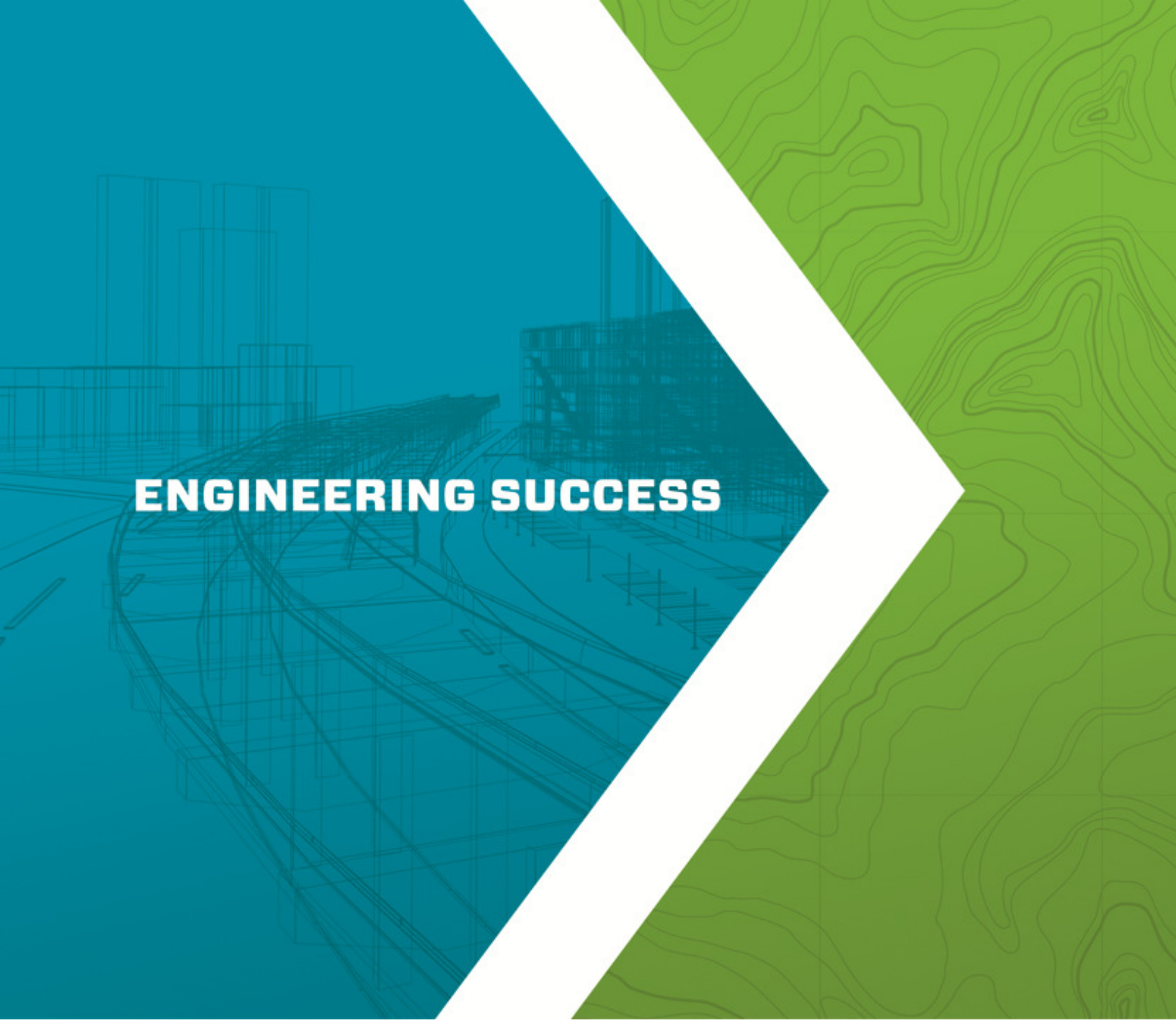


DRAINAGE REPORT FOR

Sierra Pointe Addition
Wichita, Kansas

MKEC

411 N. Webb Rd.
Wichita, KS 67206
316.684.9600

PROJECT NUMBER: 1401010070
DATE: February 2014

Table of Contents

Tab 0. Checklist **3**
Tab 1. Project Narrative **4**
Location **4**
Discussion of Development **4**
Drainage Summary **4**
Pre-Development 4
Post-Development 4
Table 1.1. Comparison of Pre and Post-Development Flow Rates 5
Best Management Practices **5**
Appendix 1.1 – USGS Quadrangle Map **6**
Appendix 1.2 – Plat **7**
Appendix 1.3 – Drainage Patterns **8**
Appendix 1.4 – Preliminary Grading Plan **9**
Tab 2. Existing Conditions **10**
Description **10**
FEMA Floodplains **10**
Soils **10**
Drainage Calculations **10**
Runoff Method 10
Rainfall 10
Table 2.1. 24-Hour Rainfall Depths. 10
Time of Concentration 10
Curve Numbers 10
Drainage Patterns 10
Table 2.3. Pre-Development Flow Rates 11
Utilities **11**
Groundwater Elevations **11**
Appendix 2.1 – Aerial Photograph **12**
Appendix 2.2 – Existing Conditions Map **13**
Appendix 2.3 – Flood Insurance Rate Map (FIRM) **14**
Appendix 2.4 – Soil Survey **15**
Appendix 2.5 – Hydraflow Hydrographs Output **16**
Appendix 2.6 – 127th Street Culvert Calculations **17**
Tab 3. Post-Development Conditions **18**
Description **18**
Drainage Calculations **18**
Runoff Method 18
Rainfall 18
Table 3.1. 24-Hour Rainfall Depths. 18
Time of Concentration 18
Curve Numbers 18
Drainage Patterns 18
Table 3.1. Post-Development Flow Rates. 19
Utilities **19**
Storm Water Sewer 19
Water 19
Sanitary Sewer 19
Minimum Lowest Opening **19**
Appendix 3.1 – Drainage and Utility Plan **20**
Appendix 3.2 – Hydraflow Storm Sewers **21**

Tab 4. Floodplain Submittal 22
Tab 5. Permits 23
US Army Corps of Engineers 23
Kansas Department of Agriculture 23
Federal Emergency Agency (FEMA) 23
Kansas Department of Transportation 23
Sedgwick County Right-of-way Permit 23

Tab O. Checklist

CITY OF WICHITA

Public Works, Engineering Division
Final Drainage Plan Submittal Checklist

Reviewer: City of Wichita Date: June 11, 2010

Subdivision Name: Pawnee & 127th Street Commercial Location: Wichita, Kansas

Total Land Area Of Ownership: 31.6 Acres

Type: ☐ Residential ☑ Commercial ☐ Industrial ☐ Recreation ☐ Municipal ☐ Other

Applicant: Occidental Management, Inc. Contact: Gary Oborny Phone #: (316) 262-3331

Engineer: MKEC Engineering Consultants, Inc. Contact: Kara Anderson, P.E. Phone # (316) 684-9600

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	
Tab 1. Project Narrative	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
A. Site Location Map, using USGS Map	✔		Appendix 1.1		
B. Discussion of development, existing conditions, and proposed impacts on stormwater, wetland, riparian, and flood plain	✔		Tab 1 Text		
C. Discussion of offsite conditions	✔		Tab 1 Text		
D. Summary of runoff calculations (pre/post development) No increase in peak discharge for all storm series	✔		Tab 1 Text		
E. Narrative description of the type and function of the permanent best management practices that are incorporated into the site design	✔		Tab 1 Text		
F. Copy of the plat	✔		Appendix 1.2		
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.)	✔		Appendix 1.4		
H. Professional Engineer seal, signature and date on cover of report	✔		Cover		
I. CD of drainage plan in PDF format (one file) and one paper copy bound with this checklist included behind the cover	✔		Cover & Tab 0.		

	Applicant			Engr	
Tab 2. Existing Conditions Runoff Calculations	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
A. Copy of applicable orthophoto showing proposed project boundaries (preferable in color)	✔		Appendix 2.1		
B. Runoff Method (Rational, Hydrograph Method, or other approved methods by Engineering)	✔		Tab 2 Text		
C. Existing topography (no greater than 2-foot contours, 1-foot recommend)	✔		Appendix 2.2		
D. Total Site Area and Total Impervious Area (acres)	✔		Tab 2 Text		
E. Benchmarks used for site control	✔		Appendix 2.2		
F. Streams, creeks, and waterway labeled	✔		Appendix 2.2		
G. Predominant soils from USDA soil surveys, and/or on site soil borings	✔		Tab 2 Text and Appendix 2.4		
H. Location and boundaries of natural features such as wetlands, lakes, and ponds with the normal water elevation noted	✔		Appendix 2.2		
I. Location of existing roads, buildings, parking lots and other impervious areas.	✔		Appendix 2.2		

Consulting Engineer Initials _____

J. Location of existing utilities (e.g., water, sewer, gas, electric) and easements	✔		Appendix 2.2		
K. Location of existing conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow	✔		Appendix 2.2		
L. Flow paths	✔		Appendix 2.2		
M. Location and dimensions of existing channels, bridges or culvert crossings	✔		Appendix 2.2		
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	✔		Tab 2 Text		
O. Assumed pre-developed runoff curve numbers	✔		Appendix 2.6		
P. Existing time of concentrations used in calculations	✔		Appendix 2.6		
Q. Evaluate immediate downstream drainage capacity, not to exceed more than 0.25 miles downstream of site	✔		Tab 2 Text		
R. Existing structural elevations (e.g., invert of pipes, manholes, etc.)	✔		Appendix 2.2		
S. Cross-section data for open channels	✔		Tab 2 Text		
T. Ground water elevations, if applicable	✔		Tab 2 Text		

	Applicant			Engr	
Tab 3. Post-Development Hydrologic Analysis	**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)	✔		Tab 3 Text and Appendix 2.5		
B. Proposed time of concentrations used in calculations	✔		Appendix 2.6		
C. Assumed post-developed runoff curve numbers	✔		Appendix 2.6		
D. Proposed contours for detention facilities (to equal area used in outlet rating curves)	✔		Appendix 3.1		
E. Preliminary sizing calculations for stormwater controls including contributing drainage area, storage, and outlet configuration	✔		Appendix 3.2		
F. Stage-storage-discharge or outlet rating curves and inflow and outflow hydrographs for storage facilities	✔		Appendix 3.1		
G. Final analysis of potential upstream/downstream impact/effects of project, where necessary	✔		Tab 3 Text		
H. Existing and proposed structural elevations (e.g., invert of pipes, manholes, etc.)	✔		Appendix 3.1		
I. Design water surface elevations and normal pool elevation for ponds.	✔		Appendix 3.1		
J. Typical detail for outlet structures, embankments, spillways, grade control structures, conveyance channels, etc. To include height, width, elevation, and/or diameter.	✔		Appendix 3.1		
K. Proposed limits of clearing and grading	✔		Tab 3 Text		
L. Location of existing and proposed roads, buildings, parking lots and other impervious areas.	✔		Appendix 3.1		
M. Location of existing and proposed utilities (e.g., water, sewer) and easements	✔		Appendix 3.1		
N. Location of existing and proposed conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow	✔		Appendix 3.1		
O. Preliminary location and dimensions of proposed channel modifications, such as bridge or culvert crossings	✔		Appendix 3.1		

Consulting Engineer Initials _____

P. Preliminary selection and location of stormwater controls	✔		Appendix 3.1		
Q. Emergency overflow structure's flow path	✔		Appendix 3.1		
R. Detention facility provides one-foot of freeboard above the HWL and emergency outfall shown (top of berm elevation shown)	✔		Appendix 3.1		
S. The 100-year 24-hour HWL delineated on the plan for detention pond	✔		Appendix 3.1		
T. Lowest opening elevations table on the plat for structures located adjacent to channels or ponds	✔		Tab 3 Text		
U. Stormwater Management Facilities located within a Reserve		✔	No detention pond on site		
V. Maintenance responsibility of stormwater management facility shall be specified in the platters text. (e.g. HOA, Lot Owners Association, or lot)	✔		Tab 3 Text		
W. Off-site drainage easements or agreements required, where necessary	✔		Tab 3 Text		

	Applicant			Engr	
Tab 4. Floodplain Submittal	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
A. Provide source of flood profile		✔	No FEMA floodplain		
B. Nearest base flood elevations		✔	No FEMA floodplain		
C. Delineation of pre-developed regulatory floodplain/floodway limits		✔	No FEMA floodplain		
D. Delineation of post-developed regulatory floodplain and floodway limits		✔	No FEMA floodplain		
E. Floodplain boundary determination per elevation (project limits shown)		✔	No FEMA floodplain		
F. Provide source of floodway data table and discharges		✔	No FEMA floodplain		
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		✔	No FEMA floodplain		
H. Provide regulatory floodway and four natural profile models (10,50,100, and 500-yr) for existing and future watershed conditions		✔	No FEMA floodplain		
I. Location of floodplain/floodway limits and relationship of site to upstream/downstream properties (floodplain limits to be per elevation and scaled location)		✔	No FEMA floodplain		
J. Flood plains and floodways located within a Reserve, where necessary		✔	No FEMA floodplain		

	Applicant			Engr	
Tab 5. Federal, State and Local Permits (to be provided prior to construction unless otherwise specified)	**I/R**	**NA**	**Explanation / Location in Plan**	**I/R**	**NA**
A. US Army Corps of Engineers - Regulatory program permits (404 water quality certification)		✔	No wetlands or jurisdictional water ways		
B. Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Flood Plain Fill, Levee, Water Appropriations, Dam safety permit, etc.)		✔	No jurisdictional waterways		
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.		✔	No FEMA floodplain		
D. Kansas Department of Transportation		✔	No KDOT roads		
E. Sedgwick County Right-of-way Permit		✔	No county roads		

Consulting Engineer Initials _____

Tab 1. Project Narrative

Location

The subject property is in the City of Wichita, Sedgwick County, Kansas. The proposed development is south of Pawnee Road and west of 127th Street North. The site lies in the northeast quarter of Section 3, Township 28 South, Range 2 East. The USD 259 4th Addition borders the site to the west and south. The plat area is 31.6 acres. The site is shown on the USGS Map, Appendix 1.1.

Discussion of Development

The site is currently undeveloped agricultural land and will develop as 11 commercial lots. Eight of the lots are approximately 1.0 acre in size, the 9th lot is 1.7 acres in size and the remaining two lots are larger commercial lots that are 7.1 acres and 11.7 acres. The USD 259 4th Addition south of the plat is also being developed for use as a school. The proposed site is shown on the plat, Appendix 1.2.

Drainage Summary

Pre-Development

The site is divided into 3 drainage basins under pre-development conditions. The southern portion of the site drains to the south into the USD 259 4th Addition. The northwestern portion drains to the west and into an existing grassed waterway on the USD 259 4th Addition. The Northeast corner of the site drains into a shallow pond that outlets to the east. The USD 259 4th Addition is currently undeveloped and in the platting process. The Drainage Report for USD 259 4th Addition dated May 7, 2010 by Ruggles and Bohm used the pre-development site conditions for this site to determine the pre-development flow rates from the USD 259 4th Addition site. The Northeast basin of this site flows into an existing pond. The pond outlets into a ditch along 127th Street North. The ditch flows through an existing 20"x28" culvert under 127th Street and to the north and the east where it crosses through a culvert under Pawnee Road. Flow from the culvert drains to the northeast to an existing 24" CMP and then flows through a field into a pond. The flow paths are shown on the Drainage Patterns Drawing, Appendix 1.3. Pre-development flow rates are shown in Table 1.1.

Post-Development

The USD 259 4th Addition Drainage Report dated May 7, 2010 by Ruggles and Bohm accounts for developed runoff from this site and provides detention for this site in the proposed detention ponds on the school property. A portion of the drainage basin draining to 127th Street has been graded to route the runoff to the school site. The basin area has been reduced from 19.6 acres to 10.0 acres. The detention ponds in the USD 259 4th Addition school site accommodate detention for most of developed site. Additional detention will be provided in the parking lot and in swales in Occidental Basin 4 to reduce the peak-flow rates from the smaller storms. Preliminary lot layout and grading are shown in the Preliminary Lot Grading Plan, Appendix 1.3.

