plan illustrates that there is no increase in runoff to the creek at the time of peak runoff from the proposed site. The attached calculations show the existing and developed peak runoffs, including assumed numbers and conditions for each storm events.

Best management practices for erosion control will include ditch checks in the proposed swales, inlet protection at all inlets, silt fence where applicable, and sediment ponds within the detention basins. The erosion control plan will have to constantly evolve as the site develops.

Site Hydrological Analysis

Existing and proposed site runoff calculations have been modeled using the Curve Number (CN) method. The Values for Curve Number (CN) and Rainfall Intensity were established using the *City of Wichita/Sedgwick County Stormwater Manual*. Existing times of concentration were calculated from existing ground conditions and can be found in tab 2. Proposed times of concentration have been modeled using the proposed site runoff and accounting for the use of storm sewer and channels to route the runoff to the extended detention basin. Storage-Indication method is used for pond routing and SCS unit hydrograph method is used for peak flow calculation.

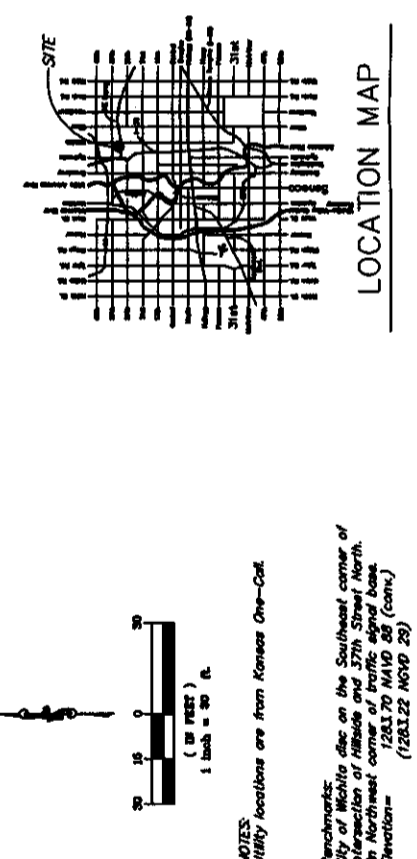
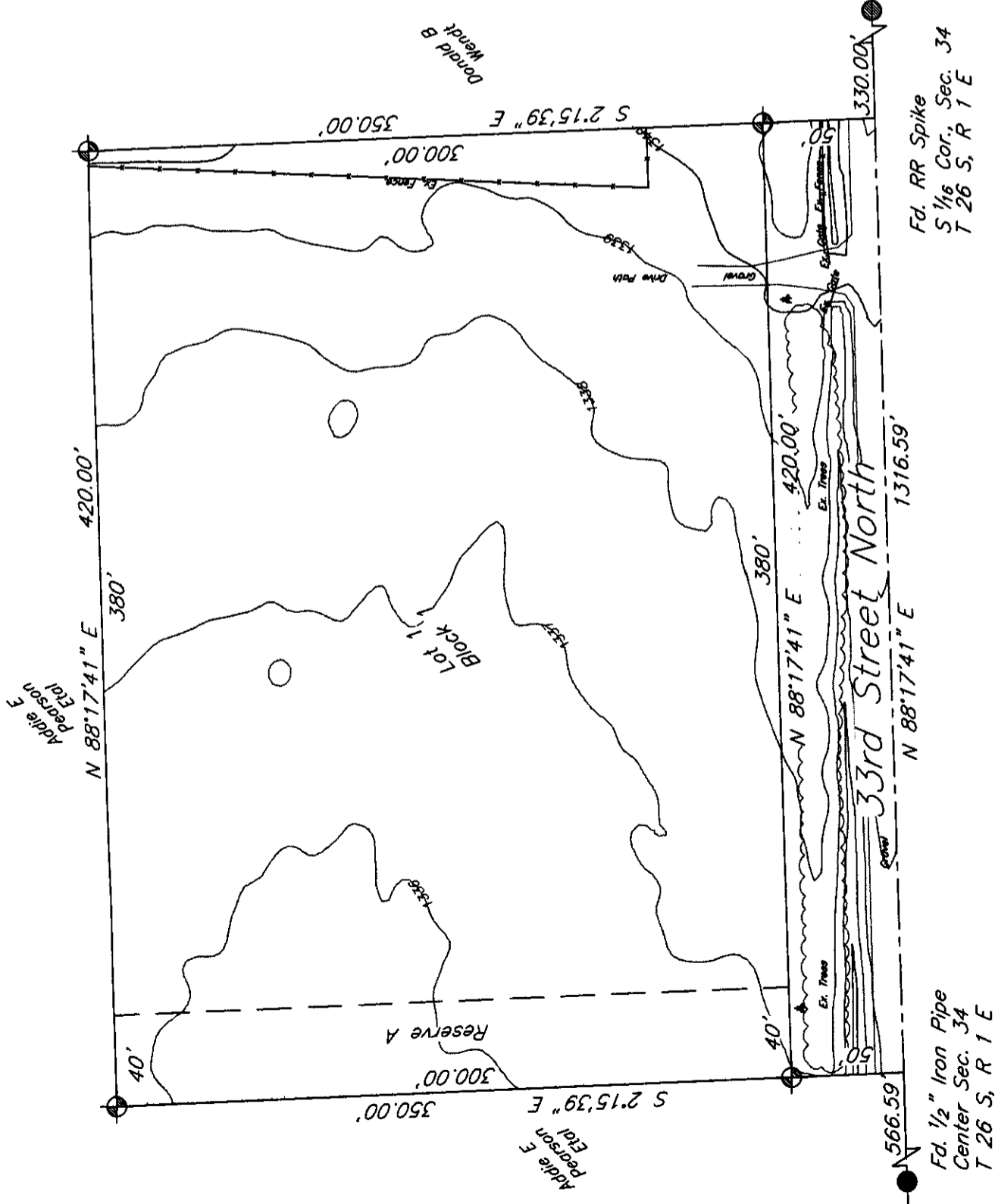
Hydraulic Model

An Analysis of hydraulic characteristics will be developed to for pipes and other stormwater facility as the site develops.

Future Development

There will be addition of a building and a parking lot at this time.

One-Step Final Plat
Pearson's Farms, LLC. Addition
Wichita, Sedgwick County, Kansas
 Part of the NE 1/4, Section 34, Township 26 South, Range 1 East of the 6th. P.M.



LEGEND

- ⊕ Benchmark
- ⊙ Power Pole
- ⊙ Cedar
- ⊙ Tree
- Fence
- Overhead Electric
- 1/2" Iron Pipe (found)
- Railroad Spike (found)
- ◆ 5/8" Rebar (set)
- ◆ REBAR C/S #157

NOTES:
 Utility locations are from Kansas One-Call

Benchmarks:
 City of Wichita disc on the Southeast corner of intersection of Hillside and 37th Street North.
 On Northwest corner of traffic signal base.
 Elevation = 1263.70 NAVD 83 (cont.)
 (1263.22 NAVD 29)

State of Kansas } SS
 City of Wichita

This plat of Pearson's Farms, LLC. Addition, Wichita, Sedgwick County, Kansas, was prepared and approved by the Wichita-Sedgwick County Metropolitan Area Planning Commission, Wichita, day of Kansas, dated this ___ day of ___, 2011.
 Wichita-Sedgwick County Metropolitan Area Planning Commission.

G. Nelson Van Fleet, Chair
 John L. Schlegel, Secretary

State of Kansas } SS
 City of Wichita

This plat approved and all dedications shown herein accepted by the City Council of the City of Wichita, Kansas, this ___ day of ___, 2011.
 At the Direction of the City Council

Carl Brewer, Mayor
 Karen Sabietz, City Clerk
 Entered on transfer record this ___ day of ___, 2011.
 Kelly B. Arnold, County Clerk

State of Kansas } SS
 County of Sedgwick

This is to certify that this plat has been filed for record in the Office of the Register of Deeds this ___ day of ___, 2011, at ___ o'clock ___ M.
 Bill Meek, Register of Deeds
 Tonya Buchingham, Deputy

Reviewed in accordance with K.S.A. 98-2005 on this ___ day of ___, 2011.

Troy L. Rehder, L.S. #1246
 Deputy County Surveyor
 Sedgwick County, Kansas

State of Kansas } SS
 County of Sedgwick

I, Bradley C. Ward, a licensed land surveyor of the State of Kansas, do hereby certify that the following described tract of land was surveyed on the 17th day of March, 2011 and the accompanying final plat prepared and that all the monuments shown herein actually exist and their positions are correctly shown to the best of my knowledge and belief.

LEGAL DESCRIPTION

The South 350 feet of the West 420 feet of the East 750 feet of the Northwest Quarter of the Northeast Quarter, Section 34, Township 26 South, Range 1 East of the Sixth Principal Meridian, Sedgwick County, Kansas.

All easements and Rights of Way within said tract are hereby vacated by virtue of K.S.A. 12-512(f) amended.

Bradley C. Ward, L.S. #920

State of Kansas } SS
 County of Sedgwick

I, Dean P. Pearson, CEO of Pearson's Farms, LLC, do hereby certify that the undersigned, have caused the land described in the surveyor's certificate to be platted and recorded in the public records of Sedgwick County, Kansas, and that the same are hereby granted as indicated for constructing, maintaining, operating, and repairing public utilities. Reserve A is platted for drainage, utilities, landscaping and irrigation. A drainage plan has been developed for the plat and all drainage easements, rights-of-way, or reserves shall remain of established grade or as modified with the approval of the applicable City or County Engineer, and undisturbed to allow for the construction and use of the same. The plat is subject to any and all restrictions, reservations and covenants now on file or hereafter filed in the Office of the Register of Deeds of Sedgwick County, Kansas.

By: Dean P. Pearson, CEO
 Pearson's Farms, LLC

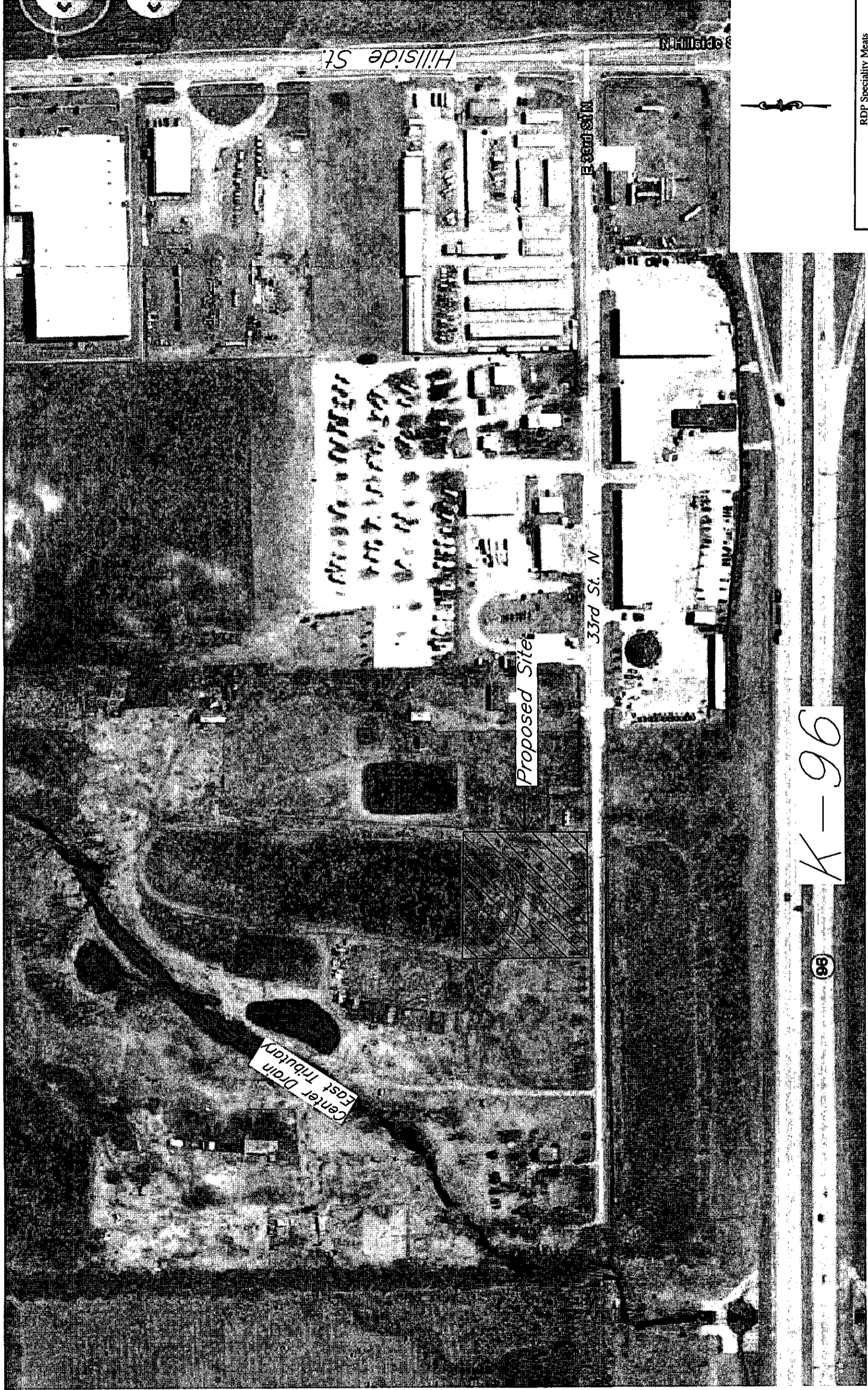
State of Kansas } SS
 County of Sedgwick

This instrument was acknowledged before me on this ___ day of ___, 2011, by Dean P. Pearson, CEO, Pearson's Farms LLC.

