



TRANSMITTAL

TO:
Scott Lindebak, P.E.

COMPANY:

ADDRESS:

CITY/ STATE:

FROM:

Trevor Wooten

DATE:

2/11/11

PROJECT:

Stonebridge 3rd Addition

PROJECT NUMBER:

RE:

Stonebridge 3rd Addition drainage plan

VIA: DELIVERY

We are sending you ATTACHED UNDER SEPARATE COVER

PLANS PRINTS SHOP DRAWINGS SAMPLES SPECS
 COPY OF LETTER CHANGE ORDER DISK OTHER

COPIES	DATE	DESCRIPTION
2	2/11/11	Stonebridge 3 rd Addition drainage plan

URGENT FOR APPROVAL FOR YOUR INFO FOR REVIEW & COMMENT

APPROVED, AS NOTED REVISE AS NOTED REVISE AND RETURN

AS REQUESTED PLEASE REPLY FOR BIDS DUE

NOTES/ COMMENTS:

Scott,

Give me a call to discuss please. Thanks,

SIGNED: 

Copy: file

ENGINEERING
SURVEYING
PLANNING
LANDSCAPE
ARCHITECTURE

B a u g h m a n
C o m p a n y , P . A .
315 Ellis Street
Wichita, Kansas 67203
P 316.262.7271
F 316.262.0149

DRAINAGE PLAN

STONEBRIDGE 3RD ADDITION

TO
WICHITA, SEDGWICK COUNTY, KANSAS

PREPARED BY



09 FEBRUARY 2011

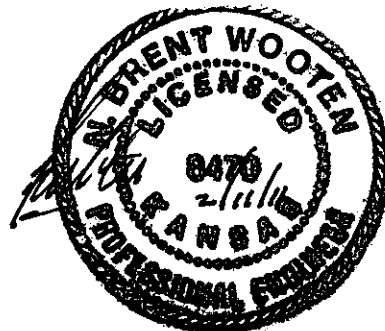


DRAINAGE PLAN STONEBRIDGE 3RD ADDITON

FINAL REPORT

Prepared by Baughman Company, P.A.
09 February 2011

By Trevor R. Kurth, P.E., CFM
N. Brent Wooten, P.E., L.S.



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**Public Works, Engineering Division
Final Drainage Plan Submittal Checklist**

Reviewer: _____ Date: _____
 Subdivision Name: STONEBRIDGE 3RD Location: 13th N & 159th E
 Total Land Area Of Ownership: 2.11 Acres
 Type: Residential _____ Commercial _____ Industrial _____ Recreation _____ Municipal _____ Other _____
 Applicant: _____ Contact: _____ Phone #: _____
 Engineer: BAUGERMAN Co Contact: TREVOR KURTH, PE Phone #: 262.7271

Please check the appropriate box:

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

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

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



J. Location of existing utilities (e.g., water, sewer, gas, electric) and easements		x	Utility Plan		
K. Location of existing conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow	x				
L. Flow paths	x				
M. Location and dimensions of existing channels, bridges or culvert crossings	x				
N. Existing conditions hydrologic analysis for runoff rates, volumes and velocities showing methodologies used and supporting calculations (2, 5, 10, 25 & 100 year, 24-hour storm events) or Critical Duration	x				
O. Assumed pre-developed runoff curve numbers	x				
P. Existing time of concentrations used in calculations	x				
Q. Evaluate immediate downstream drainage capacity, not to exceed more than 0.25 miles downstream of site	x				
R. Existing structural elevations (e.g., invert of pipes, manholes, etc.)	x				
S. Cross-section data for open channels		x	No channels		
T. Ground water elevations, if applicable		x	NA		

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



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

Tab 4. Floodplain Submittal	Applicant		Explanation / Location in Plan	Engr	
	I	NA		I	NA
A. Provide source of flood profile		Y	No FEMA on Plat		
B. Nearest base flood elevations		X	..		
C. Delineation of pre-developed regulatory floodplain/floodway limits		X	..		
D. Delineation of post-developed regulatory floodplain and floodway limits		X	..		
E. Floodplain boundary determination per elevation (project limits shown)		✓	..		
F. Provide source of floodway data table and discharges		✓	..		
G. Provide all hydrologic and hydraulic study information for site-specific floodplain studies, unnumbered Zone A area elevation determinations and flood plain map revisions or required permits		Y	..		
H. Provide regulatory floodway and four natural profile models (10,50,100, and 500-yr) for existing and future watershed conditions		✓	..		
I. Location of floodplain/floodway limits and relationship of site to upstream/downstream properties (floodplain limits to be per elevation and scaled location)		X	..		
J. Flood plains and floodways located within a Reserve, where necessary		Y	..		

Tab 5. Federal, State and Local Permits (to be provided prior to construction unless otherwise specified)	Applicant		Explanation / Location in Plan	Engr	
	I/R	NA		I/R	NA
A. US Army Corps of Engineers - Regulatory program permits (404 water quality certification)		X			
B. Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Flood Plain Fill, Levee, Water Appropriations, Dam safety permit, etc.)		X			
C. Federal Emergency Management Agency (FEMA) Letter of Map Changes (LOMA, LOMR, LOMR-f, CLOMR, etc.) Shall be included and approved when project modifies the limits of the floodway.		Y			
D. Kansas Department of Transportation		X			
E. Sedgwick County Right-of-way Permit		✓			

PROJECT NARRATIVE

EXISTING CONDITIONS

The site is located just north of 13th Street in between 143rd and 159th Street East in Wichita, Sedgwick County, Kansas. The proposed plat is a re-plat of existing lots previously platted as Stonebridge 2nd Addition. This area is already partially developed with storm sewer, sanitary sewer, water, and grading already previously installed. There are two ponds as part of the detention system that is existing on the development site.

Currently, the portion of the site that will be re-platted is mass graded with storm water sewer installed. This area drains via sheet flow and the SWS to the existing pond located in the center of Stonebridge 2nd Addition (see Stonebridge 2nd Approved Drainage Plan Exhibit 7). That pond drains south into another pond and then under 13th Street North. These drainage patterns can be seen on the Existing Conditions exhibit.

PROPOSED CONDITIONS

The property will be developed into a residential subdivision with associated streets, utilities, and drainage conveyance systems. Currently, the site is under an approved drainage plan for detention, conveyance, and overall drainage. This proposed plat will add another detention pond and remove some previously platted lots – as well as some already installed storm water sewer systems in this location. The pond will discharge to the south in the existing storm sewer system into the existing pond system to the south. Some of the existing storm water sewer will be removed and reconfigured to allow the drainage to enter the proposed pond. We anticipate more storm water sewer to be added for future phases of the entire development to drain to the proposed pond.

For a half-scale copy of the Plat, see Exhibit 3.

OFFSITE CONDITIONS

The proposed re-plat site is on a natural high point and drains to the east, west, and south. As stated earlier, the site has storm water sewer already installed to direct runoff to the south and into the existing detention pond system. The pond system has been sized for residential development in this area.

The USGS Quadrangle Sheet can be seen with the site location plotted as Exhibit 1. The Aerial for this area can be viewed as Exhibit 2.

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 Modeled
 - 2-yr Rainfall Depth = 3.5 in
 - 10-yr Rainfall Depth = 5.3 in
 - 100-yr Rainfall Depth = 7.9 in

- FLOW DATA
 - Areas per LIDAR data, USGS Quadrangle Sheet, Aerial Photos, and Site Visits
 - Rational Method used for Existing Flows ($C = 0.73$)
 - Time of Concentration: Lag Method (minimum 15 min)

SITE CHARACTERISTICS

The site consists of approximately 10.5 acres of currently platted and mass graded residential subdivision. The proposed area has storm water sewer already installed throughout as well as is already mass graded to drain to the south and into the existing pond.

The existing site characteristics can be seen from the aerial exhibit (Exhibit 2).

EXISTING CONDITIONS HYDROLOGIC ANALYSIS

The site was analyzed for pre-development conditions using the rational method for the entire storm event series. A Rational 'C' Coefficient of 0.73 was used for existing conditions as was used on the original Drainage Plan for Stonebridge and Stonebridge 2nd Addition. A Time of Concentration of 15 minutes was used as is the minimum T_c in the City of Wichita. The storm water sewer that is in place on the site was modeled and planned in Stonebridge Addition and sized per City of Wichita standards.

DOWNSTREAM DRAINAGE CAPACITY

The site currently flows to the south and into the existing pond via storm water sewer that was designed per Stonebridge Addition. This site was originally designed to fully develop into residential lots and drain into the pond system. The pond system has been designed for detention for the entire subdivision and discharges into a relatively new RCBC under 13th Street North.

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, 10-yr, 100-yr Storm Events Modeled
 - Hydrograph Method utilized for Developed Flows
 - CN = 87 (Soil Type D Residential lots)
 - Time of Concentration; Lag Method, minimum Tc = 15min

- GRADING CONSTRAINTS
 - All perimeter lot grades matched
 - One foot freeboard between 100-yr WSE and adjacent lot corner
 - Minimum 1% rear yard grade

DEVELOPED CONDITIONS HYDROLOGIC ANALYSIS

The site is proposed to be re-platted and developed into a residential subdivision with 26 single family lots with a detention pond and associated drainage structures and pathways. A Curve Number of 87, although conservative, was used for the basins representing the residential areas; no streets are included in this plat and very little street area will flow to the proposed pond.

Please be aware, that the storm listed as the '3-yr event' in the Hydraflow model is actually the 1.2" rainfall water quality event. This is do to the constraints of the programs naming conventions. All the other storm events correspond to their respective years.

DETENTION FACILITIES

There is one detention facility proposed on the proposed plat. This facility will provide detention volume, water quality volume, and channel protection volume for the proposed re-platted lots included in this plan, as well as the other portions of the development that will drain to this pond. The pond can be seen on the half-scale drainage plan in Exhibit 4. The detention pond, located in Reserve A, can be viewed in further detail below.

➤ DETENTION POND

The pond is located in the center of this proposed plat, and at the northern portion of the entire Stonebridge development. This pond will drain to the south and into the existing pond via the existing 36" RCP. We anticipate the outlet will be constructed with a 2x4 drop structure on the 36" RCP with a 4" orifice and top grate acting as a weir overflow. The pond will accept approximately 17.5 acres of developed runoff and will have a corresponding 100-year water surface elevation of 1347.3 with a static surface of a 1345.0. The 4" orifice will be at the static elevation. The grated opening (weir structure) will be at elevation 1346.0.

DISCHARGE POINTS SUMMARY

The site will continue to discharge to the south via the existing 36" RCP and into the existing pond in Stonebridge Addition. That pond, as well as the existing pond located at the south end of the development has been sized for the entire sites' detention needs. This pond will provided additional detention, as well downstream channel protection and water quality. The existing storm water sewer that is installed has been sized and installed for this entire portion to drain directly into the pond. With the addition of this pond, additional detention will be provided on the overall site.

WATER QUALITY

Water quality volume calculation on the site is included in the Appendices. The proposed pond will provide water quality volume under the static water surface for the area draining into the pond. No calculations have been performed for the existing ponds, but they appear to have sufficient volume for the water quality storage and do not appear to have 'short circuit' outlets.

The pond will have a storage volume under the static elevation of approximately 11.1 ac-ft. This was based on a pool depth of 7'. The water quality volume calculated was approximately 0.9 ac-ft of storage needed. This pond will more than adequately satisfy the WQv requirement.

DOWNSTREAM CHANNEL PROTECTION

The downstream channel protection calculations were performed in HydraFlow utilizes the pond routing with ponds inflow and outflow hydrographs. The pond will feature a structure on the existing 36" outfall RCP that will include a 2x4 RCBC with KDOT style grates installed on the top acting as a weir structure. The structure will have a 4" orifice for the 1 year storm event to drain in order to meet the CPv requirements. With the installation of this outfall structure, the centroid of the inflow/outflow hydrographs will be approximately 30.2 hours. This falls within the City of Wichita's range of 24-48 hours of extended detention time. No modeling was performed on the downstream ponds, however, with a dual pond system that is existing, some extended detention time would be provided inherently.

POTENTIAL UPSTREAM/DOWNSTREAM IMPACTS

Due to the construction of another detention facility that provides detention, water quality, and downstream channel protection; no adverse upstream or downstream impacts are expected with this plat. The prior development and surrounding development was designed to provide detention and runoff conveyance. The addition of storm water sewer as well as the detention facility will provide more than required detention on the site.

FLOODPLAIN SUBMITTAL

SOURCE OF FLOODPLAIN INFORMATION

The site lies within a FEMA Zone X - Unshaded. The location of the property, on FEMA FIRM Panel 385 of 700 for Sedgwick County, Kansas, effective February 2, 2007, is attached as Exhibit 6.

FEDERAL, STATE, & LOCAL PERMITTING

US ARMY CORPS OF ENGINEERS

There does not appear to be any jurisdictional waters of the US on this portion of the 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 proposed pond will be approximately 11.1 ac-ft of impoundment at the static water surface elevation. This figure is below the 15 ac-ft statutory surface water pond appropriation.

FEMA

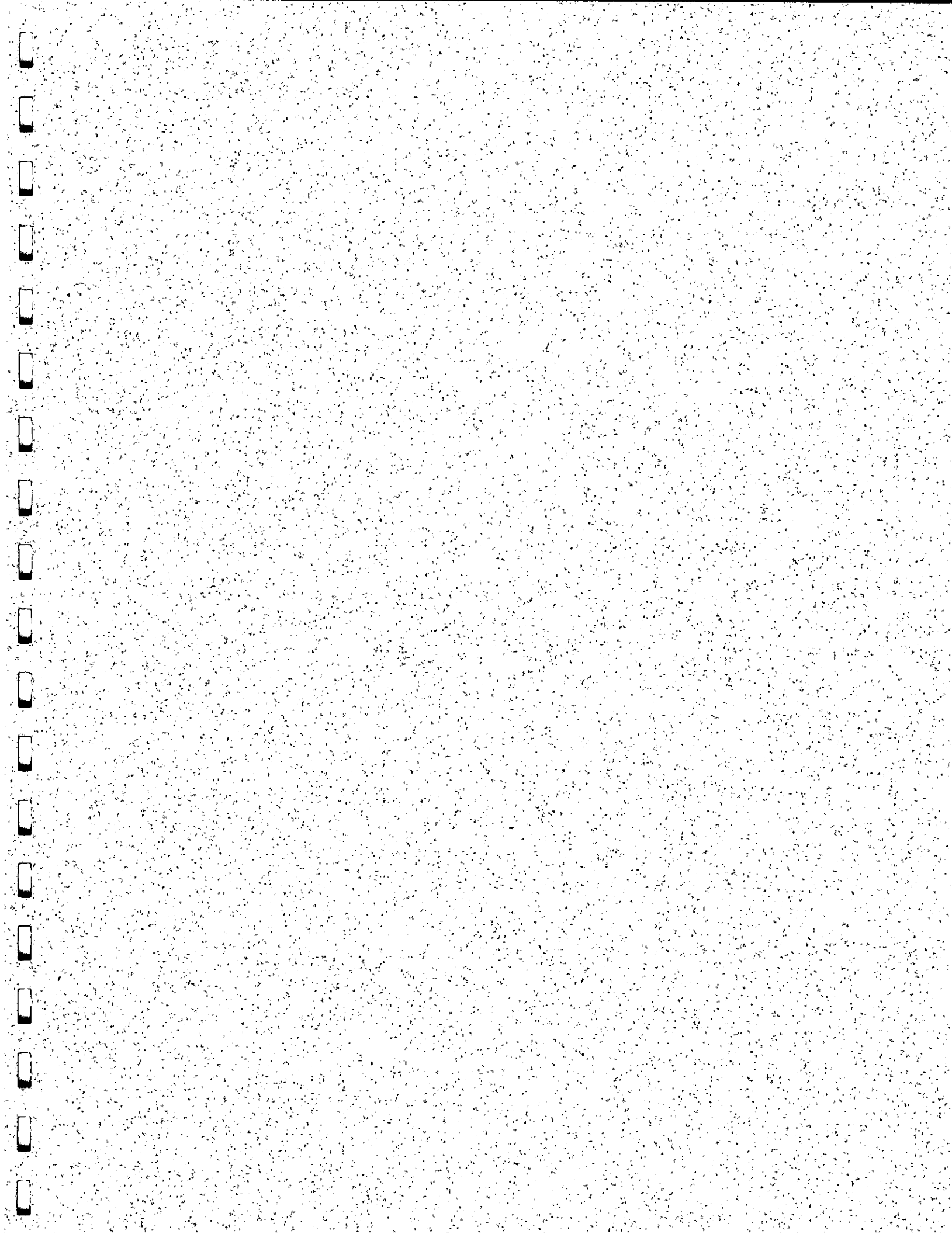
There is no mapped floodplain located upon the proposed site. Therefore, no FEMA permitting is expected at this time.

