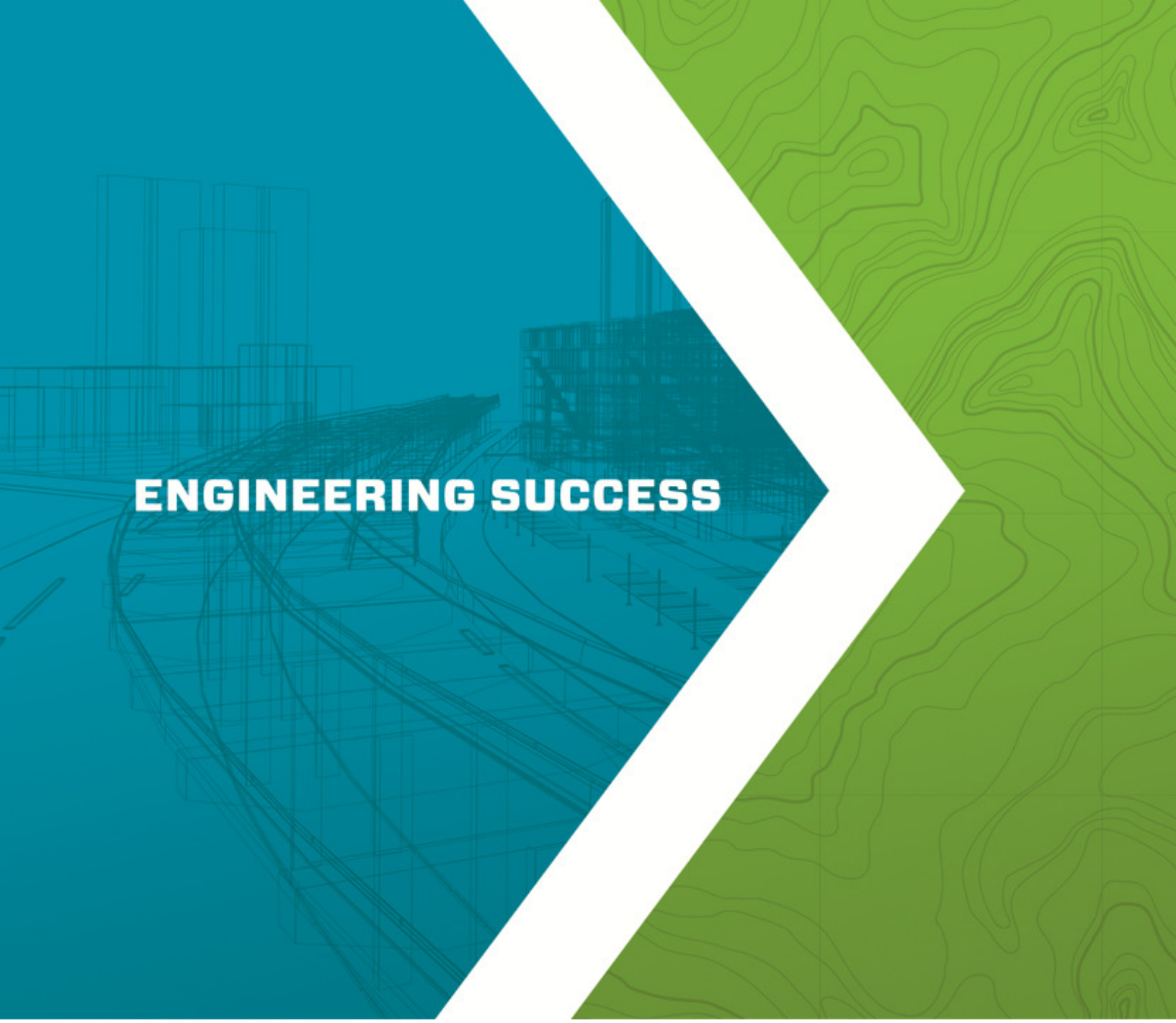


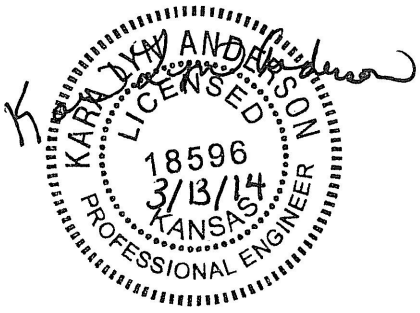
PRELIMINARY DRAINAGE REPORT FOR

Tallgrass Villas Addition
Wichita, Kansas

MKEC

411 N. Webb Rd.
Wichita, KS 67206
316.684.9600

PROJECT NUMBER: 1301010787
DATE: March 2014



City of Wichita/Sedgwick County
Subdivision Drainage Plan Checklist

Submit completed forms to:
City of Wichita Public Works & Utilities, 455 N. Main 8th Floor, Wichita KS 67202; or
Sedgwick County Stormwater Management, 1144 S. Seneca, Wichita KS 67213.

Project Name:	Tallgrass Villas Addition				
Total Area of Project:	0.7 **acres**				
Development Type:	Residential	**Other:**			
Developer Name:	Perfection Builders	**Contact:**	Scott Lehner	**Phone:**	(316) 641-2081
Email:	scott@perfectionbuilders.com				
Engineer Name:	MKEC Engineering, Inc.	**Contact:**	Kara Anderson	**Phone:**	(316) 684-9600
Email:	kanderson@mkec.com				

Directions:

(1) Fill-out this checklist completely and include it with the Drainage Plan submittal. This checklist should be included in the bound copy, behind the cover sheet for the submittal. Incomplete Drainage Plans and checklists will not be accepted.

*(2) Indicate whether a plan element is included or not included in the submittal by choosing "**Yes**" or "**No**" from the dropdown list in the **"Element Included?**" column. The question must be answered for every plan element for this checklist to be considered complete. An explanation must be provided for all **"No"** answers.*

Drainage Plan Checklist

#	Plan Element Description	Element Included?	Explanation/Notes
1.0	**General**		
1.1	Digital copy of drainage plan, including preliminary Master Grading Plan, preliminary plat and proposed plat, in PDF format and one half size, bound, paper copy.	yes	
1.2	Professional Engineer's seal, signature and date on plan cover.	yes	
1.3	Site location map, using color ortho-imagery and showing the project boundaries, a north arrow and an accurate scale.	yes	
1.4	Narrative of the development type, existing conditions and proposed impacts on stormwater runoff, wetlands, riparian zones and floodplains/floodways.	yes	
1.5	Discussion of off-site conditions surrounding the proposed development.	yes	
1.6	Summary table of runoff calculations (pre/post development).	yes	
1.7	Narrative description of the type and function of the permanent structural stormwater management facilities.	yes	
2.0	**Existing Conditions Information**		
2.1	**Existing Conditions Drainage Map**		
2.1.1	On-site and off-site topography: NAVD 88 datum, one-foot contours with spot elevations	yes	
2.1.2	On-site and off-site drainage features, including perennial and intermittent streams (with names labeled), conveyance systems such as open channels, ditches, swales and areas of overland flow. Flow direction must be indicated by arrows.	yes	
2.1.3	Storm sewer system components, including storm drains, inlets, catch basins, gutters, manholes, headwalls, pipes and culverts. Material and size must be noted for all pipes and culverts.	yes	
2.1.4	Location and boundaries of natural features such as wetlands, lakes, ponds with the normal water elevation noted, rock outcroppings, wooded areas and tree rows.	yes	
2.1.5	Location, dimensions and elevations of existing bridges and culvert crossings.	yes	
2.1.6	Location of existing utilities (e.g., water, sewer, gas, electric, cable, etc.) with labels and easement boundaries.	yes	
2.1.7	Groundwater elevations, if applicable.	yes	
2.1.8	Delineation of predominant soil based on USDA soil surveys and/or on-site soil borings; indicate NRCS soil name and Hydrologic Soil Group for undisturbed surface soils.	yes	
2.1.9	Land use types per NRCS nomenclature.	yes	
2.1.10	Footprint of existing impervious areas (labeled, area given in acres).	yes	
2.1.11	Internal drainage subbasin boundaries used for hydrologic calculations (labeled with ID, total area in acres, impervious area in acres and curve number).	yes	
2.1.12	Time of concentration flow paths. Indicate and label each segment separately (i.e., overland flow, shallow concentrated, channel1, channel2, etc.). For each segment, provide the appropriate data to calculate Tc (e.g., length, slope, cover type, paved/unpaved, roughness parameters, geometric properties, etc.).	yes	
2.2	**Existing Conditions Hydrology and Hydraulics Analysis**		

Drainage Plan Checklist			
#	Plan Element Description	Element Included?	Explanation/Notes
2.2.1	Narrative of the hydrologic analysis methodology used (e.g., unit hydrograph or other approved methods).	yes	
2.2.2	A summary table of drainage subbasin hydrologic parameters (subbasin ID, area in acres, curve number, Tc, etc.).	yes	
2.2.3	Table of existing condition runoff curve numbers with supporting data and calculations.	yes	
2.2.4	Table of existing condition times of concentration with supporting data and calculations.	yes	
2.2.5	A summary table of rainfall data used in the hydrologic analysis, and a reference for the source of the data.	yes	
2.2.6	Cross-sections and other diagrams of existing open channels, bridge and culvert sections and other hydraulic features as required to illustrate the basis for hydraulic analysis.	N/A	
2.2.7	Hydrologic and hydraulic analyses for runoff rates, volumes, velocities and elevations. Provide supporting data not specified above and identify assumptions. Include detailed calculations for the 2, 5, 10, 25 & 100-year, 24-hour storm events. Provide results in a tabular form. Provide digital copies of any computer files and models used.	yes	
3.0	**postdevelopment Conditions Information**		
3.1	**postdevelopment Conditions Drainage Map**		
3.1.1	Proposed project boundary.	yes	
3.1.2	on-site and off-site topography: NAVD 88 datum, one-foot contours with spot elevations.	yes	
3.1.3	Existing on-site and off-site drainage features that are to remain after development, including perennial and intermittent streams (with names labeled), conveyance systems such as open channels, ditches, swales and areas of overland flow. Flow direction must be indicated by arrows.	yes	
3.1.4	Location and description of off-site through-drainage conveyances which are confined to an easement, dedication and/or reserve.	yes	
3.1.5	Footprint of proposed impervious areas, including roads, parking lots, buildings and other structures.	yes	
3.1.6	Location of proposed utilities (e.g., water, sewer, gas, electric, cable, etc.) with labels and easement boundaries.	yes	
3.1.7	Delineation of predominant soils, based on anticipated soil textures and NRCS guidelines if different from predevelopment soil conditions; indicate NRCS soil name and Hydrologic Soil Group for surface soils.	yes	
3.1.8	Land use cover per NRCS nomenclature.	yes	
3.1.9	Internal drainage subbasin boundaries used for hydrologic calculations (labeled with ID, total area in acres, impervious area in acres and curve number).	yes	
3.1.10	Proposed limits of land disturbing activity (i.e., grading limits).	yes	
3.1.11	Time of concentration flow paths. Indicate and label each segment separately (i.e., overland flow, shallow concentrated, channel1, channel2, etc.). For each segment, provide the appropriate data to calculate Tc (e.g., length, slope, cover type, paved/unpaved, roughness parameters, geometric properties, etc.).	yes	
3.2	**Proposed Conveyances Map**		
3.2.1	on-site and off-site drainage features, including perennial and intermittent streams (with names labeled), proposed conveyance systems (such as open channels, ditches, swales and areas of overland flow, including backyard drainage). Flow direction must be indicated by arrows.	yes	
3.2.2	Storm sewer system components, including storm drains, inlets, catchbasins, gutters, manholes, headwalls, pipes and culverts. Material and size must be noted for all pipes and culverts.	yes	
3.2.3	For any subbasin or drainage area > 40 acres, show that the stormwater flow is confined to an open channel with required side benches and freeboard, or conformance to applicable policy and design requirements if partially enclosed.	yes	
3.2.4	Location(s) of stormwater management facilities and any associated drainage easements.	yes	
3.2.5	Proposed energy dissipaters and other channel protection devices.	yes	
3.2.6	Location(s) and dimension(s) of proposed channel, bridge and culvert crossings.	yes	
3.2.7	Normal pool and 100-year pool elevations for ponds and lakes.	yes	
3.2.8	Permanent concrete outfall control structure(s) for ponds.	yes	
3.2.9	Emergency overflow spillways and top of berm elevations for ponds and other volume/peak discharge control facilities.	yes	
3.2.10	Floodplains, ponds, and stormwater management facilities located in reserves.	yes	
3.3	**postdevelopment Conditions Hydrology & Hydraulics**		
3.3.1	Narrative of the hydrologic analysis methodology used (e.g., unit hydrograph or other approved methods).	yes	

