Davidson, Tim

From: Ken Lee [klee@rbkansas.com]
Sent: Thursday, December 10, 2009 11:21 AM
To: Davidson, Tim
Subject: Additional information for FedEx Site
Attachments: Revised FedEx Drainage.pdf

Tim,

Attached is the revised stage storage information for the FedEx site. Following are the revised numbers.

Basin	2 Year	10 Year	100 year
Employee Parking	3.2	5.0	7.5
Tractor Parking	2.4	3.7	5.4
NW Swale	1.2	1.8	2.5
Total Developed to Maize	6.7	10.2	15.1
Predeveloped to Maize	5.4	10.5	17.7
Total Developed to North	6.7	10.2	15.1
Total Predeveloped to North	13.6	26.1	44.3
Developed SE Pond	10.6	29.5	71.9
Predeveloped East Basin	19.1	41.2	74.7

I made some modifications to the flumes that exit the parking lots and was able to get both the 10 and 100 year storms below the predeveloped amount for Maize Road. The 2 year storm is only 1 cfs above the predeveloped. Overall, the amount of water from our site is less than the predeveloped amount in all storms. The modifications we made also limit the depth of the detention to six inches or less, so the curb will retain all water in all rain events. We did end up changing the flume at the northwest corner of the tractor parking to drain into the NW swale to maximize the detention over in that area. The last page of the attached document shows the stage storage information for each basin.

I know that you have concerns about the potential erosion of smaller storms and I know that can be a concern in many channels. I looked at the Maize Road Ditch and it is a 5' flat bottom ditch with 4:1 side slopes. At 5.4 cfs, the ditch will only be flowing approximately six inches deep with a velocity of 1.5 fps. Even in the 100 year condition and including drainage from the fields to the north the ditch will handle at most around 25 cfs, which yields a flow depth of 1.2 feet and a velocity of 2.3 fps. In all storms, the expected flow velocities are well below the threshold that should cause erosion on the established street ditch.

Please review the information attached and let me know if you have any additional questions. Thanks for the help.

Kenneth W. Lee, P.E.
Associate
Ruggles & Bohm, P.A.
924 N. Main
(316) 264-8008, ext. 111
(316) 264-4621 fax
(316) 258-3190 mobile
klee@rbkansas.com

Project: FedEx Simulation Run: Developed 2 Year

Start of Run: 24Sep2009, 12:00 Basin Model: Developed
End of Run: 25Sep2009, 12:04 Meteorologic Model: Met 2
Compute Time: 10Dec2009, 11:05:02 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
East Developed	0.04080	57.3	25Sep2009, 00:08	2.93
East Junction	0.04405	60.8	25Sep2009, 00:12	2.87
Employee Parking Basin	0.00242	3.4	25Sep2009, 00:12	3.04
Employee Parking Detention	0.00242	3.2	25Sep2009, 00:16	3.04
North Offsite	0.00325	3.7	25Sep2009, 00:12	2.17
NW Swale	0.00142	1.2	25Sep2009, 00:28	2.76
NW Swale Basin	0.00142	1.8	25Sep2009, 00:12	2.77
SE Pond	0.04405	10.6	25Sep2009, 00:56	2.82
Total Site	0.04999	16.4	25Sep2009, 00:24	2.85
Tractor Parking Basin	0.00210	3.2	25Sep2009, 00:12	3.31
Tractor Parking Detention	0.00210	2.4	25Sep2009, 00:24	3.30
West Total	0.00594	6.7	25Sep2009, 00:20	3.06

Project: FedEx Simulation Run: Developed 10 year

Start of Run: 24Sep2009, 12:00 Basin Model: Developed
End of Run: 25Sep2009, 12:04 Meteorologic Model: Met 10
Compute Time: 10Dec2009, 11:04:59 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
East Developed	0.04080	91.3	25Sep2009, 00:08	4.62
East Junction	0.04405	97.4	25Sep2009, 00:08	4.56
Employee Parking Basin	0.00242	5.4	25Sep2009, 00:12	4.77
Employee Parking Detention	0.00242	5.0	25Sep2009, 00:16	4.76
North Offsite	0.00325	6.5	25Sep2009, 00:12	3.83
NW Swale	0.00142	1.8	25Sep2009, 00:28	4.44
NW Swale Basin	0.00142	3.0	25Sep2009, 00:12	4.46
SE Pond	0.04405	29.5	25Sep2009, 00:40	4.46
Total Site	0.04999	37.0	25Sep2009, 00:36	4.50
Tractor Parking Basin	0.00210	4.9	25Sep2009, 00:12	5.07
Tractor Parking Detention	0.00210	3.7	25Sep2009, 00:24	5.06
West Total	0.00594	10.2	25Sep2009, 00:20	4.79