Notary Public
 My Commission Expires: ___



318 S. Lincoln, Wichita, KS 67202 316/781-0242



K-96

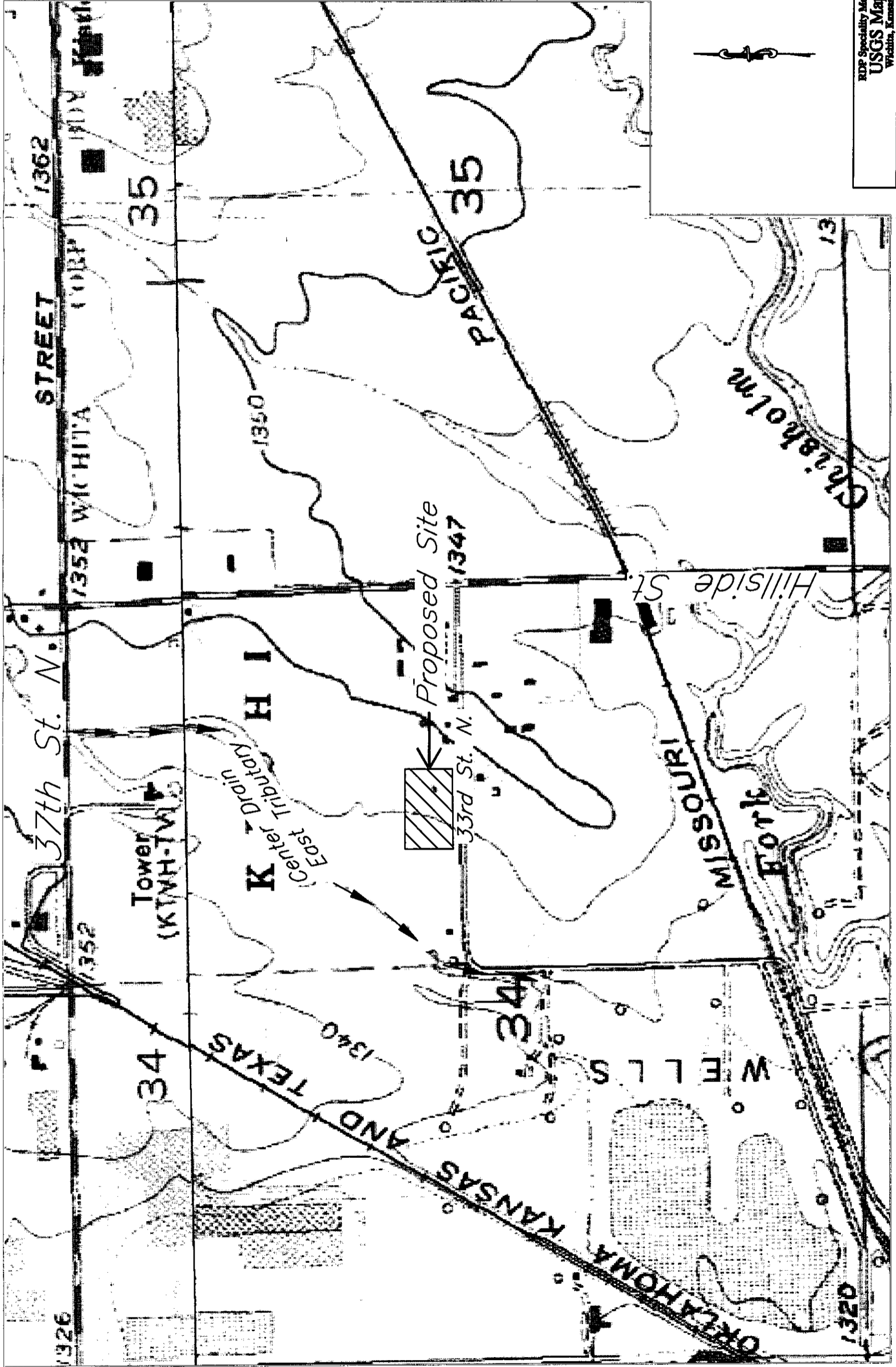
96

RDP Speciality Meats
Aerial Map
Wichita, Kansas

PROJECT NUMBER	FILE LOCATION	DATE	SHEET
	10148	03/2011	OF
	GP	REVISION	OF

kemiller
ENGINEERS

88 S. Market
Wichita, KS 67202
316/264-0348



RDP Speciality Maps
 USGS Map
 Wichita, Kansas



118 S. Market
 Wichita, KS 67202
 316/264-0241

PROJECT NUMBER		DATE		SHEET	
FORM NO.	FILE	DATE	DATE	NO.	OF
10148	10148	03/2011	03/2011	1	1
DATE OF	DATE OF	DATE OF	DATE OF	DATE OF	DATE OF

Existing/Undeveloped Condition:
 Total Site Area = 2.89 Acres, Offset = 0.25 Acres
 Total Area = 3.14 Acres
 Gross Area including offset = 3.14 Acres
 Soil Group D with average slope less than 1%

Existing, T_c Calculation:
 Elev. path = 515 ft. with average slope of ground 0.97%
 Sheet flow = 100 ft. T_c = 12.3 min
 Shallow Concentrated flow = 415 ft. T_c = 10.0 min
 Total T_c = 22.3 min

Existing Drainage Calculations

Area #	Acres	T _c	24-hr rainfall depth (inches)	Curve Number (CN)	Existing Q, cfs	Remark								
1	3.14	22	3.60	4.80	5.52	6.48	8.16	84	6.61	10.06	12.15	14.96	19.88	Ex. Slope offset drainage to the northwest corner

Water Quality Volume Calculation

85th percentile storm event (1.2 inches) P =	1.2 inches
Total area, A =	2.89 acres
Rainfall Coeff. R _v =	0.524
Required Vol. for Water Quality =	0.15 ac-ft

Water Quality Peak Flow Calculation

Area =	2.89 acres
WQV =	0.628 inches
Pond and Stream Factor, F _p	0.700
Calculated CN =	93.28
S =	0.719 inches
I _a =	0.144 inches
I _a /P =	0.120
Q _u	730.0 cfs/sq. min
Water quality peak flow	1.45 cfs

Channel Protection Volume Calculation

Drainage Area	Curve Number (CN)	Water volume (inches)	24 hr 1 yr Storm	Curve Number (CN)	Water volume (inches)
Entire Site	2.89	2.88	92	0.670	2.06
				2.88	84
				1.805	1.42

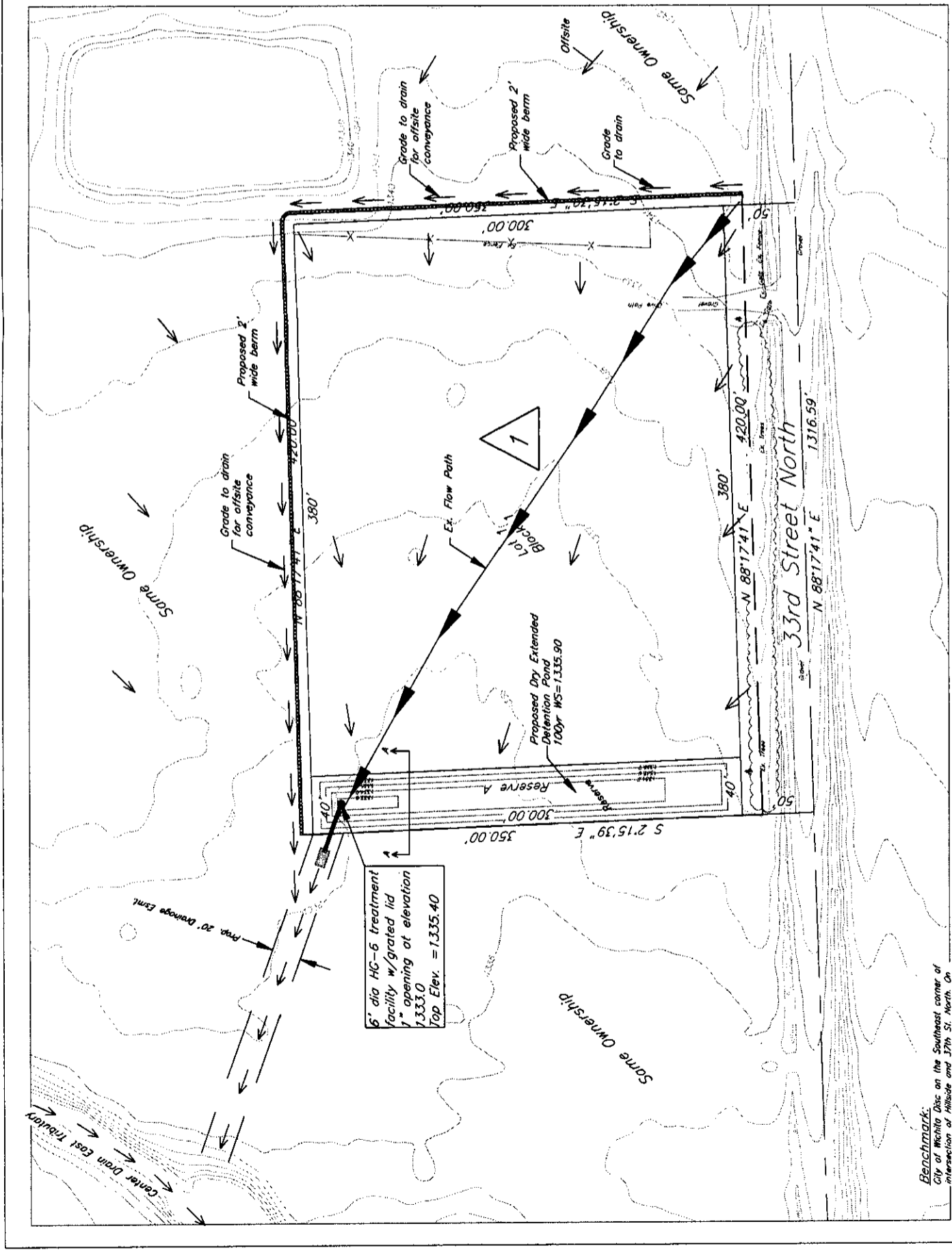
Detention Pond Volume

Elevation	Area sq. ft.	Area acres	Storage ac-ft	Cumulative Storage ac-ft
1333.0	340.8	0.01	0.01	0.01
1333.5	1570.6	0.04	0.03	0.04
1334.0	3725.2	0.09	0.05	0.09
1334.5	5439.9	0.12	0.07	0.16
1335.0	6623.9	0.15	0.08	0.25
1335.5	7839.9	0.18	0.10	0.34
1336.0	9087.9	0.21		

Water quality volume is treated in Proprietary system (HG-C, as designed by Hydroworks). The HG-6 has capacity to treat the treatment flow of 2.1 cfs and can bypass 10.5 cfs of flow with 80% particle size.

Channel protection volume is detained in Extended Detention Pond as located in plan by 1" orifice located at elevation 1333.0. The grade of manhole at elevation 1335.5 will drain the excess runoff through 18" RCP.

