



TRANSMITTAL

TO:
 Scott Lindebak, PE CFM
 COMPANY:
 City of Wichita
 ADDRESS:
 8th Floor City Hall
 CITY/ STATE:
 Wichita, Kansas

FROM:
 Trevor Kurth, PE CFM
 DATE:
 10-11-12
 PROJECT:
 DeWitt Drainage Plan
 PROJECT NUMBER:

RE:
 DeWitt 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
1	10-11-12	DeWitt Drainage Plan

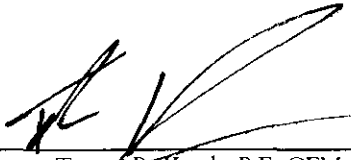
URGENT FOR APPROVAL FOR YOUR INFO FOR REVIEW & COMMENT

APPROVED, AS NOTED REVISE AS NOTED REVISE AND RETURN

AS REQUESTED PLEASE REPLY FOR BIDS DUE

NOTES/ COMMENTS:

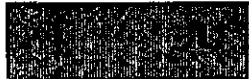
Scott,
 Please review and let me know of any questions.
 Thanks.

SIGNED: 
 Trevor R. Kurth, P.E. CFM

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
DEWITT 5TH ADDITION
TO
WICHITA, SEDGWICK COUNTY, KANSAS

PREPARED BY



11 OCTOBER 2012

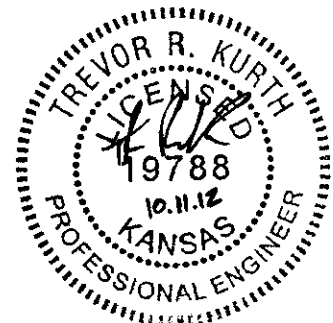


DRAINAGE PLAN DEWITT 5TH ADDITON

FINAL REPORT

Prepared by Baughman Company, P.A.
11 October 2012

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



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PROJECT NARRATIVE

EXISTING CONDITIONS

The site is located along Hoover Road in between Harry and Pawnee. The site is bounded on the east by the Wichita-Valley Center flood control levee. The current site is mostly vacant and undisturbed with various residential houses and out-buildings/garages. There is storm water sewer located in the Hoover Road frontage as well as along the north line just off the property in a drainage easement. This SWS system drains to the levee ponding area along the back of these lots.

The site lies within a FEMA Zone X-Shaded SFHA since it is protected by the levee. The drainage patterns as defined above can be seen on the Aerial (Exhibit 2).

PROPOSED CONDITIONS

The property is being platted as one large industrial lot. At this time, no site plan has been submitted for the site to develop. The site is expected to drain to the existing storm sewer system, or a new storm sewer system, and flow to the east and into the levee ponding area. No detention will be provided at this time due to the close location to the levee/floodway and due to ponding areas being provided along the backside of the levee and adjoining this property. Water quality will need to be provided at the time of site development and could consist of approved design practices per the Storm Water Manual or an underground Hydroguard unit attached to the storm water sewer system.

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

OFFSITE CONDITIONS

The site currently drains west to Hoover Street and into the storm sewer system located in the street right of way. From here, the runoff is directed back east and into the levee ponding area located at the rear of the subject property. The site is relatively flat, otherwise, and has sparse tree cover. The storm water sewer in Hoover Road is discharged, as described above, along the north line of this property in a 38"x60" HERCP located on the north adjacent property in a 30' Stormwater Sewer Easement. The ponding area located along the rear of the property, and extends the length of the levee system, has a ponding elevation of a 1294 NAVD88. The subject property varies from elevations 1298 to 1300 NAVD88.

The overall site location and hydrogeodatabase can be seen with the site location plotted as Exhibit 1.

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
 - SCS Curve Number used for Existing Flows (composite computed using %)
 - Time of Concentration: Lag Method (minimum 15 min)

SITE CHARACTERISTICS

The site is currently open space with sparse out-buildings and residential structures. There is storm water sewer located along the site's frontage as well as the north line of the site. There is a FEMA levee ponding area located along the base of the levee which has a ponding elevation of a 1294.

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 SCS Curve Number method for the entire storm series. A Curve Number of 80 was used based on guidance from the Storm Water Manual since the site lies on Type C soils and is pre-developed conditions. A Time of Concentration of 15 was used. The entire site ultimately drains to the east and ponds along the levee. This area has a ponding elevation of a 1294.

DOWNSTREAM DRAINAGE CAPACITY

Due to the levee being adjacent to the east of this property, and a studied ponding area adjoining this property, there appears to be capacity for this areas drainage. The site utilizes the storm water sewer in Hoover Road and discharges via an HERCP along the north line into this ponding area. This area not only sheets flows to the storm water sewer system, it is also served by a 15" stub in the Hoover ROW.

POST-DEVELOPMENT HYDROLOGIC ANALYSIS

DRAINAGE METHODS & STANDARDS

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

- STORM SERIES
 - 24-hour; 2-yr, 5-yr, 10-yr, 25-yr, 50-yr, 100-yr Storm Events Modeled
 - 1.2" Water Quality Flow modeled as '3-yr event' in HydraFlow
 - Hydrograph Method utilized for Developed Flows
 - CN = 95 (Soil Type C – composite of impervious area and disturbed area)
 - Time of Concentration; Lag Method, minimum Tc = 15min

- GRADING CONSTRAINTS TO BE OBSERVED AT SITE PLAN
 - One foot freeboard between ponding elevation and adjacent lot corner
 - Match all existing perimeter grades

DEVELOPED CONDITIONS HYDROLOGIC ANALYSIS

The site is proposed to be platted into an industrial lot. At the time of this report, no site plan was available. The developed conditions are a baseline for future development, as the Curve Numbers and flow directions are dependent on the site plan. Therefore, the calculations herein are to be used as a baseline, and, in the future, the site plan will need to specifically address water quality calculations and flow directions based on building locations and percentage of impervious cover. For example, at a coverage rate of 65% impervious area one can expect to have approximately 11,300 cu ft of water quality volume to treat (approximately 3.2 cfs) based on the storm water manual calculations. Hydraflow Hydrographs portrays an 85% coverage as needing approximately 10,000 cu ft of volume and 3.5 cfs of peak treatment flow. Since these values differ, a specific site plan should be utilized and calculated once a specific treatment option is chosen.

This site is not expected to provide detention or downstream channel protection upon site development due to the closeness of the levee/floodway and the detention effects the adjacent ponding area will provide.

DISCHARGE POINTS SUMMARY

The site will discharge, ultimately, to the east and into the levee ponding area. We anticipate onsite storm water sewer being utilized with a water quality unit / BMP to treat the developed runoff for storm water quality. The site will drain dependent on the site plan at the time of construction. Notwithstanding, the site will need to treat its runoff for water quality before discharging offsite.

WATER QUALITY

Water quality will be provided at the time of site development. Water quality calculations will need to be provided as the modeling done herein is conceptual and to be used as a baseline for future site planning.

DOWNSTREAM CHANNEL PROTECTION

No downstream channel protection will be provided on site since the site is less than 5 acres and due to the ponding area located adjacent to the site.

POTENTIAL UPSTREAM/DOWNSTREAM IMPACTS

No upstream or downstream impacts are expected with this development if the site is to treat for water quality at the time of construction. The ponding area located to the east of the lot has a top bank elevation at a 1300 and a ponding elevation at a 1294. Based on that, it appears there is additional storage available in the ponding area. The site is currently at elevations 1298 to 1300 and will therefore not fill or take away any storage volume when developed.

FLOODPLAIN SUBMITTAL

SOURCE OF FLOODPLAIN INFORMATION

The site lies within a FEMA Zone X - Shaded. The location of the property, on FEMA FIRM Panel 345E 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 site.

KANSAS DEPT OF AGRICULTURE – DWR PERMITTING

There does not appear to be any DWR permitting needed on the proposed site at this time. The areas of discharge do not account for more than 240 acres.

