

DRAINAGE REPORT

FOR

GARDENS AT WICHITA PLACE ADDITION
Wichita, Kansas

OCTOBER 2010

Tab 0. Checklist



Public Works, Engineering Division Final Drainage Plan Submittal Checklist

Reviewer: _____	Date: _____
Subdivision Name: _____	Location: _____
Total Land Area Of Ownership: _____ Acres	
Type: _____ Residential _____ Commercial _____ Industrial _____ Recreation _____ Municipal _____ Other	
Applicant: _____	Contact: _____ Phone #: _____
Engineer: _____	Contact: _____ Phone #: _____

Please check the appropriate box:

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

	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
Tab 1. Project Narrative					
A. Site Location Map, using USGS Map					
B. Discussion of development, existing conditions, and proposed impacts on stormwater, wetland, riparian, and flood plain					
C. Discussion of offsite conditions					
D. Summary of runoff calculations (pre/post development) No increase in peak discharge for all storm series					
E. Narrative description of the type and function of the permanent best management practices that are incorporated into the site design					
F. Copy of the plat					
G. Preliminary grading plan (The final grading plan shall be sealed, signed and dated prior to Engineering receiving the final sanitary sewer plans. One plan sheet and PDF shall be submitted to the Subdivision Engineer.)					
H. Professional Engineer seal, signature and date on cover of report					
I. CD of drainage plan in PDF format (one file) and one paper copy bound with this checklist included behind the cover					

	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
Tab 2. Existing Conditions Runoff Calculations					
A. Copy of applicable orthophoto showing proposed project boundaries (preferable in color)					
B. Runoff Method (Rational, Hydrograph Method, or other approved methods by Engineering)					
C. Existing topography (no greater than 2-foot contours, 1-foot recommend)					
D. Total Site Area and Total Impervious Area (acres)					
E. Benchmarks used for site control					
F. Streams, creeks, and waterway labeled					
G. Predominant soils from USDA soil surveys, and/or on site soil borings					
H. Location and boundaries of natural features such as wetlands, lakes, and ponds with the normal water elevation noted					
I. Location of existing roads, buildings, parking lots and other impervious areas.					



J. Location of existing utilities (e.g., water, sewer, gas, electric) and easements					
K. Location of existing conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow					
L. Flow paths					
M. Location and dimensions of existing channels, bridges or culvert crossings					
N. Existing conditions hydrologic analysis for runoff rates, volumes and velocities showing methodologies used and supporting calculations (2, 5, 10, 25 & 100 year, 24-hour storm events) or Critical Duration					
O. Assumed pre-developed runoff curve numbers					
P. Existing time of concentrations used in calculations					
Q. Evaluate immediate downstream drainage capacity, not to exceed more than 0.25 miles downstream of site					
R. Existing structural elevations (e.g., invert of pipes, manholes, etc.)					
S. Cross-section data for open channels					
T. Ground water elevations, if applicable					

Tab 3. Post-Development Hydrologic Analysis	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
A. Proposed (post-development) conditions hydrologic and hydraulic analysis for runoff rates, volumes, HGL, and velocities showing the methodologies used and supporting calculations for all applicable design storms (2, 5, 10, 25 & 100 year, 24-hour storm events)					
B. Proposed time of concentrations used in calculations					
C. Assumed post-developed runoff curve numbers					
D. Proposed contours for detention facilities (to equal area used in outlet rating curves)					
E. Preliminary sizing calculations for stormwater controls including contributing drainage area, storage, and outlet configuration					
F. Stage-storage-discharge or outlet rating curves and inflow and outflow hydrographs for storage facilities					
G. Final analysis of potential upstream/downstream impact/effects of project, where necessary					
H. Existing and proposed structural elevations (e.g., invert of pipes, manholes, etc.)					
I. Design water surface elevations and normal pool elevation for ponds.					
J. Typical detail for outlet structures, embankments, spillways, grade control structures, conveyance channels, etc. To include height, width, elevation, and/or diameter.					
K. Proposed limits of clearing and grading					
L. Location of existing and proposed roads, buildings, parking lots and other impervious areas.					
M. Location of existing and proposed utilities (e.g., water, sewer) and easements					
N. Location of existing and proposed conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow					
O. Preliminary location and dimensions of proposed channel modifications, such as bridge or culvert crossings					



P. Preliminary selection and location of stormwater controls					
Q. Emergency overflow structure's flow path					
R. Detention facility provides one-foot of freeboard above the HWL and emergency outfall shown (top of berm elevation shown)					
S. The 100-year 24-hour HWL delineated on the plan for detention pond					
T. Lowest opening elevations table on the plat for structures located adjacent to channels or ponds					
U. Stormwater Management Facilities located within a Reserve					
V. Maintenance responsibility of stormwater management facility shall be specified in the platters text. (e.g. HOA, Lot Owners Association, or lot)					
W. Off-site drainage easements or agreements required, where necessary					

Tab 4. Floodplain Submittal	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
A. Provide source of flood profile					
B. Nearest base flood elevations					
C. Delineation of pre-developed regulatory floodplain/floodway limits					
D. Delineation of post-developed regulatory floodplain and floodway limits					
E. Floodplain boundary determination per elevation (project limits shown)					
F. Provide source of floodway data table and discharges					
G. Provide all hydrologic and hydraulic study information for site-specific floodplain studies, unnumbered Zone A area elevation determinations and flood plain map revisions or required permits					
H. Provide regulatory floodway and four natural profile models (10,50,100, and 500-yr) for existing and future watershed conditions					
I. Location of floodplain/floodway limits and relationship of site to upstream/downstream properties (floodplain limits to be per elevation and scaled location)					
J. Flood plains and floodways located within a Reserve, where necessary					

Tab 5. Federal, State and Local Permits (to be provided prior to construction unless otherwise specified)	Applicant			Engr	
	I/R	NA	Explanation / Location in Plan	I/R	NA
A. US Army Corps of Engineers - Regulatory program permits (404 water quality certification)					
B. Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Flood Plain Fill, Levee, Water Appropriations, Dam safety permit, etc.)					
C. 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.					
D. Kansas Department of Transportation					
E. Sedgwick County Right-of-way Permit					

Tab 1. Project Narrative

Location

The subject property is in the City of Wichita, Sedgwick County, Kansas. The proposed development is south of 31st South and west of Broadway Avenue. The site is bounded by Wichita Street to the west, the Pioneer Addition to the North, American Legion Addition to the East, and Henry Jones Addition to the south. The site lies in the northeast quarter of Section 8, Township 28 South, Range 1 East. The plat area is 3.9 acres. The site is shown on the USGS Map, Appendix 1.1.

Discussion of Development

The site is currently platted as the American Legion addition, but remains undeveloped. The proposed site is shown on the plat, Appendix 1.2.

Drainage Summary

Pre-Development

The site is flat and the existing drainage patterns are not evident. The site basically drains to the west to Wichita Street, north into 31st Street South and to the east to the Arkansas River. Pre-development flow rates are shown in Table 1.1.

Post-Development

The proposed development will provide detention along all sides of the proposed facility. The detention will drain into Wichita Street and continue as it does under pre-development conditions. The detention pond will not outlet until the water surface elevation reaches the existing curb elevation of 1281.1. The detention will detain the 2-year event and will reduce the peak flow rate of larger design storms. Post-project flow rates are shown in Table 1.1.

Table 1.1. Comparison of Pre and Post-Development Flow Rates

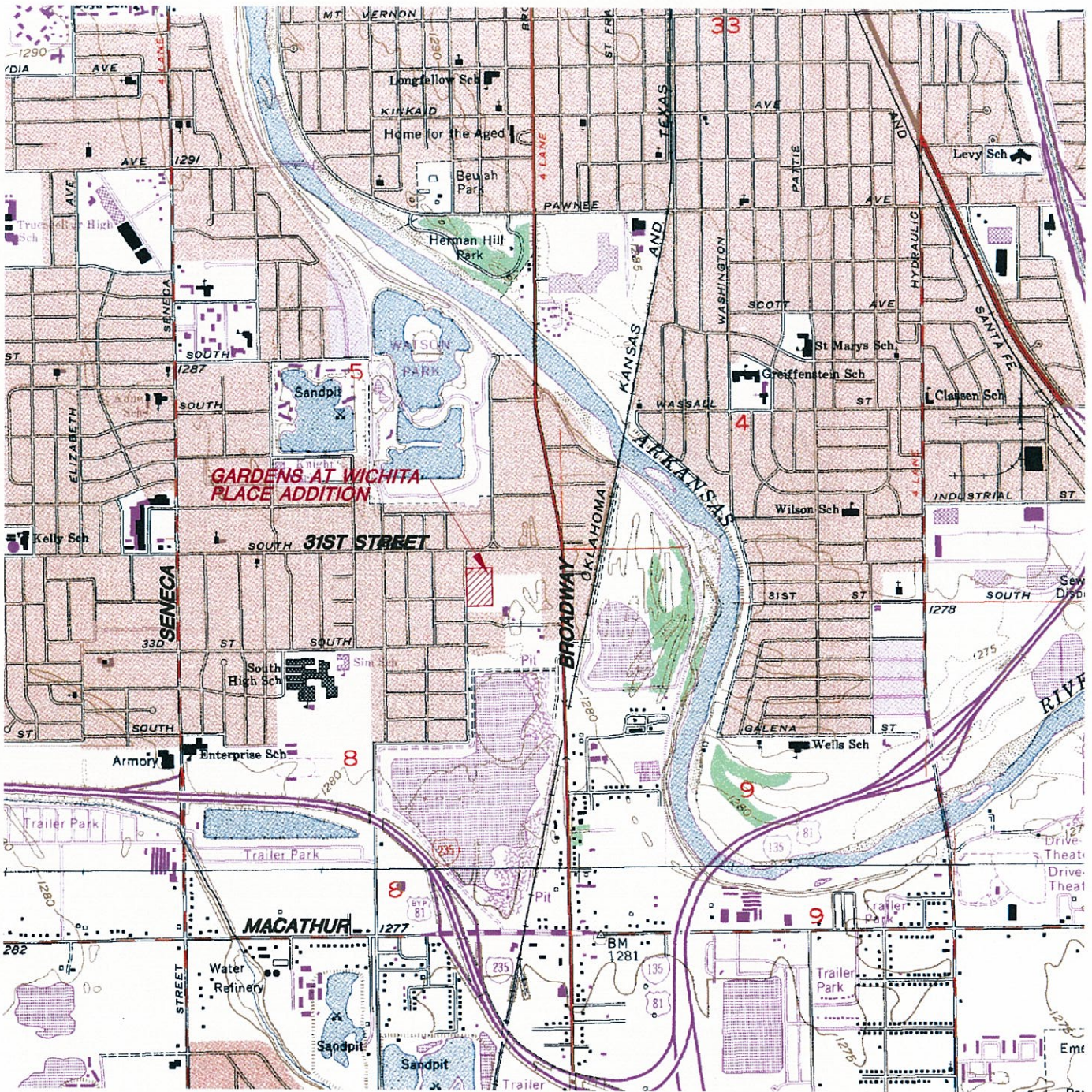
Description	Design Storm Flows (cfs)				
	2-Yr	5-Yr	10-Yr	25-Yr	100-Yr
Pre-Project	8.3	12.0	14.7	18.2	24.7
Post-Project	0.0	0.3	0.8	3.0	22.5