KANSAS DEPT OF TRANSPORTATION

There does not appear to be any KDOT permitting needed on the proposed project.

SEDGWICK COUNTY PERMITTING

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



EXHIBITS

- EXHIBIT 1: Site Location Map**
- EXHIBIT 2: Aerial Photo Exhibit with Lidar Topography**
- EXHIBIT 3: Plat – Half Scale**
- EXHIBIT 4: Drainage Plan – Half Scale**
- EXHIBIT 5: Grading Plan – Half Scale**
- EXHIBIT 6: Floodplain Location (FIRM)**
- EXHIBIT 7: Stonebridge 2nd Drainage Plan (Approved)**

AERIAL EXHIBIT
STONEBRIDGE 3RD ADDITION
WICHITA, SEDGWICK COUNTY, KANSAS

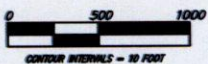
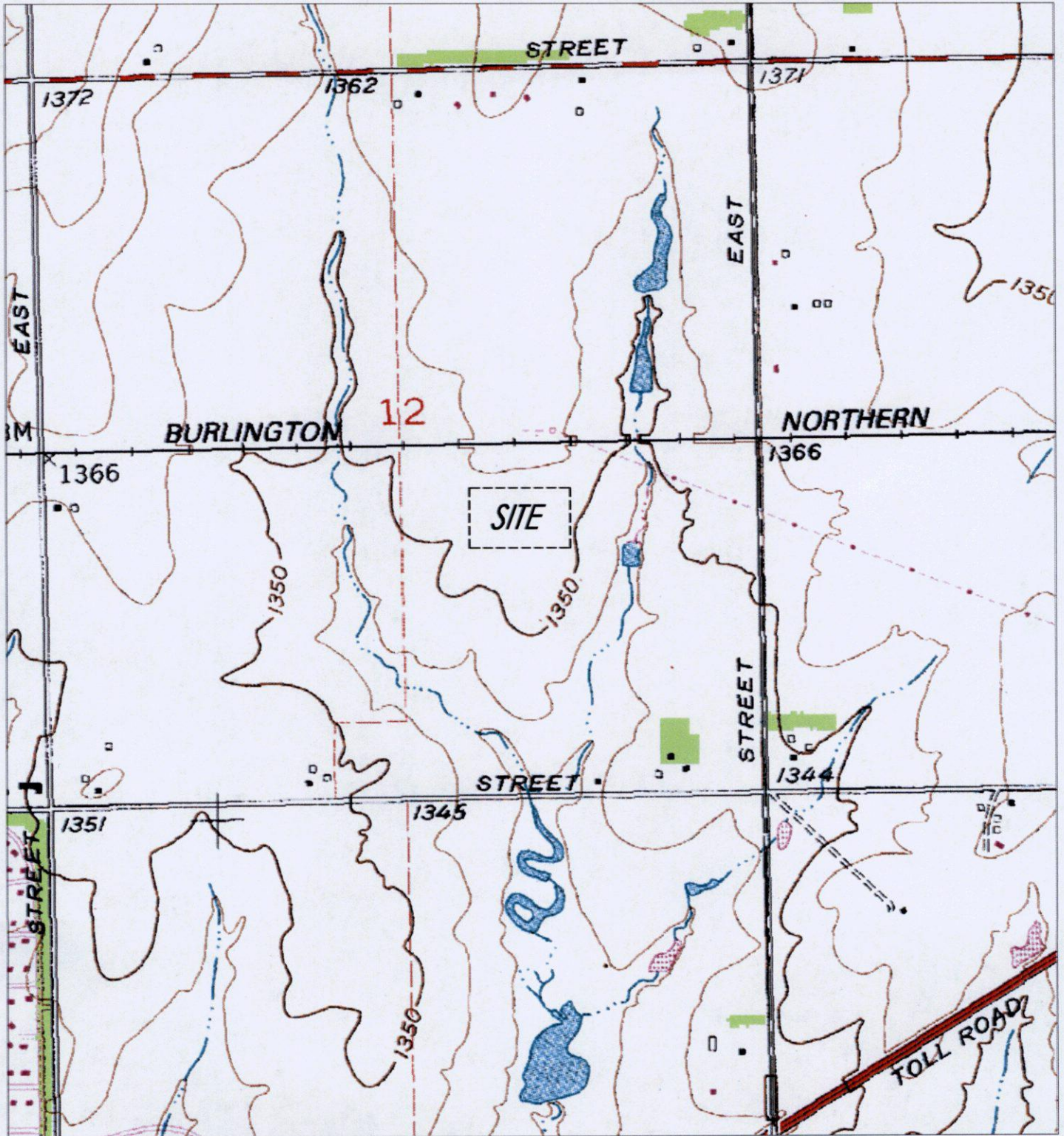
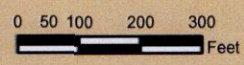


EXHIBIT 1
STONEBRIDGE 3RD ADDITION

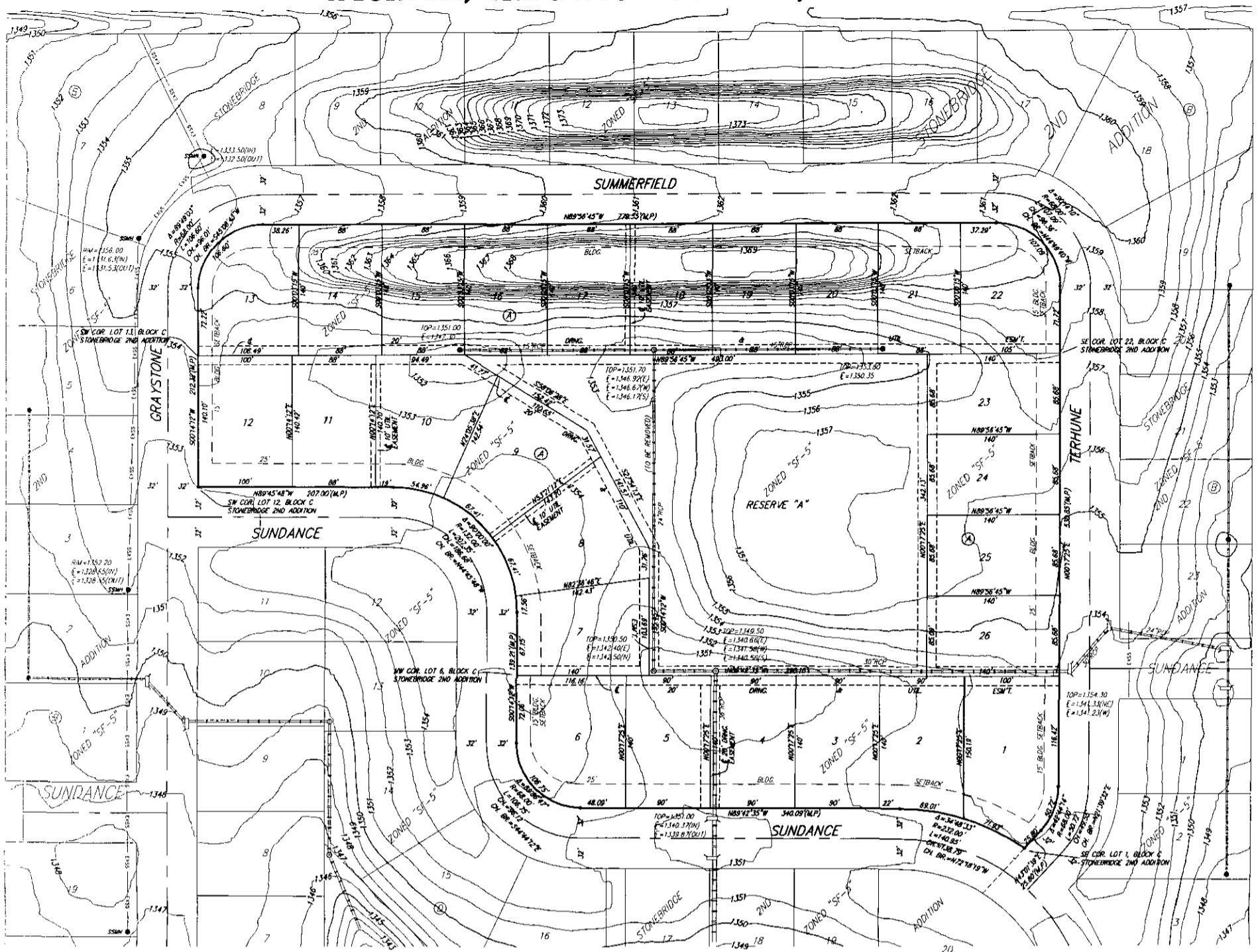
B Baughman Company, P.A.
Baughman
115 18th St. Wichita, KS 67201 P 316.262.7271 F 316.262.0149
SURVEYS • ARCHITECTURE • PLANNING • LANDSCAPE ARCHITECTURE



**AERIAL EXHIBIT
STONEBRIDGE 3RD ADDITION**



ONE-STEP FINAL PLAT
STONEBRIDGE 3RD ADDITION
WICHITA, SEDGWICK COUNTY, KANSAS



State of Kansas) SS
 Sedgwick County) We, Baughman Company, P.A., Surveyors in
 aforesaid county and state do hereby certify that we have surveyed and
 platted "STONEBRIDGE 3RD ADDITION", Wichita, Sedgwick County, Kansas
 and that the accompanying plat is a true and correct exhibit of the
 property surveyed, described as all of Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,
 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29,
 30, Block C, Stonebridge 2nd Addition, Sedgwick County, Kansas, together
 with all of Terhune Ct as dedicated in said Stonebridge 2nd Addition.

Existing public easements and dedications
 being vacated by virtue of K.S.A. 12-512(b).
 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, a Block, and a Reserve, to be known as "STONEBRIDGE
 3RD 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. Reserves "A" is hereby
 reserved for lakes, landscaping, open space, berms, sidewalks, drainage
 purposes, and utilities as confined to easements. Reserve "A" shall be
 owned and maintained by the homeowners association for the addition.
 The Minimum Building Pad Elevations for the lowest opening to the
 structures shall be as indicated on the face of the plat.

_____, Member
 Steven R. Barrett

State of Kansas) SS
 Sedgwick County) The foregoing instrument acknowledged before
 me, this _____ day of _____, 2011, by Steven R. Barrett, Member of
 FLKS Land Development, LLC, a Kansas limited liability company, on behalf
 of the limited liability company.

_____, Notary Public

My App't. Exp. _____

This plat of "STONEBRIDGE 3RD 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 _____, 2011.
 Wichita-Sedgwick County Metropolitan Area Planning Commission

_____, Chair
 Debra Miller Stevens

_____, 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 _____, 2011.

_____, Mayor
 Carl Brewer

_____, City Clerk
 Karen Sublett

Reviewed in accordance with K.S.A. 58-2005
 on this _____ day of _____, 2011.

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

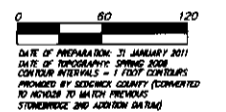
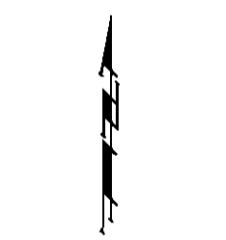
Entered on transfer record this _____ day
 of _____, 2011.

_____, County Clerk
 Kelly B. Arnold

State of Kansas) SS This is to certify that this plat has been
 Sedgwick County) filed for record in the office of the Register of Deeds, this _____ day
 of _____, 2011 at _____ o'clock _____ M, and is duly recorded.

_____, Register of Deeds
 Bill Meek

_____, Deputy
 Tonya Buckingham



DATE OF PREPARATION: 25 JANUARY 2011
 DATE OF TOPOGRAPHIC SURVEY: 2008
 CONTOUR INTERVALS: 1 FOOT CONTIGUOUS
 PROVIDED BY SEDGWICK COUNTY (FORWARDED
 TO ADVISOR BY SAATCHI PREVIOUS
 STONEBRIDGE 2ND ADDITION (S&R))

• = REBAR W/ "BAUGHMAN" CAP (SET)
 (N) = MEASURED
 (P) = PLATTED

LOT	BLOCK	ELEVATION
2-5	A	1345.0
7-10	A	1345.0
15-21	A	1345.0
23-26	D	1345.0

BENCHMARK:
 "C" CUT, TOP OF CURB, S. SIDE OF SUNDANCE AS
 DEDICATED IN SAVANNAH AT CASTLE ROCK RANCH
 7TH ADDITION, 25' W. OF THE WEST LINE OF THE
 SE 1/4 OF SEC. 12, TWP. 27-S, R-2-E.
 ELEV. = 1347.33 MGV029

600' HAIL IN HIGH LINE POLE, 30' SOUTH OF S1/4
 COR., SEC. 12, TWP. 27-S, R-2-E.
 ELEV. = 1348.58 MGV029 (PER COUNTY RECORD)

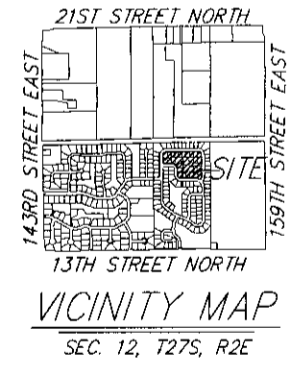
NOTE:
 ALL SANITARY SEWER AND STORM WATER
 SEWER INFORMATION PER PLAN AND IN
 MGV029 DATUM.

We the undersigned holders of a mortgage on the
 above described property, do hereby consent to this plat of "STONEBRIDGE
 3RD ADDITION", Wichita, Sedgwick County, Kansas.

