

Drainage Report

Dugan Industrial 3rd Addition, To Wichita, Sedgwick County, Kansas



March, 2012



516 S. Market
Wichita, Kansas 67202
(316) 264-0242

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Tab 1

Drainage Plan Submittal Checklist
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City of Wichita/Sedgwick County Subdivision Drainage Plan Checklist



Submit completed forms to:
City of Wichita Public Works & Utilities, 455 N. Main 8th Floor, Wichita KS 67202; or
Sedgwick County Stormwater Management, 1144 S. Seneca, Wichita KS 67213.

Project Name:	Dugan Industrial 3rd Addition		
Total Area of Project:	1.52	acres	
Development Type:	LI	Other:	
Developer Name:	John E. Dugan	Contact: 2416 N Morning Dew	Phone:
Email:			
Engineer Name:	Gyanendra Pokhrel	Contact: 516 S Market	Phone: (316)264 0242
Email:	guy@kemiller.com		

Directions:

- (1) Fill-out this checklist completely and include it with the Drainage Plan submittal. This checklist should be included in the bound copy, behind the cover sheet for the submittal. Incomplete Drainage Plans and checklists will not be accepted.
- (2) Indicate whether a plan element is included or not included in the submittal by choosing "Yes" or "No" from the dropdown list in the "Element Included?" column. The question must be answered for every plan element for this checklist to be considered complete. An explanation must be provided for all "No" answers.

Drainage Plan Checklist			
#	Plan Element Description	Element Included?	Explanation/Notes
1.0	General		
1.1	Digital copy of drainage plan, including preliminary Master Grading Plan, preliminary plat and proposed plat, in PDF format and one half size, bound, paper copy.		
1.2	Professional Engineer's seal, signature and date on plan cover.		
1.3	Site location map, using color ortho-imagery and showing the project boundaries, a north arrow and an accurate scale.		
1.4	Narrative of the development type, existing conditions and proposed impacts on stormwater runoff, wetlands, riparian zones and floodplains/floodways.		
1.5	Discussion of off-site conditions surrounding the proposed development.		
1.6	Summary table of runoff calculations (pre/post development).		
1.7	Narrative description of the type and function of the permanent structural stormwater management facilities.		
2.0	Existing Conditions Information		
2.1	Existing Conditions Drainage Map		
2.1.1	On-site and off-site topography: NAVD 88 datum, one-foot contours with spot elevations.		
2.1.2	On-site and off-site drainage features, including perennial and intermittent streams (with names labeled), conveyance systems such as open channels, ditches, swales and areas of overland flow. Flow direction must be indicated by arrows.		
2.1.3	Storm sewer system components, including storm drains, inlets, catch basins, gutters, manholes, headwalls, pipes and culverts. Material and size must be noted for all pipes and culverts.		
2.1.4	Location and boundaries of natural features such as wetlands, lakes, ponds with the normal water elevation noted, rock outcroppings, wooded areas and tree rows.		
2.1.5	Location, dimensions and elevations of existing bridges and culvert crossings.		
2.1.6	Location of existing utilities (e.g., water, sewer, gas, electric, cable, etc.) with labels and easement boundaries.		
2.1.7	Groundwater elevations, if applicable.		
2.1.8	Delineation of predominant soil based on USDA soil surveys and/or on-site soil borings; indicate NRCS soil name and Hydrologic Soil Group for undisturbed surface soils.		
2.1.9	Land use types per NRCS nomenclature.		
2.1.10	Footprint of existing impervious areas (labeled, area given in acres).		
2.1.11	Internal drainage subbasin boundaries used for hydrologic calculations (labeled with ID, total area in acres, impervious area in acres and curve number).		
2.1.12	Time of concentration flow paths. Indicate and label each segment separately (i.e., overland flow, shallow concentrated, channel1, channel2, etc.). For each segment, provide the appropriate data to calculate Tc (e.g., length, slope, cover type, paved/unpaved, roughness parameters, geometric properties, etc.).		
2.2	Existing Conditions Hydrology and Hydraulics Analysis		

Drainage Plan Checklist			
#	Plan Element Description	Element Included?	Explanation/Notes
2.2.1	Narrative of the hydrologic analysis methodology used (e.g., unit hydrograph or other approved methods).		
2.2.2	A summary table of drainage subbasin hydrologic parameters (subbasin ID, area in acres, curve number, Tc, etc.).		
2.2.3	Table of existing condition runoff curve numbers with supporting data and calculations.		
2.2.4	Table of existing condition times of concentration with supporting data and calculations.		
2.2.5	A summary table of rainfall data used in the hydrologic analysis, and a reference for the source of the data.		
2.2.6	Cross-sections and other diagrams of existing open channels, bridge and culvert sections and other hydraulic features as required to illustrate the basis for hydraulic analysis.		
2.2.7	Hydrologic and hydraulic analyses for runoff rates, volumes, velocities and elevations. Provide supporting data not specified above and identify assumptions. Include detailed calculations for the 2, 5, 10, 25 & 100-year, 24-hour storm events. Provide results in a tabular form. Provide digital copies of any computer files and models used.		
3.0 postdevelopment Conditions Information			
3.1 postdevelopment Conditions Drainage Map			
3.1.1	Proposed project boundary.		
3.1.2	on-site and off-site topography: NAVD 88 datum, one-foot contours with spot elevations.		
3.1.3	Existing on-site and off-site drainage features that are to remain after development, including perennial and intermittent streams (with names labeled), conveyance systems such as open channels, ditches, swales and areas of overland flow. Flow direction must be indicated by arrows.		
3.1.4	Location and description of off-site through-drainage conveyances which are confined to an easement, dedication and/or reserve.		
3.1.5	Footprint of proposed impervious areas, including roads, parking lots, buildings and other structures.		
3.1.6	Location of proposed utilities (e.g., water, sewer, gas, electric, cable, etc.) with labels and easement boundaries.		
3.1.7	Delineation of predominant soils, based on anticipated soil textures and NRCS guidelines if different from predevelopment soil conditions; indicate NRCS soil name and Hydrologic Soil Group for surface soils.		
3.1.8	Land use cover per NRCS nomenclature.		
3.1.9	Internal drainage subbasin boundaries used for hydrologic calculations (labeled with ID, total area in acres, impervious area in acres and curve number).		
3.1.10	Proposed limits of land disturbing activity (i.e., grading limits).		
3.1.11	Time of concentration flow paths. Indicate and label each segment separately (i.e., overland flow, shallow concentrated, channel1, channel2, etc.). For each segment, provide the appropriate data to calculate Tc (e.g., length, slope, cover type, paved/unpaved, roughness parameters, geometric properties, etc.)		
3.2 Proposed Conveyances Map			
3.2.1	on-site and off-site drainage features, including perennial and intermittent streams (with names labeled), proposed conveyance systems (such as open channels, ditches, swales and areas of overland flow, including backyard drainage). Flow direction must be indicated by arrows.		
3.2.2	Storm sewer system components, including storm drains, inlets, catchbasins, gutters, manholes, headwalls, pipes and culverts. Material and size must be noted for all pipes and culverts.		
3.2.3	For any subbasin or drainage area > 40 acres, show that the stormwater flow is confined to an open channel with required side benches and freeboard, or conformance to applicable policy and design requirements if partially enclosed.		
3.2.4	Location(s) of stormwater management facilities and any associated drainage easements.		
3.2.5	Proposed energy dissipaters and other channel protection devices.		
3.2.6	Location(s) and dimension(s) of proposed channel, bridge and culvert crossings.		
3.2.7	Normal pool and 100-year pool elevations for ponds and lakes.		
3.2.8	Permanent concrete outfall control structure(s) for ponds.		
3.2.9	Emergency overflow spillways and top of berm elevations for ponds and other volume/peak discharge control facilities.		
3.2.10	Floodplains, ponds, and stormwater management facilities located in reserves.		
3.3 postdevelopment Conditions Hydrology & Hydraulics			
3.3.1	Narrative of the hydrologic analysis methodology used (e.g., unit hydrograph or other approved methods).		

