Baughman

ENGINEERING | SURVEYING | PLANNING
LANDSCAPE ARCHITECTURE

DRAINAGE PLAN
HAWTHORNE 5TH ADDITION

MARCH 2014

REPORT CONTENTS

EXISTING CONDITIONS

The property is approximately 11.6 acres and is located at the corner of 127th Street East and Camden Chase. This area was previously planned to be a part of the commercial corner platted as Hawthorne Addition with its Drainage Plan approved as part of the same addition in 2002.

The site drains primarily to the north east and east where there are existing storm water sewer pipes constructed as part of the Hawthorne Addition residential subdivision to the east. The site is currently sparsely vegetated with a berm along the east which has vegetation and trees. This berm is currently just offsite located in a Reserve.

The drainage patterns can be viewed on the Aerial and Lidar Exhibit (Exhibit 1).

PROPOSED CONDITIONS

The proposed property is being re-platted as a residential subdivision that will feature a loop street with 40 lots designed for patio homes. These lots will be approximately 8000 sq ft in size and will all generally drain to the front street as well as the back yard will grade to the rear property line. The site will be accessed from the north off of Camden Chase and will have an internal loop to access the lots. A Reserve is located inside the loop which will have a clubhouse, pool, and walking path.

For a half-scale copy of the Plat, see Exhibit 2.

OFFSITE CONDITIONS

There is offsite water from the west that encroaches the site which discharges under 127th East via a 24" RCP. This pipe drains ROW runoff as well as acting as the detention pond outfall for the Fairmont 3rd Addition. According to the Drainage Plan for Fairmont 3rd Addition, this pipe will have a maximum 100-year discharge of approximately 69 cfs.

There are currently storm sewer pipes located at the northeast corner as well as the east line of the property. These pipes were installed as part of the Hawthorne residential development and were designed to convey runoff from this property developed as commercial. The pipes will convey runoff to the east and into the existing detention ponds located in the Hawthorne Addition.

The remaining commercial property just to the south of this site currently sheet flows across the site until utilizing the storm sewer stubs as previously discussed along the east line.

The Offsite Drainage Exhibit can be seen as Exhibit 3.

EXISTING CONDITIONS RUNOFF CALCULATIONS

DRAINAGE METHODS & STANDARDS

The following methods and standards, although not a complete list, were used in calculating the existing conditions runoff values.

- STORM SERIES
  - 24-hour; 2-yr, 5-yr, 10-yr, 25-yr, 100-yr Storm Events
  - 2-yr Rainfall Intensity = 3.83 in
  - 10-yr Rainfall Intensity = 5.22 in
  - 100-yr Rainfall Intensity = 7.37 in

- FLOW DATA
  - Areas per LIDAR data, USGS Quadrangle Sheet, Aerial Photos, and Site Visits
  - SCS Cure Number Method (CN = 84, Pre-developed Undisturbed)
  - Time of Concentration: Lag Method (minimum 15 min)

SITE CHARACTERISTICS

The site is currently open space with poor cover which drains to the east and northeast into existing storm water sewer inlets. The property appears to be well drained as there are few, if any, ponding areas on the site. The property currently accepts all offsite runoff via overland flow and discharges per the prior drainage plan via the storm water sewer into the Hawthorne Addition lake system.

EXISTING CONDITIONS HYDROLOGIC ANALYSIS

This property was analyzed based on existing conditions for peak runoff values for the entire storm series. Conditions on the site are open space undisturbed grassland in Type D soils. The time of concentration for the site and offsite to the south was calculated using the Lag Method with a minimum of 15 minutes, if applicable. The west offsite runoff from under 127th Street was taken from the Fairmont 3rd Drainage Plan pond outflow and peak flow to that culvert.

DOWNSTREAM DRAINAGE CAPACITY

The site was planned and platted to be a commercial development with storm water sewer constructed to serve the site. There is currently storm water inlets located at the north east corner of the property with a 36" RCP as well as an inlet along the east line of the property with a 30" RCP. These inlets were sized and constructed with the Hawthorne Addition Drainage Plan. The pipes are then discharged to the east and into the storm water detention pond system constructed in the same subdivision.

Based on the original Drainage Plan for this site, this proposed portion of the commercial was designed to utilize the northern two pipe systems and inlets. The remaining commercial to the south, approximately 9 acres, is to utilize the southernmost inlet constructed with Hawthorne Addition.

POST-DEVELOPMENT HYDROLOGIC ANALYSIS

DRAINAGE METHODS & STANDARDS

The following methods and standards, although not a complete list, were used in developing the drainage and grading plans.

- STORM SERIES
  - 24-hour; 2-yr, 5-yr, 10-yr, 25-yr, 50-yr, 100-yr Storm Events Calculated
  - Rational Formula Method used for peak runoff
  - CN = 88 (Disturbed and/or Developed Areas)
  - Time of Concentration; Lag Method, minimum Tc = 15min
  - Storm Sewer sized for 10-year event (HGL underground = no surcharge)
  - Rational 'C' Factor = 0.60 (10-year event)

- GRADING CONSTRAINTS TO BE OBSERVED AT SITE PLAN
  - Match all existing perimeter grades
  - On-site SWS system sized for 10-year event with emergency overflow

DEVELOPED CONDITIONS HYDROLOGIC ANALYSIS

The site is being platted into a 40 lot residential subdivision with associated streets, utilities, and storm water sewer. The site was analyzed for storm water runoff based on approximately 50% impervious cover on the entire subdivision in Type D soils. A minimum time of concentration of 15 minutes was used due to the size of the proposed site. The site was divided into smaller sub-basins primarily for on-site storm water sewer sizing. These areas were modeled for peak runoff using the Rational Method. The SCS Curve Number method was used for the water quality volume calculations.

DETENTION FACILITY

Since this site was platted and a Drainage Plan previously approved which shows the site discharging and detention provided offsite, there is no proposed detention on this specific site. This property was part of the overall drainage plan for Hawthorne and was originally planned as commercial cover. Due to the downstream pond and conveyance systems already in place, and the cover type changing from commercial to residential, this site will still conform to the original plan as approved.

DISCHARGE POINTS SUMMARY

The site currently discharges to the north and east and into the existing SWS via additional onsite SWS. The existing SWS at these two points appear to be sized for approximately the 10-year storm event with overflow occurring into Camden Chase. There are low spots in the berm at this point which will allow overflow if the inlet gets plugged or simply can't handle the runoff. There is a berm located along the east line in Hawthorne Addition which will remain. This berm does not allow flow to the east and forces runoff that is not handled by the SWS to the north and into Camden Chase.

WATER QUALITY

Water quality will be utilized in the existing wet ponds located in Hawthorn Addition. These ponds, previously constructed, will provide more than adequate water quality volume for this site as well as the surrounding residential property. Water quality calculations are included in Appendix C.

DOWNSTREAM CHANNEL PROTECTION

Since this area is developed with the existing storm sewer and downstream wet ponds, this site will not need to provide downstream channel protection.

POTENTIAL UPSTREAM/DOWNSTREAM IMPACTS

This site was originally intended to be commercial property with mostly impervious cover. The SWS and downstream pond system was modeled based on that cover type. With the site now residential cover and using the existing SWS on site, we do not expect any negative downstream impacts associated with this development.

This site will accept the runoff from the west under 127th Street via a SWS near the northwest corner of the property. Since the downstream SWS was sized and constructed for the 10-year event, the SWS extension to this point is also sized for the 10-year event. What this means is that the wall along 127th Street East that will be constructed with this subdivision will include holes/notches/openings near the bottom to allow only the 10-year storm to flow onto the property. The larger storm events will pond in the ROW (which currently occurs in the ditch section) and can overflow into Camden Chase (which appears to be the original intent based on the approved Drainage Plan for Hawthorne Addition.

The offsite runoff from the remaining commercial site will be redirected via a ditch section to the east and into the remaining SWS stub constructed to serve that property. The commercial runoff being re-directed is approximately 6.8 acres and will be conveyed fully on the commercial site to the southernmost inlet and storm water sewer. We do not expect any runoff from the south encroaching this property once this subdivision is constructed. This will meet the original intent of the Hawthorne Addition Drainage Plan based on drainage basins.

SOURCE OF FLOODPLAIN INFORMATION

This site lies within a FEMA Zone X per FEMA FIRM Panels 377 & 385 of 700 for Wichita, Sedgwick County, Kansas; effective February 2, 2007.

FEDERAL, STATE, & LOCAL PERMITTING

US ARMY CORPS OF ENGINEERS

There does not appear to be any jurisdictional waters of the US on this site.

KANSAS DEPT OF AGRICULTURE – DWR PERMITTING

There does not appear to be any DWR permitting needed on the proposed site at this time. The areas of discharge do not account for more than 640 acres.

FEMA

No FEMA permitting is expected at this time.

KANSAS DEPT OF TRANSPORTATION

There is no KDOT ROW adjacent or near this property which would require a permit at this time.

SEDGWICK COUNTY PERMITTING

There does not appear to be any Sedgwick County permitting needed at this time.

