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DRAINAGE PLAN
FABER COMMERCIAL

FINAL REPORT

21 November 2013

REPORT CONTENTS

EXISTING CONDITIONS

Faber Commercial Addition is located at the north east corner of 119th Street West and 29th Street North. The property is bounded to the north and east by Fontana Addition. The site generally drains to the north west and into the Fontana Addition pond system. The site is currently agricultural farmland with a single family residence located near the east side of the property.

Per an agreement with the owners of this property and the developers of the Fontana property, the Fontana storm water drain system was designed and constructed to meet the detention requirements of this commercial corner as well as the Fontana residential development.

There is a portion of the property, more specifically the north west corner, that is located in the FEMA Zone AE floodplain. As there was no mapped floodplain previously on the site in its history, the development of the Fontana pond system has now placed Zone AE on a portion of this site due to the design of said pond system. This area is under the BFE, currently, by approximately 1.0'.

The drainage patterns as defined above can be seen on the Aerial (Exhibit 2).

PROPOSED CONDITIONS

The property is being platted as commercial development with 7 lots. The lots will drain to the north via storm water sewer and into the Fontana Addition pond system. Water quality will be provided in the offsite Fontana ponds and channel protection will be assumed to be met in the pond system within the same pond system.

For a half-scale copy of the Plat, see Exhibit 3.

OFFSITE CONDITIONS

The site currently drains to the north west and into the existing Fontana Addition pond system located adjacent to the north of the property. This pond system drains throughout Fontana and ultimately discharges to the east and into the larger Cadillac Lake basin. This basin was modeled by PEC as part of the Fontana Addition drainage plan as well as for the Cadillac Lake LOMR. As told by PEC, the pond system had accounted for this property's runoff in its detention. The entire basin into this pond drains approximately 105 acres with the majority of that runoff offsite agricultural land from the west across 119th Street.

A small portion of the existing site drains to the south and east into the 29th Street ROW. There is currently a 15" RCP in this area that accounts for this existing runoff.

The overall site location can be seen as Exhibit 1.

EXISTING CONDITIONS RUNOFF CALCULATIONS

DRAINAGE METHODS & STANDARDS

The following methods and standards, although not a complete list, were used in calculating the existing conditions runoff values.

- STORM SERIES
  - 24-hour; 2-yr, 5-yr, 10-yr, 25-yr, 100-yr Storm Events
  - 2-yr Rainfall Intensity = 3.83 in
  - 10-yr Rainfall Intensity = 5.22 in
  - 100-yr Rainfall Intensity = 7.37 in

- FLOW DATA
  - Areas per LIDAR data, USGS Quadrangle Sheet, Aerial Photos, and Site Visits
  - Rational Formula Method for onsite flows (C = 0.60)
  - Time of Concentration: Lag Method (minimum 15 min)

SITE CHARACTERISTICS

The site is currently agricultural farmland that drains primarily to the north west and also has a single family farmstead located near the south east portion of the site with access to 29th Street. The site sheet flows to the north and into the Fontana Addition pond system. This system was modeled originally by PEC in 2003 and then re-modeled and updated with the PEC LOMR approved earlier this year for the entire Cadillac Lake basin.

A small portion of the existing site currently sheet flows into the 29th Street ROW at the south east corner of the site.

The existing site characteristics can be seen from the aerial exhibit (Exhibit 2).

EXISTING CONDITIONS HYDROLOGIC ANALYSIS

The proposed site was analyzed for peak runoff values based on agricultural cover with Soil Type C ground cover (Soils on the site are both B and D type, therefore, a composite of C was used). A minimum of 15 minutes was used due to the short lag time and existing slope. The Rational C value was used based on agricultural land in Type B soils.

This site was included in the original Fontana pond system study based on verbal communication with PEC as well as our review of the pond model in HMS. This report will discuss the HMS model in more detail in the Post-Developed Conditions section.

DOWNSTREAM DRAINAGE CAPACITY

The south east portion of the site currently drains to a 15" SWS in the 29th Street ROW. This pipe appears to be sized for the existing conditions only.

The remaining site drains to the north and into the Fontana pond and pond systems. That pond system was designed to accommodate the runoff from this property as well as other offsite runoff.

POST-DEVELOPMENT HYDROLOGIC ANALYSIS

DRAINAGE METHODS & STANDARDS

The following methods and standards, although not a complete list, were used in developing the drainage and grading plans.

- STORM SERIES
  - 24-hour; 2-yr, 5-yr, 10-yr, 25-yr, 50-yr, 100-yr Storm Events Calculated
  - Rational Formula Method used for peak runoff
  - C = 0.8 (Commercial cover type)
  - Time of Concentration; Lag Method, minimum Tc = 15min

- GRADING CONSTRAINTS TO BE OBSERVED AT SITE PLAN
  - One foot freeboard between 100-yr WSE and adjacent lot corner
  - Match all existing perimeter grades
  - On-site SWS system to be sized and located based on site plan

DEVELOPED CONDITIONS HYDROLOGIC ANALYSIS

The site is being platted into 7 commercial lots with internal utilities, parking, drives, and a storm water sewer system which will drain to the north Fontana pond. The site was analyzed for peak runoff values based on commercial land cover with Type C soils. A Rational coefficient of 0.88 was used assuming a 15 minute time of concentration.

DETENTION FACILITIES

Detention will be provided for this commercial site in the adjacent Fontana pond system. When designed, this system incorporated the developed runoff in its system. See more details below on the Fontana pond system.

DISCHARGE POINTS SUMMARY

The south east corner of the site, the frontage portions of Lots 6 & 7, will discharge into the 29th Street ROW storm sewer system. Upon site development, this area will likely need to provide detention onsite as part of their site plan in order to not inundate the SWS system.

The remaining property will discharge into the Fontana pond via storm sewer during the development process. This area was already accounted for in the Fontana pond modeling.

WATER QUALITY

Water quality treatment is provided in the Fontana pond system in the ponds static pool elevation. This site drains into the southernmost pond of the system. In this pond alone, there appears to be approximately 31.4 ac-ft of volume under its static water surface. This site (14 acres at 85% impervious), along with the contributing area to the pond from Fontana itself (24 acres at 38% impervious) will generate approximately 2.4 ac-ft of water quality volume needed to treat. As you

can see, the southern pond has enough capacity for this site as well as the Fontana development. The WQ calculations can be found in the Appendix.

DOWNSTREAM CHANNEL PROTECTION

Downstream channel protection will not be provided on site as the pond system in Fontana will detain in multiple storm events in multiple ponds before discharging offsite. There appears to be more than required detention volume in the ponds.

POTENTIAL UPSTREAM/DOWNSTREAM IMPACTS

Since this site was included in the models for downstream development, we do not anticipate any impacts downstream.

FONTANA POND SYSTEM

The Fontana pond system model was developed in 2003. Since then, it is has been updated and incorporated into the Cadillac Lake FEMA study. We have received a working copy of the model from both the City of Wichita as well as PEC.

In the current conditions model, this site was included in the WF-1 node which represents the entire basin to the southernmost pond (WF-P1). The entire basin accounts for approximately 105 acres of runoff with a CN of 68 and impervious area at 27%. Using lidar and the hydrogeodatabase (attached), we feel that these figures are accurate. When analyzing the future conditions model, the only change in the basin or pond was that a CN of 70 was used. When analyzing the basin for impervious area, the 27% figure appears to include the proposed Faber site as commercial (85% impervious).