Drainage Plan Checklist			
#	Plan Element Description	Element Included?	Explanation/Notes
3.3.2	A summary table of drainage subbasin hydrologic parameters (subbasin ID, area in acres, curve number, Tc, etc.).		
3.3.3	Table of postdevelopment condition runoff curve numbers with supporting data and calculations.		
3.3.4	Table of postdevelopment condition times of concentration with supporting data and calculations.		
3.3.5	Cross-sections and other diagrams of existing open channels, bridge and culvert sections and other hydraulic features as		
3.3.6	Hydrologic and hydraulic analyses for runoff rates, volumes, velocities and elevations. Provide supporting data not specified above and identify assumptions. Include detailed calculations for the 2, 5, 10, 25 & 100-year, 24-hour storm events. Provide results in a tabular form. Provide digital copies of any computer files and models used.		
3.3.7	Downstream peak discharge assessment (10% Rule) results and supporting data and calculations. Provide digital copies of any computer files and models used.		
3.3.8	Stage-storage-discharge or other outlet rating curves and inflow/outflow hydrographs for all ponds.		
3.3.9	Demonstrate that the pond contours on the master grading plan and the stage-storage-discharge data are consistent for all ponds.		
3.3.10	Demonstrate that all ponds have one foot of freeboard above the 100-year, 24-hour high water level.		
3.3.11	Demonstrate that runoff from the proposed project site is discharged in the same manner as prior to development, using level spreaders, energy dissipaters, other devices or grading as required, or identify an appropriate flowage easement.		
3.4 Stormwater Quantity Control Sizing			
3.4.1	Hydraulic sizing calculations for all stormwater management controls.		
3.4.2	Table(s) listing all stormwater management controls. Present the types, sizes, elevations, flows, velocities and depths for each control, as applicable. Verify that velocities are self-cleaning and non-erosive.		
3.4.3	Typical details (including cross-sections where applicable) for outlet structures, embankments, spillways, grade control structures, conveyance channels, etc.		
3.5 Stormwater Quality Management Facilities			
3.5.1	Table(s) listing all stormwater management facilities. Present the description, % TSS removal value, water quality volume handled, contributing drainage area in acres and contributing impervious area in acres.		
3.5.2	Indicate the responsible party for maintenance, as shown in the plat text (i.e., Home Owners Association, Lot Owners Association, property owner, etc.).		
3.5.3	Water quality volume (total and by facility), with supporting data and calculations.		
3.5.4	% TSS removal value (total and by facility) with supporting data and calculation. Must be equal to or greater than 80%.		
3.5.5	Channel protection volume with supporting data and calculations.		
3.5.6	Water quality volume and channel protection volume orifice size calculations.		
3.5.7	Other calculations required for each stormwater management facility as specified in the Wichita/Sedgwick County Stormwater Manual.		
3.5.8	Typical details (including cross-sections where applicable) for outlet structures, embankments, internal grading, forebays and other siltation prefilters, filtration/infiltration media, vegetation, check dams, operational controls, etc.		
4.0 Floodplains			
4.1	Reference the source of flood profile, floodplain, floodway and stream discharge information.		
4.2	Delineation of nearest base flood elevations.		
4.3	Delineation of predevelopment regulatory floodplain/floodway limits using FEMA's current GIS database; limits to be per elevation and scaled location.		
4.4	Delineation of postdevelopment regulatory floodplain/floodway limits; limits to be per elevation and scaled location, with project limits shown.		
4.5	Floodway data table and discharges.		
4.6	Hydrologic and hydraulic study information for local floodplain analysis, unnumbered Zone A elevation determinations and floodplain map revisions or required permits.		
4.7	Regulatory floodway and four natural profile models (10, 50, 100 and 500-year) for existing and postdevelopment conditions.		
4.8	Floodplains and floodways located within a reserve, where necessary.		
4.9	Floodplain cut and fill calculations for volume sensitive basins.		

Drainage Plan Checklist			
#	Plan Element Description	Element Included?	Explanation/Notes
4.10	Demonstrate that floodway elevations and velocities do not increase due to construction in the floodway ("No Rise Certification").		
5.0 Federal, State and Local Permits			
5.1	US Army Corps of Engineers regulatory program permits (Section 404 permit).		
5.2	Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Floodplain Fill, Levee, Water Appropriations, Dam Safety permit, etc.).		
5.3	FEMA letters of map change/revision - LOMA, LOMR, LOMR-f, CLOMR, etc.; shall be included and approved when project modifies the limits of the floodplain/floodway.		
6.0 Half Scale Preliminary Master Grading Plan			
6.1	One set of plans and associated PDF of plans.		
6.2	Professional Engineer's seal, signature and date.		
6.3	Title block including subdivision name and phase and dated revision documentation.		
6.4	Future phases shown but cross-hatched as information only.		
6.5	Scale, not greater than 1-inch = 60 feet.		
6.6	North arrow.		
6.7	Index or legend key.		
6.8	Benchmarks (minimum of 2) used for site control (NAVD 88 vertical datum).		
6.9	Existing contours of entire site with contour interval of one foot.		
6.10	Proposed contours for channels, ponds, and other permanent stormwater management facilities, with contour interval of one foot.		
6.11	Spot elevations shown to the nearest tenth of a foot for critical locations, including lot and property boundaries.		
6.12	Proposed lot and street layout.		
6.13	Locations of underground storm drains.		
6.14	Overflow locations for storms exceeding storm drain capacity, with elevations.		
6.15	Top elevations of storm drains at all inlets, manholes, and flow line elevations for all outfalls.		
6.16	Locations of open ditches and lakes.		
6.17	Flow direction arrows.		
6.18	Proposed flow line elevations of all open ditches at maximum 100 foot intervals, and 100-year flood elevations thereon.		
6.19	Ponds: Location, bottom elevation, normal pool elevation, 100-year flood elevation, emergency overflow elevation.		
6.20	Proposed top-of-curb elevations at points where drainage will be required to flow over the curb.		
6.21	Platted minimum building opening elevation for each lot, in table form for all lots (excluding basement floor elevations).		
6.22	Standard foundation and elevation detail for slab on grade, full basement, view-out, partial view-out and/or walk-out construction.		
6.23	Top of foundation elevation for each lot.		
6.24	Notation for builders for each lot as to the type of structure that may be constructed and the view-out, walk-out or pad elevation, as applicable.		
6.25	Indicate that all lots are above the 100-year flood elevation.		
6.26	Indicate that grading around structures conforms to perimeter drainage requirements.		
6.27	Indicate that backyard drainage grading conforms to backyard drainage requirements.		
6.28	Adjacent subdivision lot lines, with lot labels and subdivision names.		
6.29	Boundaries and labels for all easements, rights-of-way and reserves.		
6.30	Statement on proposed final plat: "A drainage plan has been developed for the subdivision and all drainage easements, rights-of-way, or reserves shall remain at the established grades and remain unobstructed to allow for the conveyance of stormwater."		
End of Checklist			

Drainage Report

Dugan Industrial 3rd Addition

Introduction

The subject property is located on north side of Southwest Blvd. (K-42) and about 300 feet East of Maize road. The tract of land is approximately 1.52 acres and is currently zoned as single family residential (SF-5). This area is partially developed and unplatted and has buildings in it. The proposed use of the land is to develop into an industrial area with addition of a building.

Existing Conditions

The site is served by city of Wichita utilities. The site has a house and a parking lot in it. Rest of the site is covered by grass and drains towards southeast. The overall drainage pattern around the site indicates that the drainage to the north ditch of K-42. The soils are of Type C, with an average slope less than 1 %. There is an open channel along the K-42 which drains northeast along K-42. There are existing culverts in the drives along the channel. There is a developed limited commercial area on the west; limited commercial developed FedEx facility on the north and single family residential (SF-5) on the east side.