Drainage Plan Checklist			
#	Plan Element Description	Element Included?	Explanation/Notes
3.3.2	A summary table of drainage subbasin hydrologic parameters (subbasin ID, area in acres, curve number, Tc, etc.).	yes	
3.3.3	Table of postdevelopment condition runoff curve numbers with supporting data and calculations.	yes	
3.3.4	Table of postdevelopment condition times of concentration with supporting data and calculations.	yes	
3.3.5	Cross-sections and other diagrams of existing open channels, bridge and culvert sections and other hydraulic features as	N/A	
3.3.6	Hydrologic and hydraulic analyses for runoff rates, volumes, velocities and elevations. Provide supporting data not specified above and identify assumptions. Include detailed calculations for the 2, 5, 10, 25 & 100-year, 24-hour storm events. Provide results in a tabular form. Provide digital copies of any computer files and models used.	yes	
3.3.7	Downstream peak discharge assessment (10% Rule) results and supporting data and calculations. Provide digital copies of any computer files and models used.	yes	
3.3.8	Stage-storage-discharge or other outlet rating curves and inflow/outflow hydrographs for all ponds.	yes	
3.3.9	Demonstrate that the pond contours on the master grading plan and the stage-storage-discharge data are consistent for all ponds.	yes	
3.3.10	Demonstrate that all ponds have one foot of freeboard above the 100-year, 24-hour high water level.	yes	
3.3.11	Demonstrate that runoff from the proposed project site is discharged in the same manner as prior to development, using level spreaders, energy dissipaters, other devices or grading as required, or identify an appropriate flowage easement.	yes	
3.4	**Stormwater Quantity Control Sizing**		
3.4.1	Hydraulic sizing calculations for all stormwater management controls.	N/A	
3.4.2	Table(s) listing all stormwater management controls. Present the types, sizes, elevations, flows, velocities and depths for each control, as applicable. Verify that velocities are self-cleaning and non-erosive.	N/A	
3.4.3	Typical details (including cross-sections where applicable) for outlet structures, embankments, spillways, grade control structures, conveyance channels, etc.	N/A	
3.5	**Stormwater Quality Management Facilities**		
3.5.1	Table(s) listing all stormwater management facilities. Present the description, % TSS removal value, water quality volume handled, contributing drainage area in acres and contributing impervious area in acres.	N/A	
3.5.2	Indicate the responsible party for maintenance, as shown in the plat text (i.e., Home Owners Association, Lot Owners Association, property owner, etc.).	N/A	
3.5.3	Water quality volume (total and by facility), with supporting data and calculations.	N/A	
3.5.4	% TSS removal value (total and by facility) with supporting data and calculation. Must be equal to or greater than 80%.	N/A	
3.5.5	Channel protection volume with supporting data and calculations.	N/A	
3.5.6	Water quality volume and channel protection volume orifice size calculations.	N/A	
3.5.7	Other calculations required for each stormwater management facility as specified in the Wichita/Sedgwick County Stormwater Manual.	N/A	
3.5.8	Typical details (including cross-sections where applicable) for outlet structures, embankments, internal grading, forebays and other siltation prefilters, filtration/infiltration media, vegetation, check dams, operational controls, etc.	N/A	
4.0	**Floodplains**		
4.1	Reference the source of flood profile, floodplain, floodway and stream discharge information.	yes	
4.2	Delineation of nearest base flood elevations.	yes	
4.3	Delineation of predevelopment regulatory floodplain/floodway limits using FEMA's current GIS database; limits to be per elevation and scaled location.	yes	
4.4	Delineation of postdevelopment regulatory floodplain/floodway limits; limits to be per elevation and scaled location, with project limits shown.	N/A	
4.5	Floodway data table and discharges.	N/A	
4.6	Hydrologic and hydraulic study information for local floodplain analysis, unnumbered Zone A elevation determinations and floodplain map revisions or required permits.	N/A	
4.7	Regulatory floodway and four natural profile models (10, 50, 100 and 500-year) for existing and postdevelopment conditions.	N/A	
4.8	Floodplains and floodways located within a reserve, where necessary.	yes	
4.9	Floodplain cut and fill calculations for volume sensitive basins.	N/A	

Drainage Plan Checklist			
#	Plan Element Description	Element Included?	Explanation/Notes
4.10	Demonstrate that floodway elevations and velocities do not increase due to construction in the floodway ("No Rise Certification").	N/A	
5.0	**Federal, State and Local Permits**		
5.1	US Army Corps of Engineers regulatory program permits (Section 404 permit)	no	
5.2	Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Floodplain Fill, Levee, Water Appropriations, Dam Safety permit, etc.).	no	
5.3	FEMA letters of map change/revision - LOMA, LOMR, LOMR-f, CLOMR, etc.; shall be included and approved when project modifies the limits of the floodplain/floodway.	N/A	
6.0	**Half Scale Preliminary Master Grading Plan**		
6.1	One set of plans and associated PDF of plans.	yes	
6.2	Professional Engineer's seal, signature and date.	N/A	Will be finalized with future plans.
6.3	Title block including subdivision name and phase and dated revision documentation.	N/A	
6.4	Future phases shown but cross-hatched as information only.	N/A	
6.5	Scale, not greater than 1-inch = 60 feet.	N/A	
6.6	North arrow.	N/A	
6.7	Index or legend key.	N/A	
6.8	Benchmarks (minimum of 2) used for site control (NAVD 88 vertical datum).	N/A	
6.9	Existing contours of entire site with contour interval of one foot.	N/A	
6.10	Proposed contours for channels, ponds, and other permanent stormwater management facilities, with contour interval of one foot.	N/A	
6.11	Spot elevations shown to the nearest tenth of a foot for critical locations, including lot and property boundaries.	N/A	
6.12	Proposed lot and street layout.	N/A	
6.13	Locations of underground storm drains.	N/A	
6.14	Overflow locations for storms exceeding storm drain capacity, with elevations.	N/A	
6.15	Top elevations of storm drains at all inlets, manholes, and flow line elevations for all outfalls.	N/A	
6.16	Locations of open ditches and lakes.	N/A	
6.17	Flow direction arrows.	N/A	
6.18	Proposed flow line elevations of all open ditches at maximum 100 foot intervals, and 100-year flood elevations thereon.	N/A	
6.19	Ponds: Location, bottom elevation, normal pool elevation, 100-year flood elevation, emergency overflow elevation.	N/A	
6.20	Proposed top-of-curb elevations at points where drainage will be required to flow over the curb.	N/A	
6.21	Platted minimum building opening elevation for each lot, in table form for all lots (excluding basement floor elevations).	N/A	
6.22	Standard foundation and elevation detail for slab on grade, full basement, view-out, partial view-out and/or walk-out construction.	N/A	
6.23	Top of foundation elevation for each lot.	N/A	
6.24	Notation for builders for each lot as to the type of structure that may be constructed and the view-out, walk-out or pad elevation, as applicable.	N/A	
6.25	Indicate that all lots are above the 100-year flood elevation.	N/A	
6.26	Indicate that grading around structures conforms to perimeter drainage requirements.	N/A	
6.27	Indicate that backyard drainage grading conforms to backyard drainage requirements.	N/A	
6.28	Adjacent subdivision lot lines, with lot labels and subdivision names.	N/A	
6.29	Boundaries and labels for all easements, rights-of-way and reserves.	N/A	
6.30	Statement on proposed final plat: "*A drainage plan has been developed for the subdivision and all drainage easements, rights-of-way, or reserves shall remain at the established grades and remain unobstructed to allow for the conveyance of stormwater.*"	N/A	
End of Checklist			

Table of Contents

General Information

Location

The subject property is in the City of Wichita, Sedgwick County, Kansas. The proposed development is north 0f 21st Street between Rock Road and Webb Road. The site is on Tallgrass Street. The development has an area of approximately 0.7 acres. The site lies in the southeast ¼, of the southwest ¼, Section 5, Township 27 South, Range 2 East. The site is shown on the USGS Quadrangle, Appendix A. The site is also shown on the Aerial Photograph, Appendix B.

Datum

The site is shown in NAVD 88 datum.

Soils

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

- Farnum Loam, 1 to 3 percent slopes, HSG "B"

The Hydraulic Soil Group (HSG) used to select runoff coefficients is "B".

Flood Insurance Rate Map (FIRM)

The site is shown on the FEMA FIRM Panels 20173C0376E effective February 2, 2007, Appendix D. The site is in Zone X (shaded), areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

The nearest 100-year floodplain is approximately 30' to the east of the site along the Middle Branch Gypsum Creek. The area is unstudied Zone A floodplain. The nearest studied floodplain is south of 21st Street with a studied elevation of 1372.2.

The floodplain adjacent to this site is going be revised with FEMA Maps scheduled to be released in 2015. A review of unofficial maps for this site shows that the BFE for this site is approximately 1376.5.

Groundwater

According to the Kansas Geological Survey Water Well Completion Records (http://www.kgs.ku.edu/Magellan/WaterWell/index.html) the static water level of existing water wells in the vicinity is10-30 feet deep.

Hydrologic Analysis

The rainfall depths used for the design storms are shown in Table 1.

Table 1. Rainfall Depths (inches) for 24-Hour Design Storms.

Design Storm	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	500-Yr
Sedgwick County	2.8	3.5	4.5	5.2	6.1	6.9	7.8	9.4

Existing Development

Description

The site is currently undeveloped and unplatted land. The site is currently open space adjacent to a golf course, the golf course club house, and adjacent to residential duplex units.

Land Use

The current land use of the site is open space. There is no impervious area on site. The curve number to represent the undeveloped conditions is 71.0. Curve numbers for the project were calculated in Excel, Appendix E.

Drainage Patterns

The site generally drains to the east into the Middle Branch Gypsum Creek.

Utilities

Sanitary Sewer

An existing 8" sanitary sewer line flows from east to west just north of the property as shown on the Drainage and Utility Plan, Appendix F. A service line to the Golf Course Maintenance facility crosses the site from south to north.

Water

An existing 36" water line is located along Tallgrass Street.

Storm Water

An existing 48" stormwater sewer pipe crosses the site from northwest to southeast. Near the east edge of the property is a manhole and the size of the pipe changes from 48" to 60"x36" elliptical pipe. The pipe outlets into Middle Branch Chisholm Creek.

Other Utilities

There are no other existing utilities onsite.

Proposed Development

Description

The proposed site will develop as one lot that will be used for a townhouse development that contains 6 units. The site is shown on the plat, Appendix F.

Land Use

The land use for the proposed site will be approximately 65 percent impervious for the residential townhouses. A curve number for the residential and commercial is 91.7. Curve numbers for the project were calculated in Excel, Appendix E.

Drainage Patterns

The proposed site will flow from west to east into the Middle Branch Gypsum Creek.

Downstream Peak Discharge Assessment (10% Rule)

The drainage area of Middle Branch Gypsum Creek at 21st Street North is 964 acres, Appendix H. When the Middle Branch Gypsum Creek intersects 21st Street North, the site is less than 1% percent of the drainage area, which is less than 10 percent.

At the confluence with Gypsum Creek, Middle Branch Gypsum Creek has a 100-year peak flow rate of 1,550 cfs according to the FEMA FIS report. The drainage basin to 21st Street is approximately half of this size; therefore the flow rate though this area should be roughly 775 cfs. A Hydraflow Hydrographs model was used to evaluate the effect of the site on the peak discharge to 21st Street North, Appendix I. The hydrograph for the basin to 21st Street used the estimated curve number of 91.7, Appendix E. The time of concentration of 450 minutes for the basin was selected to approximate the expected 775 cfs estimated from the FEMA FIS report. Time of concentration for the pre- and post- project site was used calculated using a spreadsheet, Appendix J. A summary of the results is shown in Table 2. Since the site does not increase peak flow rates to the Middle Branch Gypsum Creek, detention will not be provided.

Table 2. Peak Runoff to 21st Street (cfs) for 24-Hour Design Storms.

Design Storm	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Existing	231	308	429	508	627	717	796
Proposed	231	308	429	508	627	717	796

Water Quality

The site is less than 1 acre; therefore water quality is not required.

Channel Protection

The site is less than 1 acre; therefore channel protection volume is not required.

Permits

U.S. Army Corps of Engineers

The project is not affecting any jurisdictional waters of the U.S. or any wetlands. Permitting through the U.S. Army Corps of Engineers will not be required.

Kansas Department of Agriculture Division of Water Resources

The drainage area of the basin that flows through the project is less than 640 acres; therefore Water Structures permits will not be required.

There are no proposed ponds on site; therefore water appropriations permitting will not be required.

FEMA

The proposed project will not modify the FEMA floodplain. FEMA applications will not be required.

Kansas Department of Health and Environment

The site is less than 1 acre; therefore a notice of Intent (NOI) will not be required for review by KDHE for coverage under NPDES.

Utilities

Sanitary Sewer

The existing sanitary sewer line through the site will be removed and replaced. The proposed line will follow Tallgrass Street.

Water

There is no proposed water for the site. The existing water line on the west side of Tallgrass Street will serve the lot.

Stormwater Sewer

Existing stormwater sewer pipe through the site will be removed. Stormwater Sewer will be routed along the north and east side of the property. The stormwater sewer will be conveyed through a channel or through a pipe. The stormwater sewer system will be sized to convey the capacity of the existing pipe flowing into the proposed system. The system will tie into the existing pipe that outlets into Middle Branch Gypsum Creek and continue to outfall at the same location. Pipe sizes will be determined with site design.

Other Utilities

Easements are provided for electric, telephone, cable, and other utilities.