The pond in Fontana has a 100-year WSE at a 1360.2 in the current conditions and a 1360.3 in the future model. Based on existing topography (lidar) this elevation would inundate a small portion of the proposed Faber Lot 2 as well as the majority of the rear lots in Fontana Addition that are adjacent. After discussing this with PEC, it appears that the LOMR was approved based on mass grading and that the 'final' grades around the lake have not been set yet. When reviewing the stage storage for this pond in the model, it appears that there is adequate volume within the Reserve at elevation 1360.3. The platted Reserve has an area of approximately 6.8 acres whereas the model uses an area of 5.2 acres at elevation 1363.0 for this pond. This leads us to the conclusion that the original intent of the pond system was to have the 100-year WSE to remain in the Reserve and not encroach any platted or offsite property. Based on adequate storage volume within the pond system there should not be an issue with performing a LOMR-F to remove the portion of floodplain off of this proposed property.

SOURCE OF FLOODPLAIN INFORMATION

A portion of the site has Zone AE floodplain encroaching. This portion is located at the north west corner adjacent to the Fontana pond. The floodplain is based on a LOMR (Case #12-07-0465P) performed for the Cadillac Lake basin by PEC and was effective March 12, 2013. This portion will be filled and removed via a LOMR-F upon site development. Based on the HMS model and the size of the Fontana pond Reserve, there appears to be adequate storage within the Reserve for the volume that was used in the model.

FEDERAL, STATE, & LOCAL PERMITTING

US ARMY CORPS OF ENGINEERS

There does not appear to be any jurisdictional waters of the US on this site.

KANSAS DEPT OF AGRICULTURE – DWR PERMITTING

There does not appear to be any DWR permitting needed on the proposed site at this time. The areas of discharge do not account for more than 640 acres.

FEMA

A LOMR-F is expected to be needed to remove Zone AE Floodplain from the north west corner of the site.

KANSAS DEPT OF TRANSPORTATION

There is no KDOT ROW adjacent or near this property which would require a permit at this time.

SEDGWICK COUNTY PERMITTING

There does not appear to be any Sedgwick County permitting needed at this time.

EXHIBIT 1: Site Location Map

EXHIBIT 2: Aerial Photo Exhibit with Lidar Topography

EXHIBIT 3: Plat – Half Scale

EXHIBIT 4: Drainage Plan – Half Scale

EXHIBIT 5: Floodplain Location (FIRM)

EXHIBIT 6: Fontana Pond Drainage Basin

LIDAR Exhibit

0 105 210 420 Feet

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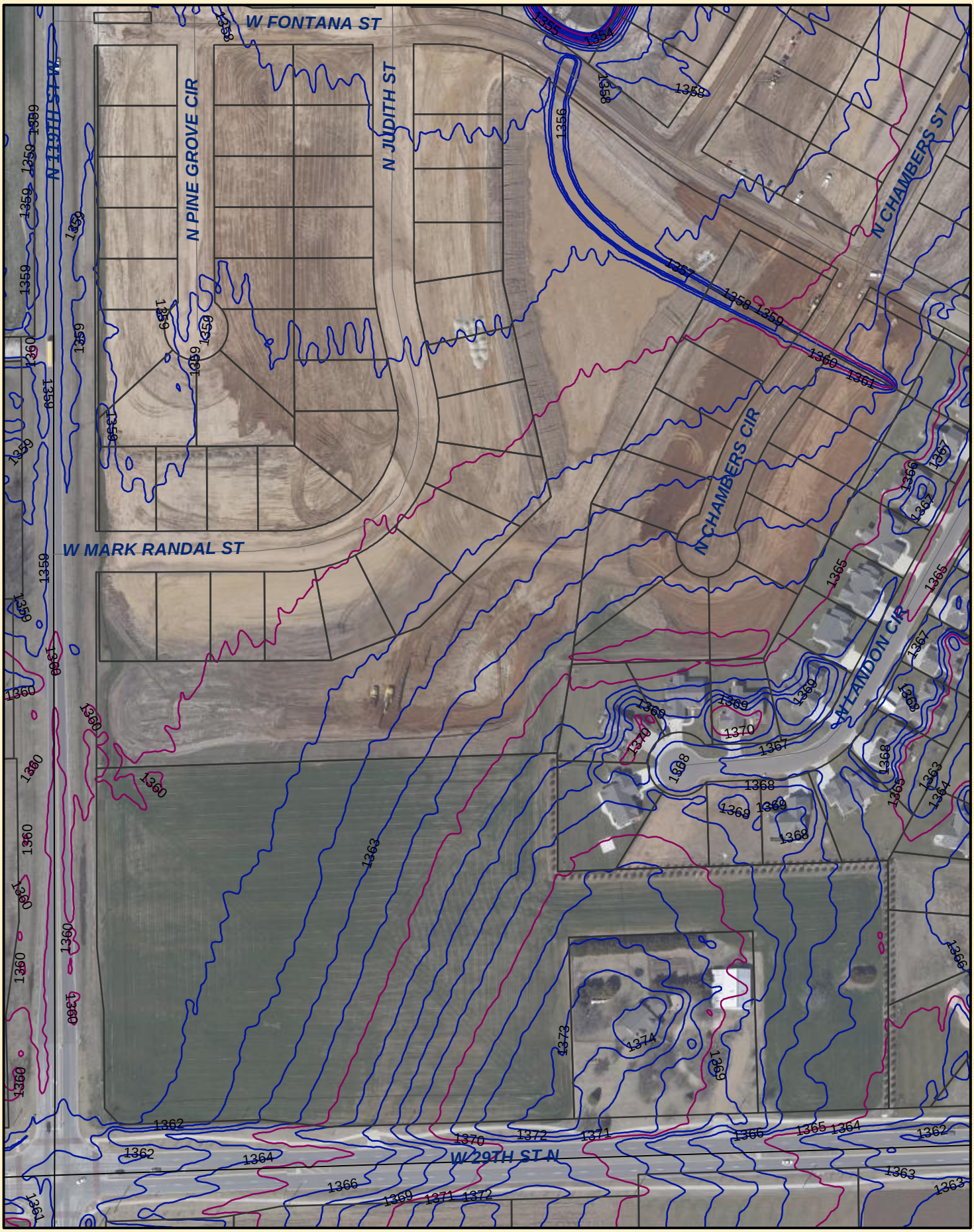