FEMA

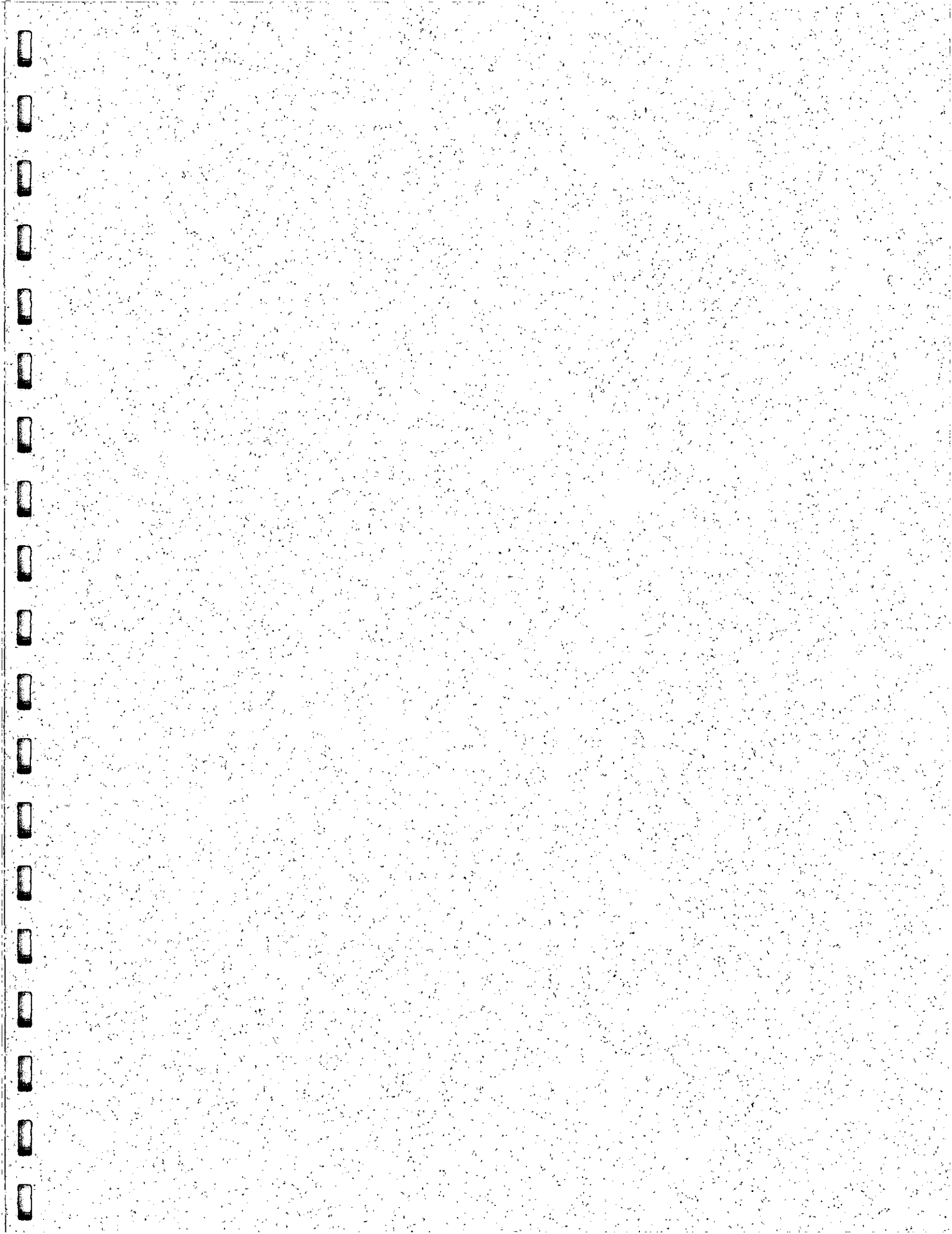
There is no mapped A or AE floodplain located upon the proposed site. Therefore, no FEMA permitting is expected at this time.

KANSAS DEPT OF TRANSPORTATION

There is no KDOT ROW located along the property.

SEDGWICK COUNTY PERMITTING

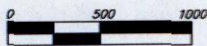
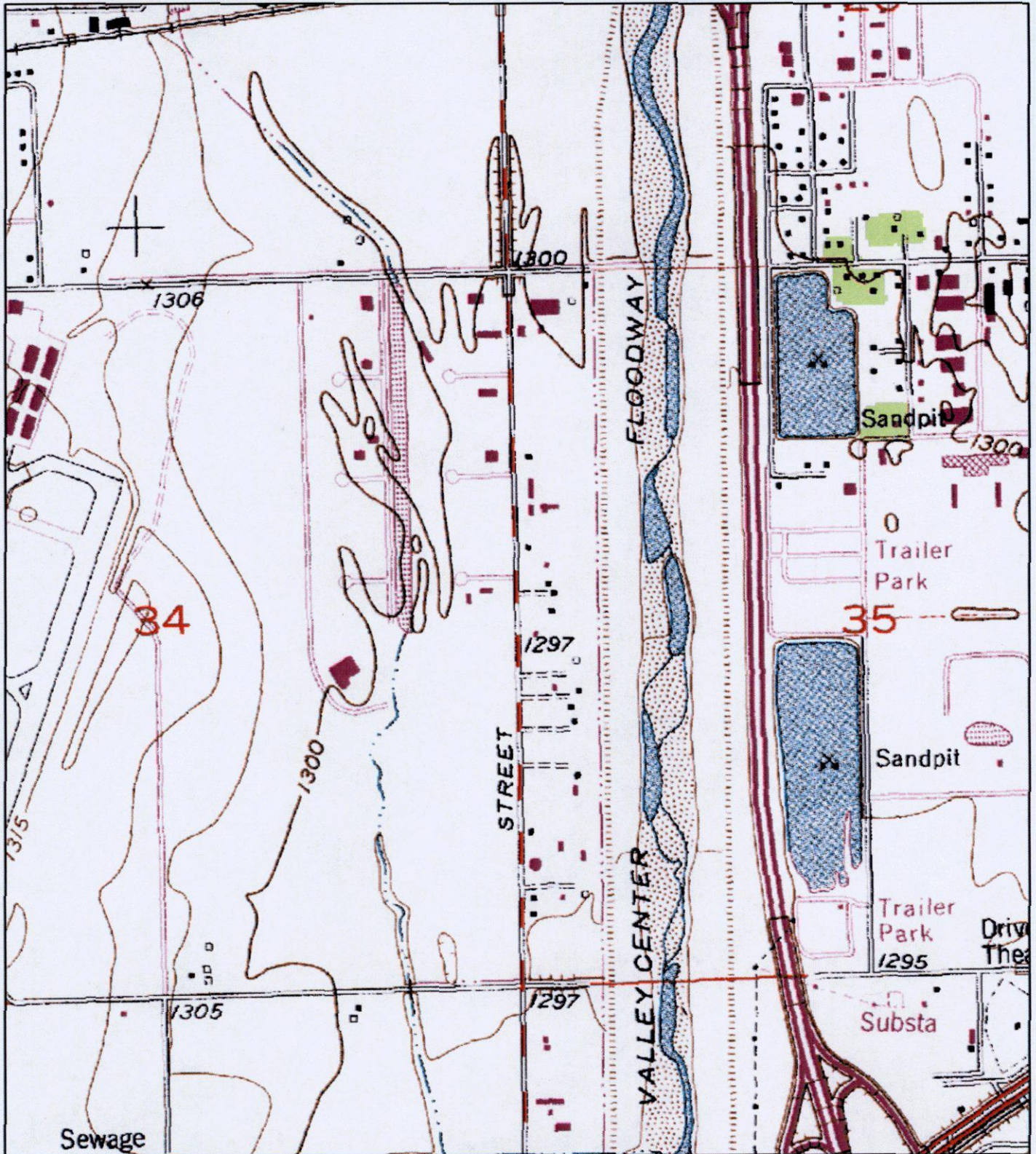
There does not appear to be any Sedgwick County permitting needed at this time.



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: Floodplain Location (FIRM)**

SITE LOCATION MAP
DEWITT 5TH ADDITION
WICHITA, SEDGWICK COUNTY, KANSAS



SITE LOCATION MAP
DEWITT 5TH ADDITION

11 OCT 2012

 **Baughman Company, P.A.**
315 Ellis St. Wichita, KS 67211 P 316260-1271 F 316260-1049
ENGINEERING | SURVEYING | PLANNING | LANDSCAPE ARCHITECTURE