EXHIBIT 1: Aerial Photo Exhibit with Lidar Topography

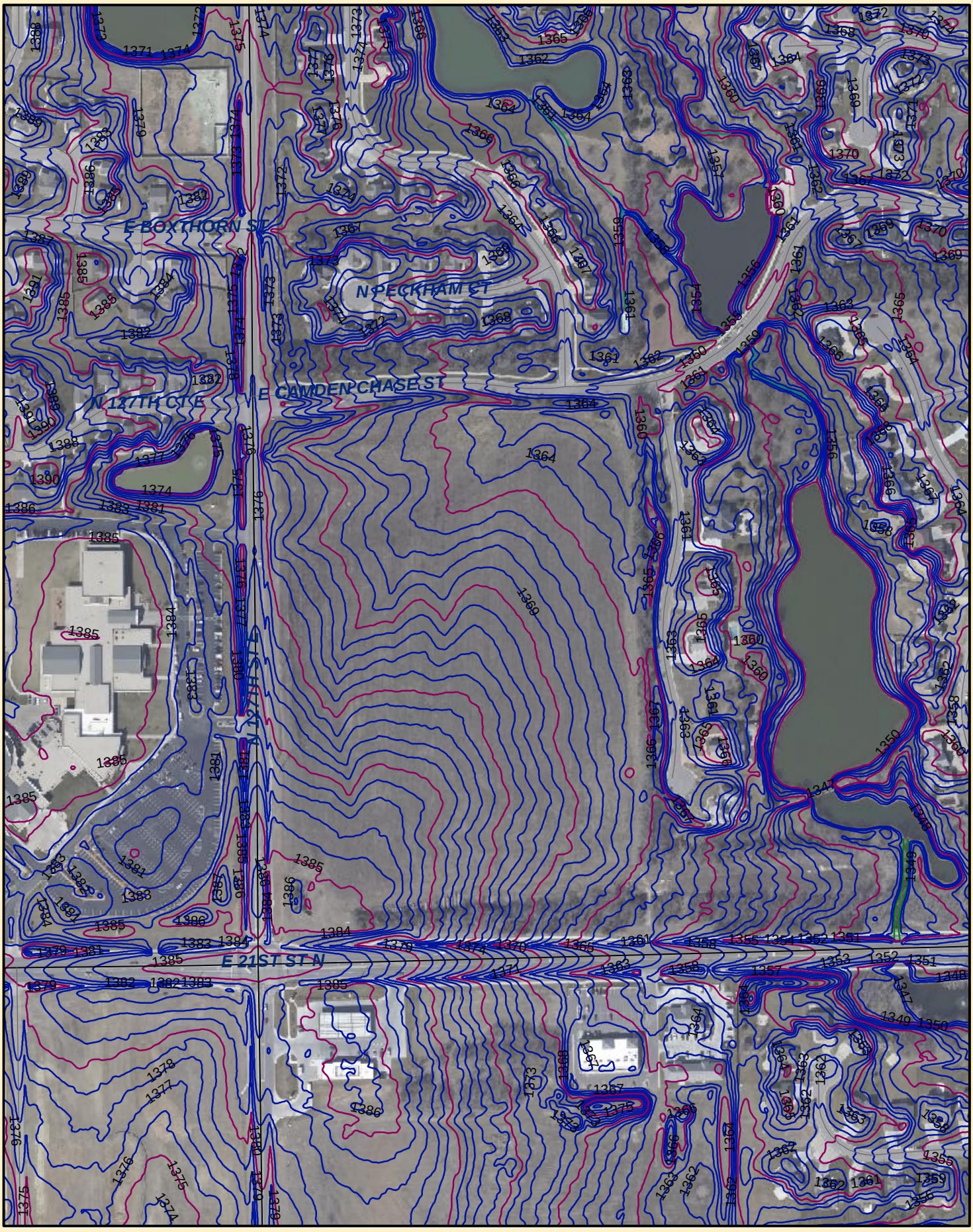
EXHIBIT 2: Plat – Half Scale

EXHIBIT 3: Site Location Map - Hydrogeodatabase

EXHIBIT 4: Drainage Plan – Half Scale

EXHIBIT 5: Floodplain Location (FIRM)

EXHIBIT 6: Offsite Drainage Basin Map

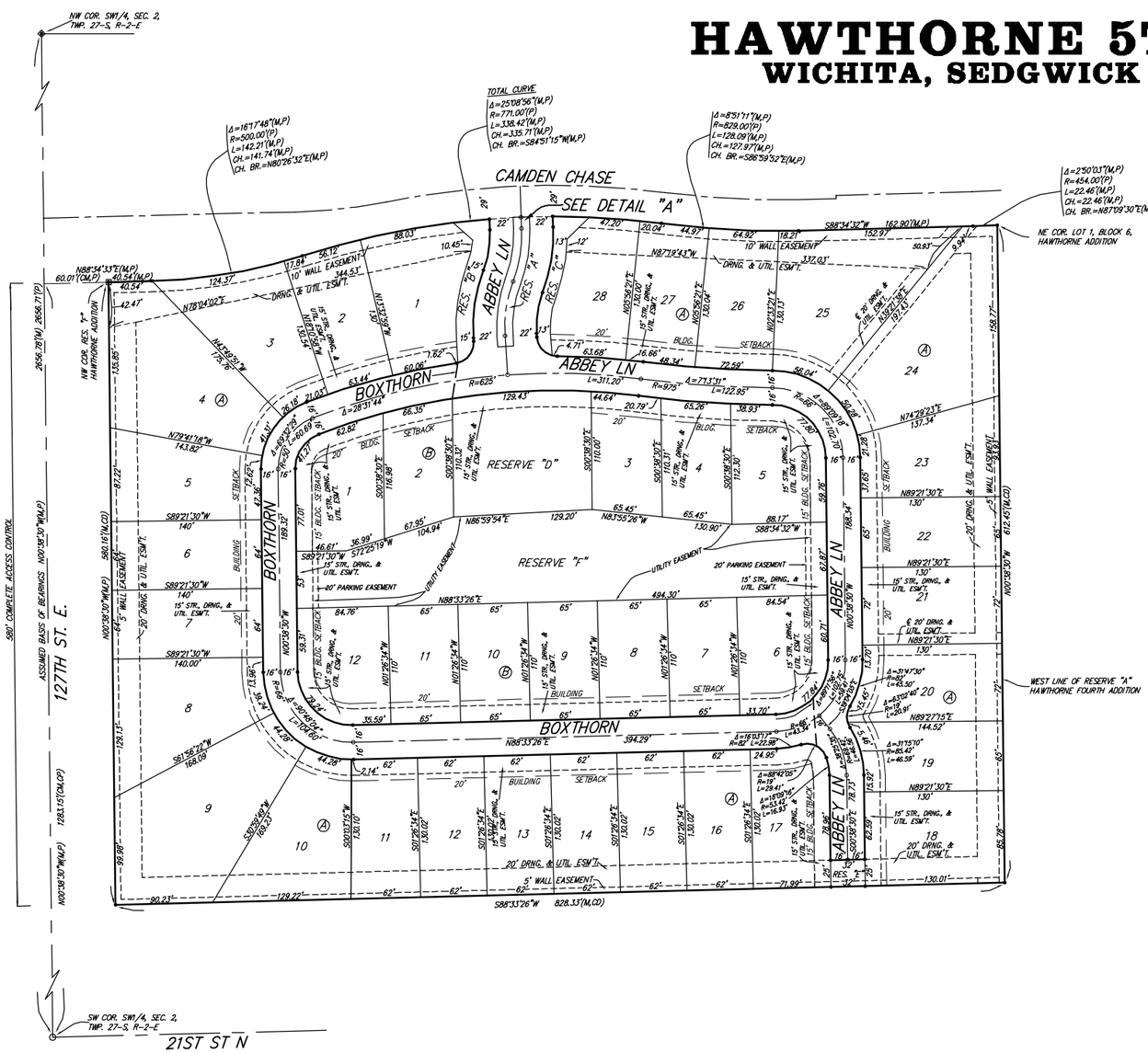


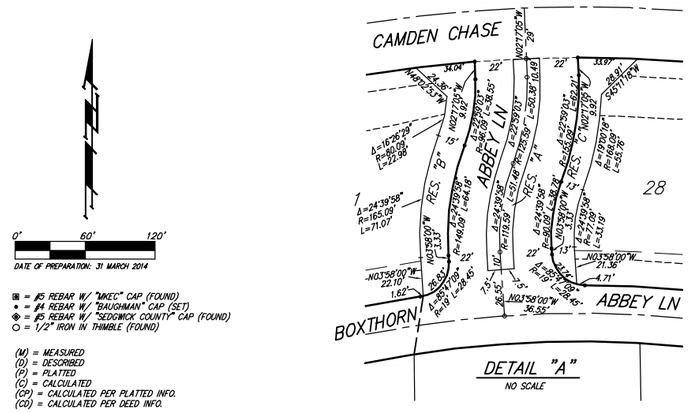
HAWTHORNE 5TH ADDITION

0 75 150 300 Feet

Baughman
ENGINEERING | SURVEYING | PLANNING
LANDSCAPE ARCHITECTURE

HAWTHORNE 5TH ADDITION
WICHITA, SEDGWICK COUNTY, KANSAS





NOTE:
ALL LOTS WITHIN HAWTHORNE 5TH ADDITION SHALL HAVE A 5 FOOT INTERIOR SIDEYARD SETBACK.

NOTE:
A master grading plan for drainage has been developed for this subdivision and is on file with the City of Wichita, Kansas. All drainage easements, right-of-ways, or reserves shall remain at established grades or as modified with the approval of the City Engineer of the City of Wichita, Kansas. No obstructions which impede the flow of this drainage system shall be allowed.

⊕ = #5 REBAR W/ "AMEC" CAP (FOUND)
• = #4 REBAR W/ "BAUGHMAN" CAP (SET)
◈ = #5 REBAR W/ "SEDGWICK COUNTY" CAP (FOUND)
○ = 1/2" IRON IN THIMBLE (FOUND)

(M) = MEASURED
(D) = DESCRIBED
(P) = PLATTED
(C) = CALCULATED
(CP) = CALCULATED PER PLATTED INFO.
(CD) = CALCULATED PER DEED INFO.

