Ruggles & Bohm, P.A
Engineering, Surveying, Land Planning
924 N. Main
Wichita, Kansas 67203

MEMO

Date: Monday, October 04, 2010

To: Tim Davidson
City of Wichita

From: Kenneth Lee

Project: Casa Bella 3rd Drainage

RB Project No.: 3655P

Other Project Reference No.:

Description:
- ☐ Confirmation
- ☒ Transmittal
- ☐ Transmittal under separate cover by

Purpose:
- ☐ Approval
- ☐ Review & comment
- ☒ Use
- ☐ Other :
- ☒ Distribution
- ☐ Information
- ☐ Record

Enclosures/Attachments:
- ☐ Prints
- ☒ Originals
- ☐ Diskettes containing:
- ☐ Change Order
- ☐ Shop Drawings
- ☐ Other:

Copies	Description
1	Drainage Plan
1	CD with pdf copy
1	plan review comments

Remarks: Tim
Attached is the drainage plan for Casa Bella 3rd. I've included my responses to your comments.
Let me know if you have any other questions.

Thank you,

Copies to:

If checked below, please:
- ☐ Acknowledge receipt of enclosures
- ☐ Return enclosures to us.

Signed

If Enclosures are not as noted above, please inform us immediately
Phone (316) 264-8008 Fax (316) 264-4621

Ken Lee

From: Ken Lee
Sent: Monday, September 20, 2010 1:39 PM
To: Alex Lane
Subject: FW: Casa Bella 3rd

My comments added.

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

From: Davidson, Tim [mailto:TDavidson@wichita.gov]
Sent: Wednesday, September 08, 2010 10:22 AM
To: Ken Lee
Subject: Casa Bella 3rd

Ken,

Comments for Casa Bella 3rd:

Grading Plan:

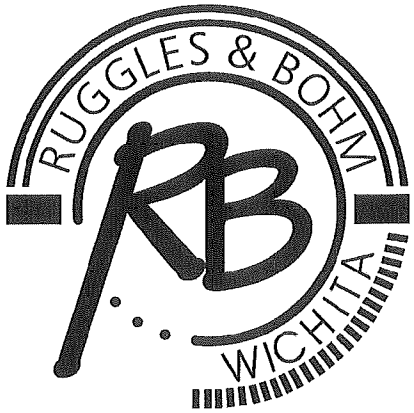
1. SWS should be extended; 13 lots drain to one inlet Blk 2, Lots 1-13. Added additional inlet and SWS.
2. SWS extended; Blk 1, Lots 9-12 and 25-30. Added additional inlet and SWS.
3. End-section FL elev for SWS outfall into pond. Added Callout
4. Culvert FL elev., US & DS. Added callout
5. Is there a culvert under Casa Bella? Added culvert
6. Street name label on cul de sac. Added note.
7. HP label, Blk 1, Lot 31. Added note
8. Permanent overflow structure for pond. Added note and small detail. Final details will be worked out with design plans.
9. VO appears too low for 2% fall from home, Blk 1, Lot 3. Adjusted Grade.
10. VO appears too low, Blk 2, Lot 5. Actual proposed backyard depth is only 35' (with proposed duplex). Grade should work with that.
11. Rim elevation on area inlets. Added callout.
12. Sumps for SWS curb inlets. Added elevations for small sump.
13. Minimum pad table in NGVD and NAVD for lots adjacent to pond (on plat, too). Modified table.

Report:

1. Who maintains Reserve E? – should be a note on plat, or covenant and note referencing covenant. Is this reserve to be platted, separately? Reserve E was added to Casa Bella 2nd specifically to address drainage concerns. Notes are on that plat.
2. There appears to be a substantial barrier between the culverts that go under 127th St. The calculations appear to assume all 3 culverts serve the site, but it looks from LiDAR that 1 culvert, the 36", serves the majority of the developed runoff coming down the ditch along 127th St. 36" RCP handles currently projected flows, ditch to be cut in when commercial development is done. Notes added to drainage basin map and report.
3. Would like to see hydrographs to show basins into detention, and how reservoir works with un-detained portions of runoff to 127th St culverts. Included HEC-HMS Output at back of report.
4. Was not sure what basin L was doing in the report. The existing grade does not seem to convey basin L to the pond, but the pond is encompassed in basin L. Basin L will drain to pond when commercial site work is completed. Provided an alternate HEC-HMS output without basin L into pond.
5. Drainage arrows in basins for drainage plan would help. Added additional arrows.
6. Grading plan calls out 18" SWS, but HY-analysis table, labeled as pond outlet, lists a 24" SWS. Changed report to indicate 24" RCP.
7. Probably should some downstream channel protection for the ditch, given the point discharge from the pond. Added note for increased channel protection. Ditch will require additional capacity when commercial development is completed.

Alright. . . Thanks,

Tim Davidson
Storm Water
Associate Engineer, EIT
316-268-4307
tdavidson@wichita.gov



Drainage Plan

CASA BELLA 3rd ADDITION
WICHITA, SEDGWICK COUNTY, KANSAS

September 2010

Drainage Plan
Casa Bella 3rd Addition
Wichita, Sedgwick County, Kansas

Introduction

Casa Bella 3rd Addition is a proposed 13.8 acre replat of a portion of Casa Bella 2nd Addition in southeast Wichita. It is northwest of the intersection of Pawnee and 127th Street East. The site is not being used for any specific purpose at this time but was originally designed as single family residential lots. The new site will have 18 duplex lots and 28 single family residential lots. The entire site was originally graded with the Casa Bella Storm Water Project (COW project #468 84073). Ponds were constructed in Casa Bella to handle drainage from Casa Bella and most of Casa Bella 2nd Addition.

Existing Conditions

The majority of the site currently drains to the west into the previously mentioned ponds. There is no offsite drainage that enters this property. There are no floodplains, wetlands or riparian areas within the proposed area of work. A portion of the east half of the plat currently drains undetained to 127th Street but the construction of a detention pond was required when infrastructure improvements were installed. The existing conditions model of the site is based on the site before the grading was done with the first phase of Casa Bella. The onsite soils are Irwin Silty Clay Loam, which are Hydrologic Soil Group D. Aerial photos with contours showing both the pre-developed grading and current site conditions are included with this submittal.

The drainage basin in the Southeast corner of the Casa Bella 2nd Addition drains to the intersection of 127th Street East and Pawnee. There are 2 – 24" RCP and a 36" RCP to carry drainage under 127th Street. A total of 18.5 acres, including offsite areas, drains to the 127th Street RCPs. The capacity of the pipes was found to be 110 cfs using HY-8. The rating curves for the culvert pipes can be seen on the following pages. The Velocity Method was used to find the time of concentration of 32 minutes. A curve number of 83 was used considering the site was not maintained and the hydrologic group D type soils.

Length of longest reach = 1170' (0.5% slope)

Tc = 300'/(0.21)(60) + 200'/(1.0)(60) + 670'/(3.0)(60) = 32 min
(sheet flow) (grassed waterway) (channel flow)

Developed Conditions

As previously outlined, the proposed Casa Bella 3rd addition consists of 13.8 acres with a mix of single family and duplex residential lots. The proposed total impervious area is 4.6 acres (33%). Along the north line of the proposed plat, there is an existing reserve with berms and a swale to prevent offsite silt transport and keep storm water onsite. Rear

yard drains will be installed in backyard areas to pick up drainage and provide 1.5% rear yard slope where possible. A minimum of 1% grade will be provided in other rear yard areas. The drainage for the west half of the plat will be controlled by the existing ponds that were previously designed to handle the runoff. Because the proposed drainage basin to the west is unchanged and was included in the design of the original ponds, please refer to those drainage reports for detention calculations and analysis for runoff in that area. The drainage for the east half of the site will be detained by a new pond constructed in Reserve "E" of Casa Bella 2nd Addition that was proposed in that plat's drainage plan. The pond outfall structure and storm sewer serving the east portion of the property has been modified from the original plans and calculations are included here. The existing and proposed ponds will act as silt traps during construction, although silt fence and other BMP measures will be utilized to limit silt transport to the ponds.

Hydraulic and Hydrologic Modeling

The proposed pond was modeled using HEC-HMS. The runoff summary for the site can be seen in Table 1. The results for the detention pond can be seen in Table 2. Storm sewer systems are needed to drain proposed lots. Proposed Storm Sewer systems have been sized using StormCAD and those results can be found at the end of this drainage plan. System 100, which serves the west half of the site, is sized for the 100 year storm except for the last inlet on the north property line. That inlet is designed to handle smaller storms and excess runoff from it is allowed to overspill to the west along the rear easement. The time of concentration for the residential and commercial portions of the developed Southeast pond basin is 15 minutes. The time of concentration for the undetained areas is 24 minutes due to the length of the roadside ditches that carry the runoff to the junction point.

The developed runoff curve for the residential basin is assumed to be 86 and for the commercial basin its assumed to be 94. The Southeast pond will be controlled by an 24" culvert for smaller storms and a 36" culvert for larger storms. The 24" RCP will be set with an inlet elevation of 1352.0 and the 36" RCP will have an inlet elevation of 1352.5.

The system was evaluated with full development and an alternate scenario with no commercial development was included as well. See the summary table below for results. A copy of the HEC-HMS electronic data is included on the CD provided with the drainage plan. The HEC-HMS model has a north basin which comprises drainage basins C, D, G, H, I, J and K as indicated on the drainage basin map and is approximately 6.3 acres. The south basin is indicated as basin L. Currently, basin L only drains in part to the proposed pond. When the area is developed as commercial property, it will be graded in a manner that conveys the water through the pond.