Best Management Practices

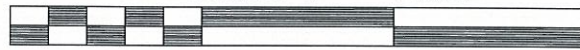
The site will be seeded or sodded after completion of the construction of grading and utilities. During construction curb protection, a construction entrance, and other erosion protection devices will be used to prevent soil from leaving the site. A storm water pollution prevention plan will be implemented prior to any soil disturbing activities.

Appendix 1.1

USGS Quadrangle Map



SCALE: 1" = 2000'



2000 0 2000 4000



**SECTION 8
TOWNSHIP 28
RANGE 1E**

MKEC
ENGINEERING
CONSULTANTS, INC.

411 N. WEBB ROAD
WICHITA, KS. 67206
316 - 684 - 9600

GARDENS AT WICHITA PLACE ADDITION
PROJECT NAME

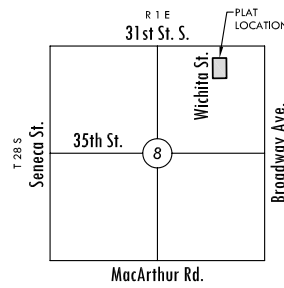
QUAD MAP
SHEET TITLE

KLA DESIGN BY:	CMJ DRAWN BY:	GJA CHECKED BY:
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OCTOBER 2010 DATE	10433 JOB NO.	1 / 1 SHEET/OF
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Appendix 1.2

Plat



VICINITY MAP

CERTIFICATE OF SURVEY

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

A replat of Lots 2, 3, 4, 5, 6, 7, 8, 9, 14, 15, 16, 17, and 18, TOGETHER WITH, the west 340 feet of Lot 1, TOGETHER WITH the west 32 feet of Lots 10 and 13, American Legion Addition, Wichita, Sedgwick County, Kansas.

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

I hereby certify that the details of this plat are correct to the best of my knowledge and belief this ___ day of _____, 2010.

Gregory J. Allison, PE, LS #1257
MKEC Engineering Consultants, Inc.
411 North Webb Road
Wichita, Kansas 67206

OWNER'S CERTIFICATES

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

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

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

Mental Health Association of South Central Kansas, a Kansas not for profit corporation

_____, President and CEO
Dr. Rose Mary Mohr, President and CEO

STATE OF KANSAS, SEDGWICK COUNTY) ss:

This instrument was acknowledged before me on ___ day of _____, 2010, by Dr. Rose Mary Mohr, President and CEO, Mental Health Association of South Central Kansas, a Kansas not for profit corporation.

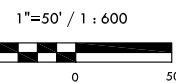
IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, the day and year last above written.

SEAL

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

LEGEND

- Date of Survey: Oct., 2010
- ▲ = Section Corner Monument Found
- = Found survey monument see annotation for type
- = Set 3/8" rebar w/ MKEC CLS 39 id. cap
- (M) = Measured
- (CM) = Calculated from measured
- (P) = Platted
- (D) = Described



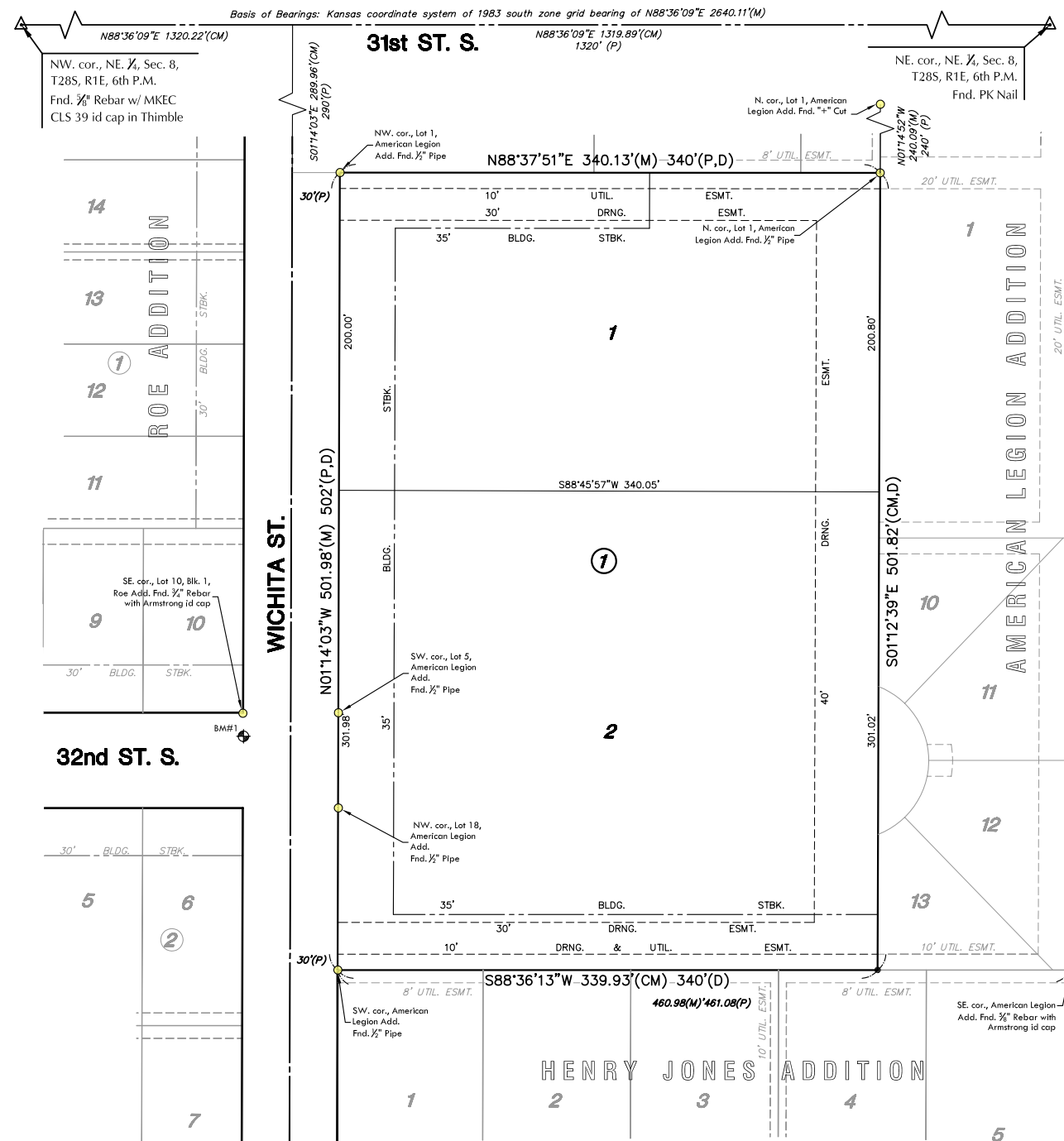
Basis of Bearing: Kansas coordinate system of 1983 south zone grid bearing of S01°04'18"E along the N. line of NE 1/4, Sec. 8, T28S, R1E, 6th P.M.

This plat is surveyed and platted on NAVD88 using Kansas state plane south zone coordinates, modified to the surface, having a combined adjustment scale factor of 1.000120014401728

BENCH MARK

BM #1 Square cut west end of northwest return at Wichita St. and 32nd St. S. ELEV.=1281.69 NAVD88

FINAL PLAT
GARDENS AT WICHITA PLACE ADDITION
AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS



PLANNING COMMISSION CERTIFICATE

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

Dated this ___ day of _____, 2010

WICHITA-SEDGWICK COUNTY METROPOLITAN AREA PLANNING COMMISSION

_____, Chair
Debra Miller Stevens, Chair

Attest: _____, Secretary
John L. Schlegel, Secretary

Affix MAPC Seal

GOVERNING BODY CERTIFICATE

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

Dated this ___ day of _____, 2010

At the direction of the City Council.

