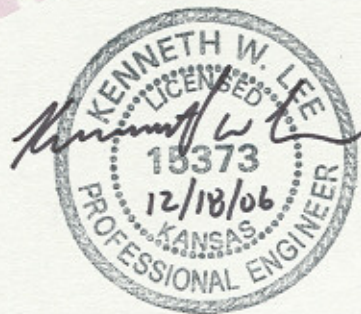




LEGACY 3RD ADDITION

DRAINAGE REPORT

DECEMBER 2006



Ruggles & Bohm P.A.

Engineering, Surveying, Land Planning

**LEGACY 3RD ADDITION
WICHITA, SEDGWICK COUNTY, KANSAS
DRAINAGE REPORT
DECEMBER 2006**

INTRODUCTION

The subject property is in southwest Wichita in Sedgwick County, Kansas. The property is located north of 47th Street South and west of Meridian in the southeast quarter of Section 13, Township 28 South, Range 1 West. There are approximately 33 acres in the development. The subject property was previously platted as a part of Legacy Addition and will be re-platted as Legacy 3rd addition and subdivided into 112 residential lots.

EXISTING CONDITIONS

As mentioned, the site was previously platted as Legacy Addition. Reserves were established at the north and west property lines to provide drainage swales to carry stormwater runoff to the downstream limits at the property corners. No stormwater detention was provided with the original design. The site is currently pasture and is not being used for agriculture. There are no established floodplains, wetlands or riparian habitats that will be modified or impacted by the development of this site. The east side of the project abuts the existing homes in Legacy Addition.

Some consideration was made on adding a detention pond on the east side of the proposed development, but existing sanitary sewer and 12" water mains limited the flexibility of the site redesign. There are existing bell telephone lines along the south property line that will limit grading in that area.

The soil on the southwesterly half of the site is in the Punkin-Taver complex, which is a silty loam that is hydrologic Soil Group D. The soil on the northeasterly half of the site is in the Naron complex, a fine sandy loam that is hydrologic soil group B.

OFFSITE CONDITIONS

Due to the extremely flat topography of the area, it is difficult to determine the exact limits of the offsite drainage area. A drainage area based on the USGS topographical map of the area indicates that there is approximately 17 acres of offsite drainage will be conveyed by the proposed swales of the replatted addition. Based on the original Legacy Addition Drainage Report, an additional 341 acres of offsite drainage makes it to the existing drainage swale in Reserve E of Legacy Addition. The offsite area to the north is primarily cultivated. The soils in the offsite drainage area consist of Naron complex soils, hydrologic soil group B.

DEVELOPED CONDITIONS

The site will be subdivided into 112 residential lots. A detention pond is proposed along the west line of the subject property with concrete flumes, grassed swales and storm sewer transporting water to the pond. The swale along the north property line will be improved as proposed in the original design. A quadruple 12'x3' RCBC will be installed under 44th Street South to convey stormwater drainage in the existing channel in Reserve 'E' of the original Legacy Addition.

Concrete flumes will be installed in backyard areas of Blocks 5, 6, and 7 to minimize the fill required on the site. Every attempt is being made to minimize the modifications required to the existing water and sewer mains on the site.

The proposed pond on the west side of the addition will spill over to an existing channel at the southwest corner that drains into an existing pond on the property to the south. Following is a breakdown of the pre-developed and post-developed flows on the site.

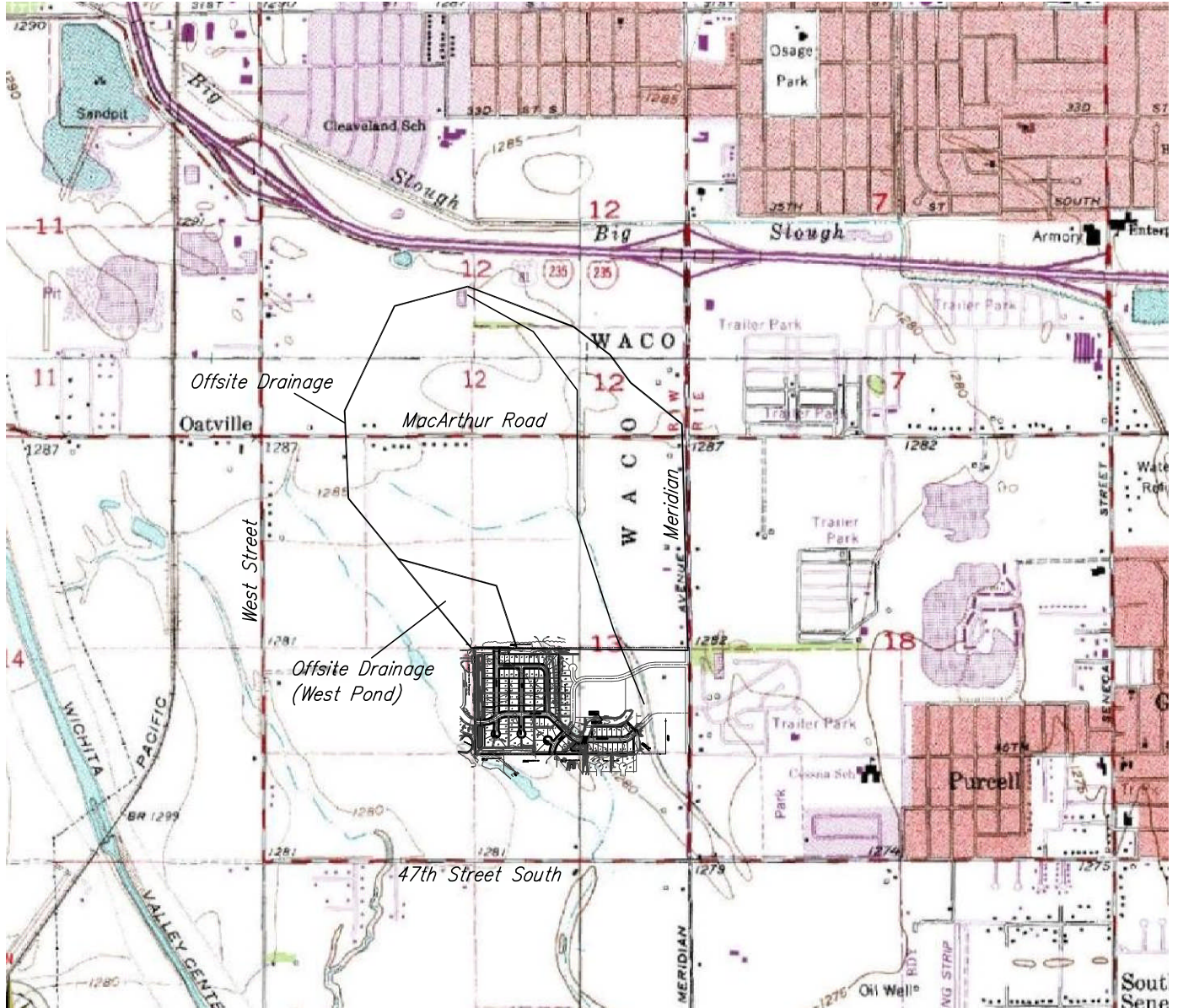
Location	2 Year		5 Year		10 Year		25 Year		100 Year	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
West Onsite	12	24	19	37	25	47	32	57	45	80
West Pond Outflow	19	20	32	31	42	40	53	51	77	77
East Onsite	10	18	18	29	25	39	32	49	49	71
Discharge at SE Corner	173	173	283	282	378	377	478	475	698	692
Combined Flows from site	187	189	307	308	410	410	518	516	757	751

A review of the runoff summary shows that the post-developed runoff at the southeast property corner is equal or lower in every storm event. The post developed west pond runoff increases by 1 cfs in the 2 year event but is decreased or equal in all subsequent events. Due to the existing sanitary sewer and water main on the property, we were unable to increase the size of the pond to reduce the runoff more. The proposed runoff is still significantly less than the amount that would have occurred if the plat had been developed in its original configuration with no detention at all.

BEST MANAGEMENT PRACTICES

The proposed swales are flat enough to act as silt retention areas during construction. Proposed ponds will provide the remaining silt containment for the site. Due to the flat (0.40%) grades proposed on the concrete flumes in backyard drainage areas, silt transport is unlikely in the middle area of the site. In addition to the proposed silt containment areas, the proposed onsite grading prevents stormwater from running off directly to adjacent properties, which will further reduce the likelihood of offsite silt transport. During construction, ditch checks and silt fence will be used to limit silt transport until grass is established.

Site Location Map
THE LEGACY 3RD ADDITION
Wichita, Sedgwick County, Kansas



SCALE
1" = 2000'



Ruggles & Bohm, P.A.
Engineering, Surveying, Land Planning

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(316) 264-4821 fax
E-mail: info@rbkansas.com

THE LEGACY 3RD ADDITION

A replat of part of The Legacy Addition, Wichita, Sedgwick County, Kansas

State of Kansas)
Sedgwick County) SS

We, Ruggles & Bohm, P.A., Land Surveyors in aforesaid county and state, do hereby certify that, under the supervision of the undersigned, we have surveyed and platted "THE LEGACY 3RD ADDITION", Wichita, Sedgwick County, Kansas, and that the accompanying plat is a true and correct exhibit of the property surveyed, described as follows:

Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11, Block 1; Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45 and 46, Block 2; Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24, Block 3; Lots 1, 2, 3 and 4, Block 4; Lots 1, 2, 3, 4, 5, 6, 7 and 8, Block 5; Lots 1, 2, 3, 4, 5, 6 and 7, Block 7; and Reserves A, E, F and that part of Reserve B lying west of the extended east line of Lot 1, Block 2; all in The Legacy Addition, an Addition to Wichita, Sedgwick County, Kansas.

