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

MEMO

Date: Monday, November 20, 2006

To: Scott Lindebak
Engineering
City of Wichita

From: Eric Glover

Project: Tara Creek Addition

RB Project No.: 2929P

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:
- ☐ Other:
- ☐ Change Order
- ☐ Shop Drawings

Copies	Description
1	Drainage Analysis Report

Remarks:

Copies to:

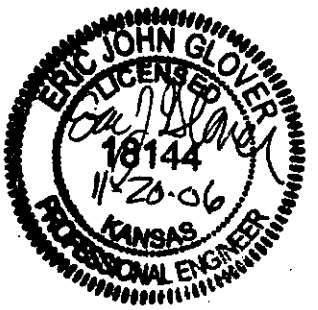
If checked below, please:
- ☐ Acknowledge receipt of enclosures
- ☐ Return enclosures to us.

Signed

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

Tara Creek Addition
Wichita, Kansas
Drainage Analysis

November 2006



Ruggles & Bohm P.A.

Engineering, Surveying, Land Planning

Tara Creek Addition
Wichita, Sedgwick County, Kansas
Drainage Analysis

November 2006

The site being studied is Tara Creek addition to Wichita, Sedgwick County, Kansas. Tara Creek Addition consists of 19.38 acres of cultivated farm land southwest of the intersection of Mt Vernon and 127th Street East. The site is to be platted into 46 – ¼ acre single family residential lots and 1 reserve that will contain a detention pond.

Existing soil complexes are Lesho (hydrologic group C) and Rosehill (hydrologic group D). The entire site drains to a pair of 36" concrete pipes that flow under Mt Vernon Street. The proposed development will consist of mass site grading, pond construction, storm sewer construction, sanitary sewer construction, water main construction, pavement construction and finally housing construction. The offsite runoff comes from Casa Bella addition to the southwest of Tara Creek. Casa Bella drainage was studied as part of the Casa Bella platting process.

The developed Casa Bella model will be employed to study the offsite drainage that reaches Tara Creek. Offsite runoff will be routed through a drainage channel into a detention pond. The detention pond outlet will be controlled by a concrete weir. Most onsite water will travel across grassed areas, along paved roadways and within storm sewer to the proposed pond. A small portion of the site will travel to the existing 36" RCP's undetained. Table 1 shows that for each return period the peak runoff has been reduced in the developed condition.

Storm Return Period	Peak Runoff Existing (cfs)	Peak Runoff Developed (cfs)
2-year	169.4	163.5
5-year	254.3	245.3
10-year	324.3	313.0
25-year	393.5	380.4
100-year	535.6	518.8

Table 1: Peak Runoff Results for each return period.

