DRAINAGE REPORT

WILLOW CREEK EAST

WICHITA, SEDGWICK COUNTY, KANSAS

November 29, 2006

WILLOW CREEK EAST
DRAINAGE ANALYSIS
November 29, 2006

INTRODUCTION

This report contains supporting documentation and calculations for the proposed Willow Creek East development. The proposed site is an undeveloped 15.9 acre tract of land located in the NW ¼ of Section 34 T27S R2E on Harry Street East of Greenwich Road. The area is currently pasture land and the soil type is designated as Rosehill which is in hydrologic group D. An unnamed tributary of Spring Creek runs just off the northwest corner of the plat. The tributary passes under Harry Street through an existing 8'X8' RCBC. The drainage patterns of the site currently direct the water off the site in two directions. An 8.59 acre tributary area drains to the northwest and into the unnamed tributary of Spring Creek. The second tributary area which drains from the site is a 16.93 acre area which flows to the northeast and drains into the south ditch of Harry Street and thence easterly to a 36 inch culvert passing under Harry Street.

The proposed development will provide detention at the northeast corner of the plat. The proposed development is the first phase of a residential subdivision and therefore will accept runoff from offsite future development. Storm sewer stubs are also designed to accommodate the future development.

HYDROLOGY

The detention analysis and the hydrology for the Harry Street RCBC were performed using HEC-HMS. The times of concentration were calculated using the velocity method and overland flow rates from attachment E of the City of Wichita Drainage Criteria. The parameters and results of the existing and proposed analysis are shown in the tables below.

Existing	Area	CN	TC (min.)	Q2 (cfs)	Q5 (cfs)	Q10 (cfs)	Q25 (cfs)	Q100 (cfs)
NE	16.93	80	43	13.35	20.4	24.81	32.31	45.3
NW	8.59	80	17	12.20	18.54	22.48	29.15	40.65

Proposed	Area	CN	TC (min.)	Q2 (cfs)	Q5 (cfs)	Q10 (cfs)	Q25 (cfs)	Q100 (cfs)
NE	18.74	87	30	24.13	34.19	40.30	50.50	67.79
NW	5.73	85	15	12.02	17.31	20.53	25.98	35.34

The rational method was used to determine peak flow rates for the basins located within the plat. The attached Drainage Plan shows the on site drainage calculations. Storm water sewer design and flow capacities are calculated with Haestad Methods STORM Cad program. Output from this program is included with this report. All starting hydraulic grade line elevations are calculated using the 100 year water surface of the detention pond at elevation 1333.27.

HARRY STREET RCBC

The RCBC under Harry Street has a tributary area of 619 acres with a weighted c factor of 0.69. The analysis of the 2-8'x8' culvert under Harry Street was performed using HY-8. The rational equation was used to determine the Q_{100}=1427 cfs. The output is attached in this report and indicates that the 100-year W.S. is 1326.80. Harry Street is overtopped at an elevation of 1327.32. It would be more conservative to base the minimum pad elevations of the houses located upstream of the Harry St. RCBC on the overtop elevation rather than the 100-year water surface. Therefore, the minimum pad elevations of Lots 1-6 of Block 4 shall be 1328.40.

DETENTION POND

The single detention pond will provide sufficient storage to detain the necessary flow from the proposed site and some additional future development. The SCS Type II Rainfall Distribution as modeled by the HEC-HMS program is used for analysis, with a total 100-year – 24 hour rainfall event of 7.8 inches (TR-55). This rainfall model is used for all basins. The attached drainage maps demonstrate the extents of the detained tributary area. The outlet of the pond shall be controlled by a 2-30" RCP culvert which maintains the static pool at 1330.50 and drains into the south ditch of Harry Street and drains east. A summary of the detention pond's performance in the various design storms can be found in the table below.