_____, Mayor
Carl Brewer, Mayor

Affix City Seal

Attest: _____, City Clerk
Karen Sublett, City Clerk

TRANSFER RECORD

STATE OF KANSAS, SEDGWICK COUNTY) ss:

Entered on transfer record this ___ day of _____, 2010

_____, County Clerk
Kelly B. Arnold, County Clerk

Affix County Clerk Seal

REGISTER OF DEEDS CERTIFICATE

STATE OF KANSAS, SEDGWICK COUNTY) ss:

This is to certify that this instrument was filed for record in the Register of Deeds office this ___ day of _____, 2010, at _____ o'clock ___ M; and is duly recorded.

_____, Register of Deeds
Bill Meek, Register of Deeds

Attest: _____, Deputy
Tonya E. Buckingham, Deputy

Affix Register of Deeds Seal

COUNTY SURVEYOR

STATE OF KANSAS, SEDGWICK COUNTY) ss:

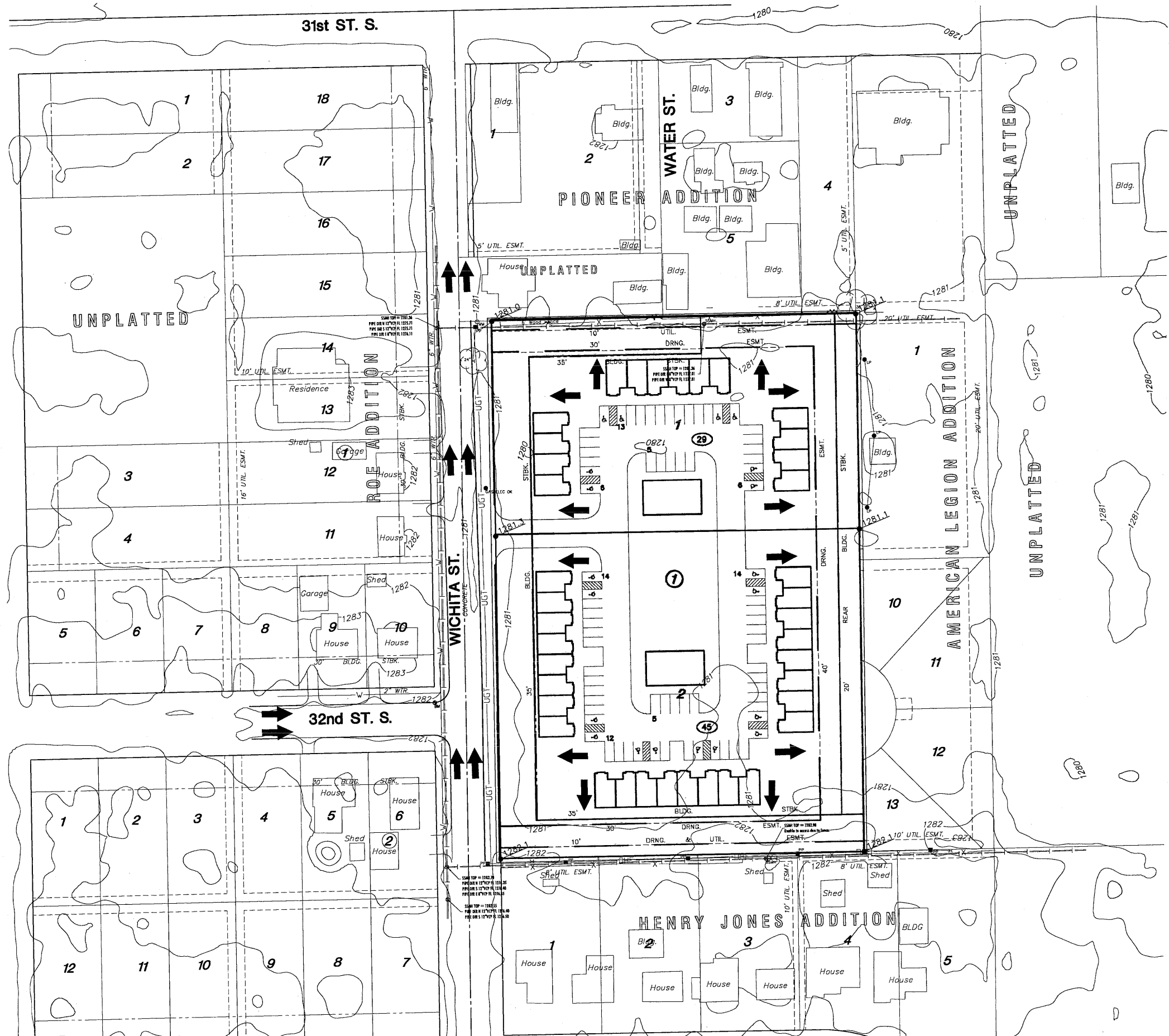
Reviewed in accordance with K.S.A. 58-2005 on this ___ day of _____, 2010.

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

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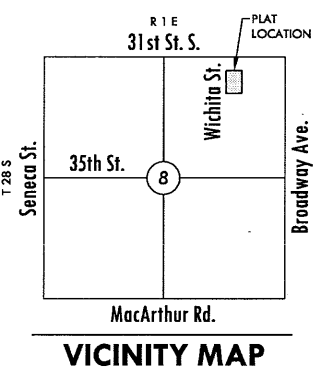
Appendix 1.3

Lot Grading Plan



BENCH MARK

BM #1 Square cut west end of northwest return at Wichita St. and 32nd St. S. ELEV.=1281.69 NAVD88



LEGEND

- ⊗ CONIFEROUS TREE
- ⊕ DECIDUOUS TREE
- ⊙ SIGN
- ⊕ POWER POLE
- ⊕ ELECTRIC BOX
- ⊕ LIGHT POLE
- ⊕ FIRE HYDRANT
- ⊕ WATER VALVE
- ⊕ WATER METER
- ⊕ SECTION CORNER
- ⊕ BENCHMARK
- EASEMENT
- BUILDING SETBACK
- FENCE
- STORM SEWER PIPE
- WATER LINE
- SANITARY SEWER LINE
- GAS LINE
- GAS PIPELINE
- TELEPHONE LINE
- UNDERGROUND ELEC.
- OVERHEAD ELECTRIC
- FIBER OPTIC CABLE
- DRAINAGE SUB BASIN
- DRAINAGE BASIN
- FLOW ARROW
- A17 AREA FOR SWS SIZING
- SPOT ELEVATION

MKEC
ENGINEERING
CONSULTANTS, INC.
411 N. WEBB ROAD
WICHITA, KS. 67206
316-684-9600

GARDENS AT WICHITA PLACE ADDITION
 WICHITA, KANSAS
LOT GRADING PLAN

DATE	October 10
REVISED	

DESIGN BY	KLA
DRAWN BY	CMJ
CHECKED BY	GJA

SHEET NUMBER	1
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J:\Civil\104-33 - Mental Health\Dwg\Drng\104-33-1.GP.dwg

Tab 2. Existing Conditions

Description

The site is 3.9 acres of undeveloped ground. The site is shown on the aerial photograph, Appendix 2.1. The site is shown on the Existing Conditions Map in Appendix 2.2.

FEMA Floodplains

The platted area is located in Zone X unshaded, areas outside of the 100-year flood, as shown on the Sedgwick County Kansas February 2, 2007 Map Number 20173C0365E, Appendix 2.3. The Wichita Drainage Canal is west of the site.

Soils

According to the NRCS (SCS) Sedgwick County Soil Survey, Appendix 2.4, soils on the site are:

- Urban land-Canadian complex, 0 to 3 percent slopes

Hydraulic Soil Group "D" was used for calculations for the basin.

Drainage Calculations

Runoff Method

The site was modeled using the SCS Hydrograph Method in Hydraflow Hydrographs, Appendix 2.5.

Rainfall

The rainfall information used is from the Kansas Department of Transportation Rainfall Depth Tables for Kansas Counties June 1997. The rainfall values used are shown in Table 2.1.

Table 2.1. 24-Hour Rainfall Depths.

	2-Yr	5-Yr	10-Yr	25-Yr	100-Yr
Sedgwick	3.50	4.53	5.24	6.24	7.80

Time of Concentration

Time of concentration was calculated using the TR-55 method. Calculations are in the Hydraflow Hydrographs output, Appendix 2.5.

Curve Numbers

The curve number used for pre-developed conditions is a weighted average based on the land use. The pre-development curve number for the undeveloped site is 84.0. Calculations for the composite curve numbers are shown in Appendix 2.6.

Drainage Patterns

The site is extremely flat and the existing drainage patterns are not evident. The site basically drains to the west and into Wichita Street. Runoff in Wichita Street flows to the north and into 31st Street South and then flows to the east to the Arkansas River. The flow paths are shown on the Existing Drainage Patterns Drawing, Appendix 2.7.

Table 2.3. Pre-Development Flow Rates

Description	Area (ac.)	T _c (min.)	CN	Design Storm Flows (cfs)				
				2-Yr	5-Yr	10-Yr	25-Yr	100-Yr
Pre-Project	4.7	29.5	84.0	8.3	12.0	14.7	18.2	24.7

Utilities

Existing sanitary sewer runs along the north boundary of the site. Existing water is located on the west side of Wichita street. There is no existing storm water sewer adjacent to the site.

