Drainage Report
Newman University Addition
Wichita, Sedgwick County, Kansas

Location

The subject property is located in Wichita, Sedgwick County, Kansas. The proposed development is located south of US-54 (Kellogg), east of Leonine Street, and west of K-42 along McCormick Avenue, in the center of Section 25, Township 27 South, Range 1 West. The site is approximately 1.8 acres. The site is shown on the Wichita West, Kansas Quadrangle, located in Appendix A.

Soils

According to the NRCS (SCS) Sedgwick County Soil Survey (Appendix B) soils on the site consist of the following;

1. Ua, Urban land–Canadian complex, 0 to 3 percent slopes, HSG B
2. Ue, Urban land-Tabler complex, 0 to 1 percent slopes, HSG D
3. Ca, Canadian fine sandy loam, rarely flooded, HSG B
4. Na, Naron fine sandy loam, 0 to 1 percent slopes, HSG B
5. Cc, Carwile fine sandy loam , 0 to 1 percent slopes, HSG D

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

Pre-Project Conditions

Pre-Project Development
McCormick Avenue currently follows a straight path from Leonine Street to K-42 through the campus of Newman University. Currently parking lots are located along the proposed McCormick Street realignment.

Two small ponds exist to the east of Dondlinger Avenue, one on each side of McCormick. The north pond was built to satisfy a need for additional fill and to provide an aesthetically pleasing appearance to the campus, when the De Mattias Fine Arts Center and the O'Shaughnessy Sports complex were constructed. The north pond does not provide stormwater detention; however the pond to the south of McCormick does exhibit detention characteristics.

Pre-Project Landforms and Slopes
Slopes across the site range from 0.5% to 3.0%.

Pre-Project Drainage Conditions
The entire site is in Zone B, Appendix C, (Community-Panel Number 200328 0025 B, Panel 25 of 40, May 15, 1986). This zone is protected for the one-percent annual chance (100-year) flood by levee, dike, or other structures subject to possible failure or overtopping during larger floods. The nearest zone A is approximately 1-½ miles southeast of the site.

Pre-Project Runoff Characteristics
The site currently drains into four stormwater sewer (SWS) drainage systems, as shown in Appendix D. The first drainage system is located near the corner of Sheridan and McCormick. This system routes runoff from McCormick south along Sheridan Ave. The second system is located on the north end of Sheridan Avenue. This system routes storm runoff from the areas north and west of the De Mattias Fine Arts Center, as well as runoff from the area around Hilary Hall East, into a Kansas Department of Transportation SWS system that run along the south side of US-54 (Kellogg). The third system is located north of the intersection of McCormick and Dondlinger. This system serves the area north and east of the O'Sheughnessy Sports Complex and routes the runoff to the pond to the north of McCormick Avenue. The final SWS system associated with the existing site is located on McCormick west of K-42. This system helps to drain the storm runoff from McCormick Avenue, southbound K-42, and excess water from the north pond to the south detention pond and will remain unchanged during the project.

Post-Project Conditions

Post-Project Development
McCormick Avenue curves to the north approximately 150 feet east of All Hallows Street and travels around the north side of the O'Shaughnessy Sports Complex and the De Mattias Fine Arts Center. McCormick curves back south to its original path approximately 190 feet west of K-42. The new street will be 40-feet wide and have a 5-foot median. The University plans to utilize the existing McCormick St. pavement therefore it will not be removed.

The impervious area for the site will not change significantly since parking lots cover a majority of the proposed road location. The layout of the proposed road will decrease the surface area of the north pond. Reducing the size of the pond will not hurt the drainage characteristics of the site because the pond does not provide stormwater detention.

Post-Project Landform and Slope
The landform and slope will be approximately the same as pre-project conditions.

Post-Project Runoff Characteristics
The post-project development was divided into 24 separate drainage sub-areas, within 6 SWS drainage systems, as shown in Appendix E. Runoff will still flow to the same

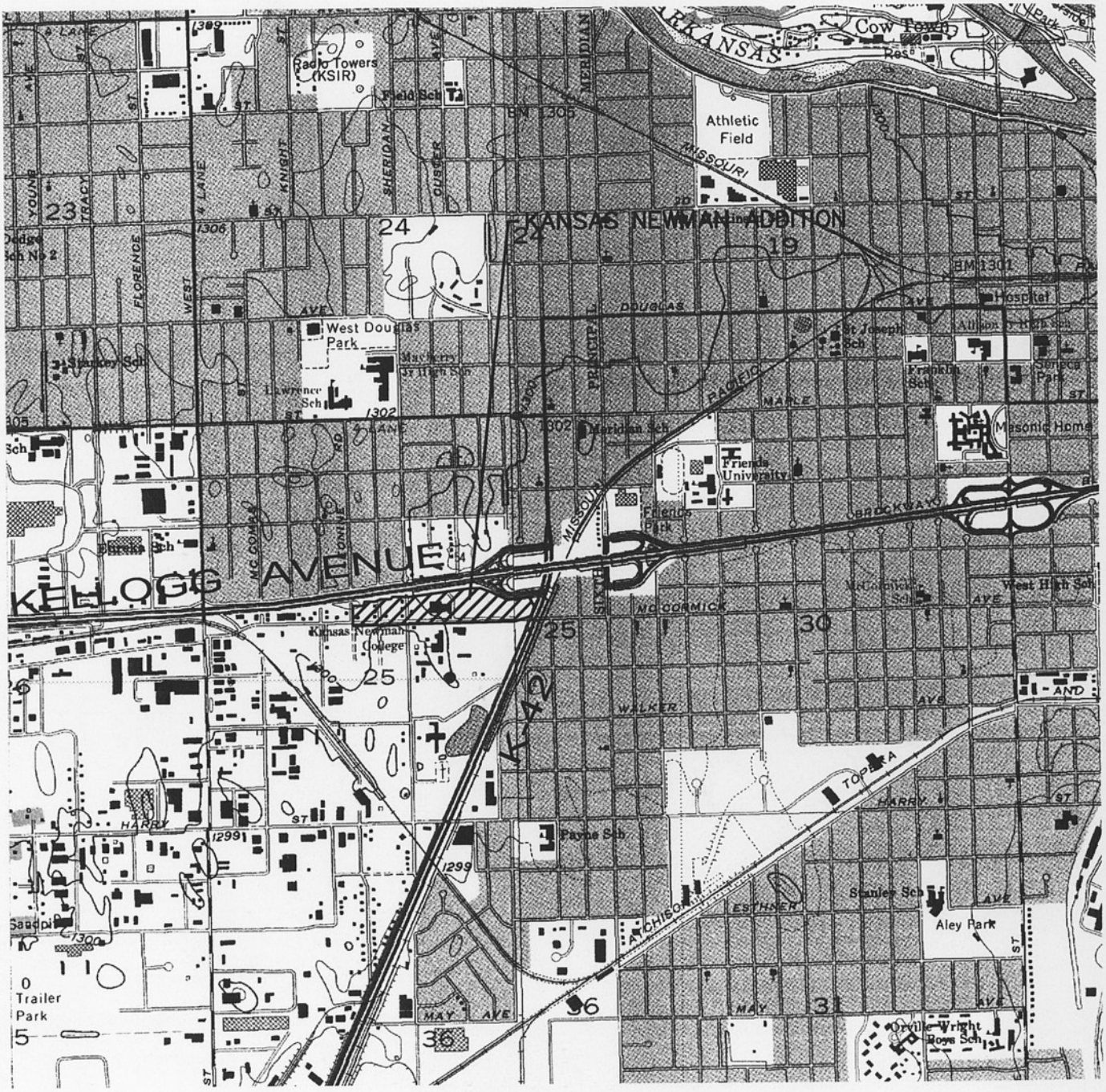
location as stated in pre-project development. The table at the bottom of the McCormick Special Drainage Plan (Appendix E) shows a summary of the post-project runoff associated with each drainage area. The areas draining into the KDOT system, south along Sheridan and to each of the ponds will remain unchanged from pre-project to post project. However, there will be an additional storm sewer system installed northeast of the O'Sheughnessy Sports Complex and an additional system at the intersection of McCormick and Dondlinger Avenue to help with the drainage of the site. These systems will not increase the rate of runoff offsite significantly from pre-project conditions, due to similar areas and runoff coefficients for pre and post project developments. A summary of calculations used to determine the runoff into the KDOT SWS along will a letter from KDOT acknowledging the insignificant increase in runoff to the KDOT SWS system is located in Appendix F. Hydraflow Storm Sewer 2000 by Intelisolve results for all the SWS system can by found in Appendix G.

Summary

McCormick Avenue is being realigned to curve around the north side of Newman University in order to deter heavy volumes of traffic from traveling through the middle of campus. The new alignment of the street closely follows the path of an existing parking lot located to the north of the O'Shaughnessy Sports Complex and the De Mattias Fine Arts Center, therefore little additional impervious area will be created due to this project. Stormwater runoff will flow into the same systems as they did pre-project with approximately equal flowrates. A portion of the pond lying to the north of McCormick Avenue will be filled to allow for the realignment of McCormick Avenue, consequently reducing the pond's surface area. However this pond provides minimal stormwater detention, therefore the reduction irrelevant. Any change in runoff from the site should be viewed as negligible.

Appendix A

Quadrangle



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MKEC ENGINEERING CONSULTANTS
411 N. WEBB ROAD
WICHITA, KS. 67206
316 - 684 - 9600

