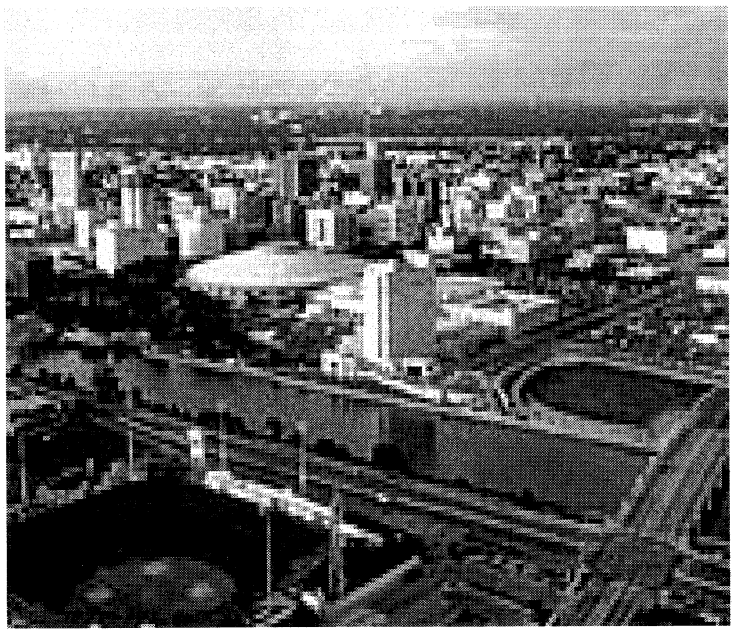
Drainage Report

Dugan Industrial 4th Addition

To Wichita, Sedgwick County, Kansas



March, 2012
Rev. June 2012

kemiller engineering

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

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Tab 1

Drainage Plan Submittal Checklist
Drainage Report
Preliminary Plat
Aerial Photograph/Location Map
USGS map with area highlighted
Proposed Drainage Plan

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 4th 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:	Guy 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.	Yes	Tab 6, Drainage Report.
1.2	Professional Engineer's seal, signature and date on plan cover.	Yes	Cover page of report.
1.3	Site location map, using color ortho-imagery and showing the project boundaries, a north arrow and an accurate scale.	Yes	Location map included in drainage plan.
1.4	Narrative of the development type, existing conditions and proposed impacts on stormwater runoff, wetlands, riparian zones and floodplains/floodways.	Yes	Described in drainage report. Existing Drainage map shows the site in existing condition.
1.5	Discussion of off-site conditions surrounding the proposed development.	Yes	Drainage report. Drainage map shows the existing off-site drainage condition.
1.6	Summary table of runoff calculations (pre/post development).	Yes	Existing and developed drainage plan.
1.7	Narrative description of the type and function of the permanent structural stormwater management facilities.	Yes	Drainage report/developed drainage plan.
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	Yes	Existing drainage plan. Topography in relation to NAVD 88 datum.
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.	Yes	Existing/proposed drainage plan. No perennial streams nearby site. Existing ditch or open channels are labeled in drainage plan.
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.	Yes	As labeled in drainage plan.
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.	No	No such feature.
2.1.5	Location, dimensions and elevations of existing bridges and culvert crossings.	No	Not applicable as there is no such feature around the site.
2.1.6	Location of existing utilities (e.g., water, sewer, gas, electric, cable, etc.) with labels and easement boundaries.	Yes	Existing drainage map/Preliminary plat.
2.1.7	Groundwater elevations, if applicable.	No	Not 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.	Yes	Drainage report/ drainage plan.
2.1.9	Land use types per NRCS nomenclature.	No	Not applicable as the land is already developed.
2.1.10	Footprint of existing impervious areas (labeled, area given in acres).	Yes	Drainage plan.
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).	Yes	Existing drainage map.
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.).	Yes	Existing drainage plan. Undeveloped Tc calculation is shown in existing drainage map with flow patterns as indicated by flow arrow.
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).	Yes	Existing drainage map.
2.2.2	A summary table of drainage subbasin hydrologic parameters (subbasin ID, area in acres, curve number, Tc, etc.).	Yes	Existing drainage map.
2.2.3	Table of existing condition runoff curve numbers with supporting data and calculations.	Yes	Existing drainage plan.
2.2.4	Table of existing condition times of concentration with supporting data and calculations.	Yes	Existing drainage plan.
2.2.5	A summary table of rainfall data used in the hydrologic analysis, and a reference for the source of the data.	Yes	Existing drainage plan.
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.	No	Not applicable. No such feature.
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.	Yes	Hydrologic analysis for existing condition is included in existing drainage map. Supporting data, assumed conditions and calculations can be found in drainage plan.
3.0	**postdevelopment Conditions Information**		
3.1	**postdevelopment Conditions Drainage Map**		
3.1.1	Proposed project boundary.	Yes	As shown in proposed drainage plan.
3.1.2	on-site and off-site topography: NAVD 88 datum, one-foot contours with spot elevations.	Yes	Included in proposed drainage plan.
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.	Yes	As shown in developed drainage plan.
3.1.4	Location and description of off-site through-drainage conveyances which are confined to an easement, dedication and/or reserve.	No	Not applicable. No off-site runoff drains to the site.
3.1.5	Footprint of proposed impervious areas, including roads, parking lots, buildings and other structures.	Yes	A rough estimate of impervious area can be found in proposed drainage plan.
3.1.6	Location of proposed utilities (e.g., water, sewer, gas, electric, cable, etc.) with labels and easement boundaries.	Yes	As shown in proposed drainage plan.
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.	Yes	HSG for surface soil based on City of Wichita soil group map is included in proposed drainage plan.
3.1.8	Land use cover per NRCS nomenclature.	No	Not applicable as the land is already developed.
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).	Yes	Developed drainage plan.
3.1.10	Proposed limits of land disturbing activity (i.e., grading limits).	Yes	Developed drainage plan.
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.).	Yes	Developed drainage plan. Proposed Tc calculation is shown in proposed drainage plan with flow paths as indicated by flow arrows.
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.	Yes	Developed drainage plan.
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.	Yes	Developed drainage plan.
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.	No	Not applicable as the site is less than 40 acre.
3.2.4	Location(s) of stormwater management facilities and any associated drainage easements.	No	Not applicable.
3.2.5	Proposed energy dissipaters and other channel protection devices.	No	Not applicable as no channel protection needed.
3.2.6	Location(s) and dimension(s) of proposed channel, bridge and culvert crossings.	Yes	Typical section is shown in drainage plan.
3.2.7	Normal pool and 100-year pool elevations for ponds and lakes.	No	N/A. No pond is proposed.
3.2.8	Permanent concrete outfall control structure(s) for ponds.	No	N/A. No outfall.
3.2.9	Emergency overflow spillways and top of berm elevations for ponds and other volume/peak discharge control facilities.	No	N/A. Channels and culverts to convey peak runoff.
3.2.10	Floodplains, ponds, and stormwater management facilities located in reserves.	No	N/A. No Pond and floodplain.
3.3	**postdevelopment Conditions Hydrology & Hydraulics**		
3.3.1	Narrative of the hydrologic analysis methodology used (e.g., unit hydrograph or other approved methods).	Yes	Developed drainage plan/Report.