All public easements and dedications are hereby vacated by virtue of K.S.A. 12-512(b).

Ruggles & Bohm, P.A.

Thomas C. Ruggles
Land Surveyor

Know all men by these presents that we, the undersigned, have caused the land described in the surveyor's certificate to be platted into Lots, Blocks, a Reserve and Streets, to be known as "THE LEGACY 3RD ADDITION", Wichita, Sedgwick County, Kansas. The streets are hereby dedicated to and for the use of the public. Utility Easements are hereby granted for the construction and maintenance of all public utilities. Drainage Easements are hereby granted to the public as indicated for drainage purposes. Reserves "A", "B" and "C" are hereby reserved for irrigation, walls, walks, lighting, landscaping, berms, ponds, drainage, drainage structures, open space, and utilities confined to easements. Reserve "D" is hereby reserved for irrigation, walks, open space, drainage, drainage structures, and utilities confined to easements. The Reserves are to be owned and maintained by the Home Owners Association for the addition. A drainage plan has been developed for this plat; the property shall remain at established grades, or as modified with the approval of the City Engineer, and unobstructed to allow for the conveyance of storm water.

Rivendale, LLC.

Robert J. Armstrong
Member

Timothy J. Malone
Member

State of Kansas)
Sedgwick County) SS

The foregoing instrument acknowledged before me, this _____ day of _____, 200___, by Robert J. Armstrong, Member, on behalf of Rivendale, LLC.

Notary Public
Mildred E. Franz

My appointment expires _____

State of Kansas)
Sedgwick County) SS

The foregoing instrument acknowledged before me, this _____ day of _____, 200___, by Timothy J. Malone, Member, on behalf of Rivendale, LLC.

Notary Public
Mildred E. Franz

My appointment expires _____

We the undersigned, holders of a mortgage on a portion of the above described property, do hereby consent to this plat of "THE LEGACY 3RD ADDITION", Wichita, Sedgwick County, Kansas.

Legacy Bank, N.A.

Executive Vice President
Brad Yaeger

State of Kansas)
Sedgwick County) SS

The foregoing instrument acknowledged before me this _____ day of _____, 200___, by Brad Yaeger, Executive Vice President of Legacy Bank, N.A., on behalf of the Bank.

Notary Public

My appointment expires _____

This plat of "THE LEGACY 3RD ADDITION", Wichita, Sedgwick County, Kansas, has been submitted to and approved by the Wichita-Sedgwick County Metropolitan Area Planning Commission, Wichita, Kansas.

Dated this _____ day of _____, 200___

Wichita-Sedgwick County Metropolitan Area Planning Commission

Chair
Darrell A. Downing

Secretary
John L. Schlegel

This plat approved and all dedications shown hereon accepted by the

City Council of the City of Wichita, Kansas, this _____ day of _____, 200___

At the Direction of the City Council

Mayor
Carlos Mayans

City Clerk
Karen Sublett

Reviewed in accordance with K.S.A. 58-2005 on this _____ day of _____, 200___

Deputy County Surveyor

Sedgwick County Kansas
Tricia L. Robello, LS #1246

Entered on transfer record this _____ day of _____, 200___

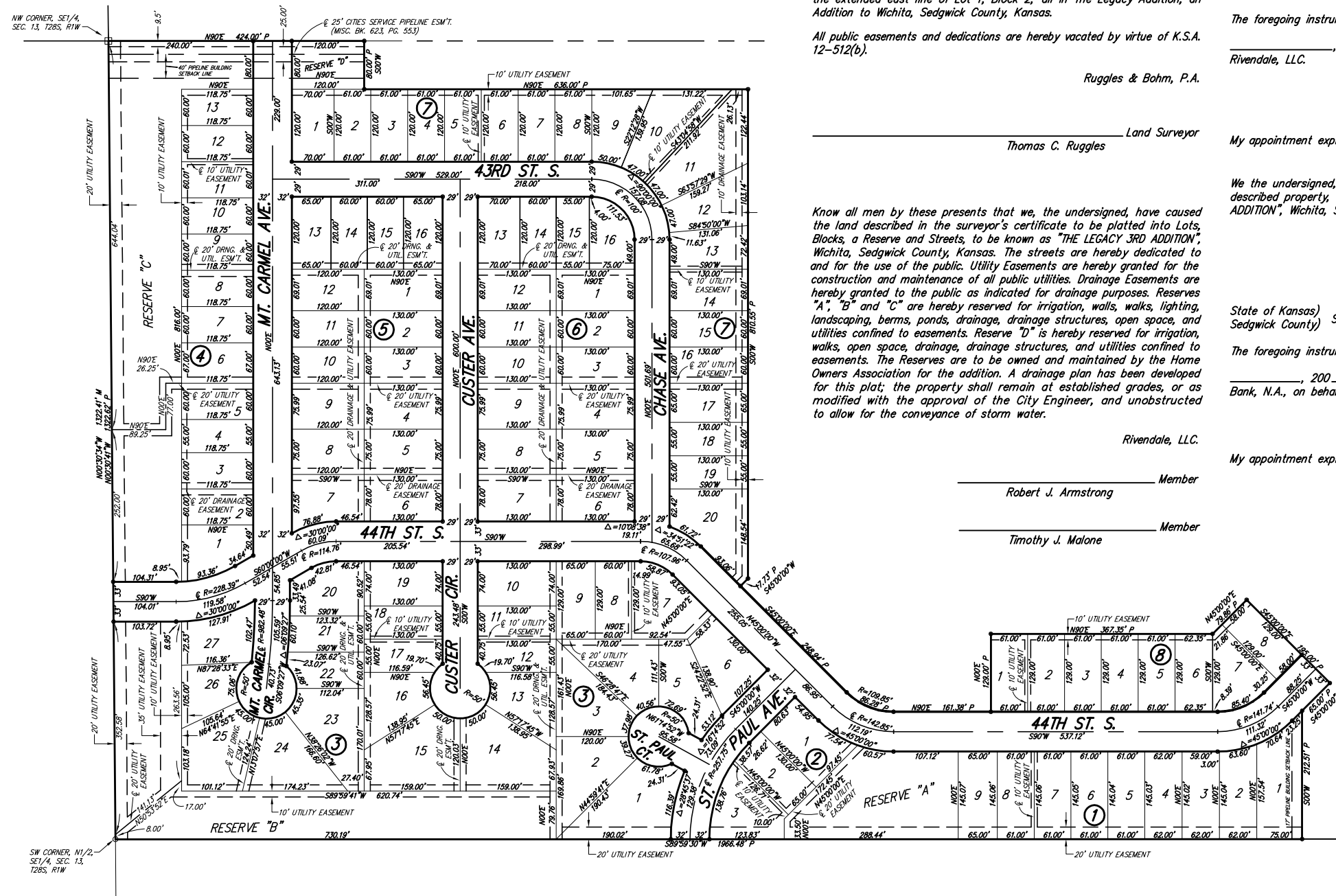
County Clerk
Dan Brace

State of Kansas)
Sedgwick County) SS

This is to certify that this plat has been filed for record in the office of the Register of Deeds, this _____ day of _____, 200___, at _____ o'clock _____ M., and is duly recorded.

Register of Deeds
Bill Meek

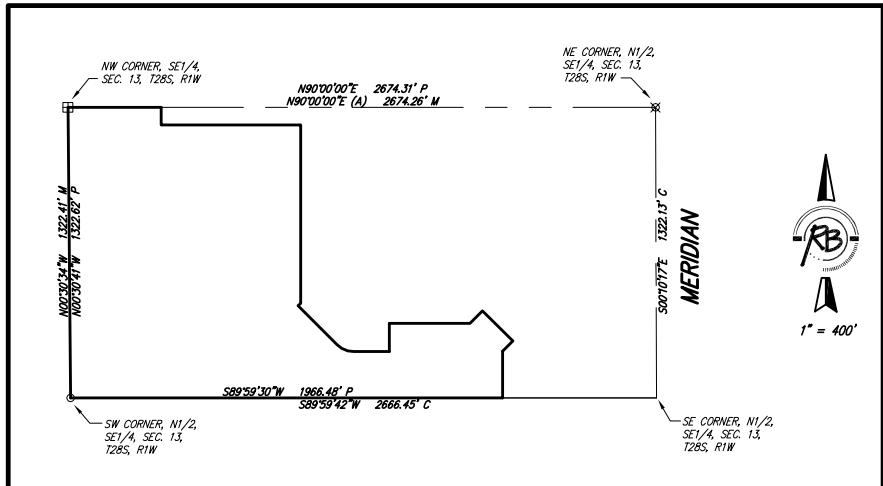
Deputy
Tonya Buckingham



(A) = Assumed
C = Calculated
M = Measured
P = Platted (The Legacy Addition)

- SURVEY MARKER LEGEND
- 1/2" CAPPED IRON PIPE OVER STONE (FOUND)
 - ⊗ 3/4" IRON PIPE IN THIMBLE (FOUND)
 - ⊞ 1/2" REBAR W/ALKEC CAP OVER STONE (FOUND)
 - 5/8" REBAR W/RUGGLES & BOHM CAP (SET)

BLOCK	LOT NO.	ELEVATION (N.G.V.D.)
1	9	1280
2	1-3	1280
3	25-27	1282
4	1-13	1282
8	1-8	1281



BUILDING SETBACKS PER ZONING REGULATIONS

BENCH MARK: CITY OF WICHITA BENCH MARK AT MERIDIAN AND 43RD STREET SOUTH, 44 FEET NORTH AND 30 FEET EAST OF THE N.E. CORNER OF THE SE1/4 OF SECTION 13, T28S, R17W OF THE 6TH P.M. ELEV = 1280.80 M.S.L.