Design Storm	Peak Inflow (cfs)	Peak Outflow (cfs)	Allowable Release (cfs)	Peak Storage (ac-ft.)	Peak Elevation
2-yr	24.13	12.44	13.35	1.15	1331.84
5-yr	34.19	19.69	20.40	1.50	1332.22
10-yr	40.30	24.25	24.81	1.71	1332.43
25-yr	50.50	31.91	32.31	2.03	1332.77
100-yr	67.79	44.89	45.30	2.54	1333.27

The stage-storage data was calculated by HEC-HMS using the parameters located in the table below.

Stage	Area (ac-ft)
1330.5	0.81
1331	0.84
1332	0.92
1333	1.00
1334	1.08
1335	1.16

The detention pond will have a top of 1334.50 to provide and will provide 1.23 feet of freeboard in the 100-year design storm. Lots 1-8, Block 1 shall have a minimum pad elevations of 1334.50.

EXISTING CONDITIONS

PROPOSED CONDITIONS

HARRY STREET RCBC

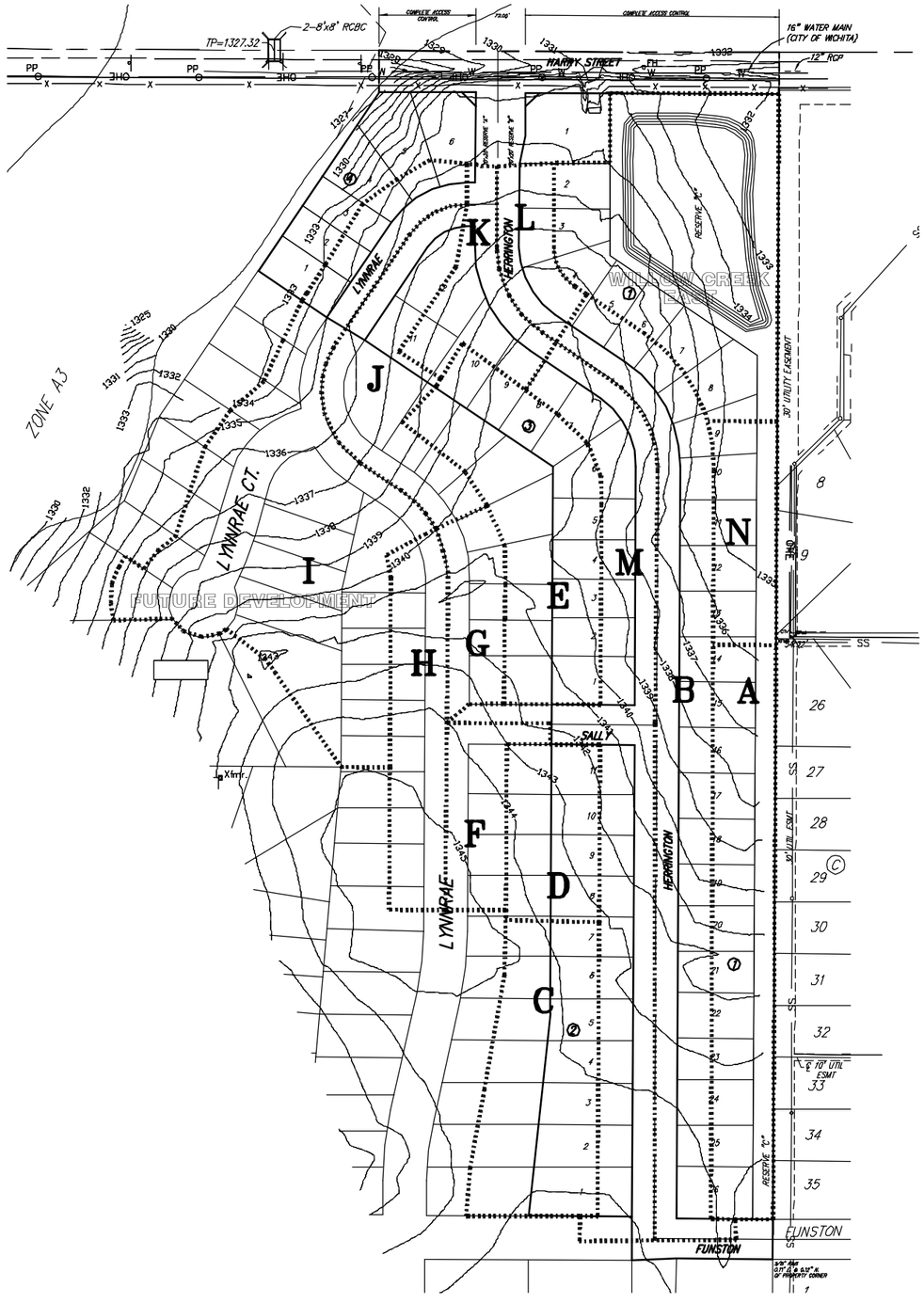
DETENTION POND

EXISTING CONDITIONS
DRAINAGE MAP

PROPOSED CONDITIONS
DRAINAGE MAP

STORM SEWER PROFILES

ADDITIONAL CALCULATIONS



SCALE: 1" = 100'

NODE	AREA	TC	C2	I2	C100	I100	Q2	Q100
A	2.41	27	0.3	2.84	0.65	5.69	2.1	8.9
B	2.68	15	0.5	3.83	0.76	7.37	5.1	15.0
C	1.57	19	0.3	3.42	0.65	6.68	1.6	6.8
D	0.79	15	0.3	3.83	0.65	7.37	0.9	3.8
E	1.81	18	0.3	3.51	0.65	6.68	1.9	7.9
F	0.59	15	0.5	3.83	0.76	7.37	1.1	3.3
G	0.53	15	0.5	3.83	0.76	7.37	1.0	3.0
H	1.01	15	0.5	3.83	0.76	7.37	1.9	5.7
I	3.71	17	0.5	3.61	0.76	7	6.7	19.7
J	1.13	15	0.5	3.83	0.76	7.37	2.2	6.3
K	0.66	15	0.5	3.83	0.76	7.37	1.3	3.7
L	0.47	15	0.5	3.83	0.76	7.37	0.9	2.6
M	2.69	15	0.5	3.83	0.76	7.37	5.2	15.1