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.).	Yes	Included in drainage plan.
3.3.3	Table of postdevelopment condition runoff curve numbers with supporting data and calculations.	Yes	Included in drainage plan.
3.3.4	Table of postdevelopment condition times of concentration with supporting data and calculations.	Yes	Included in drainage plan.
3.3.5	Cross-sections and other diagrams of existing open channels, bridge and culvert sections and other hydraulic features as	Yes	Included in drainage plan
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.	Yes	Included in drainage plan.
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.	Yes	Included in drainage plan and report.
3.3.8	Stage-storage-discharge or other outlet rating curves and inflow/outflow hydrographs for all ponds.	No	N/A. No detention.
3.3.9	Demonstrate that the pond contours on the master grading plan and the stage-storage-discharge data are consistent for all ponds.	No	N/A. No on-site detention.
3.3.10	Demonstrate that all ponds have one foot of freeboard above the 100-year, 24-hour high water level.	No	N/A. No pond.
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.	Yes	Drainage plan.
3.4	**Stormwater Quantity Control Sizing**		
3.4.1	Hydraulic sizing calculations for all stormwater management controls.	Yes	Drainage plan.
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.	Yes	Drainage plan.
3.4.3	Typical details (including cross-sections where applicable) for outlet structures, embankments, spillways, grade control structures, conveyance channels, etc.	Yes	Drainage plan.
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.	Yes	Drainage plan.
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.).	Yes	Drainage plan.
3.5.3	Water quality volume (total and by facility), with supporting data and calculations.	Yes	Drainage plan.
3.5.4	% TSS removal value (total and by facility) with supporting data and calculation. Must be equal to or greater than 80%.	Yes	Drainage plan.
3.5.5	Channel protection volume with supporting data and calculations.	No	Not applicable as the site is less than 5.0 acres.
3.5.6	Water quality volume and channel protection volume orifice size calculations.	No	N/A. No extended detention of CPv and WQv.
3.5.7	Other calculations required for each stormwater management facility as specified in the Wichita/Sedgwick County Stormwater Manual.	No	Not applicable.
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.	No	Not applicable.
4.0	**Floodplains**		
4.1	Reference the source of flood profile, floodplain, floodway and stream discharge information.	Yes	Site is not in floodplain and the FIRM Panel # is referenced in drainage plan.
4.2	Delineation of nearest base flood elevations.	No	Not applicable for this site.
4.3	Delineation of predevelopment regulatory floodplain/floodway limits using FEMA's current GIS database; limits to be per elevation and scaled location.	No	Not applicable for this site.
4.4	Delineation of postdevelopment regulatory floodplain/floodway limits; limits to be per elevation and scaled location, with project limits shown.	No	Not applicable for this site.
4.5	Floodway data table and discharges.	No	Not applicable for this site.
4.6	Hydrologic and hydraulic study information for local floodplain analysis, unnumbered Zone A elevation determinations and floodplain map revisions or required permits.	No	Not applicable for this site.
4.7	Regulatory floodway and four natural profile models (10, 50, 100 and 500-year) for existing and postdevelopment conditions.	No	Not applicable for this site.
4.8	Floodplains and floodways located within a reserve, where necessary.	No	Not applicable for this site.
4.9	Floodplain cut and fill calculations for volume sensitive basins.	No	Not applicable for this site.

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").	No	Not applicable for this site.
5.0	**Federal, State and Local Permits**		
5.1	US Army Corps of Engineers regulatory program permits (Section 404 permit)	No	Not applicable for this site.
5.2	Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Floodplain Fill, Levee, Water Appropriations, Dam Safety permit, etc.).	No	Not applicable for this site.
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.	No	Not applicable for this site.
6.0	**Half Scale Preliminary Master Grading Plan**		
6.1	One set of plans and associated PDF of plans.	No	Grading will follow the proposed drainage plan.
6.2	Professional Engineer's seal, signature and date.	Yes	Cover page of the report.
6.3	Title block including subdivision name and phase and dated revision documentation.	Yes	Drainage plan/Preliminary plat.
6.4	Future phases shown but cross-hatched as information only.	No	Not applicable for this site.
6.5	Scale, not greater than 1-inch = 60 feet.	Yes	Drainage plans.
6.6	North arrow.	Yes	Drainage plans.
6.7	Index or legend key.	Yes	Preliminary plat.
6.8	Benchmarks (minimum of 2) used for site control (NAVD 88 vertical datum).	Yes	Drainage pan/Preliminary plat.
6.9	Existing contours of entire site with contour interval of one foot.	Yes	Drainage Plan/Preliminary plat.
6.10	Proposed contours for channels, ponds, and other permanent stormwater management facilities, with contour interval of one foot.	No	N/A. No ponds.
6.11	Spot elevations shown to the nearest tenth of a foot for critical locations, including lot and property boundaries.	Yes	Drainage plan.
6.12	Proposed lot and street layout.	Yes	Drainage Plan/Preliminary plat.
6.13	Locations of underground storm drains.	No	N/A.
6.14	Overflow locations for storms exceeding storm drain capacity, with elevations.	Yes	Indicated by flow arrows.
6.15	Top elevations of storm drains at all inlets, manholes, and flow line elevations for all outfalls.	Yes	N/A. No such feature.
6.16	Locations of open ditches and lakes.	Yes	Drainage Plan.
6.17	Flow direction arrows.	Yes	Drainage Plan.
6.18	Proposed flow line elevations of all open ditches at maximum 100 foot intervals, and 100-year flood elevations thereon.	Yes	Drainage plan.
6.19	Ponds: Location, bottom elevation, normal pool elevation, 100-year flood elevation, emergency overflow elevation.	Yes	Drainage Plan.
6.20	Proposed top-of-curb elevations at points where drainage will be required to flow over the curb.	No	Not applicable for this site.
6.21	Platted minimum building opening elevation for each lot, in table form for all lots (excluding basement floor elevations).	No	Not applicable for this site.
6.22	Standard foundation and elevation detail for slab on grade, full basement, view-out, partial view-out and/or walk-out construction.	No	Not applicable for this site.
6.23	Top of foundation elevation for each lot.	No	Not applicable for this site.
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.	No	Not applicable for this site.
6.25	Indicate that all lots are above the 100-year flood elevation.	No	Not applicable for this site.
6.26	Indicate that grading around structures conforms to perimeter drainage requirements.	Yes	Flow arrows in drainage plan.
6.27	Indicate that backyard drainage grading conforms to backyard drainage requirements.	Yes	Flow arrows in drainage plan.
6.28	Adjacent subdivision lot lines, with lot labels and subdivision names.	Yes	Preliminary plat. Developed drainage plan.
6.29	Boundaries and labels for all easements, rights-of-way and reserves.	Yes	Preliminary/final plat.
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.*"	Yes	Included in final plat.
End of Checklist			

