STORMWATER MANAGEMENT PLAN

FOR

SPIRIT AEROSYSTEMS
FUSELAGE FACTORY EXPANSION (F.F.E.)
3540 South Turnpike Drive
Wichita, Kansas 67210

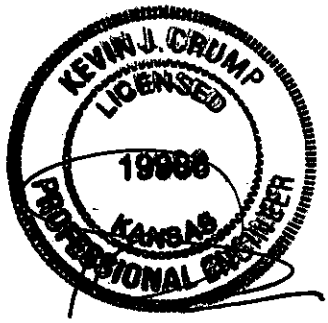
Turnpike Industrial 3rd Add.

THC Project No. 32910

Civil Permit Issue
October 8, 2008

Revised Civil Permit Issue
November 25, 2008

Prepared By: **The Haskell Company**
111 Riverside Avenue
Jacksonville, Florida 32202



11.25.08

Cory A. Yown
Civil Associate

Kevin J. Crump, P.E.
Kansas Reg. No.: 19986

HASKELL America's Design Build Leader®

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STORMWATER MANAGEMENT PLAN
FORWARD - PROJECT DATA SHEET

Project Name:	Spirit Fuselage Factory Expansion (F.F.E.)
Project Number:	32910
Client:	Spirit Aerosystems, Inc. P.O. Box 780008 Wichita, Kansas 67278
Client Representative:	Ed Lindeman – Strategic Planning Spirit Aerosystems, Inc. (316) 304-2493 Edward.a.lindeman@spiritaero.com
Property Owner:	Mid-Western Aircraft Systems, Inc. Spirit Aerosystems, Inc.
Engineer-of-record:	Kevin J. Crump, P.E. The Haskell Company 111 Riverside Ave. Jacksonville, FL 32202 (904) 791-4270 Telephone (904) 791-4699 Fax kevin.crump@haskell.com

SECTION ONE - PROJECT INTRODUCTION

Introduction

Spirit Aerosystems plans to build a new fuselage manufacturing facility. The project will consist of a single story factory containing approximately 338,023 square feet of aircraft systems manufacturing space. The facility also includes 56,118 square feet of office and employee support space. Site improvements for employee parking, truck aprons, fire lanes, and utility connections are associated with the project.

Property Description

The property lies within the City of Wichita and Sedgwick County, Kansas. Approximately 20.79 acres will be occupied by the fuselage factory manufacturing facility.

Existing Land Use

The project site is currently an employee parking lot within the existing Spirit Aerosystems campus. It is referenced as "Z Lot."

Zoning

The present zoning classification is **"LI"**, Limited Industrial. Re-zoning is not required.

Flood Zone

The Flood insurance Rate Map (FEMA Panel No.20173C0368E, dated 2/2/2007) indicates the property lies within Zone "X," and is not inundated by the 100-year base flood.

SCS Soil Classification

The site is composed of Rosehill silty clay (D) and Irwin silty clay loam (D) as shown on the enclosed NRCS soil survey. SCS Classifications primarily consist of CL, CH, MH, and ML.

Drainage Basin Conditions

Drainage sheet flows across the site in three different directions towards the northwest and southwest. A small basin area discharges towards the northeast across adjacent properties to a small area drain within the southerly rights-of-way of 31st Street. This "northeast" discharge point ultimately discharges to Gypsum Creek. The other outfall locations towards the west discharge to storm sewer systems that have outfall to the Turnpike open drainage ways and an ultimate discharge to the Arkansas River.

SECTION TWO – REFERENCES

Sheet No. C-001	Cover Sheet
Sheet No. C-100	Existing Campus Map
Sheet No. C-101	Existing Conditions Plan
Sheet No. C-102	Demolition Plan
Sheet No. C-110s	Site Plans
Sheet No. C-120s	Site Utility Plans
Sheet No. C-130	Site Grading Plans
Sheet No. C-140	Storm Piping Plan
Sheet No. C-150s	Erosion and Sediment Control Plans
Sheet No. C-153	Storm Water Pollution Prevention Plan (SWPPP)
Sheet No. C-510s	Site Details
Sheet No. C-520s	Utility Details
Sheet No. C-530s	Grading and Drainage Details
Sheet No. C-550s	Erosion and Sediment Control Detail Sheets

SECTION THREE – PROCEDURES

Basin Characteristics

An engineering evaluation of the on-site basin characteristics contributing to the existing storm water facilities immediately adjacent or down-gradient of the project area has been completed for both the pre and post-developed conditions. The evaluation includes determinations of land cover, runoff curve number, peaking factor, time of concentration, and storage capacity for the detention facilities. A summary of the characteristics are presented in the Appendix of this report.

Hydrology

The hydrologic conditions utilized for analysis of the post-developed conditions were obtained from the Urban Hydrology for Small Watersheds Technical Release 55 (TR-55) as prepared by the Soil Conservation Service (SCS). The summary of rainfall conditions which will be used are based on rainfall depths identified in TR-55. Design storm events for this project include the 2-yr return frequency event of 24-hour duration. This basis-of-design was agreed upon at a coordination meeting between owner, engineer, City of Wichita, and Sedgwick County primary stakeholders on June 26, 2008. A copy of meeting minutes is provided in the Appendix of this report. The 100-yr storm was routed only to determine conditions in the event of the base flood. Total rainfall amounts for each storm are included in the Appendix.

Hydraulics & Pond Routing

Based on the hydrologic design requirements above, a flood routing model was developed for the purpose of analyzing the system and providing response to how the system reacts to the design storm event. Results of the model are included herein. For the pre-developed condition, two points of interest are evaluated to determine the allowable discharge during post-development conditions. The post-developed peak runoff rates do not exceed the allowable discharge at each specific outfall location.

The routing of storm water runoff generated by the design storm event was modeled using the software "ICPR," as developed by Streamline Technologies. An ICPR model will be used for evaluating pre and post development conditions. A summary of results along with detailed input and output data is included in the Appendix of this report.

Tailwater / Boundary Condition

The post-developed pond routing model includes a boundary (tailwater) condition for Pond A. The outfall for Pond A ties into an existing 24" RCP which drains under Turnpike Drive. The tailwater condition at this outfall is assumed to have no impact to Pond A. The open drainage ways east of Turnpike are sufficiently below the bottom of Pond A. In this case, the outfall is operating as a free-forward flow condition and there is no consideration for tailwater.

SECTION FOUR - DESIGN SUMMARY:

Rainfall Design Summary (Obtained from TR-55 SCS Manual):

City of Wichita, KS
Type II Rainfall Distribution

- **2-yr / 24-hr depth = 3.50"**
- **10-yr / 24-hr depth = 5.20" (not used)**
- **50-yr / 24-hr depth = 7.00" (not used)**
- **100-yr / 24-hr depth = 7.80"**

PRE/POST Discharge Summary:

Design Storm Event / P.O.A.	[PRE] Allowable Discharge - (cfs)	[POST] Routed Discharge (cfs)
2-yr, 24-hr		
Point A	9.35	7.76
Point C	20.28	19.85

SECTION FIVE – STORM DRAIN DESIGN

All storm sewer systems are designed and modeled using StormCAD v.5.6 provided by Bentley Systems, Inc. The design using the StormCAD program, which is a Manning's Equation based system, considers the following variables:

- Pipe Size, Length, Materials of Construction, and Roughness Coefficient
- Pipe, Inlet and Pond Configuration
- Collection System Characteristics (Area, Runoff Coefficient, Time of Concentration)

The modeled results of the StormCAD program predict the following:

- Pipe Capacity
- Flow Velocity
- Hydraulic Grade Line

Storm water Collection System Design

The storm sewer segments will be sized to adequately convey runoff based on the following selected design criteria:

DESIGN STORM

- Frequency — 25-year
- Time of Concentration — 10-minute minimum
- Intensity — 8.15 inches/hr. @ 10 min. Tc

PIPE SELECTION

- Maximum Velocity — 10.0 feet per second
- Minimum Velocity — 2.5 feet per second
- Friction Factor ("n")
  HDPE – 0.012
- Flowing full for 25-year storm

The collection and routing of all storm water resulting from rainfall events is achieved with underground piping for 25-year, critical duration storm event.

Supporting Information

Detailed descriptions of the collection system piping are presented in the StormCAD calculations included in the Appendix of this report. The descriptions provide system diagrams, an inlet report, a pipe report, and hydraulic grade line summaries.

Tailwater Conditions

As noted on the storm water profile sheets in the Appendix, the tailwater condition for each storm sewer system is as follows:

P-1~ST1: HGL Start = 1350.54 [25-yr high-water of Pond A]
P-6~ST-7: HGL Start = 1350.54 [25-yr high-water of Pond A]
P-16~ST-18: HGL Start = 1358.00 [assumed crown of pipe]
P-25~EX-1: HGL Start = 1342.97 [assumed crown of pipe]

SECTION SIX - LAND DISTURBING ACTIVITY PLAN

Introduction

Extensive measures will be taken during construction to prevent erosion and control sedimentation on the lands undergoing land-disturbing activity. The erosion and sediment control plan for the project meets all the requirements of the State of Kansas Department of Health and Environment (KDHE) and the United States Environmental Protection Agency (EPA) Nation Pollutant Discharge Elimination System (NPDES).

Description of Activity

The property will be fully developed into an aircraft systems manufacturing facility. The initial and intermediate construction activities will include site demolition, site clearing, installation of temporary sediment controls, grading, excavation, and import fill for building pad.

Date of Construction

Initial construction is scheduled to begin **9/2008**
Final stabilization will be accomplished before **12/2009**

Standards and Specifications

All design will conform to and all work will be performed in accordance with the National Pollutant Discharge Elimination System (NPDES) and the U.S. Environmental Protection Agency (EPA) storm water discharge permit program. All contractors and subcontractors will be required to comply with the regulations.

Soil Conditions

Detailed information on soil conditions at the site are presented within the soils report.

Sequence of Land Disturbance

Initial land disturbing activities will affect 20.79 acres of the 20.79 acre site. This activity will consist of demolition of existing pavement systems, installation of perimeter controls and rough grading for initial sediment basins. The majority of the land disturbing activities will mainly consist of mass grading and import operations to prepare the building pad.

The intermediate phase of the work includes installation of associated temporary sediment controls, including temporary seeding. The bulk of the activities during this phase consist of site utility, drainage and permanent pavement installations.

The final phase of the work includes installation of permanent vegetative measures such as sod and seeding. Activities during the final phase will primarily consist of installation of final landscape and site furnishings.

Storm Water Pollution Prevention Program

The civil engineer has assembled a specific erosion and sedimentation control program for the construction activities. Generally, the Storm Water Pollution Prevention Program (SWPPP) addresses the following types of controls:

- Stabilization practices for erosion and sediment control should minimize the amount of disturbed soil, using vegetation or other measures, i.e. sodding, temporary seeding and mulching, channel linings, and erosion control blankets.
- Velocity dissipation measures are installed to slow down the runoff flowing across the site by using measures such as rock check dams, outlet protection devices, surface roughening, and slope stabilization.
- Storm water management controls are installed to prevent runoff from flowing across disturbed areas, i.e. earth dikes, drainage diversion swales, and paved flumes.
- Sediment capture measures are installed to remove sediment from on-site runoff before it leaves the site by using such measures as silt fences, sediment traps, sediment basins, storm drain inlet protection, and brush chemically treated check dams.
- Other pollution prevention measures included in the program are intended to control spills, minimize airborne dust, reduce offsite vehicle tracking of sediments, provide proper waste disposal, and deal with worker sanitation.

A detailed Storm Water Pollution Prevention Program (SWPPP) has been prepared for this project.

Inspection & Maintenance Program

The erosion and sedimentation control program must be continuously inspected and maintained. Daily inspections are required. Any damages observed will be repaired by the end of that day. Clean out of sediment control structures will accomplished on a regular basis.