Detention time for CPV = 27.2 hrs (centroid-centroid)



Developed Site analysis

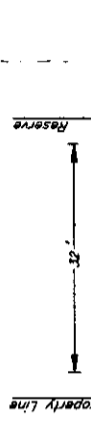
Storm Event	Peak Flow	Time to peak Flow, hrs
2-yr	10.98	12.05
5-yr	15.35	12.05
10-yr	17.95	12.05
25-yr	21.4	12.05
100-yr	27.40	12.05

Comparison between onsite peak and peak flows in Creek

Storm Event	Onsite Time to Peak	Flow in creek at Onsite Peak	Flow in creek at Increase in Creek ?
2-yr	12.05	0.37	No
5-yr	12.05	3.54	No
10-yr	12.05	13.25	No
25-yr	12.05	41.07	No
100-yr	12.05	115.97	No

Approximate Flood Detention analysis for Center Drain East Tributary

Storm Event	Peak Flow cfs	Time to peak Flow, hrs
2-yr	197	13.29
5-yr	467	13.19
10-yr	664	13.16
25-yr	955	13.13
100-yr	1515	13.11



Peerson's Farm LLC Addition
 Proposed Drainage plan
 Wichita, Kansas

kemiller
 engineering

314 784-0242
 918 S. Main St., Suite 102, Wichita, KS 67202

DATE: 03/20/11
 DRAWN BY: [Signature]
 CHECKED BY: [Signature]



Tab 2

Tab 2:

Existing Drainage Map

Tab 3

Tab 3:

**Proposed Drainage Plan
Hydroworks Treatment Facility Detail
Hydrological Analysis**

Existing/Undeveloped Condition:
 Total Site Area = 2.89 Acres, Offset = 0.25 Acres
 Impervious Area = 0.06 Acres, Offset = 0.00 Acres
 Grass Area = 2.83 Acres, Offset = 3.14 Acres
 Soil Group D with average slope less than 1%
 Existing Tc Calculation:
 Total Area = 2.89 Acres, Offset = 0.25 Acres
 Sheet Flow = 100 ft, Tc = 12.3 min
 Shallow Concentrated Flow = 415 ft, Tc = 10.0 min
 Total Tc = 22.3 min

Existing Drainage Calculations

Area #	Tc min	24-hr rainfall depth (inches)	Curve Number (CN)	Existing Q, cfs	Remark			
1	22	3.60	4.80	5.52	6.48	8.16	84	
Note: Soil Group D with average slope less than 1% Existing Tc = 12.3 min Sheet Flow = 100 ft, Tc = 12.3 min Shallow Concentrated Flow = 415 ft, Tc = 10.0 min Total Tc = 22.3 min								

Water Quality Volume Calculation

Calculation for water quality volume (WQV) = P * Rv * A / 12	Soil Group	D'
85th percentile storm event (1/2 inches) P = 1.2	inches	
Total Area, A = 2.89 acres	acres	
Rainfall Coeff. Rv = 0.524	cf	
Required Vol. for Water Quality = 0.16 ac-ft	ac-ft	
Calculation of Rv		
Coeff for undisturbed area, RvU = 0.05	Coeff	Area
Coeff for turf cover disturbed, RvT = 0.25	Coeff	Area
Coeff for impervious area, RvI = 0.95	Coeff	Area
Weighted, Rv = 0.524		

Water Quality Peak Flow Calculation

Water quality volume is treated in Proprietary system (HG-G, as designed by Hydroworks). The HG-G has capacity to treat the treatment flow of 2.1 cfs and can bypass 10.5 cfs of flow with 80% TSS removal for 200 micron particle size.

Area	Area sq. ft.	Area acres	Storage ac-ft	Cumulative Storage ac-ft
1333.0	340.8	0.01	0.01	0.01
1333.5	1570.6	0.04	0.01	0.04
1334.0	3725.2	0.09	0.03	0.04
1334.5	5439.9	0.12	0.05	0.09
1335.0	6623.9	0.15	0.07	0.16
1335.5	7839.9	0.18	0.08	0.25
1336.0	9087.9	0.21	0.10	0.34

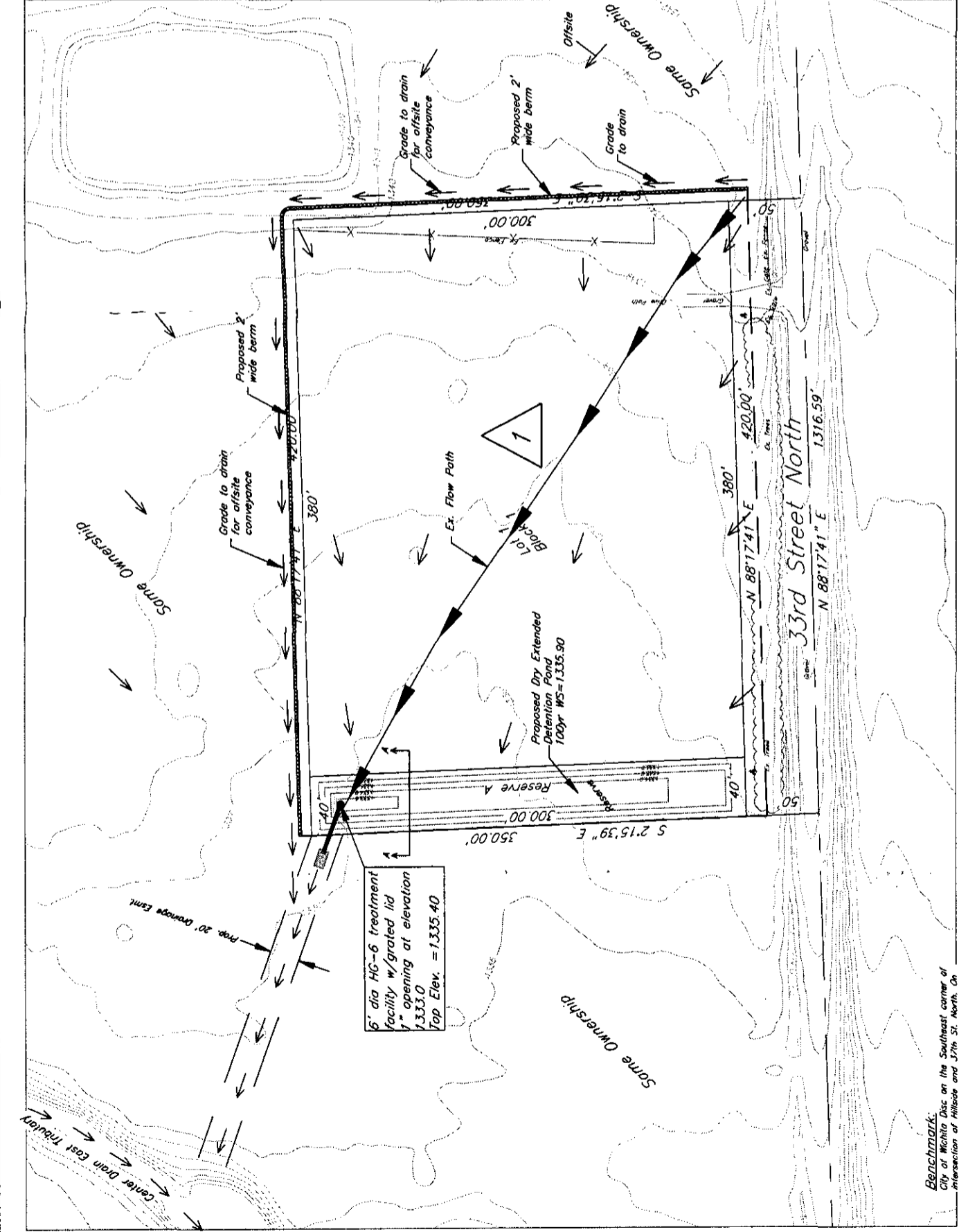
Channel Protection Volume Calculation

Drainage Area	Area	Storage	Cumulative Storage
2.89	2.89	2.89	2.89
0.870	0.870	2.06	2.86
0.84	0.84	1.905	1.42

Detention Pond Volume

Elevation	Area sq. ft.	Area acres	Storage ac-ft	Cumulative Storage ac-ft
1333.0	340.8	0.01	0.01	0.01
1333.5	1570.6	0.04	0.03	0.04
1334.0	3725.2	0.09	0.05	0.09
1334.5	5439.9	0.12	0.07	0.16
1335.0	6623.9	0.15	0.08	0.25
1335.5	7839.9	0.18	0.10	0.34
1336.0	9087.9	0.21		

Channel protection volume is detained in Extended Detention Pond as located in plan by 1" orifice located at elevation 1333.0. The grate of manhole at elevation 1335.5 will drain the excess runoff through 18" RCP.
 Detention time for CPV = 27.2 hrs (centroid-centroid)



Comparison between onsite peak and peak flows in Creek

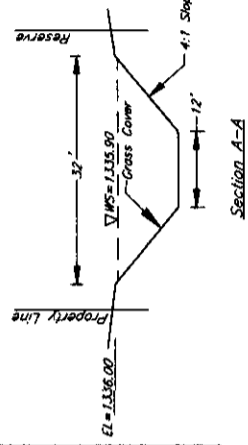
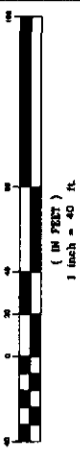
Storm Event	Onsite Time to Peak	Flow in creek at Onsite Peak	Increase in peak in Creek?
2-Yr	12.05	0.37	No
5-Yr	12.05	3.54	No
10-Yr	12.05	13.25	No
25-Yr	12.05	41.07	No
100-Yr	12.05	115.97	No

Developed Site analysis
 Drainage Area Contributing to flow = 3.14 acres
 Curve Number, CN=92

Storm Event	Peak Flow	Time to peak Flow, hrs
2-Yr	10.98	12.05
5-Yr	15.35	12.05
10-Yr	17.95	12.05
25-Yr	21.4	12.05
100-Yr	27.40	12.05

Approximate Flood Detention analysis for Center Drain East Tributary
 Approximate Drainage Area at intersection to 33rd Street N. = 1152 acres
 Curve Number used, CN=61

Storm Event	Peak Flow cfs	Time to peak Flow, hrs
2-Yr	197	13.29
5-Yr	467	13.19
10-Yr	664	13.16
25-Yr	955	13.13
100-Yr	1515	13.11

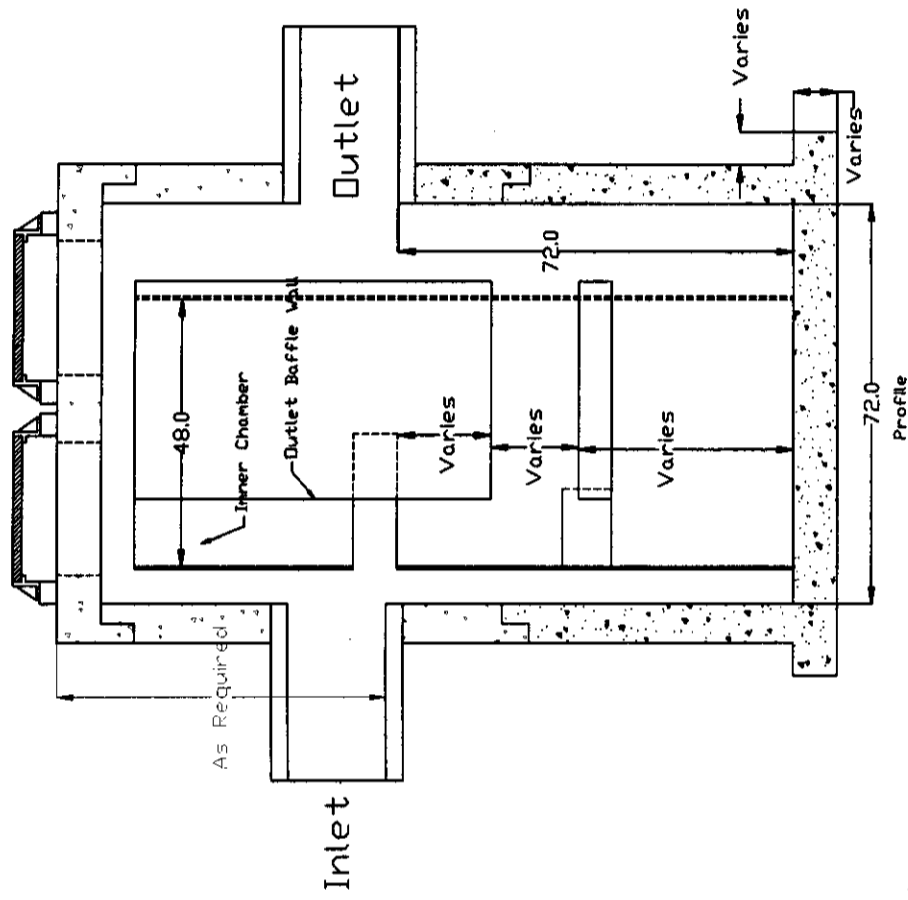
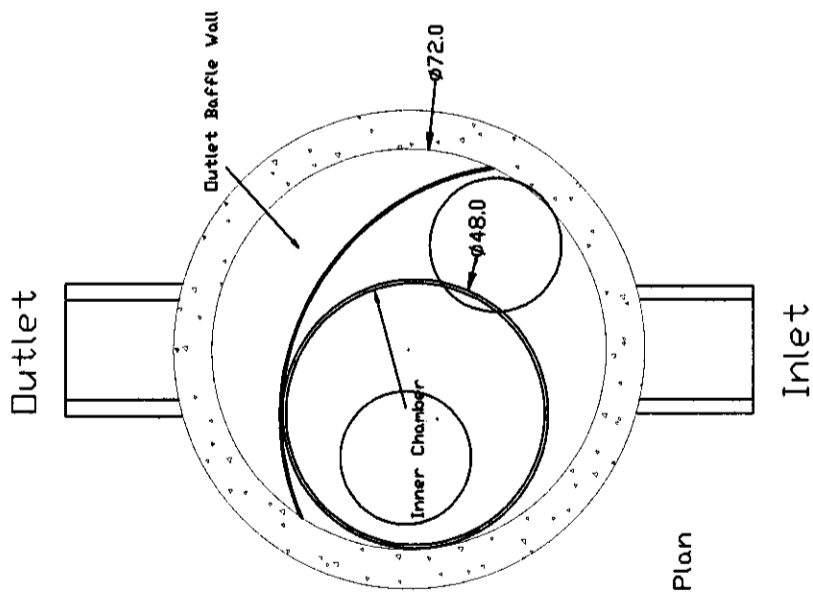