_____,
 Commerce Bank, N.A.
 _____ (Title)

State of Kansas) SS The foregoing instrument acknowledged before
 Sedgwick County) me, this _____ day of _____, 2011, by _____
 _____ of Commerce Bank, N.A., on behalf of the bank.
 _____ (Title)

_____, Notary Public
 My App't. Exp. _____



**STONEBRIDGE 3RD
 ADDITION**

14 JANUARY 2011

Baughman Company, P.A.
 10118-W. Wicks, Emporia, KS 66701 P: 785-222-7171 F: 785-222-0199

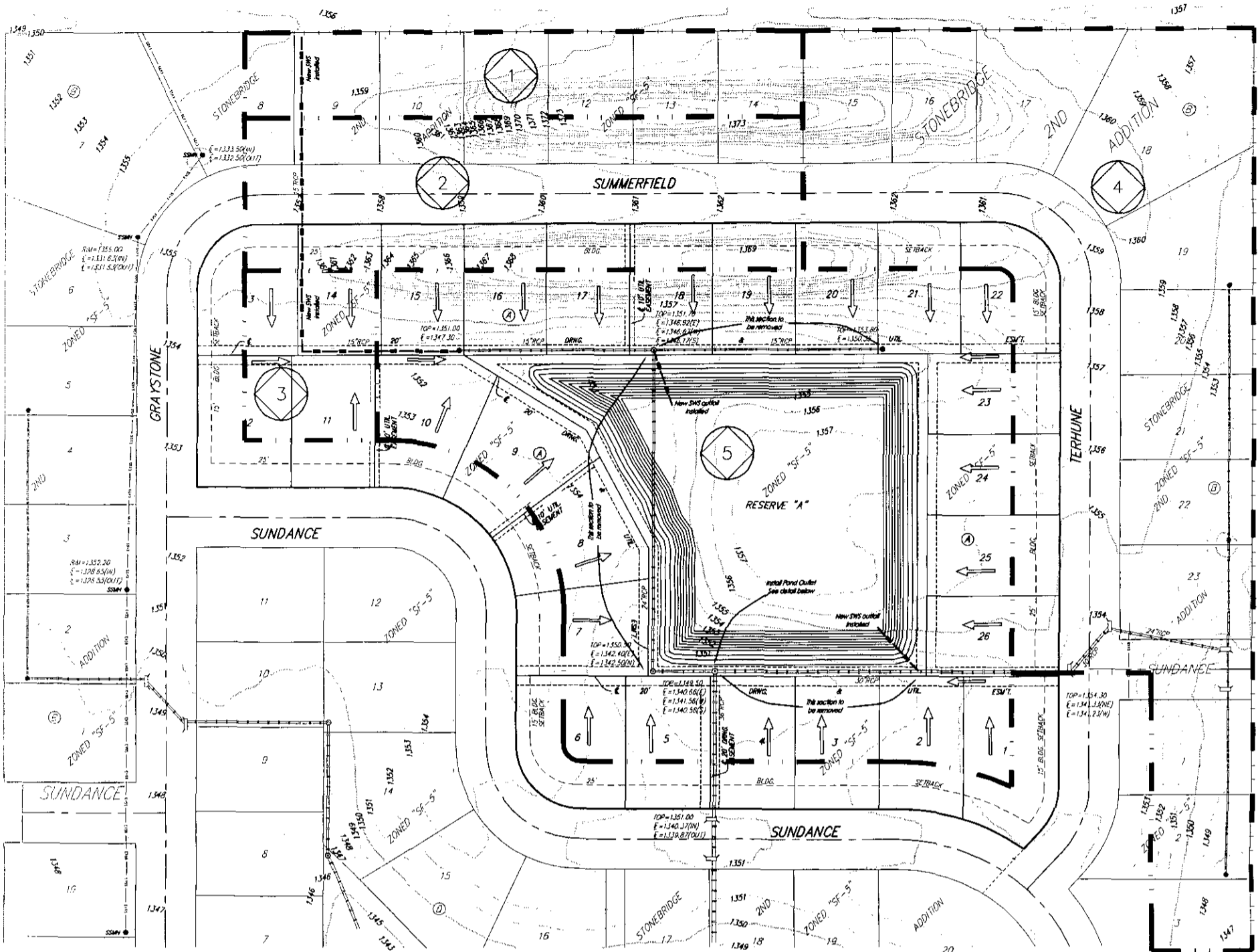
Baughman ENGINEERING & SURVEYING | PLANNING & LANDSCAPE ARCHITECTURE

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DRAINAGE PLAN

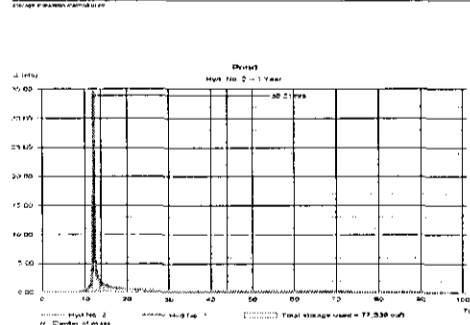
STONEBRIDGE 3RD ADDITION

WICHITA, SEDGWICK COUNTY, KANSAS



Channel Protection Hydrograph

Hydrograph Report
 Project: Stonebridge 3rd Addition Water Quality Data & Computations
 Prepared by: AEG
 Date: 2/9/2011



Water Quality Calculations

Stonebridge 3rd Addition Water Quality Data & Computations
 Completed by: AEG
 Date: 2/9/2011

- Notes & Assumptions:**
- 1/4 acre site lots assumed with 30% impervious area
 - Pond surface areas not included in WQ calculations
 - Circle drainage off site

Basin	Area	Effect
1	1.5	Streets & lots untreated but drain to existing downstream pond within the subdivision
2	0.2	Streets & lots untreated but drain to existing downstream pond within the subdivision
Total	1.7	

Impervious Cover %	Equation
0.38	$WQ_2 = R_p \cdot WQ_1$
Un disturbed Woods	$WQ_1 = R_p \cdot U \cdot R_p \cdot D \cdot R_p \cdot 1$
Disturbed Site	$U = \text{un disturbed total area}$
Impervious Cover	$D = \text{dist. area total area}$
	$R_p = \text{impervious total area}$

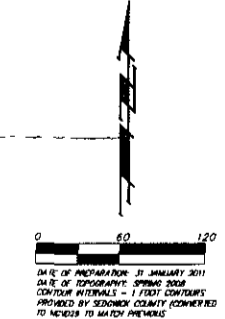
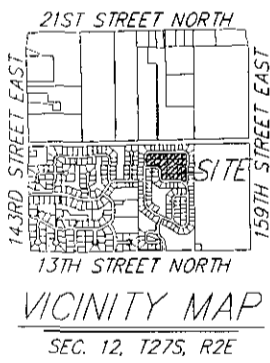
Drainage Basin	Pond Area	Un disturbed Area	Disturbed Area	Impervious Area
1	17.3	15.4	0.0	5.9
2	1.3	1.3	0.0	0.0
3	0.2	0.2	0.0	0.1
Totals	19.2	17.1	0.0	6.3

Calculations	U	D	I	Totals
	0.00	0.62	0.38	1.0
	0.00	0.62	0.38	1.0
	0.00	0.62	0.38	1.0

Basin	Static Area	Pond Bottom Area	Depth	Volume
1	81785	21	48803	1.1
Totals				11.1

Pond	WQv	Check	
1	11.1	0.9	Yes

Calculations	Rv	Area	WQv
	0.5	15.4	0.8
	0.5	1.5	0.1
	0.5	0.2	0.0
		17.1	0.9

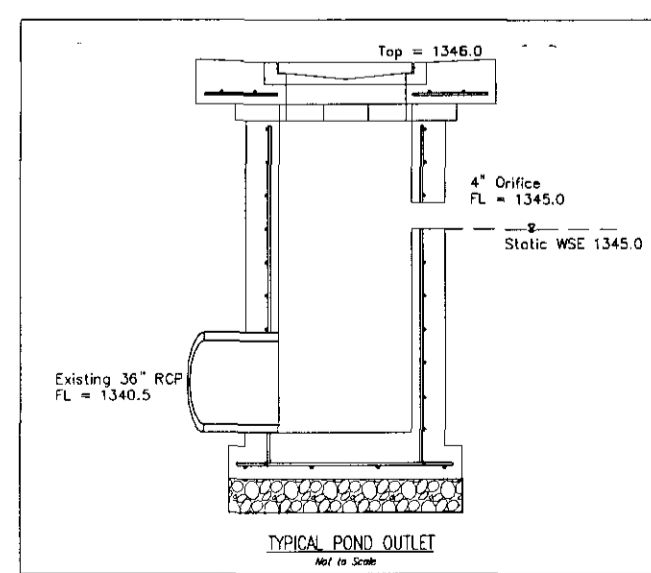


DATE OF MEASUREMENT: 31 JANUARY 2011
 DATE OF TOPOGRAPHIC SURVEY: 2008
 CONTOUR INTERVALS: 1 FOOT CONTOURS
 PROVIDED BY: SEDGWICK COUNTY (CONVEYED TO NEIGHBOR TO MATCH PREVIOUS STONEBRIDGE 2ND ADDITION DATA)

LOT	BLOCK	ELEVATION
1-26	A	1350.0

BENCHMARK:
 CUT TOP OF CURB, S. SIDE OF SUNDANCE AS DEDICATED IN SAVANNAH AT CASTLE ROCK RANCH 7TH ADDITION, 25E W. OF THE WEST LINE OF THE SE1/4 OF SEC. 12, TWP. 27-S, R-2-E, ELEV. = 1347.33 NGVD29

SOI NAIL IN HIGH LINE POLE, 30' SOUTH OF S1/4 COR., SEC. 12, TWP. 27-S, R-2-E, ELEV. = 1348.58 NGVD29 (PER COUNTY RECORD)



STAGE	INFLOW	OUTFLOW	ELEVATION
1 yr	33 cfs	0.4 cfs	1346.0
2 yr	48 cfs	2.3 cfs	1346.1
5 yr	67 cfs	10 cfs	1346.4
10 yr	81 cfs	18 cfs	1346.7
25 yr	99 cfs	32 cfs	1346.9
100 yr	132 cfs	57 cfs	1347.3

ELEVATION	AREA (sq ft)
1345	73000
1346	79000
1347	83000

Developed	2-yr	10-yr	100-yr
Intensity	3.8	5.19	7.36
Rational C	0.48	0.50	0.73

Basin ID	Area	2-yr	10-yr	100-yr
1	1.2	2.2	3.7	6.4
2	2	4.0	6.7	12
3	0.6	1.1	1.8	3.2
4	6.0	11	18	32
5	6.7	12	21	38
TOTAL	16.7	30	51	90

NOTE: No FEMA SFHA exists on this portion of the property per FEMA FIRM 200321 0385 E, Community Panel 2017300385E for Sedgwick County, Kansas; Effective Feb 2, 2007

DRAINAGE PLAN

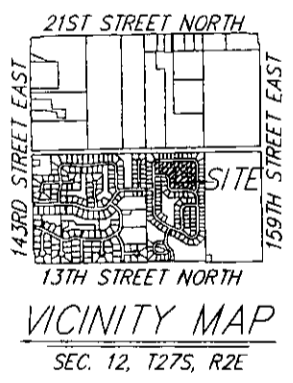
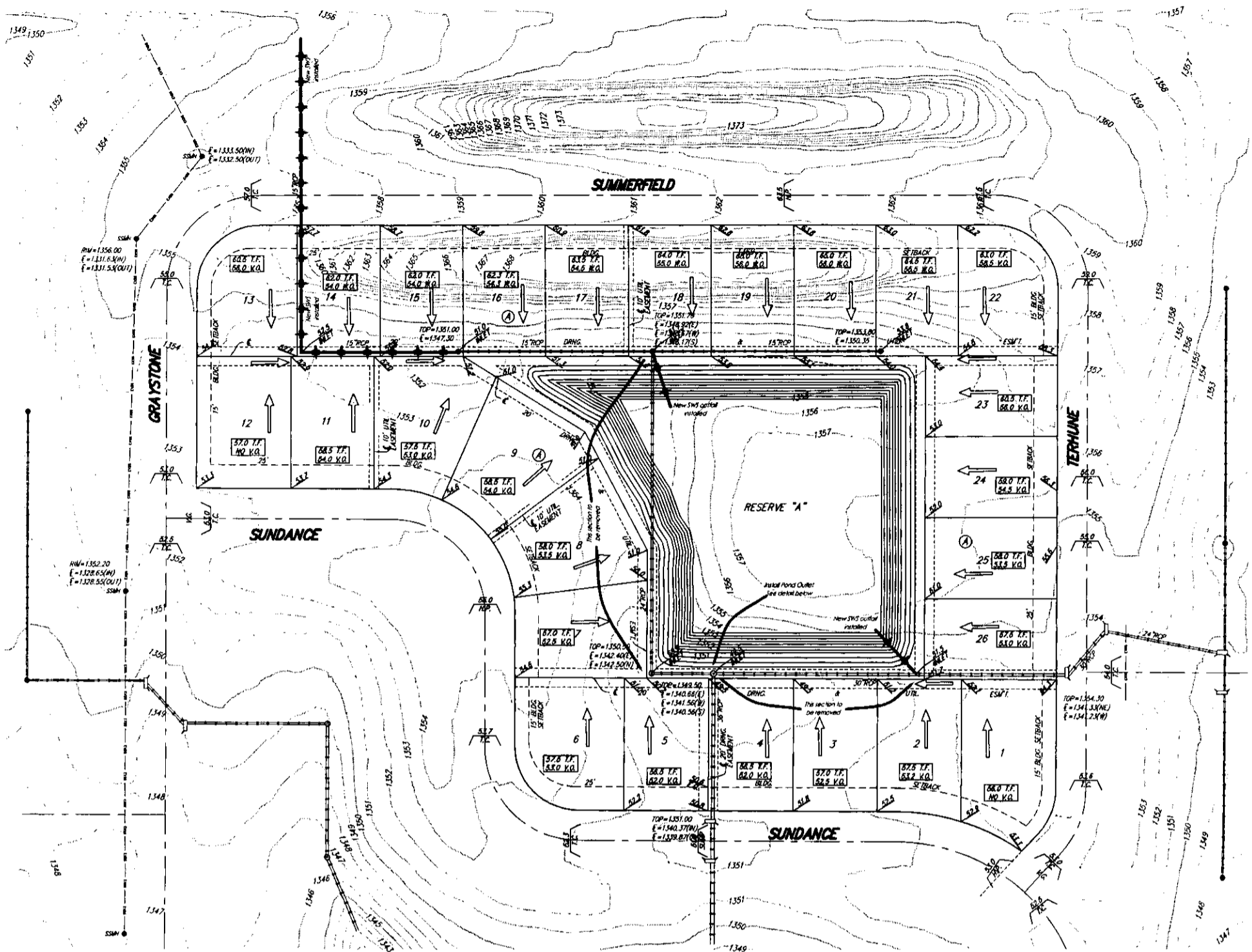
STONEBRIDGE 3RD ADDITION

Baughman Company, P.A.
 15116 St. Wichita, KS 67211 P 316-262-7271 F 316-262-0111
REGISTERED | SURVEYING | PLANNING | LANDSCAPE ARCHITECTURE

GRADING PLAN

STONEBRIDGE 3RD ADDITION

WICHITA, SEDGWICK COUNTY, KANSAS

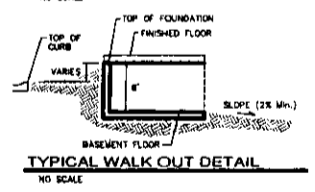
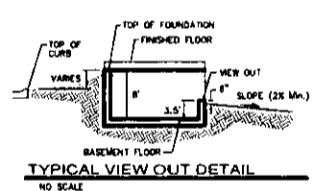


PROPOSED DETENTION POND (Static = 1345.0)

STAGE	INFLOW	OUTFLOW	ELEVATION
1 yr	35 cfs	0.4 cfs	1346.0
2 yr	48 cfs	2.5 cfs	1346.1
5 yr	67 cfs	10 cfs	1346.4
10 yr	81 cfs	18 cfs	1346.7
25 yr	99 cfs	32 cfs	1346.9
100 yr	132 cfs	57 cfs	1347.3

PROPOSED POND

ELEVATION	AREA (sq ft)
1345	73000
1346	79000
1347	85000

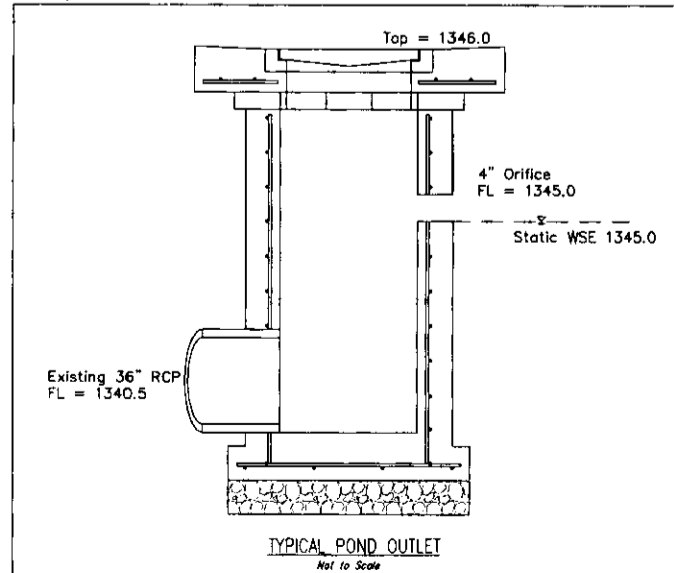


- NOTES:**
- PROPOSED TOP OF FOUNDATION ELEVATIONS ARE SHOWN ON PLANS. CONTRACTOR TO SET FINISHED FLOOR AND GARAGE FLOOR ELEVATIONS. ALL STREET ELEVATIONS SHOWN ON PLANS ARE FOR TOP OF CURB (FULL-HEIGHT).
 - THIS GRADING PLAN IS DESIGNED WITH WEIR-OUTS AND WALK-OUTS. ELEVATIONS SHOWN AS XX.X V.O. DEPICT WEIR-OUT STRUCTURES. ELEVATIONS SHOWN AS XX.X W.O. DEPICT WALK-OUT STRUCTURES.
 - ALL LOTS SHALL MEET MINIMUM PAD REQUIREMENT AS SHOWN ON THE RECORDED PLAT.