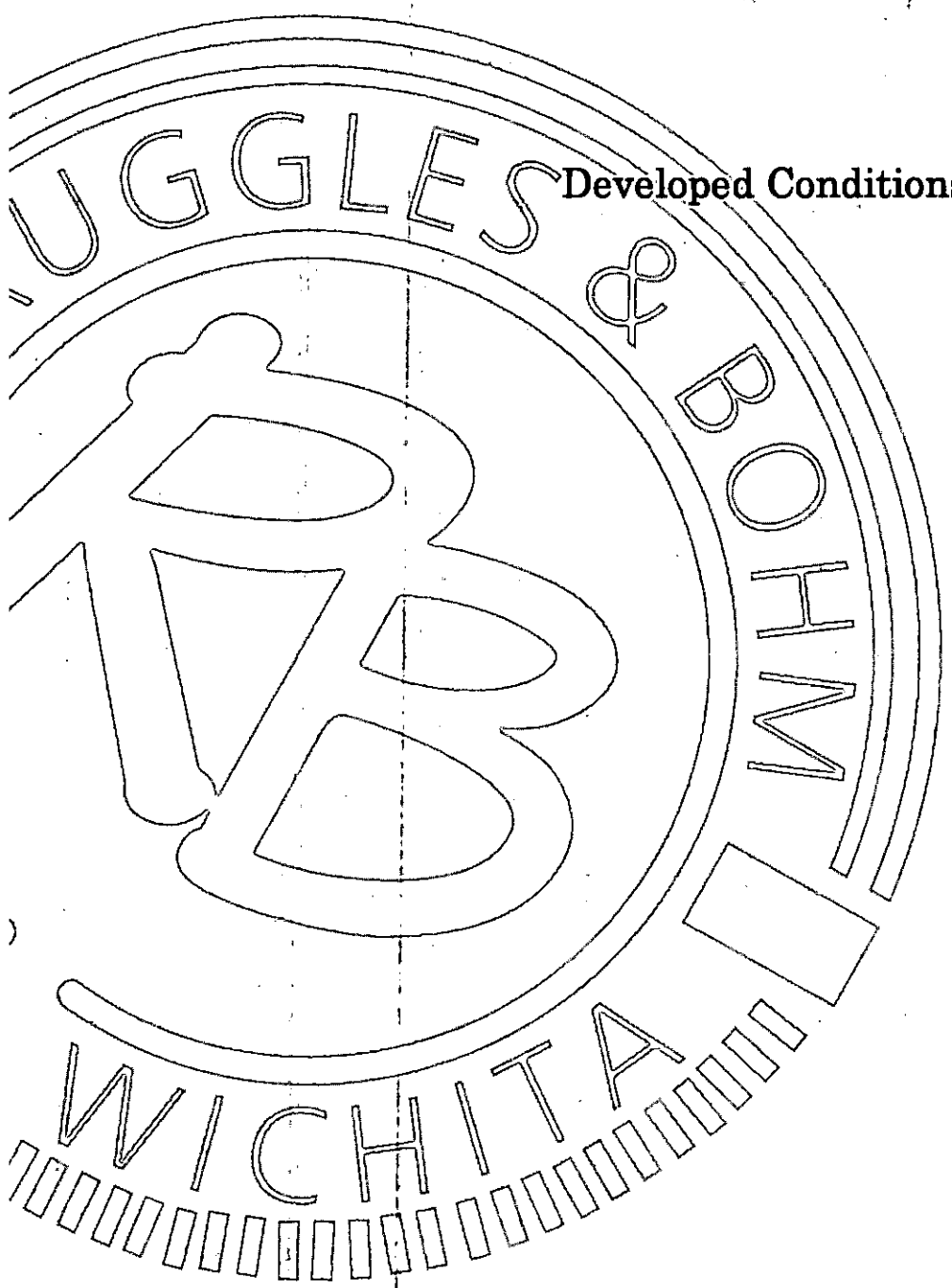
Existing Conditions

Existing Conditions

The existing site consists of 19.38 acres of cultivated farmland (0% impervious) with hydrologic group C and D soils. The time of concentration is determined to be 18 minutes using the velocity method. Considering the existing land use and soil types the curve number used is 86. The peak runoff from the Casa Bella existing model is 535.6 cfs. Using HEC-HMS, the existing peak runoff from the Tara Creek site for each return period is found in Table 1. Runoff from the site flows to 2 – 36" RCP's. For the existing conditions, the pipes are inadequately sized and future consideration should be given by the City of Wichita to upgrade to a more appropriate structure.

A review of the USGS maps, FEMA flood maps and a field visit of the site shows no evidence of floodways, wetland or riparian areas of the subject site.

Tc = 300'/0.45 ft/sec (overland flow) + 300'/1.5 ft/sec (sheet flow) + 600'/2.5 ft/sec (channel flow) = 1107 secs = 18 minutes



Developed Conditions

Developed Conditions

The developed condition of Tara Creek includes 46 lots for residential single family development, streets, a storm water system and a detention pond. The 100 year peak discharge is 518.8 cfs, an overall reduction in the peak runoff from the site. The Casa Bella drainage model considered as the existing condition, will be appended to include the developed Tara Creek model and ensure no negative impact on the Casa Bella subdivision. HEC-HMS 3.0.1 was used to model the site using the SCS Unit Hydrograph.

Development of berms and swales will aide in prevention of offsite silt transport. The proposed pond will act as a sediment basin during and after construction.

Storm Return Period	Peak Runoff Existing (cfs)	Peak Runoff Developed (cfs)
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5-year	254.3	245.3
10-year	324.3	313.0
25-year	393.5	380.4
100-year	535.6	518.8

Table 1: Peak Runoff Results for each return period.

2-year	5-year	10-year	25-year	100-year
3.5 in	4.5 in	5.3 in	6.1 in	7.8 in

Table 2: SCS Rainfall intensities used for each return period.

Basin	Peak Discharge (cfs)				
	2-year	5-year	10-year	25-year	100-year
South Basin	4.9	7.5	9.7	11.8	16.5
Cherry Creek	9.7	12.9	15.4	17.9	23.2
Cherry Creek SWS	8.9	11.7	14.0	16.3	22.4
Pond	7.1	10.7	13.7	16.8	21.1
Undetained	10.4	15.1	18.9	22.7	30.9

Table 3: Computed peak discharge for each basin and each return period

Drainage Structures

Double 10'x3' RCBC

The existing drainage from the Southeast, the South Basin and the Cherry Creek Basin flow to a double 10'X3' RCBC that conveys water under Cherry Creek Street to the detention pond.