Minimum Pad Elevation

The minimum pad elevation has been established from the unofficial map changes proposed since it is the best available information. The minimum pad elevation of 1379.5 is set 3 feet above the approximate BFE for the site.

Lot Grading Plan

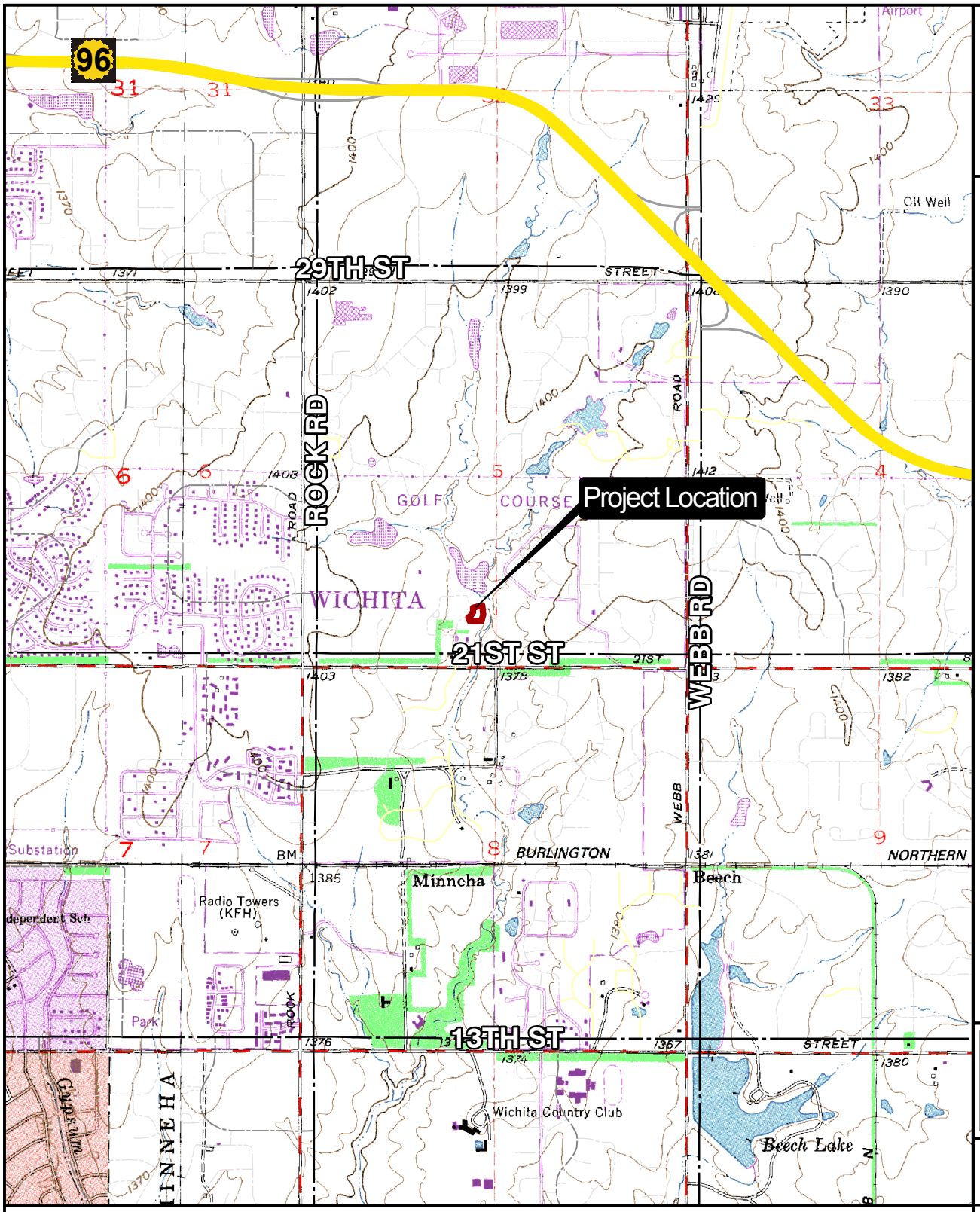
A four corner lot grading plan is included, Appendix K. The lot will match exiting grades and improvements around the perimeter.

Summary

The proposed Tallgrass Villas Addition is located in northeast Wichita north of 21st Street between Rock Road and Webb Road. The site is adjacent to the Middle Branch of Gypsum Creek. The site is currently undeveloped open space. The site will be develop as one lot with 6 residential townhouse units. The site will drain directly into the Middle Branch Gypsum Creek. Due to the proximity of the site to the River and the large drainage basin of the River, detention will not be provided and increased flow rates from the sit will not increase the peak flow rate of the Middle Branch Gypsum Creek.

On site storm water sewer will be removed and rerouted around the proposed lot. An open channel or a stormwater sewer pipe will be constructed to convey the runoff around the site.

Appendix A - USGS Quadrangle Map



MKEC

Wichita, KS · 316.684.9600

TALLGRASS VILLAS ADDITION

USGS QUAD EXHIBIT

SEC: 5
TWP: T27S
RNG: R2E

PROJECT NO.	1301010787
DATE	3/12/2014
SCALE	1"=2000'

DESIGNED	DRAWN	CHECKED
MKEC	MKEC	MKEC

NO.	REVISION	DATE

SHEET NO.
1 OF 1

Path: J:\Projects\2013\1301010787_Perfection - Tallgrass\5-Civil\GIS\USGS Quad Exhibit.mxd - Date: 3/12/2014

Appendix B - Aerial Photograph

SEC: 5
TWP: T27S
RNG: R2E

0 25 50 100
Feet

MKEC
Wichita, KS · 316.684.9600

AERIAL EXHIBIT

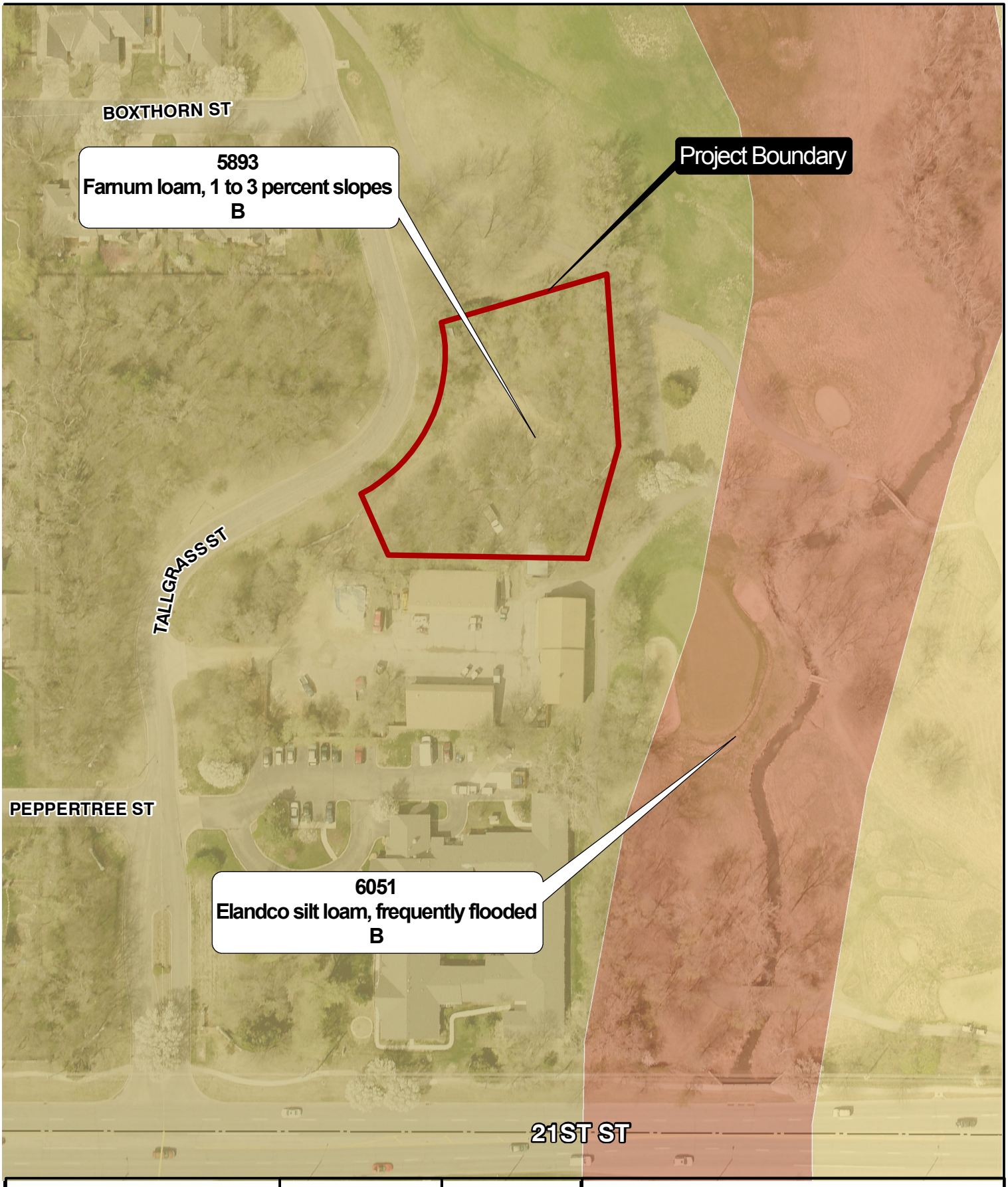
TALLGRASS VILLAS ADDITION

PROJECT NO.	DATE:	SHEET NO.
1301010787	3/12/2014	1 OF 1

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

Path: J:\Projects\2013\1301010787_Perfection - Tallgrass\5-Civil\GIS\Aerial Exhibit.mxd - Date: 3/12/2014

Appendix C - Soil Survey



SEC: 5
TWP: T27S
RNG: R2E

0 25 50 100
Feet

MKEC
Wichita, KS • 316.684.9600

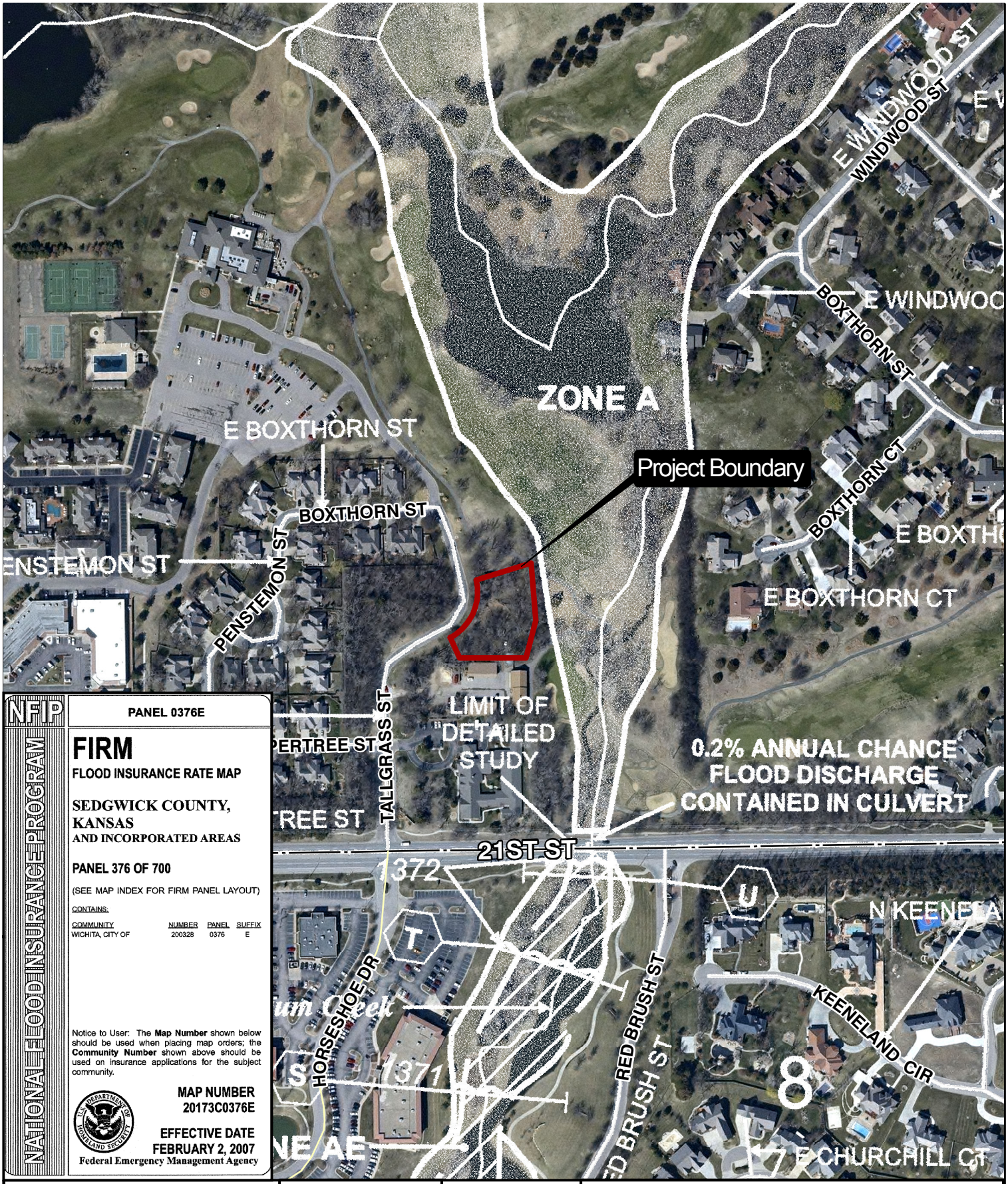
NRCS SOIL SURVEY EXHIBIT
TALLGRASS VILLAS ADDITION

PROJECT NO.	DATE:	SHEET NO.
1301010787	3/12/2014	1 OF 1

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

Path: J:\Projects\2013\1301010787_Perfection - Tallgrass\5-Civil\GIS\NRCS Soil Survey Exhibit.mxd - Date: 3/12/2014