The SWPPP shall be administered by a specific representative of the sitework contractor. The representative shall be responsible for administering the SWPPP and shall be personally responsible for required documentation. Documentation shall include regular attendance to an inspection and maintenance logbook. A logbook shall be kept in the General Superintendent's office on-site. The logbook shall include all regular inspection reports.

Inspection reports shall be completed as identified in the SWPPP.

Public Signage Requirements	The contractor shall retain a copy of the Storm Water Pollution Prevention Plan (SWPPP) on-site and posted for public view, along with a copy of the Notice of Coverage (NOC), contact information, and records of site inspections.

APPENDIX

1. Project Maps and Exhibits:
    - Vicinity Map
    - Soil Map & Key

2. Project Maps
    - Pre/Post-Developed Drainage Map (C-160)
    - Drainage Area Map (C-161)

3. Rainfall Data
    - SCS Rainfall Distribution Chart (TR-55)
    - SCS Rainfall Event Depths
    - City of Wichita Rainfall I.D.F. chart (April, 1985)

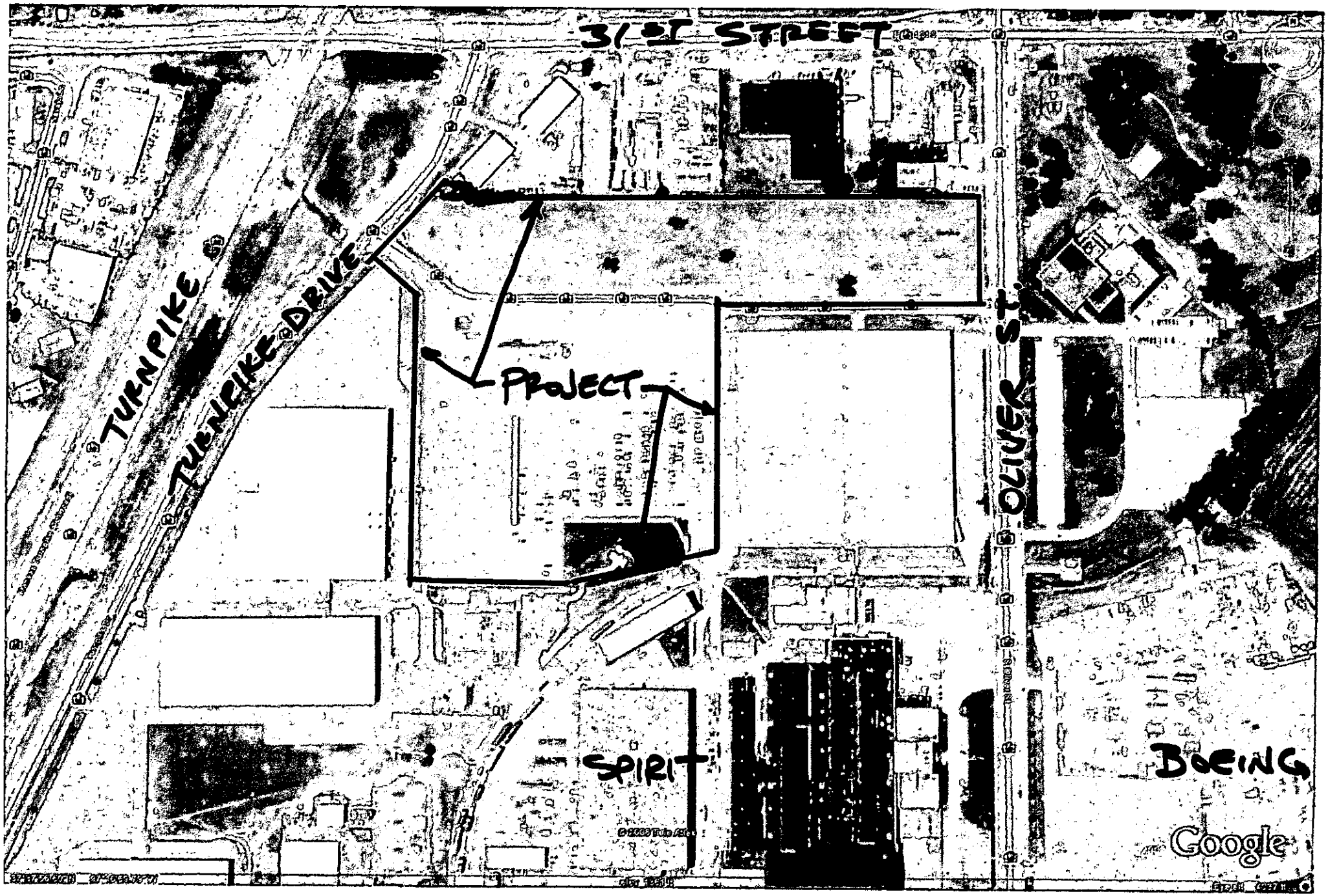
4. Basis-of-Design
    - Meeting Minutes – June 26, 2008

5. Existing Conditions Stormwater Analysis:
    - ICPR Routing Report (2-yr/24-hr)

6. Post Conditions Stormwater Analysis
    - ICPR Routing Report (2-yr/24-hr)

7. Storm Sewer Hydraulic Calculations
    - DOT Report

VICINITY MAP



VICINITY MAP


651250
651300
651350
651400
651450
651500
651550
651600
651650
651700
4166600
4166550
4166500
4166450
4166400
4166350
4166300
S TURNPIKE DR
E COLFAX
S OLIVER ST
3911
4671
3930
N
0
45
90
180
270
Meters
0
150
300
600
900
Feet

SOIL SURVEY

MAP LEGEND

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

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features

Municipalities
- Cities
- Urban Areas

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails

Roads
- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

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

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 4, Dec 29, 2007

Date(s) aerial images were photographed: 3/20/1996

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.

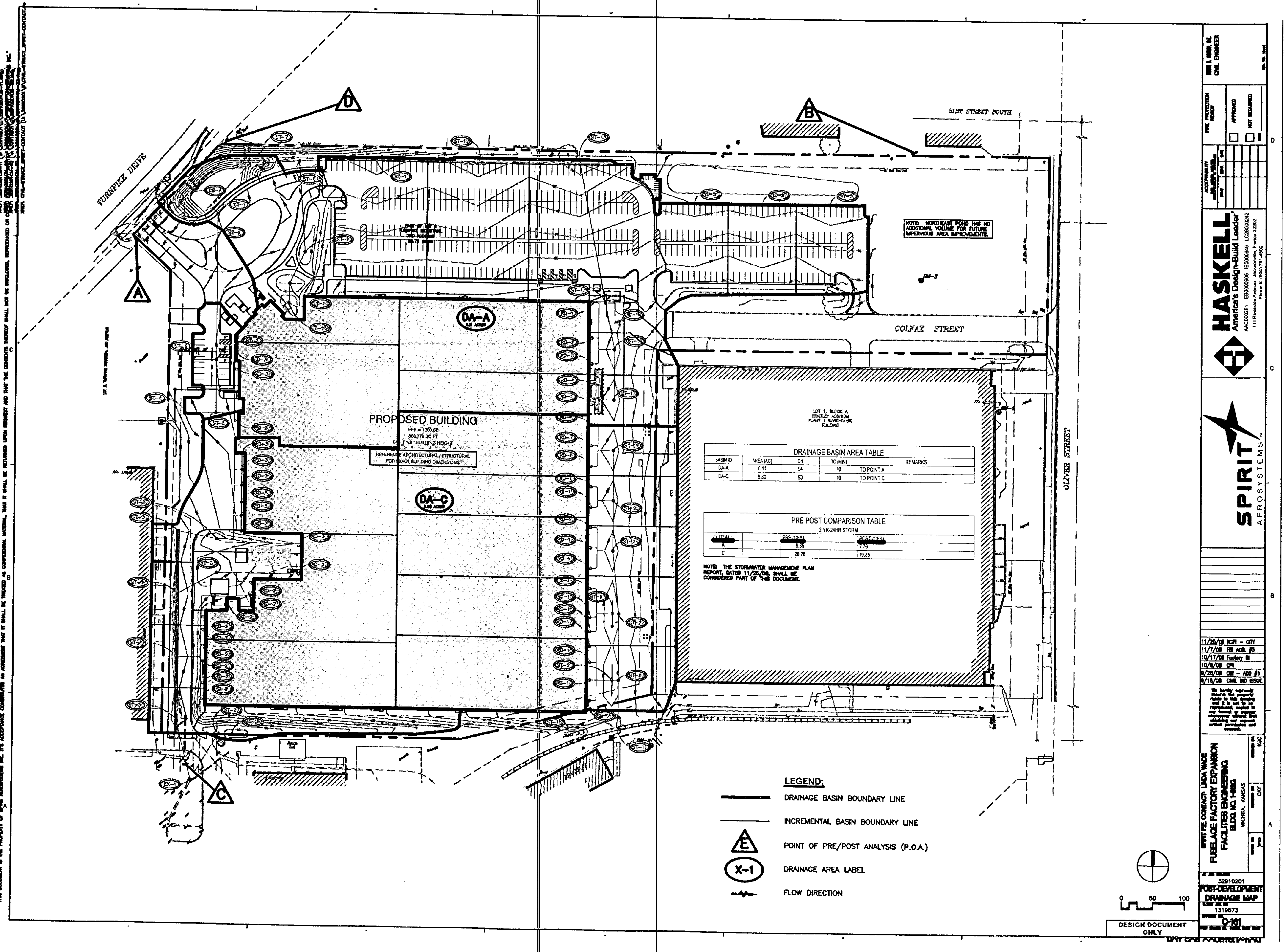
Map Unit Legend

Sedgwick County, Kansas (KS173)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
3911	Rosehill silty clay, 1 to 3 percent slopes	16.5	87.8%
3930	Urban land-Irwin complex, 1 to 3 percent slopes	0.3	1.4%
4671	Irwin silty clay loam, 1 to 3 percent slopes	2.0	10.9%
Totals for Area of Interest (AOI)		18.8	100.0%

WICHITA, KANSAS

SPIRIT

AAC000261 EB0000906 IB0000849 LC26000242



DRAINAGE BASIN AREA TABLE

BASIN ID	AREA (AC)	CN	TC (MIN)	REMARKS
DA-A	8.11	94	10	TO POINT A
DA-C	8.80	93	10	TO POINT C

PRE POST COMPARISON TABLE

2 YR-24HR STORM

OUTFALL		PRE (CFS)		POST (CFS)
A		9.35		7.76
C		20.28		19.85

NOTE: THE STORMWATER MANAGEMENT PLAN REPORT, DATED 11/26/08, SHALL BE CONSIDERED PART OF THIS DOCUMENT.

11/26/08 RCPI - CITY
11/7/08 FBI ADD. #3
10/17/08 Factory III
10/8/08 CPI
9/26/08 CBI - ADD #1
9/16/08 CIVIL BID ISSUE

SPIRIT P.E. CONTACT: LINDA WADE
FUSELAGE FACTORY EXPANSION
FACILITIES ENGINEERING
BLDG. NO. 1-65G
WICHITA, KANSAS

KJC
CAY
jmb

32910201

POST-DEVELOPMENT DRAINAGE MAP

1319673

C-101

DESIGN DOCUMENT ONLY

Appendix B Synthetic Rainfall Distributions and Rainfall Data Sources

The highest peak discharges from small watersheds in the United States are usually caused by intense, brief rainfalls that may occur as distinct events or as part of a longer storm. These intense rainstorms do not usually extended over a large area and intensities vary greatly. One common practice in rainfall-runoff analysis is to develop a synthetic rainfall distribution to use in lieu of actual storm events. This distribution includes maximum rainfall intensities for the selected design frequency arranged in a sequence that is critical for producing peak runoff.

