# BOARD OF COUNTY COMMISSIONERS OF DOUGLAS COUNTY, KANSAS

**WEDNESDAY, NOVEMBER 28, 2012**
**4:00 p.m.**
-Consider approval of the minutes for October 10, October 17 and October 24, 2012

**CONSENT AGENDA**

(1) (a) Consider approval of Commission Orders;
(b) Consider acquisition of permanent easements for culvert replacement 7.51N-18.00E (Michael Kelly)
(c) Consider acquisition of permanent easement for project No. 56-23KA-2294-01 (US 56 Hwy Bullpup Drive through E1600 Road)(Michael Kelly)
(d) Consider approval of Cereal Malt Beverage License for Clinton Marina, 1329 E 800 Rd (Clerk's Office );
(e) Consider approval of Cereal Malt Beverage License for Clinton Submarina,1329 E 800 Rd (Clerk's Office);
(f) Consider approval of Cereal Malt Beverage License for Flamingo Enterprises, 1626 E 1500 Rd (Clerk's Office);
(g) Consider approving an amendment to lease agreement between the County and United Way of Douglas County for the use of the Valleyyiew facility (Sarah Plinsky);
(h) Consider approval of 2013 Douglas County holiday schedule (Sarah Plinsky); and
(i) Consider authorizing staff to enter into an agreement allowing Douglas County Emergency Communications and its agents and contracts to access proposed radio tower site location for site survey and required testing (Scott Ruf)

**REGULAR AGENDA**

(2) Consider approval of contract extension for Douglas County Cultural and Historic Resources Survey (Jackie Waggoner/Jeanette Blackmar)

(3) Consider approval of "Douglas County Kansas Heritage Conservation Plan" to be submitted to the Kansas State Historical Society for designation of Douglas County as a Certified Local Government (John Bradley)

(4) Consider recommendation of contract for architectural services for the new Public Works facility (Jackie Waggoner)

(5) Consider approval of amendment to Resolution HR-12-9-3 pertaining to the adoption of the 2012 International codes, correcting and clarifying additional points identified by staff and the County Counselor in Chapter 13. (Linda Finger/Kay Pettit)

(6) Consider approval of a resolution to dissolve the existing Codes Board of Appeals and create a new Codes Board of Appeals consistent with 2012 I-Code requirements (Linda Finger/Kay Pettit)

(7) Receive Long Range Planning 2013 Work Program. Scott McCullough will present the item. (Scott McCullough)

(8) Other Business
(a) Consider approval of Accounts Payable (if necessary)
(b) Appointments
**-Bicycle Advisory Committee 12/2012 (eligible for reappointment)**
**-Douglas County Fair Board**-Lecompton, Kanwaka and Willow Springs,
**-Jayhawk Area Agency on Aging – 09/12**
**-Lawrence/Douglas County Advocacy Council on Aging 10/2012 (replacement)**
**-(5 positions) Codes Board of Appeals-12/31/12**
**-(6 positions) Douglas County Senior Services Board**
(c) Public Comment
(d) Miscellaneous

**RECESS**

**RECONVENE**
**6:35 p.m.**

(9) Consider approval of Temporary Set Aside Agreement for property being platted as Sadies Lake Addition (PF-1-1-12). Sadies Lake LC is property owner of record. Mary Miller is the Planner.

(10) **CUP-12-00154**: Consider a Conditional Use Permit for Kanwaka Corner Self Storage, on approximately 3 acres located at the SE corner of U.S. Hwy 40 & Douglas Co Road 442/N 1600 Road. Submitted by Landplan Engineering, for Ryan Sparke, property owner of record.(Mary Miller will present the item.)

(11) **CUP-12-00099**: Consider a Conditional Use Permit for sand excavation and extraction for Penny Sand Pit, approximately 434 acres located on the NE Corner of N 1500 Road & E 1850 Road. Submitted by Landplan Engineering, for William Penny & Van LLC, property owners of record. (Mary Miller will present the item.)

(12) Adjourn

**WEDNESDAY, DECEMBER 5, 2012**
4:00 p.m.
-Consider approval of Temporary Set Aside Agreement for property being divided through a Cluster Development in the Urban Growth Area (CSU-12-00143) for property located south of 977 E 1000 Road. John E. Bowman and Ruth M. Bowman are property owners of record. Mary Miller will present the item.

6:35 p.m.
-Consider a Text Amendment, **TA-8-11-11**, to the Douglas County Zoning Regulations for the Unincorporated Territory of Douglas County to establish *Agritourism* as a use in the County A (Agriculture) District. Mary Miller will present the item.

-Consider a Text Amendment, **TA-8-10-11**, to the Douglas County Zoning Regulations for the Unincorporated Territory of Douglas County to establish a Special Event Permit and develop application process and standards. Mary Miller will present the item.

**WEDNESDAY, DECEMBER 12, 2012**

**WEDNESDAY, DECEMBER 19, 2012**

**WEDNESDAY, DECEMBER 26, 2012 -Cancelled**

**WEDNESDAY, JANUARY 2, 2013**

**WEDNESDAY, JANUARY 9, 2013 – Cancelled**

**MONDAY, JANUARY 14, 2013**
-9:00 a.m. –c Swear in reelected Commissioners and appoint Chairman of the Board for 2013

**WEDNESDAY, JANUARY 16, 2013**

**WEDNESDAY, JANUARY 23, 2013**

**WEDNESDAY, JANUARY 30, 2013**

***Note**: The Douglas County Commission meets regularly on Wednesdays at 4:00 P.M. for administrative items and 6:35 P.M. for public items at the Douglas County Courthouse. Specific regular meeting dates that are not listed above have not been cancelled unless specifically noted on this schedule.*

**DOUGLAS COUNTY PUBLIC WORKS**
1242 Massachusetts Street
Lawrence, KS 66044-3350
(785) 832-5293 Fax (785) 841-0943
dgcopubw@douglas-county.com
www.douglas-county.com

**Keith A. Browning, P.E.**
Director of Public Works/County Engineer

MEMORANDUM

TO : Board of County Commissioners

FROM : Keith A. Browning, P.E., Director of Public Works
Michael D. Kelly, L.S., County Surveyor

DATE : November 20, 2012

RE : Drainage Structure Replacement; Structure No. 7.51N – 18.00E
Acquisition of Easement; Consent agenda

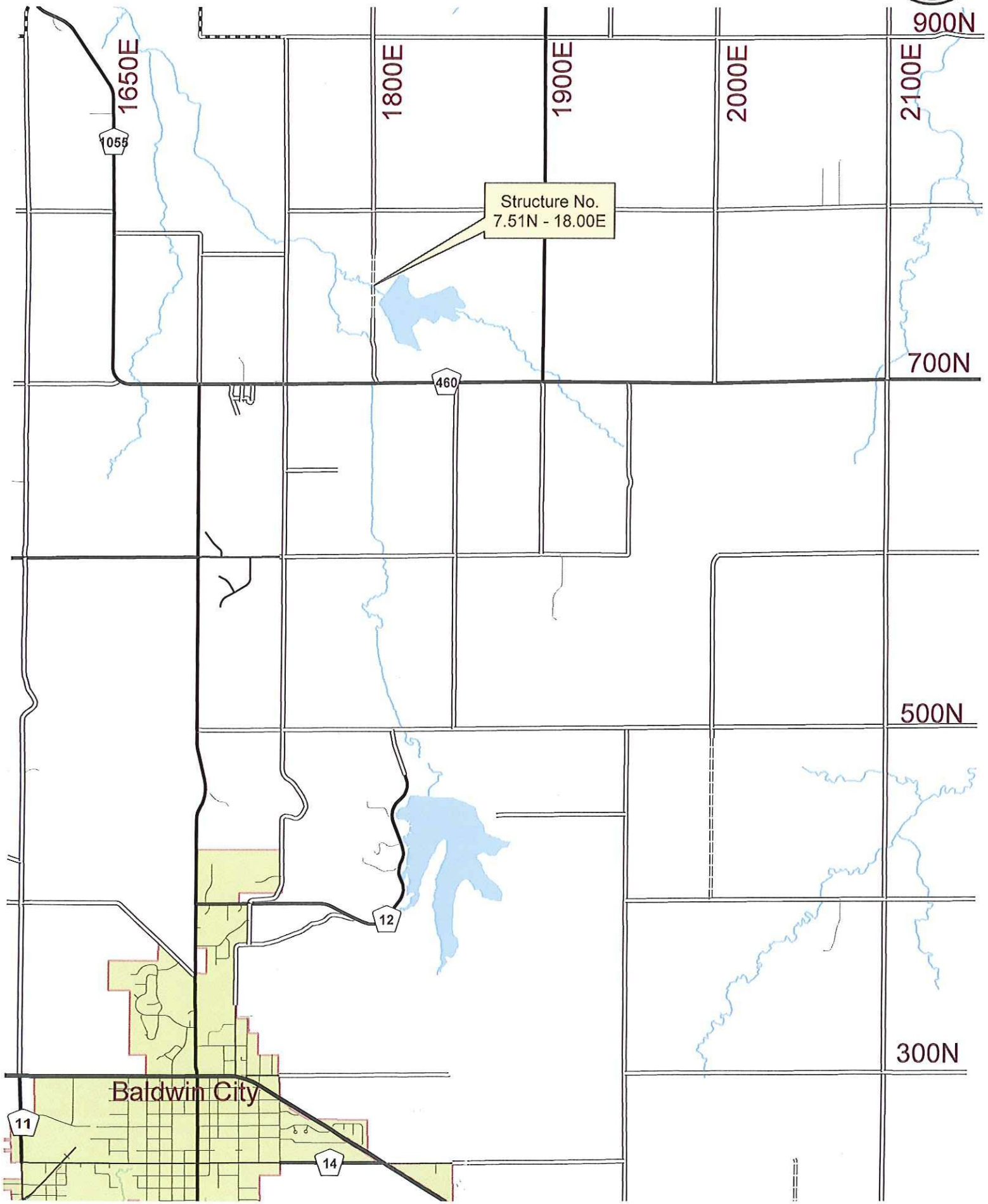
A project has been designed to replace a deficient drainage structure located approximately 1 mile northeast of Vinland on E1800 Road. Plans were developed in-house and negotiations with two of the three pertinent landowners for permanent easement have been completed. One of the landowners chose to donate easement in return for installation of a field entrance to their property. We hope to acquire the third parcel in the next week or two.

Construction is planned for December 2012 and will be accomplished using county personnel.

To ensure the proper completion of a necessary construction project approval is recommended for the attached CONTRACT FOR HIGHWAY PURPOSES.

ACTION REQUIRED: Consent agenda approval of the CONTRACT FOR HIGHWAY PURPOSES for Drainage Structure No. 7.51N – 18.00E.

Structure No. 7.51N - 18.00E
General Location Map



STA. 44+77.21 - SL
21.07' RT.
BM1 TRIPLE 60d NAIL
N; 200824.022
E: 2118876.799
ELEV= 853.461

NORTH
SCALE: 1" = 20' HORZ.

***DAVID E. UMSHEID***
***SHERYL A. UMSHEID***
***P.O. BOX 1185***
***LAWRENCE, KS. 66044***

***JEFFERSON W. SEABAUGH***
***LINDA S. SEABAUGH***
***7521 MOHAWK ST.***
***PRAIRIE VILLAGE, KS 66208***

STA. 39+25, PROP. C/L E 1800 RD. =
STA. 39+25, SL
END TAPER FROM EXISTING EDGE
OF ROAD LT. AND RT. TO
PROPOSED EDGE OF ROAD 9' LT.
AND 9' RT. OF PROP. C/L.

STA. 40+00, PROP. C/L E 1800 RD. =
STA. 40+00, SL
BEGIN EDGE OF ROAD TAPER FROM
PROP. 9' LT. AND 9' RT.
TO EXISTING EDGE OF ROAD.

STA. 38+00, PROP. C/L E 1800 RD. =
STA. 38+00. 2.02' RT. SL
BEGIN CONSTRUCTION
BEGIN EDGE OF ROAD TAPER FROM
EXIST. EDGE OF ROAD LT. AND RT.

STA. 39+25 - PROP. C/L E 1800 ROAD =
CENTERLINE P.I.

STA. 40+00 - PROP. C/L E 1800 ROAD =
CENTERLINE P.I.

STA. 41+50, PROP. C/L E 1800 ROAD =
STA. 41+50, 2.95' LT. SL
END CONSTRUCTION
END TAPER FROM PROPOSED EDGE OF
ROAD TO EXISTING EDGE LT. AND RT.

***V-BAR-T RANCH LLC***
***100 S. PARKER ST.***
***OLATHE KS. 66061***

STA. 39+61.47, PROP. C/L E 1800 ROAD =
STA. 39+61.47, SL
INSTALL 8' X 8' X 43 L.F. PRECAST R.C.B.
CULVERT 1' BURIED
w/ PRECAST WINGWALLS.

30" RCP OUTLET STRUCTURE
FL OUT = 846.80

TOP OF DAM
ELEV. = 880.50

## SECTION CORNER INFORMATION

| SL STATION | SECTION CORNER | RCODE | SECTION CORNER COORDINATE | | ELEVATION | CORNER STATUS |
|---|---|---|---|---|---|---|
| | S ¼ COR. SEC. 10-T14-R20 | T15J | N: 197245.47 | E: 2116269.91 | 862.57 | RECORD |
| | CTR. CORNER SEC.10-T14-R20 | T15G | N: 199902.03 | E: 2116187.50 | 856.05 | RECORD |
| | ¼ NL SEC. 10-T14-R20 | T15E | N: 202558.69 | E: 2116129.27 | 842.67 | RECORD |
| 10+00 | SW CORNER SEC. 11-T14-R20 | T17J | N: 197347.37 | E: 2118950.98 | 865.14 | RECORD |
| 36+47.35 | ¼ WL SEC. 11-T14-R20 | T17G | N: 199993.75 | E: 2118879.19 | 854.02 | RECORD |
| 62+99 | NW CORNER SEC.11-T14-R20 | T17E | N: 202644.45 | E: 2118804.75 | 912.89 | RECORD |
| | CTR. CORNER SEC.11-T14-R20 | T19G | N: 200093.30 | E: 2121518.86 | ——— | CALCULATED |
| | S ¼ COR. SEC. 11-T14-R20 | T19J | N:197444.56 | E: 2121587.48 | ——— | CALCULATED |
| | ¼ NL SEC. 11-T14-R20 | T19E | N: 202744.54 | E: 2121450.17 | 906.62 | RECORD |
| | NE CORNER SEC. 11-T14-R20 | T21E | N: 202843.90 | E: 21244096.97 | 901.11 | RECORD |
| | E ¼ SEC. 11-T14-R20 | T21G | N: 2001192.78 | E: 2124156.02 | 900.46 | RECORD |
| | SE CORNER SEC. 11-T14-R20 | T21J | N: 1975541.75 | E: 2124223.99 | 891.07 | RECORD |

**Douglas County Public Works**
1242 Massachusetts
Lawrence, Kansas 66044

Project: ROAD RECONSTRUCTION AND STORM DRAINAGE
Project No.: 0151800
Designed By: A.S.
Drawn By: L.H.
Checked By: T.G.
Date: 4/2012

PROPOSED R/W SHEET
SHEET 3 OF 7

CULVERT REPLACEMENT FOR E 1800 ROAD

**DOUGLAS COUNTY PUBLIC WORKS**
1242 Massachusetts Street
Lawrence, KS 66044-3350
(785) 832-5293 Fax (785) 841-0943
dgcopubw@douglas-county.com
www.douglas-county.com

**Keith A. Browning, P.E.**
Director of Public Works/County Engineer

MEMORANDUM

TO : Douglas County Commission

FROM : Keith A. Browning, P.E., Director of Public Works
Michael D. Kelly, L.S., County Surveyor

DATE : November 20, 2012

RE : Consent Agenda
Project No. 56-23KA-2294-01; US 56 Hwy at E1600 Road
Acquisition of Construction Easement

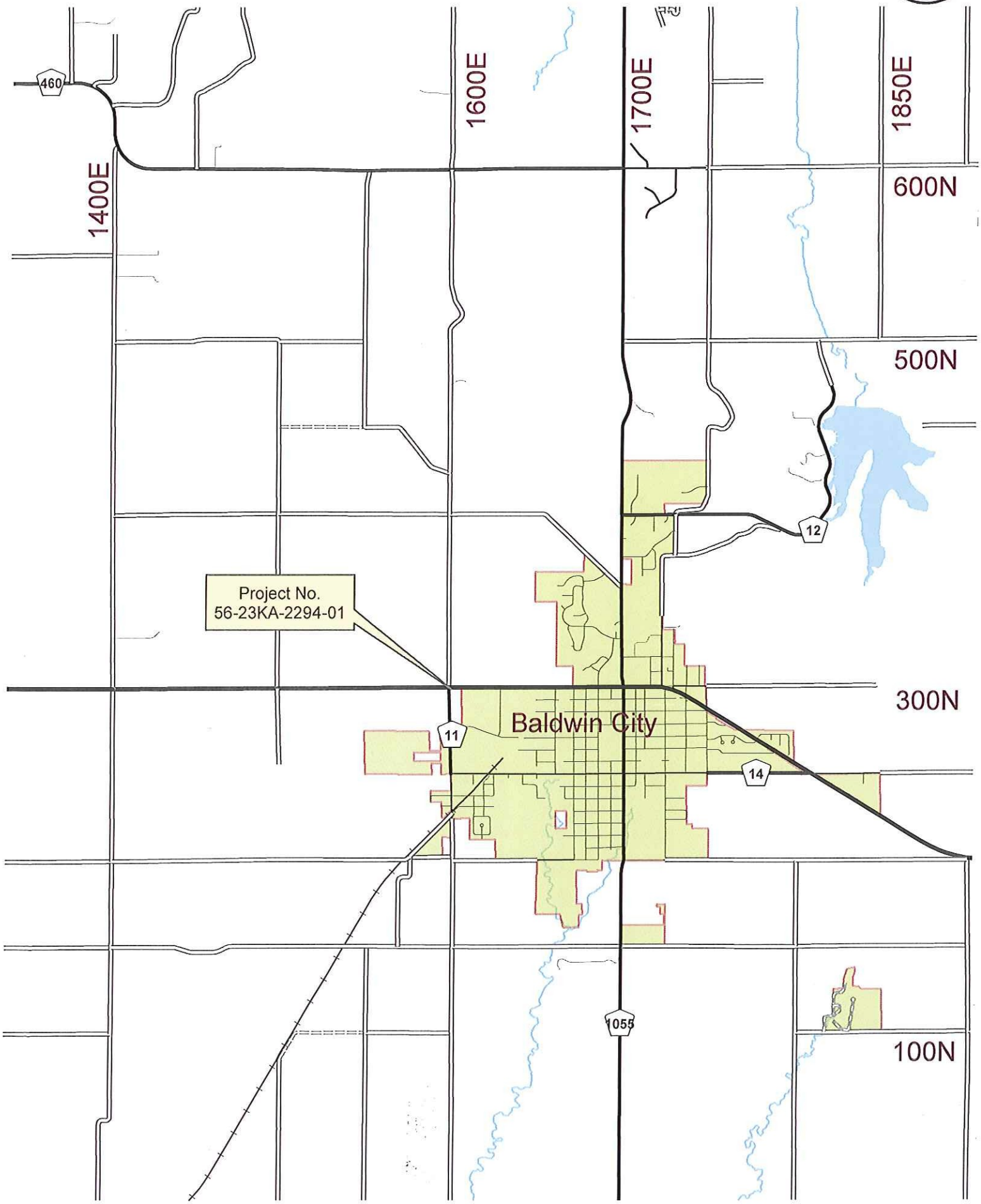
As you are aware a highway improvement project has been designed for US 56 Highway, generally between E1600 Road and Bullpup Drive. The project requires acquisition of permanent and/or temporary easement from six (6) properties.

The project will utilize federal funding and, as such, requires any necessary construction easement be acquired using federal acquisition guidelines. To that end an independent appraiser was hired to ascertain an appropriate offer for the required easement. In addition, also according to federal guidelines, a review appraisal was conducted to verify the initial appraiser's compliance with accepted appraisal techniques. The review appraisal was performed by county appraisal staff.

Attached are contracts for four (4) of the six (6) parcels requiring approval and the total expenditure for all six contracts is in the amount of $28,150.00.

ACTION REQUIRED: Consent agenda approval is required to execute the attached CONTRACT's FOR HIGHWAY PURPOSES.

Project No. 56-23KA-2294-01
General Location Map



further agrees that County shall make payment of the lump sum (**$375.00** ) agreed to as full payment under this contract as follows: **County shall make lump sum payment to Owner.**

4. It is hereby agreed that County may make immediate entry on and possession of the Premises, upon signing this Contract, for the purposes of County's construction project. In further consideration of this Contract, Owners consent to the proposed establishment, realignment and/or any change of grade of the County highway as shown on the project plan documents and hereby accepts payment under this Contract for any and all compensation and damages arising therefrom.

REMARKS/ADDITIONAL PROVISIONS:

None

Signed:

**Owner:**

**By: LeRoy Edward Stegman, D.V.M., Managing Member, Baldwin Hilltop Animal Health Center, LLC**

**County:**

Approval Recommended:

By: _____
Director of Public Works/County Engineer

11/21, 2012
Date

BOARD OF COUNTY COMMISSIONERS, Douglas County, Kansas

By: _____
Mike Gaughan, Chairman

_____, 2012
Date

ATTEST: _____
County Clerk

**RESOLUTION** _____

**WHEREAS**, on the **28th day of November, 2012**, the same being a regular session of the Board of County Commissioners of the County of Douglas, the application of **Clinton Marina** for a cereal malt beverage license came up for considerations by the above board and

**WHEREAS**, the Board does find that said **Clinton Marina** is qualified under the law to sell cereal malt beverages not for consumption on the premises located **1329 E 800 Rd, Lawrence, Kansas**

**WHEREAS**, the Board further finds that due and legal notice has been given the Clinton Township Board and that ten days has expired from the giving of said notice and that no written objection has been filed by the Clinton Township Board protesting the granting of a cereal malt beverage license.

**NOW THEREFORE, BE IT RESOLVED** that the applicant, **Clinton Marina** granted a license to sell cereal malt beverage not for consumption on the premises located at **1329 E 800 Rd, Lawrence, Kansas**

**BE IT FURTHER RESOLVED**, that Jameson Shew, County Clerk of Douglas County, Kansas be directed to issue said license.

_____
Chairman

_____
Member

_____
Member

**ATTEST:**

_____
Jameson Shew, Douglas County Clerk

KEEP THIS LICENSE POSTED CONSPICUOUSLY AT ALL TIME

# RETAIL

Fee $75.00 NO.

## DEALER'S 2013 LICENSE

**TO ALL WHOM IT MAY CONCERN:**

**License is hereby granted to: CLINTON MARINA**

**TO SELL CEREAL MALT BEVERAGES AT RETAIL IN ORIGINAL AND UNOPENED CONTAINTERS AND NOT FOR CONSUMPTI0N 0N PREMISES**

(State if for consumption on the premises or for sale in original and unopened containers and not for consumption on premises)

**1329 E 800 Road, LAWRENCE, KS. Application therefore on file in the office of the County Clerk of Douglas County, having been approved by the governing body of said County, as provided by Laws of Kansas and the regulations of the board of County Commissioners.**

**This License will expire 12:00 midnight December 31, 2013 unless sooner revoked, is not transferable, nor will any refund be allowed thereon.**

**Done by the Board of County Commissioners of Douglas County, Kansas**

**This 28th Day of November, 2012**

**Attest:**_____ _____

**County Clerk** **Chairman**

**RESOLUTION** _____

**WHEREAS**, on the **28th day of November 2012**, the same being a regular session of the Board of County Commissioners of the County of Douglas, the application of **Clinton Submarina** for a cereal malt beverage license came up for considerations by the above board and

**WHEREAS**, the Board does find that said **Clinton Submarina** is qualified under the law to sell cereal malt beverages for consumption on the premises located **1329 E 800 Rd, Lawrence, Kansas**

**WHEREAS**, the Board further finds that due and legal notice has been given the Clinton Township Board and that ten days has expired from the giving of said notice and that no written objection has been filed by the Clinton Township Board protesting the granting of a cereal malt beverage license.

**NOW THEREFORE, BE IT RESOLVED** that the applicant, **Clinton Submarina** granted a license to sell cereal malt beverage for consumption on the premises located at **1329 E 800 Rd, Lawrence, Kansas**

**BE IT FURTHER RESOLVED**, that Jameson Shew, County Clerk of Douglas County, Kansas be directed to issue said license.

_____
Chairman

_____
Member

_____
Member

**ATTEST**:

_____
Jameson Shew, Douglas County Clerk

KEEP THIS LICENSE POSTED CONSPICUOUSLY AT ALL TIME

# RETAIL

Fee $125.00 NO.

## DEALER'S 2013 LICENSE

**TO ALL WHOM IT MAY CONCERN:**

**License is hereby granted to: CLINTON SUBMARINA**

**TO SELL CEREAL MALT BEVERAGES AT RETAIL IN ORIGINAL AND UNOPENED CONTAINTERS AND FOR CONSUMPTI0N 0N PREMISES**

(State if for consumption on the premises or for sale in original and unopened containers and not for consumption on premises)

**1329 E 800 Road, LAWRENCE, KS. Application therefore on file in the office of the County Clerk of Douglas County, having been approved by the governing body of said County, as provided by Laws of Kansas and the regulations of the board of County Commissioners.**

**This License will expire 12:00 midnight December 31, 2013 unless sooner revoked, is not transferable, nor will any refund be allowed thereon.**

**Done by the Board of County Commissioners of Douglas County, Kansas**

**This 28th Day of November, 2012**

**Attest:**_____ _____

**County Clerk** **Chairman**

**RESOLUTION _____**

**WHEREAS**, on the **28th of November, 2012** the same being a regular session of the Board of County Commissioners of the County of Douglas, the application of **Flamingo Enterprises/The Bird of Lawrence** for a cereal malt beverage license came up for consideration by the above board and

**WHEREAS**, the Board does find that said **Flamingo Enterprises/The Bird of Lawrence** is qualified under the law to sell cereal malt beverages for consumption on the premises located: **1626 E 1550 Rd, Lawrence, KS**

**WHEREAS**, the Board further finds that due and legal notice has been given the Grant Township Board and that ten days has expired from the giving of said notice and that no written objection has been filed by the Grant Township Board protesting the granting of a cereal malt beverage license.

**NOW THEREFORE, BE IT RESOLVED** that the applicant, **Flamingo Enterprises/The Bird of Lawrence** granted a license to sell cereal malt beverages for consumption on the premises located: **1626 E 1550 Rd, Lawrence, KS**

**BE IT FURTHER RESOLVED**, that Jameson Shew, County Clerk of Douglas County, Kansas be directed to issue said license.

_____
Chairman

_____
Member

_____
Member

**ATTEST**:

_____
Jameson Shew, Douglas County Clerk

KEEP THIS LICENSE POSTED CONSPICUOUSLY AT ALL TIME

# RETAIL

Fee $125.00 NO.

## DEALER'S 2013 LICENSE

**TO ALL WHOM IT MAY CONCERN:**

**License is hereby granted to: FLAMINGO ENTERPRISES/THE BIRD OF LAWRENCE**

**TO SELL CEREAL MALT BEVERAGES AT RETAIL FOR CONSUMPTI0N 0N PREMISES**

(State if for consumption on the premises or for sale in original and unopened containers and not for consumption on premises)

**1626 E 1550 RD, LAWRENCE, KS Application therefore on file in the office of the County Clerk of Douglas County, having been approved by the governing body of said County, as provided by Laws of Kansas and the regulations of the board of County Commissioners.**

**This License will expire 12:00 midnight December 31, 2013 unless sooner revoked, is not transferable, nor will any refund be allowed thereon.**

**Done by the Board of County Commissioners of Douglas County, Kansas**

**This 28th Day of November 2012**

**Attest:**_____ _____

**County Clerk** **Chairman**

MEMO TO: The Board of County Commissioners
Craig Weinaug, County Administrator

FROM: Sarah Plinsky, Assistant County Administrator

CC:

SUBJECT: Amendment to the Lease Agreement for the Valleyview facility

DATE: November 19, 2012

Attached is an amendment to the Valleyview lease agreement with United Way of Douglas County. When the lease was revised last year, the initial plan was to have United Way begin making payments to the County in 2014. The intent of the payment was to assist in maintaining a healthy reserve in the Valleyview fund that is available to maintain the facility. In reviewing that fund and as a result of the assistance provided by United Way for the boiler project, staff recommends delaying any payments from United Way into the fund until 2016. The financial support for the boiler project was above what was required by the lease. Furthermore, as a result of the financial support from United Way for the boiler project, no support was required from the Valleyview fund.

Please let me know if you have any questions or concerns.

# FIRST AMENDMENT TO LEASE AGREEMENT

THIS FIRST AMENDMENT TO LEASE AGREEMENT (this "**Amendment**") is entered into this _____ day of _____, 2012, by and between THE BOARD OF COUNTY COMMISSIONERS OF DOUGLAS COUNTY, KANSAS ("**County**") and the UNITED WAY OF DOUGLAS COUNTY, INC. ("**United Way**") and amends that certain Lease Agreement entered into by and between County and United Way dated September 10, 2011 (the "Lease").

## RECITALS

WHEREAS, County and United Way entered into the Lease dated September 10, 2011 pursuant to which County leased to United Way the property located at 2518 Ridge Court and known as "Valley View;" and

WHEREAS, the Term of the Lease expires December 31, 2026; and

WHEREAS, Section 2 of the Lease requires United Way to make monthly payments to County, commencing October 1, 2014, as necessary to obtain and maintain a reserve fund of $150,000; and

WHEREAS, Section 8 of the Lease requires the County to pay for major repairs, maintenance or replacement to the Center costing $2,000.00 or more; and

WHEREAS, the parties desire to enter to amend the Lease as set forth herein.

## TERMS OF AMENDMENT

NOW, THEREFORE, the Lease is amended as follows:

1. The above Recitals are incorporated herein by reference.

2. Capitalized terms not otherwise defined in this Amendment shall have the same meaning as set forth in the Lease.

3. Notwithstanding the provisions of Section 8 of the Lease, United Way agrees to pay County the lump sum of $29,000, which County shall apply towards payment of a new boiler for the Center. County agrees to pay any costs for the boiler project in excess of $29,000.

4. In exchange for United Way's $29,000 lump sum payment identified above, Section 2 of the Lease is amended and restated to read as follows:

> 2. Rental Payments; Reserve Fund. United Way is not required to make any regular rental payments through September 1, 2016. Commencing October 1, 2016, and continuing on the first day of each subsequent month

during the Term, United Way shall make monthly payments to County as necessary to achieve and maintain a reserve fund of approximately $150,000. County and United Way agree that United Way will not be required to pay a large lump sum payment to bring the reserve fund up to $150,000, but, rather, United Way will pay County reasonable monthly installments to be applied with a goal of bringing the reserve fund to $150,000. County shall determine and provide United Way with written notice of the precise amount of these payments, but only after consultation and negotiation in good faith with United Way. County and United Way shall review and revise these payments in a similar manner, as appropriate, every 36 months during the remainder of the Term. The purpose of the reserve fund is to provide funds for major repairs and sustaining the Center without using County general fund money.

5. The remaining provisions of the Lease are not amended and are reaffirmed.

IN WITNESS WHEREOF, the governing body of each party duly approved this Amendment and it is executed and delivered to the other party effective as of the date first set forth above.

**BOARD OF COUNTY COMMISSIONERS OF DOUGLAS COUNTY, KANSAS:**

ATTEST:

By: _____
Mike Gaughan, Chair

Date: _____

_____
Jameson D. Shew, County Clerk

**UNITED WAY OF DOUGLAS COUNTY, INC.**

By: _____
Bryan Culver, President

Date: _____

# DOUGLAS COUNTY
# 2013 HOLIDAY SCHEDULE

| | |
|---|---|
| New Year's Day | Tuesday, January 1 |
| Martin Luther King's Day | Monday, January 21 |
| Memorial Day | Monday, May 27 |
| Fourth of July | Thursday, July 4 |
| Labor Day | Monday, September 2 |
| Thanksgiving | Thursday-Friday, November 28, 29 |
| Christmas | Wednesday, December 25 |
| Two (2) Personal Discretionary Days | |

***Personal Discretionary Day:***

*Eligibility: Employee's status must be full time or part time with benefits. Employees hired after June 30, 2013 (but before October 1) are only entitled to one (1) personal discretionary day. Employees hired on or after October 1, 2013 are not entitled to a 2013 personal discretionary day.*

*Definition: One (1) normal work day.*

*Scheduling: Must be taken all at one time (may not be split into hours). Must be scheduled in advance through the employee's supervisor and according to departmental procedures. Must be utilized during the calendar year 2013 and PRIOR to December 20, 2013.*

# DOUGLAS COUNTY EMERGENCY COMMUNICATIONS

**111 East 11th Street, Unit 200**
**Lawrence, KS 66044**
**phone: (785) 832-5237**
**fax: (785) 330-2801**
**website: www.douglas-county.com**
**email: eccdept@douglas-county.com**




**MEMORANDUM**

To : Board of County Commissioners

From : Scott W. Ruf, Director of Emergency Communications

Date : November 28, 2012

Re : Consent Agenda item authorizing staff to enter into agreement allowing Douglas County Emergency Communications and its agents and contractors to access proposed radio tower site location for site survey and required testing.

Douglas County is interested in leasing a portion of property owned by Jere McElhaney located on the SE corner of E550 Road and N400 Road directly due east of Rural Water District #5's water tower.

In order to determine viability and feasibility of the property as a tower site in the design and build out of the P25 800MHz Radio Project previously approved, it is necessary for employees, agents or contractors to be able to enter and inspect the property and/or conduct tests, surveys, analyses, environmental audits, and such other tests and inspections which Douglas County and its agents deem necessary or advisable.

The approval of this agreement makes no commitment by the County for any capital expenses related to the overall radio project and its scope is strictly for preliminary work related to civil engineering, licensing and permitting of system sites.

**Action Required:** Consent Agenda authorization for Emergency Communications Director, to approve and sign the Entry & Testing Agreement between Douglas County and Jere McElhaney (Property Owner) for testing related to the development of the proposed Globe tower site.

# ENTRY AND TESTING AGREEMENT

**THIS ENTRY AND TESTING AGREEMENT** ("Agreement") is made and entered into as of the 28th day of November, 2012, by and between DOUGLAS COUNTY EMERGENCY COMMUNICATIONS ("**Applicant**") and JERE MCELHANEY ("**Owner**"), concerning the following described property owned by Owner ("**Property**"): SE Corner of E550 Rd and N400 Rd east of the existing RWD#5 water tower, Overbrook, KS 66524.

**A.** Applicant has an interest in leasing a portion of the Property for use as a tower and/or antenna site for the receipt and transmission of wireless communications signals; and

**B.** In order for Applicant to determine the viability and feasibility of the Property as a tower or antenna site, it is necessary for employees, agents or independent contractors of Applicant to enter upon and inspect the Property and/or temporarily locate communications equipment on the Property to conduct short term radio propagation tests, and to make application with local, state and federal governmental entities for approval of the Property as a tower or antenna site; and

**C.** Owner and Applicant desire to provide for the entry upon, inspection and/or testing activities, and applications concerning the Property pursuant to the terms contained in this Agreement.

**NOW, THEREFORE**, in consideration of the mutual promises, covenants, undertakings, and other consideration set forth in this Agreement, Owner and Applicant agree as follows:

**1. Consent.** Owner consents and agrees that Applicant, its employees, agents and independent contractors ("Authorized Parties") may enter upon the Property to conduct and perform some or all of the following activities ("Permitted Activities"): surveys, geotechnical soil borings and analyses, phase I environmental audits, boundary surveys, radio propagation studies, and such other tests and inspections of the Property which Applicant may deem necessary or advisable. Applicant agrees to be responsible for any and all costs related to the Permitted Activities, including installation on and operation and removal of equipment on the Property.

**2. Filings.** Owner consents and agrees that the Authorized Parties may make and file applications on Owner's behalf to such local, state and federal governmental entities whose approval Applicant may consider necessary or advisable to have the Property approved as a tower or antenna site, including, but not limited to, governmental approvals for zoning variances, rezoning applications, building permits and wetland permits. Owner hereby agrees that an executed copy of this Agreement is as effective as the original. However, if requested by the Authorized Parties, Owner agrees to execute such other and further documents as may be required by the governmental entity in question to evidence Owner's consent to the action which is proposed to be taken.

**3. Access.** Owner agrees that the Authorized Parties may enter upon the Property to perform the Permitted Activities upon execution of this Agreement and may have access to the Property for up to six (6) months.

**4. Removal of Property.** Applicant agrees that it will, upon the conclusion of the term of this Agreement, remove any equipment installed on the Property as a part of the Permitted Activities, repair any damage to the Property that might have been caused in connection with any of the Permitted Activities, and will return the Property to the condition it was in before Applicant's entry onto the Property. In the event any equipment installed on the Property by Applicant is not timely removed, Owner will have the right to remove such equipment and Applicant agrees to be responsible for the reasonable costs of such removal.

**5. Indemnity.** Applicant agrees to indemnify, save harmless, and defend Owner, its directors, officers, employees, and property management agent, if any, from and against any and all claims, actions, damages, liability and expense in connection with personal injury and/or damage to property arising from or out of any occurrence in, upon or at the Property caused by the act or omission of the Authorized Parties. Any defense conducted of any such claims, actions, damages, liability and expense will be conducted by attorneys chosen by Applicant after consultation with Owner, and Applicant will be liable for the payment of any and all court costs, expenses of litigation, reasonable attorneys' fees and any judgment that may be entered therein.

**6. Insurance.** Applicant agrees to provide a certificate of insurance evidencing Applicant's insurance coverage.

**7. Governing Law.** The parties agree that the interpretation and construction of this Agreement shall be governed by the laws of the state of Kansas, without regard to such state's conflict of laws provisions.

**IN WITNESS WHEREOF**, the parties hereto have executed this Agreement as of the day and year first above written.

| | |
|---|---|
| **APPLICANT:**<br>**Douglas County Emergency Communications** | **OWNER:**<br>**Jere McElhaney** |
| By: _____ | By: _____ |
| Name: Scott W. Ruf | Name: Jere McElhaney |
| Title: Director – DGCO ECC | Title: Property Owner |
| Date: _____ | Date: _____ |

**DOUGLAS COUNTY ADMINISTRATIVE SERVICES**
**Division of Purchasing**
1100 Massachusetts Street
Lawrence, KS 66044-3064
(785) 832-5286 Fax (785) 838-2480
www.douglas-county.com

MEMO TO: The Board of County Commissioners
Craig Weinaug, County Administrator

FROM: Jackie Waggoner, Purchasing Director
Jeannette Blackmar, Heritage Council Coordinator

SUBJECT: Consider Contract Extension for Douglas County Cultural and Historic Resources Survey

DATE: October 30, 2012

In September 2010, the Douglas County Commission authorized the creation of the Natural & Cultural Heritage Taskforce. One initiative of the Heritage Council is to facilitate a comprehensive county-wide natural, cultural and historic survey. Because surveying the County in one year would be costly and highly resource intensive, the Council is implementing a systematic multi-year survey approach.

In January 2012, Mr. Dale Nimz was contracted with Douglas County to conduct a natural, cultural and historic resources survey of Eudora and Kanwaka Townships. In total, 168 properties were surveyed and more than 400 buildings, structures and landscape features were inventoried. This represents a complete survey of the unincorporated areas of Eudora Township and a partial survey of the unincorporated areas of Kanwaka Township. For the next phase of survey work, the Council has identified the remaining unincorporated areas in Kanwaka Township and Wakarusa Townships to be surveyed (see Appendix A for detailed project description). Ten percent ($35,000) of the 2012 funds allocated to the Heritage Conservation Council are defined to be used for this project.

The Council seeks a contract extension for Mr. Nimz to conduct the next phase of survey work. While it is standard purchasing policy to require a bidding process, we request to have this requirement waived. The Council seeks to hire Mr. Nimz for reasons of efficiency and effectiveness. Mr. Nimz has already established contacts and relationships in Kanwaka Township based on his 2011-2012 survey work in the Township. Furthermore, he has instilled confidence and trust in citizens whom he has engaged. This is of paramount importance in carrying out survey work. Mr. Nimz also is highly qualified as evidenced by his expertise, extensive experience and local knowledge. These attributes allowed him to exceed the expectation of total number of properties to survey with the initial round of survey work. Furthermore, the RFP process conducted for the first round of survey work resulted in a total of four proposals of which Mr. Nimz provided the lowest bid. In addition, the other bidders lacked specificity in how they approach the project and required greater reliance on the Heritage Conservation Council (HCC) and county staff for support.

**SUGGESTED MOTION:** The Board of County Commissioners waives the formal bidding process and approves a contract extension in the amount of $35,000 with Dale Nimz to survey the remaining areas of Kanwaka Township and Wakarusa Township.

**Appendix A. CULTURAL& HISTORIC RESOURCES SURVEY**
**OF UNINCOPORATED AREAS IN KANWAKA & WAKARUSA TOWNSHIPS**
**Project Description**

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**Project Background**

In an effort to enhance natural and cultural heritage initiatives within Douglas County, the Douglas County Board of County Commissioners approved the creation of the Douglas County Heritage Conservation Council in 2011. One initiative of the Heritage Council is to facilitate a comprehensive county-wide natural, cultural and historic survey. The initial survey, conducted in 2011-2012, focused on Eudora and Kanwaka Townships. It resulted in the comprehensive survey of unincorporated Eudora Township and a partial survey of unincorporated Kanwaka Township (Nimz 2012; http://www.douglas-county.com/depts/ad/hcc/ad_hcc.aspx). For the 2012-2013 survey, the Council has identified the remaining unincorporated areas in Kanwaka Township and Wakarusa Townships to be surveyed. The Council has allocated up to $35,000 for completion of a comprehensive survey and inventory to be conducted.

**Scope of Work**

Kanwaka Township, located in northwestern Douglas County, contains approximately 44 square miles of land. Wakarusa Township, located in north-central Douglas County, contains approximately 47 square miles. Within Wakarusa Township, survey priority must be given to the southern unincorporated portion of the Township. It is expected a comprehensive cultural and historic resources survey of the southern unincorporated portion of Wakarusa Township will be completed. Depending on feasibility, the survey may continue into the northern unincorporated portion of Wakarusa Township.

The Council envisions a comprehensive survey that considers cultural and historic resources in terms of period, theme, property type, architectural form and style within the project area. The survey will consider all periods of architectural and historic development from the period of first colonial European presence to circa 1960. Significant themes of historical and architectural development will be identified, and resources will be related to these themes. The survey will identify buildings and structures that are architecturally and historically significant in the history and development of the communities. The survey will include both representative and outstanding examples of the building forms, types, and styles present in the communities. These would include homes, barns and outbuildings, rock fences and hedge rows, dugouts, cellars, wells and bridges.

The survey will also document natural resources and their influence on cultural development. Natural areas are rapidly being lost to residential and commercial development, or through conversion to non-agricultural uses. The council is especially interested in the bidder being aware of woodlands, intact tallgrass prairie, wildlife habitat, viewscapes, and waterways as they are encountered so as to add these to the state survey database.

It is expected that residents of Kanwaka and Wakarusa Townships as well as other qualified individuals will be actively involved in determining which properties should be surveyed. The Heritage Conservation Council will provide, if available, a preliminary list of names and contact information of such individuals. The bidder will provide a completed historic resources form for each structure and or property included in
the survey area. The completion of this form will include property ownership, legal description, building description, construction dates, historic documentation, architect/builder, style and form

information, material information, and latitude/longitude information. A sketch of the site plan and complete photographic documentation will also be required for each property. Photographic documentation shall be in compliance with the National Park Service photography policy.

Douglas County will provide assistance with the design and completion of the area maps that are necessary for the project and the closing report.

Two public presentations per township will occur. One presentation will occur near the beginning of the project and inform the public of the upcoming work. The second presentation will highlight survey findings. To inform the public of the survey and presentations, postcard notification will be mailed to residents three weeks prior to the initial public presentations. The Heritage Conservation Coordinator will provide assistance with the required public meetings. Monthly updates on the project will be provided to the Heritage Conservation Coordinator and at completion a closing grant report shall be submitted.

# MEMO

October 30, 2012

TO: Douglas County Commission
Craig Weinaug

FROM: John Bradley, Heritage Conservation Council Chair

RE: Approval of "Douglas County Kansas Heritage Conservation Plan" to be submitted to the Kansas State Historical Society for designation of Douglas County as a Certified Local Government

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As outlined in Douglas County Resolution (No. 11-19), one primary purpose of the Heritage Conservation Council is to pursue designation of Douglas County as a Certified Local Government (CLG). In Kansas, the CLG program is designed to promote the preservation of prehistoric and historic sites and districts by establishing a partnership between the local government and the Kansas State Historic Preservation Office (SHPO), a division of the Kansas Historical Society.

The Heritage Conservation Council, in close consultation with the Kansas State Historical Society's Historic Preservation Office, has prepared the *Douglas County Kansas Heritage Conservation Plan* (attached). The Plan has been reviewed and approved by County Administration. The Council seeks County Commission approval of this document to be submitted to the Kansas State Historical Society as part of the application for designation of Douglas County as a CLG. Other required documents to be submitted include a signed Certified Local Government Agreement (attached) and resumes of Heritage Conservation Council members.

The *Douglas County Kansas Heritage Conservation Plan* establishes the Heritage Conservation Council as the County's official body to advise the County on historic preservation issues and outlines a heritage conservation plan for Douglas County Kansas. Participation in the CLG program will result in many positive outcomes. Two key reasons to become a CLG are 1) access to expert technical advice from the State Historic Preservation Office (SHPO) and the National Park Service and; 2) access to federal funding. Specifically, Douglas County would be eligible to apply for competitive grants from the Historic Preservation Fund, administered by the Kansas SHPO. These funds could support ongoing Heritage Council efforts to survey Douglas County's historic and cultural resources. Such funds could also be used to support public education about historic and cultural resources.

Requirements of a CLG include submission of an annual report summarizing activities and accomplishments as well as performance evaluation once every four years conducted by the SHPO. Douglas County will incur no costs in becoming a CLG as the Heritage Conservation Council Coordinator will subsume the administrator responsibilities.

# DOUGLAS COUNTY KANSAS HERITAGE CONSERVATION PLAN

## ARTICLE 1. GENERAL PROVISIONS

### 101. TITLE.

This document, as amended, shall be known as the Douglas County, Kansas Heritage Conservation Plan, and is referred to herein interchangeably as this "Heritage Conservation Plan" and this "Plan".

### 102. ESTABLISHMENT OF HERITAGE CONSERVATION COUNCIL AND STATEMENT OF PURPOSE.

Pursuant to Douglas County Resolution No. 11-19, the Douglas County Commission established and the County Commission hereby affirms the establishment of the Douglas County Heritage Conservation Council, hereinafter referred to as the Council, and the Douglas County Commission hereby modifies Resolution No. 11-19 to amend the Council's authority and responsibilities as set forth herein. If any conflict exists between this Heritage Conservation Plan and Resolution No. 11-19, the provisions of this Plan shall prevail. The purposes of this Heritage Conservation Plan are to:

(A) Ensure the conservation of the County's natural and cultural resources.

(B) Identify, conserve and promote the County's natural resources, prehistoric, historic and cultural heritage through an ongoing surveys and studies of natural and cultural heritage resources.

(C) Implement the strategies and goals contained in Chapter 11 of Horizon 2020 (the County's Comprehensive Plan) for the protection, development and utilization of historic resources.

(D) Foster civic pride and promote tourism, particularly as related to the natural resources, pre-settlement history, settlement history, and the themes encompassed in Freedom's Frontier National Heritage Area.

(E) Work in concert with the State Historic Preservation Officer and observe the State Preservation Act, contained at K.S.A. 75-2701 *et seq*., as amended.

(F) Support education programs to increase public awareness of and support for the County's historic environment.

### 103. APPLICATION.

The Heritage Conservation Plan is designed to be used in the unincorporated territory of Douglas County, Kansas and is to be used in conjunction with any existing zoning regulations.

### 104. DEFINITIONS.

For the purpose of implementation of this Heritage Conservation Plan, certain words or terms are hereby defined. Unless specifically defined below, words or terms in this Plan shall be interpreted so as to give them the same meaning as they have in common usage and so as to give this Plan its most reasonable application. Words in the present tense include the future, words in the singular number include the plural, and words in the plural number include the singular. The word shall is mandatory and not directory. The following words or terms shall be used as defined below in the administration of this Heritage Conservation Plan. For further

clarification of commonly used historic conservation terms, refer to the Kansas Historic Preservation Act (K.S.A. 75-2715 et seq.); Kansas Administrative Regulations 118-1-1 *et seq*.; Standards and Guidelines for Evaluating the Effect of Project on Environs (1998), Kansas State Historical Society; The National Historic Preservation Act of 1966 and amendments thereto; the National Register Bulletin #16: Guidelines for Completing National Register of Historic Places Forms, NPS; National Register Bulletin #24: Guidelines for Local Surveys: A Basis for Preservation Planning, NPS; Local Historic Resources Survey Manual, Kansas Historic Preservation Department; Harris, Cyril M., Dictionary of Architecture and Construction, McGraw-Hill, New York 1975.

(A) Accessory Structure - A subordinate structure or portion of the main structure, located on the same property and the use of which is clearly incidental to that of the main structure or to the use of the property on which it is located. Customary accessory structures include, but are not limited to, garages, carports, garden houses, small storage sheds, and children's playhouses.

(B) Adaptive Use

> (1) The process of changing the use of a structure or property to a use other than that for which the structure or property was originally designed.
>
> (2) A use for a structure or property other than the use for which it was originally designed. (Sometimes called adaptive reuse.)

(C) Adjacent - A structure or parcel having a common parcel boundary with or located immediately next to a structure or parcel.

(D) Administrator - The designated individual assigned by Douglas County to administer, interpret and enforce this Plan.

(E) Archeological Site - (See Site).

(F) Area - Properties, near to or adjacent to one another, capable of being described with such definiteness that their collective location may be established and boundaries definitely ascertained.

(G) Building - A structure, such as a house, barn, church, hotel, courthouse, city hall, social hall, commercial structure, library, factory, mill, train depot, theater, school, store or similar construction, created to shelter any form of human activity. The term may also refer to a small group of buildings consisting of a main building and subsidiary buildings which constitute an historically and functionally related unit such as a courthouse and jail, house and barn, mansion and carriage house, church and rectory, and farmhouse and related outbuildings.

(H) Certified Local Government (CLG) - A program of the National Park Service designed to promote the preservation of prehistoric and historic sites, structures, objects, buildings, and historic districts by establishing a partnership between the local government, the historic preservation department, a division of the Kansas State Historical Society, and the National Park Service. A certified local government carries out the purposes of the National Historic Preservation Act, as amended. Each certified local government is required to maintain a system of ongoing surveys compatible with the Kansas Historic Preservation Department process.

(I) Conservation (See Historic Preservation).

(J) Code Enforcement – the local regulation of building practices and enforcement of safety and housing code provisions, a principal tool to ensure neighborhood upkeep.

(K) Community Development Block Grant (CDBG) – A federal funding program that provides annual funding to eligible local governments for housing and community revitalization and development programs and for social services, particularly in low- and moderate-income areas.

(L) Comprehensive Plan – A document guiding the future growth and development of a specified geographic area and/or governmental entity. It provides a vision and direction for the governing body and a cohesive framework for decision-making.

(M) Context - A conceptual framework for determining the significant patterns that individual properties represent consisting of components that surround a resource and determine its meaning more clearly.

(N) Contributing (or Contributory) - A significant building, site, structure, or object which adds to the architectural qualities, historic association, or archeological values of an historic district because:

(1) It was present during the pertinent historic time; or

(2) It possesses integrity and reflects its significant historic character or is capable of yielding important information about the pertinent historic period.

(O) County - The governmental unit named Douglas County, Kansas.

(P) County Commission - The Governing Body of Douglas County, Kansas.

(Q) County Limits - The established governmental boundary of Douglas County, Kansas.

(R) Council - The Douglas County Heritage Conservation Council.

(S) Council Members - Members of the Heritage Conservation Council, unless otherwise indicated.

(T) Demolition - Any act or process that destroys in part or in whole a landmark or a structure within an historic district.

(U) Demolition by Neglect – The destruction of a building through abandonment or lack of maintenance or an act or process that threatens to destroy a building, structure, or object of a site by failure to maintain it in a condition of good repair and maintenance.

(V) Design Guideline - A standard of appropriate activity that guides rehabilitation and new construction efforts that preserve and enhance this historic, architectural, scenic or aesthetic character of an area.

(W) Designation – Official recognition of an historic landmark or historic district by the Council and the County Commission according to the procedures and provisions in this Heritage Conservation Plan.

(X) Developer - Any person who:

(1) Causes real property to be used for development;

(2) Sells, leases or develops; offers to sell, lease, or develop; or advertises for sale, lease or development any lot, plot, parcel, site, unit of interest, or structure for development; or

(3) Engages directly or through an agent in the business or occupation of selling, leasing, developing, or offering for sale, lease or development, any lot, plot, parcel, site, unit of interest, or structure for development.

(Y) Development - A subdivision; the construction or reconstruction of streets and utilities, the construction, expansion or remodeling of structures; a change in the use of a structure or parcel, or the clearing of land.

(Z) District - (See Historic District).

**105. DEFINITIONS, CONTINUED.**

(A) Douglas County Register - The current Douglas County Register of Historic Places as prepared, approved and amended by the Heritage Conservation Council and authorized by resolution.

(B) Easement – A less-than-fee interest in real property acquired through donation or purchase and carried as a deed restriction or covenant to protect important open spaces, building facades, and interiors.

(C) Eminent Domain – The power of government to acquire private property for public benefit after payment of just compensation to the owners.

(D) Endangered Resource - A resource under a known or anticipated threat of damage to the integrity or existence of the resource, such as:

(1) Immediate threat which will result in loss of or collapse of structure;

(2) Immediate threat or destruction by private action; and

(3) Condemnation for code violations. (Sometimes referred to as threatened resource.)

(E) Environs – Environment surrounding a historic landmark or within a district.

(F) Exterior Architectural Appearance - The architectural character and general composition of the exterior of a structure, including but not limited to the kind, color, and texture of the building material and the type, design, and character of all windows, doors, light fixtures, signs, and appurtenant elements.

(G) Fabric – The physical material of a building, structure, or community connoting an interweaving of component parts.

(H) Facade - The exterior face of a building which is the architectural front, sometimes distinguished by elaboration or architectural or ornamental details.

(I) Green Space – Land not available for construction and designated for conservation, preservation, recreation or landscaping.

(J) Historic District - An area designated as an historic district by the Heritage Conservation Council, pursuant to procedures prescribed herein, and which may contain within definable geographic boundaries one or more significant sites, structures or objects and which may have within its boundaries other properties or structures that, while not of such historic and/or architectural significance to be designated as landmarks, nevertheless contribute to the overall visual characteristics of the significant sites, structures or objects located within the historic district.

(K) Historic Preservation - The study, identification, protection, restoration and rehabilitation of natural resources, buildings, structures, objects, districts, areas and sites significant in the history, architecture, archeology or culture of the county, state or nation.

(L) Historic Resources – Historic buildings, structures, objects, districts, areas, sites and archeological sites.

(M) Historically or Architecturally Significant - Possessing that quality present in an area, site, structure, object or district because of:

(1) Its character, interest, or value as part of the development, heritage or cultural characteristics of the community, county, state, or nation;

(2) Its location as a site of a significant local, county, state, or national event;

(3) Its identification with a person or persons who significantly contributed to the development of the community, county, state, or nation;

(4) Its embodiment of distinguishing characteristics of an architectural style valuable for the study of a period, type, method of construction, or use of indigenous materials;

(5) Its identification as a work of a master builder, designer, architect, or landscape architect whose individual work has influenced the development of the community, county, state or nation;

(6) Its embodiment of elements of design, detailing, materials, or craftsmanship that render it architecturally significant;

(7) Its embodiment of design elements that make it structurally or architecturally innovative;

(8) Its unique location or singular physical characteristics that make it an established or familiar visual feature;

(9) Its character as a particularly fine or unique example of a utilitarian structure; including, but not limited to farmhouses, gas stations, or other commercial structures, with a high level of integrity or architectural significance;

(N) Kansas Register - The current Register of Historic Kansas Places as prepared, approved and amended by the Kansas Historic Sites Board of Review and authorized by K.S.A. 75-2715 *et seq*.

(O) Key Contributing (Contributory) - A building, site, structure, or object of such an outstanding quality and state of conservation that it significantly adds to the architectural qualities, historic association, or archeological values of an historic district because:

(1) It was present during the pertinent historic time;

(2) It possesses integrity and reflects its significant historic character or is capable of yielding important information about the pertinent historic period; and,

(3) It independently meets the standards and criteria of this Plan.

(P) Land Surface - The solid part of the exterior of the earth.

(Q) Landmark - A site, structure or object designated as a landmark by the Heritage Conservation Council, pursuant to procedures prescribed herein, that is worthy of rehabilitation, restoration, and preservation because of its historic and/or architectural significance to the County.

(R) Landscape – Natural or made-made features, including, but not limited to farmland, and natural resources changed for human purposes.

(S) Landscape Feature - Any element or component of outdoor open space including, but not limited to, fences, walls, retaining walls, gates, wells, sidewalks, walkways, driveways, parking lots, patios, terraces, decks, ground cover, trees, plants, outdoor furniture, exterior light standards, fountains, statuary, detached signs and other such elements.

(T) Marker - A sign used to label or identify a designated landmark or historic district as an architecturally significant property.

(U) National Register - The current National Register of Historic Places established by passage of the National Historic Preservation Act of 1966, 80 Stat. 915, 16 U.S.C. 470 *et seq*., as amended.

(V) Natural Resources – Prairies, woodlands, waterways, habitats, wildlife corridors, open spaces, riparian areas, forest and environmentally sensitive areas, i.e., those areas which contain overlapping natural features such as steep slopes, woodlands, natural prairies, wetlands, hydric soils, lakes, streams and prominent ridgelines.

(W) Noncontributing (or noncontributory) - A building, site, structure, or object that does not add to the architectural qualities, historic association, or archeological values of a landmark or historic district because:

(1) It was not present during the pertinent time; or

(2) Due to alterations, disturbances, additions, or other changes, it no longer possesses integrity nor reflects its significant historic character or is incapable of yielding important information about the pertinent historic period.

(X) Normal Maintenance and Repair - Any improvement or work for which a building permit is not required by county resolution or city ordinance, designed to correct deterioration, decay or damage and restore, as may be practical, a structure or property to the condition that existed prior to the deterioration, decay or damage.

(Y) Nuisances - Physical conditions (affecting land, water, groundwater, the air, noise levels, or other elements of the environment) that endanger human health or safety, injure persons or property, or constitute a clear danger to property.

(Z) Object - Those physical items that have functional, aesthetic, cultural, historical or scientific value and are relatively small in scale and simply constructed. While an object may be, by nature or design, movable, it should be located in a specific setting or environment appropriate to its significant historic use, role or character. Objects include, but are not limited to, sculptures, monuments, street signs, fence posts, hitching posts, mileposts, boundary markers, statuary, and fountains.

**106. DEFINITIONS, CONTINUED.**

(A) Owner(s) of Record - Those individuals, partnerships, firms, corporations, public agencies, or any other legal entity holding title to property but not including legal entities holding mere easements or leasehold interests. (May also be referred to as property owner(s).) Current owner(s) of record are those listed as owners on the records of the register of deeds.

(B) Period - A chronological division identified in the analysis of the historical development to an area or region (i.e., Victorian, Modern).

(C) Person - Any individual, firm, association, organization, partnership, business, trust, corporation, or company.

(D) Preservation - (See Historic Preservation).

(E) Preservation Easement - (See Easement).

(F) Project - Activities involving the issuance of a lease, permit, license, certificate or other entitlements for use, to any party by the County.

(G) Property - An area of land, undivided by any street, alley, railroad, stream, or similar physical feature, under common ownership or control, which is or will be occupied by one structure or land use, and any accessory structures and uses. A property could be made up of one or more lots of record, one or more portions of a lot or lots of record, or any combination thereof. The term shall include landscape features.

(H) Protection - The application of measures to defend, guard, cover or shield a building, site, structure, or object from deterioration, loss, attack, danger, or injury. In the case of buildings, structures or objects such measures generally are of a temporary nature and usually precede preservation measures. In the case of archeological sites, the protective measures may be temporary or permanent.

(I) Reconstruction/Reconstruct - The reproduction of the exact form and detail of a vanished building, site, structure or object or a part thereof, as it appeared at a pertinent time using both original and modern materials and based on precise historical documentation and physical evidence.

(J) Register - (See Douglas County Register.)

(K) Rehabilitation/Rehabilitate - The act of returning a building, site, structure or object to a useful state through its repair and/or alteration while retaining the characteristic features of the property which are significant to its historical and architectural value.

(L) Remodeling - Modification and modernization of a structure or property without striving to return to or replicate the original historical and architectural character of the structure or property.

(M) Removal - Any relocation of a structure in whole or in part on its site or to another site.

(N) Repair - Any change to a structure or object that is not construction, removal or alteration.

(O) Resource - Any building, site, structure, object or area that constitutes a source of present and future usefulness.

(P) Restoration/Restore - The act of accurately recovering the form and details, based on precise historical documentation and physical evidence, of a building, site, structure or object as it appeared at a pertinent time including the removal of improvements that are not appropriate and the replacement of missing or deteriorated features.

(Q) Right-of-Way - A strip of land occupied or intended to be occupied by a street, crosswalk, footpath, railroad, road, electric transmission line, oil or gas pipeline, water main, sanitary or storm sewer main, or for another special use.

(R) Sign - Any surface, fabric, device or display designed to visually convey information to the general public.

(S) Significant - (See Historically or Architecturally Significant).

(T) Site - The location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined or vanished, where the location itself possesses historic, cultural or archeological value regardless of the value of any existing structure. Examples of sites include habitation sites, burial sites, village sites, hunting and fishing sites, ceremonial sites, battlefields, ruins of historic buildings and structures, campsites, designed landscapes, natural features, springs, and landscapes having cultural significance.

(U) Stabilization - Taking measures to return an unsafe or deteriorated building, site, structure or object to a safe and secure condition while maintaining the existing form and detail of the building, site, structure or object.

(V) Street - A right-of-way, other than an alley, dedicated to the public use, which provides principal access to adjacent properties.

(W) Structure - Anything constructed or erected, the use of which requires permanent or temporary location on or in the ground, including, but without limiting the generality of the foregoing: buildings, fences, gazebos, advertising signs, billboards, backstops for tennis courts, radio and television antennae, including supporting towers, and swimming pools.

(X) Studies – In-depth efforts to understand the history of Douglas County through surveys of buildings and natural resources with additional research into the stories of residents and communities with the County.

(Y) Style - The specific identifying characteristics of a building both as it appears to the eye and as it is known to exist in design and structure.

(Z) Survey - An architectural and historical examination of historic resources to identify historic properties within an area.

**107. DEFINITIONS, CONTINUED**

(A) Threatened Resource - (See Endangered Resource).

(B) Use - The specific purpose for which a structure or property is utilized.

(C ) Utilitarian Structure - A category of structures intended primarily to serve a utilitarian or useful function rather than for beauty. Utilitarian structures may include, but are not limited to, structures used for agriculture, transportation and industry and certain moderate residential buildings.

## ARTICLE 2. HERITAGE CONSERVATION COUNCIL

**201. MEMBERSHIP**

The Heritage Conservation Council shall consist of seven (7) members who are Douglas County residents, and who demonstrate an interest in historic preservation and conservation of the County's natural and cultural heritage. Efforts should be made to balance the representation of all communities and unincorporated areas in the County. All members will be appointed and approved by the Douglas County Commission. Three (3) members shall be a diversity of preservation-related professionals, as defined by the National Park Service and recognized by the relevant standards of their respective profession, such as architect, architectural historian, archeologist, historian, landscape architect, and planner. The remaining four (4) members shall be a diversity of either professionals or lay persons with interest infields closely related to agriculture, tourism, unique and significant lands, ecology, geography, natural science, economic development, history or environment. At least one (1) preservation professional shall be on each subcommittee of the Council. The requirement of preservation-related professionals may be waived if Douglas County can provide acceptable written documentation to the Historic Preservation Office that it has made a reasonable effort to fill those positions.

**202 TERMS OF OFFICE**

Appointments to the Heritage Conservation Council shall be for three (3) years, excepting the first Council which shall consist of two (2) members serving for one (1) year, two (2) members serving for two (2) years, and three (3) members serving for three (3) years. A member may not serve more than two (2) full consecutive terms. The County Commission shall fill vacancies within sixty (60) days. Vacancies shall be filled for the unexpired term only.

## 203. OFFICERS

Officers shall consist of a Chair and Vice-Chair elected by the members of the Council who shall each serve a term of one year and shall be eligible for re-election; but no member shall serve as Chair for more than two consecutive years. The Chair shall preside over meetings. In the absence of the Chair, the Vice-Chair shall perform the duties of the Chair. If both are absent, a Temporary Chair shall be elected by those present.

## 204. MEETINGS; QUORUM; VOTING; MINUTES

(A) A quorum shall consist of a majority of the members. Decisions or actions of the Council shall be made using the consensus decision making rule, or by a majority vote if consensus cannot be reached. Meetings shall be held at the discretion of the Council, with at least two of the meetings at the beginning of each calendar year; additional meetings shall be on the call of the Chair. No member of the Council shall vote on any matter that may materially or apparently affect the property, income, or business interest of that member. No member of the Council may vote by proxy. Final decisions regarding property will be made by the County Commission. The Chair, and in his or her absence the Acting Chair, may request the attendance of witnesses.

(B) All meetings of the Heritage Conservation Council shall be open to the public. The Council shall keep records of its examinations and other official actions, all of which shall be filed in the office of the County Planning Department, and with the State Historic Preservation Office at the same time distributed to the members, and shall be a public record.

## 205. POWERS & DUTIES

(A) All of the powers and duties enumerated herein are subject to the approval, denial, or modification by the County Commission. All decisions made by the County Commission are subject to appeal to the District Court, pursuant to K.S.A. 19-223. Further, all funds necessary to carry out the purpose of this Resolution shall be approved and appropriated only by the County Commission.

(B) In addition to other responsibilities, the Heritage Conservation Council shall:

(1) Adopt its own bylaws and other procedural regulations, to be made available to the public, subject to the laws of the State of Kansas and Douglas County, which shall include attendance requirements and cover potential conflicts of interests;

(2) Keep a register of all properties, lands, and structures that have been designated as landmarks or historic districts, including all information required for each designation;

(3) Administer and preside over all aspects of the Natural & Cultural Heritage Grant Program. This includes evaluating and recommending to the County Commission which projects shall receive funding;

(a) Final recommendations and decisions by the council are subject to an appeal process before the County Commission;

(4) Work in concert with the State Historic Preservation Officer and observe the State Preservation Act, contained at K.S.A. 75-2701 *et seq*., as amended and comply with the

provisions of the National Historic Preservation Act of 1966, including the provisions protecting access to sensitive areas contained at 16 U.S. C. 470w-3(b), and the corresponding state law provisions contained in the Open Records Act, K.S.A. 45-215, *et seq*., as amended;

(5) Comply with all requirements of the State Historic Preservation Officer to maintain its status as a Certified Local Government;

(6) Make recommendations regarding any National Register nominations upon request of the State Historic Preservation Officer;

(7) Investigate and recommend to the County Commission the adoption of County resolutions designating sites, structures, land, and objects having special historical, natural, community, or architectural value as landmarks to the Douglas County Register of Historic Places;

(8) Investigate and recommend to the County Commission the adoption of resolutions designating areas having special historic, community, agricultural, natural, or architectural value as historic districts to the Douglas County Register of Historic Places; and

(9) Review this Heritage Conservation Plan at least every two (2) years and make a report containing the following:

(a) An assessment of progress in preserving the architecturally, historically, and naturally important resources of the County;

(b) An analysis of numbers, types, locations, and dispositions of applications for designation and certificates of appropriateness, appeals, and variances as provided for in this resolution;

(c) An assessment of the progress and performance in educating the citizenry about the value of heritage preservation; and

(d) An analysis of the validity of this Heritage Conservation Plan and recommendations for changes.

(C) In addition to other responsibilities, the Heritage Conservation Council may:

(1) Conduct ongoing studies of natural and cultural heritage resources, including but not limited to historically and architecturally significant properties and lands, structures, and areas that exemplify the cultural, social, economic, political, agricultural, environment, or architectural history of the nation, region, state, or county;

(2) Determine an appropriate system of markers and make recommendations for the design and implementation of specific markings of the streets and routes leading from one landmark or heritage district to another;

(3) Advise and assist owners of properties or structures within the County on physical and financial aspects of preservation, renovation, rehabilitation, and reuse, and on

procedures for inclusion on the Douglas County, Kansas and National Registers of Historic Places;

(4) Review and comment on any Kansas and National Register nominations submitted to the Council upon request of the County Commission and/or the State Historic Preservation Officer;

(5) Inform and educate the citizens of the County concerning the historic, natural, and architectural heritage of the County by producing maps, newsletters, brochures, pamphlets, books, and/or other appropriate materials, and hold public programs at least twice a year available, and free of charge, to the general public;

(6) Review and comment upon proposed zoning amendments, applications for special use permits, applications for zoning variances, or subdivision applications that affect proposed or designated landmarks and heritage districts. The Director of Planning or the Director of Zoning & Codes, depending upon who is responsible for scheduling the hearing, shall cause copies of all applications for zoning amendments, subdivision approvals, and variances for sites designated as landmarks or within the area of a designated heritage district, to be sent to the Council no less than ten (10) days prior to the date of the hearing by the Lawrence-Douglas County Planning Commission or the Board of Zoning Appeals;

(7) Administer on behalf of the County any full or partial property interest in real property, including easements, that the County may have or accept as a gift or otherwise, upon acceptance of the interest in real property and authorization and approval of such administration by the County Commission;

(8) Seek, accept, and administer on behalf of the County such gifts, grants, and money as may be appropriate for the purposes of this Plan. Such money may be expended for publishing maps and brochures or for hiring a staff person(s) or consultants or performing other appropriate functions for the purpose of carrying out the duties and powers of the Council;

(9) Call upon available County staff members, citizens and other experts for technical advice;

(10) Recommend retaining such specialists or consultants or recommend the appointment of such *ad hoc* citizen advisory committees as may be required or helpful from time to time;

(11) Testify before all boards and commissions, including the Lawrence-Douglas County Planning Commission and Board of Zoning Appeals, on any matter affecting historic, natural, and architecturally significant property, structures, and areas;

(12) Confer recognition upon the owners of landmarks, property or structures within heritage districts by means of certificates, plaques or markers;

(13) Periodically review the County's Zoning Regulations and Subdivision Regulations and recommend to the Lawrence-Douglas County Planning Commission and the County Commission any amendments appropriate for the protection and continued use of landmarks or property and structures within heritage districts;

(14) Attend a heritage preservation-related workshop each year with the aid of County funds, if available; and

(15) Undertake any other action or activity necessary or appropriate to the implementation of its powers and duties or implementation of the purpose of the Heritage Conservation Council.

## ARTICLE 3. SURVEYS AND INVENTORY

### 301. SURVEYS.

The Council shall conduct ongoing County-wide surveys of natural and cultural heritage resources, including but not limited to historically and architecturally significant properties and lands, structures, sites and areas that exemplify the cultural, social, economic, political, agricultural, environmental, or architectural history of the nation, region, state or county. All properties surveyed shall be inventoried in a form compatible with the current Kansas Historic Resources Inventory Form and with the State comprehensive historic preservation planning process. All inventory material shall be available to the public and kept up-to-date.

## ARTICLE 4. LANDMARK AND HISTORIC DISTRICT REGULATIONS

### 401. DOUGLAS COUNTY REGISTER OF HISTORIC PLACES.

(A) There is hereby established a Douglas County Register of Historic Places, which shall include:

(1) A description of all buildings, structures, sites, landscapes and objects designated as landmarks.

(2) A description of the boundaries of each area designated as an historic district.

(3)The boundaries of landmarks and historic districts shall be recorded on the zoning map of the County. A current copy of the Douglas County Register of Historic Places shall be kept on file in the office of the planning administrator.

(B) Landmarks may include, but are not limited to, any:

(1) Exterior of a structure;

(2) Landscape feature or object.

(C) Historic district may include, but are not limited to, two (2) or more structures and/or properties. Individual buildings, sites, structures and objects within designated historic districts shall be classified as key contributing, contributing or noncontributing.

(D) The Register shall be maintained by the Council as an Appendix to this resolution as if fully set out herein.

(E) Maps of each historic district shall be prepared by the applicants, and approved by the Council, identifying each building, site, structure and object with respective classification, and

provided to property owners within the district, and filed with the Register of Deeds of Douglas County, Kansas.

(F) Designation to the Douglas County Register of Historic Places will be made by the Douglas County Commission, on recommendation of the Council.

**402. NOMINATION OF LANDMARKS AND HISTORIC DISTRICTS.**

(A) Nominations may be made only by application in the form approved by the Heritage Conservation Council. Application for nomination of a site, structure or object for designation as a landmark or of an area for designation as an historic district may be made by motion of the Heritage Conservation Council or County Commission; or in the case of a landmark, by the owner(s) of record of the nominated property or structure; or in the case of an historic district, unanimous consent of the owners of record of property in a proposed historic district.