Drainage Report
Dugan Industrial 4th 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 unplated and has buildings in it. The propose 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 building and a parking lot in it. Rest of the site is covered by grass and drains towards southeast. The overall pattern indicates that the drainage to the north ditch of K-42. The soils are of Type C, with an average slope less than 1 %. The open channel along the K-42 drains northeast along K-42. There are existing culverts in the drives along the channel. There is developed limited commercial area on the west; developed limited commercial 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 to the open channel along the K-42. There are existing culverts in the access drives from the K-42 to the residential lots on the north. All of the drives has 24" CMP culverts to convey the runoff.

According to the 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 the 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 an industrial area which will include addition of a building and parking. No flood detention would be expected as the site is very flat and not enough grades to drain the detention basin. Instead an improvement in the downstream conveyance system will be done to handle the increased 100 yr peak.

This includes addition of culverts in the residential drives downstream of site. A proprietary treatment unit (HG-5) is proposed for the water quality. About 0.88 acres northwest offsite area drains through the property. The proposed concrete bottom channel is designed to carry the developed 100 yr peak flow. A downstream improvement includes addition of 24" CMP culvert to the existing in each of the first three drives west from Tyler and one 18" at drive just east of the property.

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

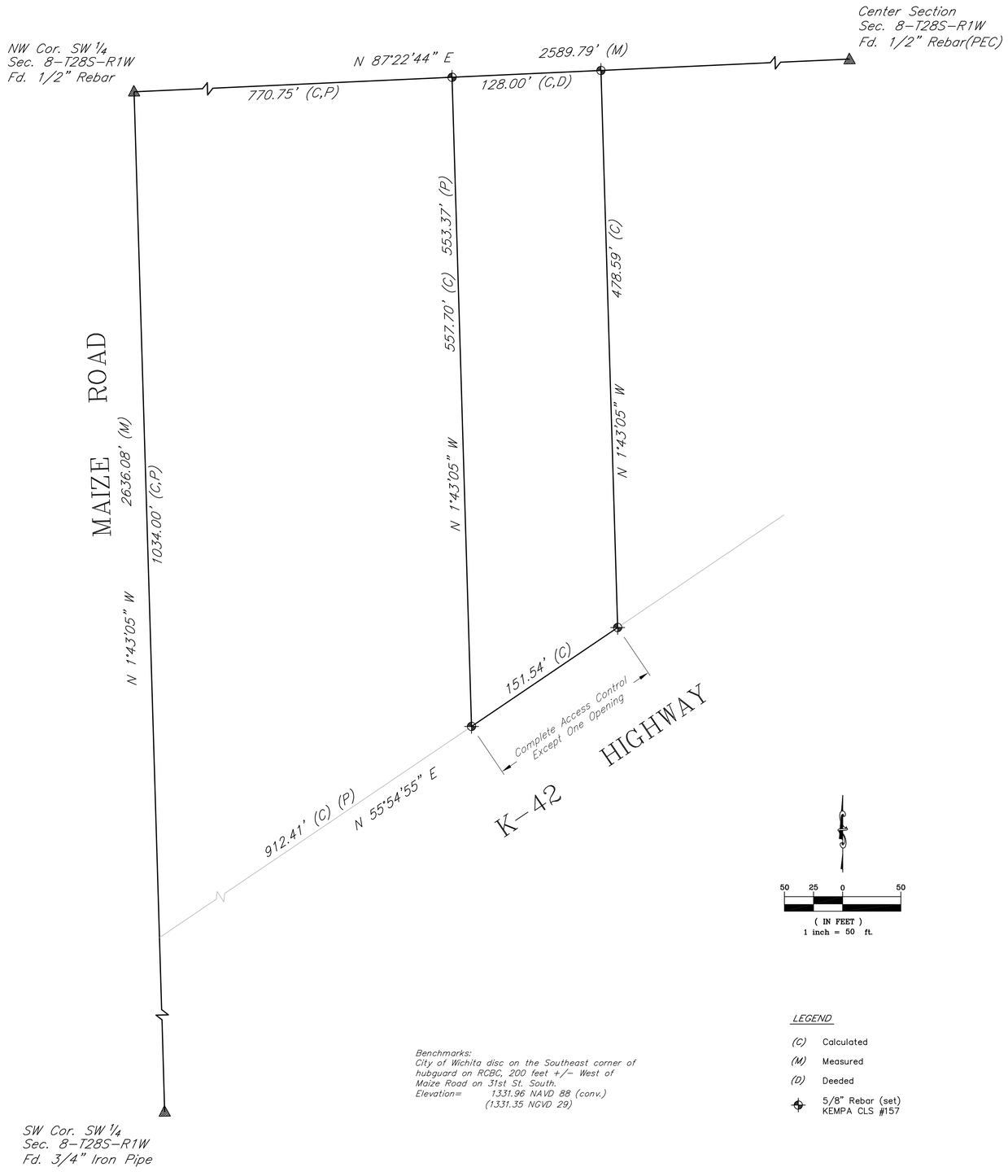
Existing and proposed site runoff calculations have been modeled using the Curve Number (CN) method. The Values for Curve Number (CN) and Rainfall Intensity were established using the *City of Wichita/Sedgwick County Stormwater Manual.* Existing times of concentration were calculated from existing ground 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. Rational method is used to calculated the peak runoff as no detention involved in this site.

Hydraulic Model

An Analysis of hydraulic characteristics for channel and culverts is conducted and the results are attached in hydrological section. Fully developed 0.88 acres of offsite commercial area was also considered while sizing the downstream conveyance system.