The existing drainage pattern indicates that all of the property drains towards the southeast through the residential lot on the east side which ultimately drains to the open channel along the K-42. There are existing culverts in the access drives from the K-42 to the properties on the north.

According to FIRM, the subject property is not in the floodplain and there are no signs of wetland although the land is very flat. The nearest 100-yr floodplain (Zone A) is about 1/2 miles south of the property, as indicated on attached FIRM panel in tab 4.

The attached plat with topography shows existing features including contours, utilities, and proposed easements. The existing drainage map, as attached in tab 2 shows the current flow pattern and runoff calculations.

Proposed Improvements

The proposed improvement of this site is to develop into industrial area which will include addition of a building at this time. No flood detention, water quality and channel protection would be expected as the site disturbance will be less than an acre. However the flood detention and water quality needs to be addressed if the cumulative site disturbance becomes more than an acre in future. A surface or underground drainage system or a combination of both will be designed to collect the runoff from the site to the north K-42 ditch.

Attached drainage plan illustrates that drainage of site and drainage pattern. The attached calculations in proposed drainage plan show the existing and developed peak runoffs, including assumed numbers and conditions for each storm events.

Best management practices for erosion control will include ditch checks in the proposed swales, inlet protection at all inlets, silt fence where applicable, and sediment ponds within the detention basins. The erosion control plan will have to evolve as the site develops.

Site Hydrological Analysis

Existing and proposed site runoff calculations have been modeled using the Curve Number (CN) method. The Values for Curve Number (CN) and Rainfall Intensity were established using the *City of Wichita/Sedgwick County Stormwater Manual*. Existing times of concentration were calculated from existing ground conditions and can be found in tab 2. Proposed times of concentration have been modeled using the proposed site runoff and accounting for the use of storm sewer and channels to route the runoff. SCS unit hydrograph method is used for peak flow calculation.

Hydraulic Model

An Analysis of hydraulic characteristics will be developed for pipes and other storm water conveyance system as the site evolves.

Future Development

There will be addition of a building at this time.

NW Cor. SW 1/4
Sec. 8-T28S-R1W
Fd. 1/2" Rebar

Center Section
Sec. 8-T28S-R1W
Fd. 1/2" Rebar(PEC)

One-Step Final Plat Dugan Industrial Third Addition Wichita, Sedgwick County, Kansas

Part of the SW 1/4, Section 8, Township 28 South, Range 1 West of the 6th. P.M.

State of Kansas)
County of Sedgwick) SS

State of Kansas)
City of Wichita) SS

I, Bradley C. Ward, a licensed land surveyor of the State of Kansas, do hereby certify that the following described tract of land was surveyed on the 13th day of March, 2012 and the accompanying final plat prepared and that all the monuments shown herein actually exist and their positions are correctly shown to the best of my knowledge and belief:

This plat of Dugan Industrial Third Addition, Wichita, Sedgwick County, Kansas, has been submitted to and approved by the Wichita-Sedgwick County Metropolitan Area Planning Commission, Wichita, day of _____, 2012. Dated this _____ day of _____, 2012. Wichita-Sedgwick County Metropolitan Area Planning Commission.

LEGAL DESCRIPTION

The East 128 feet of the West 898.75 feet of the SW 1/4 lying North of the K-42 Highway Right-of-Way, of Section 8, Township 28 South, Range 1 West, of the Sixth Principal Meridian, Sedgwick County, Kansas.

G. Nelson Van Fleet, Chair

John L. Schlegel, Secretary

All easements and Rights of Way within said tract are hereby vacated by virtue of KSA 12-512(b) amended.

State of Kansas)
City of Wichita) SS

This plat approved and all dedications shown hereon accepted by the City Council of the City of Wichita, Kansas, this _____ day of _____, 2012.

At the Direction of the City Council

Carl Brewer, Mayor

Karen Sublett, City Clerk

Entered on transfer record this _____ day of _____, 2012.

Bradley C. Ward, L.S. #920

State of Kansas)
County of Sedgwick) SS

Kelly B. Arnold, County Clerk

Know all men by these presents, that we, the undersigned, have caused the land described in the surveyor's certificate to be platted into a Lot and Block, to be known as Dugan Industrial Third Addition, Wichita, Sedgwick County, Kansas. Any easements are hereby granted as indicated for constructing, maintaining, operating, and repairing public utilities. The access controls are hereby granted to the appropriate governing body as shown hereon. A drainage plan has been developed for the plat and all drainage easements, rights-of-way, or reserves shall remain at established grades or as modified with the approval of the applicable City or County Engineer, and unobstructed to allow for the conveyance of stormwater. And further that the land contained herein is held and shall be conveyed subject to any applicable restrictions, reservations and covenants now on file or hereafter filed in the Office of the Register of Deeds of Sedgwick County, Kansas.

State of Kansas)
County of Sedgwick) SS

This is to certify that this plat has been filed for record in the Office of the Register of Deeds this _____ day of _____, 2012, at _____ o'clock _____ M, and is duly recorded.

Bill Meek, Register of Deeds

Tonya Buckingham, Deputy

By: _____ Date _____
John E. Dugan, Owner

Reviewed in accordance with K.S.A. 58-2005 on this _____ day of _____, 2012.

State of Kansas)
County of Sedgwick) SS

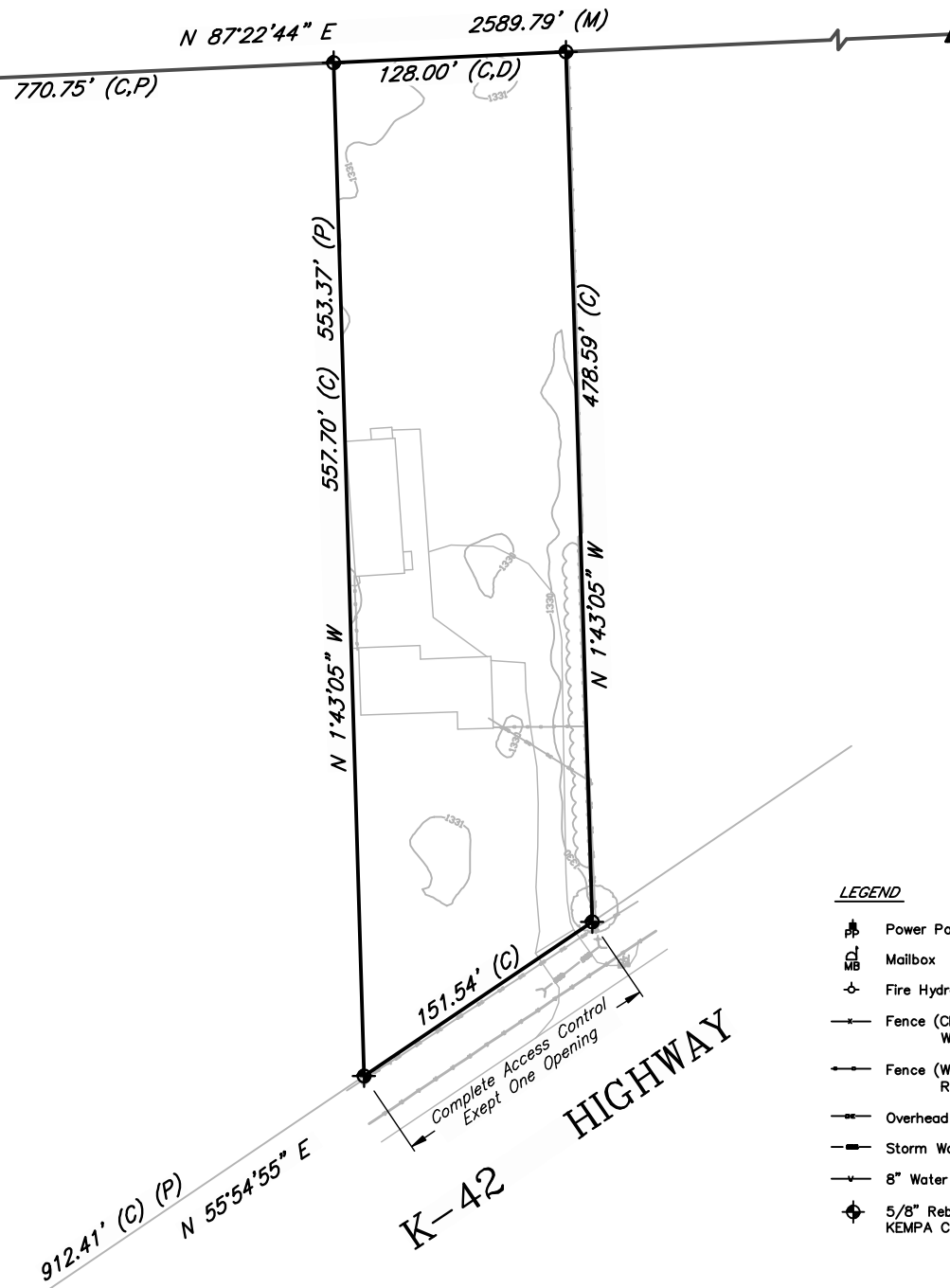
Tricia L. Robello, L.S. #1246
Deputy County Surveyor
Sedgwick County, Kansas