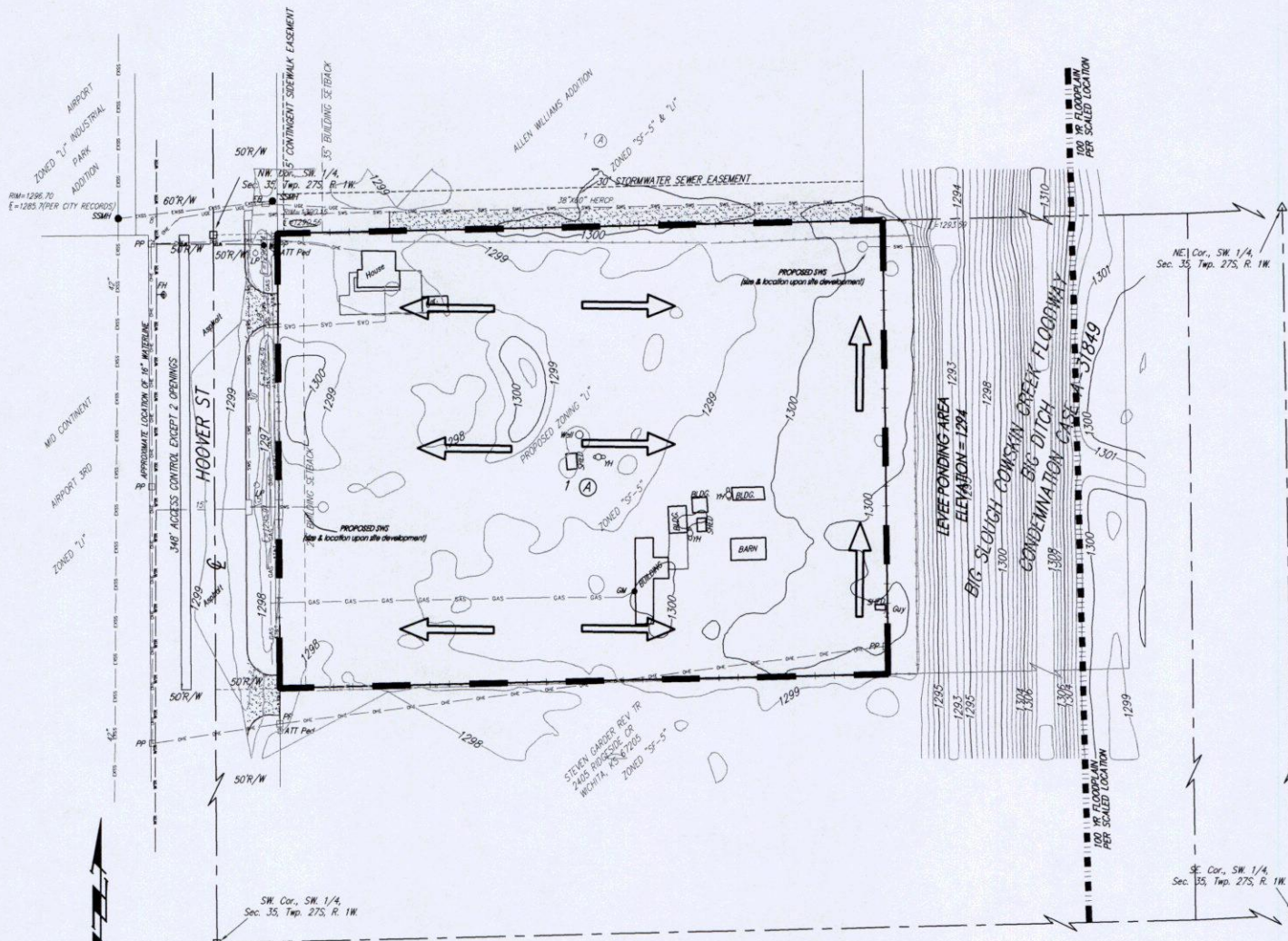
TITLE



DRAINAGE PLAN

DEWITT 5TH ADDITION

WICHITA, SEDGWICK COUNTY, KANSAS



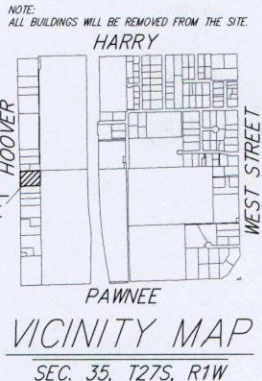
Water Quality treatment will be required at site development. Depending on impervious cover on the proposed site, the amount of water quality treatment will vary. Below is a table estimating treatment areas and flow rates for different impervious area coverages. A more detailed and site specific assessment will be required at site development.

% Impervious	WQv Required (ft ³)	WQ Flow Rate (cfs)
65	11,300	3.2
75	12,530	3.8
85	13,750	4.4

DATE OF PREPARATION: 4 OCTOBER 2012
 DATE OF TYPING: 29 AUGUST 2012
 CONTOUR INTERVALS = 1 FOOT (CONTOURS PROVIDED BY SEDGWICK COUNTY)

NOTE:
 FEMA FLOODPLAIN BOUNDARIES ARE
 SCALED PER LOCATION PER FEMA MAP
 201730345E EFFECTIVE DATE FEBRUARY
 2, 2007.

- NOTE:
 ALL BUILDINGS WILL BE REMOVED FROM THE SITE.
- = #4 Baughman Rebar Set
 - = Right of Way Monument Found
 - = 1/2" Iron Pipe in Thimble Found
 - △ = #4 Savoy Rebar Found
 - = 3/4" Iron Pipe Found
 - = 1/2" Iron Pipe in Thimble Found
- CB = Catch Basin
 - EB = Electric Box
 - FH = Fire Hydrant
 - GM = Gas Meter
 - Guy 3 = Guy Anchor
 - LP O = Light Pole
 - PP □ = Power Pole
 - SSMH ● = Sanitary Sewer Manhole
 - ATT Ped □ = ATT Pedestal
 - Well O = Cased Well
 - WM ● = Water Meter
 - YH <> = Yard Hydrant(Spigit)



NOTES: This site lies within FEMA Zone X-Shaded based on scaled location per FEMA FIRM Panel 345E of 700 for Wichita, Sedgwick County, Kansas; effective February 2, 2007.

The internal Storm Water Sewer, preliminarily as shown herein, will be sized and final location approved during the site plan process. The entire site, once developed, will need to flow into/through a water quality device as approved by the City of Wichita. The amount of water quality treatment will vary based on amount of impervious cover and can be estimated using the above table.

Ponding area is located offsite. No fill or excavation in this area is permitted without permission from the City of Wichita.

TOTAL SITE FLOW ANALYSIS	
AREA = 3.77 acres	
Soil Type C	
Tc = 15 min	
EXISTING	DEVELOPED
CN = 80	CN = 95*
Q ₂ = 7.8 cfs	Q ₂ = 13 cfs
Q ₅ = 12 cfs	Q ₅ = 17 cfs
Q ₁₀ = 15 cfs	Q ₁₀ = 20 cfs
Q ₁₀₀ = 25 cfs	Q ₁₀₀ = 31 cfs

* CN is composite computed using 85% impervious cover of the entire site

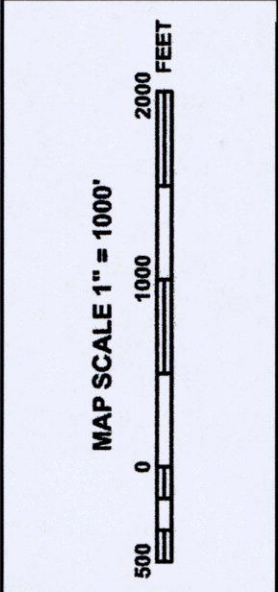
OWNER:
 DeWitt Land Company, Inc.
 1854 S. Florence Ct., Ste. 10
 Wichita, KS 67206
 Attention: Mike DeWitt
 316-942-4687

BENCHMARK:
 City of Wichita Disc at Hoover and
 May 48 feet east of 1/4 corner and
 5 feet south of 1/4 section corner.
 Elev. = 1298.43 (NAVD88)

DRAINAGE PLAN

DE WITT 5TH ADDITION

Baughman Company, P.A.
 115 E. 9th St., Wichita, KS 67202
 316-262-7271 | 316-262-0140



PANEL 0345E

FIRM
FLOOD INSURANCE RATE MAP
SEDGWICK COUNTY,
KANSAS
AND INCORPORATED AREAS

PANEL 345 OF 700
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:
 COMMUNITY SEDGWICK COUNTY
 WICHITA, CITY OF
 NUMBER 200321
 200328
 PANEL 0945
 0945
 SUFFIX E
 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.