Future Development

There will be addition of a building and parking at this time.



Dugan Industrial Fourth 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

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:

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.

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

_____
Bradley C. Ward, L.S. #920

State of Kansas)
County of Sedgwick) SS

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 Fourth 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.

By: _____
John E. Dugan, Owner Date

State of Kansas)
County of Sedgwick) SS

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

_____
Notary Public

My Commission Expires: _____

State of Kansas)
City of Wichita) SS

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

_____
Shawn Farney, Chair

_____
John L. Schlegel, Secretary

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.

_____
Kelly B. Arnold, County Clerk

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

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

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

Benchmarks:
City of Wichita disc on the Southeast corner of hubguard on RCBC, 200 feet +/- West of Maize Road on 31st St. South.
Elevation= 1331.96 NAVD 88 (conv.)
(1331.35 NGVD 29)

LEGEND

(C) Calculated
(M) Measured
(D) Deeded
5/8" Rebar (set) KEMPA CLS #157

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

KEM No: 12017 Date: 4/17/12

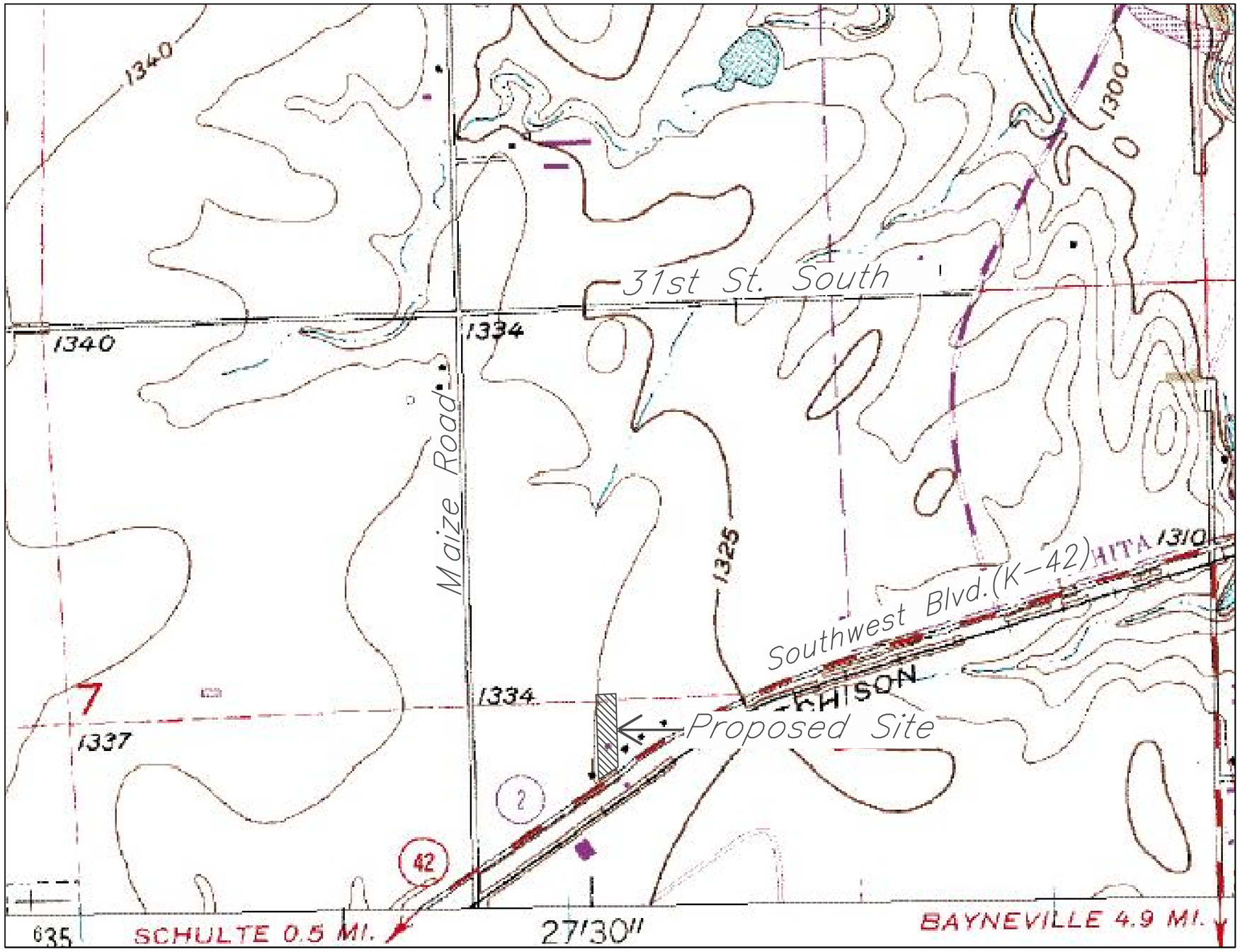
Dugan Industrial 3rd Addition

Location Map

Wichita, Kansas

kemiller engineering
816 S. Market, Wichita, KS 67202 (316)264-0042

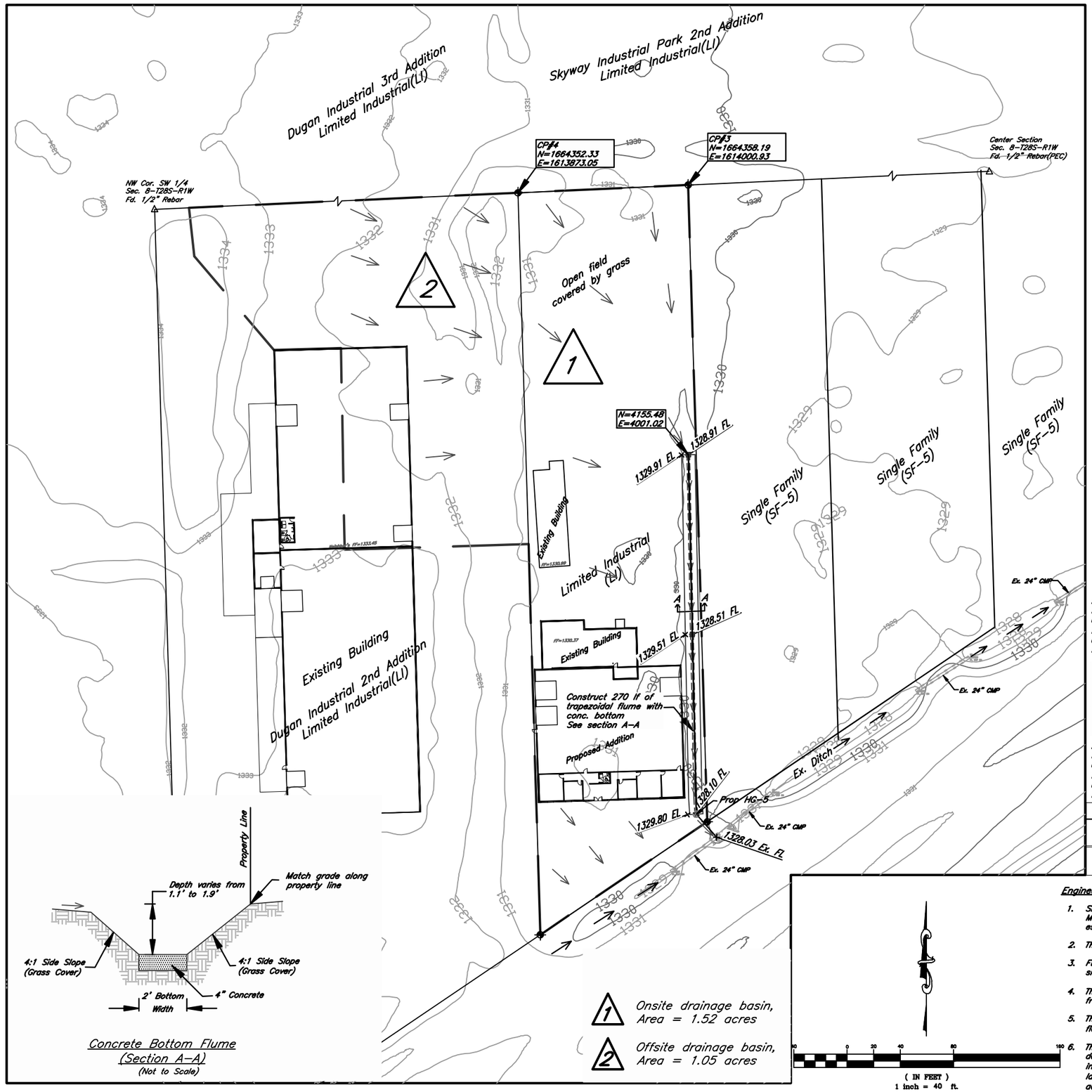
PROJECT NUMBER			
KEM NO. 12017	FILE location	DATE 03/2012	SHEET 1.0
DESIGN GP	DRAWN GP	REVISED	



Dugan Industrial 3rd Addition
USGS Map
Wichita, Kansas

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

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



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Water Quality and TSS Removal

Water Quality Volume (WQv)						
Calculation for water quality volume (WQv=P*Rv*A/12)				Soil Group 'C'		
85th percentile storm event (1.2 inches),P =	1.2	inches		Calulation of Rv		
Total area, A =	2.27	acres			Coeff.	Area
Rainfall Coeff, Rv, =	0.731	cf		Coeff for undisturbed area, R_{VU}=	0.04	0.00
Required Vol. for Water Quality =	**0.17**	ac-ft		Coeff for turf cover,disturbed, R_{VT}=	0.22	0.68
				Coeff for impervious area, R_{VI}=	0.95	1.59
				Weighted, Rv =	**0.731**	