LIDAR Exhibit

0 50 100 200 Feet

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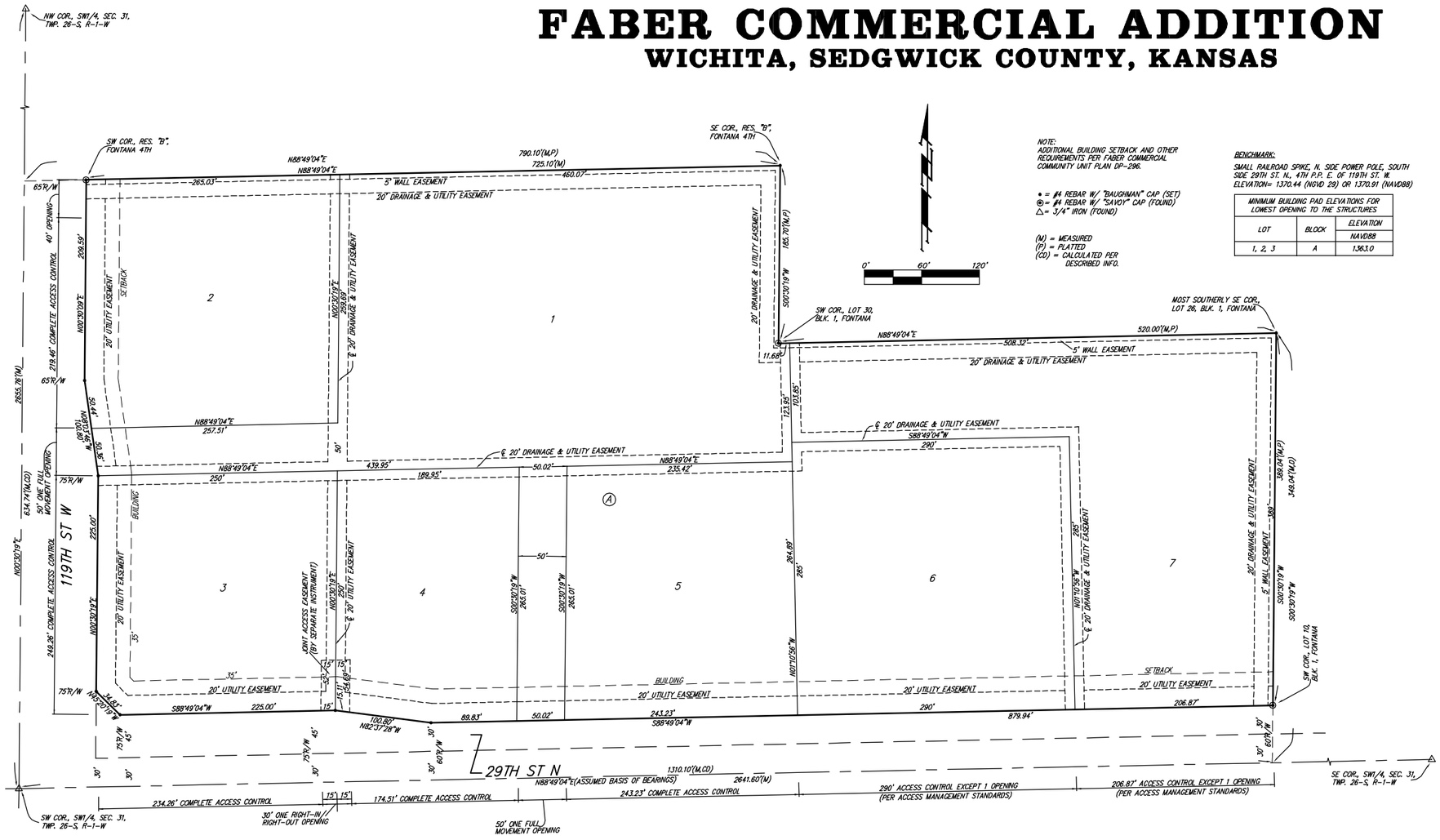
FABER COMMERCIAL ADDITION
WICHITA, SEDGWICK COUNTY, KANSAS



NOTE:
ADDITIONAL BUILDING SETBACK AND OTHER REQUIREMENTS PER FABER COMMERCIAL COMMUNITY UNIT PLAN DP-296.

● = #4 REBAR W/ "BAUGHMAN" CAP (SET)
⊙ = #4 REBAR W/ "SAVOY" CAP (FOUND)
△ = 3/4" IRON (FOUND)

(M) = MEASURED
(P) = PLATTED
(CD) = CALCULATED PER DESCRIBED INFO.

BENCHMARK:
SMALL RAILROAD SPIKE, N. SIDE POWER POLE, SOUTH SIDE 29TH ST. N., 47H P.P. E. OF 119TH ST. W.
ELEVATION= 1370.44 (NGVD 29) OR 1370.91 (NAVD88)

MINIMUM BUILDING PAD ELEVATIONS FOR LOWEST OPENING TO THE STRUCTURES		
LOT	BLOCK	ELEVATION NAVD88
1, 2, 3	A	1363.0

This plat of "FABER COMMERCIAL 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_____, 2014.
Wichita-Sedgwick County Metropolitan Area Planning Commission

_____, Chair
Don Klausmeyer

_____, 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_____, 2014.

_____, Mayor
Carl Brewer

_____, City Clerk
Karen Sublett

Reviewed in accordance with K.S.A. 58-2005 on this_____day of_____, 2014.

_____
Tricia L. Robello, L.S. #1246
Deputy County Surveyor
Sedgwick County, Kansas

Entered on transfer record this_____day of_____, 2014.

_____, County Clerk
Kelly B. Arnold

State of Kansas)
Sedgwick County) SS

We, Baughman Company, P.A., Surveyors in aforesaid county and state do hereby certify that we have surveyed and platted "FABER COMMERCIAL ADDITION", Wichita, Sedgwick County, Kansas and that the accompanying plat is a true and correct exhibit of the property surveyed, described as the south 634.74 feet of the west 790.10 feet of the SW1/4 of Section 31, TWP. 26-S, R-1-W of the 6th P.M., Sedgwick County, Kansas, TOGETHER with the east 520.00 feet of the west 1310.00 feet of the south 449.04 feet of said SW1/4, all being subject to road rights-of-way of record.

Existing public easements and dedications being vacated by virtue of K.S.A. 12-512b, as amended.

Baughman Company, P.A.

_____, Surveyor
Michael G. Conrey

Know all men by these presents that we, the undersigned, have caused the land in the surveyors certificate to be platted into Lots, a Block, and Streets, to be known as "FABER COMMERCIAL ADDITION", Wichita, Sedgwick County, Kansas. The utility easements are hereby granted as indicated for the construction and maintenance of all public utilities. The drainage and utility easements are hereby granted as indicated for drainage purposes and for the construction and maintenance of all public utilities. The wall easements are hereby granted as indicated for the construction and maintenance of private screening walls and utility main lines and service lines shall be allowed to cross these easements. The street is hereby dedicated to and for the use of the public. Access controls shall be as depicted on the face of the plat and are hereby granted to the City of Wichita, Kansas. The permitted opening locations shall be as determined by the City Engineer of the City of Wichita, Kansas. The Minimum Building Pad Elevations for the lowest opening to the structures shall be as indicated on the face of the plat.

Geraldine V. Faber Revocable Trust under Trust Agreement dated February 28, 1994, and restated May 21, 1999

_____, Trustee
Geraldine V. Faber

_____ _____
Jason W. Hull Cheree A. Hull

State of Kansas)
Sedgwick County) SS

The foregoing instrument acknowledged before me, this_____day of_____, 2014, by Geraldine V. Faber, Trustee of the Geraldine V. Faber Revocable Trust under Trust Agreement dated February 28, 1994, and restated May 21, 1999, on behalf of the trust.

_____, Notary Public

*My App't. Exp.*_____

State of Kansas)
Sedgwick County) SS

The foregoing instrument acknowledged before me, this_____day of_____, 2014, by Jason W. Hull and Cheree A. Hull, husband and wife.

_____, Notary Public

*My App't. Exp.*_____

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_____, 2014 at_____o'clock___M; and is duly recorded.