The 100yr discharge of the Southeast basin of 76.3 cfs is handled by the existing culvert pipes under 127th Street. The total capacity of the 127th Street culverts is 110 cfs. There is approximately 50' of higher ground between the two sets of pipe that cross under 127th Street. The 36" RCP that drains the majority of the area has a capacity of approximately 73 cfs before water reaches the edge of the roadway. Approximately 68 cfs of the total

runoff is directed to the 36" RCP. The remaining runoff is directed to the 2-24" RCP's from Pawnee. At the time that the commercial property in Casa Bella 2nd is developed, a cross connecting pipe or ditch between the 36" RCP and 2-24" RCP's should be implemented to provide additional protection from street overflows.

The existing roadway does not have history of overtopping, but an evaluation of the ditches indicated that storms in excess of the 25 year rain event may exceed the ditch capacity when the site is fully developed. The existing ditch has a capacity of approximately 36 cfs. In the alternate analysis that includes no commercial site development, the pond discharges 22 cfs in the 100 year event. The street ditch south of the pond should be widened to a 5' wide bottom with 3' side slopes to provide capacity for the 100 year event at the time that the commercial site is developed and that runoff is directed into the detention pond. In addition to that, the channel will require additional protection at the outfall and we recommend that the ditch be improved in that area at the time of the initial pond construction.

Stormwater Runoff Summary

Storm Return Period	Existing Q (cfs)	Developed Q (cfs)	No Commercial Q
2 year	25.1	22.0	23.8
5 year	37.0	34.7	35.1
10 year	46.7	45.8	44.2
25 year	58.5	56.7	53.4
100 year	77.4	76.3	74.4

Table 1: Existing versus Developed storm runoff of the Southeast drainage basin of Casa Bella 3rd Addition to the intersection of 127th Street East and Pawnee.

Design Storm	Peak Qin (cfs)	Peak Qout (cfs)	Peak Storage (ac-ft)	Peak Elevation
2 yr	33.0	22.0	1.10	1354.0
5 yr	41.1	22.0	1.10	1354.0
10 yr	49.9	28.1	1.30	1354.2
25 yr	58.8	35.1	1.40	1354.5
100 yr	77.4	46.8	1.80	1355.0

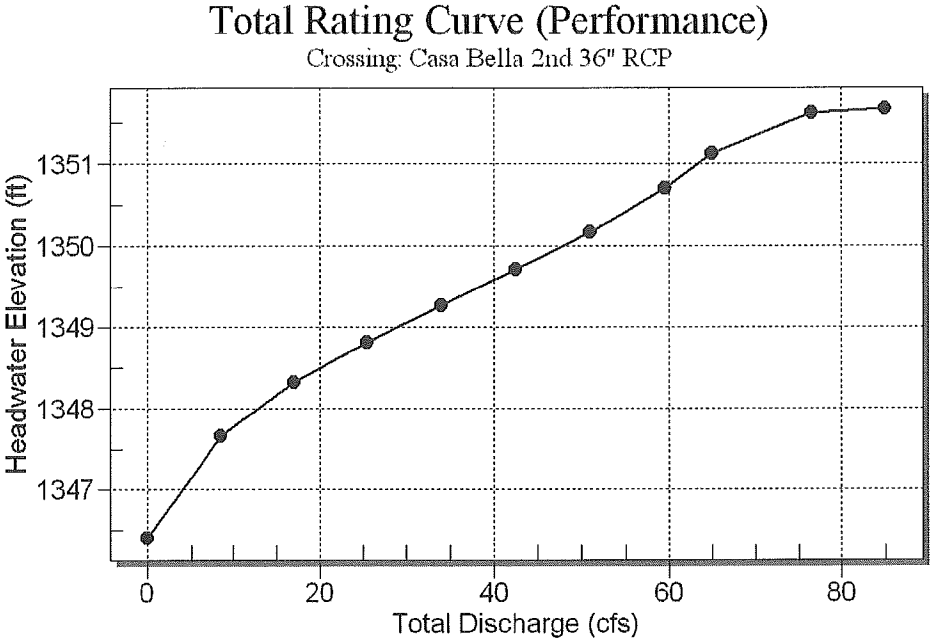
Table 2: SE Pond Information (Developed Basin w/ Full Development)

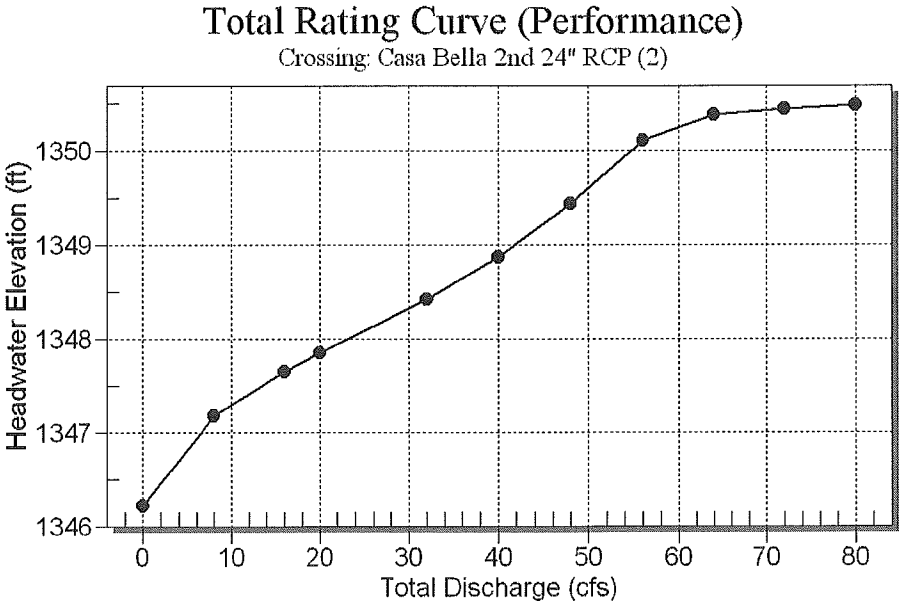
Proposed SE Pond Data:
Static Pool = 1352.0 Pond Bottom = 1346.0 100 yr Water Surface = 1355.0

Elevation	Area (ac)	Discharge (cfs)
1352.0	0.48	0
1352.5	0.52	3.0
1353.0	0.56	7.5
1353.5	0.60	14.5
1354.0	0.64	23.0
1354.5	0.68	37.5
1355.0	0.73	48.0

Table 1: SE Pond Stage-Area-Discharge

Rating Curves for 36" RCP & 24" RCPs under 127th Street East.





HY-8 Analysis Results

Crossing Summary Table

Culvert Crossing: Casa Bella3rd Pond Outlet

Headwater Elevation (ft)	Total Discharge (cfs)	24" Culvert Discharge (cfs)	36" Culvert Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1352.00	0.00	0.00	0.00	0.00	0
1353.23	7.50	3.24	4.27	0.00	4
1353.64	15.00	6.01	8.97	0.00	5
1353.98	22.50	8.27	14.21	0.00	4
1354.22	30.00	9.87	20.15	0.00	4
1354.53	37.50	11.39	26.11	0.00	4
1354.64	40.00	11.75	28.25	0.00	3
1355.23	52.50	13.45	39.05	0.00	3
1355.57	60.00	14.39	45.56	0.00	12
1355.91	67.50	15.29	52.05	0.00	25
1356.07	75.00	15.55	54.93	4.43	9
1356.00	69.17	15.51	53.66	0.00	Overtopping

HEC-HMS OUTPUT DATA

HEC-HMS

Project : casabella3rd

Basin Model : Pre Dev 127thandPawnee

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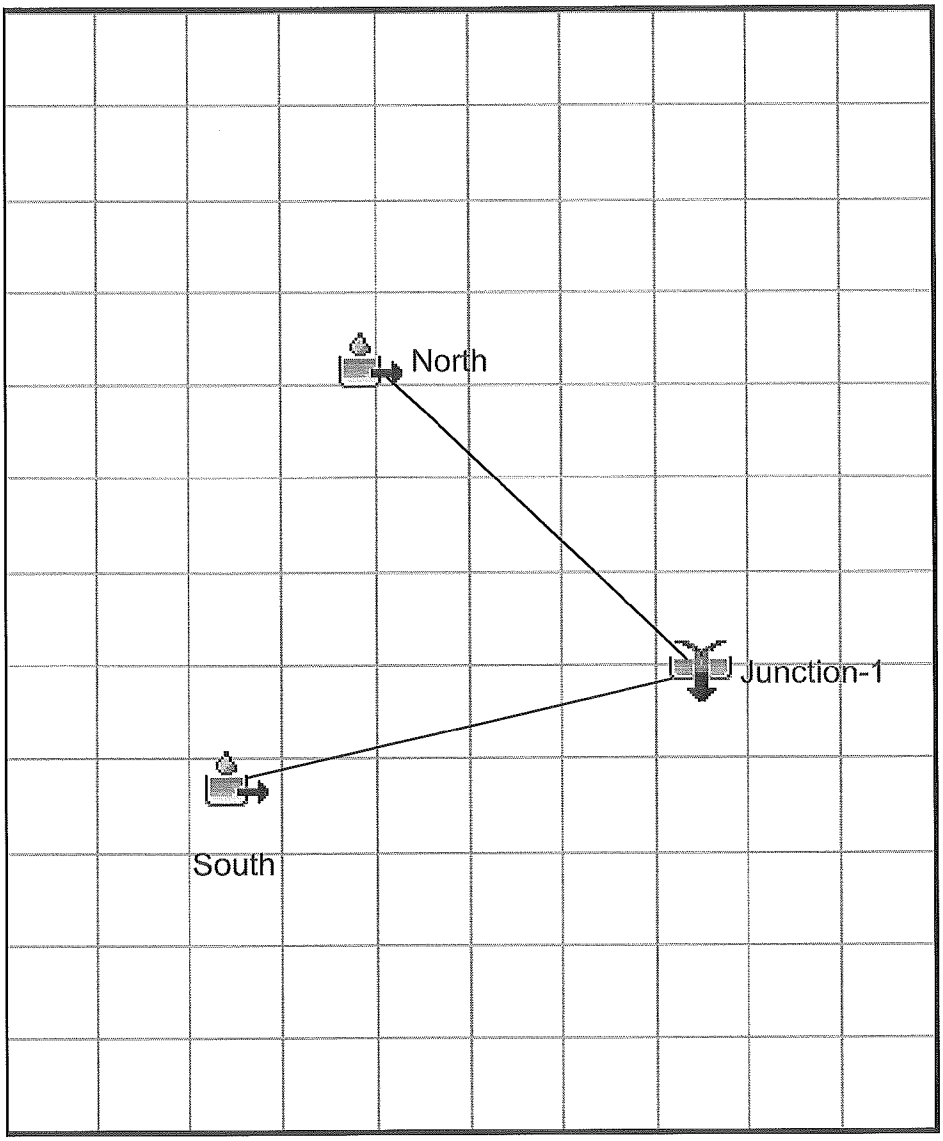