DWS FILE: SURVEY BASE
PROJECT NO. 2040P
JANUARY 2, 2007

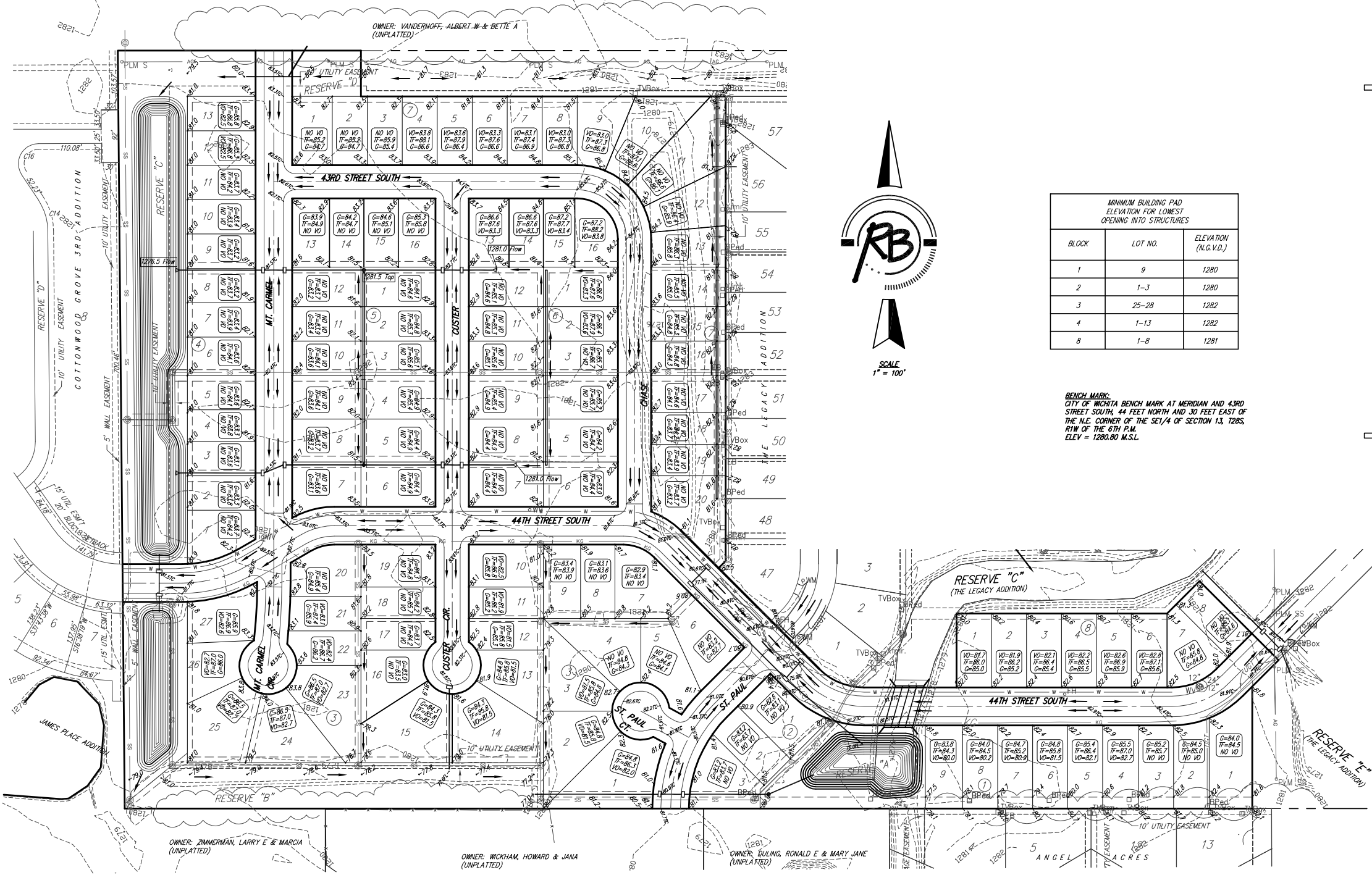


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Four Corner Lot Grading

THE LEGACY 3RD ADDITION

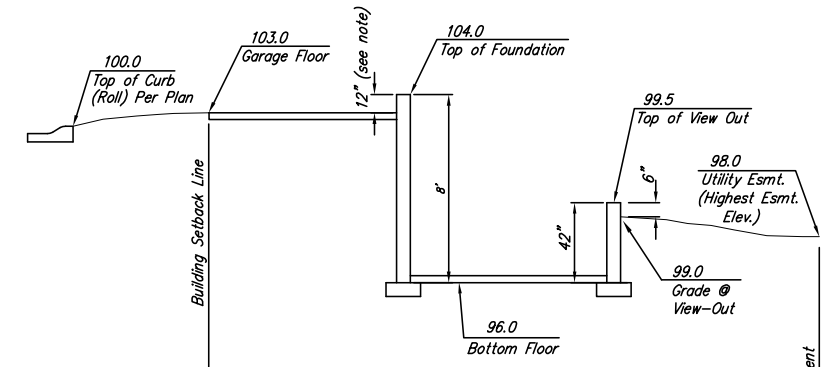
Wichita, Sedgwick County, Kansas



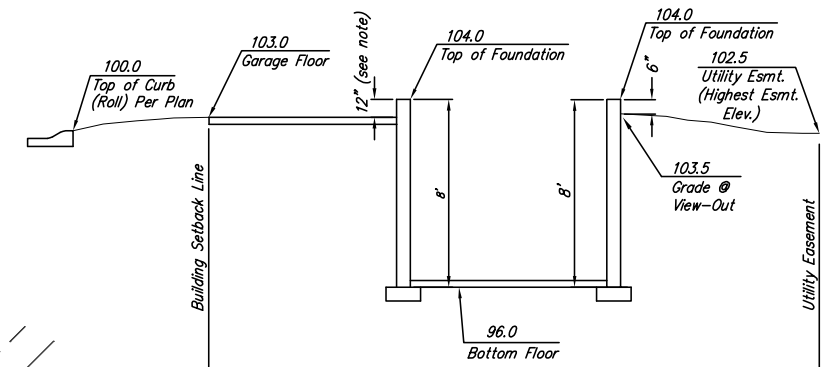
MINIMUM BUILDING PAD ELEVATION FOR LOWEST OPENING INTO STRUCTURES

BLOCK	LOT NO.	ELEVATION (N.G.V.D.)
1	9	1280
2	1-3	1280
3	25-28	1282
4	1-13	1282
8	1-8	1281

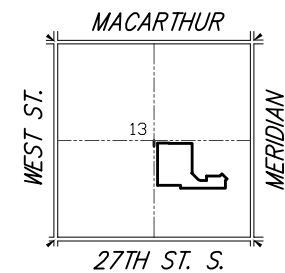
BENCH MARK:
CITY OF WICHITA BENCH MARK AT MERIDIAN AND 43RD STREET SOUTH, 44 FEET NORTH AND 30 FEET EAST OF THE N.E. CORNER OF THE SE1/4 OF SECTION 13, T28S, R1W OF THE 6TH P.M. ELEV = 1280.80 M.S.L.



Section Through Typical View-Out Lot



Section Through Typical Full Basement



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HYDROLOGY

HEC-HMS 3.0.1 was used to calculate basin flows and pond analysis. Basins were analyzed using a SCS Type II 24-hour rainfall distribution, standard SCS Dimensionless Unit Hydrograph, and SCS Curve Number method for determining losses. Times of concentration were derived using the velocity method and a minimum time of concentration of 15 minutes was used.