Project: FedEx Simulation Run: Developed 100

Start of Run: 24Sep2009, 12:00 Basin Model: Developed
End of Run: 25Sep2009, 12:04 Meteorologic Model: Met 100
Compute Time: 10Dec2009, 11:04:55 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
East Developed	0.04080	139.6	25Sep2009, 00:08	7.02
East Junction	0.04405	149.5	25Sep2009, 00:08	6.96
Employee Parking Basin	0.00242	8.1	25Sep2009, 00:12	7.21
Employee Parking Detention	0.00242	7.5	25Sep2009, 00:16	7.20
North Offsite	0.00325	10.3	25Sep2009, 00:12	6.22
NW Swale	0.00142	2.5	25Sep2009, 00:32	6.85
NW Swale Basin	0.00142	4.6	25Sep2009, 00:12	6.87
SE Pond	0.04405	71.9	25Sep2009, 00:28	6.79
Total Site	0.04999	85.7	25Sep2009, 00:28	6.85
Tractor Parking Basin	0.00210	7.2	25Sep2009, 00:12	7.54
Tractor Parking Detention	0.00210	5.4	25Sep2009, 00:24	7.53
West Total	0.00594	15.1	25Sep2009, 00:20	7.23

Project: FedEx

Simulation Run: Developed 100 Reservoir: Employee Parking Detention

Start of Run:	24Sep2009, 12:00	Basin Model:	Developed
End of Run:	25Sep2009, 12:04	Meteorologic Model:	Met 100
Compute Time:	10Dec2009, 11:04:55	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	8.1 (CFS)	Date/Time of Peak Inflow :	25Sep2009, 00:12
Peak Outflow :	7.5 (CFS)	Date/Time of Peak Outflow :	25Sep2009, 00:16
Total Inflow :	7.21 (IN)	Peak Storage :	0.1 (AC-FT)
Total Outflow :	7.20 (IN)	Peak Elevation :	1333.0 (FT)

6" deep

Project: FedEx

Simulation Run: Developed 100 Reservoir: NW Swale

Start of Run:	24Sep2009, 12:00	Basin Model:	Developed
End of Run:	25Sep2009, 12:04	Meteorologic Model:	Met 100
Compute Time:	10Dec2009, 08:27:55	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	4.6 (CFS)	Date/Time of Peak Inflow :	25Sep2009, 00:12
Peak Outflow :	2.5 (CFS)	Date/Time of Peak Outflow :	25Sep2009, 00:32
Total Inflow :	6.87 (IN)	Peak Storage :	0.1 (AC-FT)
Total Outflow :	6.85 (IN)	Peak Elevation :	1332.0 (FT) (1 foot but only 6" in parking)

Project: FedEx

Simulation Run: Developed 100 Reservoir: Tractor Parking Detention

Start of Run:	24Sep2009, 12:00	Basin Model:	Developed
End of Run:	25Sep2009, 12:04	Meteorologic Model:	Met 100
Compute Time:	10Dec2009, 08:27:55	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	7.2 (CFS)	Date/Time of Peak Inflow :	25Sep2009, 00:12
Peak Outflow :	5.4 (CFS)	Date/Time of Peak Outflow :	25Sep2009, 00:24
Total Inflow :	7.54 (IN)	Peak Storage :	0.1 (AC-FT)
Total Outflow :	7.53 (IN)	Peak Elevation :	1332.3 (FT) (6" deep)

FedEx Freight Detention Information
December 10th, 2009

SE Pond Detention

Elev.	Area (acres)	Discharge (cfs)
1325	0.01	0.0
1326	1.06	4.5
1327	2.27	9.5
1327.5	2.51	11.5
1328	2.76	37.4
1328.5	2.88	83.6
1329	2.99	143.1

Note: two 12" RCP pipes at 1325 and a notched weir at 1327.4

Employee Parking Detention

Elev.	Area (acres)	Discharge (cfs)
1332.5	0.01	0.0
1332.75	0.12	2.9
1333	0.23	8.0
1333.25	0.41	15.1
1333.5	0.65	23.0