State of Kansas)
Sedgwick County) SS

We, Baughman Company, P.A., Surveyors in aforesaid county and state do hereby certify that we have surveyed and platted "HAWTHORNE 5TH ADDITION", Wichita, Sedgwick County, Kansas and that the accompanying plat is a true and correct exhibit of the property surveyed, described as A replat of all of Lot 1, Block 6 and all of Reserve "F", Hawthorne Addition, an addition to Wichita, Sedgwick County, Kansas, TOGETHER with the north 245.55 feet of Lot 2, Block 6 in said Hawthorne Addition.

All being situated in the SW1/4 of Sec. 2, Twp. 27-S, R-2-E of the 6th P.M., Sedgwick County, Kansas.

Existing public easements and dedications being vacated by virtue of K.S.A. 12-512b, as amended.

Baughman Company, P.A.

_____, Surveyor
Michael G. Conrey

Know all men by these presents that we, the undersigned, have caused the land in the surveyors certificate to be platted into Lots, Blocks, Reserves and Streets, to be known as "HAWTHORNE 5TH ADDITION", Wichita, Sedgwick County, Kansas. The utility easements are hereby granted as indicated for the construction and maintenance of all public utilities. The drainage and utility easements are hereby granted as indicated for drainage purposes and for the construction and maintenance of all public utilities. The drainage easements are hereby granted as indicated for drainage purposes. The street, drainage, and utility easements are hereby granted as indicated for street purposes, including public sidewalks, for drainage purposes, and for the construction and maintenance of all public utilities. The wall easements area hereby granted as indicated for the construction and maintenance of private screening walls and utility main lines and service lines shall be allowed to cross these easements. The parking easements are hereby granted as indicated exclusively for residentiol parking. The streets are hereby dedicated to and for the use of the public. Reserve "A" is reserved for open space, landscaping, streets, drainage purposes, entry monuments and utilities. Reserves "B" & "C" are reserved for open space, landscaping, entry monuments, screening walls, drainage purposes and utilities. Reserve "D" is reserved for open space, landscaping, sidewalks, drainage purposes, berms, gazebos, parking, utilities as confined to easements, entry monuments, fences, playgrounds, a clubhouse and related appurtenances, and neighborhood swimming pool and related appurtenances. There shall be no building setback requirements in said Reserve "D" along any public rights-of-way. Reserve "E" is reserved for open space, landscaping, drainage purposes, utilities as confined to easement, and walls as confined to easement. Reserve "F" is reserved for open space, landscaping, sidewalks, drainage purposes, berms, gazebos, parking as confined to easements and utilities as confined to easements. There shall be no building setback requirements in said Reserve "F" along any public rights-of-way. The parking easements within within said Reserve "F" shall be used exclusively for residential parking. No obstructions shall be constructed or placed on or within the parking easement in said Reserve "F". Reserves "A", "B", "C", "D", "E", and "F" shall be owned and maintained by the home owners association for the addition. Access controls shall be as depicted on the face of the plat and are hereby granted to the City of Wichita, Kansas.

Frontgate Develpoers, LLC
a Kansas limited liability company

_____, Manager
Mark E. Hutton

State of Kansas)
Sedgwick County) SS

The foregoing instrument acknowledged before me, this_____day of_____, 2014, by Mark E. Hutton, Manager of the Frontgate Developers, LLC, a Kansas limited liability company, on behalf of the limited liability company.

_____ Notary Public

My App't. Exp. _____

This plat of "HAWTHORNE 5TH ADDITION", Wichita, Sedgwick County, Kansas 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

_____, Secretary
John L. Schlegel

This plat approved and all dedications shown hereon accepted by the City Council of the City of Wichita, Kansas, this_____ day of _____, 2014.

_____, Mayor
Carl Brewer

_____, City Clerk
Karen Sublett

Reviewed in accordance with K.S.A. 58-2005 on this_____day of _____, 2014.

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

Entered on transfer record this _____ day of _____ , 2014.

_____, County Clerk
Kelly B. Arnold

State of Kansas)
Sedgwick County) SS

This is to certify that this plat has been filed for record in the office of the Register of Deeds, this_____ day of_____, 2014 at_____o'clock ___M; and is duly recorded.

_____, Register of Deeds
Bill Meek

_____, Deputy
Tonya Buckingham

We the undersigned holders of a mortgage on the above described property, do hereby consent to this plat of "HAWTHORNE 5TH ADDITION", Wichita, Sedgwick County, Kansas.

RelianzBank

_____, _____
(Title)

State of Kansas)
Sedgwick County) SS

The foregoing instrument acknowledged before me, this_____day of_____, 2014, by_____, _____of RelianzBank, on behalf of the bank.
(Title)

_____, Notary Public

My App't. Exp._____

HAWTHORNE 5TH ADDITION
31 MARCH 2014

Baughman Company, P.A.
315 Ellis St. Wichita, KS 67211 P 316-262-7271 F 316-262-0149
ENGINEERING | SURVEYING | PLANNING | LANDSCAPE ARCHITECTURE

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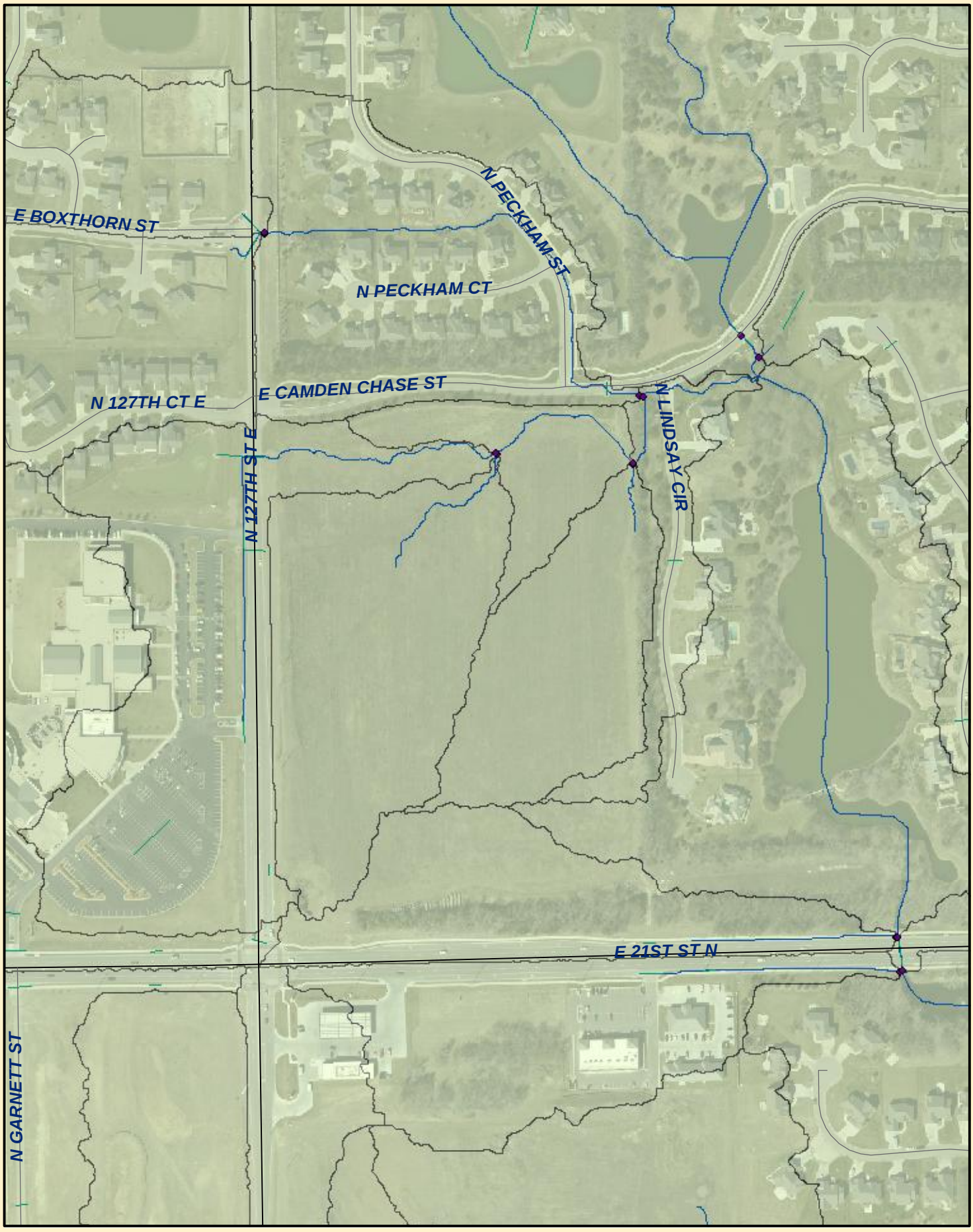