Existing Model

(Uses predeveloped runoff for all areas)

Project: casabella3rd Simulation Run: Existing2

Start of Run: 01Jan2008, 12:00 Basin Model: Pre Dev 127thandPawı
End of Run: 02Jan2008, 12:02 Meteorologic Model: 2 year
Compute Time: 17Sep2010, 14:28:06 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
North	0.02190	20.6	02Jan2008, 00:1
South	0.00703	5.1	02Jan2008, 00:2
Junction-1	0.02893	25.1	02Jan2008, 00:1

Project: casabella3rd Simulation Run: Existing5

Start of Run: 01Jan2008, 12:00
End of Run: 02Jan2008, 12:02
Compute Time: 17Sep2010, 14:28:12

Basin Model: Pre Dev 127thandPaw
Meteorologic Model: 5 year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
North	0.02190	30.4	02Jan2008, 00:1
South	0.00703	7.6	02Jan2008, 00:2
Junction-1	0.02893	37.0	02Jan2008, 00:1

Project: casabella3rd Simulation Run: Existing10

Start of Run: 01Jan2008, 12:00
End of Run: 02Jan2008, 12:02
Compute Time: 17Sep2010, 14:27:59

Basin Model: Pre Dev 127thandPawı
Meteorologic Model: 10 year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
North	0.02190	38.4	02Jan2008, 00:1
South	0.00703	9.6	02Jan2008, 00:2
Junction-1	0.02893	46.7	02Jan2008, 00:1

Project: casabella3rd Simulation Run: Existing25

Start of Run: 01Jan2008, 12:00 Basin Model: Pre Dev 127thandPawı
End of Run: 02Jan2008, 12:02 Meteorologic Model: 25 year
Compute Time: 17Sep2010, 14:28:09 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
North	0.02190	46.4	02Jan2008, 00:1
South	0.00703	11.6	02Jan2008, 00:2
Junction-1	0.02893	56.5	02Jan2008, 00:1

Project: casabella3rd Simulation Run: Existing100

Start of Run: 01Jan2008, 12:00 Basin Model: Pre Dev 127thandPawı
End of Run: 02Jan2008, 12:02 Meteorologic Model: 100 year
Compute Time: 17Sep2010, 14:28:02 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
North	0.02190	63.7	02Jan2008, 00:1
South	0.00703	15.9	02Jan2008, 00:2
Junction-1	0.02893	77.4	02Jan2008, 00:1

HEC-HMS

Project : casabella3rd

Basin Model : Developed 127th

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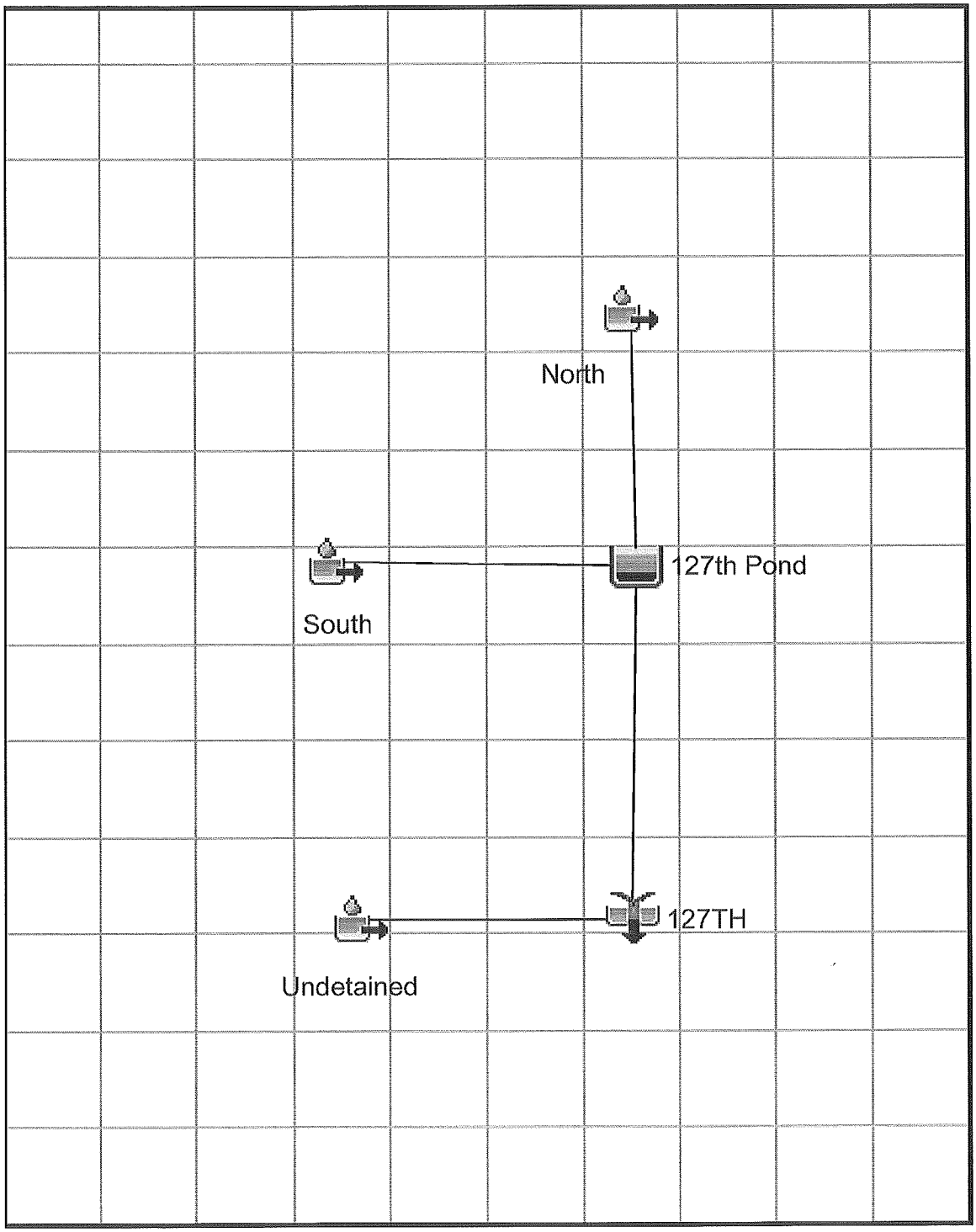


Includes Future Commercial Development

Project: casabella3rd Simulation Run: Developed2

Start of Run: 01Jan2008, 12:00 Basin Model: Developed 127th
End of Run: 02Jan2008, 12:02 Meteorologic Model: 2 year
Compute Time: 17Sep2010, 14:27:47 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
North	0.00988	13.2	02Jan2008, 00:0
South	0.00967	16.8	02Jan2008, 00:0
127th Pond	0.01955	22.0	01Jan2008, 12:0
Undetained	0.01070	9.9	02Jan2008, 00:1
127TH	0.03025	22.0	01Jan2008, 12:0

Project: casabella3rd

Simulation Run: Developed2 Reservoir: 127th Pond

Start of Run:	01Jan2008, 12:00	Basin Model:	Developed 127th
End of Run:	02Jan2008, 12:02	Meteorologic Model:	2 year
Compute Time:	17Sep2010, 14:27:47	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	30.0 (CFS)	Date/Time of Peak Inflow :	02Jan2008, 00:08
Peak Outflow :	22.0 (CFS)	Date/Time of Peak Outflow :	01Jan2008, 12:00
Total Inflow :	2.45 (IN)	Peak Storage :	1.1 (AC-FT)
Total Outflow :	3.49 (IN)	Peak Elevation :	1354.0 (FT)

Project: casabella3rd Simulation Run: Developed5

Start of Run: 01Jan2008, 12:00
End of Run: 02Jan2008, 12:02
Compute Time: 17Sep2010, 14:27:55

Basin Model: Developed 127th
Meteorologic Model: 5 year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
North	0.00988	18.8	02Jan2008, 00:0
South	0.00967	22.2	02Jan2008, 00:0
127th Pond	0.01955	22.0	01Jan2008, 12:0
Undetained	0.01070	14.5	02Jan2008, 00:1
127TH	0.03025	34.7	02Jan2008, 00:2

Project: casabella3rd

Simulation Run: Developed5 Reservoir: 127th Pond

Start of Run:	01Jan2008, 12:00	Basin Model:	Developed 127th
End of Run:	02Jan2008, 12:02	Meteorologic Model:	5 year
Compute Time:	17Sep2010, 14:27:55	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	41.1 (CFS)	Date/Time of Peak Inflow :	02Jan2008, 00:08
Peak Outflow :	22.0 (CFS)	Date/Time of Peak Outflow :	01Jan2008, 12:00
Total Inflow :	3.39 (IN)	Peak Storage :	1.1 (AC-FT)
Total Outflow :	4.41 (IN)	Peak Elevation :	1354.0 (FT)