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

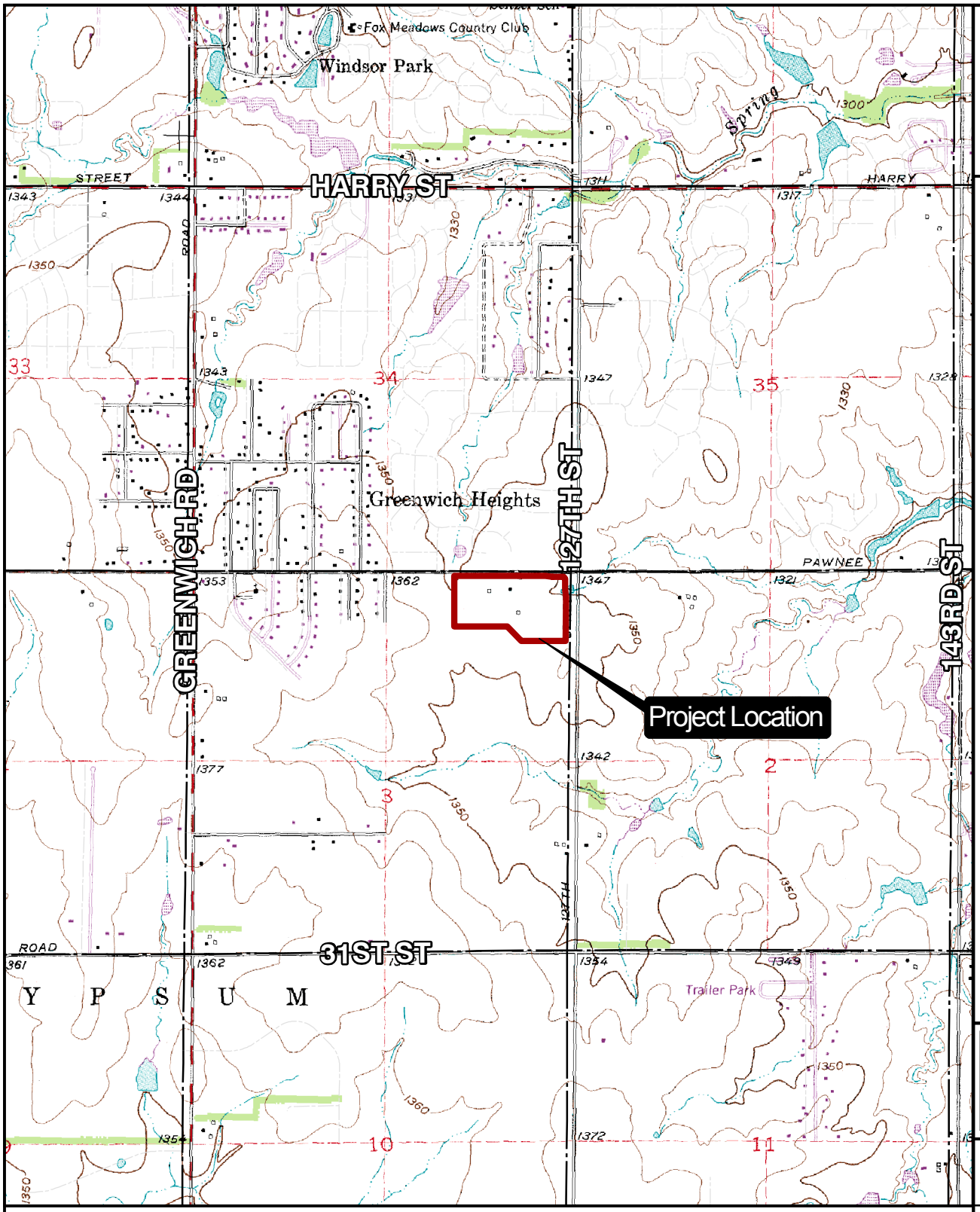
Description	Design Storm Flows (cfs)				
	2-Yr	**5-Yr**	**10-Yr**	**25-Yr**	**100-Yr**
Pre-Development North Total*	64.6	93.1	110.4	139.4	188.7
Post-Development North Total*	61.8	81.8	94.3	113.6	146.0
Pre-Development South Total*	290.3	419.6	499.4	633.3	861.7
Post-Development South Total*	283.1	401.3	476.0	604.0	825.1
Pre-Development To 127th Street/Occidental 4	29.6	44.6	54.9	70.9	98.5
Post-Develop. To 127th Street/Occidental 4	29.3	43.6	54.1	68.3	87.3

* From USD 259 4th Addition May 7, 2010 Drainage Report by Ruggles and Bohm.

Best Management Practices

The site will be seeded or sodded after construction of grading and utilities are complete. During construction curb protection, inlet protection and other erosion protection devices will be used to prevent soil from leaving the site. The site will be seeded and sodded upon completion of construction. Riprap will protect storm sewer outfalls.

Appendix 1.1 – USGS Quadrangle Map



N
W E
S

1 0.5 0 1 Miles

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

1 0.5 0 1 Kilometers

MKEC
Wichita, KS · 316.684.9600

USGS QUAD EXHIBIT
SIERRA POINTE ADDITION

SEC: 3
TWP: T28S
RNG: R2E

PROJECT NO.	1401010070
DATE	2/10/2014
SCALE	1"=2000'

DESIGNED	DRAWN	CHECKED
MKEC	MKEC	MKEC

NO.	REVISION	DATE

SHEET NO.
1 OF 1

Path: J:\Projects\2014\1401010070_127Paw_Sierra Pointe\5-Civil\GIS\USGS Quad Exhibit.mxd - Date: 2/10/2014

Appendix 1.2 – Plat

LEGAL DESCRIPTION

A tract of land lying in a portion of Government Lots 1 and 2, Section 3, Township 28 South, Range 2 East, of the 6th Principal Meridian, Wichita, Sedgwick County, Kansas; said tract being more particularly described as follows:
BEGINNING at the northeast corner of said Northeast Quarter, thence along the east line of said Quarter on a Kansas coordinate system of 1983 south zone grid bearing of S00°16'43"E,
960.06 feet; thence parallel with and 960.00 feet south of the north line of said Quarter, S89°05'03"W, 675.04 feet; thence N45°11'06"W, 279.30 feet to a point lying 760.00 feet south of said north line; thence S89°05'03"W, 729.45 feet; thence N00°54'57"W, 760.00 feet to said north line; thence along said north line, N89°05'03"E, 1610.13 feet to the POINT OF BEGINNING.

BENCHMARK

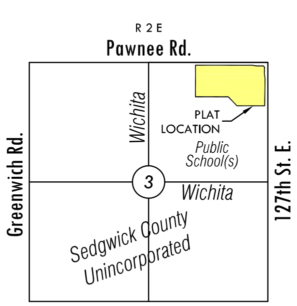
BM #1 Top of concrete witness monument 30.5 feet W. centerline 127th St. E and 51.5 feet S. Pawnee Rd.
Elev. = 1349.31 (NAVD 88)
1348.81 (NGVD 29)

LEGEND

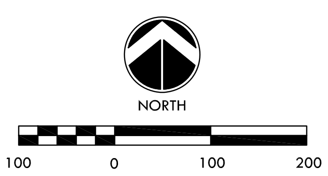
- CONIFEROUS TREE
- DECIDUOUS TREE
- SIGN
- POWER POLE
- ELECTRIC BOX
- LIGHT POLE
- FIRE HYDRANT
- WATER VALVE
- WATER METER
- SECTION CORNER
- BENCHMARK
- EASEMENT
- BUILDING SETBACK
- FENCE
- STORM SEWER PIPE
- WATER LINE
- SANITARY SEWER LINE
- GAS LINE
- GAS PIPELINE
- TELEPHONE LINE
- UNDERGROUND ELEC.
- OVERHEAD ELECTRIC
- FIBER OPTIC CABLE

NOTES

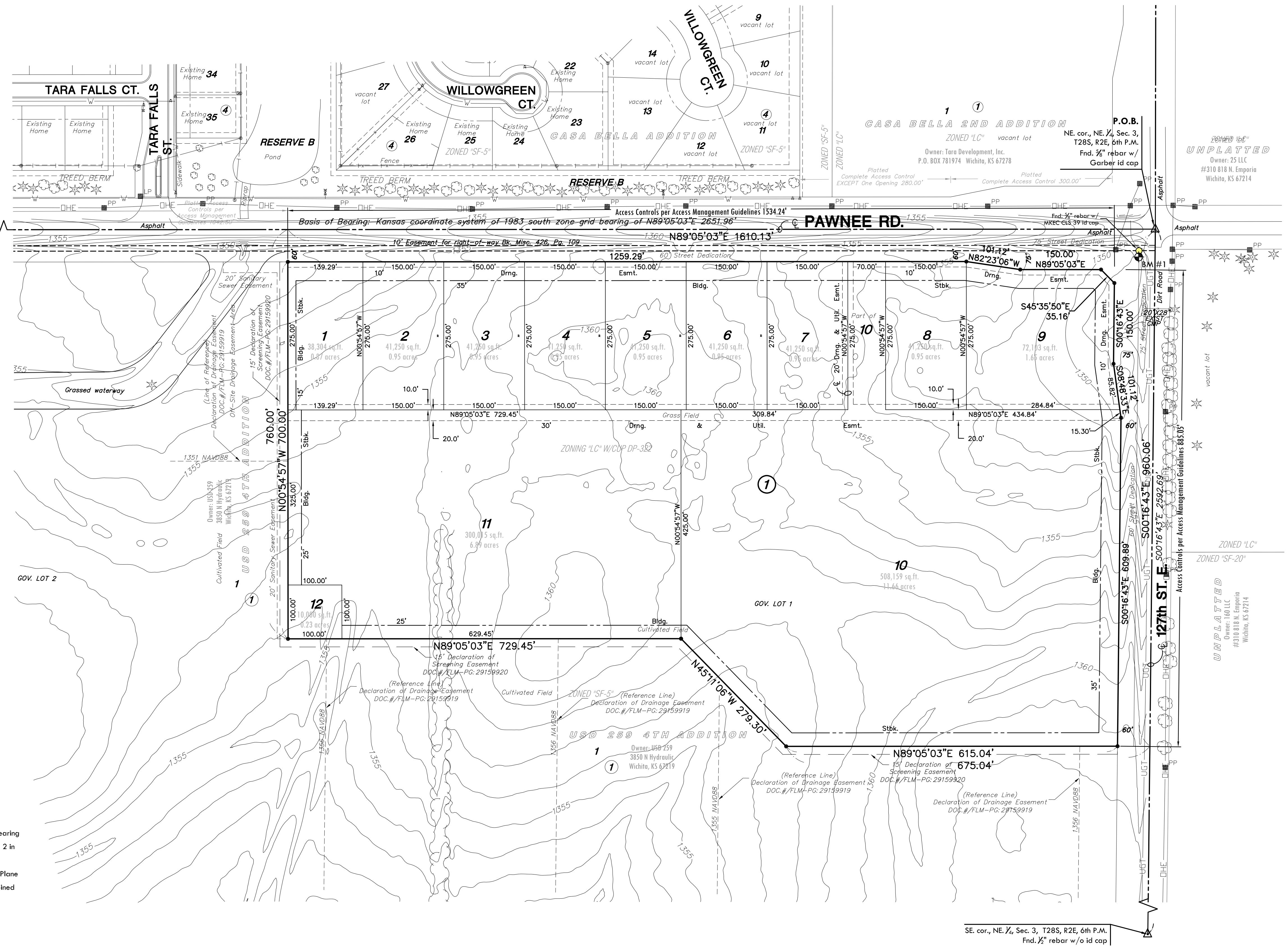
1. GEOGRAPHY: Located in southeast Wichita in an area rapidly transitioning from agricultural uses into suburban residential. The property has access to U.S.-54 Hwy. via 127th St. Existing surrounding land uses include suburban residential (N. and NE.) and agriculture production (E., W., S. NE.).
2. LOT TOTAL - 12
3. ANNEXATION: Wichita Ord. No. 46-828 Dated Nov. 22nd, 2005
4. EXISTING USES: Agricultural and vacant commercial, vacant farm
5. PROPOSED USES: Commercial Retail
6. ZONING: CUP DP-322 (CUP2010-11 & ZON2010-18) A#1 (CUP2014-__)
7. PLAT AREA: Gross - 31.571 acres Net - 27.95 acres more or less
8. SURVEY DATE: Jan., 2010 (by MKEC) Contours by (LIDAR March 2008)
9. PUBLIC UTILITIES: Municipal sanitary sewer shall extended to the site from the northwest. Municipal water is available along Pawnee Rd.
10. ACCESS CONTROLS: As shown
11. FLOOD: According to FEMA FIRM Community Unit Panel 20173C0390E, Effective Date February 7, 2007; this property lies within flood zone "X". *LOWEST OPENING TO BE DETERMINED AT THE TIME OF FINAL PLATTING.*
12. DRAINAGE: A drainage report shall accompany this plat. The property lies within a branch of Spring Creek drainage basin.



VICINITY MAP



Basis of Bearings: Kansas coordinate system 1983 south zone bearing of N89°05'03"E along the north line of Government Lots 1 and 2 in the NE. 1/4, Sec. 3, T28S, R2E, 6th P.M.
This plat is surveyed and platted on NAD83 using Kansas State Plane south zone coordinates, modified to the surface, having a combined adjustment scale factor of 1.000120014401



PRELIMINARY PLAT

A portion of the NE. 1/4, Sec. 3, T28S, R2E, 6th P.M.

SIERRA POINTE ADDITION

Owner / Developer: 127 PAW, LLC, a Kansas limited liability company 8111 E. 32nd St., Suite 101, Wichita, KS, 67226 316.262.3331

Date submitted: February 10th , 2014 **Subdivision Hearing: February 27th, 2014**

MKEC
Wichita, KS • 316.684.9600

FINAL PLAT
SIERRA POINTE ADDITION
AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS

CERTIFICATE OF SURVEY

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

A tract of land lying in a portion of Government Lots 1 and 2, Section 3, Township 28 South, Range 2 East, of the 6th Principal Meridian, Wichita, Sedgwick County, Kansas; said tract being more particularly described as follows:
BEGINNING at the northeast corner of said Northeast Quarter, thence along the east line of said Quarter on a Kansas coordinate system of 1983 south zone grid bearing of S00°16'43"E, 960.06 feet; thence parallel with and 960.00 feet south of the north line of said Quarter, S89°05'03"W, 675.04 feet; thence N45°11'06"W, 279.30 feet to a point lying 760.00 feet south of said north line; thence S89°05'03"W, 729.45 feet; thence N00°54'57"W, 760.00 feet to said north line; thence along said north line, N89°05'03"E, 1610.13 feet to the POINT OF BEGINNING.

All public dedications, reserves, streets, easements, setbacks, access controls, together with, a Right-of-Way Easement, recorded in Book Misc. 426, Page 109, within the above described property are hereby vacated and replatted by virtue of K.S.A. 12-512(b), as amended.

I hereby certify that the details of this plat are correct to the best of my knowledge and belief this___day of _____________2014.

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

OWNER'S CERTIFICATE

Know all men by these presents that we the undersigned property owners of the land above set forth in the Registered Land Surveyor's Certificate, have caused the same to be surveyed and platted into Lots, a Block, and Streets the same to be known as "SIERRA POINTE 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.

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

All abutters rights of access to or from E. Pawnee Road over and across the north line of "SIERRA POINTE ADDITION," are hereby granted to the appropriate governing body, as indicated hereon. All abutters right to access to or from 127th Street S. over and across the east line of "SIERRA POINTE ADDITION," are hereby granted to the appropriate governing body, as indicated hereon (see Access Control Note).

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

Lots 1, 10, 11 and 12, Block 1, are required to adhere to the minimum pad elevation as shown on the "Minimum Pad Elevations".

This plat shall adhere and conform to the recitals of C.U.P. DP-322 as approved and recorded at the Wichita-Sedgwick County Metropolitan Area Planning Department.

127 PAW, LLC, a Kansas limited liability company

_______________________, Managing Member
Gary L. Oborny, Managing Member

STATE OF KANSAS, SEDGWICK COUNTY} ss:

This instrument was acknowledged before me on _____ day of ____________, 2014, by Gary L. Oborny, Managing Member, 127 PAW, LLC, a Kansas limited liability.

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

Affix Seal

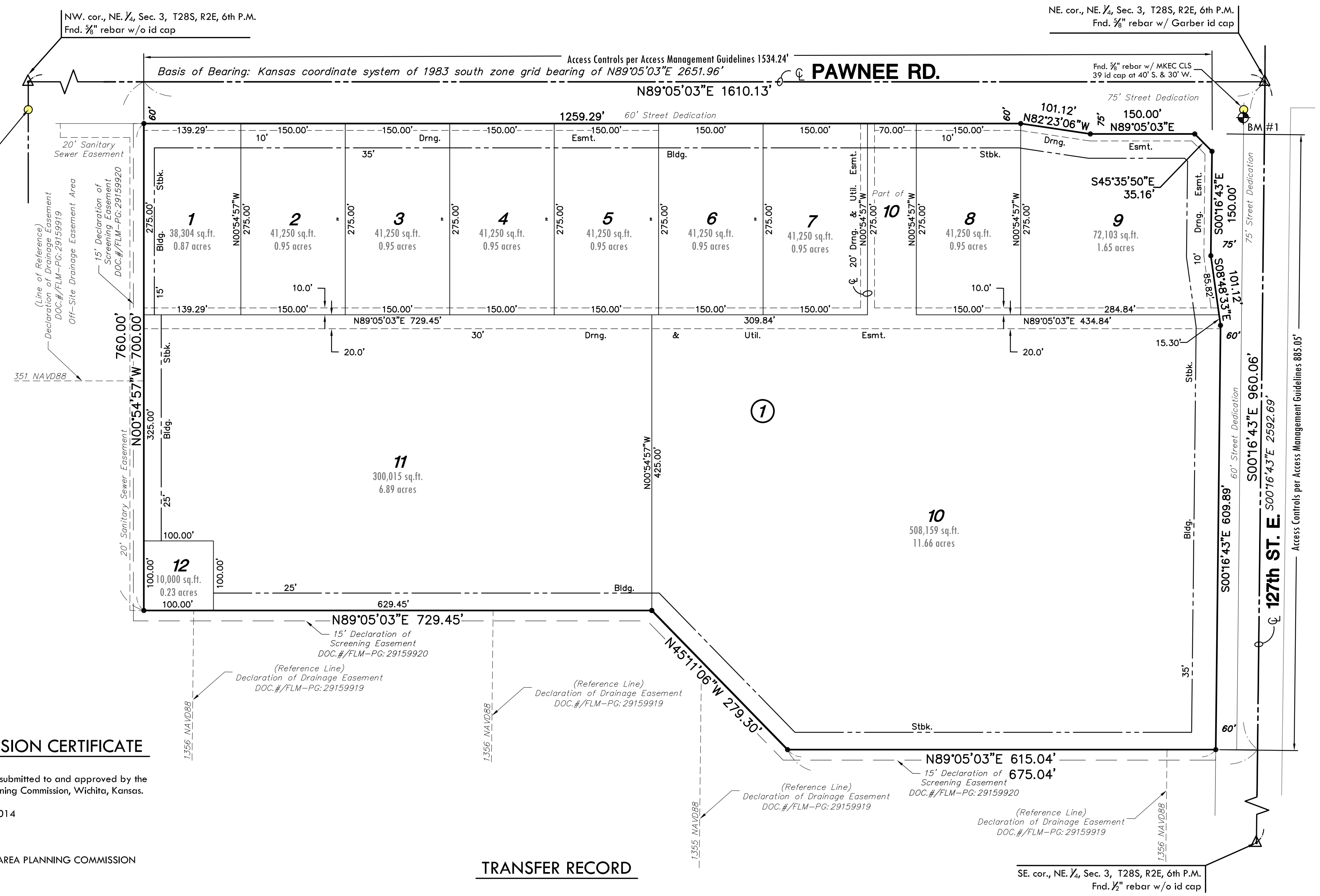
_______________________, Notary Public
Notary Public:

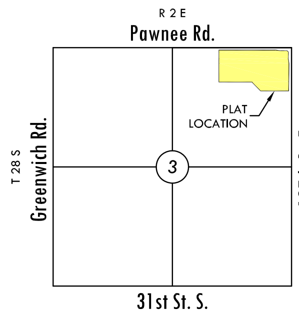
My Term Expires: ____________.

