

FIREPOINT ADDITION DRAINAGE PLAN



Presented to:
City of Wichita, Kansas

Prepared by:
Ameritrack West, Inc.

Date:
February 22, 2010



SUMMARY TABLE

	Area (Ac)	Runoff Values (cfs)			
		Existing		Proposed	
		5-yr	100-yr	5-yr	100-yr
Basin A	0.41	1.06	2.12	1.31	2.43
Basin B	0.41	1.06	2.12	1.31	2.43
Basin C	5.58	11.16	23.05	17.79	33.03
Basin D	0.80	2.07	4.14	2.55	4.74
Basin E	0.77	1.99	3.99	2.45	4.56
Basin F	7.83	15.65	32.34	24.96	46.35
Basin G	0.25	0.65	1.30	0.80	1.48
Basin H	0.60	1.55	3.11	1.91	3.55
Basin I	0.37	0.96	1.92	1.18	2.19
Basin J	0.39	1.01	2.02	1.24	2.31
Basin K	2.93	6.99	14.11	9.34	17.35
Basin L	5.93	12.62	25.86	18.90	35.11
Existing East Pond					
Existing HW ₁₀₀ (ft)=		1413.32			
Proposed HW ₁₀₀ (ft)=		1413.35			

FIREPOINT ADDITION DRAINAGE PLAN

Revised 02/19/2010

GENERAL

The Firepoint Addition is a 26.25 acre commercial subdivision located directly northeast of K-96 between Rock Road and Webb Road in the City of Wichita in Sedgwick County, Kansas. The site lies in the East Half of Section 32, Township 26 South, Range 2 East of the Sixth Principal Meridian. The property was originally platted as part of the Mediterranean Addition. The property is bounded by 34th Street and Comotara Industrial Park to the north, a detention pond and commercial property to the west, K-96 to the south and southwest, and commercial property on the east. The development of this property will have no additional impact to storm water above what has already been accounted for with the Mediterranean Plaza Addition improvements. The two existing detention ponds were sized to detain the runoff from this property.

The Rational Method was used to calculate the runoff values from each basin for existing and proposed conditions. HY8 and Microstation Geopak were used to size the culverts and storm sewer, respectively. The 5-Year Storm Event was used to size the storm sewer lines and inlets. Fifteen minutes was used as the minimum time of concentration. See the "Hydrology" and "Hydraulics" sections for more detailed information on the basin runoff, culverts and storm sewer calculations.

This property is being platted into three commercial lots. Due to the nature of this type of development, determining the locations of site features, such as buildings, paving, landscaping and storm sewer, is difficult at this point in the development process. Therefore, we have only made assumptions as to the percent of impervious area and proposed slopes. We sized the storm sewer at Toben Street to accommodate additional runoff from the lots with the intent that additional storm sewer inlets and piping will be extended. The City will be able to review the individual lot development plans prior to building permits being issued to verify slopes and storm sewer.

No new on-site detention is proposed for this property since the two existing detention ponds are sized to accommodate the development on this site.

Any time grading work is to be performed on this property, Best Management Practices shall be used to help protect from erosion. Silt fence,

ditch checks, inlet protections, construction entrances and back of curb protection are among the BMPs to be used on this site.

EXISTING CONDITIONS

The site generally drains to the southeast or to the southwest to two existing detention ponds. The property is almost entirely short grass pasture, with a wooded area along the west property line. The site soils are primarily Rosehill silty clay with 1-3 percent slopes which is a Hydrologic Soil Group D soil. An USDA soil survey map is included in the "Supplemental Info" section.

The entirety of the property lies within a FEMA defined Zone X according to the February 2, 2007 maps. A copy of the FIRMette is attached in the "Supplemental Info" section.

The basin crests outlined in the Mediterranean Addition Drainage Plan were maintained. Approximately 64.6 acres drain into an existing ditch on the property from the north through an existing 8'x4' RCB under 34th Street. Another 1.7 acres drain onto the property from the north from the Comotara Industrial Park, and an additional 27.2 acres drain into the existing drainage channel that runs along the east and southeast of the property from commercial properties to the east. The existing impervious area on the property is approximately 0.45 acres.

We reviewed the original Mediterranean Plaza Addition drainage plan which was provided to us by the City of Wichita which was prepared by MKEC dated March 27, 1990. From these documents, we were able to determine the HW100 elevation for the west pond which is labeled on the drainage map. We could not find accurate record data for the east pond so we have included analysis determining the HW100 in this document and labeled it on the drainage map.