MINIMUM BUILDING PAD ELEVATIONS FOR LOWEST OPENING TO THE STRUCTURES

LOT	BLOCK	ELEVATION
1-26	A	1350.0

- LOT DIMENSIONS HAVE BEEN OMITTED ON THIS PLAN. REFER TO THE RECORDED PLAT FOR FINAL DIMENSION, EASEMENT, & BUILDING SETBACK INFORMATION.
- HOUSE PAD ELEVATIONS DEPICTED WITH BOLD OUTLINES AND NOTED WITH THIS SYMBOL. INDICATE THAT DEEP FOOTINGS OR DEEP FOUNDATIONS MAY BE REQUIRED.
- A DRAINAGE PLAN HAS BEEN DEVELOPED FOR THIS SUBDIVISION AND IS ON FILE WITH SEDGWICK COUNTY, KANSAS. DRAINAGE INTENT SHALL REMAIN AS DEPICTED OR AS MODIFIED WITH THE APPROVAL OF THE COUNTY ENGINEER OF SEDGWICK COUNTY, KANSAS. NO OBSTRUCTIONS WHICH IMPED THE FLOW OF THIS DRAINAGE PLAN SHALL BE ALLOWED.
- ALL ELEVATIONS SHOWN ARE NGVD29 DATUM.



DATE OF PREPARATION: 31 JANUARY 2011
 DATE OF SURVEY: SPRING 2008
 CONTOUR INTERVALS = 1.00' CONTIGUOUS
 PROVIDED BY SEDGWICK COUNTY (CONVERTED TO NGVD29 TO MATCH PREVIOUS STONEBRIDGE 2ND ADDITION DATA)

• = #4 REBAR W/ "BAUGHMAN" CAP (SET)
 (N) = MEASURED
 (P) = PLATTED

BENCHMARK:
 □ CUT, TOP OF CURB, S. SIDE OF SUNDANCE AS DEDICATED IN SAVANNAH AT CASTLE ROCK RANCH 7TH ADDITION, 25' W. OF THE WEST LINE OF THE SEC. 14 OF SEC. 12, TWP. 27-S, R-2-E. ELEV. = 1347.33 NGVD29

600 NAIL IN HIGH LINE POLE, 30' SOUTH OF S1/4 COR., SEC. 12, TWP. 27-S, R-2-E. ELEV. = 1348.58 NGVD29 (PER COUNTY RECORD)

NOTE: No FEMA SFHA exists on this portion of the property per FEMA FIRM 200321 0385 E, Community Panel 20173C0385E for Sedgwick County, Kansas; Effective Feb. 2, 2007

GRADING PLAN
STONEBRIDGE 3RD ADDITION

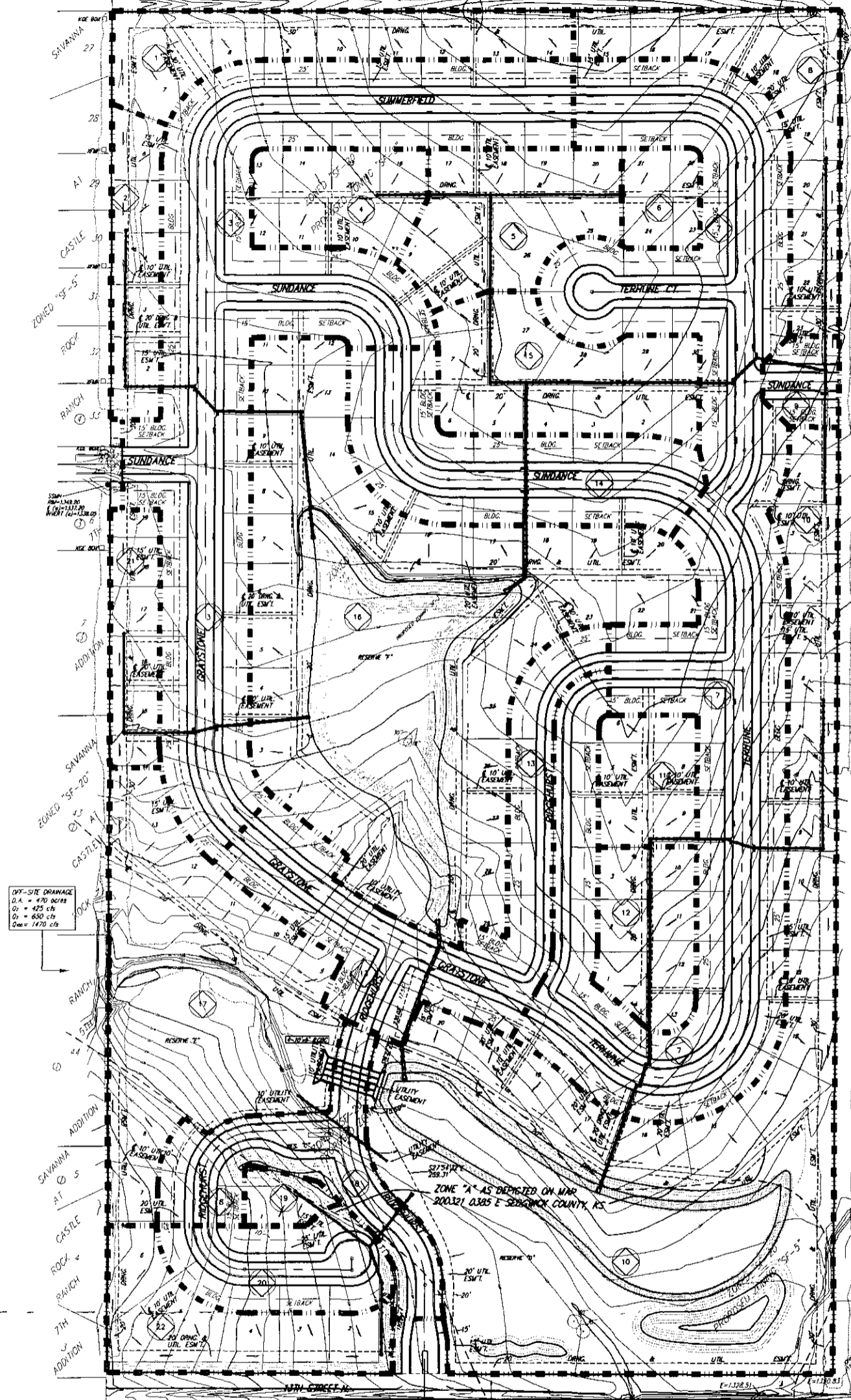
01 FEB 2011

Baughman Company, P.A.
 111 E. 10th St., Wichita, KS 67211 P: 316.262.2271 F: 316.262.0149
 WWW.BAUGHMAN-CO.COM

DRAINAGE PLAN STONEBRIDGE 2ND ADDITION SEDGWICK COUNTY, KANSAS

ST. LOUIS, WICHITA, AND WESTERN RAILWAY
(NOW BURLINGTON NORTHERN & SANTA FE RAILROAD)
6' 10" CONTIGUOUS
PEDESTRIAN ACCESS
EASEMENT

WESTERLY R/W EASEMENT
RANGE 16-24E, PG. 2007



GARVEY, EAN K.
#400
300 W. DOUGLAS
WICHITA, KS 67202
ZONED "SF-20"

Existing Intensity	2yr	5yr	100yr	Developed Intensity	2yr	5yr	100yr
Rational C	0.38	0.42	0.50	Rational C	0.46	0.5	0.73

Basin ID	Area acres	Existing Flowrates			Developed Flowrates		
		2-yr cfs	5-yr cfs	100-yr cfs	2-yr cfs	5-yr cfs	100-yr cfs
1	2.1	3.1	4.0	7.7	3.7	4.8	11
2	1.6	2.3	3.1	5.9	2.8	3.6	8.6
3	8.6	13	17	32	16	20	47
4	1.3	1.9	2.5	4.8	2.3	3.0	7.0
5	2.0	2.8	3.8	7.4	3.5	4.6	11
6	0.6	0.9	1.1	2.2	1.1	1.4	3.2
7	11	16	21	41	20	26	60
8	2.2	3.2	4.2	8.1	3.9	5.0	12
9	0.5	0.7	1.0	1.8	0.9	1.1	2.7
10	13	19	25	48	23	30	70
11	1.0	1.5	1.9	3.7	1.8	2.3	5.4
12	1.1	1.6	2.1	4.1	1.9	2.5	5.9
13	3.5	5.1	6.7	13	6.2	8.0	19
14	2.8	3.6	4.8	9.2	4.4	5.7	13
15	2.3	3.3	4.4	8.5	4.1	5.2	12
16	10	15	19	37	18	23	54
17	5.8	8.4	11	21	10	13	31
18	2.1	3.1	4.0	7.7	3.7	4.8	11
19	0.3	0.4	0.6	1.1	0.5	0.7	1.6
20	1.4	2.0	2.7	5.2	2.5	3.2	7.5
21	1.8	2.3	3.1	5.9	2.8	3.6	8.6
22	1.8	2.6	3.4	6.8	3.2	4.1	9.7
TOTAL	77	108	143	276	132	171	402

OFF-SITE DRAINAGE
D.A. = 470 acres
Q₂ = 425 cfs
Q₅ = 650 cfs
Q₁₀₀ = 1470 cfs

OFF-SITE DRAINAGE
D.A. = 370 acres
Q₂ = 330 cfs
Q₅ = 500 cfs
Q₁₀₀ = 1160 cfs

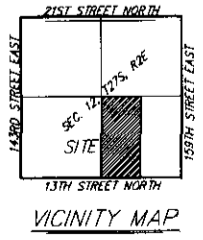
MURFIN, NANCY TRUST
SUITE 300
250 N. WATER
WICHITA, KS 67202-1216
ZONED "SF-20"

LOT	BLOCK	ELEVATION
1	A	1,337.0
8-13	A	1,338.0
1-3, 14-18	D	1,344.0
23-28	D	1,344.0
13-20	F	1,337.0

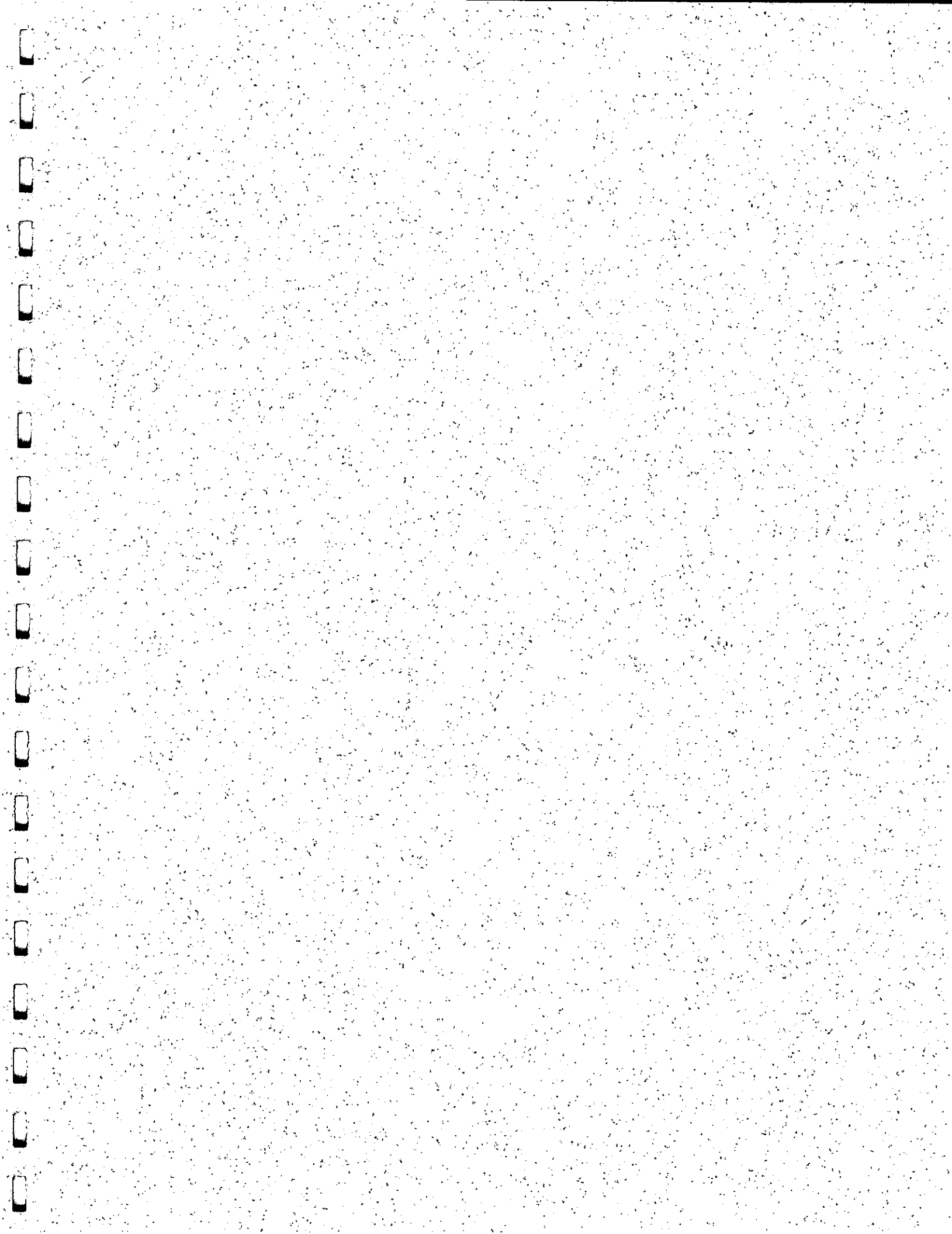
REMARKS:
"1" CUT, TOP OF CURB, S. SIDE OF SUNDANCE AS
DEDICATED IN SAVANNA AT CASTLE ROCK RANCH
7TH ADDITION, 25 1/2' W. OF THE WEST LINE OF THE
SE 1/4 OF SEC. 12, TWP. 27-S, R-2-E.
ELEV. = 1,346.58 MCH29 (PER COUNTY RECORD)

NOTE: A DWR Permit will be needed for the box crossing. BFE's were established using HEC software and were submitted in Stonebridge Addition.