COUNTY SURVEYOR'S CERTIFICATE

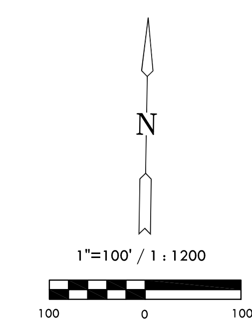
Reviewed in accordance with K.S.A. 58-2005 on this ____ day of ___________, 2014.

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





VICINITY MAP



Basis of Bearings: Kansas coordinate system 1983 south zone bearing of N89°05'03"E along the north line of Government Lots 1 and 2 in the NE. ¼, Sec. 3, T28S, R2E, 6th P.M.
This plat is surveyed and platted on NAD83 using Kansas State Plane south zone coordinates, modified to the surface, having a combined adjustment scale factor of 1.000120014401

LEGEND

- △ = Section Corner Monument Found
- ○ = Found ⅝" Rebar w/ MKEC CLS 39 id. cap
- ● = Set ⅝" Rebar w/ MKEC CLS 39 id. cap
- (M) = Measured
- (P) = Platted
- (D) = Deeded or Described
- (CM) = Calculated from measured
- C.A.C. = Complete Access Control

NOTE

Zoning:
This plat shall adhere and conform to the recitals of CUP DP-322 as approved and recorded at the Wichita-Sedgwick County Metropolitan Planning Area Department.

PLANNING COMMISSION CERTIFICATE

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

Dated this _____ day of ____________, 2014

WICHITA-SEDGWICK COUNTY METROPOLITAN AREA PLANNING COMMISSION

_______________________, Chair
Don Klausmeyer, Chair

Attest:

_______________________, Secretary
John L. Schlegel, Secretary

GOVERNING BODY CERTIFICATE

This plat approved and all dedications shown hereon, accepted by the governing body of the City of Wichita, Kansas, dated this _____ day of ____________, 2014

At the direction of the City Council

_______________________, Mayor
Carl Brewer, Mayor

Attest:

_______________________, City Clerk
Karen Sublett, City Clerk

TRANSFER RECORD

STATE OF KANSAS, SEDGWICK COUNTY} ss:

Entered on transfer record this _____ day of ____________, 2014

_______________________, County Clerk
Kelly B. Arnold, County Clerk

REGISTER OF DEEDS CERTIFICATE

This is to certify that this instrument was filed for record in the Register of Deeds office this _____ day of ____________, 2014, at __________ o'clock _M; and is duly recorded.

_______________________, Register of Deeds
Bill Meek, Register of Deeds

Attest:

_______________________, Deputy
Tonya E. Buckingham, Deputy

BENCHMARK

BM #1 Top of concrete witness monument 30.5 feet W. centerline 127th St. E and 51.5 feet S. Pawnee Rd.
Elev. = 1349.31 (NAVD 88)
1348.81 (NGVD 29)

ACCESS CONTROL NOTE

Pawnee Road and 127th Street: Access points for the lots shall be placed accordingly: The minimum distance between full turning movement drives shall be 400 feet. The minimum distance between a right in/right-out drive and either another right-in/right-out or a full movement drive shall be 200 feet.

MINIMUM PAD ELEVATIONS
LOWEST OPENINGS

LOTS	BLOCK	ELEVATION
1	1	1354.5 (NAVD 88) 1354.0 (NAVD 29)
10	1	1357.1 (NAVD 88) 1356.6 (NAVD 29)
11 & 12	1	1356.5 (NAVD 88) 1355.0 (NAVD 29)

MKEC
Wichita, KS • 316.684.9600

Appendix 1.3 – Drainage Patterns

LEGEND

- 6IN - CONIFEROUS TREE
- 3IN - DECIDUOUS TREE
- SN - SIGN
- PP-H - 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

BENCH MARK

BM #1 — Top of concrete witness monument 30.5 feet W. centerline 127th St. E and 51.5 feet S. Pawnee Rd.
Elev. = 1349.31 (NAVD 88)
1348.81 (NGVD 29)
(FROM GPS)

N

SCALE: 1" = 200'

200 0 200 400

J:\PROJECTS\2014\1401010070_12TPAW_SIERRA POINTE\5-CIVIL\CAD\DRAINAGE\DRAWING\1401010070_DRNG PATTERNS.DWG

MKEC
Wichita, KS · 316-684-9600

SIERRA POINTE ADDITION

DRAINAGE PATTERNS

WICHITA, KANSAS

DRAINAGE PATTERNS

PROJECT NO.	1401010070
DATE	FEBRUARY 2014
SCALE	AS NOTED

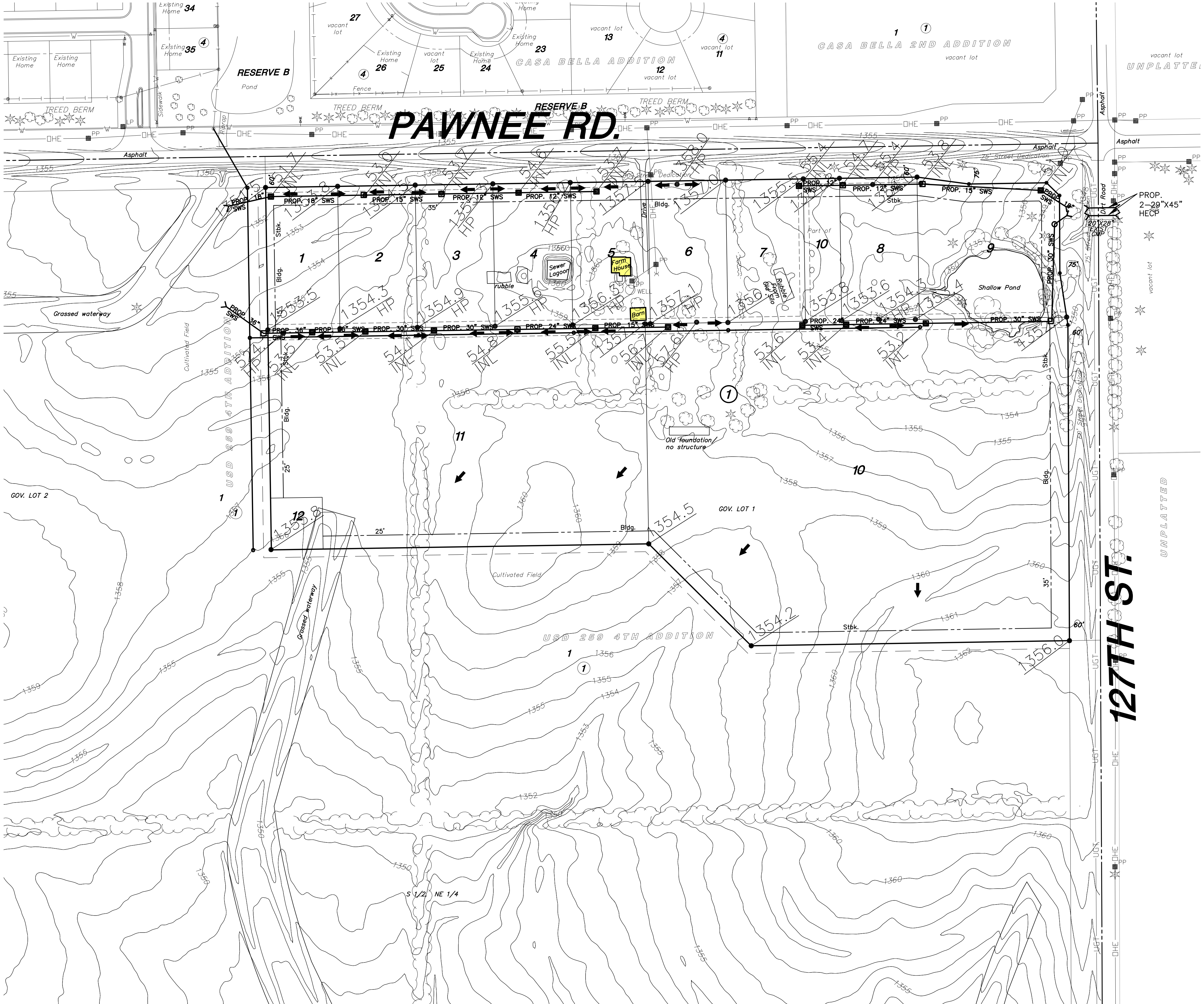
DESIGNED	DRAWN	CHECKED
KLA	JGD	GJA

NO.	REVISION	DATE

SHEET NO.

1 OF 1

Appendix 1.4 – Preliminary Grading Plan



LEGEND

- CONIFEROUS TREE (6IN)
- DECIDUOUS TREE (3IN)
- SIGN (SN)
- POWER POLE (PP)
- ELECTRIC BOX (ELEC BOX)
- LIGHT POLE (LP)
- FIRE HYDRANT (FH)
- WATER VALVE (WV)
- WATER METER (WM)
- SECTION CORNER
- BENCHMARK (BM)
- 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

N

SCALE: 1" = 100'

100 0 100 200

MKEC

Wichita, KS • 316-684-9600

LOT GRADING PLAN

SIERRA POINTE ADDITION

WICHITA, KANSAS

J:\PROJECTS\2014\1401010070_127PAW_SIERRA POINTE\5-CIVIL\CAD\DRAINAGE\DRAWING\14070_LGP.DWG

LOT GRADING PLAN

PROJECT NO.	1401010070
DATE	FEBRUARY 2014
SCALE	AS NOTED

DESIGNED	DRAWN	CHECKED
KLA	JGD	GJA

NO.	REVISION	DATE

SHEET NO.

1 OF 1

Tab 2. Existing Conditions

Description

The site is 31.6 acres of undeveloped ground. There is currently an existing farm house and barn on the site, there is no significant impervious area. 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, areas outside of the 500-year flood, as shown on the Sedgwick County Kansas February 2, 2007 Map Number 20173C0390E, Appendix 2.3. The Arkansas River is west of the site. The nearest FEMA floodplains are approximately ½ mile southeast of the site.

Soils

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

- Irwin silty clay loam, 1 to 3 percent slopes, HSG "D"
- Clime silty clay, 3 to 7 percent slopes, HSG "C"

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

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 Appendix 2.5.

Curve Numbers

The curve number used for pre-developed conditions is 84.

Drainage Patterns

Under existing conditions, the site drains in three directions. A portion of the site, Occidental 1, drains to the northwest into an existing grassed waterway to combine with flows from the school site as North Total. A small portion of the site, Occidental 2 and 3, along the southern boundary drains to the south into existing channels on the USD 259 4th Addition to flow to the south as

South Total. The northeast portion of the site and a small portion of the USD 259 property drain to the northeast into an existing pond with a surface area of 0.5 acres. The existing pond has no defined outlet structure and overtops the pond edge to flow to the east. The overtopping is about 25' wide when it begins to occur and widens as the water surface elevation increases. With the small surface area of this pond and the large outlet, the volume of detention in this pond is 1.2 acre feet in the 100-year design event. Pre-project flow rates to 127th Street account for the detention in this pond. The flow from this area flows to an existing 20"x28" CMP under 127th Street, this pipe is the equivalent of a 24" round pipe. The existing pipe overtops 127th Street with a flow rate of approximately 20 cfs. This culvert is currently not containing the 2-year design storm. The roadway is overtopped during a 2-year design event. The culvert was analyzed using Hydraflow Express by AutoCAD 2009, Appendix 2.6. Flow from the culvert flows to the northeast where it flows through an existing 24" CMP. It flows through the CMP, through a field, and into an existing pond. Any flow that the 24" CMP does not convey flows to the east and to an existing RCB under Pawnee Road and into a detention pond. The flow paths are shown on the Drainage Patterns Drawing, Appendix 1.3.

Table 2.3. Pre-Development Flow Rates

Description	**Area (ac.)**	**Tc (min.)**	**CN**	Design Storm Flows (cfs)				
				2-Yr	**5-Yr**	**10-Yr**	**25-Yr**	**100-Yr**
North Total*	39.1	-	-	64.6	93.1	110.4	139.4	188.7
South Total*	275.2	-	-	290.3	419.6	499.4	633.3	861.7
To 127th/Occ. 4	19.6	25.2	84.0	29.6	44.6	54.9	70.9	98.5

* From USD 259 4th Addition May 7, 2010 Drainage Report by Ruggles and Bohm.

Utilities

Existing sanitary sewer has been constructed north of Pawnee Road with the Casa Bella Addition.

Groundwater Elevations

According to the Kansas Geological Survey Water Well Records, the static water level in the area ranges from 19 feet to 30 feet deep.

Appendix 2.1 – Aerial Photograph

SEC: 3
TWP: T28S
RNG: R2E

0 125 250 500
Feet

MKEC
Wichita, KS · 316.684.9600

AERIAL EXHIBIT

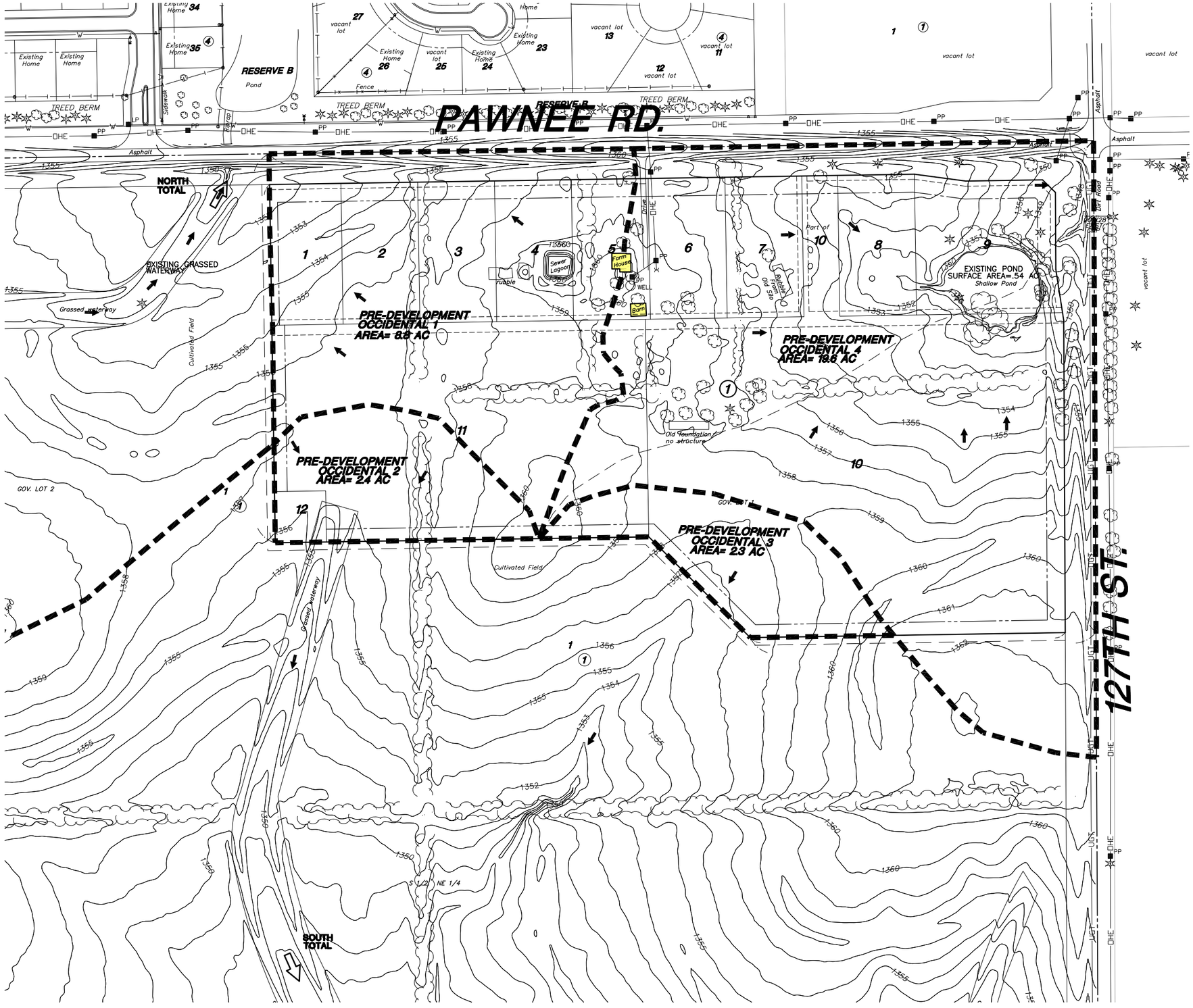
SIERRA POINTE ADDITION

PROJECT NO.	DATE:	SHEET NO.
1401010070	2/10/2014	1 OF 1

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

Path: J:\Projects\2014\1401010070_127Paw_Sierra Pointe\5-Civil\GIS\Aerial Exhibit.mxd - Date: 2/10/2014

Appendix 2.2 – Existing Conditions Map



LEGEND

- 6IN - CONIFEROUS TREE
- 3IN - 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