KANSAS NEWMAN
PROJECT NAME

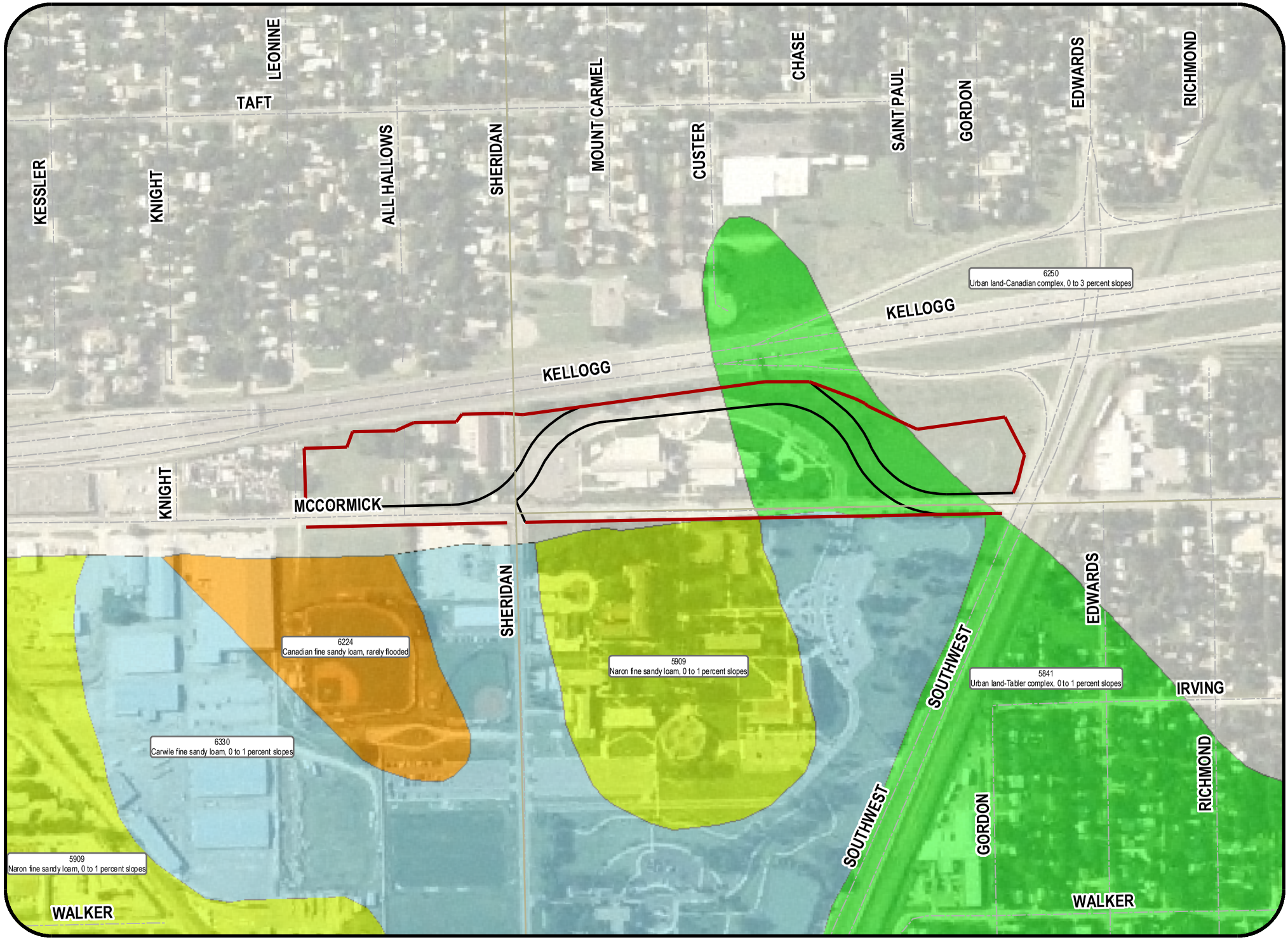
WICHITA WEST QUADRANGLE MAP
SHEET TITLE

KLA	SMD	JTC
DESIGN BY:	DRAWN BY:	CHECKED BY:

MARCH 2005	03245	1 / 1
DATE	JOB NO.	SHEET/OF

Appendix B

Soil Survey



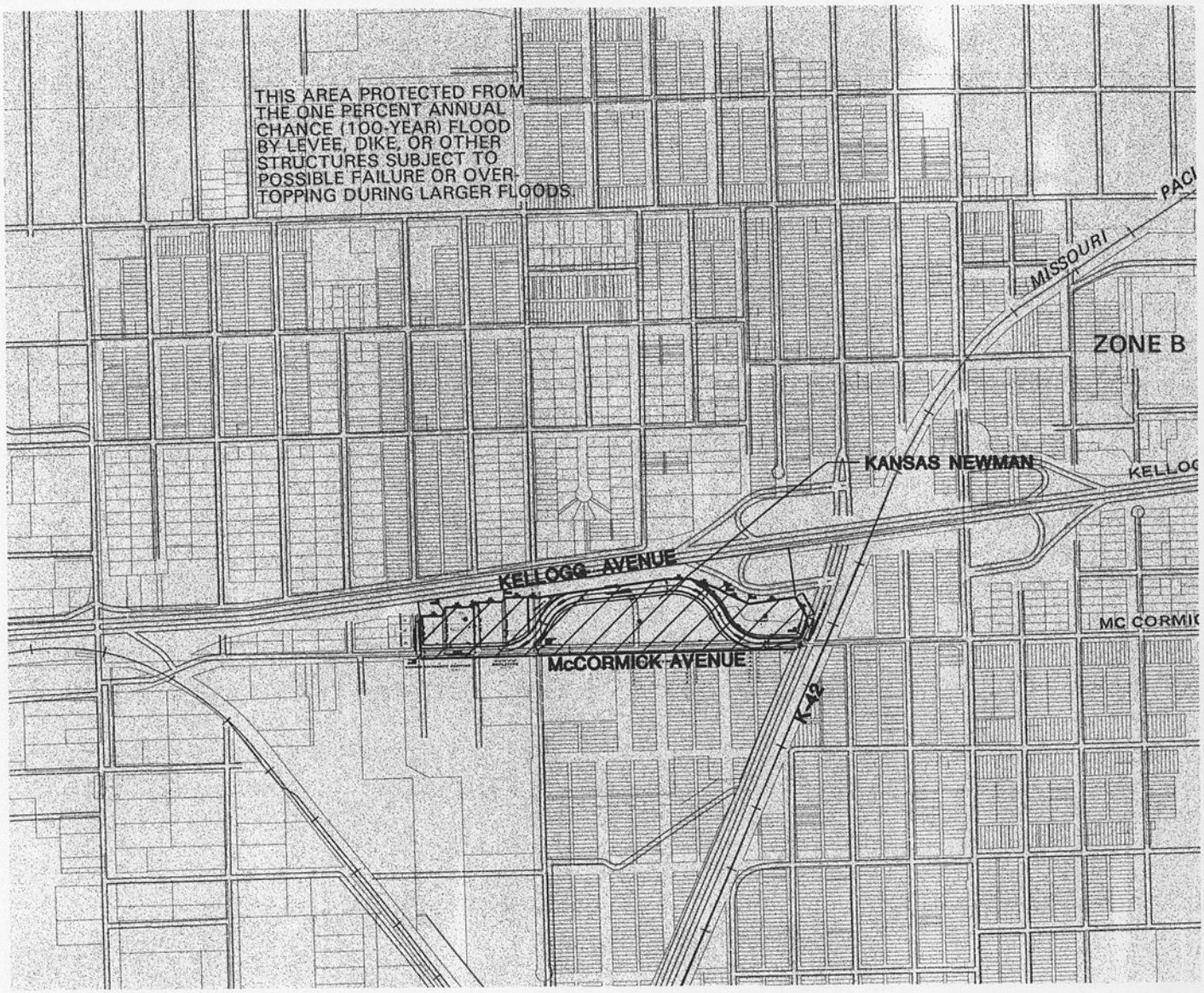
Newman University
Soil Map

400 200 0 400
Feet

MKEC ENGINEERING CONSULTANTS, INC.

Appendix C

Flood Insurance Rate Map (FIRM)
&
Flood Boundary and Floodway Map (FBFM)



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CITY OF
WICHITA,
KANSAS
SEDGWICK COUNTY

PANEL 25 OF 40
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
200328 0025 B

EFFECTIVE DATE:
MAY 15, 1986

Federal Emergency Management Agency

N

APPROXIMATE SCALE

1000 0 1000 FEET

MKEC
ENGINEERING
CONSULTANTS
411 N. WEBB ROAD
WICHITA, KS. 67206
316 - 684 - 9600

KANSAS NEWMAN
PROJECT NAME

FIRM PANEL 25 OF 40
SEDGWICK COUNTY, KANSAS
SHEET TITLE

KLA	SMD	GJA
DESIGN BY:	DRAWN BY:	CHECKED BY:
MARCH 2005	03245	1 / 1
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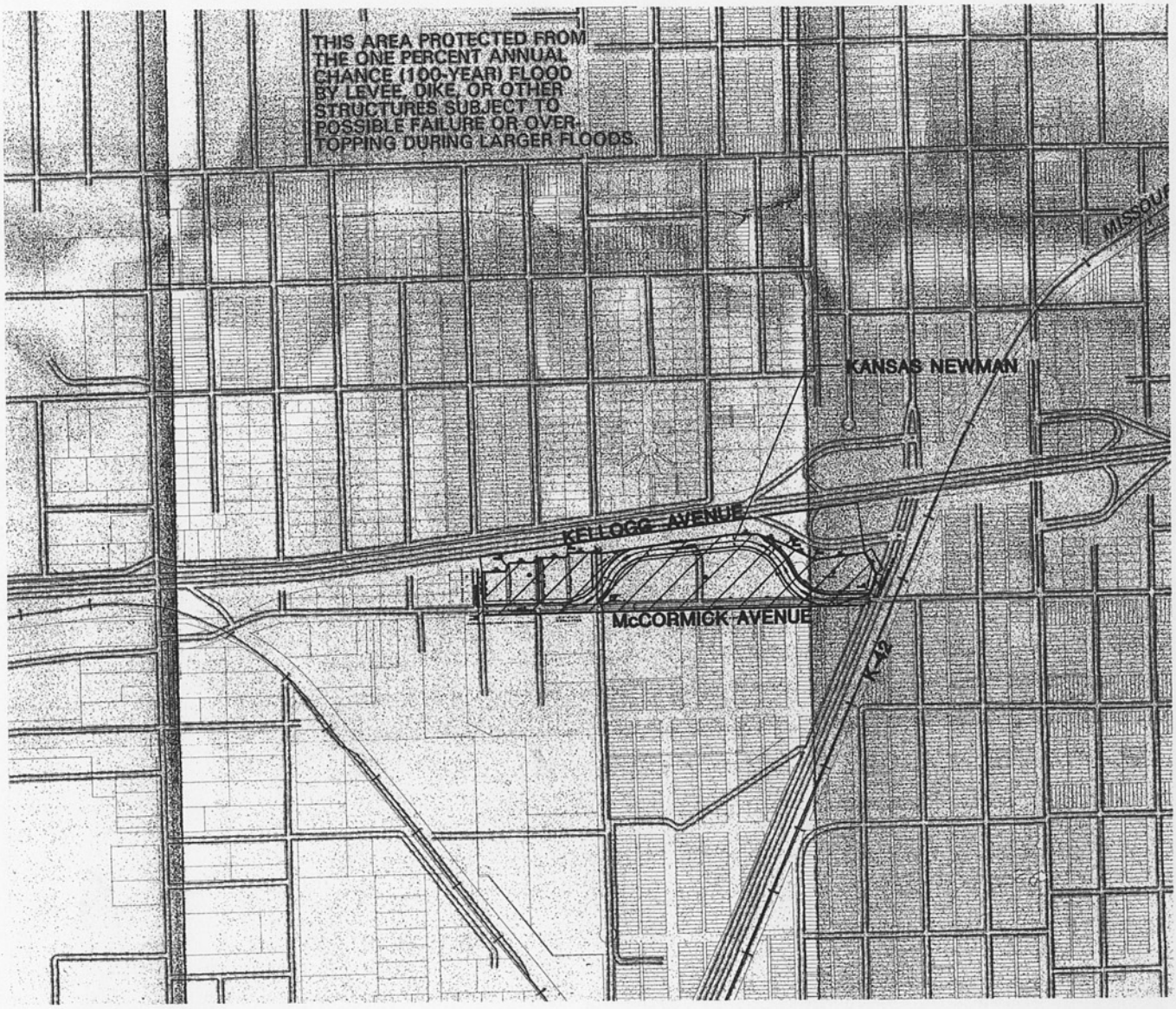