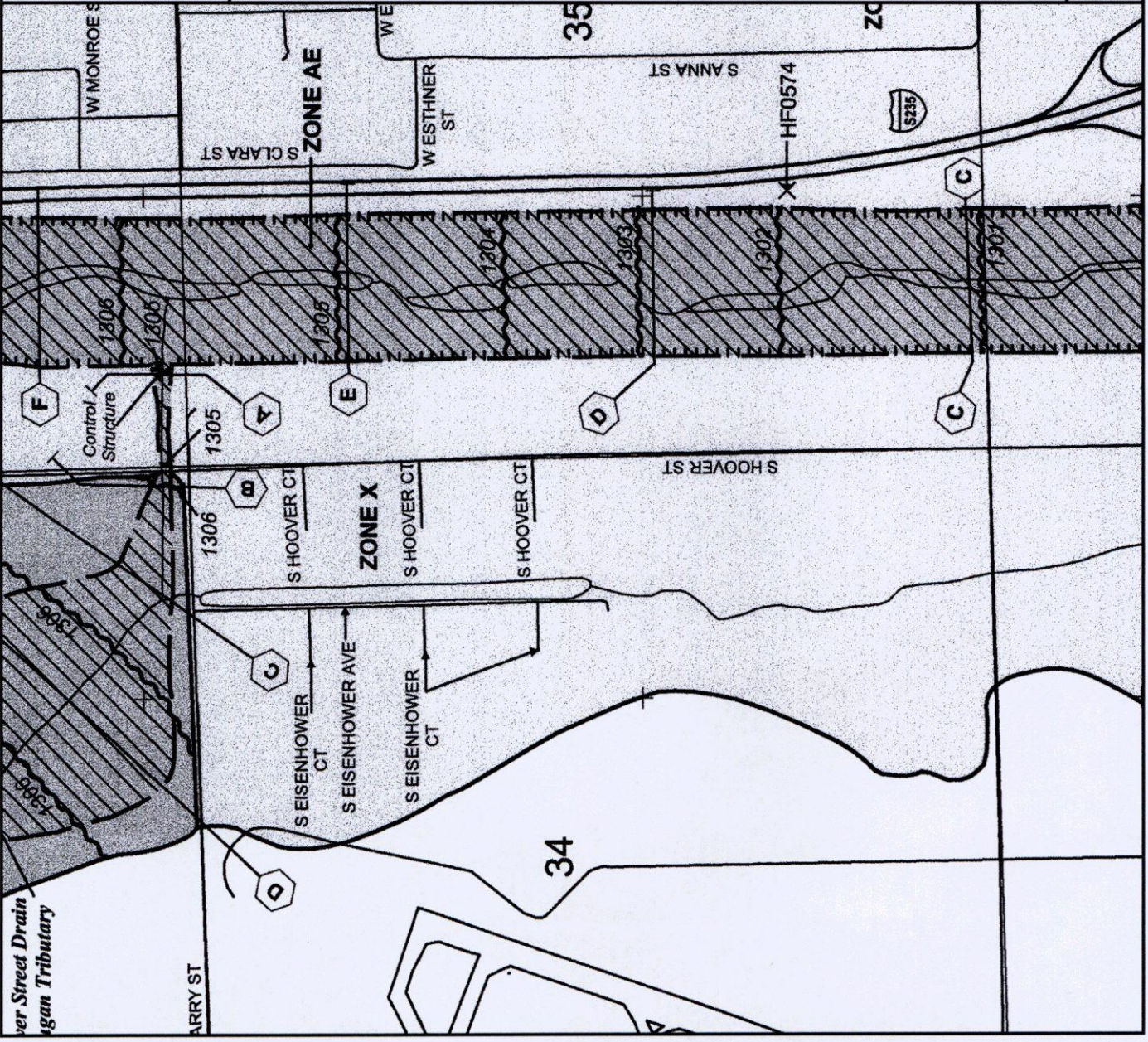
MAP NUMBER
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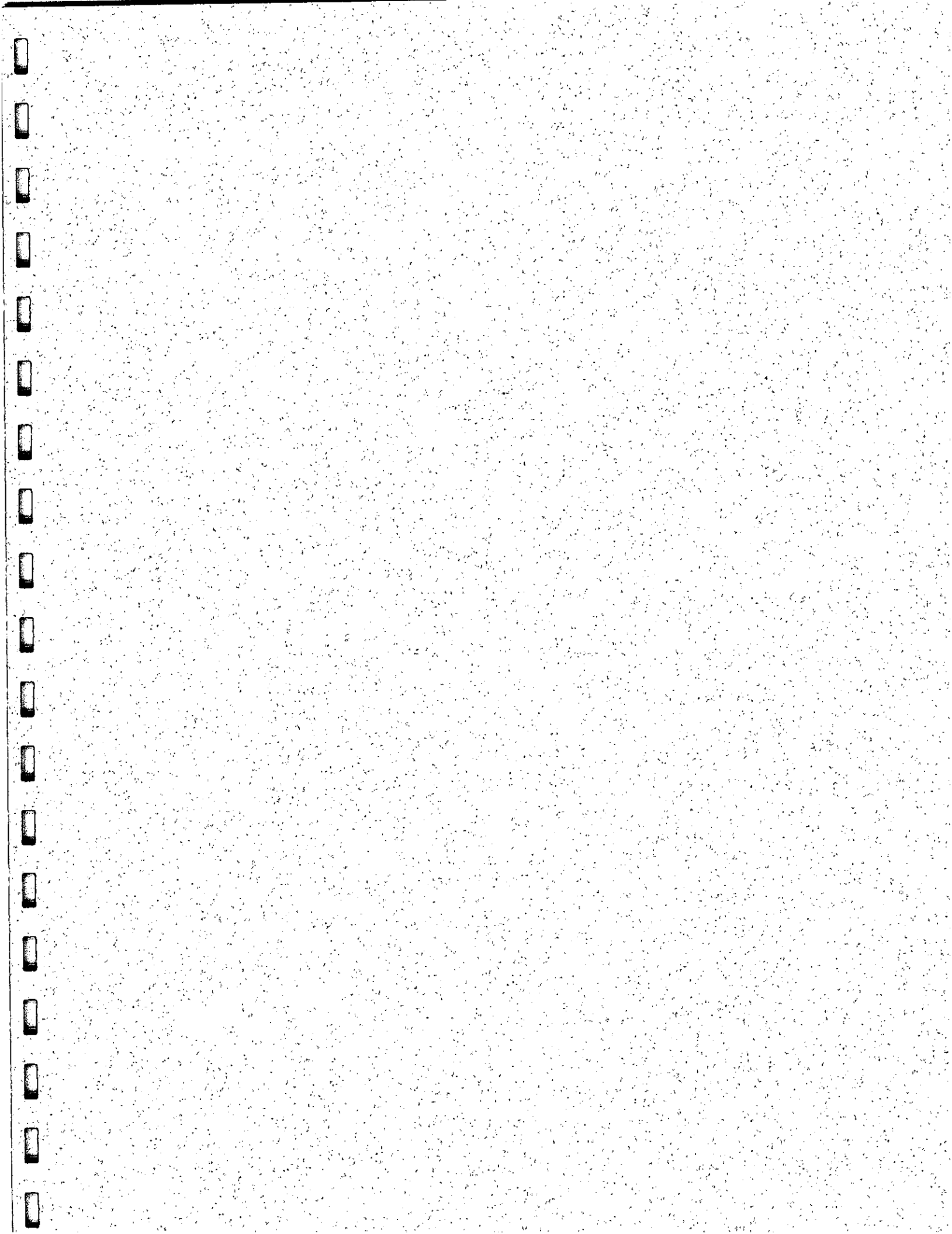
EFFECTIVE DATE
FEBRUARY 2, 2007