HAWTHORNE 5TH ADDITION

0 75 150 300 Feet

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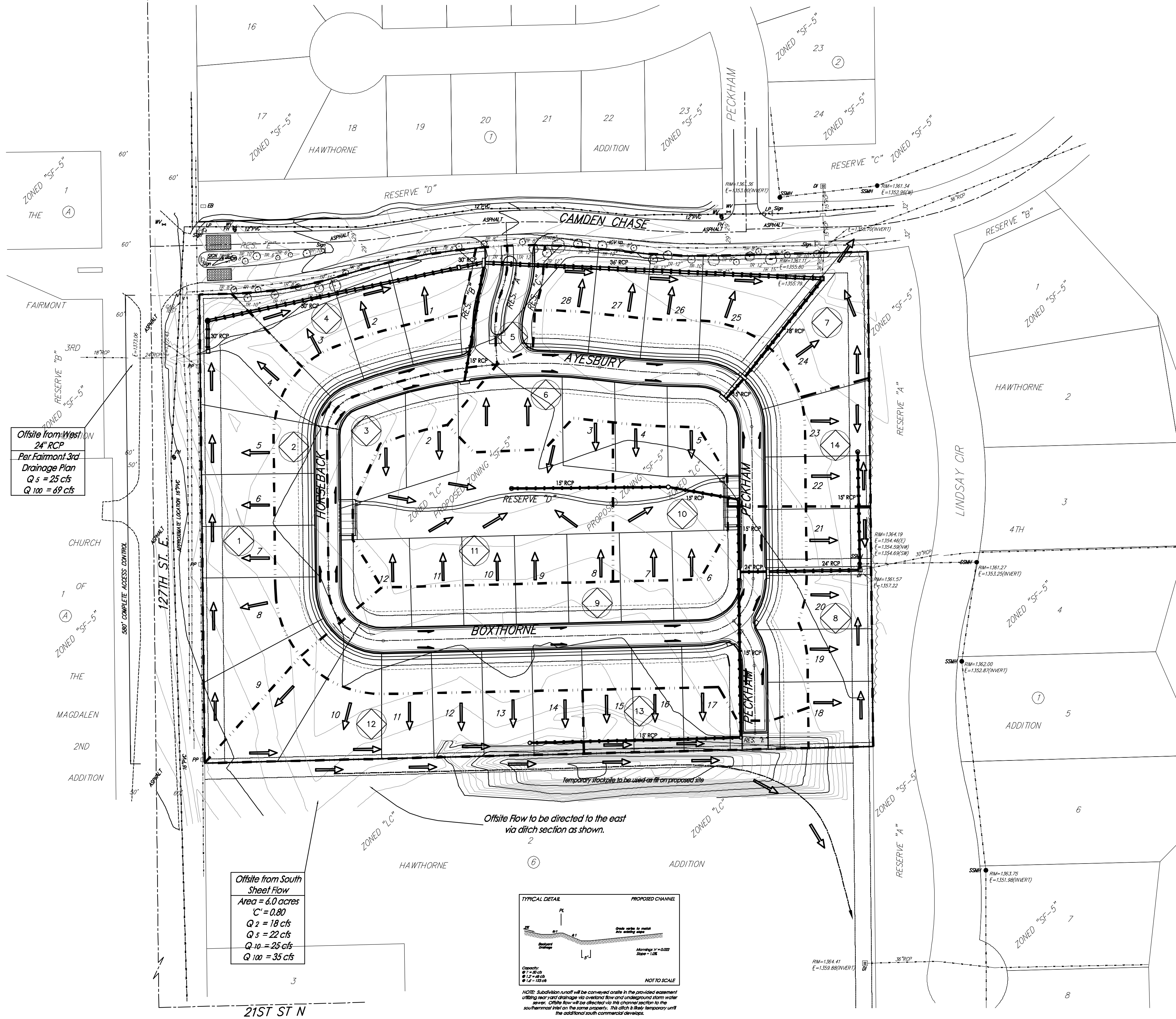
LANDSCAPE ARCHITECTURE

DRAINAGE PLAN

HAWTHORNE 5TH ADDITION

WICHITA, SEDGWICK COUNTY, KANSAS



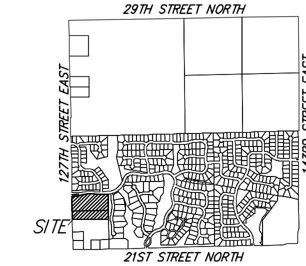
0' 60' 120'

DATE OF PREPARATION: 24 FEBRUARY 2014
DATE OF TOPOGRAPHY: 18 FEBRUARY 2014
CONTOUR INTERVALS = 1 FOOT

RESERVE "A" IS RESERVED FOR OPEN SPACE, LANDSCAPING, STREETS, DRAINAGE PURPOSES, ENTRY MONUMENTS AND UTILITIES.
RESERVES "B" & "C" ARE RESERVED FOR OPEN SPACE, LANDSCAPING, ENTRY MONUMENTS, SCREENING WALLS, DRAINAGE PURPOSES AND UTILITIES AS CONFINED TO EASEMENTS.
RESERVE "D" IS RESERVED FOR OPEN SPACE, LANDSCAPING, SIDEWALKS, DRAINAGE PURPOSES, BERMS, GAZEBOS, PARKING, UTILITIES AS CONFINED TO EASEMENTS, ENTRY MONUMENTS, FENCES, PLAYGROUNDS, A CLUBHOUSE AND RELATED APPURTENANCES, AND NEIGHBORHOOD SWIMMING POOL AND RELATED APPURTENANCES. THERE SHALL BE NO BUILDING SETBACK REQUIREMENTS IN SAID RESERVE "D" ALONG ANY PUBLIC RIGHTS-OF-WAY. THE PARKING EASEMENTS WITHIN WITHIN SAID RESERVE "D" SHALL BE USED EXCLUSIVELY FOR RESIDENTIAL PARKING. NO OBSTRUCTIONS SHALL BE CONSTRUCTED OR PLACED ON OR WITHIN THE PARKING EASEMENT IN SAID RESERVE "D". RESERVE "E" IS RESERVED FOR OPEN SPACE, LANDSCAPING, DRAINAGE PURPOSES, UTILITIES AS CONFINED TO EASEMENT, AND WALLS AS CONFINED TO EASEMENT.

LEGEND

- Proposed SWS
- Drainage Basin Boundary
- Proposed Flow Direction
- Proposed Ditch Section



VICINITY MAP

SEC. 2, T27S, R2E

Developed	2yr	10yr	100yr
Intensity	3.8	5.19	7.36
Rational C	0.5	0.6	0.7

Basin ID	Area	Developed Flowrates		
		2-yr	10-yr	100-yr
	acres	cfs	cfs	cfs
1	1.2	2.2	3.6	5.9
2	0.9	1.7	2.8	4.6
3	0.5	1.0	1.6	2.6
4	0.5	1.0	1.6	2.6
5	0.2	0.3	0.5	0.8
6	1.4	2.7	4.4	7.2
7	1.3	2.5	4.0	6.7
8	0.6	1.1	1.9	3.1
9	2.1	4.0	6.5	11
10	0.6	1.1	1.9	3.1
11	1.3	2.5	4.0	6.7
12	0.8	1.5	2.5	4.1
13	0.3	0.6	0.9	1.5
14	0.3	0.6	0.9	1.5
TOTAL	11.9	22.6	37.1	61.3

Table 4-13 Volumetric Runoff Coefficients by Land Use and Hydrologic Soil Group

Land Use	Hydrologic Soil Group A	B	C	D	Land Use	Hydrologic Soil Group A	B	C	D
Undisturbed	0.02	0.03	0.04	0.05	Undisturbed	55	71	80	84
Turf or Disturbed Soils	0.15	0.20	0.22	0.25	Turf or Disturbed Soils	71	80	84	88
Impervious Cover	0.95	0.95	0.95	0.95	Impervious Cover	98	98	98	98

Basin #	Weighted Volumetric Runoff Coef. (R_v) (eq. 4-24*) Undist. ft²	Dist. ft²	Red. Imp. ft²	New Imp. ft²	Total Area ft²	U %	D %	Redev. I %	I %	R_v %	WQ$_v$ ft³ eq. 4-25*
Total Site	0	352,600	0	552,600	905,200	0.000	0.125	0.000	0.475	0.6000	30,312
Hawthorne*	3,910,000	770,000	0	360,000	5,040,000	0.119	0.063	0.000	0.061	0.2026	80,235
											110,547

* Hawthorne basin is the westernmost basin into the western pond system. Values based on aerials and approximations of land cover.

Pond Volume Below Static Pool

Basin	Static Sq.Ft.	Static Acre	Pond Bottom Area Sq.Ft.	Pond Bottom Area Acre	Depth Feet	Volume Acre-Ft.
North Pond	57000	1.3	28000	0.6	8	7.8
Middle Pond	43700	1.0	24000	0.6	8	6.2
South Pond	150300	3.5	78000	1.8	8	21.0
Totals:		1.3		0.6		7.8

Pond Volume > WQv

Pond	WQv	Check
7.8	2.5	Yes

Pond Volumes were estimated using a depth of 8' of water surface with 3:1 sideslopes below the static water surface. The existing pond volumes far exceed the water quality volume needed for the entire western Hawthorne residential and commercial plat(s).

NOTES: There is no FEMA SFHA located on this property as of this date per FEMA FIRM Panels 377 & 385 of 700, for Derby, Sedgwick County, Kansas; effective February 2, 2007.

Detention, water quality, and channel protection will be provided in the offsite Hawthorne Addition lake and drainage system. This property was originally proposed to be commercial with its runoff to be conveyed to the east pond via the existing SWS onsite. This property was included in the detention facilities to the east in Hawthorne Addition.