This instrument was acknowledged before me on this _____ day of _____, 2012, by John E. Dugan, Owner.

Notary Public

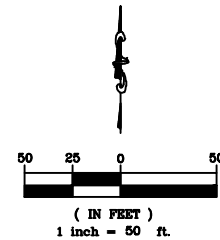
My Commission Expires: _____

MAIZE ROAD
2636.08' (M)
N 1°43'05" W
1034.00' (C,P)



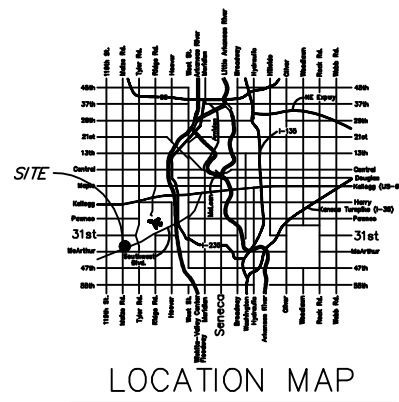
LEGEND

- Power Pole
- Mailbox
- Fire Hydrant
- Fence (Chain Link, Woven/Welded Wire, Barbed Wire, etc.)
- Fence (Wood, Brick/Mason, Rod Iron, etc.)
- Overhead Electric
- Storm Water Sewer
- 8" Water Main
- 5/8" Rebar (set) KEMPA CLS #157



NOTES:
Utility locations are from Kansas One-Call.

Benchmarks:
City of Wichita disc on the Southeast corner of hubguard on RBCB, 200 feet +/- West of Maize Road on 31st St. South.
Elevation= 1,331.96 NAVD 88 (conv.) (1,331.35 NGVD 29)



SW Cor. SW 1/4
Sec. 8-T28S-R1W
Fd. 3/4" Iron Pipe



516 S. Market, Wichita, KS 67202 (316)264-0242

GEN. No. 12017 Date: 3/26/12



Maize Road

Proposed Site

Southwest Blvd. (K-42)