Federal Emergency Management Agency



This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



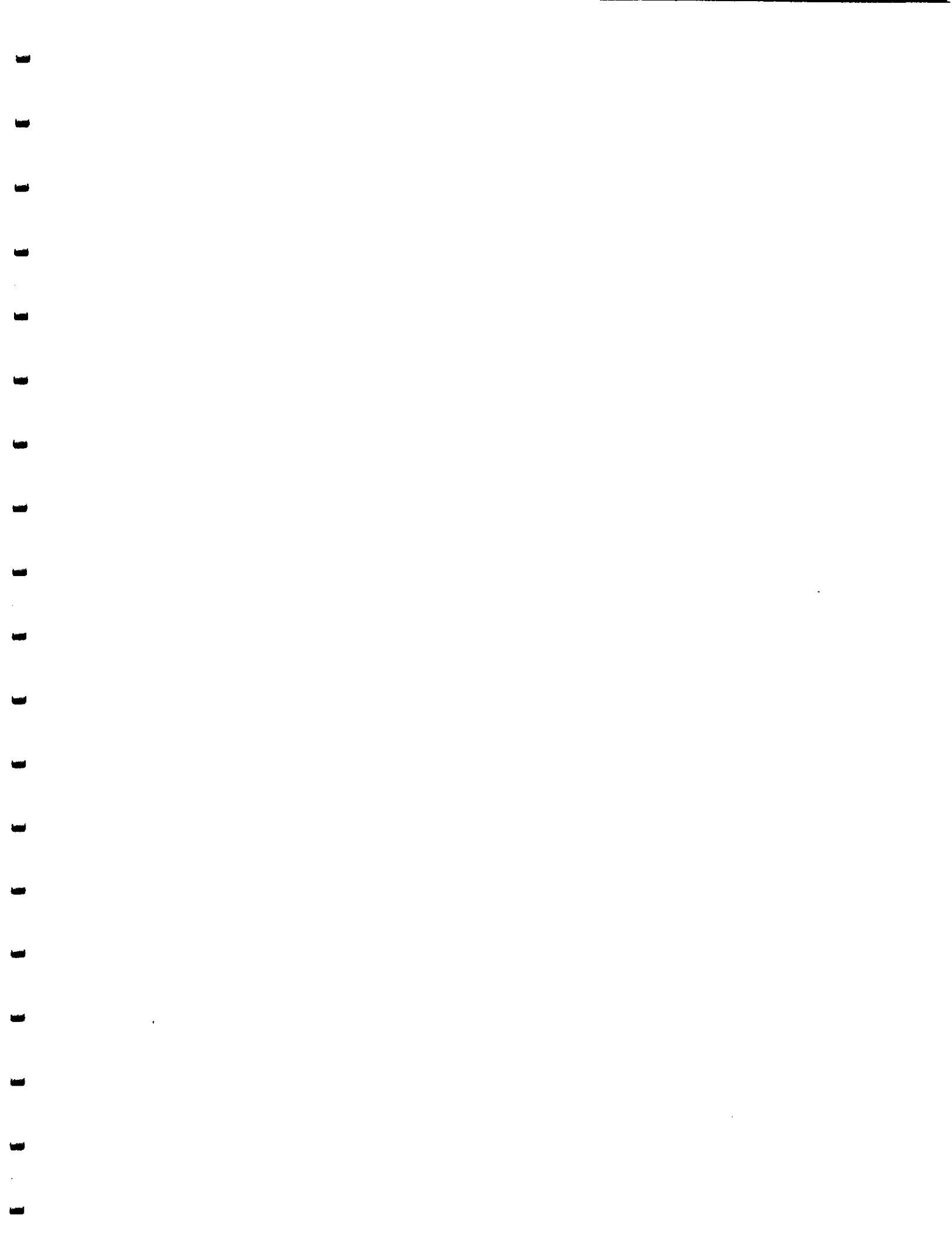


SUPPORTING CALCULATIONS

APPENDIX A: USGS Soils Survey

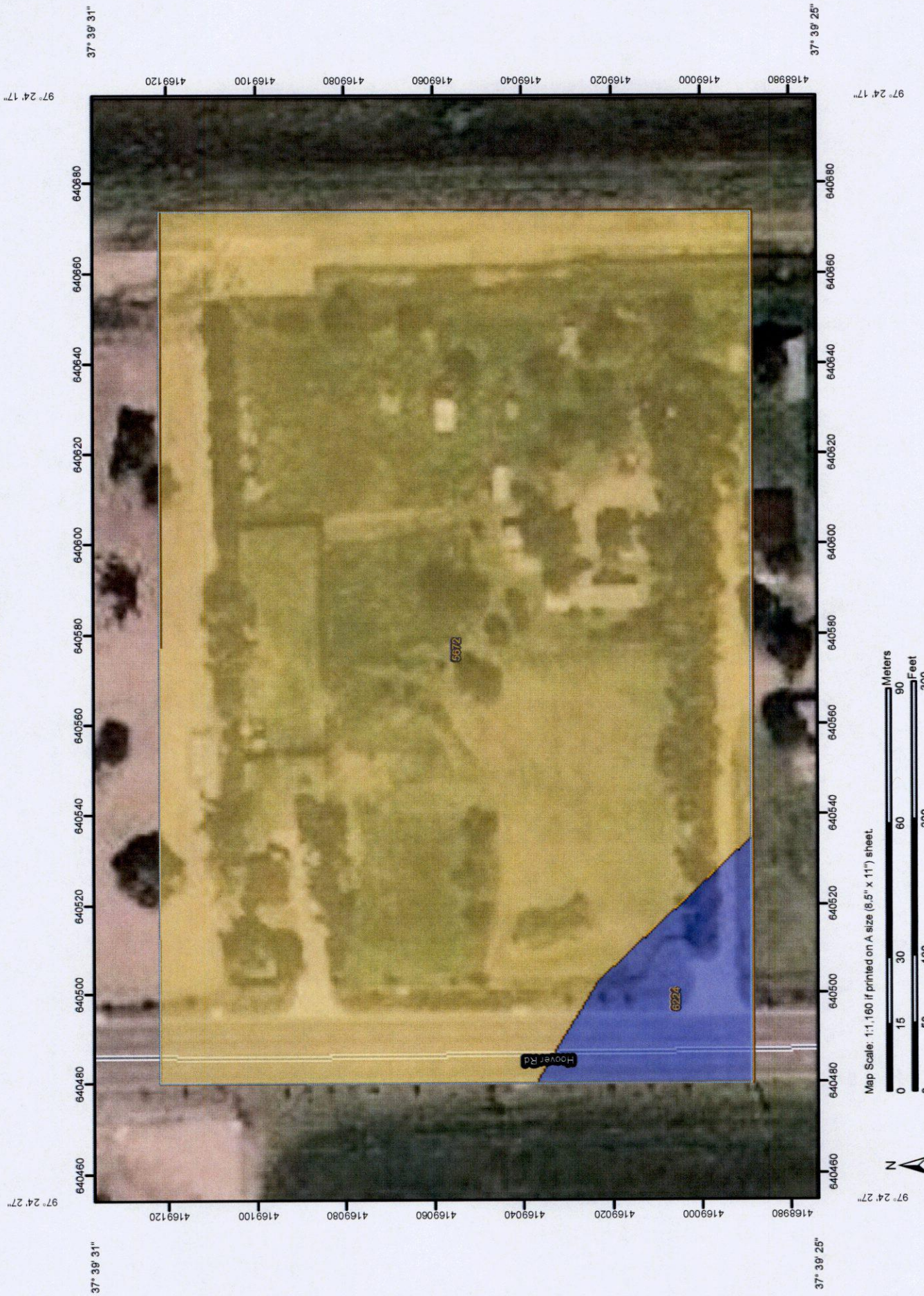
**APPENDIX B : HydraFlow Hydrographs
Site Flow**

APPENDIX C: Water Quality Calculations

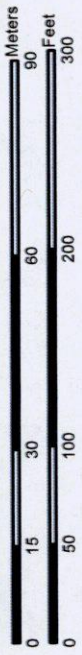


USGS Soils Survey

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



Map Scale: 1:1,160 if printed on A size (8.5" x 11") sheet.



MAP INFORMATION

Map Scale: 1:1,160 if printed on A size (8.5" x 11") sheet.
The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 14N NAD83

















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

Soil Survey Area: Sedgwick County, Kansas
Survey Area Data: Version 8, Sep 20, 2012

Date(s) aerial images were photographed: 6/20/2006

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

MAP LEGEND

- Area of Interest (AOI)
 - Area of Interest (AOI) 
- Soils
 - Soil Map Units 
- Soil Ratings
 - A 
 - A/D 
 - B 
 - B/D 
 - C 
 - C/D 
 - D 
 - Not rated or not available 
- Political Features
 - Cities 
- Water Features
 - Streams and Canals 
- Transportation
 - Rails 
 - Interstate Highways 
 - US Routes 
 - Major Roads 
 - Local Roads 

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Sedgwick County, Kansas (KS173)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
5672	Waldeck sandy loam, occasionally flooded	C	6.0	94.1%
6224	Canadian fine sandy loam, rarely flooded	B	0.4	5.9%
Totals for Area of Interest			6.4	100.0%

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

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

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

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

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie.

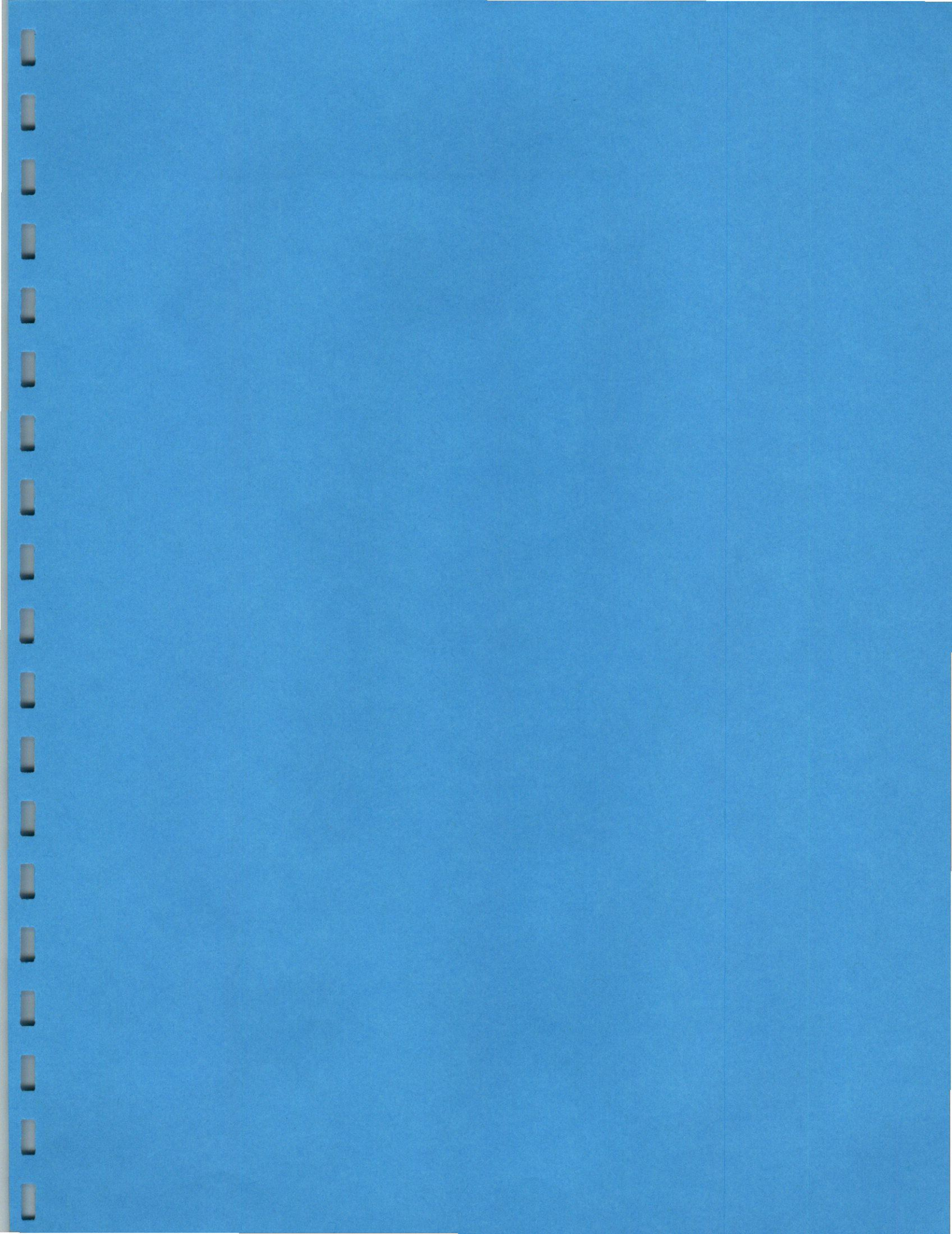
The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Component Percent Cutoff: None Specified