Water quality volume is treated in Proprietary system (HG-5, as designed by Hydroworks). The HG-5 has capacity to treat water quality flow of 2.61 cfs and bypass the higher flow. The proposed HG-5 with 2.30 cfs of treatment flow will meet the 80% of TSS load removal, considering the particle size removal as 200 micron.
Sizing of Hydroguard treatment unit:
*Critical Peclet # =0.0033*200+0.0045= 0.6645*
Treatment flow based on critical Peclet # for 5' diameter unit
*Q=Vs*h*d/Peclet #*
*Treatment Q =(0.0631*5.5*5)/0.6645=2.61 cfs*

Water Quality Peak Flow Calculation		
Area=	2.27	acres
WQv=	0.877	inches
Pond and Swamp Factor, Fp=	1.000	
Calculated CN=	96.79	
S=	0.332	inches
Ia=	0.066	inches
Ia/P=	0.055	
qu	740.0	cfs/sq.mi/in
Water quality peak flow	**2.30**	**cfs**

Channel Protection

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

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

No flood detention for this site is considered as the area is so flat and barely any grade exist to drain a detention basin. Instead a downstream improvement to convey the increased peak is considered. Downstream improvement consist of adding 24" CMPs in each of the three eastmost residential drives from K-42 and 1 18" CMp to one drive east of the property. Peak discharge from the west 1.05 acres offsite is allowed to convey through the site. A 2 ft concrete bottom channel will convey the runoff from the site to the K-42 ditch. Typical Section and grades for the channel is as shown in the plan.

EXISTING CONDITION:
Total Site Area, A1 = 1.52 acres,
Offsite Area, A2 = 1.05 acres
Total Impervious. Area (Offsite+Onsite)=2.57 acres,
Grass Area= 0.77 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, A1 = 1.52 acres,
Offsite Area, A2 = 1.05 acres
Total Impervious. Area (Offsite+Onsite)=1.80 acres,
Grass Area= 0.77 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 commerical 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.*
3. *Future grading plan shall follow the drainage pattern as shown on plan.*
4. *The trapezoidal 2' bottom width is to carry the 100-yr flow from fully developed site.*
5. *There is no sign of wetland and the property is not in the floodplain. (FIRM Panel 20173C0340E, February, 2 2007.)*
6. *The drainage plan is developed based on light industrial development with 70% of impervious surface. Downstream improvement include addition of 24" CMP culvert on each of last three residential drive on east from K-42 (first three access drives east of Tyler from K-42).*