Note: Total of three 18" wide Concrete Flumes

Tractor Parking Detention

Elev.	Area (acres)	Discharge (cfs)
1331.8	0.01	0.0
1332	0.2	1.4
1332.25	0.4	5.5
1332.5	0.7	14.5
1333	1.25	21.4

Note: one 36" wide concrete flume

NW Swale Detention

Elev.	Area (acres)	Discharge (cfs)
1331	0.01	0.0
1331.5	0.07	0.8
1332	0.26	2.5
1332.6	0.66	3.7

Note: 12" RCP pipe

West Parking Lot Detention Calculations

Elevation	Area (acres)	Discharge (cfs)
1332.5	0.01	0.0
1333.0	0.60	13.6
1333.5	0.90	25.0
1334.0	1.25	30.0

Notes:

Area includes Employee Parking and West End of Tractor Parking. Also includes swale along north property line.

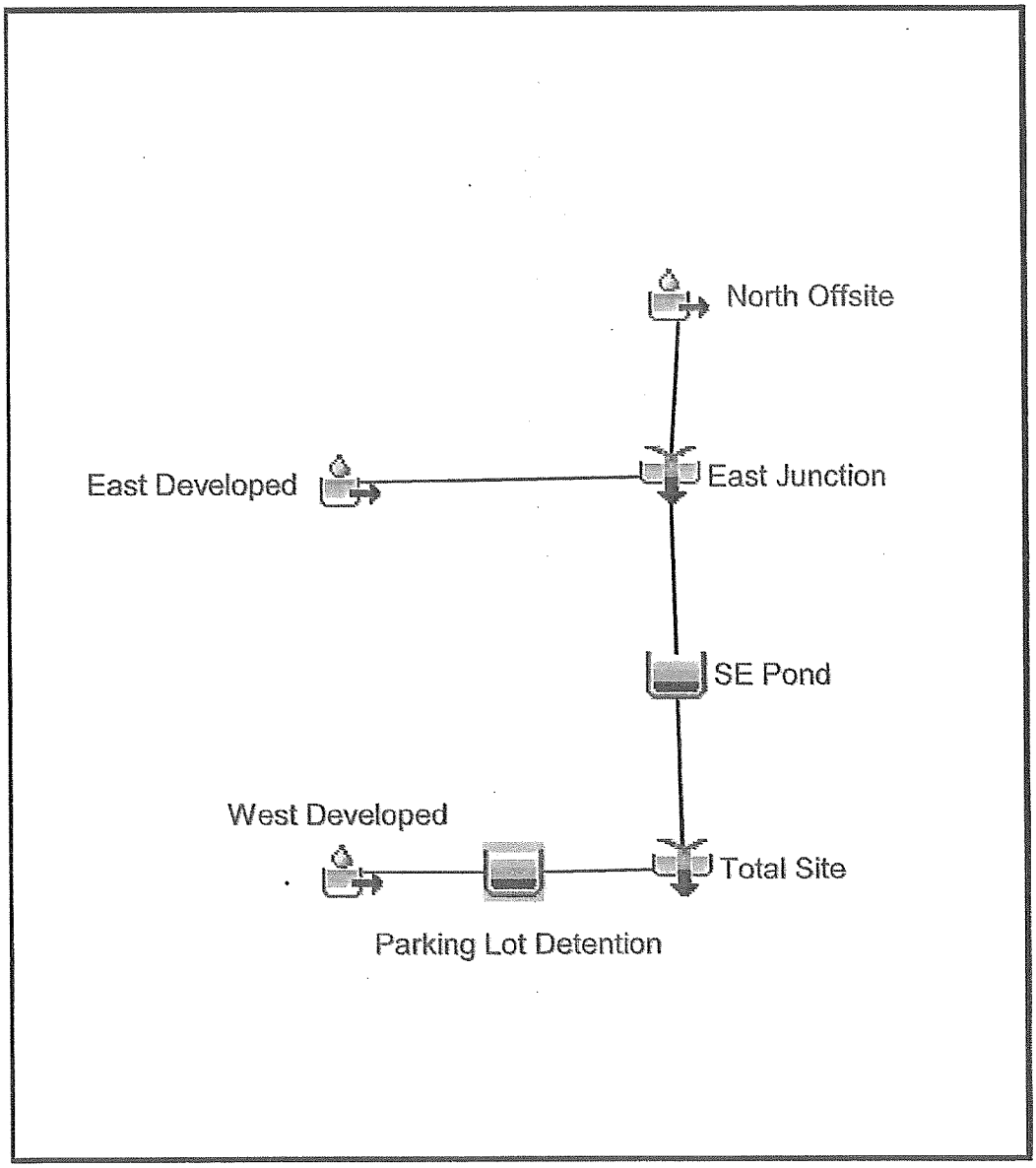
Discharge numbers include four curb openings from parking lots.