Appendix D - Flood Insurance Rate Map (FIRM)



NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0376E

FIRM

FLOOD INSURANCE RATE MAP

SEDGWICK COUNTY, KANSAS
AND INCORPORATED AREAS

PANEL 376 OF 700

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WICHITA, CITY OF	200328	0376	E

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

MAP NUMBER
20173C0376E

EFFECTIVE DATE
FEBRUARY 2, 2007
Federal Emergency Management Agency

SEC: 5
TWP: T27S
RNG: R2E

0 75 150 300
Feet

MKEC
Wichita, KS · 316.684.9600

FEMA FIRM EXHIBIT
TALLGRASS VILLAS ADDITION

PROJECT NO.	1301010787	DATE:	3/12/2014	SHEET NO.
DRAWN BY:	JGD	DESIGNED BY:	JGD	APPROVED BY: KLA	1 OF 1

Path: J:\Projects\2013\1301010787_Perfection - Tallgrass\5-Civil\GIS\FEMA Floodplain.mxd - Date: 3/12/2014

Appendix E - Curve Number

Curve Number Calculations
Tallgrass Villas Addition - Existing

Estimate Imperviousness per Land Use

HSG A			HSG B			HSG C			HSG D		
Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)
Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	85%	
Industrial	72%		Industrial	72%		Industrial	72%		Industrial	72%	
Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%	
Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%	
Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%	
Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%	
Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%	
Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%	
Impervious Area (acres)		0	Impervious Area (acres)		0	Impervious Area (acres)		0	Impervious Area (acres)		0

Composite Curve Number (CN)

HSG A			HSG B			HSG C			HSG D		
Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)
Pre-Developed or Undisturbed Pervious	55		Pre-Developed or Undisturbed Pervious	71	0.7	Pre-Developed or Undisturbed Pervious	80		Pre-Developed or Undisturbed Pervious	84	
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80		Developed or Disturbed Pervious	84		Developed or Disturbed Pervious	88	
Impervious	98	0	Impervious	98		Impervious	98	0	Impervious	98	
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	71.0	0.7	Composite Curve Number HSG C (CN)	0.0	0	Composite Curve Number HSG D (CN)	0.0	0

Total Weighted Composite Curve Number (CN)	71.0
Total Area (A) (acres)	0.7

Curve Number Calculations
Tallgrass Villas Addition - Proposed

Estimate Imperviousness per Land Use

HSG A			HSG B			HSG C			HSG D		
Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)
Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	85%	
Industrial	72%		Industrial	72%		Industrial	72%		Industrial	72%	
Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%	0.7	Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%	
Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%	
Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%	
Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%	
Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%	
Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%	
Impervious Area (acres)		0	Impervious Area (acres)		0.455	Impervious Area (acres)		0	Impervious Area (acres)		0

Composite Curve Number (CN)

HSG A			HSG B			HSG C			HSG D		
Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)
Pre-Developed or Undisturbed Pervious	55		Pre-Developed or Undisturbed Pervious	71		Pre-Developed or Undisturbed Pervious	80		Pre-Developed or Undisturbed Pervious	84	
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80	0.245	Developed or Disturbed Pervious	84		Developed or Disturbed Pervious	88	
Impervious	98	0	Impervious	98	0.455	Impervious	98	0	Impervious	98	
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	91.7	0.7	Composite Curve Number HSG C (CN)	0.0	0	Composite Curve Number HSG D (CN)	0.0	0

Total Weighted Composite Curve Number (CN)	91.7
Total Area (A) (acres)	0.7

Curve Number Calculations
Tallgrass Villas Addition - Basin to 21st Street

Estimate Imperviousness per Land Use

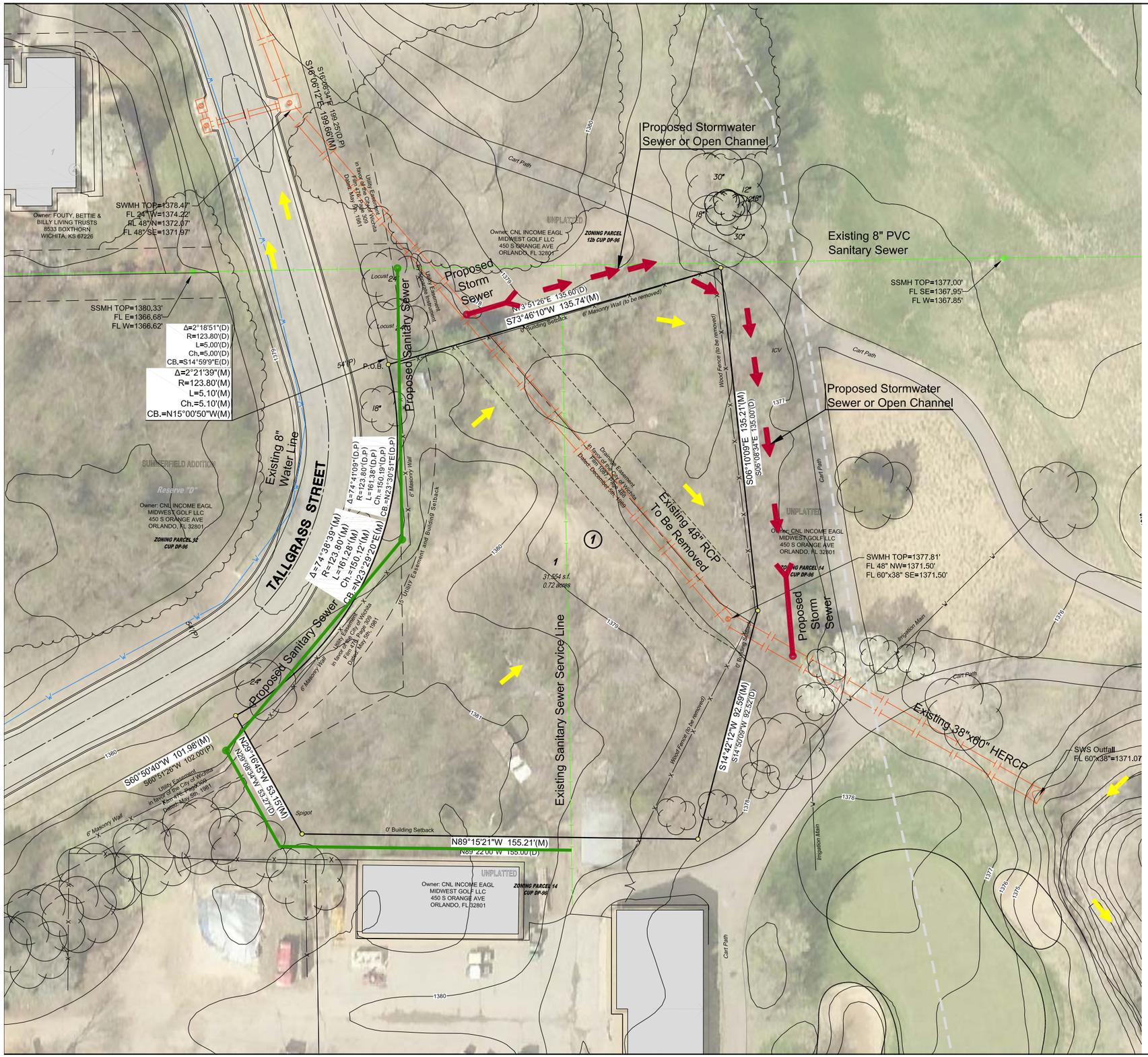
HSG A			HSG B			HSG C			HSG D		
Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)	Land Use	Average % Impervious	Area (ac)
Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	85%		Commercial and Business	85%	324
Industrial	72%		Industrial	72%		Industrial	72%		Industrial	72%	
Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%		Residential 1/8 acre or less (townhouse)	65%	
Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%		Residential 1/4 acre	38%	560
Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%		Residential 1/3 acre	30%	
Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%		Residential 1/2 acre	25%	
Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%		Residential 1 acre	20%	
Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%		Residential 2 acres	12%	
Impervious Area (acres)		0	Impervious Area (acres)		0	Impervious Area (acres)		0	Impervious Area (acres)		488.2

Composite Curve Number (CN)

HSG A			HSG B			HSG C			HSG D		
Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)	Land Use	CN	Area (ac)
Pre-Developed or Undisturbed Pervious	55		Pre-Developed or Undisturbed Pervious	71		Pre-Developed or Undisturbed Pervious	80		Pre-Developed or Undisturbed Pervious	84	80
Developed or Disturbed Pervious	71		Developed or Disturbed Pervious	80		Developed or Disturbed Pervious	84		Developed or Disturbed Pervious	88	395.8
Impervious	98	0	Impervious	98		Impervious	98	0	Impervious	98	488.2
Composite Curve Number HSG A (CN)	0.0	0	Composite Curve Number HSG B (CN)	0.0	0	Composite Curve Number HSG C (CN)	0.0	0	Composite Curve Number HSG D (CN)	92.7	964

Total Weighted Composite Curve Number (CN)	**92.7**
Total Area (A) (acres)	964

Appendix F - Drainage and Utility Plan



NORTH
SCALE: 1"=20'
0 10 20 40

R 2 E
29th St. N.
T 27 S
Rock Rd.
Webb Rd.
5
PLAT LOCATION
21st Street N.

VICINITY MAP
No Scale

LEGEND

- Edge Of Trees
- Deciduous Tree
- Sign
- Power Pole
- Electric Box
- Light Pole
- Fire Hydrant
- Water Valve
- Water Meter
- Telephone Manhole
- Telephone Riser
- Gas Meter
- Benchmark
- Existing Structure
- Found Monument ½" Bar w/ Mid Kansas id cap or see annotation for type
- (M) - Measured
- (D) - Described
- (P) - Platted
- Easement
- Fence
- FEMA FIRM Zone A (100 Yr.)
- Existing Storm Sewer Pipe
- Existing Water Line
- Existing Sanitary Sewer Line
- Proposed Storm Sewer
- Proposed Sanitary Sewer
- Flow Arrows

Source: Pictometry Aerial Photo Date: 3-25-11

MKEC
Wichita, KS · 316-684-9600

DRAINAGE & UTILITY PLAN

TALLGRASS VILLAS ADDITION

WICHITA, KANSAS

DRAINAGE & UTILITY PLAN

PROJECT NO.	1301010787
DATE	MARCH 2014
SCALE	AS NOTED

DESIGNED	DRAWN	CHECKED
KLA	JGD	GJA

NO.	REVISION	DATE

SHEET NO.
1 OF 1

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Appendix G - Plat

NOTES

1. LOCATION: Located in northeast Wichita, north of 21st Street and east of Rock Road off of Tallgrass Street south of the clubhouse to Tallgrass Country Club. There are twin homes to the west of the plat beyond a dense woodland area; Tallgrass golf course grounds maintenance yard to the south of the plat and an assisted living facility south of the maintenance yard; the plat abuts the Tallgrass golf course on the north and east property lines.
2. DEVELOPMENT DESCRIPTION: A townhouse development consisting of 6 dwelling units.
3. LOT TOTAL: 1
4. EXISTING: Vacant Land
5. PROPOSED USE: Townhouse Development
6. EXISTING ZONING: CUP DP-96 PROPOSED: no change
   This plat shall conform to the recitals of CUP DP-96
7. PLAT AREA = 0.72 acre, more or less
8. SURVEY DATE: December 2nd 2013 (by MKEC)
9. PUBLIC UTILITIES: Existing municipal sanitary sewer is available the north property line, additional laterals shall be extended. Municipal water is also being extended to the site from the the west, from which additional mains shall be extended with fire suppression system included. All proposed municipal water and sanitary sewer will lie within easements or rights-of-way. Sanitary sewer mains are planned for the front of the lot.
10. ACCESS CONTROLS: Not applicable.
11. PUBLIC IMPROVEMENTS: The development infrastructure and facilities shall be built publicly.
12. RESERVES: None.
13. FLOOD ZONE: According to FEMA FIRM Map 20173C0376E, effective date May 2, 2007; this property lies within flood ZONE "X" - "Areas determined to be outside the 0.2% annual chance floodplain".
14. MINIMUM PAD (Lowest Opening): Shall be shown on the final plat and as finalized on the final drainage plan.
15. DRAINAGE: A drainage plan has been developed for this plat. All drainage easements and rights-of-way shall remain at established grades or as modified with the approval of applicable City or County Engineer, and unobstructed to allow for the conveyance of stormwater. There is an existing stormwater sewer main running through the site that shall be relocated to the perimeter of the property within an off-site easement agreement by separate instrument.
16. RESTRICTIONS AND COVENANTS: This development shall have covenants that address the exterior residential maintenance, landscape maintenance, and common space provisions for the townhomes.