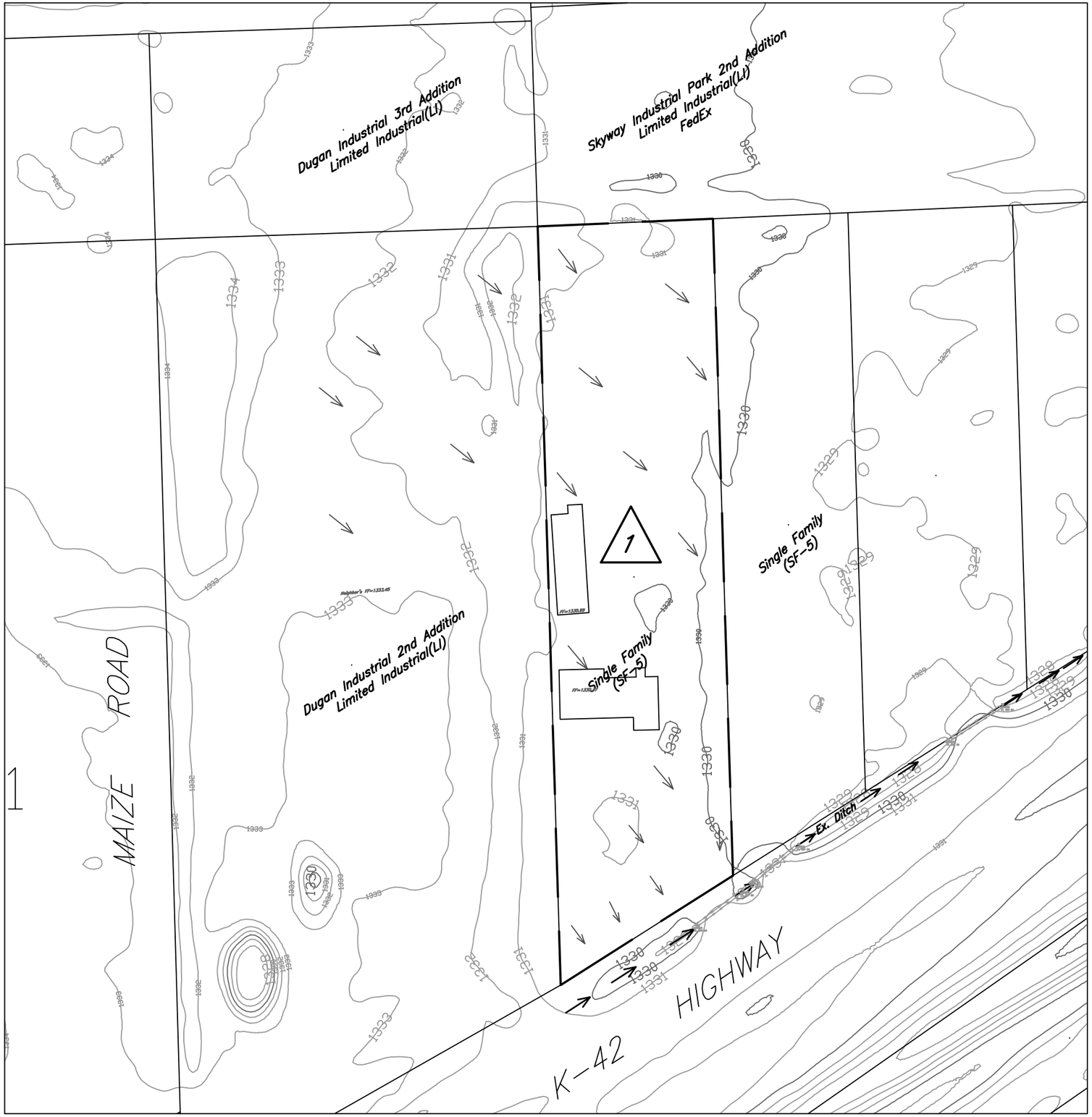
Dugan Industrial 4th Addition
Drainage Plan
Wichita, Kansas

kemiller engineering
816 S. Market, Wichita, KS 67202 (316)264-0242

PROJECT NUMBER			
KEM NO. 12017	FILE drainage	DATE 03/2012	SHEET 1.0
DESIGN GP	DRAWN GP	REVISED 04/11/2012	

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) 2-yr	5-yr	10-yr	25-yr	100-yr	Curve Number (CN)	Existing Q, cfs Q2	Q5	Q10	Q25	Q100	Remark
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

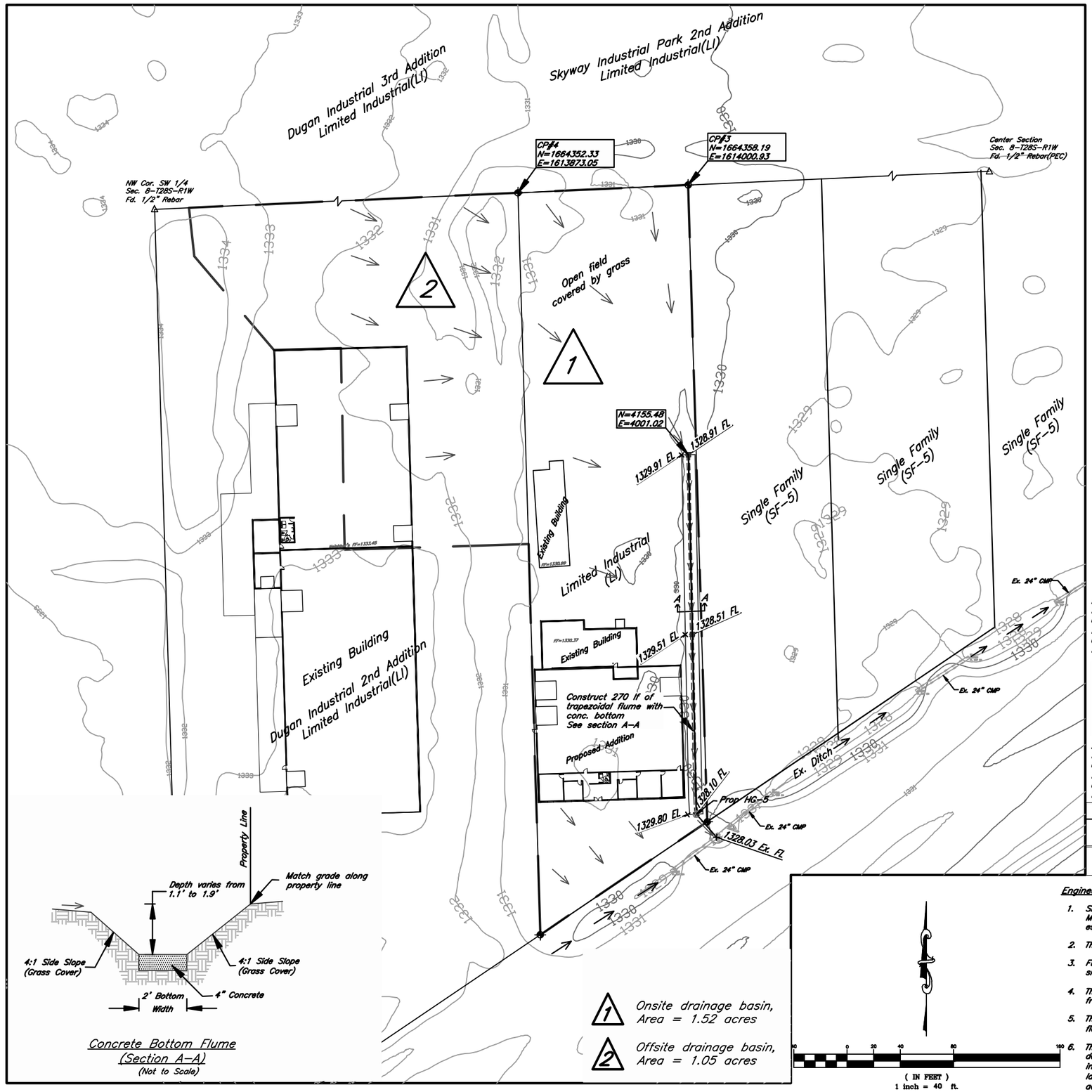
kemiller engineering
816 S. Market, Wichita, KS 67202 (316)264-0242