_____, Register of Deeds
Bill Meek

_____, Deputy
Tonya Buckingham

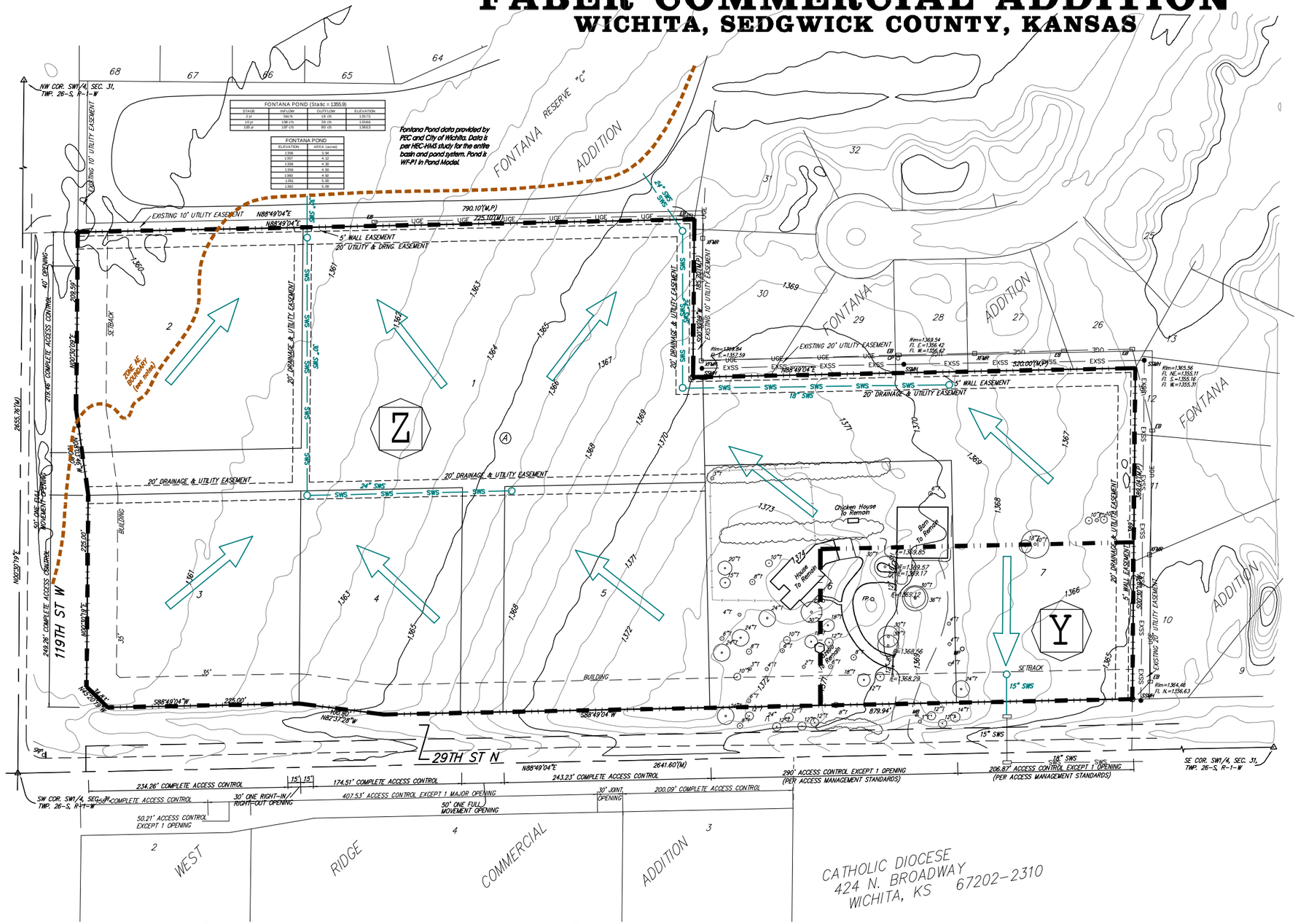
NOTE:
A drainage plan has been developed for this subdivision and is on file with the City of Wichita, Kansas. Drainage intent shall remain as depicted or as modified with the approval of the City Engineer of the City of Wichita, Kansas. No obstructions which impede the flow of this drainage plan shall be allowed.

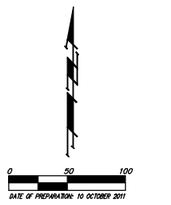
FABER COMMERCIAL ADDITION
25 NOVEMBER 2013

Baughman Company, P.A.
315 Ellis St. Wichita, KS 67211 P 316-262-7271 F 316-262-0149
Baughman ENGINEERING | SURVEYING | PLANNING | LANDSCAPE ARCHITECTURE

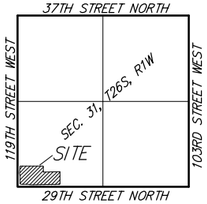
F:\PLAT\FABER COMMERCIAL ADDITION\DWG\FABERP.DWG-MGC

DRAINAGE PLAN
FABER COMMERCIAL ADDITION
WICHITA, SEDGWICK COUNTY, KANSAS





● = #4 REBAR W/ "BAUGHMAN" CAP (SET)
◉ = #4 REBAR W/ "SAVOY" CAP (FOUND)
△ = 1/4" IRON (FOUND)



VICINITY MAP

CP ○ = Cable TV Pedestal
XFMR □ = Transformer
EB □ = Electric Box
LP ◇ = Light Pole
PP □ = Power Pole
SSMH ● = Sanitary Sewer Manhole
CO ○ = Cleanout
MB ▭ = Mail Box
T ○ = Tree
Sign ▭ = Sign
FP ○ = Flag Pole

Land Use	Hydrologic Soil Group A	B	C	D	Land Use	Hydrologic Soil Group A	B	C	D
Undisturbed	0.02	0.03	0.04	0.05	Undisturbed	55	71	80	84
Turf or Disturbed Soil	0.15	0.20	0.22	0.25	Turf or Disturbed Soils	71	80	84	88
Impervious Cover	0.95	0.95	0.95	0.95	Impervious Cover	98	98	98	98

Basin #	Undist. ft²	Dist. ft²	Red. Imp ft²	New Imp. ft²	Total Area ft²	Weighted Volumetric Runoff Coef. (Rv) (eq 4-24*) U %	D %	Redev. I %	I %	Rv	WQv, ft³ (eq. 4-25*
Fontana	0	645,173	0	297,267	1,045,440	0.000	0.136	0.000	0.361	0.4974	62,000
Faber	0	21,475	0	615,364	609,840	0.000	0.033	0.000	0.808	0.8406	61,267
											103,257

Pond Volume Below Static Pool

Basin	Static Sq.Ft.	Static Acre	Pond Bottom Area Sq. Ft.	Pond Bottom Area Acre	Depth Feet	Volume Acre-Ft.
Pond	217000	5.0	130680	3.0	8	31.9
Totals:		5.0		3.0		31.9

Pond	Volume > WQv WQv	Check
31.9	2.4	Yes

Water Quality treatment is provided in the adjacent Fontana pond. The pond has approximately 31.4 ac-ft of storage under its static elevation. This site, along with the contributing area from Fontana, will only need 2.4 ac-ft of treatment volume. Downstream Channel protection will be waived as the entire pond system within Fontana Addition provides adequate storage throughout the pond system.