Project Information

File Name: 101-45
 Project: Drainage
 Date: 03/2011
 Sheet: 1 of 1

Client: Pearson's Farm LLC Addition
 Location: Wichita, Kansas

Engineer: kemiller engineering
 316 S. Main St., Suite 101
 Wichita, KS 67202
 316/764-0242



U.S. Patent No. 6,951,619

Dimensions in inches
 Permanent Pool Volume = 1250 US gallons
 The Hydroguard must be cleaned after the construction period if it is used as a sediment and erosion control measure
 The Hydroguard should be inspected once per year for stabilized sites
 Inspection will determine the maintenance frequency (annual maintenance or once every two years typical for stabilized sites)
 Sites with unstable conditions (exposed soil or materials storage) will require more frequent inspection and maintenance

Hydroworks, LLC
 50 S. 21st St., Kenilworth, NJ 07033
 Phone: 888-290-7900 Fax: 888-783-7271
 Web: www.hydroworks.com

Hydroworks HG6 (72"φ)

PROJECT:

LOCATION:

REVISION DATE: 02/10/2011



Existing Onsite Runoff Area information

Existing Onsite Runoff Information

Area #	Acres	Land Use	Max Elevation	Min. Elevation	Flow Length (L)	Time of Concentration, Tc (min)	Curve Number CN
Entire Site	2.89	Undeveloped, covered with grass	1341	1336	515"(Mixed flow)	22	84

Developed Runoff Information

Area #	Acres	Land Use	Time of Concentration, Tc (min)	Curve Number CN
Entire Site	2.89	Commercial use	15	92

****Runoff calculations are shown in Drainage plan.**

Stage-storage analysis for extended detention
(For channel protection)

Summary for Pond Detention: DED POND

Inflow Area = 2.890 ac, Inflow Depth = 1.96" for 1-yr 24 hr storm event
 Inflow = 6.91 cfs @ 12.07 hrs, Volume= 0.472 af
 Outflow = 1.19 cfs @ 12.52 hrs, Volume= 0.472 af, Atten= 83%, Lag= 26.9 min
 Primary = 1.19 cfs @ 12.52 hrs, Volume= 0.472 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.10 hrs
 Peak Elev= 1,335.57' @ 12.52 hrs Surf.Area= 8,027 sf Storage= 11,319 cf

Plug-Flow detention time= 1,544.1 min calculated for 0.472 af (100% of inflow)
 Center-of-Mass det. time= 1,543.7 min (2,355.4 - 811.7)

Volume	Invert	Avail.Storage	Storage Description
#1	1,333.00'	14,957 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,333.00	341	0	0
1,333.50	1,571	478	478
1,334.00	3,725	1,324	1,802
1,334.50	5,440	2,291	4,093
1,335.00	6,624	3,016	7,109
1,335.50	7,840	3,616	10,725
1,336.00	9,088	4,232	14,957

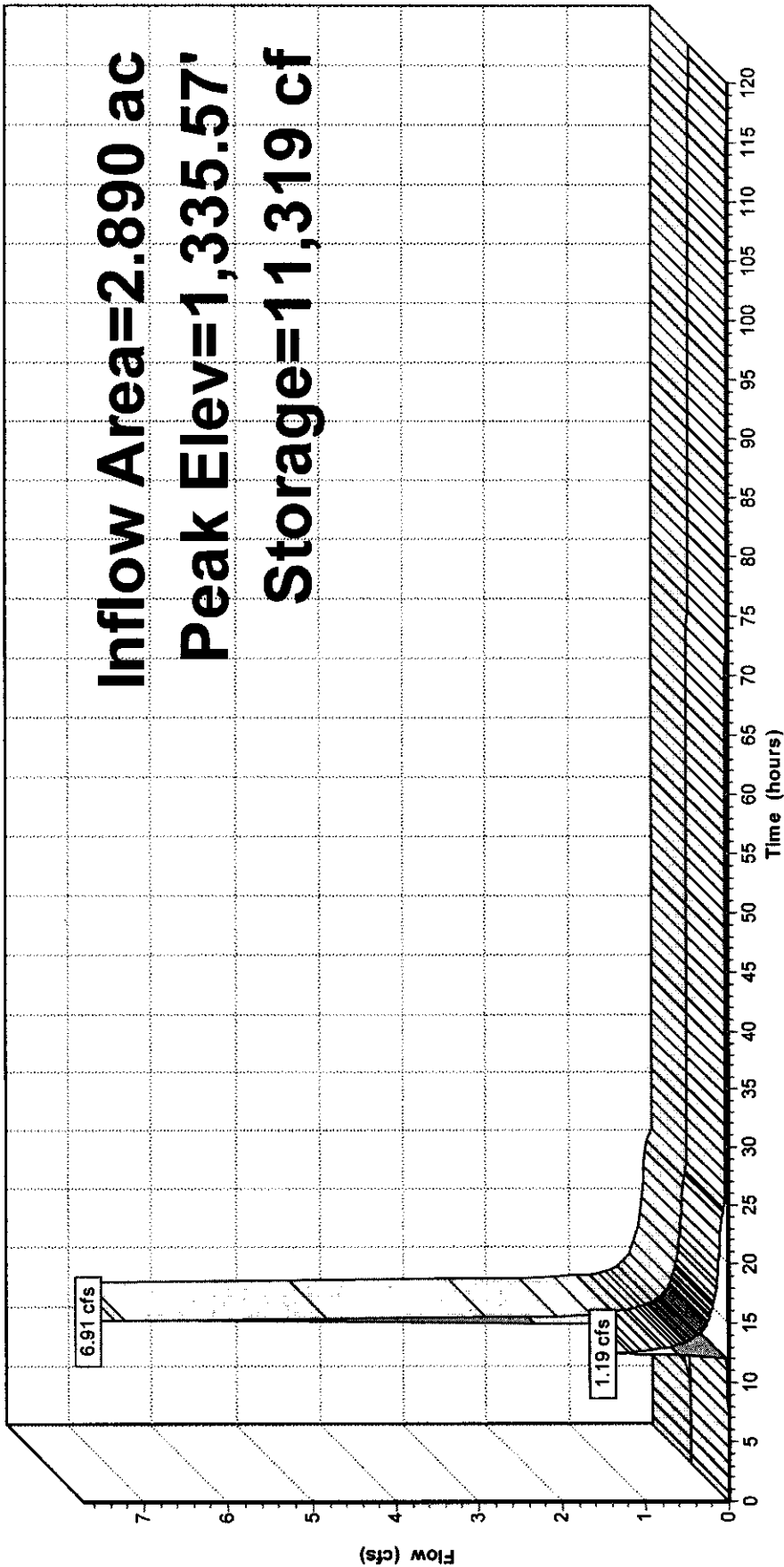
Device	Routing	Invert	Outlet Devices
#1	Primary	1,333.00'	1.0" Vert. Orifice/Grate C= 0.600
#2	Primary	1,335.40'	1.20' x 1.20' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Primary OutFlow Max=1.18 cfs @ 12.52 hrs HW=1,335.57' (Free Discharge)
 ↑
 1=Orifice/Grate (Orifice Controls 0.04 cfs @ 7.66 fps)
 2=Orifice/Grate (Weir Controls 1.13 cfs @ 1.36 fps)

Hydrograph

Inflow
 Primary

Inflow Area=2.890 ac
Peak Elev=1,335.57'
Storage=11,319 cf

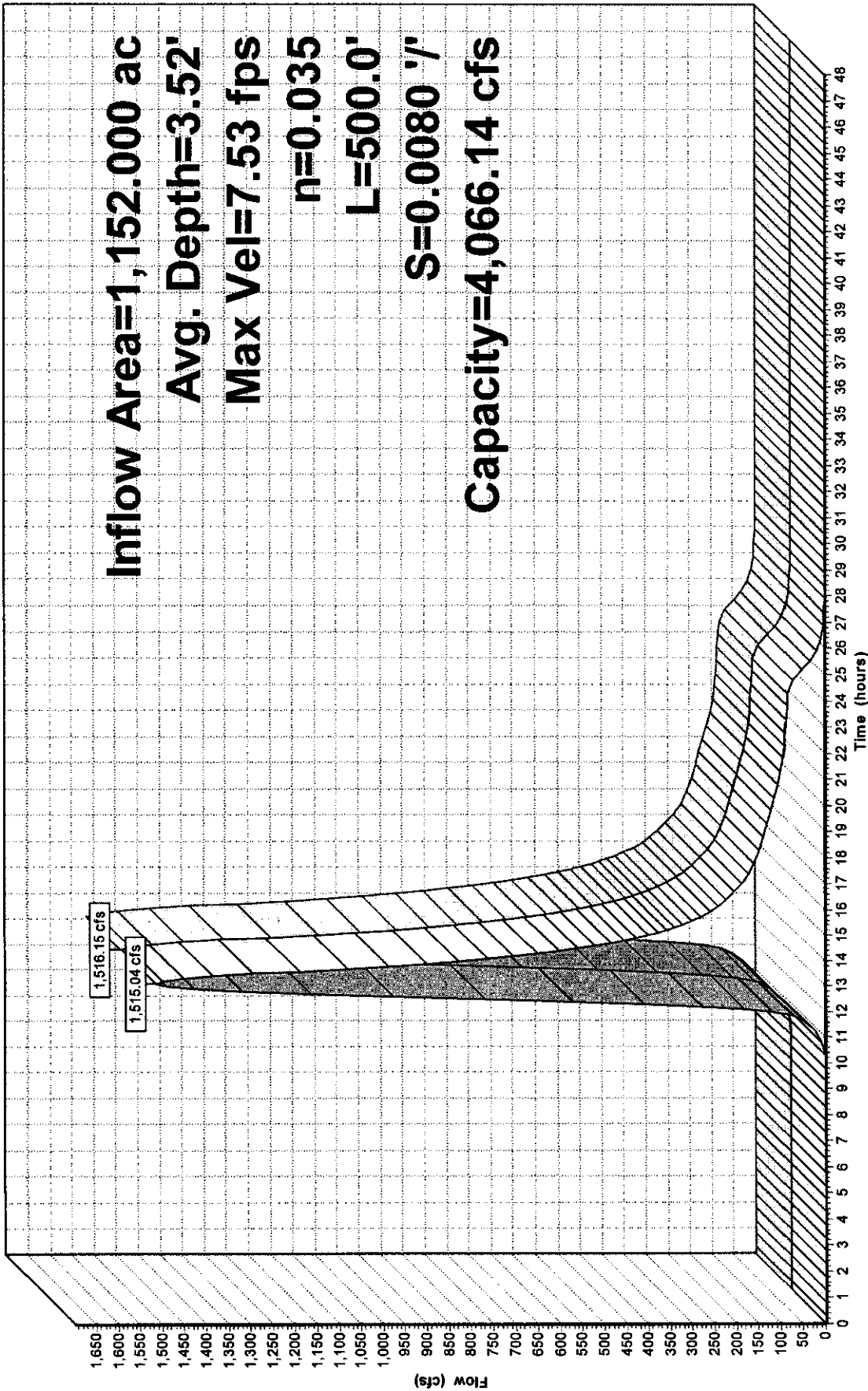


Hydrograph for Center Drain East Tributary
at the point of discharge
(100-, 25-, 10-, 5-, 2-yr)