HYDROLOGIC DATA AND CALCULATIONS

EXISTING BASINS

Large Offsite (drains to old addition)

$T_c = 300' @ 0.20 \text{ ft/s} + 600' @ 1.0 \text{ ft/s} + 3600' @ 3 \text{ ft/s} = 55 \text{ minutes}$
341 Acres = 0.533 sq. mi.
CN = 73

Small Offsite (direct drainage to new addition)

$T_c = 300' @ 0.20 \text{ ft/s} + 800' @ 1.2 \text{ ft/s} = 36 \text{ minutes}$
12.2 Acres = 0.019 sq. mi.
CN = 73

West Onsite

$T_c = 300' @ 0.20 \text{ ft/s} + 600' @ 1.0 \text{ ft/s} + 550' @ 2.0 \text{ ft/s} = 40 \text{ minutes}$
17.5 acres = 0.0273 sq. mi.
CN = 76

East Onsite

$T_c = 300' @ 0.20 \text{ ft/s} + 573' @ 1.0 \text{ ft/s} = 35 \text{ minutes}$
20.6 acres = 0.0323 sq. mi.
CN = 69

DEVELOPED BASINS

West Onsite

$T_c = 200' @ 0.20 \text{ ft/s} + 96' @ 2.5 \text{ ft/s} + 200' @ 1.2 \text{ ft/s} = 20 \text{ minutes}$
17.5 acres = 0.0273 sq. mi.
CN = 81

East Onsite

$T_c = 300' @ 0.29 \text{ ft/s} + 630' @ 1.2 \text{ ft/s} = 26 \text{ minutes}$
20.6 acres = 0.0323 sq. mi.
CN = 75

**STAGE-AREA-DISCHARGE
INFORMATION FOR PONDS**

West Pond (13' Weir)		
Elev.	Area	Discharge
1279	1.42	0
1280	1.63	45
1281	1.85	128
1282	2.1	235

East Pond (35' Channel)		
Elev.	Area	Discharge
1276	0.26	0
1277	0.3	117
1278	0.35	391
1279	0.4	812
1280	0.45	1385

Reserve E Pond (RCBC)		
Elev.	Area	Discharge
1276	1.05	1.05
1277	1.12	1.12
1278	1.63	1.63
1279	1.75	1.75
1280	1.9	1.9
1281	2.06	2.06
1282	2.5	2.5

The following summary sheets show the breakdowns of each basin and pond for the 2, 5, 10, 25, and 100 year storms for both existing and developed basins.

DRAINAGE PLAN

THE LEGACY 3RD ADDITION

Wichita, Sedgwick County, Kansas

DRAINAGE BASIN SUMMARY

BASIN	AREA (ac)	Tc	I ₂	I ₁₀₀	C ₂	C ₁₀₀	Q ₂	Q ₁₀₀
A	1.40	15	3.83	7.37	0.50	0.76	2.7	7.8
B	10.65	36	2.39	4.93	0.12	0.33	3.1	17.3
C	4.62	20	3.33	6.53	0.44	0.61	6.8	18.4
D	3.08	15	3.83	7.37	0.44	0.61	5.2	13.8
E	0.83	15	3.83	7.37	0.44	0.61	1.4	3.7
F	1.21	15	3.83	7.37	0.44	0.61	2.0	5.4
G	1.02	15	3.83	7.37	0.44	0.61	1.7	4.6
H	1.27	15	3.83	7.37	0.50	0.76	2.4	7.1
I	0.66	15	3.83	7.37	0.50	0.76	1.3	3.7
J	0.93	15	3.83	7.37	0.44	0.61	1.6	4.2
K	0.97	15	3.83	7.37	0.50	0.76	1.9	5.4
L	1.73	15	3.83	7.37	0.50	0.76	3.3	9.7
M	1.16	15	3.83	7.37	0.30	0.65	1.3	5.6
N	4.84	26	2.90	5.79	0.30	0.65	4.2	18.2
O	1.35	15	3.83	7.37	0.50	0.76	2.6	7.6
P	358	55	1.81	3.92	0.12	0.33	78	463
Q	3.79	30	2.67	5.40	0.50	0.76	5.1	15.6
R	4.49	15	3.83	7.37	0.47	0.69	8.1	22.8
S	4.33	15	3.83	7.37	0.44	0.61	7.3	19.5
T	0.77	15	2.67	5.40	0.50	0.76	1.0	3.2
U	2.33	20	3.33	6.53	0.44	0.61	3.4	9.3
V	1.45	15	3.83	7.37	0.44	0.61	2.4	6.5
W	2.15	15	3.83	7.37	0.44	0.61	3.6	9.7



BENCH MARK:
CITY OF WICHITA BENCH MARK AT MERIDIAN AND 43RD STREET SOUTH, 44 FEET NORTH AND 30 FEET EAST OF THE N.E. CORNER OF THE SE1/4 OF SECTION 13, T28S, R1W OF THE 6TH P.M. ELEV = 1280.80 M.S.L.

SOIL TYPES:
40% Punker-Tavir Complex (Soil Group D)
60% Naron Complex (Soil Group B)

IMPERVIOUS AREA
Pre-Developed = 0.0 Acres
Post-Developed = 12.5 Acres

GROSS AREA:
1,428,375.5 Sq. Ft. ±
32.79 Acres ±

DATE OF TOPOGRAPHY:
OCTOBER 20, 2006

Proposed Pond
Static Pool = 1279.0
100 W.S. = 1280.4
Q₁₀₀ = 77 cfs

Proposed Concrete Weir
FL = 1278.0
TOP = 1281.5
13' x 2.5' Notch

Proposed Pond
Static Pool = 1276.0
100 W.S. = 1278.7
Q₁₀₀ = 692 cfs

Proposed 4 - 12"x3' RCBC
FL IN = 1276.0
FL OUT = 1276.5
L = 80'

Existing 35' Flat Bottom Ditch
Capacity = 812 cfs
Proposed Q₁₀₀ = 692 cfs

BLOCK	LOT NO.	ELEVATION (N.G.V.D.)
1	9	1280
2	1-3	1280
3	25-28	1282
4	1-13	1282
8	1-8	1281



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DWG FILE: SURVEY BASE
PROJECT NO: 2940P
NOVEMBER 8, 2006

Site Location Map
THE LEGACY 3RD ADDITION
Wichita, Sedgwick County, Kansas



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EXISTING SITE ANALYSIS

Project: Legacy 3rd Simulation Run: Existing2

Start of Run: 20Nov2006, 12:00 Basin Model: Existing
End of Run: 21Nov2006, 12:03 Meteorologic Model: Met2
Compute Time: 20Nov2006, 13:42:40 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Junction-1	0.6116	187.23	21Nov2006, 00:54	1.25
Junction-2	0.5653	172.55	21Nov2006, 00:57	1.24
Junction-3	0.0463	19.26	21Nov2006, 00:33	1.27
Offsite Large	0.5330	167.27	21Nov2006, 00:51	1.26
Offsite small	0.0190	7.44	21Nov2006, 00:33	1.16
Onsite East	0.0323	9.82	21Nov2006, 00:33	0.94
Onsite West	0.0273	11.86	21Nov2006, 00:36	1.34
Reserve E Pond	0.5330	166.16	21Nov2006, 00:57	1.26

Project: Legacy 3rd Simulation Run: Existing5

Start of Run: 20Nov2006, 12:00 Basin Model: Existing
End of Run: 21Nov2006, 12:03 Meteorologic Model: Met5
Compute Time: 20Nov2006, 13:43:22 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Junction-1	0.6116	307.14	21Nov2006, 00:51	1.96
Junction-2	0.5653	282.98	21Nov2006, 00:54	1.95
Junction-3	0.0463	31.50	21Nov2006, 00:33	2.00
Offsite Large	0.5330	273.30	21Nov2006, 00:51	1.98
Offsite small	0.0190	12.53	21Nov2006, 00:30	1.87
Onsite East	0.0323	17.79	21Nov2006, 00:30	1.58
Onsite West	0.0273	19.05	21Nov2006, 00:33	2.10
Reserve E Pond	0.5330	271.18	21Nov2006, 00:54	1.98

Project: Legacy 3rd Simulation Run: Existing10

Start of Run: 20Nov2006, 12:00 Basin Model: Existing
End of Run: 21Nov2006, 12:03 Meteorologic Model: Met10
Compute Time: 20Nov2006, 13:42:21 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Junction-1	0.6116	410.59	21Nov2006, 00:51	2.58
Junction-2	0.5653	378.12	21Nov2006, 00:54	2.57
Junction-3	0.0463	41.97	21Nov2006, 00:33	2.64
Offsite Large	0.5330	364.63	21Nov2006, 00:51	2.60
Offsite small	0.0190	16.92	21Nov2006, 00:30	2.48
Onsite East	0.0323	24.86	21Nov2006, 00:30	2.15
Onsite West	0.0273	25.20	21Nov2006, 00:33	2.74
Reserve E Pond	0.5330	362.05	21Nov2006, 00:54	2.60

Project: Legacy 3rd Simulation Run: Existing25

Start of Run: 20Nov2006, 12:00 Basin Model: Existing
End of Run: 21Nov2006, 12:03 Meteorologic Model: Met25
Compute Time: 20Nov2006, 13:42:59 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Junction-1	0.6116	518.66	21Nov2006, 00:51	3.22
Junction-2	0.5653	477.54	21Nov2006, 00:51	3.22
Junction-3	0.0463	52.82	21Nov2006, 00:33	3.30
Offsite Large	0.5330	459.77	21Nov2006, 00:51	3.25
Offsite small	0.0190	21.51	21Nov2006, 00:30	3.13
Onsite East	0.0323	32.34	21Nov2006, 00:30	2.75
Onsite West	0.0273	31.54	21Nov2006, 00:33	3.42
Reserve E Pond	0.5330	456.89	21Nov2006, 00:54	3.25