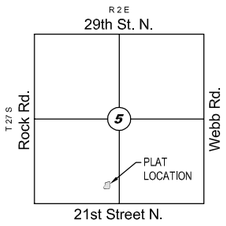
LEGAL DESCRIPTION

A tract of land lying in the Southwest Quarter, Section 5, Township 27 South, Range 2 East of the 6th P.M., Sedgwick County, Kansas, more particularly described as follows:

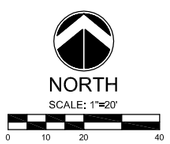
COMMENCING at the northeast corner of Reserve E as platted in Summerfield, an addition to Wichita, Sedgwick County, Kansas; thence South 16°08'34" East, 199.25 feet along the east line of said Reserve E and Tallgrass Street as platted in said Summerfield, to a point on a curve to the right; thence along said curve 5.00 feet, said curve having a central angle of 2°18'51", a radius of 123.80 feet, and a long chord of 5.00 feet, bearing South 14°59'9" East, to the POINT OF BEGINNING; thence North 73°51'26" East, 135.60 feet; thence South 6°08'34" East, 135.00 feet; thence South 14°50'09" West, 92.52 feet; thence North 89°22'00" West, 155 feet; thence North 29°08'34" West, 53.27 feet to a point on a curve to the left, said point lying on the southeasterly line of said Tallgrass Street; thence along said line and curve 161.38 feet, said curve having a central angle of 74°41'9", a radius of 123.80 feet, and a long chord of 150.19 feet, bearing North 23°30'51" East, to the POINT OF BEGINNING.

LEGEND

- Edge Of Trees
- Deciduous Tree
- SN - Sign
- Power Pole
- ELEC BOX - Electric Box
- Light Pole
- FH - Fire Hydrant
- WV - Water Valve
- WM - Water Meter
- SVB - Telephone Manhole
- TR - Telephone Riser
- GM - Gas Meter
- Benchmark
- Existing Structure
- Found Monument ½" Bar w/ Mid Kansas id cap or see annotation for type
- (M) - Measured
- (D) - Described
- (P) - Platted
- Easement
- Fence
- Storm Sewer Pipe
- Water Line
- Sanitary Sewer Line
- Gas Line
- Overhead Electric
- FEMA FIRM Zone A (100 Yr.)



VICINITY MAP



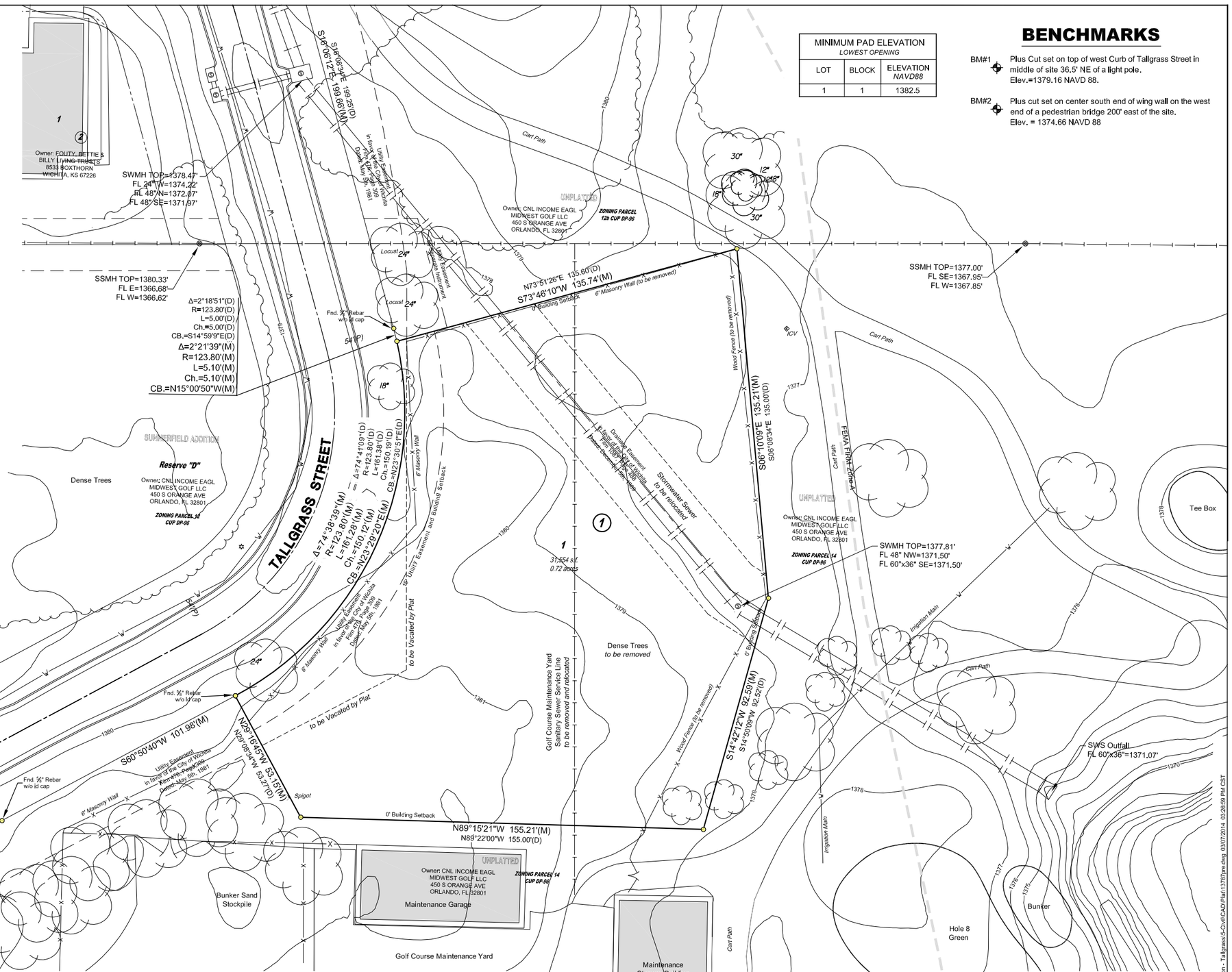
Basis of Bearing: Kansas coordinate system of 1983 south zone grid bearing of S16°06'12"E along the East line of Reserve E and Tallgrass Street, Summerfield, an addition to Wichita, Sedgwick County, Kansas
This plat is surveyed and platted on NAD83 using Kansas state plane south zone coordinates, modified to the surface, having a combined adjustment scale factor of 1.000120014401728

MINIMUM PAD ELEVATION *LOWEST OPENING*		
LOT	BLOCK	ELEVATION *NAVD88*
1	1	1382.5

BENCHMARKS

BM#1 Plus Cut set on top of west Curb of Tallgrass Street in middle of site 36.5' NE of a light pole.
Elev.=1379.16 NAVD 88.

BM#2 Plus cut set on center south end of wing wall on the west end of a pedestrian bridge 200' east of the site.
Elev. = 1374.66 NAVD 88



PRELIMINARY PLAT

A portion of the SW. ¼, Sec. 5, T27S, R2E, 6th P.M.

TALLGRASS VILLAS ADDITION

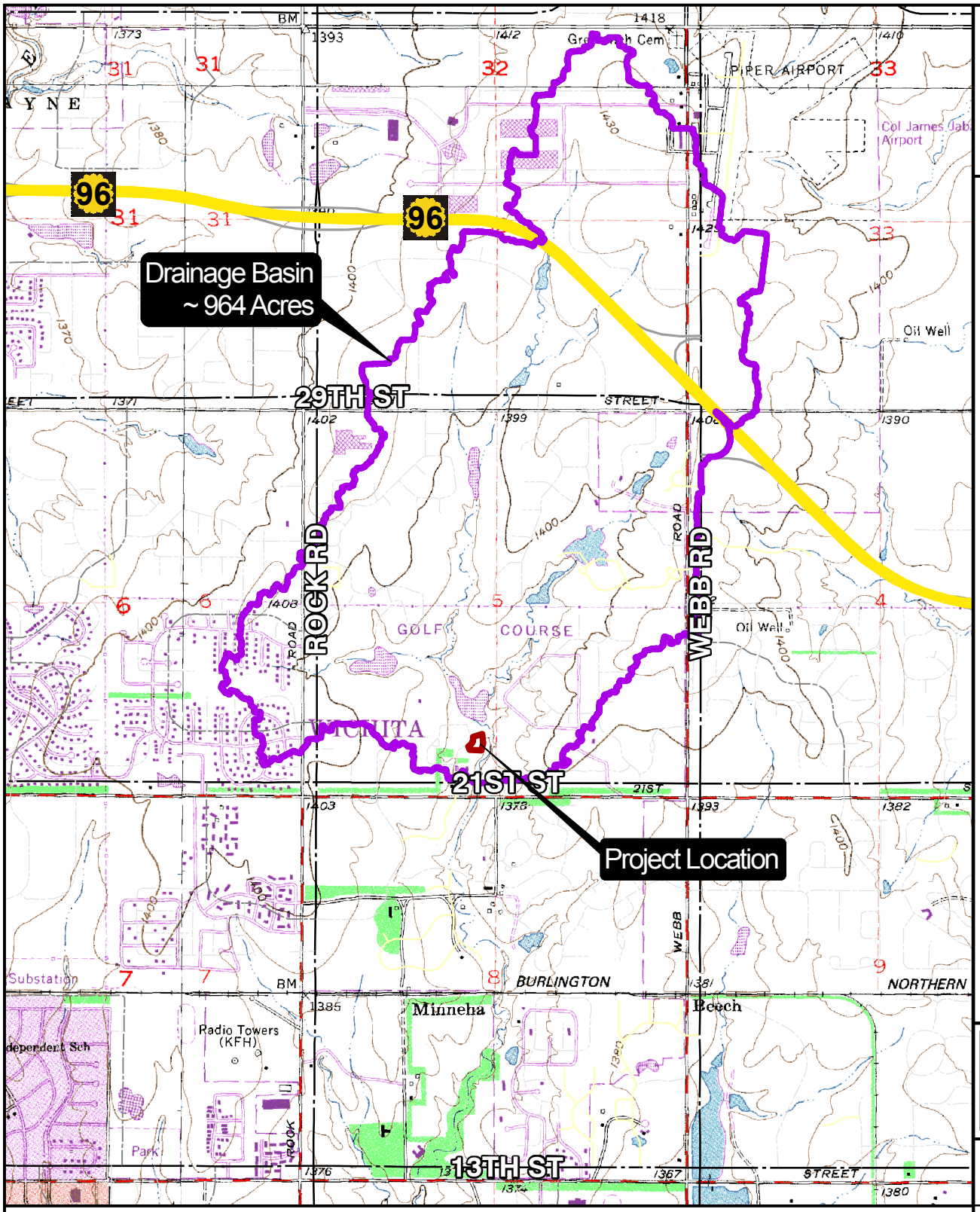
OWNER/DEVELOPER: Perfection Signature Properties, LLC Attn: Scott A. Lehner 11828 W. Central, Suite 124 Wichita, KS 67212 316-729-1900

Date submitted: March 10th, 2014
Subdivision Hearing: March 27th

MKEC Wichita, KS • 316.684.9600

J:\Projects\20131301010787_Perfection - Tallgrass\5-Civil\CAD\Plat\13787pre.dwg 03/07/2014 03:26:59 PM CST

Appendix H – Drainage Basin



MKEC
Wichita, KS · 316.684.9600

TALLGRASS VILLAS ADDITION

USGS QUAD EXHIBIT

SEC: 5
TWP: T27S
RNG: R2E

PROJECT NO.	1301010787
DATE	3/12/2014
SCALE	1"=2000'