PROJECT NUMBER

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

Tab 3:

Proposed Drainage Plan
Offsite Drainage Improvement



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Water Quality and TSS Removal

Water Quality Volume (WQv)						
Calculation for water quality volume (WQv=P*Rv*A/12)				Soil Group 'C'		
85th percentile storm event (1.2 inches),P =	1.2	inches		Calulation of Rv		
Total area, A =	2.27	acres			Coeff.	Area
Rainfall Coeff, Rv, =	0.731	cf		Coeff for undisturbed area, R_{VU}=	0.04	0.00
Required Vol. for Water Quality =	**0.17**	ac-ft		Coeff for turf cover,disturbed, R_{VT}=	0.22	0.68
				Coeff for impervious area, R_{VI}=	0.95	1.59
				Weighted, Rv =	**0.731**	

Water quality volume is treated in Proprietary system (HG-5, as designed by Hydroworks). The HG-5 has capacity to treat water quality flow of 2.61 cfs and bypass the higher flow. The proposed HG-5 with 2.30 cfs of treatment flow will meet the 80% of TSS load removal, considering the particle size removal as 200 micron.
Sizing of Hydroguard treatment unit:
*Critical Peclet # =0.0033*200+0.0045= 0.6645*
Treatment flow based on critical Peclet # for 5' diameter unit
*Q=Vs*h*d/Peclet #*
*Treatment Q =(0.0631*5.5*5)/0.6645=2.61 cfs*

Water Quality Peak Flow Calculation		
Area=	2.27	acres
WQv=	0.877	inches
Pond and Swamp Factor, Fp=	1.000	
Calculated CN=	96.79	
S=	0.332	inches
Ia=	0.066	inches
Ia/P=	0.055	
qu	740.0	cfs/sq.mi/in
Water quality peak flow	**2.30**	**cfs**

Channel Protection

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

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

No flood detention for this site is considered as the area is so flat and barely any grade exist to drain a detention basin. Instead a downstream improvement to convey the increased peak is considered. Downstream improvement consist of adding 24" CMPs in each of the three eastmost residential drives from K-42 and 1 18" CMp to one drive east of the property. Peak discharge from the west 1.05 acres offsite is allowed to convey through the site. A 2 ft concrete bottom channel will convey the runoff from the site to the K-42 ditch. Typical Section and grades for the channel is as shown in the plan.

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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 commerical 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.*
3. *Future grading plan shall follow the drainage pattern as shown on plan.*
4. *The trapezoidal 2' bottom width is to carry the 100-yr flow from fully developed site.*
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Dugan Industrial 4th Addition
Drainage Plan
Wichita, Kansas

kemiller engineering
816 S. Market, Wichita, KS 67202 (316)264-0242

PROJECT NUMBER			
KEM NO. 12017	FILE drainage	DATE 03/2012	SHEET 1.0
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Note:

Offsite drainage improvement includes addition of CMP Culverts (as shown in plan) in the four residential drive to convey the 100–yr runoff.

Dugan Industrial 3rd Addition
Limited Industrial(LI)

Skyway Industrial Park 2nd Addition
Limited Industrial(LI)

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

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

Open field
covered by grass

1

1329.91 FL.

1328.91 FL.

Existing Building
FF=1333.48

Existing Building
FF=1330.88

Single Family
(SF–5)

Limited Industrial
(LI)

Existing Building
FF=1330.37

1329.51 EL.

1328.51 FL.

Existing Building

Dugan Industrial 2nd Addition
Limited Industrial(LI)