Groundwater Elevations

Groundwater elevations will be determined through testing.

Appendix 2.1

Aerial Photograph



31ST STREET

GARDENS AT WICHITA PLACE ADDITION

BROADWAY

SCALE: 1" = 1000'



SECTION 8
TOWNSHIP 28
RANGE 1E

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316 - 684 - 9600

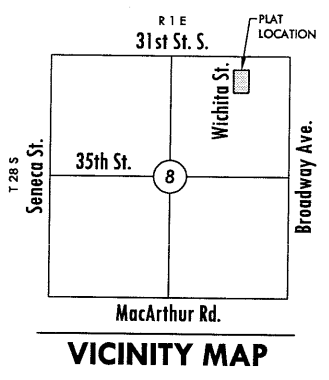
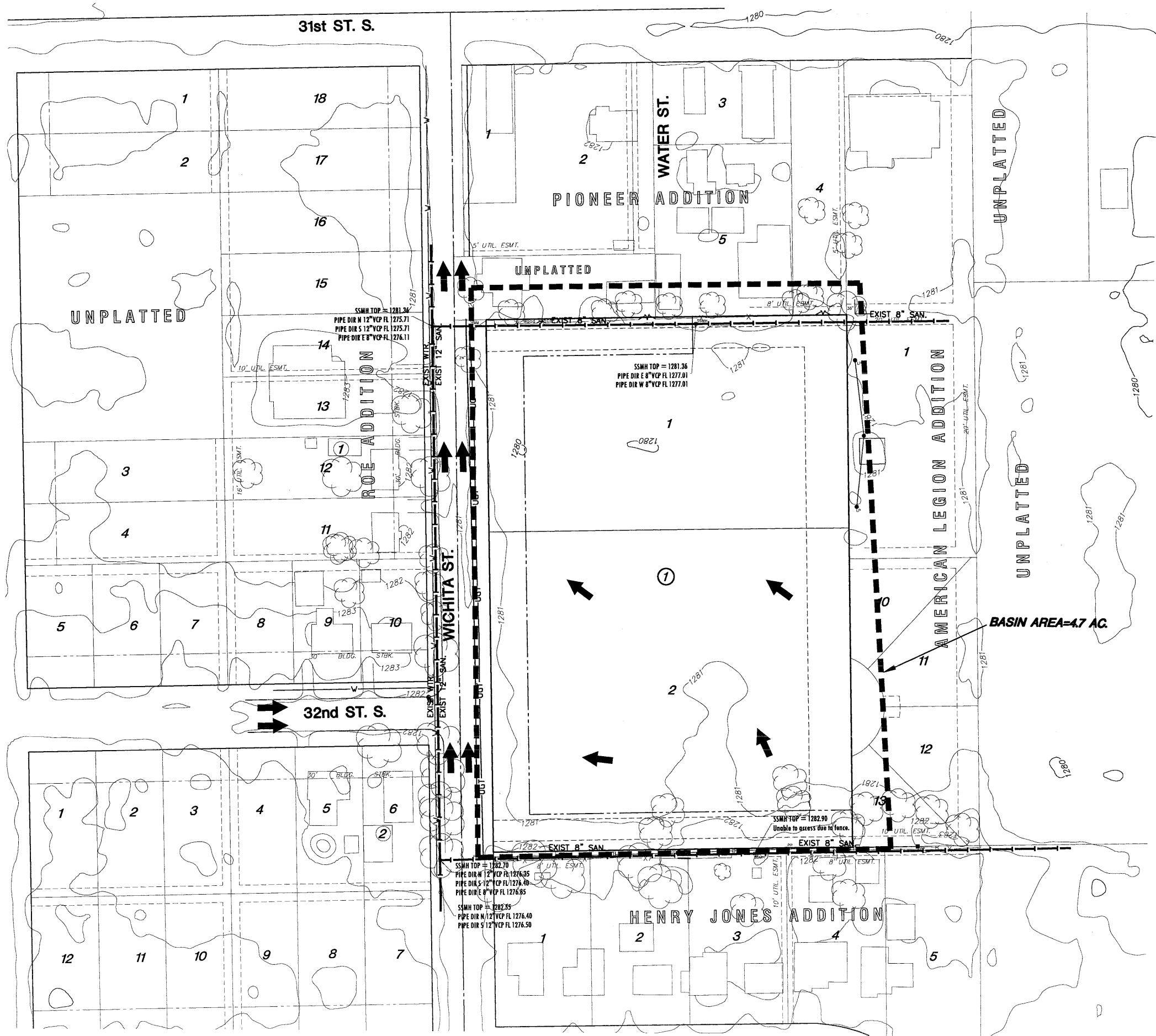
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PROJECT NAME

AERIAL MAP
SHEET TITLE

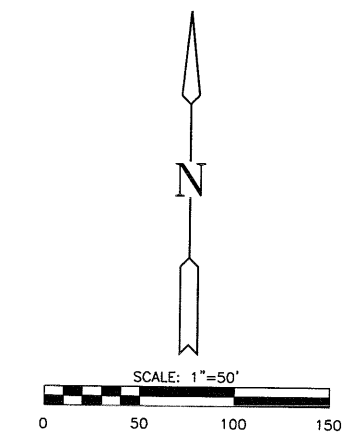
DESIGN BY:	CMJ	DRAWN BY:	GJA
DATE	OCTOBER 2010	JOB NO.	10433
		SHEET/OF	1 / 1

Appendix 2.2

Existing Conditions Map



- LEGEND**
- ⊗ BIN - CONIFEROUS TREE
 - BIN - DECIDUOUS TREE
 - ▲ SN - SIGN
 - ⊕ PP - POWER POLE
 - ⊖ ELEC BOX - ELECTRIC BOX
 - ⊖ LP - LIGHT POLE
 - ⊖ FH - FIRE HYDRANT
 - ⊖ WV - WATER VALVE
 - ⊖ WM - WATER METER
 - △ SECTION CORNER
 - ⊙ BM - BENCHMARK
 - - - EASEMENT
 - - - BUILDING SETBACK
 - - - FENCE
 - - - STORM SEWER PIPE
 - - - WATER LINE
 - - - SANITARY SEWER LINE
 - - - GAS LINE
 - - - GAS PIPELINE
 - - - TELEPHONE LINE
 - - - UNDERGROUND ELEC.
 - - - OVERHEAD ELECTRIC
 - - - FIBER OPTIC CABLE
 - - - DRAINAGE SUB BASIN
 - - - DRAINAGE BASIN
 - FLOW ARROW
 - A17 - AREA FOR SWS SIZING



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GARDENS AT WICHITA PLACE ADDITION
WICHITA, KANSAS
EXISTING CONDITIONS

DATE October 10
REVISED _____

DESIGN BY KLA
DRAWN BY CMJ
CHECKED BY GJA

SHEET NUMBER
1

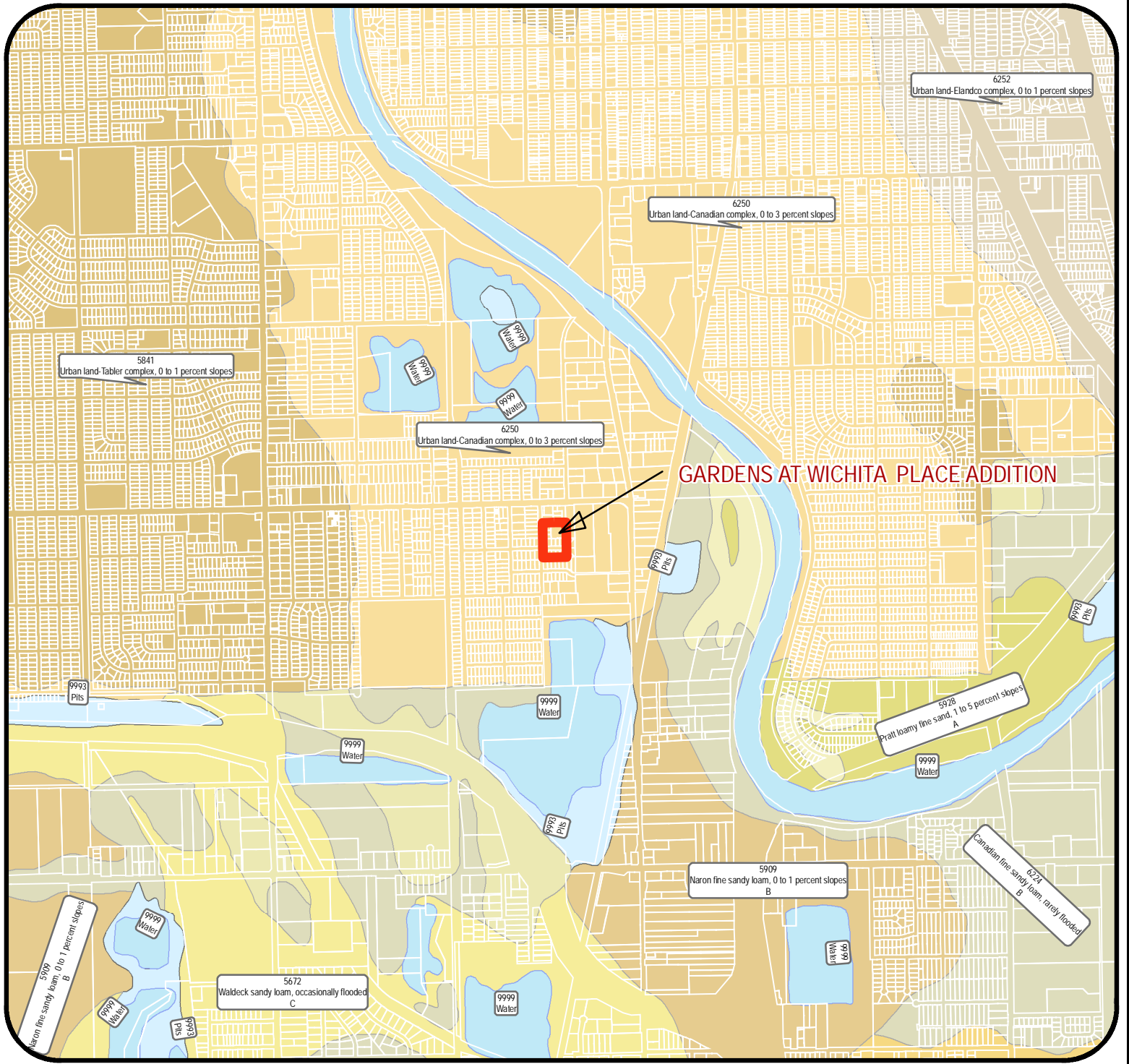
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Appendix 2.3