DRAINAGE PLAN

HAWTHORNE 5TH ADDITION

31 MAR 2014

Baughman Company, P.A.
315 Ellis St. Wichita, KS 67211 P 316-262-7271 F 316-262-0149
ENGINEERING | SURVEYING | PLANNING | LANDSCAPE ARCHITECTURE

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HAWTHORNE 5TH ADDITION

0 75 150 300 Feet

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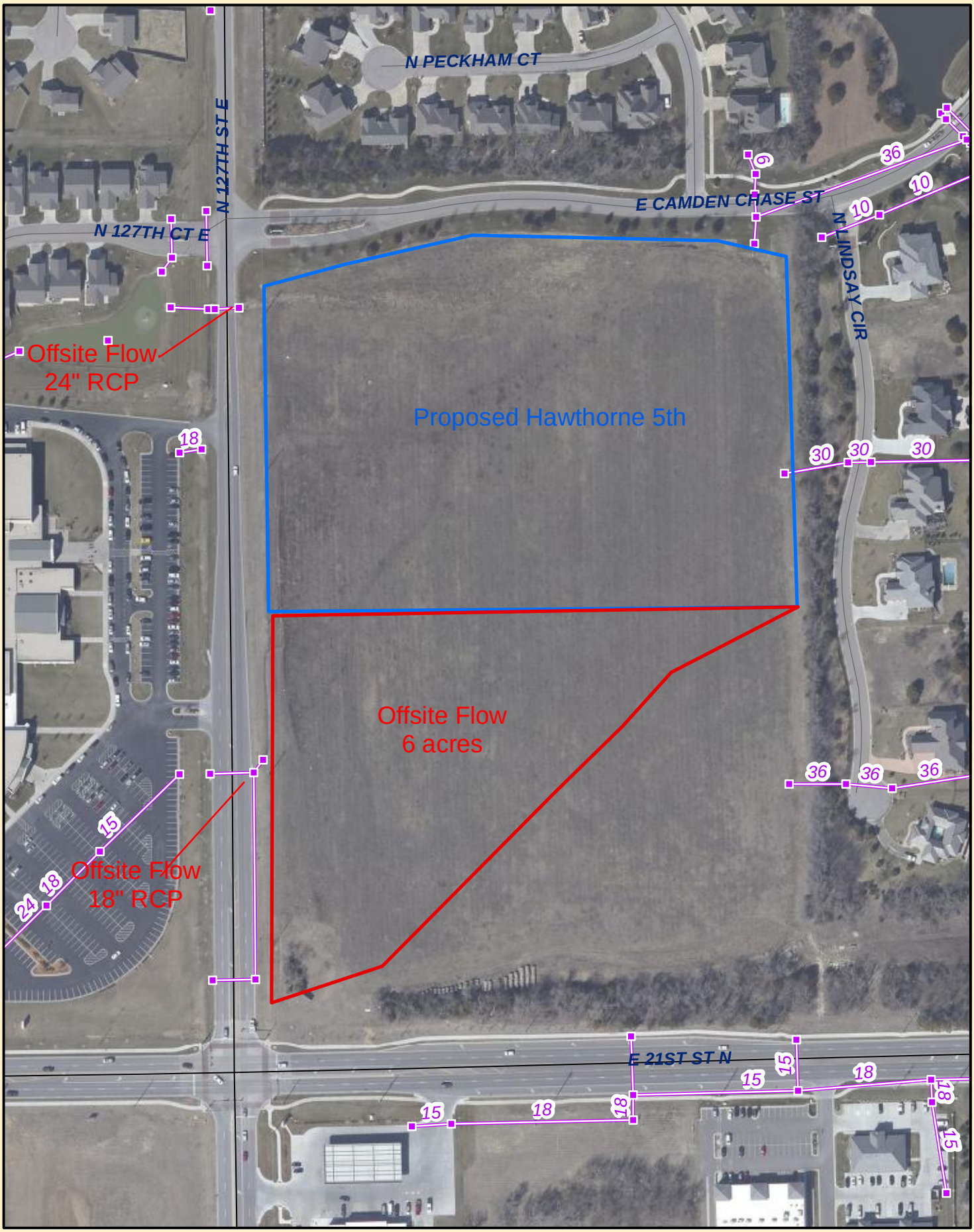

HAWTHORNE 5TH ADDITION

0 50 100 200 Feet

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APPENDIX A: USGS Soils Survey

APPENDIX B: HydraFlow SWS
Onsite System(s)

APPENDIX C: HydraFlow Express
Offsite Channel

APPENDIX C: Water Quality Worksheet

USGS Soils Survey

Hydrologic Soil Group—Sedgwick County, Kansas
(Hawthorne 5th)

MAP LEGEND

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

Soils

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Sedgwick County, Kansas
Survey Area Data: Version 9, Dec 10, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 18, 2010—Sep 27, 2011

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

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Sedgwick County, Kansas (KS173)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
3911	Rosehill silty clay, 1 to 3 percent slopes	D	16.7	88.6%
4671	Irwin silty clay loam, 1 to 3 percent slopes	D	2.2	11.4%
Totals for Area of Interest			18.9	100.0%

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

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

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

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

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie. The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Component Percent Cutoff: None Specified

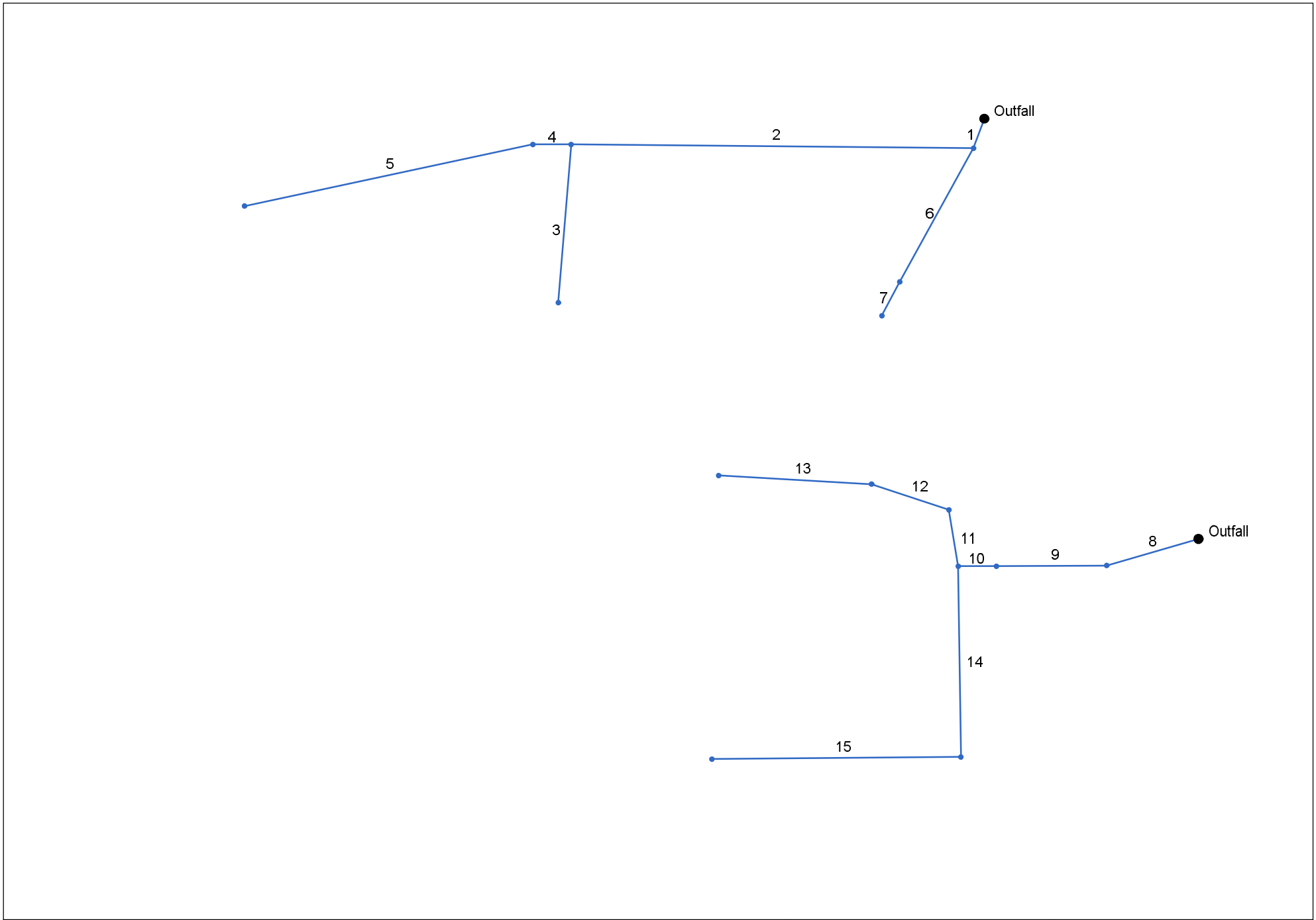
Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Higher

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

HydraFlow SWS
Onsite System(s)