Project: casabella3rd Simulation Run: Developed10

Start of Run: 01Jan2008, 12:00 Basin Model: Developed 127th
End of Run: 02Jan2008, 12:02 Meteorologic Model: 10 year
Compute Time: 17Sep2010, 14:27:39 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
North	0.00988	23.3	02Jan2008, 00:0
South	0.00967	26.6	02Jan2008, 00:0
127th Pond	0.01955	28.1	02Jan2008, 00:2
Undetained	0.01070	18.2	02Jan2008, 00:1
127TH	0.03025	45.8	02Jan2008, 00:1

Project: casabella3rd

Simulation Run: Developed10 Reservoir: 127th Pond

Start of Run:	01Jan2008, 12:00	Basin Model:	Developed 127th
End of Run:	02Jan2008, 12:02	Meteorologic Model:	10 year
Compute Time:	17Sep2010, 14:27:39	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	49.9 (CFS)	Date/Time of Peak Inflow :	02Jan2008, 00:08
Peak Outflow :	28.1 (CFS)	Date/Time of Peak Outflow :	02Jan2008, 00:20
Total Inflow :	4.15 (IN)	Peak Storage :	1.3 (AC-FT)
Total Outflow :	5.17 (IN)	Peak Elevation :	1354.2 (FT)

Project: casabella3rd Simulation Run: Developed25

Start of Run: 01Jan2008, 12:00 Basin Model: Developed 127th
End of Run: 02Jan2008, 12:02 Meteorologic Model: 25 year
Compute Time: 17Sep2010, 14:27:51 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
North	0.00988	27.9	02Jan2008, 00:0
South	0.00967	30.9	02Jan2008, 00:0
127th Pond	0.01955	35.1	02Jan2008, 00:2
Undetained	0.01070	21.9	02Jan2008, 00:1
127TH	0.03025	56.7	02Jan2008, 00:1

Project: casabella3rd

Simulation Run: Developed25 Reservoir: 127th Pond

Start of Run:	01Jan2008, 12:00	Basin Model:	Developed 127th
End of Run:	02Jan2008, 12:02	Meteorologic Model:	25 year
Compute Time:	17Sep2010, 14:27:51	Control Specifications:	Control 1

Volume Units: IN

Computed Results

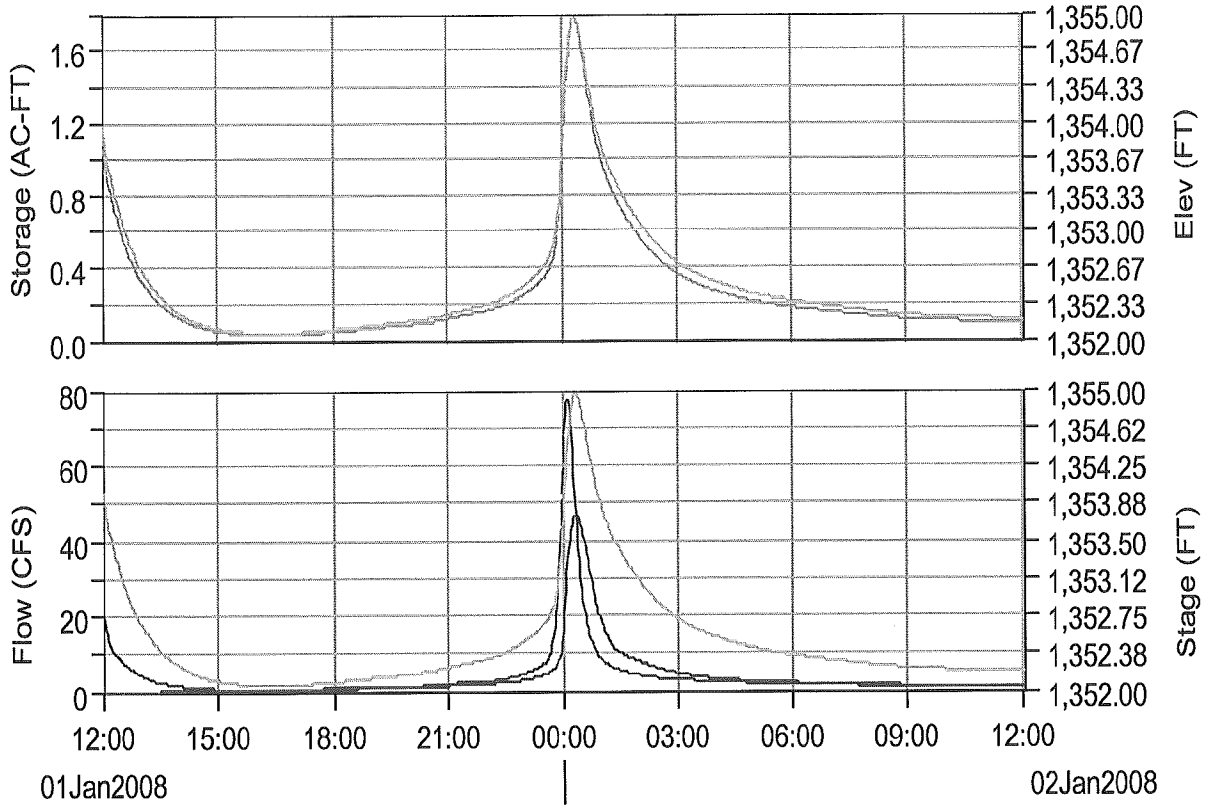
Peak Inflow :	58.8 (CFS)	Date/Time of Peak Inflow :	02Jan2008, 00:08
Peak Outflow :	35.1 (CFS)	Date/Time of Peak Outflow :	02Jan2008, 00:20
Total Inflow :	4.93 (IN)	Peak Storage :	1.4 (AC-FT)
Total Outflow :	5.93 (IN)	Peak Elevation :	1354.5 (FT)

Project: casabella3rd Simulation Run: Developed100

Start of Run: 01Jan2008, 12:00 Basin Model: Developed 127th
End of Run: 02Jan2008, 12:02 Meteorologic Model: 100 year
Compute Time: 17Sep2010, 14:53:30 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
North	0.00988	37.5	02Jan2008, 00:0
South	0.00967	40.0	02Jan2008, 00:0
127th Pond	0.01955	46.8	02Jan2008, 00:2
Undetained	0.01070	29.9	02Jan2008, 00:1
127TH	0.03025	76.3	02Jan2008, 00:1

Reservoir "127th Pond" Results for Run "Developed100"



Run:DEVELOPED100 Element:127TH POND Result:Storage

Run:DEVELOPED100 Element:127TH POND Result:Pool Elevation

Run:Developed100 Element:127TH POND Result:Outflow

Run:DEVELOPED100 Element:127TH POND Result:Combined Inflow

Run:Developed100 Element:127TH POND Result:Stage

Project: casabella3rd

Simulation Run: Developed100 Reservoir: 127th Pond

Start of Run:	01Jan2008, 12:00	Basin Model:	Developed 127th
End of Run:	02Jan2008, 12:02	Meteorologic Model:	100 year
Compute Time:	17Sep2010, 14:53:30	Control Specifications:	Control 1

Volume Units: IN

Computed Results

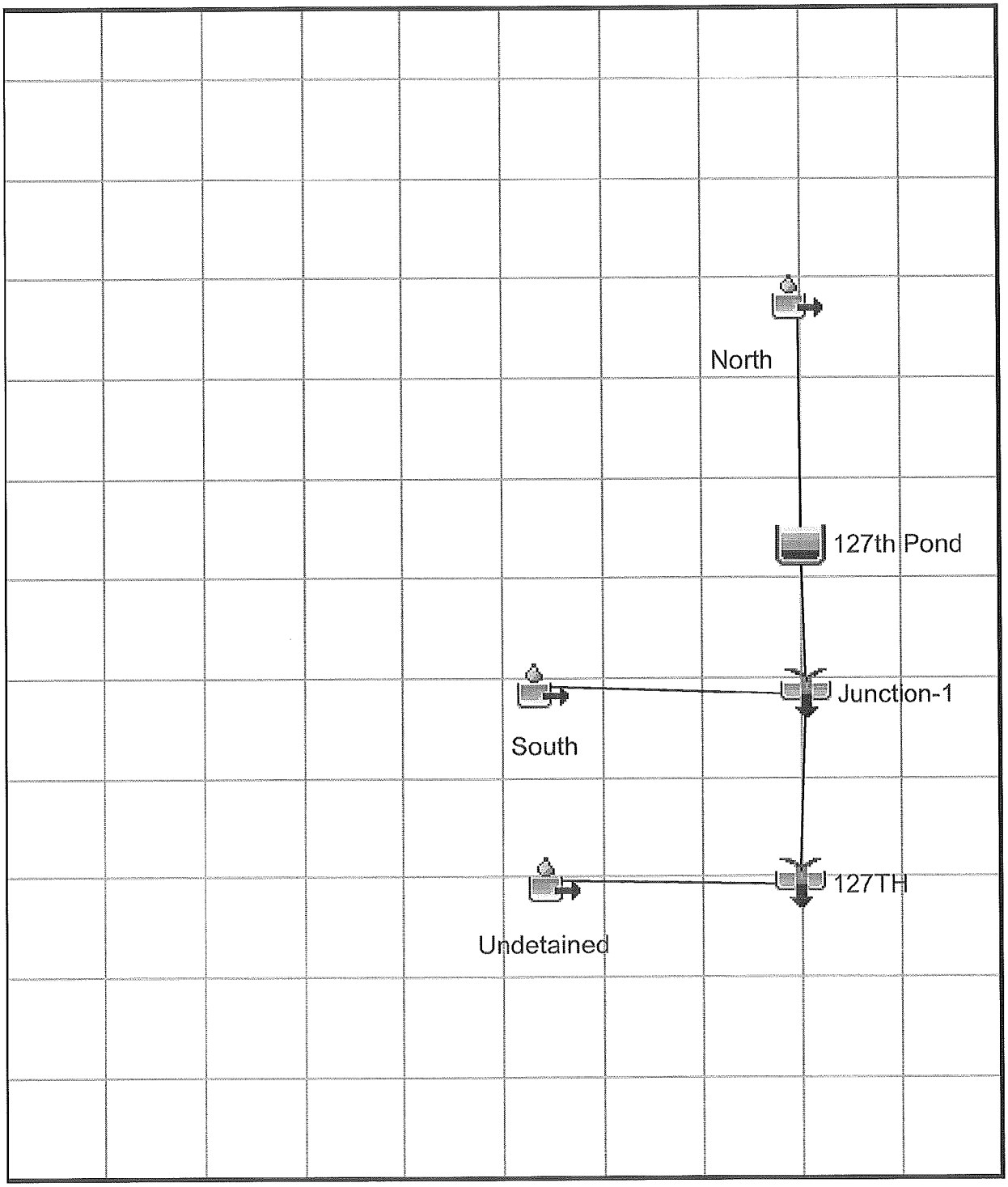
Peak Inflow :	77.4 (CFS)	Date/Time of Peak Inflow :	02Jan2008, 00:08
Peak Outflow :	46.8 (CFS)	Date/Time of Peak Outflow :	02Jan2008, 00:20
Total Inflow :	6.58 (IN)	Peak Storage :	1.8 (AC-FT)
Total Outflow :	7.56 (IN)	Peak Elevation :	1355.0 (FT)