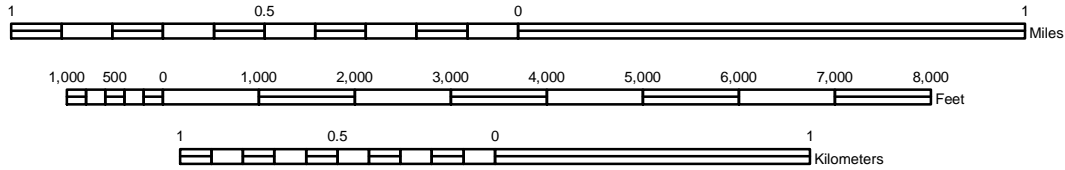
Flood Insurance Rate Map (FIRM)

Appendix 2.4

Soil Survey



GARDENS AT WICHITA PLACE ADDITION



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GARDENS AT WICHITA PLACE ADDITION

Project Name:
Soil Survey - Sedgwick County, KS

Sheet Title:



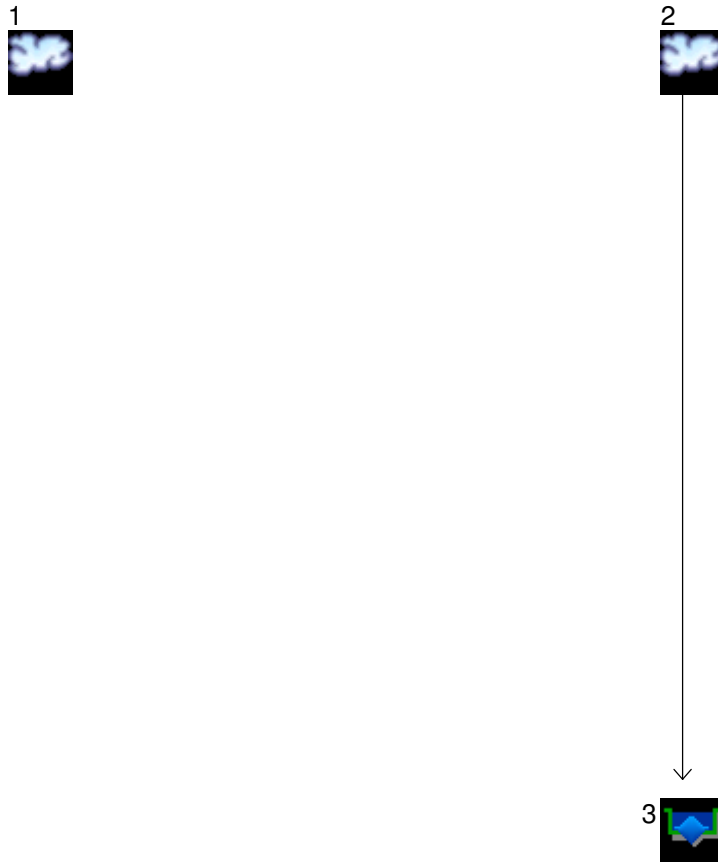
CMJ	OCT. 2010
Drawn By: KLA	Date: 10433
Design / Review:	Job No.:

Appendix 2.5

Hydraflow Hydrographs Output

Watershed Model Schematic

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



Legend

<u>Hyd.</u>	<u>Origin</u>	<u>Description</u>
1	SCS Runoff	Pre-Project
2	SCS Runoff	Post-Project
3	Reservoir	Post-Project Detained

Hydrograph Return Period Recap

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

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	-----	-----	8.257	-----	12.02	14.70	18.16	21.25	24.73	Pre-Project
2	SCS Runoff	-----	-----	16.12	-----	21.26	24.84	29.41	33.46	38.00	Post-Project
3	Reservoir	2	-----	0.000	-----	0.269	0.811	3.055	11.09	22.46	Post-Project Detained

Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description	
1	SCS Runoff	8.257	2	730	0.758	-----	-----	-----	Pre-Project	
2	SCS Runoff	16.12	2	722	1.099	-----	-----	-----	Post-Project	
3	Reservoir	0.000	2	n/a	0.000	2	1280.82	1.10	Post-Project Detained	
Detention Calcs 10-10.gpw					Return Period: 2 Year			Friday, Oct 29, 2010		

Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description	
1	SCS Runoff	12.02	2	730	1.103	-----	-----	-----	Pre-Project	
2	SCS Runoff	21.26	2	722	1.474	-----	-----	-----	Post-Project	
3	Reservoir	0.269	2	1208	0.115	2	1281.10	1.37	Post-Project Detained	
Detention Calcs 10-10.gpw					Return Period: 5 Year			Friday, Oct 29, 2010		

Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description	
1	SCS Runoff	14.70	2	730	1.353	-----	-----	-----	Pre-Project	
2	SCS Runoff	24.84	2	722	1.738	-----	-----	-----	Post-Project	
3	Reservoir	0.811	2	874	0.379	2	1281.11	1.38	Post-Project Detained	
Detention Calcs 10-10.gpw					Return Period: 10 Year			Friday, Oct 29, 2010		

Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description	
1	SCS Runoff	18.16	2	730	1.680	-----	-----	-----	Pre-Project	
2	SCS Runoff	29.41	2	722	2.078	-----	-----	-----	Post-Project	
3	Reservoir	3.055	2	756	0.719	2	1281.14	1.40	Post-Project Detained	
Detention Calcs 10-10.gpw					Return Period: 25 Year			Friday, Oct 29, 2010		

Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description	
1	SCS Runoff	21.25	2	730	1.976	-----	-----	-----	Pre-Project	
2	SCS Runoff	33.46	2	722	2.381	-----	-----	-----	Post-Project	
3	Reservoir	11.09	2	736	1.023	2	1281.18	1.45	Post-Project Detained	
Detention Calcs 10-10.gpw					Return Period: 50 Year			Friday, Oct 29, 2010		

Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description	
1	SCS Runoff	24.73	2	730	2.312	-----	-----	-----	Pre-Project	
2	SCS Runoff	38.00	2	722	2.723	-----	-----	-----	Post-Project	
3	Reservoir	22.46	2	730	1.364	2	1281.23	1.50	Post-Project Detained	
Detention Calcs 10-10.gpw					Return Period: 100 Year			Friday, Oct 29, 2010		