HEC-HMS

Project : FedEx

Basin Model : Developed

Dec 09 11:30:24 CST 2009



FedEx Freight, Inc
Proposed 96 Door Facility
Drainage Calculations

Introduction

This report outlines the drainage improvements for the proposed facility near K-42 and Maize Road. The site is approximately 30 acres in size and is currently used in an agricultural capacity. In the predeveloped condition, 9.7 acres of the site drains west and north into street ditches and swales and thence into a drainage swale that drains out the north end of Skyway Industrial Park 2nd. 20.3 acres of the site drains to the southeast into street ditches and thence through a 36" RCP under Tyler Road. The west 1/3rd of the site is Hydrologic Group D soil, while the east 2/3rds of the site is Group C soil.

Hydrology

PEC has prepared a preliminary drainage plan for the addition that proposes a detention pond at the southeast corner of the site to handle the drainage to the southeast. The area of the FedEx site that drains to the north and west will be detained in a pond at the northeast corner of the property. Following is a table showing the runoff calculations for the 2, 10 and 100 year design storms for each basin.

Basin	2-year (cfs)	10-year (cfs)	100-year (cfs)
Pre-developed to Maize Road	5.4	10.5	17.7
Developed to Maize Road	7.5	12.0	15.9
Pre-developed West Basin Total	13.6	26.1	44.3
Developed West Basin Total	8.2	13.1	20.8
Pre-developed East Basin	19.1	41.2	74.7
Developed SE Pond	10.6	29.5	71.0

Because of the higher amount of impervious area and the grading of the site, we are proposing to drain 3.8 acres to the north with the developed site rather than 9.7 acres as in the existing condition. The size of the detention area at the southeast corner has been expanded to detain the flows generated from the other 6.0 acres. That southeast detention area will be a dry pond with a swale running along the south edge to minimize the slope along the pond's east-west axis.

The proposed outlet is a pair of 12" pipes with an inflow elevation of 1325.0 and an outflow elevation of 1324.6. Coupled with those pipes will be a 20' weir with an outflow of 1327.4 to handle larger storms. There is no detention proposed for the stormwater runoff that drains to the west of the site. Sedgwick County has approved undetained runoff to Maize Road as long as the post-developed 100-Year runoff does not exceed pre-developed conditions. The 2-year and 10-year runoff to Maize Road slightly exceeds the predeveloped rates, but the small increases have been approved by Sedgwick County. The total developed runoff directed to the north is well below the pre-developed rates.

Conclusions

At the southeast corner of the site, the proposed runoff has been reduced below the pre-developed flows as calculated by PEC. For the runoff to the north, the area has been reduced to prevent developed runoff from exceeding the runoff planned for that area with the PEC drainage plan. That reduction in area limits the 100 year flow from the site to less than the predeveloped condition for the 100 year storm and given the substantial existing ditch along Maize Road and no plans for detention in this area of the plat, we are not proposing only a minor amount of parking lot detention for the west side drainage.

Project: FedEx Simulation Run: Existing 10

Start of Run: 24Sep2009, 12:00 Basin Model: Predeveloped
End of Run: 25Sep2009, 12:04 Meteorologic Model: Met 10
Compute Time: 09Dec2009, 11:29:26 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
East Junction	0.03484	41.2 29.5	25Sep2009, 00:20	2.67
East Predeveloped	0.03159	37.3	25Sep2009, 00:20	2.67
NE offsite	0.00325	3.8	25Sep2009, 00:20	2.67
Total Site	0.05024	65.9	25Sep2009, 00:16	2.84
West Combined	0.01540	26.1	25Sep2009, 00:12	3.23
West Onsite (To Master)	0.00917	10.5 12.0	25Sep2009, 00:12	3.23
West Onsite (To N683)	0.00623	15.7	25Sep2009, 00:12	3.23