HEC-HMS

Project : casabella3rd

Basin Model : No Commercial

Sep 17 15:19:55 CDT 2010



Project: casabella3rd Simulation Run: No Commercial 2

Start of Run: 01Jan2008, 12:00 Basin Model: No Commercial
End of Run: 02Jan2008, 12:02 Meteorologic Model: 2 year
Compute Time: 17Sep2010, 14:28:40 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
North	0.00988	13.2	02Jan2008, 00:0
127th Pond	0.00988	22.0	01Jan2008, 12:0
South	0.00967	11.5	02Jan2008, 00:0
Junction-1	0.01955	22.0	01Jan2008, 12:0
Undetained	0.01070	9.9	02Jan2008, 00:1
127TH	0.03025	23.8	02Jan2008, 00:1

Project: casabella3rd Simulation Run: No Commercial 5

Start of Run: 01Jan2008, 12:00 Basin Model: No Commercial
End of Run: 02Jan2008, 12:02 Meteorologic Model: 5 year
Compute Time: 17Sep2010, 14:29:00 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
North	0.00988	18.8	02Jan2008, 00:0
127th Pond	0.00988	22.0	01Jan2008, 12:0
South	0.00967	16.8	02Jan2008, 00:0
Junction-1	0.01955	22.0	01Jan2008, 12:0
Undetained	0.01070	14.5	02Jan2008, 00:1
127TH	0.03025	35.1	02Jan2008, 00:1

Project: casabella3rd Simulation Run: No Commercial 10

Start of Run: 01Jan2008, 12:00 Basin Model: No Commercial
End of Run: 02Jan2008, 12:02 Meteorologic Model: 10 year
Compute Time: 17Sep2010, 14:29:22 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
North	0.00988	23.3	02Jan2008, 00:0
127th Pond	0.00988	22.0	01Jan2008, 12:0
South	0.00967	21.2	02Jan2008, 00:0
Junction-1	0.01955	27.4	02Jan2008, 00:1
Undetained	0.01070	18.2	02Jan2008, 00:1
127TH	0.03025	44.2	02Jan2008, 00:1

Project: casabella3rd

Simulation Run: No Commercial 10 Reservoir: 127th Pond

Start of Run:	01Jan2008, 12:00	Basin Model:	No Commercial
End of Run:	02Jan2008, 12:02	Meteorologic Model:	10 year
Compute Time:	17Sep2010, 14:29:22	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	23.3 (CFS)	Date/Time of Peak Inflow :	02Jan2008, 00:08
Peak Outflow :	22.0 (CFS)	Date/Time of Peak Outflow :	01Jan2008, 12:00
Total Inflow :	3.73 (IN)	Peak Storage :	1.1 (AC-FT)
Total Outflow :	5.80 (IN)	Peak Elevation :	1354.0 (FT)

Project: casabella3rd Simulation Run: No Commercial 25

Start of Run: 01Jan2008, 12:00 Basin Model: No Commercial
End of Run: 02Jan2008, 12:02 Meteorologic Model: 25 year
Compute Time: 17Sep2010, 14:29:38 Control Specifications: Control 1

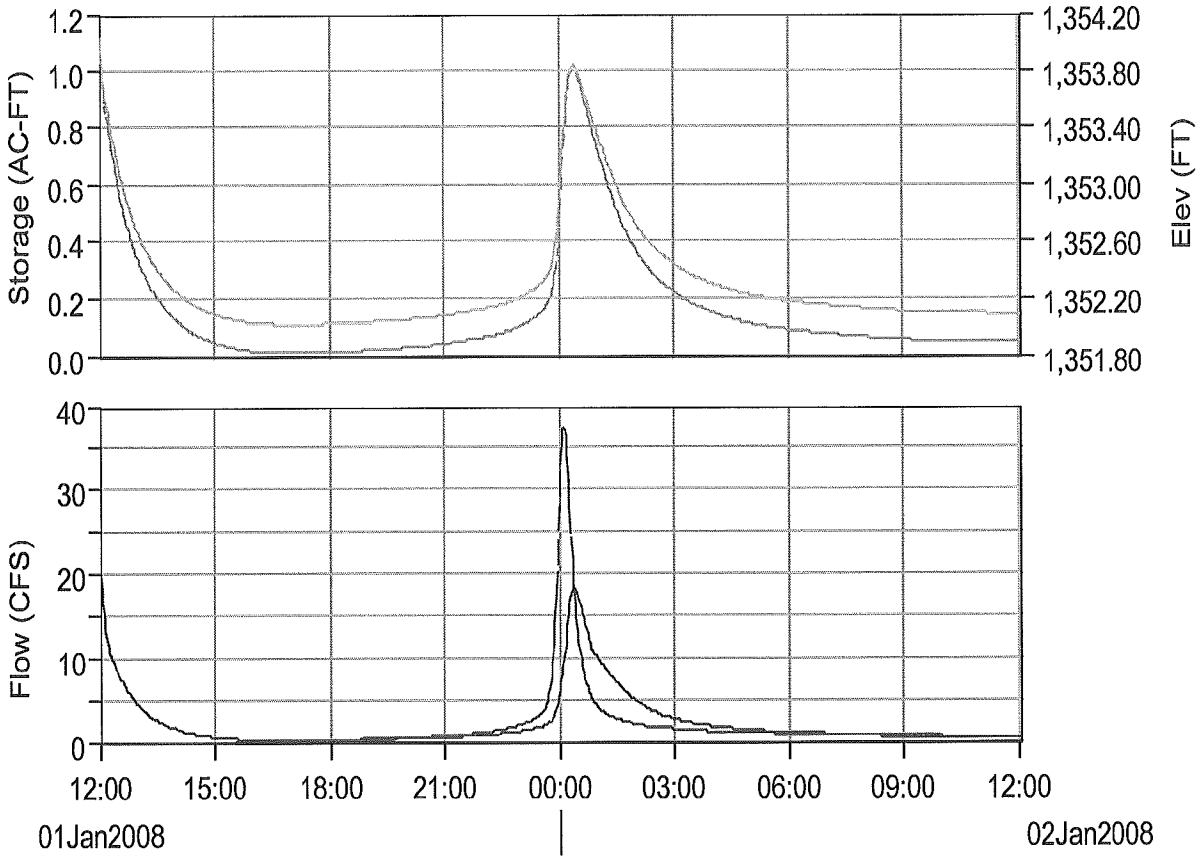
Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
North	0.00988	27.9	02Jan2008, 00:0
127th Pond	0.00988	22.0	01Jan2008, 12:0
South	0.00967	25.6	02Jan2008, 00:0
Junction-1	0.01955	33.1	02Jan2008, 00:1
Undetained	0.01070	21.9	02Jan2008, 00:1
127TH	0.03025	53.4	02Jan2008, 00:1

Project: casabella3rd Simulation Run: No Commercial 100

Start of Run: 01Jan2008, 12:00 Basin Model: No Commercial
End of Run: 02Jan2008, 12:02 Meteorologic Model: 100 year
Compute Time: 17Sep2010, 14:28:15 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
North	0.00988	37.5	02Jan2008, 00:0
127th Pond	0.00988	22.0	01Jan2008, 12:0
South	0.00967	35.0	02Jan2008, 00:0
Junction-1	0.01955	45.6	02Jan2008, 00:1
Undetained	0.01070	29.9	02Jan2008, 00:1
127TH	0.03025	74.4	02Jan2008, 00:1

Reservoir "127th Pond" Results for Run "No Commercial 100"