W Southwest Dr

42

© 2012 Google

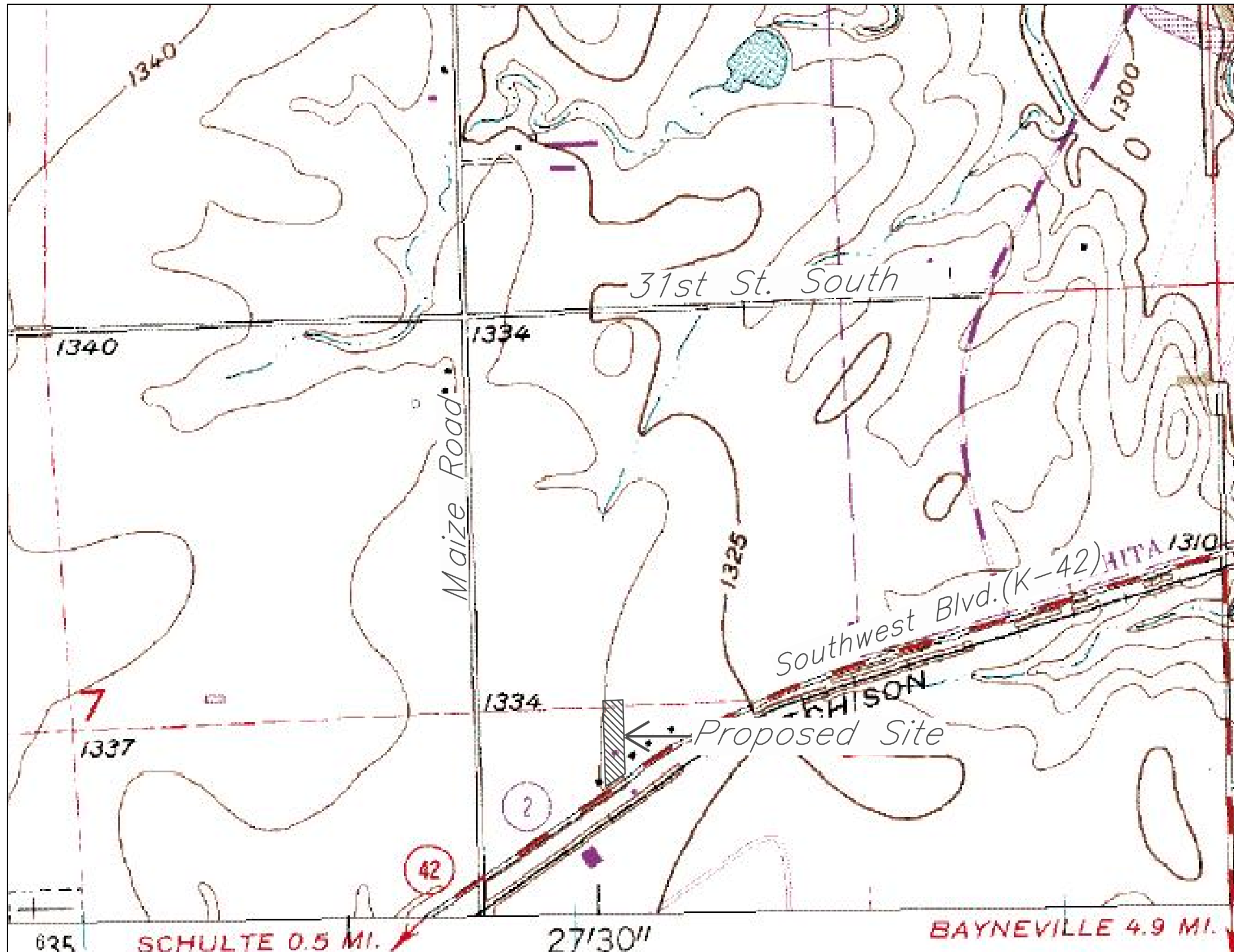


Degan Industrial 3rd Addition
Location Map
 Wichita, Kansas



PROJECT NUMBER			
KEY NO. 12017	FILE location	DATE 03/2012	SHEET 1.0
DESIGN GP	DRAWN GP	REVISED	

518 S. Mead, Wichita, KS 67202 (316)264-0242



Dugan Industrial 3rd Addition
USGS Map
 Wichita, Kansas

PROJECT NUMBER



KEM NO. 12017	FILE USGS	DATE 03/2012	SHEET
DESIGN GP	DRAWN GP	REVISED	1.0

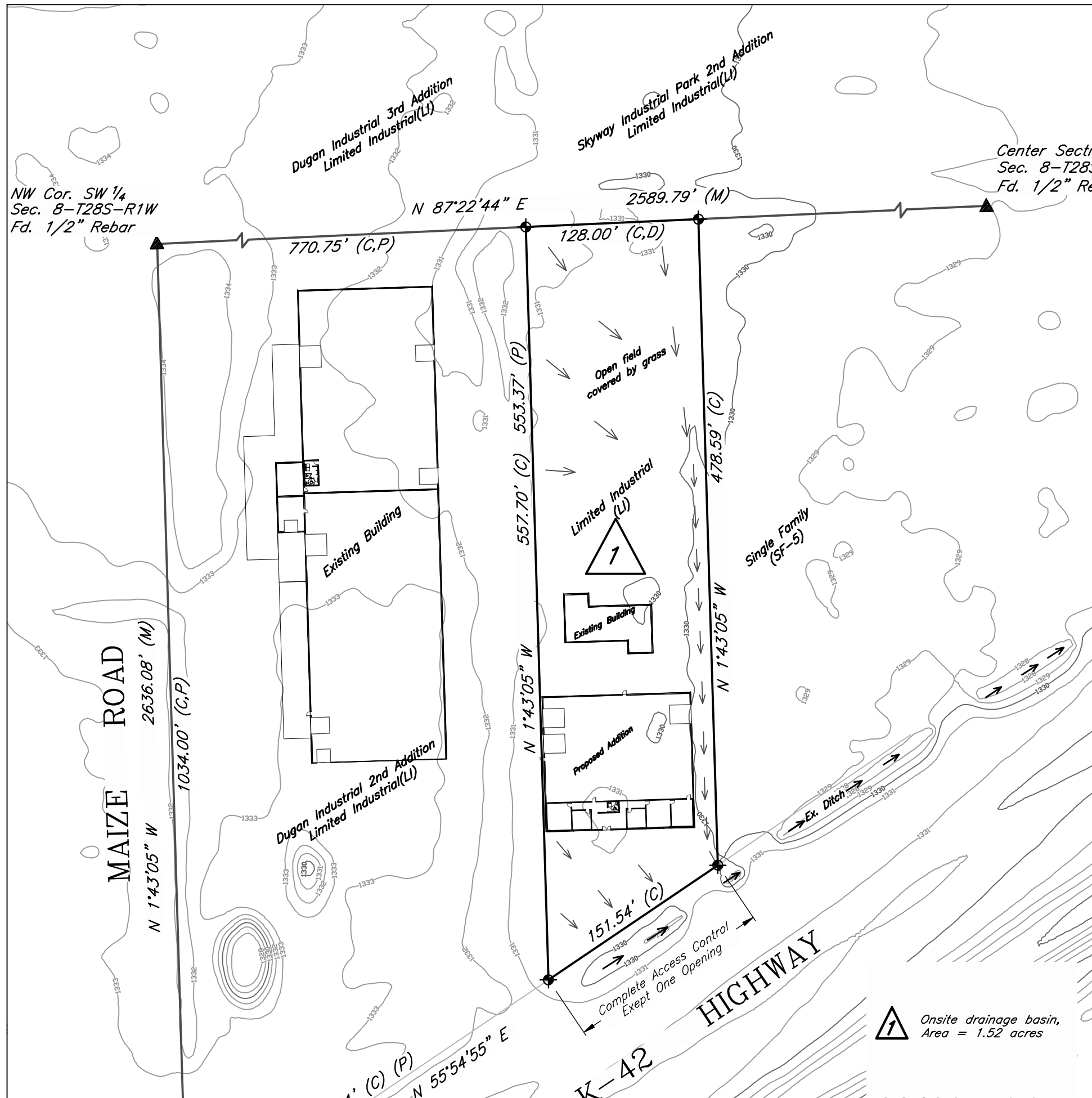
50 S. Main, Suite 102, Wichita, KS 67202 (316)261-0242

635

SCHULTE 0.5 MI. ↗

27°30'N

BAYNEVILLE 4.9 MI. ↘



Project narrative:
 The site is located on north side of K-42 (Southwest Blvd.) between Maize and Tyler. The site is partially developed with building, house and some parking area. The north half of the property is an open field covered by grass. The proposed site consists of addition of building next to the existing on south side. The existing drainage pattern indicated the site drains towards the southeast to the open channel along the K-42. The proposed drainage pattern follows the existing except routing the runoff from north open field to the K-42 open channel.

Water Quality and TSS Removal

Storm runoff treatment is not required for this site as the area of disturbance is expected to be less than an acre. However water quality needs be addressed if the cumulative area of disturbance exceeds an acre in future. North open field will be protected by installing no disturbance fence.

Channel Protection

No extended detention for channel protection is required as the total site is less than 5.0 acres.

Flood Detention (2-, 5-, 10-, 25- and 100-yr)

No flood detention for this site is considered as the area of disturbance is expected to be less than an acre. The area of disturbance is expected to be 0.66 acres due to construction or construction activity. A surface or underground conveyance system will be built to drain the north open field in to the K-42 ditch as shown in plan. However a detention system will be considered if the cumulative impervious area exceeds 1.0 acre in future. Following tables show the runoffs in existing and proposed condition.

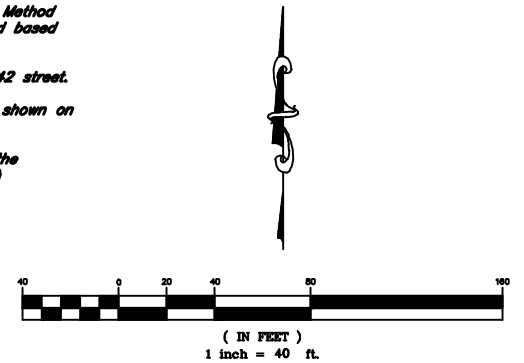
EXISTING CONDITION:
 Total Site Area = 1.52 acres,
 Impervious Area=0.48 acres, Grass Area= 1.04 acres
 Hydrological Soil Group = C

EXISTING SITE									
DRAINAGE AREA	ACRES	Tc min	CN	Q2	Q5	Q10	Q25	Q100	REMARKS
Proposed Site Area	1.52	43	84	2.10	3.21	3.89	4.81	6.40	Entire site in undeveloped condition

DEVELOPED CONDITION:
 Total Site Area = 1.52 acres
 Impervious Area=0.62 acres, Grass Area= 0.90 acres
 Hydrological Soil Group= C

DEVELOPED SITE									
DRAINAGE AREA	ACRES	Tc min	CN	Q2	Q5	Q10	Q25	Q100	REMARKS
Proposed Site Area	1.52	15	88	3.26	4.76	5.66	3.26	8.94	Fully developed commercial site

- Engineer's Notes:**
1. Site drainage calculations were developed using the SCS Method for peak flow. Weighted CN and I values were established based on existing and proposed site conditions.
 2. The site drainage will be maintained to the ditch on K-42 street.
 3. Future grading plan shall follow the drainage pattern as shown on plan.
 4. There is no sign of wetland and the property is not in the floodplain. (FIRM Panel 20173C0340E, February, 2 2007.)