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2013 Plan



Project File: Hawthorne SWS.stm	Number of lines: 15	Date: 4/1/2014

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
15	14	260.000	90.349	DrGrt	0.00	1.00	0.60	15.0	1362.34	0.82	1364.48	15	Cir	0.013	1.00	1371.00	
14	10	200.000	-90.854	DrGrt	0.00	0.30	0.60	15.0	1358.87	1.74	1362.34	15	Cir	0.013	1.50	1368.00	
13	12	160.000	-15.201	DrGrt	0.00	1.30	0.60	15.0	1359.34	0.44	1360.04	15	Cir	0.013	1.00	1365.00	
12	11	85.000	-62.230	DrGrt	0.00	0.60	0.60	15.0	1359.06	0.32	1359.34	15	Cir	0.013	0.50	1364.00	
11	10	60.000	80.665	MH	0.00	0.00	0.60	15.0	1358.87	0.33	1359.06	15	Cir	0.013	0.90	1366.00	
10	9	40.000	0.394	Curb	0.00	1.00	0.60	15.0	1358.01	0.26	1358.12	24	Cir	0.013	1.50	1365.60	
9	8	115.000	15.835	Curb	0.00	1.10	0.60	15.0	1357.72	0.25	1358.01	24	Cir	0.013	0.50	1365.60	
8	End	100.000	163.771	DrGrt	0.00	0.60	0.60	15.0	1355.80	1.42	1357.22	30	Cir	0.013	0.50	1361.50	
7	6	40.000	-0.959	Curb	0.00	0.80	0.60	15.0	1357.65	0.69	1357.93	15	Cir	0.013	1.00	1361.00	
6	1	160.000	8.777	Curb	0.00	0.60	0.60	15.0	1356.70	0.44	1357.40	18	Cir	0.013	0.50	1361.00	
5	4	308.000	-12.108	DrGrt	25.00	1.20	0.60	15.0	1357.22	0.20	1357.84	30	Cir	0.013	1.00	1369.80	
4	2	40.000	-0.545	DrGrt	0.00	0.50	0.60	15.0	1357.14	0.20	1357.22	30	Cir	0.013	0.50	1366.10	
3	2	166.565	-85.872	Curb	0.00	0.50	0.60	15.0	1358.39	0.44	1359.12	15	Cir	0.013	1.00	1367.00	
2	1	420.000	70.562	Curb	0.00	0.90	0.60	15.0	1355.80	0.20	1356.64	36	Cir	0.013	1.57	1364.80	
1	End	33.000	109.983	DrGrt	0.00	1.30	0.60	15.0	1355.70	0.30	1355.80	36	Cir	0.013	2.11	1360.12	

Project File: Hawthorne SWS.stm

Number of lines: 15

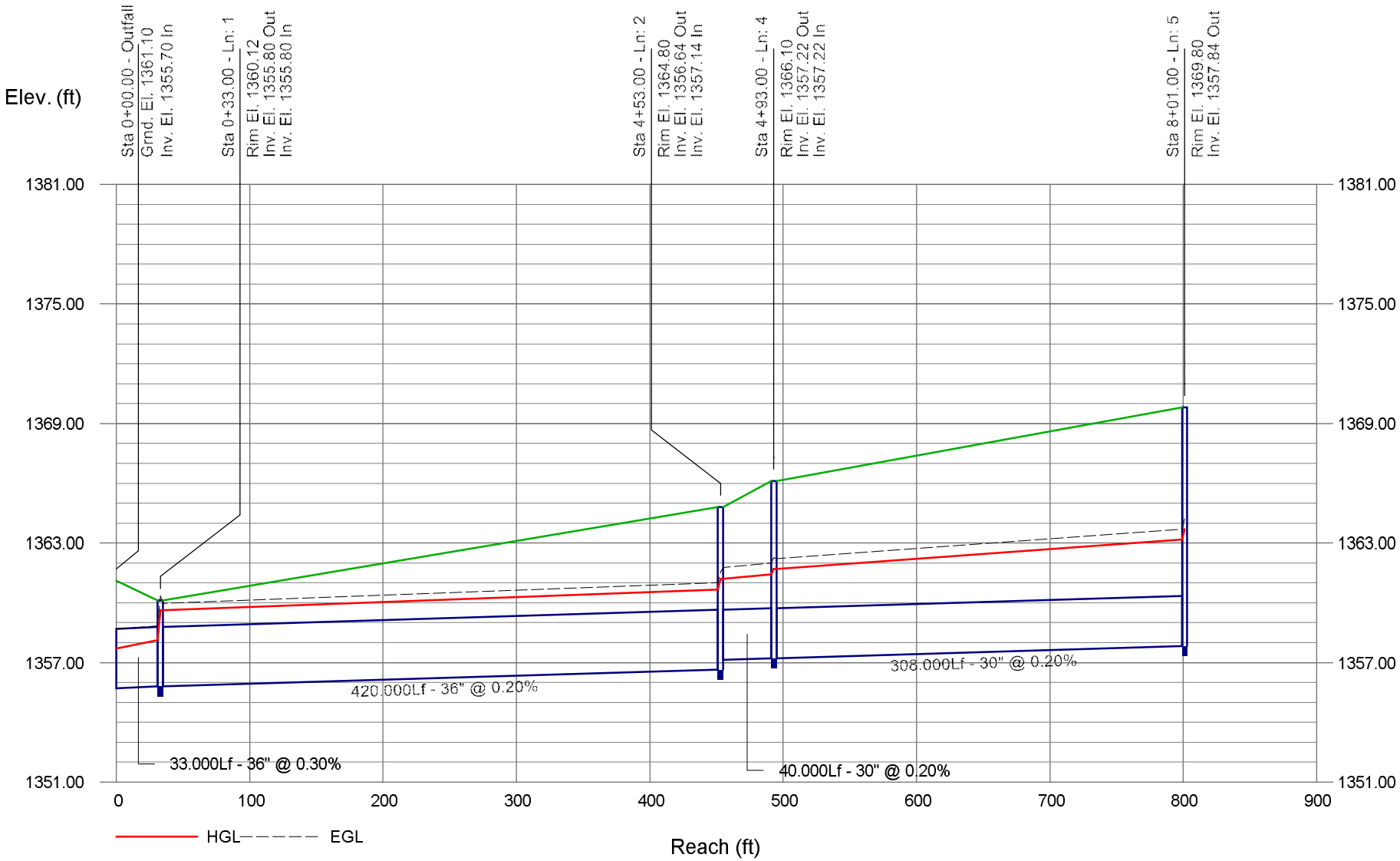
Date: 4/1/2014

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
15		DropGrate	1371.00	Cir	4.00	4.00	15	Cir	1364.48			
14		DropGrate	1368.00	Cir	4.00	4.00	15	Cir	1362.34	15	Cir	1362.34
13		DropGrate	1365.00	Cir	4.00	4.00	15	Cir	1360.04			
12		DropGrate	1364.00	Cir	4.00	4.00	15	Cir	1359.34	15	Cir	1359.34
11		Manhole	1366.00	Cir	4.00	4.00	15	Cir	1359.06	15	Cir	1359.06
10		Curb-	1365.60	Cir	4.00	4.00	24	Cir	1358.12	15 15	Cir Cir	1358.87 1358.87
9		Curb-	1365.60	Cir	4.00	4.00	24	Cir	1358.01	24	Cir	1358.01
8		DropGrate	1361.50	Cir	4.00	4.00	30	Cir	1357.22	24	Cir	1357.72
7		Curb-	1361.00	Cir	4.00	4.00	15	Cir	1357.93			
6		Curb-	1361.00	Cir	4.00	4.00	18	Cir	1357.40	15	Cir	1357.65
5		DropGrate	1369.80	Cir	4.00	4.00	30	Cir	1357.84			
4		DropGrate	1366.10	Cir	4.00	4.00	30	Cir	1357.22	30	Cir	1357.22
3		Curb-	1367.00	Cir	4.00	4.00	15	Cir	1359.12			
2		Curb-	1364.80	Cir	4.00	4.00	36	Cir	1356.64	15 30	Cir Cir	1358.39 1357.14
1		DropGrate	1360.12	Cir	4.00	4.00	36	Cir	1355.80	36 18	Cir Cir	1355.80 1356.70