BENCH MARK

BM #1 — Top of concrete witness monument 30.5 feet W. centerline 127th St. E and 51.5 feet S. Pawnee Rd.
Elev. = 1349.31 (NAVD 88)
1348.81 (NGVD 29)
(FROM GPS)

N

SCALE: 1" = 100'
100 0 100 200

MKEC
Wichita, KS · 316-684-9800

EXISTING CONDITIONS PLAN

SIERRA POINTE ADDITION

WICHITA, KANSAS

EXISTING CONDITIONS PLAN

PROJECT NO.	1401010070
DATE	FEBRUARY 2014
SCALE	AS NOTED

DESIGNED	DRAWN	CHECKED
KLA	JGD	GJA

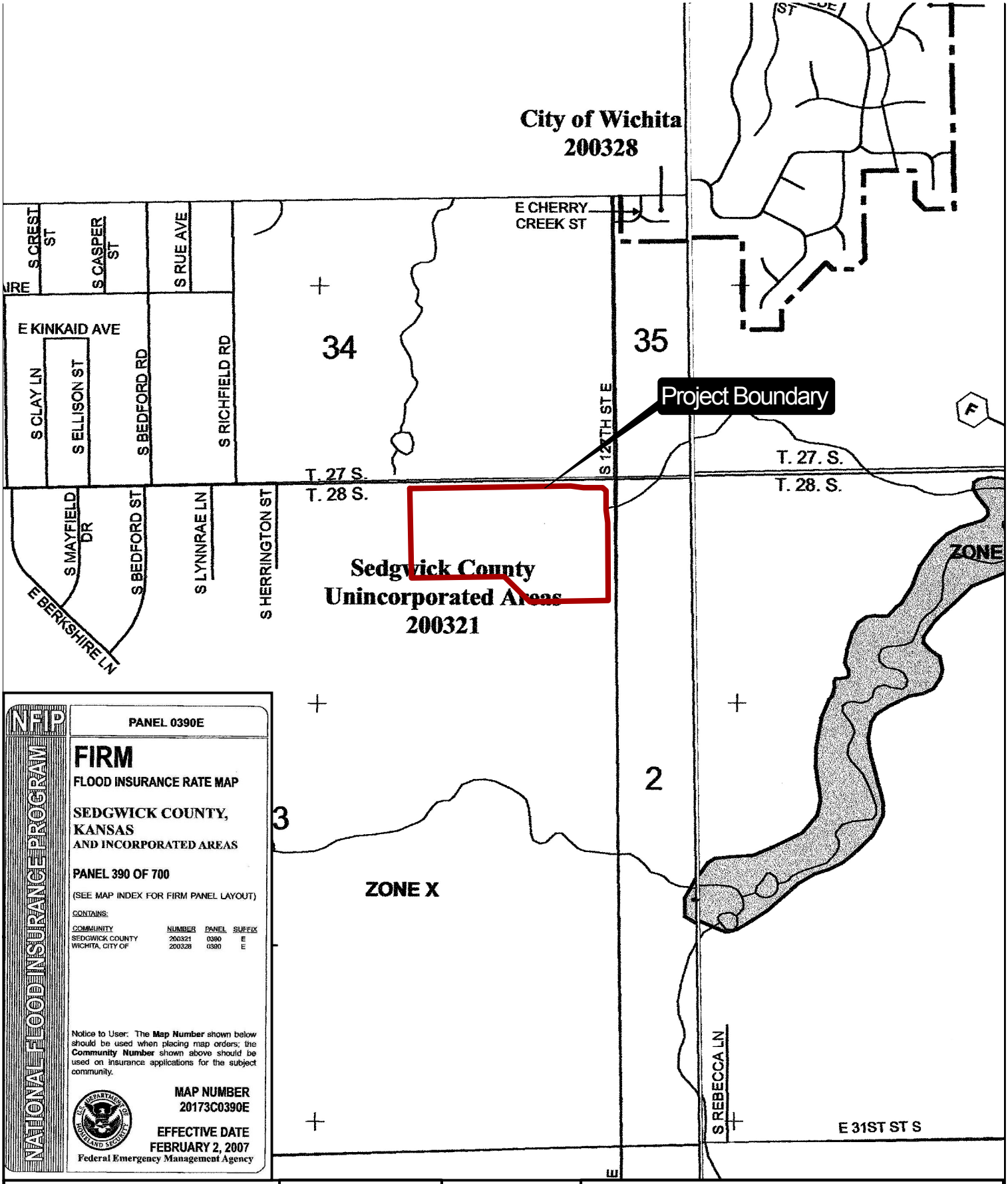
NO.	REVISION	DATE

SHEET NO.

1 OF 1

J:\PROJECTS\2014\1401010070_127PAW_SIERRA POINTE\5-CIVIL\CAD\DRAINAGE\DRAWING\1401070_EXISTING CONDITIONS.DWG

Appendix 2.3 – Flood Insurance Rate Map (FIRM)



SEC: 3
TWP: T28S
RNG: R2E

0 250 500 1,000
Feet

MKEC
Wichita, KS - 316.684.9600

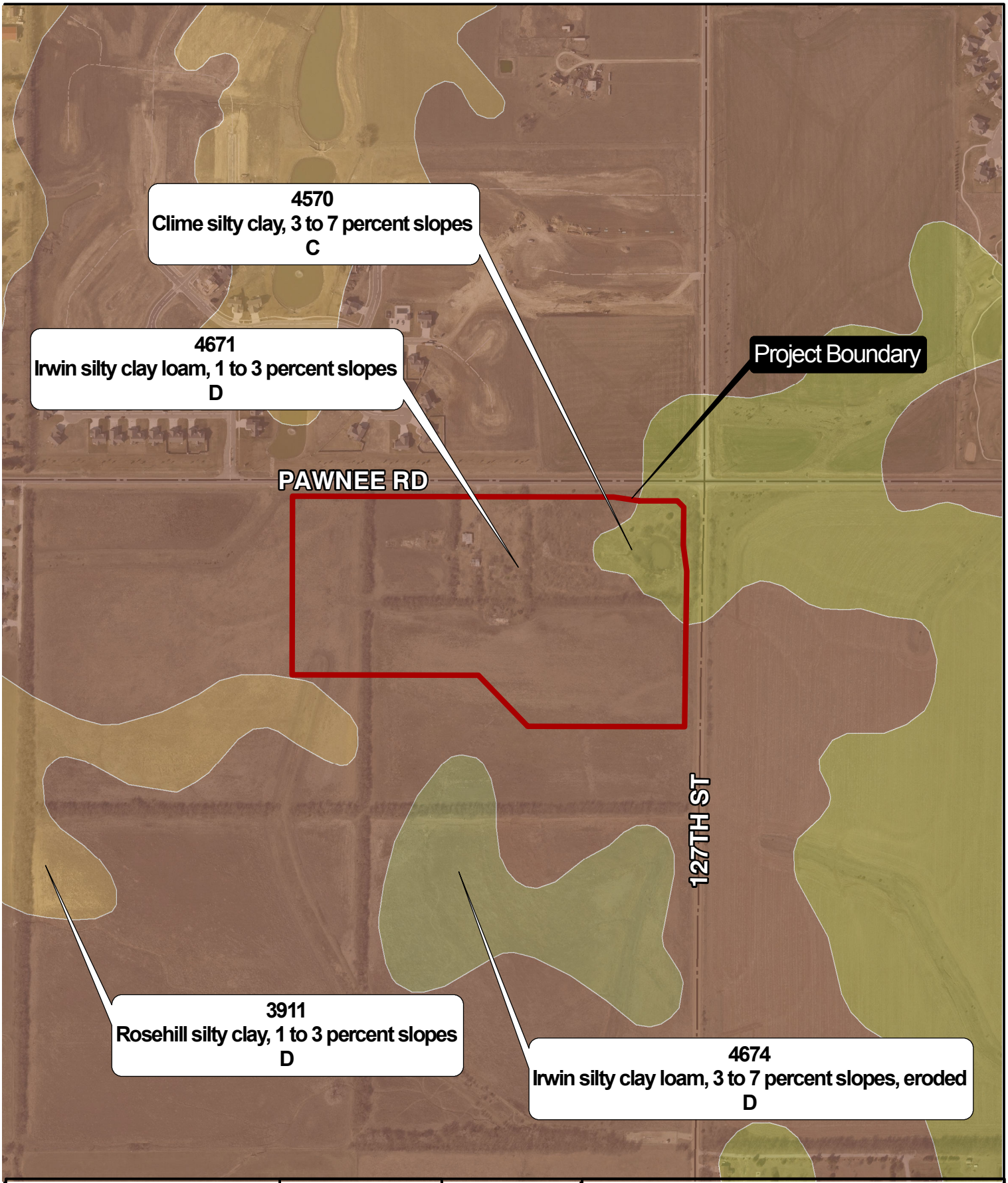
FEMA FIRM EXHIBIT
SIERRA POINTE ADDITION

PROJECT NO.	DATE:	SHEET NO.
1401010070	2/10/2014	1 OF 1

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

Path: J:\Projects\2014\1401010070_127Paw_Sierra Pointe\5-Civil\GIS\FEMA Floodplain.mxd - Date: 2/10/2014

Appendix 2.4 – Soil Survey



SEC: 3
TWP: T28S
RNG: R2E

0 125 250 500
Feet

MKEC
Wichita, KS · 316.684.9600

NRCS Soil Survey Exhibit
SIERRA POINTE ADDITION

PROJECT NO.	DATE:	SHEET NO.
1401010070	2/10/2014	1 OF 1

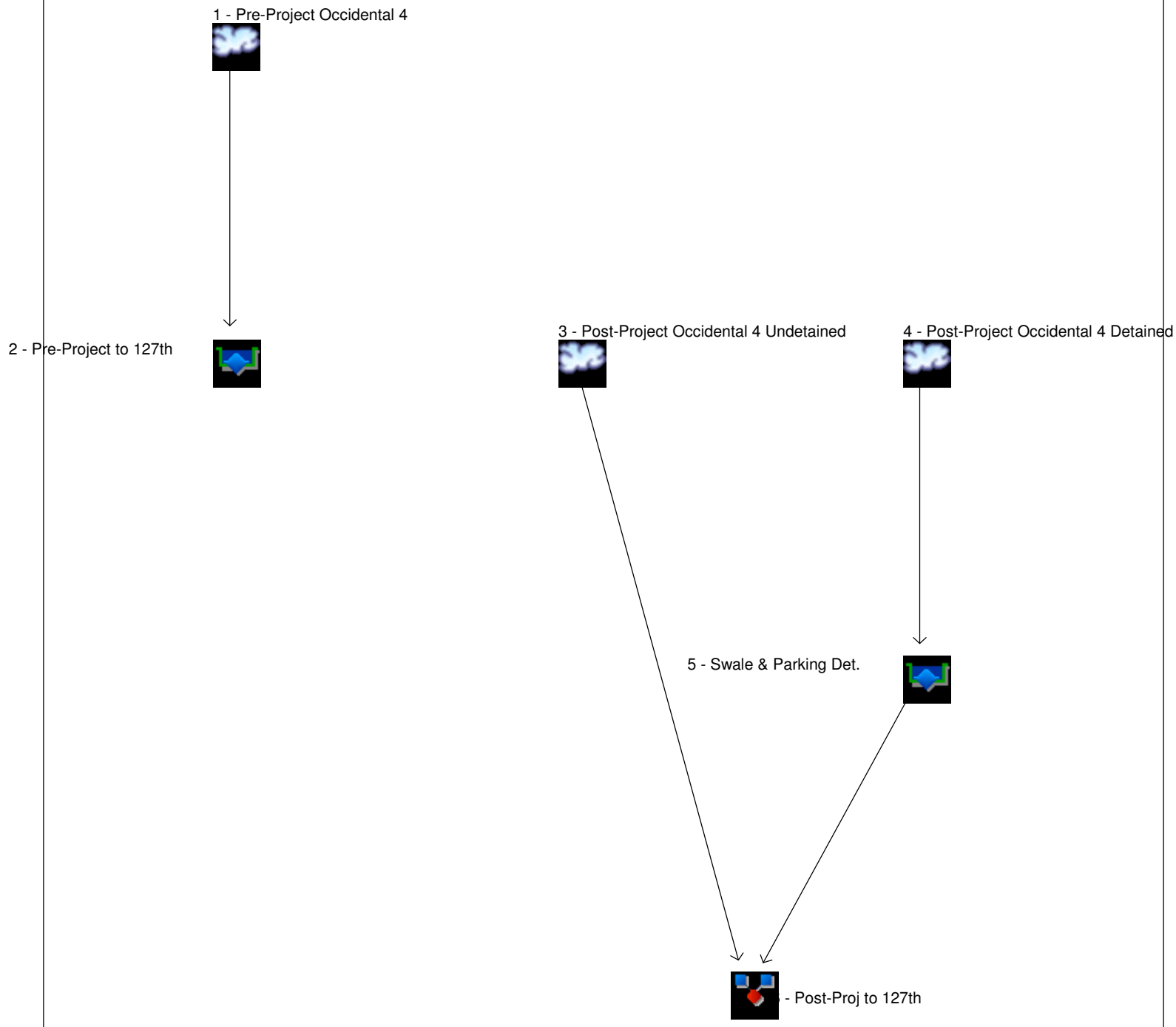
DRAWN BY:	DESIGNED BY:	APPROVED BY:
JGD	JGD	KLA

Path: J:\Projects\2014\1401010070_127Paw_Sierra Pointe\5-Civil\GIS\NRCS Soil Survey Exhibit.mxd - Date: 2/10/2014

Appendix 2.5 – Hydraflow Hydrographs Output

Watershed Model Schematic

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



Legend

Hyd.	Origin	Description
1	SCS Runoff	Pre-Project Occidental 4
2	Reservoir	Pre-Project to 127th
3	SCS Runoff	Post-Project Occidental 4 Undetained
4	SCS Runoff	Post-Project Occidental 4 Detained
5	Reservoir	Swale & Parking Det.
6	Combine	Post-Proj to 127th

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	------	-------	36.61	-------	54.55	66.49	84.50	-------	110.27	Pre-Project Occidental 4
2	Reservoir	1	-------	29.60	-------	44.55	54.87	70.85	-------	98.45	Pre-Project to 127th
3	SCS Runoff	------	-------	28.36	-------	37.92	44.13	53.40	-------	66.59	Post-Project Occidental 4 Undetained
4	SCS Runoff	------	-------	11.03	-------	14.75	17.16	20.77	-------	25.89	Post-Project Occidental 4 Detained
5	Reservoir	4	-------	4.507	-------	9.989	13.20	17.64	-------	23.11	Swale & Parking Det.
6	Combine	3, 5	-------	29.25	-------	43.64	54.07	68.32	-------	87.34	Post-Proj to 127th

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	36.61	2	728	3.086	------	------	------	Pre-Project Occidental 4
2	Reservoir	29.60	2	736	3.086	1	1351.09	0.475	Pre-Project to 127th
3	SCS Runoff	28.36	2	720	1.806	------	------	------	Post-Project Occidental 4 Undetained
4	SCS Runoff	11.03	2	720	0.702	------	------	------	Post-Project Occidental 4 Detained
5	Reservoir	4.507	2	730	0.699	4	1351.27	0.319	Swale & Parking Det.
6	Combine	29.25	2	720	2.505	3, 5	------	------	Post-Proj to 127th

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	54.55	2	728	4.601	------	------	------	Pre-Project Occidental 4
2	Reservoir	44.55	2	736	4.601	1	1351.28	0.680	Pre-Project to 127th
3	SCS Runoff	37.92	2	720	2.459	------	------	------	Post-Project Occidental 4 Undetained
4	SCS Runoff	14.75	2	720	0.956	------	------	------	Post-Project Occidental 4 Detained
5	Reservoir	9.989	2	726	0.953	4	1351.42	0.360	Swale & Parking Det.
6	Combine	43.64	2	722	3.412	3, 5	------	------	Post-Proj to 127th

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	66.49	2	728	5.627	------	------	------	Pre-Project Occidental 4
2	Reservoir	54.87	2	736	5.627	1	1351.40	0.809	Pre-Project to 127th
3	SCS Runoff	44.13	2	720	2.888	------	------	------	Post-Project Occidental 4 Undetained
4	SCS Runoff	17.16	2	720	1.123	------	------	------	Post-Project Occidental 4 Detained
5	Reservoir	13.20	2	726	1.119	4	1351.49	0.380	Swale & Parking Det.
6	Combine	54.07	2	722	4.007	3, 5	------	------	Post-Proj to 127th

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	84.50	2	728	7.200	------	------	------	Pre-Project Occidental 4
2	Reservoir	70.85	2	734	7.200	1	1351.56	0.992	Pre-Project to 127th
3	SCS Runoff	53.40	2	720	3.533	------	------	------	Post-Project Occidental 4 Undetained
4	SCS Runoff	20.77	2	720	1.374	------	------	------	Post-Project Occidental 4 Detained
5	Reservoir	17.64	2	724	1.370	4	1351.58	0.406	Swale & Parking Det.
6	Combine	68.32	2	722	4.903	3, 5	------	------	Post-Proj to 127th

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	110.27	2	728	9.492	------	------	------	Pre-Project Occidental 4
2	Reservoir	98.45	2	734	9.492	1	1351.75	1.20	Pre-Project to 127th
3	SCS Runoff	66.59	2	720	4.456	------	------	------	Post-Project Occidental 4 Undetained
4	SCS Runoff	25.89	2	720	1.733	------	------	------	Post-Project Occidental 4 Detained
5	Reservoir	23.11	2	724	1.729	4	1351.68	0.435	Swale & Parking Det.
6	Combine	87.34	2	720	6.186	3, 5	------	------	Post-Proj to 127th