Run:NO COMMERCIAL 100 Element:127TH POND Result:Storage

Run:NO COMMERCIAL 100 Element:127TH POND Result:Pool Elevation

Run:No Commercial 100 Element:127TH POND Result:Outflow

Run:NO COMMERCIAL 100 Element:127TH POND Result:Combined Inflow

Project: casabella3rd

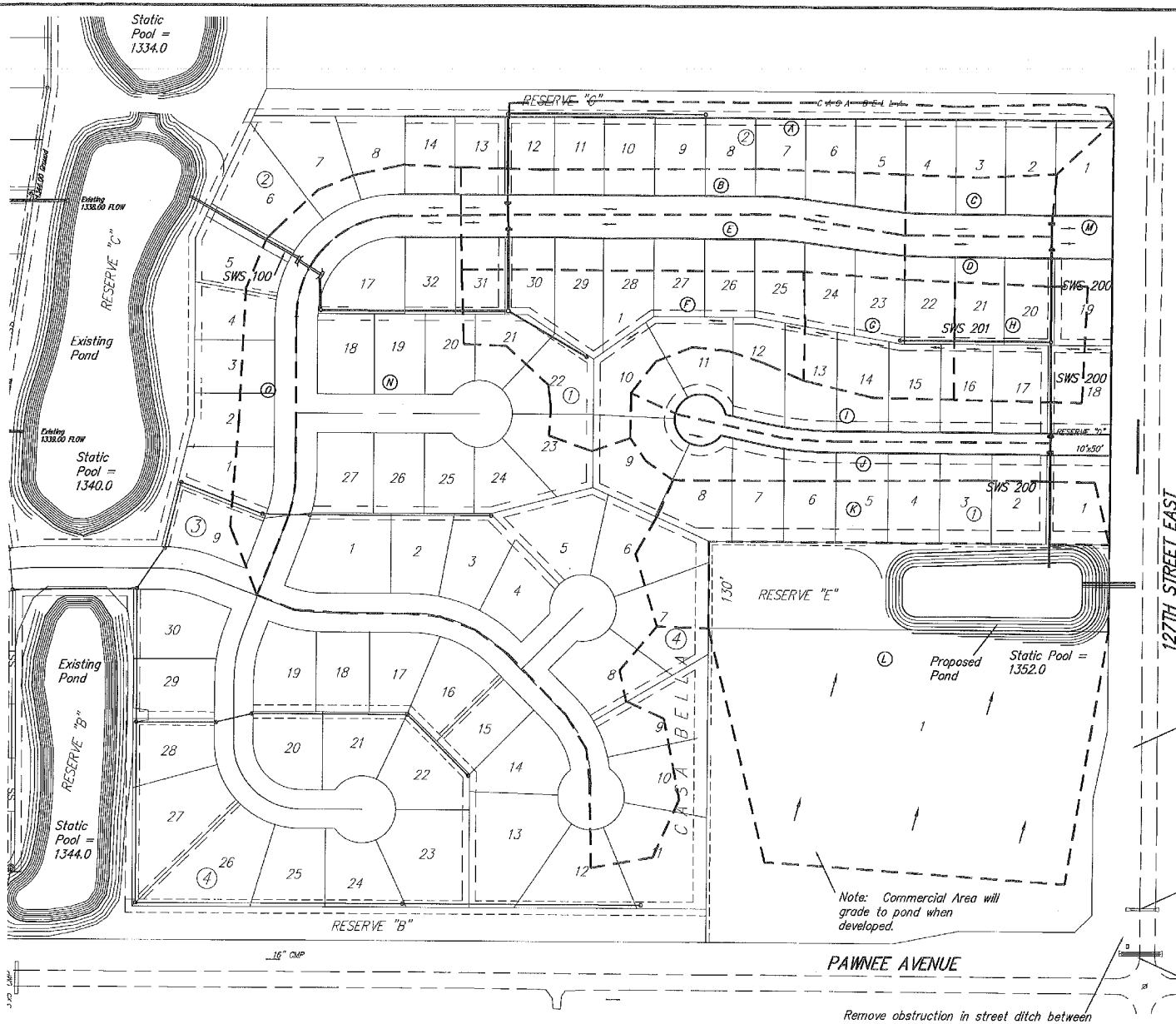
Simulation Run: No Commercial 100 Reservoir: 127th Pond

Start of Run:	01Jan2008, 12:00	Basin Model:	No Commercial
End of Run:	02Jan2008, 12:02	Meteorologic Model:	100 year
Compute Time:	17Sep2010, 14:28:15	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	37.5 (CFS)	Date/Time of Peak Inflow :	02Jan2008, 00:08
Peak Outflow :	22.0 (CFS)	Date/Time of Peak Outflow :	01Jan2008, 12:00
Total Inflow :	6.11 (IN)	Peak Storage :	1.1 (AC-FT)
Total Outflow :	8.15 (IN)	Peak Elevation :	1354.0 (FT)



Basin	Area (Ac)	Tc (min)	I2 (in/hr)	I100 (in/hr)	C2	C100	Q2 (cfs)	Q100 (cfs)
A	2.04	15	3.83	7.37	0.5	0.76	3.9	11.4
B	1.09	15	3.83	7.37	0.5	0.76	2.1	6.1
C	0.46	15	3.83	7.37	0.5	0.76	0.9	2.6
D	0.36	15	3.83	7.37	0.5	0.76	0.7	2.0
E	1.23	15	3.83	7.37	0.5	0.76	2.4	6.9
F	1.77	15	3.83	7.37	0.5	0.76	3.4	9.9
G	0.90	15	3.83	7.37	0.5	0.76	1.7	5.0
H	0.78	15	3.83	7.37	0.5	0.76	1.5	4.4
I	1.11	15	3.83	7.37	0.5	0.76	2.1	6.2
J	0.98	15	3.83	7.37	0.5	0.76	1.9	5.5
K	1.68	15	3.83	7.37	0.5	0.76	3.2	9.4
L	6.19	20	3.33	6.53	0.5	0.76	10.3	30.7
M	0.84	15	3.83	7.37	0.5	0.76	1.6	4.7
N	6.69	20	3.33	6.53	0.5	0.76	11.1	33.2
O	1.36	15	3.83	7.37	0.5	0.76	2.6	7.6

Areas C, D, G, H, I, J, K & L Drain to Proposed Pond.

Proposed Pond
Static Pool = 1352.0
100 year WS = 1355.0
Q_{100} in = 77.4 cfs
Q_{100} out = 46.8 cfs

Street Ditch to be regraded at the time of commercial lot development.

Note: Commercial Area will grade to pond when developed.

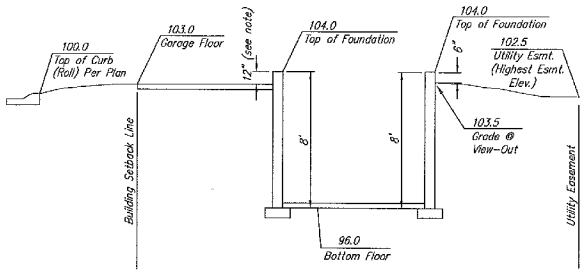
Remove obstruction in street ditch between pipes or install connecting culvert at the time of commercial development.

Scale: 1" = 100'

Casa Bella 2nd Addition
Drainage Basins
WICHITA, KANSAS

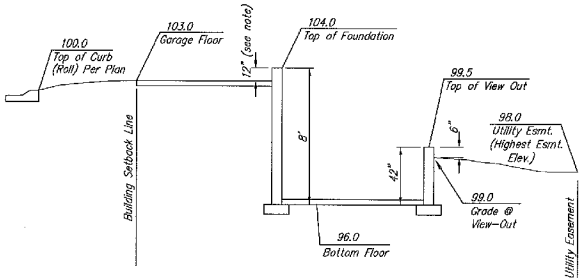
Ruggles & Bohm, P.A.
Engineering, Surveying, Land Planning
924 North Main
Wichita, Kansas 67203
www.rbkansas.com
(316) 264-8008
(316) 264-4621 fax
E-mail: info@rbkansas.com

DESIGN KWL
DRAWN KWL
REVIEW
UTILITY
DRAWING FILE Drainage Exhibits (Basins)
PROJECT NUMBER
DATE Oct. 1, 2010
RB JOB 3353P
SHEET 1 OF 1



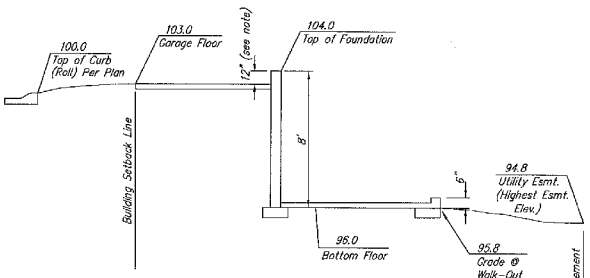
* Varies (Check Individual Lot)

Section Through Typical Full Basement



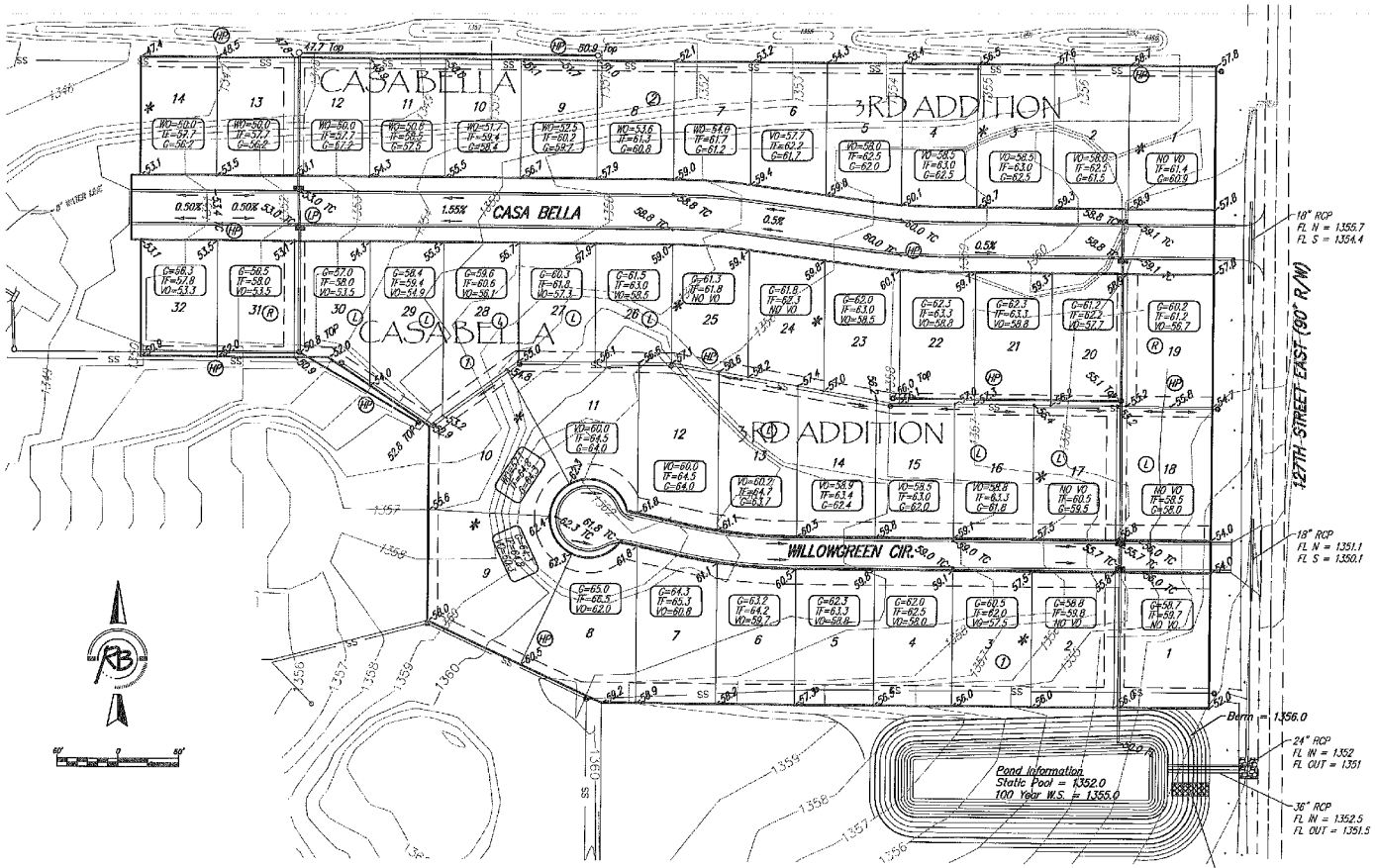
* Varies (Check Individual Lot)