Project: Legacy 3rd Simulation Run: Existing100

Start of Run: 20Nov2006, 12:00 Basin Model: Existing
End of Run: 21Nov2006, 12:03 Meteorologic Model: Met100
Compute Time: 21Nov2006, 11:55:23 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Junction-1	0.6116	757.65	21Nov2006, 00:48	4.67
Junction-2	0.5653	698.08	21Nov2006, 00:51	4.66
Junction-3	0.0463	76.75	21Nov2006, 00:30	4.77
Offsite Large	0.5330	670.38	21Nov2006, 00:48	4.70
Offsite small	0.0190	31.64	21Nov2006, 00:30	4.58
Onsite East	0.0323	49.21	21Nov2006, 00:27	4.13
Onsite West	0.0273	45.42	21Nov2006, 00:33	4.91
Reserve E Pond	0.5330	666.04	21Nov2006, 00:54	4.69

DEVELOPED SITE ANALYSIS

Project: Legacy 3rd Simulation Run: Developed 2 Year

Start of Run: 20Nov2006, 12:00 Basin Model: Developed
End of Run: 21Nov2006, 12:03 Meteorologic Model: Met2
Compute Time: 03Jan2007, 09:27:54 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
East Pond	0.5653	172.89	21Nov2006, 00:57	1.26
Junction-1	0.6116	189.17	21Nov2006, 00:54	1.28
Junction-2	0.5653	172.89	21Nov2006, 00:57	1.26
Junction-3	0.0463	29.50	21Nov2006, 00:15	1.48
Offsite Large	0.5330	167.27	21Nov2006, 00:51	1.26
Offsite small	0.0190	7.44	21Nov2006, 00:33	1.16
Onsite East	0.0323	17.90	21Nov2006, 00:21	1.29
Onsite West	0.0273	24.45	21Nov2006, 00:12	1.70
Reserve E Pond	0.5330	166.16	21Nov2006, 00:57	1.26
West Pond	0.0463	19.54	21Nov2006, 00:33	1.46

Project: Legacy 3rd Simulation Run: Developed 5 Year

Start of Run: 20Nov2006, 12:00 Basin Model: Developed
End of Run: 21Nov2006, 12:03 Meteorologic Model: Met5
Compute Time: 03Jan2007, 09:32:43 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
East Pond	0.5653	282.21	21Nov2006, 00:54	1.98
Junction-1	0.6116	307.93	21Nov2006, 00:54	2.00
Junction-2	0.5653	282.21	21Nov2006, 00:54	1.98
Junction-3	0.0463	45.61	21Nov2006, 00:15	2.26
Offsite Large	0.5330	273.30	21Nov2006, 00:51	1.98
Offsite small	0.0190	12.53	21Nov2006, 00:30	1.87
Onsite East	0.0323	29.09	21Nov2006, 00:18	2.03
Onsite West	0.0273	36.83	21Nov2006, 00:12	2.53
Reserve E Pond	0.5330	271.18	21Nov2006, 00:54	1.98
West Pond	0.0463	30.51	21Nov2006, 00:33	2.24

Project: Legacy 3rd Simulation Run: Developed 10 Year

Start of Run: 20Nov2006, 12:00 Basin Model: Developed
End of Run: 21Nov2006, 12:03 Meteorologic Model: Met10
Compute Time: 03Jan2007, 09:33:29 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
East Pond	0.5653	376.51	21Nov2006, 00:54	2.60
Junction-1	0.6116	409.97	21Nov2006, 00:51	2.62
Junction-2	0.5653	376.51	21Nov2006, 00:54	2.60
Junction-3	0.0463	59.09	21Nov2006, 00:15	2.92
Offsite Large	0.5330	364.63	21Nov2006, 00:51	2.60
Offsite small	0.0190	16.92	21Nov2006, 00:30	2.48
Onsite East	0.0323	38.71	21Nov2006, 00:18	2.67
Onsite West	0.0273	47.06	21Nov2006, 00:12	3.23
Reserve E Pond	0.5330	362.05	21Nov2006, 00:54	2.60
West Pond	0.0463	39.74	21Nov2006, 00:33	2.90

Project: Legacy 3rd Simulation Run: Developed 25 Year

Start of Run: 20Nov2006, 12:00 Basin Model: Developed
End of Run: 21Nov2006, 12:03 Meteorologic Model: Met25
Compute Time: 03Jan2007, 09:34:22 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
East Pond	0.5653	474.90	21Nov2006, 00:54	3.25
Junction-1	0.6116	516.44	21Nov2006, 00:51	3.28
Junction-2	0.5653	474.90	21Nov2006, 00:54	3.25
Junction-3	0.0463	72.90	21Nov2006, 00:15	3.61
Offsite Large	0.5330	459.77	21Nov2006, 00:51	3.25
Offsite small	0.0190	21.51	21Nov2006, 00:30	3.13
Onsite East	0.0323	48.68	21Nov2006, 00:18	3.34
Onsite West	0.0273	57.44	21Nov2006, 00:12	3.95
Reserve E Pond	0.5330	456.89	21Nov2006, 00:54	3.25
West Pond	0.0463	50.84	21Nov2006, 00:33	3.59

Project: Legacy 3rd Simulation Run: Developed 100

Start of Run: 20Nov2006, 12:00 Basin Model: Developed
End of Run: 21Nov2006, 12:03 Meteorologic Model: Met100
Compute Time: 03Jan2007, 09:35:20 Control Specifications: Control 1

Volume Units: IN

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
East Pond	0.5653	691.89	21Nov2006, 00:51	4.70
Junction-1	0.6116	750.71	21Nov2006, 00:51	4.73
Junction-2	0.5653	691.89	21Nov2006, 00:51	4.70
Junction-3	0.0463	102.84	21Nov2006, 00:15	5.13
Offsite Large	0.5330	670.38	21Nov2006, 00:48	4.70
Offsite small	0.0190	31.64	21Nov2006, 00:30	4.58
Onsite East	0.0323	70.53	21Nov2006, 00:18	4.82
Onsite West	0.0273	79.72	21Nov2006, 00:12	5.52
Reserve E Pond	0.5330	666.04	21Nov2006, 00:54	4.69
West Pond	0.0463	76.92	21Nov2006, 00:30	5.10

Reserve E Box Culvert.txt
Culvert Calculator

All calculator output should be verified prior to design use

Entered Data:

Shape Rectangular
 Number of Barrels 4
 Solving for Headwater
 Chart Number 8
 Scale Number 1
 Chart Description BOX CULVERT WITH FLARED WINGWALLS; NO INLET

TOP EDGE BEVEL

Scale Description WINGWALLS FLARED 30 TO 75 DEGREES
 Overtopping Off
 Flowrate 940.0000 cfs
 Manning's n 0.0130
 Roadway Elevation 1281.0000 ft
 Inlet Elevation 1276.0000 ft
 Outlet Elevation 1275.5000 ft
 Height 3.0000 ft
 width 12.0000 ft
 Length 80.0000 ft
 Entrance Loss 0.0000
 Tailwater 1.4266 ft

Computed Results:

Headwater 1280.0011 ft Inlet Control
 Slope 0.0063 ft/ft
 Velocity 11.1415 fps

DIS-CHARGE	HEAD-WATER	INLET CONTROL	OUTLET CONTROL	FLOW TYPE	NORMAL DEPTH	CRITICAL DEPTH	OUTLET VEL.	OUTLET DEPTH	TAILWATER VEL.	TAILWATER DEPTH
Flow cfs	ELEV. ft	DEPTH ft	DEPTH ft		ft	ft	fps	ft	fps	ft
20.00	1276.26	0.26	0.00	NA	0.16	0.18	2.62	0.16	0.96	
0.15										
40.00	1276.42	0.42	0.00	NA	0.24	0.28	3.44	0.24	1.26	
0.22										
60.00	1276.56	0.56	0.00	NA	0.31	0.36	4.03	0.31	1.47	
0.28										
80.00	1276.68	0.68	0.00	NA	0.37	0.44	4.50	0.37	1.65	
0.33										
100.00	1276.79	0.79	0.00	NA	0.42	0.51	4.90	0.42	1.79	
0.38										
120.00	1276.90	0.90	0.00	NA	0.48	0.58	5.26	0.48	1.92	
0.43										
140.00	1277.00	1.00	0.00	NA	0.52	0.64	5.58	0.52	2.03	
0.47										
160.00	1279.06	3.06	0.00	NA	0.57	0.70	5.86	0.57	2.14	
0.51										
180.00	1279.07	3.07	0.00	NA	0.61	0.76	6.13	0.61	2.24	
0.54										
200.00	1279.08	3.08	0.00	NA	0.65	0.81	6.38	0.65	2.33	
0.58										
220.00	1279.10	3.10	0.00	NA	0.69	0.87	6.61	0.69	2.41	
0.61										
240.00	1279.11	3.11	0.00	NA	0.73	0.92	6.83	0.73	2.49	
0.64										
260.00	1279.12	3.12	0.00	NA	0.77	0.97	7.04	0.77	2.56	
0.67										