Upstream Invert Elevation = 1332.45
Downstream Invert Elevation = 1332.15
Length = 90'

Elevation	Discharge (cfs)
1333.0	25
1333.5	65
1334.0	116
1334.5	160
1335.0	223
1335.5	293
1336.0	356
1336.5	430
1337.0	480
1337.5	525

Table4: Elevation-Discharge Rating Double 10'x3' RCBC

Peak runoff to the RCBC is 518.8 cfs. The resulting elevation peak at the RCBC is 1337.4.

Pond and Weir

The proposed pond has a static pool elevation of 1330.0 and a 100yr elevation of 1333.8. The pond outlet is controlled by a concrete weir with a top elevation of 1334.8 and a 20' rectangular notch at an elevation of 1330.0. The 100yr peak discharge of the pond is 513.8 cfs.

Elevation	Area (acres)	Discharge (cfs)
1330.0	1.21	0.0
1330.5	1.28	24.6
1331.0	1.35	69.5
1331.5	1.42	127.7
1332.0	1.49	196.6
1332.5	1.56	274.8
1333.0	1.63	361.2
1333.5	1.70	455.2
1334.0	1.78	556.1

Table 5: Elevation-Area-Discharge Rating for the proposed Detention pond

HEC-HMS

Project : Tara Creek HMS

Basin Model : Developed

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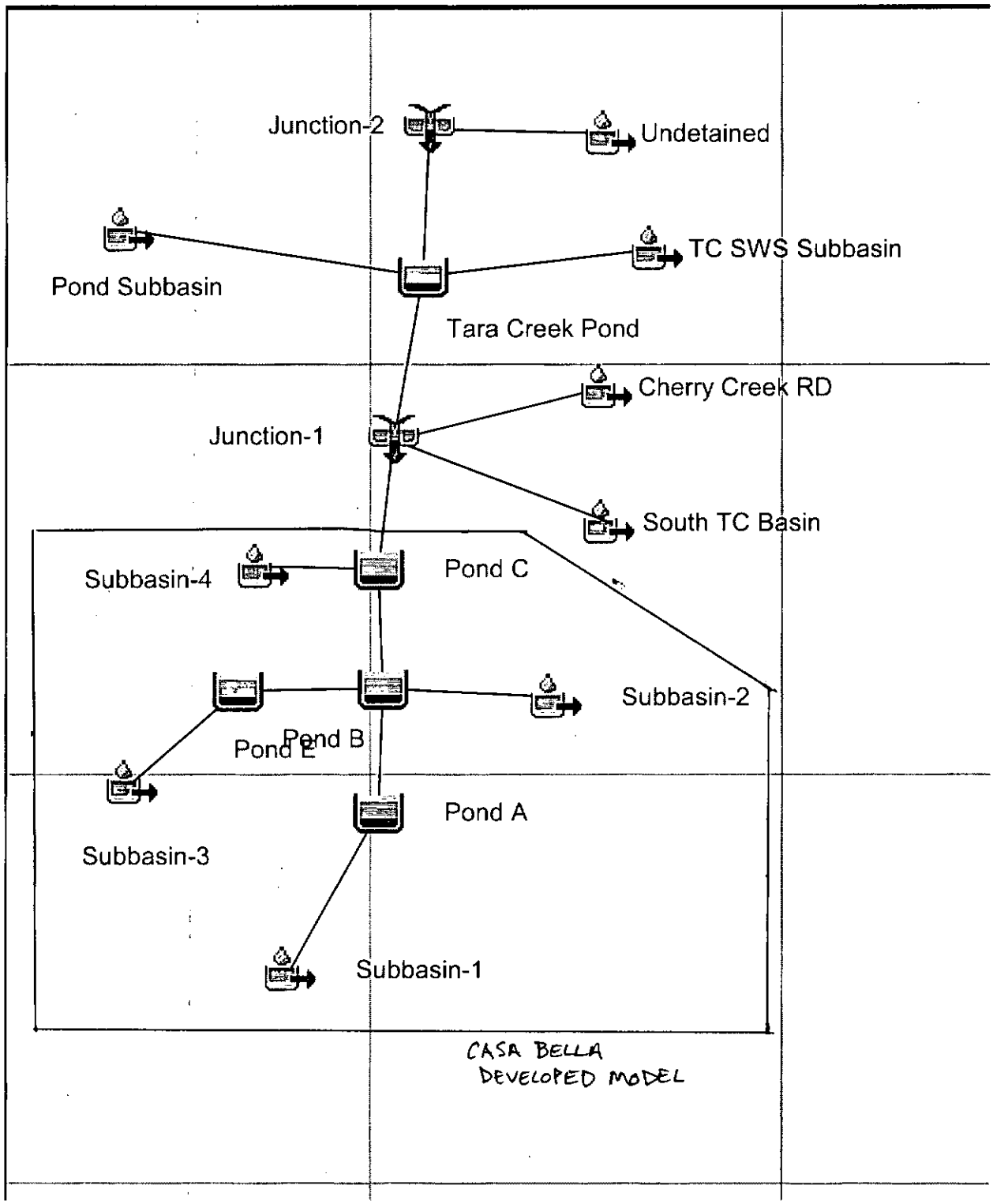