Section Through Typical View-Out Lot



* Varies (Check Individual Lot)

Section Through Typical Walk-Out Lot



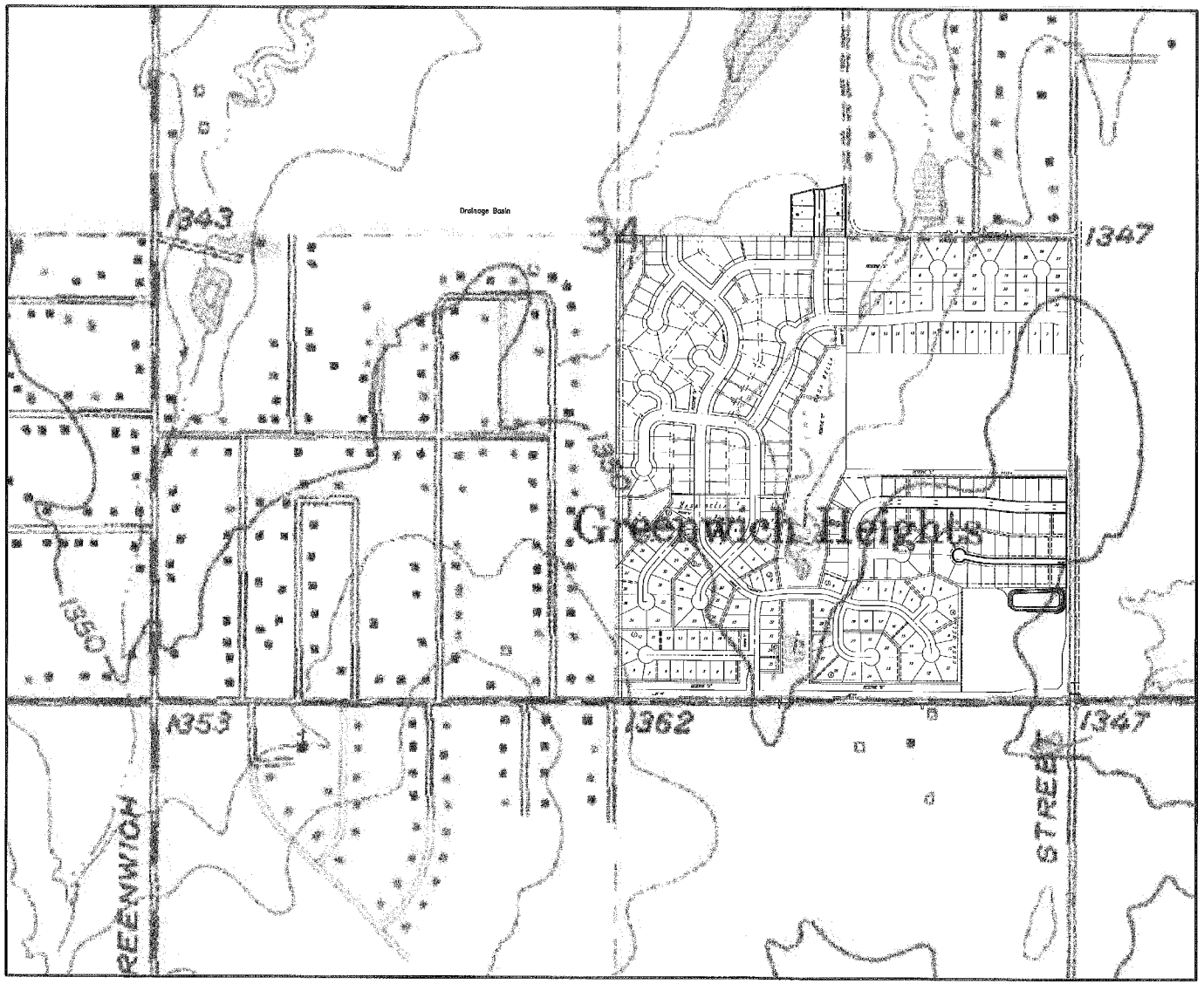
MINIMUM BUILDING PAD ELEVATION FOR LOWEST OPENING INTO STRUCTURES			
BLOCK	LOT NO.	ELEVATION (N.G.V.D.)	ELEVATION (NAVD 88)
1	LOTS 1-8	1357.0	1357.5

BENCHMARK: SRB BRASS DISC
55.45' E. & 5.13' S. OF THE N.W.
COR., SW ¼ SEC 35, 12TS, R2E.
ELEVATION = 1348.35 (NGVD29)

CASA BELLA THIRD ADDITION
PRELIMINARY GRADING PLAN
WICHITA, KANSAS

Ruggles & Bohm, P.A.
Engineering, Surveying, Land Planning
924 North Main
Wichita, Kansas 67203
www.rbkansas.com
(316) 264-8008
(316) 264-4621 fax
E-mail: info@rbkansas.com

DESIGN KWL
DRAWN MLP
REVIEW
UTILITY
DATE Aug. 28, 2010
SHEET 1 OF 1
DRAWING FILE
PROJECT NUMBER



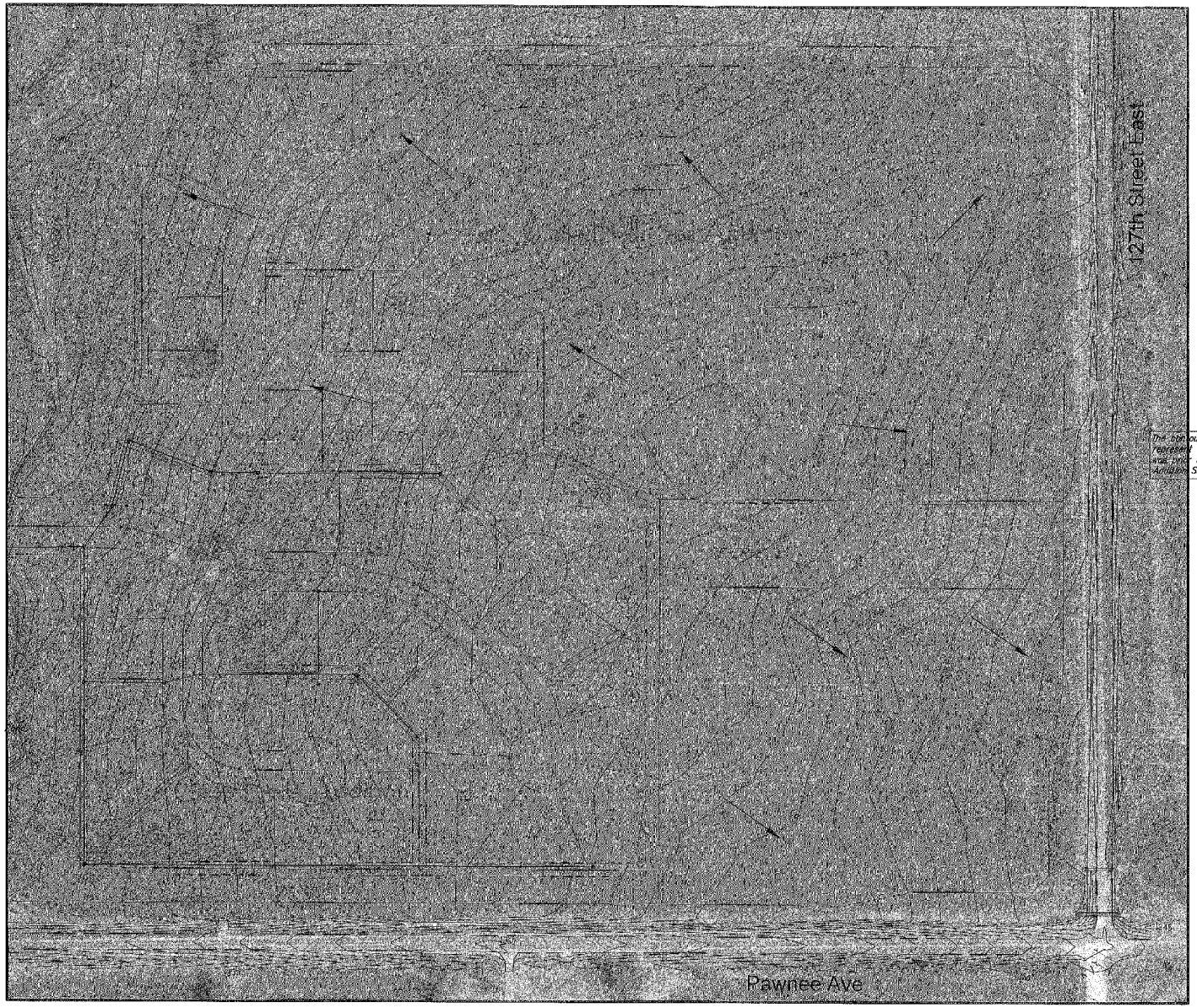
Scale: 1" = 200'