NATIONAL FLOOD INSURANCE PROGRAM

FLOODWAY

FLOOD BOUNDARY AND FLOODWAY MAP

CITY OF
WICHITA,
KANSAS
SEDGWICK COUNTY

PANEL 25 OF 40
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
200328 0025

EFFECTIVE DATE:
MAY 15, 1986

Federal Emergency Management Agency

APPROXIMATE SCALE

1000 0 1000 FEET

MKEC ENGINEERING CONSULTANTS
411 N. WEBB ROAD
WICHITA, KS. 67206
316 - 684 - 9600

KANSAS NEWMAN
PROJECT NAME

FBFM PANEL 25 OF 40
SEDGWICK COUNTY, KANSAS
SHEET TITLE

KLA	SMD	GJA
DESIGN BY:	DRAWN BY:	CHECKED BY:
MARCH 2005	03002	1 / 1
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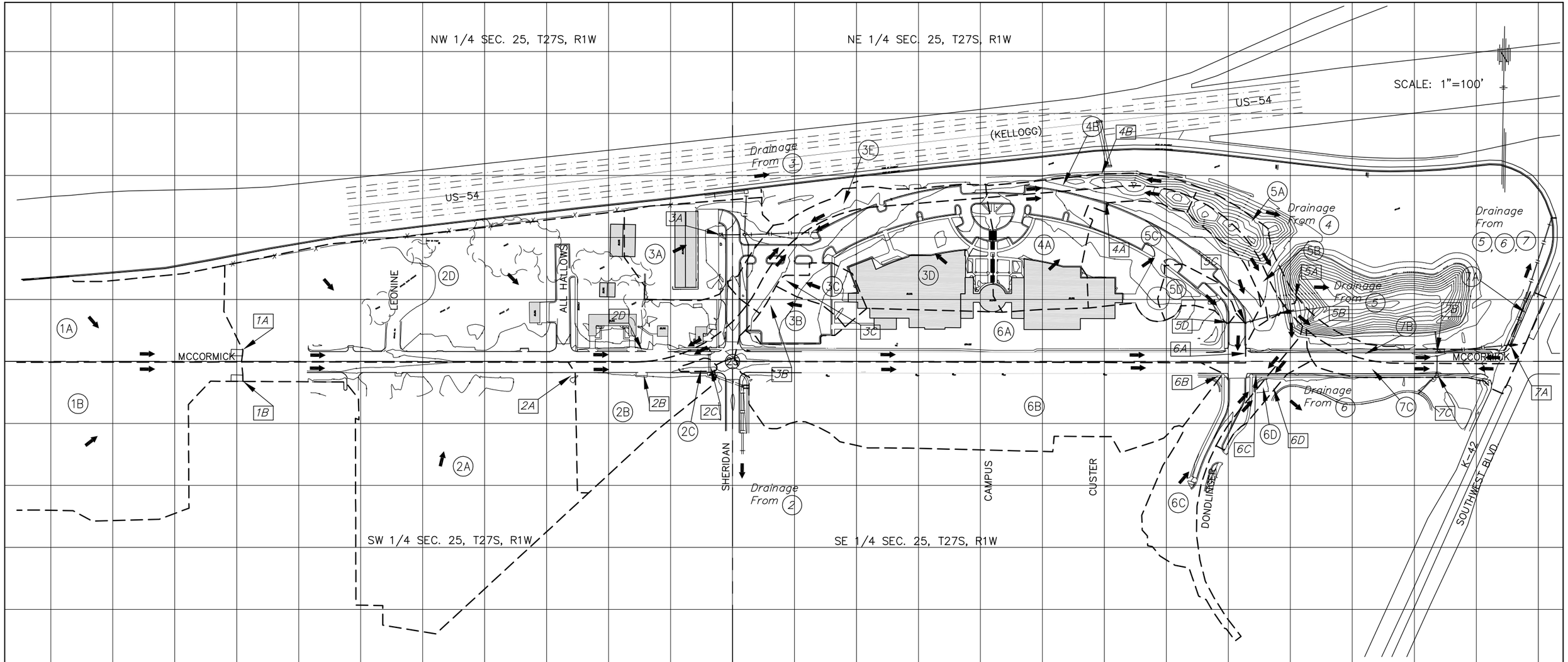
Appendix D

Site Drainage Plan



DRAINAGE ANALYSIS SUMMARY

Drainage Area	Area (ac.)	C 5-yr	C 100-yr	Elev Max (ft.)	Elev Min (ft.)	Flow Length (ft.)	Tc (5-yr) Calc (min.)	Tc (100-yr) Calc (min.)	Tc (5-yr) min (min.)	Tc (100-yr) min (min.)	Intensity (5-yr) (in./hr.)	Intensity (100-yr) (in./hr.)	Q 5-yr (cfs)	Upstream Spill-over (cfs)	Q 5-yr Total (cfs)	Q 100-yr (cfs)	Longitudinal Slope So (%)	Cross Slope Sx (%)	Inlet	STA	Inlet Type (1, 1A, 2)	Inlet Size 5-yr (ft.)	Q Intercept (cfs)	Q Bypass (cfs)	Spread *** (ft.)	Storm Sewer (5-yr) Pipe Size (in.)	Storm Sewer (5-yr) Min Slope (%)	Comments
1A	3.84	0.69	0.80	116.00	113.50	1230	44	32	44	32	2.61	5.22	6.92		6.92	16.04	0.20	1.56	1A		1	30	6.92	0.00				
1B	6.56	0.69	0.80	115.84	113.50	1170	43	32	43	32	2.64	5.22	11.97		11.97	27.44	0.20	1.56	1B		1	30	9.54	2.43				
2A	5.42	0.27	0.46	116.00	111.13	995	59.80	46.11	59	46	2.18	4.33	3.19	2.43	5.62	10.80	0.13	1.56	2A	25+32, Rt.	1A	10	3.52	2.10	< 7.25			
2B	1.32	0.33	0.53	111.90	110.49	390	38.42	28.44	38	28	2.84	5.59	1.24	2.10	3.34	10.93		2.08	2B	26+85, Rt.	1A	10	3.34	0.00	< 7.25			
2C**																			2C	28+10, Rt.	drop	2' x 4'						
2D	5.89	0.60	0.73	113.50	110.68	1030	44.48	32.92	44	32	2.61	5.22	9.22	0.00	9.22	22.44		2.08	2D	26+85, Lt.	2	6	9.22	0.00	< 7.25			
3A	1.20	0.81	0.88	115.54	111.53	450	11.51	8.73	15	15	4.56	7.37	4.43		4.43	7.78		4.00	3A	11+24.25, Lt.*	drop	3' x 3'	4.43	0.00				
3B	0.36	0.85	0.91	115.00	112.27	250	6.91	5.25	15	15	4.56	7.37	1.40		1.40	2.41		0.50	3B	29+73.0, Rt.	2	6	1.40	0.00				
3C	0.31	0.85	0.91	112.00	109.50	200	5.91	4.49	15	15	4.56	7.37	1.20		1.20	2.08		0.50	3C	30+34.8, Rt.	1	5	1.20	0.00				
3D	1.93	0.69	0.79	115.10	110.70	610	20.32	15.37	20	15	4.00	7.37	5.33		5.33	11.24		2.08	3D	31+36.3, Rt.	1A	10	5.33	0.00	< 7.25			
3E	0.58	0.62	0.72	113.34	110.70	435	21.28	16.85	21	16	3.90	7.18	1.40		1.40	3.00		2.08	3E	31+25, Lt.	1A	5	1.40	0.00	< 7.25			
4A	1.32	0.63	0.73	115.05	111.39	455	19.40	15.28	19	15	4.10	7.37	3.41		3.41	7.10		2.08	4A	37+95.0, Rt.	1A	10	3.41	0.00	< 7.25			
4B	0.28	0.81	0.87	114.10	111.39	225	7.36	5.84	15	15	4.56	7.37	1.03		1.03	1.80		2.08	4B	37+93, Lt.	1A	5	1.03	0.00	< 7.25			
5A	0.26	0.81	0.88	114.10	110.17	320	8.72	6.61	15	15	4.56	7.37	0.96		0.96	1.69	0.83	2.08	5A	43+00.0, Rt.	1A	5	0.00	0.96	< 7.25			
5B	0.26	0.81	0.88	114.10	110.17	320	8.72	6.61	15	15	4.56	7.37	0.96		0.96	1.69	0.83	2.08	5B	43+00.0, Lt.	1A	5	0.00	0.96	< 7.25			
5C	1.34	0.62	0.72	114.88	109.72	605	22.41	17.74	22	17	3.81	6.84	3.17		3.17	6.60	0.59	2.46	5C		1	5	1.83	1.34				
5D	0.28	0.55	0.67	114.55	109.82	315	15.34	12.00	15	15	4.56	8.02	0.70		0.70	1.51	0.59	2.46	5D		1	5	0.56	0.14				
6A	2.42	0.67	0.77	112.50	109.38	1,100	39.07	29.98	39	29	2.80	5.49	4.54	1.48	6.02	10.23		0.13	6A	8+82.8, Lt.#	1A	15	6.02	0.00				
6B	3.72	0.42	0.57	113.70	109.40	1080	54.68	42.62	54	42	2.30	4.54	3.59		3.59	9.63	0.11	1.08	6B	8+11.2, Lt.#	1A	15	3.29	0.30				
6C	1.27	0.75	0.83	112.24	108.65	630	19.07	14.71	19	15	4.10	7.37	3.91	1.26	5.17	7.77		1.56	6C	8+61.0, Lt.#	1A	5	5.17	0.00	< 11.0			
6D	0.21	0.81	0.88	110.89	108.65	705	20.31	15.41	20	15	4.00	7.37	0.68		0.68	1.36		1.56	6D	8+61.0, Rt.#	1A	5	0.68	0.00	< 11.0			
7A	0.09	0.81	0.88	113.25	111.91	130	5.89	4.47	15	15	4.56	7.37	0.46		0.46	0.82	0.09	1.56	7A	K-42	1	5	0.31	0.15				
7B	0.39	0.81	0.88	111.68	108.64	360	10.48	7.95	15	15	4.56	7.37	1.63	1.11	2.74	5.03		2.03	7B	46+61.32	1	5	2.74	0.00	< 14.0			
7C	0.39	0.81	0.88	110.58	108.69	330	11.42	8.66	15	15	4.56	7.37	1.63		1.63	3.03		2.03	7C	46+61.66	1	5	1.63	0.00	< 14.0			

** *Area served by drop inlet considered to be negligible. 2C area is included in area 2B.*

*** *The design allowable width of spread on proposed McCormick is 7.25'. This will provide an 8' corridor between median curb and edge of water. The spread may increase to 14.0' where medians do not exist. The design allowable width of spread on proposed Dondlinger is 11.0'. This will provide two 8' lanes between the edges of water.*