NOTE: FEMA Floodplain boundary scaled per location per FEMA FIRM 200321 0385 E, Community Panel 20173C0385E for Sedgwick County, Kansas, Effective Feb 2, 2007



Baughman Company, P.A.
11515 E. 15th St., Wichita, KS 67221 P: 316.262.1211 F: 316.262.0149
REGISTERED PROFESSIONAL ENGINEER - CIVIL
REGISTERED PROFESSIONAL SURVEYOR - LAND SURVEYING
P:\PROJECTS\Projects\Stonebridge\20173C0385E\FIRM132E.dwg, 12/10/2006



SUPPORTING CALCULATIONS

APPENDIX A: USGS Soils Survey

**APPENDIX B : HydraFlow Hydrographs
Site Flow and Pond Routing**

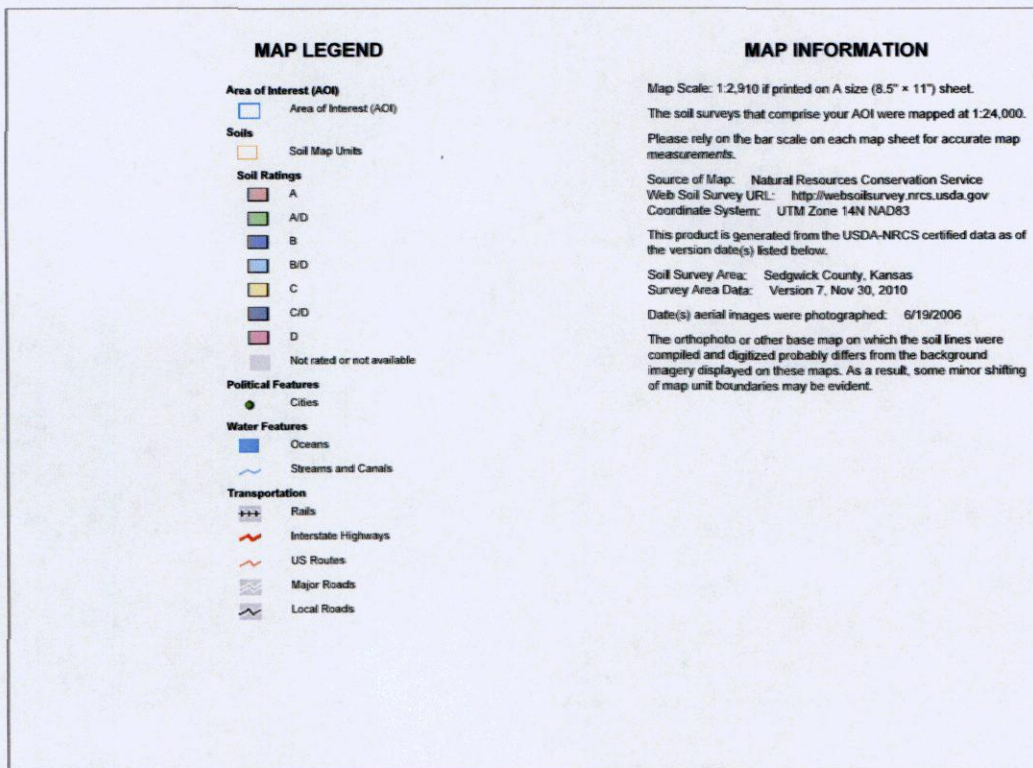
APPENDIX C: Water Quality Volume Calculations

USGS Soils Survey

Hydrologic Soil Group—Sedgwick County, Kansas
(Stonebridge 3rd Addition)



Hydrologic Soil Group—Sedgwick County, Kansas
(Stonebridge 3rd Addition)



Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
3857	Goessel silt clay, 0 to 1 percent slopes	D	0.0	0.1%
3911	Rosell silt clay, 1 to 3 percent slopes	D	29.6	96.1%
4570	Clime silt clay, 3 to 7 percent slopes	C	1.4	4.8%
Totals for Area of Interest			30.1	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.

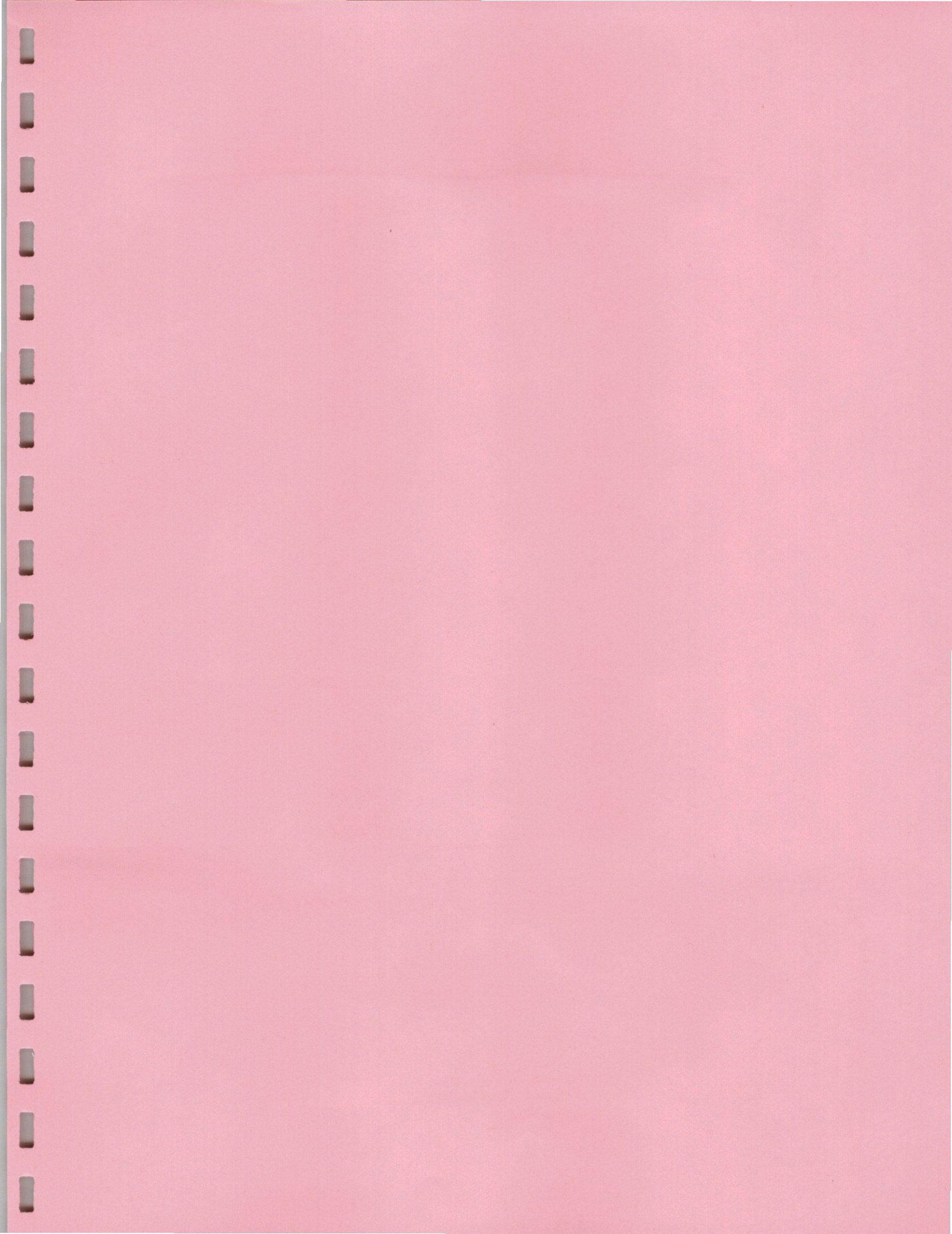
The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

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: Lower

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.

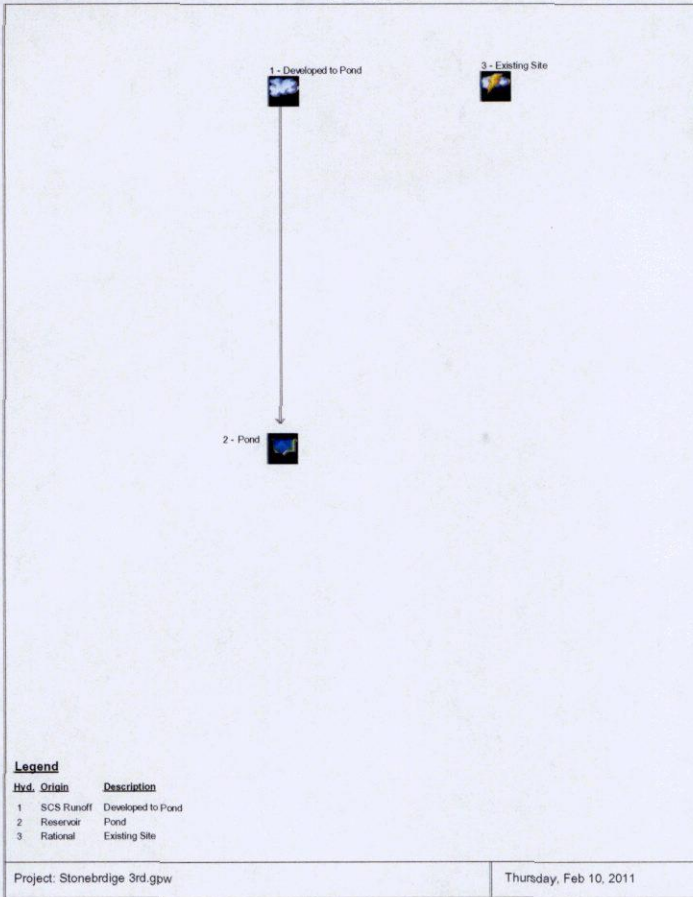


HydraFlow Hydrographs
Site Flow & Pond Routing

Watershed Model Schematic

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

1



Hydrograph Return Period Recap

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

2

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(e)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-----	34.59	47.98	7.007	67.42	81.08	98.62	114.17	131.59	Developed to Pond
2	Reservoir	1	0.568	2.469	0.103	9.781	18.51	31.57	43.79	57.36	Pond
3	Rational	-----	22.25	29.50	0.198	34.87	40.02	46.38	51.94	56.45	Existing Site

Proj. file: Stonebridge 3rd.gpw Thursday, Feb 10, 2011

Hydrograph Summary Report

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

3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	34.59	2	722	96,977	-----	-----	-----	Developed to Pond
2	Reservoir	0.568	2	1172	81,166	1	1346.02	77,339	Pond
3	Rational	22.25	1	15	20,026	-----	-----	-----	Existing Site

Stonebridge 3rd.gpw Return Period: 1 Year Thursday, Feb 10, 2011

Hydrograph Report

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

Thursday, Feb 10, 2011

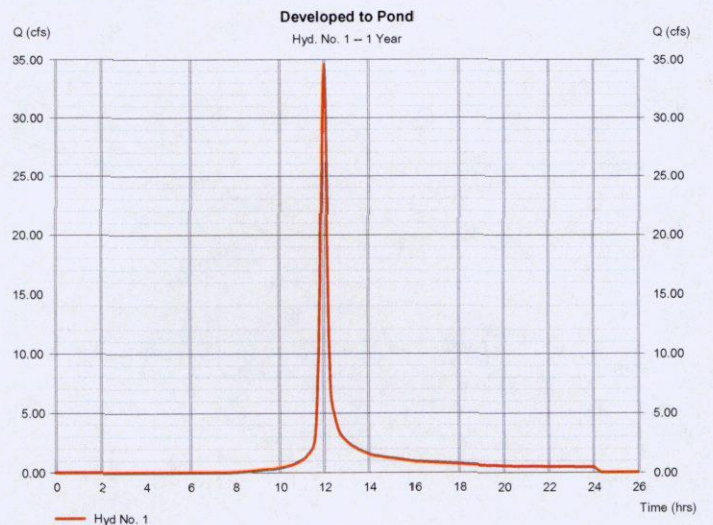
4

Hyd. No. 1

Developed to Pond

Hydrograph type = SCS Runoff
 Storm frequency = 1 yrs
 Time interval = 2 min
 Drainage area = 17,500 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 2.80 in
 Storm duration = 24 hrs

Peak discharge = 34.59 cfs
 Time to peak = 12.03 hrs
 Hyd. volume = 96,977 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 15.00 min
 Distribution = Type II
 Shape factor = 484



Hydrograph Report

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

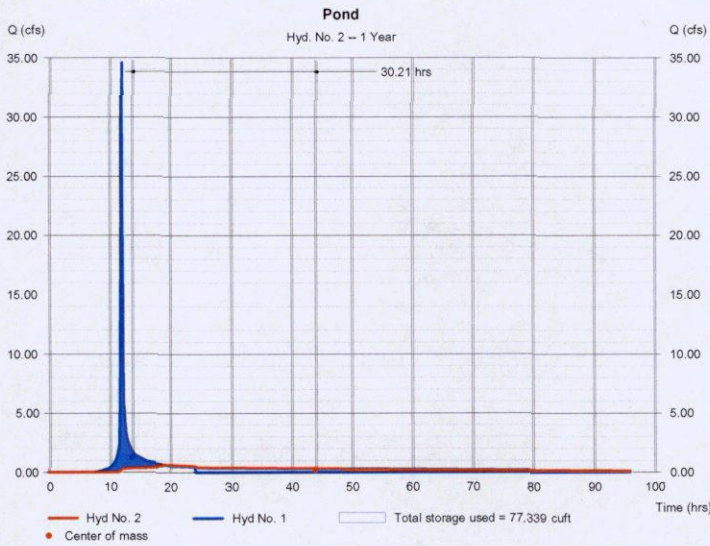
Thursday, Feb 10, 2011

Hyd. No. 2

Pond

Hydrograph type	= Reservoir	Peak discharge	= 0.598 cfs
Storm frequency	= 1 yrs	Time to peak	= 19.53 hrs
Time interval	= 2 min	Hyd. volume	= 81,166 cuft
Inflow hyd. No.	= 1 - Developed to Pond	Max. Elevation	= 1346.02 ft
Reservoir name	= Proposed Pond	Max. Storage	= 77,339 cuft

Storage Indication method used.



Hydrograph Report

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

Thursday, Feb 10, 2011

Hyd. No. 3

Existing Site

Hydrograph type	= Rational	Peak discharge	= 22.25 cfs
Storm frequency	= 1 yrs	Time to peak	= 0.25 hrs
Time interval	= 1 min	Hyd. volume	= 20,026 cuft
Drainage area	= 10.500 ac	Runoff coeff.	= 0.73
Intensity	= 2.903 in/hr	Tc by User	= 15.00 min
IDF Curve	= wich_IDF.IDF	Asc/Rec limb fact	= 1/1



Pond Report

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

Thursday, Feb 10, 2011

Pond No. 1 - Proposed Pond

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 1345.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1345.00	73,000	0	0
1.00	1346.00	79,000	75,973	75,973
2.00	1347.00	85,000	81,974	157,946
3.00	1348.00	92,000	88,408	246,414
4.00	1349.00	98,000	94,975	341,389

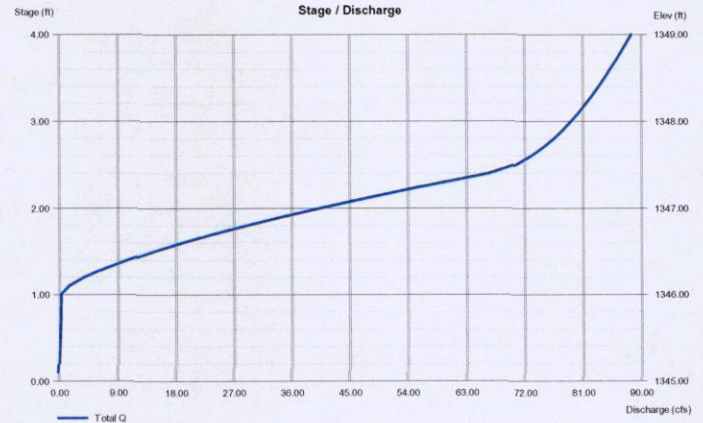
Culvert / Orifice Structures

	[A]	[B]	[C]	[Pr/Rsr]
Rise (in)	= 36.00	4.00	0.00	0.00
Span (in)	= 36.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1340.50	1345.00	0.00	0.00
Length (ft)	= 500.00	0.00	0.00	0.00
Slope (%)	= 1.50	0.00	0.00	n/a
N-Value	= 0.13	0.13	0.13	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	0.00	0.00	0.00
Crest El. (ft)	= 1346.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil. (in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outfalls are analyzed under inlet (c) and outlet (oc) control. Weir weirs checked for orifice conditions (cc) and submergence (ss).