(B) The application shall contain, at the least:

(1) The legal description and addresses of the pertinent structures and/or properties and a description of the environs thereof; and

(2) A statement of historic significance of the nominated property, using the criteria for designation, listed below.

**403. CRITERIA FOR DESIGNATION.**

(A) The Heritage Conservation Council shall, upon such investigation as it deems necessary, make a determination as to whether a nominated site, structure, object or area possesses significant historical, archeological and/or architectural qualities and thus qualifies for designation pursuant to one (1) or more of the following criteria:

(1) Its character, interest or value as part of the development, heritage or cultural characteristics of the community, county, state or nation;

(2) Its location as a site of a significant local, county, state or national event;

(3) Its identification with a person or persons who significantly contributed to the development of the community, county, state or nation;

(4) Its embodiment of distinguishing characteristics of an architectural style valuable for the study of a period type, method of construction or use of indigenous materials;

(5) Its identification as a work of a master builder, designer, architect or landscape architect whose individual work has influenced the development of the community, county, state or nation;

(6) Its embodiment of elements of design, detailing, materials or craftsmanship that render it architecturally significant;

(7) Its embodiment of design elements that make it structurally or architecturally innovative;

(8) Its unique location or singular physical characteristics that make it an established or familiar

visual feature;

(9) Its character as a particularly fine or unique example of a utilitarian structure; including, but not limited to farmhouses, gas stations, or other commercial structures, with a high level of integrity or architectural significance;

(10) Its significance as a site of prehistoric or historic occupation or activity possessing significant archeological value; and

(11) Its character, interest, or value as a cultural or natural resource.

(B) Any site, structure, object or area that meets one (1) or more of the above criteria shall also have sufficient integrity of location, design, materials, feeling, association and setting to make it worthy of preservation or restoration.

**404. DESIGNATION OF LANDMARKS AND HISTORIC DISTRICTS.**

**404.1 SAME; PROCEDURES AFTER APPLICATION SUBMISSION.**

Upon receipt of an application nominating a site, structure or object for designation as a landmark, or nominating an area for designation as an historic district, the following procedures shall apply:

(A) The Administrator shall set the date of a public hearing before the Council concerning the application. The hearing shall be held within sixty (60) days following receipt of a completed application. The hearing may be held during a regular meeting of the Council or during a special meeting of the Council called in part for that purpose, and may be continued for good cause shown.

(B) The Administrator shall publish a notice of the public hearing in the official County newspaper, as required. The notice shall specify the time and place of the hearing, the subject matter of the hearing, and invite all interested persons to appear and be heard.

(C) In addition to the requirements of notice by publication, set forth in subsection (B) above, when the hearing concerns a proposed historic district, the publication notice shall further specify the time and place of an informational meeting to be held by the Administrator, and state as follows:

(1) Owners of property within the proposed historic district have five days from the date of the informational hearing within which to file with the Administrator a written consent or protest to the inclusion of their property within the proposed historic district. Any owner who has received the required notices and fails to file a written consent or protest will be deemed to have consented to the inclusion of their property within the historic district.

(2) A copy of the staff report regarding the proposed historic district will be available for public inspection at the office of the County Clerk at least seven (7) days prior to the informational hearing.

(D) Within ten (10) days after publication of the public notice, the Administrator shall cause a copy of the public notice to be served as follows:

(1) By first class mail to all record owners of property within an owner-nominated landmark or historic district;

(2) By both certified mail and first class mail to all record owners of property within a non-owner nominated landmark or historic property;

(3) By first class mail or hand delivery to the Lawrence-Douglas County Metropolitan Planning Commission and all organizations that have submitted a written request to the Administrator within the last year to receive such notices.

(E) When an historic district is nominated without the written consent of each of the owners, proof of receipt of actual notice of the hearing shall be required. Otherwise, failure of any other notice to actually be received by any other person shall not invalidate action on the nomination of an historic district by either the Council or the County Commission.

(F) The Administrator shall prepare a staff report in conjunction with Lawrence-Douglas County Metropolitan Planning Commission (Planning Commission). The staff report shall be completed and available to the public at the office of the Planning Commission at least seven (7) days prior to the public hearing before the Council and by the date of the informational meeting to be held by the Administrator. The staff report shall contain a legal description of the proposed landmark or historic district, public hearing date and location, name(s) of the applicant and owner(s), requested action, history summary, architectural integrity summary, context description, planning and zoning considerations, positive or negative effects of the designation, fiscal comments, summary of applicable designation criteria, and any other information deemed pertinent by the Administrator.

(G) The Administrator shall hold an informational meeting on any application to nominate an historic district at least seven (7) days prior to the public hearing before the Council. At the informational meeting the Administrator shall present a summary of the staff report and such other information as the Administrator deems relevant.

(H) Prior to the hearing of the completed application before the Council, the Administrator shall notify the Council and the Planning Commission of the case and shall transmit to them copies of the application and staff report, proof of service of notice required by subsections (D) 1, 2 and 3 above, copies of any associated correspondence, and such other reports and materials as are deemed pertinent by the Administrator. The application shall not be considered complete until each of the public notice requirements and time requirements have been met.

**404.2 SAME; PUBLIC HEARING BEFORE COUNCIL.**

(A) The public hearing before the Council may be adjourned from time to time. The Administrator shall make what recommendations the Administrator deems appropriate. Comments shall also be received from the Lawrence-Douglas County Planning Commission, owners of affected property, and all other persons who have an interest in the proceedings.
(B) Following the hearing, the Council shall adopt by resolution a recommendation to be submitted to the County Commission for either (a) designation as a landmark or historic district; (b) denial of designation as a landmark or historic district; or, (c) not to make a recommendation. The resolution shall be accompanied by a report to the County Commission containing the following information:

(1) Explanation of the significance or lack of significance of the nominated landmark or historic district as it relates to the criteria for designation as set forth in Section 403;

(2) Explanation of the integrity or lack of integrity of the nominated landmark or historic district;

(3) In the case of a nominated landmark found to meet the criteria for designation, the Council shall identify the significant exterior architectural features of the nominated landmark that should be protected;

(4) In the case of a nominated historic district found to meet the criteria for designation, the staff shall identify:

(a) The types of significant exterior architectural features of the structures within the nominated historic district that should be protected;

(b) A list of all key contributing, contributing and noncontributing sites, structures, objects and natural resources within the historic district;

(5) The relationship of the nominated landmark or historic district to the ongoing effort of the Council to identity and nominate all potential areas and sites, structures, objects and natural resources that meet the criteria for designation; and

(6) A map showing the location of the nominated landmark or the boundaries of the nominated historic district.

(C) If the Council recommends denial of a nomination, the recommendation may be accompanied by a statement of the reasons for the denial. The Council may make recommendations to the applicant concerning changes, if any, in the proposed action that would cause the Council to reconsider its recommendation of denial and shall confer with the applicant and attempt to resolve as quickly as possible the differences between the owner and the Council.

(1) The applicant may resubmit an amended nomination which addresses the reasons for the denial of the Council's recommendation, or the applicant may appeal the recommendations for denial to the County Commission in accordance with the appeals procedures set out herein.

(D) The Council may recommend and the County Commission may amend or rescind designation of a landmark or historic district in the same manner and procedure as is followed in a designation of a landmark or historic district. A designated landmark or historic district may only be considered for amendment or rescission in the event that the integrity of the designated landmark or historic district is substantially impaired or destroyed by accidental or natural causes.

**404.3 SAME; PUBLIC HEARING BEFORE COUNTY COMMISSION.**

(A) The County Commission shall consider the application at a public hearing. The public hearing may be during a regularly scheduled meeting. If the application concerns the designation of an historic district, the County Commission shall not consider the application until the period for the filing of written consents and protests has ended. Prior to that hearing, the County Commission shall be provided with the record of the proceedings before the Council. The County Commission may approve a resolution designating a nominated site, structure or object as a landmark, or designating an area as an historic district in accordance with the findings of the Council. The County Commission may also recommend submittal of an application to nominate the proposed landmark or historic district for listing on the Kansas or National Registers of Historic Places.

**404.4 SAME; NOTICE OF DESIGNATION.**

(A) Within seven (7) days after approval of the nomination by the County Commission, the Administrator shall notify in writing the owner of each structure or property designated as a landmark or included within an historic district. The notice shall outline the results of such designation. The Administrator, as soon as reasonably possible, shall notify the County Building Official and the County Director of Planning of the designation in the manner requested by the county officials.

(C) The Administrator shall cause to be recorded in a timely manner at the Douglas County Register of Deeds a record of any designation of a landmark, historic district, amendment of such designation, or rescission of such a designation.

(D) The designation of a landmark or historic district shall in no way alter the uses permitted by the existing zoning classification or district of the properties so designated. A desire to change permitted uses shall require the filing of an application requesting a zoning change as provided by the County Zoning Regulations.

**405. DESIGNATION PROTEST PROCEDURES.**

(A) A landmark nomination may be made only with the written consent of the owner.

(B) An historic district nomination may be made only with the consent of all owners within a proposed historic district. Owners of a property within a proposed district shall be given thirty (30) days within which to file written objections to the inclusion of their property in the proposed district. Said thirty (30) days shall commence upon the conclusion of the public hearing before the Heritage Council. Each property owner of record shall be entitled to one vote. If a property owner, who has received the required notice, fails to file a written protest, they shall be deemed to have consented to the inclusion of their property in the proposed district.

**406. RESERVED.**

## ARTICLE 5. RESERVED.

## ARTICLE 6. RESERVED.

## ARTICLE 7. PUBLIC HEARINGS

**701. NOTICE.**

Whenever a public hearing is required by this Plan, and unless otherwise provided by this Plan, notice of the time, place and subject of such public hearing shall be given as provided in this Plan and, and as otherwise required by the rules and procedures of the Douglas County Commission:

(A) By publication in the official County newspaper at least once prior to the date of such public hearing, as required.

(B) If the hearing concerns an appeal, notice of such hearing shall also be given by mail to the person(s) filing such appeal or application.

### 702. BURDEN OF PROOF.

(A) In all hearings the burden of establishing that the requirements and criteria are met for any action shall be upon the party requesting that such action be taken.

(B) A matter on appeal to the County Commission shall be heard de novo.

### 703. CONDUCT OF HEARINGS.

(A) Public hearings shall be conducted in a manner which allows all interested persons an opportunity to present relevant and non-repetitious information concerning the subject matter of the hearing. The body conducting the hearing may impose reasonable time limitation on comments by the general public.

(B) Minutes shall be kept of such hearings and shall identify the subject matter of the hearing, the persons who testified at such hearing, and the determination made by the body conducting the hearing.

(C) Applicants and appellants may be represented by counsel and shall be allowed a reasonable opportunity to rebut any information presented in opposition to their application or appeal. However, this shall not be construed to require that applicants or appellants be allowed to question opposing witnesses.

## ARTICLE 8. PROPERTY OWNED BY PUBLIC AGENCIES

### 801 PROPERTY OWNED BY PUBLIC AGENCIES.

Many of the historically and architecturally important buildings, sites, structures, and objects are owned by government entities. The preservation of buildings, sites, structures, objects, natural resources and districts significant in American history, architecture, archeology, engineering, and culture is established as national policy in the National Historic Preservation Act of 1966, as amended. The Kansas Historic Preservation Act, as amended, declares that the historical, architectural, archeological, and cultural heritage of Kansas is an important asset of the state and that its preservation and maintenance should be among the highest priorities of government. To accomplish the adopted policies of the federal and state governments and to accomplish the purposes of this Plan, the following regulations promote the preservation of publicly-owned historically and architecturally significant buildings, sites, structures, and objects, and natural resources.

(A) For properties owned by the County and located in the unincorporated territory of the County, the Council may recommend, and the County Commission may authorize, the submittal of a proposed nomination of a building, site, structure, object, or district to the Douglas County Register of Historic Places, the Register of Historic Kansas Places, or the National Register of Historic Places.

(B) To further the purposes of this Plan, the Council may enter into agreements with other units of government. The Council may recommend and the County Commission may authorize on behalf of the County, entering into such agreements. Such agreements may address:

(1) Designation of landmarks and historic districts;

(2) Administration of the use of preservation fund resources;

(3) Improvements to landmarks, properties in historic districts, and properties adjacent to landmarks or historic districts;

(4) Efforts to encourage the maintenance of landmarks and properties in historic districts;

(5) Other mutually acceptable provisions.

## ARTICLE 9. HISTORIC RESOURCE ADMINISTRATOR

### 901. DUTIES OF ADMINISTRATOR.

The Administrator shall have the following responsibilities:

(A) Develop application forms and establish procedures consistent with this Plan;

(B) Be responsible for recording/taking minutes at each Council meeting;

(C) Be responsible for publication and distribution of copies of the minutes, reports and decisions of the Council to the members of the Commission;

(D) Give notice as provided in this Plan or by law for all public hearings conducted by the Council;

(E) Advise the County Commission of vacancies on the Council and expiring terms of members;

(F) Prepare and submit to the County Commission a complete record of the proceedings before the Council on any matter requiring County Commission consideration;

(G) Receive, review, process, and refer to the Council and the County Commission applications for designation of landmarks and historic districts, preservation easements, and appeals provided for in this Plan;

(H) Record and file approved landmark and historic district designations, preservation easements, and decisions on appeal;

(I) Maintain an up-to-date copy of the map of landmarks and historic districts, as necessary;

(J) Maintain agenda, minutes, and records of all meetings of the Council including voting records, attendance, resolutions, findings, determinations, and decisions; and

(K) Educate, communicate and inform the residents of Douglas County pursuant to the purpose of this Plan.

## ARTICLE 10. INCENTIVES AND EASEMENTS

### 1001. CONDITIONAL USE PERMIT.

To make the preservation of historically significant structures more economically feasible, the Council may recommend to the Lawrence-Douglas County Planning Commission and the County Commission that a conditional use permit be granted for landmark or historic districts as an alternative zoning category to permit appropriate functions such as bed and breakfast accommodations, house museums, art galleries, and other appropriate specialty uses.

### 1002. PRESERVATION EASEMENTS.

Conservation easements for land designated as landmarks or included in historic districts or preservation easements on the facades of buildings designated as landmarks or structures of merit may be acquired by the County or other appropriate groups of persons through purchase, donation or condemnation pursuant to the laws of the State of Kansas. A preservation easement would include any easement, restriction, covenant or condition running with the land designed to preserve or maintain the significant features of such landmarks or structures.

### 1003. RESERVED.

### 1004. PRESERVATION FUND.

(A) There is hereby established a preservation fund. The fund shall be administered as directed by and according to any limitations and regulations imposed by the County Commission and according to state law. The County may apply for, receive, and place in the fund any federal, state, local, or private gifts, grants, fees, grants-in-aid or bequests. The County Commission may budget and incorporate County revenues into the fund. Fees and fines imposed according to this Plan shall be placed in the fund.

(B) The Council may recommend, and the County Commission may approve, on a case by case basis, that the resources of the Douglas County preservation fund be used for:

(1) The purchase of fee simple title to landmarks or properties located in an historic district;

(2) The purchase of conservation or preservation easements regarding landmarks or properties located in an historic district;

(3) The purchase of fee simple title to landmarks or properties located in an historic district with the eventual objective of property resale subject to a preservation easement;

(4) Payment of installments and fees according to a contract to purchase fee simple title to landmarks or properties located in an historic district or a preservation easement regarding a landmark or properties located in an historic district;

(5) Grants and/or loans to owners, developers, and organizations for preservation and/or rehabilitation of landmarks and properties in an historic district;

(6) Grants and/or loans to organizations for programs and projects designed to achieve one or more of the purposes of this Plan;

(7) The maintenance of landmarks and properties in historic districts or maintenance of preservation easements;

(8) The costs of conducting and preparing surveys of historically and architecturally important buildings, sites, structures and objects;

(9) The costs of preparing nominations of buildings, sites, structures or objects to the State Register or the National Register;

(10) The costs of the preparation and preservation of reports, instructions, brochures, meetings, maps, press releases, conferences, and other measures designed to acquaint citizens, owners, and developers of the purposes and provisions of this Plan; and

(11) Reasonable administrative, planning, architectural, engineering, financial, real estate, appraisal, and/or legal costs associated with the purchase of property, the purchase and enforcement of preservation easements, the sale of property, the negotiation of contracts, the preparation of a grant application, and legal actions.

(C) The Council may recommend, and the County Commission may approve, criteria, standards, rules, limitations, and regulations for projects and programs established pursuant to the requirements of this section.

**1005. HISTORIC CONSERVATION AWARD PROGRAM.**

Preservation-related activities may be reviewed and awards given at appropriate times and may be given in some or all of the following categories as the Council deems appropriate:

Adaptive Use

Preservation Project

Restoration/Renovation
(A) Residential
(B) Commercial

Exterior Paint

Architectural Design

Contractor

Real Estate Sales Person

Significant Preservation Contributor

The Council may add other appropriate categories to the award program. Winners of the awards may receive plaques and/or certificates.

## ARTICLE 11. FEES

### 1101. FEES.

(A) There shall be a $50 fee to be paid by the persons nominating an historic district, and a $10 fee to be paid by persons nominating a landmark. These fees shall be paid at the time of filing the application for nomination. All fees received shall be placed in the preservation fund. Fees may be waived for good cause.

## ARTICLE 12. MINIMUM MAINTENANCE REQUIREMENT

### 1201. MINIMUM MAINTENANCE REQUIREMENT.

All real property, and any building, structure, or utility thereon designated as an historic landmark or contributory and key contributory properties located within an historic district, whether owned or controlled privately or by any public body, shall receive reasonable care, maintenance and upkeep appropriate or its protection, preservation, enhancement, perpetuation, or use in compliance with the terms of this Plan and the applicable resolutions and other regulations of the County.

## ARTICLE 13. CIVIL ACTION

### 1301. CIVIL ACTION.

Any person who willfully constructs, reconstructs, alters, restores, renovates, relocates, stabilizes, repairs or demolishes any building, object, site, or structure in violation of this Plan shall be required to return the building, object, site, or structure to its appearance and setting prior to the violation. Any action to enforce this provision shall be brought by the County. In the event that the cost of returning the building, object, site or structure to its appearance or setting prior to the violation exceeds fifty percent (50%) of the value of the building, object, site or structure, the offender shall make restitution in the form of either reconstructing the building, object, site or structure to its appearance and setting prior to the violation or paying to the preservation fund a dollar amount equivalent to the cost of reconstruction. This civil remedy shall be in addition to, and not in lieu of, any criminal prosecution and penalty otherwise authorized by state law or county resolution.

**CERTIFIED LOCAL GOVERNMENT AGREEMENT**

Pursuant to the provisions of the National Historic Preservation Act, as amended (Act), to applicable federal regulations (36 CFR 61), and to the Procedures for Implementation of Certified Local Governments in Kansas, as amended, Douglas County, Kansas (County) agrees to:

1. Enforce the appropriate legislation for the designation and protection of historic properties and cooperate with the State Historic Preservation Officer (SHPO) in these matters as referenced in the "Requirements for Certification of Local Governments in Kansas" section of the Procedures for Implementation of Certified Local Governments in Kansas, as amended.

2. Maintain an adequate and qualified historic preservation review commission composed of professional and lay members as described in "Requirements for Certification of Local Governments in Kansas" section of the Procedures for Implementation of Certified Local Governments in Kansas, as amended.

3. Maintain a system for the survey and inventory of historic properties as referenced in "Requirements for Certification of Local Governments in Kansas" section of the Procedures for Implementation of Certified Local Governments in Kansas, as amended.

4. Provide for adequate public participation in the historic preservation program, including the process of recommending properties to the National Register as referenced in the "Certified Local Government Participation in the National Register Process" section of the Procedures for Implementation of Certified Local Governments in Kansas, as amended.

5. Adhere to all Federal requirements for the Certified Local Government Program.

6. Adhere to all other requirements outlined in Procedures for Implementation of Certified Local Governments in Kansas, as amended, and issued by the Kansas State Historic Preservation Office.

7. Adhere to all requirements mandated by Congress regarding use of federal historic preservation funds including maintaining an adequate financial management system and requirements outlined in the Historic Preservation Fund Grants Manual.

Upon its designation as a Certified Local Government (CLG), the County shall be eligible for all rights and privileges of a CLG specified in the Act, Federal procedures, and procedures of Kansas. These rights include eligibility to apply for available CLG grant funds in competition only with other Certified Local Governments. If Historic Preservation Fund grants set aside for Certified Local Governments should be awarded to the County by the SHPO, the transfer of such funds and the requirements governing their use will be handled in a separate grant agreement.

| **STATE:** | **DOUGLAS COUNTY, KANSAS:** |
|---|---|
| _____ | _____ |
| SHPO or Designee | Chief Elected Official |
| _____ | _____ |
| Typed Name and Title | Typed Name and Title |
| _____ | _____ |
| Date | Date |

# THE PURPOSE OF THE CERTIFIED LOCAL GOVERNMENT PROGRAM

Since 1966, when Congress first established a preservation program for the United States, the national historic preservation program has operated as a decentralized partnership between the federal government and the states. Through the National Park Service, Department of the Interior, the federal government established a program of identification, evaluation, and protection of historic properties which were implemented primarily by the states and federal agencies. The success of that working relationship prompted Congress to expand the partnership to provide for participation by local governments. The National Historic Preservation Act as amended (16 U.S.C. 470 et. seq.). contains the legal basis for the federal-state-local preservation partnership. The federal law directs the State Historic Preservation Officer and the Secretary of the Interior to certify local governments to participate in this partnership and specifies several requirements which the local government must meet. Within federal parameters, each state tailors its Certified Local Government procedures to its circumstances.

The Certified Local Government (CLG) program is designed to promote the preservation of prehistoric and historic sites and districts by establishing a partnership between the local government on behalf of the Kansas State Government and the Kansas Historic Preservation Office (KHPO), a division of the Kansas State Historical Society. The KHPO seeks to encourage and expand local involvement in preservation issues. Some of the goals of the program are as follows:

1. Historic preservation issues should be understood and addressed at the local level and then integrated into the local planning and decision making processes at the earliest possible opportunity.

2. The interests and concerns of local governments should be integrated into the identification, evaluation, nomination, and protective processes of the Kansas Historic Preservation Office.

3. Information on local historic preservation issues should be provided to the Kansas Historic Preservation Office and to the public.

4. Historic preservation should be facilitated at the local level through the establishment of historic preservation commissions and programs.

5. The process employed in the Kansas Inventory of Historic Sites should be used to assist local communities in identifying and defining neighborhood development and conservation areas.

Through participation in the identification, evaluation, and protection of local historic resources, each Certified Local Government can assume a leadership role in the preservation of its community's prehistoric and historic sites, have a formal role in the National Register nomination process, participate in the establishment of state historic preservation objectives, and receive technical and advisory services from the Historic Preservation Office. A Certified Local Government also is eligible to apply annually to the Historic Preservation Office for subgrants from a designated Certified Local Government fund.

## I. REQUIREMENTS FOR CERTIFICATION OF LOCAL GOVERNMENTS IN KANSAS

Any general purpose political subdivision of the state, such as a city or county, which meets the criteria set forth in this document, is eligible to apply for certification. The National Historic Preservation Act as amended (16 U.S.C. 470 et. seq.) contains five broad standards, all of which must be met by a local government seeking certification. The federal standards are defined and amplified below.

A. The local government must enforce appropriate state and local legislation for the designation and protection of historic properties.

1. The local government must observe any requirements placed on it by the protective clause of the State Historic Preservation Act (KSA 75-2724) and cooperate with the State Historic Preservation Officer in any matters arising under that statute.

2. The local government must adopt a local historic preservation ordinance. The purpose of the ordinance must be clearly stated. The ordinance must establish an historic preservation commission, define all relevant terms, and specify the number, composition, and duties of the commission.

3. The ordinance shall give the local preservation commission the authority either to designate local historic districts and individual landmarks or recommend such designation to the jurisdiction's governing body, which may retain final approval. The local ordinance shall clearly define a process and criteria for local landmark designation.

4. The local ordinance shall contain provisions requiring public hearings for all designation and design review matters. Exceptions to this provision may be made for sensitive historic resources as described in Section 304 (16 US.C. 470w-3) of the National Historic Preservation Act as amended (16 USC 470) and the 45-221 exception of K.S.A. 45-215 - 45-223 Open Records Act of 1983 as amended in 1995.

5. The local government is encouraged to establish provisions for reviewing effects on locally designated properties. The nature and scope of the protections offered for properties on the local register shall be at the discretion of the local government. The criteria upon which a local preservation commission reviews proposals for alteration or demolition must be clearly set forth in the ordinance or adopted by the commission under the authority of the ordinance. Such criteria must be consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties. Should the local government elect not to include design review under the provisions for the local register, it still must conduct such reviews on Kansas and National Register properties as required by the State Historic Preservation Act (KSA 75-2724).

6. The local ordinance shall contain specific time limits within which the commission and the applicant shall act.

7. Provisions for enforcing decisions and a right of appeal must exist in the ordinance or in the general zoning ordinance.

B. The local government must establish an adequate and qualified historic preservation commission through a local ordinance.

1. Each Certified Local Government shall have a commission with a minimum of five members, whose geographic area of authority is coterminous with the boundaries of that local government's jurisdiction. The commission members must be appointed by the chief elected official of the jurisdiction.

2. The commission shall be composed of both professional and lay members, all of whom have a demonstrated interest, knowledge, or training in historic preservation. Information on the credentials of the commission members must be kept on file and available to the public. The commission members must attempt to remain current concerning historic preservation issues and techniques.

3. At least forty percent of the commission membership shall be drawn from the preservation-related profession defined by the National Park Service. These professions currently include Prehistoric and Historic Archeology, Architectural History, Conservation, Cultural Anthropology, Curation, Engineering, Folklore, Historic Architecture, Historic Landscape Architecture, Historic Preservation Planning, Historic Preservation, and History. Additional professions may be added to this list in the future by the National Park Service. This requirement may be waived if the local government can provide written documentation to the Historic Preservation Office that it has made a reasonable effort to fill those positions.

4. The historic preservation commission shall review all proposed National Register nominations for properties within its jurisdiction as well as alterations, relocations, and demolitions of listed historic properties as required by law. When a commission reviews a National Register nomination or other actions which are normally evaluated by a professional in a specific discipline and that discipline is not represented on the commission, the commission shall seek expertise in that area before rendering its decision. For example, an archeological site is normally evaluated by an archeologist, a building may be evaluated by an architectural historian or an architect. Local governments are encouraged to try to find qualified individuals with expertise in the relevant disciplines to serve on their preservation commissions. If they cannot be found, commissions will need to explore the possibility of utilizing the services of consultants or other outside experts or work with the Historic Preservation Office to meet the need in another way.

5. Terms of office of commission members shall be staggered and of at least two years duration. There need not be a limit on the number of consecutive terms served by one member.

6. The local appointing authority shall act within sixty days to fill a vacancy, including expired terms. The Historic Preservation Office shall be provided with the resumes and qualifications of new appointments.

7. The commission shall adopt rules of procedure or by-laws which shall be made available to the public. Included in the rules of procedure shall be sections which specify attendance requirements for members and which cover potential conflicts of interest situations unless those matters are already covered by other city ordinances. These rules of procedure must be

consistent with state and federal procedures.

8. All meetings of the commission shall be open to the public. Minutes shall be kept of each meeting and shall be available for public inspection. A copy of the minutes of each meeting shall be sent to the Historic Preservation Office at the same time that copies are distributed to commission members. Exceptions may be made as described in Section 304 (16 US.C. 470w-3) of the National Historic Preservation Act as amended (16 USC 470) and the 45-221 exception of K.S.A. 45-215 - 45-223 Open Records Act of 1983 as amended in 1995.

9. The commission must meet as often as necessary to complete its work in a timely manner. The commission must meet no less than twice a year.

10. All preservation responsibilities and activities shall be carried out by the Certified Local Government in a manner consistent with the state's comprehensive planning process.

11. An annual report of CLG related activities of the local government shall be submitted to the Historic Preservation Office. The report shall be due no later than August 1 and shall cover the period July 1 to June 30. The report shall include, but is not limited to, such items as number and types of cases reviewed and their disposition, a list of new designations made during the year, changes in boundaries of any previous designations, resumes of new commission members, a list of all current members with their professional disciplines, attendance records, a list of educational meetings attended by commission members, and all minutes relating to National Register nominations.

12. The State Historic Preservation Officer may, at his or her discretion and by mutual written agreement with the local government, delegate further responsibilities to the Certified Local Government.

13. In order to stay current with developments in the field, each commission member is strongly encouraged to attend at least one informational or training meeting per year that pertains to fields associated with historic preservation or with the duties of local preservation commissions. Ongoing training of historic preservation commissions may be a factor in the awarding of Historic Preservation Fund subgrants.

14. All responsibilities and duties assigned to local historic preservation commissions shall be complementary to and carried out in coordination with those assigned to the State in 36 C.F.R. 61.6 (e).

C. The local government must maintain a system for the survey and inventory of historic properties.

1. The Certified Local Government shall begin or continue a survey process approved by the Historic Preservation Office to identify historic properties within its jurisdiction. All survey and inventory activities as well as other preservation responsibilities shall be carried out by the Certified Local Government in a manner consistent with the state's comprehensive historic preservation planning process which is available from the Kansas Historic Preservation Office.

2. The Certified Local Government must maintain a detailed inventory of the districts, sites, or structures it has surveyed. All inventory materials shall be kept up to date.

3. All new surveys shall utilize the Kansas Historic Resources Inventory Reconnaissance Form.

4. All inventory materials shall be accessible to the public except in those conditions specified in Section 304 (16 US.C. 470w-3) and the 45-221 exception of the Kansas Open Meetings Law (K.S.A. 45-215 - 45-223).

5. Duplicate copies of materials from all survey efforts conducted by the local government shall be provided to the Historic Preservation Office unless already in the files of that office.

D. The local government shall provide for adequate public participation in the local historic preservation program, including the process of recommending properties for nomination to the National Register.

1. All meetings of commissions shall adhere to the provisions of the Kansas Open Meetings Law (KSA 75-4318).

2. Reasonably detailed minutes of all decisions and actions of the commissions, including the reasons for making those decisions, must be kept on file and available for public inspection except in those conditions specified in Section 304 (16 US.C. 470w-3) and the 45-221 exception of the Kansas Open Meetings Law (K.S.A. 45-215 - 45-223)..

3. All decisions by the commission shall be made in public forum and applicants shall be given written notification of decisions of the commission.

4. The local ordinance shall contain provisions requiring public hearing for all designation and design review matters.

E. Local governments shall satisfactorily perform the responsibilities listed in points A through D and those others specifically delegated to them under the National Historic Preservation Act by the State Historic Preservation Officer.

## II. PROCESS FOR CERTIFICATION OF LOCAL GOVERNMENTS IN KANSAS

A. The chief elected official of the local government shall request certification from the Kansas State Historic Preservation Officer. The request for certification will contain the following:

1. A certification agreement signed by the chief elected official or a designated representative that the local government will fulfill all the standards for certification outlined above.

2. A copy of the local historic preservation ordinance.

3. A list and accompanying maps of any area or areas already designated as historic districts as well as individual landmarks.

4. Resumes for each of the members of the historic preservation commission. This would include, where appropriate, credentials of members with expertise in the fields related to historic preservation.

B. Kansas State Historic Preservation Office staff shall respond to the chief elected official within thirty days of receipt of an adequately documented written request.

C. If the SHPO determines that the local government fulfills the requirements for certification, an agreement will be signed with the local government.

D. The agreement with the local government will specify that it satisfies the following minimum requirements:

1. The local government must enforce appropriate state and local legislation for the designation and protection of historic properties.

2. The local government must establish and continue to maintain an adequate and qualified historic preservation commission.

3. The local government must establish and maintain a system for the survey and inventory of historic properties.

4. The local government must provide for adequate public participation in the local historic preservation program, including the process of recommending properties to the National Register.

E. The certification agreement shall specify either directly or by reference the role of the local government in the National Register nomination process and any other responsibilities delegated to the local government that have been mutually agreed upon by the State Historic Preservation Officer and the local government.

F. After having determined the CLG application meets all of the requirements in the Kansas State procedures, the SHPO will forward the request for concurrence and the signed review checklist to the Secretary of the Interior, or his or her designee, for review. If the Secretary does not take exception to the request within fifteen working days of receipt, the local government shall be regarded as certified by the Secretary.

## III. PROCESS FOR MONITORING, EVALUATING AND DECERTIFYING LOCAL GOVERNMENTS IN KANSAS

A. The Kansas Historic Preservation Office shall periodically monitor and evaluate the performance of Certified Local Governments, but no less often than once a year, to ensure that each government is fulfilling the required standards. Minutes from all commission meetings must be sent to the KHPO at the same time they are sent to the commission members. The minutes assist the state office in the ongoing monitoring of the program and allow the office to identify potential needs for assistance. Continued certification shall be based on performance.

1. The Historic Preservation Office shall review the annual reports submitted by the Certified Local Governments, minutes of the local historic preservation commission meetings, records of the administration of any federal funds received from the Historic Preservation Fund, and other documents as necessary.

2. The local certified government shall make all pertinent records available to the Historic Preservation Office on request.

3. The Historic Preservation Office also may send representatives to meetings of the local historic preservation commission.

B. The following standards shall serve as criteria for the Historic Preservation Office to prepare a written evaluation of the Certified Local Government.

1. Composition of the membership of the local historic preservation commission has been consistent with the requirements in Section I. B.1-3.

2. Members of the commission have attempted to remain current with issues within the field of historic preservation by attending one workshop or conference a year that concerns historic preservation or the disciplines of which it is composed. At least one commission member has attended an historic preservation-related workshop or training program in the reporting year.

3. Design review decisions were consistent with the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings, state regulations KAR 118-3-1 through 118-3-16, and the Standards and Guidelines for Evaluating the Effect of Projects on the Environs, 1988 Edition.

4. Decisions on the eligibility of properties for the National Register were consistent with the National Park Service criteria.

5. The local preservation commission and the chief local elected official have provided opinions on all properties within their jurisdiction that are proposed for National Register nomination.

6. Public participation requirements of the Kansas Certified Local Government Program have been observed.

7. A system for initiating historic preservation surveys and recording their outcomes has been maintained. If conducted, surveys have been conducted a format consistent with KHPO inventory requirements and copies of the data provided to the Historic Preservation Office.
8. All conditions in the agreement between the Certified Local Government and the State Historic Preservation Office have been met.

9. The annual report was filed on time and contained all required information.

10. The minutes of the local historic preservation commission shall be provided the Historic Preservation Office as required by Section I. B.8.

*11. Any work funded with Historic Preservation Fund monies was completed in a timely manner, or was on schedule, and consistent with the Secretary of the Interior's standards for that type of work, e.g., survey, planning, National Register Nominations, etc.

*12. The fiscal management system of the Certified Local Government was in compliance with federal requirements.

*13. The Certified Local Government properly carried out all of its obligations as a subgrantee.

* Applicable only to Certified Local Governments which receive federal Historic Preservation Fund monies.

C. If the Historic Preservation Office's evaluation indicates that the performance of a local certified government is inadequate, the Historic Preservation Office shall document that assessment and recommend in writing to the local government specific steps to bring its performance up to an acceptable level.

1. The Certified Local Government shall have a period of no less than thirty days to implement improvements or may, with SHPO approval, develop an adequate schedule for making necessary improvements.

2. If the Historic Preservation Office determines that sufficient improvement has not occurred, the State Historic Preservation Officer shall recommend decertification of the local government to the Secretary of the Interior, citing the specific reasons for the recommendation.

3. Local certified governments may file requests with the State Historic Preservation Officer to be decertified voluntarily and without prejudice.

D. According to the National Park Service Historic Preservation Fund Grants Manual, when a local government is decertified, current HPF grants may be terminated if the terms of the subgrant can not continue to be met after decertification. If this is the case, the Historic Preservation Office shall suspend or terminate the Historic Preservation Fund assistance to that local government and implement procedures for closing out the grant as specified in the manual.

## IV. CERTIFIED LOCAL GOVERNMENT PARTICIPATION IN THE NATIONAL REGISTER PROCESS

NOTE: This section addresses only properly completed National Register nomination forms, which have been prepared in accordance with the Secretary of the Interior's Standards for Registration and Guidelines for Registration (Federal Register, v. 48, no. 190, Sept 29, 1983, pp. 44726-44728) and the National Park Service's technical publication How to Complete National Register Nomination Forms. Requests for the National Register nomination information, for preliminary opinions by the State Historic Preservation Officer on a property's eligibility, for Part 1 certifications for the preservation tax incentives, etc., will continue to be handled as they have been in the past.

A. All documentation and materials necessary for the nomination of properties to the National Register of Historic Places shall be received by the State Historic Preservation Officer.

B. If a property to be nominated lies within the jurisdiction of a Certified Local Government, the Historic Preservation Office shall transmit a copy of the nomination materials together with a staff review to the historic preservation commission of the Certified Local Government within thirty days after the State Historic Preservation Officer has determined that the nomination materials are complete and correct unless the Certified Local Government itself has initiated the nomination.

C. After providing a reasonable opportunity for public comment, the Certified Local Government shall submit a report to the Historic Preservation Office regarding the eligibility of each property or district proposed for nomination to the National Register within its jurisdiction within sixty days after receipt of the nomination materials. The report shall include the recommendation of the historic preservation commission and the chief elected official and take into account any substantive new information that may be identified through the public meeting process. The report may range from a simple affirmation that the property is eligible to a lengthy research report stating why the property should or should not be nominated. The report shall concentrate on the properties eligibility under the National Register criteria of eligibility. Guidelines on how to apply these criteria will be provided by the Historic Preservation Office. The report could also reference the Certified Local Government's preservation plan or other relevant planning documents. A copy of the report submitted to the Historic Preservation Office shall be available for public inspection locally.

D. If both the historic preservation commission and the chief elected official agree that the proposed nomination meets the criteria for listing the property in the National Register of Historic Places, the State Historic Preservation Officer will schedule the nomination for consideration by the Kansas Historic Sites Board of Review at the earliest possible opportunity.

E. If the historic preservation commission and the chief elected official disagree on whether the proposed nomination meets the National Register criteria, the State Historic Preservation Officer will schedule the nomination for consideration by the Kansas Historic Sites Board of Review at the earliest possible opportunity.

F. If the historic preservation commission and the chief elected official agree that the proposed nomination does not meet the criteria for listing in the National Register of Historic Places, the State Historic Preservation Officer will not schedule the nomination for consideration by the Kansas Historic Sites Board of Review unless an appeal is filed within thirty days with the State Historic Preservation Officer in accordance with the regulations established by the National Park Service on the appeals process.

G. If the historic preservation commission and the chief elected official do not comment on the proposed nomination within sixty days, the State Historic Preservation Officer shall present the nomination for consideration by the review board at the earliest opportunity.

H. The Kansas Historic Sites Board of Review, after considering all opinions from the local chief elected official and the historic preservation commission, shall make its recommendations to the State Historic Preservation Officer. According the federal regulations, properties approved by the board may be forwarded by the State Historic Preservation Office to Keeper of the National Register. The State Historic Preservation Officer has the discretion to decline to nominate properties the board approves. Either the local historic preservation commission or the chief elected official may appeal the final decision of the State Historic Preservation Officer under the appeals process referenced earlier.

I. In order to expedite the nomination process a Certified Local Government may elect to send a supporting report with a nomination when it is first submitted by that government or local preservation commission to the State Historic Preservation Officer. The report should be submitted jointly by the chief elected official and the historic preservation commission and should at a minimum clearly state that in their opinion the property is eligible for the National Register and why. Public participation requirements still apply. In addition, the SHPO may expedite the CLG's participation in the nomination process, including the sixty day commenting period, with the concurrence of the CLG, as long as owner notification procedures have been met.

J. Failure of the Certified Local Government to submit to the Historic Preservation Office report on all proposed nominations within its jurisdiction will be considered by the Historic Preservation Office in its annual review on the Certified Local Government.

K. Certified Local Government notification procedures do not apply when a federal agency nominates a property under its ownership or control. CLGs are encouraged to coordinate with federal agencies to the extent practical, however, in the consideration of such nominations.

L. The SHPO may delegate to a CLG other responsibilities pertaining to the processing of National Register nominations, as agreed to by the CLG, including responsibility for National Register owner notifications under 36 CFR 60, (or allowing the local historic preservation commission to act in place of the State Review Board for the purposes of considering nominations).

## V. PROCESS FOR TRANSFERRING FUNDS TO CERTIFIED LOCAL GOVERNMENTS

A. In order to be eligible to receive a portion of the Certified Local Government share of the Historic Preservation Fund allocation to Kansas, a Certified Local Government must meet the following conditions:

1. The Certified Local Government shall have adequate financial management systems which meet the standards of the Office of Management and Budget Circular A-102, Attachment G, which are auditable in accordance with General Accounting Office Standards, and which are periodically evaluated by the State Historic Preservation Officer. (The Historic Preservation Office will provide advice and information on developing and implementing financial management systems which meet the requirements above).

2. The Certified Local Government shall adhere to all requirements mandated by Congress pertaining to the Historic Preservation Fund.

3. A local government must meet the standards for certification established by the National Park Service and the state program, as confirmed by the annual report.

B. The local share of the Kansas allocation from the Historic Preservation Fund will be available to Certified Local Governments on a matching basis for eligible historic preservation activities and projects approved by the Historic Preservation Office. At present, federal law mandates that a minimum of ten percent of the state's annual Historic Preservation Fund allocation be set aside for distribution to Certified Local Governments. Any shortfall in meeting the required ten percent distribution to CLG projects will be returned to the National Park Service for reallocation. At such times as Congress may appropriate more than sixty-five million dollars to the Historic Preservation Fund, one-half of the excess shall also be available to Certified Local Governments. Certified Local Governments may participate in the review and approval of National Register nominations whether or not they elect to receive federal historic preservation funds.

C. All of the funds for Certified Local Governments will be awarded on a competitive basis. All local governments which have been certified are eligible to apply for funds but will not automatically receive funds. The Kansas State Historical Society requires that a portion of the grant funds be matched by the local government. Grants made from the Historic Preservation Funds cannot be used as a matching share for other federal grants, except for Community Development Block Grants monies or revenue sharing funds. Indirect costs may charged as a part of the grant only if the Certified Local Government subgrantee meets requirements of Chapter 12 of the Historic Preservation Fund Grants Manual. Unless the Certified Local Government has a current indirect cost rate approved by the cognizant federal agency, only direct costs may be charged.

D. The Certified Local Government which seeks to obtain a portion of the state's set-aside must complete a project application and budget by the deadline established annually by the Historic Preservation Office. Application forms, instructions, and any annual priorities or criteria for funding established by the Historic Preservation Office will be sent to all CLGs when they become available.

E. The applications will be ranked by the Kansas Historic Sites Board of Review before recommendations for funding are made to the State Historic Preservation Officer. In general, eligible activities will include projects which further the goals of identification, evaluation, nomination, and protection of the community's historic and cultural resources. This would include survey, nomination of properties to the National Register, development of a comprehensive preservation plan, and public education programs. The applications will be evaluated according to the criteria stated in the annual HPF application. Priority for funding will be given to well-conceived projects that are in accord with the published elements of the state historic preservation plan or the stated annual priorities of the HPF grant program. Past performance on Historic Preservation Fund grants is a major factor in the awarding of funds. Poor past performance on HPF grant projects may be grounds to deny funding unless the applicant can demonstrate that the conditions that led to the difficulties on the previous grants have been resolved.

F. Certified Local Governments can use Historic Preservation Fund monies only for activities that are identified as eligible in The Historic Preservation Fund Grants Manual.

G. Use of federal funds will be limited by all existing restriction imposed by the federal government. The KHPO will inform grant applicants of current federal restrictions. The intent of Historic Preservation Fund assistance is to augment, not replace, existing local commitment to historic preservation.

H. The Certified Local Government which receives Historic Preservation Fund assistance will be considered a subgrantee of the state and will be required to sign a project agreement similar to that of other subgrantees. That agreement will include the specific requirements contained in Sec. V. A. At the end of the project, the Certified Local Government will have to file a completion report and other documents which will be spelled out in the project agreement.

I. The Certified Local Government must be responsible for including the grant project in the "single audit" completed for the city in accordance with OMB Circulars A-102 and A-133. When requesting reimbursement for expenditure of funds, the Certified Local Government will need to provide the Historic Preservation Office with sufficient documentation for that office to verify that the expenditures occurred. Such documentation may include payroll records, contract documents, invoices, vouchers, canceled checks, etc. The Historic Preservation Office must have this information since the state is responsible for verifying to the National Park Service the subgrantee's match and for the proper accounting of federal funds in accordance with OMB Circulars A-102 and A-133.

J. The evaluation of performance by the Historic Preservation Office will include an assessment of the Certified Local Governments' fiscal management of the Historic Preservation Fund monies.

K. No single Certified Local Government should receive a disproportionate share of the allocation. This is based on the assumption that the amount of funds available for Certified Local Governments will be sufficient to fund more than one local government's application, that more than one application will be received, and that each application funded can produce a specific product. If these assumptions are not valid, there is the possibility that only one project may be funded.

## APPENDIX A

**DEFINITIONS**

**"Certified Local Government"** means a local government that has been certified to carry out the purposes of the National Historic Preservation Act (16 U.S.C. 470 et. seq.), as amended.

**"Certified Local Government Share"** means that the funding authorized for transfer to local governments in accordance with Sec. 103(c) of the National Historic Preservation Act (16 U.S.C. 470 et. seq.), as amended.

**"Chief elected local official"** means the elected head of a local government.

**"Historic preservation planning"** means an ongoing process that is consistent with the technical standards issued by the Department of the Interior and which produces reliable, understandable, and up-to-date information for the decision making related to identification, evaluation, protection, and treatment of historic resources.

**"Historic preservation commission"** means a board, council, commission, or similar body established by a local historic preservation ordinance.

**"Historic Preservation Office"** means the Kansas Historic Preservation Office. It is the full-time staff of the Historic Preservation Officer and a division of the Kansas State Historical Society. Its function is to implement the historic preservation program in Kansas.

**"Historic Preservation Fund"** means the monies accrued under the Outer Continental Shelf Lands Act, as amended, to support the program of matching grants-in-aid to the States for historic preservation programs and projects.

**"Local government"** means a city or county or any other general purpose political subdivision of the state.

**"National Park Service"** means the bureau of the Department of the Interior to which the Secretary of the Interior has delegated the authority and responsibility for administering the National Historic Preservation Program.

**"National Register of Historic Places"** means the national list of districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering, and culture, maintained by the National Park Service, Department of the Interior.

**Historic Preservation Fund Grants Manual** means the manual that sets forth National Park Service administrative procedures and guidelines for activities concerning the federally related historic preservation programs of the states, tribal governments, and local governments. The manual includes guidelines and procedures for the administration of the historic grants-in-aid program.

**"Secretary's Standards and Guidelines"** means the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation. The Standards and Guidelines provide information about archeological and historic preservation activities and methods.

**State Historic Preservation Officer"** means the official in each state responsible for implementing the historic preservation program. In Kansas it is the Executive Director of the Kansas State Historical Society as designated in K.S.A. 75-2717.

**"Statewide historic preservation plan"** means the part of the planning process that conforms to the Secretary of the Interior's Standards for Preservation Planning and is approved as a planning document by the National Park Service. The comprehensive plan entails the organization into a logical sequence of preservation information pertaining to identification, evaluation, registration, and treatment of historic properties, and setting priorities for accomplishing preservation activities.

**"Subgrantee"** means the agency, institution, organization, or individual to which a subgrant of federal funds is made by the State and which is accountable to the State for the use of the funds provided.

**DOUGLAS COUNTY ADMINISTRATIVE SERVICES**
**Division of Purchasing**
1100 Massachusetts Street
Lawrence, KS 66044-3064
(785) 832-5286 Fax (785) 838-2480
www.douglas-county.com

MEMO TO: The Board of County Commissioners
Craig Weinaug, County Administrator

FROM: Jackie Waggoner, Purchasing Director
Division of Purchasing

SUBJECT: Consider Recommendation of Contract for Architectural Services

DATE: November 20, 2012

At Commission direction, staff has begun developing a team for the design and construction of a new public works facility. In June, we solicited proposals for design professional services which defined the following deliverables as two phases.

Phase I will include performing additional space study analysis and programming development, developing schematic designs, and design development to provide a firm budget for the project. This estimate will consider how sustainable design can be incorporated into the project and look at different levels of sustainable building practices (i.e. LEED v. LEED Gold, Energy Star, or other measurements).

Phase II will be contingent on the approval of the commission. It is anticipated that the project will be funded through the issuance of Bonds. Phase II would consist of all remaining professional services such as contract drawings and specifications for bidding, contract administration, electronic as-built and closeout.

The following ten proposals were received in response to our solicitation: 360 Architecture, Clark-Huesemann, Davidson Architecture & Engineering, GLMV Architecture, PGAV Architects, Sabatini Architects, SFS Architecture, Treanor Architects, Wellner Architects, and Yaeger Architecture. The evaluation committee members were Commissioner Nancy Thellman, Sarah Plinsky, Keith Browning, Terese Gorman, and Eileen Horn. Initially, the committee members scored each project according to how the proposal met the evaluation criteria based on similar work, personnel, team structure, and project approach.

Based on the scoring, seven firms were selected for interviews. Following the interviews, the overall consensus was Clark-Huesemann provided a strong team and had more familiarity with our overall project. Significant value was given to firms that included public works facility programmer and planner consultants as part of their team. Firms were evaluated based on their qualifications. Cost was only factored in once the evaluation committee had narrowed their selection. The cost proposals were not entirely comparable from firm to firm. Based on qualifications, the committee selected Clark Huesemann as their top ranked firm and began negotiations.

A portion of the committee met with Clark-Huesemann to negotiate and finalize a contract, as well as legal counsel from Stevens and Brand. During our meetings, we negotiated and further defined the scope of work which resulted in reducing their proposed fee by $63,957. While this reduces their cost for both phases from $605,075 to $541,118, we are only seeking approval at this time for phase I expenses which totals $219,026.

It is important to understand that there may be some additional cost based on unknown variables (LEED certification, fuel station, car wash bay, etc.), but would be more clearly defined when we come back for phase II approval.

Once the contract with the Design firm is approved, staff will begin the design process and preparing a request for proposals for construction management services. The committee and I will be available at the commission meeting (or before) to answer any questions you may have.

**RECOMMENDATION:** The Board of County Commissioners accepts the negotiated proposal for design professional services with Clark-Huesemann for phase I in the amount of $219,026.

**DOUGLAS COUNTY ZONING & CODES DEPARTMENT**
2108 W 27th Street, Suite I
Lawrence, Ks 66047
Phone: 785.331.1343 Fax: 785.331.1347

MEMORANDUM

TO : Board of Douglas County Commissioners
Craig Weinaug, Douglas County Administrator

FROM: Linda M. Finger, Interim Director, Zoning & Codes Department

DATE : November 21, 2012

RE : Amendment to HR-12-9-3 and draft Resolution for dissolving existing 1997 UBC Building Code Appeals Board and appointing 2012 I-Codes Building Code Appeals Board.

1. Please find attached a draft revision to HR-12-9-3, which pertains to the adoption of the 2012 International Codes. This Resolution corrects and clarifies a few additional points that were identified by staff and county counselor, as they prepare for the I-Code implementation.

2. Please find attached a Resolution dissolving the existing Building Code of Appeals created under the 1997 UBC and creating a new Building Code of Appeals Board, under the 2012 I-Codes. Terms would begin January 1, 2013. (Recommendations for Board members are provided separately.) Please note there is a requirement in the I-Codes for specific trades and other professionals to be represented on this Board.

**HOME RULE RESOLUTION NO. HR-12-_____**

A HOME RULE RESOLUTION OF THE BOARD OF COUNTY COMMISSIONERS OF DOUGLAS COUNTY, KANSAS AMENDING THE CONSTRUCTION CODES OF DOUGLAS COUNTY, KANSAS, SEPTEMBER 19, 2012 EDITION, AS CODIFIED AT CHAPTER 13 OF THE DOUGLAS COUNTY CODE.

**WHEREAS**, K.S.A. 19-101a, and amendments thereto, authorizes the Board of County Commissioners (hereinafter the "Board") to transact all County business and perform all powers of local legislation and administration it deems appropriate, including the enactment of legislation designed to protect the health, safety, welfare, and quality of life of the citizens of Douglas County; and

**WHEREAS**, by Resolution No. HR-12-9-3, the Board of County Commissioners adopted Construction Codes of Douglas County, Kansas, September 19, 2012 Edition, codified at Chapter 13 (the "Construction Codes"), generally adopting new construction and building codes for the unincorporated areas of Douglas County, Kansas, replacing construction codes that were previously in place, with the new codes becoming effective January 1, 2013; and

**WHEREAS**, the Board desires to make certain amendments to the Construction Codes as set forth in this Resolution.

**NOW, THEREFORE**, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF DOUGLAS COUNTY, KANSAS, SITTING IN REGULAR SESSION THIS ___ DAY OF _____ 2012 AND INTENDING TO EXERCISE THE POWERS OF HOME RULE LEGISLATION PURSUANT TO K.S.A. 19-101a, DOES HEREBY RESOLVE AS FOLLOWS:

**Section 1. AMENDMENTS TO CONSTRUCTION CODES**. The Construction Codes of Douglas County, Kansas, September 19, 2012 Edition, as codified at Chapter 13 of the Douglas County Code, are hereby amended as follows:

1.1 Section 13-103.1.1 is amended to read:

13-103.1.1 **Residential One and Two Family Dwellings.** The provisions of the International Residential Code, 2012 Edition, adopted pursuant to Article 2 of this Chapter, as amended, shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, location, use, occupancy, removal and demolition of detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories in height with separate means of egress, and their accessory buildings.

1.2 Section 13-106.6 is amended to read:

13-106.6 **Right of Entry.** Where it is necessary to make an inspection to enforce the provisions of this Chapter, or where the building official has reasonable cause to

believe that there exists in a structure or upon a premises a condition which is contrary to or in violation of this Chapter, the building official is authorized to enter the structure or premises at reasonable times to inspect or to perform the duties imposed by this Chapter, provided that if such structure or premises be occupied that credentials be presented to the occupant and entry requested. If such structure or premises is unoccupied, the building official shall first make a reasonable effort to locate the owner or other person having charge or control of the structure or premises and request entry. If entry is refused, the building official shall have recourse to the remedies provided by law to secure entry.

Comment [A1]: took out modifier that the believed violation had to make the structure or premises unsafe

1.3 Section 13-107.4.1.3 (listing of work exempt from permits) is amended to read:

3. Decks not exceeding 200 square feet in area, that are not more than 30 inches above grade at any point, are not attached to a dwelling and do not serve the exit door required by Section R 311.4 of the International Residential Code, 2012 Edition

1.4 Section 13-107.4.1.3 (listing of work exempt from permits) is amended to read:

1.5 Section 13-112.1 is amended to read:

13-112.1 **General.** Construction or work for which a permit is required shall be subject to inspection by the building official and such construction or work shall remain accessible and exposed for inspection purposes until approved. Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this Chapter or of resolutions of Douglas County. Inspections presuming to give authority to violate or cancel the provisions of this Chapter or of other resolutions of Douglas County shall not be valid. It shall be the duty of the permit applicant to cause the work to remain accessible and exposed for inspection purposes. The building official may order work exposed for inspections purposes and the permit applicant shall bear the cost thereof. If the permit applicant refuses to expose the work for inspection, the building official may expose the work, revoke the permit, or take other action as authorized by this Chapter or other applicable law. Neither the building official nor Douglas County shall be liable for expense entailed in the removal or replacement of any material required to allow inspection.

1.6 Section 13-113.4 is amended to read:

13-113.4 **Revocation.** The building official is authorized to, in writing, suspend or revoke a certificate of occupancy or completion issued under the provisions of this Chapter wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure or portion thereof, or its use or occupancy, is in violation of any ordinance or regulation or any of the provisions of this Chapter.

1.7 Section 13-116 is amended to read:

13-116 **VIOLATIONS AND STOP WORK ORDERS.**

13-116.1 **Unlawful Acts.** It shall be unlawful for any person, firm or corporation to erect, construct, alter, extend, repair, move, remove, demolish, use or occupy any building, structure or equipment regulated by this Chapter, or cause the same to be done, in conflict with or in violation of any of the provisions thereof.

13-116.2 **Notice of Violation**. The building official is authorized to serve a notice of violation or order on the person responsible for the erection, construction, alteration, extension, repair, moving, removal, demolition, use, or occupancy of a building or structure in violation of the provisions of this chapter, or in violation of a detail statement or a plan approved thereunder, or in violation of a permit or certificate issued under the provisions of this Chapter. Such order shall direct the discontinuance of the illegal action or condition and the abatement of the violation.

13-116.3 **Violation and Penalties.** Any person who violates a provision of this Chapter or fails to comply with any of the requirements thereof or who erects, constructs, alters or repairs a building or structure in violation of the approved construction documents or directive of the building official, or of a permit or certificate issued under the provisions of this Chapter, shall be guilty of a misdemeanor, punishable by a fine of not more than $500 or by imprisonment for not more than one month, or by both such fine and imprisonment. Each day that a violation continues after due notice has been served shall be deemed a separate offense. In addition to any other remedies provided by the code or other applicable law, the county or building official may bring civil suit to enjoin the violation of any provisions of the code. The availability or pendency of an appeal to the Board of Construction Code Appeals shall not preclude Douglas County or the building official from pursuing such civil or criminal actions, seeking any available remedy, including injunction, relating to any such violation, and the court need not delay or defer its adjudication of the case on the basis that such appeal may be available or pending before the Board of Construction Code Appeals.

13-116.4 **Stop Work Orders.** Upon notice from the building official or his designee that work on any building or structure is being performed contrary to the provisions of any codes adopted in this Chapter or in an unsafe and dangerous manner, such work shall be immediately stopped. The stop work order shall be in writing and shall be given to the owner of the property involved, or to the owner's agent or to the person doing the work and shall state the conditions under which work will be permitted to resume. Where an emergency exists, the building official shall not be required to give a written notice prior to stopping work. Any person who shall continue any work in or about the structure after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable to a fine of not more than $500 and such other penalties as prescribed by law.

13-116.5 **Abatement and Injunction of Violation.** The imposition of the penalties herein prescribed shall not preclude the building official or Douglas County from instituting appropriate action to prevent unlawful construction or restrain, correct or abate a violation, or to prevent illegal use or occupancy of a building, structure, or premises, or to stop an illegal act, conduct, business or utilization of a building or other construction on or about any premises.

1.8 Section 13-117.1 is amended to read:

13-117.1 **Conditions.** Structures or equipment that are or hereafter become unsafe, unsanitary or deficient because of inadequate means of egress facilities, inadequate light and ventilation, or which constitute a fire hazard, or are otherwise detrimental to public health, safety, or welfare, or that involve illegal or improper occupancy or inadequate maintenance, shall be deemed an unsafe condition. Unsafe structures shall be taken down and removed or made safe, as the building official deems necessary and as provided for in this section. A vacant structure that is not secured against entry shall be deemed unsafe.

1.9 Section 13-117.3 is amended to read:

13-117.3 **Notice.** If an unsafe condition is found, the building official shall serve on the owner, agent or person in control of the structure, a written notice that describes the condition deemed unsafe and specifies the required repairs or improvements to be made to abate the unsafe condition, or that requires the unsafe structure to be demolished within a stipulated time. Such notice shall require the person thus notified to declare immediately to the building official acceptance or rejection of the terms of the order. If the owner, agent or person in charge fails to comply within the time allowed, the building official shall have the authority to complete the repairs or demolition or otherwise remove the structure as reasonably necessary to protect public health, safety, and welfare.

**Section 2. COPIES**. Not less than one copy of the Construction Codes, as amended, together with the International Building Code, 2012 Edition; the International Residential Code, 2012 Edition; the International Plumbing Code, 2012 Edition; the International Mechanical Code, 2012 Edition; the International Fuel Gas Code, 2012 Edition; and the National Electric Code (NFPA 70), 2011 Edition; all adopted therein, marked and stamped in the manner provided by K.S.A. 12-3304, shall be filed with the County Clerk and shall be open to inspection and available to the public at reasonable business hours. Subsequent references to the "Construction Codes" shall mean the Construction Codes as adopted and amended herein.

**Section 3. SEVERABILITY**. If any section, subsection, sentence, clause or phrase herein or in the Construction Codes is, for any reason, held to be unconstitutional or invalid, such decision shall not affect the validity of the remaining portions hereof. The Board declares that it would have adopted the Construction codes, and each section, subsection, clause or phrase thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses and phrases be declared unconstitutional or invalid.

**Section 4. EXISTING RIGHTS OR VIOLATIONS.** Nothing herein or in the Construction Codes hereby adopted shall be construed to affect any suit or proceeding impending in any court, or any rights acquired, or liability incurred, or any cause or causes of action acquired or existing, under any act or resolution repealed in connection with the adoption of the Construction Codes, nor shall any just or legal right or remedy of any character be lost, impaired or affected by this Resolution.

**Section 5. REPEAL.** Provisions in Resolution No. HR-12-9-3 inconsistent with this Resolution are repealed.

**Section 6. EFFECTIVE DATE.** This is a home rule resolution and shall take effect and be in force and effect from and after its adoption and the later of (i) its publication once in the official County newspaper, and (ii) January 1, 2013.

**ADOPTED** THIS ____ day of _____ 2012.

BOARD OF COUNTY COMMISSIONERS OF
DOUGLAS COUNTY, KANSAS

_____
Mike Gaughan, Chair

_____
Nancy Thellman, Member

_____
Jim Flory, Member

ATTEST:

_____
Jameson D. Shew, County Clerk

**RESOLUTION NO. _____**

A RESOLUTION OF THE BOARD OF COUNTY COMMISSIONERS OF DOUGLAS COUNTY, KANSAS DISSOLVING CURRENT BOARD OF CONSTRUCTION CODES APPEALS AND APPOINTING NEW MEMBERS TO THE BOARD CONSTRUCTION CODES APPEALS.

**WHEREAS**, by Resolution No. HR-12-9-3, the Board of County Commissioners adopted Construction Codes of Douglas County, Kansas, September 19, 2012 Edition, codified at Chapter 13 (the "Construction Codes"), generally adopting new construction and building codes for the unincorporated areas of Douglas County, Kansas, replacing construction codes that were previously in place, with the new codes becoming effective January 1, 2013; and

**WHEREAS**, Section 13-115.1 of the Construction Codes, as adopted by the foregoing Resolution, creates a Board of Construction Codes Appeals, to consist of five members, with terms of 4 years; and

**WHEREAS**, the Board of Construction Codes Appeals, as in effect for the various trades pursuant to the building codes in effect prior to the effective date of the foregoing resolution, has not met for many years and is not currently operational; and

**WHEREAS**, to avoid any ambiguity, the Board of County Commissions desires to dissolve the current Board of Construction Codes Appeals and reconstitute a new Board of Construction Codes Appeals.

**NOW, THEREFORE**, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF DOUGLAS COUNTY, KANSAS, SITTING IN REGULAR SESSION THIS ____ DAY OF _____ 2012, DOES HEREBY RESOLVE AS FOLLOWS:

**Section 1. DISSOLUTION OF CURRENT BOARD OF CONSTRUCTION CODES APPEALS; REMOVAL OF MEMBERS**. The Board of Construction Codes Appeals, as constituted in accordance with Douglas County Code and resolutions, as in effect on the date of this Resolution, is dissolved effective December 31, 2012. All members serving on the current Board of Construction Codes Appeals are removed.

**Section 2. RECONSTITUTED BOARD OF CONSTRUCTION CODES APPEALS; APPOINTMENT OF INITIAL MEMBERS**.

(a) The Board of Construction Codes Appeals is reconstituted in accordance with Section 13-115.1 of the Construction Codes, effective January 1, 2013. The Board of County Commissioners will, prior to January 1, 2013, appoint five individuals to serve as the initial members of the reconstituted Board of Construction Codes Appeals pursuant to Section 13-115.1 of the Douglas County Code.

(b) The initial terms of the individuals appointed to the reconstituted Board of Construction Codes Appeals will be staggered so that all terms do not expire at the same time. One member will have an initial term of 1 year, one member will have an initial term of 2 years, one member will have an initial term of 3 years, and two members will have an initial term of 4 years. Following expiration of each initial term, subsequent terms will be the regular 4-year term in accordance with Section 13-115.1 of the construction Codes.

**Section 3. EFFECTIVE DATE.** This resolution shall take effect and be in force and effect from and after its adoption.

**ADOPTED** THIS ____ day of _____, 2012.

BOARD OF COUNTY COMMISSIONERS OF
DOUGLAS COUNTY, KANSAS

_____
Mike Gaughan, Chair

_____
Nancy Thellman, Member

_____
Jim Flory, Member

ATTEST:

_____
Jameson D. Shew, County Clerk

**Board of Construction Code of Appeals -- Effective January 1, 2013**

PURPOSE: To determine the suitability of alternate materials and types of construction and to hear appeals of orders, decision or determinations made by the building official relative to the interpretation of the adopted building codes. (2012 International Code)

TERM and MEETING SCHEDULE: Board members shall serve 4 years and shall meet once a month if necessary.

COMPOSITION OF BOARD: There shall be 5 members, each shall have had 10 years experience. They must be either a general contractor, licensed architect, master electrician, master plumber, master mechanic, or a professional engineer. At least one of the members should have professional engineering or architectural experience. No more than two members should be selected from the same profession.

# Memorandum
# City of Lawrence
# Douglas County
# Planning & Development Services

**TO:** **Planning Commission**

**FROM:** **Planning Staff**

**CC:** **Scott McCullough, Director**

**Date:** **Item Misc No. 1 – For November 12, 2012 Commission Meeting**

**RE:** **Long-Range Planning Work Program**

This memo is provided to outline the recommended long-range planning work program. An update of recent efforts is presented, along with a list of future work projects, of which some will begin in 2013. Staff is seeking input from the Lawrence-Douglas County Planning Commission, Lawrence City Commission and Douglas County Board of County Commissioners on the work program to help set priorities for 2013. Staff's recommended priorities for 2013 are shown below. Other projects will be worked on as resources allow.

## Major Projects Completed – 2012

1. Annual Comprehensive Plan Review – PC received 5/21/12

2. *Inverness Park District Plan [Revision]* – CC adopted 5/15/12, BCC adopted 6/13/12

3. *Northeast Sector Plan* – PC Approved, BCC & CC comments returned to PC 12/12/11, BCC adopted 6/13/12, CC adopted 9/11/12

4. US-40 and K-10 Plan –
   - Background work with KDOT in 2011, Completed March 2012

5. Complete Streets –
   - Background work in 2011, CC adopted 3/27/12

6. Innoprise software implementation to coordinate development applications –
   - Go-live in June 2012 / on-going implementation

## Major Projects in Process – 2012

1. Downtown Redevelopment Study – Fall/Winter 2012

2. Update Retail Market Study – biannual survey – Fall/Winter 2012

3. 2010 Census Follow-up - Fall 2012
   - Analysis
   - Reports/Challenge
   - Comprehensive Plan amendments – following response to challenge (end of year or early 2013 – CPA-5-2-11)

4. Sector Plan Implementation Items
   - *Oread Neighborhood Plan*
     - Develop Overlay Districts with Design Guidelines as identified in the plan – Staff review/development underway
     - Development Code text amendment
       - Congregate living - Completed
   - *Farmland Industries Redevelopment Plan* - Underway - Fall 2012
     - Master planning – Completed/infrastructure planning underway
     - Property platting - PC approved 9/24/12
     - Rezoning – CC approved 10/23/12
   - *West of K-10 Plan* implementation
     - Update the *West 6th Street/K-10 Nodal Plan* to reflect adopted Future Land Use designations of the *West of K-10 Plan* – In process (or may be modified) with CC600 CPA

5. *Environment Chapter* implementation
   - *Potential Regulations*
     - Stream Setback Ordinance for Lawrence - Mapping assistance from Stormwater Engineer required
     - Review Development Code /prepare text amendments regarding community gardens and markets - Completed – consider additional revisions to the Home Occupations standards regarding on premises sales
   - *Inventories*
     - Woodland/Tree Inventory for County – Surveys conducted summer 2012/report to be delivered mid-2013
     - Wetlands/Riparian Areas
     - Document & Map existing quarries – Research currently underway
     - Identify appropriate locations within County for sand dredging operations – Research currently underway
     - Agricultural Soils – GIS layer developed and available 2012

## Major Projects – 2013

1. Community Review of Horizon 2020 Goals & Policies – Major update to the comprehensive plan with multiple community meetings to review and affirm policies

2. Horizon 2020 Amendments Initiated or Identified
   - *Chapter 3 – General Plan Overview*
     - Map 3-1 – Update Lawrence UGA Service Areas & Future Land Use Map (after Census analysis and water/wastewater master plan updates) – CPA-2008-8
     - Map 3-1 – Modify UGA boundaries in Grant Township (as recommended in *Northeast Sector Plan*)
     - Map 3-2 – Update Lawrence Future Land Use Map to incorporate adopted Sector Plans and improved readability – CPA-5-3-11
     - Map 3-3 – Douglas County Growth Areas – Modify identified UGAs around small cities to Planning Areas and reflect adopted comprehensive plans (on hold until Lawrence UGA is revised/utility master plans updated) – CPA-2008-2
   - *Chapter 4 – Growth Management*
     - Maps 4-1 & 4-2 – Update with new County road classifications – CPA-5-4-11
   - *Chapter 6 – Commercial Land Use*
     - Update policies for auto-related commercial development – CPA-5-5-11
   - *Chapter 9 – Parks, Recreation and Open Space*
     - Map 9-2 –Update Future Park Zones Map to reflect latest floodplain maps – CPA-5-6-11
   - *Chapter 10 – Community Facilities*
     - Chapter review and update – CPA-4-5-10
   - *Chapter 11 – Historic Resources*
     - Chapter update - HRC 5/23/11 recommended; PC approved 6/20/11 – CPA-4-4-10
   - *Chapter 17 – Implementation*
     - Chapter update to reflect completed tasks & identify new steps

3. Sector Plan Implementation Items
   - *Oread Neighborhood Plan*
     - Develop Overlay Districts with Design Guidelines as identified in the plan **–** Continue staff review/development and public review/adoption process

4. Review Development Code requirements and process for Comprehensive Plan Amendments associated with rezoning cases and for applicant requested CPAs – TA-12-00206 - CC initiated 8/12/12

5. CRS (Community Rating System) Manual Review
   - Potential Development Code Amendments to follow

6. Develop Innoprise Citizen Access Component

7. Participate in Local Food Policy initiatives

## Major Projects – Beyond 2013

1. Continue Community Review of Horizon 2020 Goals & Policies – Continue major update to the comprehensive plan with multiple community meetings to review and affirm policies

2. Continue Development of Innoprise Citizen Access Component

3. *Environment Chapter* implementation
   - *Potential Regulations*
     - Wetlands protections
     - Woodland and Urban Forest protections
   - *Inventories*
     - Groundwater
     - Mineral Deposits

4. Commercial Design Standards Review

5. *South of Wakarusa* Sector Plan

# Memorandum
# City of Lawrence
# Planning & Development Services

**TO:** **Board of County Commissioners**

**FROM:** **Mary Miller, Planner**

**CC:** **Craig Weinaug, County Administrator**

**Date:** **For November 28, 2012 meeting**

**RE:** **Temporary Set Aside Agreement for Sadies Lake**

The Board of County Commissioners accepted dedication of easements and rights-of-way for Sadies Lake Final Plat at their May 16, 2012 meeting.

When platting property in the unincorporated area of the county, environmentally sensitive lands are required to be protected through filing of a temporary set aside agreement or a permanent conservation easement with the Register of Deeds. A temporary set aside agreement has been prepared for the protection of environmentally sensitive lands located on property being platted as Sadies Lake. The protected area was shown on the approved final plat.

**Action requested:**
Approve and sign the temporary set aside agreement for Sadies Lake final plat.

[Above Space Reserved for County Officials]

# TEMPORARY SET ASIDE AGREEMENT

THIS TEMPORARY SET ASIDE AGREEMENT (this "**Agreement**") is made and entered into effective the _____ day of _____, 2012 (the "**Effective Date**"), by and between Sadies Lake, L.C., a Kansas limited liability company, having an address of P.O. Box 1797, Lawrence, Kansas 66044 ("**Owner**"), and Douglas County Kansas, having an address of 1100 Massachusetts Street, Lawrence, Kansas 66044 ("**Beneficiary**").

## RECITALS

WHEREAS, Owner is the record owner of certain real property located in Douglas County, Kansas (the "**Property**"), legally described in **Exhibit A** attached to and, by reference, made a part hereof;

WHEREAS, a portion of the Property, as shown in the map or schematic attached hereto as **Exhibit B** and, by reference, made a part hereof (the "**Protected Property**"), possesses certain environmentally sensitive areas, as defined in Section 20-810(k) of the Subdivision Regulations for Lawrence and the Unincorporated Areas of Douglas County, Kansas;

WHEREAS, the specific attributes of the environmentally sensitive areas to be protected under this Agreement (collectively referred to as the "**Conservation Values**" which are noted in **Exhibit C**) are located on the Protected Property;

WHEREAS, it is desired that the Conservation Values of the Protected Property be preserved and maintained by imposing certain limitations on the permitted use of the Protected Property, all in accordance with the terms and provisions of this Agreement.