FABER SITE TO FONTANA POND AREA = 12.4 acres	
EXISTING 'C' = 0.60	DEVELOPED 'C' = 0.88
Q_2 = 28 cfs	Q_2 = 42 cfs
Q_5 = 34 cfs	Q_5 = 50 cfs
Q_{10} = 39 cfs	Q_{10} = 57 cfs
Q_{100} = 55 cfs	Q_{100} = 80 cfs

SOUTH EAST CORNER TO 29TH STREET AREA = 1.6 acres	
EXISTING 'C' = 0.60	DEVELOPED 'C' = 0.88
Q_2 = 3.6 cfs	Q_2 = 5.4 cfs
Q_5 = 4.3 cfs	Q_5 = 6.4 cfs
Q_{10} = 5.0 cfs	Q_{10} = 7.3 cfs
Q_{100} = 7.1 cfs	Q_{100} = 10 cfs

NOTES: FEMA ZONE AE Floodplain is per scaled location per the FEMA LOMR 12-07-0465P (effective 3/12/13), elevation 1360.2 NAVD88. This area will need to be filled and removed via LOMR-F at the time of site plan construction for Lot 2.

The internal Storm Water Sewer, preliminarily as shown herein , will be sized and final location approved during the site plan process. Sizes and locations are subject to change based on development.

DRAINAGE PLAN
FABER COMMERCIAL ADDITION
25 NOV 2013

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315 Ellis St. Wichita, KS 67211 P 316-262-7271 F 316-262-0149
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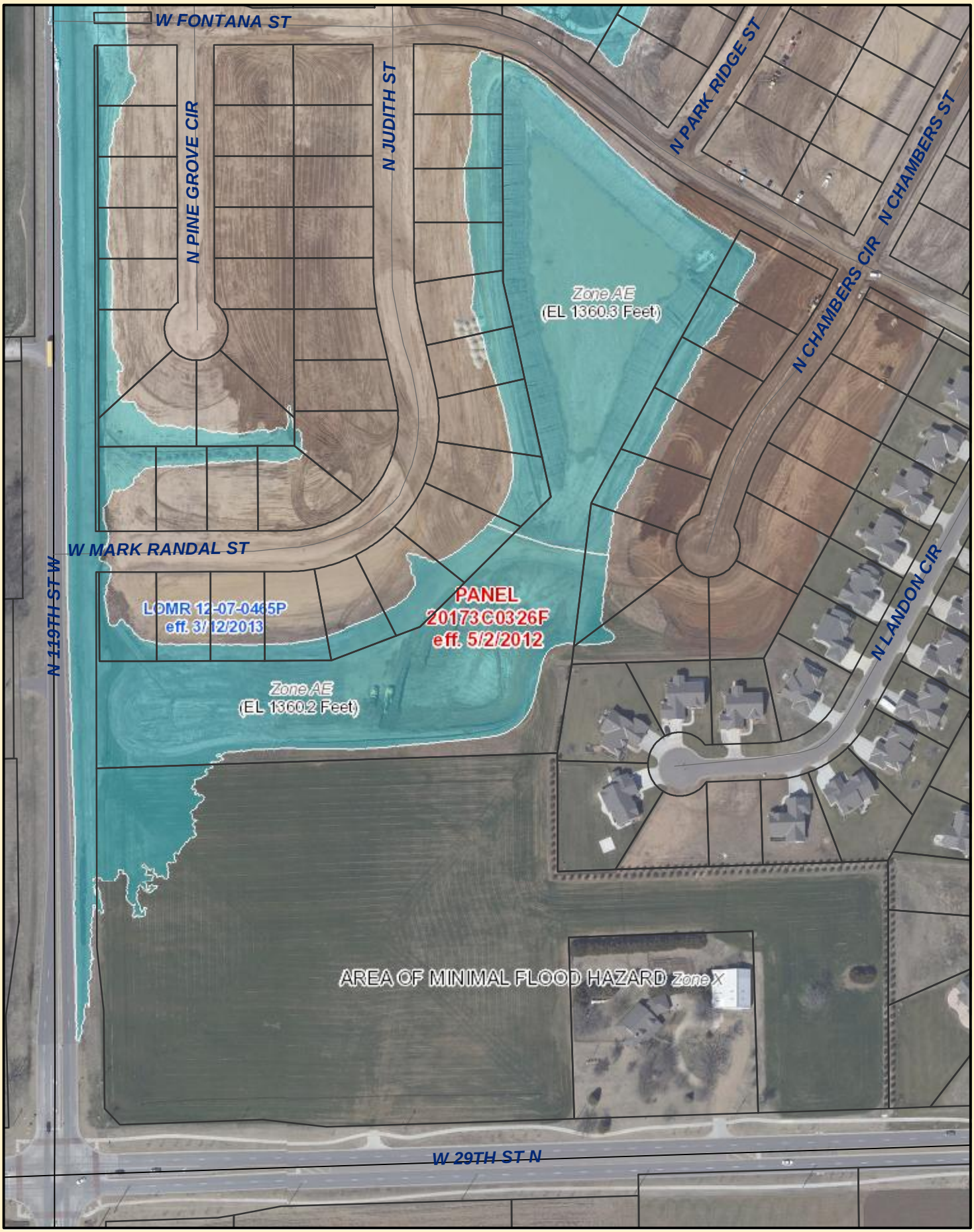
E:\Projects\Faber Commercial Addition_1\Water Resources\FABER_P_Drain.dwg



FEMA Exhibit

0 50 100 200 Feet

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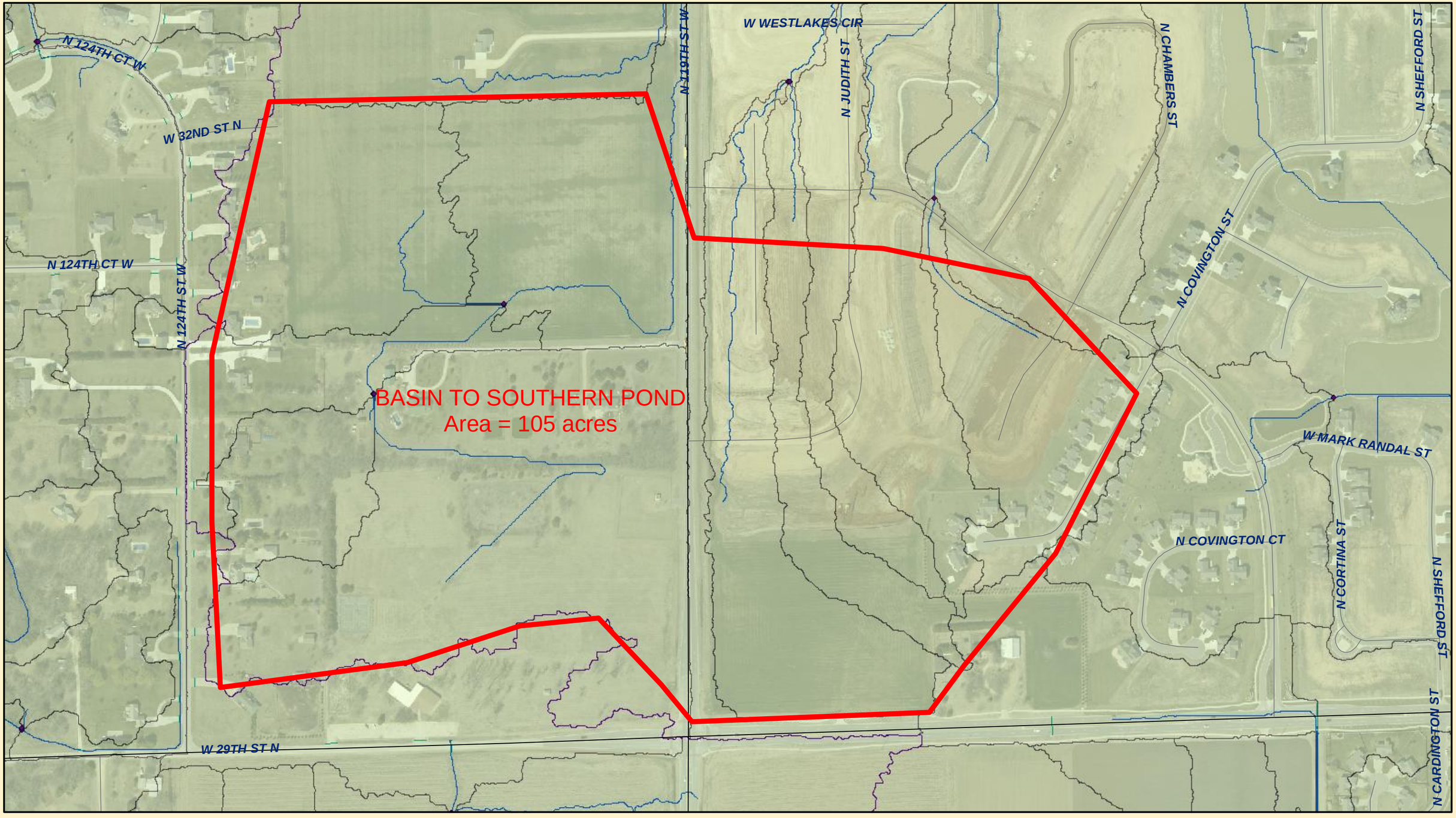