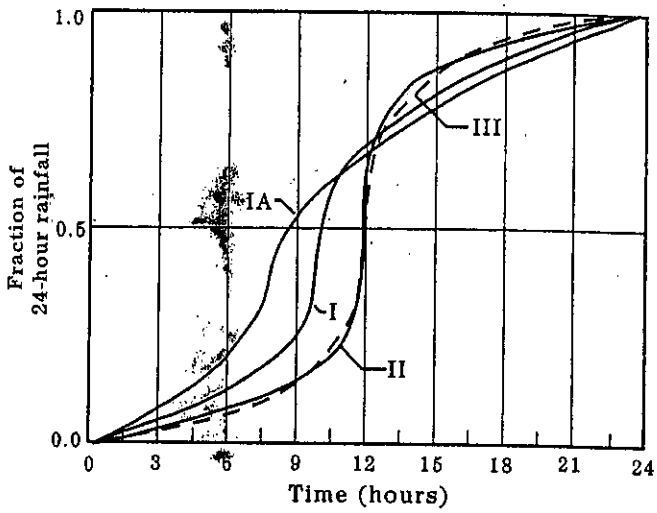
Synthetic rainfall distributions

The length of the most intense rainfall period contributing to the peak runoff rate is related to the time of concentration (T_c) for the watershed. In a hydrograph created with NRCS procedures, the duration of rainfall that directly contributes to the peak is about 170 percent of the T_c. For example, the most intense 8.5-minute rainfall period would contribute to the peak discharge for a watershed with a T_c of 5 minutes. The most intense 8.5-hour period would contribute to the peak for a watershed with a 5-hour T_c.

Different rainfall distributions can be developed for each of these watersheds to emphasize the critical rainfall duration for the peak discharges. However, to avoid the use of a different set of rainfall intensities for each drainage area size, a set of synthetic rainfall distributions having "nested" rainfall intensities was developed. The set "maximizes" the rainfall intensities by incorporating selected short duration intensities within those needed for longer durations at the same probability level.

For the size of the drainage areas for which NRCS usually provides assistance, a storm period of 24 hours was chosen the synthetic rainfall distributions. The 24-hour storm, while longer than that needed to determine peaks for these drainage areas, is appropriate for determining runoff volumes. Therefore, a single storm duration and associated synthetic rainfall distribution can be used to represent not only the peak discharges but also the runoff volumes for a range of drainage area sizes.

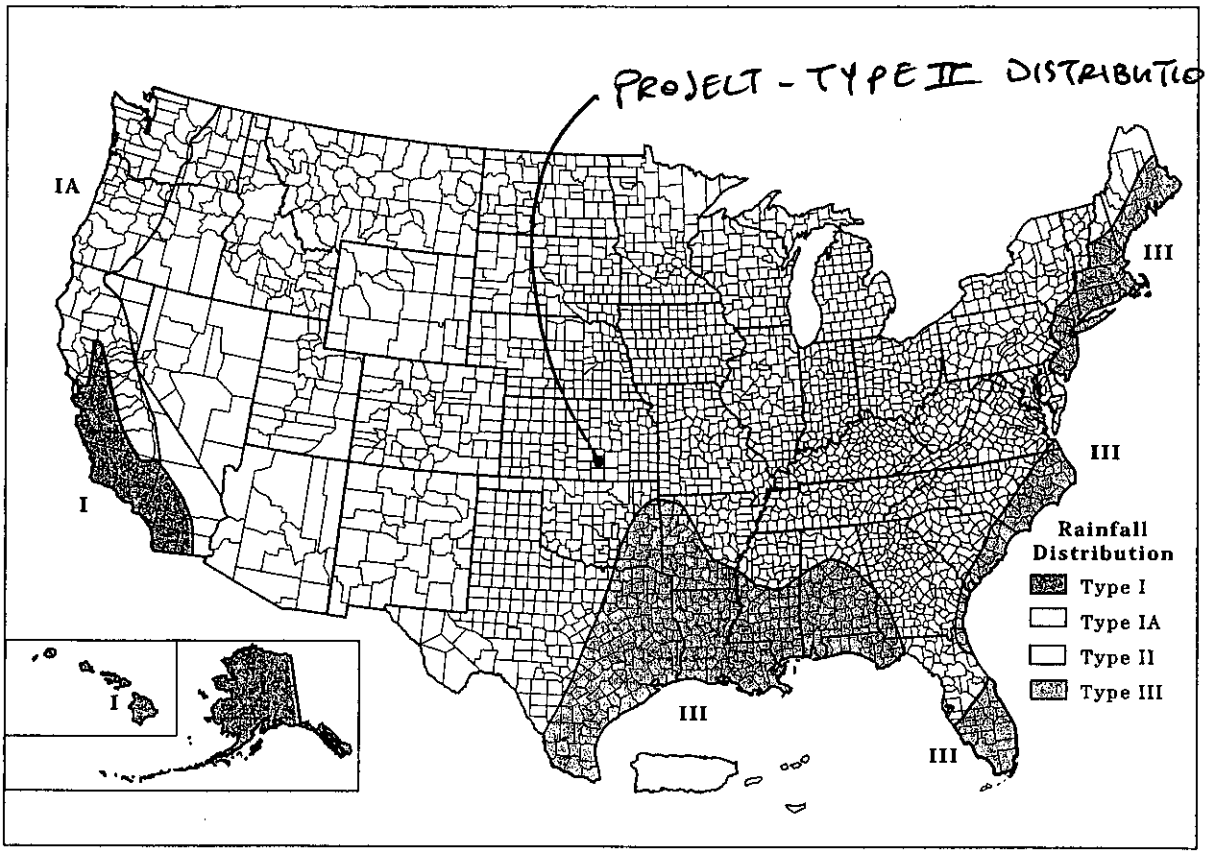
Figure B-1 SCS 24-hour rainfall distributions



The intensity of rainfall varies considerably during a storm as well as geographic regions. To represent various regions of the United States, NRCS developed four synthetic 24-hour rainfall distributions (I, IA, II, and III) from available National Weather Service (NWS) duration-frequency data (Hershfield 1061; Frederick et al., 1977) or local storm data. Type IA is the least intense and type II the most intense short duration rainfall. The four distributions are shown in figure B-1, and figure B-2 shows their approximate geographic boundaries.

Types I and IA represent the Pacific maritime climate with wet winters and dry summers. Type III represents Gulf of Mexico and Atlantic coastal areas where tropical storms bring large 24-hour rainfall amounts. Type II represents the rest of the country. For more precise distribution boundaries in a state having more than one type, contact the NRCS State Conservation Engineer.

Figure B-2 Approximate geographic boundaries for NRCS (SCS) rainfall distributions



Rainfall data sources

This section lists the most current 24-hour rainfall data published by the National Weather Service (NWS) for various parts of the country. Because NWS Technical Paper 40 (TP-40) is out of print, the 24-hour rainfall maps for areas east of the 105th meridian are included here as figures B-3 through B-8. For the area generally west of the 105th meridian, TP-40 has been superseded by NOAA Atlas 2, the Precipitation-Frequency Atlas of the Western United States, published by the National Ocean and Atmospheric Administration.

East of 105th meridian

Hershfield, D.M. 1961. Rainfall frequency atlas of the United States for durations from 30 minutes to 24 hours and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 40. Washington, DC. 155 p.

West of 105th meridian

Miller, J.F., R.H. Frederick, and R.J. Tracey. 1973. Precipitation-frequency atlas of the Western United States. Vol. I Montana; Vol. II, Wyoming; Vol III, Colorado; Vol. IV, New Mexico; Vol V, Idaho; Vol. VI, Utah; Vol. VII, Nevada; Vol. VIII, Arizona; Vol. IX, Washington; Vol. X, Oregon; Vol. XI, California. U.S. Dept. of Commerce, National Weather Service, NOAA Atlas 2. Silver Spring, MD.

Alaska

Miller, John F. 1963. Probable maximum precipitation and rainfall-frequency data for Alaska for areas to 400 square miles, durations to 24 hours and return periods from 1 to 100 years. U.S. Dept. of Commerce, Weather Bur. Tech. Pap. No. 47. Washington, DC. 69 p.

Hawaii

Weather Bureau. 1962. Rainfall-frequency atlas of the Hawaiian Islands for areas to 200 square miles, durations to 24 hours and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 43. Washington, DC. 60 p.

Puerto Rico and Virgin Islands

Weather Bureau. 1961. Generalized estimates of probable maximum precipitation and rainfall-frequency data for Puerto Rico and Virgin Islands for areas to 400 square miles, durations to 24 hours, and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 42. Washington, DC. 94 P.

Figure B-3 2-year, 24-hr rainfall = 3.5"

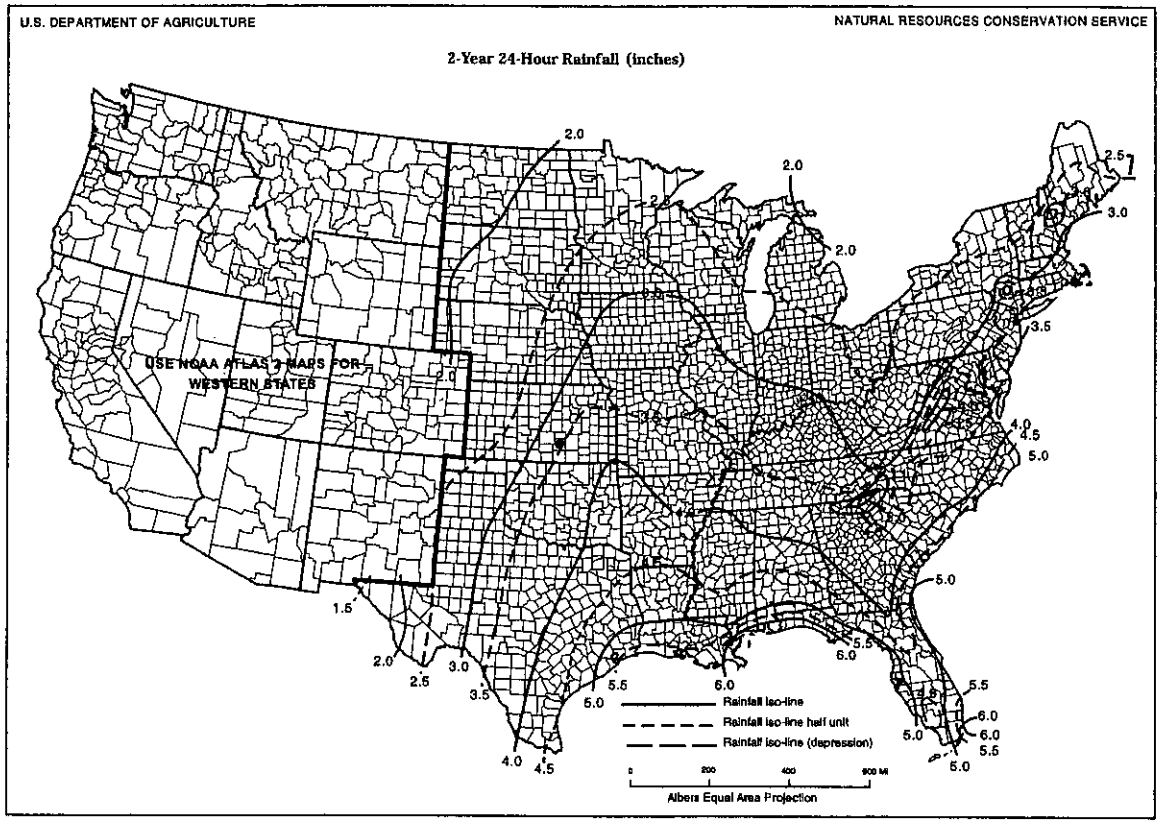


Figure B-4 5-year, 24-hour rainfall = 4.5"