Project: FedEx Simulation Run: Existing 100

Start of Run: 24Sep2009, 12:00 Basin Model: Predeveloped
End of Run: 25Sep2009, 12:04 Meteorologic Model: Met 100
Compute Time: 09Dec2009, 11:29:29 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
East Junction	0.03484	74.7 71.9	25Sep2009, 00:20	4.82
East Predeveloped	0.03159	67.7	25Sep2009, 00:20	4.82
NE offsite	0.00325	7.0	25Sep2009, 00:20	4.82
Total Site	0.05024	116.9	25Sep2009, 00:16	5.04
West Combined	0.01540	44.3	25Sep2009, 00:12	5.52
West Onsite (To [illegible])	[illegible]	17.7 15.9	25Sep2009, 00:12	5.52
West Onsite (To [illegible])	[illegible]	26.6	25Sep2009, 00:12	5.52

Project: FedEx Simulation Run: Developed 2 Year

Start of Run: 24Sep2009, 12:00 Basin Model: Developed
End of Run: 25Sep2009, 12:04 Meteorologic Model: Met 2
Compute Time: 09Dec2009, 13:05:21 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
East Developed	0.04080	57.3	25Sep2009, 00:08	2.93
East Junction	0.04405	60.8	25Sep2009, 00:12	2.87
North Offsite	0.00325	3.7	25Sep2009, 00:12	2.17
Parking Lot Detention	0.00597	7.5	25Sep2009, 00:16	2.96
SE Pond	0.04405	10.6	25Sep2009, 00:56	2.82
Total Site	0.05002	17.1	25Sep2009, 00:20	2.84
West Developed	0.00597	8.2	25Sep2009, 00:12	2.97

Project: FedEx Simulation Run: Developed 10 year

Start of Run: 24Sep2009, 12:00 Basin Model: Developed
End of Run: 25Sep2009, 12:04 Meteorologic Model: Met 10
Compute Time: 09Dec2009, 13:05:18 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
East Developed	0.04080	91.3	25Sep2009, 00:08	4.62
East Junction	0.04405	97.4	25Sep2009, 00:08	4.56
North Offsite	0.00325	6.5	25Sep2009, 00:12	3.83
Parking Lot Detention	0.00597	12.0	25Sep2009, 00:16	4.68
SE Pond	0.04405	29.5	25Sep2009, 00:40	4.46
Total Site	0.05002	36.8	25Sep2009, 00:32	4.49
West Developed	0.00597	13.1	25Sep2009, 00:12	4.68

Project: FedEx

Simulation Run: Developed 100 Reservoir: Parking Lot Detention

Start of Run:	24Sep2009, 12:00	Basin Model:	Developed
End of Run:	25Sep2009, 12:04	Meteorologic Model:	Met 100
Compute Time:	09Dec2009, 13:05:15	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	19.9 (CFS)	Date/Time of Peak Inflow :	25Sep2009, 00:12
Peak Outflow :	15.9 (CFS)	Date/Time of Peak Outflow :	25Sep2009, 00:20
Total Inflow :	7.12 (IN)	Peak Storage :	0.2 (AC-FT)
Total Outflow :	7.11 (IN)	Peak Elevation :	1333.1 (FT)

Project: FedEx Simulation Run: Developed 100

Start of Run: 24Sep2009, 12:00 Basin Model: Developed
End of Run: 25Sep2009, 12:04 Meteorologic Model: Met 100
Compute Time: 09Dec2009, 13:05:15 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
East Developed	0.04080	139.6	25Sep2009, 00:08	7.02
East Junction	0.04405	149.5	25Sep2009, 00:08	6.96
North Offsite	0.00325	10.3	25Sep2009, 00:12	6.22
Parking Lot Detention	0.00597	15.9	25Sep2009, 00:20	7.11
SE Pond	0.04405	71.9	25Sep2009, 00:28	6.79
Total Site	0.05002	87.3	25Sep2009, 00:28	6.83
West Developed	0.00597	19.9	25Sep2009, 00:12	7.12

Project: FedEx Simulation Run: Existing 2 year

Start of Run: 24Sep2009, 12:00 Basin Model: Predeveloped
End of Run: 25Sep2009, 12:04 Meteorologic Model: Met 2
Compute Time: 09Dec2009, 11:29:32 Control Specifications: Control 1