Pond Drainage Basin

Faber Commercial Addition

0 150 300 600 Feet

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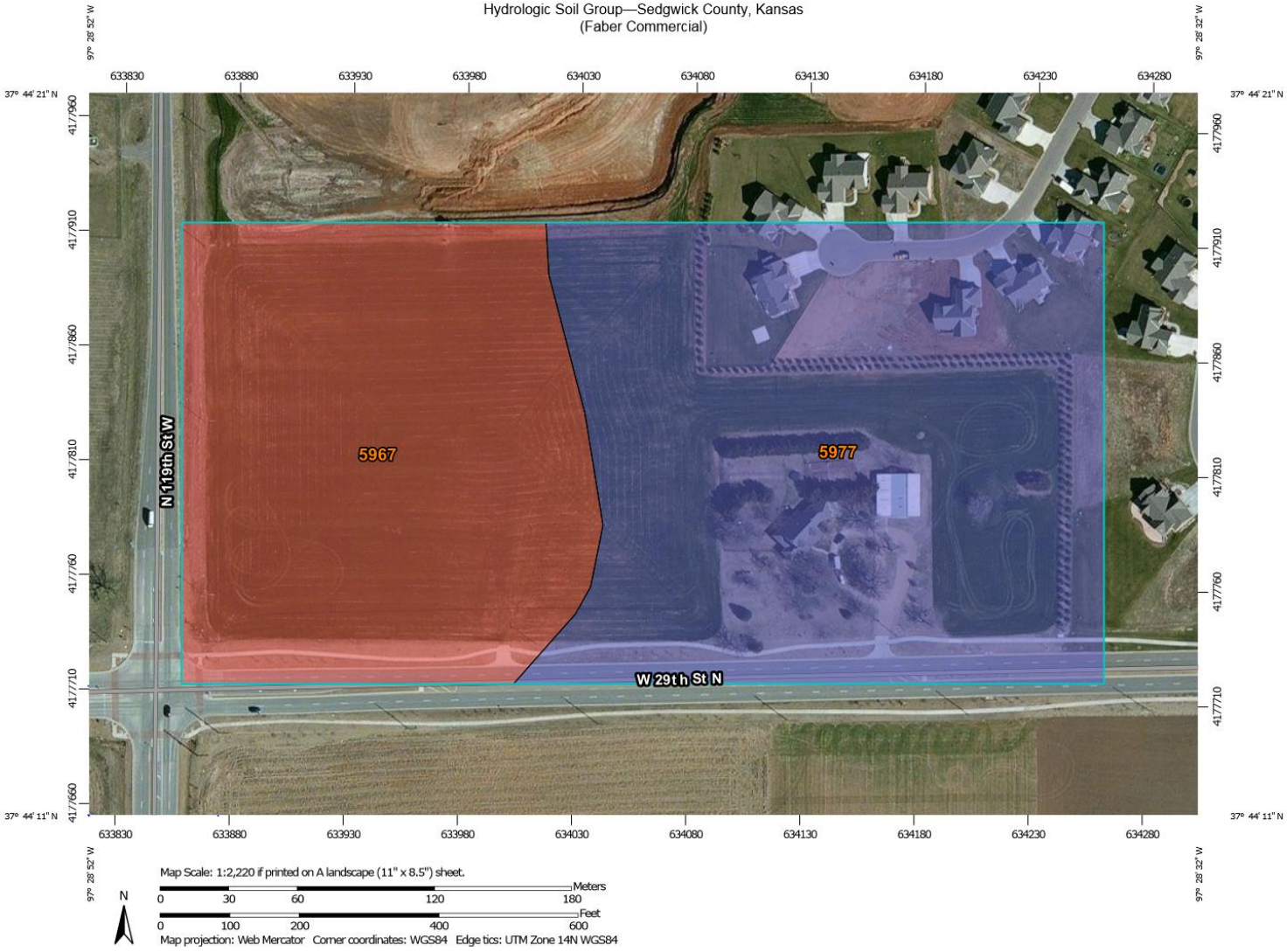
APPENDIX A: USGS Soils Survey

APPENDIX B : HydraFlow SWS
Proposed Onsite SWS

USGS Soils Survey

Hydrologic Soil Group—Sedgwick County, Kansas
(Faber Commercial)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sedgwick County, Kansas
Survey Area Data: Version 8, Sep 20, 2012

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed. Jul 18, 2010—Sep 27, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Sedgwick County, Kansas (KS173)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
5967	Tabler silty clay loam, 0 to 1 percent slopes	D	8.6	42.4%
5977	Vanoss silt loam, 1 to 3 percent slopes	B	11.6	57.6%
Totals for Area of Interest			**20.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's component. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie. The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