Reserve E Box Culvert.txt									
280.00	1279.14	3.14	0.00	NA	0.81	1.02	7.23	0.81	2.63
0.70									
300.00	1279.15	3.15	0.00	NA	0.84	1.07	7.42	0.84	2.70
0.73									
320.00	1279.17	3.17	0.00	NA	0.88	1.11	7.60	0.88	2.76
0.76									
340.00	1279.18	3.18	0.00	NA	0.91	1.16	7.77	0.91	2.83
0.79									
360.00	1279.20	3.20	0.00	NA	0.95	1.20	7.93	0.95	2.89
0.82									
380.00	1279.22	3.22	0.00	NA	0.98	1.25	8.09	0.98	2.94
0.84									
400.00	1279.24	3.24	0.00	NA	1.01	1.29	8.24	1.01	3.00
0.87									
420.00	1279.25	3.25	0.00	NA	1.04	1.34	8.39	1.04	3.05
0.89									
440.00	1279.27	3.27	0.00	NA	1.07	1.38	8.53	1.07	3.10
0.92									
460.00	1279.29	3.29	0.00	NA	1.11	1.42	8.67	1.11	3.15
0.94									
480.00	1279.31	3.31	0.00	NA	1.14	1.46	8.80	1.14	3.20
0.97									
500.00	1279.33	3.33	0.00	NA	1.17	1.50	8.93	1.17	3.25
0.99									

West Pond Weir.txt

#Units=Structural Dimensions,ft,Flowrate,cfs

#Weir Rating Curve Data

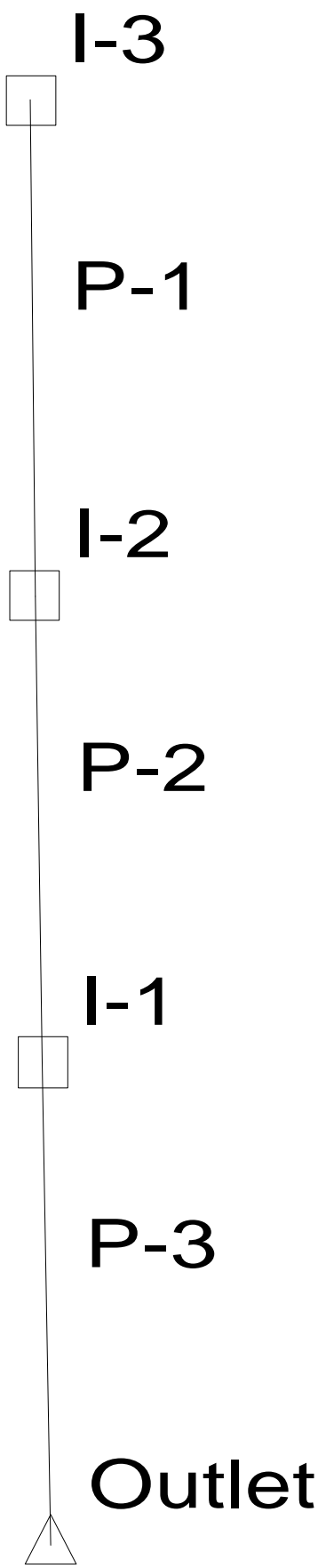
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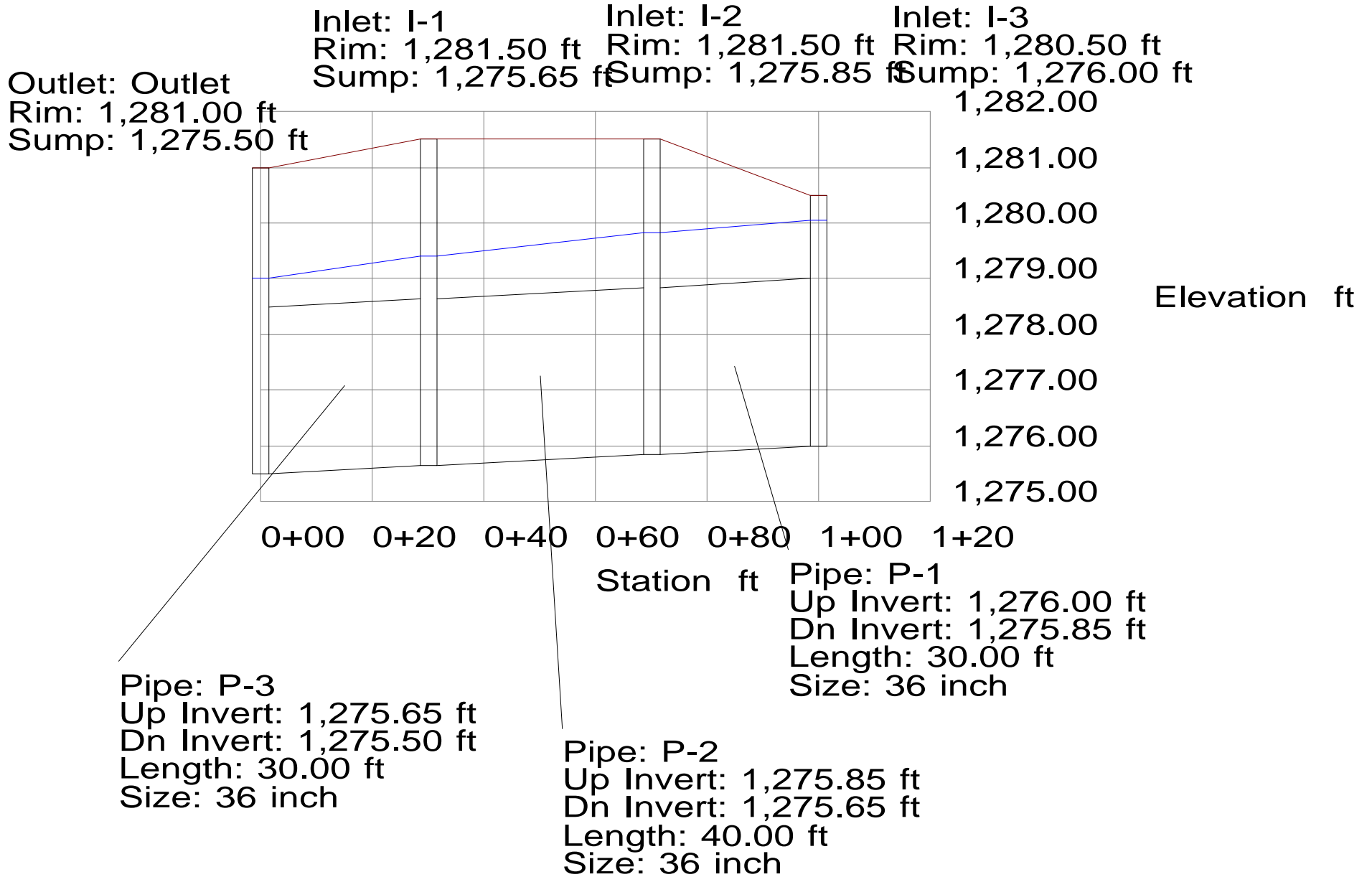
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HYDRAULICS

Onsite storm sewer has been designed to carry the 100 year storm event. StormCAD output and profiles are included in the appendix of this report. The rational method was used to determine flow rates for each pipe in the system. Time of concentration was determined using the velocity method. Following is a summary table of the hydraulic calculations. Refer to the Drainage Plan for Basin Locations. Areas A, H, I, K, L, M, N, O, R, and T are Hydrologic Soil Group D soils. Areas B, C, D, E, F, G, J, P, Q, S, U, V, and W are all Hydrologic Soil Group B soils.