DESIGNED	DRAWN	CHECKED
MKEC	MKEC	MKEC

NO.	REVISION	DATE

SHEET NO.
1 OF 1

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

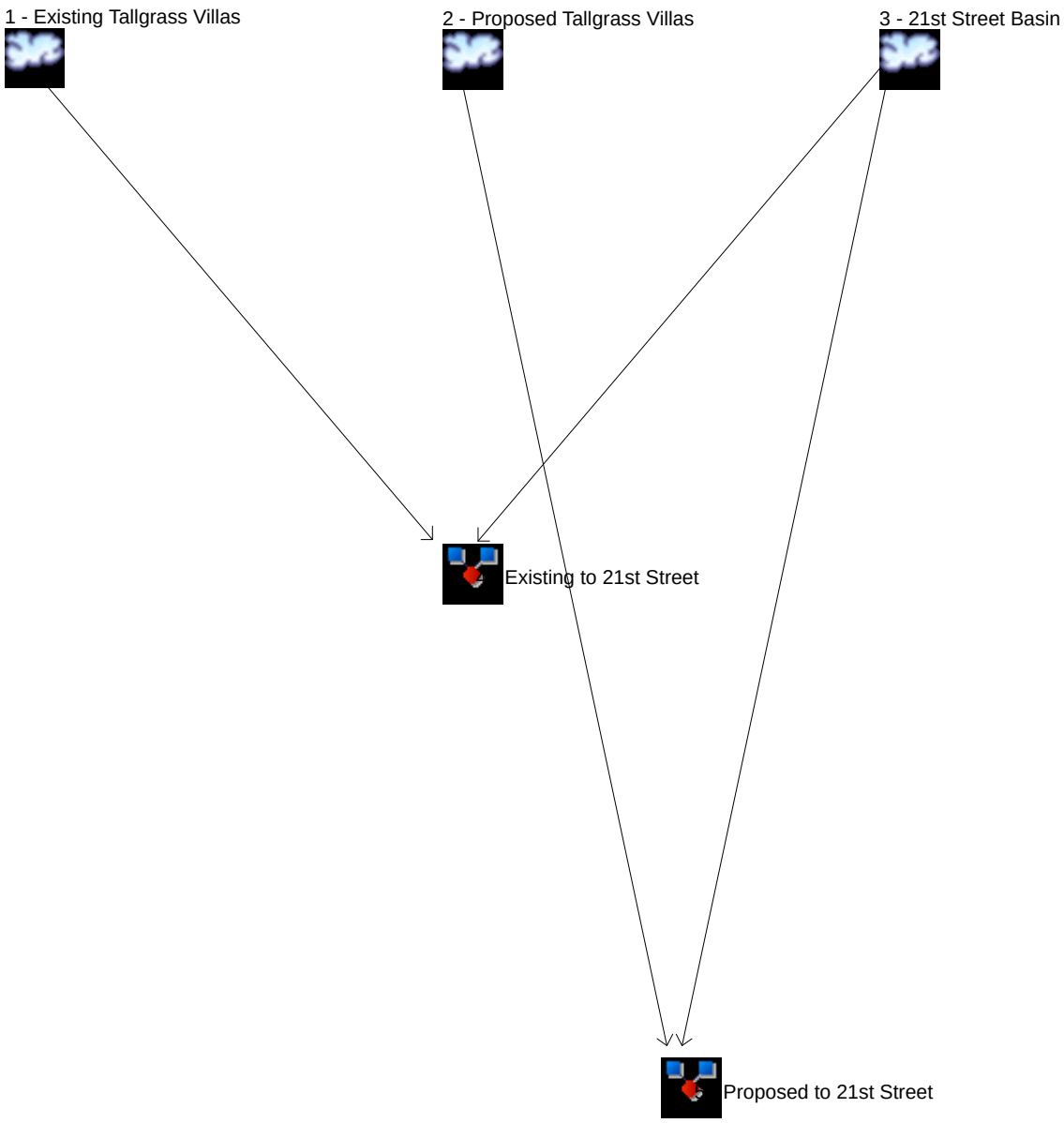
1 0.5 0 1 Kilometers

Path: J:\Projects\2013\1301010787_Perfection - Tallgrass\5-Civil\GIS\USGS Quad with Drainage Basin Exhibit.mxd - Date: 3/12/2014

Appendix I – Hydraflow Hydrographs

Watershed Model Schematic

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



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	------	0.334	0.593	-------	1.062	1.396	1.923	2.340	2.712	Existing Tallgrass Villas
2	SCS Runoff	------	2.499	3.263	-------	4.457	5.233	6.389	7.264	8.028	Proposed Tallgrass Villas
3	SCS Runoff	------	231.07	307.41	-------	428.50	507.86	626.77	717.17	796.11	21st Street Basin
4	Combine	1, 3	231.10	307.45	-------	428.55	507.92	626.85	717.26	796.22	Existing to 21st Street
5	Combine	2, 3,	231.11	307.46	-------	428.56	507.94	626.86	717.27	796.22	Proposed to 21st Street

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	0.334	1	734	0.038	------	------	------	Existing Tallgrass Villas
2	SCS Runoff	2.499	1	715	0.106	------	------	------	Proposed Tallgrass Villas
3	SCS Runoff	231.07	1	982	157.846	------	------	------	21st Street Basin
4	Combine	231.10	1	982	157.884	1, 3	------	------	Existing to 21st Street
5	Combine	231.11	1	982	157.953	2, 3,	------	------	Proposed to 21st Street

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	0.593	1	733	0.062	------	------	------	Existing Tallgrass Villas
2	SCS Runoff	3.263	1	715	0.142	------	------	------	Proposed Tallgrass Villas
3	SCS Runoff	307.41	1	981	209.604	------	------	------	21st Street Basin
4	Combine	307.45	1	981	209.666	1, 3	------	------	Existing to 21st Street
5	Combine	307.46	1	981	209.746	2, 3,	------	------	Proposed to 21st Street

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	1.062	1	733	0.105	------	------	------	Existing Tallgrass Villas
2	SCS Runoff	4.457	1	715	0.198	------	------	------	Proposed Tallgrass Villas
3	SCS Runoff	428.50	1	981	292.564	------	------	------	21st Street Basin
4	Combine	428.55	1	981	292.669	1, 3	------	------	Existing to 21st Street
5	Combine	428.56	1	981	292.762	2, 3,	------	------	Proposed to 21st Street

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	1.396	1	733	0.135	------	------	------	Existing Tallgrass Villas
2	SCS Runoff	5.233	1	715	0.235	------	------	------	Proposed Tallgrass Villas
3	SCS Runoff	507.86	1	980	347.427	------	------	------	21st Street Basin
4	Combine	507.92	1	980	347.563	1, 3	------	------	Existing to 21st Street
5	Combine	507.94	1	980	347.662	2, 3,	------	------	Proposed to 21st Street

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	1.923	1	733	0.185	------	------	------	Existing Tallgrass Villas
2	SCS Runoff	6.389	1	715	0.292	------	------	------	Proposed Tallgrass Villas
3	SCS Runoff	626.77	1	980	430.246	------	------	------	21st Street Basin
4	Combine	626.85	1	980	430.430	1, 3	------	------	Existing to 21st Street
5	Combine	626.86	1	980	430.537	2, 3,	------	------	Proposed to 21st Street

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	2.340	1	732	0.224	------	------	------	Existing Tallgrass Villas
2	SCS Runoff	7.264	1	715	0.335	------	------	------	Proposed Tallgrass Villas
3	SCS Runoff	717.17	1	980	493.629	------	------	------	21st Street Basin
4	Combine	717.26	1	980	493.852	1, 3	------	------	Existing to 21st Street
5	Combine	717.27	1	980	493.964	2, 3,	------	------	Proposed to 21st Street

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	2.712	1	732	0.259	------	------	------	Existing Tallgrass Villas
2	SCS Runoff	8.028	1	715	0.372	------	------	------	Proposed Tallgrass Villas
3	SCS Runoff	796.11	1	980	549.231	------	------	------	21st Street Basin
4	Combine	796.22	1	980	549.490	1, 3	------	------	Existing to 21st Street
5	Combine	796.22	1	980	549.604	2, 3,	------	------	Proposed to 21st Street

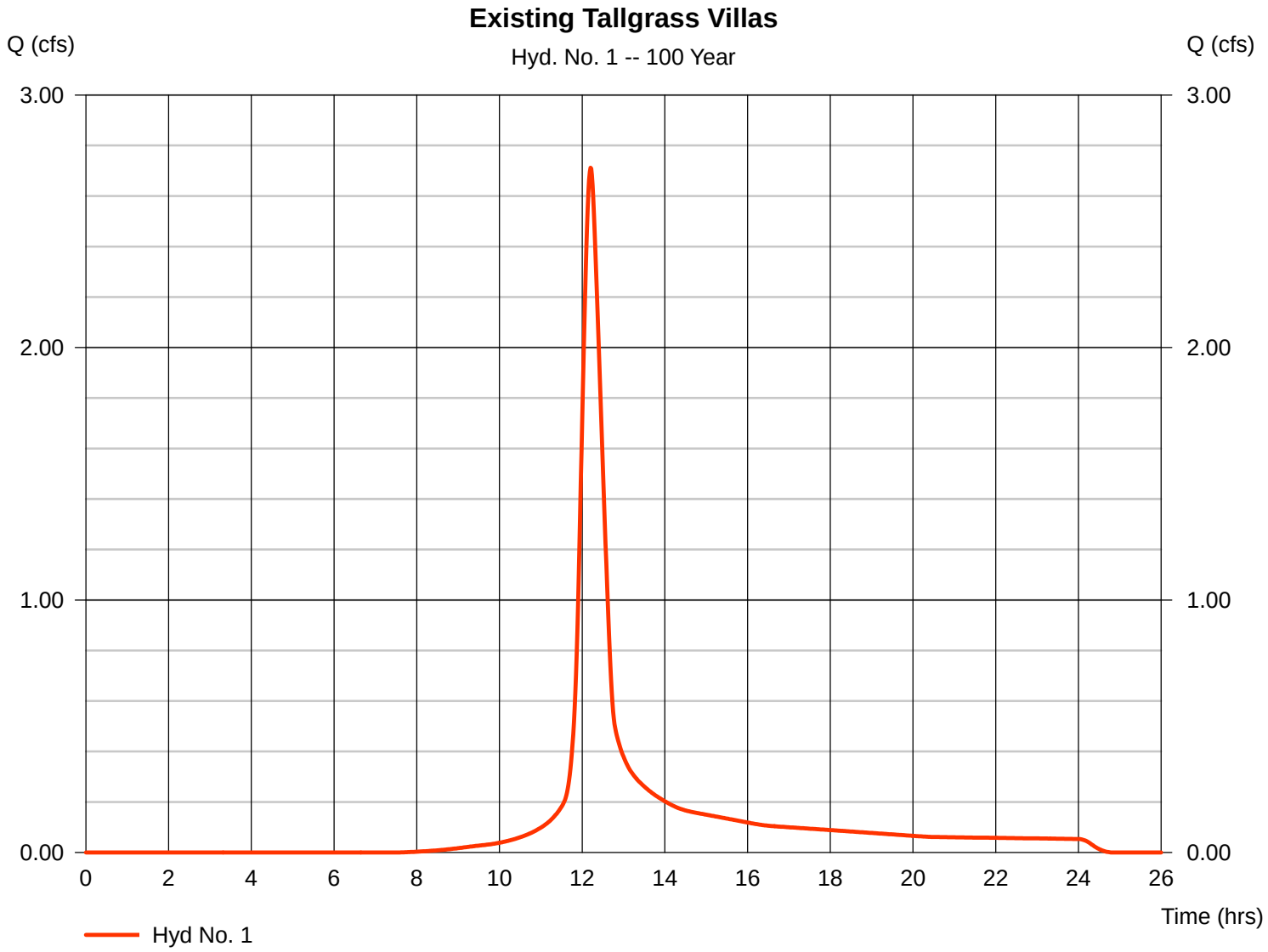
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Mar 13, 2014

Hyd. No. 1

Existing Tallgrass Villas

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.712 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.20 hrs
Time interval	=	1 min	Hyd. volume	=	0.259 acft
Drainage area	=	0.700 ac	Curve number	=	71
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	30.60 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



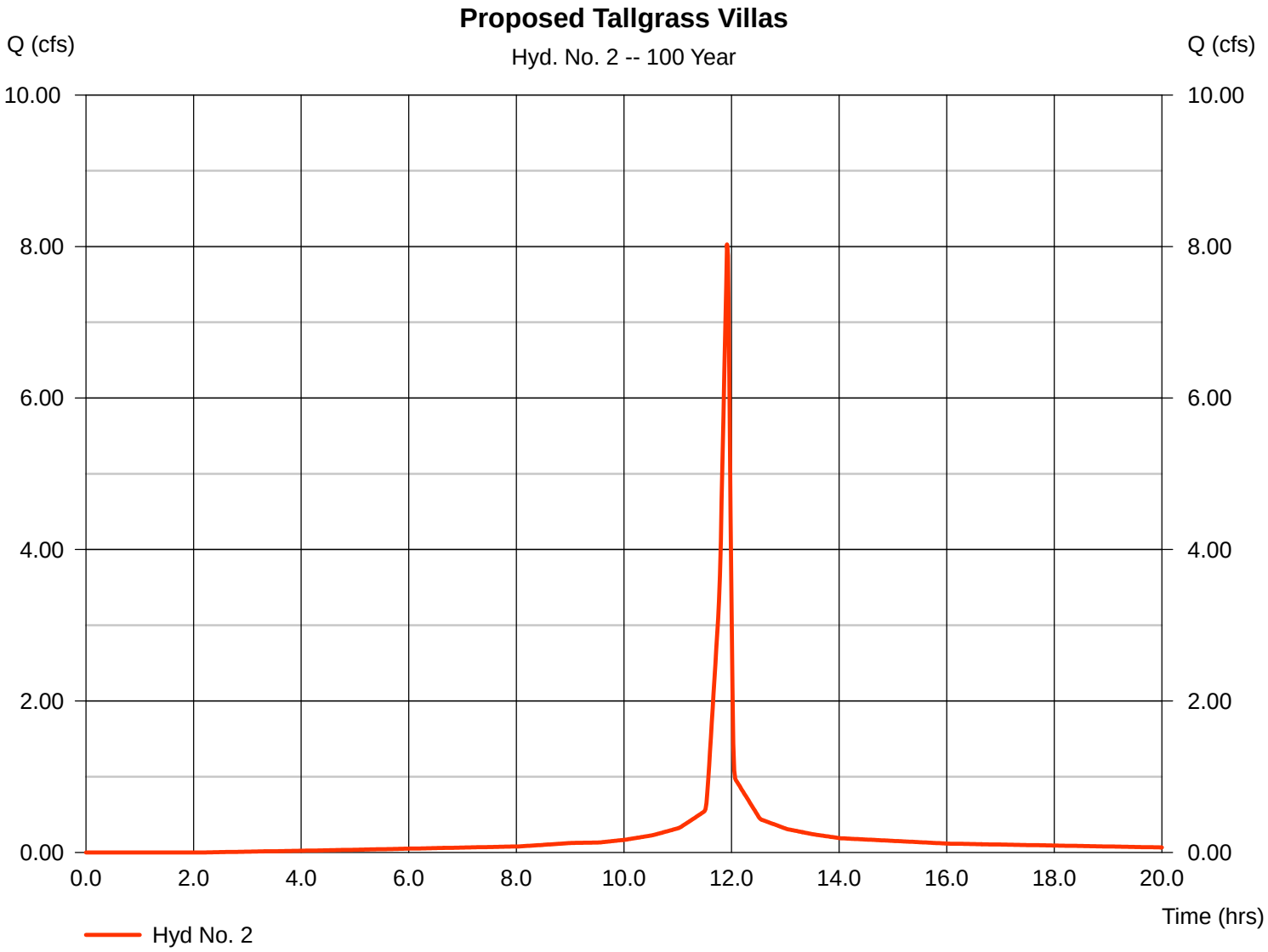
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Thursday, Mar 13, 2014