## AGREEMENT

Pursuant to Section 20-810(k) of the Subdivision Regulations for Lawrence and the Unincorporated Area of Douglas County, Kansas, and so Owner can plat the Property, Owner and Beneficiary hereby enter into this Agreement to protect and preserve the Conservation Values of the Protected Property as follows:

**1. PURPOSE**. The purpose of this Agreement is to protect and preserve the Conservation Values of the Protected Property, while allowing Owner to use the Protected Property consistent with the laws, ordinances, and approved uses applicable to the Protected Property. This Agreement will impose certain use restrictions upon the Protected Property following the Effective Date of this Agreement, until the expiration or sooner termination of this Agreement. The use restrictions set forth in this Agreement shall be and are hereby limited solely to the Protected Property, and nothing herein shall affect the Owner's use of the remaining portion of the Property.

**2. OWNER'S RESERVED RIGHTS**. Owner reserves exclusively to Owner, and to Owner's successors and assigns, all rights, title and interests accruing from ownership of the Protected Property, including the right to engage in or permit others to engage in, uses of the Protected Property that are consistent with the purpose of this Agreement and the laws, ordinances, and any approved site plan(s) applicable to the Protected Property. Without limiting the generality of the foregoing, and by way of example and not limitation, the following rights are hereby expressly reserved by Owner, and Owner's sucessors and assigns, following the Effective Date of this Agreement:

**2.1 Conveyance**. Owner may deed, transfer, dedicate, sell, give, mortgage, pledge, lease or otherwise convey rights in the Protected Property, provided that any such conveyance shall be subject to the terms and provisions of this Agreement.

**2.2 Continued Agricultural Use**. Owner may continue to farm the Protected Property, grow crops and other vegetation, and raise livestock upon the Protected Property, subject to the limitations contained in Section 3.7(vi), below, and such agricultural use shall not be construed to be a commercial activity that is prohibited by this Agreement.

**2.3 Ingress and Egress**. The parties acknowledge and agree that use of the Property as a corporate retreat or for any other use permitted in any approved site plan(s) may require the construction of paved or unpaved vehicular ingress and egress over, on, and across portions of the Protected Property. Nothing in this Agreement shall be construed to prohibit or otherwise limit Owner's ability to repave, resurface, repair, maintain, or improve any existing paths of travel, walking trails, and paved or unpaved access roads for vehicular ingress and egress over and upon the Protected Property. All reasonable efforts will be made to avoid or minimize any new paved or unpaved vehicular ingress or egress within the Protected Area, and any new vehicular ingress or egress within the Protected Area shall be shown on an approved site plan of the Property. Owner may repair, rebuild, renovate or maintain any existing structures located with the Protected Property prior to the Effective Date of this Agreement.

**2.4 Recreational and Commercial Uses**. Owner, and its licensees and invitees, may make recreational and commercial uses of the Protected Property (by way of example and not limitation, such as horse riding, hiking, camping, hunting, fishing, etc.), to the extent consistent with Owner's intended use and any approved site plans.

**2.5 Fences**. Owner may construct, repair, replace, maintain, improve or remove any additional fencing as Owner deems necessary to secure the Protected Property.

**2.6 Educational Use**. Owner may, in Owner's sole and absolute discretion and without obligation, make the Protected Property accessible to the public to enjoy the Conservation Values of the Protected Property.

**2.7 Farm Machinery, Boats and Vehicles**. Farm machinery, boats and other motorized vehicles may be operated on the Protected Property in a manner consistent with and in furtherance of preserving the Conservation Values, the Owner's intended use and the laws, ordinances, and approved uses applicable to the Protected Property.

**2.8 Declaration of Restrictive Covenants**. Owner may record covenants, conditions, and restrictions that are more restrictive than this Agreement.

**3. PROHIBITED USES**. Except as expressly provided in this Agreement, any activity on or use of the Protected Property inconsistent with the purpose of this Agreement and preservation of the Conservation Values of the Protected Property is prohibited. Without limiting the generality of the foregoing, Owner agrees as follows:

**3.1 Structures**. There shall be no New Structure (defined hereafter) constructed on the protected Property, except as shown on any approved site plan(s) from time to time. The term "**New Structure**" includes, but is not limited to, a house, mobile or manufactured home, garage, barn, church, or other building, swimming pool, billboard or other sign, antenna, storage tank, utility system, wind turbine, tower, or any other temporary or permanent improvement of a similar nature or with similar characteristics. This prohibition shall not extend to the construction, repair, renovation, maintenance, or restoration or existing structures on the Protected Property, to any ingress or egress described in this Agreement, to deer stands, duck blinds and similar structures used for hunting, docks, or to any improvements shown on any approved site plan(s) of the Property.

**3.2 Minerals and Gas Development**. There shall be no exploration for, development of or extraction of minerals, gas or hydrocarbons on the surface of the Protected Property.

**3.3 Soil, Water and Watersheds**. Any use or activity that may cause significant soil degradation or erosion, or significant pollution of any water on or about the Protected Property is prohibited unless otherwise permitted in this Agreement. Following the Effective Date of this Agreement, there shall be no new man-made damming, impoundment or channelization of the streams, watercourses, or watersheds on the Protected Property, except pursuant to the rights of a

watershed district under K.S.A. 24-1201 et seq., as amended, or as may be approved by the Beneficiary. Any damming, impoundment or channelization of the streams, watercourses, or watersheds on the Protected Property existing as of the Effective Date of this Agreement shall not be affected by this Agreement and may be maintained or repaired from time to time. Nothing in this Agreement shall prevent or inhibit Owner from remediating damage to the Property caused by or related to the relocation of U.S. Highway 59, including without limitation the remediation of soil runoff, cleanup, silt and sediment removal, or the construction of a weir or other structure to slow or control the increased stormwater runoff caused by the U.S. Highway 59 relocation.

**3.4 Topography; Exposed Rock.** There shall be no removal of topsoil, sod, sand, gravel, rock, or other materials, or any change in the topography of the Protected Property in any material manner, other than as permitted in any approved site plan(s) of the Property, as expressly permitted in this Agreement (including but not limited to vehicular ingress and egress), or to provide walking trails or other outdoor amenities that do not materially affect the Conservation Values on the Protected Property.

**3.5 Dumping**. There shall be no dumping of trash, construction materials, or hazardous or toxic substances on the Protected Property. Nothing herein shall prohibit the collection of refuse and trash consistent with the intended use of the Protected Property, provided that all such refuse and trash shall be routinely collected, stored, and disposed of in a timely and lawful manner.

**3.6 Commercial Activities**. Commerical activities other than those expressly provided for in this Agreement, an approved site plan, or as approved by the Beneficiary shall not be permitted on the Protected Property, either by Property Owner or Property Owner's licensees, invitees, or tenants.

**3.7 Tree and Vegetation Removal**. Cutting or removal of trees or vegetation and undergrowth in the Protected Property is prohibited except to the extent reasonably necessary to (i) install and maintain fences, (ii) prevent invasion of undesirable undergrowth or, in the case of areas within the Protected Property that are not "stands of mature trees" as of the Effective Date, to prevent the invasion of woody plants on the native vegetation, (iii) control dead, diseased or dying trees, (iv) clear sites for the construction of buildings, vehicular ingress and egress, utility services, pedestrian paths of travel, camp sites, and related support services to the extent reasonably necessary and consistent with any approved site plan(s) and this Agreement, and in connection with Owner's intended use, (v) reduce tree density, control undergrowth, or manage the species of trees within the Protected Property, for the purpose of beautifying or otherwise improving the aesthetics of the Protected Property; and (vi) plant or harvest crops or crop plots on those portions of the Protected Property that do not constitute "stands of mature trees" or "stream corridors" as of the Effective Date. Nothing in this Agreement shall prohibit Owner from mowing grass, hay, etc., or removing trees or vegetation located outside of the Protected Property, or the mowing or removal of weeds or other undesirable growth in connection with or related to the remediation of damage to the Property caused by the relocation of U.S. Highway 59. The cutting, pruning, and removal of trees, brush, woody shrubs, and other undesirable

undergrowth from the Property prior to the Effective Date of this Agreement, by Owner or Owner's predecessors, shall not be affected by this Agreement.

**3.8 Construction of New Structures**. The construction of any new structures or improvements in the Protected Area shall be shown on an approved site plan of the Property, and shall be constructed in a manner reasonably calculated to minimize damage to the Protected Area. Beneficiary may, as part of the site plan approval process and to the extent reasonably necessary to protect the Protected Area, require the use of construction fencing and/or signage, or to designate areas for the storage of materials and equipment, in an effort to screen or establish the limits of development activity related to such improvements.

**4. BENEFICIARY'S REMEDIES**.

**4.1 Notice of Violation; Corrective Action**. If Beneficiary determines that a violation of the terms of this Agreement has occurred or is threatened, Beneficiary shall give written notice to Owner of the alleged violation and demand corrective action sufficient to cure the violation.

**4.2 Injunctive Relief**. If Owner fails to cure the violation within 30 days after receipt of notice thereof from Beneficiary, or fails to commence curing such violation within the 30 day period, if such sure cannot reasonably be cured within the 30 day period**,** or fails to continue diligently to cure such violation until finally cured, Beneficiary may bring an action at law or in equity in a court of competent jurisdiction to enforce the terms of this Agreement or to enjoin the violation. Notwithstanding the 30 day notice required above, if Beneficiary reasonably determines that circumstances require immediate action to prevent or mitigate significant damage to the ConservationValues of the Protected Property, Beneficiary may pursue its remedies under this Agreement, including but not limited to injunctive relief, without prior notice to Owner. The remedies described herein shall be in addition to all remedies now or hereafter existing at law or in equity.

**4.3 Waivers**. No delay or omission by a Beneficiary in the exercise of any right or remedy upon any breach by Owner shall impair such right or remedy or be construed as a waiver. Owner hereby waives any defense of laches, estoppel, or prescription.

**5. ACCESS**. No license, easement, or other right of physical access by the general public to any portion of the Property or the Protected Property is conveyed by this Agreement.

**6. COSTS, LIABILITIES, AND CONTROL**.

**6.1 Costs, Legal Requirements, and Liabilities**. Owner retains all responsibilities and shall bear all costs and liabilities of any kind related to Ownership, operation, upkeep, and maintenance of the Protected Property.

**6.2 Control**. Nothing in this Agreement shall be construed as creating any right or ability in Beneficiary to exercise physical or managerial control over the day-to-day operations

of the Protected Property, or any of Owner's activities on the Protected Property, or otherwise to become an operator with respect to the Protected Property within the meaning of any applicable environmental law.

**7. AMENDMENT**. If circumstances arise under which an amendment to or modification of this Agreement is advisable or necessary, Owner and Beneficiary are free to jointly amend this Agreement, but any such amendment must be in writing and signed by both parties. Any such amendment shall be recorded in the Office of the Register of Deeds of Douglas County, Kansas.

**8. NOTICES**. Any notice, demand, request, consent, approval, or communication that any party desires or is required to give to any other shall be in writing and either served personally or sent by first class mail, postage prepaid, addressed as follows:

To Owner: Sadies Lake, L.C.
Attn: Michael Treanor
P.O. Box 1797
Lawrence, KS 66044

To County: Douglas County, Kansas
Attn: County Administrator
1100 Massachusetts St.
Lawrence, KS 66044

or to such other address as any party from time to time shall designate by written notice to the other.

**9. RECORDATION**. Planning Staff, at Owner's expense, shall record this instrument in the Office of the Douglas County, Kansas Register of Deeds prior to the recordation of the Certificate of Survey.

**10. COVENANT RUNNING WITH THE LAND**. Subject to termination or expiration of this Agreement according to its terms, the covenants, terms, conditions, and restrictions of this Agreement shall constitute a covenant and equitable servitude running with the land and be binding upon Owner and Owner's personal representatives, heirs, successors and assigns, and inure to the benefit of Beneficiary and their respective successors and assigns. The terms "Owner" and "Beneficiary," wherever used herein, and any pronouns used in place thereof, shall include, respectively, the above-named Owner and its successors, and assigns, and the above-named Beneficiary and its successors and assigns. A party's rights, obligations, and liabilities under this Agreement terminate upon transfer of the party's interest in this Agreement or Protected Property, except that liability for acts or omissions occurring prior to transfer shall survive transfer.

**11. GENERAL PROVISIONS.**

**11.1 Controlling Law**. The interpretation and performance of this Agreement shall be governed by the laws of the State of Kansas.

**11.2 Entire Agreement**. This instrument sets forth the entire agreement of the parties with respect to this Agreement and supersedes all prior discussions, negotiations, understandings, or agreements relating to the Agreement, all of which are merged herein. No alteration or variation of this instrument shall be valid or binding unless contained in an amendment that complies with Section 7 of this Agreement.

**12. TERMINATION**. If Owner elects to abandon the permitted uses shown on any approved site plan, terminate the approved plat of the Protected Property, and rezone the Protected Property to an agricultural use, then this Agreement shall terminate automatically, effective on the date such rezoning ordinance is published in accordance with Kansas law. In addition, if Beneficiary's Subdivision Regulations are amended in the future such that this Agreement would not have been necessary to approve a plat or other land division involving the Protected Property had the application for approval been made after the effective date of the amendment, either party hereto may terminate this Agreement upon written notice to the other. In the event of a termination of this Agreement, the parties agree to sign an instrument identifying the termination and record it with the Office of the Douglas County, Kansas Register of Deeds.

**13. EXPIRATION OF AGREEMENT**. This Agreement shall expire on the date that is 2 years after the date that the Protected Property is annexed into the jurisdictional boundaries of any City in Douglas County, Kansas unless further action is taken by either such city or Owner to secure its continuance.

**SCHEDULE OF EXHIBITS:**

A. Legal Description of Property
B. Map of Protected Property
C. Conservation Values of Protected Property

**IN WITNESS WHEREOF**, Owner and Beneficiary have executed this Agreement as of the day and year first above written.

**OWNER:**

Sadies Lake, L.C.,
A Kansas limited liability company

By:_____
Its:_____

**STATE OF KANSAS )**
**) ss**
**COUNTY OF DOUGLAS )**

BE IT REMEMBERED, that on this ____ day of _____, 2012, before me, the undersigned, a Notary Public in and for the County and State aforesaid, came _____, Manager of Sadies Lake, L.C., a Kansas limited liability company, known to me to be the same person(s) who executed the foregoing instrument on behalf of said limited liability company, and duly acknowledged the execution of same.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my official seal the day and year last above written.

_____
Notary Public

My commission expires: _____

**IN WITNESS WHEREOF**, Owner and Beneficiary have executed this Agreement as of the day and year first above written.

**COUNTY:**

Douglas County, Kansas

By:_____
Mike Gaughan
Title: Chair of Board of County Commissioners

ATTEST:

_____
County Clerk

APPROVED AS TO FORM:

_____
County Counselor

**STATE OF KANSAS )**
**) ss**
**COUNTY OF DOUGLAS )**

BE IT REMEMBERED, that on this ____ day of _____, 2012, before me, the undersigned, a Notary Public in and for the County and State aforesaid, came Mike Gaughan, Chair of Board of County Commissioners of Douglas County, Kansas, known to me to be the same person who executed the foregoing instrument on behalf of Douglas County, Kansas, and duly acknowledged the execution of same.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my official seal the day and year last above written.

_____
Notary Public

My commission expires: _____

## EXHIBIT A

## Legal Description of Property

Lot 1, Block One, Sadies Lake Addition, an addition in Douglas County, Kansas.

**EXHIBIT B**

**Map of Protected Property**

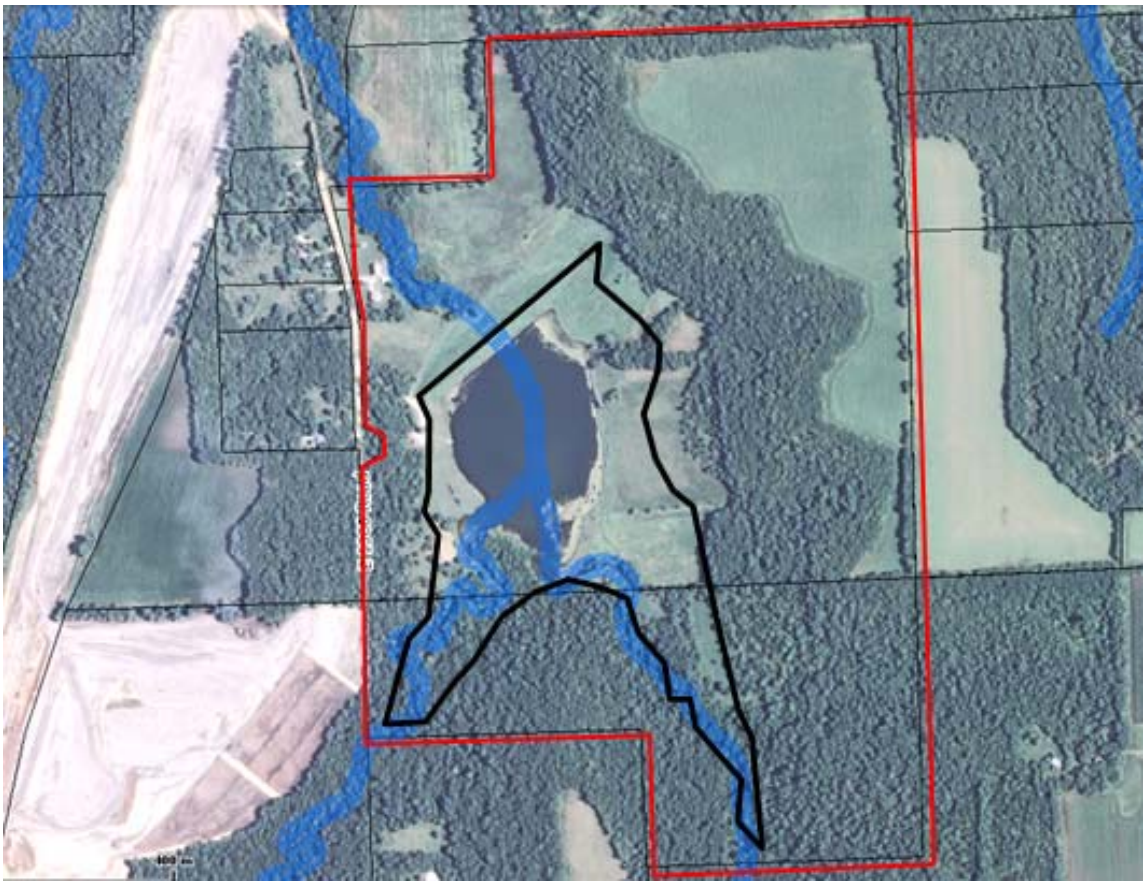
[Attach Exhibit B]

## EXHIBIT C

### Conservation Values of Protected Property

Conservation Values on the Protected Property are described as follows:

1. Floodplain (all of the Protected Property shown on Exhibit B)
2. Stream Corridors (blue lines shown below)
3. Stands of Mature Trees (as shown below)



**PLANNING COMMISSION REPORT**
**Regular Agenda**

PC Staff Report
10/22/12

**ITEM NO. 1: CONDITIONAL USE PERMIT; KANWAKA CORNER SELF STORAGE; HWY 40 & N 1600 RD (MKM)**

**CUP-12-00154**: Consider a Conditional Use Permit for Kanwaka Corner Self Storage, on approximately 3 acres located at the SE corner of U.S. Hwy 40 & Douglas Co Road 442/N 1600 Road. Submitted by Landplan Engineering, for Ryan Sparke, property owner of record.

**STAFF RECOMMENDATION:** Staff recommends approval of the Conditional Use Permit for Kanwaka Corner Self Storage and forwarding it to the Board of County Commissioners with a recommendation for approval based on the findings of fact found in the body of the staff report subject to the following conditions:

1) The provision of a revised Conditional Use Site Plan with the following changes:
   a. Addition of a note indicating the prohibited activities listed in Section 12-319-4.34(i) of the Zoning Regulations.
   b. Addition of a note that the area shall be policed by the owner or operator for removal of trash and debris.
   c. Addition of a note indicating the potential for the southern unit to be converted into a restroom for the use of storage tenants.
   d. Addition of landscaping along the east 36 ft of the northern border in the southwest corner of the property. Landscaping located to the east and south of this area can be relocated to the west.

**Reason for Request:** *"The property owner seeks to develop a self-storage facility on the subject property."*

**KEY POINTS**

- The property is zoned B-2 (General Business) District. Per Section 12-310-2.12 of the Zoning Regulations for the Unincorporated Territory of Douglas County, a wholesale establishment or warehouse is permitted in the B-2 District when located in a completely enclosed building so long as the floor area does not exceed 20,000 sq ft. As the proposed storage facility will exceed 20,000 sq ft of total area, a Conditional Use Permit is required.
- Per Section 12-319-4.11 of the Zoning Regulations for the Unincorporated Territory of Douglas County, *self storage* is a use which may be approved as a Conditional Use.
- No direct access is permitted to Hwy 40. Access will be taken from Douglas County Road 442/N 1600 Road through a frontage road which the applicant shall improve per County Standards.

**ATTACHMENTS**

**A –** CUP Plan

**DESCRIPTION OF USE**

The applicant is requesting a Conditional Use Permit to allow the development of a self-storage facility. Boat storage may be included; however, all storage will be within an enclosed building.

## ASSOCIATED CASES/OTHER ACTION REQUIRED

- Approval of Conditional Use by the Board of County Commissioners.
- Conditional Use Permit Plan released to the Zoning and Codes Office.
- Issuance of permit for the Conditional Use by the Zoning and Codes Office following application and determination that all conditions have been met.
- Building plans submitted for approval and issuance of building permit from the Douglas County Zoning and Codes Office prior to development.

## PUBLIC COMMENT RECEIVED PRIOR TO PRINTING

- Walt Spencer, owner of other commercial property in the B-2 District, called for information on the project.

## GENERAL INFORMATION

Current Zoning and Land Use: B-2 (General Business) District; undeveloped.

Surrounding Zoning and Land Use: To the northwest: A-1 (Suburban Home) District; rural residential subdivision.

To the north and south: A (Agricultural) District; agricultural uses, rural residence and right-of-way for Hwy 40 and County Route 442.

To the east and west:
B-2 (General Business) District; service and auto related businesses to the east, rural residence to the west.

(Figure 1)

| **Site Summary:** | |
|---|---|
| Subject Property: | 130,628 sq ft (3.01 acres) |
| Proposed Buildings: | 38,610 sq ft |
| Off Street Parking Required: | 1 space per 8,000 sq ft of floor area in the facility, plus one space for each employee. 38,610/8,000=4.8 5 spaces + 1 employee: 6 spaces |
| Off Street Parking Provided: | 6 spaces with one ADA accessible. |

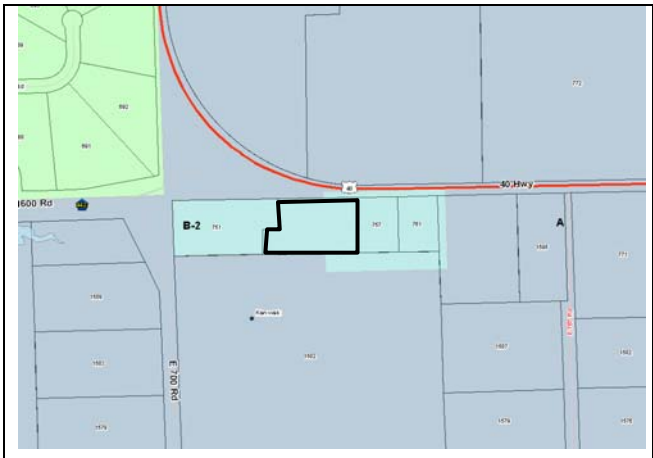



**Figure 1a.** Area zoning. (Subject property outlined.)


**Figure 1b**. Area land use. (Subject property outlined.)

## I. ZONING AND USES OF PROPERTY NEARBY

The surrounding area is zoned A (Agricultural) and contains agricultural and rural residential uses with two areas being zoned for more intense uses. A rural subdivision is located to the northwest of the subject property within the A-1 (Suburban Home) District and service businesses are located to the east of the subject property on approximately 2.5 acres zoned B-2 (General Business). The parcel to the west of the subject property is also zoned B-2 but is currently used for residential purposes. The area is divided by the intersection of County Road 442/N 1600 Road and US Hwy 40, with the commercially zoned properties being located adjacent to US Hwy 40 on the southeastern corner of the intersection.

**Staff Finding** –The area contains a major transportation network with the intersection of US Hwy 40, County Route 442/N 1600 Road, and E 700 Rd, all principal arterials. The predominate zoning in the area is Agricultural and agriculture and rural residences are the principal land uses. A-1 Zoning and a rural residential subdivision is located on the northwest corner of the intersection and B-2 Zoning is located east and west of the subject property; commercial uses have been developed on the properties to the east.

## II. CHARACTER OF THE AREA

This is a rural residential and agricultural area with a limited amount of commercial uses in the vicinity of the subject property. A US Highway and two county principal arterials intersect in this area. The subject property is located approximately 2 miles west of the intersection of K-10 and Hwy 40/W 6$^{th}$ Street and is within Service Area 4 of the City of Lawrence UGA.

**Staff Finding** -- This is a rural residential and agricultural area with limited commercial uses. The subject property is located on a major transportation corridor within the Lawrence Urban Growth Area. The proposed use, a self-storage facility, could be compatible with the character of the area.

## III. SUITABILITY OF SUBJECT PROPERTY FOR THE USES TO WHICH IT HAS BEEN RESTRICTED

Applicant's response:

> *"The subject property has existed as a vacant and undeveloped farm field since the time of its rezoning from A to B-2. While it is possible that this property could be developed into a use permitted in the B-2 District, such a proposal has yet to materialize. Without the approval of this conditional Use Permit (CUP), the property will remain vacant."*

The property was rezoned from the A (Agricultural) to the B-2 (General Business) District in 2011 with approval of rezoning application Z-3-7-11. The B-2 District permits uses such as automobile parking lots and storage garages; filling stations; offices, personal uses such as barbers, restaurants, taverns, etc.; retail stores; bowling alleys; drive-in restaurants; hotels; material storage yards; used car lot; and wholesale establishment or warehouse in a completely enclosed building so long as floor area devoted to such uses shall not exceed 20,000 sq ft. The subject property is well-suited for the commercial uses which are permitted in the B-2 District.

The proposed use is a self-storage facility which would be classified as a warehouse in a completely enclosed building. This is a permitted use in the B-2 District if the building does not have a floor area greater than 20,000 sq ft. As the use will be larger in scope than permitted in the B-2 District, approval as a Conditional Use is necessary. Given the property's proximity to Hwy 40, County Road

442/N 1600 Road, and E 700 Road, all principal arterials, the property is well-suited to the proposed self-storage use and the traffic that would be generated.

**Staff Finding –** A Conditional Use Permit (CUP) does not change the base, underlying zoning; therefore, the suitability of the property for other commercial uses permitted in the B-2 District will not be altered. The property has good access to the major transportation network and is also well suited for the proposed use of *self-storage*.

## IV. LENGTH OF TIME SUBJECT PROPERTY HAS REMAINED VACANT AS ZONED

**Staff Finding –** The property was rezoned to the B-2 District on July 20, 2011 with Resolution No. 11-24. The property has remained vacant as zoned for approximately 15 months.

## V. EXTENT TO WHICH REMOVAL OF RESTRICTIONS WILL DETRIMENTALLY AFFECT NEARBY PROPERTY

Applicant's Response:

> *"The subject property, as well as its neighbors to the east and west, is zoned B-2. A contractor's shop and auto restoration facility are currently in business immediately to the east. The proposed self-storage business will be an appropriate addition to this small commercial node. Removal of restrictions on the subject property poses no detriment to nearby property."*

The proposed use is a permitted use within the B-2 District; however, the removal of restrictions will allow a larger warehouse facility, 38,610 sq ft, than is permitted in the B-2 District, 20,000 sq ft. The use will be completely enclosed and the screening and lighting will be as required in Section 20-319-4.34 for mini- or self-storage facilities. The screening and lighting requirements for the mini-or-self-storage use permitted with a CUP exceed those required for warehouse uses in the B-2 District. With these additional provisions the visual impact of a larger facility on nearby properties should be minimal.

The larger building area could result in more storage units and increased trips to the facility. The Traffic Impact Study (TIS) provided with the application indicated that, on average, five inbound and three outbound trips would be generated during the morning peak hour of a typical weekday and five inbound and five outbound trips would occur during the afternoon peak hour. The Traffic Impact Study concluded that the traffic generated from the proposed development will not have a negative impact on the capacity of the roadway networks in the study area.

The TIS made the following recommendations for improvements to the area to improve safety based on the proposed development:

1. Remove the over-grown trees and shrubs along the east side of US Hwy 40, approximately 550 ft north of its intersection with DG County Road 442/N 1600 Road. This will increase the intersection sight distance to the north (around the curve) providing additional time required by those passenger cars pulling a boat trailer entering US Hwy 40 from Dg County Road 442/N 1600 Road. KDOT maintains the right-of-way in this area and is aware of this recommendation. They've indicated that they would remove vegetation in the right-of-way to eliminate conflict with the sight distance.

2. Realign the exiting driveway to the residential dwelling unit adjoining the development site (which is to serve the proposed site as well) in such a way that its intersection with Dg County Road 442/N 1600 Road will be located at mid-point between US Hwy 40 and E 700

Road. This will provide for more storage room between main highway and the driveway location. *This change is being made by the applicant and is shown on the CUP plan.*

The Zoning Regulations provide standards for self-storage when approved as a Conditional Use. A photometric plan has been submitted that illustrates that lighting is adequate for security while eliminating glare or light trespass to other properties to the maximum extent possible. Screening is required on any side which abuts a residentially zoned district of property containing a residence with a view reducing wall, fence, berm, landscaping materials or a combination. The structure will be screened from the nearby residence to the west with a 6 ft high solid wood fence and landscaping consisting of a mix of trees and shrubs. Staff recommends that additional landscaping be provided where the property turns to the west, close to the residence to screen the view of the facility from the residence. This jog in the property is approximately 73 ft in length, approximately half or 36 ft should be landscaped similarly to the landscaping provided along the west property line. (Figure 2) Some of the landscaping shown south of this point could be relocated to the west.

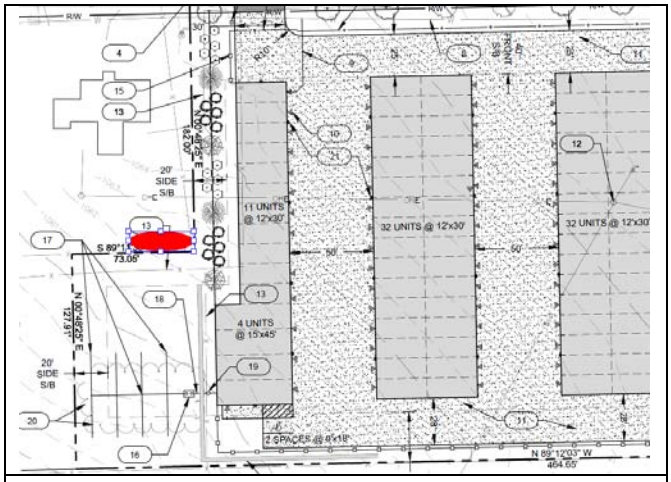


**Figure 2.** Area for additional landscaping.

Screening from the residence to the south will be accomplished with a 6 ft high solid wood fence and with the back of the building itself. Given the distance of the residence to the south from the facility, this screening should be adequate. (Figure 3)

**Staff Finding –** The proposed use is similar to the permitted warehouse use within the B-2 District with the exception that the total area of the storage building will exceed 20,000 sq ft in area. The TIS indicates that the increased traffic associated with the proposed use will not have a negative impact on the capacity of the roadway networks in the study area. With the safety improvement recommended in the TIS, and the design standards required in the CUP process, the proposed use should not negatively impact surrounding properties.

## VI. RELATIVE GAIN TO THE PUBLIC HEALTH, SAFETY AND WELFARE BY THE DESTRUCTION OF THE VALUE OF THE PETITIONER'S PROPERTY AS COMPARED TO THE HARDSHIP IMPOSED UPON THE INDIVIDUAL LANDOWNERS

Applicant's Response:
*"Denial of this CUP does not pose a relative gain to the public health, safety, and welfare. Rather it perpetuates the vacancy of this commercially-zoned land. Approval of the CUP does not pose a hardship to individual landowners. It instead promotes the commercial development of this property, as intended under the B-2 District, and other neighboring properties at this corner."*

Evaluation of the relative gain weighs the benefits to the community-at-large vs. the benefit of the owners of the subject property. Denial of the request for a Conditional Use Permit would prohibit the scope of the proposed enclosed storage facility and require development to be limited to a 20,000 sq ft facility.

Denial of the CUP request would not benefit the public health, safety, and welfare as the roadway network in the area is capable of handling the traffic which would be generated by the use. With this proposed use, the frontage road access point will be moved further to the south, about midway between Highway 40 and E 700 Road. The increased spacing of the frontage road/driveway from Hwy 40 will be a safety improvement in the area.

**Staff Finding** – Denial of the request limits the scope of the business for this site. Denial of the CUP would not benefit the public safety, health, or welfare. Approval of this request does not directly harm the public health, safety and welfare; but would provide a benefit in the improved access point location on Douglas County Road 442/N 1600 Road.

## VII. CONFORMANCE WITH THE COMPREHENSIVE PLAN

The subject property is located within Service Area 4 of the Lawrence Urban Growth Area. The subject area was rezoned in 2011 to the B-2 (General Business) District. The proposed use is in conformance with the comprehensive plan as the general use is permitted within the zoning district; and a Conditional Use Permit is being obtained in order to insure compatibility of the larger facility with surrounding properties

**Staff Finding –** The proposed use is in general conformance with the recommendations in the Comprehensive Plan as it is a permitted use within the existing Zoning District. Consideration is being given to design of the facility, which is larger than permitted in the B-2 District, to insure that it is compatible with surrounding properties.

## STAFF REVIEW

The applicant proposes to develop a 38,610 sq ft self-storage facility on the subject property. The Rural Water District indicated they would be able to serve this facility and the Health Department approved the proposed on-site sewage management system. Prior to installing a septic system, the property owner must first obtain a permit from the Lawrence-Douglas County Health Department. A septic system is shown to the west of the facility and the applicant indicated that the southern unit on the west row of units may be converted to a restroom for the use of customers of the storage facility. No office or caretaker unit is being proposed at this time.

The request has been reviewed with Section 12-319-4.34 of the Zoning Regulations which contains standards which must be met for approval of a conditional use for a self-storage facility. The property meets these standards in that it is located in the Urban Growth Area; takes access to E 700 Road, a principal arterial; security fencing and lighting is provided for the entire facility; photometric plan was submitted which meet the standards in this section; screening has been provided for sides which abut residentially zoned property or property which contains a residence (Figure 3). Adequate off-street parking is provided and the access ways are a minimum of


**Figure 3.** Residences in relation to subject property. Residence on Hwy 40: approximately 27 ft west of subject property. Residence on E 700 Road: approximately 670 ft southwest of subject property.

25 ft in width. The storage will occur within an enclosed building; a keyless keypad entry system will be used and the storage units are oriented toward the interior of the site with no doors being visible from the exterior. The facility will be screened from residential properties but will have visibility from adjacent properties and rights-of-way for security. Notes will be added to the CUP plan indicating the prohibited activities listed in section 12-319-4.34(i) and the requirement that the area shall be properly policed by the owner or operator for removal of trash and debris.

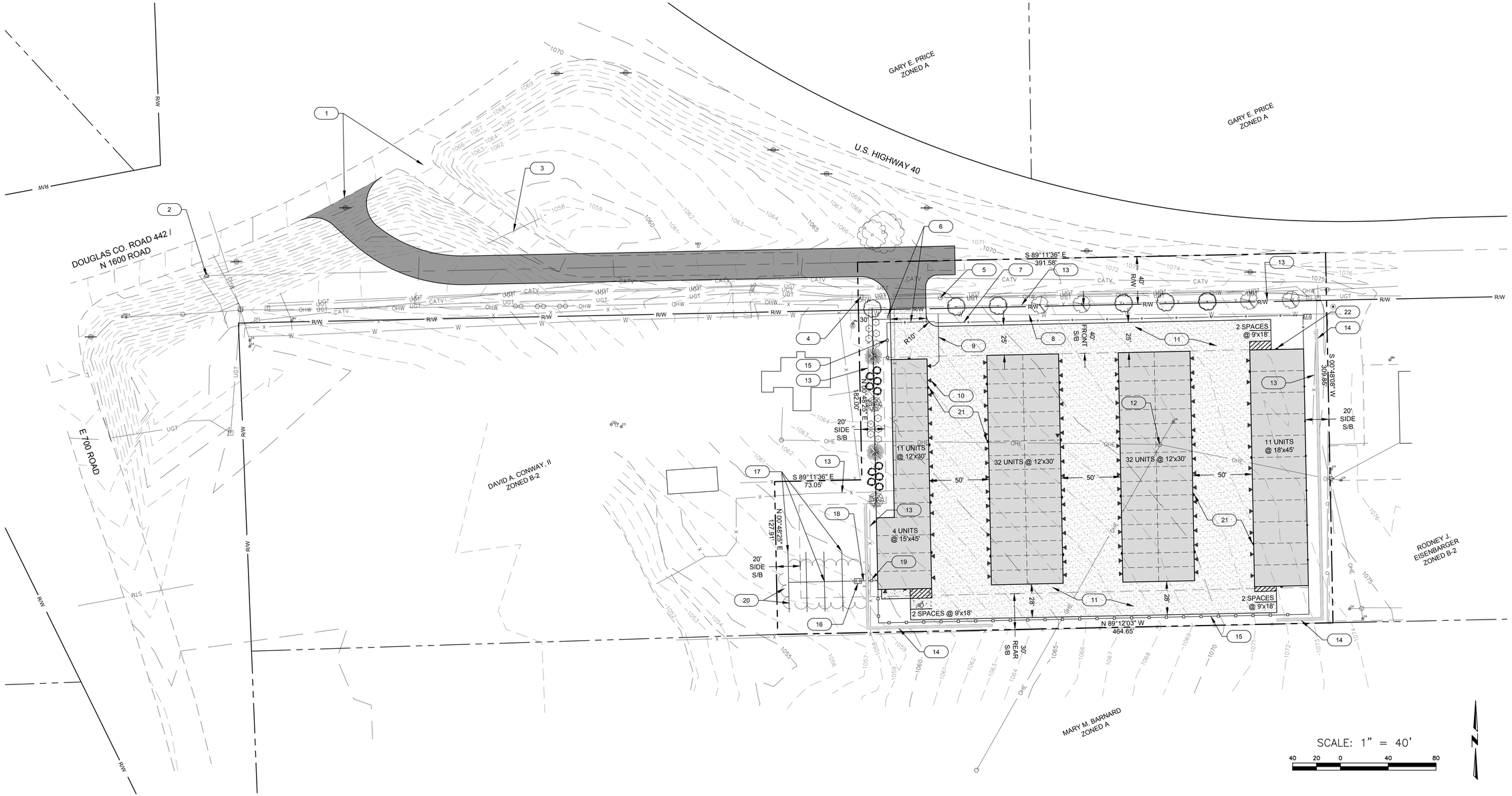
The County Engineer requested that a drainage study be provided to evaluate the impact of the increased impervious surface on drainage in the area. The applicant provided a drainage study which the County Engineer accepted.

The applicant provided a turning radius diagram showing how vehicles with boat trailers would maneuver on site. The County Engineer reviewed this exhibit and found it acceptable.

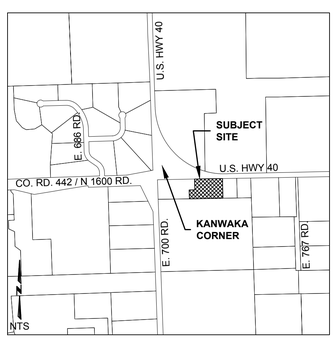
This is to be a phased development, beginning with the units on the west side of the property. The landscaping and perimeter fencing will be provided with the first phase. Parking spaces will be revised with each phase so that adequate parking is being provided for the warehouse floor area that has been constructed.

**Conclusion**

Approval of a Conditional Use can be tailored to address specific issues such as intensity or frequency of use, include time limitations, and provide screening requirements. The recommended conditions respond to the specific nature of this request. The storage facility, as conditioned, should be compatible with nearby land uses.




## LOCATION MAP




## LEGAL DESCRIPTION

A TRACT OF LAND IN THE NORTHWEST CORNER (NW 1/4) OF SECTION THIRTY-SIX (36), TOWNSHIP TWELVE (12) SOUTH, RANGE EIGHTEEN (18) EAST OF THE 6TH P.M., DOUGLAS COUNTY, KANSAS, MORE FULLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHWEST CORNER OF THE NORTHWEST QUARTER (NW 1/4) OF SAID SECTION 36; THENCE SOUTH 89°11'36" EAST ALONG THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF SAID SECTION 36, 544.48 FEET FOR A POINT OF BEGINNING; THENCE SOUTH 89°11'36" EAST ALONG THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF SAID SECTION 36, 391.58 FEET; THENCE SOUTH 00°48'08" WEST, 309.85 FEET; THENCE NORTH 89°12'03" WEST, 464.65 FEET; THENCE NORTH 00°48'25" EAST, 127.91 FEET; THENCE SOUTH 89°11'36" EAST, 73.05 FEET; THENCE NORTH 00°48'25" EAST, 182.00 FEET TO THE POINT OF BEGINNING, ALL IN DOUGLAS COUNTY, KANSAS.

## SITE SUMMARY

| EXIST. CONDITIONS | AREA (SF) | PROP. CONDITIONS | AREA (SF) |
|---|---|---|---|
| TOTAL BUILDING | 0 | TOTAL BUILDING | 38,610 |
| TOTAL PAVEMENT | 940 | TOTAL PAVEMENT | 4,385 |
| TOTAL IMPERVIOUS | 940 | TOTAL IMPERVIOUS | 42,995 |
| TOTAL PERVIOUS | 129,688 | TOTAL PERVIOUS | 87,633 |
| TOTAL PROPERTY | 130,628 | TOTAL PROPERTY | 130,628 |

## GENERAL NOTES

1. OWNER: RYAN SPARKE, 2620 CRANLEY STREET, LAWRENCE, KANSAS 66046
2. LAND PLANNER: LANDPLAN ENGINEERING, PA, 1310 WAKARUSA DRIVE, LAWRENCE, KANSAS 66049
3. REFER TO SHEET 2 FOR PHASING PLAN.
4. TOPOGRAPHIC INFORMATION WAS OBTAINED FROM A FIELD SURVEY PERFORMED BY LANDPLAN ENGINEERING, AUGUST 2012.
5. EXISTING LAND USE: VACANT
6. PROPOSED LAND USE: SELF-STORAGE FACILITY
7. EXISTING ZONING: B-2
8. PROPOSED ZONING: B-2
9. NO PART OF THIS SITE IS LOCATED WITHIN THE FLOODPLAIN PER FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) #20045C0151D, DATED AUGUST 5, 2010.
10. THIS SITE IS DESIGNED TO COMPLY WITH THE PROVISIONS OF THE AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES (ADAAG) FOR BUILDINGS AND FACILITIES, APPENDIX A TO 28 CFR PART 36.
11. ANY CONSTRUCTION OR RENOVATION WORK MUST COMPLY WITH APPLICABLE BUILDING CODES IN EFFECT AT THE TIME OF WORK.
12. NO PERSON SHALL BE ISSUED A BUILDING PERMIT WITHOUT HAVING FIRST OBTAINED FROM THE DOUGLAS COUNTY HEALTH DEPARTMENT A PERMIT TO CONSTRUCT AN ON-SITE SEWAGE MANAGEMENT SYSTEM.
13. PROPOSED BUILDINGS WILL NOT EXCEED 16 FEET IN HEIGHT.

## KEYED NOTES

1. EXISTING DRIVEWAY TO BE IMPROVED PER COUNTY ROAD STANDARDS AND REALIGNED, AS SHOWN, PENDING APPROVAL BY COUNTY ENGINEER.
2. NW CORNER OF THE NW QUARTER OF SECTION 36, TOWNSHIP 12 SOUTH, RANGE 18 EAST
3. EXISTING 24-INCH CULVERT TO BE RELOCATED WITH DRIVEWAY IMPROVEMENTS.
4. EXISTING AT&T TELEPHONE PEDESTAL TO REMAIN, TYP.
5. EXISTING WESTAR UTILITY POLE TO REMAIN, TYP.
6. PROPOSED SECURITY GATE WITH KEYLESS KEYPAD ENTRY SYSTEM
7. PROPOSED SECURITY FENCE, 6-FOOT HEIGHT CHAIN LINK, TYP.
8. EXISTING RWD #1 3-INCH DUCTILE IRON WATERLINE TO REMAIN
9. PROPOSED 1-INCH DOMESTIC WATER SERVICE LINE
10. PROPOSED BUILDING ENTRY, TYP.
11. PROPOSED 4-INCH DEPTH GRAVEL SURFACE, TYP.
12. EXISTING KAW VALLEY ELECTRIC UTILITY POLE TO BE RELOCATED
13. EXISTING WIRE FENCE TO BE REMOVED, AS NECESSARY
14. PROPOSED 3-6-FOOT HEIGHT SEGMENTAL BLOCK RETAINING WALL
15. PROPOSED VIEW-REDUCING FENCE, 6-FOOT SOLID WOOD, TYP.
16. PROPOSED 1,000-GALLON CONCRETE SEPTIC TANK
17. PROPOSED CONVENTIONAL SEQUENTIAL STEP-DOWN LATERAL FIELD SYSTEM
18. PROPOSED 4-INCH SCHEDULE 40 PVC SEPTIC SYSTEM LINE
19. PROPOSED 4-INCH SEPTIC SYSTEM CLEANOUT
20. EXISTING TREES TO BE REMOVED
21. 100-WATT METAL HALIDE FIXTURE MOUNTED TO BUILDING AT 9-FEET ABOVE GROUND, TYP.

## PARKING SUMMARY

REQUIRED: SELF-STORAGE FACILITY
1 SPACE / 8,000 SF FLOOR AREA + 1 SPACE / EMPLOYEE
38,610 SF / 8,000 + 1 EMPLOYEE
6 SPACES
PROVIDED: 6 SPACES, INCL 1 ADA

## PLANT SCHEDULE

| SYMBOL | QTY. | NAME | SIZE | COND. |
|---|---|---|---|---|
| | | STREET TREES | | |
| | 6 | CERCIS CANADENSIS VAR. TEXENSIS 'OKLAHOMA' REDBUD | 2.5" CAL. | B&B |
| | 4 | CRATAEGUS CRUS-GALLI THORNLESS COCKSPUR HAWTHORN | 2.5" CAL. | B&B |
| | | CONIFEROUS TREES | | |
| | 2 | JUNIPEROUS VIRGINIA 'CANAERTI' EASTERN RED CEDAR | 6' HT. | B&B |
| | 2 | PICEA ABIES NORWAY SPRUCE | 6' HT. | B&B |
| | | DECIDUOUS SHRUBS | | |
| | 10 | ILEX VERTICILLATA 'WINTER RED' WINTERBERRY HOLLY | 5 GAL. | CONT. |
| | | EVERGREEN SHRUBS | | |
| | 10 | JUNIPERUS SABINA 'BROADMOOR' SAVIN JUNIPER | 5 GAL. | CONT. |


Civil Engineering
Landscape Architecture
Community Planning
Surveying

Landplan Engineering, P.A.
1310 Wakarusa Drive
Lawrence, Kansas 66049
785-843-0085 fax 785-843-2410
email: landplan@landplan-pa.com
Web: www.landplan-pa.com

Lawrence, KS • Kansas City, MO • Columbus, OH
The Woodlands, TX • Farmington Hills, MI



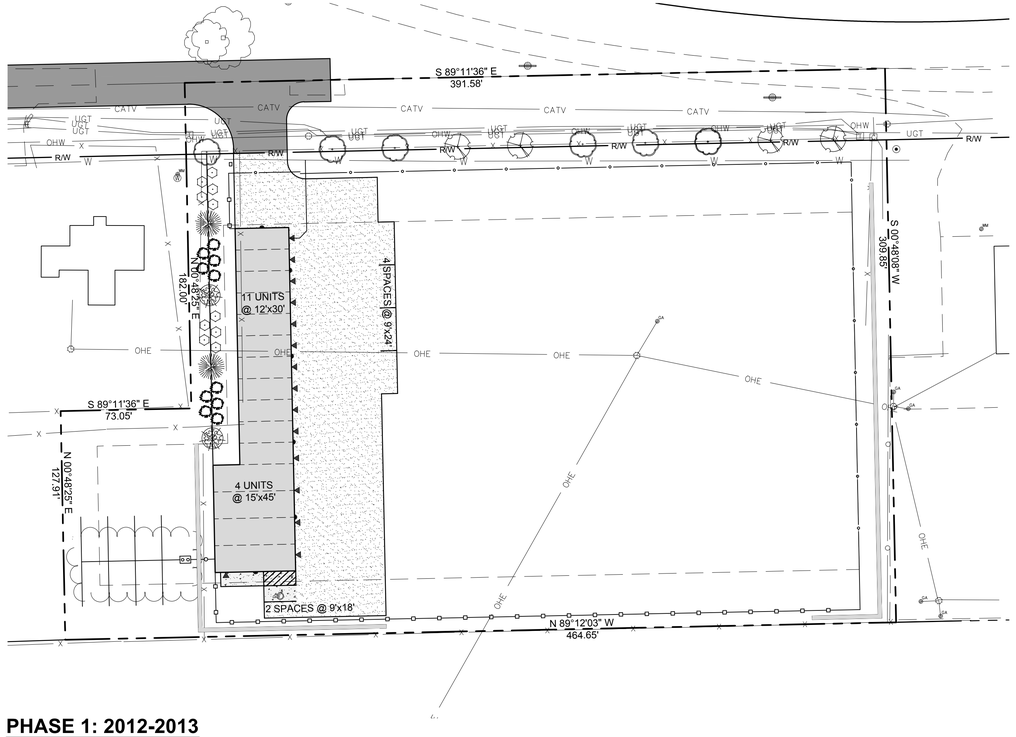

# KANWAKA CORNER SELF STORAGE
# KANWAKA TOWNSHIP, KANSAS
# CONDITIONAL USE PERMIT SITE PLAN

| REV | DATE | DESCRIPTION |
|---|---|---|
| 1 | 9/26/12 | PER DEPT COMMENTS |

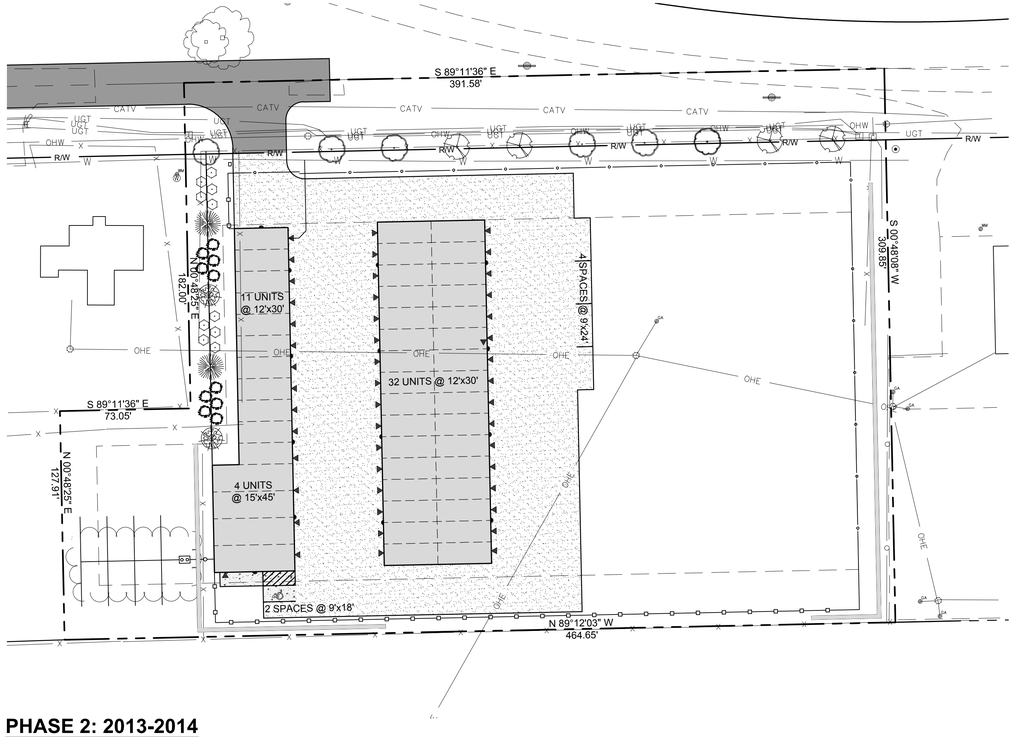
DATE: 8/20/12
PROJECT NO.: 20121157
DESIGNED BY: LPE
DRAWN BY: BS
CHECKED BY: BS

ISSUE 0 | SHEET NO. 1 OF 2 SHEETS

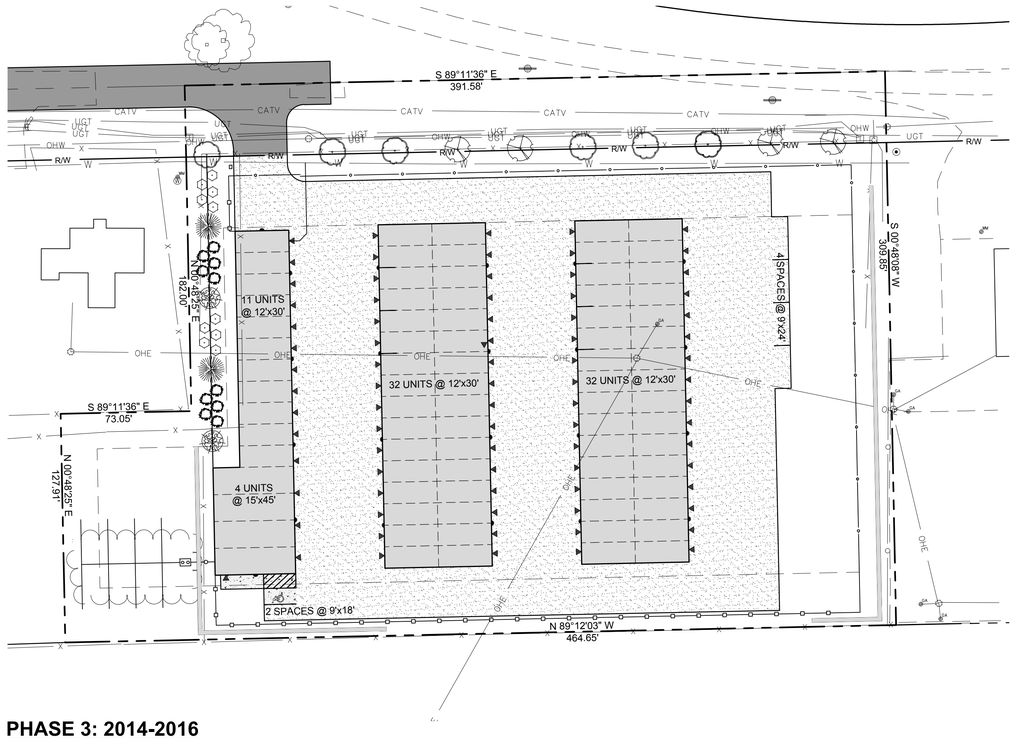

FILE NAME: Q:\20121157\CAD\Planning\CUP\121157C-CUP.dwg LAST SAVED BY: Brian Sturm SAVED DATE: 9/26/2012 1:01 PM PLOTTED: 9/26/2012 1:01 PM



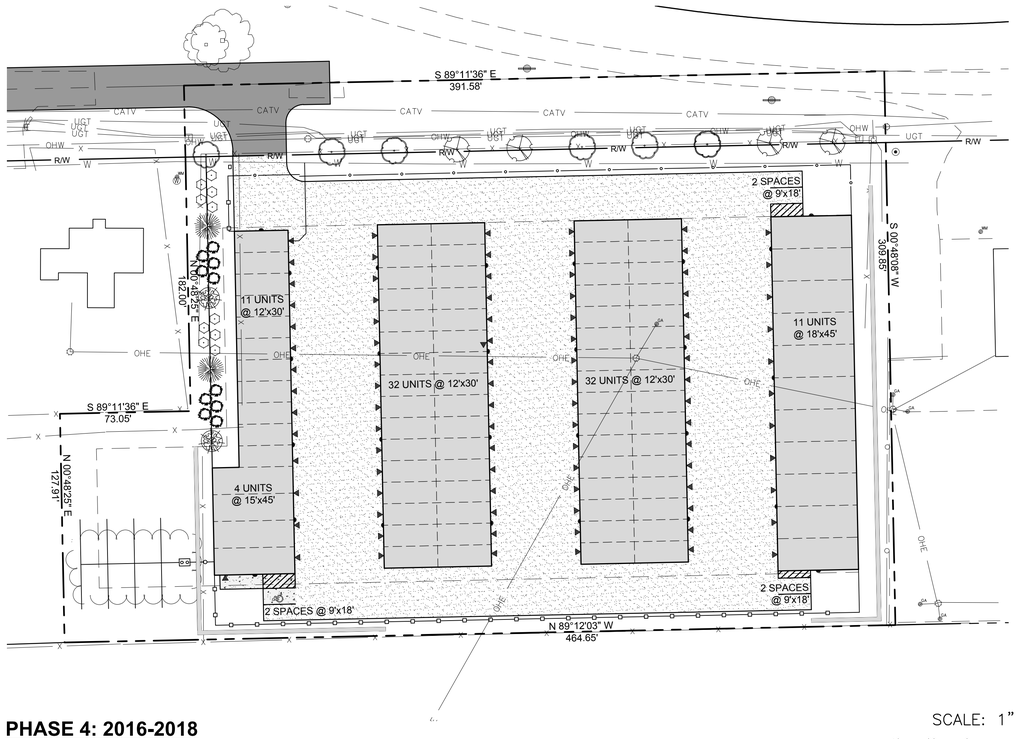

**PHASE 1: 2012-2013**




**PHASE 2: 2013-2014**




**PHASE 3: 2014-2016**




**PHASE 4: 2016-2018**

SCALE: 1" = 40'

40 20 0 40 80

Civil Engineering
Landscape Architecture
Community Planning
Surveying

Landplan Engineering, P.A.

1310 Wakarusa Drive
Lawrence, Kansas 66049
tel (785)843-0651
fax (785)843-2410
e-mail landplan@landplan-pa.com
Web www.landplan-pa.com

Lawrence, KS • Kansas City, MO • Columbus, OH
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# KANWAKA CORNER SELF STORAGE
# KANWAKA TOWNSHIP, KANSAS
# CONDITIONAL USE PERMIT PHASING PLAN

| REV | DATE | DESCRIPTION |
|---|---|---|
| 1 | 9/24/12 | PER DEPT COMMENTS |

| | |
|---|---|
| DATE: | 8/20/12 |
| PROJECT NO.: | 20121157 |
| DESIGNED BY: | LPE |
| DRAWN BY: | BS |
| CHECKED BY: | BS |

| ISSUE | SHEET NO. |
|---|---|
| 0 | 2 |

OF 2 SHEETS

**ITEM NO. 1 CONDITIONAL USE PERMIT; KANWAKA CORNER SELF STORAGE; HWY 40 & N 1600 RD (MKM)**

**CUP-12-00154**: Consider a Conditional Use Permit for Kanwaka Corner Self Storage, on approximately 3 acres located at the SE corner of U.S. Hwy 40 & Douglas Co Road 442/N 1600 Road. Submitted by Landplan Engineering, for Ryan Sparke, property owner of record.

**STAFF PRESENTATION**
Ms. Mary Miller presented the item.

**APPLICANT PRESENTATION**
Mr. Brian Sturm, Landplan Engineering, agreed with staff recommendations.

**PUBLIC HEARING**
Mr. Walt Spencer, neighbor to the property, said he did not want the proposed wood fence because a pasture fire could burn it. He said he would prefer a non-wood fence. He said the neighbor to the west had people in his backyard without prior warning. He said the property lines established 100 years ago do not agree with the points used by the property owner. He said all the property, 40' from the center road still belongs to state, not the county. He expressed concern about people coming all hours of the day/night pulling in his driveway looking for the storage unit. He wondered if it would be government storage, self storage, and what type of buildings and hours. He said his main concerns were the wood fence, screening, and a way to deter people using his driveway to turn around.

Commissioner Liese asked staff to respond.

Ms. Miller said there were no records of the right-of-way property owner but approval for the improvements was given by KDOT. She said the applicant could consider something other than wood for the fence. She said regarding the historical survey points, the more accurate survey information would be used. She said they could double check with county surveyor for property points. She said she did not know how to keep people out of his driveway but did not think hiding the storage facility would resolve that issue. She suggested signage might help. She said this was a self-storage facility so it could contain such things as boats and personal belongings. She said regarding security there would be outdoor lighting, fencing that would allow visibility, a keypad for people to gain access so only people using the facility could get into it, but that they would have access 24 hours a day.

Mr. David Conway, property owner to the west, said he did not have a problem with a storage unit being built but that nobody told him about this and he found out about it when he found people in his yard without his permission. He said they put flags in and around his yard and moved the property stake back from its original position. He asked Planning Commission to delay their decision and have someone talk to him about what was intended for the project.

Commissioner Liese asked if Mr. Conway received a notification letter from the Planning Department.

Mr. Conway said yes, he received a letter from the Planning Department about this meeting, but he hadn't seen any plans.

**APPLICANT CLOSING COMMENTS**
Mr. Sturm said regarding the questions and concerns about property pins and survey points, Landplan Engineering worked with the County Public Works Department and the County Surveyor to re-establish two section corners in the Highway 40 right-of-way. He stated because the legal description for the property was based off the section line it needed to be re-established and the section corners found to correctly demarcate the boundary. He said in the process of doing the survey Landplan got in touch with all the utility companies which was why flags were placed in the ground. He said the property corners were set by Landplan for the

property owner. He apologized for any action that his survey crew may have taken that Mr. Conway wasn't aware of. He said they made attempts to reach Mr. Conway.

Mr. Spencer said the state still owned the right-of-way, 40' from the center line to the west.

Ms. Miller said in the county there were two sections of the Zoning Regulations that relate to setbacks. She said one was the base setback measured from the center line of the highway back a certain distance. She said from that distance it was measured from the base setback line back further. She said since Highway 40 curved in the area the setback would change because the base setback would be different.

Commissioner Lamer asked when Landplan conducted their survey were there any encroachments onto the applicant's property from the neighboring properties.

Mr. Sturm said the property was not encumbered by any title concerns and there were no strange easements crossing property lines. He said there were several stretches of fence that may have been constructed by the property owner to the east or west that were now in fact on the subject property today. He said other than the few stretches of barbed wire fence there were no encroachments.

Commissioner Burger asked if KDOT would have plenty of space to expand.

Ms. Miller said that was the purpose of the base setback. She said KDOT had no issues with the location of the building.

Commissioner Josserand asked if Mr. Spencer's property was to the east.

Mr. Spencer said yes.

Ms. Miller showed a map on the overhead with the access of the property.

**COMMISSION DISCUSSION**

Commissioner Britton said he was struggling with moving on this when there seemed to be confusion on who owned what property. He was hesitant moving forward on this if things were unsettled.

Mr. McCullough said typically staff takes the documents presented by the applicant as accurate factual record. He said in this case it was unique in terms of where the right-of-way lies. He said they should take the documents presented as factual until challenged in court, outside of this realm. He said there were great questions about encroachments, who shares what, where the fences were, where right-of-way and driveways were, but he advised them to use the record before them tonight. He stated there weren't competing surveys, just one document that showed where the improvements were, submitted by a professional design firm.

Commissioner Liese said in the staff recommendation it says findings of fact so Planning Commission bases their decision on those facts.

Mr. McCullough said the facts of the case were before them.

Commissioner Britton asked what happened if they approved the Conditional Use Permit and then a challenge or lawsuit followed.

Mr. McCullough said they would not determine adverse possession. Planning Commissions decision was based on the record represented today. He said if a court were to provide a different set of facts the applicant may have to change the site plan.

Commissioner Burger asked where Mr. Conroy's property was located.

Ms. Miller showed Mr. Conroy's property on the overhead. She said it was a commercially zoned property used as a residence.

Commissioner Josserand said he was generally inclined to support the applicant. He said the property was zoned for the potential use. He said staff addressed his concern about adverse possession. He said regarding the access issue of people turning into Mr. Spencer's property, he did not see a problem with that. He wondered what they should do with the nature of the fence issue.

Ms. Miller said the requirement was to have a fence and the applicant was putting a fence in but a variance was being requested from another section of the regulations that says there can't be a fence in the front setback.

**ACTION TAKEN**

Motioned by Commissioner Josserand, seconded by Commissioner Britton, to approve the Conditional Use Permit for Kanwaka Corner Self Storage and forwarding it to the Board of County Commissioners with a recommendation for approval based on the findings of fact found in the body of the staff report subject to the following conditions:

1.) The provision of a revised Conditional Use Site Plan with the following changes:
   a. Addition of a note indicating the prohibited activities listed in Section 12-319-4.34(i) of the Zoning Regulations.
   b. Addition of a note that the area shall be policed by the owner or operator for removal of trash and debris.
   c. Addition of a note indicating the potential for the southern unit to be converted into a restroom for the use of storage tenants.
   d. Addition of landscaping along the east 36 ft of the northern border in the southwest corner of the property. Landscaping located to the east and south of this area can be relocated to the west.
   e. Variance shall be required from the prohibition from fencing in the front yard setback to allow the required fencing for the mini-storage facility.

Commissioner Burger asked when this would go to County Commission.

Ms. Miller said normally the earliest it could go was two weeks from Planning Commission's recommendation but that there were a few County Commission meetings cancelled in November.

Commissioner Britton said he was not worried about adverse possession since it would not affect the Conditional Use Permit moving forward. He hoped for patience from the neighbors on the process. He supported the proposal overall and assumed the property owner would make best efforts to make sure the use was not infringing on the adjoining property owners use, to the extent possible. He encouraged the property owner to work with staff regarding signage and prevent people from using the neighboring driveways.

Commissioner Burger said regarding the land use it was a good opportunity for the property. She felt this type of use had a lot less activity than one might think once it was established. She said County Commission would be very responsive to neighbors concerns.

Commissioner Lamer inquired about other material options for the fence.

Ms. Miller said the building itself was being used as screening in some areas. She said the applicant may have some other fencing suggestions.

Commissioner Liese said given the findings of fact in the staff report he did not feel like he had any choice but to vote to recommend it. He asked Mr. Sturm to comment on some of the concerns.

Mr. Sturm said this was still the beginning of this project for the property owner. He said there would be another public meeting and he would make sure Mr. Spencer and Mr. Conway had his contact information so they could speak with him about any questions. He said they would be happy to work through any issues the neighbors have between now and County Commission, County Board of Zoning Appeals, and through construction. He said regarding the fence on the south property line it had to be an opaque or solid fence to screen the property from the residential use. He said it could be something other than wood, such as a chain link fence with plastic vinyl slats going through the fence. He said Landplan's position was to meet the Douglas County Zoning Regulations and the plan before them tonight does that.

Unanimously approved 8-0.

# Memorandum
# City of Lawrence
# Planning & Development Services

**TO:** **Planning Commission**

**CC:** **Scott McCullough, Director of Planning and Development Services**
**Sheila Stogsdill, Assistant Planning Director**

**FROM:** **Mary Miller, City/County Planner**

**Date:** **September 21, 2012**

**RE:** **ITEM NO. 1: CONDITIONAL USE PERMIT FOR PENNY SAND PIT; N 1500 RD & E 1850 RD (MKM)**
**For September 24, 2012 Planning Commission meeting**

Two errors were identified in the staff report for the CUP referenced above. Changes have been made and the corrected staff report placed in the Planning Commission agenda packet. The following changes were made to Section VI of the report (Page 10):

1. The applicant's response to the factor "RELATIVE GAIN TO THE PUBLIC HEALTH, SAFETY AND WELFARE BY THE DESTRUCTION OF THE VALUE OF THE PETITIONER'S PROPERTY AS COMPARED TO THE HARDSHIP IMPOSED UPON THE INDIVIDUAL LANDOWNERS" was corrected. Staff had inserted the wrong response for this question. The corrected response is:
"*No identifiable gain will result by denial of this request; no identifiable hardship will result from its approval."*

2. The first paragraph in Section VI was revised. This paragraph incorrectly noted that the subject property was located outside the Eudora Wellhead Protection Zone. The property had been identified as being within the western reaches of the Protection Zone on Page 7 of the staff report, under the heading "Proposed Uses" and in Figure 3. The revised language is:
*"Evaluation of the relative gain weighs the benefits to the community-at-large vs. the benefit of the owners of the subject property. There are many factors to consider when locating a sand pit, and this location meets the geographic criteria of being outside the FAA 10,000 ft wildlife mitigation area, has good access to the arterial roadway system, and is in a lowly populated area. Denial of the request for a Conditional Use Permit would affect the individual landowner by prohibiting the use of the property for the off-river sand dredging pit."*

**PLANNING COMMISSION REPORT**
**Regular Agenda**
***Joint Meeting with Eudora Planning Commission***

PC Staff Report
09/24/12 (Corrected)

**ITEM NO. 1: CONDITIONAL USE PERMIT FOR PENNY SAND PIT; N 1500 RD & E 1850 RD (MKM)**

**CUP-12-00099**: Consider a Conditional Use Permit for sand excavation and extraction for Penny Sand Pit, approximately 434 acres located on the NE Corner of N 1500 Road & E 1850 Road. Submitted by Landplan Engineering, for William Penny & Van LLC, property owners of record. *Joint meeting with Eudora Planning Commission.*

**STAFF RECOMMENDATION:** Staff recommends approval of the Conditional Use Permit for Penny Sand Pit and forwarding it to the Board of County Commissioners with a recommendation for approval based on the findings of fact found in the body of the staff report subject to the following conditions:

1) The approval is contingent upon the issuance of all State and/or Federal permits which are required for this operation including the Army Corps of Engineers.
2) An agreement designating responsibility for the ongoing maintenance of the berms to the property owner shall be executed and recorded with the Register of Deeds prior to the release of the CUP plans to the Zoning and Codes Office. A copy of the agreement shall be provided to the Planning Office for the file.
3) A copy of the easement for the off-site access drive shall be provided to the Planning Office for the file prior to the release of the CUP plans to the Zoning and Codes Office.
4) The applicant shall obtain a Flood Plain Development Permit from the Director of Zoning and Codes prior to the release of the CUP plans.
5) The reclamation plan shall be revised with the following changes prior to release of the CUP plans:
   a. The plan shall note the requirement that the lake that is being created will have a varied shoreline and will appear natural in appearance.
   b. The plan shall note that the intended use of the lake, when mining and reclamation is complete, is to be a recreational feature.
   c. The plan shall note the maximum slope of the lake shoreline for a specified depth to insure that the slopes are of a grade that it would be possible for a person or animal that accidentally entered the lake to exit.
   d. The plan shall explain the sequential nature of the reclamation process; that overburden produced in one phase will be used to reclaim previously excavated areas.
   e. The reclamation plan shall note that topsoil will be placed over the overburden in areas that are to be reclaimed as farmland, shoreline, or berms. If topsoil is to be stockpiled and stored it must be vegetated to prevent erosion.
6) The applicant shall submit a revised CUP plan with the following changes:
   a) A detailed landscaping plan for the buffer area surrounding the McElwee house will be submitted.

b) The Book and Page number of the recorded easement for the off-site access road shall be noted on the CUP plan.

c) The ownership shall be noted as Van, LLC as well as Penny's Concrete Inc. on the CUP plan.

d) The on-site residential structure on the east side of the property will be shown on the CUP plan as on the reclamation plan.

e) If stockpiling of overburden is to occur on the subject property, the CUP or operation plan should note the maximum height and approximate location. The stockpiles should be placed as far from the existing residences as possible.

f) List the following CUP conditions on the plan:

i. Hours of operation are 6:30 AM to 6:30 PM, Monday through Friday. No removal, transfer, or placement of overburden is permitted outside these operating hours; however dredging and extraction of sand may exceed these hours when necessary.

ii. The approval for this Conditional Use is valid for 30 years. An extension request for the CUP must be submitted prior to the expiration date or a new CUP application must be submitted. The Zoning and Codes office shall conduct 5 year administrative reviews to insure compliance with the CUP, operation, and reclamation plans.

iii. The only exterior lighting in the areas to be excavated will be the headlights on the dredge.

iv. The scale house, processing plant, sediment pond, and stockpile area, approved with CUP-2-2-79, will be used to serve the subject property.

v. Sales of overburden, topsoil, sand or aggregate products will occur only on the portion of the property that contains the scale house on the CUP plan.

vi. Truck traffic will utilize Noria Road (E 1750 Road), and is restricted from using N 1500 Road or E 1850 Road.

vii. The applicant shall work with the Army Corps of Engineers to determine how the existing wetlands on the property will be treated. Prior to any excavation in Phase 21, the applicant will provide documentation to the Planning Office on the wetlands indicating whether the wetlands will be maintained on site or if they will be mitigated elsewhere. If the wetlands will be maintained on site, the operation plan will be revised to include the protection measures and the property owner shall submit a revised CUP plan for administrative review/approval of the wetland setbacks. If the wetlands are to be mitigated, a revised CUP plan shall be submitted to note the removal of the wetlands.