Hydrograph

□ Inflow
□ Outflow

Inflow Area=1,152.000 ac
Avg. Depth=3.52'
Max Vel=7.53 fps
n=0.035
L=500.0'
S=0.0080 1/1"
Capacity=4,066.14 cfs



Hydrograph

□ Inflow
□ Outflow

Inflow Area=1,152.000 ac

Avg. Depth=2.72'

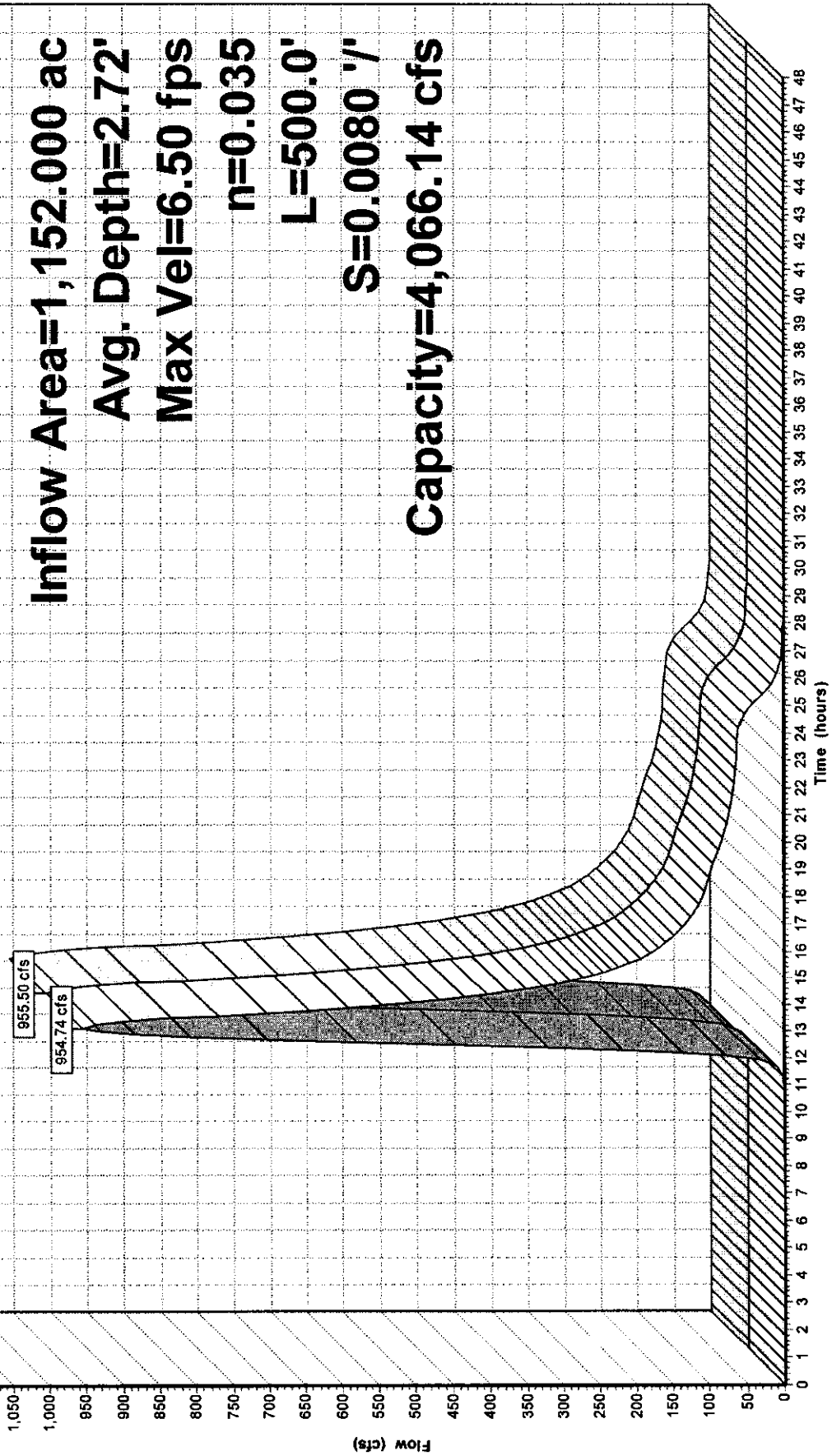
Max Vel=6.50 fps

n=0.035

L=500.0'

S=0.0080 '/'

Capacity=4,066.14 cfs



Hydrograph

▨ Inflow
▨ Outflow

Inflow Area=1,152.000 ac

Avg. Depth=2.22'

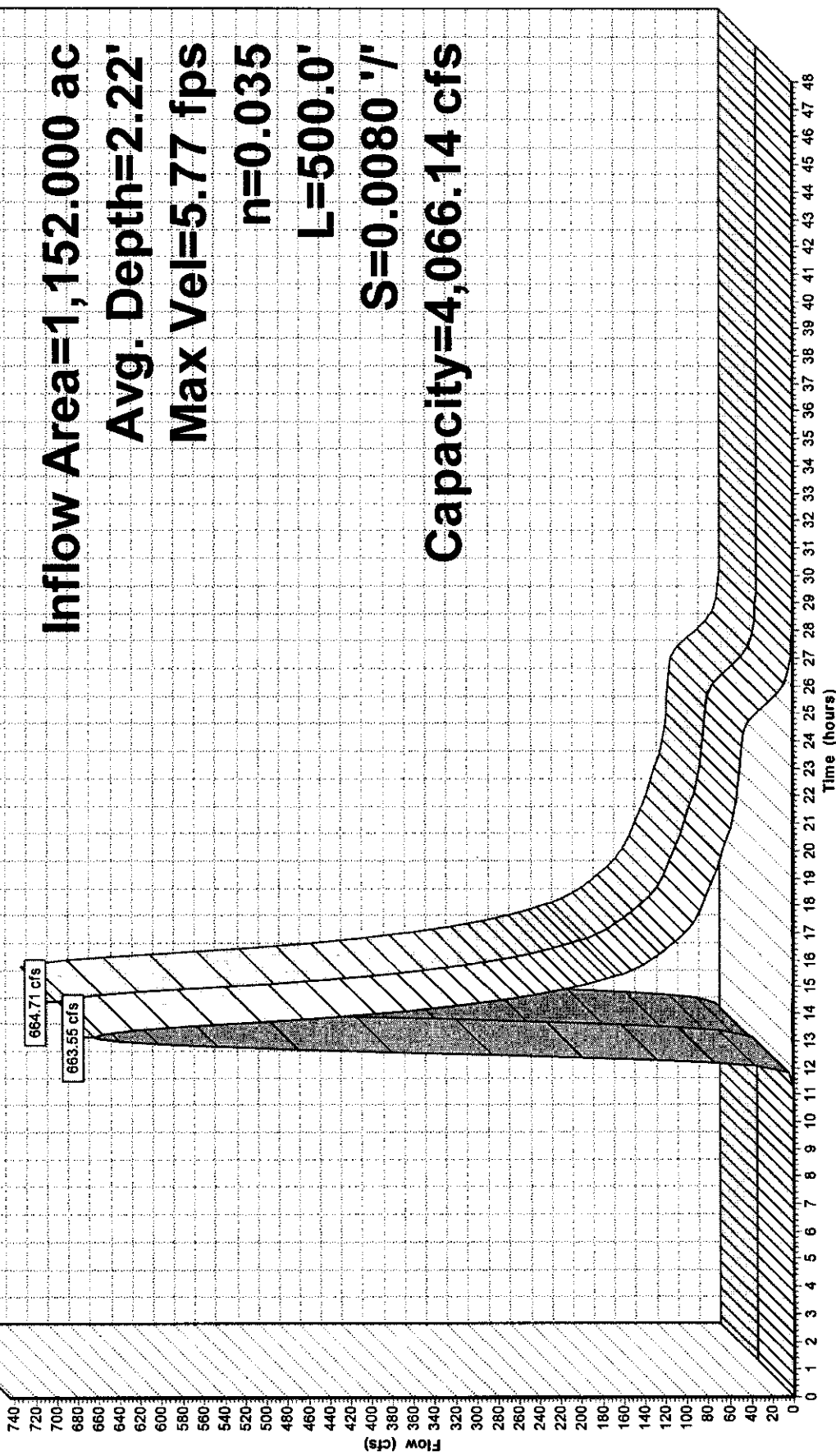
Max Vel=5.77 fps

n=0.035

L=500.0'

S=0.0080 '/'

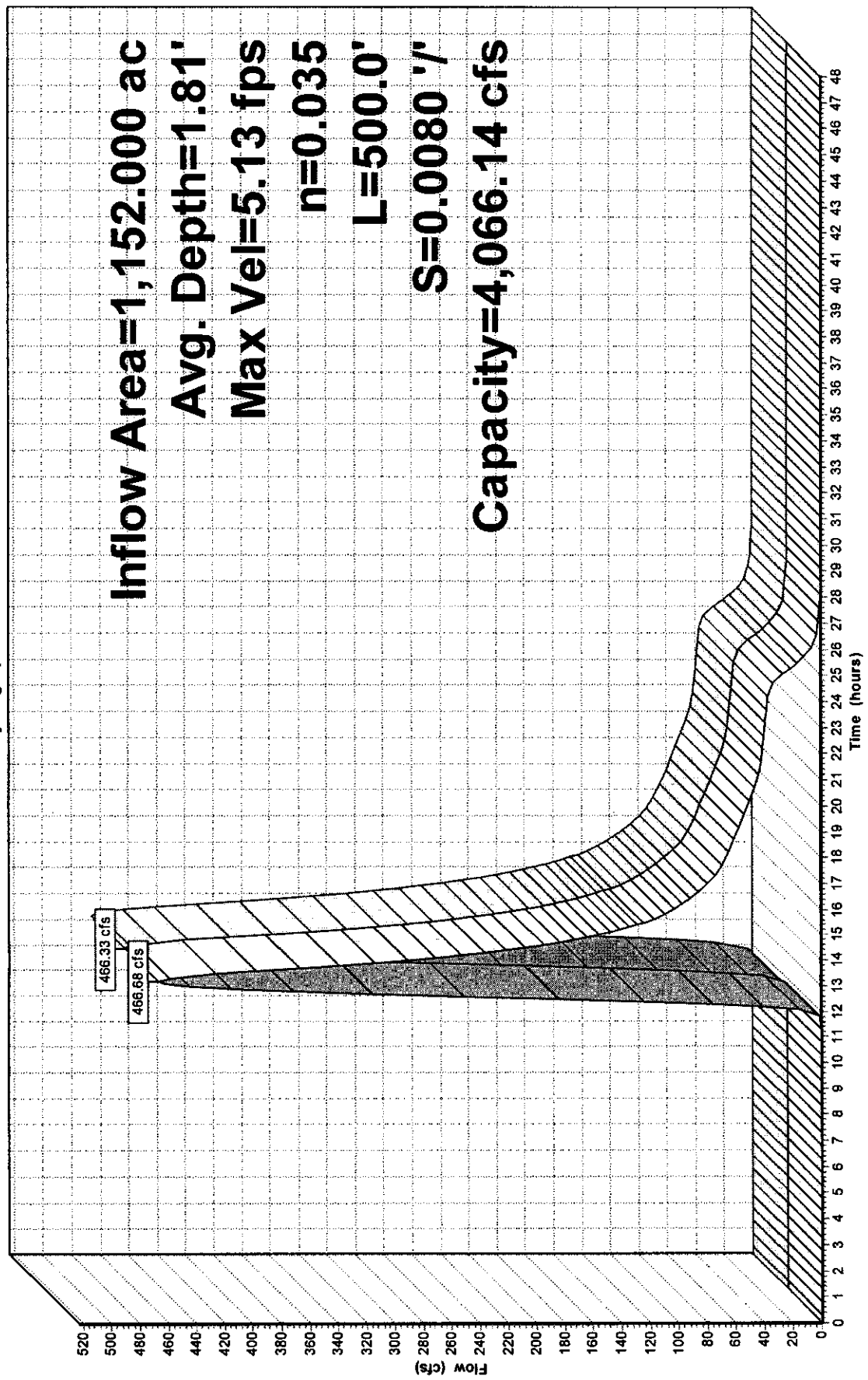
Capacity=4,066.14 cfs



Inflow
 Outflow

Hydrograph

Inflow Area=1,152.000 ac
Avg. Depth=1.81'
Max Vel=5.13 fps
n=0.035
L=500.0'
S=0.0080 '/'
Capacity=4,066.14 cfs