PROPOSED CONDITIONS

Basin A consists of the western half of Toben Street adjacent to Lot 1, Block A of the Firepoint Addition. Basin A will drain along the curb and gutter of Toben Street to a proposed curb inlet (Node 300, see "Drainage Map") where water will be taken via RCB to the detention pond directly west of the project site. Approximately 0.99 acres of developed commercial area drains west into Basin A via a 36" PVC pipe collected at a curb inlet (Node 310) and then into the open ditch and RCB that services Basins B & C. Basin A has an area of approximately 0.41 acres will be impervious after improvements.

Basin B consists of the eastern half of Toben Street adjacent to Lot 1, Block A of the Firepoint Addition. Basin B will drain along the curb and gutter of Toben Street to a proposed curb inlet (Node 290) where water will be taken via RCB to the detention pond directly west of the project site. Basin B has an area of approximately 0.41 acres for which all will be impervious after improvements.

Basin C consists of Lot 1, Block A of the Firepoint Addition. Basin C will drain west towards an open ditch currently existing on the property and will then drain into the RCB that is accommodating Basins A & B, after which it will drain into the detention pond directly west of the project site. Approximately 64.6 acres of developed commercial area drain south into the open ditch in Basin C via an 8' x 4' RCB under 34th Street. Basin C has an area of approximately 5.58 acres. Assuming 85% impervious area after improvements, Basin C will have an impervious area of 4.74 acres.

Basin D consists of the western half of Toben Street adjacent to Lot 2, Block A of the Firepoint Addition (see "Drainage Map"). Basin D will drain along the curb and gutter of Toben Street to a proposed curb inlet (Node 200) where water will be taken via RCP to the detention pond directly west of the project site. Basin D has an area of approximately 0.80 acres for which all will be impervious after improvements.

Basin E consists of the eastern half of Toben Street adjacent to Lot 2, Block A of the Firepoint Addition. Basin E will drain along the curb and gutter of Toben Street to a proposed curb inlet (Node 210) where water will be taken via RCP to the detention pond directly west of the project site. Basin E has an area of approximately 0.77 acres for which all will be impervious after improvements.

Basin F consists of approximately the western half of Lot 2, Block A of the Firepoint Addition. Basin F will drain southwest into a drop inlet (Node 220) where it will be taken via the RCP servicing Basins D & E to the detention pond directly west of the project site. Approximately 0.60 acres areas of developed commercial area drain into Basin F from the Comotara Industrial Park on the north. Basin F has an area of approximately 7.83 acres. Assuming 85% impervious area after improvements, Basin F will have an impervious area of 6.66 acres.

Basin G consists of approximately the northwest third of Lot 1, Block B of the Firepoint Addition (see "Drainage Map"). Basin G drains southwest into the ditch along K-96. Basin G has an area of 0.25 acres. Assuming 85% impervious area after improvements, Basin G will have an impervious area of 0.21 acres.

Basin H consists of approximately the southeast two thirds of Lot 1, Block B of the Firepoint Addition. Basin H drains to the southwest into the ditch along K-96. Basin H has an area of 0.60 acres. Assuming 85% impervious area after improvements, Basin F will have an impervious area of 0.51 acres.

Basin I consists of the southern half of Toben Street adjacent to Lot 2, Block A of the Firepoint Addition. Basin I will drain east via curb and gutter along Toben Street to a curb inlet (Node 110) where it will be taken via RCP to the detention pond southeast of the property. Basin I has an area of approximately 0.37 acres for which all will be impervious after improvements.

Basin J consists of the northern half of Toben Street adjacent to Lot 2, Block A of the Firepoint Addition. Basin J drains east via curb and gutter along Toben Street to a curb inlet (Node 100) where it will be taken via RCP to the detention pond southeast of the property. Basin J has an area of approximately 0.39 acres for which all will be impervious after improvements.

Basin K consists of the portion of Lot 2, Block A of the Firepoint Addition (see "Drainage Map"). Basin K drains south-southeast to a proposed drop inlet where it is taken via RCP to the detention pond southeast of the property. Basin K has an area of approximately 2.93 acres. Assuming 85% impervious area after improvements, Basin K will have an impervious area of 2.49 acres.

Basin L consists of the portion of Lot 2, Block A of the Firepoint Addition that lies east of the basin crest delineating Basins K & L. Basin L drains south-southeast to the drainage channel that runs along the east and southeast of the property. This basin will most likely be picked up in storm sewer and released to the channel. The exact location and size of the storm sewer will be determined when the site is developed. From there, water is taken through an existing 2-60"x38" HERCP under Toben Street to the detention pond that lies south east of the property. Basin L has an area of approximately 5.93 acres. Assuming 85% impervious are after improvements, Basin L will have an impervious area of 5.04 acres.