PROPOSED DRAINAGE MAP
WILLOW CREEK EAST
WICHITA, KANSAS

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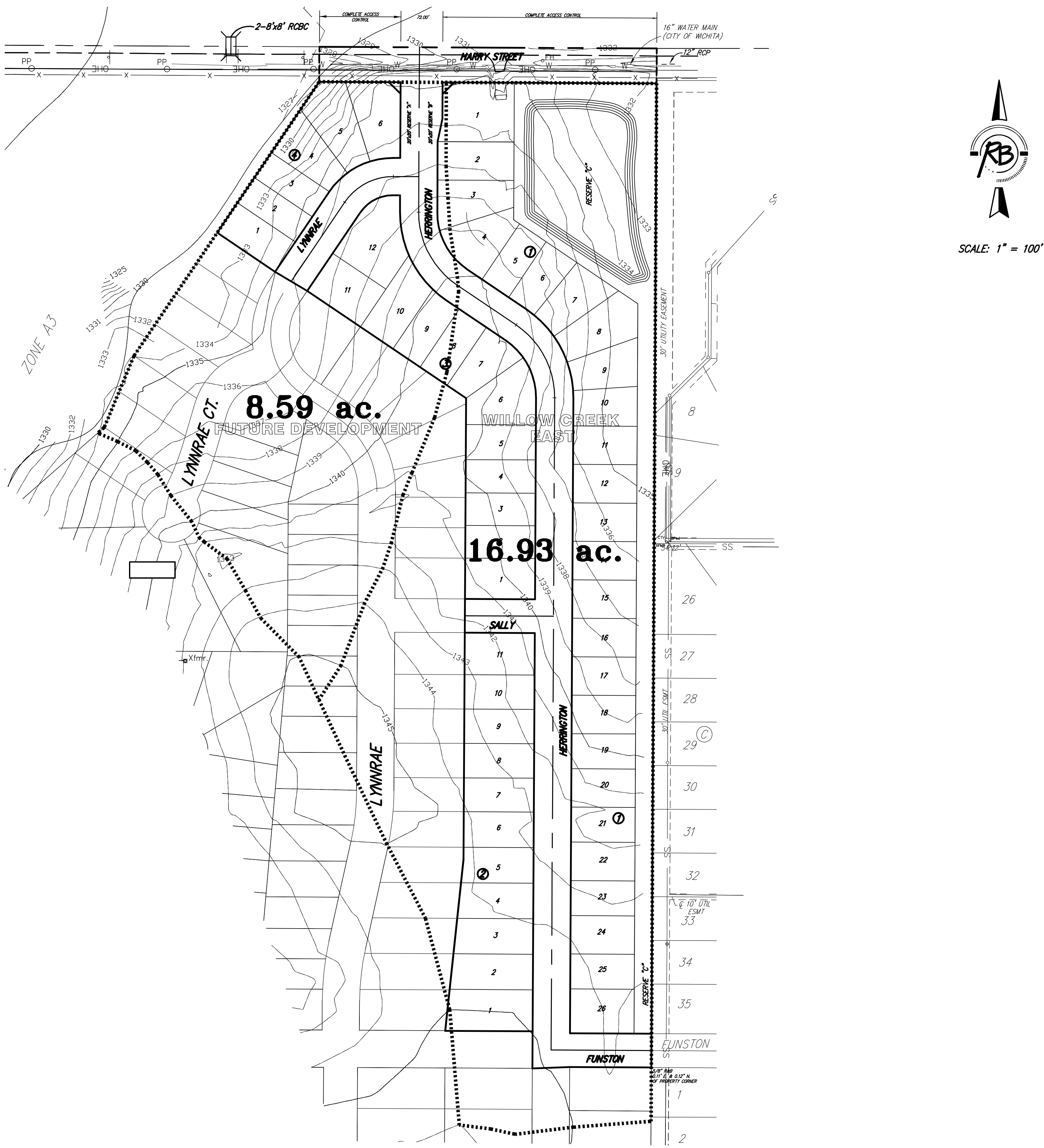
DESIGN AML
DRAWN AML
REVIEW
UTILITY

RB JOB 2316P

SHEET 1 OF 1

DRAWING FILE: Drainage Concept (Drainage Plan)
PROJECT NUMBER: --
DATE: Dec. 6, 2006



EXISTING DRAINAGE MAP
WILLOW CREEK EAST
WICHITA, KANSAS

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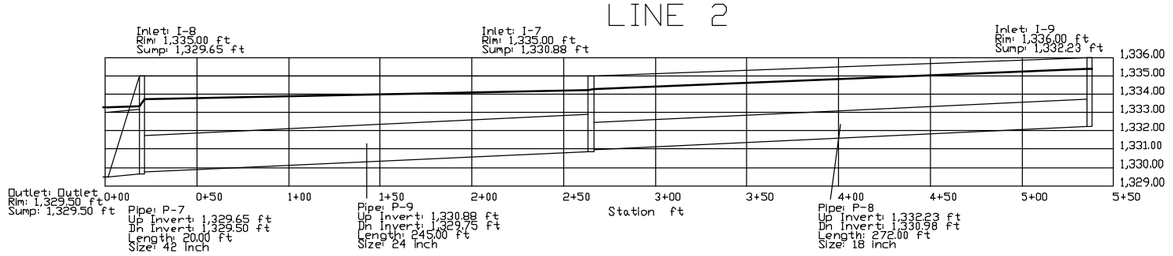
DESIGN	AML
DRAWN	AML
REVIEW	
UTILITY	
DATE	Dec. 6, 2006
RB JOB	2916P
SHEET	1 OF 1
DRAWING FILE	Drainage Concept {Drainage Plan}
PROJECT NUMBER	--