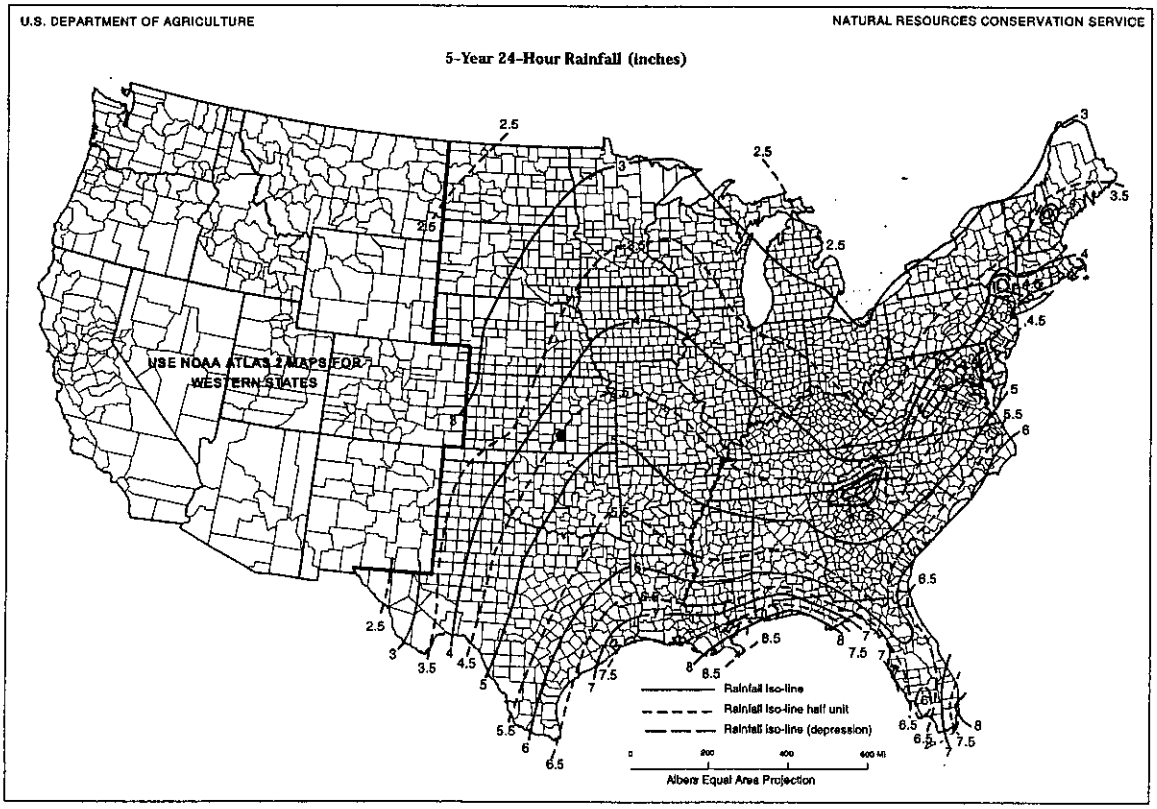


Figure B-5 10-year, 24-hour rainfall = 5.2"

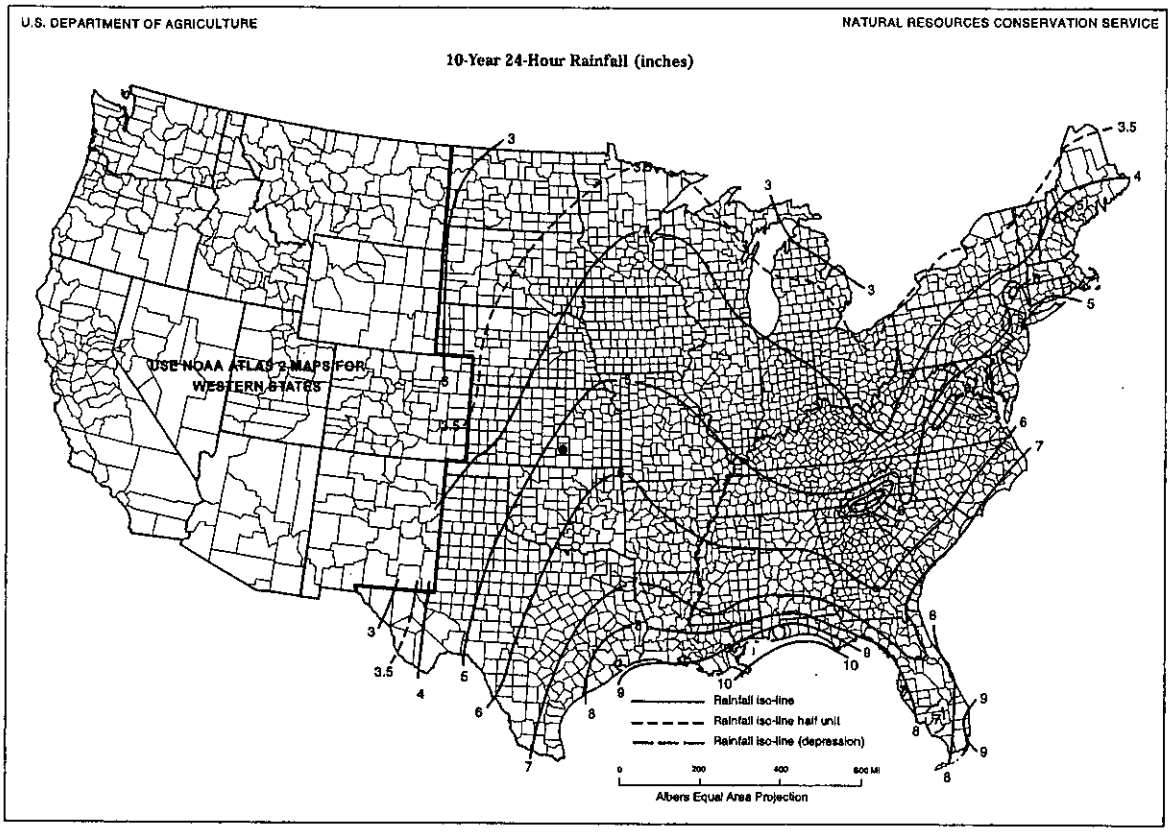


Figure B-6 25-year, 24-hour rainfall = 6.1"

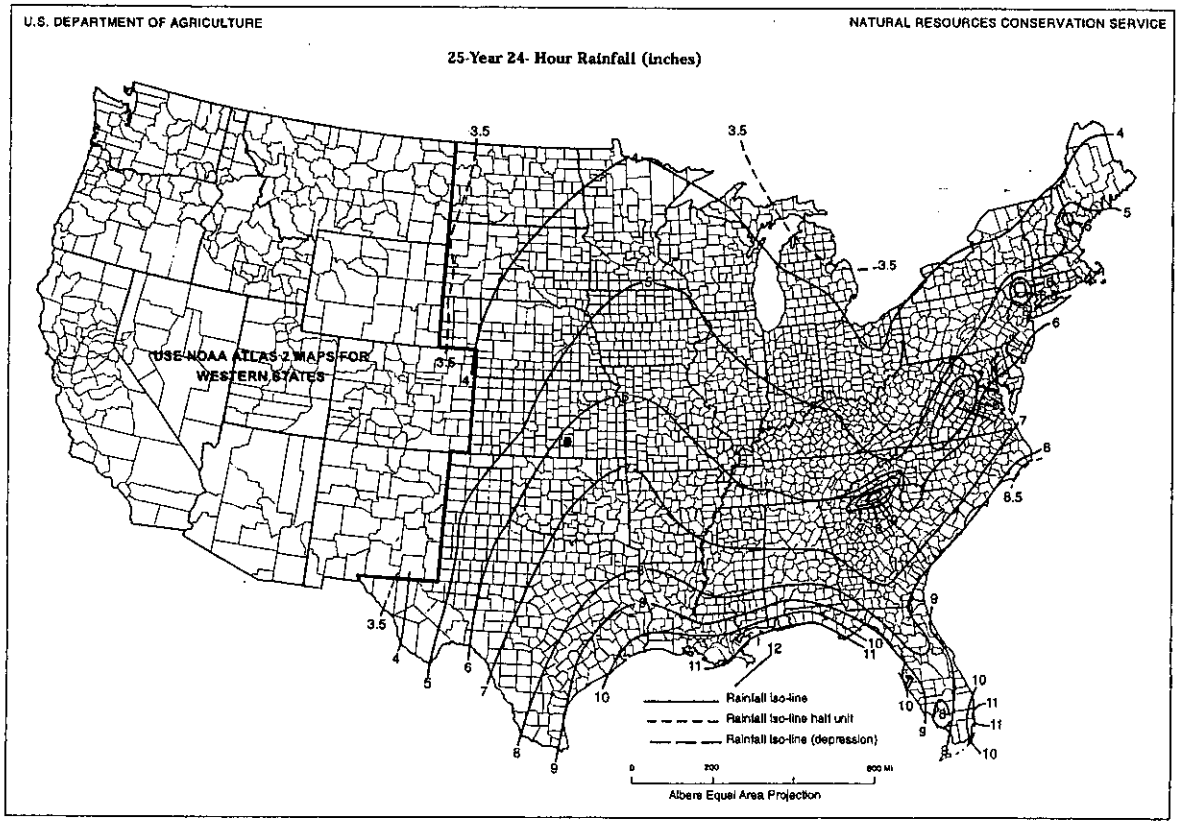


Figure B-7 50-year, 24-hour rainfall = 7.0"