CURRENT DATE: 02-19-2010
CURRENT TIME: 09:00:15

FILE DATE: 02-19-2010
FILE NAME: POND CONTROL

Existing East Pond

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

C U L V E R T N O.	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1409.60	1409.59	2.00	1 RCB	7.00	2.34	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs)

FILE: WEIR

DATE: 02-19-2010

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1409.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1410.54	16.1	16.1	0.0	0.0	0.0	0.0	0.0	0.00	1
1411.07	32.1	32.1	0.0	0.0	0.0	0.0	0.0	0.00	1
1411.52	48.2	48.2	0.0	0.0	0.0	0.0	0.0	0.00	1
1411.93	64.3	64.3	0.0	0.0	0.0	0.0	0.0	0.00	1
1412.35	80.3	80.3	0.0	0.0	0.0	0.0	0.0	0.00	1
1412.52	86.6	86.6	0.0	0.0	0.0	0.0	0.0	0.00	1
1413.28	112.5	111.2	0.0	0.0	0.0	0.0	0.0	0.33	20
1413.35	128.6	113.5	0.0	0.0	0.0	0.0	0.0	14.27	8
1413.40	144.6	114.9	0.0	0.0	0.0	0.0	0.0	28.96	6
1413.45	160.7	116.1	0.0	0.0	0.0	0.0	0.0	43.67	5
1413.27	110.9	110.9	0.0	0.0	0.0	0.0	0.0	0.0	OVERTOPPING

SUMMARY OF ITERATIVE SOLUTION ERRORS

FILE: WEIR

DATE: 02-19-2010

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1409.60	0.000	0.00	0.00	0.00
1410.54	0.000	16.07	0.00	0.00
1411.07	0.000	32.14	0.00	0.00
1411.52	0.000	48.21	0.00	0.00
1411.93	0.000	64.28	0.00	0.00
1412.35	0.000	80.35	0.00	0.00
1412.52	0.000	86.60	0.00	0.00
1413.28	-0.004	112.49	0.99	0.88
1413.35	-0.002	128.56	0.77	0.60
1413.40	-0.002	144.63	0.77	0.53
1413.45	-0.003	160.70	0.98	0.61

<1> TOLERANCE (ft) = 0.010

<2> TOLERANCE (%) = 1.000

CURRENT DATE: 02-19-2010
 CURRENT TIME: 09:00:15

FILE DATE: 02-19-2010
 FILE NAME: WEIR

TAILWATER

***** REGULAR CHANNEL CROSS SECTION *****

BOTTOM WIDTH	8.00 ft
SIDE SLOPE H/V (X:1)	3.0
CHANNEL SLOPE V/H (ft/ft)	0.020
MANNING'S n (.01-0.1)	0.030
CHANNEL INVERT ELEVATION	1409.59 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	1409.59 ft

***** UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	1409.59	0.000	0.00	0.00	0.00
16.07	1410.05	0.979	0.46	3.76	0.57
32.14	1410.27	1.011	0.68	4.72	0.85
48.21	1410.44	1.026	0.85	5.37	1.06
64.28	1410.59	1.035	1.00	5.86	1.24
80.35	1410.72	1.042	1.13	6.27	1.40
86.60	1410.76	1.044	1.17	6.41	1.46
112.49	1410.94	1.051	1.35	6.92	1.68
128.56	1411.04	1.054	1.45	7.20	1.81
144.63	1411.13	1.057	1.54	7.44	1.92
160.70	1411.22	1.060	1.63	7.67	2.03

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	2.00 ft
CREST LENGTH	200.00 ft
OVERTOPPING CREST ELEVATION	1413.27 ft

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*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 19FEB10 TIME 09:04:40
*
*****

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*****
*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
*****

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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

HEC-1 INPUT

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LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID Firepoint Addition - Wichita, Kansas
2 ID Proposed Conditions through Existing East Detention Pond
3 ID 5 & 100-YR 24-HR STORM EVENTS
4 ID By: BLB Date: 02/19/10

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*DIAGRAM

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*
* IT 15 02JUL08 1200 0 06JUL08 2000
* IN 15 02JUL08 1200
* IO 0 5
* JR PREC 4.56 7.68
*
*