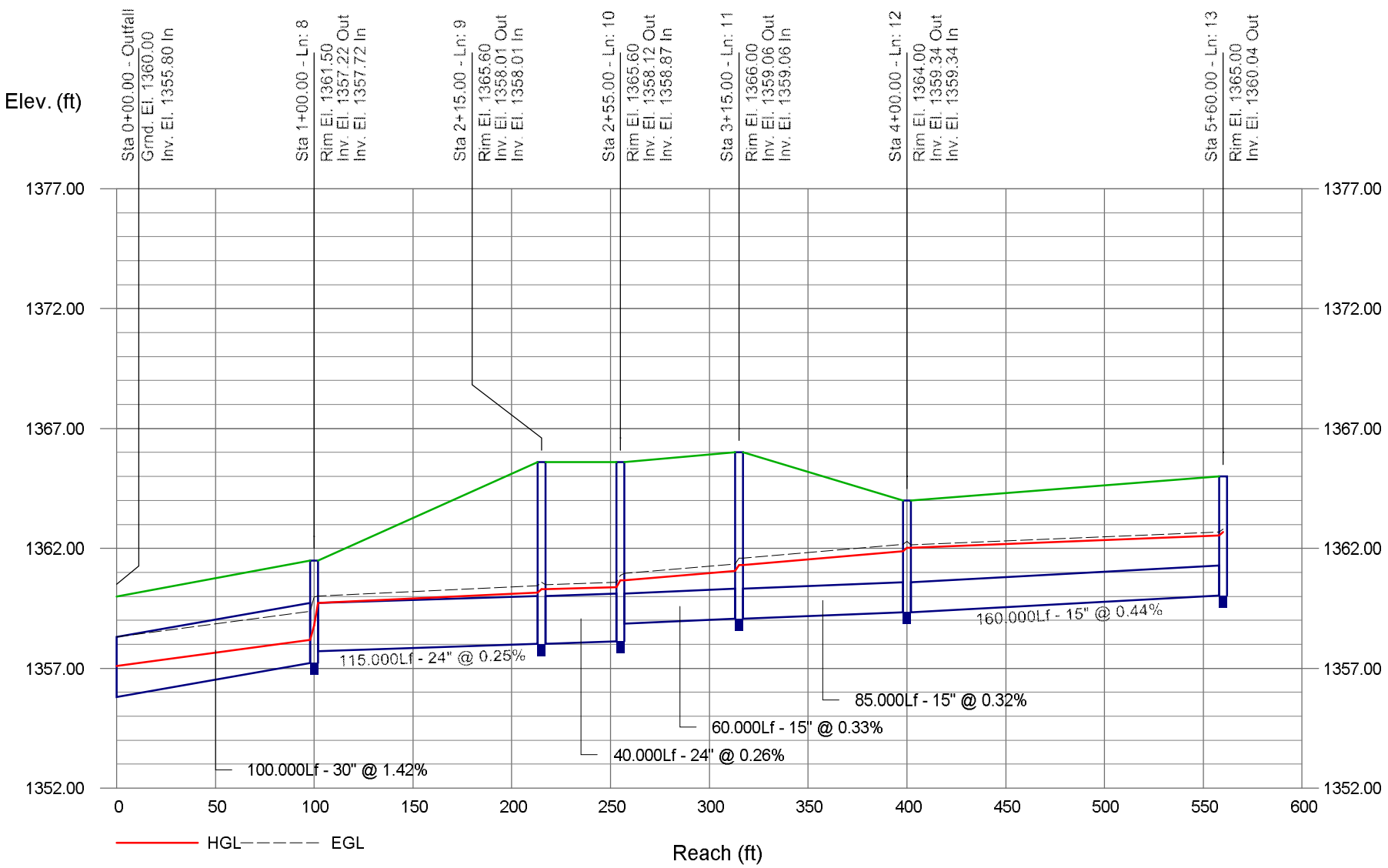
Storm Sewer Profile

Proj. file: Hawthorne SWS.stm



Storm Sewer Profile

Proj. file: Hawthorne SWS.stm



HydraFlow Express
Offsite Channel

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Tuesday, Apr 1 2014

<Name>

Trapezoidal

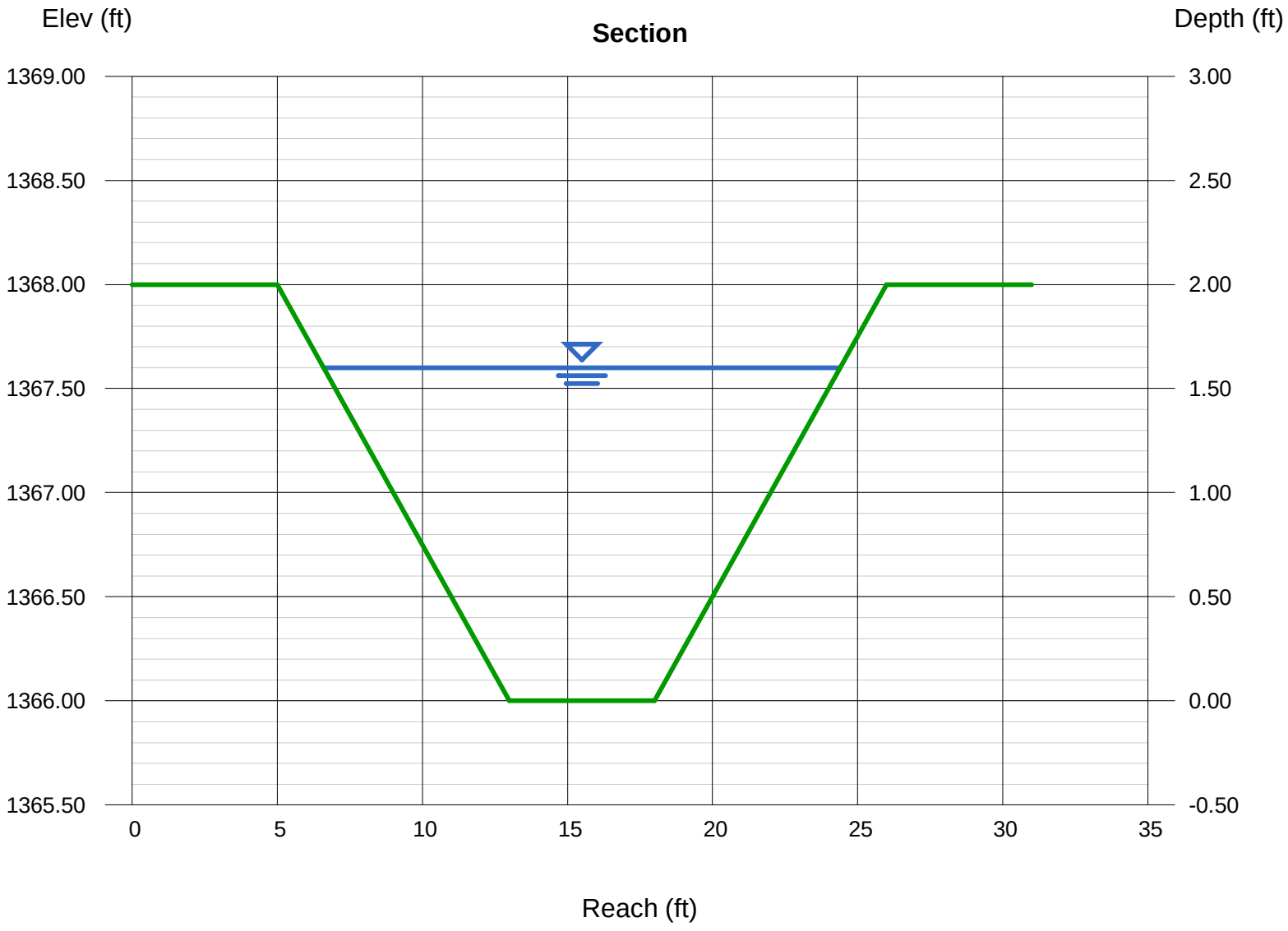
Bottom Width (ft)	= 5.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 1366.00
Slope (%)	= 1.00
N-Value	= 0.022

Calculations

Compute by:	Q vs Depth
No. Increments	= 10

Highlighted

Depth (ft)	= 1.60
Q (cfs)	= 123.41
Area (sqft)	= 18.24
Velocity (ft/s)	= 6.77
Wetted Perim (ft)	= 18.19
Crit Depth, Yc (ft)	= 1.74
Top Width (ft)	= 17.80
EGL (ft)	= 2.31



Depth	Q	Area	Veloc	Wp	Yc	TopWidth
(ft)	(cfs)	(sqft)	(ft/s)	(ft)	(ft)	(ft)
0.20	2.445	1.160	2.11	6.65	0.19	6.60
0.40	8.307	2.640	3.15	8.30	0.40	8.20
0.60	17.51	4.440	3.94	9.95	0.62	9.80
0.80	30.30	6.560	4.62	11.60	0.84	11.40
1.00	46.98	9.000	5.22	13.25	1.06	13.00
1.20	67.85	11.76	5.77	14.90	1.29	14.60
1.40	93.22	14.84	6.28	16.54	1.51	16.20
1.60	123.4	18.24	6.77	18.19	1.74	17.80
1.80	158.7	21.96	7.23	19.84	1.97	19.40
2.00	199.4	26.00	7.67	21.49	2.00	21.00

Water Quality Worksheet

Table 4-13 Volumetric Runoff Coefficients by Land Use and Hydrologic Soil Group

Land Use	Hydrologic Soil Group				Land Use	Hydrologic Soil Group			
	A	B	C	**D**		A	B	C	**D**
Undisturbed	0.02	0.03	0.04	**0.05**	Undisturbed	55	71	80	**84**
Turf or Disturbed Soils	0.15	0.20	0.22	**0.25**	Turf or Disturbed Soils	71	80	84	**88**
Impervious Cover	0.95	0.95	0.95	**0.95**	Impervious Cover	98	98	98	**98**

Basin	Weighted Volumetric Runoff Coef. (R_v) (eq. 4-24*)										WQ_v ft^3
	Undist.	Dist.	Red. Imp.	New Imp.	Totol	U	D	Redev. I	I	R_v	
#	ft^2	ft^2	ft^2	ft^2	Area ft^2	%	%	%	%	%	eq. 4-25*
Total Site	*0*	*252,600*	*0*	*252,600*	505,200	0.000	0.125	0.000	0.475	**0.6000**	**30,312**
Hawthorne*	*2,010,000*	*770,000*	*0*	*260,000*	3,040,000	0.119	0.063	0.000	0.081	**0.2639**	**80,235**
											110,547

* Hawthorne basin is the westernmost basin into the western pond system. Values based on aerials and approximations of land cover.

Pond Volume Below Static Pool

Basin	Static		Pond Bottom Area		Depth	Volume
	Sq.Ft.	Acre	Sq. Ft.	Acre	Feet	Acre-Ft.
North Pond	57000	1.3	28000	0.6	8	7.8
Middle Pond	43700	1.0	24000	0.6	8	6.2
South Pond	150300	3.5	78000	1.8	8	21.0
Totals:		1.3		0.6		7.8

Pond Volume > WQv		
Pond	WQv	Check
7.8	2.5	**Yes**

Pond Volumes were estimated using a depth of 8' of water surface with 3:1 sideslopes below the static water surface. The existing pond volumes far exceed the water quality volume needed for the entire western Hawthorne residential and commercial plat(s).