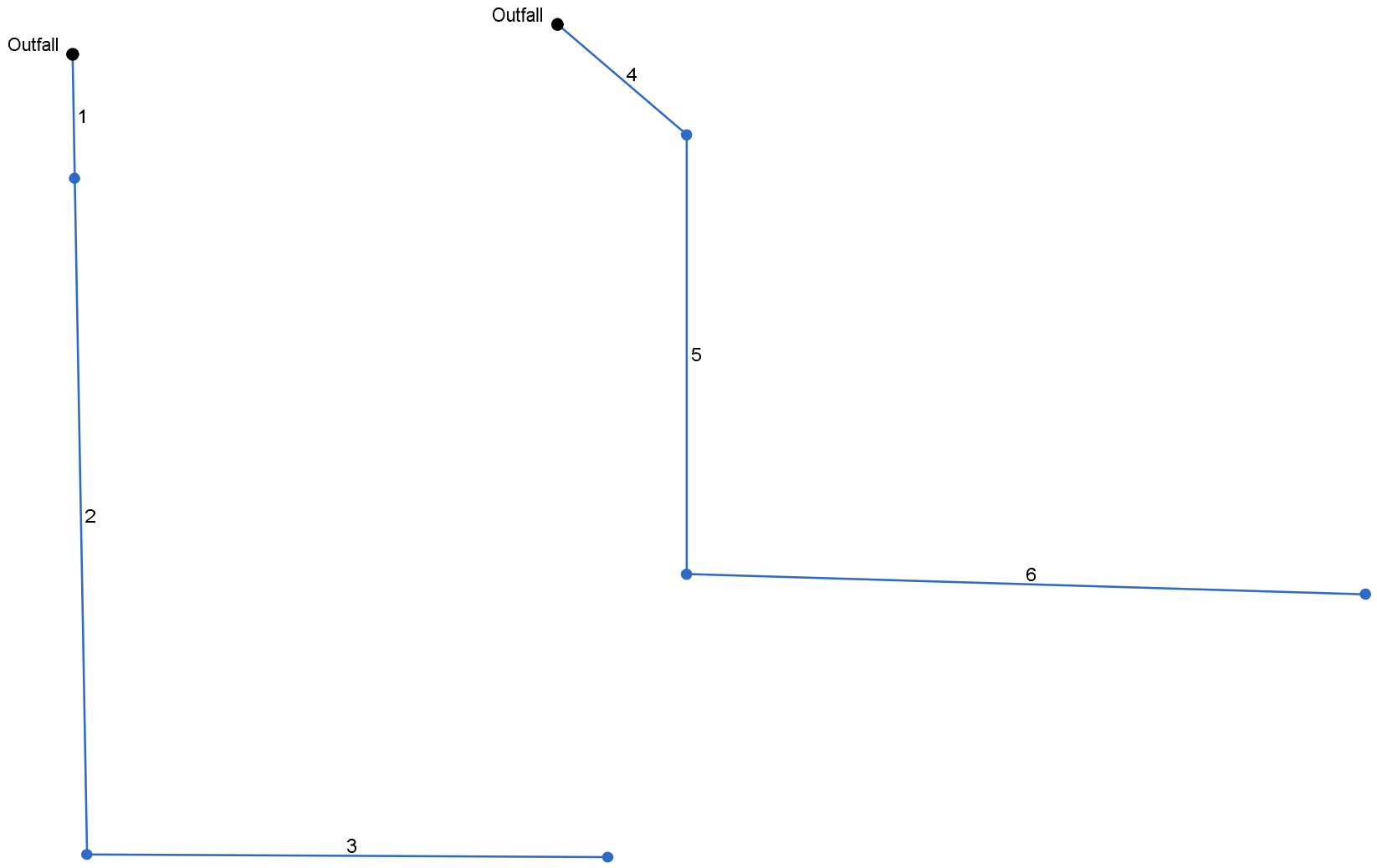
Tie-break Rule: Higher

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

HydraFlow SWS

Onsite SWS Systems

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2013 Plan



Project File: proposed SWS.stm	Number of lines: 6	Date: 11/26/2013

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
6	5	300.000	-88.305	DrGrt	0.00	1.60	0.90	15.0	1362.54	0.25	1363.30	18	Cir	0.013	1.00	1368.00	
5	4	195.000	49.399	DrGrt	0.00	1.70	0.90	15.0	1360.80	0.64	1362.04	24	Cir	0.012	1.50	1369.00	
4	End	75.172	40.601	DrGrt	0.00	0.70	0.90	15.0	1359.75	1.40	1360.80	24	Cir	0.013	1.19	1367.00	
3	2	230.000	-88.658	DrGrt	0.00	3.00	0.90	15.0	1357.96	1.29	1360.92	24	Cir	0.013	1.00	1366.00	
2	1	300.000	-0.187	DrGrt	0.00	3.30	0.90	15.0	1356.11	0.45	1357.46	30	Cir	0.013	1.50	1363.00	
1	End	55.000	89.145	DrGrt	0.00	2.00	0.90	15.0	1356.00	0.20	1356.11	30	Cir	0.013	0.50	1361.00	

Project File: proposed SWS.stm

Number of lines: 6

Date: 11/26/2013

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
6		7.50	18	Cir	300.000	1362.54	1363.30	0.255	1364.45*	1365.98*	0.28	1366.26	5	DropGrate
5		14.99	24	Cir	195.000	1360.80	1362.04	0.635	1362.11	1363.35	n/a	1364.45	4	DropGrate
4		17.85	24	Cir	75.172	1359.75	1360.80	1.397	1361.25	1362.00	n/a	1362.00	End	DropGrate
3		14.06	24	Cir	230.000	1357.96	1360.92	1.287	1361.51	1362.34	0.54	1362.88	2	DropGrate
2		28.87	30	Cir	300.000	1356.11	1357.46	0.450	1359.22*	1360.70*	0.81	1361.51	1	DropGrate
1		37.19	30	Cir	55.000	1356.00	1356.11	0.200	1358.04*	1358.77*	0.45	1359.22	End	DropGrate

Project File: proposed SWS.stm | Number of lines: 6 | Run Date: 11/26/2013

NOTES: Return period = 10 Yrs. ; *Surcharged (HGL above crown).