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KKProposed Conditions

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* Approx: 47.1 ac draining to pond based on LIDAR data
10 KO 5
11 BA 0.074
12 PB 1.00
13 PC 0.000 0.003 0.006 0.008 0.011 0.014 0.017 0.019 0.022 0.025
14 PC 0.029 0.032 0.035 0.038 0.042 0.045 0.048 0.052 0.056 0.060

```

463_hecout_existing east pond.txt

15	PC	0.064	0.068	0.072	0.076	0.080	0.085	0.090	0.095	0.100	0.105
16	PC	0.110	0.115	0.120	0.127	0.134	0.140	0.147	0.155	0.163	0.172
17	PC	0.181	0.193	0.204	0.220	0.235	0.259	0.283	0.387	0.663	0.699
18	PC	0.735	0.754	0.772	0.786	0.799	0.810	0.820	0.828	0.835	0.843
19	PC	0.850	0.858	0.865	0.873	0.880	0.885	0.889	0.894	0.898	0.903
20	PC	0.907	0.912	0.916	0.921	0.925	0.929	0.934	0.938	0.943	0.947
21	PC	0.952	0.955	0.958	0.961	0.964	0.967	0.970	0.976	0.976	0.979
22	PC	0.982	0.985	0.988	0.991	0.994	0.997	1.000			
23	LS	0	89	0							
24	UD	0.250									

25 KK POND
 * Control Structure = Concrete wall with approx. 16.4 sf opening
 26 KO 5
 27 RS 1 ELEV 1409.60
 28 SA 0.00 2.00 2.20 2.30
 29 SE 1409.6 1411.0 1413.0 1413.5
 30 SQ 0.0 16.1 32.1 48.2
 31 SE 1409.6 1410.54 1411.07 1411.52 1411.93 80.3 86.6 112.5
 * * * * *
 32 ZZ

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW
 NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW

9 Proposed
 V
 V
 25 POND

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

 * FLOOD HYDROGRAPH PACKAGE (HEC-1) *
 * JUN 1998 *
 * VERSION 4.1 *
 * RUN DATE 19FEB10 TIME 09:04:40 *

 * U.S. ARMY CORPS OF ENGINEERS *
 * HYDROLOGIC ENGINEERING CENTER *
 * 609 SECOND STREET *
 * DAVIS, CALIFORNIA 95616 *
 * (916) 756-1104 *

Firepoint Addition - Wichita, Kansas
 Proposed Conditions through Existing East Detention Pond
 5 & 100-YR 24-HR STORM EVENTS
 By: BLB Date: 02/19/10

7 IO OUTPUT CONTROL VARIABLES
 IPRNT 0 PRINT CONTROL
 IPLOT 5 PLOT CONTROL

QSCAL 0. HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	15	MINUTES IN COMPUTATION INTERVAL
IDATE	2JUL 8	STARTING DATE
ITIME	1200	STARTING TIME
NQ	417	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	6JUL 8	ENDING DATE
NDDTIME	2000	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL .25 HOURS
 TOTAL TIME BASE 104.00 HOURS

ENGLISH UNITS

DRAINAGE AREA	SQUARE MILES
PRECIPITATION DEPTH	INCHES
LENGTH, ELEVATION	FEET
FLOW	CUBIC FEET PER SECOND
STORAGE VOLUME	ACRE-FEET
SURFACE AREA	ACRES
TEMPERATURE	DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION 1 NUMBER OF PLANS
 NPLAN

JR MULTI-RATIO OPTION 4.56 7.68
 RATIOS OF PRECIPITATION

9 KK * Proposed * Conditions

10 KO OUTPUT CONTROL VARIABLES
 IPRNT 5 PRINT CONTROL
 IPLOT 5 PLOT CONTROL
 QSCAL 0. HYDROGRAPH PLOT SCALE

25 KK * POND *

26 KO OUTPUT CONTROL VARIABLES
 IPRNT 5 PRINT CONTROL
 IPLOT 5 PLOT CONTROL
 QSCAL 0. HYDROGRAPH PLOT SCALE

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
 TIME TO PEAK IN HOURS

RATIOS APPLIED TO PRECIPITATION

RATIO 1 4.56
 RATIO 2 7.68

OPERATION STATION AREA PLAN FLOW TIME
 + HYDROGRAPH AT Proposed .07 1 110. 205.
 12.00 12.00

ROUTED TO POND .07 1 66. 116.
 12.50 12.50

** PEAK STAGES IN FEET **
 1 STAGE 1411.97 1413.38
 TIME 12.50 12.50

*** NORMAL END OF HEC-1 ***

Ameritrack West, Inc.
 12469 SW 15th Street, P.O. Box 9
 Benton, KS 67017

FIREPOINT ADDITION
 Hydraulics
 SWS Line #1

Prepared by: BLB
 2/18/2010

ID	US Node	DS Node	Size	Actual Length	Manning's N	Slope	Discharge	Capacity	Velocity	HGL US	HGL DS	US Junction Loss	Invert US	Invert DS	US Freeboard