* Sheridan

\# Dondlinger

LEGEND

(1A) DRAINAGE AREA

[1A] INLET I.D. NUMBER

DRAINAGE BASIN BOUNDARY

DRAINAGE DIRECTION

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MKEC ENGINEERING CONSULTANTS
411 N. WEBB ROAD
WICHITA, KS. 67206
316 - 684 - 9600

McCORMICK AVENUE STREET IMPROVEMENTS
PROJECT NAME

McCORMICK - SPECIAL DRAINAGE PLAN
SHEET TITLE

LAC	DPG	JRA
DESIGN BY:	DRAWN BY:	CHECKED BY:
JANUARY 2005	03245	69 / 106
DATE	JOB NO.	SHEET/OF

Appendix E

KDOT SUBMITTAL

Kansas Department of Transportation

MEMO TO: Benny P. Tarverdi, P.E.
KDOT Metro Engineer
Wichita, Kansas

FROM: Jim L. Kowach, P.E.
Chief, Bureau of Design

BY: Richard G. Adams, P.E. RGA
Road Design Engineer

RECEIVED
JAN 2 2 2005
METRO ENGINEER
WICHITA OFFICE

DATE: January 21, 2005

REFERENCE: US-54 in Sedgwick County

SUBJECT: Newman University
MKEC Project No.: 03245

We have completed the initial review of the plans for the proposed drainage revisions and have the following comments and recommendations:

- The contributing area to the KDOT storm sewer is essentially unchanged from the existing to the proposed condition.
- The increased flow that will be produced by increasing the pipe size from 15 inches to 18 inches is small relative to the amount of water already carried by the KDOT storm sewer system. This increase pipe size should not adversely affect the level of service provided by the current KDOT storm sewer system.
- When converted to NGVD elevation, the invert elevation of the proposed 18-inch pipe into the KDOT system is 1293.95 feet. The as-built plans show the invert elevation of the existing 15-inch pipe into the KDOT system as 1295.1 ±. Proposed flowlines should be field verified to be sure that connection to the manhole will properly align with the existing 15-inch pipe location and that the manhole connection is property repaired/adjusted.

We are returning the attachments. If you have any additional questions, please contact Howard Lubliner at (785) 296-0143.

RGA:js

Attachment

COMPUTATIONS FOR EXISTING CONDITIONS

Inlet E1 – COW Type II (Combination Curb Opening & Grate) inlet for parking lot west of Newman Universities DeMattias Hall.
Inlet is in a sump and for comparison to proposed storm sewer, will look at a 5-year storm event.
Drainage Area = **0.77 acres** (see accompanied drainage map)
C_5-value: (90%) Pavement = (0.90)(0.88) = 0.79
(10%) Lawn = (0.10)(0.22) = 0.02
0.81
Flow Length (L) = 340'
Δ Elevation (H) = 114.98 – 110.62 = 4.36'

Time of Concentration: $T_{C5} = \frac{[1.8(1.1-C_5)(L)^{1/2}]}{(S_A)^{1/3}}$

$= \frac{[1.8(1.1-0.81)(340')^{1/2}]}{[(4.36/340)*100]^{1/3}} = 8.86$ minutes (Use 15 minute minimum)

Therefore; Intensity (I) = **4.56 inches/hr.**
(Rainfall Intensity Charts, SG County, 1997)

Q_5 = (0.81)(4.56 "/hr.)(0.77 acres) = 2.84 cfs

Inlet E2 – COW Type II (Combination Curb Opening & Grate) inlet for parking lot north of DeMattias Hall, west half. Included in these calculations are roof drains off the hall onto the parking area.
Inlet is in sump and used a 5-year storm event.
Drainage Area = **1.47 acres** (see accompanied drainage map)
C_5-value: (65%) Pavement = (0.65)(0.88) = 0.57
(35%) Lawn = (0.35)(0.22) = 0.08
0.65
Flow Length (L) = 610'
Δ Elevation (H) = 115.00 – 111.41 = 3.59'

Time of Concentration: $T_{C5} = \frac{[1.8(1.1-C_5)(L)^{1/2}]}{(S_A)^{1/3}}$

$= \frac{[1.8(1.1-0.65)(610')^{1/2}]}{[(3.59/610)*100]^{1/3}} = 23.872$ minutes = 24 minutes

Therefore; Intensity (I) = **3.65 inches/hr.**
(Rainfall Intensity Charts, SG County, 1997)
Assumption: 4" PVC Roof drains are running full at 1.00% grade, therefore 0.29 cfs per outlet. There are seven (7) outlets on this side.

Q_5 = (0.65)(3.65 "/hr.)(1.47 acres) + 7(0.29 cfs) = 5.52 cfs

Inlet E3 – COW Type II (Combination Curb Opening & Grate) inlet at entrance of roadway leading to parking lots off of N. Sheridan, south side of road.
Inlet is in sump and used a 5-year storm event.
Drainage Area = **0.14 acres** (see accompanied drainage map)
C_5-value: (95%) Pavement = (0.95)(0.88) = 0.84
(5%) Lawn = (0.05)(0.22) = 0.01
0.85
Flow Length (L) = 200'
Δ Elevation (H) = 114.00 – 110.71 = 3.29'
Time of Concentration: $T_{C5} = \frac{[1.8(1.1-C_5)(L)^{1/2}]}{(S_A)^{1/3}}$

$= \frac{[1.8(1.1-0.85)(200')^{1/2}]}{[(3.29/200)*100]^{1/3}} = 5.391$ minutes (Use 15 minute minimum)

Therefore; Intensity (I) = **4.56 inches/hr.**
(Rainfall Intensity Charts, SG County, 1997)

Q_5 = (0.85)(4.56 "/hr.)(0.14 acres) = 0.54 cfs

Inlet E4 – COW Type II (Combination Curb Opening & Grate) inlet at entrance of roadway leading to parking lots off of N. Sheridan, north side of road.
Inlet is in sump and used a 5-year storm event.
Drainage Area = **1.03 acres** (see accompanied drainage map)
C_5-value: (80%) Pavement = (0.80)(0.88) = 0.70
(20%) Lawn = (0.20)(0.22) = 0.04
0.74
Flow Length (L) = 450'
Δ Elevation (H) = 114.09 – 110.72 = 3.29'
Time of Concentration: $T_{C5} = \frac{[1.8(1.1-C_5)(L)^{1/2}]}{(S_A)^{1/3}}$

$= \frac{[1.8(1.1-0.74)(450')^{1/2}]}{[(3.29/450)*100]^{1/3}} = 15.259$ minutes (Use 15 minute minimum)

Therefore; Intensity (I) = **4.56 inches/hr.**
(Rainfall Intensity Charts, SG County, 1997)

Q_5 = (0.74)(4.56 "/hr.)(1.03 acres) = 3.48 cfs

Inlet E5 – COW Type 1A (Depressed curb opening) for parking lot for apartment complex west of N. Sheridan.
Inlet is in sump and used a 5-year storm event.
Drainage Area = **0.37 acres** (see accompanied drainage map)
C_5-value: (100%) Pavement = (1.00)(0.88) = **0.88**

Flow Length (L) = 210'
Δ Elevation (H) = 113.86 – 111.67 = 2.19'
Time of Concentration: $T_{C5} = \frac{[1.8(1.1-C_5)(L)^{1/2}]}{(S_A)^{1/3}}$

$= \frac{[1.8(1.1-0.88)(210')^{1/2}]}{[(2.19/210)*100]^{1/3}} = 5.659$ minutes (Use 15 minute minimum)

Therefore; Intensity (I) = **4.56 inches/hr.**
(Rainfall Intensity Charts, SG County, 1997)

Q_5 = (0.88)(4.56 "/hr.)(0.37 acres) = <u>1.48 cfs</u>

Total existing flow toward KDOT Storm Sewer System = 2.84+5.52+0.54+3.48+1.48 = <u>13.86 cfs</u>

If however, this system is backing up as indicated, the 15" RCP may be reacting as a pressure pipe. In that case the following are the calculations for a pipe under pressure;

$$Q = A(2gH/1+K_M+K_PL)^{1/2}$$

A = pipe area = πr^2 = (3.1416)(1.25'/2)^2 = 1.227 ft^2
g = gravitational acceleration = 32.2 ft/s^2
H= elevation difference (head) =
112.02 (elev of overtopping)- 107.18(center of outfall pipe) = 4.84'
K_M = Coefficient of Minor Losses = 1.0
n = Manning's pipe coefficient for concrete pipe = 0.013
K_P = Pipe loss coefficient = (29.16 n^2/r$^{4/3}$) = [29.16(0.013)^2]/(0.31)$^{4/3}$ = 0.0232
r = hydraulic radius = D/4 (for full pipe) = 0.31'
L = Pipe Length = 86'

$$Q = (1.227)[(2*32.2*4.84)/(1+1.0+(0.0232*86))]^{1/2} = \underline{\mathbf{10.84\ cfs}}$$

COMPUTATIONS FOR PROPOSED CONDITIONS

Inlet P1 – COW Type II (Combination Curb Opening & Grate) inlet for south portion of parking lot west of Newman Universities DeMattias Hall.
Inlet is in a sump and designed for a 5- year storm event.
Drainage Area = **0.36 acres** (see accompanied drainage map)
C_5-value: (95%) Pavement = (0.95)(0.88) = 0.84
(5%) Lawn = (0.05)(0.22) = 0.01
0.85

Flow Length (L) = 250'
Δ Elevation (H) = 115.00 – 112.27 = 2.73'

Time of Concentration: $T_{C5} = \frac{[1.8(1.1-C_5)(L)^{1/2}]}{(S_A)^{1/3}}$

$= \frac{[1.8(1.1-0.85)(250')^{1/2}]}{[(2.73/250)*100]^{1/3}} = 6.909$ minutes (Use 15 minute minimum)

Therefore; Intensity (I) = **4.56 inches/hr.**
(Rainfall Intensity Charts, SG County, 1997)

Q_5 = (0.85)(4.56 "/hr.)(0.36 acres) = 1.40 cfs

Inlet P2 – COW Type 1 (Curb Opening, 5' Opening) inlet for north portion of parking lot west of Newman Universities DeMattias Hall.
Inlet is in sump and designed for a 5- year storm event.
Drainage Area = **0.31 acres** (see accompanied drainage map)
C_5-value: (95%) Pavement = (0.95)(0.88) = 0.84
(5%) Lawn = (0.05)(0.22) = 0.01
0.85

Flow Length (L) = 200'
Δ Elevation (H) = 115.00 – 112.50 = 2.50'

Time of Concentration: $T_{C5} = \frac{[1.8(1.1-C_5)(L)^{1/2}]}{(S_A)^{1/3}}$

$= \frac{[1.8(1.1-0.85)(200')^{1/2}]}{[(2.50/200)*100]^{1/3}} = 5.908$ minutes (Use 15 minute minimum)

Therefore; Intensity (I) = **4.56 inches/hr.**
(Rainfall Intensity Charts, SG County, 1997)

Q_5 = (0.85)(4.56 "/hr.)(0.31 acres) = 1.20 cfs

Inlet P3 – COW Type 1A (Depressed Curb Opening, 10'opening) inlet at the sump in proposed McCormick Ave., south side of road.
This inlet will be connected to a 8" PVC trunk line for roof drains.
Used a 5-year storm event.
Drainage Area = **1.27 acres** (see accompanied drainage map)
C_5-value: (65%) Pavement = (0.65)(0.88) = 0.57
(35%) Lawn = (0.35)(0.22) = 0.08
0.65

Flow Length (L) = 610'
Δ Elevation (H) = 115.10 – 110.70 = 4.40'
Time of Concentration: $T_{C5} = \frac{[1.8(1.1-C_5)(L)^{1/2}]}{(S_A)^{1/3}}$

$= \frac{[1.8(1.1-0.65)(610')^{1/2}]}{[(4.40/610)*100]^{1/3}} = 22.307$ minutes = 22 minutes

Therefore; Intensity (I) = **3.81 inches/hr.**
(Rainfall Intensity Charts, SG County, 1997)

Assumption: 8" PVC Roof drain trunk line is running full at 1.00% grade, therefore 1.77 cfs .