7) The following improvements to nearby roads and intersections shall be completed per the County Engineer's approval before issuance of a permit for the Conditional Use :

a. Realignment of the entrance to the sand facility so that it opposes the Noria Road intersection at N 1500 Road.

b. Pavement of a 100 ft long section of the site access drive just north of N 1500 Road, as recommended in the TIS.

c. Reconstruction of pavement in the Noria Road (E 1750 Road)/N 1500 Road intersection. The existing surfacing is likely a crushed rock base that has been chip sealed. This will not stand up to the increased truck traffic crossing N 1500 Road.

d. Construction of an eastbound right turn lane on Route 442 (N 1400 Road) at Route 1057 (E 1900 Road). This is mentioned as a desirable improvement in the TIS. Pavement on the existing shoulder at this location is not adequate for the projected amount of truck traffic.

**Reason for Request:** *"The owner wishes to conduct sand excavation, extraction and processing operations on the subject property in conjunction with the existing agricultural uses."*

**KEY POINTS**

- Per Section 12-319-4.11 of the Zoning Regulations for the Unincorporated Territory of Douglas County, mining and excavation uses are permitted in the A and V-C Districts when approved as a Conditional Use.
- The area is encumbered with floodplain including the regulatory floodway and floodway fringe of the Kansas River.
- Previous Conditional Use Permits were approved for the river dredging operation to the north and northwest of the subject property. The Conditional Use Permits are not being combined with this request; however, the processing plant and access drive on the property with the previous Conditional Use Permits will be utilized. These previous Conditional Use Permits are discussed in more detail later in the report.

**ATTACHMENTS**

**A –** Public Communications received prior to printing of this staff report.
**B –** Traffic Impact Study and Addendum
**C –** Plans
**D –** Ground Water Report

**DESCRIPTION OF USE**

The applicant is requesting a Conditional Use Permit to allow pit dredging on the subject property. The applicant has an existing Conditional Use Permit for river dredging in the property along the river, north of the subject property [CUP-2-2-79] and a CUP was approved for river dredging on the property to the west owned by David and Carmiletta Penny. The applicant has been operating the two river dredging operations and intends to utilize the access drive which was constructed for the river dredging facilities. The intent is also to use the same processing plant, currently located in the middle of the existing stockpiles; however, it will be moved to the subject property in the location marked on the CUP plan after the first few phases. The reclamation plan indicates that portions of the property will be reclaimed for agricultural uses and the remainder will be reclaimed as a lake.

**ASSOCIATED CASES/OTHER ACTION REQUIRED**

- Approval of Conditional Use Permit by Board of County Commissioners.
- Conditional Use Permit Plan released to the Zoning and Codes Office.
- Issuance of permit for the Conditional Use by the Zoning and Codes Office following application and determination that all conditions have been met.

**PUBLIC COMMENT RECEIVED PRIOR TO PRINTING**

- August 9th phone call from Carl McElwee, adjacent property owner listing the following concerns with the project: 1) unstability of the river bank, 2) possible pollution of the aquifer, and 3) loss of prime agricultural soils.
- Staff met with Carl McElwee on August 31st to discuss his concerns with the CUP. Mr. McElwee provided a letter and reference material which is included in Attachment A.
- Petition from nearby property owners on September 17th in opposition to the sand pit.
- Letter from David Penny, president of Master's Dredging Company, requesting deferral. This letter is included in Attachment A.
- Letter from Carl McElwee on September 18th in opposition to the deferral request, Attachment A.

## GENERAL INFORMATION

| | |
|---|---|
| Current Zoning and Land Use: | V-C (County- Valley-Channel), F-W (Floodway Overlay) and F-F (Floodway Fringe Overlay) Districts; rural residential and agriculture. |
| Surrounding Zoning and Land Use: | To the west:<br>V-C (Valley-Channel), and F-W (Floodway Overlay) Districts; rural residential and agriculture.<br>To the north:<br>V-C (Valley-Channel), and F-W (Floodway Overlay) Districts; river dredging operation approved with CUP-2-2-79 and the Kansas River.<br>To the east:<br>V-C (Valley-Channel), F-W (Floodway Overlay) and F-F (Floodway Fringe Overlay) Districts; rural residential and agriculture.<br>To the south:<br>V-C (Valley-Channel), and F-F (Floodway Fringe Overlay) Districts; rural residential and agriculture.<br>(Figure 1) |

| **Site Summary:** | |
|---|---|
| Subject Property: | 465 acres |
| Proposed Buildings: | No new buildings are being proposed. |
| Off Street Parking Required: | 1 space per 2 employees. 4 employees/ 2 spaces are required. |
| Off Street Parking Provided: | 2 spaces provided on property to north, included within CUP-2-2-79. |

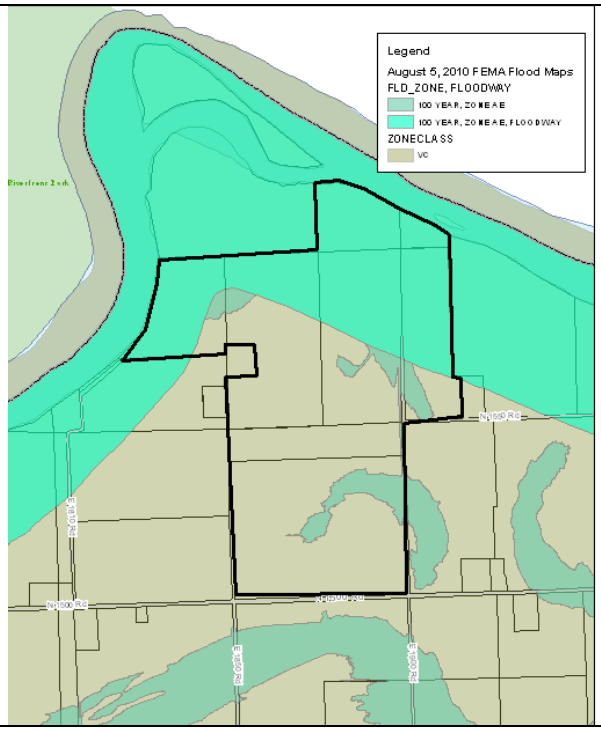



**Figure 1a.** Zoning in the area.

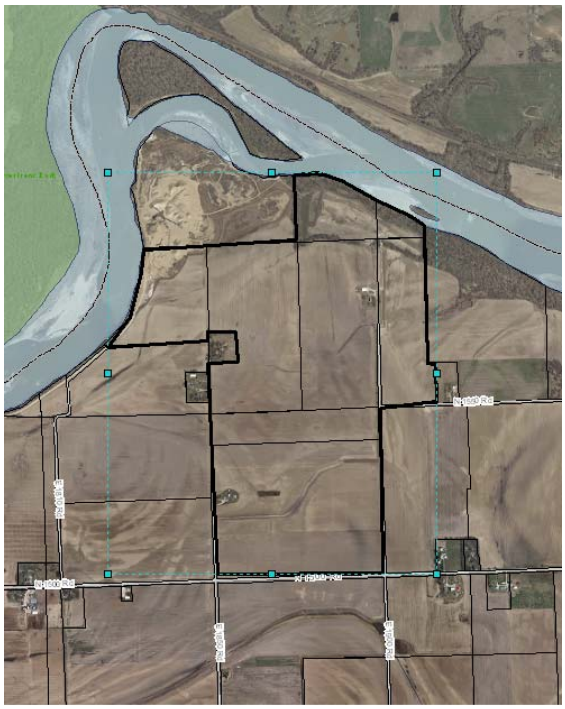


**Figure 1b**. Land use in the area.

## I. ZONING AND USES OF PROPERTY NEARBY

The subject property contains approximately 465 acres and is located northwest of the intersection of N 1500 and E 1900 Roads in portions of Sections 25, 26, 35, and 36 in Township 12 South, Range 20 East.

The nearby area is zoned V-C (Valley Channel), a protective zoning district that was created prior to the construction of Clinton Dam and development of the FEMA Flood Insurance Rate Maps for property which was prone to flooding. The V-C District permits the following limited land uses: agricultural land uses, public or private commercial recreational facilities and structures, open space, and farm dwellings provided a minimum area of 5 acres per dwelling unit is provided. Per Section 12-319-4.05, mining, extraction, and excavation of raw materials in the V-C District require approval of a Conditional Use Permit (CUP) and approval of a reclamation plan. Land uses in the area include rural residences, agricultural land uses, and mining/excavation land uses approved with CUPs. Conditional Use Permits which have been approved in this area for sand dredging are listed below and the areas included are shown in Figure 2.

- A Conditional Use Permit application, CUP-2-2-79, for river dredging was submitted in 1979 for the area north of the subject property. Planning Commission voted to recommend approval at their April 25, 1979 meeting.
- A Conditional Use Permit application, CUP-1-3-91, was submitted in 1991 for approximately 130 acres located to the west of the subject property to permit river dredging along the shore and pit dredging on the remainder. The Planning Commission voted to recommend approval of the river dredging at their March 27, 1991 meeting but voted to recommend denial of the pit operation at their May 22, 1991 meeting. The minutes indicated the vote for denial was based primarily on concerns with the possibility of contamination of ground water and local wells and the possibility of the pit accelerating the changing of the river's course.
- Various extensions were approved for CUP-1-3-91 and a new file number, CUP-3-3-01, was assigned in 2001 for that extension. On December 17, 2001, the County Commission approved a 5 year extension of the CUP through December 31, 2006. CUP-1-3-91 expired as the Corps of Engineer permit was issued after the expiration date of Dec. 31, 2006.
- CUP-06-04-08 was submitted in 2008 to replace the expired CUP-1-3-91. Planning Commission voted to recommend approval at their August meeting. County Commission approved the CUP on September 17, 2008. The CUP will expire December 31, 2012 unless a new Army Corps of Engineers permit is obtained and approved by the Zoning and Codes Director.

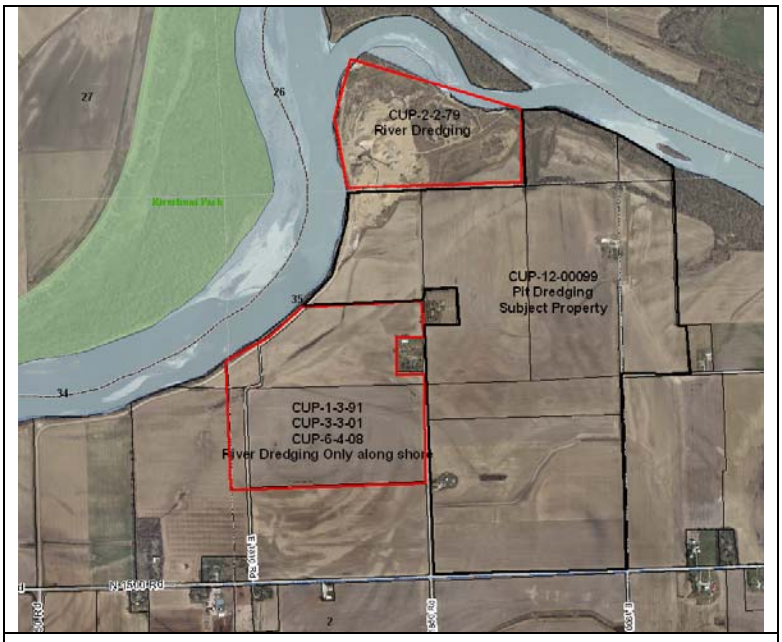



**Figure 2.** Approximate area included in CUPs for sand dredging in the area. Previously approved CUPs outlined in red, subject property in black.

**Staff Finding –** The area is zoned V-C (Valley Channel) and portions are encumbered by the Regulatory Floodway and the Regulatory Floodway Fringe. The predominate land uses in the area are agriculture, mining and extraction, and rural residential. The proposed land use, mining and excavation, is permitted in the V-C District and has been approved in the area.

## II. CHARACTER OF THE AREA

The subject property is located east of the City of Lawrence and is outside of, and adjacent to, the Urban Growth Area boundary. This is an agricultural area with scattered rural residences. Natural features in the area include the Kansas River, which borders the area to the north and is the dividing line between Douglas and Leavenworth Counties; riparian woodlands along the Kansas River; floodplain; and high quality agricultural soils. The property has good access to the transportation network through N 1500 Road, which is classified as a minor collector on the Major Thoroughfares Map. N 1500 Road connects E 15th Street with County Route 1061 (E 2200 Road), both classified as minor arterials.

**Staff Finding –** This is predominately an agricultural area with scattered rural residences, floodplain, and natural resources in the form of sand reserves and high quality agricultural soils. N 1500 Road, a minor collector, provides a connection through the area to minor arterials to the east and west.

## III. SUITABILITY OF SUBJECT PROPERTY FOR THE USES TO WHICH IT HAS BEEN RESTRICTED

Applicant's response:

> *"A Conditional Use Permit (CUP) was granted to Dunbar in 1979 for removal of sand from the river bank. The original permit covered an area approximately 114 acres gross in size which is approximately located in the northwest corner of the CUP request. The mining is a use that is allowed in V-C (Valley Channel)."*

### Existing Uses

Uses allowed in the V-C District include farms, truck gardens, orchards, nurseries, grazing, hunting and fishing, public or private commercial recreation facilities and structures, preserves, reservations and other similar open uses, and farm residences when located on a minimum of 5 acres. Mining and excavation activities are permitted as a Conditional Use. A Conditional Use requires approval though a public review process. Section 12-319 of the County Zoning Regulations states:

> *"Recognizing that certain uses may be desirable when located in the community, but that these uses may be incompatible with other uses permitted in a district, certain conditional uses listed in Section 12-319-4 below, when found to be in the interest of the public health, safety, morals and general welfare of the community may be permitted, except as otherwise specified, in any district from which they are prohibited.*"

The property is partially encumbered by the Regulatory Floodway and Regulatory Floodway Fringe. Per Section 12-328 of the County Zoning Regulations, the purpose of the floodplain management regulations is to protect individuals and property from flood hazards or flooding by providing for the orderly and safe development of the floodplain for the most advantageous uses which are consistent with the health, safety, and welfare of the general public. Any development in the area requires review and issuance of a floodplain development permit by the Zoning and Codes Office.

**Proposed Uses**

The property has many features which suit it well for the mining and excavation use which is being requested. It is located adjacent to the Kansas River in an area with sand reserves and has good access to the major transportation network. The property is located at the western reaches of the Eudora Wellhead Protection Zone and is outside the FAA 10,000 ft Wildlife Mitigation Area. (Figure 3) Conditional Use Permits for river dredging have been approved for the property to the north and an off-site access drive was constructed to accommodate this facility. There is little residential development in the area; however, 4 residences are within very close proximity to the area proposed to be pit mined with 2 of these being located on the subject property. The area is not served by a rural water district, but relies on well water. Care must be taken through the approval and operation process to minimize any negative impacts to the nearby residences.

The subject property is located in a large contiguous area of high quality agricultural soils. (Figure 4) There is a conflict between the two natural resources in that the removal of the underground sand deposits will remove the high quality soils in this location. The fact that sand reserves are typically located near the river, and often within the floodplain makes it difficult to avoid locating in areas with high quality soils.

**Staff Finding –** The property is well suited to the agricultural and residential uses to which it has been restricted by the V-C Zoning District. The property is also suited to the Conditional Use of mining and excavation provided that appropriate measures are taken to minimize negative impacts on nearby residences. A policy decision for the Commission would be a decision regarding the competing natural resources in the area: high quality agricultural soils and off-river sand reserves.

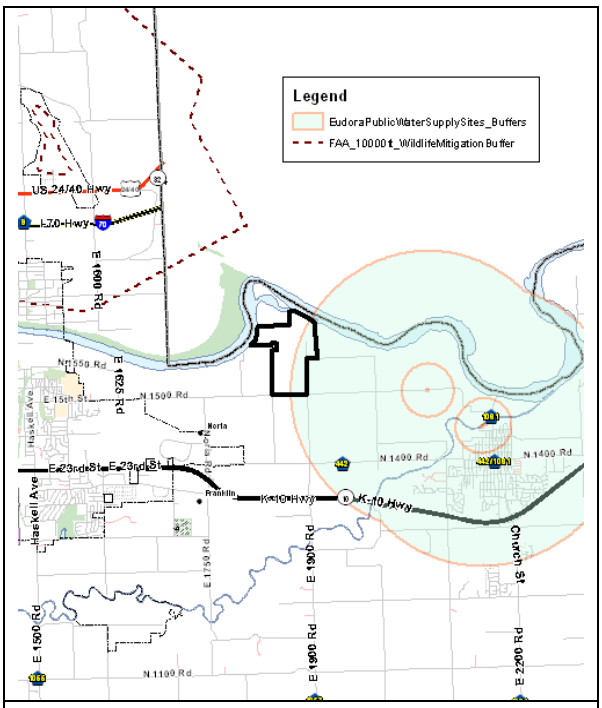



**Figure 3.** Eudora Wellhead Protection Zone and FAA Wildlife Mitigation Area.

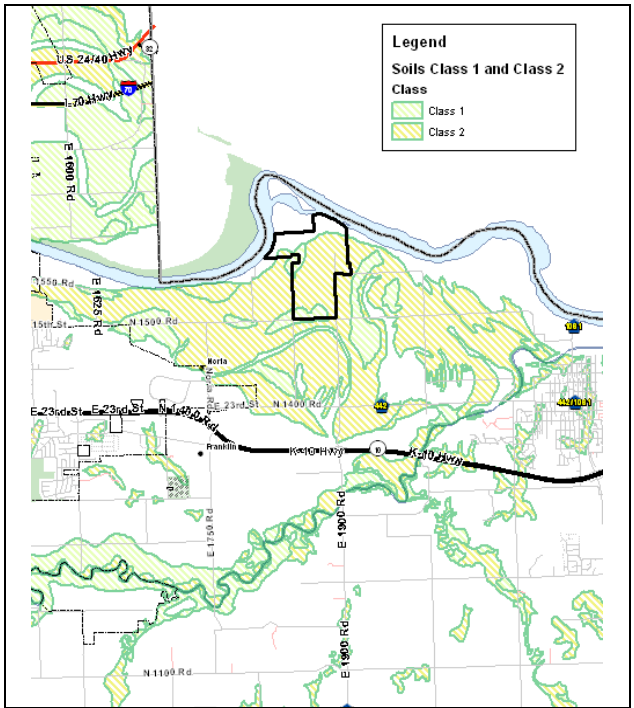



**Figure 4.** High Quality Agricultural Soils in the area. Subject property outlined.

## IV. LENGTH OF TIME SUBJECT PROPERTY HAS REMAINED VACANT AS ZONED

**Staff Finding –** The V-C District permits limited development of agricultural, recreational uses or farm residences. The property has been used for farming and 2 farm residences were constructed on the property in the early 1900s. There has been no other development on the subject property.

## V. EXTENT TO WHICH REMOVAL OF RESTRICTIONS WILL DETRIMENTALLY AFFECT NEARBY PROPERTY

Applicant's Response:

> *"No detriment to nearby properties will occur. This CUP request maintains existing agricultural uses on the land while adding employment and revenue opportunities in northeast Douglas County. The Corps of Engineers regulate the mining activity on the river along with several other governmental agencies which require permits."*

The proposed use will produce permanent changes in the area. Agricultural uses will continue as mining occurs by phase; however, eventually all phases will be mined. The reclamation plan shows some areas being returned to farmland, particularly around the residence on the east side of the property and the area in the northwest corner of the subject property adjacent to the Kansas River and the rest being reclaimed as a lake. An access drive installed for an earlier CUP will be utilized and this will have direct access to a paved road.

Sand pits have the possibility to detrimentally affect nearby properties through the following:

- **Stockpiles**: Overburden, topsoil, and finished products of sand and aggregate will be stockpiled on the area. The placement, height, and maintenance of stockpiles to prevent dust pollution are important considerations to reduce any negative impact. The applicant indicated that overburden would be used primarily to construct the perimeter berms and for reclamation of previously excavated phases. If stockpiling of overburden is proposed on the subject property, the CUP plan should note the maximum height and location. The stockpiles should be kept as far from the existing residences as possible to reduce visual impact.
- **Ground water:** As mentioned earlier, properties in this area are not served by public water and must rely on well water. The mining will occur above and below the water table. It would be important to study any impact the mining activity could have on the quality of ground water and the quantity available to nearby wells. The applicant provided a study on the impact of the mining activity on groundwater. The study looked at wells which are registered with Division of Water Resources, Kansas Department of Agriculture. It is important to note that some wells in the area were installed prior to the requirement to register. The study was prepared by Carl E. Nuzman, P.E., P.HG, a consulting engineer and hydrogeologist. The following are excerpts taken from the study:
    a. The report provided the following information on the quantity of water available for the wells: *"A well can decrease in yield due to biological fouling and lack of property maintenance but unless the static water level has a substantial decline reducing the saturated thickness, the yield available from the aquifer remains constant."* (Page 5, Nuzman report.)
    b. And the following recommendation in relation to the McElwee well: *"The C. McElwee domestic well is up-gradient from the sand pit and down-gradient from the Kansas River. Although the property is about 5 acres in area, it is recommended that the set back of the pit mining be 300 feet from his property line. The radius of influence of the domestic well is less than 300 feet and will not be adversely affected by the sandpit."* (page 8, Nuzman report.)
    c. Regarding the impact of the sand pit on the quantity of water available for other wells in the area: "*Sand pits beneficially support the yield of wells that are down-gradient from a pit that is within the area of influence of a well."* (Page 8, Nuzman report.)

d. "*Due to the hydraulic gradient of the valley aquifer system and recharge to the aquifer from rainfall, the aquifer flow to the City wells is from the west-southwest. The Penny sand pit will be a half mile north of the capture zone of the City wells and will have no influence on the Eudora public water supply wells*." (page 7, Nuzman report)

The report recommended that a 300 ft setback be maintained between the property boundary of any residence out parcel and the active dredging of sand from the pit and concluded that the proposed sand pit lake that will be developed will have no effect on the McElwee wells, Public Wholesale Water Supply District No. 25 or the City of Eudora's wells or water supply. The applicant provided a revised CUP plan with the 300 ft setback shown.

- **River channel:** Concern was raised that allowing the pit mining to occur so close to the river could accelerate a change in the river channel, especially during flood events. The river is naturally working to change its channel in this location. Wakefield Dort, a retired KGS professor, examined the channel changes in the Kansas River and Carl McElwee provided an excerpt of one of his publications in his materials. Staff contacted a hydrologist with the USGS (United States Geological Survey) Midwest Division, Kyle E Juracek, for his opinion on the impact of the dredging operation and pit on the river channel. Mr. Juracek indicated that the location of a lake could result in channel change in the event of a flood but pointed out that the river channel may change as a result of a flooding event even without a lake in close proximity. Rip-rap including large pieces of concrete and smaller infill pieces has been placed on the Kansas River shore to stabilize it since the river dredging operation began.

- **Visual impact:** To minimize the visual impact on nearby properties, particularly the residential properties that are in close proximity to the mining area, it is necessary to establish well-landscaped buffers and to place limits on the location and height of stockpiled materials. The Operation Plan indicates that excess overburden and topsoil might be sold. To minimize activity near these residences, sales should be by delivery only or occur on the northern area where the scale house is shown on the CUP. The reclamation plan should provide details about the lake which is to be created, showing the approximate boundaries, and shape. Development of a lake that is an attractive natural feature could be a positive impact on the area.

- **Traffic:** The applicant provided a Traffic Impact Study (TIS) and addendum which are included with this report as Attachment B. The TIS estimated that on a high production day as many as 200 trucks a day could be expected (400 truck trips as these would be round trips). The increase in truck traffic that would result from the sand plant expansion would be 20 trucks a day (40 trip-ends, 20 in and 20 outbound trips). The applicant's consultant provided an amended TIS which explains that the traffic generation estimated in the original TIS assumed that the river dredging operation and the sandpit operation would be occurring concurrently. The applicant indicated that the primary reason for the expansion of the plant is to switch over the river dredging to off-river pit dredging maintaining its current rate of sand distribution at approximately 1,000 (+/-) tons on an average day. The TIS indicates that all truck traffic will utilize Noria Road, and will not use N 1500 Road; this should be listed as a condition on the CUP plan. When the sand pit dredging operation replaces the river dredging the estimated number of trucks serving the site will be around 40 trucks per day. The consultant also clarified that the 200 trucks per day estimate was based on a high productivity day, 5000 tons, which may still occur but on a very infrequent basis.

  Based on this information, traffic can be assumed to be about 40 trucks a day on an average day and up to 200 trucks a day on a high productivity day.

These documents were provided to the County Engineer for review, and also to the City Engineer as some of the roads used to access the plant lie within the City of Lawrence. The County Engineer recommended the following improvements to nearby roads and intersections to accommodate the increased traffic associated with the sand pit:

a. Realignment of the entrance to the sand facility so that it opposes the Noria Road intersection at N 1500 Road.

b. Pavement of a 100 ft long section of the site access drive just north of N 1500 Road, as recommended in the TIS.

c. Reconstruction of pavement in the Noria Road (E 1750 Road)/N 1500 Road intersection. The existing surfacing is likely a crushed rock base that has been chip sealed. This will not stand up to the increased truck traffic crossing N 1500 Road.

d. Construction of an eastbound right turn lane on Route 442 (N 1400 Road) at Route 1057 (E 1900 Road). This is mentioned as a desirable improvement in the TIS. Pavement on the existing shoulder at this location is not adequate for the projected amount of truck traffic.

These changes shall be noted as conditions of approval which must be met before the Conditional Use Permit is issued.

- **Activity:** A sand pit operation includes the removal of overburden with heavy equipment, the dredging of sand, processing and sale of the sand/aggregate products, and reclamation activities. These activities could have an impact on surrounding properties due to lighting or noise. The operation plan indicates that typical hours of operation will be Monday through Friday from 6:30 AM to 6:30 PM. There may be extenuating circumstances which would require operation on Saturdays or for dredging to occur beyond the regular hours of operation due to the nature of the construction business. The operation of the dredge should be low impact as the 4 headlights that are on the dredge provide the only lighting when operating at night and the dredge operates relatively quietly. It should be noted as a condition of approval that no removal, transfer, or placement of overburden which requires heavy equipment would be permitted outside these operating hours. This will serve to keep the higher intensity uses within the regular business hours.

**Staff Finding –**Potential negative impacts the proposed use could have on nearby properties include the noise and activity associated with the mining, reduced visual appeal created by stockpiles of overburden or topsoil, impacts on well water, and traffic. Conditions should be placed the CUP to minimize potential negative impacts on nearby properties.

## VI. RELATIVE GAIN TO THE PUBLIC HEALTH, SAFETY AND WELFARE BY THE DESTRUCTION OF THE VALUE OF THE PETITIONER'S PROPERTY AS COMPARED TO THE HARDSHIP IMPOSED UPON THE INDIVIDUAL LANDOWNERS

Applicant's Response:
"*No identifiable gain will result by denial of this request; no identifiable hardship will result from its approval."*

Evaluation of the relative gain weighs the benefits to the community-at-large vs. the benefit of the owners of the subject property. There are many factors to consider when locating a sand pit, and this location meets the geographic criteria of being outside the FAA 10,000 ft wildlife mitigation area, has good access to the arterial roadway system, and is in a lowly populated area. Denial of the

request for a Conditional Use Permit would affect the individual landowner by prohibiting the use of the property for the off-river sand dredging pit.

Denial of the CUP request may benefit the area property owners by preventing the proposed mining activity and possible negative impacts. Denial may benefit the public by retaining the high quality soils. Denial may also detrimentally affect the public in that it will prohibit production of sand and aggregate materials from a local source. With the recent move away from river dredging, appropriate locations for pit mining must be found.

**Staff Finding** – Denial of the CUP would result in a hardship to the applicant and public in that it would prohibit the applicant from operating a sand pit to produce sand and aggregate products from local reserves. Denial of the CUP may benefit the public at large by maintaining the high quality soils which are present. To weigh the benefit the denial of the CUP would have on the public, protection of high quality soils, versus the impact it would have, loss of potential sand and aggregate production from a local source, it is necessary to choose between these two natural resources in this location.

## VII. CONFORMANCE WITH THE COMPREHENSIVE PLAN

The subject property is not located within an identified urban growth area. The comprehensive plan recommends that agricultural uses continue to be the predominant land use within the areas of the county beyond the designated urban growth areas. Uses permitted in the rural area should continue to be limited to those which are compatible with agricultural production and uses. The mining activity and the resultant lake would be compatible with agricultural production and uses.

**Chapter 16 Policy 2.7 "*Encourage the protection of High Quality Agricultural Land in Douglas County for current and future agricultural use.*"** (page 16-15, *Horizon 2020)*
This policy contains the following 4 steps to encourage the protection of High Quality Agricultural Land:

- Including the protection of High Quality Agricultural Land as a key assumption in the sector planning process.
- Establishing tools to protect High Quality Agricultural Land for farming and make its protection economically feasible for the land owner.
- Maintaining an inventory of High Quality Agricultural Land in Douglas County and track the amount lost to urbanization.
- Encourage and develop policies that support agri- and eco-tourism.

**Chapter 16: *Resource Management***
*"This section encourages the responsible use of marketable natural resources within Douglas County through proper extraction and reclamation methods. They are essential to sustainable development activity, primarily in the form of low cost raw materials, such as sand, gravel, timber, oil, gas, and stone, etc."* (page 16-21, *Horizon 2020*)

The Comprehensive Plan recommends both the encouragement of the protection of High Quality Agricultural Land and the responsible use of marketable natural resources.

**Staff Finding –** The proposed use is in general conformance with the recommendations in the Comprehensive Plan; however, it is proposing the use of marketable natural resources rather than the protection of High Quality Agricultural Land.

**STAFF REVIEW**

As discussed earlier, there are two approved Conditional Use Permits for river dredging in this area, CUP-2-2-79 and CUP-06-04-08. CUP-06-04-08 replaced an expired Conditional Use Permit, CUP-1-3-91, which had requested both river and pit mining for the area to the west of the subject property (Figure 2). The river dredging request was approved but the pit dredging request was denied. CUP-2-2-79 was approved for the property to the north of the subject property. The processing plant, scale house and stockpiles are currently located on this property. The scale house and stockpiles would remain in this location; however, the processing plant would be located to the east onto the property within the current CUP in later phases of excavation. An easement was dedicated in 1979 for the access drive and this access drive will continue to provide access for the subject property. A copy of this easement shall be provided to the Planning Office for the file.

Most of the neighbor's concerns were addressed in an earlier section of this report dealing with possible negative impacts to surrounding properties; however, another concern was raised regarding the perpetual maintenance of the berms in the future to insure that stormwater runoff does not enter the lake. Staff recommends that an agreement placing the responsibility for the perpetual maintenance of the berms on the property owner should be executed and recorded with the Register of Deeds prior to the release of the CUP permit.

Wetlands are present on the subject property as shown on the CUP plan. The applicant's intention is to either protect the wetlands or mitigate them off-site; however, the decision has not been made at this time. The applicant shall work with the Army Corps of Engineers to determine how the existing wetlands on the property will be treated. Prior to any excavation occurring in the phase adjacent to the phase containing the wetlands, the applicant should provide documentation to the Planning Office indicating the plans for the wetlands, whether they will be maintained on site or if they will be mitigated elsewhere. If the wetlands are to be maintained, the operation plan should be revised to include the protection measures and the revised plan should be submitted to the Planning Office for administrative approval of the wetland setbacks and protection measures.

The applicant indicated that their long term plan for the area is to reclaim the areas to farmland as shown on the reclamation plan and to create a lake for recreational use in the remainder. A note should be added to the reclamation plan which indicates that the lake will be contoured with a more natural shape than the rectangular shape shown on the plan and to note the intended use following reclamation.

The previously approved CUP restricted sand pit access on E 1810 Road to employees and required customers and commercial trucks to use the established access drive. A note to this effect should be included on the CUP plan.

Due to the nature of mining and excavation uses, the approval time frames are typically for 30 years. This allows time for the mining, excavation and reclamation of the land. An extension request may be submitted to the Planning Office for public hearing before the Planning Commission and action by the County Commission. The Zoning and Codes office shall conduct 5 year reviews to insure compliance with the CUP, operation, and reclamation plans.

The applicant explained the mining process will begin with excavation of the overburden in Phase 1 and the dredge will be moved in for removal of sand when possible. A picture of the dredge and the processing plant is included in Figure 5. The mine is to be sequentially reclaimed which means that that earlier phases will be in the reclamation process as later phases are being excavated. The first few phases are planned to be reclaimed as farm land so overburden from later phases will be placed in the area to be reclaimed. Topsoil will then be applied and vegetation planted. As they move

through the phases the overburden will be excavated and placed within the previously created pit. Overburden will also be used to create the perimeter berms which will keep stormwater runoff from surrounding areas from entering the lake. This is an important step is preventing pollution of ground water. There may be some incidental sales of excess overburden or topsoil but this would occur on the property with the scale house. All stockpiling of finished material will occur on the area designated on CUP-2-2-79. A note should be added to the plan that states that the area shown on CUP-2-2-79 with the scale house, processing plant, sediment pond, and stockpile area will also be used to serve the subject property and CUP.

**Figure 5a.** Picture of processing plant which will remain on the north portion of the property.

**Figure 5b.** Picture of dredge which will be used for mining operations.

**Public Communications**

Public Communications included with this staff report in Attachment A include a letter from adjacent land owner, Carl McElwee, expressing his concerns with the possible impact the proposal may have on the area; a petition signed by neighbors in opposition to the project; a request for deferral from adjacent property owner, Dave Penny, and a letter of opposition to the deferral request from Carl McElwee. The concerns raised in Carl McElwee's letter have been discussed throughout this staff report. Staff does not typically make recommendations when deferrals are requested, but the letters have been provided for the Commission's consideration.

**Joint Hearing**

County Resolution No 80-5 established the policy that a joint hearing be held for requests within 3 miles of the incorporated cities in Douglas County so that the County Commission would have the benefit of both Planning Commissions' recommendations. The subject property is approximately 2 miles west of the Eudora City Limits; therefore, a joint meeting is being held between the Lawrence/Douglas-County Metropolitan Planning Commission and the City of Eudora Planning Commission and their recommendations will be forwarded to the Board of County Commissioners.

**Conclusion**

Approval of a Conditional Use can be tailored to address specific issues such as intensity or frequency of use, include time limitations, and provide screening requirements. The recommended conditions respond to the specific nature of this request. The sand pit, as conditioned, should be compatible with nearby land uses.

Aug. 30, 2012

***Lawrence Douglas County***
***Metropolitan Planning Office***
6 East 6th Street,
P.O. Box 708,
Lawrence, KS 66044

Planning Staff:

My name is Carl McElwee and I live at 1564 E. 1850 Rd. I have lived at this location since 1975 (37 years this November). I am writing this letter to object to the Conditional Use Permit (CUP) that Penny Sand Co. has applied for near my house. This CUP asks permission to surround my house on 3 sides with a pit mining operation for sand removal. This would completely change my immediate surroundings which I have enjoyed for so long. If allowed this CUP would subject me and my family to dramatically increased industrial activity, including noise, dust, and environment destruction. This will undoubtedly dramatically affect my property values.

The affected area has some interesting Douglas County history associated with it. It was obtained very early by the Altenbernd family. Penny Sand has acquired much of the land as elder Altenbernds have died. On the land currently owned by Penny and covered under this CUP there exist two historic houses. One is an early stone homestead house and one is a classic two story farm stead that dates to approximately 1910. There is no mention of what will become of these structures in the CUP. I hope they will be preserved and that this CUP will not be allowed to detract from their historic value. My house was also built by an Altenbernd. As best we can tell it was built in about 1919 and is a classic Craftsman Bungalow style. My wife and I have lived here 37 years and raised our two children here. We do not want to see this environment affected by an ugly and destructive sand mining operation.

This will create a huge strip mining operation that will severely impact the local environment. Naturally, I am opposed to the CUP because of the impact on my property. However, I would like to lay out some scientific reasons why this CUP should be denied. I am a retired Geology Professor from KU and have spent a 35 year career there studying groundwater. I have worked extensively at a research site in the Kansas River Valley just northeast of the Lawrence Airport. So I am qualified to comment on the scientific aspects of the situation.

My scientific bases for opposing this CUP are as follows:

(1) The river bank in the vicinity of this proposed pit mining operation is unstable and has moved considerably over recent times, as shown by the work of Dr. Dort of the KU Geology Department. I have included copies of pertinent pages of his work. It shows that this area is unstable and the river is trying to make a straighter course, cutting off the existing meander. If pit mining is allowed in this area, in times of flood the chances of a dramatic river channel change is magnified greatly. An open pit with a small buffer

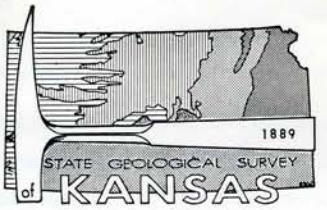
region from the river in the vicinity of this unstable bend would make it easy for the flooding river to make a sudden change in direction.

(2) On this proposed 434 acre pit mining site, the majority of the area is covered by some of the highest quality soils as defined by the US Department of Agriculture. I have included a USDA Soil Report and some pages from the 1977 Douglas County Soils Survey to support this. It seems very short sighted to produce sand for short term gain and lose the potential for significant food and fiber production indefinitely. You will notice that the USDA report shows this area as being rated as poor for sand production. This is probably because of the large amount of overburden (unusable soil, silt and clay) that must be removed. I have included three well drilling logs that show 23-24 feet of soil, silt and clay exist in the vicinity of my property. Removing this much overburden will create a very environmentally difficult situation. The spoil piles must be dealt with, not allowing runoff into the river. At the same time surface runoff must not be allowed into the pit because of possible pollution of the aquifer. There is great potential for operational missteps to create environmental problems. We have all seen the detrimental effects of strip mining elsewhere; I hope we can avoid them here.

(3) Opening this pit operation will expose one of the most prolific aquifers in this region to potential pollution. The very sand that they desire to excavate is the material that forms this prolific aquifer. I have included a few pages from a Kansas Geological Survey Bulletin by Fader that shows the characteristics of this aquifer. In general, groundwater in the aquifer moves down the valley from West to East. This aquifer is a magnificent resource that must be protected and preserved for the future. It is capable of producing vast amounts of water for irrigation and public water supply. In the future water may be one of our most valued resources. The alluvial material (loose material, soil, silt, clay, sand) in the river valley varies in depth, but about 70 feet is a good average number. The better sand is near the bottom, so the mining will proceed to the bedrock (harder material). The better sand near the bottom is also the main aquifer of the river valley. The overlying soil, silt, and clay protect the aquifer from surface pollutants. By removing this overburden the aquifer is exposed to potential pollution from surface runoff and anything that is spilled into the pit. In particular, my well would be very close to the proposed pit mine and could be affected by the operation, as could several other neighboring house wells. Just down the valley about 1 5/8 miles lies the Eudora Public Water Supply Well Field (See enclosed map); it could also be affected by the proposed pit mining operation. I do not believe that Penny Sand Co. can guarantee that no pollution will occur. Penny Sand Co will tell us that they will engineer solutions that will prevent any pollution or problems; however, I do not think the risk of a potential engineering failure is appropriate. After the 30 year CUP has finished the pit will remain, who will continue to maintain the site and guarantee aquifer integrity?

Thank you for your consideration. If I may answer any questions, please contact me.

Carl McElwee
1564 E. 1850 Rd.
Lawrence, KS 66046 785-843-4164 cmcelwee@ku.edu




BULLETIN 206, PART 2

# Ground Water in the Kansas River Valley Junction City to Kansas City, Kansas

By

Stuart W. Fader

*Prepared by the State Geological Survey of Kansas and the United States Geological Survey, with the cooperation of the Division of Water Resources of the Kansas State Board of Agriculture and the Division of Environmental Health of the Kansas State Department of Health.*

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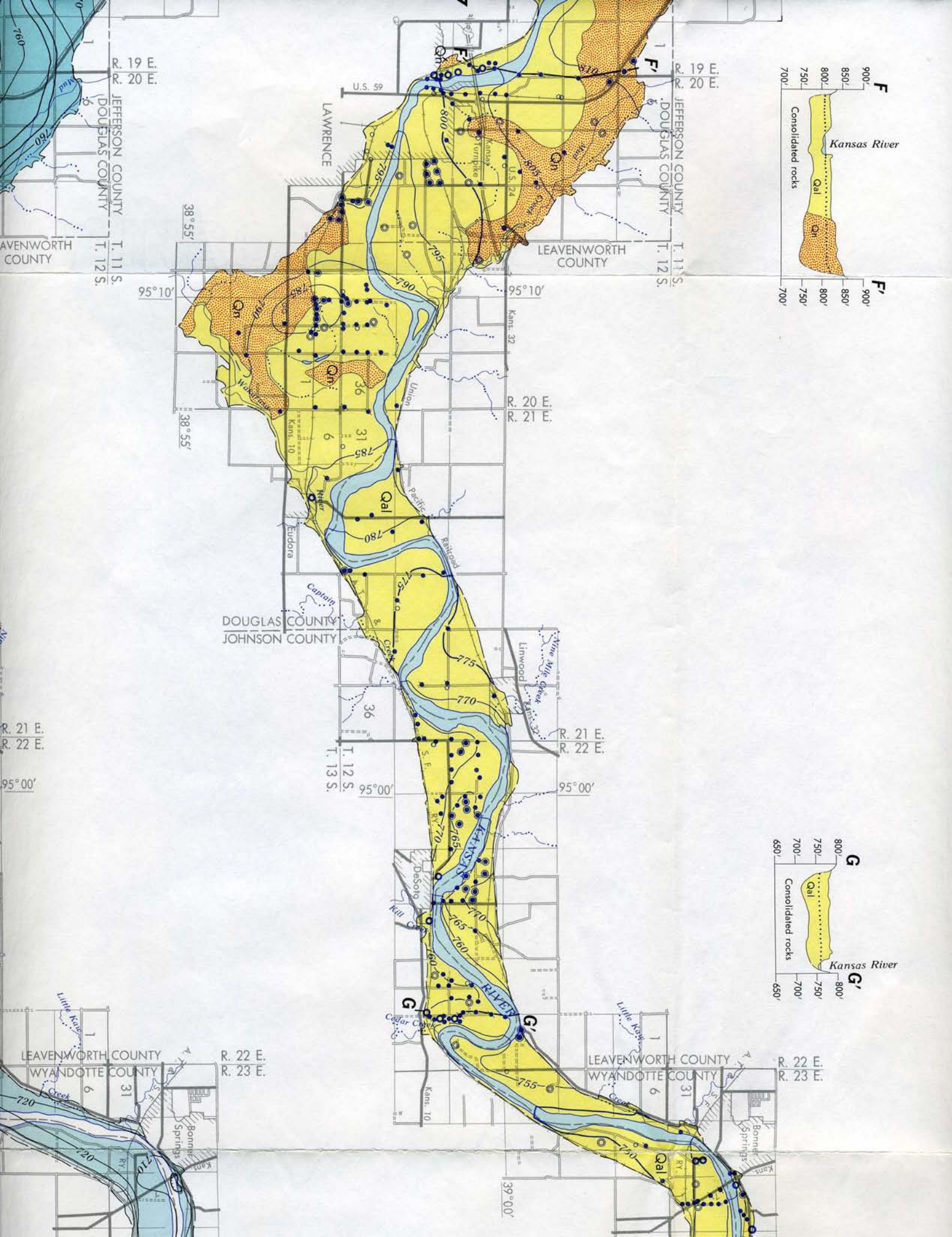
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Qal
Qn
Kansas River
900'
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800'
750'
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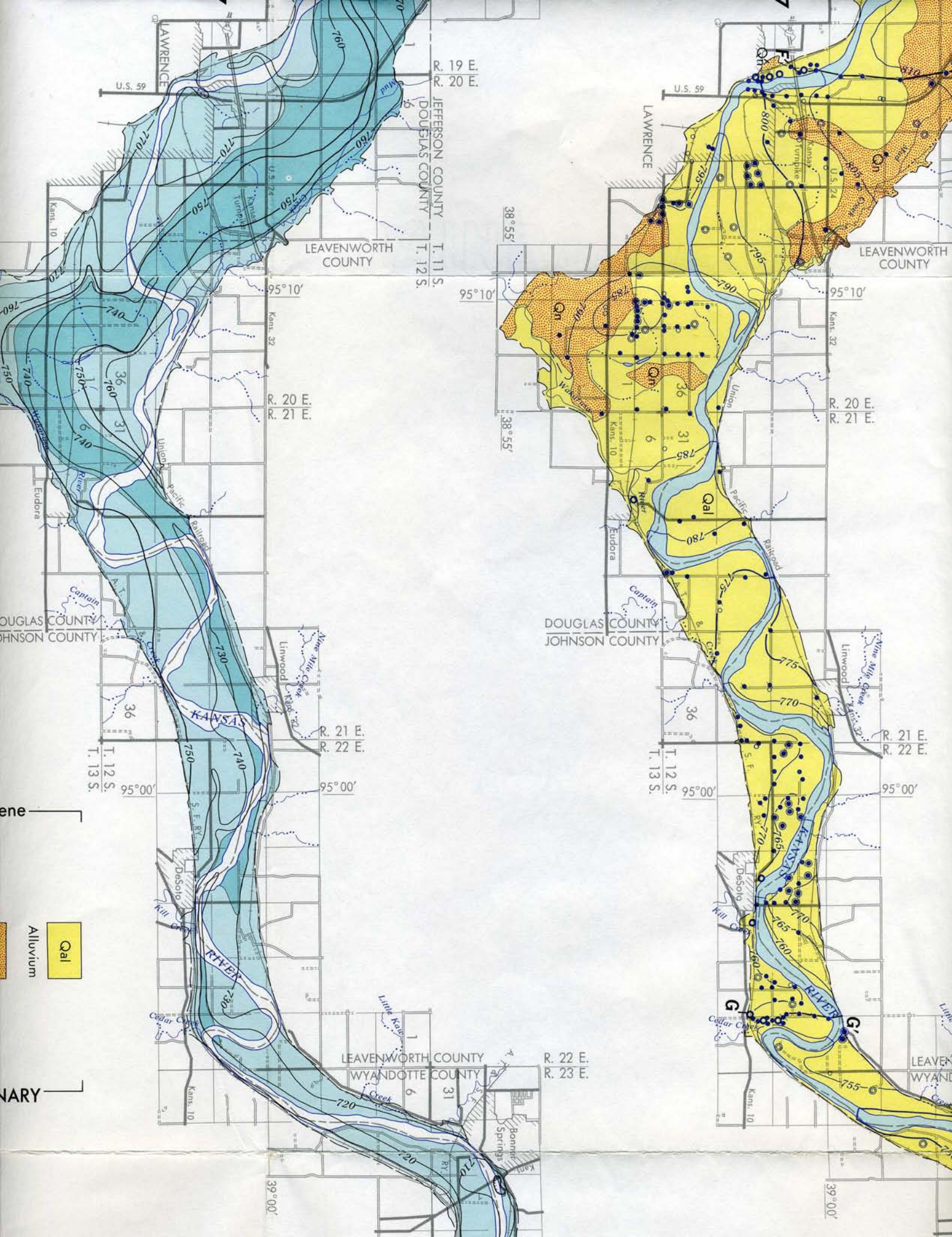
650'
R. 19 E.
R. 20 E.
R. 21 E.
R. 22 E.
R. 23 E.
T. 11 S.
T. 12 S.
T. 13 S.
JEFFERSON COUNTY
DOUGLAS COUNTY
LEAVENWORTH COUNTY
WYANDOTTE COUNTY
JOHNSON COUNTY
LAWRENCE
EUDORA
BONNER SPRINGS
DESOTO
U.S. 59
Kansas Turnpike
U.S. 24
Kans. 32
Kans. 10
Union Pacific Railroad
Wakarusa River
Captain Creek
Little Kaw Creek
Mill Creek
Linwood
Kill Creek
Cedar Creek
KANSAS RIVER
Qn
Qal
38°55'
95°10'
95°00'
39°00'


LAWRENCE
U.S. 59
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LEAVENWORTH COUNTY
Kans. 10
Kansas Turnpike
U.S. 24
Stinson Creek
95°10′
Kans. 32
R. 20 E.
R. 21 E.
Wakarusa River
Union Pacific Railroad
Eudora
Captain Creek
DOUGLAS COUNTY
JOHNSON COUNTY
Nine Mile Creek
Linwood
R. 21 E.
R. 22 E.
T. 12 S.
T. 13 S.
95°00′
KANSAS RIVER
S. F. RY.
DeSoto
Kill Creek
Cedar Creek
Little Kaw
WYANDOTTE COUNTY
Bonner Springs
39°00′
38°55′
Qn
Qal
Alluvium
F
F′
G
G′


Geology modified from Beck (1959), Davis and Carlson (1952), Dufford (1958), Fishel (1948), Johnson and others (1967), and O'Connor (1960, 1971)

## EXPLANATION

Pleistocene — QUATERNARY

Qal — Alluvium

Qn — Newman terrace deposits

Qb — Buck Creek terrace deposits

Contact
Dashed where inferred on geologic sections

E——E′
Trace of geologic section
Datum for geologic sections is mean sea level and vertical exaggeration x 40

Boundary of project area

785
Water-table contour
Shows altitude of water table, March 1967.
Dashed where approximately located.
Interval 5 feet. Datum is mean sea level

Water table
Shown on geologic sections

Irrigation well

Public supply well

Industrial well

Domestic or stock well

Test hole

Observation well

Stream-gaging station

Saturated thickness, in feet

Less than 20

20-40

More than 40

760
Bedrock contour
Shows altitude of bedrock surface.
Dashed where approximately located.
Interval 10 feet. Datum is mean sea level

True North
9°
Magnetic North

APPROXIMATE MEAN
DECLINATION, 1972

**STATEMENT**

March 24, 2004

Carl McElwee

1564 E 1850 Rd Lawrence, Ks. 66046

# STRADER DRILLING COMPANY, INC.

**Phone: 785-364-3011 — 12302 246th Road**
**HOLTON, KANSAS 66436**

**NOTICE:** We do not make installment or credit sales. All accounts are due upon receipt of billing. A delinquency charge of 1½% per month (18% per year) will be added to accounts not paid within 30 days from invoice date.

| | | | |
|---|---|---|---|
| 3-16-04 | | | |
| | 1st 40' | | 1200.00 |
| | 8' add'l @ | 13.00 | 104.00 |
| | 24 bags hole plug | 10.00 | 240.00 |
| | well seal & vent | | 37.00 |
| | tax on 677.00 | | 42.65 |
| | | total | 1623.65 |
| | 0-2 top soil | | |
| | 2-11 clay brown/silty | | |
| | 11-24 clay brown | | |
| | 24-34 fine san brown | | |
| | 34-38 fine/course sand med pea bronw | | |
| | 38-42 fine/course sand med pea br/gr/grn | | |
| | 42-42½ clay grey | | |
| | 42½-48 fine sand br/gr/grn/boulders | | |
| | 48' 12" drilling | | |
| | 50' 5" casing | | |
| | 15' screen 33'-48' — .025 slot | | |
| | 37 GPM - SWL 29' | | |
| | HP 3'-30' | | |

# Drill Logs

1 April 76 — Carl McElwee's 5 acres

SE Corner

| | |
|---|---|
| 0-5 | black soil |
| 5-23 | gray brown clay |
| 23-28 | med coarse sand |
| 28-38 | coarse sand |
| 38-42 | green sand |
| 42 | gray clay stringer? |
| 42-50 | green sand |
| 50 | hard - (boulders?) |
| 50-66 | green sand |
| 66 | light brown limestone |

300' N of SE corner

| | |
|---|---|
| 0-4 | black soil |
| 4-23 | brown clay |
| 23-38 | pink-brown sand |
| 38-54 | greens sand |
| 54 | crunchy (boulders?) |
| 54-65 | green sand |
| 65 | light brown limestone |

SOIL SURVEY OF

# Douglas County, Kansas

United States Department of Agriculture
Soil Conservation Service
In cooperation with
Kansas Agricultural Experiment Station

TABLE 2.—*Yields per acre of crops and pasture*

[All yields were estimated for a high level of management in 1974. Only arable soils are listed]

| Soil name and map symbol | Corn | Grain sorghum | Soybeans | Wheat | Alfalfa hay | Smooth bromegrass |
|---|---|---|---|---|---|---|
| | *Bu* | *Bu* | *Bu* | *Bu* | *Ton* | *AUM* [1] |
| Eudora: | | | | | | |
| Et | 110 | 112 | 45 | 50 | 5.6 | 6.5 |
| Ev[2] | 100 | 100 | 40 | 43 | 5.0 | 6.2 |
| Ew[2] | 105 | 106 | 42 | 47 | 5.5 | 6.3 |
| Gymer: | | | | | | |
| Gm | 90 | 94 | 38 | 42 | 4.3 | 5.5 |
| Gy | 83 | 90 | 35 | 40 | 4.0 | 6.1 |
| Judson: Ju | 109 | 111 | 44 | 52 | 5.6 | 7.0 |
| Kennebec: Kb | 103 | 98 | 40 | 42 | 5.5 | 6.5 |
| Kimo: Km | 85 | 90 | 38 | 40 | 4.5 | 5.5 |
| Leanna: Le | 80 | 85 | 32 | 36 | 4.0 | 7.0 |
| Martin: | | | | | | |
| Mb | 80 | 85 | 35 | 40 | 3.9 | 5.5 |
| Mc | 75 | 80 | 31 | 38 | 3.6 | 5.5 |
| Mh[2] | 50 | 59 | 24 | 26 | 2.9 | 4.5 |
| Mo[2] | 68 | 78 | 30 | 37 | 3.4 | 5.0 |
| Morrill: | | | | | | |
| Mr | 80 | 85 | 32 | 40 | 4.0 | 6.5 |
| Ms | 68 | 75 | 28 | 37 | 3.5 | 6.0 |
| Oska: Oe | 67 | 79 | 32 | 38 | 3.4 | 5.4 |
| Pawnee: | | | | | | |
| Pb | 73 | 80 | 34 | 38 | 3.8 | 6.0 |
| Pc | 68 | 75 | 30 | 35 | 3.6 | 5.5 |
| Ph | 44 | 55 | 23 | 26 | 2.7 | 4.5 |
| Reading: Re | 103 | 106 | 44 | 50 | 5.6 | 6.5 |
| Sarpy: Sb[2] | 70 | 80 | 30 | 35 | 5.0 | 3.9 |
| Sharpsburg: | | | | | | |
| Sc | 95 | 95 | 38 | 42 | 4.7 | 6.8 |
| Sd | 90 | 90 | 36 | 41 | 4.5 | 6.5 |
| Sibleyville: | | | | | | |
| Sh | 62 | 73 | 25 | 34 | 3.6 | 6.0 |
| So | 52 | 57 | 21 | 28 | 3.0 | 5.0 |
| Ss[2] | 54 | 60 | 22 | 29 | 3.2 | 4.5 |
| St[2], Sv[2] | | | | | | 5.2 |
| Thurman: Tc | 60 | 60 | 22 | 32 | 3.0 | 5.0 |
| Vinland: Vc[2] | 48 | 55 | 23 | 27 | 2.2 | 4.0 |
| Wabash: | | | | | | |
| Wc | 82 | 88 | 37 | 38 | 4.0 | 6.0 |
| Wh | 65 | 65 | 31 | 32 | 3.0 | 5.5 |
| Woodson: | | | | | | |
| Wo | 65 | 75 | 28 | 34 | 3.5 | 5.0 |
| Ws | 65 | 75 | 24 | 32 | 3.5 | 5.0 |
| Wx | 50 | 55 | 20 | 25 | 2.3 | 4.5 |

[1] Animal-unit-month (AUM) is a term used to express the carrying capacity of pasture. It is the amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for a period of 30 days.

[2] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

# DOUGLAS COUNTY, KANSAS

United States Department of Agriculture

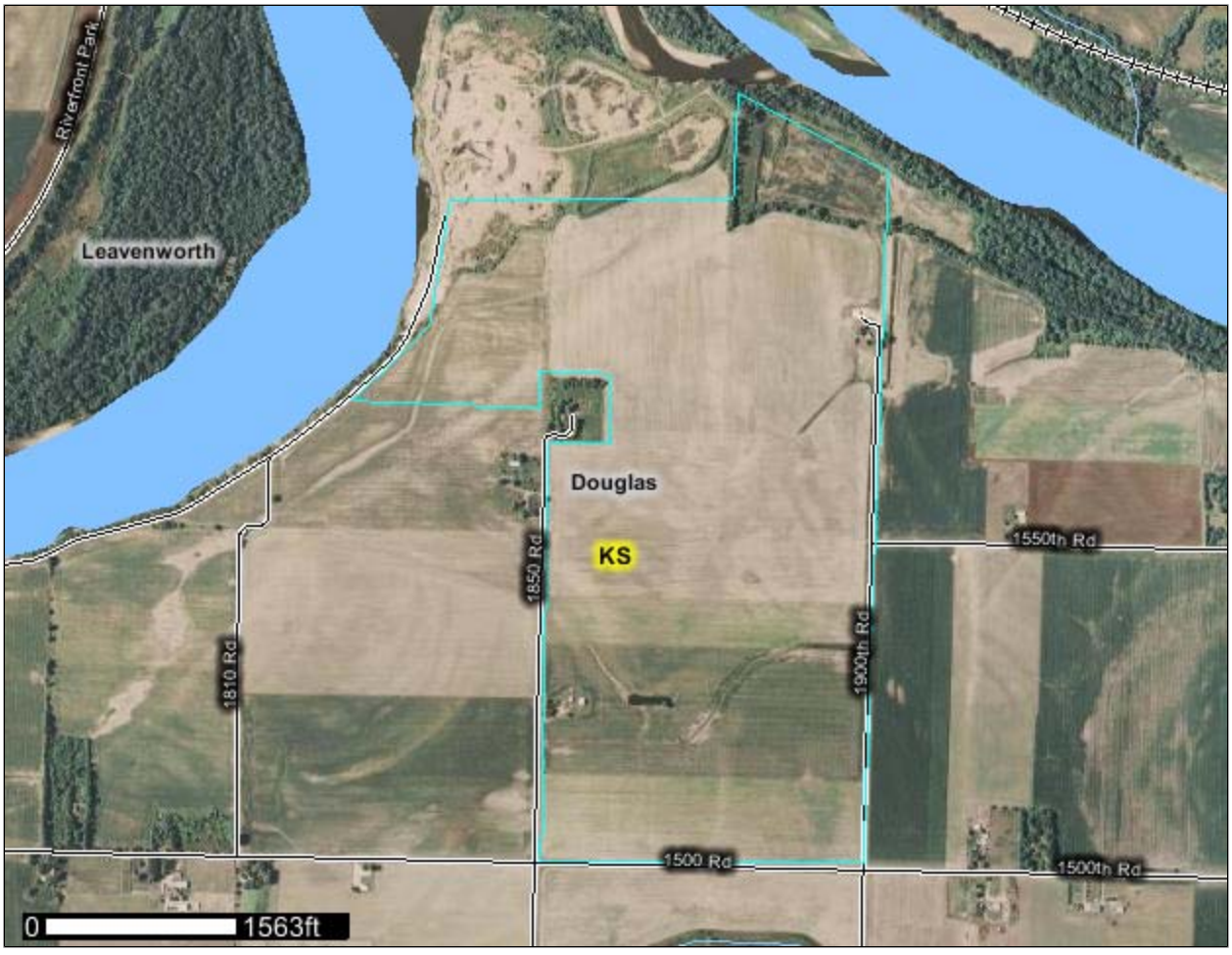
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

# Custom Soil Resource Report for Douglas County, Kansas

## Sand Pit Site




August 22, 2012

# Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

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# Contents

# How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

# Custom Soil Resource Report
## Soil Map (Sand Pit Site)

## MAP LEGEND

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

**Soils**
- Soil Map Units

**Special Point Features**
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

**Special Line Features**
- Gully
- Short Steep Slope
- Other

**Political Features**
- Cities

**Water Features**
- Streams and Canals

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

## MAP INFORMATION

Map Scale: 1:10,100 if printed on A size (8.5" × 11") sheet.

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 accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 15N NAD83

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

Soil Survey Area: Douglas County, Kansas
Survey Area Data: Version 8, Nov 30, 2010

Date(s) aerial images were photographed: 6/15/2006

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.

# Map Unit Legend (Sand Pit Site)

| Douglas County, Kansas (KS045) | | | |
|---|---|---|---|
| **Map Unit Symbol** | **Map Unit Name** | **Acres in AOI** | **Percent of AOI** |
| 7035 | Eudora-Bismarckgrove fine sandy loams, overwash, occasionally flooded | 61.6 | 16.5% |
| 7089 | Stonehouse-Eudora fine sandy loams, overwash, occasionally flooded | 12.1 | 3.2% |
| 7123 | Eudora silt loam, rarely flooded | 48.9 | 13.1% |
| 7127 | Eudora-Kimo complex, overwash, rarely flooded | 240.6 | 64.5% |
| 9995 | Sand Pits | 10.0 | 2.7% |
| **Totals for Area of Interest** | | **373.1** | **100.0%** |

# Map Unit Descriptions (Sand Pit Site)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic

classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

# Douglas County, Kansas

## 7035—Eudora-Bismarckgrove fine sandy loams, overwash, occasionally flooded

### Map Unit Setting

*Elevation:* 750 to 980 feet
*Mean annual precipitation:* 31 to 47 inches
*Mean annual air temperature:* 52 to 55 degrees F
*Frost-free period:* 175 to 215 days

### Map Unit Composition

*Eudora and similar soils:* 55 percent
*Bismarckgrove and similar soils:* 25 percent
*Minor components:* 0 percent

### Description of Eudora

#### Setting

*Landform:* Terraces
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-silty alluvium

#### Properties and qualities

*Slope:* 0 to 1 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* Occasional
*Frequency of ponding:* None
*Calcium carbonate, maximum content:* 5 percent
*Available water capacity:* High (about 11.1 inches)

#### Interpretive groups

*Land capability (nonirrigated):* 2w
*Ecological site:* Loamy Lowland (PE 30-37) (R106XY013KS)

#### Typical profile

*0 to 7 inches:* Fine sandy loam
*7 to 14 inches:* Silt loam
*14 to 40 inches:* Silt loam
*40 to 48 inches:* Silt loam
*48 to 80 inches:* Very fine sandy loam

### Description of Bismarckgrove

#### Setting

*Landform:* Terraces
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Silty alluvium

**Properties and qualities**

*Slope:* 0 to 1 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.60 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* Occasional
*Frequency of ponding:* None
*Calcium carbonate, maximum content:* 5 percent
*Available water capacity:* High (about 10.6 inches)

**Interpretive groups**

*Land capability (nonirrigated):* 2w
*Ecological site:* Loamy Lowland (PE 30-37) (R106XY013KS)

**Typical profile**

*0 to 6 inches:* Fine sandy loam
*6 to 14 inches:* Silty clay loam
*14 to 19 inches:* Silty clay loam
*19 to 29 inches:* Silt loam
*29 to 44 inches:* Silt loam
*44 to 80 inches:* Stratified loamy fine sand to fine sandy loam

**Minor Components**

**Aquolls**

*Percent of map unit:* 0 percent
*Landform:* Depressions, drainageways, hillslopes
*Down-slope shape:* Concave
*Across-slope shape:* Concave

## 7089—Stonehouse-Eudora fine sandy loams, overwash, occasionally flooded

**Map Unit Setting**

*Elevation:* 750 to 980 feet
*Mean annual precipitation:* 31 to 47 inches
*Mean annual air temperature:* 52 to 55 degrees F
*Frost-free period:* 175 to 215 days

**Map Unit Composition**

*Stonehouse and similar soils:* 50 percent
*Eudora and similar soils:* 30 percent
*Minor components:* 0 percent

### Description of Stonehouse

#### Setting

*Landform:* Terraces
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Sandy alluvium

#### Properties and qualities

*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Excessively drained
*Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* Occasional
*Frequency of ponding:* None
*Calcium carbonate, maximum content:* 5 percent
*Available water capacity:* Low (about 5.4 inches)

#### Interpretive groups

*Land capability (nonirrigated):* 4s
*Ecological site:* Sandy Lowland (PE 30-37) (R106XY023KS)

#### Typical profile

*0 to 9 inches:* Fine sandy loam
*9 to 23 inches:* Loamy fine sand
*23 to 31 inches:* Stratified loamy sand
*31 to 45 inches:* Stratified fine sand
*45 to 71 inches:* Stratified sandy loam
*71 to 80 inches:* Stratified loamy fine sand

### Description of Eudora

#### Setting

*Landform:* Terraces
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-silty alluvium

#### Properties and qualities

*Slope:* 0 to 1 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* Occasional
*Frequency of ponding:* None
*Calcium carbonate, maximum content:* 5 percent
*Available water capacity:* High (about 11.1 inches)

#### Interpretive groups

*Land capability (nonirrigated):* 2w
*Ecological site:* Loamy Lowland (PE 30-37) (R106XY013KS)

**Typical profile**

*0 to 7 inches:* Fine sandy loam
*7 to 14 inches:* Silt loam
*14 to 40 inches:* Silt loam
*40 to 48 inches:* Silt loam
*48 to 80 inches:* Very fine sandy loam

**Minor Components**

**Aquolls**

*Percent of map unit:* 0 percent
*Landform:* Depressions, drainageways
*Down-slope shape:* Concave
*Across-slope shape:* Concave

## 7123—Eudora silt loam, rarely flooded

**Map Unit Setting**

*Elevation:* 800 to 1,050 feet
*Mean annual precipitation:* 31 to 47 inches
*Mean annual air temperature:* 52 to 55 degrees F
*Frost-free period:* 175 to 215 days

**Map Unit Composition**

*Eudora and similar soils:* 85 percent
*Minor components:* 0 percent

**Description of Eudora**

**Setting**

*Landform:* Terraces
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-silty alluvium

**Properties and qualities**

*Slope:* 0 to 1 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* Rare
*Frequency of ponding:* None
*Calcium carbonate, maximum content:* 5 percent
*Available water capacity:* High (about 11.8 inches)

**Interpretive groups**

*Land capability (nonirrigated):* 1
*Ecological site:* Loamy Lowland (PE 30-37) (R106XY013KS)

**Typical profile**

*0 to 7 inches:* Silt loam
*7 to 14 inches:* Silt loam
*14 to 40 inches:* Silt loam
*40 to 48 inches:* Silt loam
*48 to 80 inches:* Very fine sandy loam

**Minor Components**

**Aquolls, ponded**

*Percent of map unit:* 0 percent
*Landform:* Depressions
*Down-slope shape:* Concave
*Across-slope shape:* Concave

**Aquolls**

*Percent of map unit:* 0 percent
*Landform:* Depressions, drainageways, hillslopes
*Down-slope shape:* Concave
*Across-slope shape:* Concave

## 7127—Eudora-Kimo complex, overwash, rarely flooded

**Map Unit Setting**

*Elevation:* 400 to 1,200 feet
*Mean annual precipitation:* 31 to 47 inches
*Mean annual air temperature:* 52 to 59 degrees F
*Frost-free period:* 175 to 215 days

**Map Unit Composition**

*Eudora and similar soils:* 60 percent
*Kimo and similar soils:* 30 percent
*Minor components:* 5 percent

**Description of Eudora**

**Setting**

*Landform:* Flood plains
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-silty alluvium

**Properties and qualities**

*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* Rare
*Frequency of ponding:* None
*Available water capacity:* Very high (about 12.2 inches)

**Interpretive groups**

*Land capability (nonirrigated):* 2w
*Ecological site:* Loamy Lowland (PE 30-37) (R106XY013KS)

**Typical profile**

*0 to 12 inches:* Silt loam
*12 to 72 inches:* Silt loam

## Description of Kimo

**Setting**

*Landform:* Flood plains
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Clayey over loamy alluvium

**Properties and qualities**

*Slope:* 0 to 1 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Somewhat poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
*Depth to water table:* About 22 to 26 inches
*Frequency of flooding:* Rare
*Frequency of ponding:* Occasional
*Available water capacity:* High (about 11.4 inches)

**Interpretive groups**

*Land capability (nonirrigated):* 2w
*Ecological site:* Loamy Lowland (PE 30-37) (R106XY013KS)

**Typical profile**

*0 to 6 inches:* Silty clay loam
*6 to 28 inches:* Silty clay
*28 to 60 inches:* Silt loam

## Minor Components

**Wabash**

*Percent of map unit:* 5 percent
*Landform:* Flood plains
*Landform position (three-dimensional):* Tread
*Other vegetative classification:* CLAY LOWLAND (PE30-37) (106XY004KS_1)

## 9995—Sand Pits

**Map Unit Setting**

*Mean annual precipitation:* 31 to 47 inches
*Frost-free period:* 175 to 215 days

**Map Unit Composition**

*Pits, sand:* 100 percent

# Soil Information for All Uses

## Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

## Construction Materials

This folder contains a collection of tabular reports that present soil interpretations related to sources of construction materials. The reports (tables) include all selected map units and components for each map unit, limiting features and interpretive ratings. Construction materials interpretations are tools designed to provide guidance to users in selecting a site for potential source of various materials. Individual soils or groups of soils may be selected as a potential source because they are close at hand, are the only source available, or they meets some or all of the physical or chemical properties required for the intended application. Example interpretations include roadfill, sand and gravel, topsoil and reclamation material.

### Source of Sand and Gravel (Sand Pit Site)

This table gives information about the soils as potential sources of gravel and sand. Normal compaction, minor processing, and other standard construction practices are assumed.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. Only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness. The ratings are for the whole soil, from the surface to a depth of about 6 feet.

The soils are rated *good*, *fair*, or *poor* as potential sources of sand and gravel. A rating of *good* or *fair* means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of sand or gravel. The number 0.00 indicates that the layer is a poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

Information in this table is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this table. Local ordinances and regulations should be considered in planning, in site selection, and in design.

## Report—Source of Sand and Gravel (Sand Pit Site)

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.00 to 0.99. The larger the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel]

| Source of Sand and Gravel– Douglas County, Kansas | | | | | |
|---|---|---|---|---|---|
| **Map symbol and soil name** | **Pct. of map unit** | **Potential as a source of gravel** | | **Potential as a source of sand** | |
| | | **Rating class and limiting features** | **Value** | **Rating class and limiting features** | **Value** |
| 7035—Eudora-Bismarckgrove fine sandy loams, overwash, occasionally flooded | | | | | |
| Eudora | 55 | Poor | | Poor | |
| | | Bottom layer | 0.00 | Bottom layer | 0.00 |
| | | Thickest layer | 0.00 | Thickest layer | 0.00 |
| Bismarckgrove | 25 | Poor | | Poor | |
| | | Bottom layer | 0.00 | Bottom layer | 0.00 |
| | | Thickest layer | 0.00 | Thickest layer | 0.00 |

| Source of Sand and Gravel– Douglas County, Kansas | | | | | |
|---|---|---|---|---|---|
| Map symbol and soil name | Pct. of map unit | Potential as a source of gravel | | Potential as a source of sand | |
| | | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 7089—Stonehouse-Eudora fine sandy loams, overwash, occasionally flooded | | | | | |
| Stonehouse | 50 | Poor | | Fair | |
| | | Bottom layer | 0.00 | Thickest layer | 0.03 |
| | | Thickest layer | 0.00 | Bottom layer | 0.13 |
| Eudora | 30 | Poor | | Poor | |
| | | Bottom layer | 0.00 | Bottom layer | 0.00 |
| | | Thickest layer | 0.00 | Thickest layer | 0.00 |
| 7123—Eudora silt loam, rarely flooded | | | | | |
| Eudora | 85 | Poor | | Poor | |
| | | Bottom layer | 0.00 | Bottom layer | 0.00 |
| | | Thickest layer | 0.00 | Thickest layer | 0.00 |
| 7127—Eudora-Kimo complex, overwash, rarely flooded | | | | | |
| Eudora | 60 | Poor | | Poor | |
| | | Bottom layer | 0.00 | Bottom layer | 0.00 |
| | | Thickest layer | 0.00 | Thickest layer | 0.00 |
| Kimo | 30 | Poor | | Poor | |
| | | Bottom layer | 0.00 | Bottom layer | 0.00 |
| | | Thickest layer | 0.00 | Thickest layer | 0.00 |
| 9995—Sand Pits | | | | | |
| Pits, sand | 100 | Not rated | | Not rated | |

## Source of Sand and Gravel (Sand Pit Site)

This table gives information about the soils as potential sources of gravel and sand. Normal compaction, minor processing, and other standard construction practices are assumed.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. Only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness. The ratings are for the whole soil, from the surface to a depth of about 6 feet.