Hydrograph

Inflow
 Outflow

Inflow Area=1,152.000 ac

Avg. Depth=1.10'

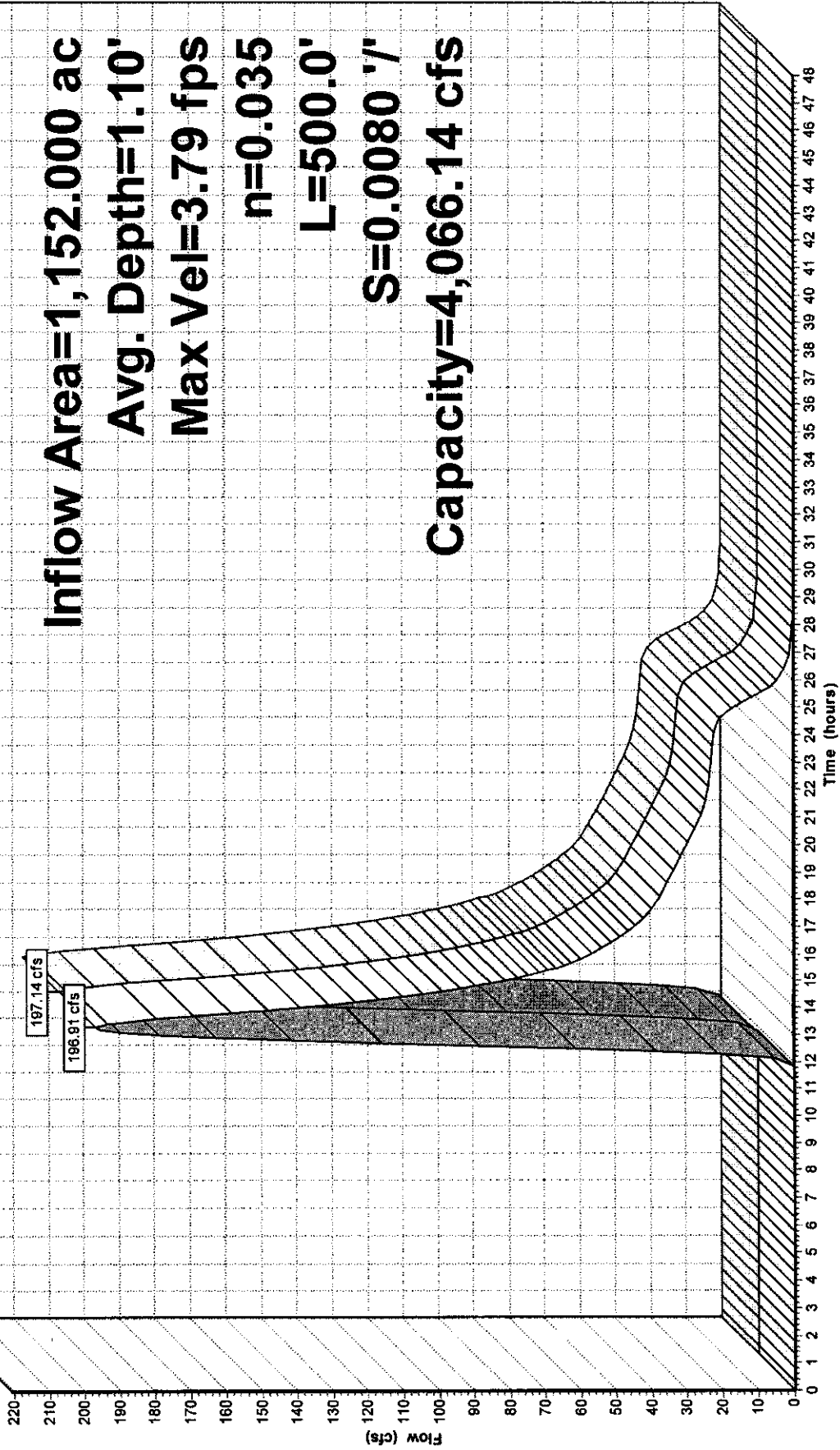
Max Vel=3.79 fps

n=0.035

L=500.0'

S=0.0080 '/'

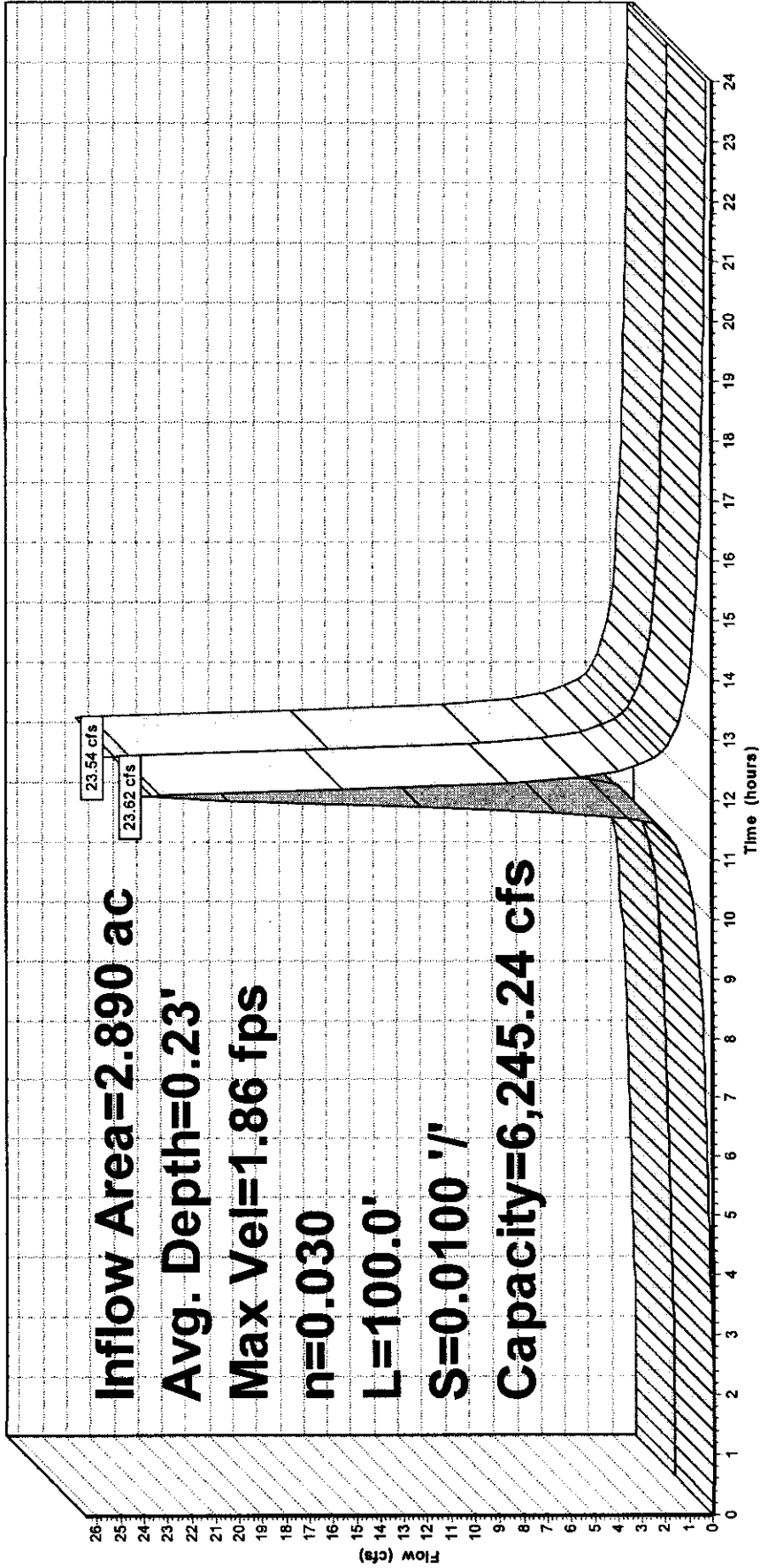
Capacity=4,066.14 cfs



Hydrographs of site runoff
at the discharge point to creek
(100-, 25-, 10-, 5-, 2-yr)