Q_5 = (0.65)(3.81 "/hr.)(1.27 acres)+ 1.77cfs = 4.92 cfs

Inlet P4 – COW Type 1A (Depressed Curb Opening, 5'opening) inlet at the sump in proposed McCormick Ave., north side of road.
Used a 5-year storm event.
Drainage Area = **0.58 acres** (see accompanied drainage map)
C_5-value: (60%) Pavement = (0.60)(0.88) = 0.53
(40%) Lawn = (0.40)(0.22) = 0.09
0.62

Flow Length (L) = 435'
Δ Elevation (H) = 113.34 – 110.70 = 2.64'
Time of Concentration: $T_{C5} = \frac{[1.8(1.1-C_5)(L)^{1/2}]}{(S_A)^{1/3}}$

$= \frac{[1.8(1.1-0.62)(435')^{1/2}]}{[(2.64/435)*100]^{1/3}} = 21.284$ minutes = 21 minutes

Therefore; Intensity (I) = **3.90 inches/hr.**
(Rainfall Intensity Charts, SG County, 1997)

Q_5 = (0.62)(3.90 "/hr.)(0.58 acres) = 1.40 cfs

Inlet P5 – COW Type 1A (Depressed curb opening) for parking lot for apartment complex west of N. Sheridan.
Inlet is in sump and used a 5-year storm event.
Drainage Area = **1.20 acres** (see accompanied drainage map)
C_5-value: (50%) Pavement = (0.50)(0.88) = 0.44
(20%) Roofs = (0.20)(0.85) = 0.17
(30%) Lawns = (0.30)(0.22) = 0.07
0.68

Flow Length (L) = 420'
Δ Elevation (H) = 114.09 – 111.80 = 2.29'
Time of Concentration: $T_{C5} = \frac{[1.8(1.1-C_5)(L)^{1/2}]}{(S_A)^{1/3}}$

$= \frac{[1.8(1.1-0.68)(420')^{1/2}]}{[(2.29/420)*100]^{1/3}} = 18.965$ minutes = 19 minutes

Therefore; Intensity (I) = **4.10 inches/hr.**
(Rainfall Intensity Charts, SG County, 1997)

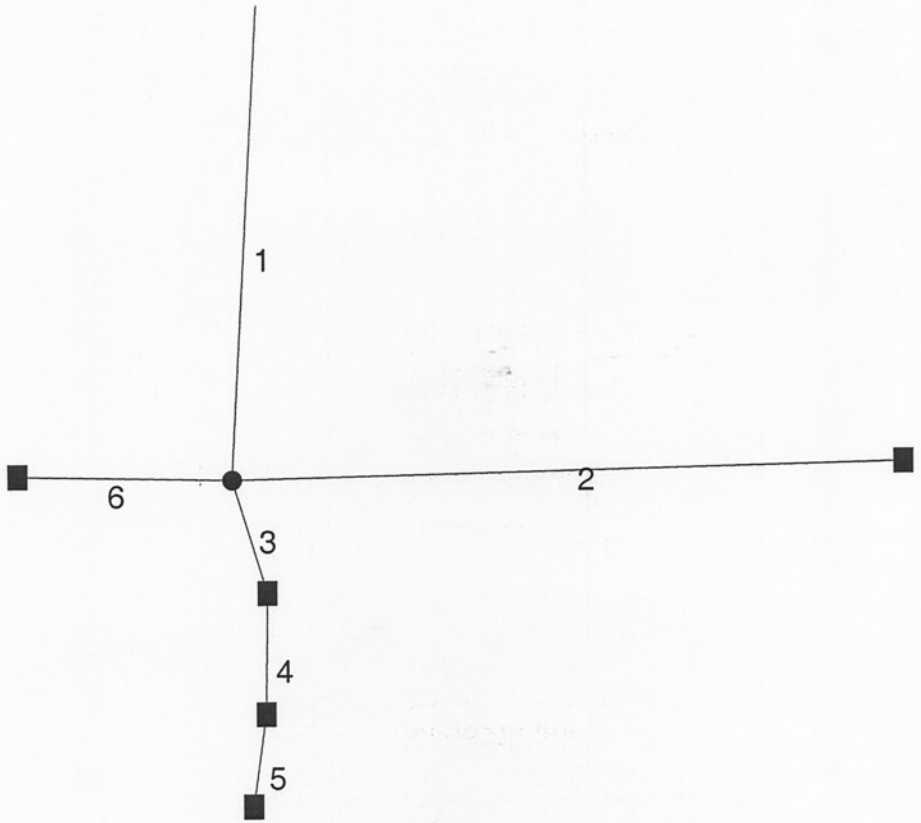
Q_5 = (0.68)(4.10 "/hr.)(1.20 acres) = 3.35 cfs

Total proposed flow toward KDOT Storm Sewer System = 1.40+1.20+4.92+1.40+3.35 = 12.27 cfs

Appendix F

HYDRAFLOW CALCS

Hydraflow Plan View



Project file: ExistMcCorm.stm	IDF file: sampleFHA.IDF	No. Lines: 6	04-08-2005

Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		13.86	15 c	86.0	106.55	107.55	1.163	107.80*	111.76*	1.98	End
2		5.52	12 c	153.0	107.80	108.60	0.523	113.75*	117.42*	0.77	1
3		6.86	15 c	22.0	107.77	107.97	0.909	113.75*	114.00*	0.34	1
4		3.38	15 c	22.0	107.93	108.03	0.455	114.34*	114.40*	0.06	3
5		2.84	12 c	17.0	108.04	108.12	0.471	114.45*	114.56*	0.20	4
6		1.48	12 c	49.0	107.70	108.29	1.204	113.75*	113.83*	0.06	1

Project File: ExistMcCorm.stm | IDF File: sampleFHA.IDF | Total No. Lines: 6 | Run Date: 04-08-2005

NOTES: c = circular; e = elliptical; b = box; Return period = 5 Yrs.; * Indicates surcharge condition.

Hydraflow Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	86.0	0.00	0.00	0.00	0.00	0.00	0.0	0.4	0.0	13.86	6.96	11.30	15	1.16	107.55	106.55	111.76	107.80	111.85	112.03	
2	1	153.0	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	5.52	2.58	7.03	12	0.52	108.60	107.80	117.42	113.75	111.36	111.85	
3	1	22.0	0.00	0.00	0.00	0.00	0.00	0.0	0.2	0.0	6.86	6.16	5.59	15	0.91	107.97	107.77	114.00	113.75	110.76	111.85	
4	3	22.0	0.00	0.00	0.00	0.00	0.00	0.0	0.1	0.0	3.38	4.35	2.75	15	0.45	108.03	107.93	114.40	114.34	110.80	110.76	
5	4	17.0	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	2.84	2.44	3.62	12	0.47	108.12	108.04	114.56	114.45	111.02	110.80	
6	1	49.0	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	1.48	3.91	1.88	12	1.20	108.29	107.70	113.83	113.75	111.56	111.85	

Project File: ExistMcCorm.stm

IDF File: sampleFHA.IDF

Total number of lines: 6

Run Date: 04-08-2005

NOTES: Intensity = 79.26 / (Inlet time + 14.60) ^ 0.84; Return period = 5 Yrs. ; Initial tailwater elevation = 107.80 (ft)

Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)	Dep (in)	
1		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2		5.52*	0.00	5.52	0.00	Comb	6.0	2.30	1.60	2.30	1.23	Sag	2.00	0.130	0.021	0.000	0.59	17.78	0.54	17.78	2.00	1
3		3.48*	0.00	3.48	0.00	Comb	6.0	2.30	1.60	2.30	1.23	Sag	2.00	0.130	0.021	0.000	0.45	11.11	0.40	11.11	2.00	1
4		0.54*	0.00	0.54	0.00	Comb	6.0	2.30	1.60	2.30	1.23	Sag	2.00	0.130	0.021	0.000	0.17	1.32	0.12	1.15	2.00	3
5		2.84*	0.00	2.84	0.00	Comb	6.0	2.30	1.60	2.30	1.23	Sag	2.00	0.130	0.021	0.000	0.40	8.73	0.35	8.73	2.00	4
6		1.48*	0.00	1.48	0.00	Curb	6.0	2.30	0.00	0.00	0.00	Sag	2.00	0.130	0.021	0.000	0.44	10.79	0.39	10.79	2.00	1

Project File: ExistMcCorm.stm | I-D-F File: sampleFHA.IDF | Total number of lines: 6 | Run Date: 04-08-2005

NOTES: Inlet N-Values = 0.016 ; Intensity = 79.26 / (Inlet time + 14.60) ^ 0.84; Return period = 5 Yrs. ; * Indicates Known Q added