# References

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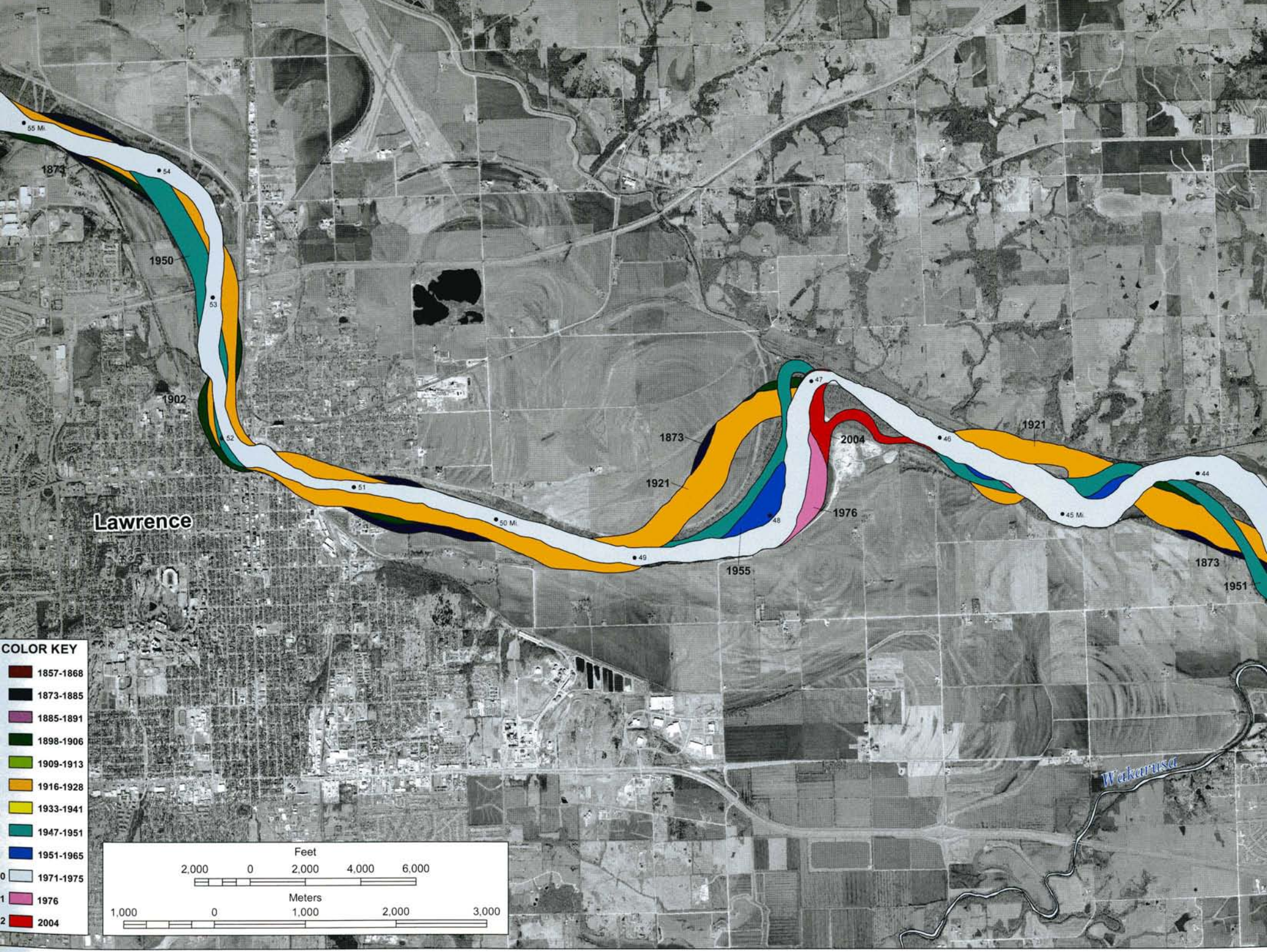
1564 E 1850 Rd, Lawrence, KS
1-5/8mi
Eudora Well Field
© 2012 Google
Google earth
Imagery Date: 5/30/2011
1991
38°57'39.00" N 95°07'50.91" W elev 811 ft
Eye alt 17376 ft

# HISTORICAL
# CHANNEL CHANGES
# OF THE
# KANSAS RIVER
# AND ITS MAJOR TRIBUTARIES

WAKEFIELD DORT, JR.


SPECIAL PUBLICATION NUMBER 42

AMERICAN GEOGRAPHICAL SOCIETY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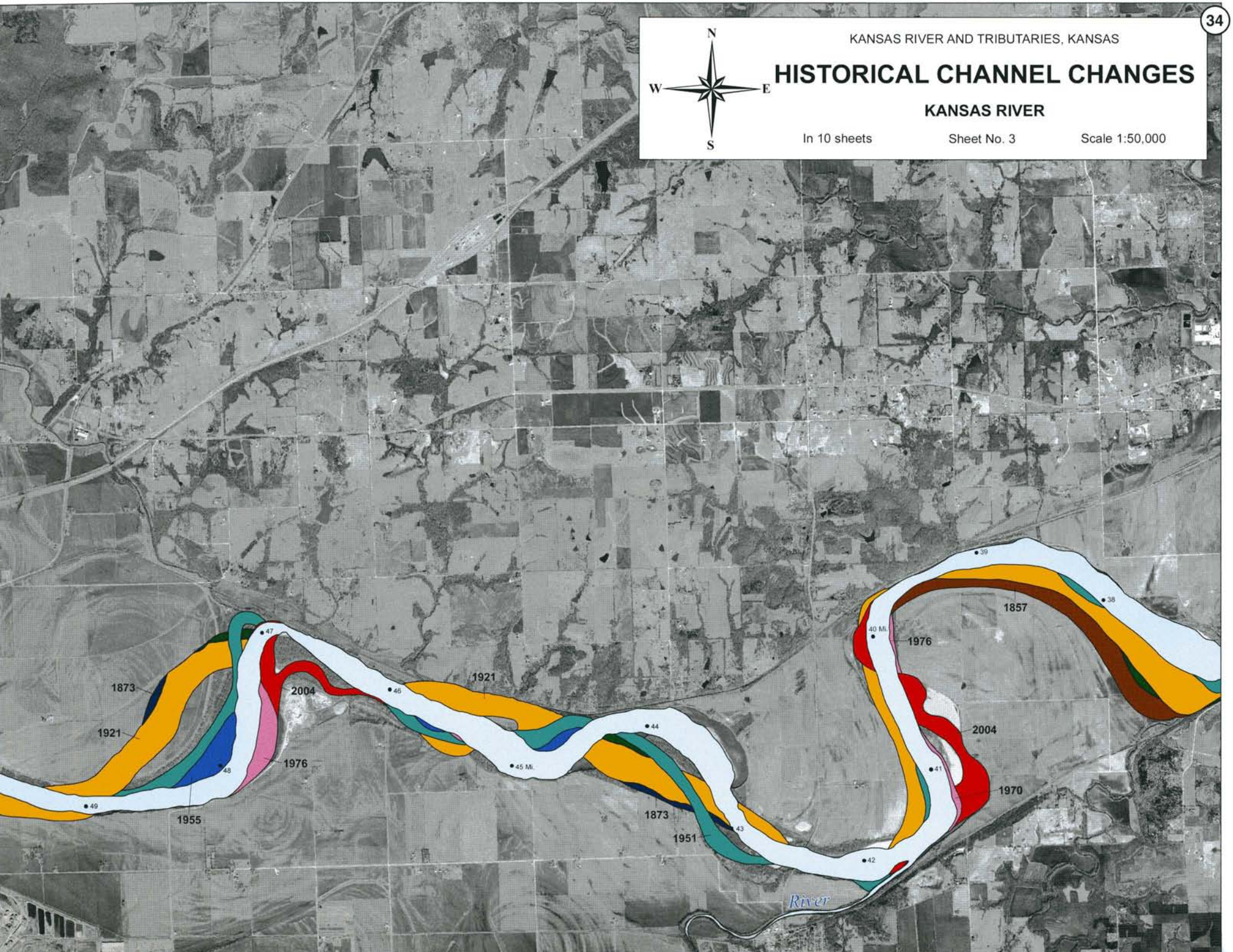
KANSAS RIVER AND TRIBUTARIES, KANSAS

# HISTORICAL CHANNEL CHANGES

## KANSAS RIVER

In 10 sheets | Sheet No. 3 | Scale 1:50,000



Sept. 9, 2012

***Lawrence Douglas County***
***Metropolitan Planning Office***
6 East 6th Street,
P.O. Box 708,
Lawrence, KS 66044

Planning Staff:

As interested property owners, we are writing this letter to object to the Conditional Use Permit (CUP) that Penny Sand Co. has applied for near 1500N and 1850E. This CUP asks permission for a pit mining operation for sand removal. This would completely change the agricultural setting of the area. If allowed, this CUP would subject the area to dramatically increased industrial activity, including noise, dust, and environment destruction. We ask that you deny the CUP for the following reasons:

(1)The affected area has some interesting Douglas County history associated with it and contains some historic houses.

(2) The river bank in the vicinity of this proposed pit mining operation is unstable and has moved considerably over recent times. If pit mining is allowed in this area, in times of flood the chances of a dramatic river channel change is magnified greatly.

(3) On this proposed 434 acre pit mining site, the majority of the area is covered by some of the highest quality soils as defined by the US Department of Agriculture. It seems very short sighted to produce sand for short term gain and lose the potential for significant food and fiber production indefinitely.

(4)There is a large amount of overburden (unusable soil, silt and clay) that must be removed (typically 23-24 feet). Removing this much overburden will create an environmental nightmare

(5) Opening this pit operation will expose one of the most prolific aquifers in this region to potential pollution. This aquifer is a magnificent resource that must be protected and preserved for the future.

(6)Several neighboring house wells could be affected by this pit. Just down the valley about 1 5/8 miles lies the Eudora Public Water Supply Well Field; it could also be affected by the proposed pit mining operation.

Thank you for your consideration of our concerns.

# Penny Sand Pit Petition

| Name | Address | Phone Number | email |
|---|---|---|---|
| Print: Carl McElwee | 1564 E. 1850 Rd. | 785 | cmcelwee@ku.edu |
| Signature: Carl McElwee | Lawrence, KS 66046 | 843-4164 | |
| Print: MARGERY McELWEE | 1564 E 1850 Rd | 785 | |
| Signature: Margery McElwee | Lawrence KS 66046 | 843-4164 | |
| Print: Rick Gaebler | 1555 E 1850 Rd | 785-393- | |
| Signature: Rick Gaebler | Lawrence KS | 9028 | |
| Print: Esther McCabria | 1455 E 1900 Rd | 542 | BMccabria@aol.com |
| Signature: E. McCabria | Eudora, KS 66025 | 2492 | |
| Print: Robert McCabria | 1455 E 1900 Rd | 542 | " |
| Signature: Robert E McCabria | Eudora, KS 66025 | 2492 | |
| Print: Scott | 1964 N 1550 Rd | 785 | Scothjackson |
| Signature: Scott Jackson | Eudora 66025 | 331 6561 | 1964@yahoo.com |
| Print: Bruce Perkins | Eudor 66025 | 785 | BrucePerkins55@ |
| Signature: Bruce Perkins | | 764 6295 | Gmail.com |
| Print: Philip R Ernst | 826 Mass, Lawrence | 843-2313 | |
| Signature: Ernst | | | |
| Print: NORMA L. SCHMILZ | 1610 E. GLENN DR. | | |
| Signature: Norma L. Schmilz | LAWRENCE, KS 66044 | 843-0943 | |
| Print: AL W DEATHE | 1918 N 1500 RD | | AWDVKD@ |
| Signature: Al W Deathe | EUDORA KS | 542-2352 | SUNFLOWER.COM |
| Print: ViAnn K. Deathe | 1918 N 1500 Rd | | |
| Signature: ViAnn K Deathe | Eudora, KS 66025 | 542-2352 | |

# Penny Sand Pit Petition

| Name | Address | Phone Number | email |
|---|---|---|---|
| Print: Gregory Shype | 1394 E 1900 Rd | 785 | KS wiker@ |
| Signature: Gregory Shype | Eudora, Ks 66025 | 542-227[illegible] | hotmail.com |
| Print: Virginia S. Strong | 3712 Trail Rd. | 785 843- | |
| Signature: Virginia S. Strong | Lawrence, Ks 66049 | 2393 | |
| Print: DAVID VERTAČNIK | 1403 E 1850 Road | 785 842-4428 | david.vek.u.edu |
| Signature: David Vertačnik | Lawrence, KS | | |
| Print: Wendy Leet Vertacnik | 1403 E. 1850 Rd | 785- | vertacnik@ |
| Signature: Wendy Leet Vertacnik | Lawrence. KS 66046 | 842.4428 | sunflower.com |
| Print: Dr Karen Johnston | 1928 N 1500 Rd | 785 | drkarenjohnston |
| Signature: K Johnston | Eudora KS 66025 | 393 2933 | @gmail.com |
| Print: Linda Knabe | 39460 W 145th ST | 785 | Knabefarms@ |
| Signature: Linda Knabe | Eudora, Ks 66025 | 542 2228 | wildblue.net |
| Print: Richard Knabe | Same | | |
| Signature: Richard Knabe | | | |
| Print: PETER SHENOUDA | 1411 E. 1850 Road | 785-856- | PShenouda@hotmail.com |
| Signature: Peter Shenouda | Lawrence, KS 66046 | 3999 | |
| Print: Building Blocks Daycare | 1411 E. 1850 Road | 785- | buildingblocks@ |
| Signature: ~~Peter Shenouda~~ | Lawrence, KS 66046 | 856- 3999 | Sunflower.com |
| Print: Steve BOYER | Eudora K.S. | 785-218- | |
| Signature: Steve Boyer | 2027 N 1500 RD | 2491 | |
| Print: Nancy Jackson | 1964 N 1550th Rd | 785-331- | nancyjackson66@ |
| Signature: Nancy Jackson | Eudora, KS 66025 | 8743 | gmail.com |

# The Master's Dredging Company, Inc.

**Dredging Contractors**
**P.O. Box 9, Lawrence, KS 66044**
**(913) 583-3335**

**September 12, 2012**



**Mr. Bruce Liese**
**Chairman, Lawrence-Douglas County Planning Commission**
**6 East 6th Street**
**Lawrence, Kansas 66044**

**Dear Mr. Liese,**

**We have a CUP for a sand plant operation approved in 1991 on land about 1.5 miles northeast of the intersection of Noria Road and North 1500 Road. At the time of the 1991 approval of our CUP we had applied for both a Kansas River operation and a sand pit operation on the land where our sand plant was located. At the time, the zoning board did not feel that there was a need for both operations and gave me a choice between the two. I choose the river operation. Under a sand plant lease arrangement, Pennys Concrete has been producing sand from our river permit for over 17 years.**

**With a pending Corps of Engineer decision to halt both ours and Pennys' river permits, Pennys Concrete (1) terminated their lease agreement with us and (2) applied for zoning of an off-river sand pit operation. In light of this we are renewing our CUP zoning application for an off-river sand pit on land immediately adjacent to the Pennys Concrete's application for a CUP permit for off river sand pit operation. We are presently applying for a CUP for an off-river sand pit operation.**

**In light of the fact that Pennys Concrete and we have nearly identical CUP applications on adjacent lands, I would like to request that the zoning board defer consideration of Pennys Concrete's application and that the zoning board would consider both Pennys' and our CUP applications concurrently. I would appreciate your passing on this request to the rest of your zoning board, the planning staff, and county commissioners. If you have any questions, feel free to email me at ( davidpenny@theaquaticgroup.com ) or call me: 913-583-3335 (office, but please do not leave a message) or 785-218-8800 (cell, leave a message if you do not get me).**

**Sincerely,**

**David Penny**
**President**

Sept. 18, 2012

***Lawrence Douglas County***
***Metropolitan Planning Office***
6 East 6th Street,
P.O. Box 708,
Lawrence, KS 66044

Planning Commission:

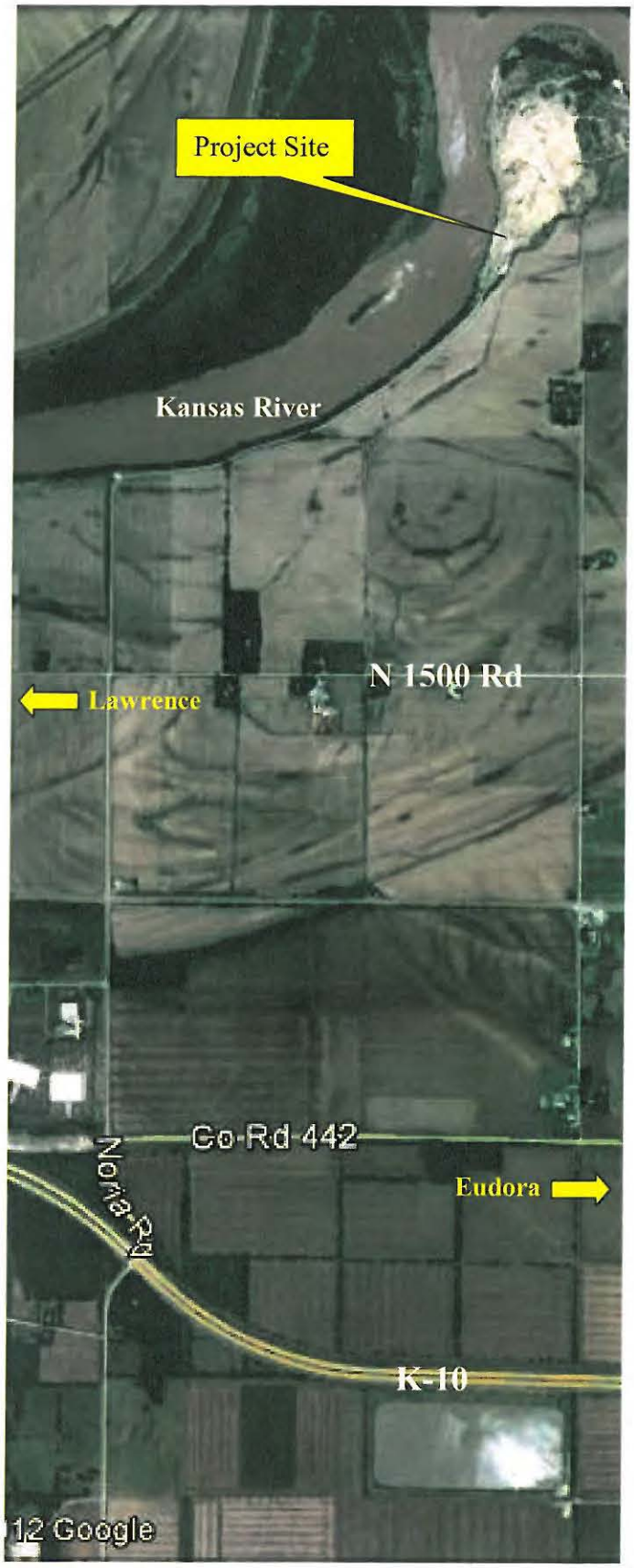
I would like to object to the request in David Penny's letter from The Masters Dredging Company, Inc. to defer consideration of the Penny Sand CUP from the Sept. 24 meeting. I and other land owners have worked to prepare for that meeting and would like to see our concerns addressed in a timely manner.

I have a long scheduled previous commitment Oct 15-25 and will be out of town. I ask the Planning Commission to please not schedule any meetings on this issue during my absence.

Thank you for your consideration. If I may answer any questions, please contact me.

Sincerely,

Carl McElwee
1564 E. 1850 Rd.
Lawrence, KS 66046 785-843-4164 cmcelwee@ku.edu




# Traffic Impact Study

# for

# Penny Sand Plant Expansion

1-1/2 mile Northeast of the Intersection of Noria Road and N 1500 Road

Douglas County, Kansas

Prepared
for
Landplan Engineering, PA

Prepared
By

MGineering Solutions
Serving Communities Through Excellence
Kansas - Missouri - Michigan - California


Mehrdad Givechi, PE, PTOE

**July 2012**

## *TABLE OF CONTENTS*

## *Introduction*

*Proposed Development*

The existing "Penny Sand Extraction" facility - located next to Kansas River approximately 1-1/2 miles northeast of the intersection of Noria Road (E 1750 Rd.) and N 1500 Road in Douglas County, Kansas – comprises approximately 114 acres. Under the proposed plan, the site will be expanded to include an additional sand excavation area of approximately 351 acres for a total site area of approximately 465 acres (See Location Map, Figure 1 of Appendix I). Access to the site, as shown on the Site Plan (Figure 2 of Appendix I), will remain unchanged at its current location at the intersection of Noria Road and N 1500 Road (i.e. north leg of the intersection).

The facility will be open for operation on weekdays and some Saturdays (approximately 250 days a year) between the hours of 6:30 a.m. and 6:30 p.m., staffed by as many as four (4) employees.

According to the Horizon 2020 (Map 4-2), the site is FEMA designated "Floodway" and "Floodway Fringe".

*Existing Nearby Developments*

Currently, the vast majority of the land in the proximity of the site is undeveloped with the exception of

- "East Hills Business Park" located on the west side of Noria Road approximately 2/3 miles south of N 1500 Road; and
- A few scattered residential dwelling units in the study area.

*Purpose*

The purpose of this study is to:

1. Evaluate the existing operating conditions of traffic along the anticipated route that site-generated trucks will utilize to access the site including the intersections of
    a. Noria Road and N 1500 Road;
    b. Noria Road and DG CO 442 (Old K-10);
    c. DG CO 442 (Old K-10) and DG CO 1057 (E 1900 Rd); and

d. The interchange of K-10 and DG CO 1057 (E 1900 Rd).

2. Assess impact of the trips generated by the proposed expansion of the sand facility on the above mentioned intersections and roadway network; and
3. Recommend off-site improvements needed (if any) as the result of this expansion.

## *Data Collection and Summary*

In order to assess the impact of traffic generated by the expansion of the existing sand facility in the study area, field observations and traffic counts (including truck traffic) were conducted. The following paragraphs summarize the results of data collection efforts for this project.

*Roadway Network Geometric & Operating Characteristics*

In the vicinity of the development site, as illustrated in Figure 3 of Appendix I,

- N. 1500 Road is a two-way, two lane roadway that runs east/west approximately 1.4 miles south of the development site. This roadway extends west and becomes 15th Street at approximately 1-3/4 miles west of Noria Road as it enters the city limits of Lawrence. Some of the other roadway characteristics for N 1500 Road include:
    - Asphalt pavement with uneven surface west of E 1810 Road turning into gravel road east of there.
    - No shoulders.
    - An active railroad crossing (with gate and signal) approximately 1.3 miles west of Noria Road (just west of E 1625 Road).
    - Posted speed limit of 40 mph, changing to 30 mph west of E 1625 Road where railroad crossing is located.
    - Posted weight limit sign of “5 Tons” for commercial vehicles for both directions of travel.
    - East of Noria Road, it is designated as “Rural Minor Collector” on the County’s T2030 Major Thoroughfare Map. This designation changes to “Minor Arterial” for the segment west of Noria Road.
    - West of Noria Road, it serves as a commuter route between Lawrence and both, Eudora and “East Hills Business Park”.

- Noria Road (E. 1750 Road) is a two-way, two lane roadway that runs north/south along east side of “East Hills Business Park” connecting N 1500 Road to DG CO 442 (Old K-10) and K-10 Highway. Some of the other characteristics of this roadway include:
    - An active railroad crossing (with gate and signal) approximately 1/2 mile south of Noria Road.
    - Concrete pavement with 6’ paved shoulders north of the railroad track. Asphalt pavement with 4’ shoulders south of the railroad track.
    - Posted speed limit of 45 mph between Noria Road and DG CO 442 (old K-10), with an advisory speed limit sign of 35 mph along the curve south of DG CO 442.
    - Designated as “Minor Arterial” on the County’s T2030 Major Thoroughfare Map.
    - It serves as a commuter route between Lawrence and both Eudora and “east Hills Business Park”.
- DG CO 442 (Old K-10) is a two-way, two lane roadway that runs east/west approximately 1 mile south of Noria Road and goes through city of Eudora to the east. Other roadway characteristics include:
    - Asphalt pavement with uneven surface and unpaved 4’-6’ shoulders.
    - Posted speed limit of 45 mph within the city limits (near Noria Road), changing to 55 mph in the county (west of Eudora).
    - Between Noria Road and Eudora, it is designated as “Minor Arterial” on the County’s T2030 Major Thoroughfare Map.
    - West of Eudora, this roadway serves as a commuter route between Eudora and both, Lawrence and “East Hills Business Park”.
- DG CO 1057 is a two-way, two lane roadway running north/south crossing DG CO 442 at approximately 1.5 miles east of Noria Road providing a main connection to K-10 Highway. Other roadway characteristics include:
    - Asphalt pavement with unpaved 2’-4’ shoulders.
    - Posted speed limit of 45 mph.
    - Designated as “Minor Arterial” on the County’s T2030 Major Thoroughfare Map.

- All intersections in the study area have one lane on each approach except for the:
    - Intersection of DG CO 1057 and DG CO 442, which has a dedicated northbound right-turn lane with approximately 175' of storage and a dedicated westbound left-turn lane with approximately 110' of storage; and
    - Intersection of Noria Road and DG CO 442, which has a dedicated westbound right-turn lane with 175' of storage; and a channelized northbound right turnout.

*Manual Traffic Counts*

Currently, the "East Hills Business Park" is the main trip generator in the study area and will most likely dictate the time periods during which traffic on the adjacent roadway network reaches its peak. As part of this study, therefore, vehicular turning movement counts (including truck traffic) were conducted at the intersections under study during the time periods when shift changes for the "East Hills Business Park" occur.

Currently the shifts change at 6:30, 7:00 and 7:30 in the morning and 2:30, 3:00 and 3:30 in the afternoon. Therefore, for the purpose of this analysis, turning movement counts were conducted from 6:00 to 9:00 a.m. and 2:00 to 5:00 p.m. on typical weekdays (July 11$^{th}$, 12$^{th}$ and 17$^{th}$, 2012). The results, as summarized in Appendix III and illustrated in Figures 4 and 5 of Appendix I, indicate that

- Morning peak occurs between 7:30 and 8:30 a.m. for all vehicles including truck traffic; and
- Afternoon peak occurs between 4:00 and 5:00 p.m. for all vehicles, and between 3:00 and 4:00 p.m. for truck traffic.
- At the intersection of Noria Road and N 1500 Road, the predominant movements are eastbound right-turn and northbound left-turn with no truck traffic on N 1500 Road.
- At the intersection of Noria Road and DG CO 442, the predominant movements are southbound left-turn and westbound right-turn. The predominant truck movements,

however, are northbound through (31% to 46%) and southbound left-turn (7% to 16%).

- At the intersection of DG CO 442 and DG CO 1057, the predominant movements are eastbound and westbound through. The predominant truck movements, however, are eastbound right-turn (19% to 31%) and northbound right-turn (unusually high at 27% to 60%).
- At the interchange of K-10 and DG CO 1057, the predominant movements are southbound right-turn (at the north ramps) and eastbound left-turn (at the south ramps). The predominant truck movements, however, are southbound left-turn (20% to 32%) and eastbound left-turn (unusually high at 25% to 34%), both at the south ramps.
- Field observations indicate that loaded trucks, leaving the existing sand plant, take Noria Road south to DG CO 442 (Old K-10), then east to DG CO 1057, then south to K-10 interchange, then east to their destinations. After their delivery, the trucks head back to the sand plant using K-10 Highway, then north on Noria Road straight to the plant entrance off of N 1500 Road.

*NOTES:*

1. *During the time period traffic counts were being conducted for this study, there was a paving project near Eudora that generated a large number of truck traffic. Loaded trucks, carrying asphalt material, got to the job site from west using K-10 Highway to access DG CO 1057 at the interchange, then head north to DG CO 442 (Old K-10), then east to Eudora. Empty trucks left the job site using Church Street south to K-10 Highway, then west to the asphalt plant. This construction activity resulted in an skew in the normal truck traffic pattern in the study area, which caused the heavy truck movement for the eastbound left-turn movement at the interchange and northbound right-turn movement at the intersection of DG Co 1057 and DG CO 442.*
2. *DG CO 1057, approximately ½ mile south of the K-10 interchange, has been closed to traffic for a bridge replacement project. This also affected the through traffic on DG CO 1057 south of the interchange.*

## *Evaluation of the Existing Operating Conditions*

A volume/capacity analysis (using methodologies outlined in the *2000 Highway Capacity Manual (HCM) published by the Transportation Research Board*) was conducted to determine the level-of-service (LOS) for all movements at the intersections under study during the afternoon peak-hour of a typical weekday.

Level-of-service, as defined in the HCM, describes the quality of traffic operating condition and ranges from "A" to "F", with LOS "A" representing the best (most desirable with minimum delay) conditions and LOS "F" the worst (severely congested with excessive delays). The following chart outlines the level-of-service criteria for unsignalized and signalized intersections.

| Level-Of-Service | Control Delay for Unsignalized Intersections (seconds/vehicle) | Control Delay for Signalized Intersections (seconds/vehicle) |
|---|---|---|
| A | 0 – 10 | 0 – 10 |
| B | > 10 – 15 | > 10 – 20 |
| C | > 15 – 25 | > 20 – 35 |
| D | > 25 – 35 | > 35 – 55 |
| E | > 35 – 50 | > 55 – 80 |
| F | > 50 | > 80 |

The results of analysis, as shown in Appendix II and summarized in Figure 6 of Appendix I, indicate that, under the existing conditions, all movements at all intersections in the study area operate at LOS "B" or higher during both morning and afternoon peak-hours of a typical weekday.

## *Trip Generation Analysis*

Typically, trips generated by a proposed development are estimated using trip generation rates suggested by the *Institute of Transportation Engineers, Trip Generation Manual, 8th Edition*. Since the Manual does not have information for land use type "Sand Plant", the following procedure was used for analysis:

- For the sand processing component of this development, the number of trucks generated by this site was estimated based on the following assumptions:
    - With the proposed new expansion, the plant is anticipated to distribute as much as 5,000 tons of sand on a most productive day.
    - 80% of trucks serving the site will be Tractor Trailers each with a maximum load capacity of 25-30 tons. The remaining 20% will be tandem trucks each hauling between 15 and 18 tons. This is equivalent to an average truck load of approximately 25 tons.
    - Assuming a high productive day (5,000 tons of distribution), the estimated number of trucks serving the site will be around 200 trucks/day, which equates to a total of 400 trip-ends (two-way trips) per day.
    - Hauling time varies for different plants. Truckers going to the same plant have different lap times. The only time that trucks tend to arrive somewhat simultaneously is first thing in the morning when a plant opens. Their departure from the plant, however, is not simultaneous due to individual loading times. Other times throughout the day, truck traffic to/from the plant is spread out randomly over the 12-hours of operation (6:30 a.m. to 6:30 p.m.). For analysis purposes, it is assumed that peak-hour truck traffic will be approximately 12% of the daily truck traffic, which is approximately 48 trip-ends (24 inbound and 24 outbound) during the morning peak-hour of operation.
    - To account for the existing traffic in/out of the site (i.e. current operation of the sand plant), a truck count survey was conducted during the time period when turning movement counts were being conducted. The results, as summarized in Figure 5 of Appendix I, indicate that the existing sand processing facility generates 8 trip-ends (4 inbound and 4 outbound)

during the morning peak-hour, and 9 trip-ends (5 inbound and 4 outbound) during the afternoon peak-hour.

- For the office component of this development, no increase in number of employees are anticipated, hence no additional trips will be generated by the office component.

Using above mentioned assumptions, the ***net increase*** in number of trips resulted by the proposed sand plant expansion will be approximately 40 trip-ends (20 inbound and 20 outbound) during both morning and afternoon peak-hours of a typical weekday - all truck traffic.

*Analysis Time Period*

An overview of the existing traffic volumes in the study area and their peak characteristics, in conjunction with estimated trips generated from the proposed development, indicate that the most critical peak period will likely occur during *morning peak-hour* of a typical weekday. Therefore, the morning peak-hour is selected as the analysis time period for this study. In addition, afternoon peak-hour is also analyzed.

## *Trip Distribution and Assignment Analysis*

As mentioned earlier, field observations indicate that all truck traffic generated by the existing sand operation head south on Noria Road, thence east on DG CO 442, thence south on DG CO 1057 to access K-10 Highway and head east. Based on the information provided by the applicant, the vast majority of the new trips generated by the site expansion will also follow the same patterns. Figures 7 and 8 of Appendix I illustrate trip distribution patterns and assignment for the site-generated trips, respectively. Note that a small portion of the trips (~ 5%) are assigned to go west on K-10 (at the interchange) to represent occasional trips to the west.

## *Impact Assessment*

*Volume/Capacity Analysis*

An evaluation of the "Existing + Proposed Development" traffic conditions (using HCS2000 methodology mentioned earlier) indicates that LOS for all movements at all intersections under study remain unchanged at "B" or higher during both morning and afternoon peak-hours of a typical weekday. The results, as shown in Appendix II and illustrated in Figures 9 and 10 of Appendix I, indicate that traffic generated from the proposed facility expansion will not have a negative impact on the capacity of the roadway networks in the study area.

*Dedicated Turn-Lane Analysis*

Using the guidelines for both right-turn and left-turn treatments at unsignalized intersections (as listed in Appendix IV) indicate that, from traffic volume stand point, no new dedicated turn lanes are required at any intersections in the study area.

Under the existing conditions, during the critical analysis period (morning peak-hour of a typical weekday), approximately 17% of the eastbound traffic at the intersection of DG CO 442 and DG CO 1057 consists of heavy trucks - all of which negotiate right turn at this location. The proposed expansion for the sand plant will significantly increase the heavy truck traffic for this movement to as high as ~42% of the total eastbound movement. Because of their low power/acceleration ratio, not having a dedicated eastbound right-turn lane may interfere with the through traffic creating a safety concern. It is, therefore, desirable (as a safety measure) that a dedicated eastbound right-turn lane be provided at this location to keep the large number of heavy trucks out of the main traffic flow on DG CO 442.

## *Summary & Recommendations*

The results of this impact analysis indicate that the proposed “Penny Sand Plant Expansion” will have minimal impact on the capacity of the roadway network in the study area with no degradation of level-of-service at any locations under study (LOS of “B” or higher).

From safety stand point, however, the following improvements are desirable:

1. Pave a 100’ long section of the site access, just north of N 1500 Road, to keep gravel from being tracked, by site-generated trucks, onto the intersection.
2. Provide a dedicated eastbound right-turn lane on DG CO 442 (Old K-10) at its intersection with DG CO 1057 (E 1900 Rd). The minimum storage length for this turn lane should be 150’ in order to accommodate two (2) tractor trailer and two passenger cars. This is a desirable safety measure to keep loaded heavy trucks (having low power/acceleration ratio) out of the main traffic flow. Under the existing conditions, there is a 12’ wide paved area for a length of approximately 140’ that is not marked as a traffic lane rather has white crosshatch pavement marking along its entire length. This area can potentially be utilized to create the subject right-turn lane.
3. Pavement condition along certain segments of the roadway network in the study area should be evaluated to determine if it can withstand the increase in heavy truck traffic resulted by the proposed sand plant expansion.

# APPENDIX I

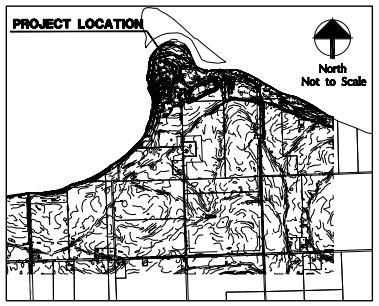
Results of Trip Distribution and Assignment Analysis


Intersections under study

**Figure 1**

**Location Map**


## Location Map




## Legal Description

## General Notes

OWNER: PENNY'S CONCRETE, INC.
ATTN: BILL PENNY
800 EAST 8TH STREET,
LAWRENCE, KS 66044

1. LAND PLANNER/ ENGINEER: LANDPLAN ENGINEERING, P.A.
1310 WAKARUSA DRIVE
LAWRENCE, KS 66049
2. TOPOGRAPHIC INFORMATION OBTAINED FROM 2006 CITY OF LAWRENCE LIDAR AERIAL DATA.
3. EXISTING LAND USE: AGRICULTURAL& SAND EXTRACTION
4. PROPOSED LAND USE: SAND EXCAVATION, EXTRACTION & PROCESSING; AGRICULTURAL
5. EXISTING ZONING: A – VC
6. PROPOSED ZONING: A – VC
7. THIS SITE IS LOCATED WITHIN THE FLOODPLAIN PER FEMA MAP #20045C0203D, DATED AUGUST 5, 2010.
8. THIS SITE HAS BEEN DESIGNED TO COMPLY WITH THE PROVISIONS OF THE AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES (ADAAG) FOR BUILDINGS AND FACILITIES, APPENDIX A TO 28 CFR PART 36.
9. PHASE BOUNDARIES ARE ONLY AN APPROXIMATION DUE TO VARIABILITY OF UNDERGROUND DEPOSITS. SEQUENCES OF EXCAVATION MAY VARY.

## Site Summary

| | |
|---|---|
| GROSS CUP/SITE AREA: | 20261272 SF / 465.13 AC |
| PUBLIC RIGHTS-OF-WAY: | 0 SF / 0.00 AC |
| NET CUP/SITE AREA: | XX SF / XX AC |
| SAND EXCAVATION & AGRI AREA: | XX / XX AC |
| SAND/GRAVEL PROCESSING AREA: | XX / XX AC |
| SCALE HOUSE & MATERIALS LAB: | XX SF |
| SAND/GRAVEL PROCESSING PLANT: | XX SF |

## Parking Summary

REQUIRED = 1 SPACE/2 EMPLOYEES; 4 TOTAL EMPLOYEES = 2 SPACES
PROVIDED = 8 SPACES

SCALE: 1" = 400'

400 200 0 400 800

*Access Road*

# *Penny Sand Lawrence Facility*

*Douglas County, Kansas*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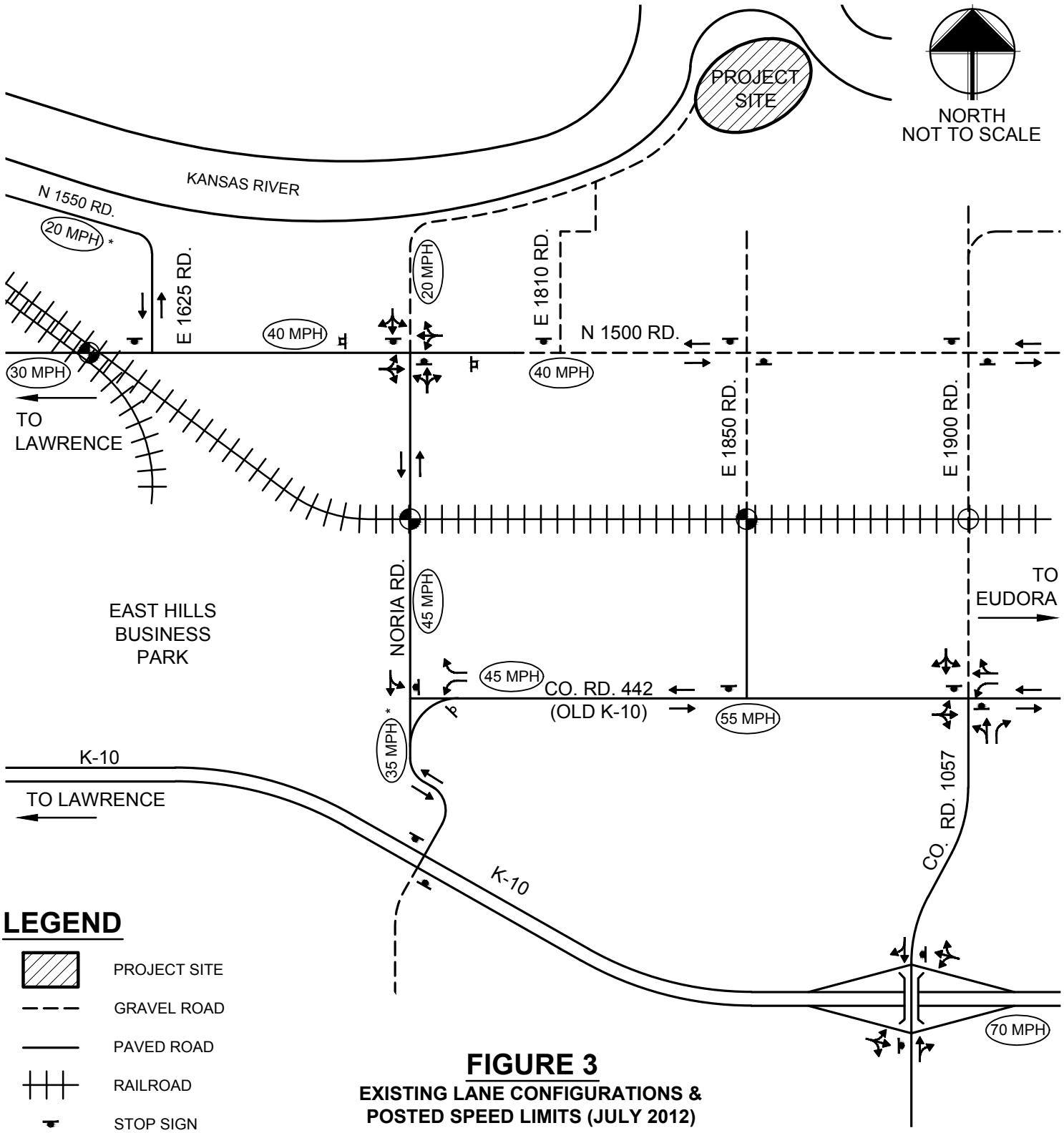
PENNY SAND FACILITY
CONDITIONAL USE PERMIT
CUP SITE PLAN

| REV | DATE | DESCRIPTION |
|---|---|---|
| | | |

| | |
|---|---|
| DATE: | 7.2.12 |
| PROJECT NO.: | 20121146 |
| DESIGNED BY: | CLM |
| DRAWN BY: | CLM |
| CHECKED BY: | CLM |

ISSUE: A
SHEET NO.: C-001
OF 2 SHEETS


FILE NAME: G:\20121146\CAD\Planning\CUP\121146C-CUP.dwg LAST SAVED BY: CL Maurer SAVED DATE: 7/9/2012 9:04 AM PLOTTED: 7/9/2012 9:08 AM




## LEGEND

- PROJECT SITE
- GRAVEL ROAD
- PAVED ROAD
- RAILROAD
- STOP SIGN
- YIELD SIGN
- WEIGHT LIMIT SIGN
- ACTIVE RR CROSSING (GATE & SIGNAL)
- PASSIVE RR CROSSING (CROSS BUCK)
- DEDICATED LANE
- SHARED LANE
- XX MPH — POSTED SPEED LIMIT (*DENOTES ADVISORY SPEED)

# FIGURE 3

**EXISTING LANE CONFIGURATIONS & POSTED SPEED LIMITS (JULY 2012)**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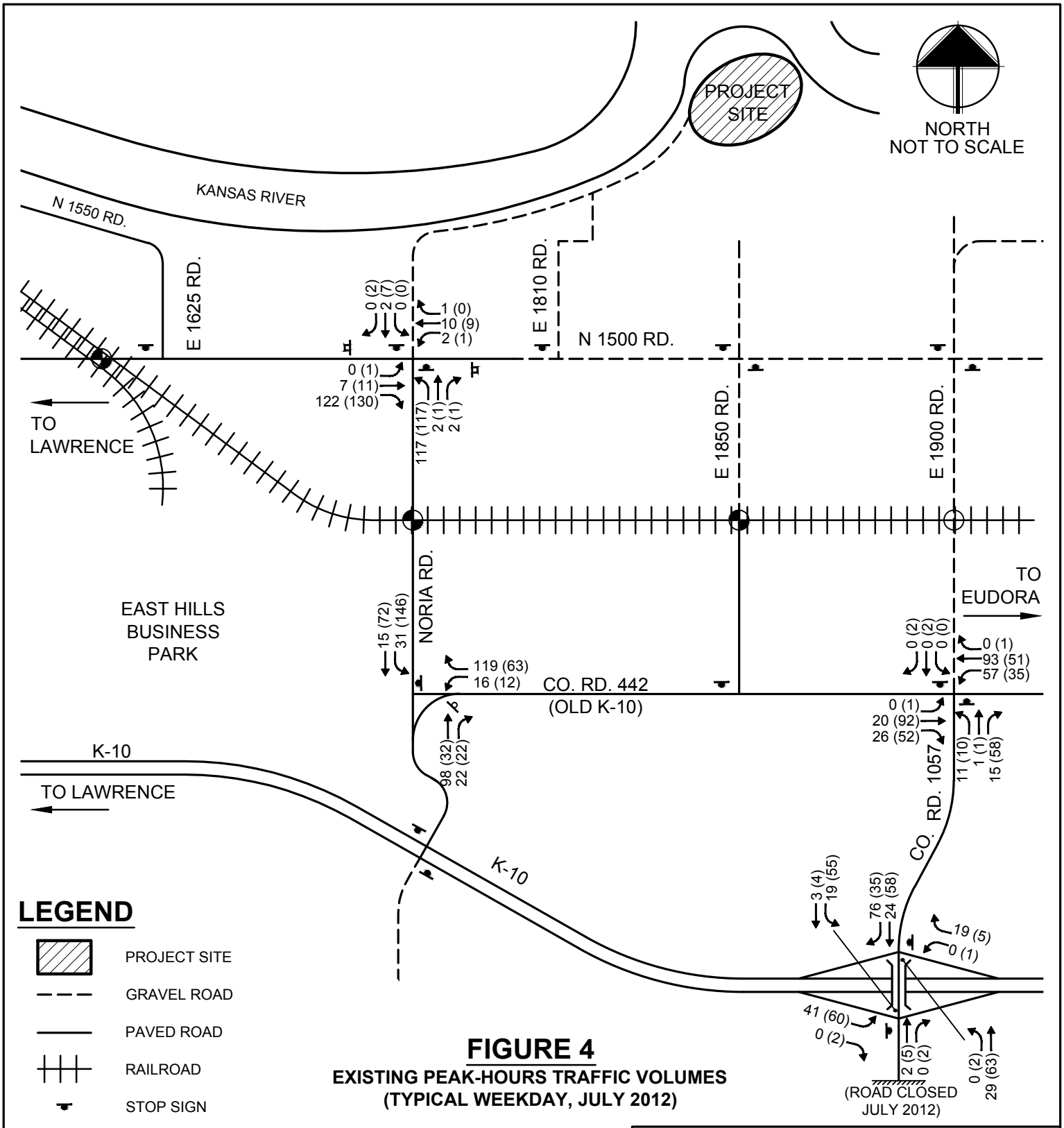


## LEGEND

- PROJECT SITE
- GRAVEL ROAD
- PAVED ROAD
- RAILROAD
- STOP SIGN
- YIELD SIGN
- WEIGHT LIMIT SIGN
- ACTIVE RR CROSSING (GATE & SIGNAL)
- PASSIVE RR CROSSING (CROSS BUCK)
- XX (XX) A.M. (P.M.)
  - 4:00 - 5:00
  - 7:30 - 8:30

# FIGURE 4

**EXISTING PEAK-HOURS TRAFFIC VOLUMES**
**(TYPICAL WEEKDAY, JULY 2012)**


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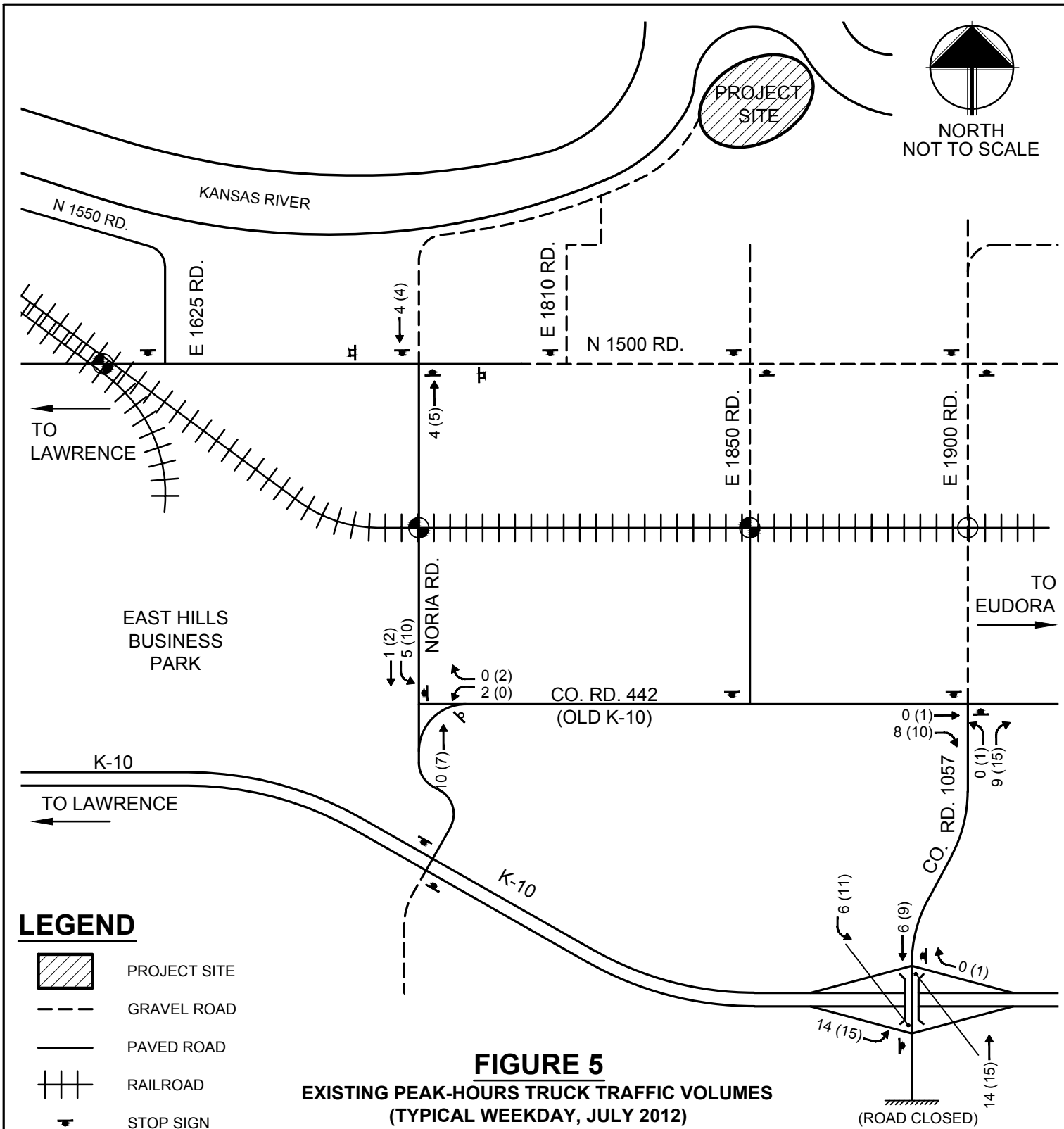


## LEGEND

- PROJECT SITE
- GRAVEL ROAD
- PAVED ROAD
- RAILROAD
- STOP SIGN
- YIELD SIGN
- WEIGHT LIMIT SIGN
- ACTIVE RR CROSSING (GATE & SIGNAL)
- PASSIVE RR CROSSING (CROSS BUCK)
- XX (XX) A.M. (P.M.)
  - 3:00 - 4:00
  - 7:30 - 8:30

# FIGURE 5

**EXISTING PEAK-HOURS TRUCK TRAFFIC VOLUMES**
**(TYPICAL WEEKDAY, JULY 2012)**

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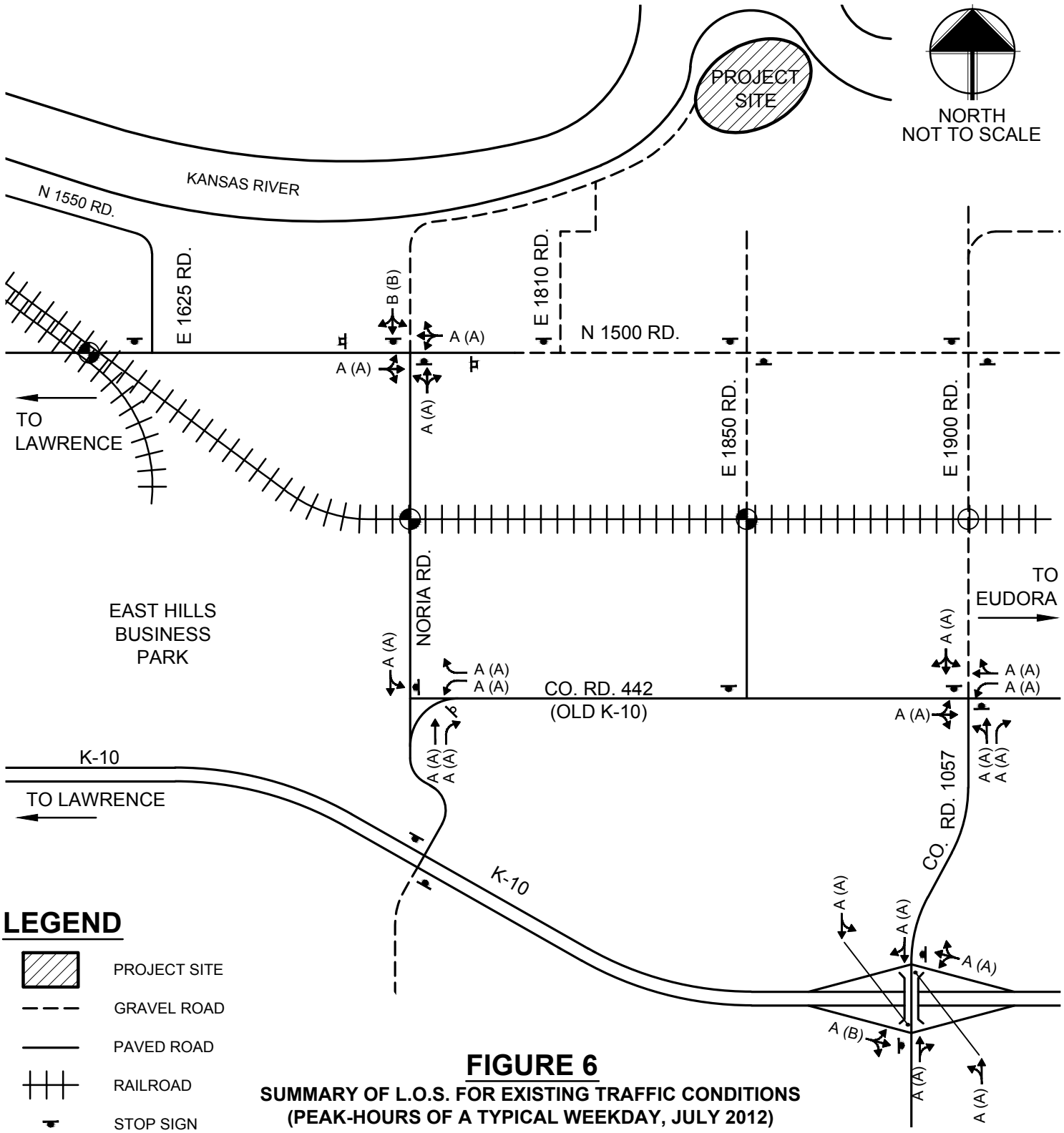


## LEGEND

- PROJECT SITE
- GRAVEL ROAD
- PAVED ROAD
- RAILROAD
- STOP SIGN
- YIELD SIGN
- WEIGHT LIMIT SIGN
- ACTIVE RR CROSSING (GATE & SIGNAL)
- PASSIVE RR CROSSING (CROSS BUCK)
- XX (XX) A.M. (P.M.)

# FIGURE 6

**SUMMARY OF L.O.S. FOR EXISTING TRAFFIC CONDITIONS**
**(PEAK-HOURS OF A TYPICAL WEEKDAY, JULY 2012)**


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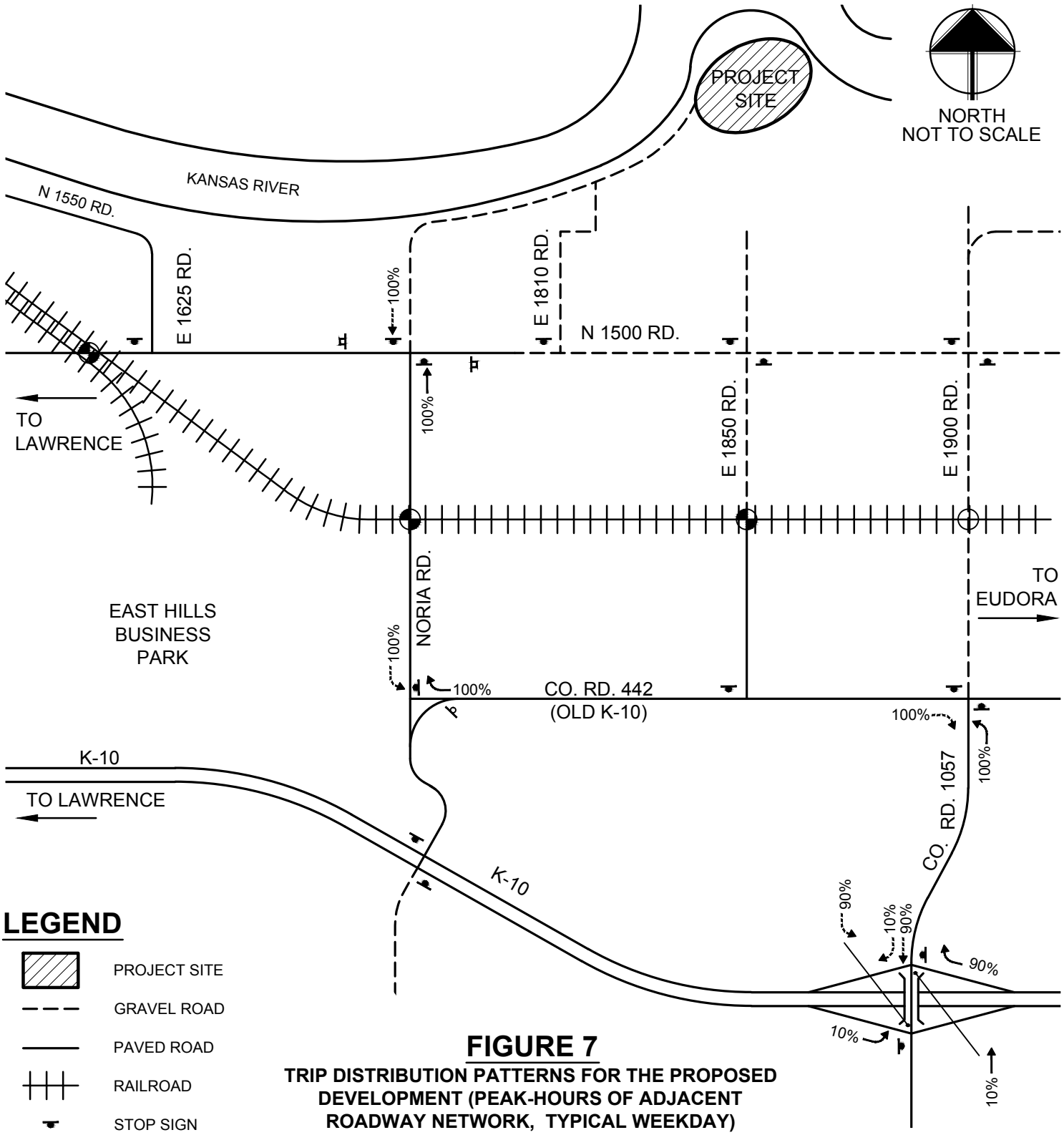


## LEGEND

- PROJECT SITE
- GRAVEL ROAD
- PAVED ROAD
- RAILROAD
- STOP SIGN
- YIELD SIGN
- WEIGHT LIMIT SIGN
- ACTIVE RR CROSSING (GATE & SIGNAL)
- PASSIVE RR CROSSING (CROSS BUCK)
- INBOUND TRIPS
- OUTBOUND TRIPS

# FIGURE 7

**TRIP DISTRIBUTION PATTERNS FOR THE PROPOSED DEVELOPMENT (PEAK-HOURS OF ADJACENT ROADWAY NETWORK, TYPICAL WEEKDAY)**

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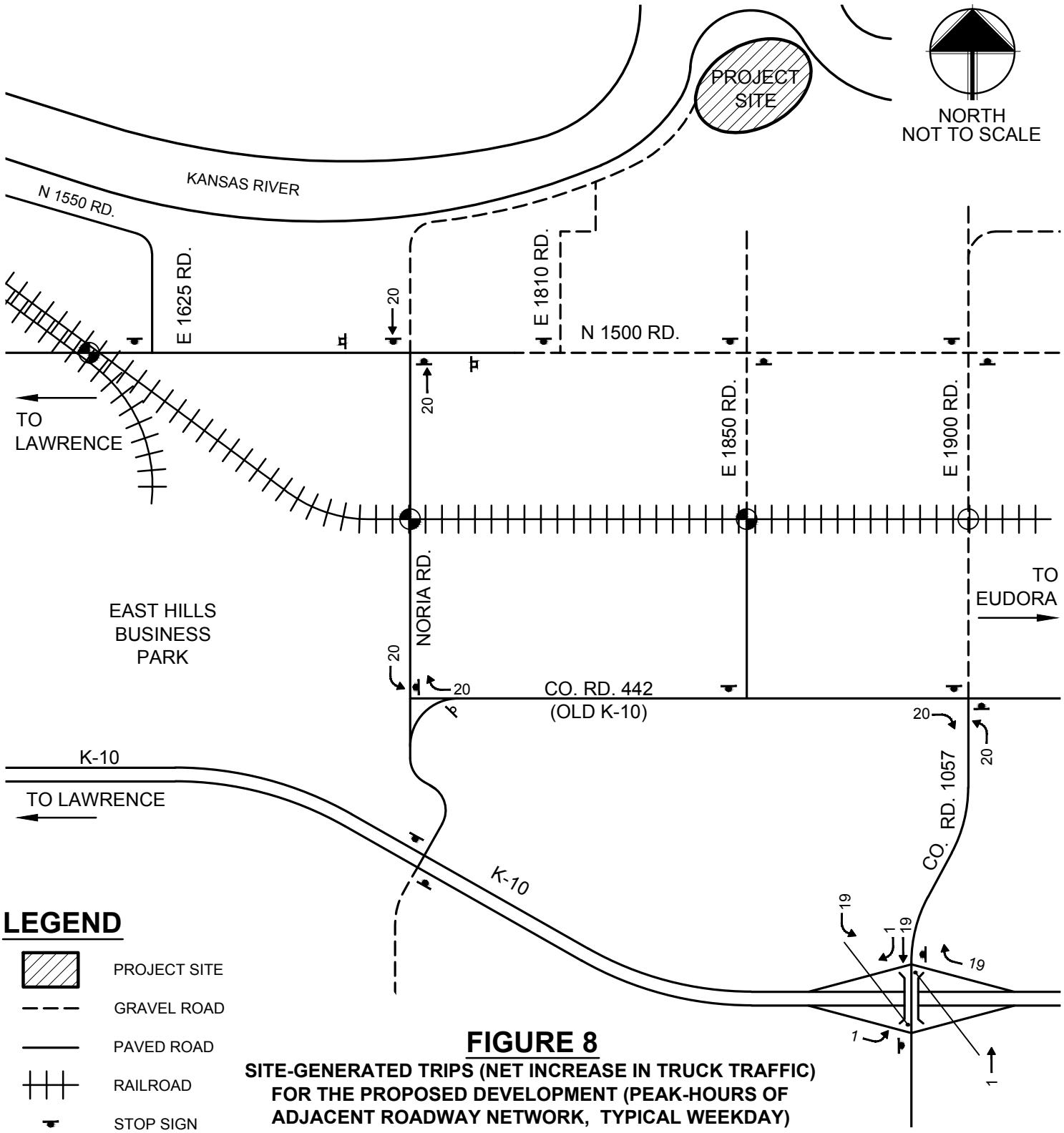


## LEGEND

- PROJECT SITE
- GRAVEL ROAD
- PAVED ROAD
- RAILROAD
- STOP SIGN
- YIELD SIGN
- WEIGHT LIMIT SIGN
- ACTIVE RR CROSSING (GATE & SIGNAL)
- PASSIVE RR CROSSING (CROSS BUCK)

# FIGURE 8

**SITE-GENERATED TRIPS (NET INCREASE IN TRUCK TRAFFIC) FOR THE PROPOSED DEVELOPMENT (PEAK-HOURS OF ADJACENT ROADWAY NETWORK, TYPICAL WEEKDAY)**


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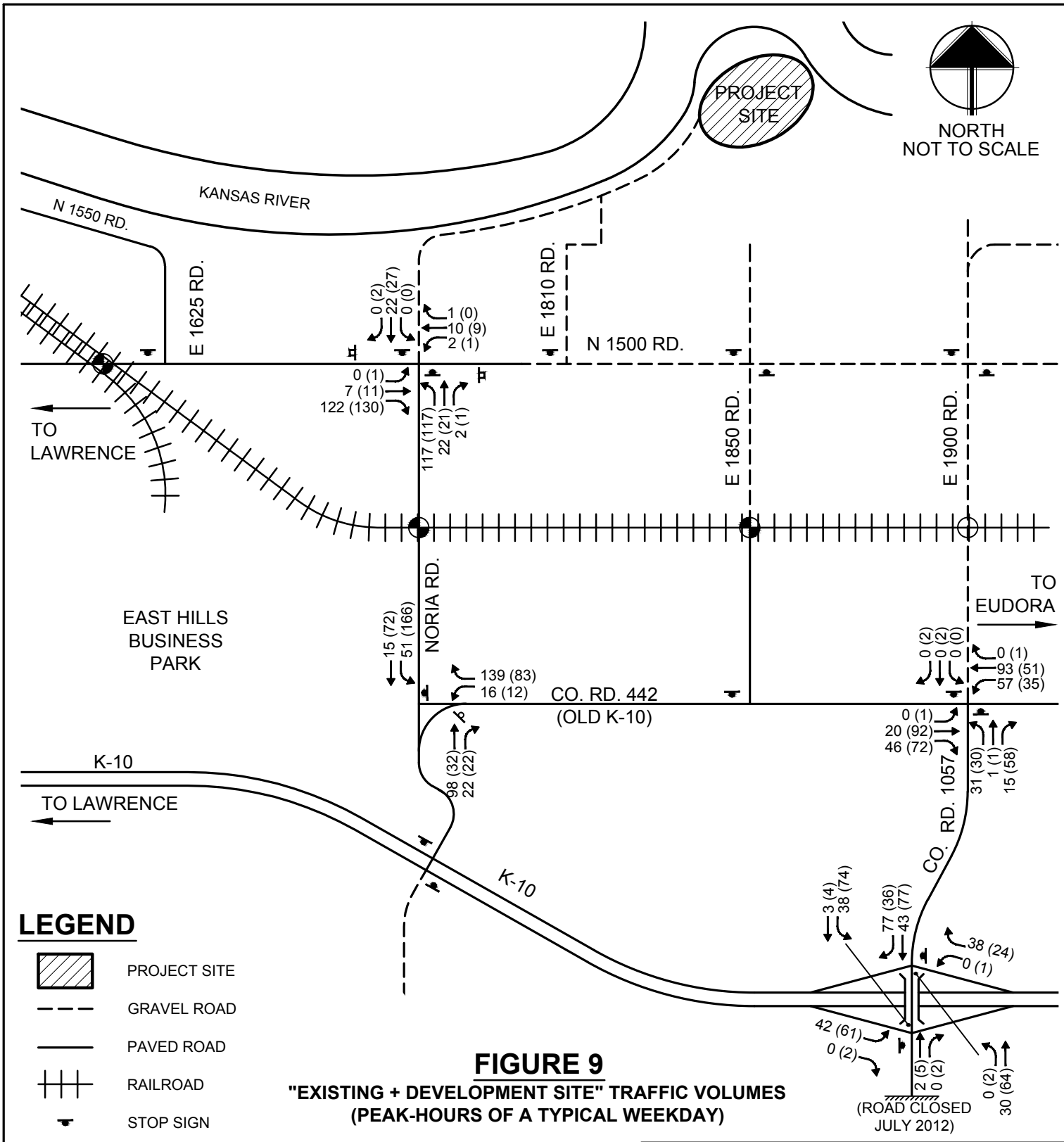


## LEGEND

- PROJECT SITE
- GRAVEL ROAD
- PAVED ROAD
- RAILROAD
- STOP SIGN
- YIELD SIGN
- WEIGHT LIMIT SIGN
- ACTIVE RR CROSSING (GATE & SIGNAL)
- PASSIVE RR CROSSING (CROSS BUCK)
- XX (XX) A.M. (P.M.)
  - → 4:00 - 5:00
  - → 7:30 - 8:30

# FIGURE 9

**"EXISTING + DEVELOPMENT SITE" TRAFFIC VOLUMES**
**(PEAK-HOURS OF A TYPICAL WEEKDAY)**


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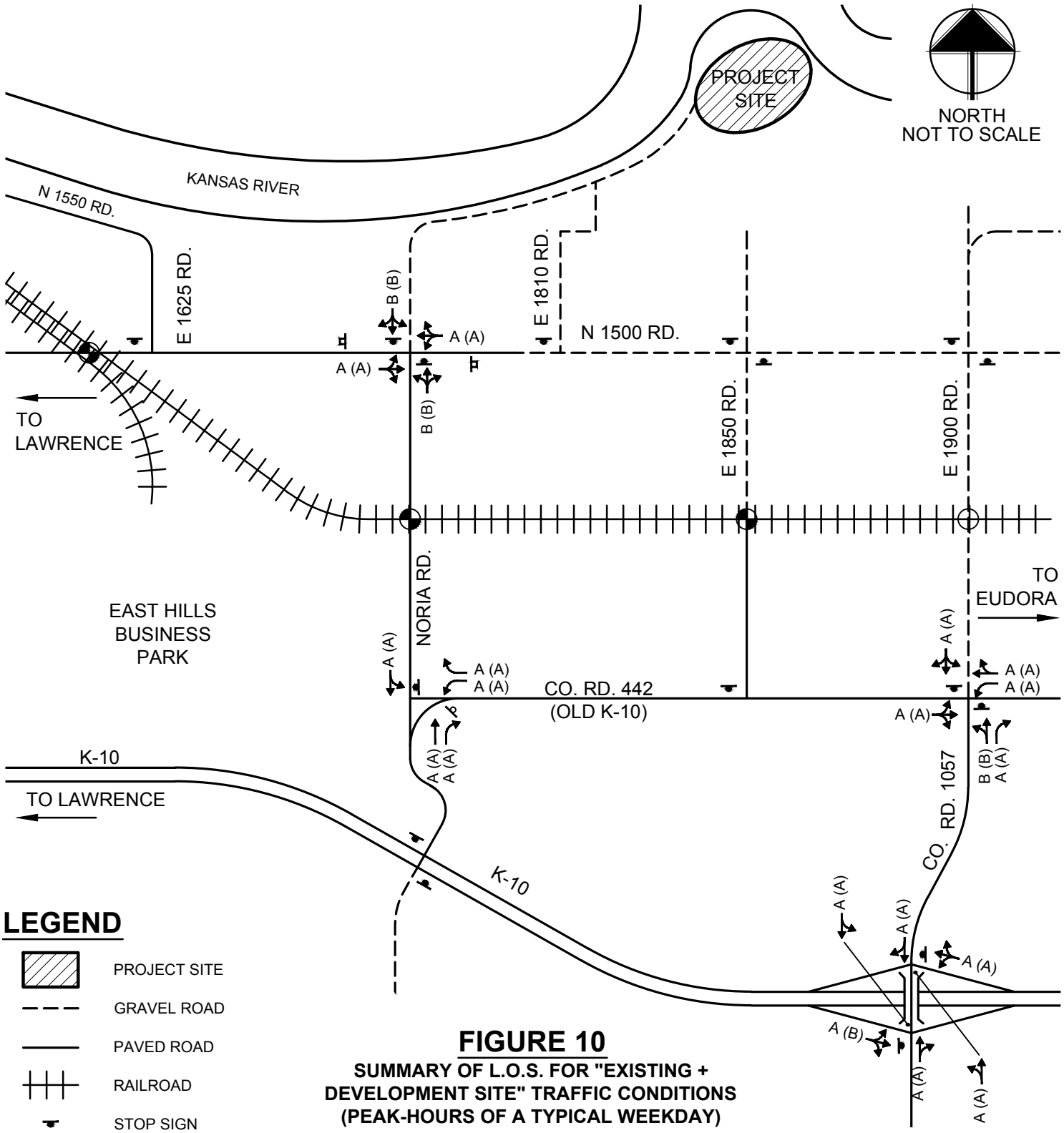


## LEGEND

- PROJECT SITE
- GRAVEL ROAD
- PAVED ROAD
- RAILROAD
- STOP SIGN
- YIELD SIGN
- WEIGHT LIMIT SIGN
- ACTIVE RR CROSSING (GATE & SIGNAL)
- PASSIVE RR CROSSING (CROSS BUCK)
- XX (XX) A.M. (P.M.)