Hydrograph Summary Report

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

Thursday, Feb 10, 2011

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	47.98	2	722	135,173	-----	-----	-----	Developed to Pond
2	Reservoir	2.489	2	820	119,191	1	1346.13	86,984	Pond
3	Rational	29.50	1	15	28,549	-----	-----	-----	Existing Site

Hydrograph Report

9

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

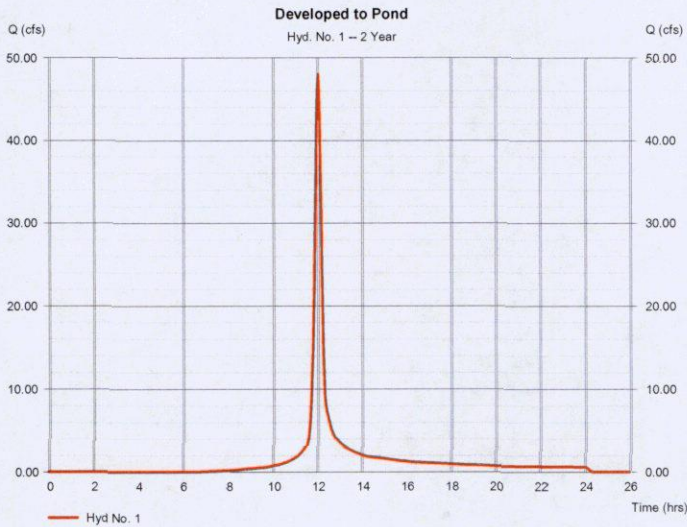
Thursday, Feb 10, 2011

Hyd. No. 1

Developed to Pond

Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Time interval = 2 min
 Drainage area = 17,500 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 3.50 in
 Storm duration = 24 hrs

Peak discharge = 47.98 cfs
 Time to peak = 12.03 hrs
 Hyd. volume = 135,173 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 15.00 min
 Distribution = Type II
 Shape factor = 484



Hydrograph Report

10

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

Thursday, Feb 10, 2011

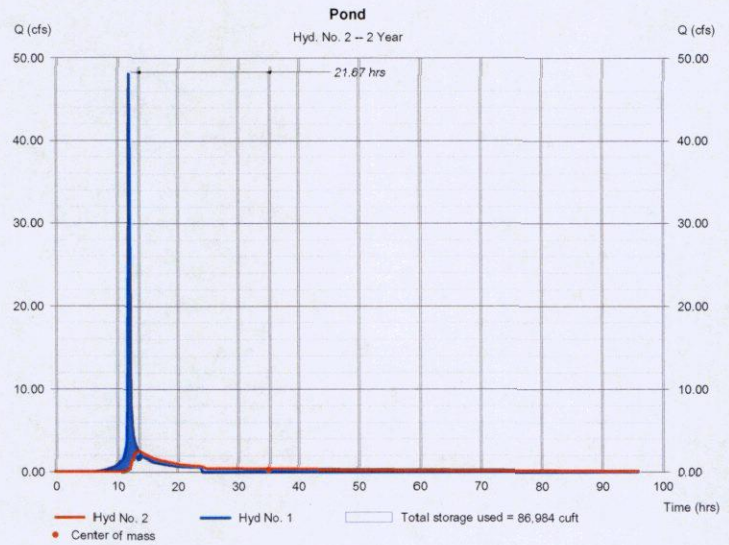
Hyd. No. 2

Pond

Hydrograph type = Reservoir
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyd. No. = 1 - Developed to Pond
 Reservoir name = Proposed Pond

Peak discharge = 2.469 cfs
 Time to peak = 13.67 hrs
 Hyd. volume = 119,191 cuft
 Max. Elevation = 1346.13 ft
 Max. Storage = 86,984 cuft

Storage Indication method used:



Hydrograph Report

11

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

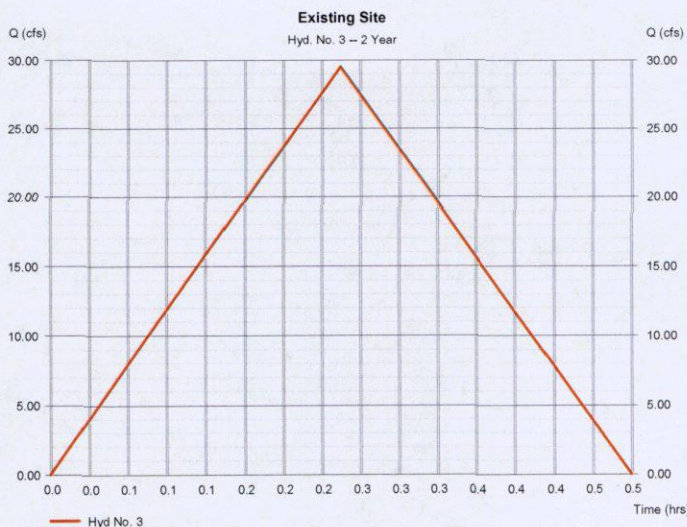
Thursday, Feb 10, 2011

Hyd. No. 3

Existing Site

Hydrograph type = Rational
 Storm frequency = 2 yrs
 Time interval = 1 min
 Drainage area = 10,500 ac
 Intensity = 3,849 in/hr
 IDF Curve = wich_IDF.IDF

Peak discharge = 29.50 cfs
 Time to peak = 0.25 hrs
 Hyd. volume = 26,549 cuft
 Runoff coeff. = 0.73
 Tc by User = 15.00 min
 Asc/Rec limb fact = 1/1



Hydrograph Summary Report

12

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	7.007	2	724	20,967	-----	-----	-----	Developed to Pond
2	Reservoir	0.103	2	1448	15,013	1	1345.23	17,325	Pond
3	Rational	9.198	1	15	8,278	-----	-----	-----	Existing Site

Stonebridge 3rd.gpw Return Period: 3 Year Thursday, Feb 10, 2011

Hydrograph Report

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

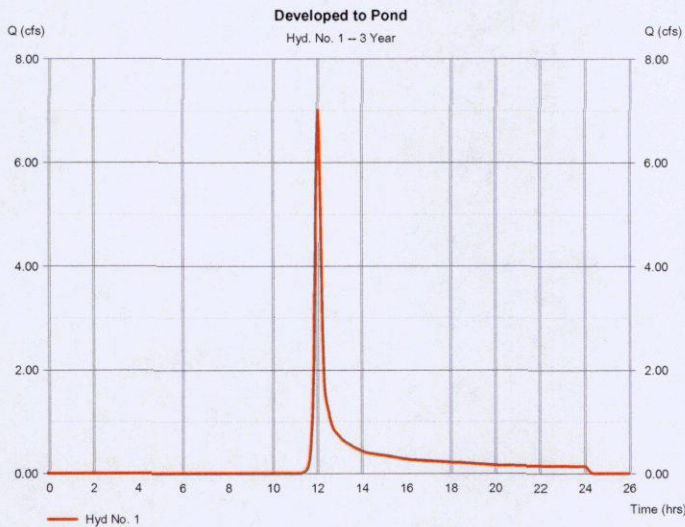
Thursday, Feb 10, 2011

Hyd. No. 1

Developed to Pond

Hydrograph type = SCS Runoff
 Storm frequency = 3 yrs
 Time interval = 2 min
 Drainage area = 17,500 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 1.20 in
 Storm duration = 24 hrs

Peak discharge = 7.007 cfs
 Time to peak = 12.07 hrs
 Hyd. volume = 20,997 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 15.00 min
 Distribution = Type II
 Shape factor = 484



Hydrograph Report

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

Thursday, Feb 10, 2011

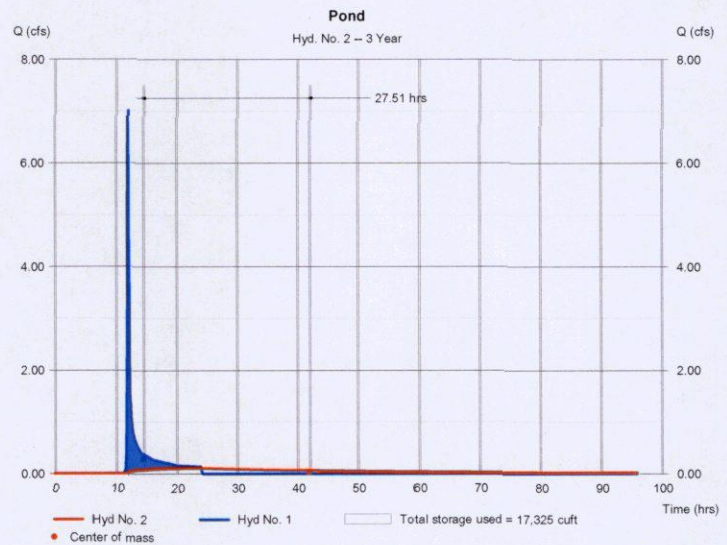
Hyd. No. 2

Pond

Hydrograph type = Reservoir
 Storm frequency = 3 yrs
 Time interval = 2 min
 Inflow hyd. No. = 1 - Developed to Pond
 Reservoir name = Proposed Pond

Peak discharge = 0.103 cfs
 Time to peak = 24.13 hrs
 Hyd. volume = 15,013 cuft
 Max. Elevation = 1345.23 ft
 Max. Storage = 17,325 cuft

Storage Indication method used:



Hydrograph Report

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

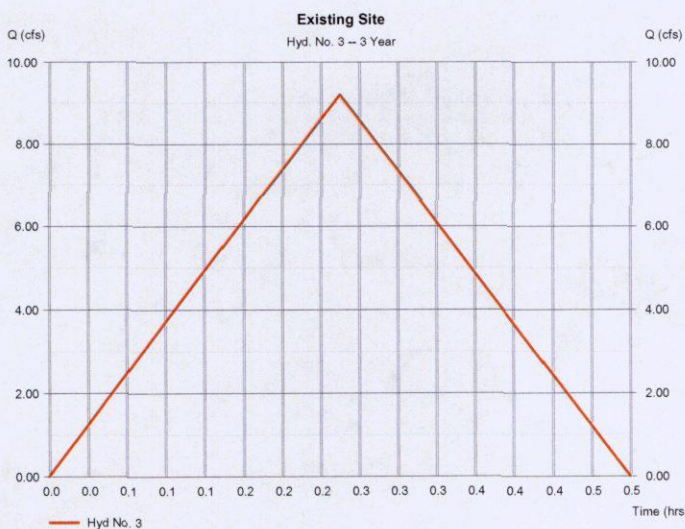
Thursday, Feb 10, 2011

Hyd. No. 3

Existing Site

Hydrograph type ≈ Rational
 Storm frequency ≈ 3 yrs
 Time interval ≈ 1 min
 Drainage area ≈ 10,500 ac
 Intensity ≈ 1.200 in/hr
 IDF Curve ≈ wich_IDF.IDF

Peak discharge = 9.198 cfs
 Time to peak = 0.25 hrs
 Hyd. volume = 8,278 cuft
 Runoff coeff. = 0.73
 Tc by User = 15.00 min
 Asc/Rec limb fact = 1/1



Hydrograph Summary Report

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Hydroflow 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 (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	67.42	2	722	191,938	-----	-----	-----	Developed to Pond
2	Reservoir	9.781	2	746	175,791	1	1346.38	106,931	Pond
3	Rational	34.87	1	15	31,382	-----	-----	-----	Existing Site

Stonebridge 3rd.gpw Return Period: 5 Year Thursday, Feb 10, 2011

Hydrograph Report

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

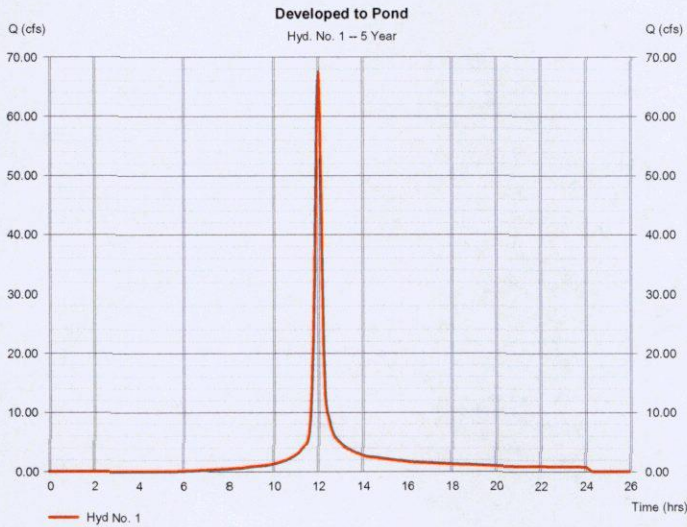
Thursday, Feb 10, 2011

Hyd. No. 1

Developed to Pond

Hydrograph type = SCS Runoff
 Storm frequency = 5 yrs
 Time interval = 2 min
 Drainage area = 17,500 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 4.50 in
 Storm duration = 24 hrs

Peak discharge = 67.42 cfs
 Time to peak = 12.03 hrs
 Hyd. volume = 191,938 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 15.00 min
 Distribution = Type II
 Shape factor = 484



Hydrograph Report

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

Thursday, Feb 10, 2011

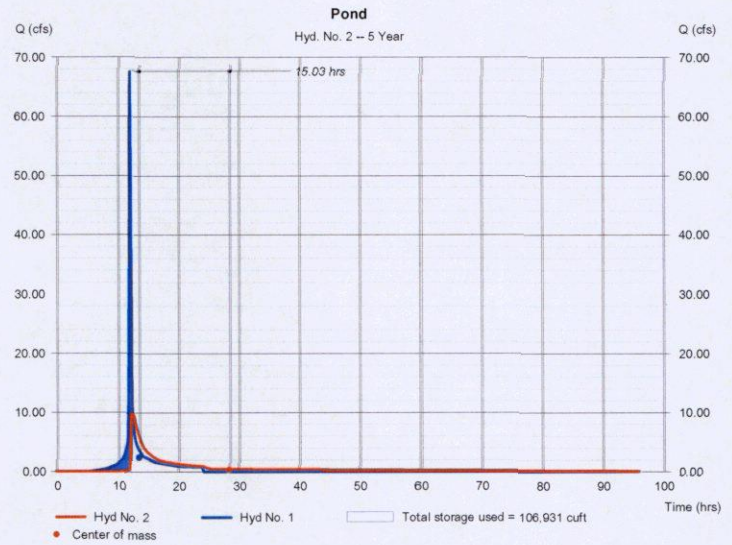
Hyd. No. 2

Pond

Hydrograph type = Reservoir
 Storm frequency = 5 yrs
 Time interval = 2 min
 Inflow hyd. No. = 1 - Developed to Pond
 Reservoir name = Proposed Pond

Peak discharge = 9.781 cfs
 Time to peak = 12.43 hrs
 Hyd. volume = 175,791 cuft
 Max. Elevation = 1346.38 ft
 Max. Storage = 106,931 cuft

Storage Indication method used.