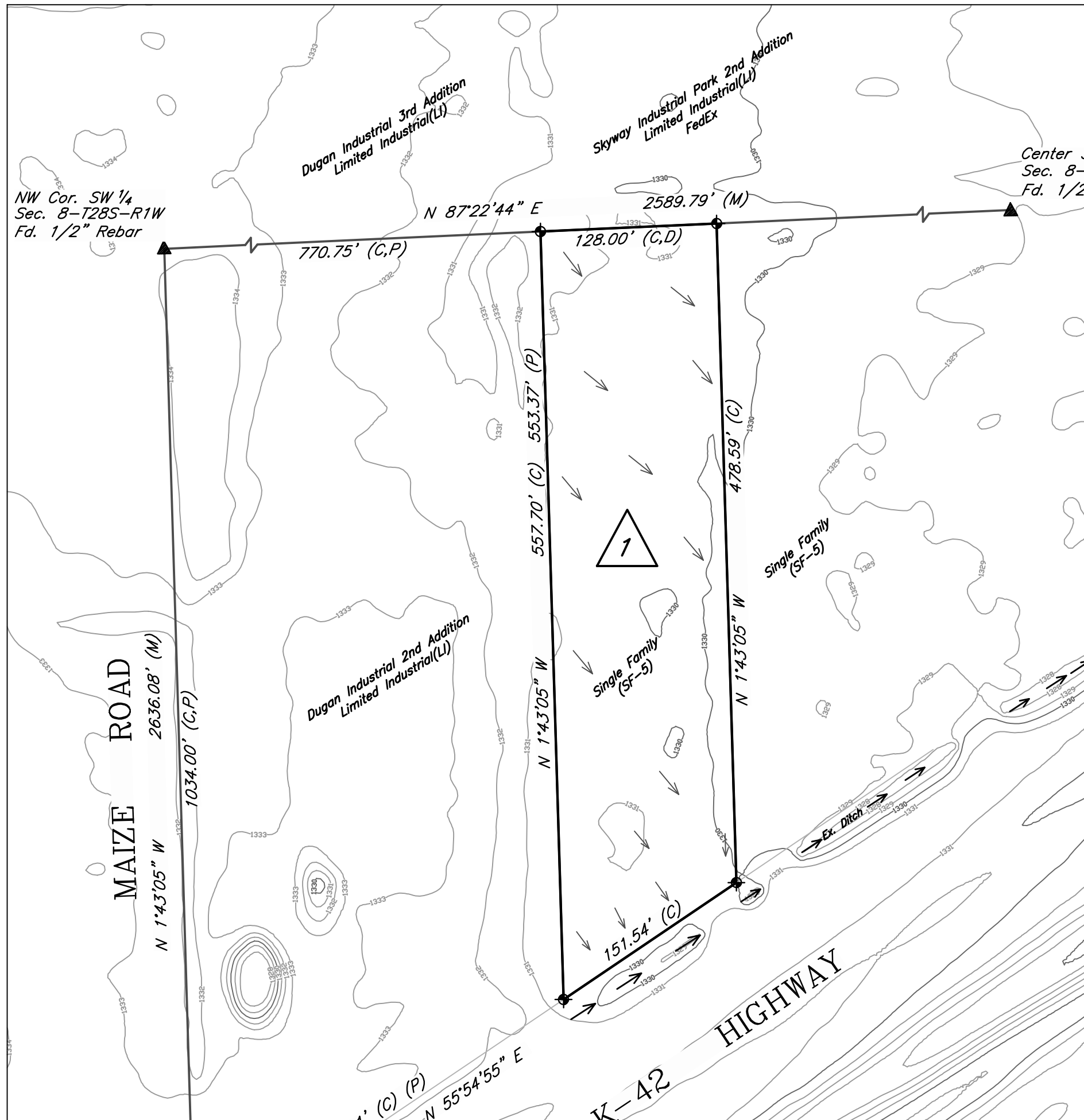
**Dugan Industrial 3rd Addition
 Drainage Plan
 Wichita, Kansas**

PROJECT NUMBER				
kemiller engineering	KEM NO. 12017	FILE drainage	DATE 03/2012	SHEET 1.0
	DESIGN GP	DRAWN GP	REVISED	

216 S. Market, Wichita, KS 67202 (316)264-0242

Tab 2:

Existing Drainage Map



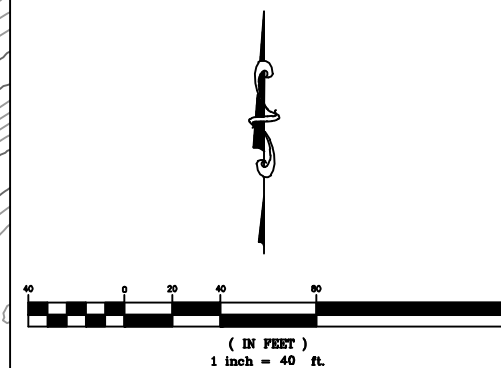
Existing/Undeveloped Site

Total Site Area= 1.52 Acres
 Impervious Area= 0.00 Acres
 Partially developed area.
 Undeveloped CN=84
 Soil Group C with average slope less than 1%

Existing Tc Calculation:
 Flow Length=480 ft, with average slope of ground less than 1.0%
 Sheet flow=100 ft, TC1=22.8 min
 Shallow concentrated flow=480 ft, TC2=19.7 min
 Total Tc=42.5= 43 min

Existing Drainage Calculations

Area #	Acres	Tc min	24-hr rainfall depth (inches)					Curve Number (CN)	Existing Q, cfs					Remark
			2-yr	5-yr	10-yr	25-yr	100-yr		Q2	Q5	Q10	Q25	Q100	
Entire Site(1)	1.52	43	3.60	4.80	5.52	6.48	8.16	84	2.10	3.21	3.89	4.81	6.40	Runoff from site in undeveloped condition



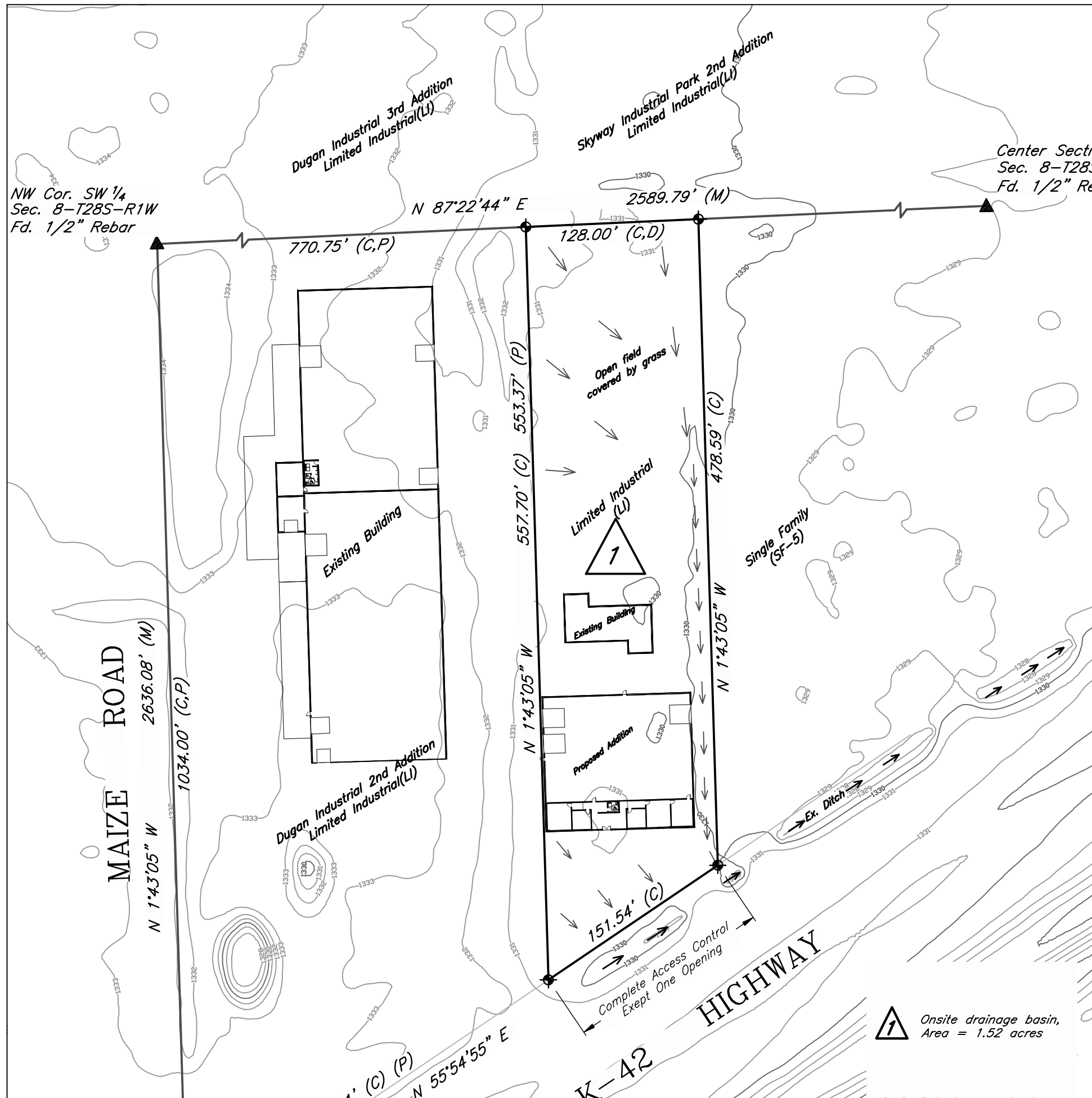
**Dugan Industrial 3rd Addition
 Ex. Drainage Map
 Wichita, Kansas**