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

Tie-break Rule: Higher

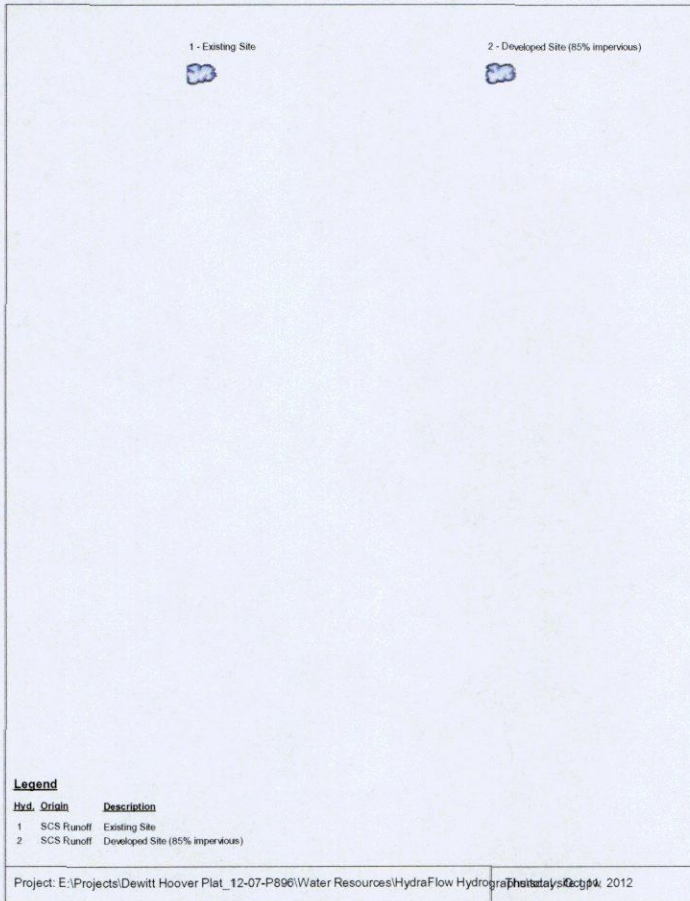
The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.



HydraFlow Hydrographs
Site Flow

Watershed Model Schematic

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8



Hydrograph Return Period Recap

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

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	-----	5.145	7.757	0.408	11.72	14.58	18.31	21.66	25.44	Existing Site
2	SCS Runoff	-----	10.21	13.11	3.505	17.21	20.07	23.72	26.96	30.60	Developed Site (85% impervious)

Proj. file: E:\Projects\Dewitt Hoover Plat_12-07-P896\Water Resources\HydroFlow Hydrographs\Hydrographs.ctb 2012.gpw

Hydrograph Summary Report

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

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	7.757	2	722	21,834	-----	-----	-----	Existing Site
2	SCS Runoff	13.11	2	722	39,216	-----	-----	-----	Developed Site (85% impervious)

E:\Projects\Dewitt Hoover Plat_12-07-P896\Water Resources\HydroFlow Hydrographs\Hydrographs.ctb 2012

Hydrograph Report

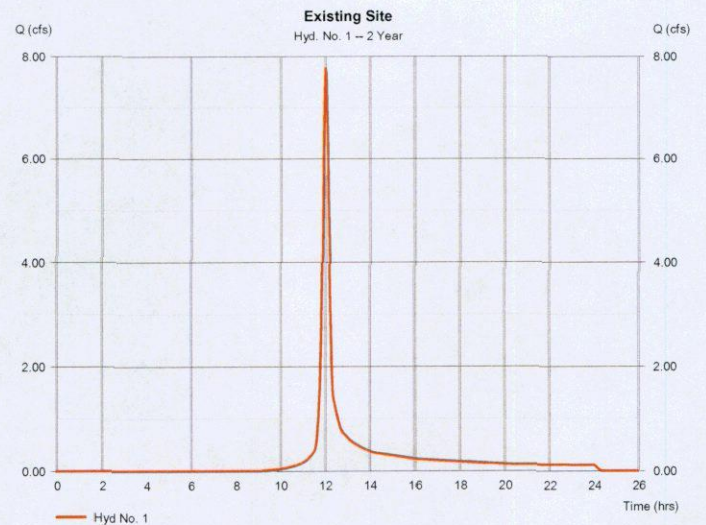
Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Thursday, Oct 11, 2012

Hyd. No. 1

Existing Site

Hydrograph type	= SCS Runoff	Peak discharge	≈ 7.757 cfs
Storm frequency	= 2 yrs	Time to peak	≈ 12.03 hrs
Time interval	= 2 min	Hyd. volume	≈ 21,834 cuft
Drainage area	= 3.770 ac	Curve number	≈ 80
Basin Slope	= 0.0 %	Hydraulic length	≈ 0 ft
Tc method	= User	Time of conc. (Tc)	≈ 15.00 min
Total precip.	= 3.50 in	Distribution	≈ Type II
Storm duration	= 24 hrs	Shape factor	≈ 484



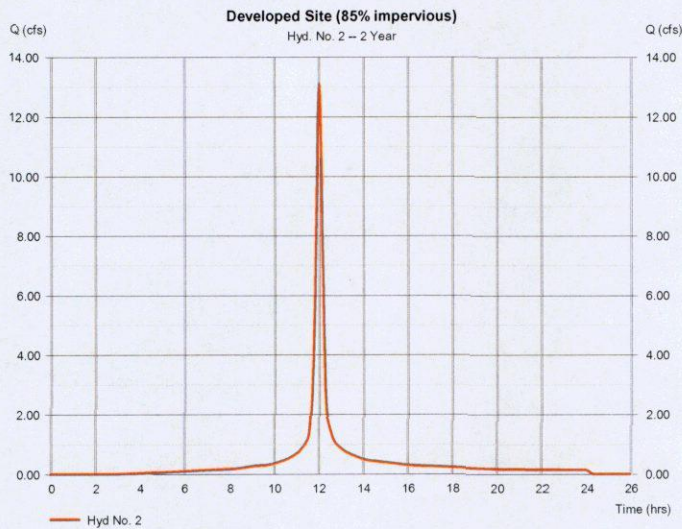
Hydrograph Report

Hyd. No. 2

Developed Site (85% impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 13.11 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 39,216 cuft
Drainage area	= 3.770 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.200 x 98) + (0.550 x 80)] / 3.770



Hydrograph Summary Report

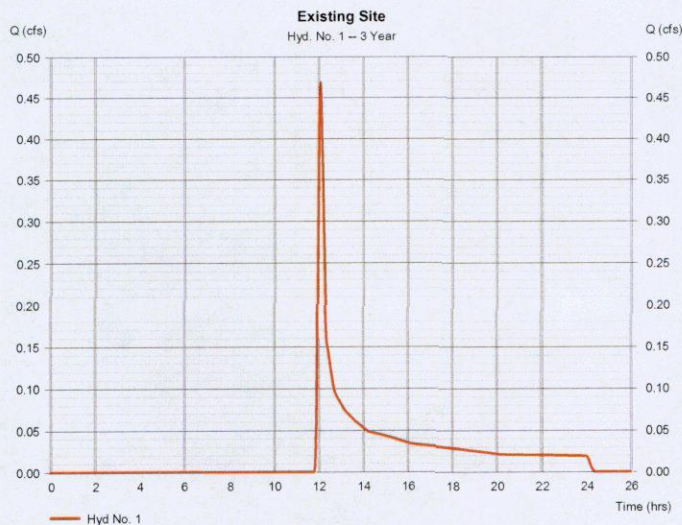
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.468	2	726	2,042	-----	-----	-----	Existing Site
2	SCS Runoff	3.505	2	722	9,864	-----	-----	-----	Developed Site (85% impervious)

Hydrograph Report

Hyd. No. 1

Existing Site

Hydrograph type	= SCS Runoff	Peak discharge	= 0.468 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 2,042 cuft
Drainage area	= 3.770 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



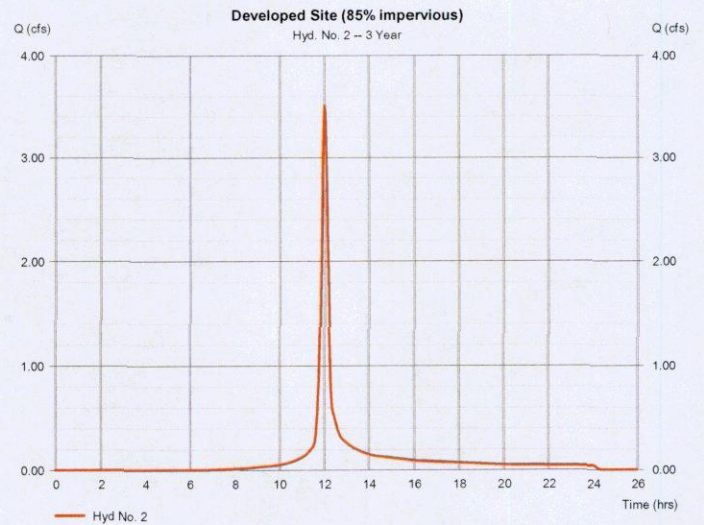
Hydrograph Report

Hyd. No. 2

Developed Site (85% impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.505 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 9,864 cuft
Drainage area	= 3.770 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.200 x 98) + (0.550 x 80)] / 3.770



Hydrograph Summary Report

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

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	11.72	2	722	32,844	-----	-----	-----	Existing Site
2	SCS Runoff	17.21	2	722	52,367	-----	-----	-----	Developed Site (85% impervious)

E:\Projects\Dewitt Hoover Plat_12-07-P896\W\Revised\Hydroflow Hydrographs\Site.tbx\2012