# FIGURE 10

**SUMMARY OF L.O.S. FOR "EXISTING + DEVELOPMENT SITE" TRAFFIC CONDITIONS (PEAK-HOURS OF A TYPICAL WEEKDAY)**


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tele (785)843-7530
fax (785)843-2410
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# APPENDIX II

Results of Highway Capacity Analysis

Using

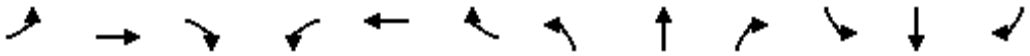
Synchro 7 Software

# EXISTING CONDITIONS

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 7 | 122 | 2 | 10 | 1 | 117 | 2 | 2 | 0 | 2 | 0 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 8 | 133 | 2 | 11 | 1 | 127 | 2 | 2 | 0 | 2 | 0 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (ft) | | | | | | | | | | | | |
| Walking Speed (ft/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (ft) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 12 | | | 140 | | | 91 | 90 | 74 | 93 | 156 | 11 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 12 | | | 140 | | | 91 | 90 | 74 | 93 | 156 | 11 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.1 | 6.5 | 6.2 | 7.1 | 7.5 | 6.2 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.0 | 3.3 | 3.5 | 4.9 | 3.3 |
| p0 queue free % | 100 | | | 100 | | | 86 | 100 | 100 | 100 | 100 | 100 |
| cM capacity (veh/h) | 1607 | | | 1443 | | | 890 | 799 | 988 | 886 | 588 | 1069 |

| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 |
|---|---|---|---|---|
| Volume Total | 140 | 14 | 132 | 2 |
| Volume Left | 0 | 2 | 127 | 0 |
| Volume Right | 133 | 1 | 2 | 0 |
| cSH | 1607 | 1443 | 890 | 588 |
| Volume to Capacity | 0.00 | 0.00 | 0.15 | 0.00 |
| Queue Length 95th (ft) | 0 | 0 | 13 | 0 |
| Control Delay (s) | 0.0 | 1.2 | 9.7 | 11.1 |
| Lane LOS | | A | A | B |
| Approach Delay (s) | 0.0 | 1.2 | 9.7 | 11.1 |
| Approach LOS | | | A | B |

| Intersection Summary | | | | |
|---|---|---|---|---|
| Average Delay | 4.6 | | | |
| Intersection Capacity Utilization | 28.0% | ICU Level of Service | A | |
| Analysis Period (min) | 15 | | | |



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 1 | 11 | 130 | 1 | 9 | 0 | 117 | 1 | 1 | 0 | 7 | 2 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | 0.876 | | | | | | 0.999 | | | 0.973 | |
| Flt Protected | | | | | 0.995 | | | 0.953 | | | | |
| Satd. Flow (prot) | 0 | 1632 | 0 | 0 | 1853 | 0 | 0 | 1760 | 0 | 0 | 1025 | 0 |
| Flt Permitted | | | | | 0.995 | | | 0.953 | | | | |
| Satd. Flow (perm) | 0 | 1632 | 0 | 0 | 1853 | 0 | 0 | 1760 | 0 | 0 | 1025 | 0 |
| Link Speed (mph) | | 30 | | | 30 | | | 30 | | | 30 | |
| Link Distance (ft) | | 742 | | | 793 | | | 5163 | | | 445 | |
| Travel Time (s) | | 16.9 | | | 18.0 | | | 117.3 | | | 10.1 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles (%) | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 100% | 2% | 2% | 100% | 2% |
| Adj. Flow (vph) | 1 | 12 | 141 | 1 | 10 | 0 | 127 | 1 | 1 | 0 | 8 | 2 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 0 | 154 | 0 | 0 | 11 | 0 | 0 | 129 | 0 | 0 | 10 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(ft) | | 0 | | | 0 | | | 0 | | | 0 | |
| Link Offset(ft) | | 0 | | | 0 | | | 0 | | | 0 | |
| Crosswalk Width(ft) | | 16 | | | 16 | | | 16 | | | 16 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |

| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Control Type: Unsignalized | | | |
| Intersection Capacity Utilization 28.8% | | ICU Level of Service A | |
| Analysis Period (min) 15 | | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 16 | 119 | 98 | 22 | 31 | 15 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 17 | 129 | 107 | 24 | 34 | 16 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | 7 | | | | |
| Median type | | | None | | | None |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 190 | 107 | | | 107 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 190 | 107 | | | 107 | |
| tC, single (s) | 6.5 | 6.2 | | | 4.3 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.6 | 3.3 | | | 2.3 | |
| p0 queue free % | 98 | 86 | | | 98 | |
| cM capacity (veh/h) | 758 | 948 | | | 1401 | |

| Direction, Lane # | WB 1 | NB 1 | NB 2 | SB 1 |
|---|---|---|---|---|
| Volume Total | 147 | 107 | 24 | 50 |
| Volume Left | 17 | 0 | 0 | 34 |
| Volume Right | 129 | 0 | 24 | 0 |
| cSH | 1075 | 1700 | 1700 | 1401 |
| Volume to Capacity | 0.14 | 0.06 | 0.01 | 0.02 |
| Queue Length 95th (ft) | 12 | 0 | 0 | 2 |
| Control Delay (s) | 9.5 | 0.0 | 0.0 | 5.2 |
| Lane LOS | A | | | A |
| Approach Delay (s) | 9.5 | 0.0 | | 5.2 |
| Approach LOS | A | | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 5.0 | | |
| Intersection Capacity Utilization | 19.2% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 12 | 63 | 32 | 22 | 146 | 72 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 13 | 68 | 35 | 24 | 159 | 78 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | 7 | | | | |
| Median type | | | None | | | None |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 430 | 35 | | | 35 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 430 | 35 | | | 35 | |
| tC, single (s) | 6.4 | 6.5 | | | 4.2 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.6 | | | 2.3 | |
| p0 queue free % | 98 | 93 | | | 90 | |
| cM capacity (veh/h) | 522 | 959 | | | 1545 | |

| Direction, Lane # | WB 1 | NB 1 | NB 2 | SB 1 |
|---|---|---|---|---|
| Volume Total | 82 | 35 | 24 | 237 |
| Volume Left | 13 | 0 | 0 | 159 |
| Volume Right | 68 | 0 | 24 | 0 |
| cSH | 1141 | 1700 | 1700 | 1545 |
| Volume to Capacity | 0.07 | 0.02 | 0.01 | 0.10 |
| Queue Length 95th (ft) | 6 | 0 | 0 | 9 |
| Control Delay (s) | 9.5 | 0.0 | 0.0 | 5.4 |
| Lane LOS | A | | | A |
| Approach Delay (s) | 9.5 | 0.0 | | 5.4 |
| Approach LOS | A | | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 5.4 | | |
| Intersection Capacity Utilization | 28.5% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 20 | 26 | 57 | 93 | 0 | 11 | 1 | 15 | 0 | 0 | 0 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 22 | 28 | 62 | 101 | 0 | 12 | 1 | 16 | 0 | 0 | 0 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (ft) | | | | | | | | | | | | |
| Walking Speed (ft/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | 7 | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (ft) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 101 | | | 50 | | | 261 | 261 | 36 | 270 | 275 | 101 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 101 | | | 50 | | | 261 | 261 | 36 | 270 | 275 | 101 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.1 | 6.5 | 6.3 | 7.1 | 6.5 | 6.2 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.0 | 3.4 | 3.5 | 4.0 | 3.3 |
| p0 queue free % | 100 | | | 96 | | | 98 | 100 | 98 | 100 | 100 | 100 |
| cM capacity (veh/h) | 1491 | | | 1557 | | | 671 | 618 | 1025 | 651 | 607 | 954 |

| Direction, Lane # | EB 1 | WB 1 | WB 2 | NB 1 | SB 1 |
|---|---|---|---|---|---|
| Volume Total | 50 | 62 | 101 | 29 | 0 |
| Volume Left | 0 | 62 | 0 | 12 | 0 |
| Volume Right | 28 | 0 | 0 | 16 | 0 |
| cSH | 1491 | 1557 | 1700 | 1500 | 1700 |
| Volume to Capacity | 0.00 | 0.04 | 0.06 | 0.02 | 0.00 |
| Queue Length 95th (ft) | 0 | 3 | 0 | 1 | 0 |
| Control Delay (s) | 0.0 | 7.4 | 0.0 | 9.4 | 0.0 |
| Lane LOS | | A | | A | A |
| Approach Delay (s) | 0.0 | 2.8 | | 9.4 | 0.0 |
| Approach LOS | | | | A | A |

| Intersection Summary | | | | |
|---|---|---|---|---|
| Average Delay | 3.0 | | | |
| Intersection Capacity Utilization | 19.8% | ICU Level of Service | | A |
| Analysis Period (min) | 15 | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 1 | 92 | 52 | 35 | 51 | 1 | 10 | 1 | 58 | 0 | 2 | 2 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 1 | 100 | 57 | 38 | 55 | 1 | 11 | 1 | 63 | 0 | 2 | 2 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (ft) | | | | | | | | | | | | |
| Walking Speed (ft/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | 7 | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (ft) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 57 | | | 157 | | | 265 | 263 | 128 | 295 | 291 | 56 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 57 | | | 157 | | | 265 | 263 | 128 | 295 | 291 | 56 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.2 | 6.5 | 6.5 | 7.1 | 6.5 | 6.2 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.6 | 4.0 | 3.5 | 3.5 | 4.0 | 3.3 |
| p0 queue free % | 100 | | | 97 | | | 98 | 100 | 93 | 100 | 100 | 100 |
| cM capacity (veh/h) | 1548 | | | 1423 | | | 654 | 624 | 861 | 596 | 603 | 1011 |

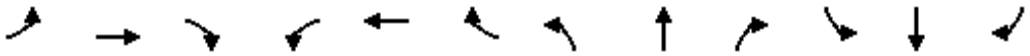
| Direction, Lane # | EB 1 | WB 1 | WB 2 | NB 1 | SB 1 |
|---|---|---|---|---|---|
| Volume Total | 158 | 38 | 57 | 75 | 4 |
| Volume Left | 1 | 38 | 0 | 11 | 0 |
| Volume Right | 57 | 0 | 1 | 63 | 2 |
| cSH | 1548 | 1423 | 1700 | 1025 | 755 |
| Volume to Capacity | 0.00 | 0.03 | 0.03 | 0.07 | 0.01 |
| Queue Length 95th (ft) | 0 | 2 | 0 | 6 | 0 |
| Control Delay (s) | 0.1 | 7.6 | 0.0 | 9.7 | 9.8 |
| Lane LOS | A | A | | A | A |
| Approach Delay (s) | 0.1 | 3.1 | | 9.7 | 9.8 |
| Approach LOS | | | | A | A |

| Intersection Summary | | | | |
|---|---|---|---|---|
| Average Delay | 3.2 | | | |
| Intersection Capacity Utilization | 28.7% | ICU Level of Service | | A |
| Analysis Period (min) | 15 | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 29 | 0 | 0 | 24 | 76 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 0 | 0 | 0 | 0 | 21 | 0 | 32 | 0 | 0 | 26 | 83 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (ft) | | | | | | | | | | | | |
| Walking Speed (ft/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (ft) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 120 | 99 | 67 | 99 | 140 | 32 | 109 | | | 32 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 120 | 99 | 67 | 99 | 140 | 32 | 109 | | | 32 | | |
| tC, single (s) | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 | 2.2 | | | 2.2 | | |
| p0 queue free % | 100 | 100 | 100 | 100 | 100 | 98 | 100 | | | 100 | | |
| cM capacity (veh/h) | 839 | 791 | 996 | 883 | 751 | 1042 | 1482 | | | 1581 | | |

| Direction, Lane # | WB 1 | NB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 21 | 32 | 109 |
| Volume Left | 0 | 0 | 0 |
| Volume Right | 21 | 0 | 83 |
| cSH | 1042 | 1482 | 1700 |
| Volume to Capacity | 0.02 | 0.00 | 0.06 |
| Queue Length 95th (ft) | 2 | 0 | 0 |
| Control Delay (s) | 8.5 | 0.0 | 0.0 |
| Lane LOS | A | | |
| Approach Delay (s) | 8.5 | 0.0 | 0.0 |
| Approach LOS | A | | |

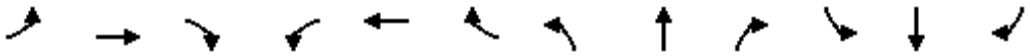
| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 1.1 | | |
| Intersection Capacity Utilization | 15.9% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 0 | 0 | 1 | 0 | 5 | 2 | 63 | 0 | 0 | 58 | 35 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 0 | 0 | 1 | 0 | 5 | 2 | 68 | 0 | 0 | 63 | 38 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (ft) | | | | | | | | | | | | |
| Walking Speed (ft/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (ft) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 160 | 155 | 82 | 155 | 174 | 68 | 101 | | | 68 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 160 | 155 | 82 | 155 | 174 | 68 | 101 | | | 68 | | |
| tC, single (s) | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.4 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.5 | 2.2 | | | 2.2 | | |
| p0 queue free % | 100 | 100 | 100 | 100 | 100 | 99 | 100 | | | 100 | | |
| cM capacity (veh/h) | 800 | 736 | 978 | 811 | 718 | 947 | 1491 | | | 1533 | | |

| Direction, Lane # | WB 1 | NB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 7 | 71 | 101 |
| Volume Left | 1 | 2 | 0 |
| Volume Right | 5 | 0 | 38 |
| cSH | 921 | 1491 | 1700 |
| Volume to Capacity | 0.01 | 0.00 | 0.06 |
| Queue Length 95th (ft) | 1 | 0 | 0 |
| Control Delay (s) | 8.9 | 0.2 | 0.0 |
| Lane LOS | A | A | |
| Approach Delay (s) | 8.9 | 0.2 | 0.0 |
| Approach LOS | A | | |

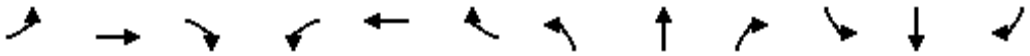
| Intersection Summary | | | | |
|---|---|---|---|---|
| Average Delay | 0.4 | | | |
| Intersection Capacity Utilization | 15.2% | ICU Level of Service | A | |
| Analysis Period (min) | 15 | | | |



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 41 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 19 | 3 | 0 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 45 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 21 | 3 | 0 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (ft) | | | | | | | | | | | | |
| Walking Speed (ft/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (ft) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 47 | 47 | 3 | 47 | 47 | 2 | 3 | | | 2 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 47 | 47 | 3 | 47 | 47 | 2 | 3 | | | 2 | | |
| tC, single (s) | 7.4 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 | 4.1 | | | 4.4 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.8 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 | 2.2 | | | 2.5 | | |
| p0 queue free % | 95 | 100 | 100 | 100 | 100 | 100 | 100 | | | 99 | | |
| cM capacity (veh/h) | 871 | 833 | 1081 | 944 | 833 | 1082 | 1619 | | | 1444 | | |

| Direction, Lane # | EB 1 | NB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 45 | 2 | 24 |
| Volume Left | 45 | 0 | 21 |
| Volume Right | 0 | 0 | 0 |
| cSH | 871 | 1700 | 1444 |
| Volume to Capacity | 0.05 | 0.00 | 0.01 |
| Queue Length 95th (ft) | 4 | 0 | 1 |
| Control Delay (s) | 9.4 | 0.0 | 6.5 |
| Lane LOS | A | | A |
| Approach Delay (s) | 9.4 | 0.0 | 6.5 |
| Approach LOS | A | | |

| Intersection Summary | | | | |
|---|---|---|---|---|
| Average Delay | 8.1 | | | |
| Intersection Capacity Utilization | 17.9% | ICU Level of Service | A | |
| Analysis Period (min) | 15 | | | |



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 60 | 0 | 2 | 0 | 0 | 0 | 0 | 5 | 2 | 55 | 4 | 0 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 65 | 0 | 2 | 0 | 0 | 0 | 0 | 5 | 2 | 60 | 4 | 0 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (ft) | | | | | | | | | | | | |
| Walking Speed (ft/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (ft) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 130 | 132 | 4 | 133 | 130 | 7 | 4 | | | 8 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 130 | 132 | 4 | 133 | 130 | 7 | 4 | | | 8 | | |
| tC, single (s) | 7.3 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 | 4.1 | | | 4.3 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.7 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 | 2.2 | | | 2.4 | | |
| p0 queue free % | 92 | 100 | 100 | 100 | 100 | 100 | 100 | | | 96 | | |
| cM capacity (veh/h) | 768 | 729 | 1079 | 812 | 730 | 1076 | 1617 | | | 1503 | | |

| Direction, Lane # | EB 1 | NB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 67 | 8 | 64 |
| Volume Left | 65 | 0 | 60 |
| Volume Right | 2 | 2 | 0 |
| cSH | 775 | 1700 | 1503 |
| Volume to Capacity | 0.09 | 0.00 | 0.04 |
| Queue Length 95th (ft) | 7 | 0 | 3 |
| Control Delay (s) | 10.1 | 0.0 | 7.0 |
| Lane LOS | B | | A |
| Approach Delay (s) | 10.1 | 0.0 | 7.0 |
| Approach LOS | B | | |

| Intersection Summary | | | | |
|---|---|---|---|---|
| Average Delay | 8.1 | | | |
| Intersection Capacity Utilization | 20.0% | ICU Level of Service | A | |
| Analysis Period (min) | 15 | | | |

# EXISTING + DEVELOPMENT TRAFFIC CONDITIONS

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 7 | 122 | 2 | 10 | 1 | 117 | 22 | 2 | 0 | 22 | 0 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 8 | 133 | 2 | 11 | 1 | 127 | 24 | 2 | 0 | 24 | 0 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (ft) | | | | | | | | | | | | |
| Walking Speed (ft/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (ft) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 12 | | | 140 | | | 102 | 90 | 74 | 104 | 156 | 11 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 12 | | | 140 | | | 102 | 90 | 74 | 104 | 156 | 11 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.1 | 6.5 | 6.2 | 7.1 | 7.5 | 6.2 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.0 | 3.3 | 3.5 | 4.9 | 3.3 |
| p0 queue free % | 100 | | | 100 | | | 85 | 97 | 100 | 100 | 96 | 100 |
| cM capacity (veh/h) | 1607 | | | 1443 | | | 851 | 799 | 988 | 853 | 588 | 1069 |

| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 |
|---|---|---|---|---|
| Volume Total | 140 | 14 | 153 | 24 |
| Volume Left | 0 | 2 | 127 | 0 |
| Volume Right | 133 | 1 | 2 | 0 |
| cSH | 1607 | 1443 | 844 | 588 |
| Volume to Capacity | 0.00 | 0.00 | 0.18 | 0.04 |
| Queue Length 95th (ft) | 0 | 0 | 17 | 3 |
| Control Delay (s) | 0.0 | 1.2 | 10.2 | 11.4 |
| Lane LOS | | A | B | B |
| Approach Delay (s) | 0.0 | 1.2 | 10.2 | 11.4 |
| Approach LOS | | | B | B |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 5.6 | | |
| Intersection Capacity Utilization | 29.0% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 1 | 11 | 130 | 1 | 9 | 0 | 117 | 21 | 1 | 0 | 27 | 2 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 1 | 12 | 141 | 1 | 10 | 0 | 127 | 23 | 1 | 0 | 29 | 2 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (ft) | | | | | | | | | | | | |
| Walking Speed (ft/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (ft) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 10 | | | 153 | | | 114 | 97 | 83 | 109 | 167 | 10 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 10 | | | 153 | | | 114 | 97 | 83 | 109 | 167 | 10 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.1 | 7.5 | 6.2 | 7.1 | 7.5 | 6.2 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.9 | 3.3 | 3.5 | 4.9 | 3.3 |
| p0 queue free % | 100 | | | 100 | | | 85 | 96 | 100 | 100 | 95 | 100 |
| cM capacity (veh/h) | 1610 | | | 1427 | | | 828 | 640 | 977 | 844 | 579 | 1072 |

| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 |
|---|---|---|---|---|
| Volume Total | 154 | 11 | 151 | 32 |
| Volume Left | 1 | 1 | 127 | 0 |
| Volume Right | 141 | 0 | 1 | 2 |
| cSH | 1610 | 1427 | 793 | 598 |
| Volume to Capacity | 0.00 | 0.00 | 0.19 | 0.05 |
| Queue Length 95th (ft) | 0 | 0 | 17 | 4 |
| Control Delay (s) | 0.1 | 0.8 | 10.6 | 11.4 |
| Lane LOS | A | A | B | B |
| Approach Delay (s) | 0.1 | 0.8 | 10.6 | 11.4 |
| Approach LOS | | | B | B |

| Intersection Summary | | | | |
|---|---|---|---|---|
| Average Delay | 5.7 | | | |
| Intersection Capacity Utilization | 29.8% | ICU Level of Service | A | |
| Analysis Period (min) | 15 | | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 16 | 139 | 98 | 22 | 51 | 15 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 17 | 151 | 107 | 24 | 55 | 16 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | 7 | | | | |
| Median type | | | None | | | None |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 234 | 107 | | | 107 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 234 | 107 | | | 107 | |
| tC, single (s) | 6.5 | 6.2 | | | 4.3 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.6 | 3.3 | | | 2.3 | |
| p0 queue free % | 98 | 84 | | | 96 | |
| cM capacity (veh/h) | 704 | 948 | | | 1401 | |

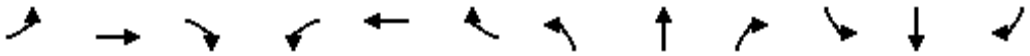
| Direction, Lane # | WB 1 | NB 1 | NB 2 | SB 1 |
|---|---|---|---|---|
| Volume Total | 168 | 107 | 24 | 72 |
| Volume Left | 17 | 0 | 0 | 55 |
| Volume Right | 151 | 0 | 24 | 0 |
| cSH | 1057 | 1700 | 1700 | 1401 |
| Volume to Capacity | 0.16 | 0.06 | 0.01 | 0.04 |
| Queue Length 95th (ft) | 14 | 0 | 0 | 3 |
| Control Delay (s) | 9.6 | 0.0 | 0.0 | 6.0 |
| Lane LOS | A | | | A |
| Approach Delay (s) | 9.6 | 0.0 | | 6.0 |
| Approach LOS | A | | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 5.5 | | |
| Intersection Capacity Utilization | 20.4% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 12 | 83 | 32 | 22 | 166 | 72 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 13 | 90 | 35 | 24 | 180 | 78 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | 7 | | | | |
| Median type | | | None | | | None |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 474 | 35 | | | 35 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 474 | 35 | | | 35 | |
| tC, single (s) | 6.4 | 6.5 | | | 4.2 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.6 | | | 2.3 | |
| p0 queue free % | 97 | 91 | | | 88 | |
| cM capacity (veh/h) | 485 | 959 | | | 1545 | |

| Direction, Lane # | WB 1 | NB 1 | NB 2 | SB 1 |
|---|---|---|---|---|
| Volume Total | 103 | 35 | 24 | 259 |
| Volume Left | 13 | 0 | 0 | 180 |
| Volume Right | 90 | 0 | 24 | 0 |
| cSH | 1097 | 1700 | 1700 | 1545 |
| Volume to Capacity | 0.09 | 0.02 | 0.01 | 0.12 |
| Queue Length 95th (ft) | 8 | 0 | 0 | 10 |
| Control Delay (s) | 9.6 | 0.0 | 0.0 | 5.6 |
| Lane LOS | A | | | A |
| Approach Delay (s) | 9.6 | 0.0 | | 5.6 |
| Approach LOS | A | | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 5.8 | | |
| Intersection Capacity Utilization | 29.6% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 20 | 46 | 57 | 93 | 0 | 31 | 1 | 15 | 0 | 0 | 0 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 22 | 50 | 62 | 101 | 0 | 34 | 1 | 16 | 0 | 0 | 0 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (ft) | | | | | | | | | | | | |
| Walking Speed (ft/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | 7 | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (ft) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 101 | | | 72 | | | 272 | 272 | 47 | 280 | 297 | 101 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 101 | | | 72 | | | 272 | 272 | 47 | 280 | 297 | 101 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.1 | 6.5 | 6.3 | 7.1 | 6.5 | 6.2 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.0 | 3.4 | 3.5 | 4.0 | 3.3 |
| p0 queue free % | 100 | | | 96 | | | 95 | 100 | 98 | 100 | 100 | 100 |
| cM capacity (veh/h) | 1491 | | | 1528 | | | 660 | 609 | 1011 | 640 | 590 | 954 |

| Direction, Lane # | EB 1 | WB 1 | WB 2 | NB 1 | SB 1 |
|---|---|---|---|---|---|
| Volume Total | 72 | 62 | 101 | 51 | 0 |
| Volume Left | 0 | 62 | 0 | 34 | 0 |
| Volume Right | 50 | 0 | 0 | 16 | 0 |
| cSH | 1491 | 1528 | 1700 | 967 | 1700 |
| Volume to Capacity | 0.00 | 0.04 | 0.06 | 0.05 | 0.00 |
| Queue Length 95th (ft) | 0 | 3 | 0 | 4 | 0 |
| Control Delay (s) | 0.0 | 7.5 | 0.0 | 10.1 | 0.0 |
| Lane LOS | | A | | B | A |
| Approach Delay (s) | 0.0 | 2.8 | | 10.1 | 0.0 |
| Approach LOS | | | | B | A |

| Intersection Summary | | | | |
|---|---|---|---|---|
| Average Delay | 3.4 | | | |
| Intersection Capacity Utilization | 19.8% | ICU Level of Service | | A |
| Analysis Period (min) | 15 | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 1 | 92 | 72 | 35 | 51 | 1 | 30 | 1 | 58 | 0 | 2 | 2 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 1 | 100 | 78 | 38 | 55 | 1 | 33 | 1 | 63 | 0 | 2 | 2 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (ft) | | | | | | | | | | | | |
| Walking Speed (ft/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | 7 | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (ft) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 57 | | | 178 | | | 276 | 274 | 139 | 305 | 312 | 56 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 57 | | | 178 | | | 276 | 274 | 139 | 305 | 312 | 56 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.2 | 6.5 | 6.5 | 7.1 | 6.5 | 6.2 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.6 | 4.0 | 3.5 | 3.5 | 4.0 | 3.3 |
| p0 queue free % | 100 | | | 97 | | | 95 | 100 | 93 | 100 | 100 | 100 |
| cM capacity (veh/h) | 1548 | | | 1398 | | | 643 | 616 | 849 | 585 | 586 | 1011 |

| Direction, Lane # | EB 1 | WB 1 | WB 2 | NB 1 | SB 1 |
|---|---|---|---|---|---|
| Volume Total | 179 | 38 | 57 | 97 | 4 |
| Volume Left | 1 | 38 | 0 | 33 | 0 |
| Volume Right | 78 | 0 | 1 | 63 | 2 |
| cSH | 1548 | 1398 | 1700 | 1303 | 742 |
| Volume to Capacity | 0.00 | 0.03 | 0.03 | 0.07 | 0.01 |
| Queue Length 95th (ft) | 0 | 2 | 0 | 6 | 0 |
| Control Delay (s) | 0.1 | 7.6 | 0.0 | 10.0 | 9.9 |
| Lane LOS | A | A | | B | A |
| Approach Delay (s) | 0.1 | 3.1 | | 10.0 | 9.9 |
| Approach LOS | | | | B | A |

| Intersection Summary | | | | |
|---|---|---|---|---|
| Average Delay | 3.5 | | | |
| Intersection Capacity Utilization | 31.0% | ICU Level of Service | | A |
| Analysis Period (min) | 15 | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 38 | 0 | 30 | 0 | 0 | 43 | 77 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 0 | 0 | 0 | 0 | 41 | 0 | 33 | 0 | 0 | 47 | 84 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (ft) | | | | | | | | | | | | |
| Walking Speed (ft/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (ft) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 162 | 121 | 89 | 121 | 163 | 33 | 130 | | | 33 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 162 | 121 | 89 | 121 | 163 | 33 | 130 | | | 33 | | |
| tC, single (s) | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 | 2.2 | | | 2.2 | | |
| p0 queue free % | 100 | 100 | 100 | 100 | 100 | 96 | 100 | | | 100 | | |
| cM capacity (veh/h) | 771 | 769 | 970 | 854 | 729 | 1041 | 1455 | | | 1579 | | |

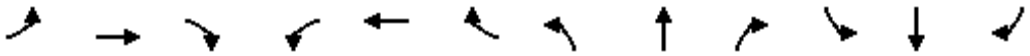
| Direction, Lane # | WB 1 | NB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 41 | 33 | 130 |
| Volume Left | 0 | 0 | 0 |
| Volume Right | 41 | 0 | 84 |
| cSH | 1041 | 1455 | 1700 |
| Volume to Capacity | 0.04 | 0.00 | 0.08 |
| Queue Length 95th (ft) | 3 | 0 | 0 |
| Control Delay (s) | 8.6 | 0.0 | 0.0 |
| Lane LOS | A | | |
| Approach Delay (s) | 8.6 | 0.0 | 0.0 |
| Approach LOS | A | | |

| Intersection Summary | | | | |
|---|---|---|---|---|
| Average Delay | 1.7 | | | |
| Intersection Capacity Utilization | 17.0% | ICU Level of Service | A | |
| Analysis Period (min) | 15 | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 0 | 0 | 1 | 0 | 24 | 2 | 64 | 0 | 0 | 77 | 36 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 0 | 0 | 1 | 0 | 26 | 2 | 70 | 0 | 0 | 84 | 39 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (ft) | | | | | | | | | | | | |
| Walking Speed (ft/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (ft) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 203 | 177 | 103 | 177 | 197 | 70 | 123 | | | 70 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 203 | 177 | 103 | 177 | 197 | 70 | 123 | | | 70 | | |
| tC, single (s) | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.4 | 4.1 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.5 | 2.2 | | | 2.2 | | |
| p0 queue free % | 100 | 100 | 100 | 100 | 100 | 97 | 100 | | | 100 | | |
| cM capacity (veh/h) | 733 | 715 | 952 | 784 | 698 | 945 | 1464 | | | 1531 | | |

| Direction, Lane # | WB 1 | NB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 27 | 72 | 123 |
| Volume Left | 1 | 2 | 0 |
| Volume Right | 26 | 0 | 39 |
| cSH | 938 | 1464 | 1700 |
| Volume to Capacity | 0.03 | 0.00 | 0.07 |
| Queue Length 95th (ft) | 2 | 0 | 0 |
| Control Delay (s) | 9.0 | 0.2 | 0.0 |
| Lane LOS | A | A | |
| Approach Delay (s) | 9.0 | 0.2 | 0.0 |
| Approach LOS | A | | |

| Intersection Summary | | | | |
|---|---|---|---|---|
| Average Delay | 1.2 | | | |
| Intersection Capacity Utilization | 16.2% | ICU Level of Service | A | |
| Analysis Period (min) | 15 | | | |



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 42 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 38 | 3 | 0 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 41 | 3 | 0 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (ft) | | | | | | | | | | | | |
| Walking Speed (ft/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (ft) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 88 | 88 | 3 | 88 | 88 | 2 | 3 | | | 2 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 88 | 88 | 3 | 88 | 88 | 2 | 3 | | | 2 | | |
| tC, single (s) | 7.4 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 | 4.1 | | | 4.4 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.8 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 | 2.2 | | | 2.5 | | |
| p0 queue free % | 94 | 100 | 100 | 100 | 100 | 100 | 100 | | | 97 | | |
| cM capacity (veh/h) | 808 | 779 | 1081 | 878 | 779 | 1082 | 1619 | | | 1444 | | |

| Direction, Lane # | EB 1 | NB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 46 | 2 | 45 |
| Volume Left | 46 | 0 | 41 |
| Volume Right | 0 | 0 | 0 |
| cSH | 808 | 1700 | 1444 |
| Volume to Capacity | 0.06 | 0.00 | 0.03 |
| Queue Length 95th (ft) | 4 | 0 | 2 |
| Control Delay (s) | 9.7 | 0.0 | 7.0 |
| Lane LOS | A | | A |
| Approach Delay (s) | 9.7 | 0.0 | 7.0 |
| Approach LOS | A | | |

| Intersection Summary | | | | |
|---|---|---|---|---|
| Average Delay | 8.2 | | | |
| Intersection Capacity Utilization | 18.9% | ICU Level of Service | A | |
| Analysis Period (min) | 15 | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 61 | 0 | 2 | 0 | 0 | 0 | 0 | 5 | 2 | 74 | 4 | 0 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 66 | 0 | 2 | 0 | 0 | 0 | 0 | 5 | 2 | 80 | 4 | 0 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (ft) | | | | | | | | | | | | |
| Walking Speed (ft/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (ft) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 172 | 173 | 4 | 174 | 172 | 7 | 4 | | | 8 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 172 | 173 | 4 | 174 | 172 | 7 | 4 | | | 8 | | |
| tC, single (s) | 7.3 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 | 4.1 | | | 4.3 | | |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 3.7 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 | 2.2 | | | 2.4 | | |
| p0 queue free % | 91 | 100 | 100 | 100 | 100 | 100 | 100 | | | 95 | | |
| cM capacity (veh/h) | 712 | 682 | 1079 | 755 | 683 | 1076 | 1617 | | | 1503 | | |

| Direction, Lane # | EB 1 | NB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 68 | 8 | 85 |
| Volume Left | 66 | 0 | 80 |
| Volume Right | 2 | 2 | 0 |
| cSH | 720 | 1700 | 1503 |
| Volume to Capacity | 0.10 | 0.00 | 0.05 |
| Queue Length 95th (ft) | 8 | 0 | 4 |
| Control Delay (s) | 10.5 | 0.0 | 7.2 |
| Lane LOS | B | | A |
| Approach Delay (s) | 10.5 | 0.0 | 7.2 |
| Approach LOS | B | | |

| Intersection Summary | | | | |
|---|---|---|---|---|
| Average Delay | 8.3 | | | |
| Intersection Capacity Utilization | 21.1% | ICU Level of Service | A | |
| Analysis Period (min) | 15 | | | |

# APPENDIX III

Summary of Peak-Hours Traffic Counts

- All Vehicles
- Trucks Only

# Turning Movement Counts
# (All Vehicles )

Intersection of Noria Rd & N 1500 Rd
Morning Peak-Hours
Sunny, Hot

File Name : Noria & N 1500 -eam
Site Code : 1
Start Date : 7/11/2012
Page No : 1

Groups Printed- Unshifted

| | Sand Plant Driveway From North | | | | | N 1500 Rd From East | | | | | Noria Rd From South | | | | | N 1500 Rd From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| 06:00 AM | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 6 | 11 | 0 | 0 | 0 | 11 | 18 |
| 06:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 10 | 0 | 11 | 21 | 2 | 0 | 0 | 23 | 35 |
| 06:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 0 | 1 | 21 | 0 | 22 | 19 | 1 | 1 | 0 | 21 | 45 |
| 06:45 AM | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 20 | 0 | 21 | 32 | 3 | 0 | 0 | 35 | 58 |
| Total | 1 | 1 | 0 | 0 | 2 | 0 | 3 | 1 | 0 | 4 | 1 | 2 | 57 | 0 | 60 | 83 | 6 | 1 | 0 | 90 | 156 |
| 07:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 18 | 0 | 18 | 11 | 0 | 0 | 0 | 11 | 30 |
| 07:15 AM | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 | 0 | 0 | 32 | 0 | 32 | 20 | 1 | 0 | 0 | 21 | 55 |
| 07:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 4 | 0 | 1 | 26 | 0 | 27 | 26 | 0 | 0 | 0 | 26 | 57 |
| 07:45 AM | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 2 | 0 | 0 | 40 | 0 | 40 | 49 | 3 | 0 | 0 | 52 | 95 |
| Total | 0 | 1 | 0 | 0 | 1 | 1 | 7 | 1 | 0 | 9 | 0 | 1 | 116 | 0 | 117 | 106 | 4 | 0 | 0 | 110 | 237 |
| 08:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 1 | 1 | 27 | 0 | 29 | 19 | 2 | 0 | 0 | 21 | 53 |
| 08:15 AM | 0 | 1 | 0 | 0 | 1 | 1 | 2 | 1 | 0 | 4 | 1 | 0 | 24 | 0 | 25 | 28 | 2 | 0 | 0 | 30 | 60 |
| 08:30 AM | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 3 | 18 | 0 | 22 | 18 | 2 | 0 | 0 | 20 | 44 |
| 08:45 AM | 0 | 3 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 20 | 0 | 20 | 19 | 0 | 0 | 0 | 19 | 43 |
| Total | 0 | 5 | 0 | 0 | 5 | 1 | 7 | 1 | 0 | 9 | 3 | 4 | 89 | 0 | 96 | 84 | 6 | 0 | 0 | 90 | 200 |
| Grand Total | 1 | 7 | 0 | 0 | 8 | 2 | 17 | 3 | 0 | 22 | 4 | 7 | 262 | 0 | 273 | 273 | 16 | 1 | 0 | 290 | 593 |
| Apprch % | 12.5 | 87.5 | 0 | 0 | | 9.1 | 77.3 | 13.6 | 0 | | 1.5 | 2.6 | 96 | 0 | | 94.1 | 5.5 | 0.3 | 0 | | |
| Total % | 0.2 | 1.2 | 0 | 0 | 1.3 | 0.3 | 2.9 | 0.5 | 0 | 3.7 | 0.7 | 1.2 | 44.2 | 0 | 46 | 46 | 2.7 | 0.2 | 0 | 48.9 | |

# Turning Movement Counts
# (All Vehicles )

Intersection of Noria Rd & N 1500 Rd
Morning Peak-Hours
Sunny, Hot

File Name : Noria & N 1500 -eam
Site Code : 1
Start Date : 7/11/2012


| | Sand Plant Driveway From North | | | | | N 1500 Rd From East | | | | | Noria Rd From South | | | | | N 1500 Rd From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:30 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 4 | 0 | 1 | 26 | 0 | 27 | 26 | 0 | 0 | 0 | 26 | 57 |
| 07:45 AM | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 2 | 0 | 0 | 40 | 0 | 40 | 49 | 3 | 0 | 0 | 52 | 95 |
| 08:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 1 | 1 | 27 | 0 | 29 | 19 | 2 | 0 | 0 | 21 | 53 |
| 08:15 AM | 0 | 1 | 0 | 0 | 1 | 1 | 2 | 1 | 0 | 4 | 1 | 0 | 24 | 0 | 25 | 28 | 2 | 0 | 0 | 30 | 60 |
| Total Volume | 0 | 2 | 0 | 0 | 2 | 1 | 10 | 2 | 0 | 13 | 2 | 2 | 117 | 0 | 121 | 122 | 7 | 0 | 0 | 129 | 265 |
| % App. Total | 0 | 100 | 0 | 0 | | 7.7 | 76.9 | 15.4 | 0 | | 1.7 | 1.7 | 96.7 | 0 | | 94.6 | 5.4 | 0 | 0 | | |
| PHF | .000 | .500 | .000 | .000 | .500 | .250 | .625 | .500 | .000 | .813 | .500 | .500 | .731 | .000 | .756 | .622 | .583 | .000 | .000 | .620 | .697 |

# Turning Movement Counts
# (All Vehicles )

Intersection of Noria Rd & N 1500 Rd
Afternoon Peak-Hours
Sunny, Hot

File Name : Noria & N 1500 -epm
Site Code : 1
Start Date : 7/11/2012
Page No : 1

Groups Printed- Unshifted

| | Sand Plant Driveway From North | | | | | N 1500 Rd From East | | | | | Noria Rd From South | | | | | N 1500 Rd From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| 02:00 PM | 1 | 2 | 0 | 0 | 3 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 19 | 0 | 19 | 13 | 3 | 1 | 0 | 17 | 41 |
| 02:15 PM | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 9 | 0 | 11 | 19 | 2 | 0 | 0 | 21 | 33 |
| 02:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 3 | 1 | 1 | 15 | 0 | 17 | 24 | 3 | 0 | 0 | 27 | 47 |
| 02:45 PM | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 16 | 0 | 17 | 16 | 3 | 0 | 0 | 19 | 38 |
| Total | 1 | 4 | 0 | 0 | 5 | 0 | 5 | 1 | 0 | 6 | 3 | 2 | 59 | 0 | 64 | 72 | 11 | 1 | 0 | 84 | 159 |
| 03:00 PM | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 29 | 0 | 30 | 19 | 0 | 0 | 0 | 19 | 50 |
| 03:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 28 | 0 | 28 | 17 | 2 | 0 | 0 | 19 | 49 |
| 03:30 PM | 0 | 1 | 0 | 0 | 1 | 0 | 3 | 1 | 0 | 4 | 0 | 3 | 52 | 0 | 55 | 26 | 4 | 0 | 0 | 30 | 90 |
| 03:45 PM | 0 | 1 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 2 | 0 | 2 | 20 | 0 | 22 | 25 | 2 | 0 | 0 | 27 | 52 |
| Total | 0 | 3 | 0 | 0 | 3 | 0 | 7 | 1 | 0 | 8 | 0 | 6 | 129 | 0 | 135 | 87 | 8 | 0 | 0 | 95 | 241 |
| 04:00 PM | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 27 | 0 | 27 | 23 | 4 | 1 | 0 | 28 | 60 |
| 04:15 PM | 1 | 0 | 0 | 0 | 1 | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 14 | 0 | 14 | 35 | 4 | 0 | 0 | 39 | 58 |
| 04:30 PM | 0 | 2 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 2 | 1 | 1 | 53 | 0 | 55 | 25 | 1 | 0 | 0 | 26 | 85 |
| 04:45 PM | 1 | 0 | 0 | 0 | 1 | 0 | 3 | 1 | 0 | 4 | 0 | 0 | 23 | 0 | 23 | 47 | 2 | 0 | 0 | 49 | 77 |
| Total | 2 | 7 | 0 | 0 | 9 | 0 | 9 | 1 | 0 | 10 | 1 | 1 | 117 | 0 | 119 | 130 | 11 | 1 | 0 | 142 | 280 |
| Grand Total | 3 | 14 | 0 | 0 | 17 | 0 | 21 | 3 | 0 | 24 | 4 | 9 | 305 | 0 | 318 | 289 | 30 | 2 | 0 | 321 | 680 |
| Apprch % | 17.6 | 82.4 | 0 | 0 | | 0 | 87.5 | 12.5 | 0 | | 1.3 | 2.8 | 95.9 | 0 | | 90 | 9.3 | 0.6 | 0 | | |
| Total % | 0.4 | 2.1 | 0 | 0 | 2.5 | 0 | 3.1 | 0.4 | 0 | 3.5 | 0.6 | 1.3 | 44.9 | 0 | 46.8 | 42.5 | 4.4 | 0.3 | 0 | 47.2 | |

# Turning Movement Counts
# (All Vehicles )

Intersection of Noria Rd & N 1500 Rd
Afternoon Peak-Hours
Sunny, Hot

File Name : Noria & N 1500 -epm
Site Code : 1
Start Date : 7/11/2012
Page No : 2

| | Sand Plant Driveway From North | | | | | N 1500 Rd From East | | | | | Noria Rd From South | | | | | N 1500 Rd From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 04:00 PM | | | | | | | | | | | | | | | | | | | | | |
| 04:00 PM | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 27 | 0 | 27 | 23 | 4 | 1 | 0 | 28 | 60 |
| 04:15 PM | 1 | 0 | 0 | 0 | 1 | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 14 | 0 | 14 | 35 | 4 | 0 | 0 | 39 | 58 |
| 04:30 PM | 0 | 2 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 2 | 1 | 1 | 53 | 0 | 55 | 25 | 1 | 0 | 0 | 26 | 85 |
| 04:45 PM | 1 | 0 | 0 | 0 | 1 | 0 | 3 | 1 | 0 | 4 | 0 | 0 | 23 | 0 | 23 | 47 | 2 | 0 | 0 | 49 | 77 |
| Total Volume | 2 | 7 | 0 | 0 | 9 | 0 | 9 | 1 | 0 | 10 | 1 | 1 | 117 | 0 | 119 | 130 | 11 | 1 | 0 | 142 | 280 |
| % App. Total | 22.2 | 77.8 | 0 | 0 | | 0 | 90 | 10 | 0 | | 0.8 | 0.8 | 98.3 | 0 | | 91.5 | 7.7 | 0.7 | 0 | | |
| PHF | .500 | .350 | .000 | .000 | .450 | .000 | .563 | .250 | .000 | .625 | .250 | .250 | .552 | .000 | .541 | .691 | .688 | .250 | .000 | .724 | .824 |

# Turning Movement Counts
# (All Vehicles )

Intersection of Noria Rd & DG CO 442
Morning Peak-Hours
Sunny, Hot

File Name : CR 442 & Noria-eam
Site Code : 2
Start Date : 7/12/2012
Page No : 1

Groups Printed- Unshifted

| | Noria Rd From North | | | | | DG CO 442 From East | | | | | Noria Rd From South | | | | | From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | | Thru | Left | | App. Total | Right | | Left | | App. Total | Right | Thru | | | App. Total | | | | | App. Total | Int. Total |
| 06:00 AM | 0 | 4 | 2 | 0 | 6 | 13 | 0 | 1 | 0 | 14 | 1 | 6 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 27 |
| 06:15 AM | 0 | 3 | 3 | 0 | 6 | 11 | 0 | 0 | 0 | 11 | 1 | 9 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 27 |
| 06:30 AM | 0 | 3 | 5 | 0 | 8 | 22 | 0 | 2 | 0 | 24 | 5 | 16 | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 53 |
| 06:45 AM | 0 | 0 | 8 | 0 | 8 | 27 | 0 | 2 | 0 | 29 | 8 | 28 | 0 | 0 | 36 | 0 | 0 | 0 | 0 | 0 | 73 |
| Total | 0 | 10 | 18 | 0 | 28 | 73 | 0 | 5 | 0 | 78 | 15 | 59 | 0 | 0 | 74 | 0 | 0 | 0 | 0 | 0 | 180 |
| 07:00 AM | 0 | 5 | 8 | 0 | 13 | 23 | 0 | 4 | 0 | 27 | 4 | 17 | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 61 |
| 07:15 AM | 0 | 0 | 11 | 0 | 11 | 29 | 0 | 2 | 0 | 31 | 5 | 17 | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 0 | 64 |
| 07:30 AM | 0 | 3 | 4 | 0 | 7 | 42 | 0 | 5 | 0 | 47 | 2 | 16 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 72 |
| 07:45 AM | 0 | 4 | 6 | 0 | 10 | 25 | 0 | 7 | 0 | 32 | 8 | 37 | 0 | 0 | 45 | 0 | 0 | 0 | 0 | 0 | 87 |
| Total | 0 | 12 | 29 | 0 | 41 | 119 | 0 | 18 | 0 | 137 | 19 | 87 | 0 | 0 | 106 | 0 | 0 | 0 | 0 | 0 | 284 |
| 08:00 AM | 0 | 2 | 10 | 0 | 12 | 26 | 0 | 3 | 0 | 29 | 7 | 25 | 0 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 73 |
| 08:15 AM | 0 | 6 | 11 | 0 | 17 | 26 | 0 | 1 | 0 | 27 | 5 | 20 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 69 |
| 08:30 AM | 0 | 10 | 4 | 0 | 14 | 18 | 0 | 6 | 0 | 24 | 2 | 14 | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 54 |
| 08:45 AM | 0 | 6 | 6 | 0 | 12 | 5 | 0 | 8 | 0 | 13 | 1 | 17 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 43 |
| Total | 0 | 24 | 31 | 0 | 55 | 75 | 0 | 18 | 0 | 93 | 15 | 76 | 0 | 0 | 91 | 0 | 0 | 0 | 0 | 0 | 239 |
| Grand Total | 0 | 46 | 78 | 0 | 124 | 267 | 0 | 41 | 0 | 308 | 49 | 222 | 0 | 0 | 271 | 0 | 0 | 0 | 0 | 0 | 703 |
| Apprch % | 0 | 37.1 | 62.9 | 0 | | 86.7 | 0 | 13.3 | 0 | | 18.1 | 81.9 | 0 | 0 | | 0 | 0 | 0 | 0 | | |
| Total % | 0 | 6.5 | 11.1 | 0 | 17.6 | 38 | 0 | 5.8 | 0 | 43.8 | 7 | 31.6 | 0 | 0 | 38.5 | 0 | 0 | 0 | 0 | 0 | |

# Turning Movement Counts
# (All Vehicles )

Intersection of Noria Rd & DG CO 442
Morning Peak-Hours
Sunny, Hot

File Name : CR 442 & Noria-eam
Site Code : 2
Start Date : 7/12/2012


| | Noria Rd From North | | | | | DG CO 442 From East | | | | | Noria Rd From South | | | | | From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | | Thru | Left | | App. Total | Right | | Left | | App. Total | Right | Thru | | | App. Total | | | | | App. Total | Int. Total |
| Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:30 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:30 AM | 0 | 3 | 4 | 0 | 7 | 42 | 0 | 5 | 0 | 47 | 2 | 16 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 72 |
| 07:45 AM | 0 | 4 | 6 | 0 | 10 | 25 | 0 | 7 | 0 | 32 | 8 | 37 | 0 | 0 | 45 | 0 | 0 | 0 | 0 | 0 | 87 |
| 08:00 AM | 0 | 2 | 10 | 0 | 12 | 26 | 0 | 3 | 0 | 29 | 7 | 25 | 0 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 73 |
| 08:15 AM | 0 | 6 | 11 | 0 | 17 | 26 | 0 | 1 | 0 | 27 | 5 | 20 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 69 |
| Total Volume | 0 | 15 | 31 | 0 | 46 | 119 | 0 | 16 | 0 | 135 | 22 | 98 | 0 | 0 | 120 | 0 | 0 | 0 | 0 | 0 | 301 |
| % App. Total | 0 | 32.6 | 67.4 | 0 | | 88.1 | 0 | 11.9 | 0 | | 18.3 | 81.7 | 0 | 0 | | 0 | 0 | 0 | 0 | | |
| PHF | .000 | .625 | .705 | .000 | .676 | .708 | .000 | .571 | .000 | .718 | .688 | .662 | .000 | .000 | .667 | .000 | .000 | .000 | .000 | .000 | .865 |

# Turning Movement Counts
# (All Vehicles )

Intersection of DG CO 442 & Noria Rd
Afternoon Peak-Hours
Sunny, Hot

File Name : CR 442 & Noria-epm
Site Code : 2
Start Date : 7/12/2012
Page No : 1

Groups Printed- Unshifted

| | Noria Road From North | | | | | DG CO 442 From East | | | | | Noria Road From South | | | | | From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | | Thru | Left | | App. Total | Right | | Left | | App. Total | Right | Thru | | | App. Total | | | | | App. Total | Int. Total |
| 02:00 PM | 0 | 9 | 9 | 0 | 18 | 16 | 0 | 7 | 0 | 23 | 7 | 2 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 50 |
| 02:15 PM | 0 | 6 | 14 | 0 | 20 | 14 | 0 | 3 | 0 | 17 | 7 | 10 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 54 |
| 02:30 PM | 0 | 12 | 18 | 0 | 30 | 14 | 0 | 6 | 0 | 20 | 6 | 4 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 60 |
| 02:45 PM | 0 | 5 | 19 | 0 | 24 | 8 | 0 | 8 | 0 | 16 | 5 | 7 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 52 |
| Total | 0 | 32 | 60 | 0 | 92 | 52 | 0 | 24 | 0 | 76 | 25 | 23 | 0 | 0 | 48 | 0 | 0 | 0 | 0 | 0 | 216 |
| 03:00 PM | 0 | 5 | 32 | 0 | 37 | 9 | 0 | 4 | 0 | 13 | 5 | 3 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 58 |
| 03:15 PM | 0 | 3 | 16 | 0 | 19 | 19 | 0 | 6 | 0 | 25 | 2 | 12 | 0 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 58 |
| 03:30 PM | 0 | 24 | 30 | 0 | 54 | 11 | 0 | 3 | 0 | 14 | 5 | 7 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 80 |
| 03:45 PM | 0 | 7 | 23 | 0 | 30 | 7 | 0 | 5 | 0 | 12 | 5 | 8 | 0 | 0 | 13 | 0 | 0 | 0 | 0 | 0 | 55 |
| Total | 0 | 39 | 101 | 0 | 140 | 46 | 0 | 18 | 0 | 64 | 17 | 30 | 0 | 0 | 47 | 0 | 0 | 0 | 0 | 0 | 251 |
| 04:00 PM | 0 | 24 | 34 | 0 | 58 | 20 | 0 | 4 | 0 | 24 | 5 | 4 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 91 |
| 04:15 PM | 0 | 13 | 33 | 0 | 46 | 19 | 0 | 4 | 0 | 23 | 5 | 11 | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 85 |
| 04:30 PM | 0 | 23 | 36 | 0 | 59 | 13 | 0 | 2 | 0 | 15 | 8 | 9 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 91 |
| 04:45 PM | 0 | 12 | 43 | 0 | 55 | 11 | 0 | 2 | 0 | 13 | 4 | 8 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 80 |
| Total | 0 | 72 | 146 | 0 | 218 | 63 | 0 | 12 | 0 | 75 | 22 | 32 | 0 | 0 | 54 | 0 | 0 | 0 | 0 | 0 | 347 |
| Grand Total | 0 | 143 | 307 | 0 | 450 | 161 | 0 | 54 | 0 | 215 | 64 | 85 | 0 | 0 | 149 | 0 | 0 | 0 | 0 | 0 | 814 |
| Apprch % | 0 | 31.8 | 68.2 | 0 | | 74.9 | 0 | 25.1 | 0 | | 43 | 57 | 0 | 0 | | 0 | 0 | 0 | 0 | | |
| Total % | 0 | 17.6 | 37.7 | 0 | 55.3 | 19.8 | 0 | 6.6 | 0 | 26.4 | 7.9 | 10.4 | 0 | 0 | 18.3 | 0 | 0 | 0 | 0 | 0 | |

# Turning Movement Counts
# (All Vehicles )

Intersection of DG CO 442 & Noria Rd
Afternoon Peak-Hours
Sunny, Hot

File Name : CR 442 & Noria-epm
Site Code : 2
Start Date : 7/12/2012


| | Noria Road From North | | | | | DG CO 442 From East | | | | | Noria Road From South | | | | | From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | | Thru | Left | | App. Total | Right | | Left | | App. Total | Right | Thru | | | App. Total | | | | | App. Total | Int. Total |
| Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 04:00 PM | | | | | | | | | | | | | | | | | | | | | |
| 04:00 PM | 0 | 24 | 34 | 0 | 58 | 20 | 0 | 4 | 0 | 24 | 5 | 4 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 91 |
| 04:15 PM | 0 | 13 | 33 | 0 | 46 | 19 | 0 | 4 | 0 | 23 | 5 | 11 | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 85 |
| 04:30 PM | 0 | 23 | 36 | 0 | 59 | 13 | 0 | 2 | 0 | 15 | 8 | 9 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 91 |
| 04:45 PM | 0 | 12 | 43 | 0 | 55 | 11 | 0 | 2 | 0 | 13 | 4 | 8 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 80 |
| Total Volume | 0 | 72 | 146 | 0 | 218 | 63 | 0 | 12 | 0 | 75 | 22 | 32 | 0 | 0 | 54 | 0 | 0 | 0 | 0 | 0 | 347 |
| % App. Total | 0 | 33 | 67 | 0 | | 84 | 0 | 16 | 0 | | 40.7 | 59.3 | 0 | 0 | | 0 | 0 | 0 | 0 | | |
| PHF | .000 | .750 | .849 | .000 | .924 | .788 | .000 | .750 | .000 | .781 | .688 | .727 | .000 | .000 | .794 | .000 | .000 | .000 | .000 | .000 | .953 |

# Turning Movement Counts
# (All Vehicles )

Intersection of CO Rd 442 & CO Rd 1057
Morning Peak-Hours
Sunny, Hot
Other:

File Name : CR 442 & CR 1057-eam
Site Code : 3
Start Date : 7/17/2012
Page No : 1

Groups Printed- Unshifted

| | E 1900 Rd From North | | | | | DG CO 442 From East | | | | | DG CO 1057 From South | | | | | DG CO 442 From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| 06:00 AM | 1 | 0 | 0 | 0 | 1 | 0 | 15 | 6 | 0 | 21 | 2 | 0 | 2 | 0 | 4 | 5 | 2 | 0 | 0 | 7 | 33 |
| 06:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 8 | 0 | 22 | 2 | 0 | 0 | 0 | 2 | 1 | 3 | 0 | 0 | 4 | 28 |
| 06:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 37 | 15 | 0 | 52 | 2 | 0 | 1 | 0 | 3 | 10 | 3 | 0 | 0 | 13 | 68 |
| 06:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 15 | 0 | 30 | 5 | 1 | 2 | 0 | 8 | 5 | 4 | 0 | 0 | 9 | 47 |
| Total | 1 | 0 | 0 | 0 | 1 | 0 | 81 | 44 | 0 | 125 | 11 | 1 | 5 | 0 | 17 | 21 | 12 | 0 | 0 | 33 | 176 |
| 07:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 11 | 0 | 29 | 3 | 0 | 3 | 0 | 6 | 8 | 11 | 0 | 0 | 19 | 54 |
| 07:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | 23 | 16 | 0 | 39 | 5 | 0 | 5 | 0 | 10 | 3 | 2 | 0 | 0 | 5 | 54 |
| 07:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 8 | 0 | 24 | 5 | 1 | 10 | 0 | 16 | 6 | 3 | 0 | 0 | 9 | 49 |
| 07:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 18 | 0 | 38 | 4 | 0 | 7 | 0 | 11 | 4 | 2 | 0 | 0 | 6 | 55 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 77 | 53 | 0 | 130 | 17 | 1 | 25 | 0 | 43 | 21 | 18 | 0 | 0 | 39 | 212 |
| 08:00 AM | 0 | 3 | 0 | 0 | 3 | 0 | 16 | 6 | 0 | 22 | 5 | 0 | 6 | 0 | 11 | 8 | 3 | 0 | 0 | 11 | 47 |
| 08:15 AM | 0 | 1 | 0 | 0 | 1 | 1 | 12 | 5 | 0 | 18 | 8 | 1 | 5 | 0 | 14 | 1 | 11 | 0 | 0 | 12 | 45 |
| 08:30 AM | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 2 | 0 | 10 | 8 | 0 | 2 | 0 | 10 | 2 | 6 | 0 | 0 | 8 | 28 |
| 08:45 AM | 0 | 1 | 1 | 0 | 2 | 0 | 4 | 9 | 0 | 13 | 4 | 0 | 1 | 0 | 5 | 3 | 6 | 0 | 0 | 9 | 29 |
| Total | 0 | 5 | 1 | 0 | 6 | 2 | 39 | 22 | 0 | 63 | 25 | 1 | 14 | 0 | 40 | 14 | 26 | 0 | 0 | 40 | 149 |
| Grand Total | 1 | 5 | 1 | 0 | 7 | 2 | 197 | 119 | 0 | 318 | 53 | 3 | 44 | 0 | 100 | 56 | 56 | 0 | 0 | 112 | 537 |
| Apprch % | 14.3 | 71.4 | 14.3 | 0 | | 0.6 | 61.9 | 37.4 | 0 | | 53 | 3 | 44 | 0 | | 50 | 50 | 0 | 0 | | |
| Total % | 0.2 | 0.9 | 0.2 | 0 | 1.3 | 0.4 | 36.7 | 22.2 | 0 | 59.2 | 9.9 | 0.6 | 8.2 | 0 | 18.6 | 10.4 | 10.4 | 0 | 0 | 20.9 | |

# Turning Movement Counts
# (All Vehicles )

Intersection of CO Rd 442 & CO Rd 1057
Morning Peak-Hours
Sunny, Hot
Other:

File Name : CR 442 & CR 1057-eam
Site Code : 3
Start Date : 7/17/2012
Page No : 2

| | E 1900 Rd From North | | | | | DG CO 442 From East | | | | | DG CO 1057 From South | | | | | DG CO 442 From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 06:30 AM | | | | | | | | | | | | | | | | | | | | | |
| 06:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 37 | 15 | 0 | 52 | 2 | 0 | 1 | 0 | 3 | 10 | 3 | 0 | 0 | 13 | 68 |
| 06:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 15 | 0 | 30 | 5 | 1 | 2 | 0 | 8 | 5 | 4 | 0 | 0 | 9 | 47 |
| 07:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 11 | 0 | 29 | 3 | 0 | 3 | 0 | 6 | 8 | 11 | 0 | 0 | 19 | 54 |
| 07:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | 23 | 16 | 0 | 39 | 5 | 0 | 5 | 0 | 10 | 3 | 2 | 0 | 0 | 5 | 54 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 0 | 93 | 57 | 0 | 150 | 15 | 1 | 11 | 0 | 27 | 26 | 20 | 0 | 0 | 46 | 223 |
| % App. Total | 0 | 0 | 0 | 0 | | 0 | 62 | 38 | 0 | | 55.6 | 3.7 | 40.7 | 0 | | 56.5 | 43.5 | 0 | 0 | | |
| PHF | .000 | .000 | .000 | .000 | .000 | .000 | .628 | .891 | .000 | .721 | .750 | .250 | .550 | .000 | .675 | .650 | .455 | .000 | .000 | .605 | .820 |

# Turning Movement Counts
# (All Vehicles )

Intersection of CO Rd 442 & CO Rd 1057
Afternoon Peak-Hours
Sunny, Hot

File Name : CR 442 & CR 1057-epm
Site Code : 3
Start Date : 7/17/2012
Page No : 1

Groups Printed- Unshifted

| | E 1900 Rd. From North | | | | | DG CO 442 From East | | | | | DG CO 1057 From South | | | | | DG CO 442 From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| 02:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 6 | 0 | 17 | 14 | 1 | 2 | 0 | 17 | 5 | 9 | 0 | 0 | 14 | 48 |
| 02:15 PM | 1 | 1 | 2 | 0 | 4 | 0 | 7 | 6 | 0 | 13 | 14 | 0 | 1 | 0 | 15 | 4 | 12 | 0 | 0 | 16 | 48 |
| 02:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 6 | 0 | 26 | 15 | 0 | 0 | 0 | 15 | 2 | 15 | 1 | 0 | 18 | 59 |
| 02:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 5 | 0 | 16 | 11 | 0 | 3 | 0 | 14 | 0 | 10 | 0 | 0 | 10 | 40 |
| Total | 1 | 1 | 2 | 0 | 4 | 0 | 49 | 23 | 0 | 72 | 54 | 1 | 6 | 0 | 61 | 11 | 46 | 1 | 0 | 58 | 195 |
| 03:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 8 | 0 | 17 | 14 | 0 | 2 | 0 | 16 | 10 | 22 | 0 | 0 | 32 | 65 |
| 03:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 8 | 0 | 23 | 9 | 0 | 3 | 0 | 12 | 1 | 11 | 0 | 0 | 12 | 47 |
| 03:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 9 | 0 | 20 | 13 | 1 | 0 | 0 | 14 | 10 | 22 | 0 | 0 | 32 | 66 |
| 03:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 3 | 0 | 15 | 10 | 3 | 2 | 0 | 15 | 6 | 18 | 0 | 0 | 24 | 54 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 47 | 28 | 0 | 75 | 46 | 4 | 7 | 0 | 57 | 27 | 73 | 0 | 0 | 100 | 232 |
| 04:00 PM | 0 | 1 | 0 | 0 | 1 | 0 | 14 | 8 | 0 | 22 | 15 | 0 | 2 | 0 | 17 | 16 | 18 | 0 | 0 | 34 | 74 |
| 04:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 7 | 0 | 16 | 15 | 0 | 5 | 0 | 20 | 11 | 21 | 0 | 0 | 32 | 68 |
| 04:30 PM | 1 | 0 | 0 | 0 | 1 | 1 | 16 | 11 | 0 | 28 | 15 | 1 | 1 | 0 | 17 | 18 | 32 | 0 | 0 | 50 | 96 |
| 04:45 PM | 1 | 1 | 0 | 0 | 2 | 0 | 12 | 9 | 0 | 21 | 13 | 0 | 2 | 0 | 15 | 7 | 21 | 1 | 0 | 29 | 67 |
| Total | 2 | 2 | 0 | 0 | 4 | 1 | 51 | 35 | 0 | 87 | 58 | 1 | 10 | 0 | 69 | 52 | 92 | 1 | 0 | 145 | 305 |
| Grand Total | 3 | 3 | 2 | 0 | 8 | 1 | 147 | 86 | 0 | 234 | 158 | 6 | 23 | 0 | 187 | 90 | 211 | 2 | 0 | 303 | 732 |
| Apprch % | 37.5 | 37.5 | 25 | 0 | | 0.4 | 62.8 | 36.8 | 0 | | 84.5 | 3.2 | 12.3 | 0 | | 29.7 | 69.6 | 0.7 | 0 | | |
| Total % | 0.4 | 0.4 | 0.3 | 0 | 1.1 | 0.1 | 20.1 | 11.7 | 0 | 32 | 21.6 | 0.8 | 3.1 | 0 | 25.5 | 12.3 | 28.8 | 0.3 | 0 | 41.4 | |

# Turning Movement Counts
# (All Vehicles )

Intersection of CO Rd 442 & CO Rd 1057
Afternoon Peak-Hours
Sunny, Hot

File Name : CR 442 & CR 1057-epm
Site Code : 3
Start Date : 7/17/2012
Page No : 2

| | E 1900 Rd. From North | | | | | DG CO 442 From East | | | | | DG CO 1057 From South | | | | | DG CO 442 From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 04:00 PM | | | | | | | | | | | | | | | | | | | | | |
| 04:00 PM | 0 | 1 | 0 | 0 | 1 | 0 | 14 | 8 | 0 | 22 | 15 | 0 | 2 | 0 | 17 | 16 | 18 | 0 | 0 | 34 | 74 |
| 04:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 7 | 0 | 16 | 15 | 0 | 5 | 0 | 20 | 11 | 21 | 0 | 0 | 32 | 68 |
| 04:30 PM | 1 | 0 | 0 | 0 | 1 | 1 | 16 | 11 | 0 | 28 | 15 | 1 | 1 | 0 | 17 | 18 | 32 | 0 | 0 | 50 | 96 |
| 04:45 PM | 1 | 1 | 0 | 0 | 2 | 0 | 12 | 9 | 0 | 21 | 13 | 0 | 2 | 0 | 15 | 7 | 21 | 1 | 0 | 29 | 67 |
| Total Volume | 2 | 2 | 0 | 0 | 4 | 1 | 51 | 35 | 0 | 87 | 58 | 1 | 10 | 0 | 69 | 52 | 92 | 1 | 0 | 145 | 305 |
| % App. Total | 50 | 50 | 0 | 0 | | 1.1 | 58.6 | 40.2 | 0 | | 84.1 | 1.4 | 14.5 | 0 | | 35.9 | 63.4 | 0.7 | 0 | | |
| PHF | .500 | .500 | .000 | .000 | .500 | .250 | .797 | .795 | .000 | .777 | .967 | .250 | .500 | .000 | .863 | .722 | .719 | .250 | .000 | .725 | .794 |

# Turning Movement Counts
# (All Vehicles )

Interchange of K-10 & E 1900 Rd (North Ramps)
Morning Peak-Hours
Sunny, warm

File Name : K10-N Ramps-eam
Site Code : 4
Start Date : 7/12/2012
Page No : 1

Groups Printed- Unshifted

| | E 1900 Rd / DG CO 1057 From North | | | | | K-10 (WB Off Ramp) From East | | | | | E 1900 Rd / DG CO 1057 From South | | | | | K-10 (WB On Ramp) From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | | | App. Total | Right | Thru | Left | | App. Total | | Thru | Left | | App. Total | | | | | App. Total | Int. Total |
| 06:00 AM | 9 | 5 | 0 | 0 | 14 | 0 | 0 | 1 | 0 | 1 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 18 |
| 06:15 AM | 2 | 2 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 7 |
| 06:30 AM | 3 | 2 | 0 | 0 | 5 | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 8 |
| 06:45 AM | 10 | 3 | 0 | 0 | 13 | 1 | 0 | 0 | 0 | 1 | 0 | 8 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 22 |
| Total | 24 | 12 | 0 | 0 | 36 | 2 | 0 | 1 | 0 | 3 | 0 | 16 | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 55 |
| 07:00 AM | 16 | 6 | 0 | 0 | 22 | 2 | 0 | 0 | 0 | 2 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 29 |
| 07:15 AM | 20 | 8 | 0 | 0 | 28 | 6 | 0 | 0 | 0 | 6 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 37 |
| 07:30 AM | 20 | 6 | 0 | 0 | 26 | 5 | 0 | 0 | 0 | 5 | 0 | 11 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 42 |
| 07:45 AM | 20 | 4 | 0 | 0 | 24 | 6 | 0 | 0 | 0 | 6 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 40 |
| Total | 76 | 24 | 0 | 0 | 100 | 19 | 0 | 0 | 0 | 19 | 0 | 29 | 0 | 0 | 29 | 0 | 0 | 0 | 0 | 0 | 148 |
| 08:00 AM | 13 | 5 | 0 | 0 | 18 | 1 | 0 | 1 | 0 | 2 | 0 | 9 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 29 |
| 08:15 AM | 14 | 6 | 0 | 0 | 20 | 1 | 0 | 0 | 0 | 1 | 0 | 12 | 1 | 0 | 13 | 0 | 0 | 0 | 0 | 0 | 34 |
| 08:30 AM | 12 | 2 | 0 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 18 |
| 08:45 AM | 16 | 0 | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 23 |
| Total | 55 | 13 | 0 | 0 | 68 | 2 | 0 | 1 | 0 | 3 | 0 | 31 | 2 | 0 | 33 | 0 | 0 | 0 | 0 | 0 | 104 |
| Grand Total | 155 | 49 | 0 | 0 | 204 | 23 | 0 | 2 | 0 | 25 | 0 | 76 | 2 | 0 | 78 | 0 | 0 | 0 | 0 | 0 | 307 |
| Apprch % | 76 | 24 | 0 | 0 | | 92 | 0 | 8 | 0 | | 0 | 97.4 | 2.6 | 0 | | 0 | 0 | 0 | 0 | | |
| Total % | 50.5 | 16 | 0 | 0 | 66.4 | 7.5 | 0 | 0.7 | 0 | 8.1 | 0 | 24.8 | 0.7 | 0 | 25.4 | 0 | 0 | 0 | 0 | 0 | |

# Turning Movement Counts
# (All Vehicles )

Interchange of K-10 & E 1900 Rd (North Ramps)
Morning Peak-Hours
Sunny, warm

File Name : K10-N Ramps-eam
Site Code : 4
Start Date : 7/12/2012


| | E 1900 Rd / DG CO 1057 From North | | | | | K-10 (WB Off Ramp) From East | | | | | E 1900 Rd / DG CO 1057 From South | | | | | K-10 (WB On Ramp) From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | | | App. Total | Right | Thru | Left | | App. Total | | Thru | Left | | App. Total | | | | | App. Total | Int. Total |
| Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:00 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:00 AM | 16 | 6 | 0 | 0 | 22 | 2 | 0 | 0 | 0 | 2 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 29 |
| 07:15 AM | 20 | 8 | 0 | 0 | 28 | 6 | 0 | 0 | 0 | 6 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 37 |
| 07:30 AM | 20 | 6 | 0 | 0 | 26 | 5 | 0 | 0 | 0 | 5 | 0 | 11 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 42 |
| 07:45 AM | 20 | 4 | 0 | 0 | 24 | 6 | 0 | 0 | 0 | 6 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 40 |
| Total Volume | 76 | 24 | 0 | 0 | 100 | 19 | 0 | 0 | 0 | 19 | 0 | 29 | 0 | 0 | 29 | 0 | 0 | 0 | 0 | 0 | 148 |
| % App. Total | 76 | 24 | 0 | 0 | | 100 | 0 | 0 | 0 | | 0 | 100 | 0 | 0 | | 0 | 0 | 0 | 0 | | |
| PHF | .950 | .750 | .000 | .000 | .893 | .792 | .000 | .000 | .000 | .792 | .000 | .659 | .000 | .000 | .659 | .000 | .000 | .000 | .000 | .000 | .881 |

# Turning Movement Counts
# (All Vehicles )

Interchange of K-10 & E 1900 Rd (N Ramps)
Afternoon Peak-Hours
Sunny, Hot

File Name : K10-N Ramps-epm
Site Code : 4
Start Date : 7/17/2012
Page No : 1

Groups Printed- Unshifted

| | E 1900 Rd / DG CO 1057 From North | | | | | K-10 (WB Off Ramp) From East | | | | | E 1900 Rd / DG CO 1057 From South | | | | | K-10 (WB On Ramp) From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | | | App. Total | Right | Thru | Left | | App. Total | | Thru | Left | | App. Total | | | | | App. Total | Int. Total |
| 02:00 PM | 7 | 7 | 0 | 0 | 14 | 2 | 0 | 1 | 0 | 3 | 0 | 18 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 35 |
| 02:15 PM | 5 | 5 | 0 | 0 | 10 | 1 | 0 | 0 | 0 | 1 | 0 | 12 | 2 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 25 |
| 02:30 PM | 6 | 3 | 0 | 0 | 9 | 0 | 0 | 3 | 0 | 3 | 0 | 14 | 0 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 26 |
| 02:45 PM | 5 | 0 | 0 | 0 | 5 | 2 | 0 | 1 | 0 | 3 | 0 | 11 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 19 |
| Total | 23 | 15 | 0 | 0 | 38 | 5 | 0 | 5 | 0 | 10 | 0 | 55 | 2 | 0 | 57 | 0 | 0 | 0 | 0 | 0 | 105 |
| 03:00 PM | 9 | 11 | 0 | 0 | 20 | 2 | 0 | 0 | 0 | 2 | 0 | 14 | 1 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 37 |
| 03:15 PM | 8 | 1 | 0 | 0 | 9 | 3 | 0 | 0 | 0 | 3 | 0 | 9 | 1 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 22 |
| 03:30 PM | 6 | 10 | 0 | 0 | 16 | 1 | 0 | 1 | 0 | 2 | 0 | 17 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 35 |
| 03:45 PM | 8 | 7 | 0 | 0 | 15 | 3 | 0 | 0 | 0 | 3 | 0 | 11 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 29 |
| Total | 31 | 29 | 0 | 0 | 60 | 9 | 0 | 1 | 0 | 10 | 0 | 51 | 2 | 0 | 53 | 0 | 0 | 0 | 0 | 0 | 123 |
| 04:00 PM | 7 | 15 | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 41 |
| 04:15 PM | 9 | 10 | 0 | 0 | 19 | 2 | 0 | 0 | 0 | 2 | 0 | 15 | 0 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 36 |
| 04:30 PM | 11 | 23 | 0 | 0 | 34 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 1 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 51 |
| 04:45 PM | 8 | 10 | 0 | 0 | 18 | 3 | 0 | 1 | 0 | 4 | 0 | 13 | 1 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 36 |
| Total | 35 | 58 | 0 | 0 | 93 | 5 | 0 | 1 | 0 | 6 | 0 | 63 | 2 | 0 | 65 | 0 | 0 | 0 | 0 | 0 | 164 |
| Grand Total | 89 | 102 | 0 | 0 | 191 | 19 | 0 | 7 | 0 | 26 | 0 | 169 | 6 | 0 | 175 | 0 | 0 | 0 | 0 | 0 | 392 |
| Apprch % | 46.6 | 53.4 | 0 | 0 | | 73.1 | 0 | 26.9 | 0 | | 0 | 96.6 | 3.4 | 0 | | 0 | 0 | 0 | 0 | | |
| Total % | 22.7 | 26 | 0 | 0 | 48.7 | 4.8 | 0 | 1.8 | 0 | 6.6 | 0 | 43.1 | 1.5 | 0 | 44.6 | 0 | 0 | 0 | 0 | 0 | |