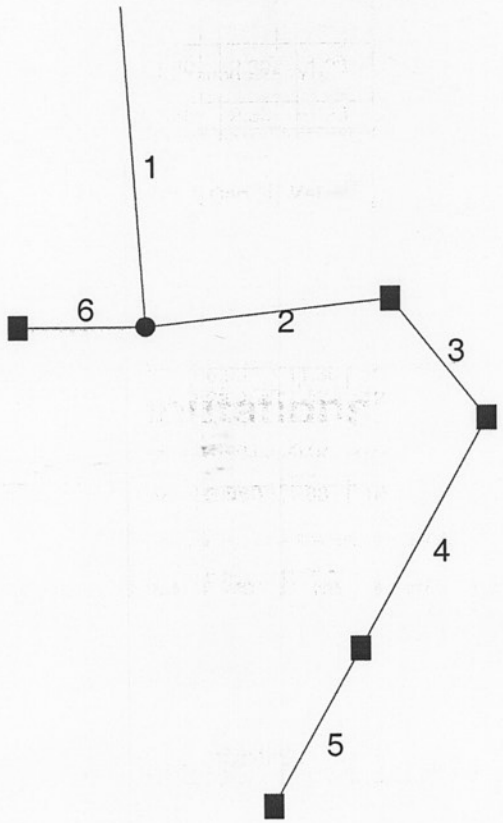
Hydraflow Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	15	13.86	106.55	107.80	1.25	1.23	11.30	1.98	109.78	4.609	86.0	107.55	111.76	1.25	1.23	11.29	1.98	113.75	4.607	4.608	3.963	1.00	1.98
2	12	5.52	107.80	113.75	1.00	0.79	7.03	0.77	114.52	2.404	153	108.60	117.42	1.00	0.79	7.03	0.77	118.19	2.403	2.403	3.677	1.00	0.77
3	15	6.86	107.77	113.75	1.25	1.23	5.59	0.49	114.23	1.129	22.0	107.97	114.00	1.25	1.23	5.59	0.49	114.48	1.129	1.129	0.248	0.70	0.34
4	15	3.38	107.93	114.34	1.25	1.23	2.75	0.12	114.45	0.274	22.0	108.03	114.40	1.25	1.23	2.75	0.12	114.51	0.274	0.274	0.060	0.50	0.06
5	12	2.84	108.04	114.45	1.00	0.79	3.62	0.20	114.66	0.636	17.0	108.12	114.56	1.00	0.79	3.62	0.20	114.77	0.636	0.636	0.108	1.00	0.20
6	12	1.48	107.70	113.75	1.00	0.79	1.88	0.06	113.80	0.173	49.0	108.29	113.83	1.00	0.79	1.88	0.06	113.89	0.173	0.173	0.085	1.00	0.06

Project File: ExistMcCorm.stm | IDF File: sampleFHA.IDF | Total number of lines: 6 | Run Date: 04-08-2005

NOTES: Initial tailwater elevation = 107.8 (ft) , * Normal depth assumed., ** Critical depth assumed.

Hydraflow Plan View



Project file: KDOTMcCormProp.stm	IDF file: sampleFHA.IDF	No. Lines: 6	04-08-2005

Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	100.0	85.0	MH	0.00	0.00	0.00	0.0	106.55	1.00	107.55	18	Cir	0.013	1.00	112.03	
2	1	96.0	-90.0	Curb	1.40	0.00	0.00	0.0	107.65	0.30	107.94	24	Cir	0.013	1.10	111.62	
3	2	53.0	50.0	Curb	5.33	0.00	0.00	0.0	108.04	0.30	108.20	18	Cir	0.013	1.50	111.62	
4	3	87.0	80.0	Curb	1.20	0.00	0.00	0.0	108.30	1.10	109.26	15	Cir	0.013	0.50	112.50	
5	4	60.0	0.0	Comb	1.40	0.00	0.00	0.0	109.36	0.30	109.54	15	Cir	0.013	1.00	112.33	
6	1	50.0	95.0	Curb	3.25	0.00	0.00	0.0	107.70	1.18	108.29	12	Cir	0.013	1.00	111.56	

Project File: KDOTMcCormProp.stm | IDF File: sampleFHA.IDF | Total number of lines: 6 | Date: 04-08-2005

Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		12.58	18 c	100.0	106.55	107.55	1.000	108.05*	109.49*	0.79	End
2		9.33	24 c	96.0	107.65	107.94	0.302	110.27*	110.44*	0.15	1
3		7.93	18 c	53.0	108.04	108.20	0.302	110.59*	110.89*	0.47	2
4		2.60	15 c	87.0	108.30	109.26	1.103	111.36*	111.50*	0.03	3
5		1.40	15 c	60.0	109.36	109.54	0.300	111.54*	111.56*	0.02	4
6		3.25	12 c	50.0	107.70	108.29	1.180	110.27*	110.69*	0.27	1

Project File: KDOTMcCormProp.stm | IDF File: sampleFHA.IDF | Total No. Lines: 6 | Run Date: 04-08-2005

NOTES: c = circular; e = elliptical; b = box; Return period = 5 Yrs.; * Indicates surcharge condition.

Hydraflow Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	100.0	0.00	0.00	0.00	0.00	0.00	0.0	2.3	0.0	12.58	10.50	7.12	18	1.00	107.55	106.55	109.49	108.05	112.03	112.03	
2	1	96.0	0.00	0.00	0.00	0.00	0.00	0.0	1.8	0.0	9.33	12.43	2.97	24	0.30	107.94	107.65	110.44	110.27	111.62	112.03	
3	2	53.0	0.00	0.00	0.00	0.00	0.00	0.0	1.6	0.0	7.93	5.77	4.49	18	0.30	108.20	108.04	110.89	110.59	111.62	111.62	
4	3	87.0	0.00	0.00	0.00	0.00	0.00	0.0	0.9	0.0	2.60	6.78	2.12	15	1.10	109.26	108.30	111.50	111.36	112.50	111.62	
5	4	60.0	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	1.40	3.54	1.14	15	0.30	109.54	109.36	111.56	111.54	112.33	112.50	
6	1	50.0	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	3.25	3.87	4.14	12	1.18	108.29	107.70	110.69	110.27	111.56	112.03	

Project File: KDOTMcCormProp.stm | IDF File: sampleFHA.IDF | Total number of lines: 6 | Run Date: 04-08-2005

NOTES: Intensity = 79.26 / (Inlet time + 14.60) ^ 0.84; Return period = 5 Yrs. ; Initial tailwater elevation = 108.05 (ft)

Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)	Dep (in)	
1		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
2		1.40*	0.00	1.40	0.00	Curb	6.0	5.00	0.00	0.00	0.00	Sag	2.17	0.110	0.021	0.000	0.36	7.89	0.33	7.89	2.00	1
3		5.33*	0.00	5.33	0.00	Curb	6.0	10.00	0.00	0.00	0.00	Sag	2.17	0.110	0.021	0.000	0.49	14.33	0.47	14.33	2.00	2
4		1.20*	0.00	1.20	0.00	Curb	6.0	5.00	0.00	0.00	0.00	Sag	0.01	0.001	0.005	0.000	0.22	43.89	0.39	43.89	2.00	3
5		1.40*	0.00	1.40	0.00	Comb	5.0	2.30	3.20	2.30	1.23	Sag	2.17	0.110	0.005	0.000	0.28	10.67	0.22	10.67	2.00	4
6		3.25*	0.00	3.25	0.00	Curb	6.0	5.00	0.00	0.00	0.00	Sag	2.17	0.110	0.005	0.000	0.52	58.26	0.46	58.26	2.00	1

Project File: KDOTMcCormProp.stm | I-D-F File: sampleFHA.IDF | Total number of lines: 6 | Run Date: 04-08-2005

NOTES: Inlet N-Values = 0.016 ; Intensity = 79.26 / (Inlet time + 14.60) ^ 0.84; Return period = 5 Yrs. ; * Indicates Known Q added

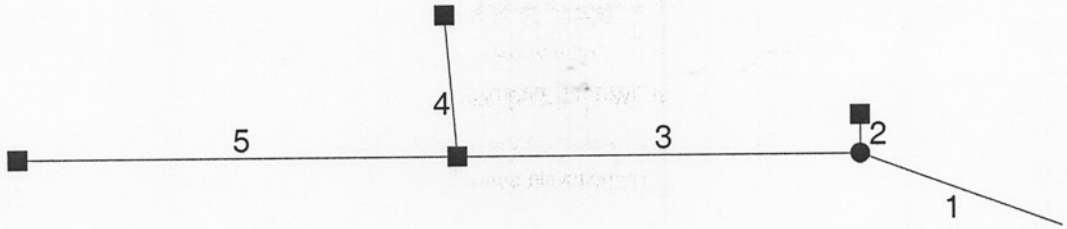
Hydraflow Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	18	12.58	106.55	108.05	1.50	1.77	7.12	0.79	108.84	1.436	100	107.55	109.49	1.50	1.77	7.12	0.79	110.27	1.435	1.435	1.435	1.00	0.79
2	24	9.33	107.65	110.27	2.00	3.14	2.97	0.14	110.41	0.170	96.0	107.94	110.44	2.00	3.14	2.97	0.14	110.57	0.170	0.170	0.163	1.10	0.15
3	18	7.93	108.04	110.59	1.50	1.77	4.49	0.31	110.90	0.571	53.0	108.20	110.89	1.50	1.77	4.49	0.31	111.20	0.570	0.570	0.302	1.50	0.47
4	15	2.60	108.30	111.36	1.25	1.23	2.12	0.07	111.43	0.162	87.0	109.26	111.50	1.25	1.23	2.12	0.07	111.57	0.162	0.162	0.141	0.50	0.03
5	15	1.40	109.36	111.54	1.25	1.23	1.14	0.02	111.56	0.047	60.0	109.54	111.56	1.25	1.23	1.14	0.02	111.58	0.047	0.047	0.028	1.00	0.02
6	12	3.25	107.70	110.27	1.00	0.79	4.14	0.27	110.54	0.833	50.0	108.29	110.69	1.00	0.79	4.14	0.27	110.96	0.833	0.833	0.417	1.00	0.27

Project File: KDOTMcCormProp.stm | IDF File: sampleFHA.IDF | Total number of lines: 6 | Run Date: 04-08-2005

NOTES: Initial tailwater elevation = 108.05 (ft) , * Normal depth assumed., ** Critical depth assumed.

Hydraflow Plan View



Project file: McCormLine1&2.stm	IDF file: sampleFHA.IDF	No. Lines: 5	04-08-2005

Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	73.0	-160.0	MH	0.00	0.00	0.00	0.0	106.46	1.00	107.19	34 53	Ellip	0.013	0.85	111.88	
2	1	13.0	70.0	DrGrt	0.15	0.00	0.00	0.0	107.12	1.23	107.28	24 38	Ellip	0.013	1.00	111.51	
3	1	137.0	-20.0	Curb	3.39	0.00	0.00	0.0	107.29	0.30	107.70	30	Cir	0.013	1.50	111.39	
4	3	48.0	85.0	Comb	8.91	0.00	0.00	0.0	107.80	0.29	107.94	18	Cir	0.013	1.00	111.39	
5	3	150.0	0.0	Curb	3.47	0.00	0.00	0.0	107.80	0.90	109.15	18	Cir	0.013	1.00	112.05	

Project File: McCormLine1&2.stm | IDF File: sampleFHA.IDF | Total number of lines: 5 | Date: 04-08-2005

Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		15.92	34 x 53 e	73.0	106.46	107.19	1.000	107.74	108.47	0.18	End
2		0.15	24 x 38 e	13.0	107.12	107.28	1.231	108.65	108.68	0.00	1
3		15.77	30 c	137.0	107.29	107.70	0.299	108.84	109.24	0.57	1
4		8.91	18 c	48.0	107.80	107.94	0.292	109.82*	110.16*	0.40	3
5		3.47	18 c	150.0	107.80	109.15	0.900	109.82	110.00	0.18	3

Project File: McCormLine1&2.stm	IDF File: sampleFHA.IDF	Total No. Lines: 5	Run Date: 04-08-2005

NOTES: c = circular; e = elliptical; b = box; Return period = 5 Yrs.; * Indicates surcharge condition.