Hyd. No. 2

Proposed Tallgrass Villas

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.028 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.92 hrs
Time interval	=	1 min	Hyd. volume	=	0.372 acft
Drainage area	=	0.700 ac	Curve number	=	91.7
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	3.00 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

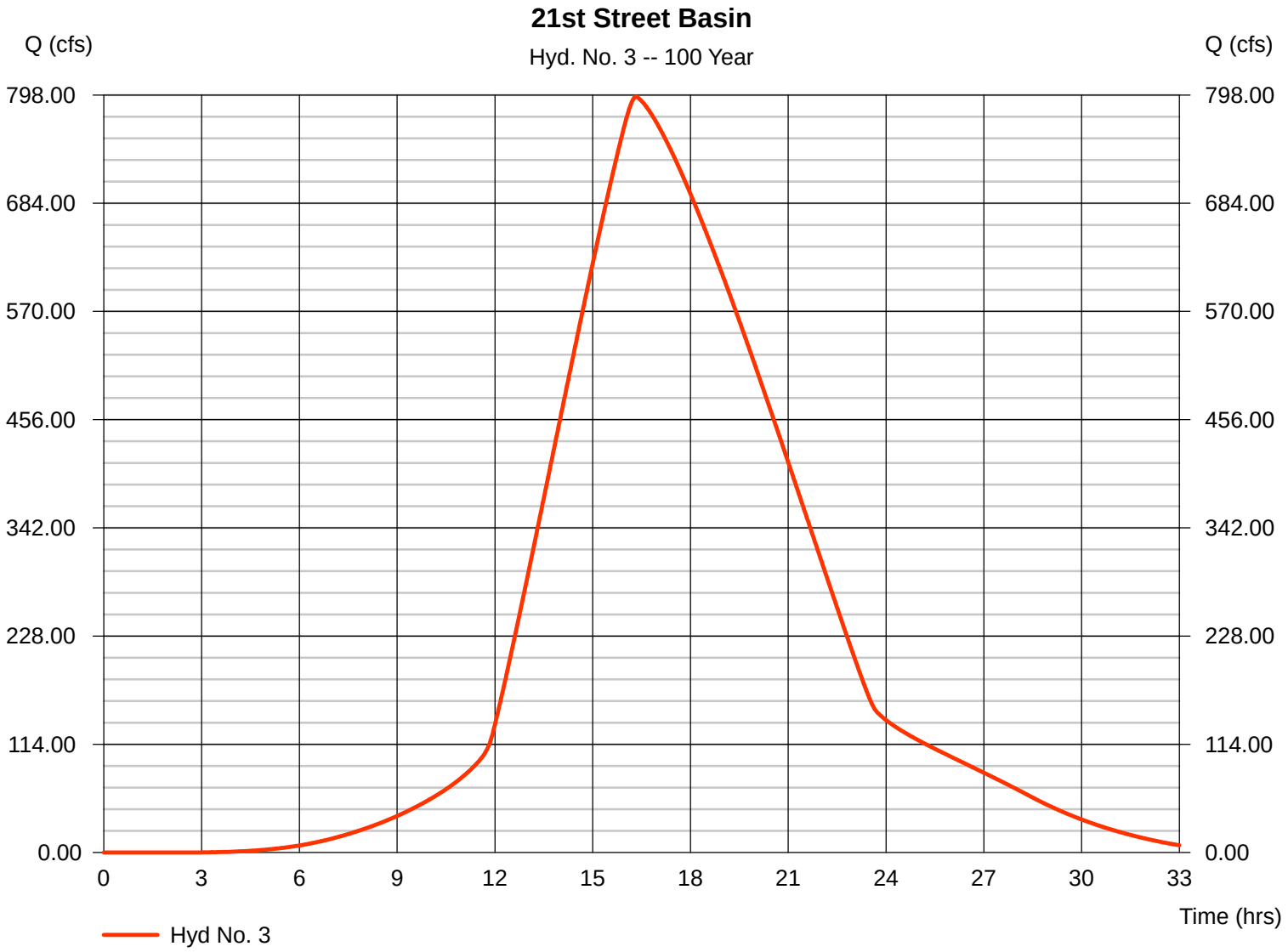


Hydrograph Report

Hyd. No. 3

21st Street Basin

Hydrograph type	=	SCS Runoff	Peak discharge	=	796.11 cfs
Storm frequency	=	100 yrs	Time to peak	=	16.33 hrs
Time interval	=	1 min	Hyd. volume	=	549.231 acft
Drainage area	=	964.000 ac	Curve number	=	91.9
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	450.00 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

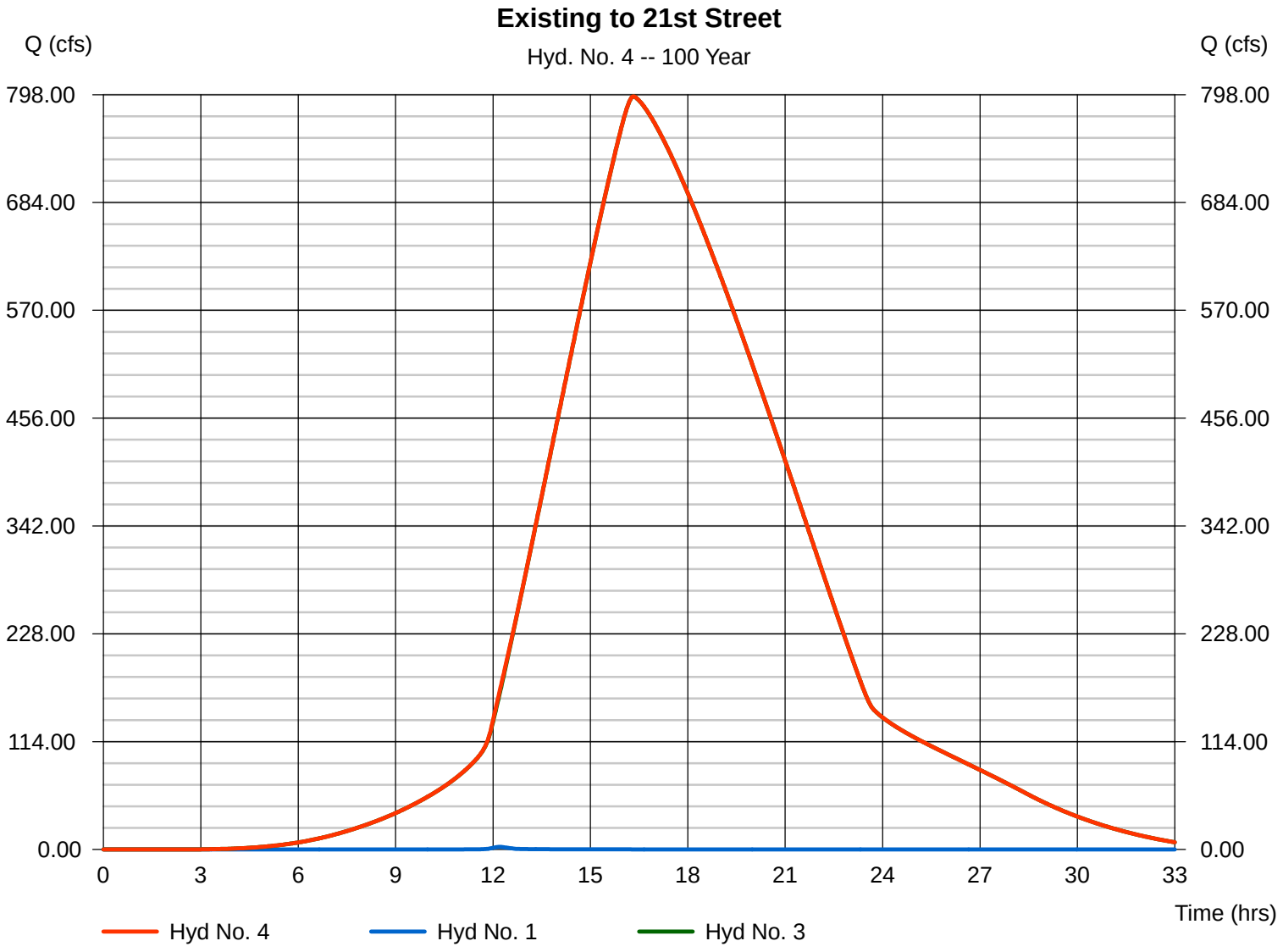


Hydrograph Report

Hyd. No. 4

Existing to 21st Street

Hydrograph type	= Combine	Peak discharge	= 796.22 cfs
Storm frequency	= 100 yrs	Time to peak	= 16.33 hrs
Time interval	= 1 min	Hyd. volume	= 549.490 acft
Inflow hyds.	= 1, 3	Contrib. drain. area	= 964.700 ac

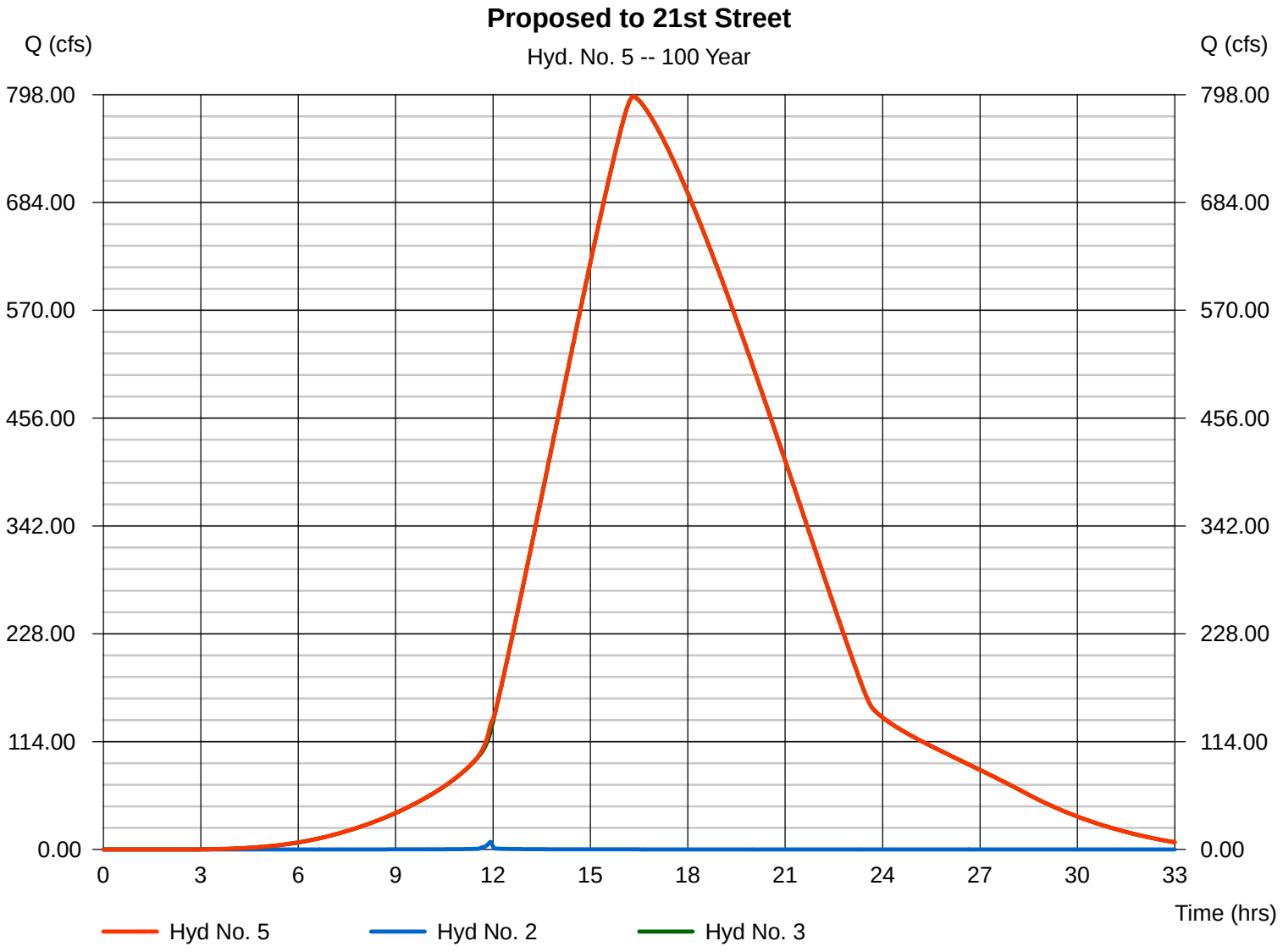


Hydrograph Report

Hyd. No. 5

Proposed to 21st Street

Hydrograph type	= Combine	Peak discharge	= 796.22 cfs
Storm frequency	= 100 yrs	Time to peak	= 16.33 hrs
Time interval	= 1 min	Hyd. volume	= 549.604 acft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 964.700 ac