Hydraulic Grade Line Computations

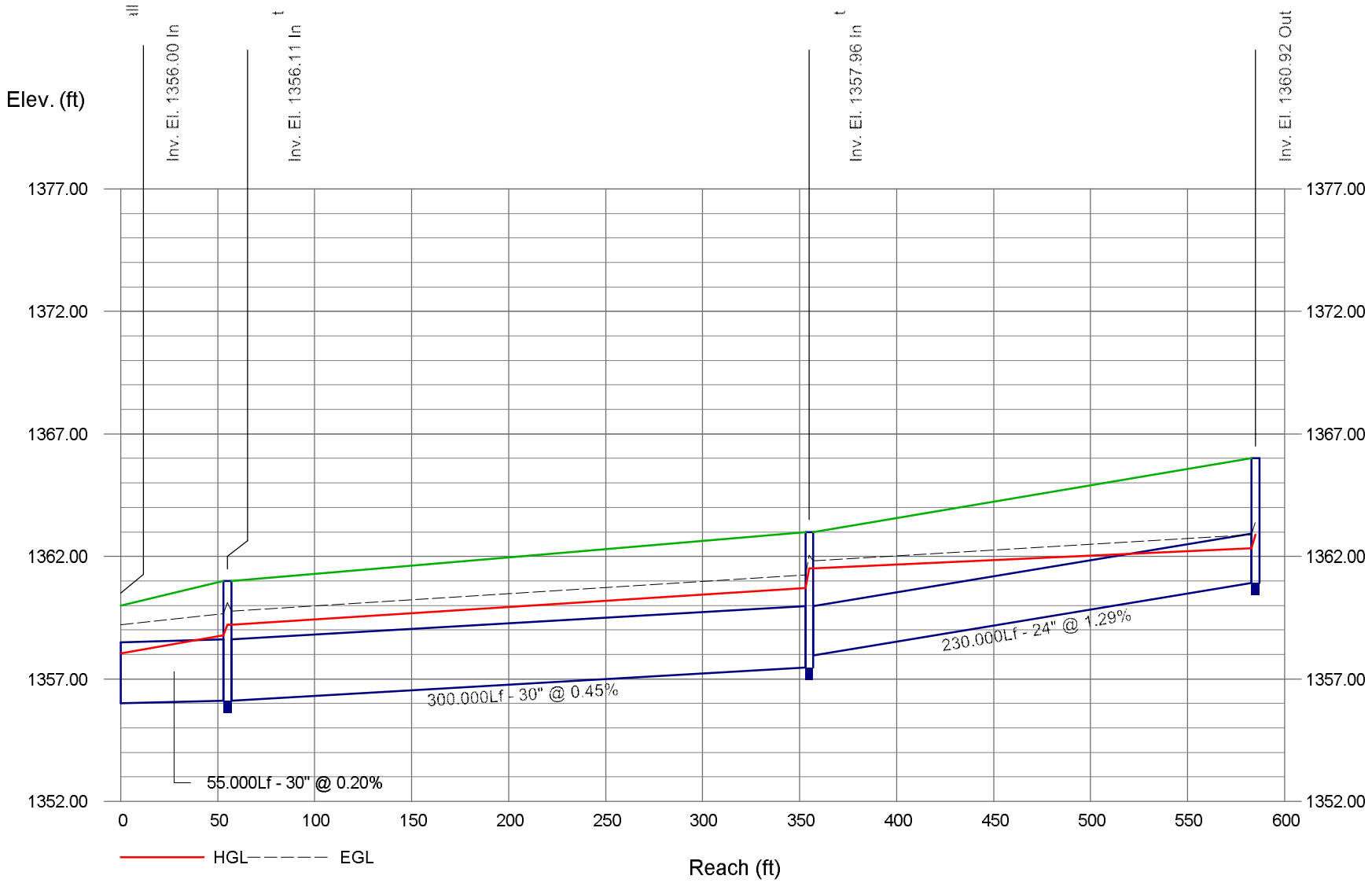
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
6	18	7.50	1362.54	1364.45	1.50	1.77	4.25	0.28	1364.73	0.510	300.000	1363.30	1365.98	1.50	1.77	4.24	0.28	1366.26	0.510	0.510	1.531	1.00	0.28
5	24	14.99	1360.80	1362.11	1.31*	2.19	4.77	0.73	1362.84	0.000	195.000	1362.04	1363.35	1.31	2.19	6.85	0.73	1364.08	0.000	0.000	0.000	1.50	n/a
4	24	17.85	1359.75	1361.25	1.50*	1.96	10.28	1.29	1362.54	0.000	75.172	1360.80	1362.00	1.20	1.96	9.11	1.29	1363.29	0.000	0.000	0.000	1.19	n/a
3	24	14.06	1357.96	1361.51	2.00	3.14	4.48	0.31	1361.82	0.387	230.000	1360.92	1362.34	1.42	2.39	5.89	0.54	1362.88	0.531	0.459	1.055	1.00	0.54
2	30	28.87	1356.11	1359.22	2.50	4.91	5.88	0.54	1359.76	0.496	300.000	1357.46	1360.70	2.50	4.91	5.88	0.54	1361.24	0.495	0.496	1.487	1.50	0.81
1	30	37.19	1356.00	1358.04	2.04	4.28	8.68	1.17	1359.21	0.830	55.000	1356.11	1358.77	2.50	4.91	7.58	0.89	1359.66	0.822	0.826	0.454	0.50	0.45

Project File: proposed SWS.stm | Number of lines: 6 | Run Date: 11/26/2013

Notes: * depth assumed. ; c = cir e = ellip b = box

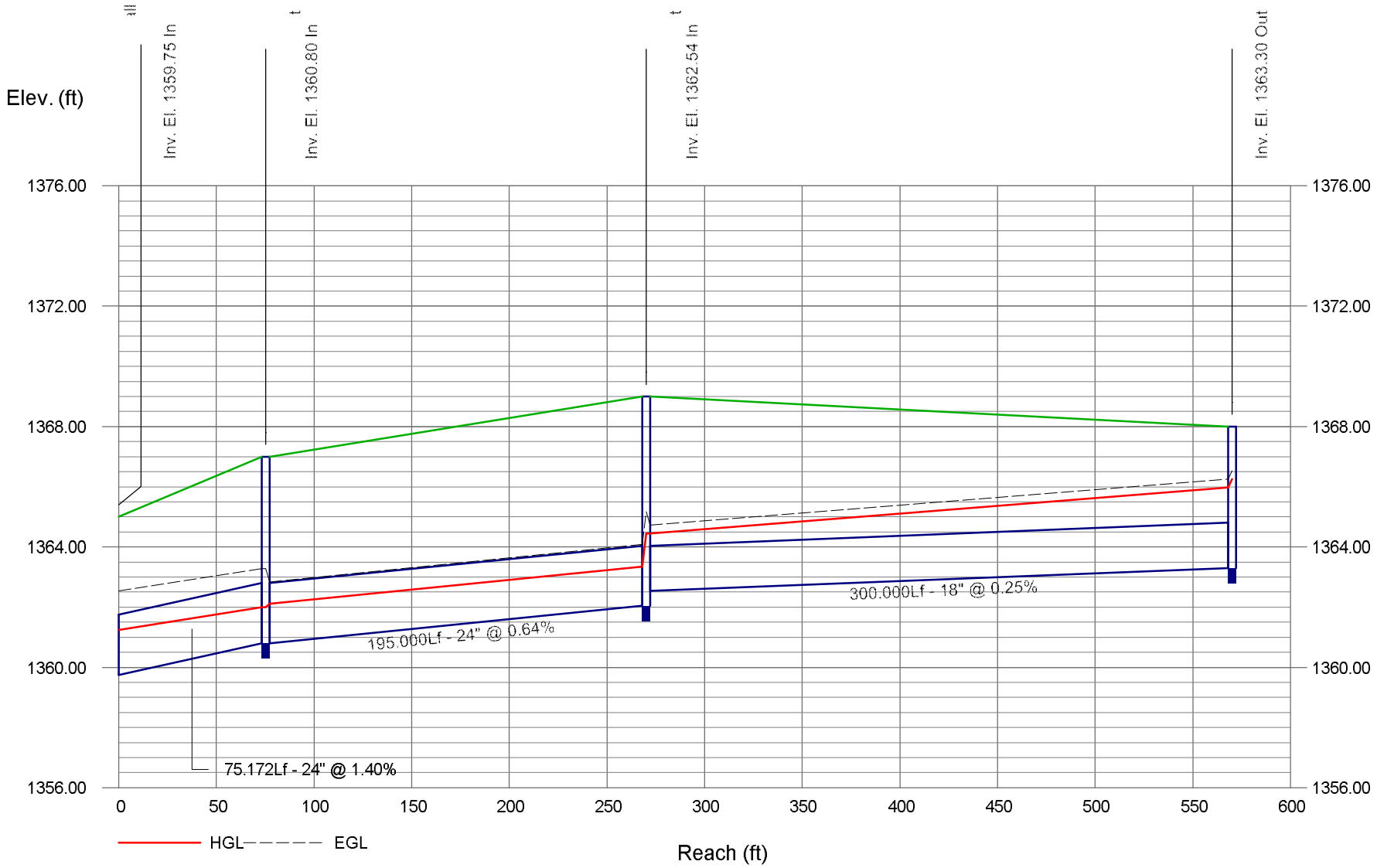
Storm Sewer Profile

Proj. file: proposed SWS.stm



Storm Sewer Profile

Proj. file: proposed SWS.stm



Drainage Plan

1:100 Scale