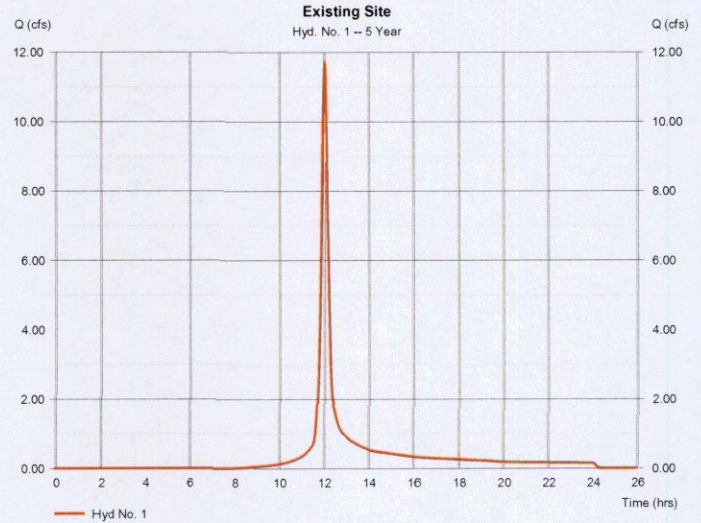
Hydrograph Report

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No. 1

Existing Site

Hydrograph type	= SCS Runoff	Peak discharge	= 11.72 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 32,844 cuft
Drainage area	= 3.770 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

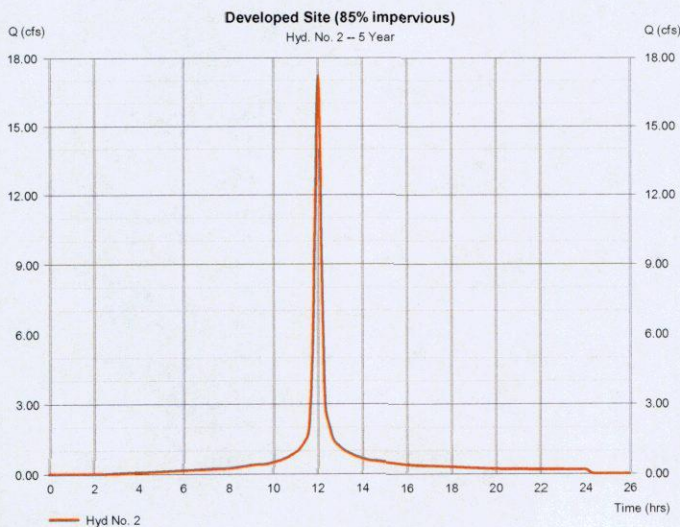
Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No. 2

Developed Site (85% impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 17.21 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 52,367 cuft
Drainage area	= 3.770 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.200 x 98) + (0.550 x 80)] / 3.770



Hydrograph Summary Report

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

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	14.58	2	722	40,937	-----	-----	-----	Existing Site
2	SCS Runoff	20.07	2	722	61,614	-----	-----	-----	Developed Site (85% impervious)

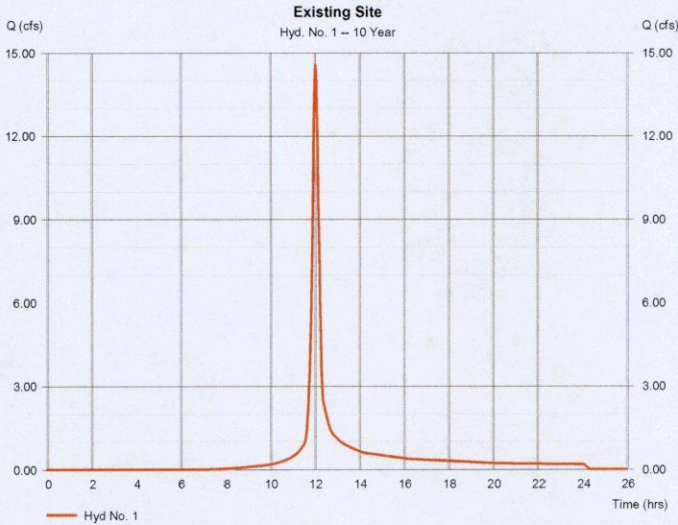
E:\Projects\Dewitt Hoover Plat_12-07-P896\W\Revised\Hydroflow Hydrographs\Site.tbx\2012

Hydrograph Report

Hyd. No. 1

Existing Site

Hydrograph type	= SCS Runoff	Peak discharge	= 14.58 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 40,937 cuft
Drainage area	= 3.770 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



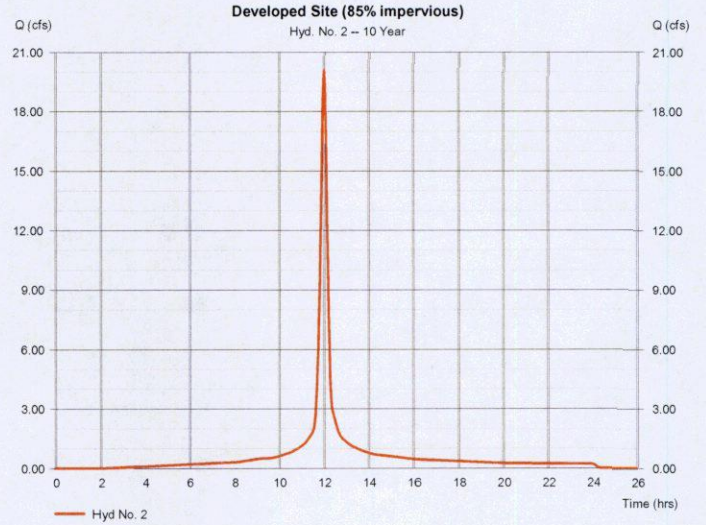
Hydrograph Report

Hyd. No. 2

Developed Site (85% impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 20.07 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 61,614 cuft
Drainage area	= 3.770 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3,200 x 98) + (0,550 x 80)] / 3,770



Hydrograph Summary Report

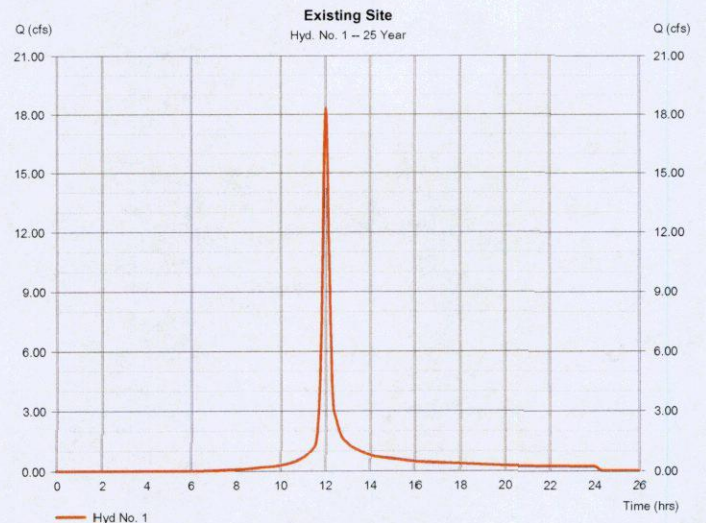
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	18.31	2	722	51,659	-----	-----	-----	Existing Site
2	SCS Runoff	23.72	2	722	73,532	-----	-----	-----	Developed Site (85% impervious)