Volume Units: IN

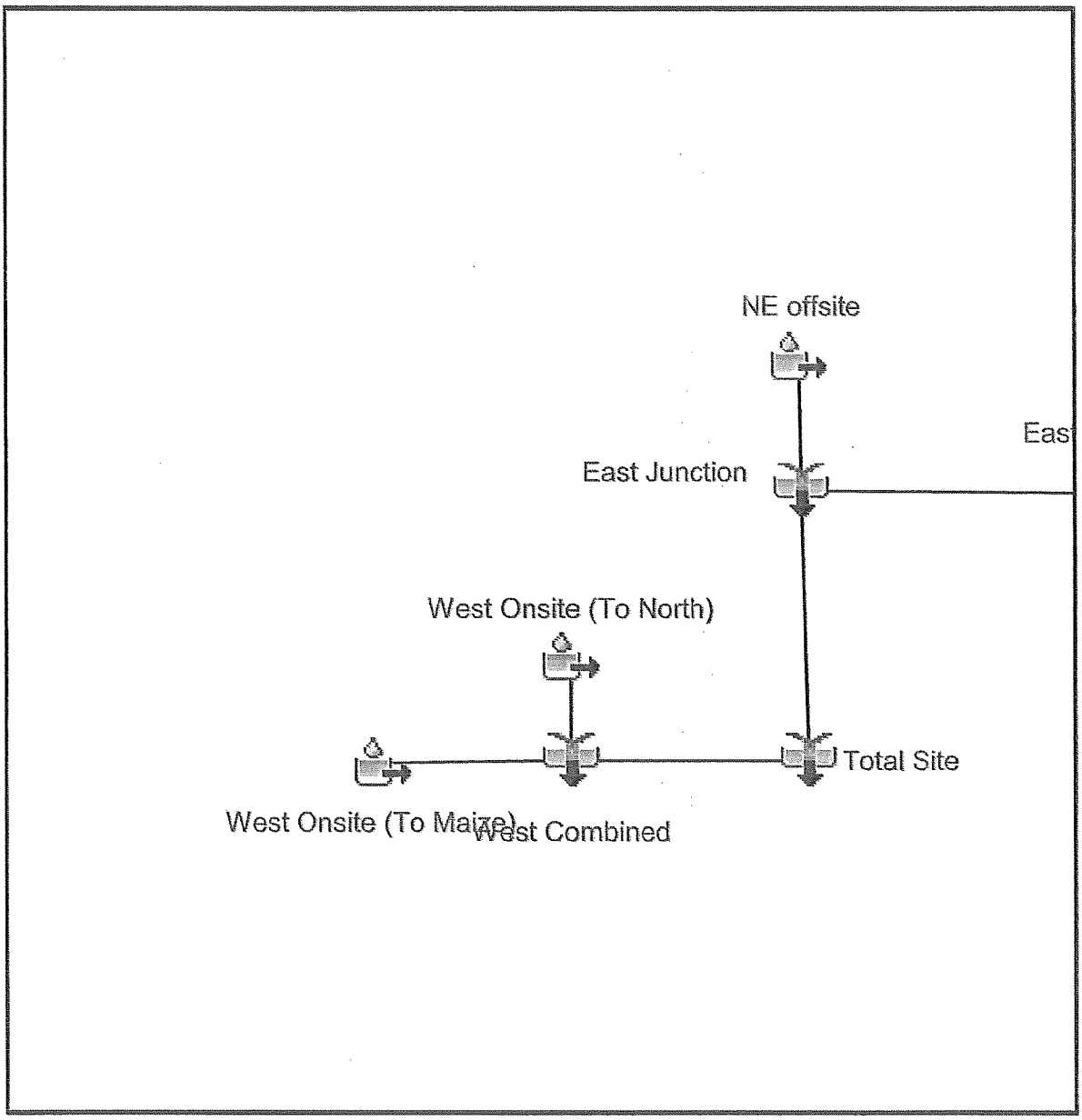
Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
East Junction	0.03484	19.1 10.6	25Sep2009, 00:20	1.29
East Predeveloped	0.03159	17.3	25Sep2009, 00:20	1.29
NE offsite	0.00325	1.8	25Sep2009, 00:20	1.29
Total Site	0.05024	31.8	25Sep2009, 00:16	1.41
West Combined	0.01540	13.6	25Sep2009, 00:12	1.70
West Onsite (To Wetland)	0.00917	5.4 7.5	25Sep2009, 00:12	1.70
West Onsite (To NE)	0.00623	8.1	25Sep2009, 00:12	1.70

HEC-HMS

Project : FedEx

Basin Model : Predeveloped

Dec 09 13:18:08 CST 2009



FedEx Freight, Inc
Proposed 96 Door Facility
Drainage Calculations

Introduction

This report outlines the drainage improvements for the proposed facility near K-42 and Maize Road. The site is approximately 30 acres in size and is currently used in an agricultural capacity. In the predeveloped condition, 9.7 acres of the site drains west and north into street ditches and swales and thence into a drainage swale that drains out the north end of Skyway Industrial Park 2nd. 20.3 acres of the site drains to the southeast into street ditches and thence through a 36" RCP under Tyler Road.