Hydrograph Report

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

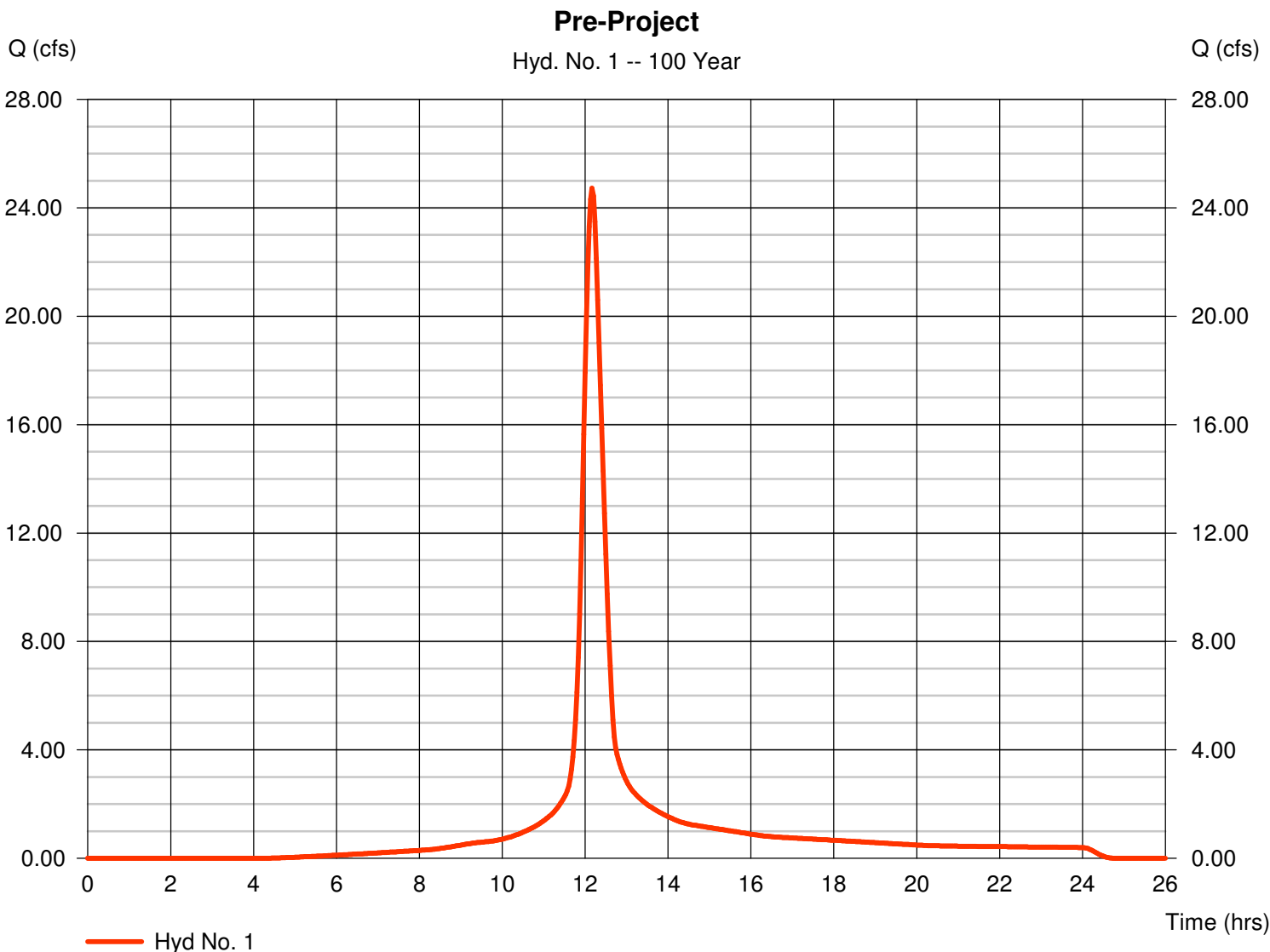
Friday, Oct 29, 2010

Hyd. No. 1

Pre-Project

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 2 min
 Drainage area = 4.700 ac
 Basin Slope = 0.0 %
 Tc method = TR55
 Total precip. = 7.80 in
 Storm duration = 24 hrs

Peak discharge = 24.73 cfs
 Time to peak = 12.17 hrs
 Hyd. volume = 2.312 acft
 Curve number = 84
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 29.50 min
 Distribution = Type II
 Shape factor = 484



TR55 Tc Worksheet

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

Hyd. No. 1

Pre-Project

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.150	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.50	0.00	0.00	
Land slope (%)	= 0.50	0.00	0.00	
Travel Time (min)	= 16.31	+ 0.00	+ 0.00	= 16.31
Shallow Concentrated Flow				
Flow length (ft)	= 900.00	0.00	0.00	
Watercourse slope (%)	= 0.50	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 1.14	0.00	0.00	
Travel Time (min)	= 13.15	+ 0.00	+ 0.00	= 13.15
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	= 0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				29.50 min

Hydrograph Report

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

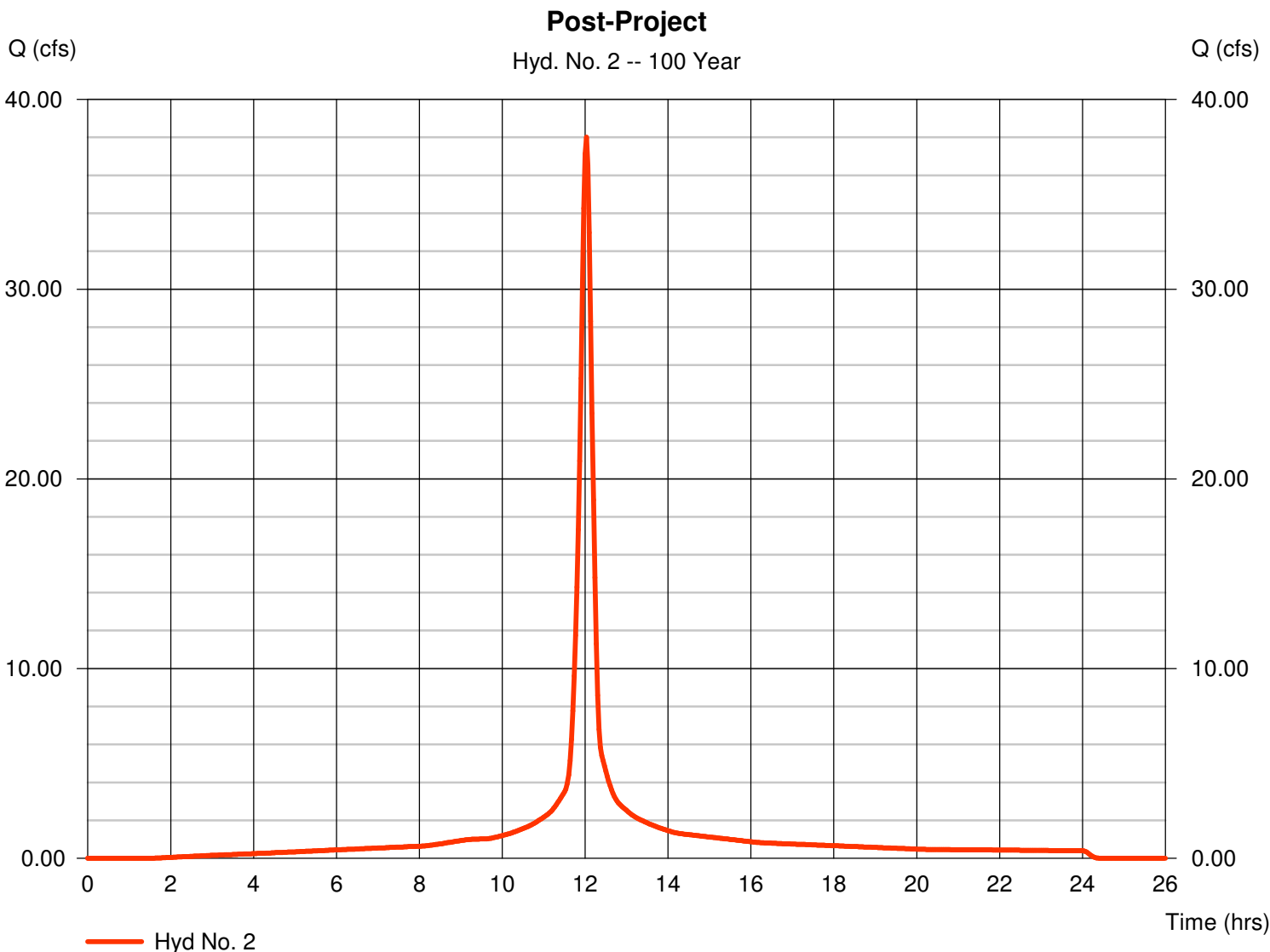
Friday, Oct 29, 2010

Hyd. No. 2

Post-Project

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 2 min
 Drainage area = 4.700 ac
 Basin Slope = 0.0 %
 Tc method = TR55
 Total precip. = 7.80 in
 Storm duration = 24 hrs

Peak discharge = 38.00 cfs
 Time to peak = 12.03 hrs
 Hyd. volume = 2.723 acft
 Curve number = 94.4
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 13.50 min
 Distribution = Type II
 Shape factor = 484



TR55 Tc Worksheet

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

Hyd. No. 2

Post-Project

<u>Description</u>	<u>A</u>		<u>B</u>		<u>C</u>		<u>Totals</u>	
Sheet Flow								
Manning's n-value	= 0.130		0.011		0.011			
Flow length (ft)	= 100.0		0.0		0.0			
Two-year 24-hr precip. (in)	= 3.50		0.00		0.00			
Land slope (%)	= 1.00		0.00		0.00			
Travel Time (min)	= 11.02	+	0.00	+	0.00	=	11.02	
Shallow Concentrated Flow								
Flow length (ft)	= 300.00		0.00		0.00			
Watercourse slope (%)	= 1.00		0.00		0.00			
Surface description	= Paved		Paved		Paved			
Average velocity (ft/s)	= 2.03		0.00		0.00			
Travel Time (min)	= 2.46	+	0.00	+	0.00	=	2.46	
Channel Flow								
X sectional flow area (sqft)	= 0.00		0.00		0.00			
Wetted perimeter (ft)	= 0.00		0.00		0.00			
Channel slope (%)	= 0.00		0.00		0.00			
Manning's n-value	= 0.015		0.015		0.015			
Velocity (ft/s)	= 0.00		0.00		0.00			
Flow length (ft)	= 0.0		0.0		0.0			
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00	
Total Travel Time, Tc							=	13.50 min