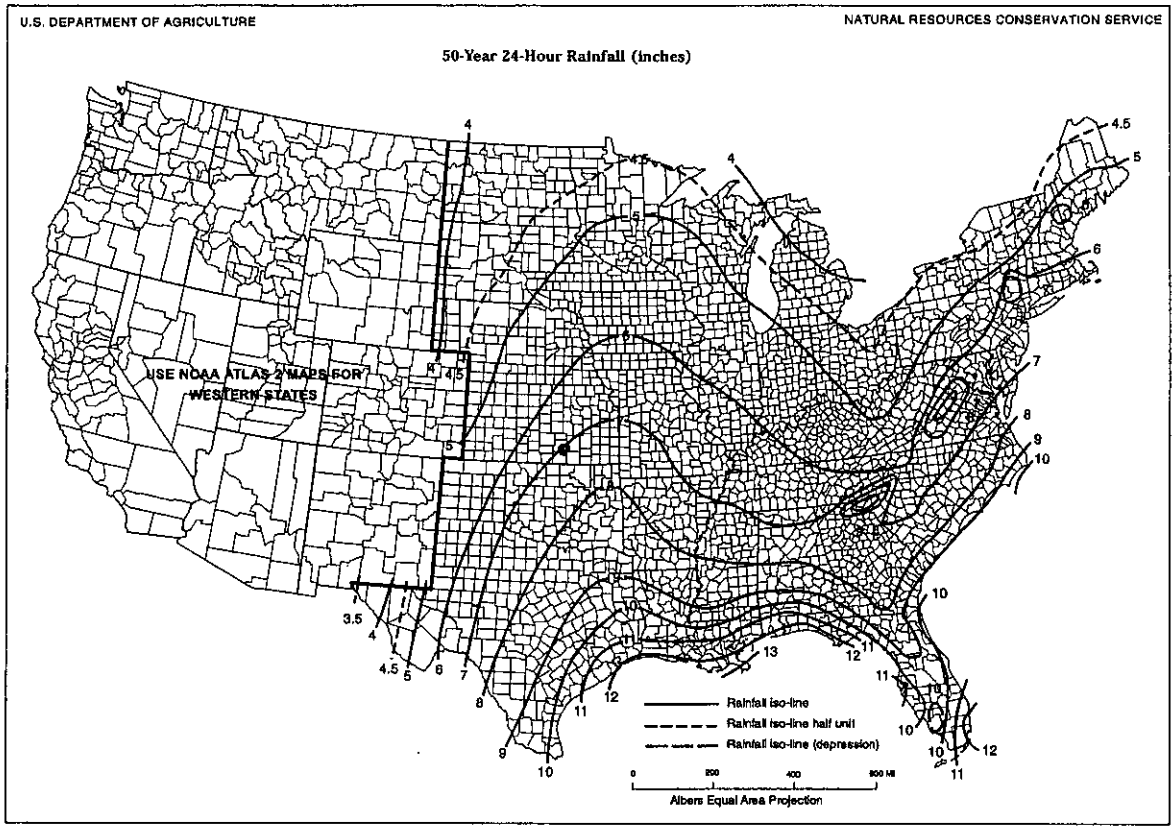
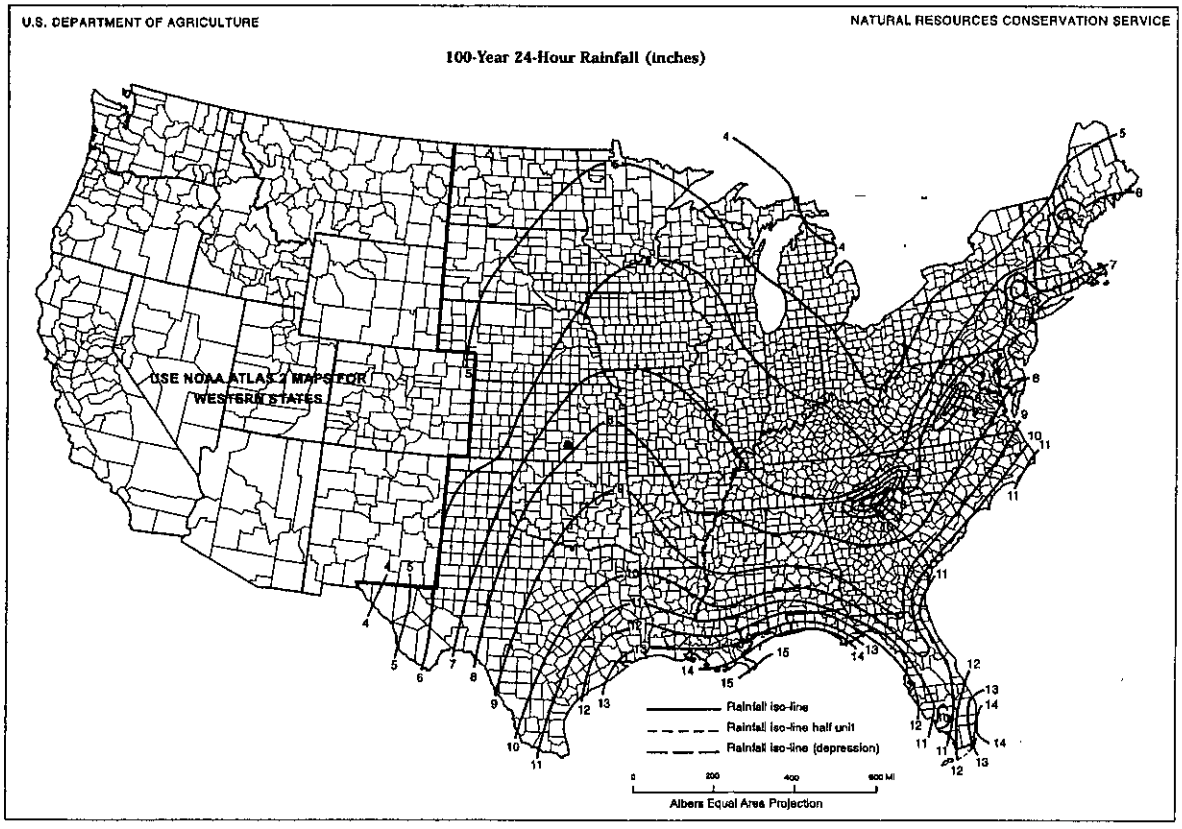


Figure B-8 100-year, 24-hour rainfall = 7.8"



April, 1985

ATTACHMENT A
DRAINAGE CRITERIA MANUAL

CITY OF WICHITA, KANSAS

RAINFALL INTENSITY TABLE FOR SEDGWICK COUNTY, KANSAS

The following tabulation contains rainfall intensity in inches per hour as derived from ESSA Weather Bureau Technical Paper 40.

DURATION IN MINUTES	RETURN PERIODS OF 1-YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
5	4.67	6.23	8.00	9.34	10.67	12.23	13.79
6	4.35	5.80	7.45	8.70	9.94	11.39	12.84
7	4.09	5.46	7.02	8.19	9.36	10.72	12.09
8	3.88	5.18	6.66	7.77	8.89	10.18	11.48
9	3.71	4.95	6.36	7.43	8.49	9.72	10.96
10	3.56	4.75	6.11	7.13	8.15	9.33	10.52
11	3.43	4.58	5.89	6.87	7.85	8.99	10.14
12	3.32	4.40	5.69	6.64	7.59	8.69	9.80
13	3.21	4.29	5.51	6.43	7.35	8.42	9.50
14	3.12	4.17	5.36	6.25	7.14	8.18	9.23
15	3.04	4.06	5.21	6.08	6.95	7.97	8.98
16	2.96	3.96	5.09	5.93	6.78	7.77	8.76
17	2.90	3.86	4.97	5.79	6.62	7.59	8.55
18	2.83	3.78	4.86	5.67	6.48	7.42	8.37
19	2.77	3.70	4.76	5.55	6.34	7.27	8.19
20	2.72	3.63	4.66	5.44	6.22	7.12	8.03
21	2.67	3.56	4.57	5.34	6.10	6.99	7.88
22	2.62	3.49	4.49	5.24	5.99	6.86	7.74
23	2.57	3.43	4.41	5.15	5.89	6.74	7.60
24	2.53	3.38	4.34	5.07	5.79	6.63	7.48
25	2.49	3.32	4.27	4.99	5.70	6.53	7.36
26	2.45	3.23	4.21	4.91	5.61	6.43	7.25
27	2.42	3.18	4.15	4.84	5.53	6.33	7.14
28	2.38	3.05	4.09	4.77	5.45	6.25	7.04
29	2.35	2.97	4.02	4.68	5.38	6.16	6.95
30	2.32	2.89	3.92	4.56	5.31	6.08	6.79
31	2.29	2.82	3.82	4.44	5.19	6.00	6.62
32	2.26	2.75	3.73	4.33	5.07	5.87	6.45
33	2.24	2.68	3.64	4.23	4.95	5.73	6.30
34	2.19	2.62	3.55	4.13	4.83	5.60	6.16
35	2.14	2.57	3.47	4.04	4.73	5.47	6.02
36	2.09	2.51	3.40	3.95	4.62	5.35	5.89
37	2.05	2.46	3.33	3.87	4.52	5.23	5.76
38	2.00	2.41	3.26	3.79	4.43	5.13	5.64
39	1.96	2.36	3.19	3.71	4.34	5.02	5.53
40	1.92	2.32	3.13	3.64	4.26	4.92	5.42
41	1.89	2.27	3.07	3.57	4.18	4.83	5.32
42	1.85	2.23	3.01	3.51	4.10	4.74	5.22
43	1.82	2.19	2.96	3.44	4.02	4.65	5.13
44	1.78	2.15	2.91	3.38	3.95	4.56	5.03
45	1.75	2.11	2.86	3.32	3.88	4.48	4.95

ATTACHMENT A CONTINUED
Page 2

DURATION IN MINUTES	RETURN PERIODS OF 1-YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
46	1.72	2.08	2.81	3.27	3.82	4.41	4.86
47	1.69	2.04	2.76	3.21	3.75	4.33	4.78
48	1.67	2.01	2.72	3.16	3.69	4.26	4.70
49	1.64	1.98	2.67	3.11	3.63	4.19	4.63
50	1.61	1.95	2.63	3.06	3.58	4.13	4.56
51	1.59	1.92	2.59	3.01	3.52	4.06	4.49
52	1.56	1.89	2.55	2.97	3.47	4.00	4.42
53	1.54	1.86	2.51	2.92	3.42	3.94	4.35
54	1.52	1.84	2.48	2.88	3.37	3.88	4.29
55	1.50	1.81	2.44	2.84	3.32	3.83	4.23
56	1.47	1.79	2.41	2.80	3.27	3.77	4.17
57	1.45	1.76	2.37	2.76	3.23	3.72	4.11
58	1.43	1.74	2.34	2.73	3.19	3.67	4.06
59	1.42	1.72	2.31	2.69	3.14	3.62	4.01
60	1.40	1.69	2.28	2.65	3.10	3.57	3.95
61	1.38	1.67	2.25	2.62	3.06	3.53	3.90
62	1.36	1.65	2.22	2.59	3.02	3.48	3.85
63	1.34	1.63	2.20	2.55	2.99	3.44	3.81
64	1.33	1.61	2.17	2.52	2.95	3.40	3.76
65	1.31	1.59	2.14	2.49	2.92	3.35	3.71
66	1.30	1.57	2.12	2.46	2.88	3.31	3.67
67	1.28	1.56	2.09	2.44	2.85	3.27	3.63
68	1.26	1.54	2.07	2.41	2 81	3.24	3.59
69	1.25	1.52	2.05	2.38	2.78	3.20	3.54
70	1.24	1.50	2.02	2.35	2.75	3.16	3.51
71	1.22	1.49	2.00	2.33	2.72	3.13	3.47
72	1.21	1.47	1.98	2.30	2.69	3.09	3.43
73	1.20	1.46	1.96	2.28	2.66	3.06	3.39
74	1.18	1.44	1.94	2.25	2.63	3.03	3.36
75	1.17	1.43	1.92	2.23	2.61	3.00	3.32
76	1.16	1.41	1.90	2.21	2.58	2.96	3.29
77	1.15	1.40	1.88	2.18	2.55	2.93	3.25
78	1.13	1.38	1.86	2.16	2.53	2.90	3.22
79	1.12	1.37	1.84	2.14	2.50	2.88	3.19
80	1.11	1.36	1.82	2.12	2.48	2.85	3.16
81	1.10	1.34	1.81	2.10	2.46	2.82	3.13
82	1.09	1.33	1.79	2.08	2.43	2.79	3.10
83	1.08	1.32	1.77	2.06	2.41	2.76	3.07
84	1.07	1.31	1.75	2.04	2.39	2.74	3.04
85	1.06	1.30	1.74	2.02	2.37	2.71	3.01
86	1.05	1.28	1.72	2.00	2.34	2.69	2.99
87	1.04	1.27	1.71	1.99	2.32	2.66	2.96
88	1.03	1.26	1.69	1.97	2.30	2.64	2.93
89	1.02	1.25	1.68	1.95	2.28	2.62	2.91
90	1.01	1.24	1.66	1.93	2.26	2.59	2.88

DURATION IN MINUTES	RETURN PERIODS OF 1-YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
91	1.00	1.23	1.65	1.92	2.24	2.57	2.86
92	1.00	1.22	1.63	1.90	2.22	2.55	2.83
93	0.99	1.21	1.62	1.89	2.20	2.53	2.81
94	0.98	1.20	1.61	1.87	2.19	2.51	2.79
95	0.97	1.19	1.59	1.85	2.17	2.49	2.76
96	0.96	1.18	1.58	1.84	2.15	2.46	2.74
97	0.96	1.17	1.57	1.82	2.13	2.44	2.72
98	0.95	1.16	1.56	1.81	2.12	2.42	2.70
99	0.94	1.15	1.54	1.80	2.10	2.41	2.67
100	0.93	1.14	1.53	1.78	2.08	2.39	2.65
101	0.93	1.13	1.52	1.77	2.07	2.39	2.65
102	0.92	1.13	1.51	1.75	2.05	2.35	2.61
103	0.91	1.12	1.50	1.74	2.04	2.33	2.59
104	0.90	1.11	1.49	1.73	2.02	2.31	2.57
105	0.90	1.10	1.47	1.72	2.01	2.30	2.55
106	0.89	1.09	1.46	1.70	1.99	2.28	2.54
107	0.88	1.09	1.45	1.69	1.98	2.26	2.52
108	0.88	1.08	1.44	1.68	1.96	2.25	2.50
109	0.87	1.07	1.43	1.67	1.95	2.23	2.48
110	0.87	1.06	1.42	1.65	1.93	2.21	2.46
111	0.86	1.06	1.41	1.64	1.92	2.20	2.45
112	0.85	1.05	1.40	1.63	1.91	2.18	2.43
113	0.85	1.04	1.39	1.62	1.89	2.17	2.41
114	0.84	1.03	1.38	1.61	1.88	2.15	2.40
115	0.84	1.03	1.37	1.60	1.87	2.14	2.38
116	0.83	1.02	1.36	1.59	1.86	2.12	2.36
117	0.82	1.01	1.36	1.58	1.84	2.11	2.35
118	0.82	1.01	1.35	1.57	1.83	2.09	2.33
119	0.81	1.00	1.34	1.56	1.82	2.08	2.32
120	0.81	0.99	1.33	1.55	1.81	2.07	2.30