Appendix J – Time of Concentration

Project	Tallgrass Villas Addition
Feature	
Analyst	Kara Anderson
Version	
Notes	

Sheet	Subbasin	Number of Segments	Sheet Flow (mins)	Shallow Concentrated Flow (mins)	Open Channel Ditch Flow (mins)	Open Channel Pipe Flow (mins)	Open Channel General Flow (mins)	Other (mins)	Total Tc (mins)	Length (feet)	Drop (feet)	Avg. Slope (%)	Avg. Vel. (fps)	Lag (mins)	Lag (hours)	Area (acres)
1	Existing	2	27.4	3.3	0.0	0.0	0.0	0.0	**30.6**	230	4	1.74	0.13	18.4	0.306	0.7
2	Proposed	2	2.0	1.0	0.0	0.0	0.0	0.0	**3.0**	250	5	1.80	1.40	1.8	0.030	0.7

Subbasin Name	Existing
Drainage Area (ac)	0.7
Drainage Area (sq mi)	0.00109375

	Sheet Flow					Total
selected>>						
Select (0 or 1)	1					1 segments
Length (ft)	80					80 feet length
Top Elevation (ft)	1381.5					
Bottom Elevation (ft)	1381.0					
Cover	0.40, Woods, light underbrush					
Specify alternate "n"						
Sheet Flow "n" (dim)	0.400					
2-yr, 24-hr Rainfall (ins)	3.50					
Drop (ft)	1					1 feet drop
Slope (ft/ft)	0.0063					
Slope (%)	0.63					
Velocity (fps)	0.05					
Travel Time (hrs)	0.456					
Travel Time (mins)	27.35					27.4 mins travel

	Shallow Concentrated Flow					Total
selected>>						
Select (0 or 1)	1					1 segments
Length (ft)	150					150 feet length
Top Elevation (ft)	1381					
Bottom Elevation (ft)	1378					
Cover	5, Woodland					
Specify alternate "K"						
Surface Coeff (dim)	5.00					
Drop (ft)	4					3.5 feet drop
Slope (ft/ft)	0.0233					
Slope (%)	2.33					
Velocity (fps)	0.76					
Travel Time (mins)	3.27					3.3 mins travel

	Open Channel Ditch Flow					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Channel Lining						
Bottom Width (ft)						
Left Side Slope (H:V)						
Right Side Slope (H:V)						
Depth (ft)						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Flow Area (sq ft)						
Wet Perimeter (ft)						
Hydraulic Radius (ft)						
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

	Open Channel Pipe Flow					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Pipe Material						
Diameter (ins)						
Flow Depth (ins)						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Theta (radians)						
Flow Area (sq ft)						
Wet Perimeter (ft)						
Hydraulic Radius (ft)						
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

	Open Channel General Flow					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Hydraulic Radius (ft)						
Channel Lining						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Velocity (fps)						
Travel Time (mins)						0.0 mins travel

	Other (Computed Separately)					Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Drop (ft)						0 feet drop
Velocity (fps)						
Slope (ft/ft)						
Slope (%)						
Travel Time (mins)						0.0 mins travel

Total for Subbasin

Segments	2
Length (ft)	230
Drop (ft)	4
Slope (ft/ft)	0.0174
Slope (%)	1.74
Velocity (fps)	0.13
Travel Time (mins)	**30.6**
Lag (mins)	18.4
Lag (hrs)	0.306

Subbasin Name	Proposed
Drainage Area (ac)	0.7
Drainage Area (sq mi)	0.00109375

selected>>	Sheet Flow						Total
	Select (0 or 1)	1					1 segments
	Length (ft)	100					100 feet length
	Top Elevation (ft)	1381.5					
	Bottom Elevation (ft)	1381.0					
	Cover	0.011, Concrete, asphalt, etc.					
	Specify alternate "n"						
	Sheet Flow "n" (dim)	0.011					
	2-yr, 24-hr Rainfall (ins)	3.50					
	Drop (ft)	1					1 feet drop
	Slope (ft/ft)	0.0050					
	Slope (%)	0.50					
	Velocity (fps)	0.83					
	Travel Time (hrs)	0.034					
	Travel Time (mins)	2.02					2.0 mins travel

selected>>	Shallow Concentrated Flow						Total
	Select (0 or 1)	1					1 segments
	Length (ft)	150					150 feet length
	Top Elevation (ft)	1381.5					
	Bottom Elevation (ft)	1378					
	Cover	16.1, Unpaved					
	Specify alternate "K"						
	Surface Coeff (dim)	16.10					
	Drop (ft)	4					4 feet drop
	Slope (ft/ft)	0.0267					
	Slope (%)	2.67					
	Velocity (fps)	2.63					
	Travel Time (mins)	0.95					1.0 mins travel

Open Channel Ditch Flow						Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Channel Lining						
Bottom Width (ft)						
Left Side Slope (H:V)						
Right Side Slope (H:V)						
Depth (ft)						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Flow Area (sq ft)						
Wet Perimeter (ft)						
Hydraulic Radius (ft)						
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

Open Channel Pipe Flow						Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Pipe Material						
Diameter (ins)						
Flow Depth (ins)						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Theta (radians)						
Flow Area (sq ft)						
Wet Perimeter (ft)						
Hydraulic Radius (ft)						
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

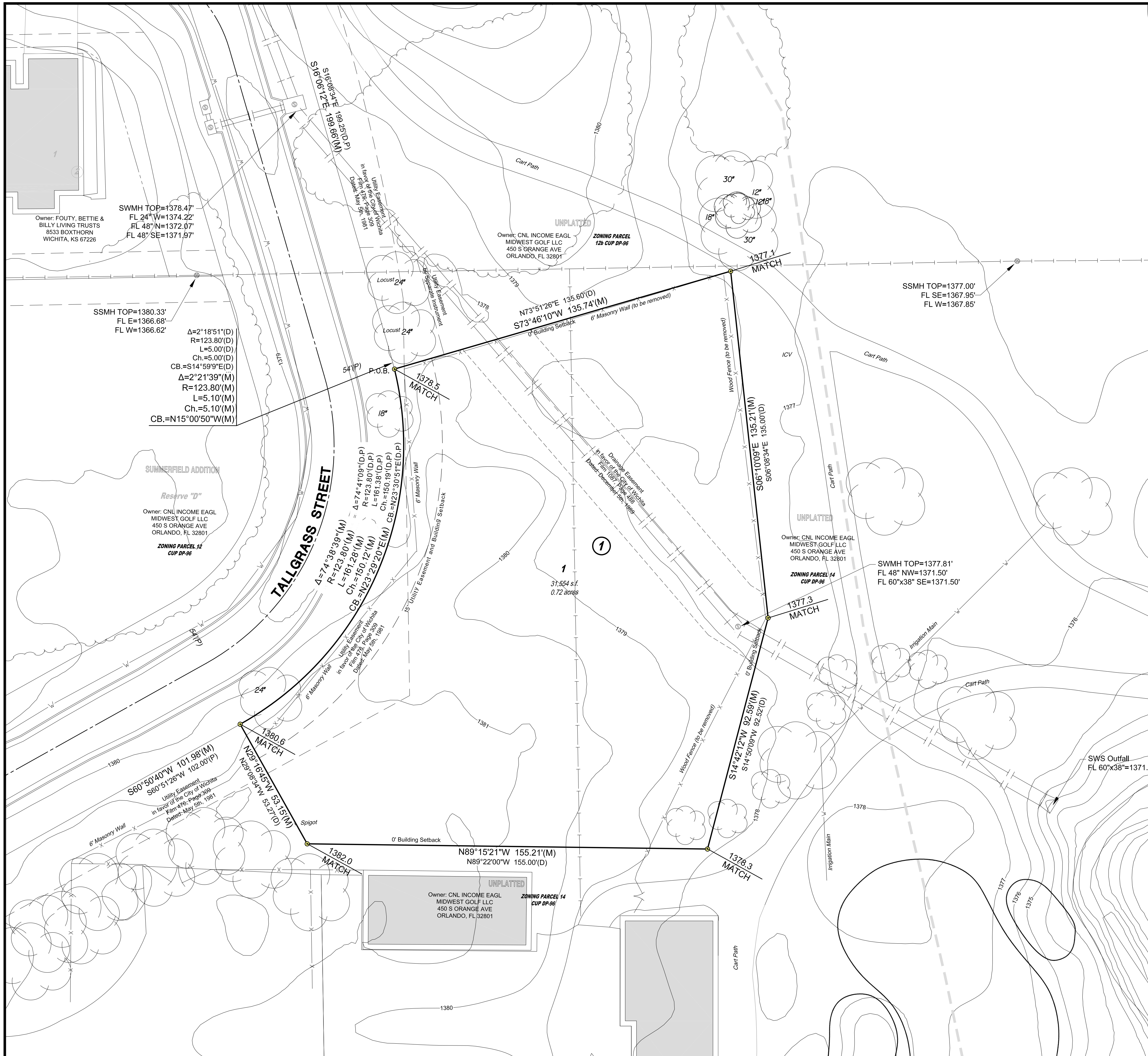
Open Channel General Flow						Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Top Elevation (ft)						
Bottom Elevation (ft)						
Hydraulic Radius (ft)						
Channel Lining						
Specify alternate "n"						
Manning "n" (dim)						
Drop (ft)						0 feet drop
Slope (ft/ft)						
Slope (%)						
Velocity (fps)						
Travel Time (mins)						0.0 mins travel

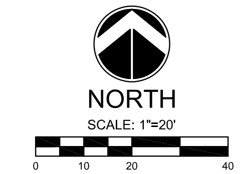
Other (Computed Separately)						Total
Select (0 or 1)						0 segments
Length (ft)						0 feet length
Drop (ft)						0 feet drop
Velocity (fps)						
Slope (ft/ft)						
Slope (%)						
Travel Time (mins)						0.0 mins travel

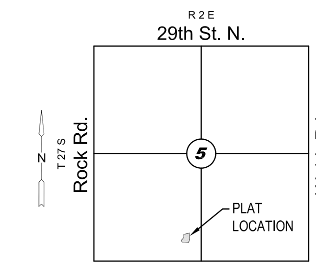
Total for Subbasin

Segments	2
Length (ft)	250
Drop (ft)	5
Slope (ft/ft)	0.0180
Slope (%)	1.80
Velocity (fps)	1.40
Travel Time (mins)	**3.0**
Lag (mins)	1.8
Lag (hrs)	0.030

Appendix K – Lot Grading Plan







VICINITY MAP

No Scale

LEGEND

- Edge Of Trees
- Deciduous Tree
- Sign
- Power Pole
- Electric Box
- Light Pole
- Fire Hydrant
- Water Valve
- Water Meter
- Telephone Manhole
- Telephone Riser
- Gas Meter
- Benchmark
- Existing Structure
- Found Monument ½" Bar w/ Mid Kansas id cap or see annotation for type
- (M) - Measured
- (D) - Described
- (P) - Platted
- Easement
- Fence
- FEMA FIRM Zone A (100 Yr.)
- Storm Sewer Pipe
- Water Line
- Sanitary Sewer Line
- Spot Elevation

MKEC

Wichita, KS • 316-684-9600

LOT GRADING PLAN

TALLGRASS VILLAS ADDITION

WICHITA, KANSAS

LOT GRADING PLAN

PROJECT NO.	1301010787
DATE	MARCH 2014
SCALE	AS NOTED

DESIGNED	DRAWN	CHECKED
KLA	JGD	GJA

NO.	REVISION	DATE

SHEET NO.

1 OF 1

J:\PROJECTS\2013\1301010787_PERFECTION - TALLGRASS\5-CIVIL\CAD\DRAINAGE\DRAWING\13787_LGP.DWG