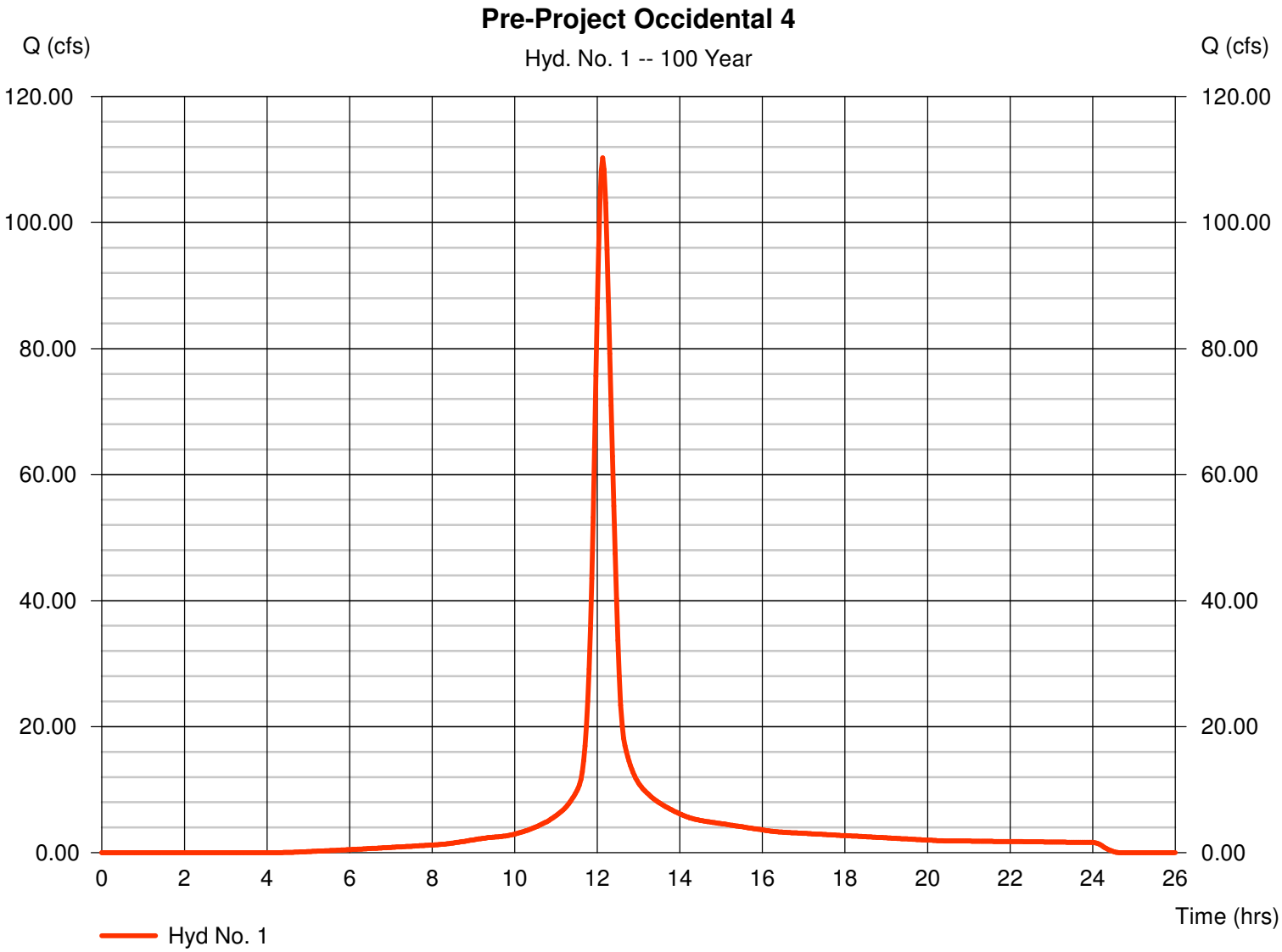
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 24, 2010

Hyd. No. 1

Pre-Project Occidental 4

Hydrograph type	=	SCS Runoff	Peak discharge	=	110.27 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.13 hrs
Time interval	=	2 min	Hyd. volume	=	9.492 acft
Drainage area	=	19.600 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	25.20 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 1

Pre-Project Occidental 4

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.240		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.48		3.48		0.00		
Land slope (%)	=	1.00		0.00		0.00		
Travel Time (min)	**=**	**18.06**	**+**	**0.00**	**+**	**0.00**	**=**	**18.06**
Shallow Concentrated Flow								
Flow length (ft)	=	850.00		0.00		0.00		
Watercourse slope (%)	=	1.50		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	1.98		0.00		0.00		
Travel Time (min)	**=**	**7.17**	**+**	**0.00**	**+**	**0.00**	**=**	**7.17**
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 ..... 25.20 min

Hydrograph Report

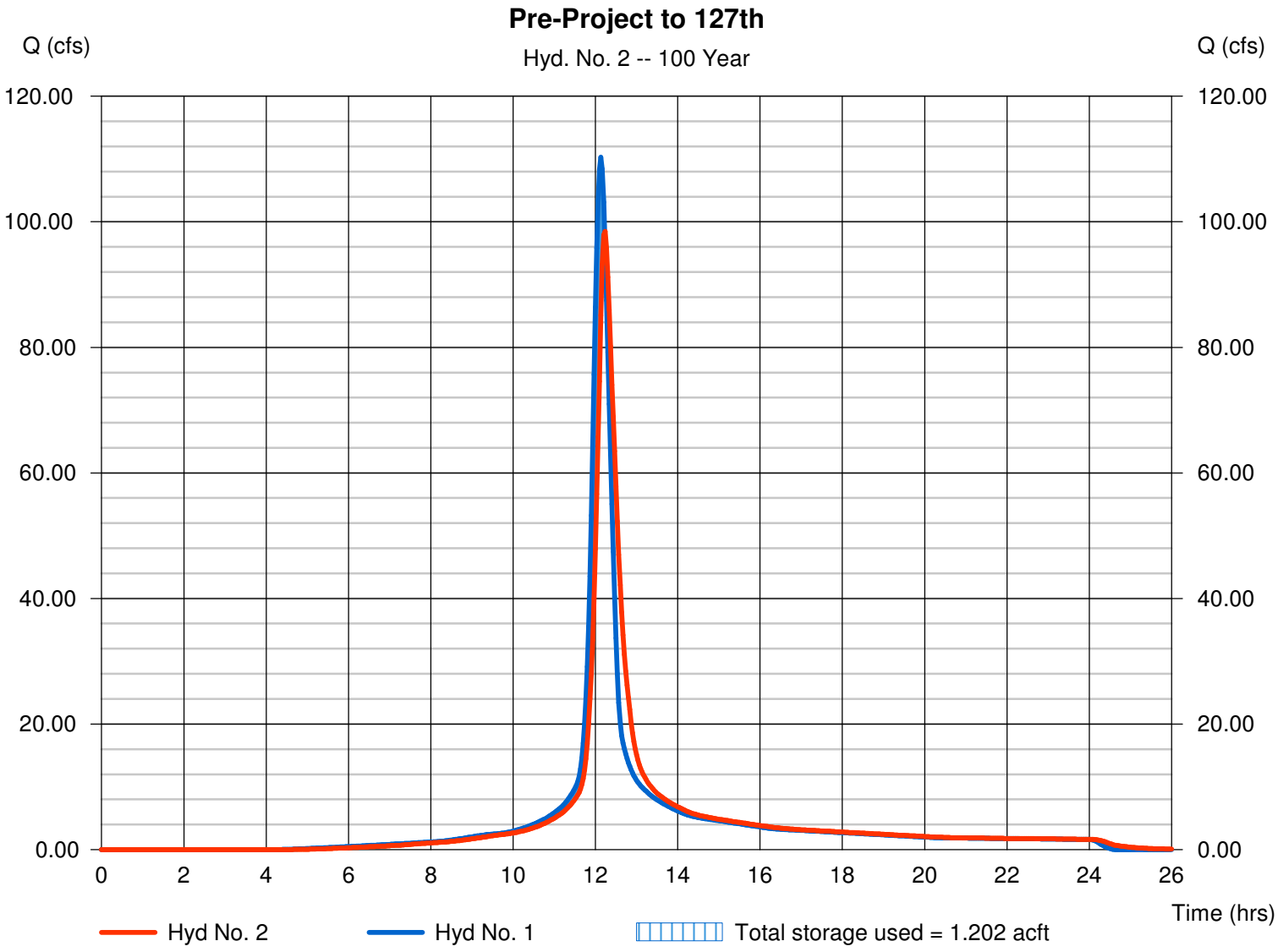
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Jun 24, 2010

Hyd. No. 2

Pre-Project to 127th

Hydrograph type	=	Reservoir	Peak discharge	=	98.45 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.23 hrs
Time interval	=	2 min	Hyd. volume	=	9.492 acft
Inflow hyd. No.	=	1 - Pre-Project Occidental 4	Max. Elevation	=	1351.75 ft
Reservoir name	=	Existing Pond	Max. Storage	=	1.202 acft

Storage Indication method used.



Pond Report

Pond No. 1 - Existing Pond

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1350.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	1350.50	23,699	0.000	0.000
0.50	1351.00	42,307	0.374	0.374
1.50	1352.00	54,355	1.107	1.480

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)	= 25.00	50.00	Inactive	0.00
Crest El. (ft)	= 1350.50	1351.60	1350.50	0.00
Weir Coeff.	= 2.60	2.60	4.40	3.33
Weir Type	= Broad	Broad	120degV	---
Multi-Stage	= No	No	No	No

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

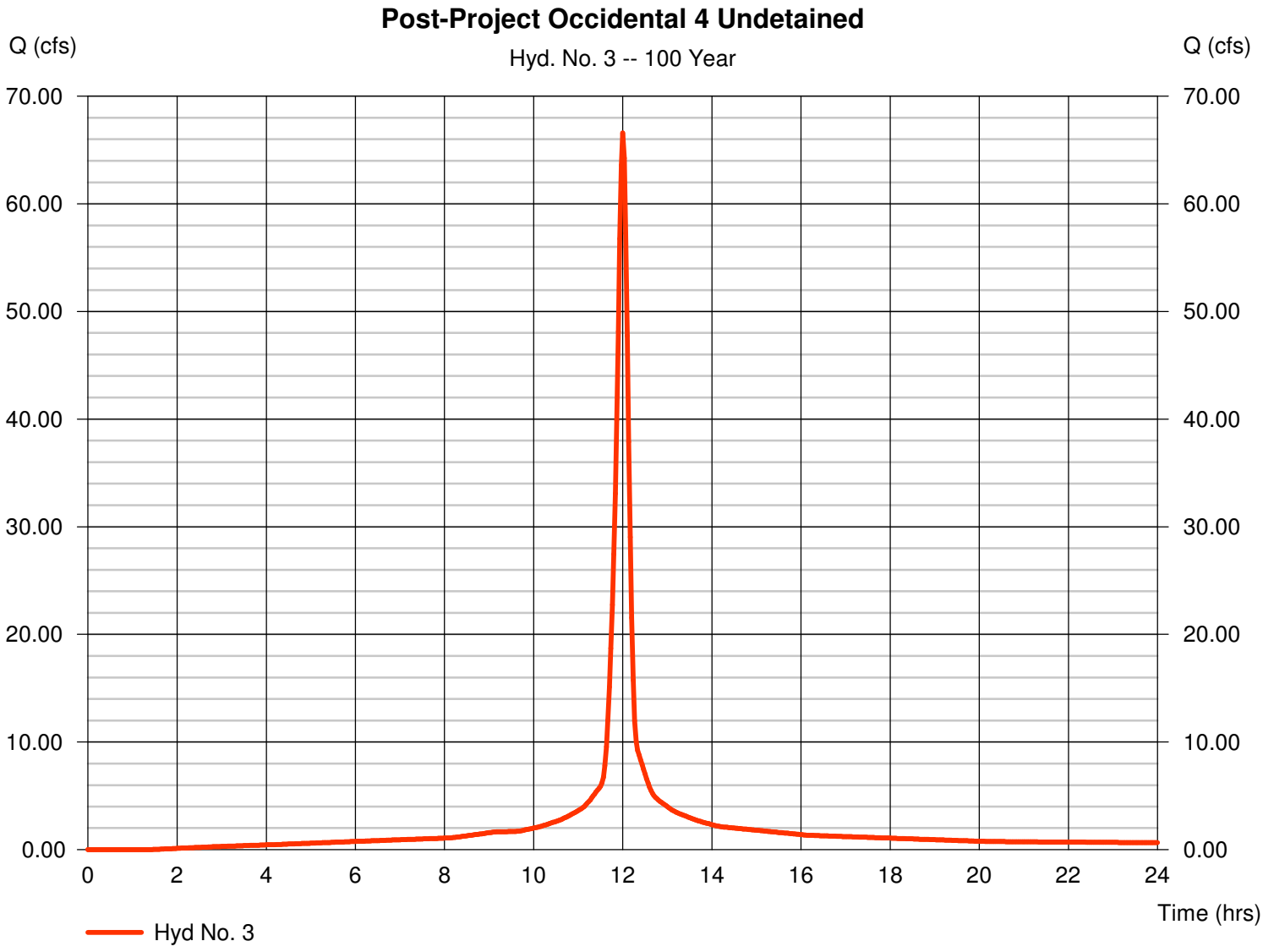
Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0.000	1350.50	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.05	0.037	1350.55	---	---	---	---	0.73	0.00	---	---	---	---	0.728
0.10	0.075	1350.60	---	---	---	---	2.06	0.00	---	---	---	---	2.058
0.15	0.112	1350.65	---	---	---	---	3.78	0.00	---	---	---	---	3.782
0.20	0.149	1350.70	---	---	---	---	5.82	0.00	---	---	---	---	5.822
0.25	0.187	1350.75	---	---	---	---	8.14	0.00	---	---	---	---	8.137
0.30	0.224	1350.80	---	---	---	---	10.70	0.00	---	---	---	---	10.70
0.35	0.262	1350.85	---	---	---	---	13.48	0.00	---	---	---	---	13.48
0.40	0.299	1350.90	---	---	---	---	16.47	0.00	---	---	---	---	16.47
0.45	0.336	1350.95	---	---	---	---	19.65	0.00	---	---	---	---	19.65
0.50	0.374	1351.00	---	---	---	---	22.98	0.00	---	---	---	---	22.98
0.60	0.484	1351.10	---	---	---	---	30.21	0.00	---	---	---	---	30.21
0.70	0.595	1351.20	---	---	---	---	38.06	0.00	---	---	---	---	38.06
0.80	0.706	1351.30	---	---	---	---	46.50	0.00	---	---	---	---	46.50
0.90	0.816	1351.40	---	---	---	---	55.49	0.00	---	---	---	---	55.49
1.00	0.927	1351.50	---	---	---	---	64.99	0.00	---	---	---	---	64.99
1.10	1.038	1351.60	---	---	---	---	74.97	0.00	---	---	---	---	74.97
1.20	1.148	1351.70	---	---	---	---	85.43	4.10	---	---	---	---	89.53
1.30	1.259	1351.80	---	---	---	---	96.32	11.61	---	---	---	---	107.94
1.40	1.370	1351.90	---	---	---	---	107.65	21.34	---	---	---	---	128.99
1.50	1.480	1352.00	---	---	---	---	119.41	32.89	---	---	---	---	152.30

Hydrograph Report

Hyd. No. 3

Post-Project Occidental 4 Undetained

Hydrograph type	=	SCS Runoff	Peak discharge	=	66.59 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	4.456 acft
Drainage area	=	7.200 ac	Curve number	=	95
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.40 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 3

Post-Project Occidental 4 Undetained

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.013	0.011	0.011	
Flow length (ft)	= 150.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.48	0.00	0.00	
Land slope (%)	= 1.00	0.00	0.00	
Travel Time (min)	**= 2.42**	**+ 0.00**	**+ 0.00**	**= 2.42**
Shallow Concentrated Flow				
Flow length (ft)	= 750.00	0.00	0.00	
Watercourse slope (%)	= 0.60	0.00	0.00	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	= 1.57	0.00	0.00	
Travel Time (min)	**= 7.94**	**+ 0.00**	**+ 0.00**	**= 7.94**
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**