DURATION IN HOURS	RETURN PERIODS OF 1-YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
2	0.81	0.99	1.33	1.55	1.81	2.07	2.30
3	0.59	0.72	0.97	1.13	1.32	1.51	1.68
4	0.47	0.58	0.78	0.91	1.06	1.21	1.35
5	0.40	0.49	0.66	0.77	0.89	1.02	1.14
6	0.35	0.42	0.57	0.67	0.78	0.89	0.99
8	0.28	0.34	0.46	0.53	0.62	0.71	0.79
10	0.23	0.29	0.39	0.45	0.52	0.60	0.67
12	0.20	0.25	0.33	0.39	0.45	0.52	0.58
18	0.15	0.18	0.24	0.28	0.33	0.38	0.42
24	0.12	0.15	0.20	0.23	0.27	0.31	0.34

ATTACHMENT B

DRAINAGE CRITERIA MANUAL

CITY OF WICHITA, KANSAS

INCREMENTAL INFILTRATION VALUES IN INCHES

Time Minutes**	SCS Hydrologic Soil Group			
	A	B	C	D
5	.33	.26	.19	.12
10	.25	.17	.09	.04
15	.18	.11	.05	.02
20	.13	.07	.03	.02
25	.10	.05	.03	.02
30	.08	.05	.03	.02
35	.08	.05	.03	.02
40	.08	.05	.03	.02
45	.08	.05	.03	.02
50	.08	.05	.03	.02
55	.08	.05	.03	.02
60	.08	.05	.03	.02
65	.08	.05	.03	.02
70	.08	.05	.03	.02
75	.08	.05	.03	.02
80	.08	.05	.03	.02
85	.08	.05	.03	.02
90	.08	.05	.03	.02
95	.08	.05	.03	.02
100	.08	.05	.03	.02
105	.08	.05	.03	.02
110	.08	.05	.03	.02
115	.08	.05	.03	.02
120	.08	.05	.03	.02

**Time at end of the time increment

NOTE: Values for 125 minutes and additional 5 minute increments shall be the same as those shown for 120 minutes.

SPIRIT AEROSYSTEMS

FACILITIES

Meeting Report

By: John A Hageman

Purpose: Establish Engineering Direction/Scope

Date: 26June2008

Description: Storm Drainage Outflow of FFE

Project#1319573

Attendance List:

John Hageman – Spirit
John Hetherington – Spirit
Jim Weber – Sedgwick County
Irene Hart – Sedgwick County
Lanny Schuessler – Spirit
Melisa Carpenter – Spirit
Bud Lett – Sedgwick County
Julianne Kallman – City of Wichita
Kevin Crump, PE – Haskell Company
Terry Fish – Spirit
Scott Lindebak, PE – City of Wichita

General

We discussed design parameters for the excess outflow of storm water caused by the replacement of permeable surface area (grassed or open ground) areas with impermeable areas (paving and roofing). Currently, there are three outflow directions for this project site which are; the southwest into the Spirit dedicated controlled drainage way, northwest under turnpike drive into the KTA drainage way and northeast surface flow across the property line onto EBY leased property into an area catch basin. This multi-directional flow is due to the fact that this site sits at a high point of our facilities.

Civil

With the public works drawings that were furnished to the Haskell Company, Kevin determined that existing city storm water sewers are found on 31st Street South and on Oliver north of 31st Street. The focus of discussion centered on the northeast outflow. The existing southwest flow is not affected significantly and the northwest will be addressed with a retention wet pond.
The sheet outflow to the northeast is routed under 31st street to the fire training facility then beyond to the park. The City will investigate the flow for Spirit's 5+ acres under consideration but the contribution is considered minimal. The City's stance on flow detention was made clear by Mr. Lindebak and it was determined that only a two year event would be considered in the design of any detention or retention requirements. The concern by Spirit was the possible selection of a 100 year event and that impact on required area for a detention pond that could displace 100 parking stalls. The design approach may be to provide a linear bermed ditch with a east-west orientation on the north property line. This would move our parking lot southward. The impact of this should be minimal in regards to site development. The overflow from this normally dry ditch would still have to drain through a control structure to the north catch basin.
Jim Weber, Assistant Director of Sedgwick County Public Works was instrumental in moderating the city's position on impact of outflow from this site.

Action or Direction:

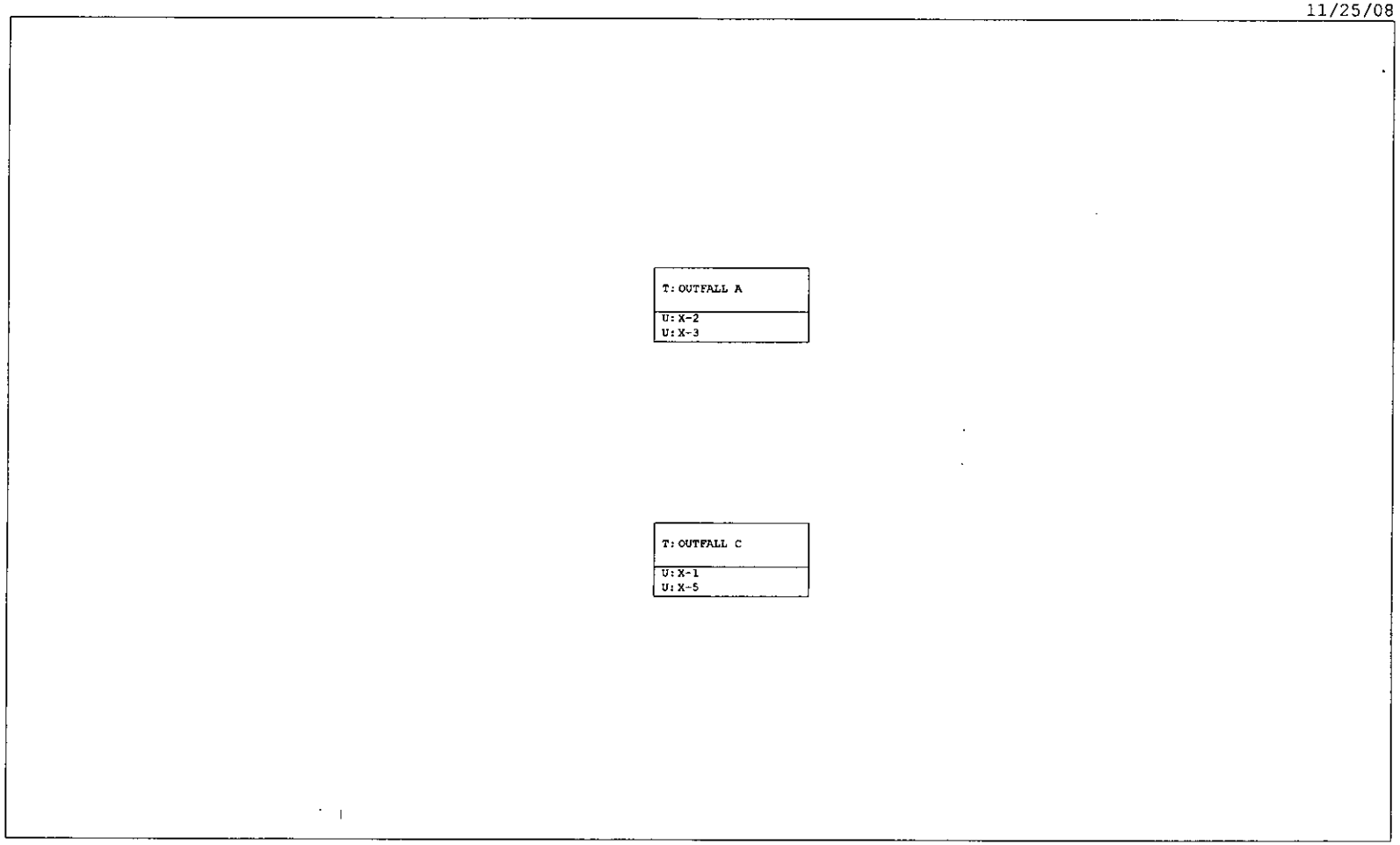
We will need to approach the owner of the property leased by EBY to obtain an easement for the installation of drainage pipe to the inlet from the detention ditch.

Spirit Wichita
Existing Conditions
11/25/08

Nodes
A Stage/Area
V Stage/Volume
T Time/Stage
M Manhole

Basins
O Overland Flow
U SCS Unit Hydro
S Santa Barbara

Links
P Pipe
W Weir
C Channel
D Drop Structure
B Bridge
R Rating Curve
H Breach



Name	Simulation	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Inflow cfs	Max Outflow cfs
OUTFALL A	02YR-24HR	1344.000	1348.000	0.0000	0	9.350	0.000
OUTFALL C	02YR-24HR	1344.000	1348.000	0.0000	0	20.278	0.000

==== Basins ====

Name: X-1
Group: BASE
Node: OUTFALL C
Type: SCS Unit Hydrograph
Status: Onsite

Unit Hydrograph: Uh484
Rainfall File: Scsii-24
Rainfall Amount(in): 2.500
Area(ac): 7.440
Curve Number: 96.00
DCIA(%): 0.00
Peaking Factor: 484.0
Storm Duration(hrs): 24.00
Time of Conc(min): 10.00
Time Shift(hrs): 0.00
Max Allowable Q(cfs): 999999.000

Name: X-2
Group: BASE
Node: OUTFALL A
Type: SCS Unit Hydrograph
Status: Onsite

Unit Hydrograph: Uh323
Rainfall File: Scsii-24
Rainfall Amount(in): 2.500
Area(ac): 4.470
Curve Number: 93.00
DCIA(%): 0.00
Peaking Factor: 323.0
Storm Duration(hrs): 24.00
Time of Conc(min): 10.00
Time Shift(hrs): 0.00
Max Allowable Q(cfs): 999999.000

Name: X-3
Group: BASE
Node: OUTFALL A
Type: SCS Unit Hydrograph
Status: Onsite

Unit Hydrograph: Uh323
Rainfall File: Scsii-24
Rainfall Amount(in): 2.500
Area(ac): 2.690
Curve Number: 75.00
DCIA(%): 0.00
Peaking Factor: 323.0
Storm Duration(hrs): 24.00
Time of Conc(min): 17.00
Time Shift(hrs): 0.00
Max Allowable Q(cfs): 999999.000

Name: X-5
Group: BASE
Node: OUTFALL C
Type: SCS Unit Hydrograph
Status: Onsite

Unit Hydrograph: Uh323
Rainfall File: Scsii-24
Rainfall Amount(in): 2.500
Area(ac): 1.030
Curve Number: 85.00
DCIA(%): 0.00
Peaking Factor: 323.0
Storm Duration(hrs): 24.00
Time of Conc(min): 10.00
Time Shift(hrs): 0.00
Max Allowable Q(cfs): 999999.000

==== Nodes ====

Name: OUTFALL A
Group: BASE
Type: Time/Stage
Base Flow(cfs): 0.000
Init Stage(ft): 1344.000
Warn Stage(ft): 1348.000