Drainage Basins

South Basin (Basin A)
Rear yard drainage to the swale south of the double 10'x3' RCBC.
Area = 3.98 acres
CN = 80
Time of concentration = 24 minutes (300' / 0.3ft/sec + 300' / 1.5 ft/sec + 600 ft / 2.5 ft/sec)

Cherry Creek Basin (Basin B)
Front yard drainage including impervious areas of pavement and housing along Cherry Creek.
Area = 3.58 acres
CN = 94
Time of concentration = 15 minutes

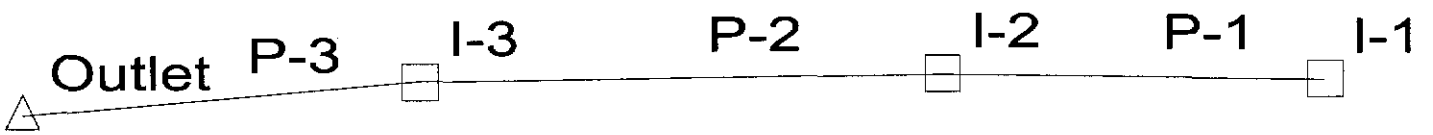
Tara Creek SWS Basin (Basins C1,C2,C3)
Front yard drainage including impervious areas of pavement and housing along Cherry Creek Courts into proposed sws system.
Area = 3.23 acres
CN = 94
Time of Concentration = 15 minutes.

Pond Basin (Basin D)
Rear yard and reserve drainage the flows directly to the proposed pond.
Area = 4.35 acres
CN = 80
Time of Concentration = 15 minutes.

Undetained Basin (Basin E)
Rear yard drainage the flows directly to the RCP's under Mt Vernon and is not detained.
Area = 5.38 acres
CN = 84
Time of Concentration = 15 minutes (60' / 0.3ft/sec + 300' / 1.5 ft/sec + 1140 ft / 2.5 ft/sec = 14 minutes)

HEC-HMS 3.0.1 [F:\Projects\Projects 2900-2999\2929P (Tara Creek)\HMS Data\Tara_Creek_...

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Cherry Creek RD	0.0056	23.16	02Jan2005, 00:08	7.06
Junction-1	0.2938	518.75	02Jan2005, 00:40	6.22
Junction-2	0.3141	518.75	02Jan2005, 00:46	6.18
Pond A	0.1270	251.75	02Jan2005, 00:36	6.18
Pond B	0.2020	367.24	02Jan2005, 00:42	6.22
Pond C	0.2820	506.96	02Jan2005, 00:40	6.23
Pond E	0.0170	38.69	02Jan2005, 00:24	6.35
Pond Subbasin	0.0068	23.36	02Jan2005, 00:08	5.41
South TC Basin	0.0062	16.52	02Jan2005, 00:16	5.40
Subbasin-1	0.1270	312.87	02Jan2005, 00:22	6.22
Subbasin-2	0.0580	148.31	02Jan2005, 00:22	6.49
Subbasin-3	0.0170	56.34	02Jan2005, 00:12	6.51
Subbasin-4	0.0800	204.57	02Jan2005, 00:22	6.49
TC SWS Subbasin	0.0051	21.09	02Jan2005, 00:08	7.06
Tara Creek Pond	0.3057	513.83	02Jan2005, 00:46	6.19
Undetained	0.0084	30.91	02Jan2005, 00:08	5.88


Outlet
P-3
I-3
P-2
I-2
P-1
I-1

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	I-2	300.00	18 inch	10.33	5.99	1,343.40	1,340.50	0.009667		7.50
P-2	I-2	I-3	300.00	24 inch	34.55	5.59	1,340.00	1,333.00	0.023333		15.00
P-3	I-3	Outlet	175.00	24 inch	34.20	7.16	1,333.00	1,329.00	0.022857		22.50