LINE 2



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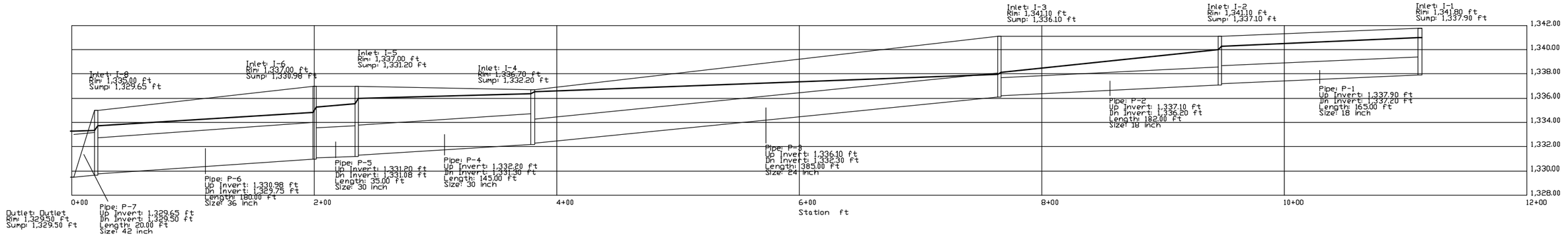

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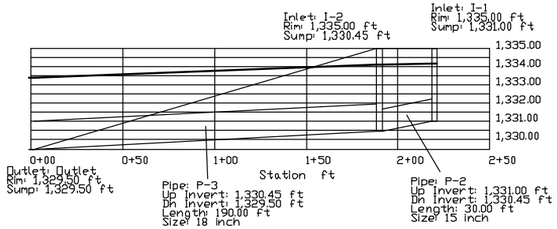

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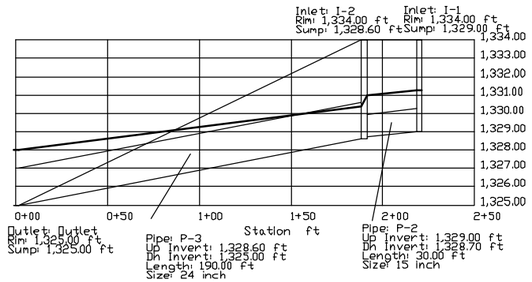

STORM SEWER PROFILES

WILLOW CREEK EAST

WICHITA, KANSAS

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DESIGN	AML
DRAWN	AML
REVIEW	
UTILITY	
DATE	Dec. 7, 2006
DRAWING FILE	profiles
PROJECT NUMBER	--
R&B JOB	2916P
SHEET	1 OF 1

Project: Willow Creek East Simulation Run: Ex 2

Start of Run: 01Jan2006, 00:00 Basin Model: Existing
End of Run: 02Jan2006, 00:05 Meteorologic Model: 2
Compute Time: 05Mar2007, 16:31:59 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Harry RCBC	0.9671	290.57	01Jan2006, 13:45	1.78
Junction-1	0.0402	20.26	01Jan2006, 12:20	1.61
NE	0.0268	13.35	01Jan2006, 12:40	1.61
NW	0.0134	11.03	01Jan2006, 12:15	1.63

Project: Willow Creek East Simulation Run: Ex 5

Start of Run: 01Jan2006, 00:00 Basin Model: Existing
End of Run: 02Jan2006, 00:05 Meteorologic Model: 5
Compute Time: 05Mar2007, 16:32:06 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Harry RCBC	0.9671	429.94	01Jan2006, 13:45	2.62
Junction-1	0.0402	31.12	01Jan2006, 12:20	2.43
NE	0.0268	20.40	01Jan2006, 12:35	2.42
NW	0.0134	16.71	01Jan2006, 12:15	2.45

Project: Willow Creek East Simulation Run: Ex 10

Start of Run:	01Jan2006, 00:00	Basin Model:	Existing
End of Run:	02Jan2006, 00:05	Meteorologic Model:	10
Compute Time:	05Mar2007, 16:31:52	Control Specifications:	Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Harry RCBC	0.9671	515.98	01Jan2006, 13:40	3.15
Junction-1	0.0402	37.89	01Jan2006, 12:20	2.95
NE	0.0268	24.81	01Jan2006, 12:35	2.94
NW	0.0134	20.24	01Jan2006, 12:15	2.96