# Turning Movement Counts
# (All Vehicles )

Interchange of K-10 & E 1900 Rd (N Ramps)
Afternoon Peak-Hours
Sunny, Hot

File Name : K10-N Ramps-epm
Site Code : 4
Start Date : 7/17/2012
Page No : 2

| | E 1900 Rd / DG CO 1057 From North | | | | | K-10 (WB Off Ramp) From East | | | | | E 1900 Rd / DG CO 1057 From South | | | | | K-10 (WB On Ramp) From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | | | App. Total | Right | Thru | Left | | App. Total | | Thru | Left | | App. Total | | | | | App. Total | Int. Total |
| Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 04:00 PM | | | | | | | | | | | | | | | | | | | | | |
| 04:00 PM | 7 | 15 | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 41 |
| 04:15 PM | 9 | 10 | 0 | 0 | 19 | 2 | 0 | 0 | 0 | 2 | 0 | 15 | 0 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 36 |
| 04:30 PM | 11 | 23 | 0 | 0 | 34 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 1 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 51 |
| 04:45 PM | 8 | 10 | 0 | 0 | 18 | 3 | 0 | 1 | 0 | 4 | 0 | 13 | 1 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 36 |
| Total Volume | 35 | 58 | 0 | 0 | 93 | 5 | 0 | 1 | 0 | 6 | 0 | 63 | 2 | 0 | 65 | 0 | 0 | 0 | 0 | 0 | 164 |
| % App. Total | 37.6 | 62.4 | 0 | 0 | | 83.3 | 0 | 16.7 | 0 | | 0 | 96.9 | 3.1 | 0 | | 0 | 0 | 0 | 0 | | |
| PHF | .795 | .630 | .000 | .000 | .684 | .417 | .000 | .250 | .000 | .375 | .000 | .829 | .500 | .000 | .855 | .000 | .000 | .000 | .000 | .000 | .804 |

# Turning Movement Counts
# (All Vehicles )

Interchange of K-10 & E 1900 Rd (South Ramps)
Morning Peak-Hours
Sunny, Warm

File Name : K10-S Ramps-eam
Site Code : 4
Start Date : 7/12/2012
Page No : 1

Groups Printed- Unshifted

| | E 1900 Rd / DG CO 1057 From North | | | | | K-10 (EB On Ramp) From East | | | | | E 1900 Rd / DG CO 1057 From South | | | | | K-10 (EB Off Ramp) From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | | Thru | Left | | App. Total | | | | | App. Total | Right | Thru | | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| 06:00 AM | 0 | 3 | 3 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 3 | 0 | 3 | 10 |
| 06:15 AM | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 3 | 0 | 3 | 7 |
| 06:30 AM | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 4 |
| 06:45 AM | 0 | 1 | 2 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 7 | 0 | 7 | 11 |
| Total | 0 | 4 | 9 | 0 | 13 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 4 | 0 | 0 | 15 | 0 | 15 | 32 |
| 07:00 AM | 0 | 0 | 6 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 5 | 11 |
| 07:15 AM | 0 | 0 | 8 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 11 |
| 07:30 AM | 0 | 1 | 5 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 10 | 0 | 10 | 17 |
| 07:45 AM | 0 | 0 | 4 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 10 | 14 |
| Total | 0 | 1 | 23 | 0 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 28 | 0 | 28 | 53 |
| 08:00 AM | 0 | 1 | 5 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 9 | 15 |
| 08:15 AM | 0 | 1 | 5 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 12 | 0 | 12 | 19 |
| 08:30 AM | 0 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 4 | 0 | 4 | 7 |
| 08:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 7 | 0 | 8 | 8 |
| Total | 0 | 3 | 11 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 | 1 | 0 | 32 | 0 | 33 | 49 |
| Grand Total | 0 | 8 | 43 | 0 | 51 | 0 | 0 | 0 | 0 | 0 | 4 | 3 | 0 | 0 | 7 | 1 | 0 | 75 | 0 | 76 | 134 |
| Apprch % | 0 | 15.7 | 84.3 | 0 | | 0 | 0 | 0 | 0 | | 57.1 | 42.9 | 0 | 0 | | 1.3 | 0 | 98.7 | 0 | | |
| Total % | 0 | 6 | 32.1 | 0 | 38.1 | 0 | 0 | 0 | 0 | 0 | 3 | 2.2 | 0 | 0 | 5.2 | 0.7 | 0 | 56 | 0 | 56.7 | |

# Turning Movement Counts
# (All Vehicles )

Interchange of K-10 & E 1900 Rd (South Ramps)
Morning Peak-Hours
Sunny, Warm

File Name : K10-S Ramps-eam
Site Code : 4
Start Date : 7/12/2012


| | E 1900 Rd / DG CO 1057 From North | | | | | K-10 (EB On Ramp) From East | | | | | E 1900 Rd / DG CO 1057 From South | | | | | K-10 (EB Off Ramp) From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | | Thru | Left | | App. Total | | | | | App. Total | Right | Thru | | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:30 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:30 AM | 0 | 1 | 5 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 10 | 0 | 10 | 17 |
| 07:45 AM | 0 | 0 | 4 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 10 | 14 |
| 08:00 AM | 0 | 1 | 5 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 9 | 15 |
| 08:15 AM | 0 | 1 | 5 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 12 | 0 | 12 | 19 |
| Total Volume | 0 | 3 | 19 | 0 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 41 | 0 | 41 | 65 |
| % App. Total | 0 | 13.6 | 86.4 | 0 | | 0 | 0 | 0 | 0 | | 0 | 100 | 0 | 0 | | 0 | 0 | 100 | 0 | | |
| PHF | .000 | .750 | .950 | .000 | .917 | .000 | .000 | .000 | .000 | .000 | .000 | .500 | .000 | .000 | .500 | .000 | .000 | .854 | .000 | .854 | .855 |

# Turning Movement Counts
# (All Vehicles )

Interchange of K-10 & E 1900 Rd (S Ramps)
Afternoon Peak-Hours
Sunny, Hot

File Name : K10-S Ramps-epm
Site Code : 4
Start Date : 7/17/2012
Page No : 1

Groups Printed- Unshifted

| | E 1900 / DG CO 1057 From North | | | | | K-10 (EB On Ramp) From East | | | | | E 1900 / DG CO 1057 From South | | | | | K-10 (EB Off Ramp) From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | | Thru | Left | | App. Total | | | | | App. Total | Right | Thru | | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| 02:00 PM | 0 | 2 | 6 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 17 | 0 | 17 | 26 |
| 02:15 PM | 0 | 0 | 5 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 4 | 1 | 0 | 12 | 0 | 13 | 22 |
| 02:30 PM | 0 | 2 | 4 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 14 | 0 | 14 | 21 |
| 02:45 PM | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 11 | 12 |
| Total | 0 | 5 | 15 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 6 | 1 | 0 | 54 | 0 | 55 | 81 |
| 03:00 PM | 0 | 0 | 11 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 15 | 0 | 15 | 27 |
| 03:15 PM | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 4 | 0 | 0 | 8 | 0 | 8 | 13 |
| 03:30 PM | 0 | 0 | 11 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | 17 | 28 |
| 03:45 PM | 0 | 1 | 6 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 11 | 0 | 13 | 20 |
| Total | 0 | 1 | 29 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 0 | 0 | 5 | 2 | 0 | 51 | 0 | 53 | 88 |
| 04:00 PM | 0 | 0 | 15 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 19 | 34 |
| 04:15 PM | 0 | 0 | 10 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 3 | 1 | 0 | 13 | 0 | 14 | 27 |
| 04:30 PM | 0 | 0 | 23 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 | 0 | 0 | 16 | 0 | 16 | 41 |
| 04:45 PM | 0 | 4 | 7 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 1 | 0 | 12 | 0 | 13 | 26 |
| Total | 0 | 4 | 55 | 0 | 59 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 0 | 0 | 7 | 2 | 0 | 60 | 0 | 62 | 128 |
| Grand Total | 0 | 10 | 99 | 0 | 109 | 0 | 0 | 0 | 0 | 0 | 7 | 11 | 0 | 0 | 18 | 5 | 0 | 165 | 0 | 170 | 297 |
| Apprch % | 0 | 9.2 | 90.8 | 0 | | 0 | 0 | 0 | 0 | | 38.9 | 61.1 | 0 | 0 | | 2.9 | 0 | 97.1 | 0 | | |
| Total % | 0 | 3.4 | 33.3 | 0 | 36.7 | 0 | 0 | 0 | 0 | 0 | 2.4 | 3.7 | 0 | 0 | 6.1 | 1.7 | 0 | 55.6 | 0 | 57.2 | |

# Turning Movement Counts
# (All Vehicles )

Interchange of K-10 & E 1900 Rd (S Ramps)
Afternoon Peak-Hours
Sunny, Hot

File Name : K10-S Ramps-epm
Site Code : 4
Start Date : 7/17/2012


| | E 1900 / DG CO 1057 From North | | | | | K-10 (EB On Ramp) From East | | | | | E 1900 / DG CO 1057 From South | | | | | K-10 (EB Off Ramp) From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | | Thru | Left | | App. Total | | | | | App. Total | Right | Thru | | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 04:00 PM | | | | | | | | | | | | | | | | | | | | | |
| 04:00 PM | 0 | 0 | 15 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 19 | 34 |
| 04:15 PM | 0 | 0 | 10 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 3 | 1 | 0 | 13 | 0 | 14 | 27 |
| 04:30 PM | 0 | 0 | 23 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 | 0 | 0 | 16 | 0 | 16 | 41 |
| 04:45 PM | 0 | 4 | 7 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 1 | 0 | 12 | 0 | 13 | 26 |
| Total Volume | 0 | 4 | 55 | 0 | 59 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 0 | 0 | 7 | 2 | 0 | 60 | 0 | 62 | 128 |
| % App. Total | 0 | 6.8 | 93.2 | 0 | | 0 | 0 | 0 | 0 | | 28.6 | 71.4 | 0 | 0 | | 3.2 | 0 | 96.8 | 0 | | |
| PHF | .000 | .250 | .598 | .000 | .641 | .000 | .000 | .000 | .000 | .000 | .500 | .625 | .000 | .000 | .583 | .500 | .000 | .789 | .000 | .816 | .780 |

# Turning Movement Counts
# (Trucks Only )

Intersection of Noria Rd & N 1500 Rd
Morning Peak-Hours
Sunny, Hot

File Name : Noria & N 1500 -eam-truck
Site Code : 1
Start Date : 7/11/2012
Page No : 1

Groups Printed- Unshifted

| | Sand Plant Driveway From North | | | | | N 1500 Rd From East | | | | | Noria Rd From South | | | | | N 1500 Rd From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | |
| 06:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 2 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | |
| 06:45 AM | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Total | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 3 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | |
| 07:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 07:45 AM | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Total | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| 08:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 08:15 AM | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 08:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 |
| 08:45 AM | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| Total | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 8 |
| Grand Total | 0 | 6 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 1 | 0 | 0 | 1 | 13 |
| Apprch % | 0 | 100 | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 100 | 0 | 0 | | 0 | 100 | 0 | 0 | | |
| Total % | 0 | 46.2 | 0 | 0 | 46.2 | 0 | 0 | 0 | 0 | 0 | 0 | 46.2 | 0 | 0 | 46.2 | 0 | 7.7 | 0 | 0 | 7.7 | |

# Turning Movement Counts
# (Trucks Only )

Intersection of Noria Rd & N 1500 Rd
Morning Peak-Hours
Sunny, Hot

File Name : Noria & N 1500 -eam-truck
Site Code : 1
Start Date : 7/11/2012


| | Sand Plant Driveway From North | | | | | N 1500 Rd From East | | | | | Noria Rd From South | | | | | N 1500 Rd From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 08:00 AM | | | | | | | | | | | | | | | | | | | | | |
| 08:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 08:15 AM | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 08:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 |
| 08:45 AM | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| Total Volume | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 8 |
| % App. Total | 0 | 100 | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 100 | 0 | 0 | | 0 | 0 | 0 | 0 | | |
| PHF | .000 | .333 | .000 | .000 | .333 | .000 | .000 | .000 | .000 | .000 | .000 | .333 | .000 | .000 | .333 | .000 | .000 | .000 | .000 | .000 | .667 |

# Turning Movement Counts
# (Trucks Only )

Intersection of Noria Rd & N 1500 Rd
Afternoon Peak-Hours
Sunny, Hot

File Name : Noria & N 1500 -epm-truck
Site Code : 1
Start Date : 7/11/2012
Page No : 1

Groups Printed- Unshifted

| | Sand Plant Driveway From North | | | | | N 1500 Rd From East | | | | | Noria Rd From South | | | | | N 1500 Rd From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| 02:00 PM | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | |
| 02:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | |
| Total | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 |
| 03:00 PM | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 3 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | |
| 03:30 PM | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 3 |
| 03:45 PM | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 |
| Total | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 9 |
| 04:00 PM | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | |
| 04:30 PM | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| 04:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| Total | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 5 |
| Grand Total | 0 | 9 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 7 | 1 | 0 | 0 | 0 | 1 | 17 |
| Apprch % | 0 | 100 | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 100 | 0 | 0 | | 100 | 0 | 0 | 0 | | |
| Total % | 0 | 52.9 | 0 | 0 | 52.9 | 0 | 0 | 0 | 0 | 0 | 0 | 41.2 | 0 | 0 | 41.2 | 5.9 | 0 | 0 | 0 | 5.9 | |

# Turning Movement Counts
# (Trucks Only )

Intersection of Noria Rd & N 1500 Rd
Afternoon Peak-Hours
Sunny, Hot

File Name : Noria & N 1500 -epm-truck
Site Code : 1
Start Date : 7/11/2012


| | Sand Plant Driveway From North | | | | | N 1500 Rd From East | | | | | Noria Rd From South | | | | | N 1500 Rd From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 03:00 PM | | | | | | | | | | | | | | | | | | | | | |
| 03:00 PM | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 3 |
| 03:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 03:30 PM | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 3 |
| 03:45 PM | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 |
| Total Volume | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 9 |
| % App. Total | 0 | 100 | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 100 | 0 | 0 | | 0 | 0 | 0 | 0 | | |
| PHF | .000 | .500 | .000 | .000 | .500 | .000 | .000 | .000 | .000 | .000 | .000 | .625 | .000 | .000 | .625 | .000 | .000 | .000 | .000 | .000 | .750 |

# Turning Movement Counts
# (Trucks Only )

Intersection of Noria Rd & DG CO 442
Morning Peak-Hours
Sunny, Hot

File Name : CR 442 & Noria-eam-truck
Site Code : 2
Start Date : 7/12/2012
Page No : 1

Groups Printed- Unshifted

| | Noria Rd From North | | | | | DG CO 442 From East | | | | | Noria Rd From South | | | | | From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | | Thru | Left | | App. Total | Right | | Left | | App. Total | Right | Thru | | | App. Total | | | | | App. Total | Int. Total |
| 06:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | |
| 06:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 06:45 AM | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 4 |
| Total | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 8 |
| 07:00 AM | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 4 |
| 07:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| 07:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| 07:45 AM | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 4 |
| Total | 0 | 0 | 4 | 0 | 4 | 0 | 0 | 2 | 0 | 2 | 1 | 5 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 12 |
| 08:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 |
| 08:15 AM | 0 | 1 | 4 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 9 |
| 08:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 08:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| Total | 0 | 1 | 4 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 15 |
| Grand Total | 0 | 1 | 9 | 0 | 10 | 0 | 0 | 2 | 0 | 2 | 1 | 22 | 0 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 35 |
| Apprch % | 0 | 10 | 90 | 0 | | 0 | 0 | 100 | 0 | | 4.3 | 95.7 | 0 | 0 | | 0 | 0 | 0 | 0 | | |
| Total % | 0 | 2.9 | 25.7 | 0 | 28.6 | 0 | 0 | 5.7 | 0 | 5.7 | 2.9 | 62.9 | 0 | 0 | 65.7 | 0 | 0 | 0 | 0 | 0 | |

# Turning Movement Counts
# (Trucks Only )

Intersection of Noria Rd & DG CO 442
Morning Peak-Hours
Sunny, Hot

File Name : CR 442 & Noria-eam-truck
Site Code : 2
Start Date : 7/12/2012
Page No : 2

| | Noria Rd From North | | | | | DG CO 442 From East | | | | | Noria Rd From South | | | | | From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | | Thru | Left | | App. Total | Right | | Left | | App. Total | Right | Thru | | | App. Total | | | | | App. Total | Int. Total |
| Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:30 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| 07:45 AM | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 4 |
| 08:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 |
| 08:15 AM | 0 | 1 | 4 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 9 |
| Total Volume | 0 | 1 | 5 | 0 | 6 | 0 | 0 | 2 | 0 | 2 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 18 |
| % App. Total | 0 | 16.7 | 83.3 | 0 | | 0 | 0 | 100 | 0 | | 0 | 100 | 0 | 0 | | 0 | 0 | 0 | 0 | | |
| PHF | .000 | .250 | .313 | .000 | .300 | .000 | .000 | .500 | .000 | .500 | .000 | .625 | .000 | .000 | .625 | .000 | .000 | .000 | .000 | .000 | .500 |

# Turning Movement Counts
# (Trucks Only )

Intersection of DG CO 442 & Noria Rd
Afternoon Peak-Hours
Sunny, Hot

File Name : CR 442 & Noria-epm-truck
Site Code : 2
Start Date : 7/12/2012
Page No : 1

Groups Printed- Unshifted

| | Noria Road From North | | | | | DG CO 442 From East | | | | | Noria Road From South | | | | | From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | | Thru | Left | | App. Total | Right | | Left | | App. Total | Right | Thru | | | App. Total | | | | | App. Total | Int. Total |
| 02:00 PM | 0 | 0 | 4 | 0 | 4 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 02:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 4 |
| 02:30 PM | 0 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 |
| 02:45 PM | 0 | 1 | 3 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 5 |
| Total | 0 | 2 | 8 | 0 | 10 | 0 | 0 | 1 | 0 | 1 | 0 | 6 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 17 |
| 03:00 PM | 0 | 1 | 2 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 4 |
| 03:15 PM | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 4 |
| 03:30 PM | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 6 |
| 03:45 PM | 0 | 1 | 4 | 0 | 5 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 7 |
| Total | 0 | 2 | 10 | 0 | 12 | 2 | 0 | 0 | 0 | 2 | 0 | 7 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 21 |
| 04:00 PM | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 04:15 PM | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 04:30 PM | 0 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 |
| 04:45 PM | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Total | 0 | 1 | 5 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 7 |
| Grand Total | 0 | 5 | 23 | 0 | 28 | 2 | 0 | 1 | 0 | 3 | 0 | 14 | 0 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 45 |
| Apprch % | 0 | 17.9 | 82.1 | 0 | | 66.7 | 0 | 33.3 | 0 | | 0 | 100 | 0 | 0 | | 0 | 0 | 0 | 0 | | |
| Total % | 0 | 11.1 | 51.1 | 0 | 62.2 | 4.4 | 0 | 2.2 | 0 | 6.7 | 0 | 31.1 | 0 | 0 | 31.1 | 0 | 0 | 0 | 0 | 0 | |

# Turning Movement Counts
# (Trucks Only )

Intersection of DG CO 442 & Noria Rd
Afternoon Peak-Hours
Sunny, Hot

File Name : CR 442 & Noria-epm-truck
Site Code : 2
Start Date : 7/12/2012
Page No : 2

| | Noria Road From North | | | | | DG CO 442 From East | | | | | Noria Road From South | | | | | From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | | Thru | Left | | App. Total | Right | | Left | | App. Total | Right | Thru | | | App. Total | | | | | App. Total | Int. Total |
| Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 03:00 PM | | | | | | | | | | | | | | | | | | | | | |
| 03:00 PM | 0 | 1 | 2 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 4 |
| 03:15 PM | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 4 |
| 03:30 PM | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 6 |
| 03:45 PM | 0 | 1 | 4 | 0 | 5 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 7 |
| Total Volume | 0 | 2 | 10 | 0 | 12 | 2 | 0 | 0 | 0 | 2 | 0 | 7 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 21 |
| % App. Total | 0 | 16.7 | 83.3 | 0 | | 100 | 0 | 0 | 0 | | 0 | 100 | 0 | 0 | | 0 | 0 | 0 | 0 | | |
| PHF | .000 | .500 | .625 | .000 | .600 | .500 | .000 | .000 | .000 | .500 | .000 | .583 | .000 | .000 | .583 | .000 | .000 | .000 | .000 | .000 | .750 |

# Turning Movement Counts
# (Trucks Only )

Intersection of CO Rd 442 & CO Rd 1057
Morning Peak-Hours
Sunny, Hot
Other:

File Name : CR 442 & CR 1057-eam-truck
Site Code : 3
Start Date : 7/17/2012
Page No : 1

Groups Printed- Unshifted

| | E 1900 Rd From North | | | | | DG CO 442 From East | | | | | DG CO 1057 From South | | | | | DG CO 442 From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| 06:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3 | 3 |
| 06:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 06:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 4 | 4 |
| 06:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3 | 4 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 11 | 12 |
| 07:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3 | 3 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | |
| 07:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 07:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 2 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 6 | 6 |
| 08:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 4 | 0 | 0 | 0 | 4 | 5 |
| 08:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 4 |
| 08:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 4 | 2 | 0 | 0 | 0 | 2 | 6 |
| 08:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 2 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 9 | 8 | 0 | 0 | 0 | 8 | 17 |
| Grand Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 9 | 0 | 0 | 0 | 9 | 25 | 0 | 0 | 0 | 25 | 35 |
| Apprch % | 0 | 0 | 0 | 0 | | 0 | 0 | 100 | 0 | | 100 | 0 | 0 | 0 | | 100 | 0 | 0 | 0 | | |
| Total % | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.9 | 0 | 2.9 | 25.7 | 0 | 0 | 0 | 25.7 | 71.4 | 0 | 0 | 0 | 71.4 | |

# Turning Movement Counts
# (Trucks Only )

Intersection of CO Rd 442 & CO Rd 1057
Morning Peak-Hours
Sunny, Hot
Other:

File Name : CR 442 & CR 1057-eam-truck
Site Code : 3
Start Date : 7/17/2012
Page No : 2

| | E 1900 Rd From North | | | | | DG CO 442 From East | | | | | DG CO 1057 From South | | | | | DG CO 442 From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:45 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 2 |
| 08:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 4 | 0 | 0 | 0 | 4 | 5 |
| 08:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 4 |
| 08:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 4 | 2 | 0 | 0 | 0 | 2 | 6 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 9 | 8 | 0 | 0 | 0 | 8 | 17 |
| % App. Total | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | | 100 | 0 | 0 | 0 | | 100 | 0 | 0 | 0 | | |
| PHF | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .563 | .000 | .000 | .000 | .563 | .500 | .000 | .000 | .000 | .500 | .708 |

# Turning Movement Counts
# (Trucks Only )

Intersection of CO Rd 442 & CO Rd 1057
Afternoon Peak-Hours
Sunny, Hot

File Name : CR 442 & CR 1057-epm-truck
Site Code : 3
Start Date : 7/17/2012
Page No : 1

Groups Printed- Unshifted

| | E 1900 Rd. From North | | | | | DG CO 442 From East | | | | | DG CO 1057 From South | | | | | DG CO 442 From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| 02:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 1 | 3 |
| 02:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 1 | 0 | 5 | 3 | 0 | 0 | 0 | 3 | 8 |
| 02:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 4 |
| 02:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 5 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 1 | 0 | 16 | 4 | 0 | 0 | 0 | 4 | 20 |
| 03:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3 | 4 | 0 | 0 | 0 | 4 | 7 |
| 03:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 1 | 5 |
| 03:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 5 |
| 03:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 3 | 0 | 0 | 0 | 3 | 5 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | 0 | 0 | 14 | 8 | 0 | 0 | 0 | 8 | 22 |
| 04:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 6 | 4 | 0 | 0 | 0 | 4 | 10 |
| 04:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 5 | 1 | 0 | 0 | 0 | 1 | 6 |
| 04:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 3 | 2 | 1 | 0 | 0 | 3 | 6 |
| 04:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 | 1 | 0 | 17 | 7 | 1 | 0 | 0 | 8 | 25 |
| Grand Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 45 | 0 | 2 | 0 | 47 | 19 | 1 | 0 | 0 | 20 | 67 |
| Apprch % | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | | 95.7 | 0 | 4.3 | 0 | | 95 | 5 | 0 | 0 | | |
| Total % | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 67.2 | 0 | 3 | 0 | 70.1 | 28.4 | 1.5 | 0 | 0 | 29.9 | |

# Turning Movement Counts
# (Trucks Only )

Intersection of CO Rd 442 & CO Rd 1057
Afternoon Peak-Hours
Sunny, Hot

File Name : CR 442 & CR 1057-epm-truck
Site Code : 3
Start Date : 7/17/2012
Page No : 2

| | E 1900 Rd. From North | | | | | DG CO 442 From East | | | | | DG CO 1057 From South | | | | | DG CO 442 From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Right | Thru | Left | | App. Total | Int. Total |
| Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 03:45 PM | | | | | | | | | | | | | | | | | | | | | |
| 03:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 3 | 0 | 0 | 0 | 3 | 5 |
| 04:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 6 | 4 | 0 | 0 | 0 | 4 | 10 |
| 04:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 5 | 1 | 0 | 0 | 0 | 1 | 6 |
| 04:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 3 | 2 | 1 | 0 | 0 | 3 | 6 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 1 | 0 | 16 | 10 | 1 | 0 | 0 | 11 | 27 |
| % App. Total | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | | 93.8 | 0 | 6.2 | 0 | | 90.9 | 9.1 | 0 | 0 | | |
| PHF | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .625 | .000 | .250 | .000 | .667 | .625 | .250 | .000 | .000 | .688 | .675 |

# Turning Movement Counts
# (Trucks Only )

Interchange of K-10 & E 1900 Rd (North Ramps)
Morning Peak-Hours
Sunny, warm

File Name : K10-N Ramps-eam-truck
Site Code : 4
Start Date : 7/12/2012
Page No : 1

Groups Printed- Unshifted

| | E 1900 Rd / DG CO 1057 From North | | | | | K-10 (WB Off Ramp) From East | | | | | E 1900 Rd / DG CO 1057 From South | | | | | K-10 (WB On Ramp) From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | | trucks | App. Total | Right | Thru | Left | trucks | App. Total | | Thru | Left | trucks | App. Total | | | | | App. Total | Int. Total |
| 06:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 07:00 AM | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | |
| 07:30 AM | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 4 |
| 07:45 AM | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 4 |
| Total | 0 | 0 | 0 | 7 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 12 |
| 08:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 4 |
| 08:15 AM | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 8 |
| 08:30 AM | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 4 |
| 08:45 AM | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| Total | 0 | 0 | 0 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 12 | 0 | 0 | 0 | 0 | 0 | 18 |
| Grand Total | 0 | 0 | 0 | 13 | 13 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 17 | 17 | 0 | 0 | 0 | 0 | 0 | 31 |
| Apprch % | 0 | 0 | 0 | 100 | | 0 | 0 | 0 | 100 | | 0 | 0 | 0 | 100 | | 0 | 0 | 0 | 0 | | |
| Total % | 0 | 0 | 0 | 41.9 | 41.9 | 0 | 0 | 0 | 3.2 | 3.2 | 0 | 0 | 0 | 54.8 | 54.8 | 0 | 0 | 0 | 0 | 0 | |

# Turning Movement Counts
# (Trucks Only )

Interchange of K-10 & E 1900 Rd (North Ramps)
Morning Peak-Hours
Sunny, warm

File Name : K10-N Ramps-eam-truck
Site Code : 4
Start Date : 7/12/2012
Page No : 2

| | E 1900 Rd / DG CO 1057 From North | | | | | K-10 (WB Off Ramp) From East | | | | | E 1900 Rd / DG CO 1057 From South | | | | | K-10 (WB On Ramp) From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | | trucks | App. Total | Right | Thru | Left | trucks | App. Total | | Thru | Left | trucks | App. Total | | | | | App. Total | Int. Total |
| Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:30 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:30 AM | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 4 |
| 07:45 AM | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 4 |
| 08:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 4 |
| 08:15 AM | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 8 |
| Total Volume | 0 | 0 | 0 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 14 | 0 | 0 | 0 | 0 | 0 | 20 |
| % App. Total | 0 | 0 | 0 | 100 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 100 | | 0 | 0 | 0 | 0 | | |
| PHF | .000 | .000 | .000 | .500 | .500 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .700 | .700 | .000 | .000 | .000 | .000 | .000 | .625 |

# Turning Movement Counts
# (Trucks Only )

Interchange of K-10 & E 1900 Rd (N Ramps)
Afternoon Peak-Hours
Sunny, Hot

File Name : K10-N Ramps-epm-truck
Site Code : 4
Start Date : 7/17/2012
Page No : 1

Groups Printed- Unshifted

| | E 1900 Rd / DG CO 1057 From North | | | | | K-10 (WB Off Ramp) From East | | | | | E 1900 Rd / DG CO 1057 From South | | | | | K-10 (WB On Ramp) From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | | trucks | App. Total | Right | Thru | Left | trucks | App. Total | | Thru | Left | trucks | App. Total | | | | | App. Total | Int. Total |
| 02:00 PM | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 5 |
| 02:15 PM | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 7 |
| 02:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 5 |
| 02:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 4 |
| Total | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 15 | 15 | 0 | 0 | 0 | 0 | 0 | 21 |
| 03:00 PM | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 8 |
| 03:15 PM | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 4 |
| 03:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 6 |
| 03:45 PM | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 5 |
| Total | 0 | 0 | 0 | 8 | 8 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 14 | 14 | 0 | 0 | 0 | 0 | 0 | 23 |
| 04:00 PM | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 9 |
| 04:15 PM | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 6 |
| 04:30 PM | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 6 |
| 04:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| Total | 0 | 0 | 0 | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 15 | 0 | 0 | 0 | 0 | 0 | 23 |
| Grand Total | 0 | 0 | 0 | 21 | 21 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 44 | 44 | 0 | 0 | 0 | 0 | 0 | 67 |
| Apprch % | 0 | 0 | 0 | 100 | | 0 | 0 | 0 | 100 | | 0 | 0 | 0 | 100 | | 0 | 0 | 0 | 0 | | |
| Total % | 0 | 0 | 0 | 31.3 | 31.3 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 65.7 | 65.7 | 0 | 0 | 0 | 0 | 0 | |

# Turning Movement Counts
# (Trucks Only )

Interchange of K-10 & E 1900 Rd (N Ramps)
Afternoon Peak-Hours
Sunny, Hot

File Name : K10-N Ramps-epm-truck
Site Code : 4
Start Date : 7/17/2012


| | E 1900 Rd / DG CO 1057 From North | | | | | K-10 (WB Off Ramp) From East | | | | | E 1900 Rd / DG CO 1057 From South | | | | | K-10 (WB On Ramp) From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | | trucks | App. Total | Right | Thru | Left | trucks | App. Total | | Thru | Left | trucks | App. Total | | | | | App. Total | Int. Total |
| Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 03:30 PM | | | | | | | | | | | | | | | | | | | | | |
| 03:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 6 |
| 03:45 PM | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 5 |
| 04:00 PM | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 9 |
| 04:15 PM | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 6 |
| Total Volume | 0 | 0 | 0 | 9 | 9 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 16 | 16 | 0 | 0 | 0 | 0 | 0 | 26 |
| % App. Total | 0 | 0 | 0 | 100 | | 0 | 0 | 0 | 100 | | 0 | 0 | 0 | 100 | | 0 | 0 | 0 | 0 | | |
| PHF | .000 | .000 | .000 | .450 | .450 | .000 | .000 | .000 | .250 | .250 | .000 | .000 | .000 | .800 | .800 | .000 | .000 | .000 | .000 | .000 | .722 |

# Turning Movement Counts
# (Trucks Only )

Interchange of K-10 & E 1900 Rd (South Ramps)
Morning Peak-Hours
Sunny, Warm

File Name : K10-S Ramps-eam-truck
Site Code : 4
Start Date : 7/12/2012
Page No : 1

Groups Printed- Unshifted

| | E 1900 Rd / DG CO 1057 From North | | | | | K-10 (EB On Ramp) From East | | | | | E 1900 Rd / DG CO 1057 From South | | | | | K-10 (EB Off Ramp) From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | | Thru | Left | trucks | App. Total | | | | | App. Total | Right | Thru | | trucks | App. Total | Right | Thru | Left | trucks | App. Total | Int. Total |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | |
| 07:00 AM | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| *** BREAK *** | | | | | | | | | | | | | | | | | | | | | |
| 07:30 AM | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 4 |
| 07:45 AM | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 4 |
| Total | 0 | 0 | 0 | 7 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 12 |
| 08:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 4 |
| 08:15 AM | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 8 |
| 08:30 AM | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 4 |
| 08:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| Total | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 12 | 17 |
| Grand Total | 0 | 0 | 0 | 12 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 17 | 29 |
| Apprch % | 0 | 0 | 0 | 100 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 100 | | |
| Total % | 0 | 0 | 0 | 41.4 | 41.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 58.6 | 58.6 | |

# Turning Movement Counts
# (Trucks Only )

Interchange of K-10 & E 1900 Rd (South Ramps)
Morning Peak-Hours
Sunny, Warm

File Name : K10-S Ramps-eam-truck
Site Code : 4
Start Date : 7/12/2012


| | E 1900 Rd / DG CO 1057 From North | | | | | K-10 (EB On Ramp) From East | | | | | E 1900 Rd / DG CO 1057 From South | | | | | K-10 (EB Off Ramp) From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | | Thru | Left | trucks | App. Total | | | | | App. Total | Right | Thru | | trucks | App. Total | Right | Thru | Left | trucks | App. Total | Int. Total |
| Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:30 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:30 AM | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 4 |
| 07:45 AM | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 4 |
| 08:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 4 |
| 08:15 AM | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 8 |
| Total Volume | 0 | 0 | 0 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 14 | 20 |
| % App. Total | 0 | 0 | 0 | 100 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 100 | | |
| PHF | .000 | .000 | .000 | .500 | .500 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .700 | .700 | .625 |

# Turning Movement Counts
# (Trucks Only )

Interchange of K-10 & E 1900 Rd (S Ramps)
Afternoon Peak-Hours
Sunny, Hot

File Name : K10-S Ramps-epm-truck
Site Code : 4
Start Date : 7/17/2012
Page No : 1

Groups Printed- Unshifted

| | E 1900 / DG CO 1057 From North | | | | | K-10 (EB On Ramp) From East | | | | | E 1900 / DG CO 1057 From South | | | | | K-10 (EB Off Ramp) From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | | Thru | Left | trucks | App. Total | | | | | App. Total | Right | Thru | | trucks | App. Total | Right | Thru | Left | trucks | App. Total | Int. Total |
| 02:00 PM | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 4 |
| 02:15 PM | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 6 |
| 02:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 5 |
| 02:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 4 |
| Total | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 15 | 19 |
| 03:00 PM | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 8 |
| 03:15 PM | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 4 |
| 03:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 5 |
| 03:45 PM | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 5 |
| Total | 0 | 0 | 0 | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 14 | 22 |
| 04:00 PM | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 9 |
| 04:15 PM | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 6 |
| 04:30 PM | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 6 |
| 04:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 |
| Total | 0 | 0 | 0 | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 15 | 23 |
| Grand Total | 0 | 0 | 0 | 20 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 44 | 44 | 64 |
| Apprch % | 0 | 0 | 0 | 100 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 100 | | |
| Total % | 0 | 0 | 0 | 31.2 | 31.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 68.8 | 68.8 | |

# Turning Movement Counts
# (Trucks Only )

Interchange of K-10 & E 1900 Rd (S Ramps)
Afternoon Peak-Hours
Sunny, Hot

File Name : K10-S Ramps-epm-truck
Site Code : 4
Start Date : 7/17/2012


| | E 1900 / DG CO 1057 From North | | | | | K-10 (EB On Ramp) From East | | | | | E 1900 / DG CO 1057 From South | | | | | K-10 (EB Off Ramp) From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | | Thru | Left | trucks | App. Total | | | | | App. Total | Right | Thru | | trucks | App. Total | Right | Thru | Left | trucks | App. Total | Int. Total |
| Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 03:45 PM | | | | | | | | | | | | | | | | | | | | | |
| 03:45 PM | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 5 |
| 04:00 PM | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 9 |
| 04:15 PM | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 6 |
| 04:30 PM | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 6 |
| Total Volume | 0 | 0 | 0 | 11 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 15 | 26 |
| % App. Total | 0 | 0 | 0 | 100 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 100 | | |
| PHF | .000 | .000 | .000 | .550 | .550 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .750 | .750 | .722 |

# APPENDIX IV

Crash History

(Source: Douglas County)

# APPENDIX V

Guidelines for Right-Turn & Left-Turn Treatments

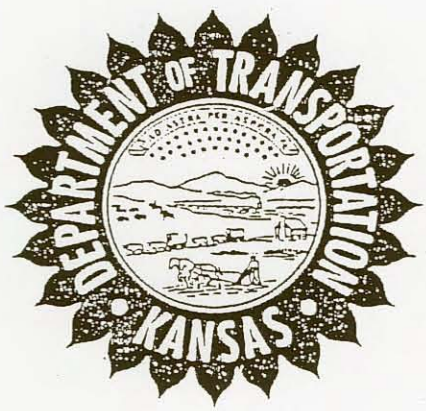
at

Unsignalized Intersections

Report No. K-TRAN:KSU-95-5
Final Report

# GUIDELINES FOR RIGHT-TURN TREATMENTS AT UNSIGNALIZED INTERSECTIONS AND DRIVEWAYS

Tanweer Hasan
Robert W. Stokes
Kansas State University
Manhattan, Kansas




May 1996

K-TRAN

A COOPERATIVE TRANSPORTATION RESEARCH PROGRAM BETWEEN:
KANSAS DEPARTMENT OF TRANSPORTATION
THE KANSAS STATE UNIVERSITY
THE UNIVERSITY OF KANSAS

Table 7.1 Right-turn treatment guidelines for two-lane highways.[a]

(*Turning speed = 15 mph*)

| Roadway DDHV (vph) | Roadway Operating Speed (mph) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 40 | | 45 | | 50 | | 55 | | 60 | | 65 | |
| | Lane | Taper | Lane | Taper | Lane | Taper | Lane | Taper | Lane | Taper | Lane | Taper |
| 200 | | | | 83 | 73 | 30 | 35 | 14 | 20 | 8 | 15 | 7 |
| 300 | | | 120 | 40 | 41 | 19 | 24 | 9 | 15 | 7 | 12 | 6 |
| 400 | 200 | 85 | 52 | 27 | 30 | 14 | 19 | 8 | 12 | 6 | 11 | 5 |
| 600 | 50 | 27 | 26 | 13 | 20 | 9 | 14 | 6 | 10 | 5 | 9 | 4 |
| 800 | 25 | 12 | 16 | 8 | 15 | 7 | 11 | 5 | 9 | 4 | 8 | 3 |
| 1000 | 14 | 8 | 12 | 5 | 11 | 5 | 9 | 4 | 8 | 3 | 7 | 3 |
| 1200 | 10 | 6 | 9 | 4 | 9 | 4 | 8 | 4 | 7 | 3 | 7 | 3 |

[a] Minimum right-turn design hour volumes (vph) required to warrant right-turn treatments.

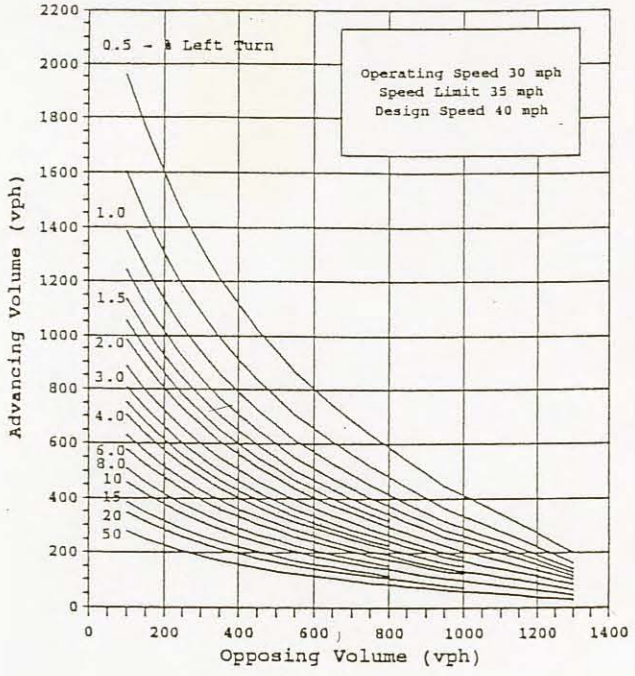
National Cooperative Highway Research Program

# NCHRP Synthesis 225

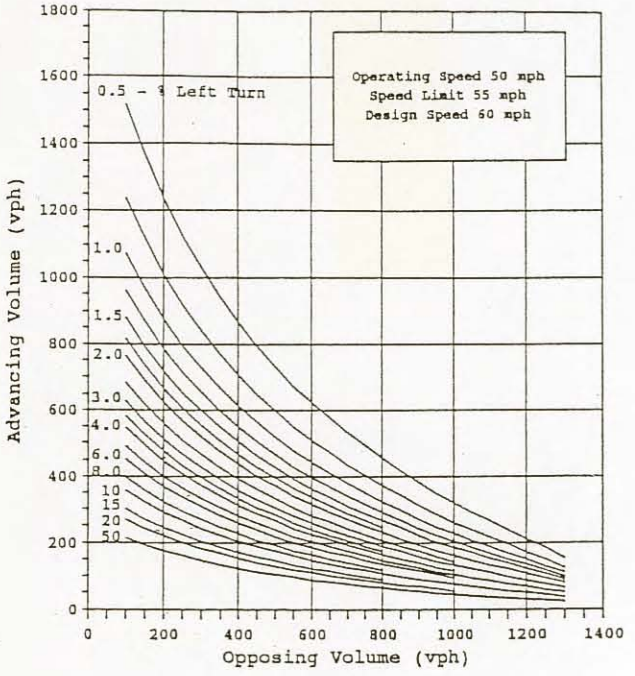
# Left-Turn Treatments at Intersections

A Synthesis of Highway Practice

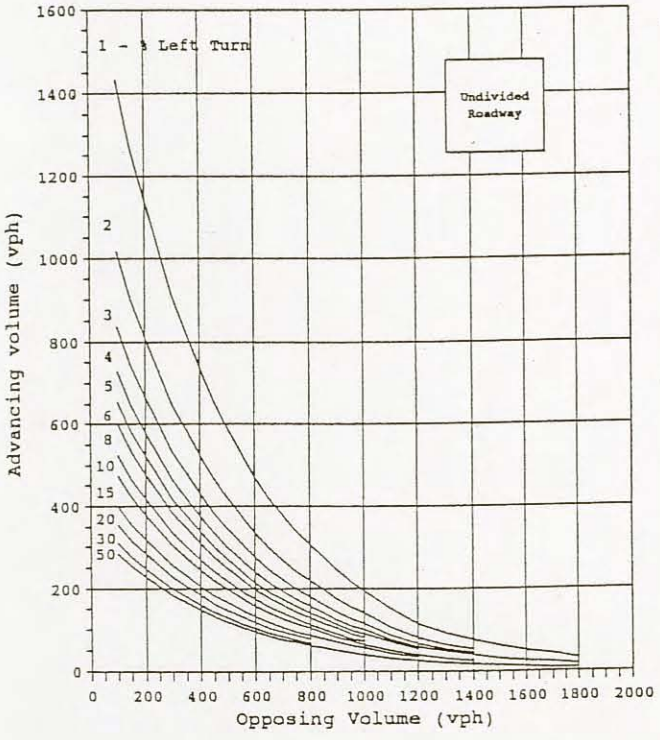
Transportation Research Board
National Research Council



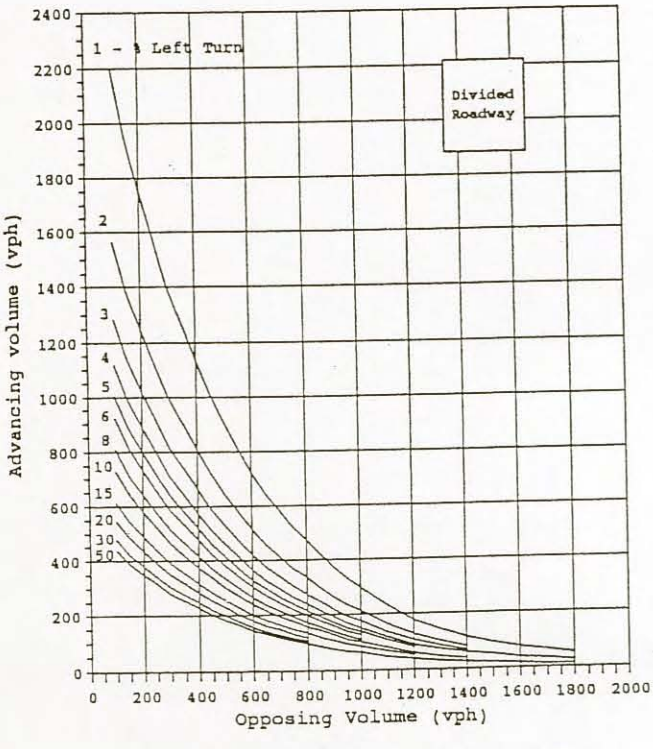

Guidelines for Left-turn Lane at Unsignalized Intersection - Two-lane Roadway




Guidelines for Left-turn Lane at Unsignalized Intersection - Two-lane Roadway




Guidelines for Left-turn Lane at Unsignalized Intersection - Four-lane, Undivided Roadway




Guidelines for Left-turn Lane at Unsignalized Intersection - Four-lane, Divided Roadway

FIGURE 5 ITE guidelines for left-turn lanes. *(18)*

MGineering Solutions
Traffic Engineering | Transportation Planning | Technical Training

*Serving Communities Through Excellence*

*Kansas - Missouri - Michigan - California*



# Memorandum

Date: September 13th, 2012

To: C.L. Maurer, RLA, ASLA
Senior Landscape Architect
Landplan Engineering, P.A.

From: Mehrdad Givechi, PE, PTOE, *Mehrdad Givechi*
Managing Principal
MGineering Solutions

Re: Penny Sand Plant Expansion, Addendum No. 1
Between Lawrence and Eudora, Douglas County, KS

This memo is prepared as an Addendum No. 1 to *Traffic Impact Study for "Penny Sand Plant Expansion"* dated 7/23/12 to re-evaluate impact of the traffic generated by this development, using the new information provided by the applicant as summarized in the following paragraphs:

1. The original TIS report dated 7/23/12 was prepared based on the "worst case scenario" when the proposed sand facility would potentially distribute approximately 5,000 tons of sand on a highly productive day (a very rare event). Based on the new information provided by the applicant, the primary reason for the proposed expansion of the plant (from 114 acres to 465 acres) is to switch over the sand excavation area from the river-side to the in-land side, maintaining its current rate of sand distribution at approximately 1,000(+/-) tons on an average day (based on most recent 7-year average) for foreseeable future. It is, however, to be noted that as the economy improves, a higher distribution rate will be likely as demand goes up with the absolute maximum rate of 5,000 tons a day (a very rare event) as described and studied in the original TIS dated 7/23/12.
2. As mentioned in the original TIS, N. 1500 Road has posted weight limit signs of 5 tons on both sides of Noria Road and is not a designated truck route. Currently, all

site-generated trucks use Noria Road to access the site. Under the proposed development plan, all site-generated trucks will maintain the same route to access the site and will not be using N. 1500 Road.

3. The original TIS dated 7/23/12 states that, currently, the facility is staffed by 4 employees and no increase in the number of employees is anticipated. Based on the new information provided by the applicant, the number of current employees is 8 and expected to increase to 10.

*Traffic Impact Reassessment*

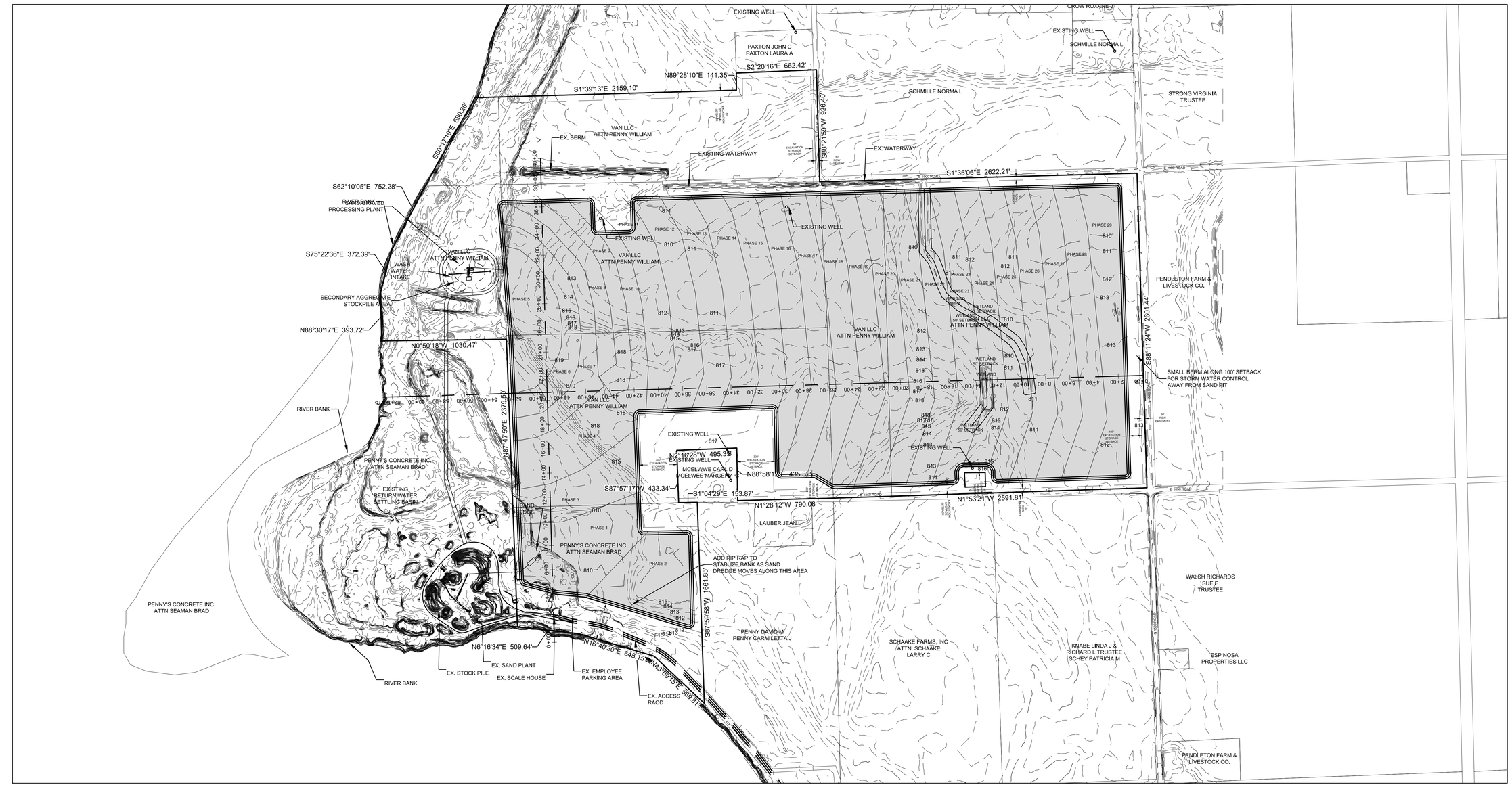
Using the average distribution rate of 1,000 tons/day following the same analogy mentioned in the original TIS, the estimated number of trucks serving the site will be around 40 trucks/day with 5 trucks/peak-hour - equivalent to 10 truck trip-ends/peak-hour (5 inbound and 5 outbound). Comparing this number to that generated by the existing sand plant (8 truck trip-ends, 4 inbound and 4 outbound) results in an increase of 2 truck trip-ends/peak-hour (1 inbound and 1 outbound) – a nominal increase in truck traffic, none of which will be impacting N. 1500 Road except at the access point to the site.

Using the ITE trip generation rates for the office component of the site (ITE Land Use Code 715) indicates that the increase in the number of employees (2 new people) will likely result in 2 new trip-ends (all passenger cars) during the peak-hour of a typical weekday – a nominal increase in passenger car traffic with insignificant impact on the roadway network.

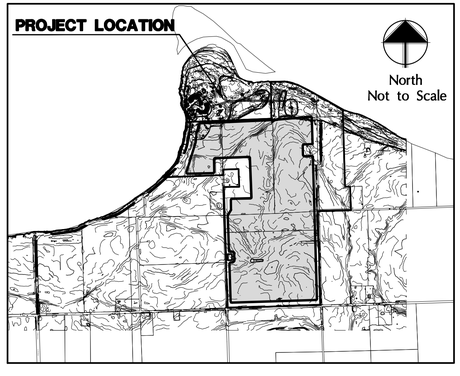
Re-evaluation of the operating conditions of traffic in the study area, given the new information, indicates that, during the critical peak-hour of a typical weekday when the plant is operating under average conditions, the increase in the number of trucks and passenger cars is insignificant with nominal impact on the roadway network.

In light of the new information provided by the applicant and the traffic impact reassessment:

1. It is still desirable that 100' long section of the site access, just north of N. 1500 Road be paved as listed in the original TIS under improvement #1.
2. The need for a dedicated eastbound right-turn lane on Route 442 (Old K-10) at its intersection with Route 1057 (as listed under improvement #2 in the original TIS) becomes less relevant because the increase in truck traffic will be nominal for a foreseeable future. As time goes by and economy improves with higher demand for sand distribution, the increase in site-generated truck traffic should be studies to re-assess the need for this turn lane.
3. As stated in the original TIS, under improvement #3, pavement conditions along certain segments of the roadway network should be evaluated to determine if they can withstand heavy truck loads. This was merely suggested based on a cursory visual field observation and is not the result of a formal pavement analysis and/or evaluation. It should be noted that pavement analysis and/or evaluation is beyond the scope of a typical traffic impact study.




## Location Map




## Legal Description

A TRACT OF LAND LOCATED IN PORTIONS OF SECTIONS 25, 26, 35 AND 36 IN TOWNSHIP 12 SOUTH, RANGE 20 EAST OF THE 6TH PRINCIPAL MERIDIAN, IN DOUGLAS COUNTY, KANSAS, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHWEST CORNER OF THE SOUTHEAST QUARTER OF SECTION 35, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE NORTH, ALONG THE WEST LINE OF SAID QUARTER SECTION TO THE CENTER OF SAID SECTION 35, THENCE NORTH ALONG THE WEST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 35, 765.00 FEET TO THE SOUTHWEST CORNER OF A TRACT RECORDED IN BOOK 307, PAGE 487; THENCE EAST 442.00 FEET ALONG THE SOUTH LINE OF SAID TRACT; THENCE NORTH 492.00 FEET ALONG THE EAST LINE OF SAID TRACT; THENCE WEST 442.00 FEET ALONG THE NORTH LINE OF SAID TRACT TO THE WEST LINE OF THE NORTHEAST QUARTER OF SECTION 35, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE SOUTH ALONG SAID WEST LINE, 126.40 FEET TO THE SOUTH LINE OF THE NORTH 77 ACRES OF THE EAST 134 ACRES OF THE NORTHWEST QUARTER OF SAID SECTION 35, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE WEST ALONG THE SOUTH LINE OF THE NORTH 77 ACRES TO THE EAST BANK OF THE KANSAS RIVER; THENCE NORTHEASTERLY, ALONG SAID EAST BANK, TO THE NORTH LINE OF SECTION 35, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE EAST, ALONG THE NORTH LINE OF SAID SECTION 35, TO THE SOUTHWEST CORNER OF THE EAST 11.53 ACRES OF GOVERNMENT LOT 1 IN SECTION 26, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE NORTH, ALONG THE WEST LINE OF SAID EAST 11.53 ACRES, TO THE SOUTH BANK OF THE KANSAS RIVER; THENCE EASTERLY, ALONG THE SOUTH BANK OF THE KANSAS RIVER, TO THE WEST LINE OF SECTION 25, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE CONTINUING SOUTHEASTERLY, ALONG THE SOUTH BANK OF THE KANSAS RIVER, TO THE NORTHWEST CORNER OF A TRACT RECORDED IN BOOK 1056, PAGE 5024, SAID POINT LYING 739.2 FEET EAST OF THE WEST LINE OF THE NORTHWEST QUARTER SECTION 36, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE SOUTH, ALONG THE WEST LINE OF SAID TRACT, AND PARALLEL TO THE WEST LINE OF THE NORTHWEST QUARTER OF SECTION 36, TOWNSHIP 12 SOUTH, RANGE 20 EAST TO A POINT 151.78 FEET WEST OF THE NORTHWEST CORNER OF THE TRACT RECORDED IN BOOK 1000, PAGE 3430; THENCE EAST 151.78 FEET TO THE NORTHWEST CORNER OF SAID TRACT; THENCE SOUTH 660 FEET, ALONG THE WEST LINE OF SAID TRACT, TO THE SOUTH LINE OF THE NORTHWEST QUARTER OF SECTION 36, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE WEST ALONG SAID SOUTH LINE, 890.98 FEET TO THE SOUTHWEST CORNER OF THE NORTHWEST QUARTER OF SECTION 36, TOWNSHIP 12 SOUTH, RANGE 20 EAST, ALSO KNOWN AS THE NORTHEAST CORNER OF THE SOUTHEAST QUARTER OF SECTION 35, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE SOUTH, ALONG THE EAST LINE OF SAID SOUTHEAST QUARTER TO THE SOUTHEAST CORNER OF SAID SECTION 35, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE WEST, ALONG THE SOUTH LINE OF SAID QUARTER, TO THE POINT OF BEGINNING. CONTAINS 465 ACRES, MORE OR LESS.

## General Notes

OWNER: PENNY'S CONCRETE, INC.
ATTN: BILL PENNY
800 EAST 8TH STREET,
LAWRENCE, KS 66044

1. LAND PLANNER/ ENGINEER: LANDPLAN ENGINEERING, P.A.
1310 WAKARUSA DRIVE
LAWRENCE, KS 66049
2. TOPOGRAPHIC INFORMATION OBTAINED FROM 2006 CITY OF LAWRENCE LIDAR AERIAL DATA.
3. EXISTING LAND USE: AGRICULTURAL
4. PROPOSED LAND USE: SAND EXCAVATION, PROCESSING PLANT AND EXTRACTION; AGRICULTURAL
5. EXISTING ZONING: A – VC
6. PROPOSED ZONING: A – VC
7. THIS SITE IS LOCATED WITHIN THE FLOODPLAIN PER FEMA MAP #20045C0203D, DATED AUGUST 5, 2010.
8. PHASE BOUNDARIES ARE ONLY AN APPROXIMATION DUE TO VARIABILITY OF UNDERGROUND DEPOSITS. SEQUENCES OF EXCAVATION MAY VARY. APPROXIMATELY 350,000 TONS TO 400,000 TON PER YEAR.
9. NO FOREIGN MATTER, RUBBISH, TREES, JUNK, SHALL BE DEPOSITED IN THE EXTRACTION AREA.
10. NO ON SITE STORAGE OF FUELS OR CHEMICALS.
11. THE ACCESS POINT AT NORIA ROAD AND N 1500 SHALL BE REALIGN AS REQUIRED BY COUNTY ENGINEER.
12. OVERBURDEN AND TOPSOIL WILL BE SOLD ON SITE.

## Site Summary

| | | |
|---|---|---|
| GROSS CUP/SITE AREA: | 20,255,400 SF / | 465 AC |
| PUBLIC RIGHTS-OF-WAY: | 0 SF / | 0.00 AC |
| PIT AREA: | 13,083,057 / | 294 AC |

## Parking Summary

REQUIRED = 1 SPACE/2 EMPLOYEES; 8-10 TOTAL EMPLOYEES = 4-5 SPACES
PROVIDED = 8 SPACES
PARKING NEXT TO EXISTING SCALE HOUSE SHOWN ON CUP 06-04-08

SCALE: 1" = 400'

400 200 0 400 800

*A CUP Site Plan for*

# *Penny Sand Lawrence Facility*

*Douglas County, Kansas*


**Civil Engineering**
**Landscape Architecture**
**Community Planning**
**Surveying**

1310 Wakarusa Drive
Lawrence, Kansas 66049
tele (785)843-7530
fax (785)843-7555
email: info@landplan-pa.com
Web: www.landplan-pa.com

**Landplan Engineering, P.A.**
Lawrence, KS • Kansas City, MO • Manhattan, KS
Blue Springs, MO • The Woodlands, TX




**PENNY SAND FACILITY**
**CONDITIONAL USE PERMIT**
**CUP SITE PLAN**

| REV | DATE | DESCRIPTION |
|---|---|---|
| 1 | 8.28.12 | PLANNING COMMENTS |
| 2 | 9.17.12 | PLANNING NOTES |

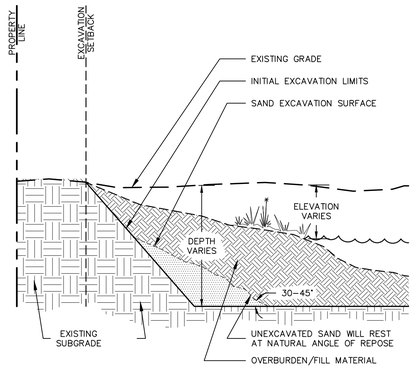
| | |
|---|---|
| DATE: | 7.2.12 |
| PROJECT NO.: | 20121146 |
| DESIGNED BY: | CLM |
| DRAWN BY: | CLM |
| CHECKED BY: | CLM |

ISSUE A — SHEET NO. C-001 — OF 3 SHEETS


## Approx. Reclamation Schedule

| | |
|---|---|
| PHASE 1 - 4 | APPROX. 2017-2027 |
| PHASE 4 - 10 | APPROX. 2027-2037 |
| PHASE 10 - 17 | APPROX. 2037-2047 |
| PHASE 17 - 24 | APPROX. 2047-2057 |
| PHASE 24 - 30 | APPROX. 2057-2067 |

1. RECLAMATION TIME FRAMES ARE APPROXIMATE.
2. TIME FRAMES AND SEQUENCE OF RECLAMATION MAY VARY DUE TO VARIABILITY OF UNDERGROUND DEPOSITS AND THE DEMAND FOR MATERIALS.
3. RECLAMATION WILL TYPICALLY BEGIN ONLY AFTER THE PERIMETER OF THE EXCAVATION HAS REACHED THE EXCAVATION LIMITS AND A SUFFICIENT LENGTH OF BANK IS READY FOR RESTORATION.
4. A MINIMUM OF 12" OF SOIL FROM THE PROCESSING PLANT AND STOCKPILE AREAS TO BE REMOVED AND REPLACED WITH TOPSOIL, SEEDED, MULCHED AND FERTILIZED OR RETURNED TO AGRICULTURAL PURPOSES.




## Typical Reclamation/Restoration
## Outer Edges of Lake

NOT TO SCALE

SCALE: 1" = 300'

300 150 0 300 600

*A Reclamation Plan for*

# *Penny Sand Lawrence Facility*

*Douglas County, Kansas*


Civil Engineering
Landscape Architecture
Community Planning
Surveying

Landplan Engineering, P.A.
Lawrence, KS • Kansas City, MO • Manhattan, KS
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Web: www.landplan-pa.com




**PENNY SAND FACILITY**
**CONDITIONAL USE PERMIT**
**RECLAMATION PLAN**

| REV | DATE | DESCRIPTION |
|---|---|---|
| 1 | 9.17.12 | POND SIZE |

| | |
|---|---|
| DATE: | 8/03/11 |
| PROJECT NO.: | 20101019 |
| DESIGNED BY: | LPE/KVC |
| DRAWN BY: | LPE |
| CHECKED BY: | RDD/CLM |

ISSUE A

SHEET NO. R-001

OF 2 SHEETS

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## GENERAL

With the current restrictions which The Corps of Engineers has placed on dredging sand from the Kansas River, many river dredging operations have had their permits suspended or restricted, and will be forced to terminate their dredging operations. Although the Kansas River is being restricted for the dredging of sand, the need for this raw material for construction and development continues. Throughout the river valley / river channel sand is one of the natural resources available for local mining.

### Extraction Process

**Overburden Removal:** A location will be selected for the first stage of sand removal. This location is referenced on the Site Plan as Phase 1. Within this location, topsoil and overburden are removed to expose the sand deposit by means of appropriate earthmoving equipment. Overburden is defined as any earthen material lying above the aggregates. Topsoil and overburden will be used to grade the site as necessary. Excavation will be no closer than 50 feet from any property line. Overburden will be retained for use in reclamation with any excess materials stockpiled and available for resale.

**Extraction:** Excavation will continue until the water table is exposed. At this point. the material will be dredged from the pit, pumped to the processing plant.

### Material Processing:

As sand is extracted, it is pumped to the plant for processing. Through plant processing, sand will be sorted by particle size and blended to make a quality product that can be used in concrete, asphalt, ice control, masonry, glass, insulation or specifications provided for a particular project.

The processing plant uses water from the excavated lake to wash sand over a series of screens separating the material into different classifications of material. The processing plant contains vibrating screens with various size of openings. After the material is sorted, these materials will be stockpiled via radial stackers or front end loaders. Pea gravel, river rock will also be stockpiled.

Water used during the operations will be diverted either to a sedimentation pond where solids suspended in these waters can settle out or in the event the material is of a coarser nature will return directly to the excavated lake.

With wet processing, we would expect minimal dust to be created during the process. Dust exposure is monitored by Mine Safety Health Administration to assure minimal risks to our employees and therefore also to surrounding areas.

Noise levels are monitored, as well, by MSHA for assurance the decibel levels do not exceed the safety standards.

### Material Handling

Finished material is conveyed to stockpiles consisting of various grades fine aggregates. The primary stockpiles are generally 30-40 feet tall. Stockpiles will vary in height. The material will be transported by trucks. The trucks are loaded either by a conveyor / bin or a front end loader, weighed to assure the truck weight is approximately the requested weight or within the legal gross tagged weight, ticketed and then travel to their destination.

Existing access roads will be maintained to promote drainage thus preventing excessive erosion or tracking of mud onsite or offsite. The approximate location of existing access roads, stockpiles, scalehouse and main entrance are shown on the Site Plans.

## Reclamation

Reclamation for an off-river dredging operation occurs over the entire lifespan of the operation as the excavated lake reaches its limits. Reclamation involves the restoration of the perimeter of the mining site, leaving a permanent body of water. The reclamation plan will include the placement of fill material along the bank to create a uniformly sloped and stabilized bank to create an area that can be vegetated and maintained. Reclamation plans must be submitted, approved and annually monitored by the State Conservation Commission.

Phased excavation schedules have been provided on the Site Plan. These schedules are approximations and will vary due to the economic demand, the variability of the deposits and the desire to maintain the current agriculture as long as feasibly possible. Similarly, an approximate reclamation schedule has been provided on the Reclamation Plan. Annual reporting to the State Conservation Commission monitors "affected" acreage and any changes to the reclamation plan.

Since reclamation is performed when the excavated lake has reached its limits for the specific phase, it is not uncommon for the first reclamation to occur up to 10 years following the beginning of the operation.

When extraction operations at this site are complete, the final reclamation will include the restoration of all remaining banks, the removal of the processing plant, scalehouse, scales and all other associated equipment and buildings from the site. The processing plant and stockpile areas may be returned to agricultural land or other uses that will be beneficial to the property or owner.

## Local, State and Federal Requirements

Penny's will adhere to all applicable State and Federal Requirements / Regulations. Each required State and Federal permit for this project, will be obtained prior to the commencing of operations which the specific permit regulates. As these permits are obtained, copies will be submitted to the Douglas County Planning Department.

### U.S. Army Corps of Engineers:

**Clean Waters Act** – The U.S. Army Corps of Engineers requires a Section 404 Permit for the discharge of dredged or fill materials into the Waters of the U.S. (regulated rivers, streams, lakes, wetland areas, etc.). This facility is an off-river operation and does not discharge into Waters of the U.S. An official wetland delineation has not been performed for this site. There exists potential wetland areas within the project boundaries, which have been delineated based on aerial photography and site visits. All operations are designed to have no impact on the potential wetland areas. A 50-foot buffer has been provided to ensure the project does not encroach upon potential wetland areas. Therefore, a permit application will not be filed with the U.S. Army Corps of Engineers as pertaining to Section 404 of the Clean Waters Act.

**Excavation Near a Levee** - There are no levees along the Kansas River near this project, therefore, there will be no excavation within the Critical Area of the levee and no permitting will be required.

### Kansas Department of Agriculture – Division of Water Resources:

**Water Structures** – DWR Water Structures Section requires that, per K.A.R. 5-43-5 of the Rules and Regulations (K.S.A. 82a-012 to 305a), a minimum setback of 50 feet be maintained from the bank of a channel to any sand dredging operations located outside the channel of any stream. A natural riparian buffer currently exists between the northern boundary of the project and the Kansas River. The minimum width of this buffer is approximately 300 feet. The buffer is to remain intact undisturbed.

**Water Appropriation** - DWR Water Appropriation Section requires an Application for Approval to Change the Place of Use, The Point of Diversion or the Use Made of the Water under an Existing Water Right. There will be no new uses or change of uses of water rights associated with this project. DWR Water Appropriation Section requires permits for all sand and gravel pits in townships where the net average annual potential for net evaporation is greater than 18 inches per year. The potential net evaporation for this site is approximately 6 inches per year; therefore, this permit will not be required. DWR also requires a Notice of Intent to Open or Expand a Sand or Gravel Pit Operation. This NOI has been requested.

**Floodplain Management** - DWR Floodplain Management Section will require a permit for the placement of fill within the floodplain per K.A.R. 5-45 of the Rules and Regulations (K.S.A. 24-126). All permanent fills and unconsolidated mass storage stockpiles located within the floodway require approval from the Chief Engineer with 'no-rise" certification.

**Kansas Department of Health and Environment:**

**Stormwater and Erosion Protection** – An erosion control plan for construction will be filed with KDHE and a permit will be required under the Kansas General Permit for Stormwater Runoff Associated with Construction Activities. An application for permit will be filed following approval of the Conditional Use Permit.

Because of the industrial nature of the project, a permit will be required for all stormwater runoff originating from an industrial activity. Penny's will develop and implement a Stormwater Pollution Prevention Plan for the site, to be reviewed and approved by KDHE. An application for permit has been requested.

The predominance of stormwater from onsite will drain back into the water body created by the extraction process. Stormwater from offsite shall be conveyed to the existing wetland areas, as occurs in the existing condition, and will only be allowed to enter the excavation pond during flooding events.

**Water** – Currently Penny's is permitted for an onsite well used for irrigation. When it is time for the plugging or elimination of this well, the KDHE Bureau of Water – Geology Section will be contacted and the proper paperwork will be filed.

**Fugitive Dust** – Penny's will utilize water trucks and apply dust suppressants to control fugitive dust within the site as needed. However, since the product processed in this operation is drawn from a body of water, the typical need for dust suppressant in minimal.

**State Conservation Commission:**

**Mining Permit/License** – The proposed site is subject to the "Surface Mined Land Conservation and Reclamation Act", K.S.A. 49-602 *et seq*. Penny's holds License No. 95-064, which must be renewed annually. The current license expires December 31, 2012.

**Mine Registry** - As required by State law, this site will be registered with the SCC prior commencing with the mining process. Penny's will file an application to register the site as a mine site with the SCC following approval of the CUP.