L1	SWS100	SWS90	18"	29.96	0.012	3.06	11.76	21.40	11.71	1412.82	1411.39	0.11	1411.41	1410.46	3.96
L2	SWS110	SWS100	18"	45.00	0.012	0.51	10.58	8.72	6.14	1413.32	1412.82	0.03	1411.75	1411.51	3.46
L3	SWS120	SWS110	18"	31.00	0.012	0.45	9.34	8.20	5.42	1414.11	1413.32	0.43	1412.00	1411.85	2.89

Ameritrack West, Inc.
12469 SW 15th Street, P.O. Box 9
Benton, KS 67017

FIREPOINT ADDITION
Hydraulics
SWS Line #1

Prepared by: BLB
2/18/2010

ID	Type	Elevation	Junction Loss	Discharge	Cumulative Q	Freeboard	Min Invert Elevation
SWS90	Outlet	1416.00	0.13	0.00	0.00	0.00	1410.46
SWS100	Curb	1416.78	0.11	1.18	11.76	3.96	1411.41
SWS110	Curb	1416.78	0.03	1.24	10.58	3.46	1411.75
SWS120	Grate	1417.00	0.43	9.34	9.34	2.89	1412.00

Ameritrack West, Inc.
 12469 SW 15th Street, P.O. Box 9
 Benton, KS 67017

FIREPOINT ADDITION
 Hydraulics
 SWS Line #2

Prepared by: BLB
 2/18/2010

ID	US Node	DS Node	Size	Actual Length	Manning's N	Slope	Discharge	Capacity	Velocity	HGL US	HGL DS	US Junction Loss	Invert US	Invert DS	US Freeboard
L4	SWS200	SWS190	36"	36.94	0.012	0.42	29.96	50.38	7.06	1409.77	1409.70	0.01	1406.86	1406.70	4.89
L5	SWS210	SWS200	36"	45.00	0.012	0.49	27.41	54.21	7.24	1409.83	1409.77	0.03	1407.09	1406.86	4.83
L6	SWS220	SWS210	36"	22.51	0.012	0.44	24.96	51.59	6.83	1410.09	1409.83	0.24	1407.30	1407.19	7.17

Ameritrack West, Inc.
12469 SW 15th Street, P.O. Box 9
Benton, KS 67017

FIREPOINT ADDITION
Hydraulics
SWS Line #2

Prepared by: BLB
2/18/2010

ID	Type	Elevation	Junction Loss	Discharge	Cumulative Q	Freeboard	Min Invert Elevation
SWS190	Outlet	1409.70	0.13	0.00	0.00	0.00	1406.70
SWS200	Curb	1414.66	0.01	2.55	29.96	4.89	1406.86
SWS210	Curb	1414.66	0.03	2.45	27.41	4.83	1407.09
SWS220	Grate	1417.25	0.24	24.96	24.96	7.17	1407.30

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 Benton, KS 67017

FIREPOINT ADDITION
 Hydraulics
 SWS Line #3

Prepared by: BLB
 2/18/2010

ID	US Node	DS Node	Size	Actual Length	Manning's N	Slope	Discharge	Capacity	Velocity	HGL US	HGL DS	US Junction Loss	Invert US	Invert DS	US Freeboard
L7	SWS290	SWS280	8"x4'	407.16	0.012	1.05	213.09	636.94	14.72	1414.36	1407.34	1.76	1409.80	1405.50	3.89
L8	SWS291	SWS290	8"x4'	39.43	0.012	0.49	205.93	435.78	11.24	1415.08	1414.36	0.64	1410.00	1409.80	1.92
L9	SWS300	SWS290	36"	44.99	0.012	0.21	5.85	35.75	3.51	1414.37	1414.36	0.00	1409.90	1409.80	3.88
L10	SWS310	SWS300	36"	25.69	0.012	12.02	4.54	269.43	13.62	1414.38	1414.37	0.09	1413.36	1410.00	3.87

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FIREPOINT ADDITION
Hydraulics
SWS Line #3

Prepared by: BLB
2/18/2010

ID	Type	Elevation	Junction Loss	Discharge	Cumulative Q	Freeboard	Min Invert Elevation
SWS280	Outlet	1412.75	0.13	0.00	0.00	0.00	1405.50
SWS290	Curb	1418.25	1.76	1.31	213.09	3.89	1409.80
SWS291	Other	1417.00	0.64	205.93	205.93	1.92	1410.00
SWS300	Curb	1418.25	0.00	1.31	5.85	3.88	1409.90
SWS310	Curb	1418.25	0.09	4.54	4.54	3.87	1413.36

SUMMARY TABLE

	Area (Ac)	Runoff Values (cfs)			
		Existing		Proposed	
		5-yr	100-yr	5-yr	100-yr
Basin A	0.41	1.06	2.12	1.31	2.43
Basin B	0.41	1.06	2.12	1.31	2.43
Basin C	5.58	11.16	23.05	17.79	33.03
Basin D	0.80	2.07	4.14	2.55	4.74
Basin E	0.77	1.99	3.99	2.45	4.56
Basin F	7.83	15.65	32.34	24.96	46.35
Basin G	0.25	0.65	1.30	0.80	1.48
Basin H	0.60	1.55	3.11	1.91	3.55
Basin I	0.37	0.96	1.92	1.18	2.19
Basin J	0.39	1.01	2.02	1.24	2.31
Basin K	2.93	6.99	14.11	9.34	17.35
Basin L	5.93	12.62	25.86	18.90	35.11
Existing East Pond					
Existing HW ₁₀₀ (ft)=		1413.32			
Proposed HW ₁₀₀ (ft)=		1413.35			