Construct 270 lf of
trapezoidal flume with
conc. bottom
See section A–A

Proposed Addition

1329.80 EL.

1328.10 FL.

1328.03 Ex. FL.

Ex. Ditch

Ex. 24" CMP

Ex. 24" CMP

Prop. 24" CMP

Ex. 24" CMP

Prop. 24" CMP

Ex. 24" CMP

Prop. 24" CMP

Ex. 24" CMP

Prop. 18" CMP

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

Dugan Industrial 4th Addition

Offsite Improvement Plan

Wichita, Kansas

kemiller engineering
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PROJECT NUMBER			
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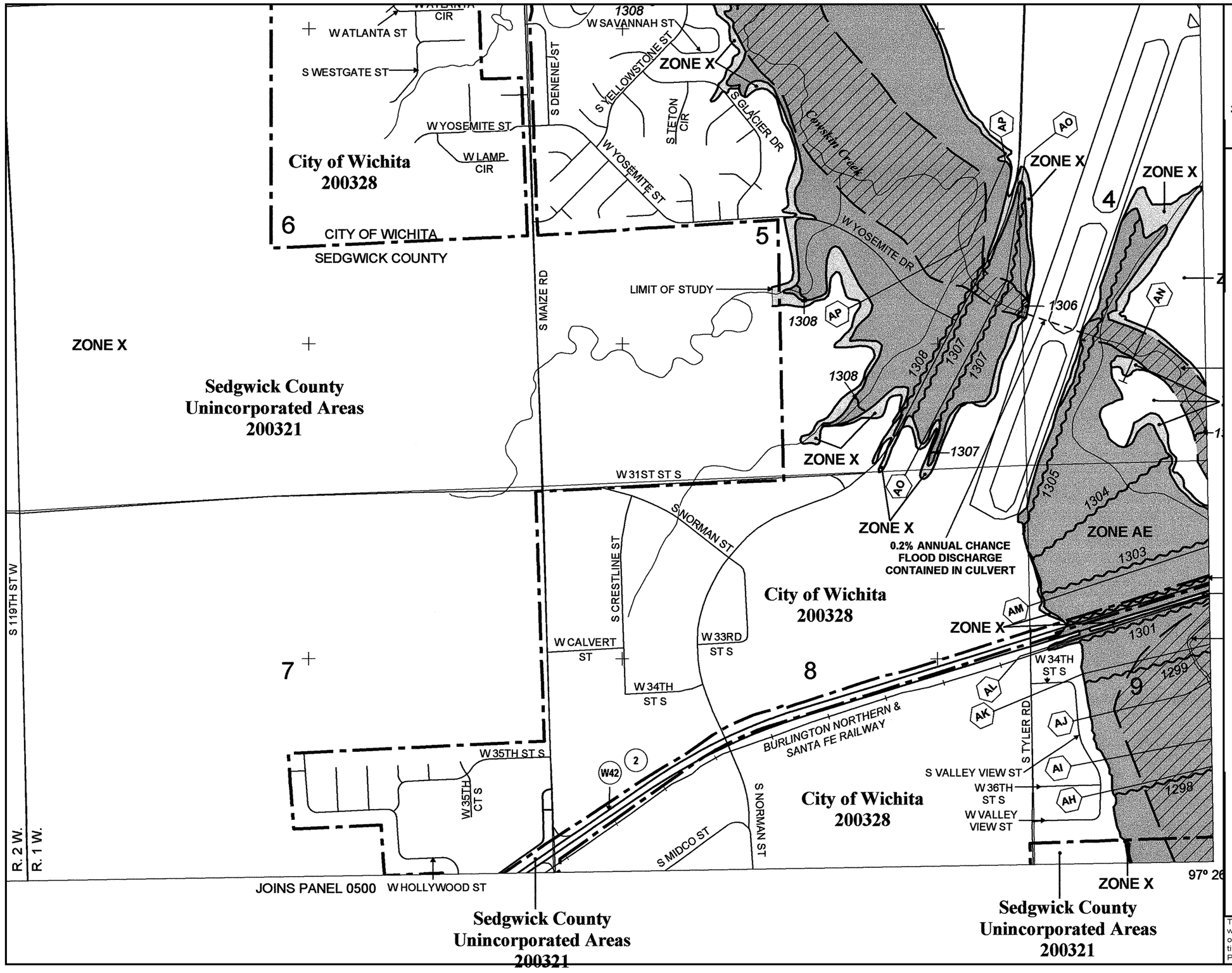
Tab 4:

FIRM Panel



NFIP 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

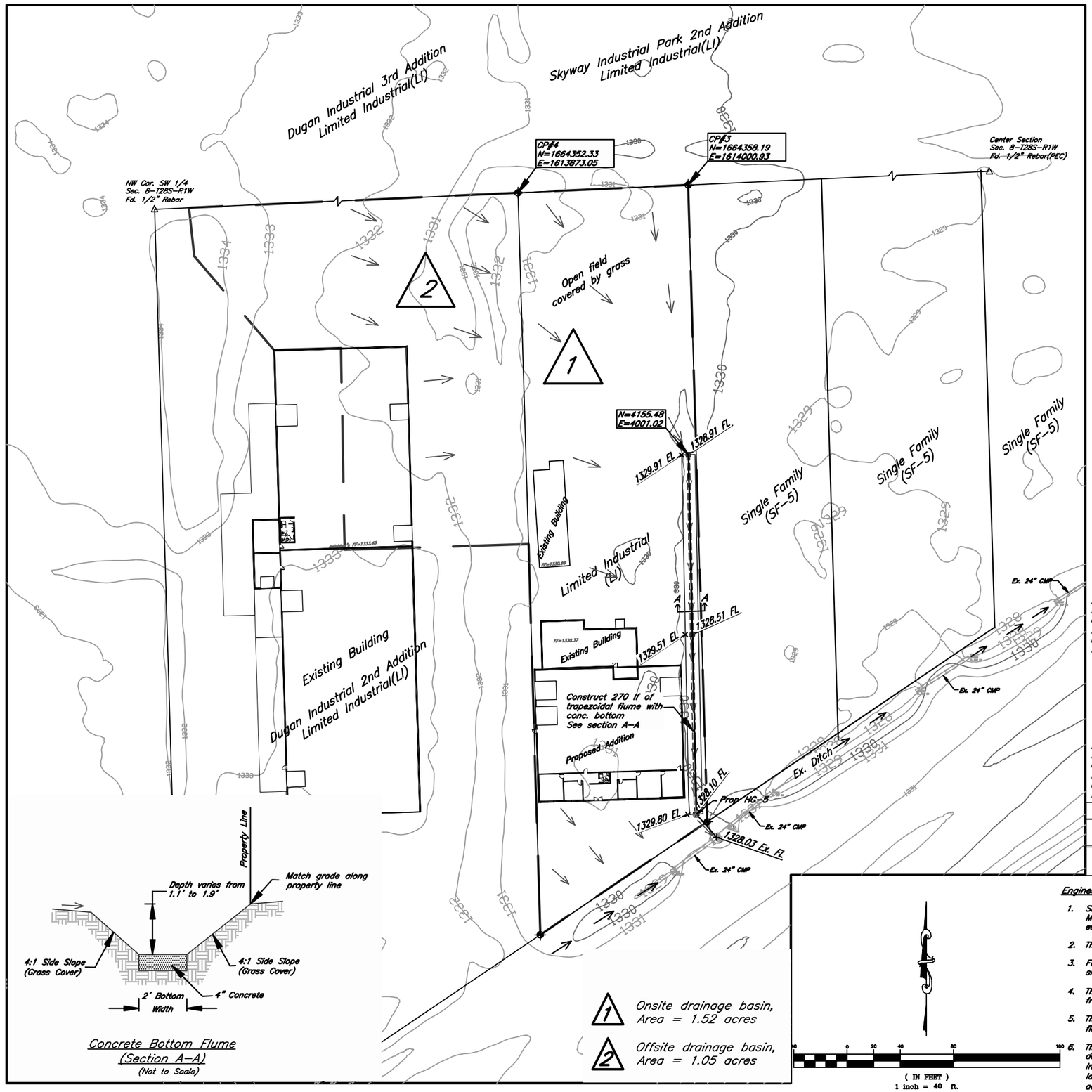
EFFECTIVE DATE
FEBRUARY 2, 2007
Federal Emergency Management Agency

Tab 5:

Not applicable

Tab 6:

Proposed Drainage Plan
Electronic copies of report



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