Hydrograph Report

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

Friday, Oct 29, 2010

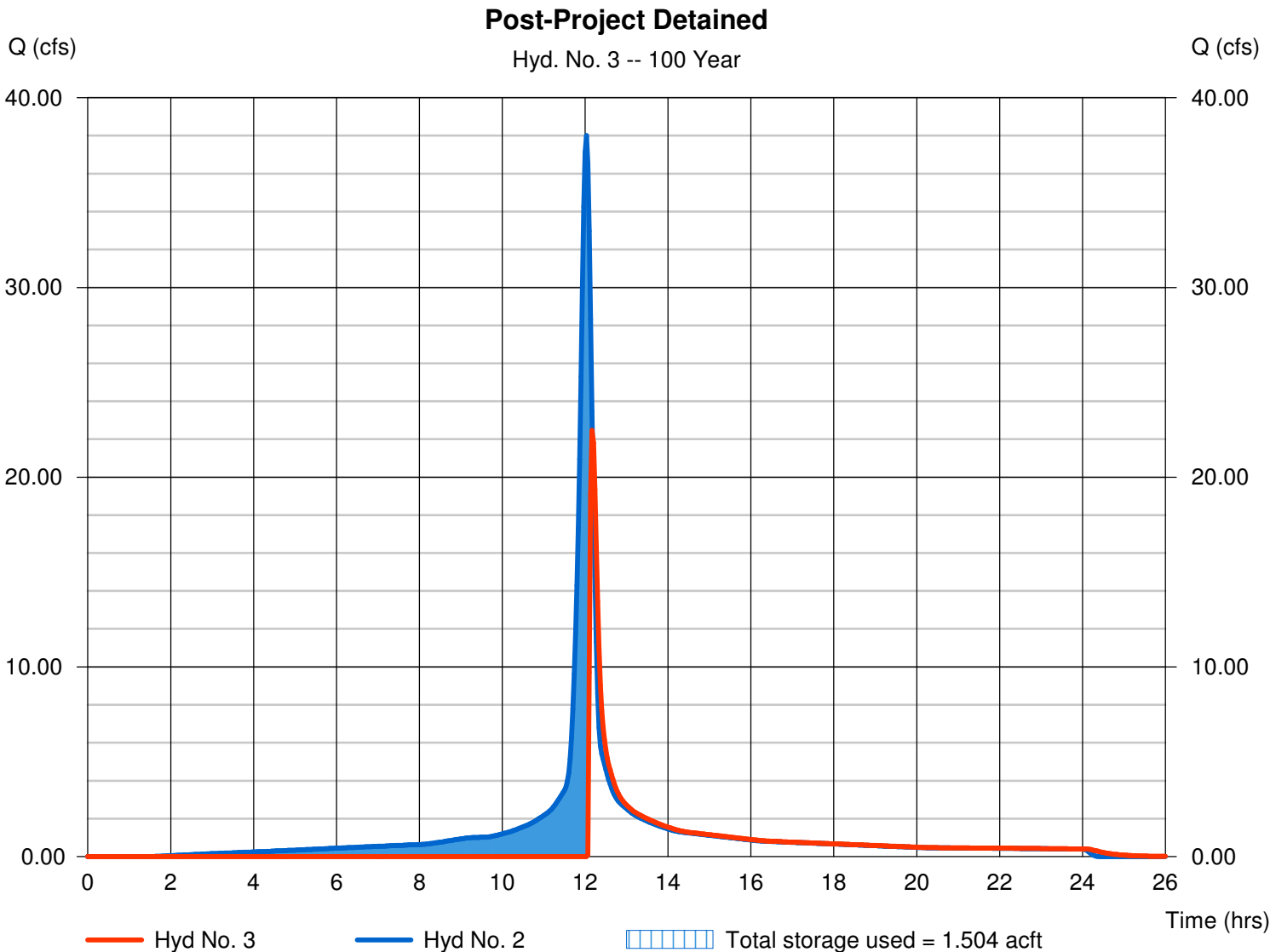
Hyd. No. 3

Post-Project Detained

Hydrograph type = Reservoir
 Storm frequency = 100 yrs
 Time interval = 2 min
 Inflow hyd. No. = 2 - Post-Project
 Reservoir name = Proposed Detention

Peak discharge = 22.46 cfs
 Time to peak = 12.17 hrs
 Hyd. volume = 1.364 acft
 Max. Elevation = 1281.23 ft
 Max. Storage = 1.504 acft

Storage Indication method used.



Pond Report

Pond No. 1 - Proposed Detention

Pond Data

Trapezoid - Bottom L x W = 1300.0 x 20.0 ft, Side slope = 4.00:1, Bottom elev. = 1279.40 ft, Depth = 1.90 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	1279.40	26,000	0.000	0.000
0.19	1279.59	28,009	0.118	0.118
0.38	1279.78	30,022	0.127	0.244
0.57	1279.97	32,040	0.135	0.380
0.76	1280.16	34,063	0.144	0.524
0.95	1280.35	36,090	0.153	0.677
1.14	1280.54	38,122	0.162	0.839
1.33	1280.73	40,158	0.171	1.009
1.52	1280.92	42,199	0.180	1.189
1.71	1281.11	44,245	0.189	1.378
1.90	1281.30	46,295	0.197	1.575

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
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	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	180.00	0.00	0.00
Crest El. (ft)	= 1280.90	1281.10	0.00	0.00
Weir Coeff.	= 2.60	2.60	3.33	3.33
Weir Type	= Broad	Broad	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (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 acft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0.000	1279.40	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.02	0.012	1279.42	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.04	0.024	1279.44	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.06	0.035	1279.46	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.08	0.047	1279.48	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.10	0.059	1279.50	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.11	0.071	1279.51	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.13	0.082	1279.53	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.15	0.094	1279.55	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.17	0.106	1279.57	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.19	0.118	1279.59	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.21	0.130	1279.61	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.23	0.143	1279.63	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.25	0.156	1279.65	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.27	0.168	1279.67	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.29	0.181	1279.69	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.30	0.194	1279.70	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.32	0.206	1279.72	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.34	0.219	1279.74	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.36	0.232	1279.76	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.38	0.244	1279.78	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.40	0.258	1279.80	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.42	0.271	1279.82	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.44	0.285	1279.84	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.46	0.298	1279.86	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.48	0.312	1279.88	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.49	0.326	1279.89	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.51	0.339	1279.91	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.53	0.353	1279.93	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.55	0.366	1279.95	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.57	0.380	1279.97	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.59	0.394	1279.99	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.61	0.409	1280.01	---	---	---	---	0.00	0.00	---	---	---	---	0.000

Continues on next page...

Proposed Detention

Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.63	0.423	1280.03	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.65	0.437	1280.05	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.67	0.452	1280.07	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.68	0.466	1280.08	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.70	0.481	1280.10	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.72	0.495	1280.12	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.74	0.509	1280.14	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.76	0.524	1280.16	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.78	0.539	1280.18	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.80	0.554	1280.20	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.82	0.570	1280.22	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.84	0.585	1280.24	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.86	0.600	1280.26	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.87	0.616	1280.27	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.89	0.631	1280.29	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.91	0.646	1280.31	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.93	0.662	1280.33	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.95	0.677	1280.35	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.97	0.693	1280.37	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.99	0.709	1280.39	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.01	0.725	1280.41	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.03	0.742	1280.43	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.05	0.758	1280.45	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.06	0.774	1280.46	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.08	0.790	1280.48	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.10	0.806	1280.50	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.12	0.823	1280.52	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.14	0.839	1280.54	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.16	0.856	1280.56	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.18	0.873	1280.58	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.20	0.890	1280.60	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.22	0.907	1280.62	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.24	0.924	1280.64	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.25	0.941	1280.65	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.27	0.958	1280.67	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.29	0.975	1280.69	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.31	0.992	1280.71	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.33	1.009	1280.73	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.35	1.027	1280.75	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.37	1.045	1280.77	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.39	1.063	1280.79	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.41	1.081	1280.81	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.43	1.099	1280.83	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.44	1.117	1280.84	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.46	1.135	1280.86	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.48	1.153	1280.88	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.50	1.171	1280.90	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.52	1.189	1280.92	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.54	1.208	1280.94	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.56	1.227	1280.96	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.58	1.246	1280.98	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.60	1.264	1281.00	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.62	1.283	1281.02	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.63	1.302	1281.03	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.65	1.321	1281.05	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.67	1.340	1281.07	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.69	1.359	1281.09	---	---	---	---	0.00	0.00	---	---	---	---	0.000
1.71	1.378	1281.11	---	---	---	---	0.00	0.47	---	---	---	---	0.469
1.73	1.397	1281.13	---	---	---	---	0.00	2.32	---	---	---	---	2.318
1.75	1.417	1281.15	---	---	---	---	0.00	4.94	---	---	---	---	4.936
1.77	1.437	1281.17	---	---	---	---	0.00	8.14	---	---	---	---	8.142
1.79	1.457	1281.19	---	---	---	---	0.00	11.84	---	---	---	---	11.84
1.81	1.476	1281.21	---	---	---	---	0.00	15.97	---	---	---	---	15.97
1.82	1.496	1281.22	---	---	---	---	0.00	20.50	---	---	---	---	20.50
1.84	1.516	1281.24	---	---	---	---	0.00	25.39	---	---	---	---	25.39
1.86	1.536	1281.26	---	---	---	---	0.00	30.62	---	---	---	---	30.62
1.88	1.555	1281.28	---	---	---	---	0.00	36.16	---	---	---	---	36.16
1.90	1.575	1281.30	---	---	---	---	0.00	41.88	---	---	---	---	41.88

...End

Appendix 2.6

Curve Number Calculations

Curve Number Calculations
Gardens at Wichita Place Addition

Basin	Total Area	HSG	Area of Impervious by Land Use																		Undisturbed Pervious			Disturbed Pervious			Impervious			Water Surfaces			Composite CN						
			Commercial		85%		Industrial		72%		Residential 1/8 ac or less		65%		Residential 1/4 acre		38%		Residential 1/2 acre		25%		Residential 1 acre		20%		Area	CN	Weighted CN	Area	CN	Weighted CN		Area	CN	Weighted CN	Area	CN	Weighted CN
			Area	Perv.	Imp.	Area	Perv.	Imp.	Area	Perv.	Imp.	Area	Perv.	Imp.	Area	Perv.	Imp.	Area	Perv.	Imp.	Area	Perv.	Imp.	Area	Perv.	Imp.													
Pre-Project	4.7	D		0	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0	4.7	84	84	0.0	88	0.0	0.0	98	0.0		100	0	84.0
Post-Project	4.7	D		0	0		0	0	3.9	1.365	2.535		0	0		0	0		0	0		0	0		0	0	0.8	84	14.29787	1.4	88	25.6	2.5	98	52.9		101	0	92.7

Tab 3. Post-Development Conditions

Description

The site is 3.9 acres that will develop as a multi-family senior living residential facility.