```

*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*   JUN 1998
*   VERSION 4.1
*
* RUN DATE 22FEB10 TIME 11:42:48
*
*****
*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
*****

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X X X XXXXXXXX XXXXX X
X X X X X XX
X X X X X X
XXXXXXX XXXX XXXXX X
X X X X X X
X X X XXXXXXXX XXXXX X
X X X XXXXXXXX XXXXX XXX

```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT

PAGE 1

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID Firepoint Addition - Wichita, Kansas
2 ID Existing Conditions through Existing East Detention Pond
3 ID 5 & 100-YR 24-HR STORM EVENTS (minimum 15 minute TC)
4 ID By: BLB Date: 02/22/10

```

```

*** LIST ***
*** FREE ***
*
* *DIAGRAM
*
5 IT 15 02JUL08 1200 0 06JUL08 2000
6 IN 15 02JUL08 1200
7 IO 0 5
8 JR PREC 4.56 7.68
*
*
9 KExisting Conditions
* Approx. 34.2 ac draining to Toben street based on LIDAR data
10 KO 5
11 BA 0.053
12 PB 1.00
13 PC 0.000 0.003 0.006 0.008 0.011 0.014 0.017 0.019 0.022 0.025
14 PC 0.029 0.032 0.035 0.038 0.042 0.045 0.048 0.052 0.056 0.060

```

15	PC	0.064	0.068	0.072	0.076	0.080	0.085	0.085	0.090	0.095	0.100	0.105
16	PC	0.110	0.115	0.120	0.127	0.134	0.140	0.140	0.147	0.155	0.163	0.172
17	PC	0.181	0.193	0.204	0.220	0.235	0.259	0.259	0.283	0.387	0.663	0.699
18	PC	0.735	0.754	0.772	0.786	0.799	0.810	0.810	0.820	0.828	0.835	0.843
19	PC	0.850	0.858	0.865	0.873	0.880	0.885	0.885	0.889	0.894	0.898	0.903
20	PC	0.907	0.912	0.916	0.921	0.925	0.929	0.929	0.934	0.938	0.943	0.947
21	PC	0.952	0.955	0.958	0.961	0.964	0.967	0.967	0.970	0.973	0.976	0.979
22	PC	0.982	0.985	0.988	0.991	0.994	0.997	0.997	1.000			
23	LS	0	88	0								
24	UD	0.250										

25	KK	TOBEN										
26	Control	5	Structure = 2 - 60"x38"	HERCP								
27	RS	1	ELEV 1410.00									
28	SA	0.00	0.23									
29	SE	1410.0	1415.0									
30	SQ	0.0	19.6	39.2	58.7	78.3	97.9	105.5	137.1	156.6	176.2	
31	SE	1410.0	1411.12	1411.63	1412.05	1412.43	1412.78	1412.91	1413.43	1413.74	1414.07	