Hydrograph Report

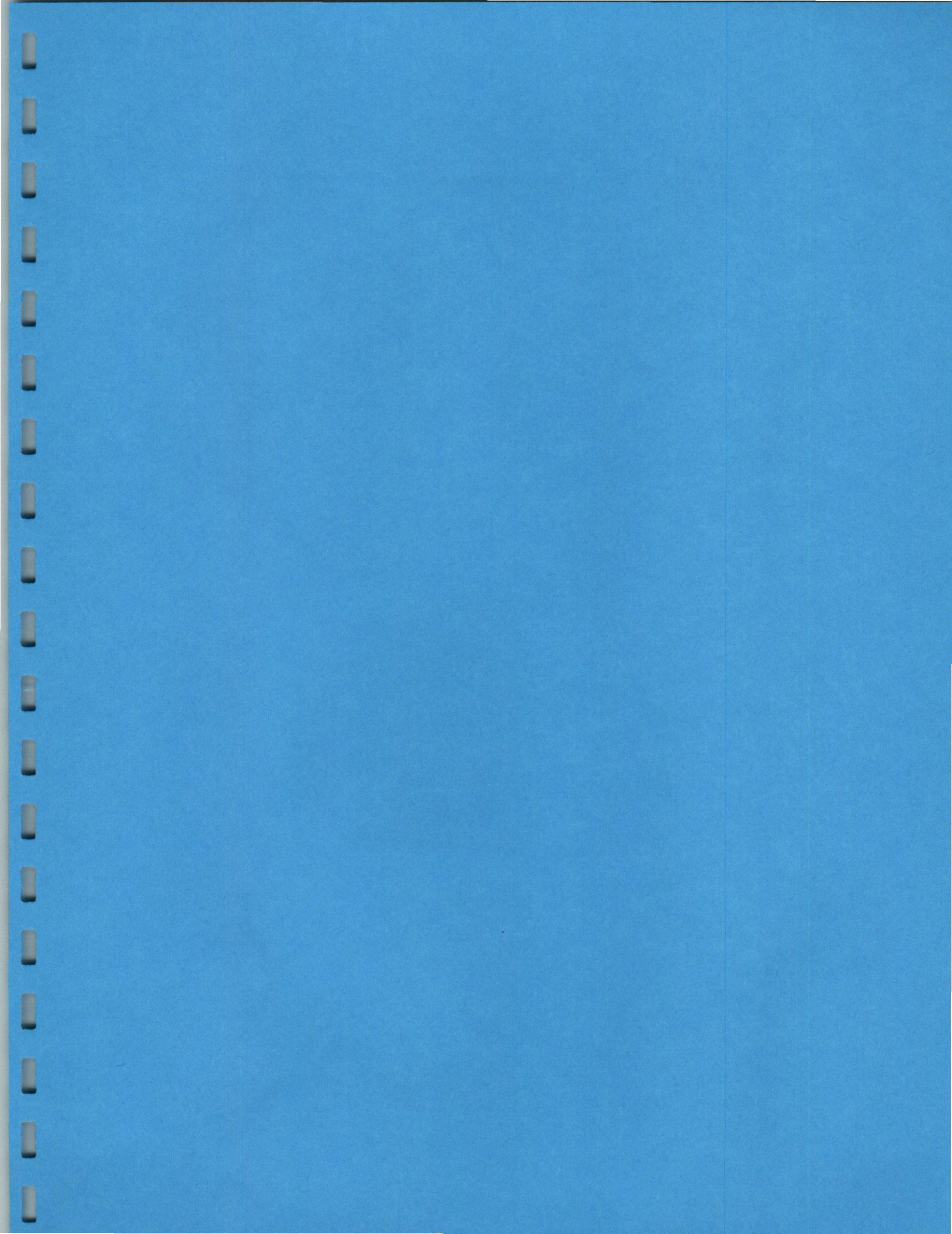
Hyd. No. 1

Existing Site

Hydrograph type	= SCS Runoff	Peak discharge	= 18.31 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 51,659 cuft
Drainage area	= 3.770 ac	Curve number	= 80
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



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Water Quality Calculations

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

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

Basin #	Hydrologic Soil Group				Land Use	Hydrologic Soil Group				Total Area ft ²	New Imp. ft ²	Red. Imp. ft ²	Weighted Volumetric Runoff Coef. (R _v) (eq. 4-24*)				WQ _v ft ³ eq. 4-25*
	A	B	C	D		A	B	C	D				U	D	Redev. I	I	
0	57,540	0	106,860	164,400	0.070	0.000	0.000	0.070	0.000	0.000	0.000	0.618	0.6875	11,303			
CN	84	98	93	93													

Water Quality Peak Flow

HG% unit Min Duty

eq. 4-18*

$Q_p = q_u * A * Q_{wv} * F_p$

CN =	93	Table 4-9
la/P =	0.126	
Tc =	15	min
qu =	675	Figure 4-6
A =	164,400	ft ²
	3.8	acre
	0.005897	mi ²
Rv =	0.6875	Eq. 4-24
P =	1.2	Sedg. Std.
Q _{wv} =	0.825	eq. 4-26
F _p =	1.00	Table 4-10
Q_p =	3.28	cfs

This chart is valid for 65% impervious cover on the site.

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

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

Weighted Volumetric Runoff Coef. (R _v) (eq. 4-24*)											
Basin #	Undist. ft ²	Dist. ft ²	Red. Imp. ft ²	New Imp. ft ²	Total Area ft ²	U %	D %	Redev. I %		R _v %	WQ _v ft ³ eq. 4-25*
								U %	D %		
Total Site	0	41,100	0	123,300	164,400	0.000	0.050	0.000	0.713	0.7625	12,536
CN		84		98	95						

Water Quality Peak Flow
HG% unit Min Duty

eq. 4-18*

$Q_p = q_u * A * Q_{wv} * F_p$

CN =	95	Table 4-9
la/P =	0.088	
Tc =	15	min
qu =	700	Figure 4-6
A =	164,400	ft ²
	3.8	acre
	0.005897	mi ²
Rv =	0.7625	Eq. 4-24
P =	1.2	Sedg. Std.
Qwv =	0.915	eq. 4-26
Fp =	1.00	Table 4-10
Qp =	3.78	cfs

This chart is valid for 75% impervious cover on the site.

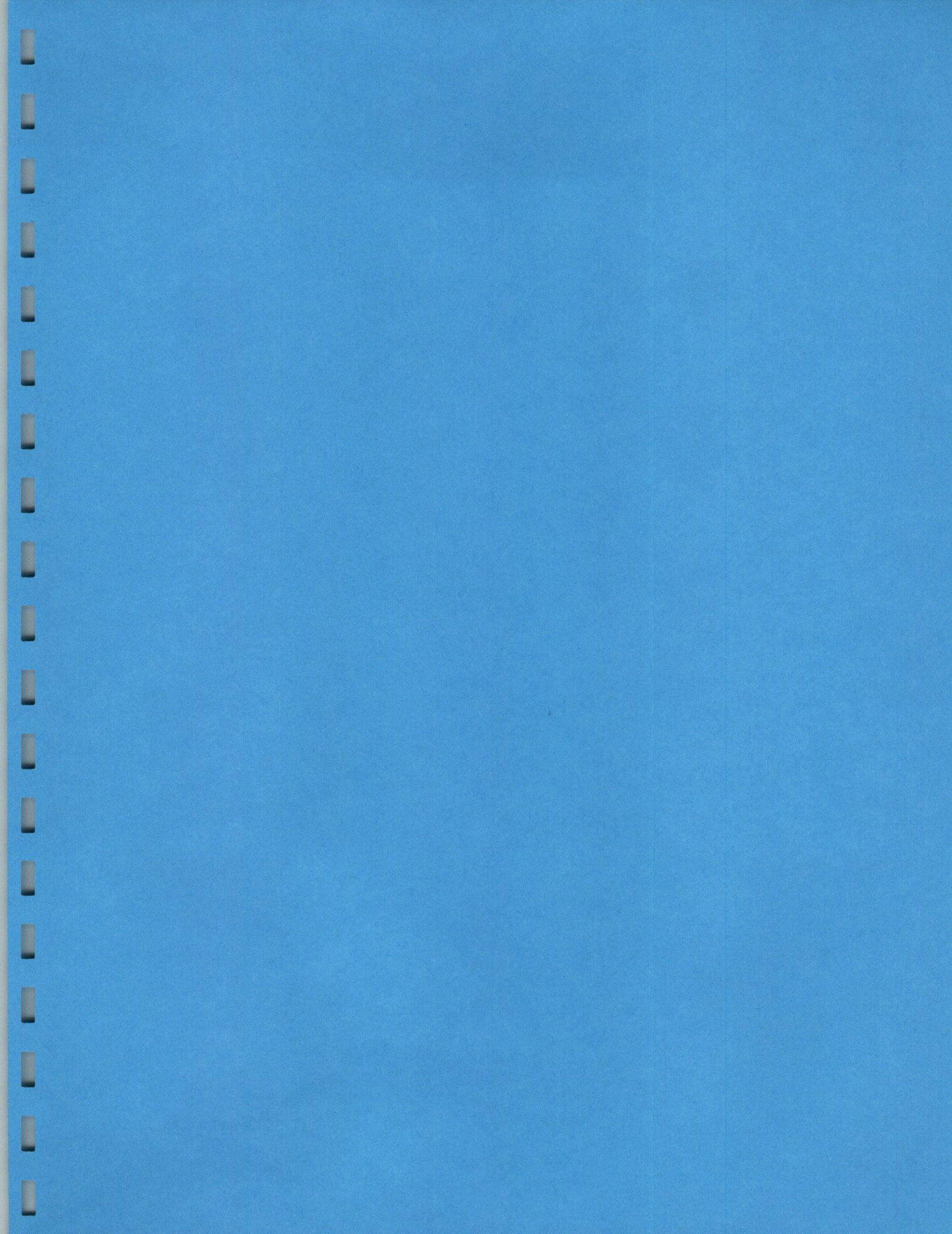
Table 4-13 Volumetric Runoff Coefficients by Land Use and Hydrologic Soil Group

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

Weighted Volumetric Runoff Coef. (R _v) (eq. 4-24*)											
Basin #	Undist. ft ²	Dist. ft ²	Red. Imp. ft ²	New Imp. ft ²	Total Area ft ²	U %	D %	Redev. I %	I %	R _v %	WQ _v ft ³ eq. 4-25*
Total Site	0	25,000	0	139,400	164,400	0.000	0.030	0.000	0.806	0.8359	13,743
CN		84		98	96						

Water Quality Peak Flow	
HG% unit Min Duty	
eq. 4-18*	
Qp = qu * A * Q _{wv} * Fp	
CN =	96 Table 4-9
la/P =	0.069
Tc =	15 min
qu =	750 Figure 4-6
A =	164,400 ft ²
	3.8 acre
	0.005897 mi ²
Rv =	0.8359 Eq. 4-24
P =	1.2 Sedg. Std.
Q _{wv} =	1.003139 eq. 4-26
Fp =	1.00 Table 4-10
Qp =	4.44 cfs

This chart is valid for 85% impervious cover on the site.



Drainage Plan
1:60 Scale