Time(hrs)	Stage(ft)
0.00	1344.000
24.00	1344.000

Name: OUTFALL C Base Flow(cfs): 0.000 Init Stage(ft): 1344.000
Group: BASE Warn Stage(ft): 1348.000
Type: Time/Stage

Time(hrs)	Stage(ft)
0.00	1344.000
24.00	1344.000

Hydrology Simulations

Name: 02YR-24HR
Filename: H:\INDUSTRIAL\PROJECTS\32910 - SPIRIT PROJECT FFE WICHITA\33 DESIGN INFO\33A CIVIL\SWM\ICP

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: Scsii-24
Rainfall Amount(in): 2.50

Time(hrs)	Print Inc(min)
8.000	30.00
10.000	10.00
12.000	5.00
14.000	5.00
16.000	10.00
24.000	30.00

Routing Simulations

Name: 02YR-24HR Hydrology Sim: 02YR-24HR
Filename: H:\INDUSTRIAL\PROJECTS\32910 - SPIRIT PROJECT FFE WICHITA\33 DESIGN INFO\33A CIVIL\SWM\ICP

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 24.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
8.000	30.000
10.000	10.000
12.000	5.000
14.000	5.000
16.000	10.000
24.000	30.000

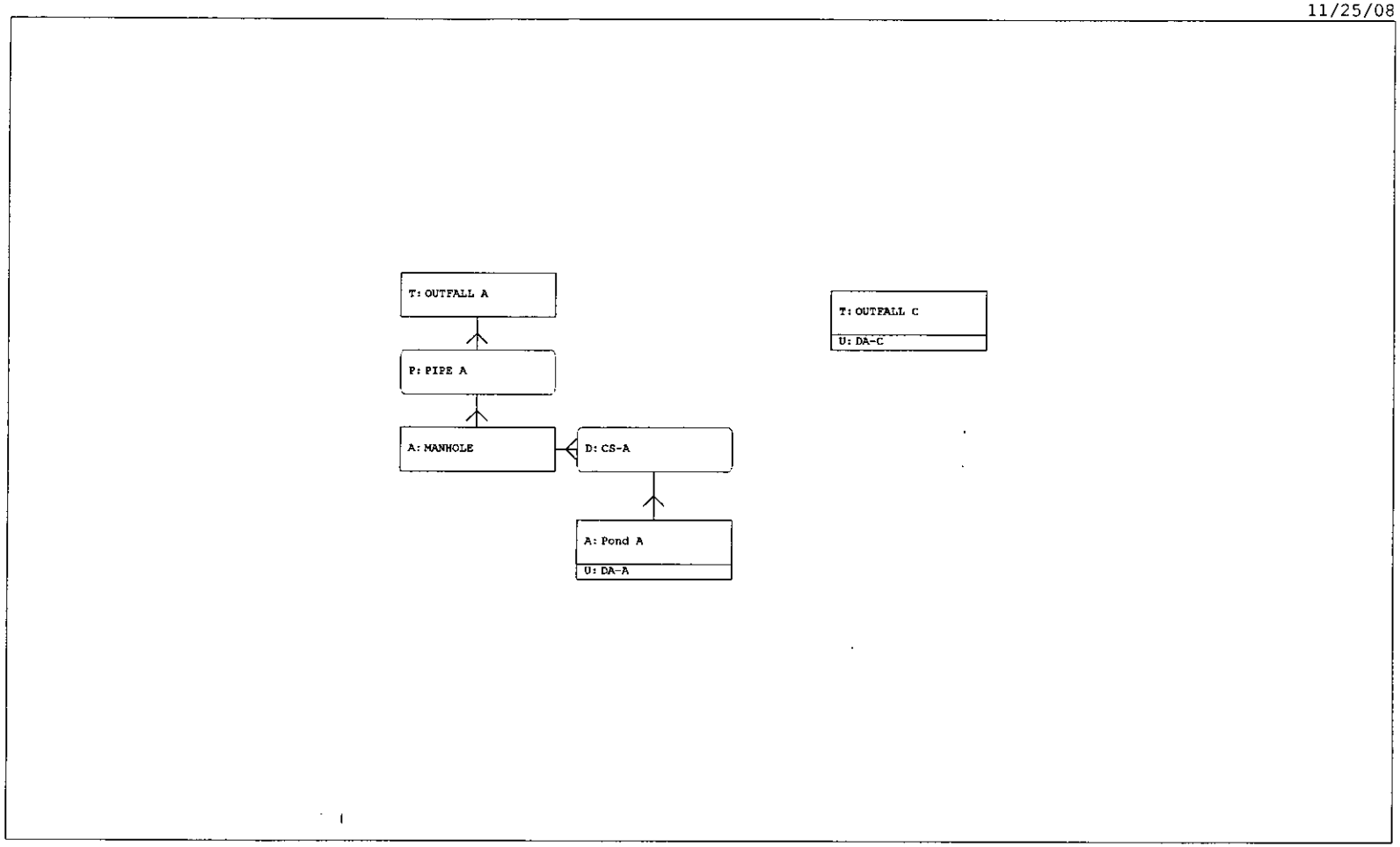
Group	Run
BASE	Yes

Boundary Conditions

Nodes
A Stage/Area
V Stage/Volume
T Time/Stage
M Manhole

Basins
O Overland Flow
U SCS Unit Hydro
S Santa Barbara

Links
P Pipe
W Weir
C Channel
D Drop Structure
B Bridge
R Rating Curve
H Breach



Name	Simulation	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Inflow cfs	Max Outflow cfs
MANHOLE	02YR-24HR	1346.210	1350.250	0.0050	210	7.759	7.758
OUTFALL A	02YR-24HR	1345.870	1350.000	0.0018	97	7.758	0.000
OUTFALL C	02YR-24HR	1344.000	1348.000	0.0000	0	19.854	0.000
Pond A	02YR-24HR	1349.509	1351.000	-0.0050	6397	15.863	7.759

==== Basins ====

Name: DA-A
Group: BASE
Node: Pond A
Type: SCS Unit Hydrograph
Status: Onsite

Unit Hydrograph: Uh323
Rainfall File: Scsii-24
Rainfall Amount(in): 2.500
Area(ac): 8.110
Curve Number: 94.00
DCIA(%): 0.00
Peaking Factor: 323.0
Storm Duration(hrs): 24.00
Time of Conc(min): 10.00
Time Shift(hrs): 0.00
Max Allowable Q(cfs): 999999.000

Name: DA-C
Group: BASE
Node: OUTFALL C
Type: SCS Unit Hydrograph
Status: Onsite

Unit Hydrograph: Uh484
Rainfall File: Scsii-24
Rainfall Amount(in): 2.500
Area(ac): 8.800
Curve Number: 92.50
DCIA(%): 0.00
Peaking Factor: 484.0
Storm Duration(hrs): 24.00
Time of Conc(min): 10.00
Time Shift(hrs): 0.00
Max Allowable Q(cfs): 999999.000

==== Nodes ====

Name: MANHOLE
Group: BASE
Type: Stage/Area
Base Flow(cfs): 0.000
Init Stage(ft): 1344.900
Warn Stage(ft): 1350.250

Stage(ft)	Area(ac)
1344.900	0.0000
1345.000	0.0001
1350.250	0.0001
1350.260	999.0000

Name: OUTFALL A
Group: BASE
Type: Time/Stage
Base Flow(cfs): 0.000
Init Stage(ft): 1344.620
Warn Stage(ft): 1350.000

Time(hrs)	Stage(ft)
0.00	1344.620
24.00	1344.620

Name: OUTFALL C
Group: BASE
Type: Time/Stage
Base Flow(cfs): 0.000
Init Stage(ft): 1344.000
Warn Stage(ft): 1348.000

Time(hrs)	Stage(ft)
0.00	1344.000
24.00	1344.000

Name: Pond A Base Flow(cfs): 0.000 Init Stage(ft): 1346.000
Group: BASE Warn Stage(ft): 1351.000
Type: Stage/Area

Stage(ft)	Area(ac)
1345.000	0.0738
1346.000	0.0872
1347.000	0.1019
1348.000	0.1194
1349.000	0.1374
1350.000	0.1560
1351.000	0.1758

Pipes

Name: PIPE A From Node: MANHOLE Length(ft): 78.00
Group: BASE To Node: OUTFALL A Count: 1

	UPSTREAM	DOWNSTREAM
Geometry:	Circular	Circular
Span(in):	30.00	30.00
Rise(in):	30.00	30.00
Invert(ft):	1344.900	1344.620
Manning's N:	0.013000	0.013000
Top Clip(in):	0.000	0.000
Bot Clip(in):	0.000	0.000

Friction Equation: Average Conveyance
Solution Algorithm: Automatic
Flow: Both
Entrance Loss Coef: 0.50
Exit Loss Coef: 1.00
Bend Loss Coef: 0.00
Outlet Ctrl Spec: Use dc or tw
Inlet Ctrl Spec: Use dn
Stabilizer Option: None

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Drop Structures

Name: CS-A From Node: Pond A Length(ft): 15.00
Group: BASE To Node: MANHOLE Count: 1

	UPSTREAM	DOWNSTREAM
Geometry:	Circular	Circular
Span(in):	30.00	30.00
Rise(in):	30.00	30.00
Invert(ft):	1344.950	1344.900
Manning's N:	0.013000	0.013000
Top Clip(in):	0.000	0.000
Bot Clip(in):	0.000	0.000

Friction Equation: Average Conveyance
Solution Algorithm: Automatic
Flow: Both
Entrance Loss Coef: 0.500
Exit Loss Coef: 1.000
Outlet Ctrl Spec: Use dc or tw
Inlet Ctrl Spec: Use dn
Solution Incs: 10

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

*** Weir 1 of 3 for Drop Structure CS-A ***

Count: 1 Bottom Clip(in): 0.000 TABLE

```
                Type: Vertical: Mavis          Top Clip(in): 0.000
                Flow: Both                   Weir Disc Coef: 3.200
            Geometry: Rectangular          Orifice Disc Coef: 0.600

            Span(in): 8.00                        Invert(ft): 1347.500
            Rise(in): 24.00                 Control Elev(ft): 1347.500

*** Weir 2 of 3 for Drop Structure CS-A ***

                                                                TABLE
               Count: 2                     Bottom Clip(in): 0.000
                Type: Horizontal              Top Clip(in): 0.000
                Flow: Both                   Weir Disc Coef: 3.200
            Geometry: Rectangular          Orifice Disc Coef: 0.600

            Span(in): 24.00                       Invert(ft): 1349.500
            Rise(in): 36.00                 Control Elev(ft): 1349.500

*** Weir 3 of 3 for Drop Structure CS-A ***

                                                                TABLE
               Count: 1                     Bottom Clip(in): 0.000
                Type: Vertical: Mavis         Top Clip(in): 0.000
                Flow: Both                   Weir Disc Coef: 3.200
            Geometry: Circular             Orifice Disc Coef: 0.600

            Span(in): 6.00                        Invert(ft): 1346.000
            Rise(in): 6.00                  Control Elev(ft): 1346.000


==========================================================================================
==== Hydrology Simulations ===============================================================
==========================================================================================

        Name: 02YR-24HR
    Filename: H:\Industrial\Projects\32910 - Spirit Project FFE Wichita\33 Design Info\33A Civil\SWM\ICP

     Override Defaults: Yes
   Storm Duration(hrs): 24.00
         Rainfall File: Scsii-24
   Rainfall Amount(in): 2.50

Time(hrs)       Print Inc(min)
--------------- ---------------
8.000           30.00
10.000          10.00
12.000          5.00
14.000          5.00
16.000          10.00
24.000          30.00

------------------------------------------------------------------------------------------

        Name: 100YR-24HR
    Filename: H:\INDUSTRIAL\PROJECTS\32910 - SPIRIT PROJECT FFE WICHITA\33 DESIGN INFO\33A CIVIL\SWM\ICP

     Override Defaults: Yes
   Storm Duration(hrs): 24.00
         Rainfall File: Scsii-24
   Rainfall Amount(in): 6.50

Time(hrs)       Print Inc(min)
--------------- ---------------
8.000           30.00
10.000          10.00
12.000          5.00
14.000          5.00
16.000          10.00
24.000          30.00

------------------------------------------------------------------------------------------

        Name: 10YR-24HR
    Filename: H:\INDUSTRIAL\PROJECTS\32910 - SPIRIT PROJECT FFE WICHITA\33 DESIGN INFO\33A CIVIL\SWM\ICP
```