Hydraflow Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	73.0	0.00	0.00	0.00	0.00	0.00	0.0	7.2	0.0	15.92	115.1	3.70	36 e	1.00	107.19	106.46	108.47	107.74	111.88	111.88	
2	1	13.0	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.15	51.73	0.04	24 e	1.23	107.28	107.12	108.68	108.65	111.51	111.88	
3	1	137.0	0.00	0.00	0.00	0.00	0.00	0.0	1.3	0.0	15.77	22.44	4.95	30	0.30	107.70	107.29	109.24	108.84	111.39	111.88	
4	3	48.0	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	8.91	5.67	5.04	18	0.29	107.94	107.80	110.16	109.82	111.39	111.39	
5	3	150.0	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	3.47	9.96	2.66	18	0.90	109.15	107.80	110.00	109.82	112.05	111.39	

Project File: McCormLine1&2.stm | IDF File: sampleFHA.IDF | Total number of lines: 5 | Run Date: 04-08-2005

NOTES: Intensity = 79.26 / (Inlet time + 14.60) ^ 0.84; Return period = 5 Yrs. ; Initial tailwater elevation = 107.74 (ft)

Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)	Dep (in)	
1		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
2		0.15*	0.00	0.15	0.00	DrGrt	0.0	0.00	8.00	2.00	4.00	Sag	4.00	0.001	0.001	0.000	0.03	62.38	0.03	62.38	0.0	1
3		3.39*	0.00	3.39	0.00	Curb	6.0	5.00	0.00	0.00	0.00	Sag	2.17	0.110	0.021	0.000	0.49	14.27	0.47	14.27	2.00	1
4		8.91*	0.00	8.91	0.00	Comb	5.0	5.00	3.20	2.30	1.23	Sag	2.17	0.110	0.021	0.000	0.77	27.30	0.74	27.30	2.00	3
5		3.47*	0.00	3.47	0.00	Curb	6.0	10.00	0.00	0.00	0.00	0.001	2.17	0.110	0.016	0.013	0.49	17.88	0.45	17.77	2.00	3

Project File: McCormLine1&2.stm | I-D-F File: sampleFHA.IDF | Total number of lines: 5 | Run Date: 04-08-2005

NOTES: Inlet N-Values = 0.016 ; Intensity = 79.26 / (Inlet time + 14.60) ^ 0.84; Return period = 5 Yrs. ; * Indicates Known Q added

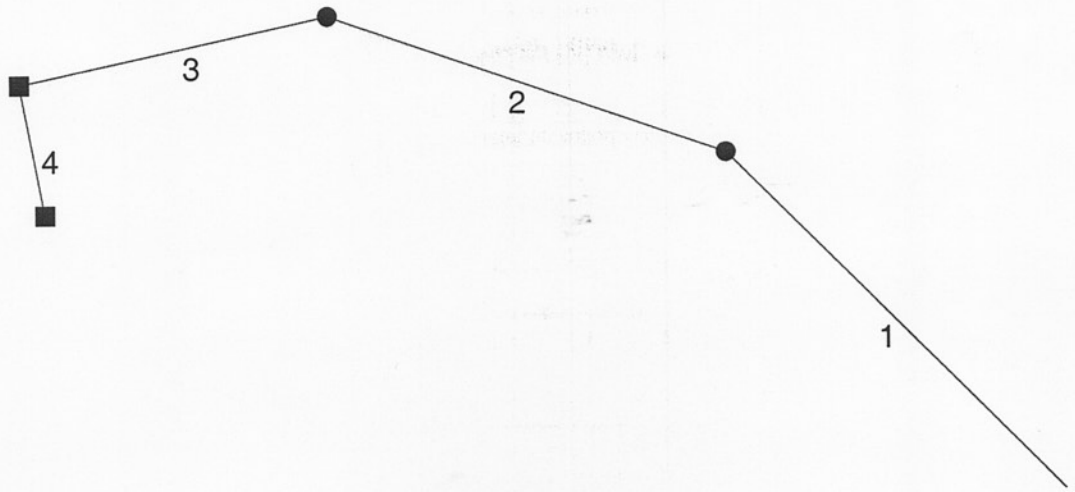
Hydraflow Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	34 53 e	15.92	106.46	107.74	1.28	4.30	3.70	0.21	107.95	0.143	73.0	107.19	108.47	1.28**	4.30	3.70	0.21	108.68	0.143	0.143	N/A	0.85	0.18
2	24 38 e	0.15	107.12	108.65	1.53	4.24	0.04	0.00	108.65	0.000	13.0	107.28	108.68	1.40	3.69	0.04	0.00	108.68	0.000	0.000	0.000	1.00	0.00
3	30	15.77	107.29	108.84	1.55*	3.19	4.95	0.38	109.22	0.299	137	107.70	109.24	1.54	3.18	4.96	0.38	109.63	0.301	0.300	0.411	1.50	0.57
4	18	8.91	107.80	109.82	1.50	1.77	5.04	0.40	110.21	0.720	48.0	107.94	110.16	1.50	1.77	5.04	0.40	110.56	0.720	0.720	0.346	1.00	0.40
5	18	3.47	107.80	109.82	1.50	1.77	1.96	0.06	109.88	0.109	150	109.15	110.00	0.85	1.03	3.36	0.18	110.18	0.290	0.200	0.299	1.00	0.18

Project File: McCormLine1&2.stm | IDF File: sampleFHA.IDF | Total number of lines: 5 | Run Date: 04-08-2005

NOTES: Initial tailwater elevation = 107.735 (ft) , * Normal depth assumed., ** Critical depth assumed.

Hydraflow Plan View



Project file: McCormLine4.stm	IDF file: sampleFHA.IDF	No. Lines: 4	04-08-2005

Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	188.0	-135.0	MH	0.00	0.00	0.00	0.0	106.00	0.30	106.56	18	Cir	0.013	0.45	115.20	
2	1	165.0	-26.0	MH	0.00	0.00	0.00	0.0	106.66	0.30	107.16	18	Cir	0.013	0.45	112.00	
3	2	124.0	-31.0	Curb	3.41	0.00	0.00	0.0	107.26	0.30	107.63	18	Cir	0.013	1.50	112.31	
4	3	52.0	-89.0	Curb	1.03	0.00	0.00	0.0	108.78	0.31	108.94	15	Cir	0.013	1.00	112.31	

Project File: McCormLine4.stm | IDF File: sampleFHA.IDF | Total number of lines: 4 | Date: 04-08-2005

Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		4.44	18 c	188.0	106.00	106.56	0.298	106.99	107.55	0.09	End
2		4.44	18 c	165.0	106.66	107.16	0.303	107.65	108.14	0.09	1
3		4.44	18 c	124.0	107.26	107.63	0.298	108.25	108.62	0.30	2
4		1.03	15 c	52.0	108.78	108.94	0.308	109.24	109.40	0.10	3

Project File: McCormLine4.stm | IDF File: sampleFHA.IDF | Total No. Lines: 4 | Run Date: 04-08-2005

NOTES: c = circular; e = elliptical; b = box; Return period = 5 Yrs.; * Indicates surcharge condition.

Hydraflow Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	188.0	0.00	0.00	0.00	0.00	0.00	0.0	2.9	0.0	4.44	5.73	3.59	18	0.30	106.56	106.00	107.55	106.99	115.20	0.00	
2	1	165.0	0.00	0.00	0.00	0.00	0.00	0.0	1.9	0.0	4.44	5.78	3.60	18	0.30	107.16	106.66	108.14	107.65	112.00	115.20	
3	2	124.0	0.00	0.00	0.00	0.00	0.00	0.0	1.0	0.0	4.44	5.74	3.58	18	0.30	107.63	107.26	108.62	108.25	112.31	112.00	
4	3	52.0	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	1.03	3.58	2.51	15	0.31	108.94	108.78	109.40	109.24	112.31	112.31	

Project File: McCormLine4.stm

IDF File: sampleFHA.IDF

Total number of lines: 4

Run Date: 04-08-2005

NOTES: Intensity = 79.26 / (Inlet time + 14.60) ^ 0.84; Return period = 5 Yrs. ; Initial tailwater elevation = 106.99 (ft)

Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)	Dep (in)	
1		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
2		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	1
3		3.41*	0.00	3.41	0.00	Curb	6.0	5.00	0.00	0.00	0.00	Sag	2.17	0.110	0.021	0.000	0.49	14.32	0.47	14.32	2.00	2
4		1.03*	0.00	1.03	0.00	Curb	6.0	10.00	0.00	0.00	0.00	Sag	2.17	0.110	0.021	0.000	0.29	4.77	0.27	4.77	2.00	3

Project File: McCormLine4.stm | I-D-F File: sampleFHA.IDF | Total number of lines: 4 | Run Date: 04-08-2005

NOTES: Inlet N-Values = 0.016 ; Intensity = 79.26 / (Inlet time + 14.60) ^ 0.84; Return period = 5 Yrs. ; * Indicates Known Q added

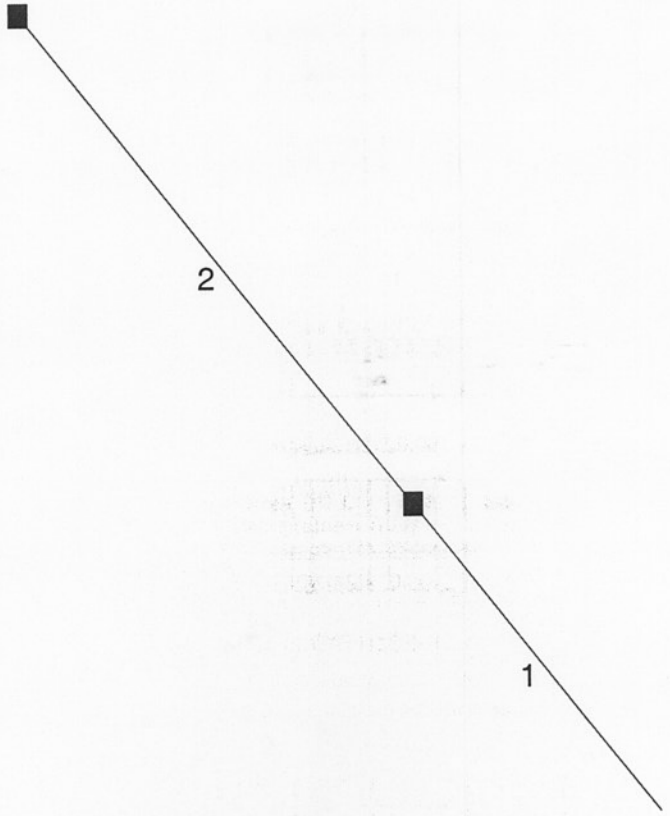
Hydraflow Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	18	4.44	106.00	106.99	0.99	1.24	3.59	0.20	107.19	0.299	188	106.56	107.55	0.99	1.24	3.58	0.20	107.75	0.298	0.299	0.562	0.45	0.09
2	18	4.44	106.66	107.65	0.99*	1.24	3.59	0.20	107.85	0.300	165	107.16	108.14	0.98	1.23	3.61	0.20	108.35	0.304	0.302	0.499	0.45	0.09
3	18	4.44	107.26	108.25	0.99*	1.24	3.58	0.20	108.45	0.297	124	107.63	108.62	0.99	1.24	3.58	0.20	108.82	0.298	0.298	0.369	1.50	0.30
4	15	1.03	108.78	109.24	0.46*	0.41	2.51	0.10	109.34	0.303	52.0	108.94	109.40	0.46	0.41	2.52	0.10	109.50	0.306	0.304	0.158	1.00	0.10

Project File: McCormLine4.stm | IDF File: sampleFHA.IDF | Total number of lines: 4 | Run Date: 04-08-2005

NOTES: Initial tailwater elevation = 106.99 (ft) , * Normal depth assumed., ** Critical depth assumed.