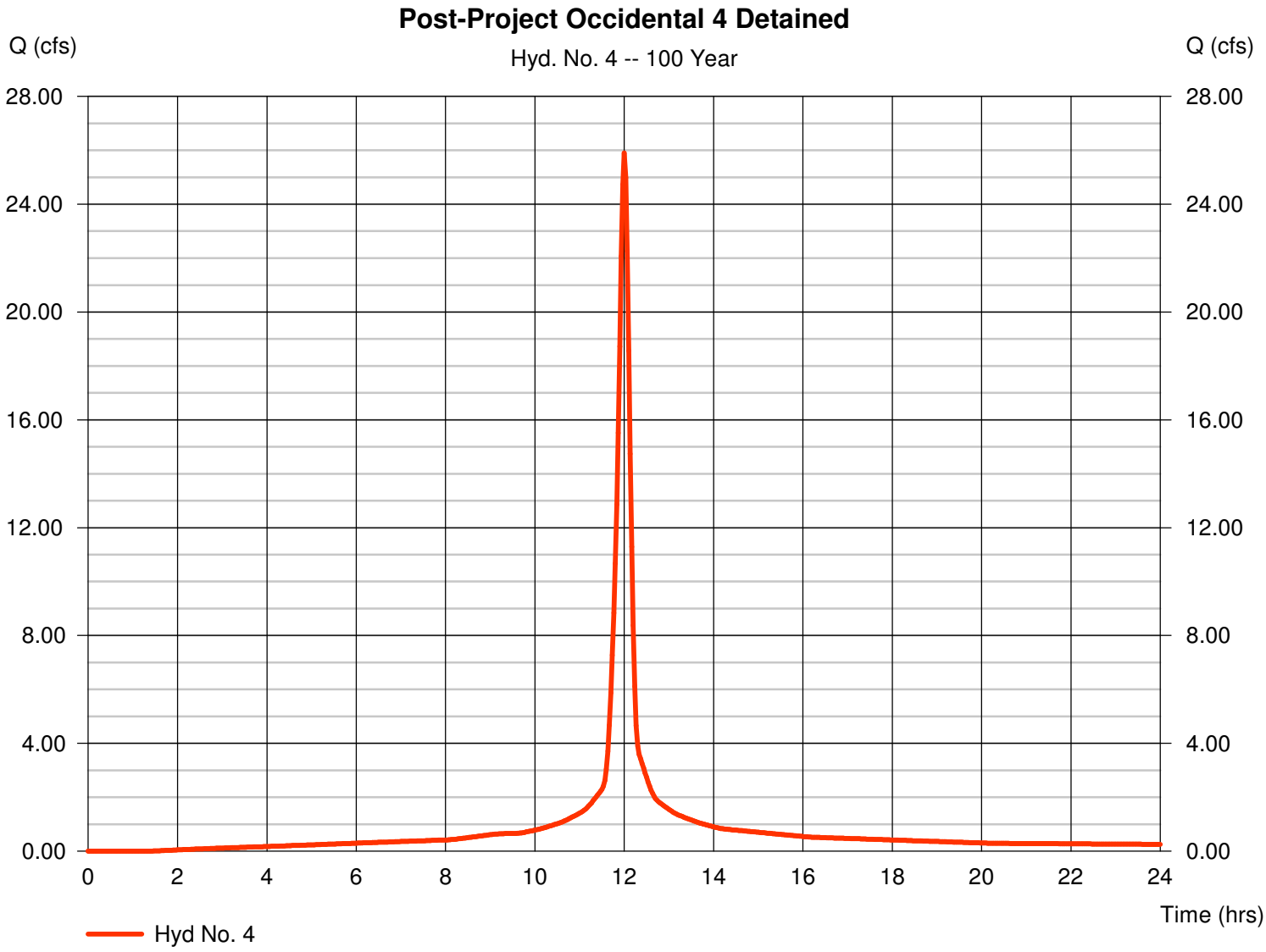
Total Travel Time, Tc ..... 10.40 min

Hydrograph Report

Hyd. No. 4

Post-Project Occidental 4 Detained

Hydrograph type	=	SCS Runoff	Peak discharge	=	25.89 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	1.733 acft
Drainage area	=	2.800 ac	Curve number	=	95
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.40 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 4

Post-Project Occidental 4 Detained

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.013	0.011	0.011	
Flow length (ft)	= 150.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.48	0.00	0.00	
Land slope (%)	= 1.00	0.00	0.00	
Travel Time (min)	**= 2.42**	**+ 0.00**	**+ 0.00**	**= 2.42**
Shallow Concentrated Flow				
Flow length (ft)	= 750.00	0.00	0.00	
Watercourse slope (%)	= 0.60	0.00	0.00	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	= 1.57	0.00	0.00	
Travel Time (min)	**= 7.94**	**+ 0.00**	**+ 0.00**	**= 7.94**
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 ..... 10.40 min

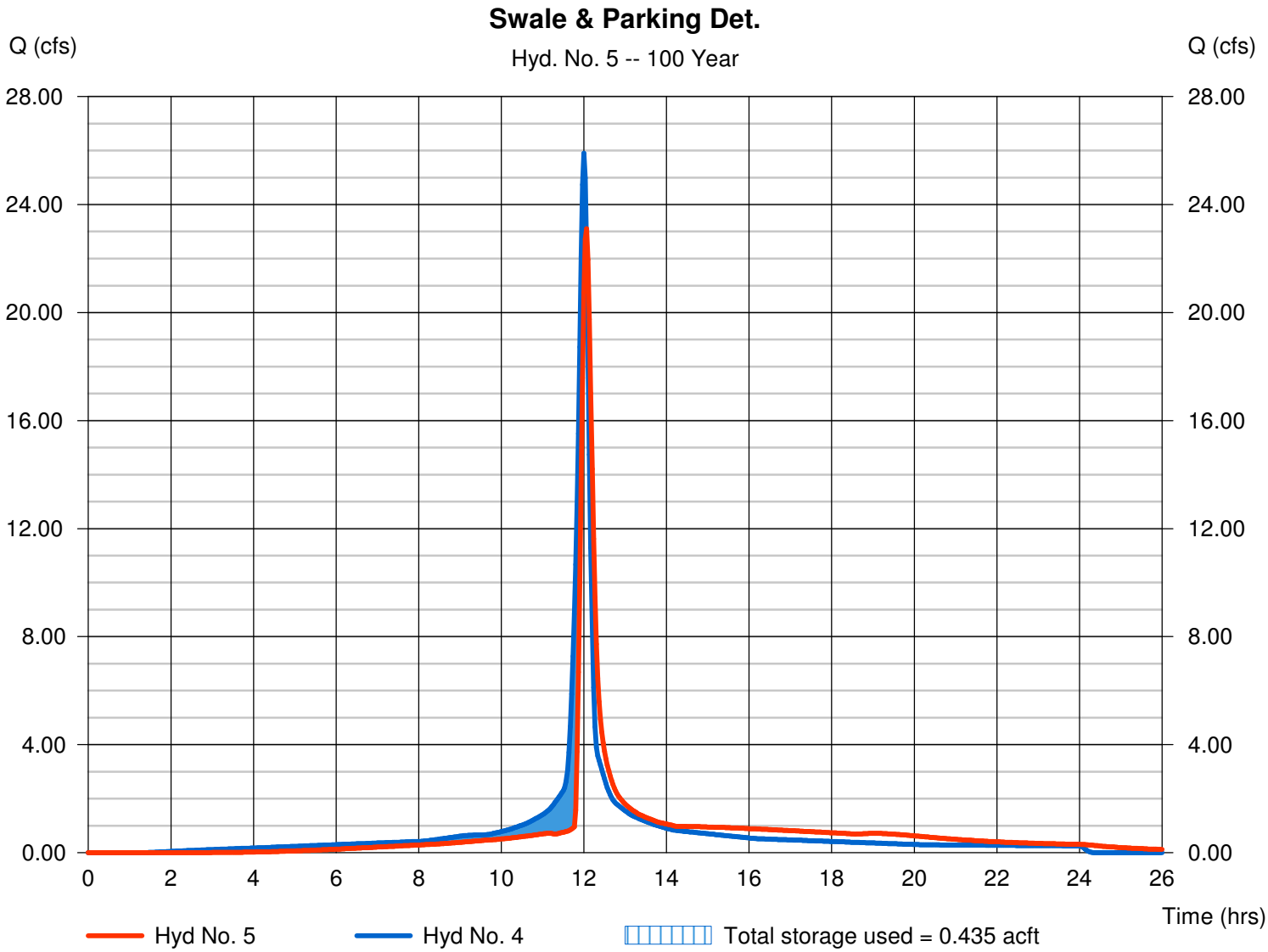
Hydrograph Report

Hyd. No. 5

Swale & Parking Det.

Hydrograph type	=	Reservoir	Peak discharge	=	23.11 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	1.729 acft
Inflow hyd. No.	=	4 - Post-Project Occidental 4 Detained	Max. Elevation	=	1351.68 ft
Reservoir name	=	Swale & Parking Detention	Max. Storage	=	0.435 acft

Storage Indication method used.



Pond No. 3 - Swale & Parking Detention

Pond Data

Trapezoid - Bottom L x W = 50.0 x 200.0 ft, Side slope = 3.00:1, Bottom elev. = 1350.00 ft, Depth = 2.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	1350.00	10,000	0.000	0.000
0.20	1350.20	10,301	0.047	0.047
0.40	1350.40	10,606	0.048	0.095
0.60	1350.60	10,913	0.049	0.144
0.80	1350.80	11,223	0.051	0.195
1.00	1351.00	11,536	0.052	0.247
1.20	1351.20	11,852	0.054	0.301
1.40	1351.40	12,171	0.055	0.356
1.60	1351.60	12,492	0.057	0.413
1.80	1351.80	12,817	0.058	0.471
2.00	1352.00	13,144	0.060	0.530

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 8.00	0.00	0.00	0.00
Span (in)	= 8.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1350.00	0.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 0.40	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.00	Inactive	0.00	0.00
Crest El. (ft)	= 1351.10	1350.80	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	Rect	---	---
Multi-Stage	= No	No	No	No

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0.000	1350.00	0.00	---	---	---	0.00	0.00	---	---	---	---	0.000
0.02	0.005	1350.02	0.00 oc	---	---	---	0.00	0.00	---	---	---	---	0.001
0.04	0.009	1350.04	0.01 oc	---	---	---	0.00	0.00	---	---	---	---	0.005
0.06	0.014	1350.06	0.01 oc	---	---	---	0.00	0.00	---	---	---	---	0.013
0.08	0.019	1350.08	0.02 ic	---	---	---	0.00	0.00	---	---	---	---	0.023
0.10	0.023	1350.10	0.04 ic	---	---	---	0.00	0.00	---	---	---	---	0.035
0.12	0.028	1350.12	0.05 ic	---	---	---	0.00	0.00	---	---	---	---	0.050
0.14	0.033	1350.14	0.07 ic	---	---	---	0.00	0.00	---	---	---	---	0.068
0.16	0.037	1350.16	0.09 ic	---	---	---	0.00	0.00	---	---	---	---	0.088
0.18	0.042	1350.18	0.11 ic	---	---	---	0.00	0.00	---	---	---	---	0.110
0.20	0.047	1350.20	0.13 ic	---	---	---	0.00	0.00	---	---	---	---	0.134
0.22	0.051	1350.22	0.16 ic	---	---	---	0.00	0.00	---	---	---	---	0.161
0.24	0.056	1350.24	0.19 ic	---	---	---	0.00	0.00	---	---	---	---	0.189
0.26	0.061	1350.26	0.22 ic	---	---	---	0.00	0.00	---	---	---	---	0.219
0.28	0.066	1350.28	0.25 ic	---	---	---	0.00	0.00	---	---	---	---	0.251
0.30	0.071	1350.30	0.28 ic	---	---	---	0.00	0.00	---	---	---	---	0.285
0.32	0.075	1350.32	0.32 oc	---	---	---	0.00	0.00	---	---	---	---	0.318
0.34	0.080	1350.34	0.35 oc	---	---	---	0.00	0.00	---	---	---	---	0.351
0.36	0.085	1350.36	0.38 oc	---	---	---	0.00	0.00	---	---	---	---	0.383
0.38	0.090	1350.38	0.42 oc	---	---	---	0.00	0.00	---	---	---	---	0.416
0.40	0.095	1350.40	0.45 oc	---	---	---	0.00	0.00	---	---	---	---	0.449
0.42	0.100	1350.42	0.48 oc	---	---	---	0.00	0.00	---	---	---	---	0.481
0.44	0.104	1350.44	0.51 oc	---	---	---	0.00	0.00	---	---	---	---	0.513
0.46	0.109	1350.46	0.54 oc	---	---	---	0.00	0.00	---	---	---	---	0.544
0.48	0.114	1350.48	0.57 oc	---	---	---	0.00	0.00	---	---	---	---	0.573
0.50	0.119	1350.50	0.60 oc	---	---	---	0.00	0.00	---	---	---	---	0.601
0.52	0.124	1350.52	0.63 oc	---	---	---	0.00	0.00	---	---	---	---	0.627
0.54	0.129	1350.54	0.65 oc	---	---	---	0.00	0.00	---	---	---	---	0.650
0.56	0.134	1350.56	0.67 oc	---	---	---	0.00	0.00	---	---	---	---	0.672
0.58	0.139	1350.58	0.69 oc	---	---	---	0.00	0.00	---	---	---	---	0.689
0.60	0.144	1350.60	0.70 oc	---	---	---	0.00	0.00	---	---	---	---	0.703
0.62	0.149	1350.62	0.71 oc	---	---	---	0.00	0.00	---	---	---	---	0.712
0.64	0.154	1350.64	0.71 oc	---	---	---	0.00	0.00	---	---	---	---	0.713

Continues on next page...

Swale & Parking 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
0.66	0.159	1350.66	0.70 oc	---	---	---	0.00	0.00	---	---	---	---	0.700
0.68	0.164	1350.68	0.69 oc	---	---	---	0.00	0.00	---	---	---	---	0.690
0.70	0.169	1350.70	0.71 oc	---	---	---	0.00	0.00	---	---	---	---	0.706
0.72	0.174	1350.72	0.72 oc	---	---	---	0.00	0.00	---	---	---	---	0.723
0.74	0.180	1350.74	0.74 oc	---	---	---	0.00	0.00	---	---	---	---	0.738
0.76	0.185	1350.76	0.75 oc	---	---	---	0.00	0.00	---	---	---	---	0.754
0.78	0.190	1350.78	0.77 oc	---	---	---	0.00	0.00	---	---	---	---	0.769
0.80	0.195	1350.80	0.78 oc	---	---	---	0.00	0.00	---	---	---	---	0.784
0.82	0.200	1350.82	0.80 oc	---	---	---	0.00	0.00	---	---	---	---	0.798
0.84	0.205	1350.84	0.81 oc	---	---	---	0.00	0.00	---	---	---	---	0.813
0.86	0.210	1350.86	0.83 oc	---	---	---	0.00	0.00	---	---	---	---	0.827
0.88	0.216	1350.88	0.84 oc	---	---	---	0.00	0.00	---	---	---	---	0.840
0.90	0.221	1350.90	0.85 oc	---	---	---	0.00	0.00	---	---	---	---	0.854
0.92	0.226	1350.92	0.87 oc	---	---	---	0.00	0.00	---	---	---	---	0.867
0.94	0.231	1350.94	0.88 oc	---	---	---	0.00	0.00	---	---	---	---	0.881
0.96	0.237	1350.96	0.89 oc	---	---	---	0.00	0.00	---	---	---	---	0.894
0.98	0.242	1350.98	0.91 oc	---	---	---	0.00	0.00	---	---	---	---	0.906
1.00	0.247	1351.00	0.92 oc	---	---	---	0.00	0.00	---	---	---	---	0.919
1.02	0.252	1351.02	0.93 oc	---	---	---	0.00	0.00	---	---	---	---	0.931
1.04	0.258	1351.04	0.94 oc	---	---	---	0.00	0.00	---	---	---	---	0.944
1.06	0.263	1351.06	0.96 oc	---	---	---	0.00	0.00	---	---	---	---	0.956
1.08	0.269	1351.08	0.97 oc	---	---	---	0.00	0.00	---	---	---	---	0.968
1.10	0.274	1351.10	0.98 oc	---	---	---	0.00	0.00	---	---	---	---	0.980
1.12	0.279	1351.12	0.99 oc	---	---	---	0.14	0.00	---	---	---	---	1.133
1.14	0.285	1351.14	1.00 oc	---	---	---	0.40	0.00	---	---	---	---	1.403
1.16	0.290	1351.16	1.01 oc	---	---	---	0.74	0.00	---	---	---	---	1.749
1.18	0.295	1351.18	1.03 oc	---	---	---	1.13	0.00	---	---	---	---	2.157
1.20	0.301	1351.20	1.04 oc	---	---	---	1.58	0.00	---	---	---	---	2.616
1.22	0.306	1351.22	1.05 oc	---	---	---	2.08	0.00	---	---	---	---	3.124
1.24	0.312	1351.24	1.06 oc	---	---	---	2.62	0.00	---	---	---	---	3.676
1.26	0.317	1351.26	1.07 oc	---	---	---	3.20	0.00	---	---	---	---	4.267
1.28	0.323	1351.28	1.08 oc	---	---	---	3.82	0.00	---	---	---	---	4.897
1.30	0.328	1351.30	1.09 oc	---	---	---	4.47	0.00	---	---	---	---	5.561
1.32	0.334	1351.32	1.10 oc	---	---	---	5.15	0.00	---	---	---	---	6.255
1.34	0.339	1351.34	1.11 oc	---	---	---	5.87	0.00	---	---	---	---	6.984
1.36	0.345	1351.36	1.12 oc	---	---	---	6.62	0.00	---	---	---	---	7.745
1.38	0.350	1351.38	1.13 oc	---	---	---	7.40	0.00	---	---	---	---	8.534
1.40	0.356	1351.40	1.14 oc	---	---	---	8.21	0.00	---	---	---	---	9.352
1.42	0.362	1351.42	1.15 oc	---	---	---	9.04	0.00	---	---	---	---	10.20
1.44	0.367	1351.44	1.16 oc	---	---	---	9.90	0.00	---	---	---	---	11.06
1.46	0.373	1351.46	1.17 oc	---	---	---	10.79	0.00	---	---	---	---	11.96
1.48	0.379	1351.48	1.18 oc	---	---	---	11.70	0.00	---	---	---	---	12.88
1.50	0.384	1351.50	1.19 oc	---	---	---	12.64	0.00	---	---	---	---	13.83
1.52	0.390	1351.52	1.20 oc	---	---	---	13.60	0.00	---	---	---	---	14.80
1.54	0.396	1351.54	1.21 oc	---	---	---	14.58	0.00	---	---	---	---	15.79
1.56	0.401	1351.56	1.22 oc	---	---	---	15.59	0.00	---	---	---	---	16.81
1.58	0.407	1351.58	1.23 oc	---	---	---	16.61	0.00	---	---	---	---	17.84
1.60	0.413	1351.60	1.24 oc	---	---	---	17.66	0.00	---	---	---	---	18.90
1.62	0.418	1351.62	1.25 oc	---	---	---	18.73	0.00	---	---	---	---	19.98
1.64	0.424	1351.64	1.26 oc	---	---	---	19.82	0.00	---	---	---	---	21.08
1.66	0.430	1351.66	1.27 oc	---	---	---	20.94	0.00	---	---	---	---	22.20
1.68	0.436	1351.68	1.28 oc	---	---	---	22.07	0.00	---	---	---	---	23.34
1.70	0.442	1351.70	1.28 oc	---	---	---	23.21	0.00	---	---	---	---	24.50
1.72	0.447	1351.72	1.29 oc	---	---	---	24.38	0.00	---	---	---	---	25.68
1.74	0.453	1351.74	1.30 oc	---	---	---	25.58	0.00	---	---	---	---	26.88
1.76	0.459	1351.76	1.31 oc	---	---	---	26.78	0.00	---	---	---	---	28.10
1.78	0.465	1351.78	1.32 oc	---	---	---	28.01	0.00	---	---	---	---	29.33
1.80	0.471	1351.80	1.33 oc	---	---	---	29.26	0.00	---	---	---	---	30.59
1.82	0.477	1351.82	1.34 oc	---	---	---	30.51	0.00	---	---	---	---	31.85
1.84	0.483	1351.84	1.35 oc	---	---	---	31.80	0.00	---	---	---	---	33.14
1.86	0.488	1351.86	1.35 oc	---	---	---	33.10	0.00	---	---	---	---	34.45
1.88	0.494	1351.88	1.36 oc	---	---	---	34.41	0.00	---	---	---	---	35.77
1.90	0.500	1351.90	1.37 oc	---	---	---	35.74	0.00	---	---	---	---	37.12
1.92	0.506	1351.92	1.38 oc	---	---	---	37.09	0.00	---	---	---	---	38.47
1.94	0.512	1351.94	1.39 oc	---	---	---	38.45	0.00	---	---	---	---	39.84
1.96	0.518	1351.96	1.40 oc	---	---	---	39.84	0.00	---	---	---	---	41.23
1.98	0.524	1351.98	1.40 oc	---	---	---	41.23	0.00	---	---	---	---	42.64
2.00	0.530	1352.00	1.41 oc	---	---	---	42.65	0.00	---	---	---	---	44.06