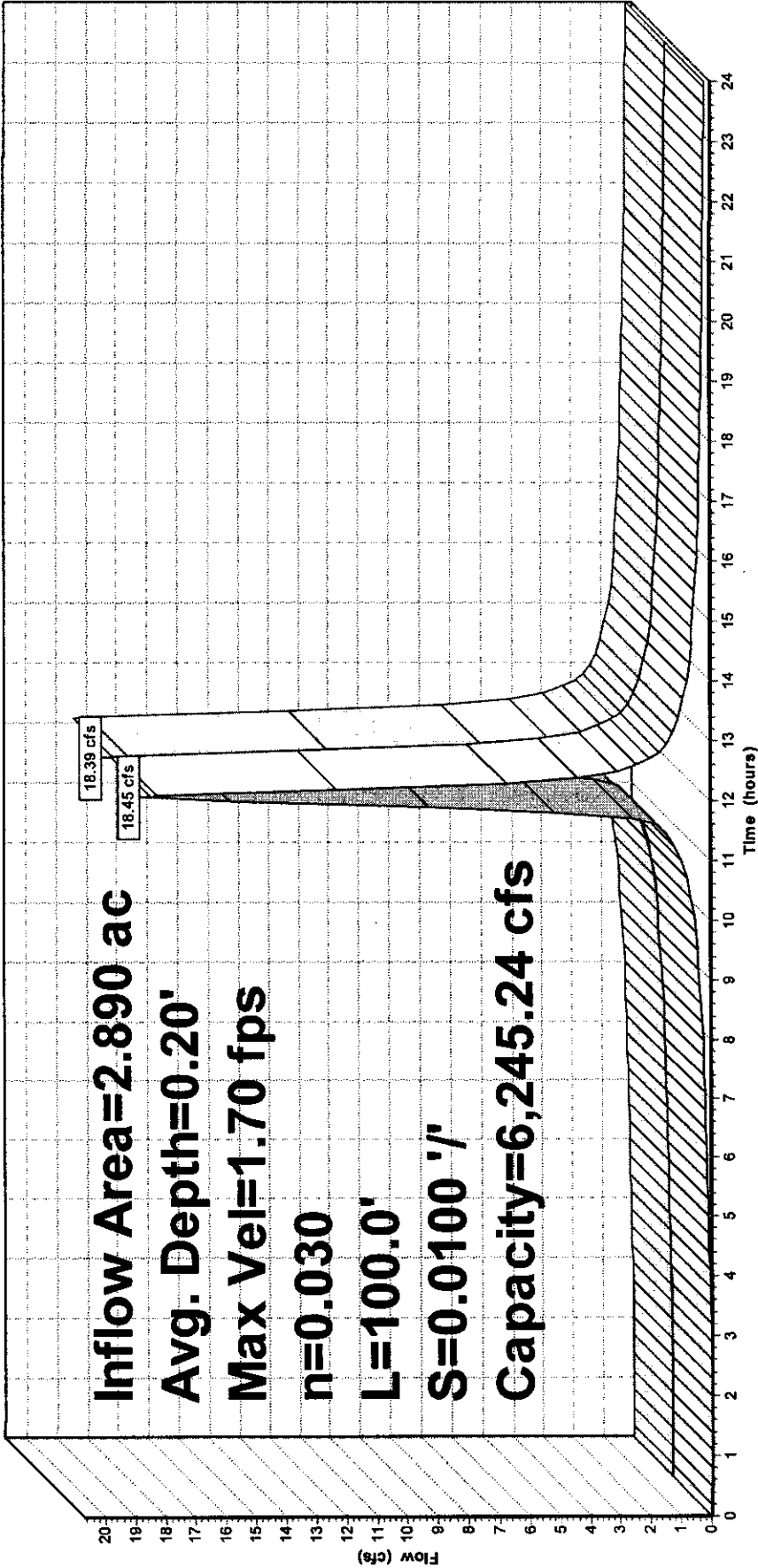
Hydrograph

Inflow
 Outflow



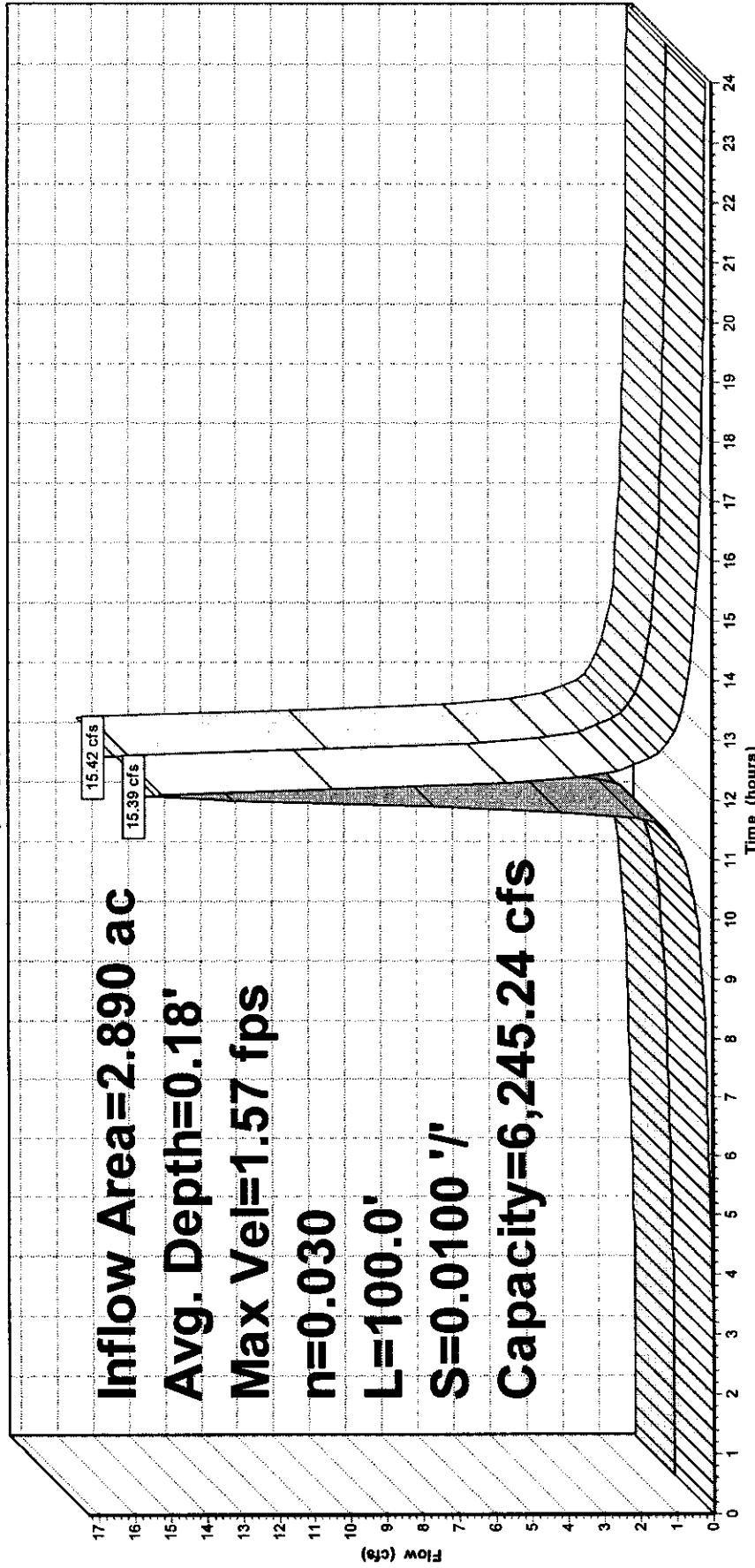
Hydrograph

Inflow
 Outflow



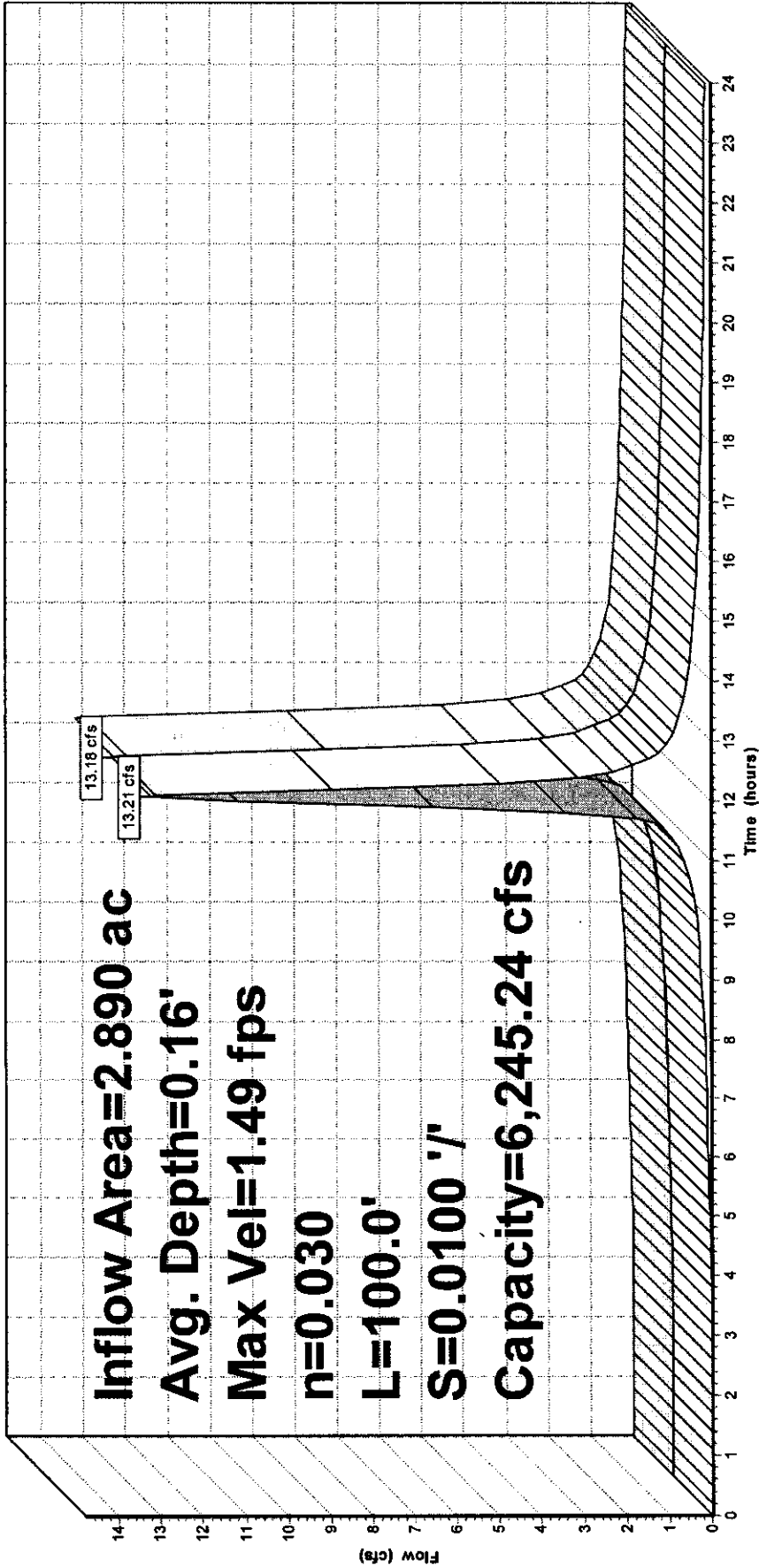
Hydrograph

Inflow
 Outflow



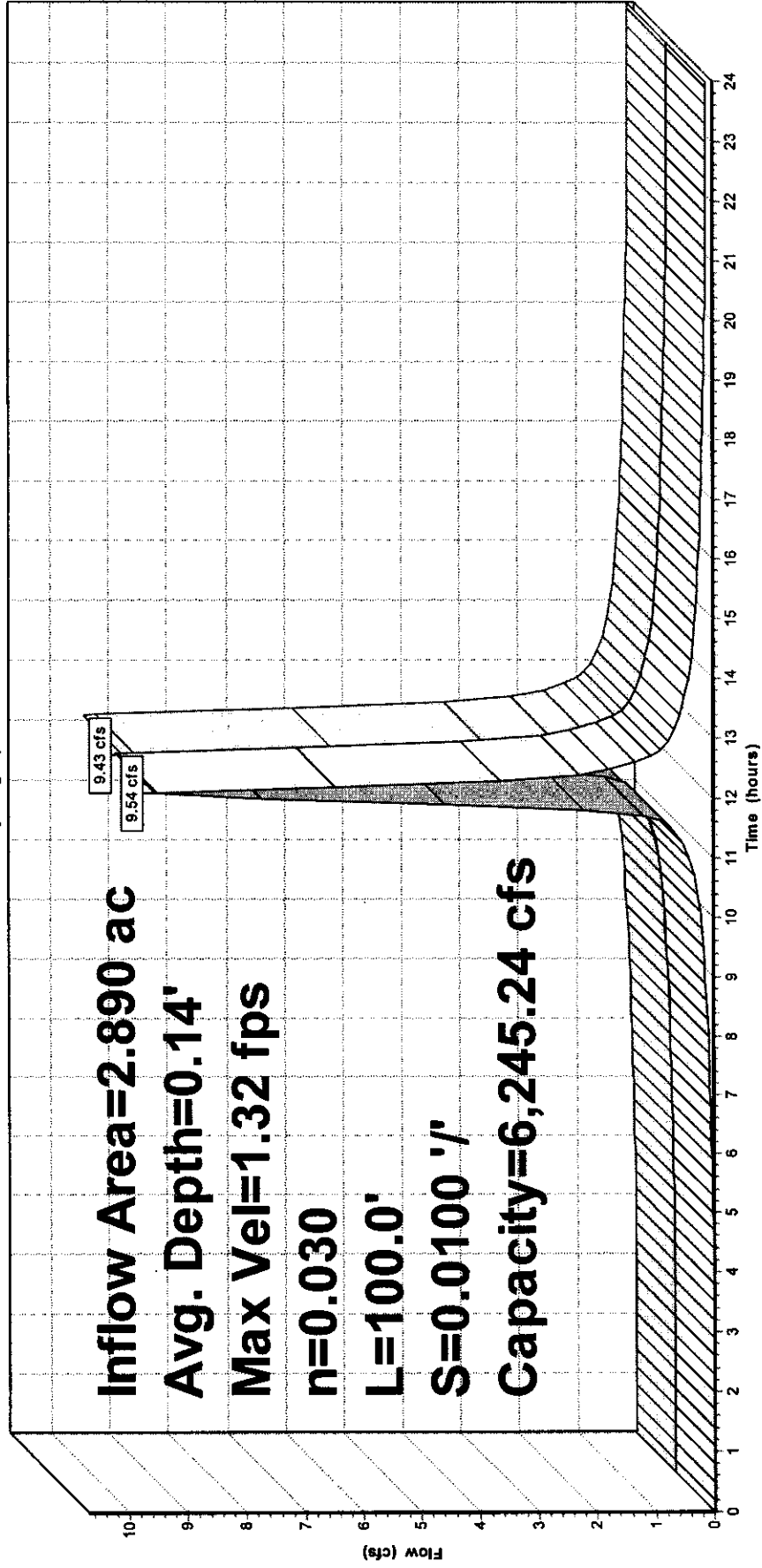
Hydrograph

Inflow
 Outflow



Hydrograph

Inflow
 Outflow



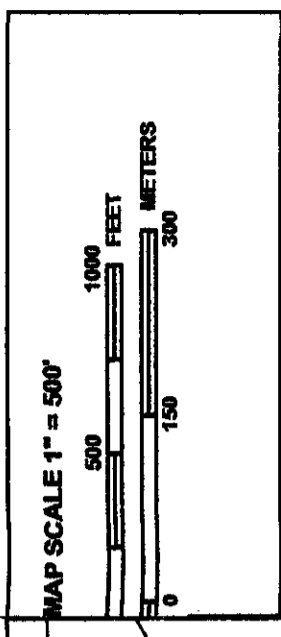
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Tab 4

Tab 4:

FEMA Flood Map



PANEL 0356E

FIRM
FLOOD INSURANCE RATE MAP
SEDGWICK COUNTY,
KANSAS
AND INCORPORATED AREAS

PANEL 356 OF 700

SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SEDGWICK COUNTY	200321	0356	E
WICHITA, CITY OF	200328	0356	E

Notes 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.