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: Scsii-24
Rainfall Amount(in): 4.00

Time(hrs)	Print Inc(min)
8.000	30.00
10.000	10.00
12.000	5.00
14.000	5.00
16.000	10.00
24.000	30.00

Name: 25YR-24HR
Filename: H:\INDUSTRIAL\PROJECTS\32910 - SPIRIT PROJECT FFE WICHITA\33 DESIGN INFO\33A CIVIL\SWM\ICP

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: Scsii-24
Rainfall Amount(in): 5.00

Time(hrs)	Print Inc(min)
8.000	30.00
10.000	10.00
12.000	5.00
14.000	5.00
16.000	10.00
24.000	30.00

==========
==== Routing Simulations ==========
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Name: 02YR-24HR Hydrology Sim: 02YR-24HR
Filename: H:\Industrial\Projects\32910 - Spirit Project FFE Wichita\33 Design Info\33A Civil\SWM\ICP

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 24.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: A-2YR Boundary Flows:

Time(hrs)	Print Inc(min)
8.000	30.000
10.000	10.000
12.000	5.000
14.000	5.000
16.000	10.000
24.000	30.000

Group	Run
BASE	Yes

Name: 100YR-24HR Hydrology Sim: 100YR-24HR
Filename: H:\INDUSTRIAL\PROJECTS\32910 - SPIRIT PROJECT FFE WICHITA\33 DESIGN INFO\33A CIVIL\SWM\ICP

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 24.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: A-25YR Boundary Flows:

Time(hrs)	Print Inc(min)
8.000	30.000
10.000	10.000
12.000	5.000
14.000	5.000
16.000	10.000
24.000	30.000

Group	Run
BASE	Yes

Name: 10YR-24HR Hydrology Sim: 10YR-24HR
Filename: H:\INDUSTRIAL\PROJECTS\32910 - SPIRIT PROJECT FFE WICHITA\33 DESIGN INFO\33A CIVIL\SWM\ICP

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 24.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
8.000	30.000
10.000	10.000
12.000	5.000
14.000	5.000
16.000	10.000
24.000	30.000

Group	Run
BASE	Yes

Name: 25YR-24HR Hydrology Sim: 25YR-24HR
Filename: H:\INDUSTRIAL\PROJECTS\32910 - SPIRIT PROJECT FFE WICHITA\33 DESIGN INFO\33A CIVIL\SWM\ICP

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 24.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: A-25YR Boundary Flows:

Time(hrs)	Print Inc(min)
8.000	30.000
10.000	10.000
12.000	5.000

14.000	5.000
16.000	10.000
24.000	30.000

Group	Run
BASE	Yes

Boundary Conditions

Name: A-2YR Node: OUTFALL A Type: Stage

Time(hrs)	Stage(ft)
0.000	1344.620
6.000	1345.250
12.000	1345.870
14.000	1345.670
18.000	1345.370
24.000	1344.870

Name: A-25YR Node: OUTFALL A Type: Stage

Time(hrs)	Stage(ft)
0.000	1344.620
6.000	1346.270
12.000	1347.910
15.000	1347.500
18.000	1346.000
24.000	1345.120

Scenario: Base

DOT Report

Label	-Node- Upstream Downstream	-Section- Shape Size	Material	Length (ft)	Total System Flow (cfs)	Constructed Slope (ft/ft)	Hydraulic Slope (ft/ft)	Average Velocity (ft/s)	-Ground- Upstream Downstream (ft)	-Invert- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)
P-1	ST-2	Circular	Corrugated HD	11.00	14.14	0.010000	0.003331	4.50	1,350.25	1,345.11	1,350.58
	ST-1	24 inch							1,351.50	1,345.00	1,350.54
P-2	ST-3	Circular	Corrugated HD	232.00	11.83	0.005000	0.002330	3.77	1,353.06	1,346.27	1,350.79
	ST-2	24 inch							1,350.25	1,345.11	1,350.25
P-3	ST-4	Circular	Corrugated HD	37.00	1.48	0.010000	0.001476	1.89	1,352.00	1,346.64	1,350.87
	ST-3	12 inch							1,353.06	1,346.27	1,350.82
P-4	ST-5	Circular	Corrugated HD	84.00	7.69	0.005000	0.004573	4.35	1,352.70	1,346.69	1,351.22
	ST-3	18 inch							1,353.06	1,346.27	1,350.84
P-5	ST-6	Circular	Corrugated HD	49.00	0.64	0.010000	0.000275	0.81	1,351.75	1,347.18	1,351.70
	ST-5	12 inch							1,352.70	1,346.69	1,351.68
P-6	ST-8	Circular	Corrugated HD	55.00	42.19	0.005000	0.003196	8.08	1,353.15	1,347.78	1,350.72
	ST-7	36 inch							1,351.00	1,347.50	1,350.54
P-7	ST-9	Circular	Corrugated HD	144.00	2.06	0.003235	0.002855	2.63	1,352.17	1,348.24	1,351.14
	ST-8	12 inch							1,353.15	1,347.78	1,350.73
P-8	ST-10	Circular	Corrugated HD	56.00	1.05	0.003186	0.000738	1.34	1,352.17	1,348.42	1,351.29
	ST-9	12 inch							1,352.17	1,348.24	1,351.25
P-9	ST-11	Circular	Corrugated HD	123.00	40.46	0.005000	0.002293	8.02	1,353.50	1,348.39	1,351.06
	ST-8	36 inch							1,353.15	1,347.78	1,350.77
P-10	ST-12	Circular	Corrugated HD	162.00	35.39	0.005000	0.006344	7.21	1,353.50	1,349.20	1,352.13
	ST-11	30 inch							1,353.50	1,348.39	1,351.10
P-11	ST-13	Circular	Corrugated HD	162.00	29.58	0.003200	0.004431	6.03	1,353.75	1,349.72	1,352.91
	ST-12	30 inch							1,353.50	1,349.20	1,352.19
P-12	ST-14	Circular	Corrugated HD	223.00	14.00	0.005135	0.003264	4.46	1,359.92	1,350.86	1,353.82
	ST-13	24 inch							1,353.75	1,349.72	1,353.10
P-13	ST-15	Circular	Corrugated HD	15.00	1.05	0.006667	0.008901	3.61	1,359.67	1,355.67	1,356.10
	ST-14	12 inch							1,359.92	1,355.57	1,355.97
P-14	ST-16	Circular	Corrugated HD	75.00	13.02	0.004933	0.004953	6.02	1,359.67	1,355.27	1,356.57
	ST-14	24 inch							1,359.92	1,354.90	1,356.20
P-15	ST-17	Circular	Corrugated HD	80.00	7.51	0.005000	0.003287	5.17	1,359.67	1,355.67	1,356.93
	ST-16	18 inch							1,359.67	1,355.27	1,356.67
P-16	ST-19	Circular	Corrugated HD	85.00	35.10	0.001000	0.002360	4.97	1,360.50	1,355.09	1,358.20
	ST-18	36 inch							1,360.00	1,355.00	1,358.00
P-17	ST-20	Circular	Corrugated HD	59.00	35.27	0.001000	0.002383	4.99	1,360.13	1,355.14	1,358.34
	ST-19	36 inch							1,360.50	1,355.09	1,358.20
P-18	ST-21	Circular	Corrugated HD	10.00	8.80	0.009600	0.005985	4.98	1,359.67	1,355.24	1,358.46

Scenario: Base

DOT Report

Label	-Node- Upstream Downstream	-Section- Shape Size	Material	Length (ft)	Total System Flow (cfs)	Constructed Slope (ft/ft)	Hydraulic Slope (ft/ft)	Average Velocity (ft/s)	-Ground- Upstream Downstream (ft)	-Invert- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)
	ST-20	18 inch							1,360.13	1,355.14	1,358.40
P-19	ST-22	Circular	Corrugated HD	106.00	27.06	0.001000	0.003709	5.51	1,360.05	1,355.25	1,358.77
	ST-20	30 inch							1,360.13	1,355.14	1,358.38
P-20	ST-23	Circular	Corrugated HD	10.00	7.98	0.009000	0.004913	4.51	1,359.67	1,355.34	1,358.92
	ST-22	18 inch							1,360.05	1,355.25	1,358.87
P-21	ST-24	Circular	Corrugated HD	100.00	19.57	0.001000	0.001940	3.99	1,359.67	1,355.35	1,359.08
	ST-22	30 inch							1,360.05	1,355.25	1,358.88
P-22	ST-25	Circular	Corrugated HD	80.00	12.63	0.001125	0.000808	2.57	1,359.67	1,355.44	1,359.18
	ST-24	30 inch							1,359.67	1,355.35	1,359.12
P-23	ST-26	Circular	Corrugated HD	80.00	7.28	0.001750	0.000883	2.32	1,359.67	1,355.58	1,359.26
	ST-25	24 inch							1,359.67	1,355.44	1,359.19
P-24	ST-28	Circular	Corrugated HD	22.00	1.68	0.034091	0.043296	7.42	1,347.75	1,342.75	1,343.30
	ST-27	12 inch							1,348.56	1,342.00	1,342.35
P-25	ST-30	Circular	Corrugated HD	98.00	26.07	0.005000	0.002734	7.16	1,348.65	1,340.96	1,343.24
	ST-29	30 inch							1,346.47	1,340.47	1,342.97
P-26	ST-31	Circular	Corrugated HD	100.00	25.27	0.000980	0.006429	5.15	1,348.65	1,344.20	1,346.46
	ST-30	30 inch							1,348.65	1,344.10	1,345.81
P-27	ST-32	Circular	Corrugated HD	100.00	18.48	0.001200	0.005686	5.88	1,348.65	1,344.32	1,347.06
	ST-31	24 inch							1,348.65	1,344.20	1,346.49
P-28	ST-33	Circular	Corrugated HD	71.00	7.74	0.005028	0.004630	4.38	1,349.00	1,344.68	1,347.61
	ST-32	18 inch							1,348.65	1,344.32	1,347.28
P-29	ST-34	Circular	Corrugated HD	100.00	9.78	0.001200	0.001594	3.11	1,348.65	1,344.44	1,347.31
	ST-32	24 inch							1,348.65	1,344.32	1,347.15
P-30	ST-35	Circular	Corrugated HD	63.00	6.73	0.005000	0.003494	3.81	1,349.00	1,344.75	1,347.67
	ST-34	18 inch							1,348.65	1,344.44	1,347.45
P-46	ST-10A	Circular	Corrugated HD	31.00	0.53	0.003200	0.000191	0.68	1,352.17	1,348.52	1,351.32
	ST-10	12 inch							1,352.17	1,348.42	1,351.31
P-47	ST-36	Circular	Corrugated HD	190.00	8.36	0.005008	0.005403	4.73	1,356.50	1,350.67	1,354.18
	ST-13	18 inch							1,353.75	1,349.72	1,353.15
P-48	ST-37	Circular	Corrugated HD	108.00	5.48	0.005000	0.002315	3.10	1,356.50	1,351.21	1,354.62
	ST-36	18 inch							1,356.50	1,350.67	1,354.37
P-49	ST-38	Circular	Corrugated HD	108.00	2.81	0.005000	0.005299	3.58	1,356.23	1,351.75	1,355.22
	ST-37	12 inch							1,356.50	1,351.21	1,354.65