PROJECT NUMBER			
KEM NO. 12017	FILE drainage	DATE 03/2012	SHEET 1.0
DESIGN GP	DRAWN GP	REVISED	

210 N. Market, Wichita, KS 67202 (316)264-0242

Tab 3:

Proposed Drainage Plan



Project narrative:
 The site is located on north side of K-42 (Southwest Blvd.) between Maize and Tyler. The site is partially developed with building, house and some parking area. The north half of the property is an open field covered by grass. The proposed site consists of addition of building next to the existing on south side. The existing drainage pattern indicated the site drains towards the southeast to the open channel along the K-42. The proposed drainage pattern follows the existing except routing the runoff from north open field to the K-42 open channel.

Water Quality and TSS Removal
 Storm runoff treatment is not required for this site as the area of disturbance is expected to be less than an acre. However water quality needs be addressed if the cumulative area of disturbance exceeds an acre in future. North open field will be protected by installing no disturbance fence.

Channel Protection
 No extended detention for channel protection is required as the total site is less than 5.0 acres.

Flood Detention (2-, 5-, 10-, 25- and 100-yr)
 No flood detention for this site is considered as the area of disturbance is expected to be less than an acre. The area of disturbance is expected to be 0.66 acres due to construction or construction activity. A surface or underground conveyance system will be built to drain the north open field in to the K-42 ditch as shown in plan. However a detention system will be considered if the cumulative impervious area exceeds 1.0 acre in future. Following tables show the runoffs in existing and proposed condition.

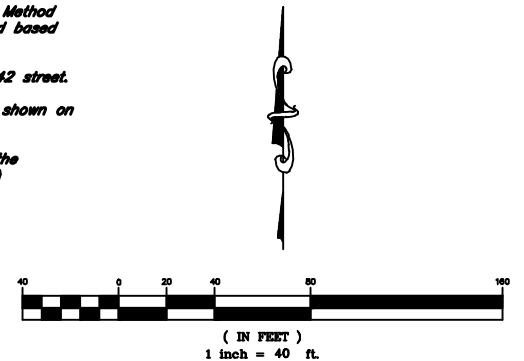
EXISTING CONDITION:
 Total Site Area = 1.52 acres,
 Impervious Area=0.48 acres, Grass Area= 1.04 acres
 Hydrological Soil Group = C

EXISTING SITE									
DRAINAGE AREA	ACRES	Tc min	CN	Q2	Q5	Q10	Q25	Q100	REMARKS
Proposed Site Area	1.52	43	84	2.10	3.21	3.89	4.81	6.40	Entire site in undeveloped condition

DEVELOPED CONDITION:
 Total Site Area = 1.52 acres
 Impervious Area=0.62 acres, Grass Area= 0.90 acres
 Hydrological Soil Group= C

DEVELOPED SITE									
DRAINAGE AREA	ACRES	Tc min	CN	Q2	Q5	Q10	Q25	Q100	REMARKS
Proposed Site Area	1.52	15	88	3.26	4.76	5.66	3.26	8.94	Fully developed commercial site

- Engineer's Notes:**
1. Site drainage calculations were developed using the SCS Method for peak flow. Weighted CN and I values were established based on existing and proposed site conditions.
 2. The site drainage will be maintained to the ditch on K-42 street.
 3. Future grading plan shall follow the drainage pattern as shown on plan.
 4. There is no sign of wetland and the property is not in the floodplain. (FIRM Panel 20173C0340E, February, 2 2007.)



Onsite drainage basin,
 Area = 1.52 acres

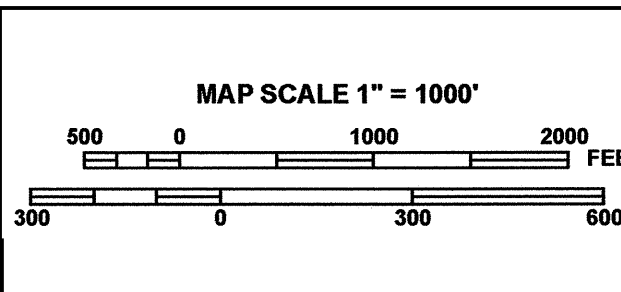
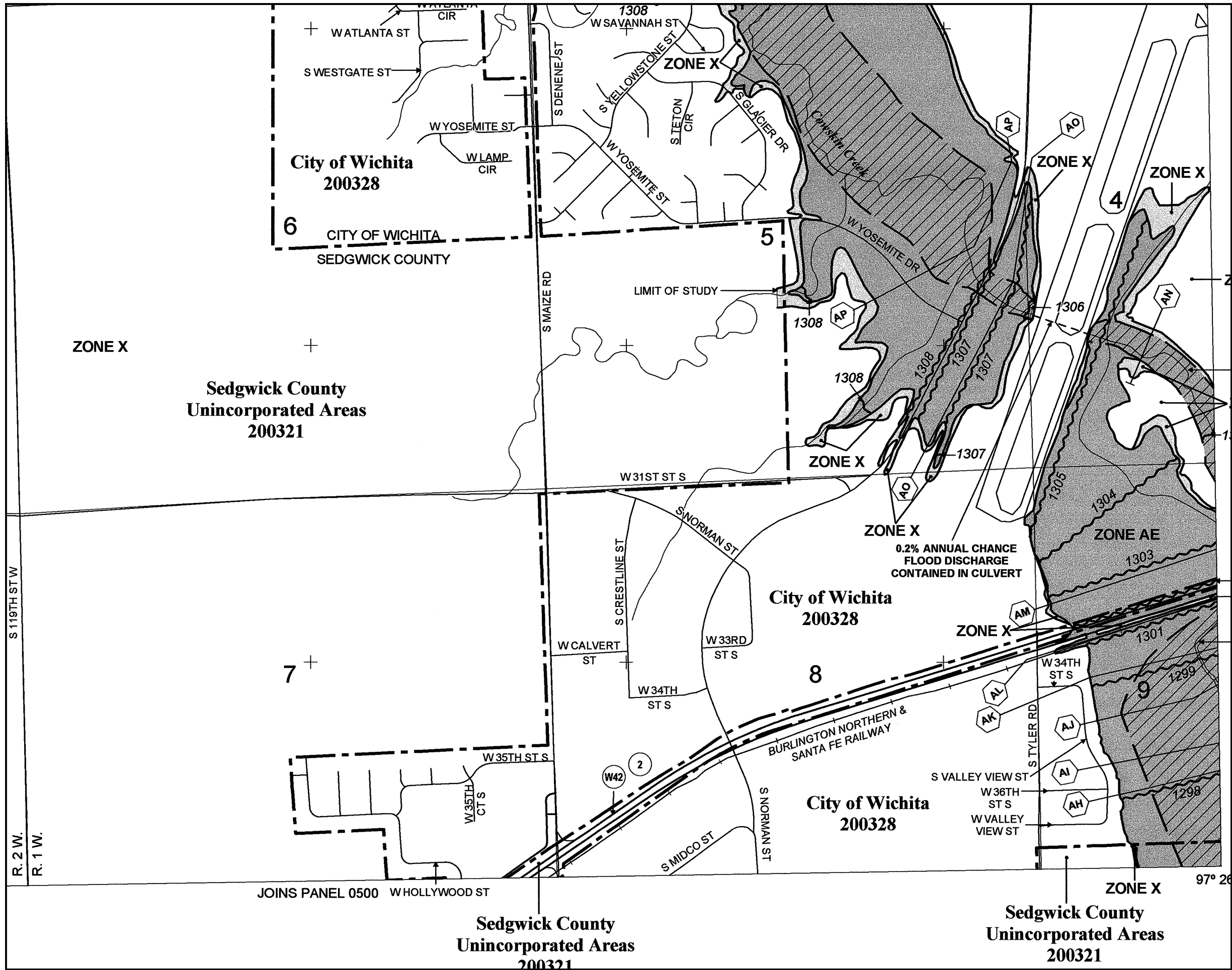
**Dugan Industrial 3rd Addition
 Drainage Plan
 Wichita, Kansas**