Hydraflow Plan View



Project file: McCormLine5.stm	IDF file: sampleFHA.IDF	No. Lines: 2	04-08-2005

Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	32.0	-135.0	Curb	0.96	0.00	0.00	0.0	106.17	1.00	106.49	15	Cir	0.013	0.50	111.09	
2	1	51.0	0.0	Curb	0.96	0.00	0.00	0.0	106.49	1.00	107.00	15	Cir	0.013	1.00	111.09	

Project File: McCormLine5.stm | IDF File: sampleFHA.IDF | Total number of lines: 2 | Date: 04-08-2005

Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		1.92	15 c	32.0	106.17	106.49	1.000	108.36*	108.39*	0.02	End
2		0.96	15 c	51.0	106.49	107.00	1.000	108.41*	108.42*	0.01	1

Project File: McCormLine5.stm	IDF File: sampleFHA.IDF	Total No. Lines: 2	Run Date: 04-08-2005

NOTES: c = circular; e = elliptical; b = box; Return period = 5 Yrs.; * Indicates surcharge condition.

Hydraflow Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	32.0	0.00	0.00	0.00	0.00	0.00	0.0	1.1	0.0	1.92	6.46	1.56	15	1.00	106.49	106.17	108.39	108.36	111.09	0.00	
2	1	51.0	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.96	6.46	0.78	15	1.00	107.00	106.49	108.42	108.41	111.09	111.09	

Project File: McCormLine5.stm | IDF File: sampleFHA.IDF | Total number of lines: 2 | Run Date: 04-08-2005

NOTES: Intensity = 79.26 / (Inlet time + 14.60) ^ 0.84; Return period = 5 Yrs. ; Initial tailwater elevation = 108.36 (ft)

Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)	Dep (in)	
1		0.96*	0.09	0.94	0.11	Curb	6.0	5.00	0.00	0.00	0.00	0.008	2.17	0.110	0.021	0.013	0.27	3.66	0.26	4.21	2.00	Off
2		0.96*	0.00	0.87	0.09	Curb	6.0	5.00	0.00	0.00	0.00	0.008	2.17	0.110	0.021	0.013	0.26	3.18	0.25	3.78	2.00	1

Project File: McCormLine5.stm | I-D-F File: sampleFHA.IDF | Total number of lines: 2 | Run Date: 04-08-2005

NOTES: Inlet N-Values = 0.016 ; Intensity = 79.26 / (Inlet time + 14.60) ^ 0.84; Return period = 5 Yrs. ; * Indicates Known Q added

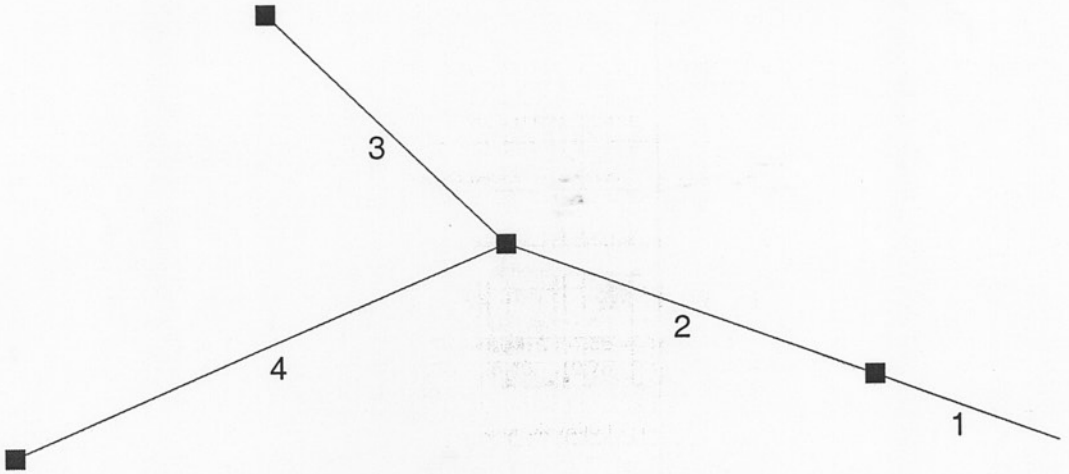
Hydraflow Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	15	1.92	106.17	108.36	1.25	1.23	1.56	0.04	108.40	0.088	32.0	106.49	108.39	1.25	1.23	1.56	0.04	108.43	0.088	0.088	0.028	0.50	0.02
2	15	0.96	106.49	108.41	1.25	1.23	0.78	0.01	108.42	0.022	51.0	107.00	108.42	1.25	1.23	0.78	0.01	108.43	0.022	0.022	0.011	1.00	0.01

Project File: McCormLine5.stm | IDF File: sampleFHA.IDF | Total number of lines: 2 | Run Date: 04-08-2005

NOTES: Initial tailwater elevation = 108.36 (ft) , * Normal depth assumed., ** Critical depth assumed.

Hydraflow Plan View



Project file: McCormLine6&7.stm	IDF file: sampleFHA.IDF	No. Lines: 4	04-08-2005

Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	23.0	-160.0	Curb	1.10	0.00	0.00	0.0	104.63	0.39	104.72	30	Cir	0.013	0.50	109.57	
2	1	46.0	0.0	Curb	4.72	0.00	0.00	0.0	104.82	0.35	104.98	30	Cir	0.013	1.10	109.57	
3	2	39.0	24.0	Curb	6.02	0.00	0.00	0.0	105.08	0.41	105.24	18	Cir	0.013	1.00	109.70	
4	2	63.0	-43.0	Curb	3.20	0.00	0.00	0.0	105.08	0.40	105.33	18	Cir	0.013	1.00	109.73	

Project File: McCormLine6&7.stm | IDF File: sampleFHA.IDF | Total number of lines: 4 | Date: 04-08-2005

Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		15.04	30 c	23.0	104.63	104.72	0.391	108.36*	108.39*	0.07	End
2		13.94	30 c	46.0	104.82	104.98	0.348	108.46*	108.52*	0.14	1
3		6.02	18 c	39.0	105.08	105.24	0.410	108.66*	108.78*	0.18	2
4		3.20	18 c	63.0	105.08	105.33	0.397	108.66*	108.71*	0.05	2

Project File: McCormLine6&7.stm	IDF File: sampleFHA.IDF	Total No. Lines: 4	Run Date: 04-08-2005

NOTES: c = circular; e = elliptical; b = box; Return period = 5 Yrs.; * Indicates surcharge condition.

Hydraflow Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	23.0	0.00	0.00	0.00	0.00	0.00	0.0	0.8	0.0	15.04	25.66	3.06	30	0.39	104.72	104.63	108.39	108.36	109.57	0.00	
2	1	46.0	0.00	0.00	0.00	0.00	0.00	0.0	0.6	0.0	13.94	24.19	2.84	30	0.35	104.98	104.82	108.52	108.46	109.57	109.57	
3	2	39.0	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	6.02	6.73	3.41	18	0.41	105.24	105.08	108.78	108.66	109.70	109.57	
4	2	63.0	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	3.20	6.62	1.81	18	0.40	105.33	105.08	108.71	108.66	109.73	109.57	

Project File: McCormLine6&7.stm

IDF File: sampleFHA.IDF

Total number of lines: 4

Run Date: 04-08-2005

NOTES: Intensity = 79.26 / (Inlet time + 14.60) ^ 0.84; Return period = 5 Yrs. ; Initial tailwater elevation = 108.36 (ft)

Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)	Dep (in)	
1		1.10*	0.00	1.10	0.00	Curb	6.0	5.00	0.00	0.00	0.00	Sag	2.17	0.110	0.016	0.000	0.34	8.81	0.31	8.81	2.00	Off
2		4.72*	0.00	4.72	0.00	Curb	6.0	5.00	0.00	0.00	0.00	Sag	2.17	0.110	0.016	0.000	0.58	23.38	0.54	23.38	2.00	1
3		6.02*	0.00	6.02	0.00	Curb	6.0	15.00	0.00	0.00	0.00	Sag	2.17	0.110	0.001	0.000	0.50	259.82	0.43	259.82	2.00	2
4		3.20*	0.00	3.20	0.00	Curb	6.0	15.00	0.00	0.00	0.00	0.001	2.17	0.110	0.011	0.013	0.45	21.38	0.40	21.39	2.00	2

Project File: McCormLine6&7.stm | I-D-F File: sampleFHA.IDF | Total number of lines: 4 | Run Date: 04-08-2005

NOTES: Inlet N-Values = 0.016 ; Intensity = 79.26 / (Inlet time + 14.60) ^ 0.84; Return period = 5 Yrs. ; * Indicates Known Q added

Hydraflow Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	30	15.04	104.63	108.36	2.50	4.91	3.06	0.15	108.51	0.135	23.0	104.72	108.39	2.50	4.91	3.06	0.15	108.54	0.134	0.135	0.031	0.50	0.07
2	30	13.94	104.82	108.46	2.50	4.91	2.84	0.13	108.59	0.116	46.0	104.98	108.52	2.50	4.91	2.84	0.13	108.64	0.116	0.116	0.053	1.10	0.14
3	18	6.02	105.08	108.66	1.50	1.77	3.41	0.18	108.84	0.329	39.0	105.24	108.78	1.50	1.77	3.41	0.18	108.96	0.329	0.329	0.128	1.00	0.18
4	18	3.20	105.08	108.66	1.50	1.77	1.81	0.05	108.71	0.093	63.0	105.33	108.71	1.50	1.77	1.81	0.05	108.76	0.093	0.093	0.059	1.00	0.05

Project File: McCormLine6&7.stm | IDF File: sampleFHA.IDF | Total number of lines: 4 | Run Date: 04-08-2005

NOTES: Initial tailwater elevation = 108.36 (ft) , * Normal depth assumed., ** Critical depth assumed.