Casa Bella 3rd Addition
USGS Exhibit
WICHITA, KANSAS

Ruggles & Bohm, P.A.
Engineering Surveying Land Planning
924 North Main
Wichita, Kansas 67203
www.rbkansas.com
(316) 264-8008
(316) 264-4621 fax
E-mail: info@rbkansas.com

DESIGN	EJG
DRAWN	KWL
REVIEW	
UTILITY	
DATE	Aug. 26, 2010
JOB #	3552
SHEET	1 of 1

DRAWING #: Drainage Exhibits (USGS)
PROJECT NUMBER: -



Existing Conditions
Area = 13.8 acres
0.0 acres impervious

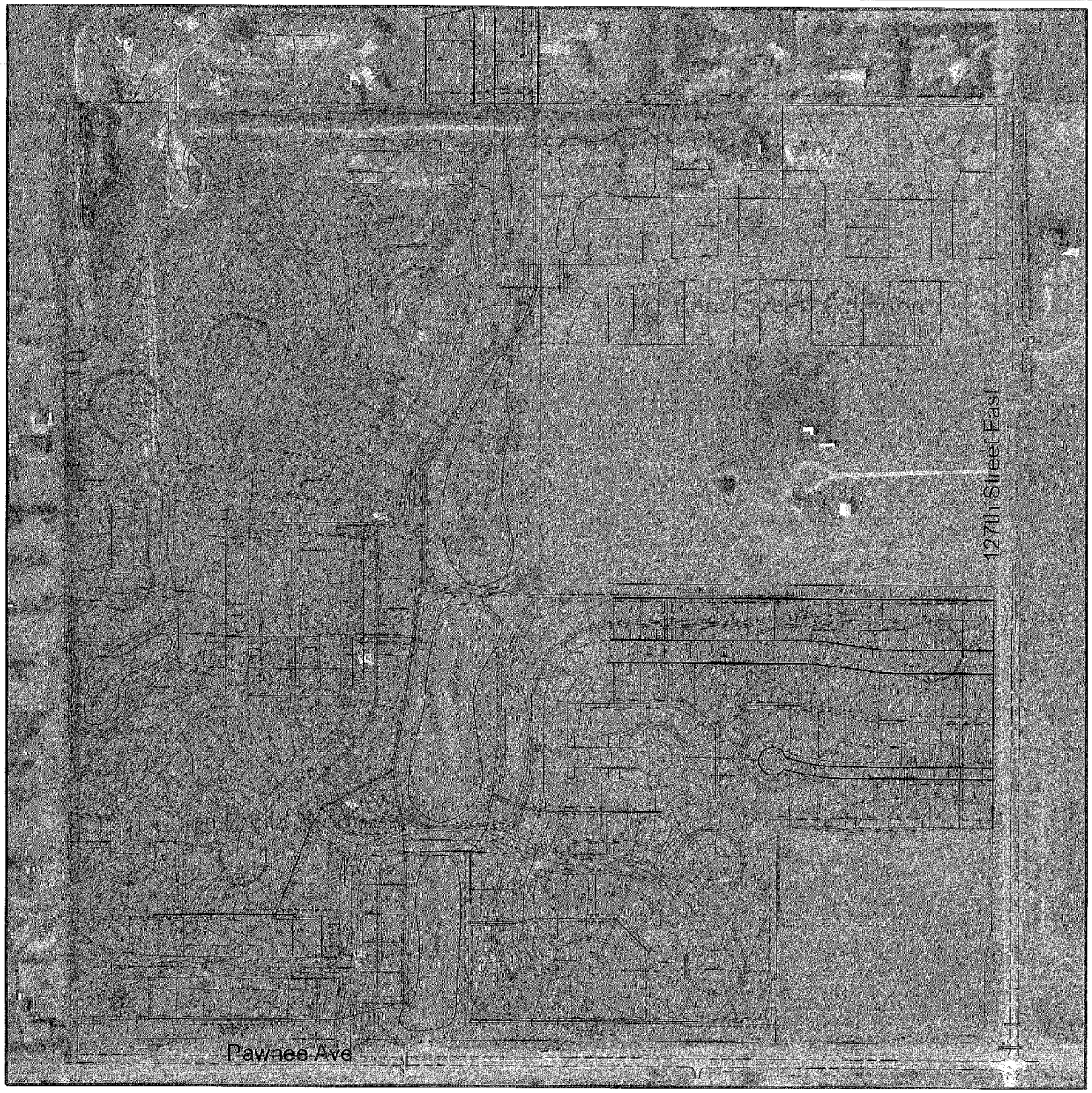
The contours on this sheet represent the natural site as it was prior to the the Casa Bella Addition Storm Water Drain Project.

Scale: 1" = 200'

Casa Bella 2nd Addition
Pre-Development Aerial
WICHITA, KANSAS

Ruggles & Bohm, P.A.
Engineering, Surveying, Land Planning
924 North Main
Wichita, Kansas 67203
www.rbkansas.com
(316) 264-8008
(316) 264-4621 fax
E-mail: info@rbkansas.com

DESIGN KWL
DRAWN KWL
REVIEW
INITIALS
DRAWING FILE Drainage Exhibits [aerial]
PROJECT NUMBER
DATE Aug. 26, 2010
JOB NO. 3253
SHEET 1 OF 1



The contours on this sheet represent the site grading done with the Casa Bella Addition Storm Water Drain Project.

Scale: 1" = 200'

Casa Bella 2nd Addition

Current Site Conditions

WICHITA, KANSAS

Ruggles & Bohm, P.A.
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924 North Main
Wichita, Kansas 67203
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(316) 264-6000
(316) 264-4621 fax
E-mail: info@rbkansas.com

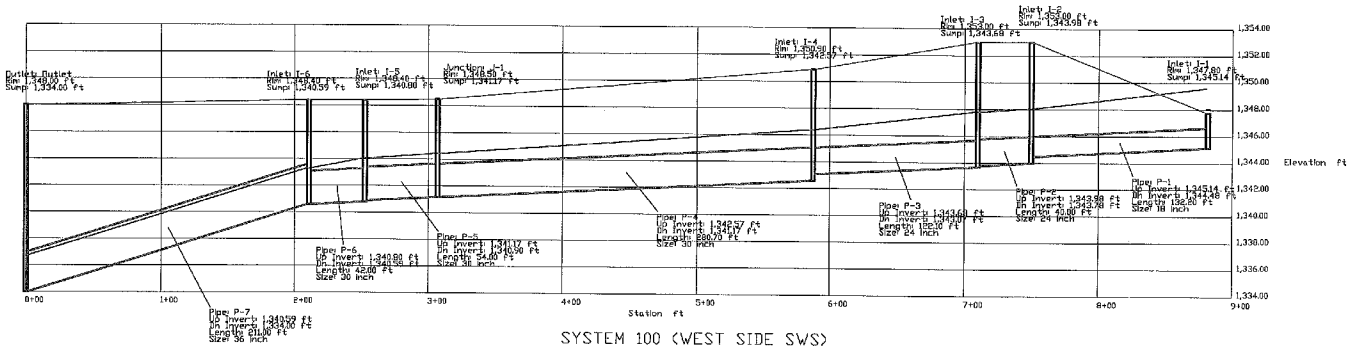
DRAWING FILE: Drainage Exhibits foerial (2)

PROJECT NUMBER

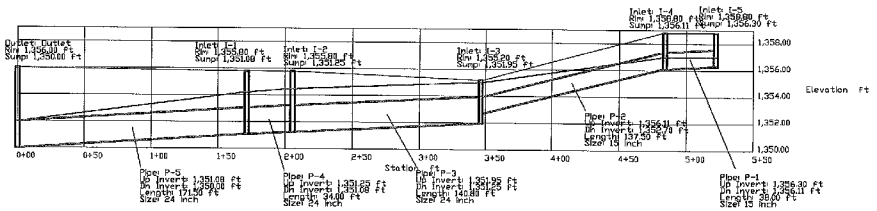
DESIGN: EJG
DRAWN: EJG
CHECKED:
UTILITY:
DATE: Aug. 27, 2010

FB/JOB: 325/3P

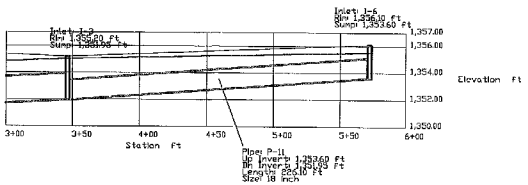
SHEET 1 OF 1



SYSTEM 100 (WEST SIDE SWS)



SYSTEM 200 (WEST SIDE SWS)



SYSTEM 201 (WEST SIDE SWS)

Casa Bella 2nd Addition
StormCAD
WICHITA, KANSAS

Ruggles & Bohm, P.A.
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924 North Main
Wichita, Kansas 67203
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(316) 264-8008
(316) 264-4571 fax
E-mail: info@rbkansas.com

DESIGN: KWL
DRAWN: KWL
REVIEW:
QT CITY:
DATE: Aug. 27, 2010
DRAWING FILE: Drainage Exhibits (StormCAD)
PROJECT NUMBER:
SCALE: 3000#
SHEET: 1 OF 1