Hydrology

PEC has prepared a preliminary drainage plan for the addition that proposes a detention pond at the southeast corner of the site to handle the drainage to the southeast. The area of the FedEx site that drains to the north and west will be detained in a pond at the northeast corner of the property. Following is a table showing the runoff calculations for the 2, 10 and 100 year design storms for each basin.

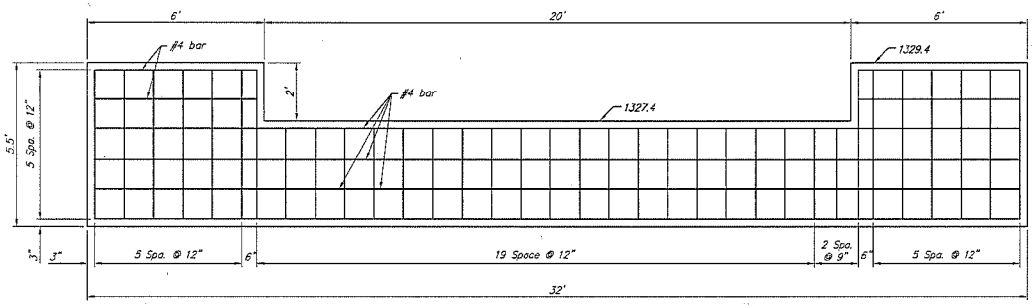
Basin	2-year (cfs)	10-year (cfs)	100-year (cfs)
Pre-developed West Basin (PEC)	6.3	16.8	38.0
Developed West Basin (PEC)	14.9	28.9	48.9
Developed West Basin (Proposed)	12.9	21.0	32.0
Pre-developed East Basin (PEC)	12.4	33.7	78.0
Developed SE Pond (Proposed)	10.4	26.4	65.5

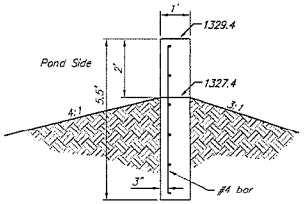
Because of the higher amount of impervious area and the grading of the site, we are proposing to drain 5.2 acres to the north with the developed site rather than 9.7 acres as in the existing condition. The size of the detention area at the southeast corner has been expanded to detain the flows generated from the other 4.5 acres. That southeast detention area will be a dry pond with a concrete flume running along the south edge to minimize the slope along the pond's east-west axis.

The proposed outlet is a pair of 12" pipes with an inflow elevation of 1325.0 and an outflow elevation of 1324.6. Coupled with those pipes will be a 20' weir with an outflow of 1327.5 to handle larger storms. There is no detention proposed for the stormwater runoff that drains to the west of the site.

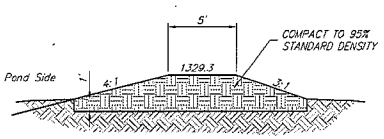
Conclusions

At the southeast corner of the site, the proposed runoff has been reduced below the pre-developed flows as calculated by PEC. For the runoff to the north, the area has been reduced to prevent developed runoff from exceeding the runoff planned for that area with the PEC drainage plan. That reduction in area limits the 100 year flow from the site to less than the predeveloped condition for the 100 year storm and given the substantial existing ditch along Maize Road and no plans for detention in this area of the plat, we are not proposing any detention for the west side drainage.