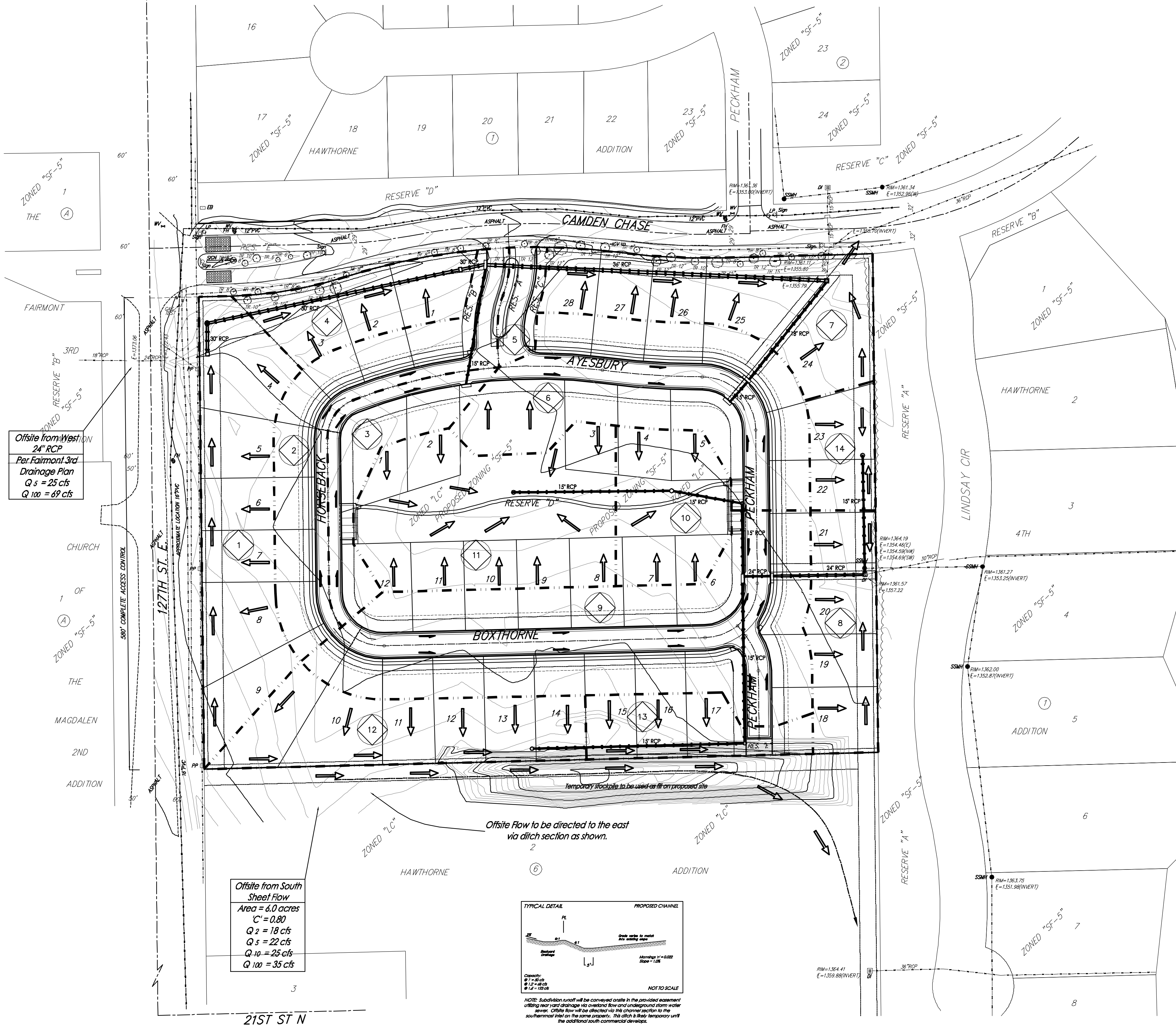
Drainage Plan

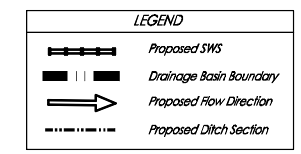
1:100 Scale

DRAINAGE PLAN

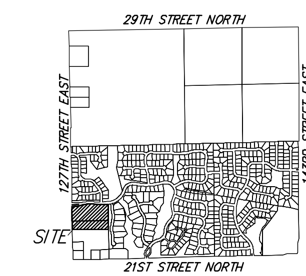
HAWTHORNE 5TH ADDITION

WICHITA, SEDGWICK COUNTY, KANSAS





RESERVE "A" IS RESERVED FOR OPEN SPACE, LANDSCAPING, STREETS, DRAINAGE PURPOSES, ENTRY MONUMENTS AND UTILITIES.
RESERVES "B" & "C" ARE RESERVED FOR OPEN SPACE, LANDSCAPING, ENTRY MONUMENTS, SCREENING WALLS, DRAINAGE PURPOSES AND UTILITIES AS CONFINED TO EASEMENTS.
RESERVE "D" IS RESERVED FOR OPEN SPACE, LANDSCAPING, SIDEWALKS, DRAINAGE PURPOSES, BERMS, GAZEBOS, PARKING, UTILITIES AS CONFINED TO EASEMENTS, ENTRY MONUMENTS, FENCES, PLAYGROUNDS, A CLUBHOUSE AND RELATED APPURTENANCES, AND NEIGHBORHOOD SWIMMING POOL AND RELATED APPURTENANCES. THERE SHALL BE NO BUILDING SETBACK REQUIREMENTS IN SAID RESERVE "D" ALONG ANY PUBLIC RIGHTS-OF-WAY. THE PARKING EASEMENTS WITHIN WITHIN SAID RESERVE "D" SHALL BE USED EXCLUSIVELY FOR RESIDENTIAL PARKING. NO OBSTRUCTIONS SHALL BE CONSTRUCTED OR PLACED ON OR WITHIN THE PARKING EASEMENT IN SAID RESERVE "D". RESERVE "E" IS RESERVED FOR OPEN SPACE, LANDSCAPING, DRAINAGE PURPOSES, UTILITIES AS CONFINED TO EASEMENT, AND WALLS AS CONFINED TO EASEMENT.



VICINITY MAP

SEC. 2, T27S, R2E

Developed	2yr	10yr	100yr
Intensity	3.8	5.19	7.36
Rational C	0.5	0.6	0.7

Basin ID	Area	Developed Flowrates		
		2-yr	10-yr	100-yr
	acres	cfs	cfs	cfs
1	1.2	2.2	3.6	5.9
2	0.9	1.7	2.8	4.6
3	0.5	1.0	1.6	2.6
4	0.5	1.0	1.6	2.6
5	0.2	0.3	0.5	0.8
6	1.4	2.7	4.4	7.2
7	1.3	2.5	4.0	6.7
8	0.6	1.1	1.9	3.1
9	2.1	4.0	6.5	11
10	0.6	1.1	1.9	3.1
11	1.3	2.5	4.0	6.7
12	0.8	1.5	2.5	4.1
13	0.3	0.6	0.9	1.5
14	0.3	0.6	0.9	1.5
TOTAL	11.9	22.6	37.1	61.3

Table 4-13 Volumetric Runoff Coefficients by Land Use and Hydrologic Soil Group

Land Use	Hydrologic Soil Group				Land Use	Hydrologic Soil Group			
	A	B	C	D		A	B	C	D
Undisturbed	0.02	0.03	0.04	0.05	Undisturbed	55	71	80	84
Turf or Disturbed Soils	0.15	0.20	0.22	0.25	Turf or Disturbed Soils	71	80	84	88
Impervious Cover	0.95	0.95	0.95	0.95	Impervious Cover	98	98	98	98

Basin	Weighted Volumetric Runoff Coeff. (R_v) (eq. 4-24*)										WQ, ft³
	Undist.	Dist.	Red. Imp.	New Imp.	Total	U	D	Redev. I	I	R_v	
#	ft²	ft²	ft²	ft²	Area ft²	%	%	%	%	%	eq. 4-25*
Total Site	0	352,600	0	352,600	505,200	0.000	0.125	0.000	0.475	0.6000	30,312
Hawthorne*	3,816,000	776,000	0	388,000	5,040,000	0.119	0.069	0.000	0.081	0.3026	80,235
											110,547

* Hawthorne basin is the westernmost basin into the western pond system. Values based on aerials and approximations of land cover.

Pond Volume Below Static Pool

Basin	Static		Pond Bottom Area		Depth	Volume
	Sq.Ft.	Acre	Sq. Ft.	Acre	Feet	Acre-Ft.
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South Pond	150300	3.5	78000	1.8	8	21.0
Totals:		1.3		0.6		7.8

Pond Volume > WQv

Pond	WQv	Check
7.8	2.5	Yes

Pond Volumes were estimated using a depth of 8' of water surface with 3:1 sideslopes below the static water surface. The existing pond volumes far exceed the water quality volume needed for the entire western Hawthorne residential and commercial plat(s).

NOTES: There is no FEMA SFHA located on this property as of this date per FEMA FIRM Panels 377 & 385 of 700, for Derby, Sedgwick County, Kansas; effective February 2, 2007.

Detention, water quality, and channel protection will be provided in the offsite Hawthorne Addition lake and drainage system. This property was originally proposed to be commercial with its runoff to be conveyed to the east pond via the existing SWS onsite. This property was included in the detention facilities to the east in Hawthorne Addition.

DRAINAGE PLAN

HAWTHORNE 5TH ADDITION

31 MAR 2014

Baughman Company, P.A.
315 Ellis St. Wichita, KS 67211 P 316-262-7271 F 316-262-0149
ENGINEERING | SURVEYING | PLANNING | LANDSCAPE ARCHITECTURE

E:\PROJECTS\HAWTHORNE PATIO HOMES ADDITION_1401-P014\WATER RESOURCES\HUTTON HAWTHORNE PATIO__DRAIN PLAN.DWG