Drainage Calculations

Runoff Method

The site was modeled using Hydraflow Hydrographs by AutoCAD 2009, Appendix 2.5.

Rainfall

The rainfall information used is from the Kansas Department of Transportation Rainfall Depth Tables for Kansas Counties June 1997. The rainfall values used are shown in Table 3.1.

Table 3.1. 24-Hour Rainfall Depths.

	2-Yr	5-Yr	10-Yr	25-Yr	100-Yr
Sedgwick	3.50	4.53	5.24	6.24	7.80

Time of Concentration

Time of concentration was calculated using the TR-55 method. Calculations are in Appendix 2.5.

Curve Numbers

Weighted curve numbers were calculated to represent the land usage of the basins. A curve number of 94.4 was used to represent the commercial development. The curve numbers are shown in Table 3.2.

Drainage Patterns

The site will drain to a bio-swale that surrounds the site. The swale will have a bottom elevation below the outlet elevation. The swale will contain the 2-year design event and the runoff will percolate into the soil. In an event larger than the 2-year design event, the swale will overflow over the existing curb and into Wichita Street at an elevation of 1381.1. The peak runoff for smaller design storms has been greatly reduced. The soil type in the bottom of the swale will need to be tested to determine percolation rates. Soil may need to be imported to increase infiltration so that water in the swale evaporates after a rainfall event. The proposed detention is shown on the drainage and utility plan, Appendix 3.1.

Table 3.2. Post-Development Flow Rates.

Description	Area (ac.)	T _c (min.)	CN	Design Storm Flows (cfs)				
				2-Yr	5-Yr	10-Yr	25-Yr	100-Yr
Post-Project	4.7	13.5	94.4	0.0	0.3	0.8	3.0	22.5

Utilities

Storm Water Sewer

There is no existing storm water sewer on the site. The site will surface drain in all four directions and no storm water sewer is planned.

Water

The proposed water system will tie into the existing system along Wichita Street.

Sanitary Sewer

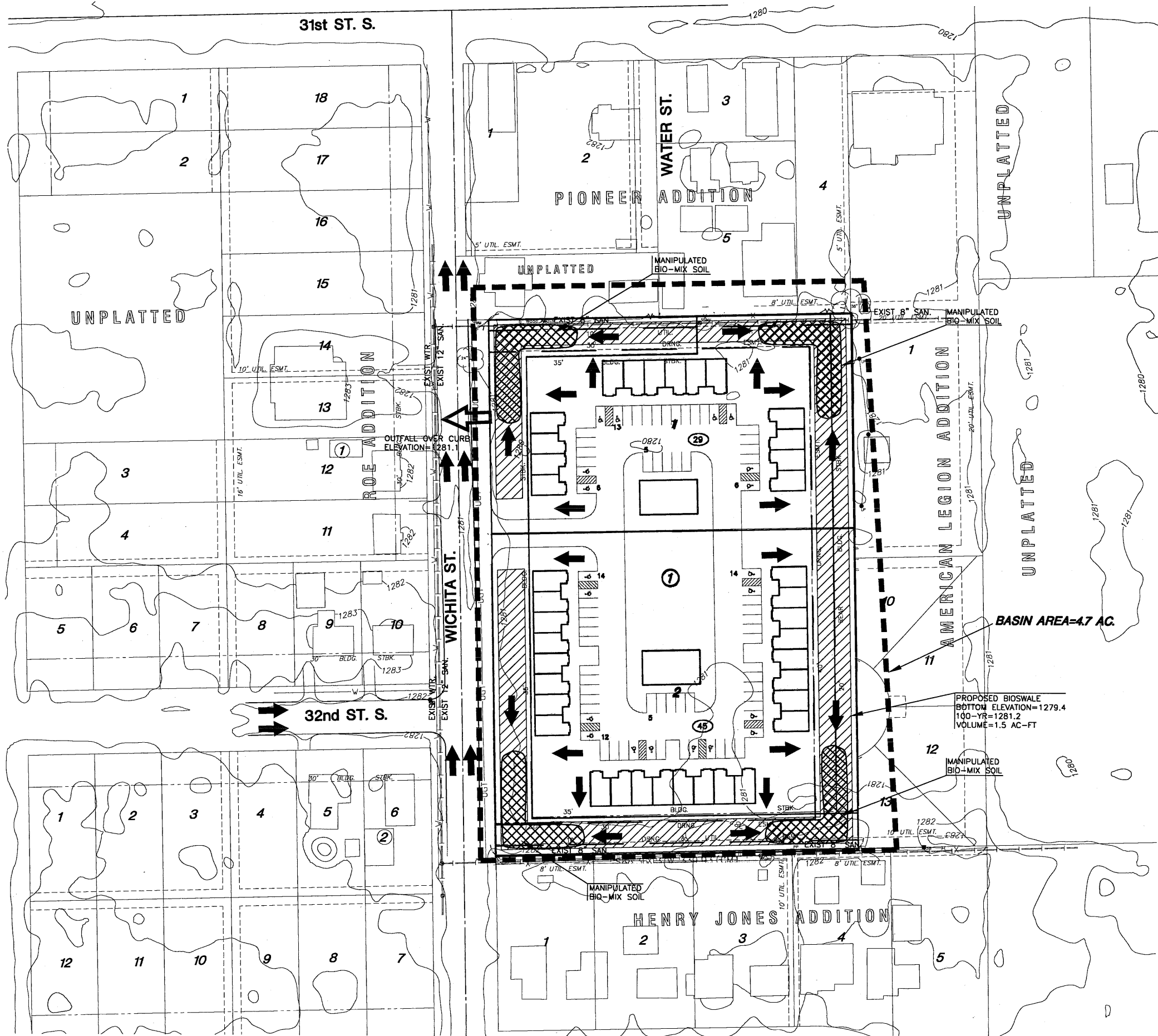
The site will tie into the existing 8" sanitary sewer that runs along the north side of the site.

Minimum Lowest Opening

The minimum lowest opening for both Lots 1 and 2 Block 1 is 1283.2.

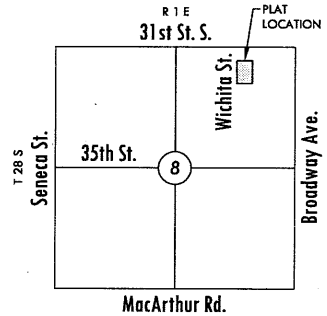
Appendix 3.1

Drainage and Utility Plan



BENCH MARK

BM #1 Square cut west end of northwest return at Wichita St. and 32nd St. S. ELEV.=1281.69 NAVD88



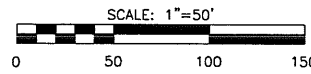
VICINITY MAP

LEGEND

- ✱ - CONIFEROUS TREE
- - DECIDUOUS TREE
- SN - SIGN
- PP - POWER POLE
- ELEC BOX - ELECTRIC BOX
- LP - LIGHT POLE
- FH - FIRE HYDRANT
- WV - WATER VALVE
- WM - WATER METER
- SC - SECTION CORNER
- BM - BENCHMARK
- - - - - EASEMENT
- - - - - BUILDING SETBACK
- - - - - FENCE
- - - - - STORM SEWER PIPE
- - - - - WATER LINE
- - - - - SANITARY SEWER LINE
- - - - - GAS LINE
- - - - - GAS PIPELINE
- - - - - TELEPHONE LINE
- - - - - UNDERGROUND ELEC.
- - - - - OVERHEAD ELECTRIC
- - - - - FIBER OPTIC CABLE
- - - - - DRAINAGE SUB BASIN
- - - - - DRAINAGE BASIN
- - FLOW ARROW
- A17 - AREA FOR SWS SIZING

BASIN AREA=4.7 AC.

PROPOSED BIOSWALE
BOTTOM ELEVATION=1279.4
100-YR=1281.2
VOLUME=1.5 AC-FT



MKEC
ENGINEERING
CONSULTANTS, INC.
411 N. WEBB ROAD
WICHITA, K.S. 67206
316-684-9600

GARDENS AT WICHITA PLACE ADDITION
WICHITA, KANSAS
DRAINAGE PLAN

DATE	October 10
REVISED	

DESIGN BY	KLA
DRAWN BY	CMJ
CHECKED BY	GJA

SHEET NUMBER
1

Tab 4. Floodplain Submittal

There are no FEMA floodplains on this site.

Tab 5. Permits

US Army Corps of Engineers

There are blue lines on the USGS Quadrangle map on the site. Therefore no permit will be required.

Kansas Department of Agriculture

The site does not change any waterways or provide detention, therefore division of water resources permits.

Federal Emergency Agency (FEMA)

There are no FEMA floodplains on site, therefore no LOMC applications are required.

Kansas Department of Transportation

There are no state highways on site.

Sedgwick County Right-of-way Permit

Not applicable.