PROJECT NUMBER				
kemiller engineering	KEM NO. 12017	FILE drainage	DATE 03/2012	SHEET 1.0
	DESIGN GP	DRAWN GP	REVISED	

216 S. Market, Wichita, KS 67202 (316)264-0242

Tab 4:

FIRM Panel



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0340E

FIRM
FLOOD INSURANCE RATE MAP

**SEDGWICK COUNTY,
KANSAS
AND INCORPORATED AREAS**

PANEL 340 OF 700
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:


COMMUNITY	NUMBER	PANEL	SUFFIX
SEDGWICK COUNTY	200321	0340	E
WICHITA, CITY OF	200328	0340	E

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
20173C0340E

EFFECTIVE DATE
FEBRUARY 2, 2007

Federal Emergency Management Agency



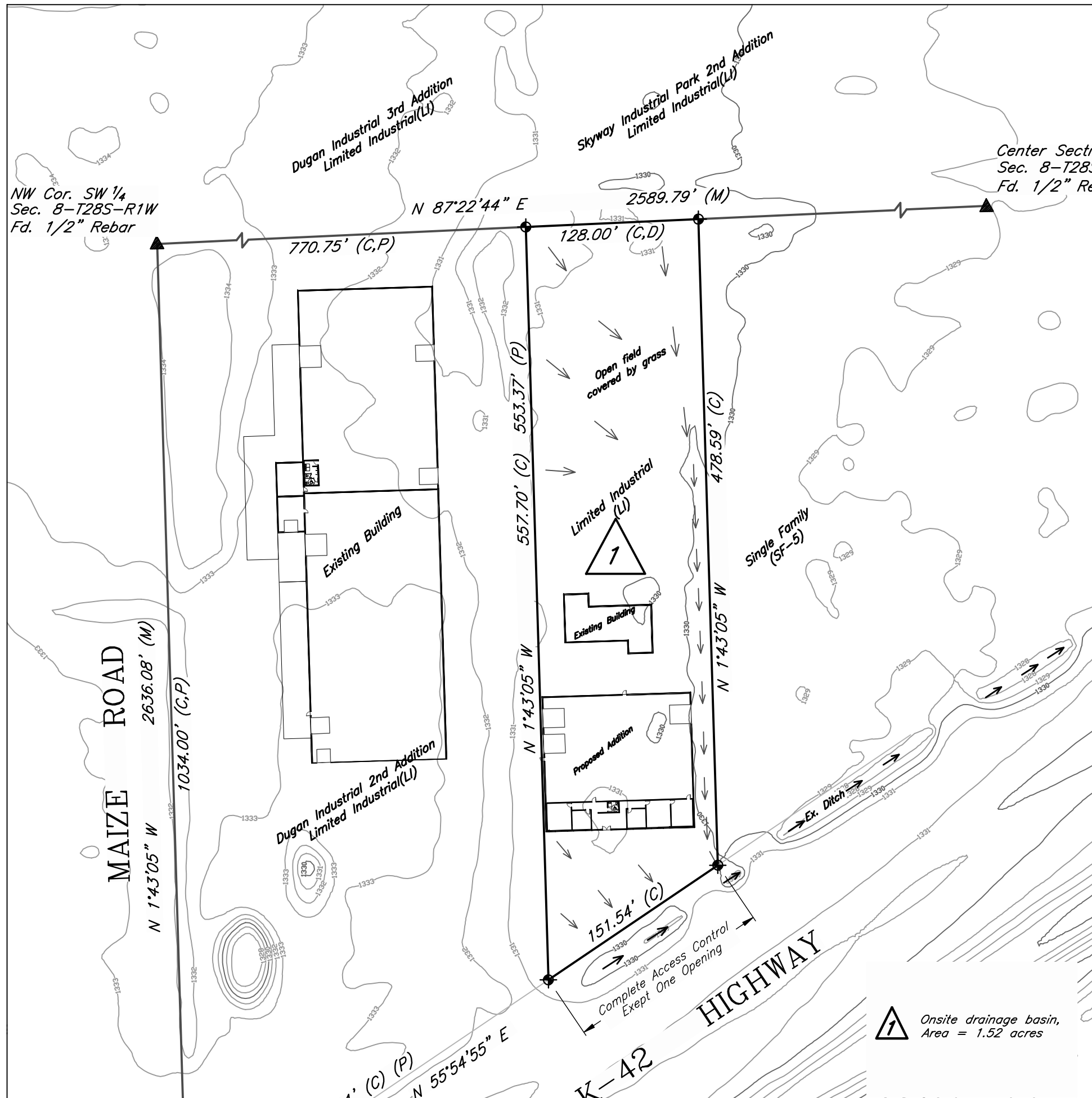
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Tab 5:

Not applicable

Tab 6:

Proposed Drainage Plan
Electronic copies of report



Project narrative:
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 Hydrological Soil Group = C

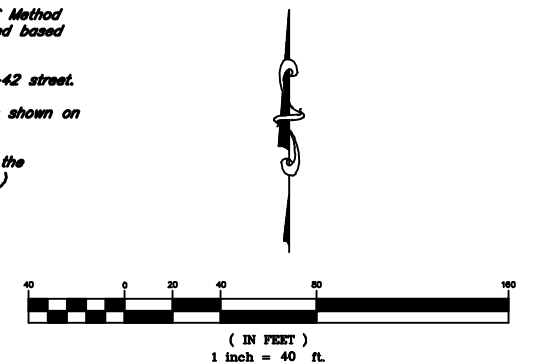
EXISTING SITE									
DRAINAGE AREA	ACRES	Tc min	CN	Q2	Q5	Q10	Q25	Q100	REMARKS
Proposed Site Area	1.52	43	84	2.10	3.21	3.89	4.81	6.40	Entire site in undeveloped condition

DEVELOPED CONDITION:
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DEVELOPED SITE									
DRAINAGE AREA	ACRES	Tc min	CN	Q2	Q5	Q10	Q25	Q100	REMARKS
Proposed Site Area	1.52	15	88	3.26	4.76	5.66	3.26	8.94	Fully developed commercial site

Engineer's Notes:

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**Dugan Industrial 3rd Addition
 Drainage Plan
 Wichita, Kansas**

PROJECT NUMBER				
kemiller engineering	KEM NO. 12017	FILE drainage	DATE 03/2012	SHEET 1.0
	DESIGN GP	DRAWN GP	REVISED	

216 S. Market, Wichita, KS 67202 (316)264-0242