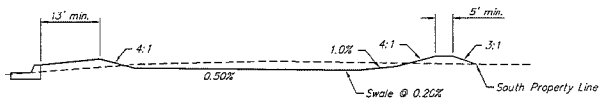




WEIR DETAILS



BERM DETAIL



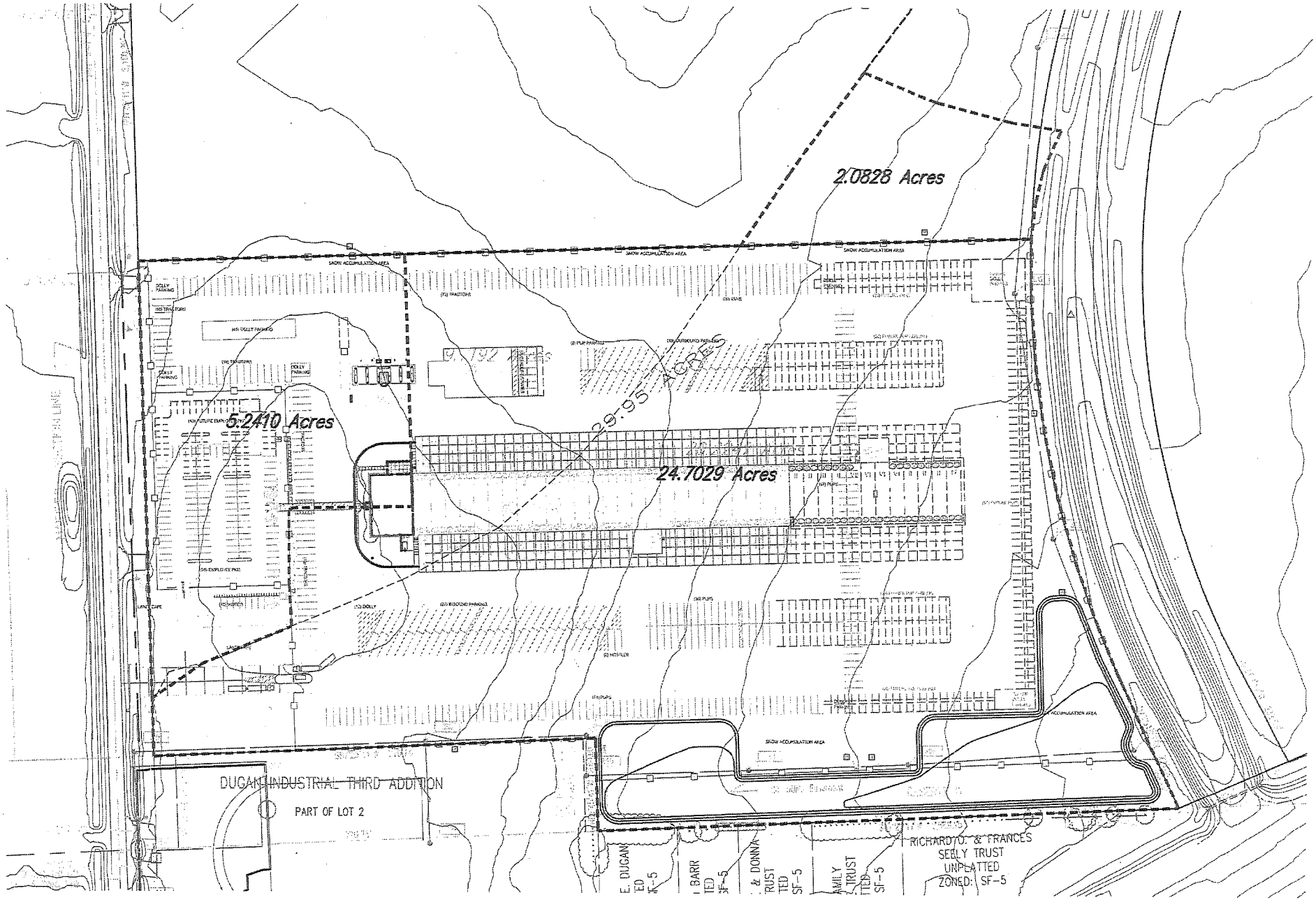
POND SECTION

PRELIMINARY
NOT FOR CONSTRUCTION
Date : 10-29-2009

FED EX FREIGHT FACILITY
DRY DETENTION POND
WICHITA, KANSAS

Ruggles & Bohm, P.A.
Engineering, Surveying, Land Planning
924 North Main
Wichita, Kansas 67203
www.rbkansas.com
(316) 264-6005
(316) 264-4621 fax
E-mail: info@rbkansas.com

DESIGN KWL
DRAWN RA
FIELD BOOK
CHECK
DATE
PROJECT NO. 3578
SHEET C1.6


2.0828 Acres
5.2410 Acres
24.7029 Acres
DUGAN INDUSTRIAL THIRD ADDITION
PART OF LOT 2
RICHARD O. & FRANCES
SEELY TRUST
UNPLATTED
ZONED: SF-5