1
 LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
 HEC-1 INPUT
 PAGE 2

32	KK	Existing Conditions										
33	KO	5	Additional 12.9 ac draining to pond based on LIDAR data									
34	BA	0.020										
35	PB	1.00										
36	PC	0.000	0.003	0.006	0.008	0.011	0.014	0.014	0.017	0.019	0.022	0.025
37	PC	0.029	0.032	0.035	0.038	0.042	0.045	0.045	0.048	0.052	0.056	0.060
38	PC	0.064	0.068	0.072	0.076	0.080	0.085	0.085	0.090	0.095	0.100	0.105
39	PC	0.110	0.115	0.120	0.127	0.134	0.140	0.140	0.147	0.155	0.163	0.172
40	PC	0.181	0.193	0.204	0.220	0.235	0.259	0.259	0.283	0.387	0.663	0.699
41	PC	0.735	0.754	0.772	0.786	0.799	0.810	0.810	0.820	0.828	0.835	0.843
42	PC	0.850	0.858	0.865	0.873	0.880	0.885	0.885	0.889	0.894	0.898	0.903
43	PC	0.907	0.912	0.916	0.921	0.925	0.929	0.929	0.934	0.938	0.943	0.947
44	PC	0.952	0.955	0.958	0.961	0.964	0.967	0.967	0.970	0.973	0.976	0.979
45	PC	0.982	0.985	0.988	0.991	0.994	0.997	0.997	1.000			
46	LS	0	89	0								
47	UD	0.250										

48 KK TOTAL
 * Combine total drainage area into pond
 KO 5
 HC 2 0
 *
 *
 *

51 KK POND
 * Control Structure = Concrete Wall with approx. 16.4 sf opening
 KO 5
 52

HYDROGRAPH AT	Existing	1	FLOW TIME	30.	55.
+ 2 COMBINED AT	TOTAL	1	FLOW TIME	106.	199.
				12.25	12.25
+ Routed TO	POND	1	FLOW TIME	64.	114.
				12.50	12.50

** PEAK STAGES IN FEET **
 1 STAGE 1411.93 1413.32
 12.50 12.50

*** NORMAL END OF HEC-1 ***

```

*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 22FEB10 TIME 11:35:58
*
*****
*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
*****

```

```

X X X XXXXXXXX XXXXX X
X X X X X X XX
X X X X X X X
XXXXXXXXX XXXX XXXXX X
X X X X X X X
X X X X XXXXXXXX XXXX
X X X X XXXXXXXX XXXX

```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
ID ID Firepoint Addition - Wichita, Kansas
ID ID Proposed Conditions through Existing East Detention Pond
ID ID 5 & 100-YR 24-HR STORM EVENTS (minimum 15 minute TC)
ID ID By: BLB Date: 02/22/10

```

*DIAGRAM

```

*
* IT 15 02JUL08 1200 0 06JUL08 2000
* IN 15 02JUL08 1200
* IO 0 5
* JR PREC 4.56 7.68
*
*

```

KKProposed Conditions
 * Approx. 34.2 ac draining to Toben Street based on LIDAR data

```

10 KO 0.053
11 BA 1.00
12 PB 0.000
13 PC 0.029 0.003 0.006 0.008 0.011 0.014 0.017 0.019 0.022 0.025
14 PC 0.032 0.035 0.038 0.042 0.045 0.048 0.052 0.056 0.060

```

15	PC	0.064	0.068	0.072	0.076	0.080	0.085	0.090	0.095	0.100	0.105
16	PC	0.110	0.115	0.120	0.127	0.134	0.140	0.147	0.155	0.163	0.172
17	PC	0.181	0.193	0.204	0.220	0.235	0.259	0.283	0.387	0.663	0.699
18	PC	0.735	0.754	0.772	0.786	0.799	0.810	0.820	0.828	0.835	0.843
19	PC	0.850	0.858	0.865	0.873	0.880	0.885	0.889	0.894	0.898	0.903
20	PC	0.907	0.912	0.916	0.921	0.925	0.929	0.934	0.938	0.943	0.947
21	PC	0.952	0.955	0.958	0.961	0.964	0.967	0.970	0.973	0.976	0.979
22	PC	0.982	0.985	0.988	0.991	0.994	0.997	1.000			
23	LS	0	89	0							
24	UD	0.250									

463_hecutout_existing east pond_proposed.txt

25	KK	TOBEN									
26	KK	Control	Structure = 2 - 60"x38" HERCP								
27	KO	5									
28	RS	1	ELEV 1410.00								
29	SA	0.00	0.23								
30	SE	1410.0	1415.0								
31	SQ	0.0	19.6	39.2	58.7	78.3	97.9	105.5	137.1	156.6	176.2
	SE	1410.0	1411.12	1411.63	1412.05	1412.43	1412.78	1412.91	1413.43	1413.74	1414.07

1

PAGE 2

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

KKProposed Conditions
* Additional 12.9 ac draining to pond based on LIDAR data

32	KK	BA	0.020	0.003	0.006	0.008	0.011	0.014	0.017	0.019	0.022	0.025
33	KO	5										
34	BA	1.00										
35	PB	0.000	0.032	0.035	0.038	0.042	0.045	0.048	0.052	0.056	0.060	0.060
36	PC	0.029	0.068	0.072	0.076	0.080	0.085	0.090	0.095	0.100	0.105	0.105
37	PC	0.064	0.115	0.120	0.127	0.134	0.140	0.147	0.155	0.163	0.172	0.172
38	PC	0.110	0.193	0.204	0.220	0.235	0.259	0.283	0.387	0.663	0.699	0.699
39	PC	0.181	0.193	0.204	0.220	0.235	0.259	0.283	0.387	0.663	0.699	0.699
40	PC	0.181	0.193	0.204	0.220	0.235	0.259	0.283	0.387	0.663	0.699	0.699
41	PC	0.735	0.754	0.772	0.786	0.799	0.810	0.820	0.828	0.835	0.843	0.843
42	PC	0.850	0.858	0.865	0.873	0.880	0.885	0.889	0.894	0.898	0.903	0.903
43	PC	0.907	0.912	0.916	0.921	0.925	0.929	0.934	0.938	0.943	0.947	0.947
44	PC	0.952	0.955	0.958	0.961	0.964	0.967	0.970	0.973	0.976	0.979	0.979
45	PC	0.982	0.985	0.988	0.991	0.994	0.997	1.000				
46	LS	0	89	0								
47	UD	0.250										

KK TOTAL
* Combine total drainage area into pond

48

KK KO HC

5 2 0

KK

51

52

KK KO

5

Structure = Concrete Wall with approx. 16.4 sf opening