Basin	Area	Tc	I2	I100	C2	C100	Q2	Q100
A	1.40	15	3.83	7.37	0.5	0.76	2.7	7.8
B	10.65	36	2.39	4.93	0.12	0.33	3.1	17.3
C	4.62	20	3.33	6.53	0.44	0.61	6.8	18.4
D	3.08	15	3.83	7.37	0.44	0.61	5.2	13.8
E	0.83	15	3.83	7.37	0.44	0.61	1.4	3.7
F	1.21	15	3.83	7.37	0.44	0.61	2.0	5.4
G	1.02	15	3.83	7.37	0.44	0.61	1.7	4.6
H	1.27	15	3.83	7.37	0.5	0.76	2.4	7.1
I	0.66	15	3.83	7.37	0.5	0.76	1.3	3.7
J	0.93	15	3.83	7.37	0.44	0.61	1.6	4.2
K	0.97	15	3.83	7.37	0.5	0.76	1.9	5.4
L	1.73	15	3.83	7.37	0.5	0.76	3.3	9.7
M	1.16	15	3.83	7.37	0.3	0.65	1.3	5.6
N	4.84	26	2.9	5.79	0.3	0.65	4.2	18.2
O	1.35	15	3.83	7.37	0.5	0.76	2.6	7.6
P	341	55	1.81	3.92	0.12	0.33	74.1	441.1
Q	3.79	30	2.67	5.4	0.5	0.76	5.1	15.6
R	4.49	15	3.83	7.37	0.47	0.69	8.1	22.8
S	4.33	15	3.83	7.37	0.44	0.61	7.3	19.5
T	0.77	15	2.67	5.4	0.5	0.76	1.0	3.2
U	2.33	20	3.33	6.53	0.44	0.61	3.4	9.3
V	1.45	15	3.83	7.37	0.44	0.61	2.4	6.5
W	2.15	15	3.83	7.37	0.44	0.61	3.6	9.7





Combined Pipe/Node Report

Pipe	Up Node	Dn Node	Length (ft)	Size	Cap (cfs)	V avg (ft/s)	Up Invert (ft)	Dn Invert (ft)	S (ft/ft)	Description	Q (cfs)
P-1	I-3	I-2	30.00	36 inch	47.16	8.35	1,276.00	1,275.85	0.005000		59.00
P-2	I-2	I-1	40.00	36 inch	47.16	9.62	1,275.85	1,275.65	0.005000		68.00
P-3	I-1	Outlet	30.00	36 inch	47.16	10.89	1,275.65	1,275.50	0.005000		77.00

Pipe Report

Pipe	Up Node	Dn Node	Q (cfs)	Length (ft)	S (ft/ft)	Size	Roughness	Cap (cfs)	Up Invert (ft)	Dn Invert (ft)	Up Cover (ft)	Dn Cover (ft)	Up HGL (ft)	Dn HGL (ft)
P-1	I-3	I-2	59.00	30.00	0.005000	36 inch	0.013	47.16	1,276.00	1,275.85	1.50	2.65	1,280.05	1,279.82
P-2	I-2	I-1	68.00	40.00	0.005000	36 inch	0.013	47.16	1,275.85	1,275.65	2.65	2.85	1,279.82	1,279.40
P-3	I-1	Outlet	77.00	30.00	0.005000	36 inch	0.013	47.16	1,275.65	1,275.50	2.85	2.50	1,279.40	1,279.00
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Outlet



P-6

I-1



P-5

I-2



P-4

I-3



P-3

I-4



P-2

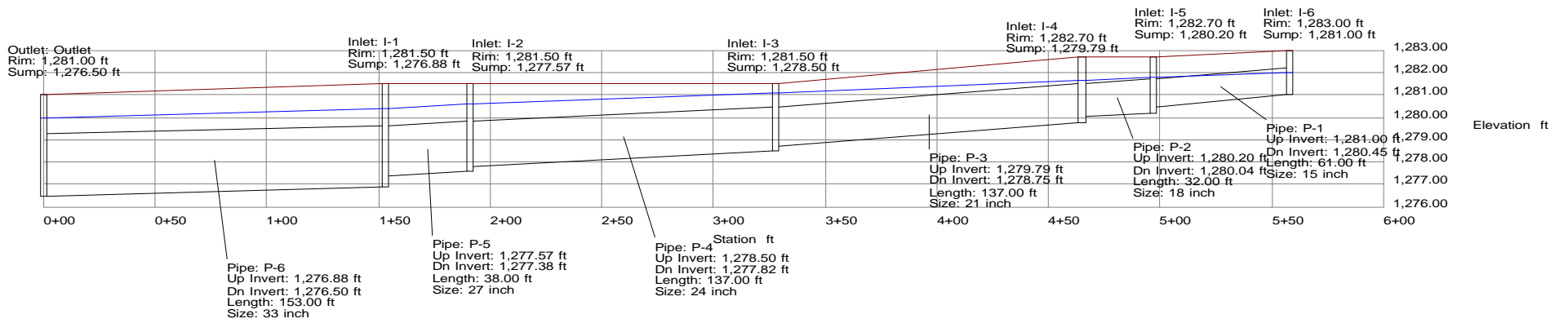
I-5



P-1

I-6



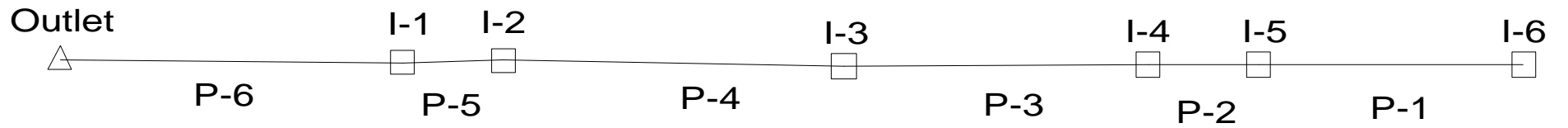


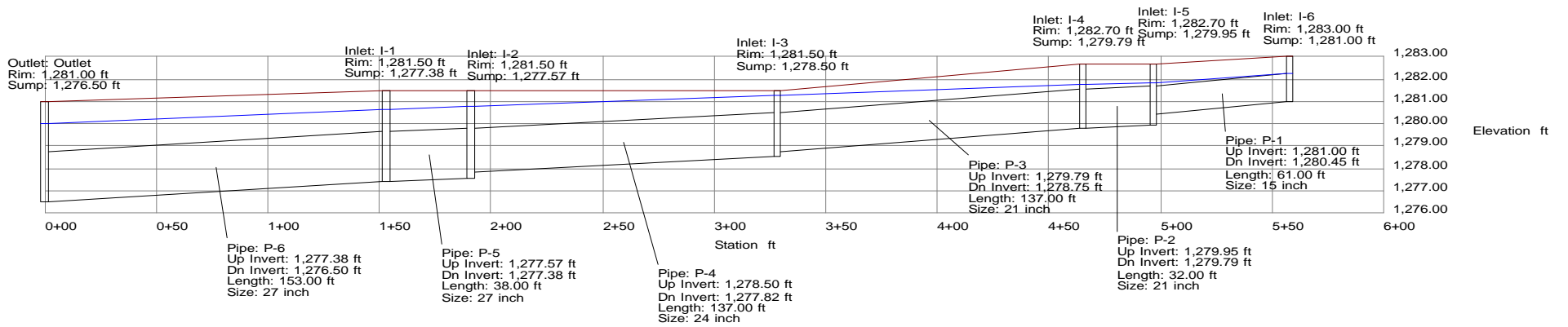
Pipe Report

Pipe	Up Node	Dn Node	Q (cfs)	Length (ft)	S (ft/ft)	Size	Roughness	Cap (cfs)	Up Invert (ft)	Dn Invert (ft)	Up Cover (ft)	Dn Cover (ft)	Up HGL (ft)	Dn HGL (ft)
P-1	I-6	I-5	4.60	61.00	0.009016	15 inch	0.013	6.13	1,281.00	1,280.45	0.75	1.00	1,282.00	1,281.78
P-2	I-5	I-4	7.30	32.00	0.005000	18 inch	0.013	7.43	1,280.20	1,280.04	1.00	1.16	1,281.78	1,281.63
P-3	I-4	I-3	10.00	137.00	0.007591	21 inch	0.013	13.80	1,279.79	1,278.75	1.16	1.00	1,281.63	1,281.08
P-4	I-3	I-2	13.70	137.00	0.005000	24 inch	0.013	16.00	1,278.50	1,277.82	1.00	1.68	1,281.08	1,280.58
P-5	I-2	I-1	20.60	38.00	0.005000	27 inch	0.013	21.90	1,277.57	1,277.38	1.68	1.87	1,280.58	1,280.41
P-6	I-1	Outlet	27.50	153.00	0.002451	33 inch	0.013	26.18	1,276.88	1,276.50	1.87	1.75	1,280.41	1,280.00
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Combined Pipe/Node Report

Pipe	Up Node	Dn Node	Length (ft)	Size	Cap (cfs)	V avg (ft/s)	Up Invert (ft)	Dn Invert (ft)	S (ft/ft)	Description	Q (cfs)
P-1	I-6	I-5	61.00	15 inch	6.13	4.05	1,281.00	1,280.45	0.009016		4.60
P-2	I-5	I-4	32.00	18 inch	7.43	4.13	1,280.20	1,280.04	0.005000		7.30
P-3	I-4	I-3	137.00	21 inch	13.80	4.16	1,279.79	1,278.75	0.007591		10.00
P-4	I-3	I-2	137.00	24 inch	16.00	4.36	1,278.50	1,277.82	0.005000		13.70
P-5	I-2	I-1	38.00	27 inch	21.90	5.18	1,277.57	1,277.38	0.005000		20.60
P-6	I-1	Outlet	153.00	33 inch	26.18	4.63	1,276.88	1,276.50	0.002451		27.50





Combined Pipe/Node Report

Pipe	Up Node	Dn Node	Length (ft)	Size	Cap (cfs)	V avg (ft/s)	Up Invert (ft)	Dn Invert (ft)	S (ft/ft)	Description	Q (cfs)
P-1	I-6	I-5	61.00	15 inch	6.13	4.40	1,281.00	1,280.45	0.009016		5.40
P-2	I-5	I-4	32.00	21 inch	11.20	3.12	1,279.95	1,279.79	0.005000		7.50
P-3	I-4	I-3	137.00	21 inch	13.80	3.99	1,279.79	1,278.75	0.007591		9.60
P-4	I-3	I-2	137.00	24 inch	16.00	4.23	1,278.50	1,277.82	0.005000		13.30
P-5	I-2	I-1	38.00	27 inch	21.90	4.25	1,277.57	1,277.38	0.005000		16.90
P-6	I-1	Outlet	153.00	27 inch	23.42	5.13	1,277.38	1,276.50	0.005719		20.40