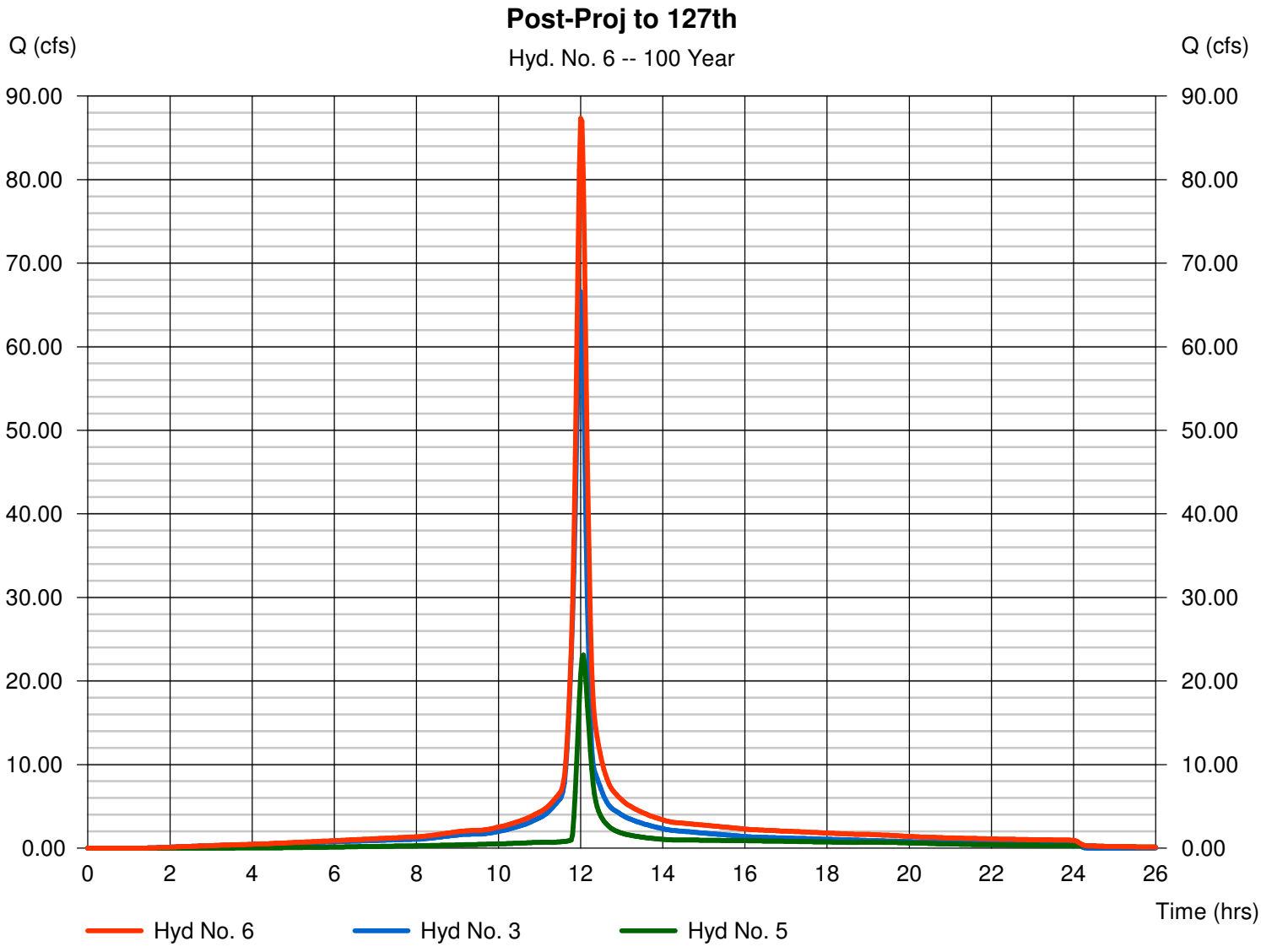
...End

Hydrograph Report

Hyd. No. 6

Post-Proj to 127th

Hydrograph type	= Combine	Peak discharge	= 87.34 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 6.186 acft
Inflow hyds.	= 3, 5	Contrib. drain. area	= 7.200 ac



Appendix 2.6 – 127th Street Culvert Calculations

Culvert Report

127th Street Culvert

Invert Elev Dn (ft)	=	1344.70
Pipe Length (ft)	=	35.00
Slope (%)	=	2.00
Invert Elev Up (ft)	=	1345.40
Rise (in)	=	28.0
Shape	=	Ell
Span (in)	=	20.0
No. Barrels	=	1
n-Value	=	0.023
Inlet Edge	=	Projecting
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.5

Embankment

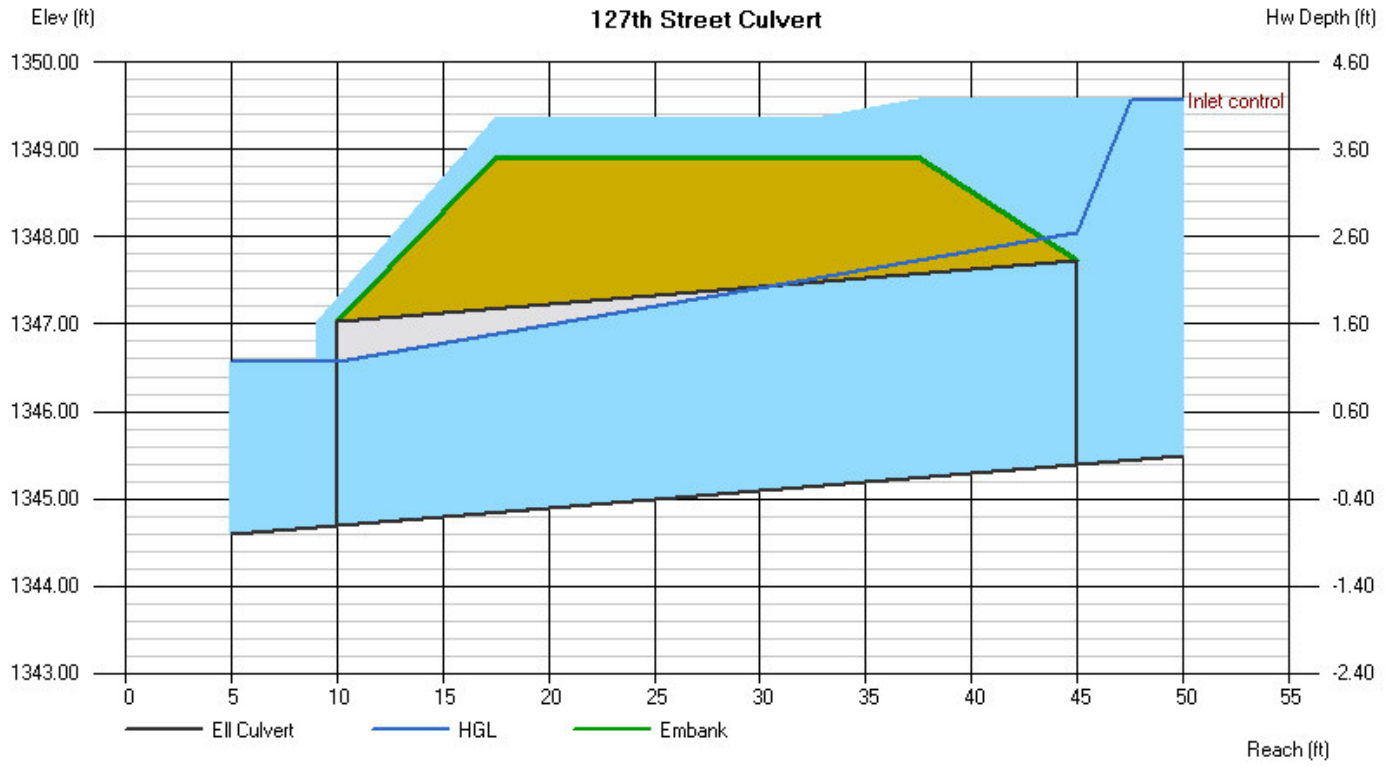
Top Elevation (ft)	=	1348.90
Top Width (ft)	=	20.00
Crest Width (ft)	=	50.00

Calculations

Qmin (cfs)	=	0.00
Qmax (cfs)	=	120.00
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	110.00
Qpipe (cfs)	=	22.30
Qovertop (cfs)	=	87.70
Veloc Dn (ft/s)	=	8.57
Veloc Up (ft/s)	=	7.30
HGL Dn (ft)	=	1346.57
HGL Up (ft)	=	1348.04
Hw Elev (ft)	=	1349.56
Hw/D (ft)	=	1.78
Flow Regime	=	Inlet Control



Q			Veloc		Depth		HGL			
Total	Pipe	Over	Dn	Up	Dn	Up	Dn	Up	Hw	Hw/D
(cfs)	(cfs)	(cfs)	(ft/s)	(ft/s)	(in)	(in)	(ft)	(ft)	(ft)	
10.00	10.00	0.00	8.68	3.27	11.20	28.00	1345.63	1347.81	1347.89	1.07
20.00	18.23	1.77	8.74	5.97	18.20	28.00	1346.22	1347.91	1348.94	1.52
30.00	18.61	11.39	8.92	6.09	18.20	28.00	1346.22	1347.98	1349.04	1.56
40.00	20.69	19.31	8.49	6.77	21.00	28.00	1346.45	1347.93	1349.16	1.61
50.00	20.96	29.04	8.60	6.86	21.00	28.00	1346.45	1347.97	1349.22	1.64
60.00	21.14	38.86	8.67	6.92	21.00	28.00	1346.45	1348.00	1349.27	1.66
70.00	21.34	48.66	8.76	6.99	21.00	28.00	1346.45	1348.03	1349.32	1.68
80.00	21.49	58.51	8.82	7.04	21.00	28.00	1346.45	1348.05	1349.35	1.69
90.00	21.74	68.26	8.92	7.12	21.00	28.00	1346.45	1348.09	1349.41	1.72
100.00	22.22	77.78	9.12	7.28	21.00	28.00	1346.45	1348.16	1349.54	1.77
110.00	22.30	87.70	8.57	7.30	22.40	28.00	1346.57	1348.04	1349.56	1.78
120.00	22.38	97.62	8.60	7.33	22.40	28.00	1346.57	1348.05	1349.58	1.79

Culvert Report

127th Street Culvert

Invert Elev Dn (ft)	=	1344.70
Pipe Length (ft)	=	35.00
Slope (%)	=	2.00
Invert Elev Up (ft)	=	1345.40
Rise (in)	=	29.0
Shape	=	Ell
Span (in)	=	45.0
No. Barrels	=	2
n-Value	=	0.013
Inlet Edge	=	Projecting
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.5

Embankment

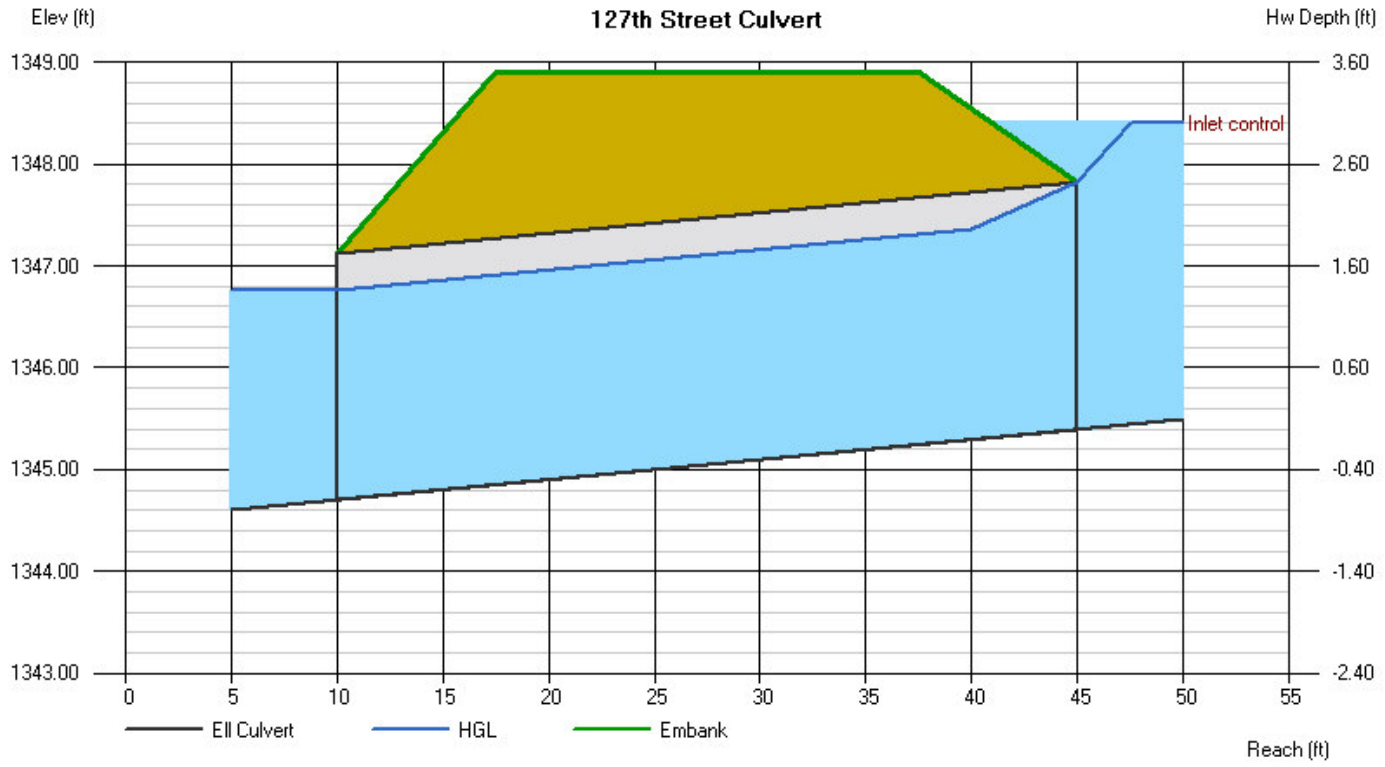
Top Elevation (ft)	=	1348.90
Top Width (ft)	=	20.00
Crest Width (ft)	=	50.00

Calculations

Qmin (cfs)	=	0.00
Qmax (cfs)	=	90.00
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	90.00
Qpipe (cfs)	=	90.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	7.01
Veloc Up (ft/s)	=	7.01
HGL Dn (ft)	=	1346.75
HGL Up (ft)	=	1347.45
Hw Elev (ft)	=	1348.40
Hw/D (ft)	=	1.24
Flow Regime	=	Inlet Control



Q			Veloc		Depth		HGL			
Total	Pipe	Over	Dn	Up	Dn	Up	Dn	Up	Hw	Hw/D
(cfs)	(cfs)	(cfs)	(ft/s)	(ft/s)	(in)	(in)	(ft)	(ft)	(ft)	
10.00	10.00	0.00	2.71	13.01	8.70	2.90	1345.43	1345.64	1347.06	0.69
20.00	20.00	0.00	3.73	3.73	11.60	11.60	1345.67	1346.37	1346.59	0.49
30.00	30.00	0.00	4.21	4.21	14.50	14.50	1345.91	1346.61	1346.90	0.62
40.00	40.00	0.00	4.51	4.51	17.40	17.40	1346.15	1346.85	1347.20	0.75
50.00	50.00	0.00	5.14	5.14	18.85	18.85	1346.27	1346.97	1347.44	0.84
60.00	60.00	0.00	5.69	5.69	20.30	20.30	1346.39	1347.09	1347.67	0.94
70.00	70.00	0.00	6.16	6.16	21.75	21.75	1346.51	1347.21	1347.91	1.04
80.00	80.00	0.00	6.60	6.60	23.20	23.20	1346.63	1347.33	1348.15	1.14
90.00	90.00	0.00	7.01	7.01	24.65	24.65	1346.75	1347.45	1348.40	1.24

Tab 3. Post-Development Conditions

Description

The site is 31.6 acres that will develop for commercial usage. Eight of the lots are approximately 1.0 acre in size, the 9th lot is 1.7 acres in size and the remaining two lots are larger commercial lots that are 7.1 acres and 11.7 acres.

Drainage Calculations

Runoff Method

The site was modeled using Hydraflow Hydrographs by AutoCAD 2009, Appendix 2.5. The model was originally created for the *USD 259 4th Addition Drainage Report..*

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 theTR-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 95 was used to represent the commercial development. The curve numbers are shown in Table 3.2.