```

463_hecut_existing east pond_proposed.txt
RS      1      ELEV 1409.60
SA      0.00    2.00    2.20    2.30
SE      1409.6 1411.0 1413.0 1413.5
SQ      0.0     16.1    32.1    48.2
SE      1409.6 1410.54 1411.07 1411.52 1411.93 1412.35 1412.52 1413.28
*
*
*
*
ZZ

```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

```

INPUT LINE NO. (V) ROUTING (--->) DIVERSION OR PUMP FLOW
                (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW

```

```

9 Proposed
  V
25 TOBEN
  V
32 . . . Proposed
  V
48 TOTAL.....
  V
51 POND

```

1 (****) RUNOFF ALSO COMPUTED AT THIS LOCATION

```

*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
*   JUN 1998
*   VERSION 4.1
*
* RUN DATE 22FEB10 TIME 11:35:58
*
*****

```

```

*****
*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
*****

```

Firepoint Addition - Wichita, Kansas
Proposed Conditions through Existing East Detention Pond
5 & 100-YR 24-HR STORM EVENTS (minimum 15 minute TC)
By: BLB Date: 02/22/10

```

7 IO OUTPUT CONTROL VARIABLES
  IPRT 0 PRINT CONTROL
  IPLOT 5 PLOT CONTROL
  QSCAL 0. HYDROGRAPH PLOT SCALE

```

```

IT HYDROGRAPH TIME DATA
  NMIN 15 MINUTES IN COMPUTATION INTERVAL
  IDATE 2JUL 8 STARTING DATE
  ITIME 1200 STARTING TIME
  NQ 417 NUMBER OF HYDROGRAPH ORDINATES
  NDDATE 6JUL 8 ENDING DATE

```

NDTIME 2000 ENDING TIME
ICENT 19 CENTURY MARK
COMPUTATION INTERVAL .25 HOURS
TOTAL TIME BASE 104.00 HOURS

ENGLISH UNITS
DRAINAGE AREA SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW CUBIC FEET PER SECOND
STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION 1 NUMBER OF PLANS
NPLAN
JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
4.56 7.68

*
* Proposed *
*

Conditions

10 KO OUTPUT CONTROL VARIABLES
IPRNT 5 PRINT CONTROL
IPLOT 5 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

*
* TOBEN *
*

26 KO OUTPUT CONTROL VARIABLES
IPRNT 5 PRINT CONTROL
IPLOT 5 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

*

*
* Proposed *
*

Conditions

HYDROGRAPH AT	Proposed	.02	1	FLOW TIME	30.	55.
+ 2 COMBINED AT	TOTAL	.07	1	FLOW TIME	108.	200.
+ Routed TO	POND	.07	1	FLOW TIME	65.	115.
					12.50	12.50

** PEAK STAGES IN FEET **
 1 STAGE 1411.96 1413.35
 12.50 12.50

*** NORMAL END OF HEC-1 ***