Hydrograph Report

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

Thursday, Feb 10, 2011

Hyd. No. 3

Existing Site

Hydrograph type = Rational
 Storm frequency = 5 yrs
 Time interval = 1 min
 Drainage area = 10,500 ac
 Intensity = 4,549 in/hr
 IDF Curve = wich_IDF.IDF

Peak discharge = 34.87 cfs
 Time to peak = 0.25 hrs
 Hyd. volume = 31,382 cuft
 Runoff coeff. = 0.73
 Tc by User = 15.00 min
 Asc/Rec limb fact = 1/1



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 (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	81.08	2	722	232,030	-----	-----	-----	Developed to Pond
2	Reservoir	18.51	2	738	216,398	1	1346.59	124,119	Pond
3	Rational	40.02	1	15	36,016	-----	-----	-----	Existing Site

Stonebridge 3rd.gpw Return Period: 10 Year Thursday, Feb 10, 2011

Hydrograph Report

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

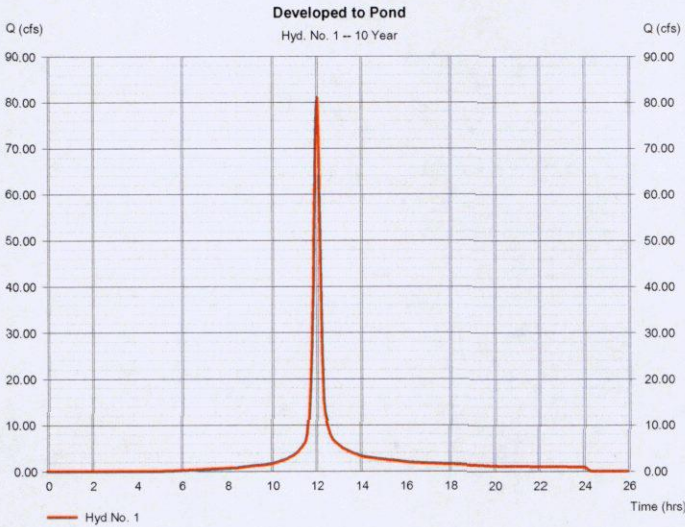
Thursday, Feb 10, 2011

Hyd. No. 1

Developed to Pond

Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Time interval = 2 min
 Drainage area = 17,500 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 5.20 in
 Storm duration = 24 hrs

Peak discharge = 81.08 cfs
 Time to peak = 12.03 hrs
 Hyd. volume = 232,636 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 15.00 min
 Distribution = Type II
 Shape factor = 484



Hydrograph Report

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

Thursday, Feb 10, 2011

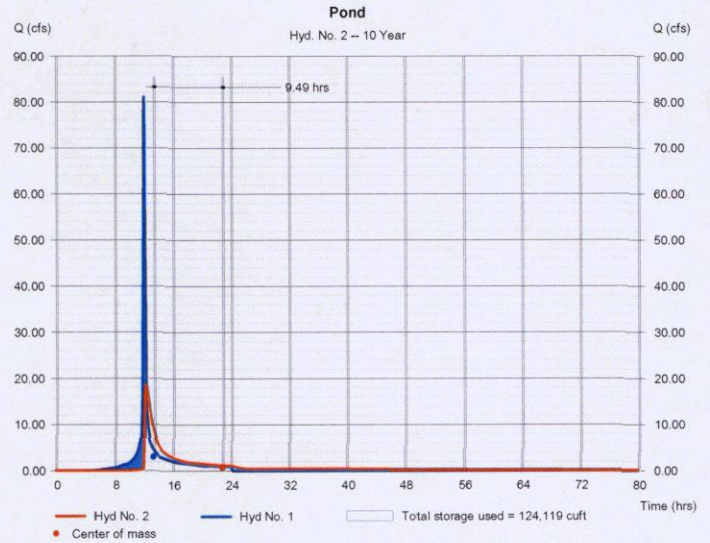
Hyd. No. 2

Pond

Hydrograph type = Reservoir
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyd. No. = 1 - Developed to Pond
 Reservoir name = Proposed Pond

Peak discharge = 18.51 cfs
 Time to peak = 12.30 hrs
 Hyd. volume = 216,396 cuft
 Max. Elevation = 1346.59 ft
 Max. Storage = 124,119 cuft

Storage Indication method used.



Hydrograph Report

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

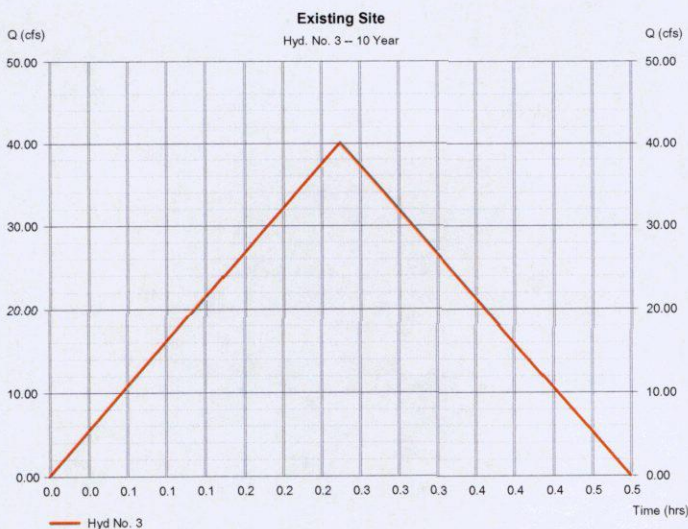
Thursday, Feb 10, 2011

Hyd. No. 3

Existing Site

Hydrograph type = Rational
 Storm frequency = 10 yrs
 Time interval = 1 min
 Drainage area = 10,500 ac
 Intensity = 5.221 in/hr
 IDF Curve = wich_IDF.IDF

Peak discharge = 40.02 cfs
 Time to peak = 0.25 hrs
 Hyd. volume = 36,016 cuft
 Runoff coeff. = 0.73
 Tc by User = 15.00 min
 Asc/Rec limb fact = 1/1



Hydrograph Summary Report

Hydroflow 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 (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	98.62	2	722	285,712	-----	-----	-----	Developed to Pond
2	Reservoir	31.57	2	736	269,372	1	1346.85	145,165	Pond
3	Rational	40.38	1	15	41,745	-----	-----	-----	Existing Site

Stonebridge 3rd.gpw Return Period: 25 Year Thursday, Feb 10, 2011

Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

Thursday, Feb 10, 2011

Hyd. No. 1

Developed to Pond

Hydrograph type = SCS Runoff	Peak discharge = 98.62 cfs
Storm frequency = 25 yrs	Time to peak = 12.03 hrs
Time interval = 2 min	Hyd. volume = 285,712 cuft
Drainage area = 17,500 ac	Curve number = 87
Basin Slope = 0.0 %	Hydraulic length = 0 ft
Tc method = USER	Time of conc. (Tc) = 15.00 min
Total precip. = 6.10 in	Distribution = Type II
Storm duration = 24 hrs	Shape factor = 484

Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

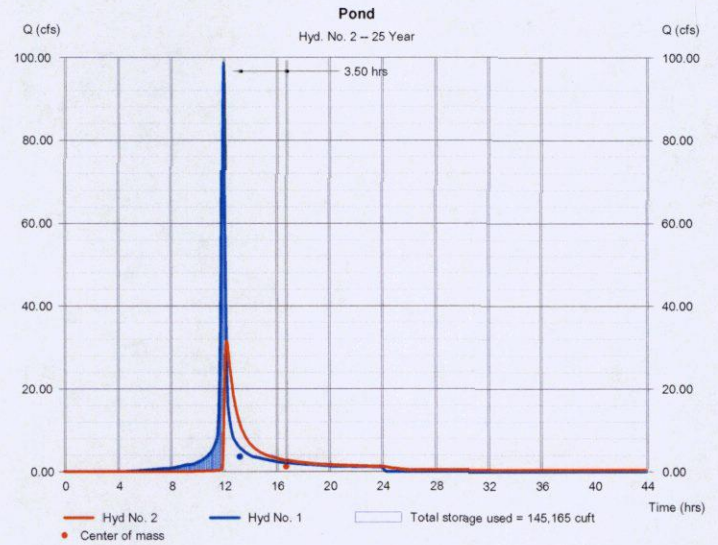
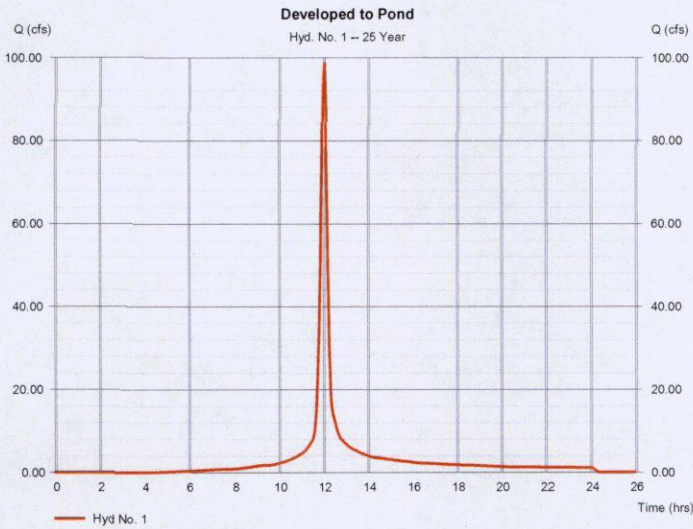
Thursday, Feb 10, 2011

Hyd. No. 2

Pond

Hydrograph type = Reservoir	Peak discharge = 31.57 cfs
Storm frequency = 25 yrs	Time to peak = 12.27 hrs
Time interval = 2 min	Hyd. volume = 269,372 cuft
Inflow hyd. No. = 1 - Developed to Pond	Max. Elevation = 1346.85 ft
Reservoir name = Proposed Pond	Max. Storage = 145,165 cuft

Storage Indication method used.



Hydrograph Report

27

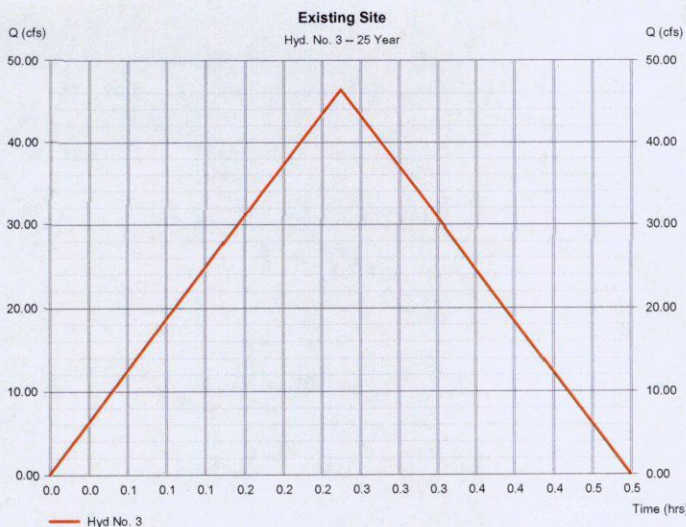
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

Thursday, Feb 10, 2011

Hyd. No. 3

Existing Site

Hydrograph type = Rational	Peak discharge = 46.38 cfs
Storm frequency = 25 yrs	Time to peak = 0.25 hrs
Time interval = 1 min	Hyd. volume = 41,745 cuft
Drainage area = 10,500 ac	Runoff coeff. = 0.73
Intensity = 6.051 in/hr	Tc by User = 15.00 min
IDF Curve = wich_IDF.IDF	Asc/Rec limb fact = 1/1



Hydrograph Summary Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	114.17	2	722	333,386	-----	-----	-----	Developed to Pond
2	Reservoir	43.79	2	734	316,974	1	1347.05	162,631	Pond
3	Rational	51.94	1	15	40,748	-----	-----	-----	Existing Site

Stonebridge 3rd.gpw Return Period: 50 Year Thursday, Feb 10, 2011

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

Thursday, Feb 10, 2011

Hyd. No. 1

Developed to Pond

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 17,500 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 6.90 in
 Storm duration = 24 hrs

Peak discharge = 114.17 cfs
 Time to peak = 12.03 hrs
 Hyd. volume = 333,388 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 15.00 min
 Distribution = Type II
 Shape factor = 484

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

Thursday, Feb 10, 2011

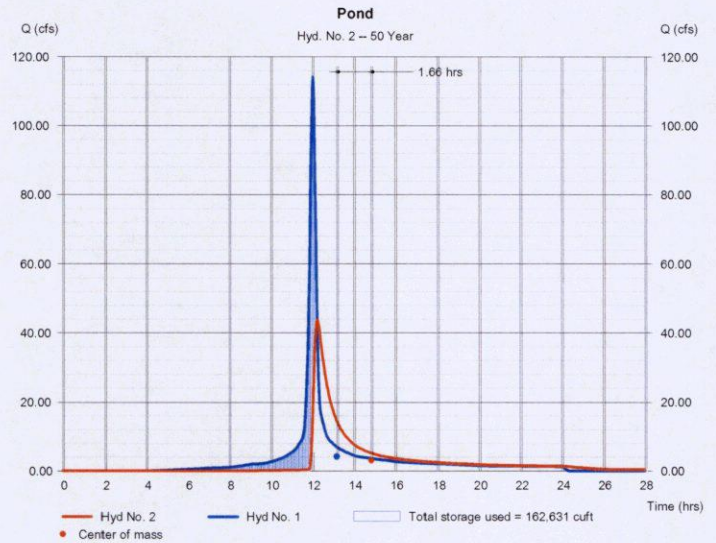
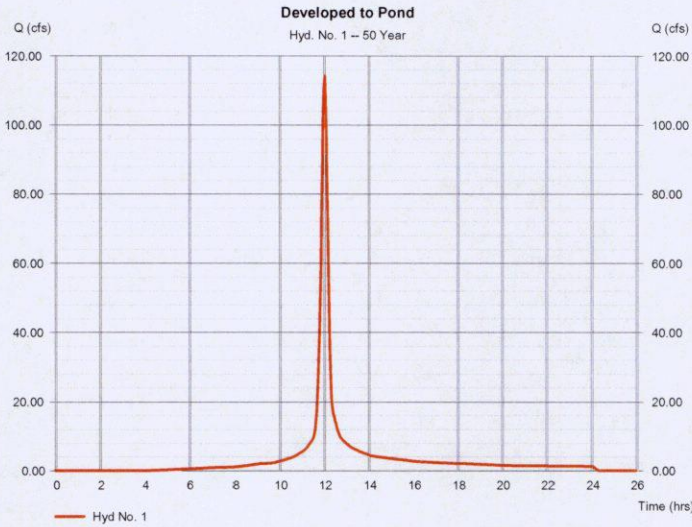
Hyd. No. 2

Pond

Hydrograph type = Reservoir
 Storm frequency = 50 yrs
 Time interval = 2 min
 Inflow hyd. No. = 1 - Developed to Pond
 Reservoir name = Proposed Pond

Peak discharge = 43.79 cfs
 Time to peak = 12.23 hrs
 Hyd. volume = 316,974 cuft
 Max. Elevation = 1347.05 ft
 Max. Storage = 162,631 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

Thursday, Feb 10, 2011

Hyd. No. 3

Existing Site

Hydrograph type = Rational
 Storm frequency = 50 yrs
 Time interval = 1 min
 Drainage area = 10,500 ac
 Intensity = 6.776 in/hr
 IDF Curve = wich_IDF.IDF