Drainage Patterns

The site will continue to drain in three directions. The basin draining to the north (Occidental 1) will drain to the proposed detention pond provided in the USD 259 4th Addition. The dividing line between the northeast basin (Occidental 4) and the south basin (Occidental 2 & 3) will be graded to route a portion of Occidental 4 to the south and west and into detention ponds provided with the USD 259 4th Addition. The Occidental 4 basin will be reduced from 19.6 acres to 10.0 acres. Decreasing the size of the area draining to 127th Street will reduce the peak flow rate to 127th Street below pre-development flow rates during larger design storms, but not the smaller design storms. Parking lots and swales will be used to provide an additional 0.4 acre-feet of detention to reduce the peak flow rate of the smaller design storms. The locations of the detention facilities and the outlet structures will be determined when the site plan for this area is developed. Even though the peak flow rate to the 127th Street culvert has been decreased from pre-development conditions the existing culvert under 127th Street still does not have the capacity to convey the flow from the development. This culvert will be replaced by 2-29”x45” Horizontal Elliptical Concrete Pipes (HECP), the equivalent to 2-36” round pipes. By increasing the pipe sizes 127th Street will not overtop during a 100-year design storm. The pipes were analyzed using Hydraflow Express, Appendix 2.6.

Table 3.1. Post-Development Flow Rates.

Description	Area (ac.)	Tc (min.)	CN	Design Storm Flows (cfs)				
				2-Yr	5-Yr	10-Yr	25-Yr	100-Yr
North Total*	-	-	-	61.8	81.8	94.3	113.6	146.0
South Total*	-	-	-	283.1	401.3	476.0	604.0	825.1
To 127th/Occ. 4	10.0	10.4	95.0	29.3	43.6	54.1	68.3	87.3

* From USD 259 4th Addition May 7, 2010 Drainage Report by Ruggles and Bohm.

Utilities

Storm Water Sewer

Proposed storm water sewer will convey runoff from the lots to the proposed detention ponds on the USD 259 4th Addition property and to 127th Street. Storm sewer has been sized to convey the 5-year design event with overland escape routes for larger design events. The Storm Water Sewer layout is shown on the Drainage and Utility Plan, Appendix 3.1. Pipe sizing calculations were done using Hydraflow Storm Sewers by AutoCAD 2009, Appendix 3.2.

Water

The proposed water system will tie into the existing system north of Pawnee Road. The water line will run along the north line of lot 10 and along the back of the remaining lots.

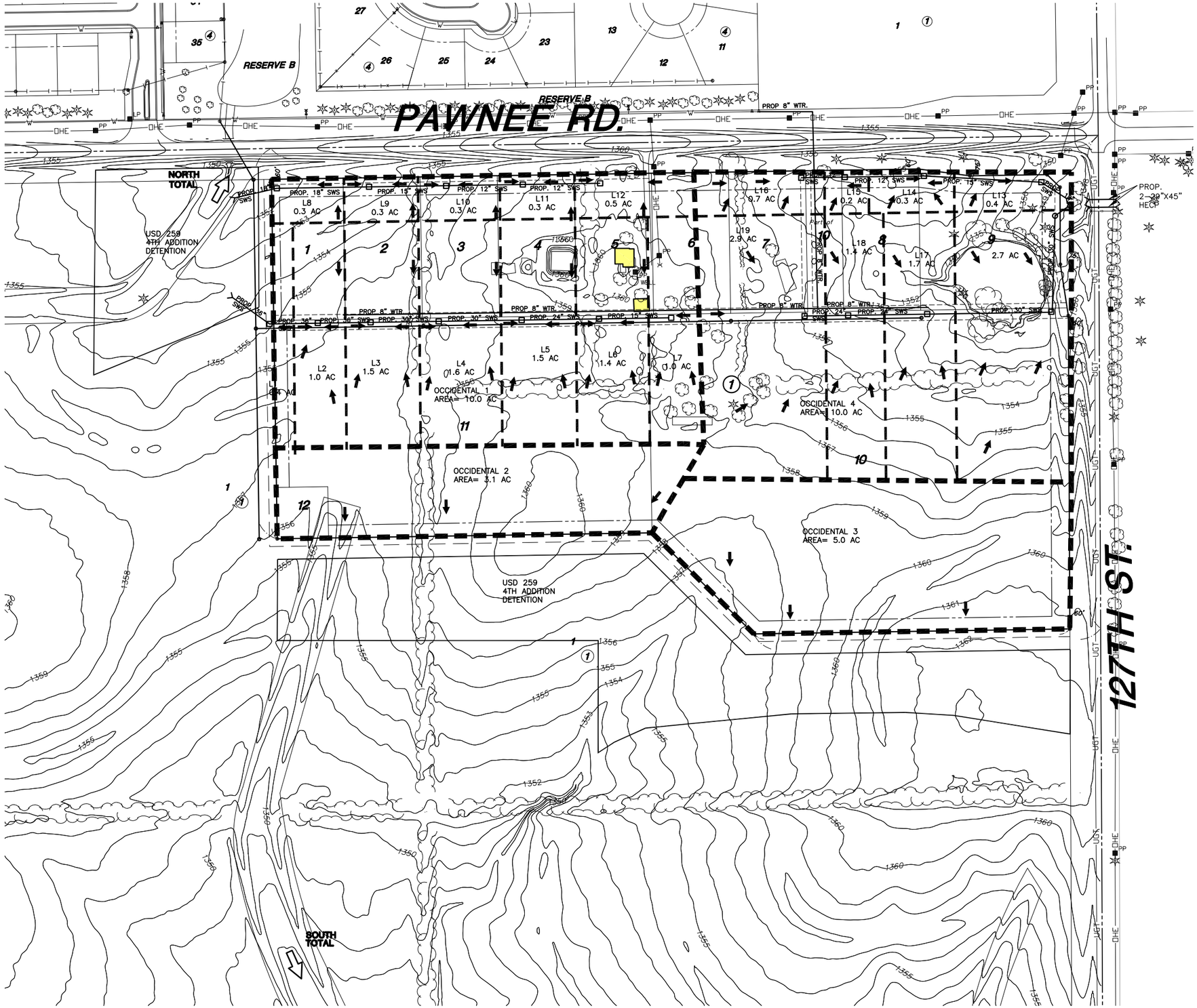
Sanitary Sewer

A sanitary sewer line serves the existing residential addition north of Pawnee Road. A proposed sanitary sewer line will connect into this existing line and will flow from south to north, west of the west property line of this development. A line will also be constructed south of Lots 1-9 Block 1 to serve the development.

Minimum Lowest Opening

Lot 1 Block 1 will have a minimum lowest opening of 1354.5. Lot 10 Block 1 will have a minimum lowest opening of 1357.1. Lot 11 Block 1 will have a minimum lowest opening of 1356.5. These elevations are 3 feet above the 100-year water surface elevation of the adjacent detention facilities.

Appendix 3.1 – Drainage and Utility Plan



LEGEND

- 6IN - CONIFEROUS TREE
- 3IN - 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
- UGE - UNDERGROUND ELEC.
- OHE - OVERHEAD ELECTRIC
- FOC - FIBER OPTIC CABLE
- DRAINAGE SUB BASIN
- DRAINAGE BASIN
- FLOW ARROW
- A17 - AREA FOR SWS SIZING

BENCH MARK

BM #1 Top of concrete witness monument
30.5 feet W. centerline 127th St. E
and 51.5 feet S. Pawnee Rd.
Elev. = 1349.31 (NAVD 88)
1348.81 (NGVD 29)
(FROM GPS)

N

SCALE: 1" = 100'

100 0 100 200

MKEC
Wichita, KS · 316-684-9800

DRAINAGE AND UTILITY PLAN

SIERRA POINTE ADDITION

WICHITA, KANSAS

DRAINAGE & UTILITY PLAN

PROJECT NO.	1401010070
DATE	FEBRUARY 2014
SCALE	AS NOTED

DESIGNED	DRAWN	CHECKED
KLA	JGD	GJA

NO.	REVISION	DATE

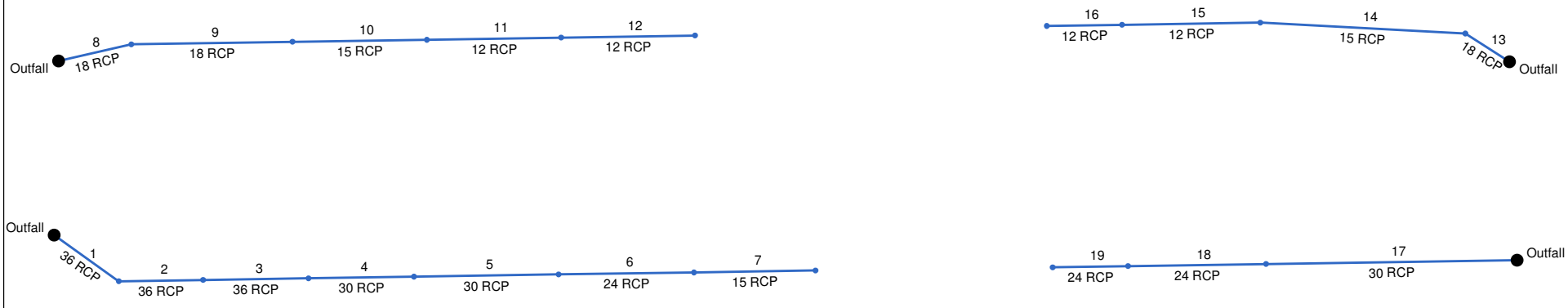
SHEET NO.

1 OF 1

J:\PROJECTS\2014\1401010070_127PAW_SIERRA POINTE\5-CIVIL\CAD\DRAINAGE\DRAWING\1401070_DUP.DWG

Appendix 3.2 – Hydraflow Storm Sewers

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



Project File: Preliminary Pipe Sizing 6-2010.stm	Number of lines: 19	Date: 06-14-2010

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	88.411	0.10	8.10	0.87	0.09	7.05	15.0	18.8	4.2	29.80	25.57	6.09	36	0.15	1349.50	1349.63	1351.24	1351.91	1351.50	1353.50	36 RCP
2	1	93.974	1.00	8.00	0.87	0.87	6.96	15.0	18.4	4.3	29.70	25.74	4.20	36	0.15	1349.73	1349.87	1352.73	1352.87	1353.50	1353.50	36 RCP
3	2	117.623	1.50	7.00	0.87	1.31	6.09	15.0	17.8	4.3	26.34	26.09	3.73	36	0.15	1349.97	1350.15	1353.01	1353.15	1353.50	1353.50	36 RCP
4	3	117.623	1.60	5.50	0.87	1.39	4.79	15.0	17.4	4.4	20.94	16.05	4.27	30	0.15	1350.25	1350.43	1353.26	1353.56	1353.50	1354.10	30 RCP
5	4	161.396	1.50	3.90	0.87	1.31	3.39	15.0	16.5	4.5	15.18	18.26	3.09	30	0.20	1350.53	1350.85	1353.71	1353.93	1354.10	1354.80	30 RCP
6	5	150.742	1.40	2.40	0.87	1.22	2.09	15.0	15.7	4.6	9.55	10.09	3.04	24	0.20	1350.95	1351.25	1354.00	1354.27	1354.80	1355.50	24 RCP
7	6	135.454	1.00	1.00	0.87	0.87	0.87	15.0	15.0	4.7	4.06	4.08	3.30	15	0.40	1351.35	1351.89	1354.34	1354.88	1355.50	1356.70	15 RCP
8	End	83.405	0.30	1.70	0.87	0.26	1.48	15.0	18.3	4.3	6.32	6.60	4.68	18	0.40	1350.00	1350.33	1350.96	1351.57	1352.00	1352.00	18 RCP
9	8	179.507	0.30	1.40	0.87	0.26	1.22	15.0	17.3	4.4	5.34	6.65	3.75	18	0.40	1350.43	1351.15	1351.69	1352.18	1352.00	1353.00	18 RCP
10	9	150.034	0.30	1.10	0.87	0.26	0.96	15.0	16.6	4.5	4.27	4.08	3.77	15	0.40	1351.25	1351.85	1352.34	1352.94	1353.00	1353.70	15 RCP
11	10	149.606	0.30	0.80	0.87	0.26	0.70	15.0	16.0	4.5	3.16	2.26	4.02	12	0.40	1351.95	1352.55	1353.05	1354.23	1353.70	1354.60	12 RCP
12	11	149.406	0.50	0.50	0.87	0.44	0.44	15.0	15.0	4.7	2.03	2.26	2.58	12	0.40	1352.65	1353.25	1354.35	1354.84	1354.60	1355.70	12 RCP
13	End	58.687	0.40	1.40	0.87	0.35	1.22	15.0	17.5	4.4	5.32	6.72	4.23	18	0.41	1350.52	1350.76	1351.52	1351.77	1352.00	1352.00	18 RCP
14	13	228.915	0.30	1.00	0.87	0.26	0.87	15.0	16.3	4.5	3.92	4.09	3.56	15	0.40	1350.86	1351.78	1351.99	1352.77	1352.00	1353.80	15 RCP
15	14	154.033	0.20	0.70	0.87	0.17	0.61	15.0	15.5	4.6	2.80	2.26	3.56	12	0.40	1351.88	1352.50	1352.88	1353.83	1353.80	1354.70	12 RCP
16	15	83.906	0.50	0.50	0.87	0.44	0.44	15.0	15.0	4.7	2.03	2.27	2.58	12	0.41	1352.60	1352.94	1353.93	1354.20	1354.70	1355.40	12 RCP
17	End	279.907	1.70	6.00	0.87	1.48	5.22	15.0	15.8	4.6	23.78	25.94	6.10	30	0.40	1348.50	1349.62	1350.29	1351.54	1350.00	1353.20	30 RCP
18	17	153.880	1.40	4.30	0.87	1.22	3.74	15.0	15.4	4.6	17.26	14.36	5.49	24	0.40	1349.72	1350.34	1351.81	1352.71	1353.20	1353.40	24 RCP
19	18	84.059	2.90	2.90	0.87	2.52	2.52	15.0	15.0	4.7	11.76	14.39	3.74	24	0.40	1350.34	1350.68	1352.94	1353.17	1353.40	1353.60	24 RCP

Project File: Preliminary Pipe Sizing 6-2010.stm

Number of lines: 19

Run Date: 06-14-2010

NOTES: Intensity = 64.67 / (Inlet time + 13.40) ^ 0.79; Return period = 5 Yrs. ; c = cir e = ellip b = box

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	36 RCP	29.80	36	Cir	88.411	1349.50	1349.63	0.147	1351.24	1351.91	0.40	1352.31	End	Curb-Horiz
2	36 RCP	29.70	36	Cir	93.974	1349.73	1349.87	0.149	1352.73	1352.87	0.14	1353.01	1	Curb-Horiz
3	36 RCP	26.34	36	Cir	117.623	1349.97	1350.15	0.153	1353.01	1353.15	0.11	1353.26	2	Curb-Horiz
4	30 RCP	20.94	30	Cir	117.623	1350.25	1350.43	0.153	1353.26*	1353.56*	0.14	1353.71	3	Curb-Horiz
5	30 RCP	15.18	30	Cir	161.396	1350.53	1350.85	0.198	1353.71*	1353.93*	0.07	1354.00	4	Curb-Horiz
6	24 RCP	9.55	24	Cir	150.742	1350.95	1351.25	0.199	1354.00*	1354.27*	0.07	1354.34	5	Curb-Horiz
7	15 RCP	4.06	15	Cir	135.454	1351.35	1351.89	0.399	1354.34*	1354.88*	0.17	1355.05	6	Curb-Horiz
8	18 RCP	6.32	18	Cir	83.405	1350.00	1350.33	0.396	1350.96	1351.57	0.13	1351.69	End	Curb-Horiz
9	18 RCP	5.34	18	Cir	179.507	1350.43	1351.15	0.401	1351.69	1352.18	0.13	1352.31	8	Curb-Horiz
10	15 RCP	4.27	15	Cir	150.034	1351.25	1351.85	0.400	1352.34	1352.94	0.11	1353.05	9	Curb-Horiz
11	12 RCP	3.16	12	Cir	149.606	1351.95	1352.55	0.401	1353.05*	1354.23*	0.13	1354.35	10	Curb-Horiz
12	12 RCP	2.03	12	Cir	149.406	1352.65	1353.25	0.402	1354.35*	1354.84*	0.10	1354.94	11	Curb-Horiz
13	18 RCP	5.32	18	Cir	58.687	1350.52	1350.76	0.409	1351.52	1351.77	0.23	1351.99	End	Curb-Horiz
14	15 RCP	3.92	15	Cir	228.915	1350.86	1351.78	0.402	1351.99	1352.77	0.11	1352.88	13	Curb-Horiz
15	12 RCP	2.80	12	Cir	154.033	1351.88	1352.50	0.403	1352.88*	1353.83*	0.10	1353.93	14	Curb-Horiz
16	12 RCP	2.03	12	Cir	83.906	1352.60	1352.94	0.405	1353.93*	1354.20*	0.10	1354.31	15	Curb-Horiz
17	30 RCP	23.78	30	Cir	279.907	1348.50	1349.62	0.400	1350.29	1351.54	0.27	1351.81	End	Curb-Horiz
18	24 RCP	17.26	24	Cir	153.880	1349.72	1350.34	0.403	1351.81*	1352.71*	0.23	1352.94	17	Curb-Horiz
19	24 RCP	11.76	24	Cir	84.059	1350.34	1350.68	0.405	1352.94*	1353.17*	0.22	1353.39	18	Curb-Horiz

Project File: Preliminary Pipe Sizing 6-2010.stm | Number of lines: 19 | Run Date: 06-14-2010

NOTES: Return period = 5 Yrs. ; *Surcharged (HGL above crown).

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.