Project: Willow Creek East Simulation Run: Ex 25

Start of Run:	01Jan2006, 00:00	Basin Model:	Existing
End of Run:	02Jan2006, 00:05	Meteorologic Model:	25
Compute Time:	05Mar2007, 16:32:03	Control Specifications:	Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Harry RCBC	0.9671	661.71	01Jan2006, 13:40	4.04
Junction-1	0.0402	49.41	01Jan2006, 12:20	3.83
NE	0.0268	32.31	01Jan2006, 12:35	3.82
NW	0.0134	26.26	01Jan2006, 12:10	3.85

Project: Willow Creek East Simulation Run: Ex 100

Start of Run:	01Jan2006, 00:00	Basin Model:	Existing
End of Run:	02Jan2006, 00:05	Meteorologic Model:	100
Compute Time:	05Mar2007, 16:31:56	Control Specifications:	Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Harry RCBC	0.9671	912.07	01Jan2006, 13:40	5.60
Junction-1	0.0402	69.36	01Jan2006, 12:20	5.38
NE	0.0268	45.30	01Jan2006, 12:35	5.37
NW	0.0134	36.79	01Jan2006, 12:10	5.41

Project: Willow Creek East Simulation Run: Prop 2

Start of Run: 01Jan2006, 00:00 Basin Model: Proposed
End of Run: 02Jan2006, 00:05 Meteorologic Model: 2
Compute Time: 05Mar2007, 16:32:18 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
NE	0.0279	24.13	01Jan2006, 12:25	2.16
NW	0.0103	12.02	01Jan2006, 12:10	1.97
Pond 1	0.0279	9.39	01Jan2006, 13:00	1.92

Project: Willow Creek East Simulation Run: Prop 5

Start of Run: 01Jan2006, 00:00 Basin Model: Proposed
End of Run: 02Jan2006, 00:05 Meteorologic Model: 5
Compute Time: 05Mar2007, 16:32:26 Control Specifications: Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
NE	0.0279	34.19	01Jan2006, 12:20	3.07
NW	0.0103	17.31	01Jan2006, 12:10	2.85
Pond 1	0.0279	15.29	01Jan2006, 12:55	2.80

Project: Willow Creek East Simulation Run: Prop 10

Start of Run:	01Jan2006, 00:00	Basin Model:	Proposed
End of Run:	02Jan2006, 00:05	Meteorologic Model:	10
Compute Time:	05Mar2007, 16:32:10	Control Specifications:	Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
NE	0.0279	40.30	01Jan2006, 12:20	3.63
NW	0.0103	20.53	01Jan2006, 12:10	3.40
Pond 1	0.0279	19.10	01Jan2006, 12:55	3.34

Project: Willow Creek East Simulation Run: Prop 25

Start of Run:	01Jan2006, 00:00	Basin Model:	Proposed
End of Run:	02Jan2006, 00:05	Meteorologic Model:	25
Compute Time:	05Mar2007, 16:32:22	Control Specifications:	Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
NE	0.0279	50.50	01Jan2006, 12:20	4.58
NW	0.0103	25.98	01Jan2006, 12:05	4.33
Pond 1	0.0279	25.43	01Jan2006, 12:50	4.25

Project: Willow Creek East Simulation Run: Prop 100

Start of Run:	01Jan2006, 00:00	Basin Model:	Proposed
End of Run:	02Jan2006, 00:05	Meteorologic Model:	100
Compute Time:	05Mar2007, 16:32:14	Control Specifications:	Control

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
NE	0.0279	67.79	01Jan2006, 12:20	6.21
NW	0.0103	35.34	01Jan2006, 12:05	5.94
Pond 1	0.0279	36.30	01Jan2006, 12:50	5.84