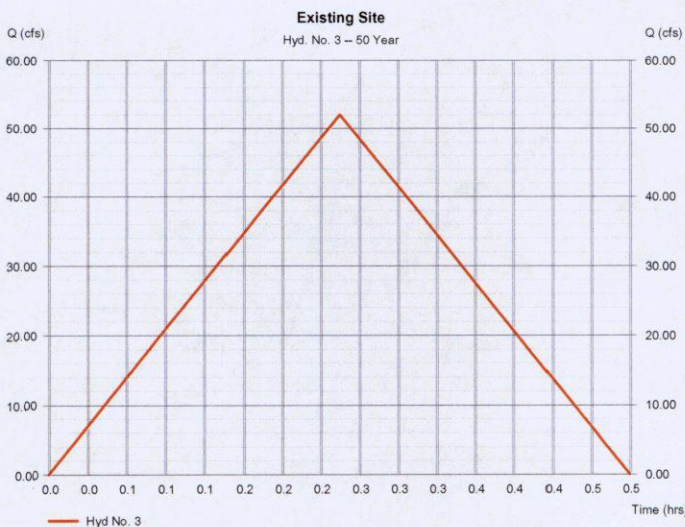
Peak discharge = 51.94 cfs
 Time to peak = 0.25 hrs
 Hyd. volume = 46,748 cuft
 Runoff coeff. = 0.73
 Tc by User = 15.00 min
 Asc/Rec limb fact = 1/1

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	131.59	2	722	387,422	-----	-----	-----	Developed to Pond
2	Reservoir	57.36	2	734	370,937	1	1347.27	181,215	Pond
3	Rational	56.45	1	15	50,808	-----	-----	-----	Existing Site

Stonebridge 3rd.gpw Return Period: 100 Year Thursday, Feb 10, 2011



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

Thursday, Feb 10, 2011

Hyd. No. 1

Developed to Pond

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 2 min
 Drainage area = 17,500 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 7.80 in
 Storm duration = 24 hrs

Peak discharge = 131.59 cfs
 Time to peak = 12.03 hrs
 Hyd. volume = 387,422 cuft
 Curve number = 87
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 15.00 min
 Distribution = Type II
 Shape factor = 484

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

Thursday, Feb 10, 2011

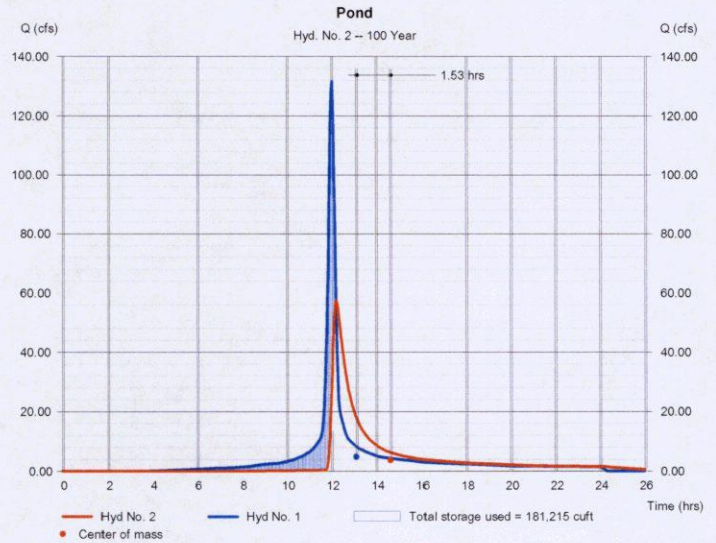
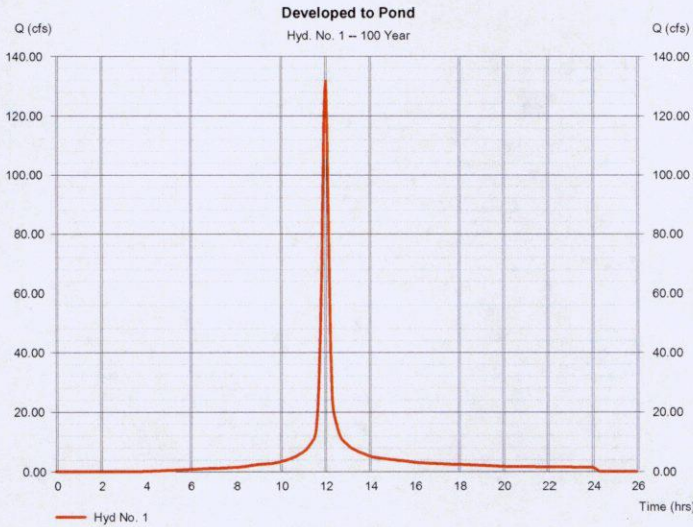
Hyd. No. 2

Pond

Hydrograph type = Reservoir
 Storm frequency = 100 yrs
 Time interval = 2 min
 Inflow hyd. No. = 1 - Developed to Pond
 Reservoir name = Proposed Pond

Peak discharge = 57.36 cfs
 Time to peak = 12.23 hrs
 Hyd. volume = 370,937 cuft
 Max. Elevation = 1347.27 ft
 Max. Storage = 181,215 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

Thursday, Feb 10, 2011

Hyd. No. 3

Existing Site

Hydrograph type = Rational
 Storm frequency = 100 yrs
 Time interval = 1 min
 Drainage area = 10,500 ac
 Intensity = 7.365 in/hr
 IDF Curve = wich_IDF.IDF

Peak discharge = 56.45 cfs
 Time to peak = 0.25 hrs
 Hyd. volume = 50,808 cuft
 Runoff coeff. = 0.73
 Tc by User = 15.00 min
 Asc/Rec limb fact = 1/1

Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.006

Thursday, Feb 10, 2011

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	27.8967	9.8000	0.7047	-----
2	76.3137	14.3000	0.8844	-----
3	1.2000	0.1000	0.0000	-----
5	52.6224	11.2000	0.7497	-----
10	55.1841	11.1000	0.7229	-----
25	60.7012	11.1000	0.7088	-----
50	66.9222	11.3000	0.7004	-----
100	62.2794	10.1000	0.6624	-----

File name: wich_IDF.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.18	3.40	2.90	2.55	2.29	2.08	1.91	1.78	1.66	1.56	1.48	1.40
2	5.57	4.54	3.85	3.35	2.97	2.67	2.43	2.23	2.06	1.92	1.80	1.69
3	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
5	6.52	5.33	4.55	3.99	3.57	3.24	2.97	2.75	2.57	2.41	2.27	2.15
10	7.40	6.09	5.22	4.60	4.13	3.76	3.46	3.21	3.00	2.82	2.67	2.53
25	8.51	7.03	6.05	5.35	4.81	4.39	4.05	3.76	3.52	3.32	3.14	2.98
50	9.47	7.86	6.78	6.00	5.41	4.94	4.56	4.24	3.98	3.75	3.55	3.37
100	10.31	8.53	7.37	6.53	5.90	5.40	5.00	4.66	4.37	4.13	3.92	3.73

Tc = time in minutes. Values may exceed 60.

Precip. file name: SCS_24HR.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.80	3.50	1.20	4.50	5.20	6.10	6.50	7.80
SCS 6-Hr	0.00	1.80	0.00	0.00	2.00	0.00	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	1.75	0.00	2.80	3.90	5.25	6.00	7.10



Hydraflow Table of Contents

Stonebridge 3rd.gpw

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.096

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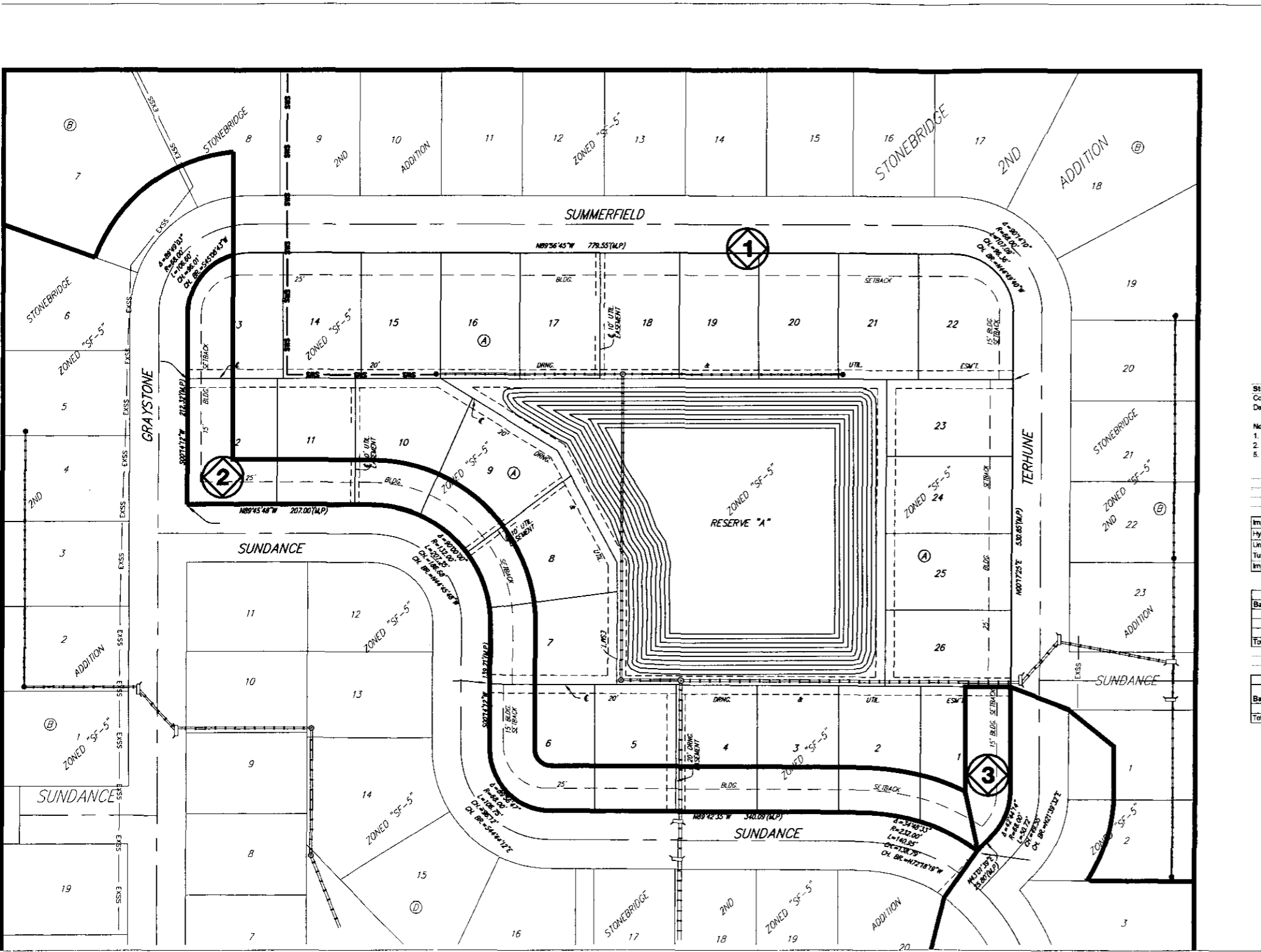
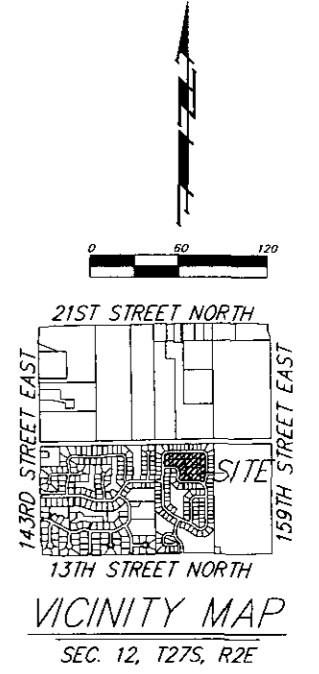
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**Water Quality Volume
Spreadsheet Calculations**

WATER QUALITY EXHIBIT

STONEBRIDGE 3RD ADDITION

WICHITA, SEDGWICK COUNTY, KANSAS



Stonebridge 3rd Addition Water Quality Data & Computations
 Completed by: AEG
 Date: 2/9/2011

- Notes & Assumptions:**
- 1/4 acre size lots assumed with 38% impervious area
 - Pond surface areas not included in WQv calculations
 - Onsite drainage off site

Basin	Area	Effect
2	1.5	Streets & lots untreated but drain to existing downstream ponds within this subdivision
3	0.2	Streets & lots untreated but drain to existing downstream pond within this subdivision
Total	1.7	

Impervious Cover %	Rv Values
0.38	
Hydrologic Soil Group C	$R_{vD} = 0.04$
Undisturbed Woods	$R_{vU} = 0.22$
Turf Disturbed Soils	$R_{vI} = 0.95$
Impervious Cover	

Equations

$$WQ_v = R_v \cdot A / 10$$

$$R_v = R_{vU} \cdot U + R_{vD} \cdot D + R_{vI} \cdot I$$

U = undisturbed/total area
 D = dist. perv./total area
 I = impervious/total area

Drainage Basin	Pond Area	Treatment Area	Undisturbed Area	Disturbed Pervious Area	Impervious Area
Basin	Acres	Acres	Acres	Acres	Acres
1	17.5	2.1	15.4	0.0	9.5
2	1.5	0.0	1.5	0.0	0.9
3	0.2	0.0	0.2	0.0	0.1
Totals	19.2	2.1	17.1	27.8	10.6

Calculations				
U	D	I	Totals	
0.00	0.62	0.38	1.0	
0.00	0.62	0.38	1.0	
0.00	0.62	0.38	1.0	

Pond Volume Below Static Pool					
Basin	Static Area	Pond Bottom Area	Depth	Volume	
	Sq. Ft.	Sq. Ft.	Feet	Acres-Ft.	
1	91785	2.1	46865	1.1	11.1
Totals					11.1

Pond Volume > WQv			
Pond	WQv	Check	
11.1	0.9	Yes	

Calculations			
Rv	Area	WQv	
	Acres	Acres	Acres-Ft.
0.5	16.4	0.8	
0.5	1.5	0.1	
0.5	0.2	0.0	
	17.1	0.9	

LEGEND:

- 8 BASIN LABEL
- BASIN BOUNDARY
- DEVELOPED AREA

Stonebridge 3rd Addition Water Quality Data & Computations

Completed by: AEG
Date: 2/9/2011

Notes & Assumptions:

- 1/4 acre size lots assumed with 38% impervious area
- Pond surface areas not included in WQv calculations
- Onsite drainage off site

Basin	Area	Effect
2	1.5	Streets & lots untreated but drain to existing downstream pond within this subdivision
3	0.2	Streets & lots untreated but drain to existing downstream pond within this subdivision
Total	1.7	

Equations
 $WQv = R_v * A / 10$
 $R_v = R_{vu} * U + R_{vp} * D + R_{vi} * I$
 U = undisturbed/total area
 D = dist. perv./total area
 I = impervious/total area

Impervious Cover %	Rv Values
Hydrologic Soil Group C	$R_{vu} = 0.04$
Undisturbed Woods	$R_{vp} = 0.22$
Turf/ Disturbed Soils	$R_{vi} = 0.95$
Impervious Cover	

Basin	Area Acre	Pond Area Acre	Treatment Area Acre	Undisturbed Area Acre		Disturbed Pervious Area Acre		Impervious Area Acre	
				Area Acre	Area Acre	Area Acre	Area Acre	Area Acre	Area Acre
1	17.5	2.1	15.4	0.0	9.5	5.9			
2	1.5	0.0	1.5	0.0	0.9	0.6			
3	0.2	0.0	0.2	0.0	0.1	0.1			
Totals:	19.2	2.1	17.1	27.8	10.6	6.5			

U	Calculations		
	D	I	Totals
0.00	0.62	0.38	1.0
0.00	0.62	0.38	1.0
0.00	0.62	0.38	1.0

Basin	Pond Volume Below Static Pool			
	Static Area Sq.Ft.	Pond Bottom Area Acre	Depth Feet	Volume Acre-Ft.
1	91785	2.1	46805	11.1
Totals:		2.1	1.1	11.1

Pond Volume > WQv			
Pond	WQv	Check	Yes
11.1	0.9		Yes

Calculations	Area		WQv
	Rv	Acres	
0.5	15.4	0.8	
0.5	1.5	0.1	
0.5	0.2	0.0	
	17.1	0.9	

Drainage Plan
1:60 Scale