Pipe Report

Pipe	Up Node	Dn Node	Q (cfs)	Length (ft)	S (ft/ft)	Size	Roughness	Cap (cfs)	Up Invert (ft)	Dn Invert (ft)	Up Cover (ft)	Dn Cover (ft)	Up HGL (ft)	Dn HGL (ft)
P-1	I-6	I-5	5.40	61.00	0.009016	15 inch	0.013	6.13	1,281.00	1,280.45	0.75	1.00	1,282.25	1,281.83
P-2	I-5	I-4	7.50	32.00	0.005000	21 inch	0.013	11.20	1,279.95	1,279.79	1.00	1.16	1,281.83	1,281.75
P-3	I-4	I-3	9.60	137.00	0.007591	21 inch	0.013	13.80	1,279.79	1,278.75	1.16	1.00	1,281.75	1,281.25
P-4	I-3	I-2	13.30	137.00	0.005000	24 inch	0.013	16.00	1,278.50	1,277.82	1.00	1.68	1,281.25	1,280.78
P-5	I-2	I-1	16.90	38.00	0.005000	27 inch	0.013	21.90	1,277.57	1,277.38	1.68	1.87	1,280.78	1,280.66
P-6	I-1	Outlet	20.40	153.00	0.005719	27 inch	0.013	23.42	1,277.38	1,276.50	1.87	2.25	1,280.66	1,280.00
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Outlet

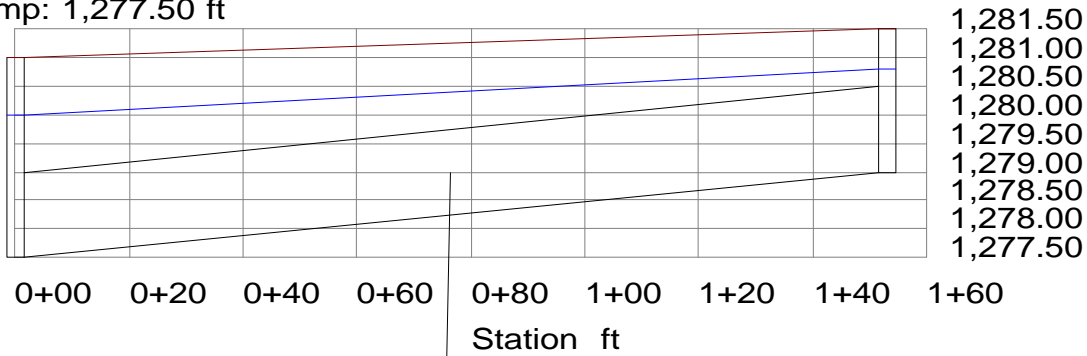
I-1



P-1

Outlet: Outlet
 Rim: 1,281.00 ft
 Sump: 1,277.50 ft

Inlet: I-1
 Rim: 1,281.50 ft
 Sump: 1,279.00 ft



Elevation ft

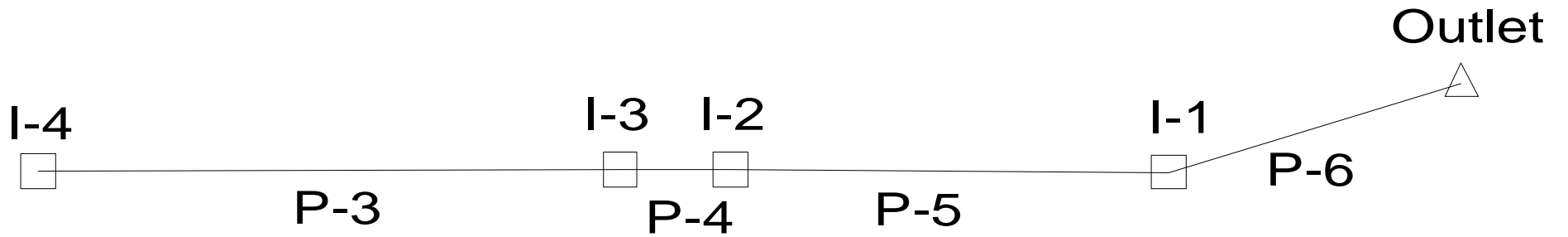
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 Up Invert: 1,279.00 ft
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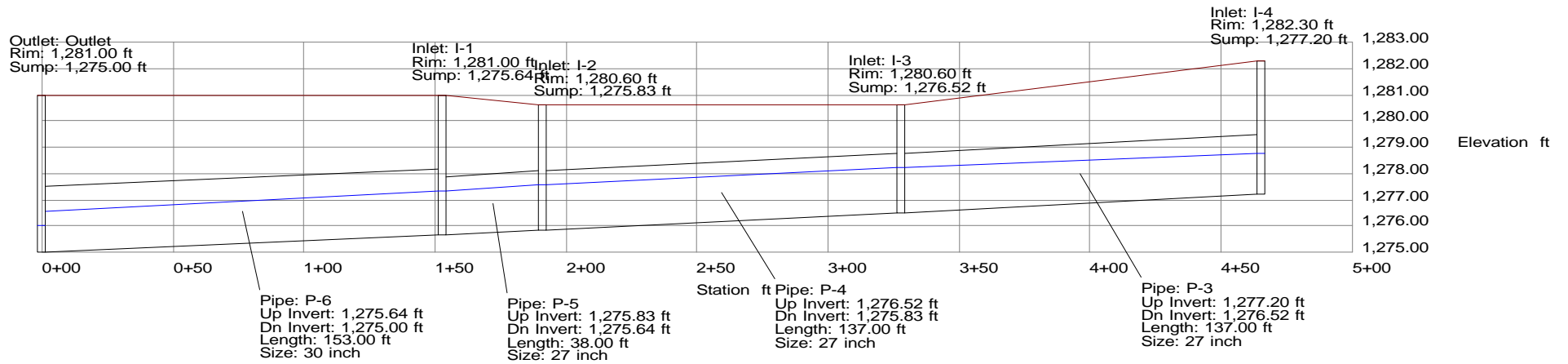
Combined Pipe/Node Report

Pipe	Up Node	Dn Node	Length (ft)	Size	Cap (cfs)	V avg (ft/s)	Up Invert (ft)	Dn Invert (ft)	S (ft/ft)	Description	Q (cfs)
P-1	I-1	Outlet	153.00	18 inch	10.40	4.30	1,279.00	1,277.50	0.009804		7.60

Pipe Report

Pipe	Up Node	Dn Node	Q (cfs)	Length (ft)	S (ft/ft)	Size	Roughness	Cap (cfs)	Up Invert (ft)	Dn Invert (ft)	Up Cover (ft)	Dn Cover (ft)	Up HGL (ft)	Dn HGL (ft)
P-1	I-1 N/A	Outlet N/A	7.60 N/A	153.00 N/A	0.009804 N/A	18 inch N/A	0.013 N/A	10.40 N/A	1,279.00 N/A	1,277.50 N/A	1.00 N/A	2.00 N/A	1,280.80 N/A	1,280.00 N/A





Combined Pipe/Node Report

Pipe	Up Node	Dn Node	Length (ft)	Size	Cap (cfs)	V avg (ft/s)	Up Invert (ft)	Dn Invert (ft)	S (ft/ft)	Description	Q (cfs)
P-3	I-4	I-3	137.00	27 inch	21.90	5.89	1,277.20	1,276.52	0.005000		18.20
P-4	I-3	I-2	137.00	27 inch	21.90	6.15	1,276.52	1,275.83	0.005000		20.20
P-5	I-2	I-1	38.00	27 inch	21.90	6.52	1,275.83	1,275.64	0.005000		21.40
P-6	I-1	Outlet	153.00	30 inch	26.53	6.30	1,275.64	1,275.00	0.004183		21.40

Pipe Report

Pipe	Up Node	Dn Node	Q (cfs)	Length (ft)	S (ft/ft)	Size	Roughness	Cap (cfs)	Up Invert (ft)	Dn Invert (ft)	Up Cover (ft)	Dn Cover (ft)	Up HGL (ft)	Dn HGL (ft)
P-3	I-4	I-3	18.20	137.00	0.005000	27 inch	0.013	21.90	1,277.20	1,276.52	2.85	1.83	1,278.77	1,278.22
P-4	I-3	I-2	20.20	137.00	0.005000	27 inch	0.013	21.90	1,276.52	1,275.83	1.83	2.52	1,278.22	1,277.59
P-5	I-2	I-1	21.40	38.00	0.005000	27 inch	0.013	21.90	1,275.83	1,275.64	2.52	3.11	1,277.59	1,277.34
P-6	I-1	Outlet	21.40	153.00	0.004183	30 inch	0.013	26.53	1,275.64	1,275.00	2.86	3.50	1,277.34	1,276.57
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A