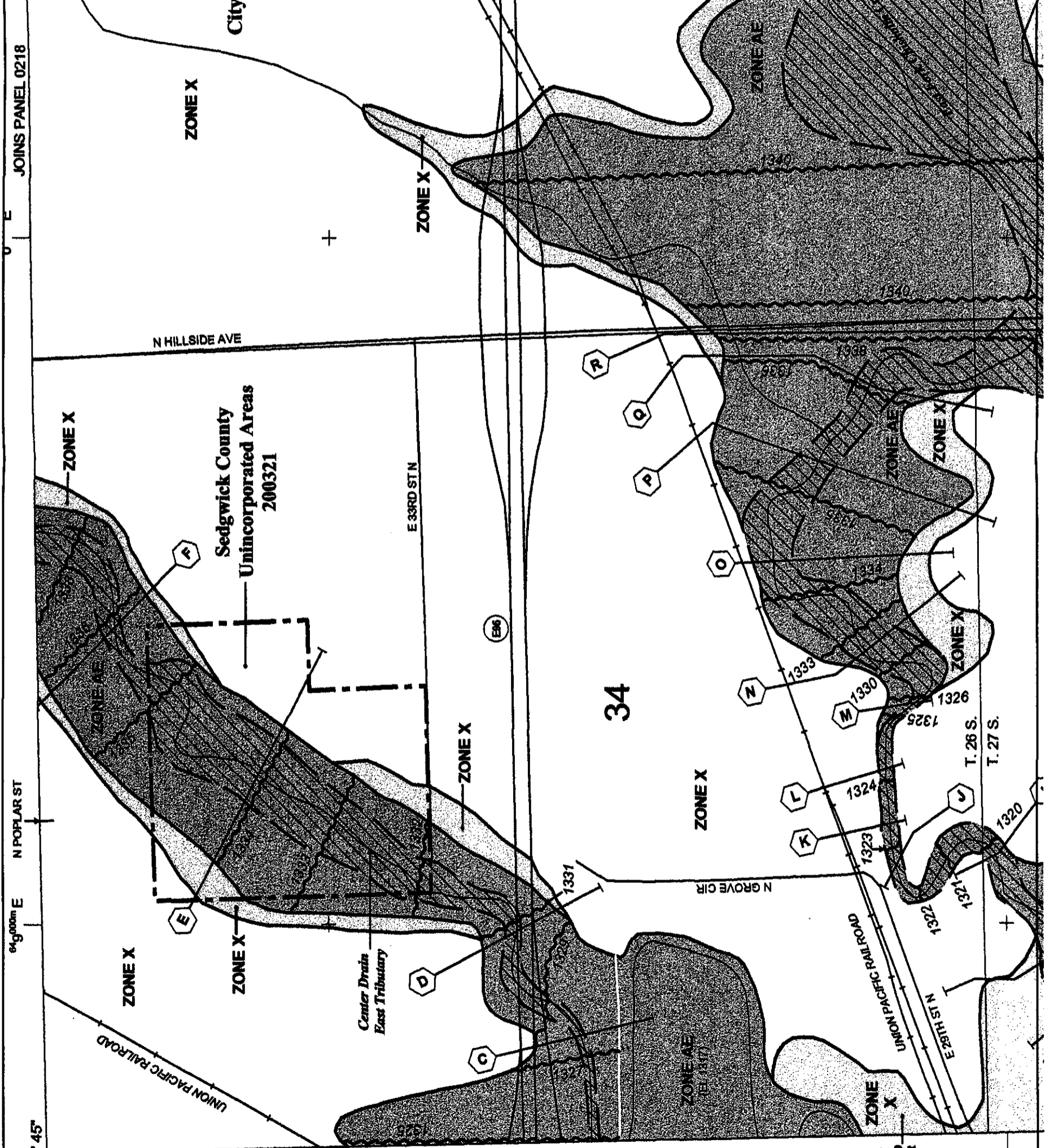
MAP NUMBER
20173C0356E

EFFECTIVE DATE
FEBRUARY 2, 2007



Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



THIS AREA IS SHOWN AS FLOODED FROM THE 1-PERCENT ANNUAL FLOOD HAZARD BY LEVEE. THIS STRUCTURE IS POSSIBLE TO BE DESTROYED BY FLOODING. PROPER FLOOD INSURANCE, AND EVACUATION PROCEDURES SHOULD BE FOLLOWED. FOR ADDITIONAL INFORMATION, CONTACT THE LOCAL FLOOD INSURANCE NOTES TO USERS.

Tab 5:

Not Applicable

Tab 6:

Proposed Drainage Plan
Electronic copies of report

Tab 6

Existing/Undeveloped Condition:
 Total Site Area = 2.89 Acres, Offsite = 0.25 Acres
 Impervious Area = 0.90 Acres, S14 = 1.14 Acres
 Soil Group D with average slope less than 1%
 Existing Tc Calculation:
 Show Magnitude of Runoff = 1.23
 Shallow Concentrated Flow = 4.15 ft. Tc = 10.0 min
 Total Tc = 22.3 min = 22 min

Existing Drainage Calculations

Area #	Acres	Tc	24-hr rainfall depth (inches)	Curve Number	Existing Q, cfs	Remark										
Entire Site	3.14	22	3.60	4.80	5.52	6.48	8.16	84	6.61	10.06	12.15	4.96	19.89	10.0	0.100	0.010

Water Quality Volume Calculation

Calculation for water quality volume (WQV) = P x V x I x C	Soil Group	D
85th percentile storm event (1.2 inches) P =	1.2	inches
Total area, A =	2.89	acres
Rainfall Coeff. Rv =	0.524	
Required Vol. for Water Quality =	0.16	ac-ft
Calculation of Rv		
Coeff. for undisturbed area, RvU =	0.05	0.00
Coeff. for turf cover distributed, RvT =	0.25	1.76
Coeff. for impervious area, RvI =	0.95	1.13
Weighted, Rv =	0.524	

Water Quality Peak Flow Calculation

Area =	2.89	acres
WQV =	0.16	ac-ft
Pond and Swamp Factor, Fp =	0.700	
Calculated CN =	93.29	
S =	0.719	inches
LxP =	0.144	inches
Q _u =	730.0	cfs/sq.mil/m
Water quality peak flow	1.45	cfs

Channel Protection Volume Calculation

Drainage Area	Acres	24 hr 1 yr Storm Curve Number (CN)	Water volume inches	24 hr 1 yr Storm Curve Number (CN)	Water volume inches
Entire Site	2.89	2.88	2.05	2.88	84
					1.905
					1.42

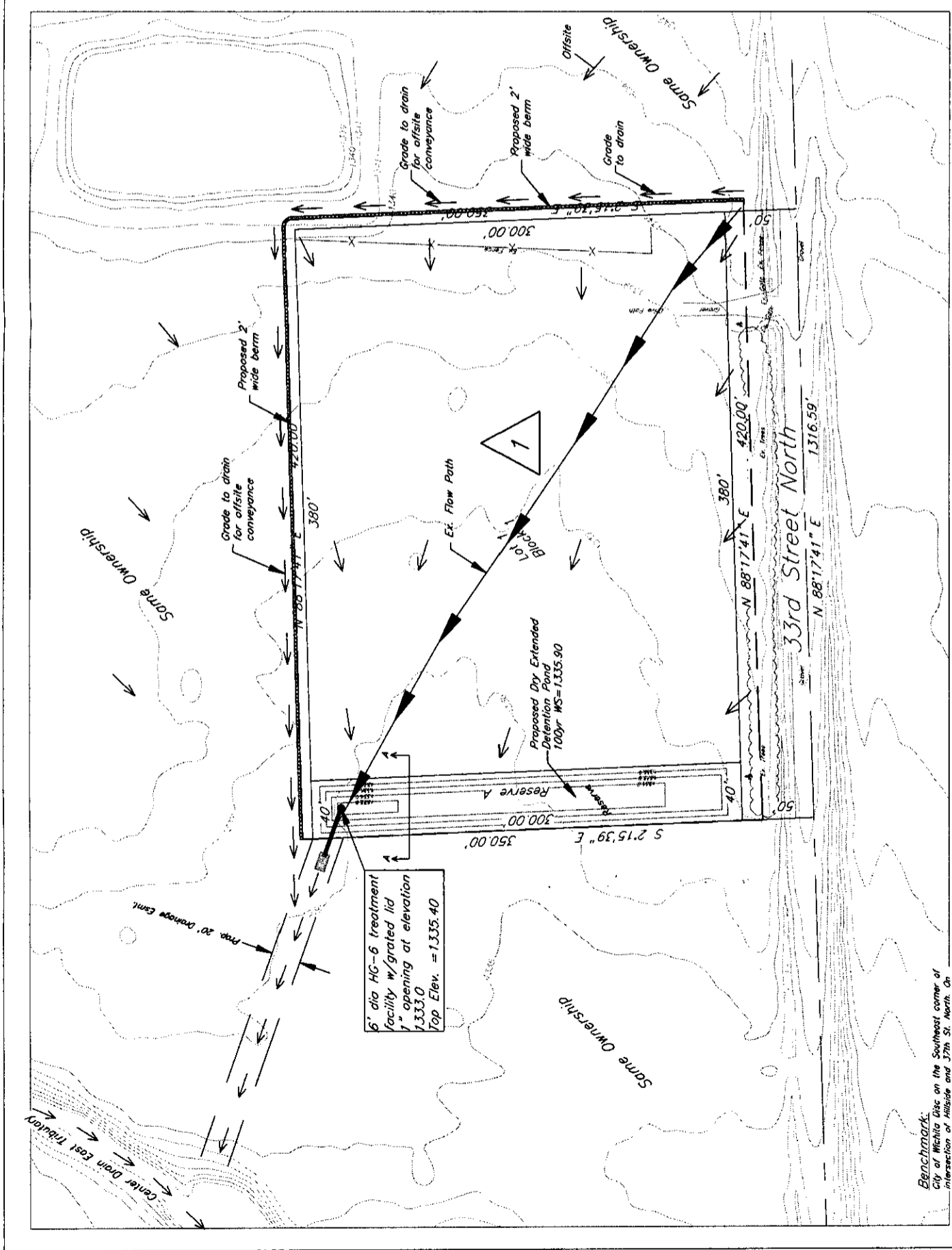
Detention Pond Volume

Elevation	sq. ft.	Area	Storage	Cumulative Storage
		acres	ac-ft	ac-ft
1333.0	340.8	0.01	0.01	0.01
1333.5	1570.6	0.04	0.03	0.04
1334.0	3725.2	0.09	0.05	0.09
1334.5	5439.9	0.12	0.07	0.16
1335.0	6623.9	0.15	0.08	0.25
1335.5	7839.9	0.18	0.10	0.34
1336.0	9087.9	0.21		

Water quality volume is treated in proprietary system (HG-6, as designed by Hydroworks). The HG-6 has capacity to treat the treatment flow of 2.1 cfs and can bypass 10.5 cfs of flow with 80% TSS removal for 200 micron particle size.

Channel protection volume is detained in Extended Detention Pond as located in plan by 1" orifice located at elevation 1333.0. The grate of manhole at elevation 1335.5 will drain the excess runoff through 18" RCP.

Detention time for CPV = 27.2 hrs (centroid-centroid)



Comparison between onsite peak and peak flows in Creek

Storm Event	Onsite Time to Peak	Flow in creek at Onsite Peak	Increase in peak in Creek ?
2-yr	12.05	0.37	No
5-yr	12.05	3.54	No
10-yr	12.05	13.25	No
25-yr	12.05	41.07	No
100-yr	12.05	115.97	No

Developed Site analysis

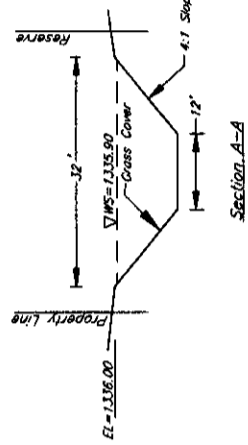
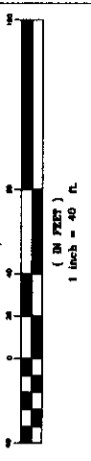
Drainage Area Contributing to flow = 3.14 acres
 Curve Number, CN=92

Storm Event	Peak Flow	Time to peak Flow, hrs
2-yr	10.98	12.05
5-yr	15.35	12.05
10-yr	17.95	12.05
25-yr	21.4	12.05
100-yr	27.40	12.05

Approximate Flood Detention analysis for Center Drain East Tributary

Approximate Drainage Area at intersection to 33rd Street N = 1152 acres
 Curve Number used, CN=61

Storm Event	Peak Flow cfs	Time to peak Flow, hrs
2-yr	197	13.29
5-yr	467	13.19
10-yr	664	13.16
25-yr	955	13.13
100-yr	1515	13.11



Proposed Drainage plan
 Pearson's Farm LLC Addition
 Wichita, Kansas

kemiller
 engineering

PROJECT NUMBER: 28/201-0042
 DATE: 03/2011
 DRAWN: CP
 CHECKED: CP
 REVISION: OF