**Reclamation Bonding** – As required by State law, license holders are required to post a bond or other acceptable financial security to the SCC and a Reclamation Plan, detailing the post-mining land use and the reclamation process, must be filed and approved by the SCC prior to any mining taking

place on the proposed mine. The bond application / letter of credit will be filed with the SCC upon approval of the CUP.

**Department of Wildlife and Parks**:

**Action Permit** – A request will be made to the Kansas Department of Wildlife and Parks for an environmental review of the site for potential endangered species or critical habitats. Based on the findings of the review, the need for an action permit will be determined. KDWP may also request additional review from the Department of the Interior or the U.S. Fish and Wildlife Service.

**Environmental Protection Agency**:

**Spill Prevention, Control and Countermeasure Plan** – Penny's may maintain a fuel tank for fueling loaders used for the loading of sand into trucks. Fuel for the dredge will not be stored onsite. Fueling of the dredge will be performed by fuel stored offsite. Other fuel or petroleum-based products used for generators or maintenance will occur in amounts smaller than 55 gallons, which is the minimum container size that that is required to be documented in an SPCC Plan. Overall, the amount of petroleum-based materials stored at this site will not exceed the levels (1,320 gallons) required by the EPA for implementing an SPCC Plan.

**Operation Times:** Typically hours of operation would be Monday – Friday 6:30 AM – 6:30 PM. There may be extenuating circumstances which would require Penny's to maintain operating hours on Saturdays or to extend the normal hours of operation due to the nature of the construction business. Many clients, including State agencies and City governments require construction activities to be completed at odd hours for the safety of the general public. Weather conditions and / or the necessity to provide materials for the hazardous conditions as it relates to snow and ice to state and local agencies may also result in the need to extend hours of operation. Projects / contracts may have such stringent completion dates and / or penalties for exceeding working days it would necessitate the extension of hours of operation.

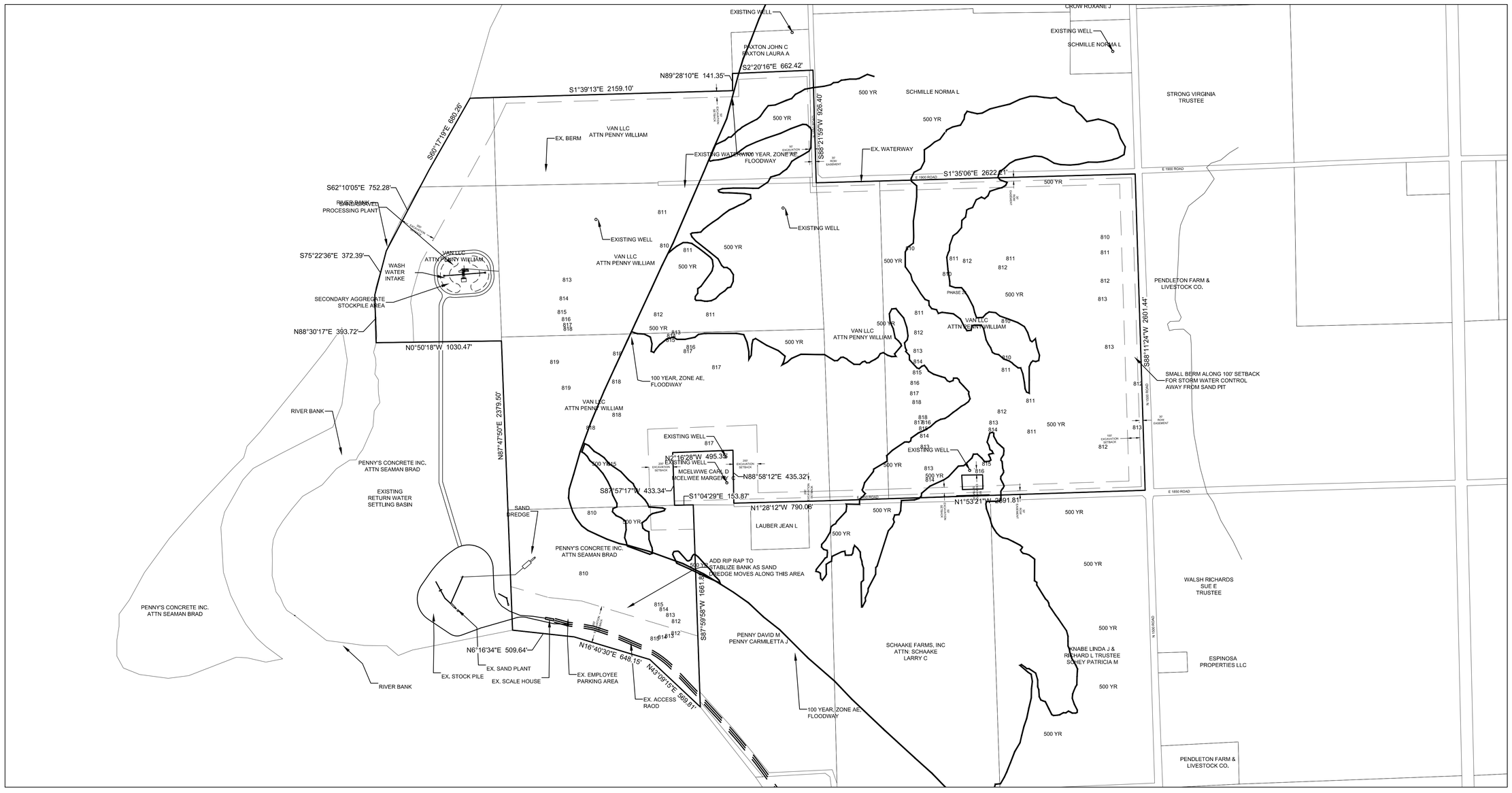
**Overburden Placement:** During the initial stage of the operation, overburden removed from the excavation area will be used in raising the grade of the processing plant and scalehouse areas and for berms as required. As the excavated lake pond expands into future stages, overburden will be stockpiled at locations deemed beneficial to the reclamation effort, sold, or used to restore the banks of the body of water established by the previous stages.

**Operation Life Expectancy:** Based upon current economic conditions, the expected life of this project would be 30+ years.

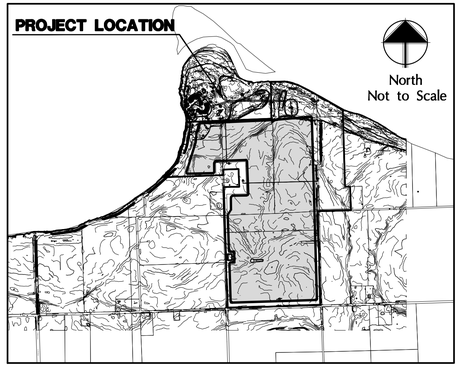
**Plan of Response to a Major Flooding Event:** Penny's will prepare a plan of action, which would be implemented immediately upon notification that a flood event may occur . The plan will include the removal of all equipment, materials and bulk fuel that is not stationary. The scalehouse, scales and processing plant will remain. Non-stationary items that will be removed will include, but are not limited to, loaders, vehicles, fuel supplies, generators, and any electronic equipment or office materials in the scalehouse.

**Power and Fuel Supply:** The scalehouse and processing plant will be electrically powered by the Westar Energy lines. The dredge will be diesel-powered. The site fuel supply for the loader and/or generators will be limited to 1,000 gallons. The fuel will be stored in an aboveground storage tank with secondary containment. The fuel pump will be controlled with a power switch located within the scalehouse. The pump will be turned off during non-business hours. Dredge fueling will be performed by fuel from offsite.

**Stormwater Runoff:** All stormwater falling around the scalehouse, processing plant or stockpiles will be kept on site. The site will be completely non-discharging, with no stormwater leaving the site. Stormwater from offsite shall be conveyed to the existing wetland areas, as occurs in the existing condition, and will only be allowed to enter the excavated lake during flooding events. Any increases in stormwater runoff due the increased impervious surfaces will be substantially offset by the storage capabilities of the excavated lake.




## Location Map




## Legal Description

A TRACT OF LAND LOCATED IN PORTIONS OF SECTIONS 25, 26, 35 AND 36 IN TOWNSHIP 12 SOUTH, RANGE 20 EAST OF THE 6TH PRINCIPAL MERIDIAN, IN DOUGLAS COUNTY, KANSAS, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHWEST CORNER OF THE SOUTHEAST QUARTER OF SECTION 35, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE NORTH, ALONG THE WEST LINE OF SAID QUARTER SECTION TO THE CENTER OF SAID SECTION 35, THENCE NORTH ALONG THE WEST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 35, 765.00 FEET TO THE SOUTHWEST CORNER OF A TRACT RECORDED IN BOOK 307, PAGE 487; THENCE EAST 442.00 FEET ALONG THE SOUTH LINE OF SAID TRACT; THENCE NORTH 492.00 FEET ALONG THE EAST LINE OF SAID TRACT; THENCE WEST 442.00 FEET ALONG THE NORTH LINE OF SAID TRACT TO THE WEST LINE OF THE NORTHEAST QUARTER OF SECTION 35, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE SOUTH ALONG SAID WEST LINE, 126.40 FEET TO THE SOUTH LINE OF THE NORTH 77 ACRES OF THE EAST 134 ACRES OF THE NORTHWEST QUARTER OF SAID SECTION 35, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE WEST ALONG THE SOUTH LINE OF THE NORTH 77 ACRES TO THE EAST BANK OF THE KANSAS RIVER; THENCE NORTHEASTERLY, ALONG SAID EAST BANK, TO THE NORTH LINE OF SECTION 35, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE EAST, ALONG THE NORTH LINE OF SAID SECTION 35, TO THE SOUTHWEST CORNER OF THE EAST 11.53 ACRES OF GOVERNMENT LOT 1 IN SECTION 26, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE NORTH, ALONG THE WEST LINE OF SAID EAST 11.53 ACRES, TO THE SOUTH BANK OF THE KANSAS RIVER; THENCE EASTERLY, ALONG THE SOUTH BANK OF THE KANSAS RIVER, TO THE WEST LINE OF SECTION 25, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE CONTINUING SOUTHEASTERLY, ALONG THE SOUTH BANK OF THE KANSAS RIVER, TO THE NORTHWEST CORNER OF A TRACT RECORDED IN BOOK 1056, PAGE 5024, SAID POINT LYING 739.2 FEET EAST OF THE WEST LINE OF THE NORTHWEST QUARTER SECTION 36, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE SOUTH, ALONG THE WEST LINE OF SAID TRACT, AND PARALLEL TO THE WEST LINE OF THE NORTHWEST QUARTER OF SECTION 36, TOWNSHIP 12 SOUTH, RANGE 20 EAST TO A POINT 151.78 FEET WEST OF THE NORTHWEST CORNER OF THE TRACT RECORDED IN BOOK 1000, PAGE 3430; THENCE EAST 151.78 FEET TO THE NORTHWEST CORNER OF SAID TRACT; THENCE SOUTH 660 FEET, ALONG THE WEST LINE OF SAID TRACT, TO THE SOUTH LINE OF THE NORTHWEST QUARTER OF SECTION 36, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE WEST ALONG SAID SOUTH LINE, 890.98 FEET TO THE SOUTHWEST CORNER OF THE NORTHWEST QUARTER OF SECTION 36, TOWNSHIP 12 SOUTH, RANGE 20 EAST, ALSO KNOWN AS THE NORTHEAST CORNER OF THE SOUTHEAST QUARTER OF SECTION 35, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE SOUTH, ALONG THE EAST LINE OF SAID SOUTHEAST QUARTER TO THE SOUTHEAST CORNER OF SAID SECTION 35, TOWNSHIP 12 SOUTH, RANGE 20 EAST; THENCE WEST, ALONG THE SOUTH LINE OF SAID QUARTER, TO THE POINT OF BEGINNING. CONTAINS 465 ACRES, MORE OR LESS.

SCALE: 1" = 400'

400 200 0 400 800

*FLOODWAY AND 500 YR EXHIBIT*

# *Penny Sand Lawrence Facility*

*Douglas County, Kansas*

**Civil Engineering**
**Landscape Architecture**
**Community Planning**
**Surveying**

1310 Wakarusa Drive
Lawrence, Kansas 66049
tele (785)843-7530
fax (785)843-1570
email: info@landplan-pa.com
Web: www.landplan-pa.com

**Landplan Engineering, P.A.**
**Lawrence, KS • Kansas City, MO • Manhattan, KS**
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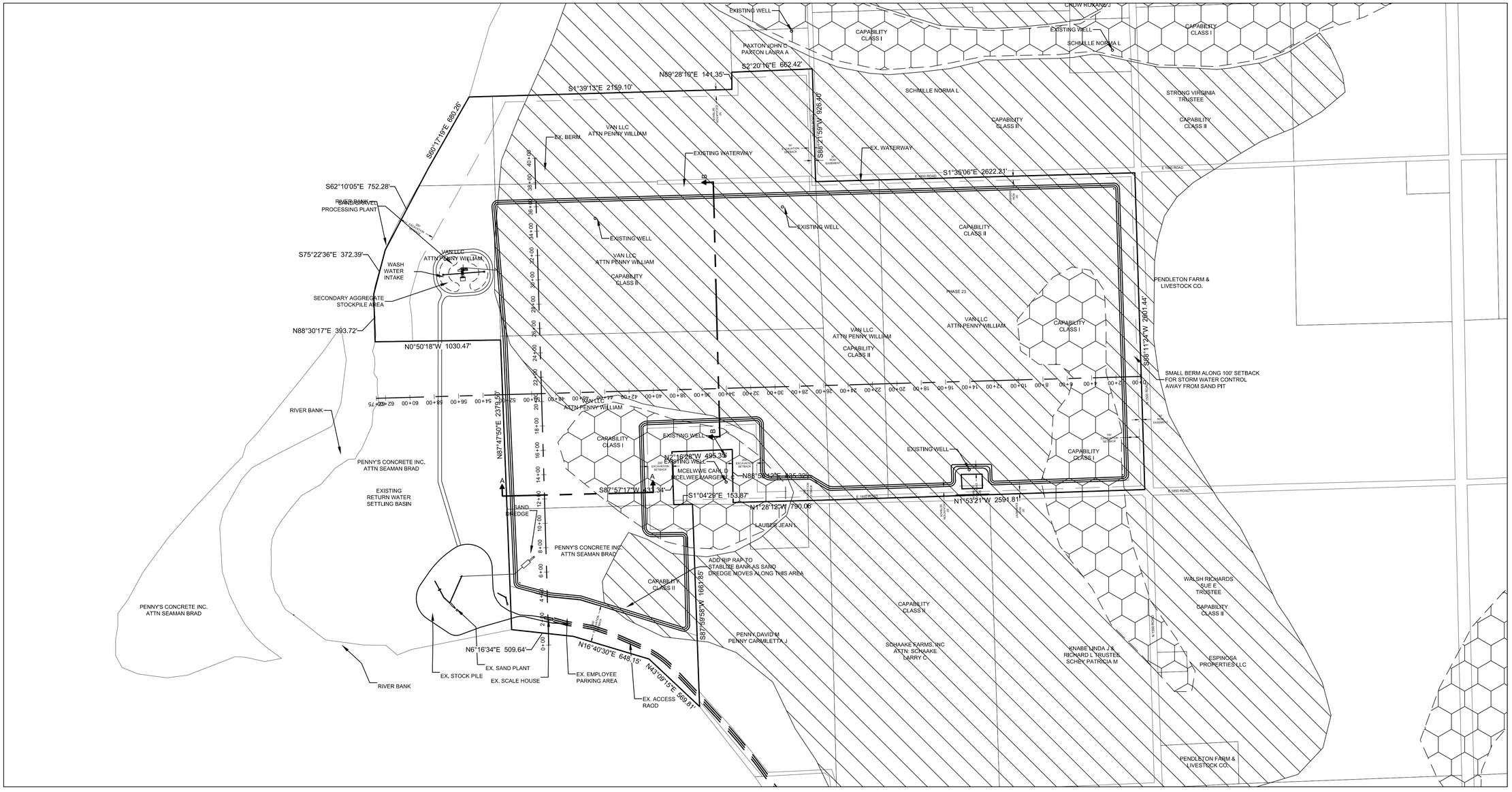
**PENNY SAND FACILITY**
**FLOODWAY AND 500 YR**
**EXHIBIT**

| REV | DATE | DESCRIPTION |
|---|---|---|
| | | |

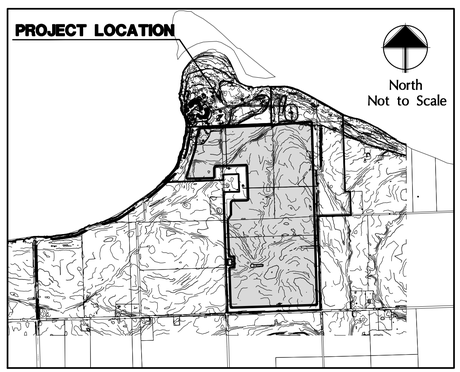
| | |
|---|---|
| DATE: | 7.2.12 |
| PROJECT NO.: | 20121146 |
| DESIGNED BY: | CLM |
| DRAWN BY: | CLM |
| CHECKED BY: | CLM |

| ISSUE | SHEET NO. |
|---|---|
| A | C-003 |

OF 3 SHEETS




## Location Map

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SCALE: 1" = 400'

400 200 0 400 800

*HIGH QUALITY AGRICULTURAL LAND EXHIBIT*

# *Penny Sand Lawrence Facility*

*Douglas County, Kansas*

**Civil Engineering**
**Landscape Architecture**
**Community Planning**
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1310 Wakarusa Drive
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tele (785)843-7530
fax (785)843-7555
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**PENNY SAND FACILITY**
**HIGH QUALITY AGRICULTURAL LAND EXHIBIT**

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| ISSUE | SHEET NO. |
|---|---|
| A | C-002 |

OF 3 SHEETS

# Evaluation of Penny's Concrete and Sand LLC,

# Proposed Sand Pit Operation on Ground Water

## For the Lawrence Facility

**For**

**Penny's Concrete and Sand LLC**

**23400 West 82nd Street**

**Shawnee, Kansas**

**By**

**Carl E. Nuzman, P.E., P.Hg.**

**Consulting Engineer/Hydrogeologist**

**3314 NW Huxman Road**

**Silver Lake, KS 66539**

**Phone 785 224 9929**

**September 12, 2012**

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# Evaluation of Penny's Concrete and Sand LLC,

# Proposed Sand Pit Operation on Ground Water for the Lawrence Facility

## 1. INTRODUCTION

A study and evaluation was made of the aquifer characteristics of the Kansas River Valley alluvial sediments in the vicinity between Lawrence, KS and Eudora to determine if any detrimental effects will occur to the existing wells in the vicinity of the proposed sand mining operation. Penny Concrete and Sand proposes to establish a pit to mine sand located in the East ½, and the NE¼ of the NW ¼ of Section 35 excluding two outparcels, the West 60 acres of the West ½ of the NW ¼ of Section 36, and a portion of the SE¼ of the SE¼ of Section 26, all in Township 11 South, Range 20 East in Douglas County, Kansas. Shown on Exhibit A is the conditional use permit (CUP) area where the proposed sand pit is located and wells registered with the Division of Water Resources Kansas Department of Agriculture.

## 2. GEOLOGIC SETTING

A study was made by Alvin E. Dufford of the Quaternary Geology and Ground-Water Resources of the Kansas River Valley between Bonner Springs and Lawrence. The results of his work were published by the University of Kansas for the Kansas Geological Survey in Bulletin 130, Part 1, in 1958. The Wakarusa River hugs the south edge of the valley while the Kansas River stays close to the north edge of the valley, narrowing as the valley approaches Eudora from the west.

The Kansas River valley has a general eastward slope of about 3 feet per mile with low dissected hills bounding the flood plain on both sides. The Kansas River valley alluvium merges with the Wakarusa River valley alluvium near the center of Section 10, Twp 13 South, Range 20 East in Douglas County, Ks. The valley alluvium that comprises the aquifer consists principally of sand but contains lenses of both coarser and finer material. Generally, the saturated thickness of the aquifer is about 40 to 50 feet thick in the deepest part of the valley but thins to about 20 feet in the vicinity in the saturated thickness, in the proposed sand mining operation. Bed roc elevation in the area was defined by Stuart W. Fader in Ground Water in the Kansas River Valley, Junction City to Kansas City, Kansas in Bulletin No. 206, Part 2.

Well logs of selected wells in the area are given in Appendix I from the WWC-5 forms filed with the Kansas Geological Survey water well log file in Lawrence, KS. Exhibit B, is a geologic west to east cross-section along North 1500 Road showing the geology profile in that area. Static

water levels given on the well log reports do not reflect average conditions of the aquifer. Static water levels can vary several feet with changes in precipitation in the area. The static water levels will be higher during periods of normal or above normal precipitation and will decline during periods of drought. Static water levels given in the WWC-5 reports may not have been allowed to completely stabilize after pumping.

## 3. HYDROLOCIC SITUATION

The Eudora area has a humid continental climate. Normally, more than 70% of the annual precipitation falls during the growing season from April through September. Precipitation during this period is usually from thunderstorms ( high intensity rainfall of brief duration) in the evening and early morning hours. The mean hourly wind speed is about 10 miles per hour usually from the south or southwest, and the sun usually shines more than 60% of the daylight hours.

The Kansas River which flows in an easterly direction is the principal stream in the area. The Army Corps of Engineers normally maintains a minimum desirable stream flow of 1,000 cubic feet per second at the DeSoto gaging station on the Kansas /river. The Wakarusa River is hydrologically an important tributary stream because it is a major source of recharge to the alluvial aquifer, especially in the vicinity of major well fields.

## 4. SAFE YIELD ANALYSIS

The safe yield available for appropriation from an unconfined aquifer at a specific location is determined by the amount of average annual precipitation that becomes recharge to the aquifer occurring within the area of consideration by the Chief Engineer of the Division of Water Resources, Kansas Department of Agriculture. The area of consideration means the portion of the aquifer area that lies within a 2-mile radius from the proposed point of interest, which is the geo-center of the proposed sand pit.

Although a safe yield analysis is not required for a sand pit operation in the Kansas River Basin by the Division of Water Resources, Kansas Department of Agriculture, such an appraisal was made to identify all registered ground water appropriators within a two (2) mile radius of the proposed sand pit operation. There were 15 identified ground water users some of which have multiple water rights on file. All wells registered are given in Appendix II with the well information followed by the owner and their address.

Based on established recharge rate of 9.2 inches per year by the Division of Water Resources, the safe yield for the 2-mile circle comprising and effective area of 6,350 acres is 4,868.33 acre-feet.

The prior appropriations certified in the circle are 4,305.78 acre-feet, with the added permitted appropriated water totaling 5,429.45 acre feet. Only wells 7 and 9 of the City of Eudora are at the edge of 2-mile circle from the geo-centroid of the proposed Penny sand pit.

The City of Eudora's total appropriation of 699 ac-ft or 227.77 MGY for municipal appropriation including future water use for population growth was used in the model given in Exhibits E and F. The maximum authorized diversion rate or pumping in one day is 1.4 million gallons per day. Exhibits E and F show the proposed Penny sand pit will not affect the City of Eudora wells in any way. The over appropriation of water in the area is up-gradient from the City wells and serves to intercept any ground water contamination that may exist in the capture zone of the City of Eudora wells identified in Exhibit F.

## 5. AQUIFER PROPERTIES

You do not get water from a well. A well is a stabilized hole in the ground to gain access to water bearing material called an ***aquifer***. The yield of an aquifer is controlled by the permeability of the geologic formation and the saturated thickness of that permeable formation. The yield of a well can never be greater than that of the aquifer and usually less depending upon the efficiency of well construction and development. A well can decrease in yield due to biological fouling and lack of proper maintenance but unless the static water level has a substantial decline reducing the saturated thickness, the yield available from the aquifer remains constant.

Data from the WWC-5 report for City Well No 8, shown in Appendix I was used to estimate the properties of the aquifer. The reported drawdown was 4 feet after 11 hours of pumping at 521 gallons per minute (gpm). These values give a well specific capacity of 130 gpm/foot of drawdown when constructed. This value is used to estimate the transmissivity of the aquifer which is estimated to be 220,000 gpd/ft. Utilizing the 25 feet of well screen installed which is less than the formation thickness; the calculated formation permeability is 8,800 gpd/ft$^2$, a very good formation value. Typical average value of formation permeability for the Kansas River valley alluvium is about 5,000 gpd/ft$^2$, with a maximum value observed of 10,000 gpd/ft$^2$. Additional data was found for City wells No. 6 and No. 7. The original specific capacity for well No. 6 was 101.7 gpm/foot of drawdown. The estimated formation transmissivity of the aquifer at well No. 6 location is 172,900 gpd/ft. The original well specific capacity for well No. 7 was 126.8 gpm/ft which gives an estimated formation transmissivity of 215,600 gpd/ft. An average transmissivity value of 210,000 gpd/ft was used to model the aquifer in Exhibits 6 and 7. This value under estimates the transmissivity in the deeper portions of the aquifer and over estimates the transmissivity near the boundaries of the aquifer. The 210,000 gpd/ft is in the same range that was determined by S. W. Fader in Bulletin No. 206, part 2, figure 7.

When a well is pumped, the pump energy creates a partial vacuum that causes a cone of depression to develop around the bore hole. The bore hole for the construction of Well No. 8 was reported to be 42 inches which gives a well radius of 1.75 feet. Using the formation transmissivity value of 220,000 gpd/ft, the drawdown per log cycle was calculated to be 1.0 foot for a pumping rate of 325 gpm, which is the maximum authorized pumping rate established for well No. 6. This information was then plotted on a semi-log plot to obtain the radius of influence for well 6, well 7 and well 8, Reference Exhibit C. The zero (0) drawdown for wells 6 & 7 was 2,400 feet and 2,100 feet for well 8. Drawdown values of less than 1 foot are considered insignificant since annual variations of static water level may vary more than 2 feet in a year due to weather conditions. The 1-foot drawdown occurs at a radius from about 130 to 260 feet for each of the wells shown in Exhibit C. The basic assumptions in the calculations for Exhibit C assume the world is flat and the aquifer properties are ideal. The approximate 1,000 feet distance between City wells minimizes the mutual interference effects from simultaneous pumping of these wells.

## 6. AQUIFER WATER YIELD AND AREA OF WATER CAPTURE

Simple model system was developed using the analytical-element method often used in modeling well-head protection. The State Geological Survey of Kansas had experienced geologists investigate the Kansas River valley geology and ground water resources from Bonner Springs to the vicinity of Manhattan. The reach of special interest is contained in Bulletin 130, Part 1, Quaternary Geology and Ground-Water Resources of Kansas River Valley between Bonner Springs and Lawrence, Kansas. At that time, the Kansas Geological Survey had their own small drilling rig in which to drill test holes. Many of the data points used in the model were from this work dated back to the 1940's and 1950's.

Figure 3 in Bulletin 130, Part 1 is the basis for the development of Exhibit D, a generalized static water table of the area of interest. In the 1950's there was little or no large pumpage in this area of interest which gives a good representation of pre-development conditions for the aquifer. Since the measurements upon which Figure 3 was based occurred over a period of years, exact replication of the water level elevations was not possible. Using statistical analysis, a very reasonable simulation of the water table gradient was obtained.

The model was then used to simulate the probable maximum pumping rate of 1.4 million gallons per day to obtain the area of direct influence of the City of Eudora well field. You will note that the area of 1 foot drawdown for the City of Eudora's peak pumpage is not circular but somewhat egg shaped extending more up-gradient to the west than to the east. Average annual pumping rate is estimated at 60% of peak day rate. Thus the development of the drawdown simulated in Exhibit E is a representation of the maximum drawdown expected in the future.

A feature of the model called particle tracking was then used to plot the movement of water in the aquifer to each of the four wells shown in Exhibit F. Based on the maximum allowable pumpage of 227.77 MGY authorized by the City's water rights on file with the Division of Water Resources, the travel time of water in the aquifer was calculated. The time period selected was 25 years. Each little collar around the straw like flow path lines represents one (1) year of flow. Due to the hydraulic gradient of the valley aquifer system and recharge to the aquifer from rainfall, **the aquifer flow to the City wells is from the west-southwest.** The Penny sand pit will be a half mile north of the capture zone of the City wells and will have no influence on the Eudora public water supply wells.

## 7. WELL-HEAD PROTECTION STUDY

The City's concern in regard to protecting the future quality of water from their well field must focus on the area in the immediate vicinity of the wells and to the west of the wells.

In so far as contaminants in the aquifer, the water movement is from west to east in a down-gradient direction. The estimated travel time of water in the Kansas River alluvium aquifer, based on the general formation transmissivity and land surface gradient is about 0.7 feet/day or 8.4 inches per day, a very slow migration rate.

Several potential contamination sources, given in Appendix III, have been identified that could potentially threaten the water quality of the Eudora well field:

a. Septic tanks at the several domestic residences in the vicinity are each a potential threat to the water quality of the City wells.

b. To the east of Well No. 6 near the point of stagnation is or was a cattle feeding operation with livestock present as shown in Appendix III.

c. Chemical fertilizer and herbicides applied to corn planted next to the wells as shown next to Well No. 6 in Appendix III, are a potential threat of contamination to the City wells. This threat of contamination is increased with irrigation, especially on sandy soils. Major portions of Hall and Merrick Counties in Nebraska have nitrates nearly double that of the KDHE and EPA regulations for Nitrates in public water supply due to irrigation and chemigation of corn on sandy loam soils similar to the alluvial soils shown in Bulletin 206, Part 2, Ground Water in the Kansas River Valley Junction City to Kansas City, Kansas by Stuart W. Fader. The Newman Terrace clay loam soils offer more protection of the aquifer from fertilizers.

d. Abandoned wells or old domestic wells that were drilled long ago with thin wall casing that have corroded through the years and were not grout sealed, can allow

storm water runoff to flow directly into the aquifer resulting in direct contamination to the City wells. Such a well may exist west of Eudora Well No. 7 as shown in Appendix III, under the old windmill tower.

The C. McElwee domestic well is up gradient from the sand pit and down-gradient from the Kansas River. Although the property is about 5 acres in area, it is recommended that the set back of the pit mining be 300 feet from his property line. The radius of influence of the domestic well is less than 300 feet and will not be adversely affected by the sandpit.

## 8. SAND PIT OPERATION

The static water level elevation in the sand pit will be about the same as the water surface elevation in the Kansas River. Sand pit lakes that are within the effective radius of influence of a water well support the water production from a well during drought conditions due to the increase of lake water storage which is 5 times greater than the water storage yield capacity of the aquifer itself. This storage yield effect is applicable to any unconsolidated aquifer. Sand pits beneficially support the yield of wells that are down-gradient from a pit that is within the area of influence of a well.

Water pumped by the sand dredge is piped to the sand separator, and then water is diverted to a sediment pond, and returned to the sand pit. Storm water runoff from local precipitation is diverted around the pit. Berms and a grass swale will be provided on the west and south sides of the sand pit for the diversion of local storm water runoff.

## 9. CONCLUSION

The City of Olathe was concerned about their well field more than 20 years ago when Penny Concrete and Sand proposed to open a pit next to their well field. This consultant was contacted by the City of Olathe and reviewed the situation. It was recommended to the City of Olathe at that time to maintain at least 500 feet of aquifer intact between the sand pit and any well. The sand pit shown in Appendix III, directly up-gradient from the Olathe wells has <u>never</u> caused any contamination to their wells. Since that time, more studies have been made both in Kansas and other states and no significant contamination of an aquifer has been attributed to a sand pit in unconsolidated alluvial aquifers.

Present regulations require 200 feet separation between a surface water source and a well to allow normal biological activity of surface water to be filtered before entering the well. It is recommended that a 300 foot set-back be maintained between the property boundary of any

residence out parcel and the active dredging of sand from the pit. The recommended set back from all road right-of way is 100 feet.

It was found in this study that the proposed Penny sand pit lake that will eventually be developed in this study area will have ***absolutely no*** effect on the McElwee wells, Public Wholesale Water Supply District No. 25 or City of Eudora's wells or water supply. The threat of contamination does exist to Public Water Supply wells, but not from the proposed Penny sand mining operation, but from adjacent property to their wells.

# EXHIBITS

**A. Penny Sand Lawrence Facility – Area Plan**

**B. West to East Geologic Cross-Section along N 1500 Road**

**C. Distance-Drawdown Semi-Log Plot of Eudora's Wells No's 6, 7, & 8**

**D. Generalized Static Water Table in Area (From KGS Bull. 130, Part 1)**

**E. Eudora Wells Drawdown at Peak Day Pumpage of 1.4 MGD**

**F. Groundwater Flow Paths to Eudora Wells at 227.77 MGY Pumpage**

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**For the Lawrence Facility**



**For**

**Penny's Concrete and Sand LLC**

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**Shawnee, Kansas**

**By**

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**Consulting Engineer/Hydrogeologist**

**3314 NW Huxman Road**

**Silver Lake, KS 66539**

**Phone 785 224 9929**

**September 12, 2012**

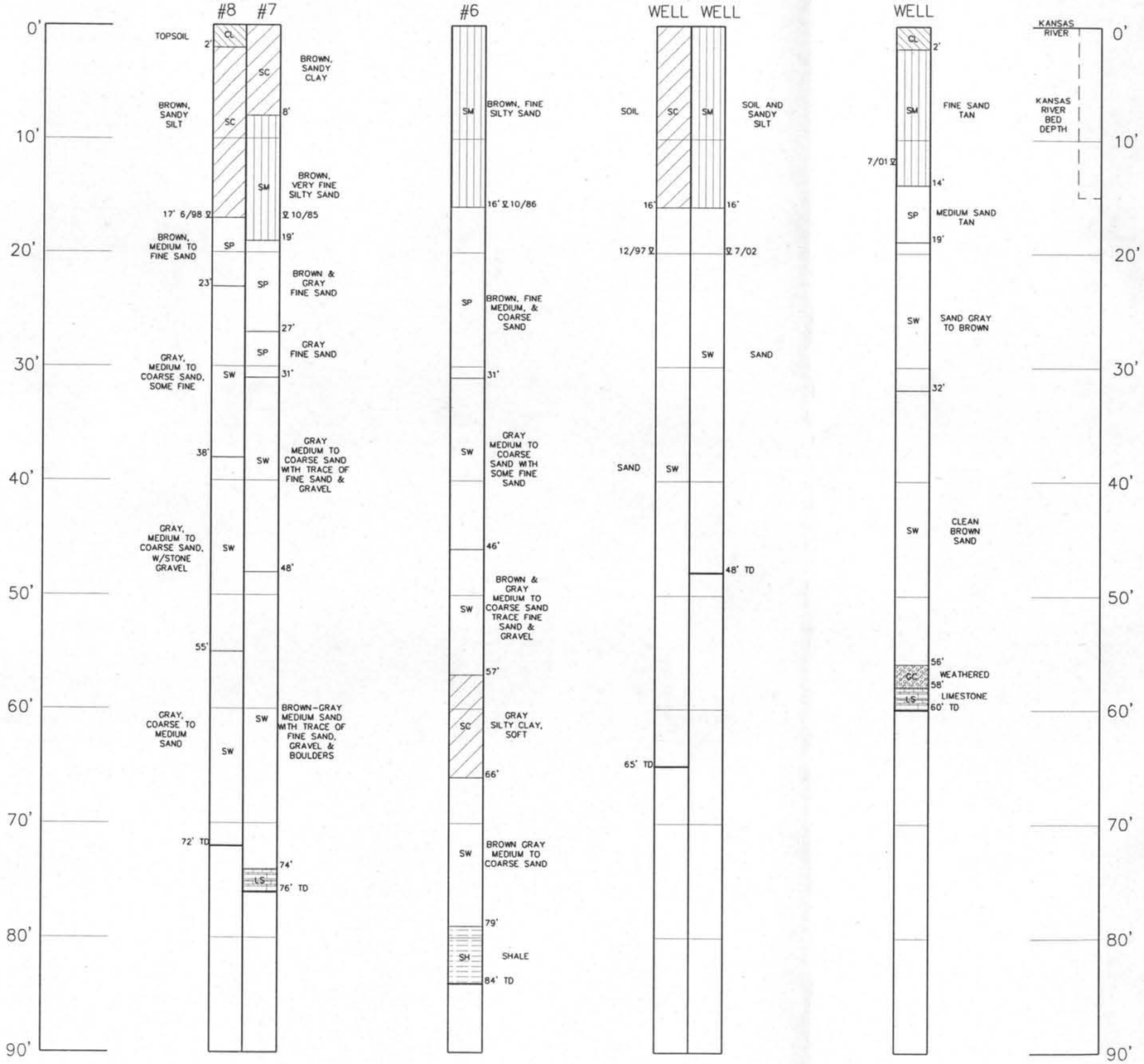

PENNY SAND FACILITY
AREA PLAN

PREPARED 9/13/12

EXHIBIT A

SCALE: 1" = 500'

Landtan Engineering, P.A.




# EXHIBIT B
# WEST TO EAST CROSS SECTION ALONG N 1500 ROAD

PREPARED 9/13/12

SCALE: 1" = 10'

10 5 0 10 20


Civil Engineering
Landscape Architecture
Community Planning
Surveying

**Landplan Engineering, P.A.**
Lawrence, KS • Kansas City, MO • Columbus, OH
The Woodlands, TX • Farmington Hills, MI

1310 Wakarusa Drive
Lawrence, Kansas 66049
tele (785)843-7530
fax (785)843-2410
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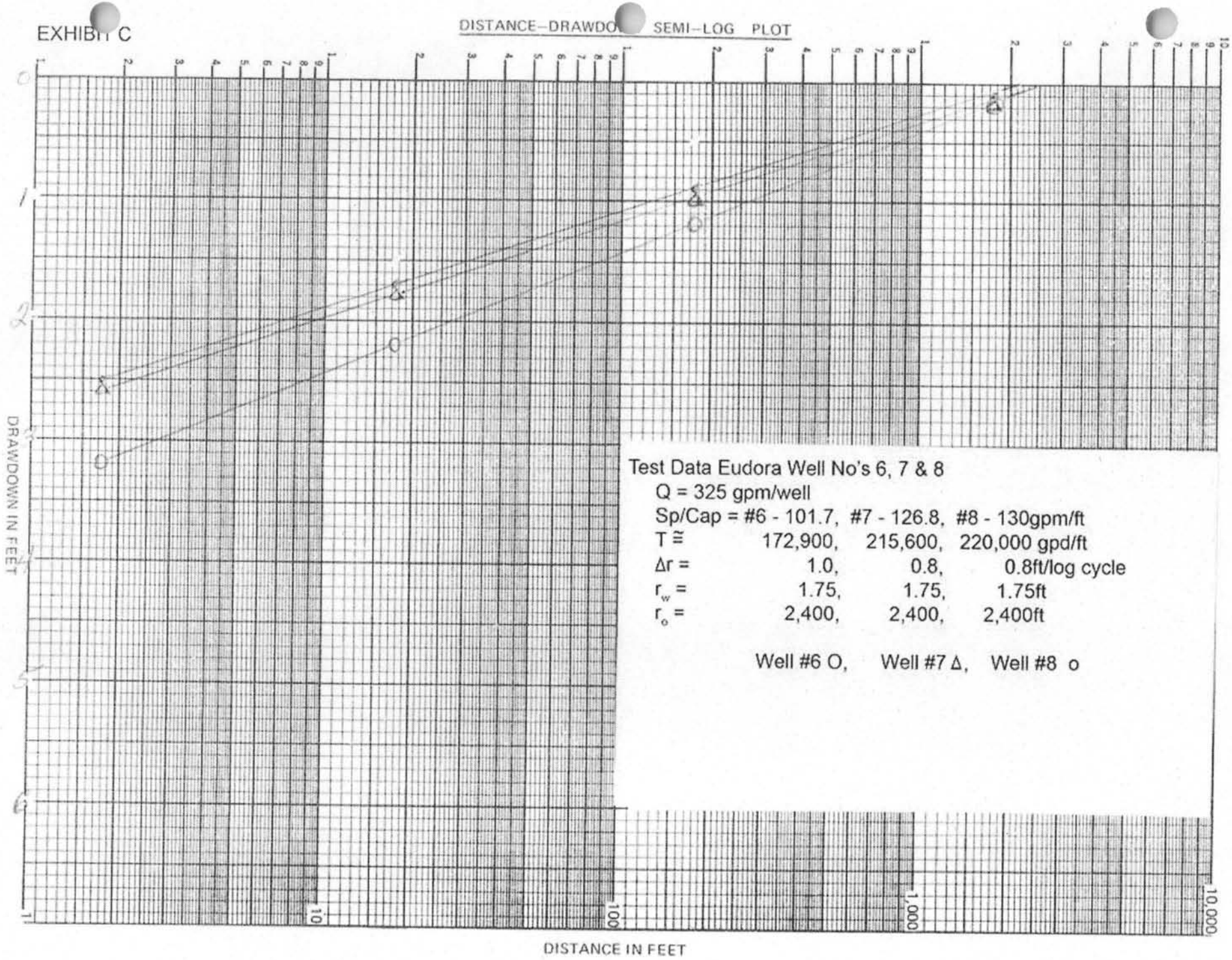
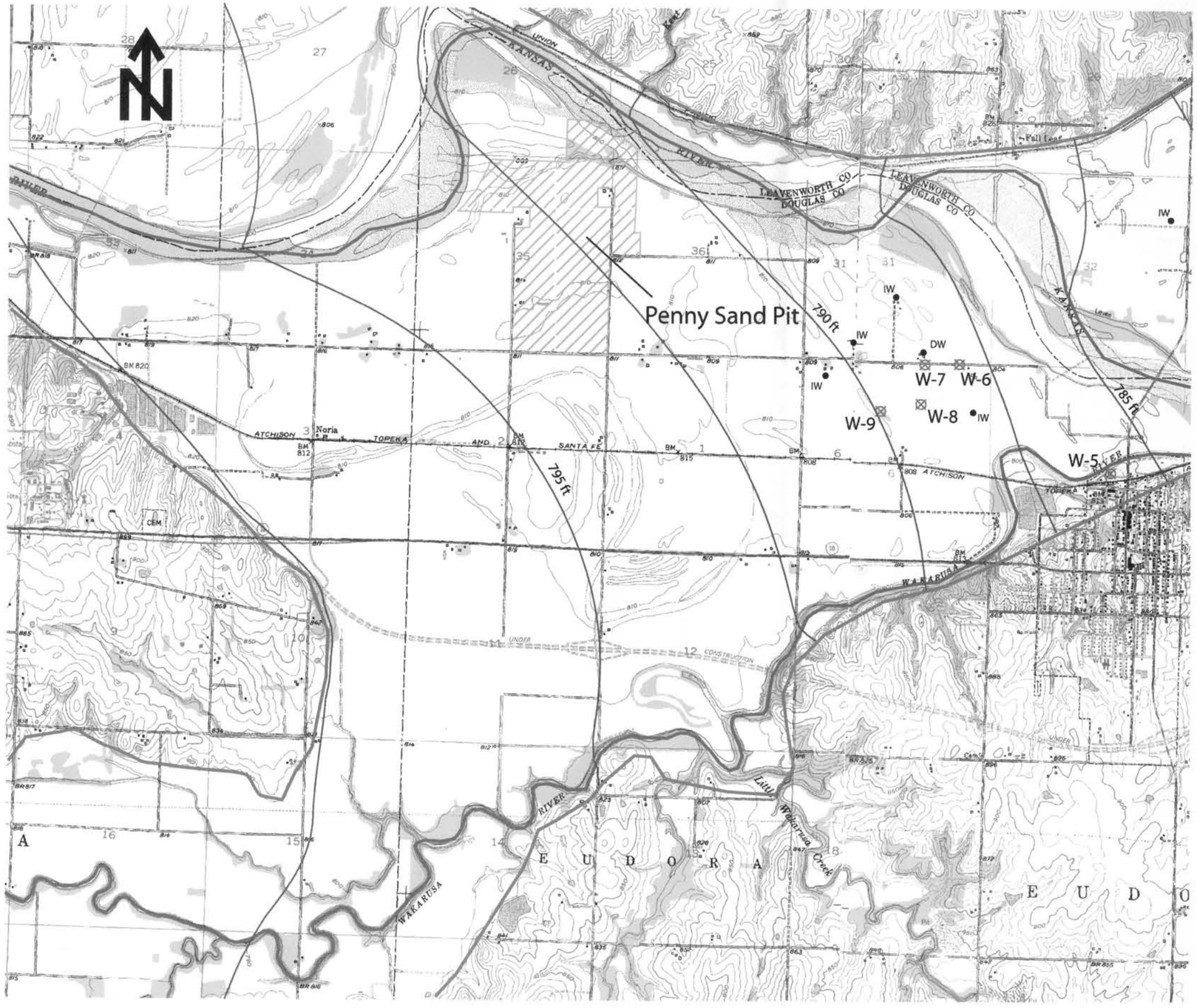
EXHIBIT C


DISTANCE–DRAWDOWN SEMI–LOG PLOT
DRAWDOWN IN FEET
DISTANCE IN FEET
0
1
2
3
4
5
6
10
100
1,000
10,000
Test Data Eudora Well No's 6, 7 & 8
Q = 325 gpm/well
Sp/Cap = #6 - 101.7, #7 - 126.8, #8 - 130gpm/ft
T ≅ 172,900, 215,600, 220,000 gpd/ft
Δr = 1.0, 0.8, 0.8ft/log cycle
$r_w$ = 1.75, 1.75, 1.75ft
$r_o$ = 2,400, 2,400, 2,400ft
Well #6 O, Well #7 Δ, Well #8 o

# Exhibit D:

## Generalized Static Water Table
(Based on data from KGS Bul. 130, Part 1)




### Legend

- River
- Aquifer Boundary
- Water Table Elevation (Contour Interval 2.5 feet)
- W-7 — City of Eudora Water Supply Well
- IW DW — Registered Irrigation or Domestic Well

Approximate Scale

0 0.5 1.0 miles

0 2,640 5,280 feet


# Exhibit E:

Eudora Wells - Drawdown at Peak Day Pumpage of 1.4 MGD

Legend

- River
- Aquifer Boundary
- Water Table Drawdown (Contour Interval 0.5 feet)
- W-7 — City of Eudora Water Supply Well
- IW, DW — Registered Irrigation or Domestic Well

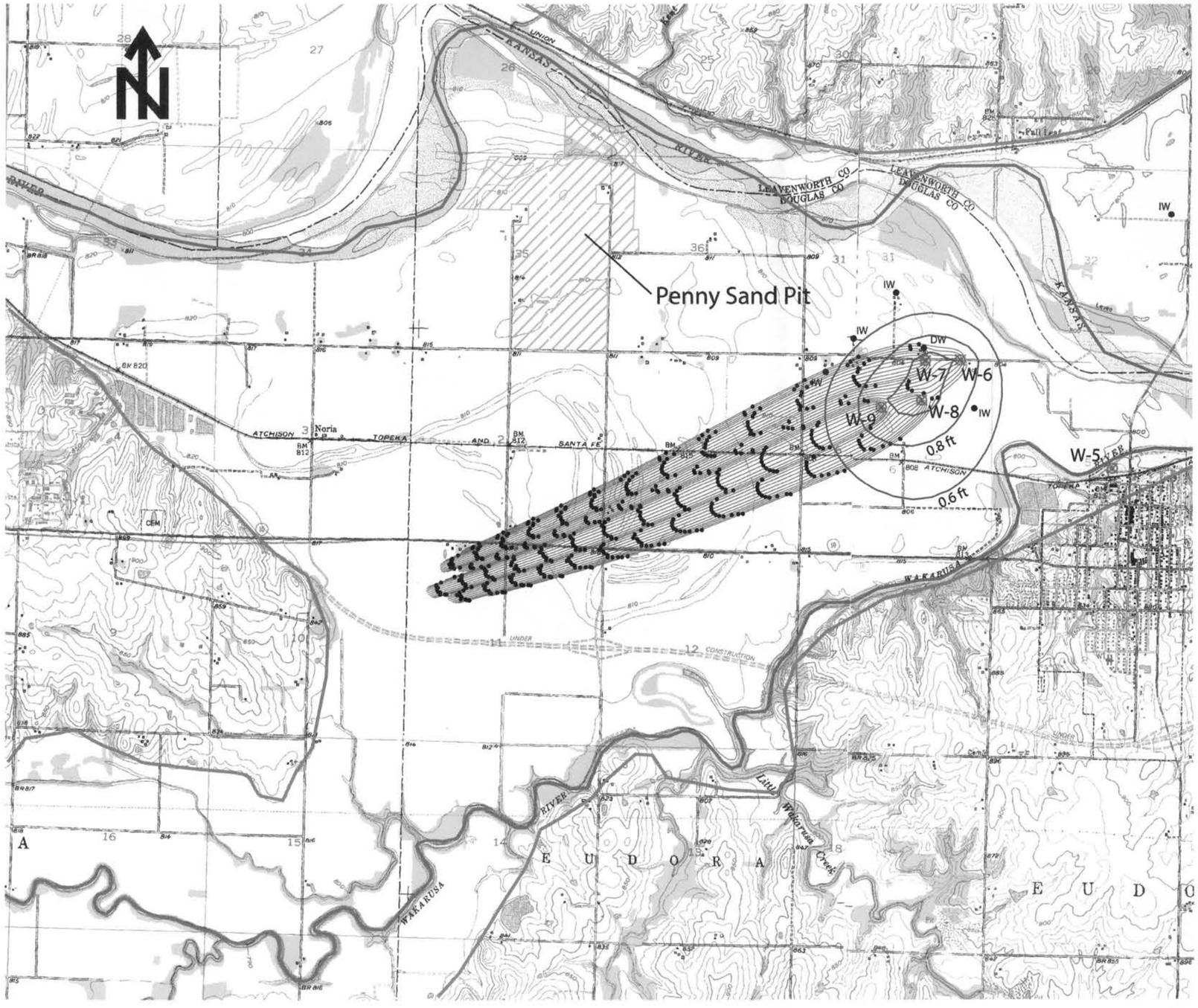
Approximate Scale

0 0.5 1.0 miles

0 2,640 5,280 feet

# Exhibit F:

Groundwater Flow Paths to Eudora Wells at 227.77 MGY Pumpage




## Legend

- River
- Aquifer Boundary
- Water Table Drawdown (Contour Interval 0.2 feet)
- Flowpaths to Pumping Wells (Tick Marks = 2 years travel time)
- W-7 — City of Eudora Water Supply Well
- IW, DW — Registered Irrigation or Domestic Well

Approximate Scale

0 0.5 1.0 miles

0 2,640 5,280 feet

# APPENDICES

I. **Selected WWC-5 Water Well Logs in Study Area**

II. **KDA, Division of Water Resources, Safe Yield Analysis Data**

III. **Potential Pollution Sources in the Area**

IV. **Carl E. Nuzman, Resume' and Personal Information**

# APPENDIX I.

**Selected Water Well Logs from the Kansas Geological Survey Well Log Library for Sections 34, 35, and 36 in Twp 12 South Rng 20 East, Sections 1, 2, 3, 11, and 12 in Twp 13 South Rng 20 East, Section 31 in Twp 12 South, Rng 21 East, and Sections 5 and 6 in Twp 13 South, Rng 21 East, all in Douglas County Kansas.**

14 9883 TW9-09

# WATER WELL RECORD Form WWC-5

Division of Water Resources App. No.

**1 LOCATION OF WATER WELL:** County: Douglas | Fraction: 1/4 SE 1/4 NW 1/4 SE 1/4 | Section Number: 34 | Township No.: T 12 S | Range Number: R 20 ☒ E ☐ W

Street/Rural Address of Well Location; if unknown, distance & direction from nearest town or intersection: If at owner's address, check here ☐

Approximately 2 1/4 miles east of Lawrence

**Global Positioning System (GPS) information:**

Latitude: 38-961011 (in decimal degrees)

Longitude: -95.172574 (in decimal degrees)

Elevation: Unknown

Datum: ☐ WGS 84, ☐ NAD 83, ☒ NAD 27

Collection Method:

☒ GPS unit (Make/Model: WAAS )

☐ Digital Map/Photo, ☐ Topographic Map, ☐ Land Survey

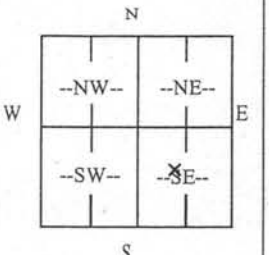
Est. Accuracy: ☐ <3 m, ☒ 3-5 m, ☐ 5-15 m, ☐ >15 m

**2 WATER WELL OWNER:**

RR#, Street Address, Box #: Public Wholesale Water Supply District No. 25, 946 E 650 Rd.

City, State, ZIP Code : Lawrence, KS 66047

3 LOCATE WELL WITH AN "X" IN SECTION BOX:




**4 DEPTH OF COMPLETED WELL** 56 ft.

Depth(s) Groundwater Encountered (1) _____ ft. (2) _____ ft. (3) _____ ft.

WELL'S STATIC WATER LEVEL 24.33 ft. below land surface measured on mo/day/yr 10/01/10

Pump test data: Well water was Not checked ft. after _____ hours pumping _____ gpm

EST. YIELD Unknown gpm. Well water was _____ ft. after _____ hours pumping _____ gpm

Bore Hole Diameter _____ in. to _____ ft., and _____ in. to _____ ft.

WELL WATER TO BE USED AS: ☐ Public water supply ☐ Geothermal ☐ Injection well

☐ Domestic ☐ Feedlot ☐ Oil field water supply ☐ Dewatering ☒ Other (Specify below)

☐ Irrigation ☐ Industrial ☐ Domestic-lawn & garden ☐ Monitoring well Test Well

Was a chemical/bacteriological sample submitted to Department? ☐ Yes ☒ No

If yes, mo/day/yr sample was submitted _____

Water well disinfected? ☒ Yes ☐ No

**5 TYPE OF CASING USED:** ☐ Steel ☒ PVC ☐ Other _____

CASING JOINTS: ☒ Glued ☐ Clamped ☐ Welded ☐ Threaded

Casing diameter 5 in. to 34 ft., Diameter _____ in. to _____ ft., Diameter _____ in. to _____ ft.

Casing height above land surface 24 in., Weight 2.36 lbs./ft., Wall thickness or gauge No. .214

TYPE OF SCREEN OR PERFORATION MATERIAL:

☐ Steel ☐ Stainless Steel ☒ PVC ☐ Other (Specify) _____

☐ Brass ☐ Galvanized Steel ☐ None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE:

☐ Continuous slot ☒ Mill slot ☐ Gauze wrapped ☐ Torch cut ☐ Drilled holes ☐ None (open hole)

☐ Louvered shutter ☐ Key punched ☐ Wire wrapped ☐ Saw cut ☐ Other (specify) _____

SCREEN-PERFORATED INTERVALS: From 34 ft. to 54 ft., From _____ ft. to _____ ft.

From _____ ft. to _____ ft., From _____ ft. to _____ ft.

GRAVEL PACK INTERVALS: From 20 ft. to 57 ft., From _____ ft. to _____ ft.

From _____ ft. to _____ ft., From _____ ft. to _____ ft.

**6 GROUT MATERIAL:** ☐ Neat cement ☐ Cement grout ☒ Bentonite ☐ Other _____

Grout Intervals: From _____ ft. to _____ ft., From 0 ft. to 20 ft., From _____ ft. to _____ ft.

What is the nearest source of possible contamination:

☐ Septic tank ☐ Lateral lines ☐ Pit privy ☐ Livestock pens ☐ Insecticide storage ☒ Other (specify below)

☐ Sewer lines ☐ Cesspool ☐ Sewage lagoon ☐ Fuel storage ☐ Abandoned water well None known

☐ Watertight sewer lines ☐ Seepage pit ☐ Feedyard ☐ Fertilizer storage ☐ Oil well/gas well

Direction from well _____ Distance from well _____

| FROM | TO | LITHOLOGIC LOG | FROM | TO | LITHO. LOG (cont.) or PLUGGING INTERVALS |
|---|---|---|---|---|---|
| 0 | 3 | Topsoil | 54 | 55 | Cemented sand, hard |
| 3 | 14 | Clay, light brown, soft, silty | 55 | 57 | Shale, gray, hard |
| 14 | 31 | Sand, fine to coarse | | | |
| 31 | 38 | Sand, fine to coarse, with gravel, fine, | | | |
| | | with clay streaks, black | | | |
| 38 | 41 | Clay, light gray, hard | | | |
| 41 | 52 | Sand, fine to coarse, with gravel, fine to | | | |
| | | medium, gray color, dirty | | | |
| 52 | 54 | Sand, fine to coarse, with gravel, fine to | | | |
| | | medium, and large rock streaks | | | |

**7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION:** This water well was ☒ constructed, ☐ reconstructed, or ☐ plugged under my jurisdiction and was completed on (mo/day/year) 10/01/09 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 185 This Water Well Record was completed on (mo/day/year) 10/06/09 under the business name of Clarke Well & Equipment, Inc. by (signature) [signature]

INSTRUCTIONS: Use typewriter or ball point pen. *PLEASE PRESS FIRMLY* and *PRINT* clearly. Please fill in blanks and check the correct answers. Send three copies (white, blue, pink) to Kansas Department of Health and Environment, Bureau of Water, Geology Section, 1000 SW Jackson St., Suite 420, Topeka, Kansas 66612-1367. Telephone 785-296-5522. Send one copy to WATER WELL OWNER and retain one for your records. Include fee of $5.00 for each constructed well. Visit us at http://www.kdheks.gov/waterwell/index.html.

KSA 82a-1212

Check: ☐ White Copy, ☐ Blue Copy, ☐ Pink Copy

89

USE TYPEWRITER OR BALL POINT PEN-PRESS FIRMLY, PRINT CLEARLY.

WATER WELL RECORD
KSA 82a-1201-1215

Kansas Department of Health and Environment-Division of Environment
(Water well Contractors)
Topeka, Kansas 66620

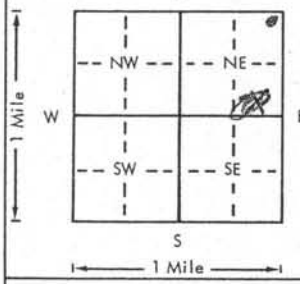
95 20599 38.97063 212 NE NE NE

| 1. Location of well: | County | Fraction | Section number | Township number | Range number |
|---|---|---|---|---|---|
| | Douglas. | ~~S/2 SE NE~~ | 35 | T 12 S | R 20 E/W |

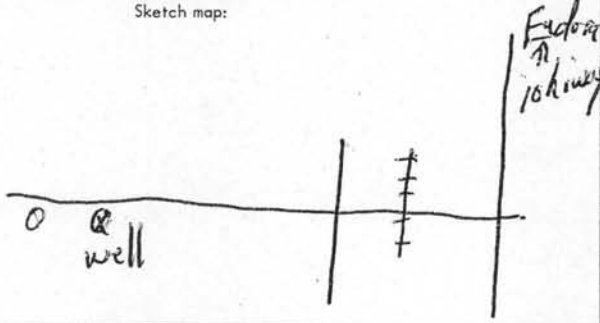
2. Distance and direction from nearest town or city: 2mi West 1¼ North of Eudora
Street address of well location if in city:

3. Owner of well: E.C. ALTENBERND
R.R. or street: R.R. 3
City, state, zip code: EUDORA Kts. 66025

4. Locate with "X" in section below:




Sketch map:




6. Bore hole dia. 10 in. Completion date NOV 15-77
Well depth 47 ft.

7. X Cable tool __ Rotary __ Driven __ Dug
__ Hollow rod __ Jetted __ Bored __ Reverse rotary

8. Use: __ Domestic __ Public supply __ Industry
X Irrigation __ Air conditioning __ Stock
__ Lawn __ Oil field water __ Other

9. Casing: Material Steel Height: Above or ~~below~~
Threaded __ Welded X Surface 12 in.
RMP __ PVC __ Weight 26 lbs./ft.
Dia. 8 in. to 32 ft. depth Wall Thickness: inches or
Dia. __ in. to __ ft. depth gage No. .250

10. Screen: Manufacturer's name Johnson
Type Stainless Dia. 10
Slot/gauze 25 Length 15
Set between 32 ft. and 47 ft.
__ ft. and __ ft.
Gravel pack? No Size range of material

11. Static water level: mo./day/yr.
23-8 ft. below land surface Date NOV 15-77

12. Pumping level below land surfaces:
__ ft. after __ hrs. pumping __ g.p.m.
__ ft. after __ hrs. pumping __ g.p.m.
Estimated maximum yield 300 + g.p.m.

13. Water sample submitted: mo./day/yr.
__ Yes No No Date

14. Well head completion:
__ Pitless adapter 12+ Inches above grade

15. Well grouted? yes
With: X Neat cement __ Bentonite __ Concrete
Depth: From 0 ft. to 10 ft.

16. Nearest source of possible contamination:
ft. 500 Direction North Type Livestock
Well disinfected upon completion? X Yes __ No

17. Pump: __ Not installed
Manufacturer's name Jacuzzi
Model number 5S6X1 HP 5 Volts __
Length of drop pipe 47 ft. capacity 300 g.p.m.
Type:
X Submersible __ Turbine
__ Jet __ Reciprocating
__ Centrifugal __ Other

| 5. Type and color of material | From | To |
|---|---|---|
| Top Soil | 0 | 2 |
| Loamy Clay | 2 | 25 |
| Sand & Fine | 25 | 27 |
| Sand Grey - Med | 27 | 31 |
| Sand Clay layers | 31 | 34 |
| Sand Gr - Med | 34 | 38 |
| Sand Gr - Med - dirty | 38 | 40 |
| Sand Med - Fair clean | 40 | 47 |

(Use a second sheet if needed)

18. Elevation: 811
Topography:
__ Hill
__ Slope
__ Upland
X Valley

19. Remarks:

20. Water well contractor's certification:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
TUNNELL BROS DRILLING CO. 119
Business name License No.
Address CARBONDALE Kts.
Signed James B. Tunnell Date 1-28-78
Authorized representative

T 12 R 20 E/W Sec 35 1/4 SE 1/4 NE 1/4

Forward the white, blue and pink copies to the Department of Health and Environment

Form WWC-5

BR < 764 D = 787

MI-1023

USE TYPEWRITER OR BALL POINT PEN-PRESS FIRMLY, PRINT CLEARLY.

WATER WELL RECORD
KSA 82a-1201-1215

Kansas Department of Health and Environment-Division of Environment
(Water well Contractors)
Topeka, Kansas 66620

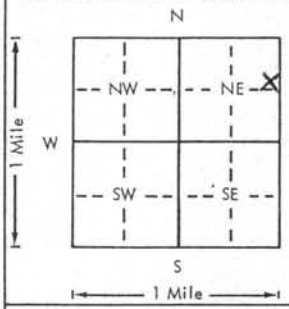
95.20596 38.96860 210

| 1. Location of well: | County | Fraction | Section number | Township number | Range number |
|---|---|---|---|---|---|
| | Douglas | SE 1/4 NE 1/4 NE 1/4 | 35 | T 12 S | R 20 E/W |

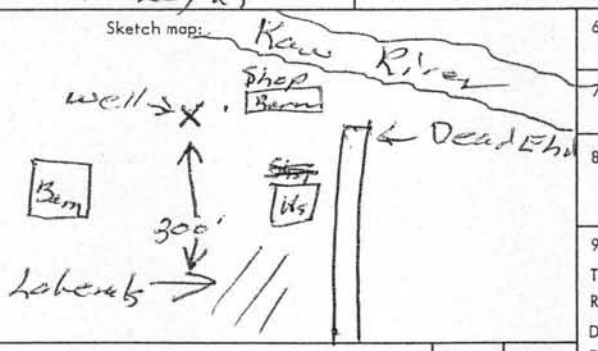
2. Distance and direction from nearest town or city: 3 mi. E.
Street address of well location if in city: Lawrence, Ks

3. Owner of well: E.C. Atterburn R.R.
R.R. or street: Eudora Ks.
City, state, zip code: 66025

4. Locate with "X" in section below:




Sketch map:




6. Bore hole dia 10-5/8" in. Completion date 8-25-77
Well depth 57 ft.

7. ___ Cable tool X Rotary ___ Driven ___ Dug
___ Hollow rod ___ Jetted ___ Bored ___ Reverse rotary

8. Use: X Domestic ___ Public supply ___ Industry
___ Irrigation ___ Air conditioning ___ Stock
___ Lawn ___ Oil field water ___ Other

9. Casing: Material PVC Height: Above or below
Threaded ___ Welded ___ Surface 24 in.
RMP ___ PVC Blue Weight 2.74 lbs./ft.
Dia. 5 in. to 51 ft. depth Wall Thickness: inches or
Dia. ___ in. to ___ ft. depth gage No. 258

| 5. Type and color of material | From | To |
|---|---|---|
| Top Soil Silt | 0 | 11 |
| Brown Fine Sand | 11 | 15 |
| Brown Coarse Sand | 15 | 33 |
| Gray Med Gravel | 33 | 38 |
| Gray Clay | 38 | 41 |
| Med. Gray Gravel | 41 | 51 |
| Limestone 51 | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| (Use a second sheet if needed) | | |

10. Screen: Manufacturer's name Pumpco
Type PVC Dia. 5"
Slot/gauze .050 Length 10
Set between 41 ft. and 51 ft.
___ ft. and ___ ft.
Gravel pack? Yes Size range of material 1/4 x 1/8

11. Static water level: mo./day/yr.
12 ft. below land surface Date 8-25-77

12. Pumping level below land surfaces: Air test
___ ft. after ___ hrs. pumping ___ g.p.m.
___ ft. after ___ hrs. pumping ___ g.p.m.
Estimated maximum yield 100 g.p.m.

13. Water sample submitted: mo./day/yr.
___ Yes X No Date ___

14. Well head completion: Top Cap
___ Pitless adapter 24 Inches above grade

15. Well grouted? Yes
With: ✓ Neat cement ___ Bentonite ___ Concrete
Depth: From 0 ft. to 10 ft.

16. Nearest source of possible contamination:
ft. 200 Direction S Type Laterals
Well disinfected upon completion? X Yes ___ No

17. Pump: X Not installed
Manufacturer's name ___
Model number ___ HP ___ Volts ___
Length of drop pipe ___ ft. capacity ___ g.p.m.
Type:
___ Submersible ___ Turbine
___ Jet ___ Reciprocating
___ Centrifugal ___ Other

18. Elevation:
Topography:
___ Hill
___ Slope
___ Upland
X Valley

19. Remarks:
Owner will Pour Slab

20. Water well contractor's certification:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
STRADER Drlg CO Inc. 182
Business name License No.
Address Holton, Ks
Signed Dale Atterburn Date 8-26-77
Authorized representative

T 12 R 20 E/W Sec 35 1/4 1/4 1/4

Forward the white, blue and pink copies to the Department of Health and Environment

Form WWC-5

MI-1023

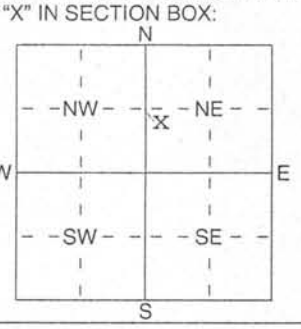
WATER WELL RECORD Form WWC-5 KSA 82a-1212 ID No. _____

| 1 LOCATION OF WATER WELL: | Fraction | Section Number | Township Number | Range Number |
|---|---|---|---|---|
| County: Douglas | NW ¼ SW ¼ NE ¼ | 35 | T 12 S | R 20E E/W |

Distance and direction from nearest town or city street address of well if located within city?
3½ East of Lawrence

2 WATER WELL OWNER: Carl McElwee
RR#, St. Address, Box # : 1564 E 1850 Rd
City, State, ZIP Code : Lawrence, Ks. 66046
Board of Agriculture, Division of Water Resources Application Number:

3 LOCATE WELL'S LOCATION WITH AN "X" IN SECTION BOX:




4 DEPTH OF COMPLETED WELL 48 ft. ELEVATION:
Depth(s) Groundwater Encountered 1 ..... ft. 2 ..... ft. 3 ..... ft.
WELL'S STATIC WATER LEVEL 29' ft. below land surface measured on mo/day/yr 3-16-04
Pump test data: Well water was ..... ft. after ..... hours pumping ..... gpm
Est. Yield 37 gpm: Well water was ..... ft. after ..... hours pumping ..... gpm
WELL WATER TO BE USED AS: 1 Domestic 2 ~~Irrigation~~ 3 Feedlot 4 Industrial 5 Public water supply 6 Oil field water supply 7 Domestic (lawn & garden) 8 Air conditioning 9 Dewatering 10 Monitoring well 11 Injection well 12 Other (Specify below)

Was a chemical/bacteriological sample submitted to Department? Yes ..... No ..x..; If yes, mo/day/yrs sample was submitted .
Water Well Disinfected? Yes x No

5 TYPE OF BLANK CASING USED: 1 Steel 2 PVC 3 RMP (SR) 4 ABS 5 Wrought iron 6 Asbestos-Cement 7 Fiberglass 8 Concrete tile 9 Other (specify below)
CASING JOINTS: Glued x Clamped ..... Welded ..... Threaded .....
Blank casing diameter 5" in. to ..... ft., Dia ..... in. to ..... ft., Dia ..... in. to ..... ft.
Casing height above land surface 24" in., weight 2.82 lbs./ft. Wall thickness or guage No. .258

TYPE OF SCREEN OR PERFORATION MATERIAL: 1 Steel 2 Brass 3 Stainless Steel 4 Galvanized Steel 5 Fiberglass 6 Concrete tile 7 PVC 8 ~~RMP (SR)~~ 9 ABS 10 Asbestos-Cement 11 Other (Specify) 12 None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE: 1 Continuous slot 2 Louvered shutter 3 Mill slot 4 Key punched 5 Guazed wrapped 6 Wire wrapped 7 Torch cut 8 Saw cut 9 ~~Drilled holes~~ 10 Other (specify) ..... 11 None (open hole)

SCREEN-PERFORATED INTERVALS: From 33 ft. to 48 ft., From ..... ft. to ..... ft.
From ..... ft. to ..... ft., From ..... ft. to ..... ft.
GRAVEL PACK INTERVALS: From 30 ft. to 48 ft., From ..... ft. to ..... ft.
From ..... ft. to ..... ft., From ..... ft. to ..... ft.

6 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other .....
Grout Intervals: From ..... ft. to 3 ft., From 30 ft. to ..... ft., From ..... ft. to ..... ft.

What is the nearest source of possible contamination: 1 Septic tank 2 Sewer lines 3 Watertight sewer lines 4 Lateral lines 5 Cess pool 6 Seepage pit 7 Pit privy 8 Sewage lagoon 9 Feedyard 10 Livestock pens 11 Fuel storage 12 Fertilizer storage 13 Insecticide storage 14 Abandoned water well 15 Oil well/Gas well 16 Other (specify below) .....
Direction from well? North How many feet? 125'

| FROM | TO | LITHOLOGIC LOG | FROM | TO | PLUGGING INTERVALS |
|---|---|---|---|---|---|
| 0 | 2 | top soil | | | |
| 2 | 11 | clay brown/silty | | | |
| 11 | 24 | brown clay | | | |
| 24 | 34 | brown fine sand | | | |
| 34 | 38 | fine/course sand med pea brown | | | |
| 38 | 42 | fine/course sand med pea brown/grey/gren | | | |
| 42 | 42½ | grey clay | | | |
| 42½ | 48 | fine sand brown/grey/green/boulders | | | |

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and was completed on (mo/day/year) 4-16-04 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's Licence No 182 This Water Well Record was completed on (mo/day/yr) 4-16-04 under the business name of Strader Drilling. Co.,Inc. by (signature) Jim Strader

INSTRUCTIONS: Use typewriter or ball point pen. *PLEASE PRESS FIRMLY* and *PRINT* clearly. Please fill in blanks, underline or circle the correct answers. Send top three copies to Kansas Department of Health and Environment, Bureau of Water, Geology Section, 1000 SW Jackson St., Suite 420, Topeka, Kansas 66612-1367. Telephone 785-296-5522. Send one to WATER WELL OWNER and retain one for your records. Fee of $5.00 for each constructed well.

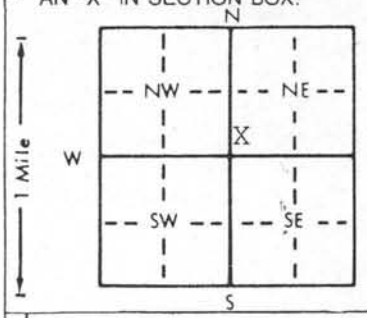
WATER WELL RECORD Form WWC-5 KSA 82a-1212

| 1 LOCATION OF WATER WELL: | Fraction | Section Number | Township Number | Range Number |
|---|---|---|---|---|
| County: Douglas | SW ¼ SW ¼ NE ¼ | 36 | T 12 S | R 20 E/W |

Distance and direction from nearest town or city street address of well if located within city?
1½ west, 1½ north of Eudora

2 WATER WELL OWNER: James Waller
R#, St. Address, Box # : 1964 N. 1550 Rd.
City, State, ZIP Code : Eudora, KS 66025
Board of Agriculture, Division of Water Resourc
Application Number:

3 LOCATE WELL'S LOCATION WITH AN "X" IN SECTION BOX:




4 DEPTH OF COMPLETED WELL 40' ft. ELEVATION:
Depth(s) Groundwater Encountered 1. ft. 2. ft. 3. ft
WELL'S STATIC WATER LEVEL 24' ft. below land surface measured on mo/day/yr 9/06/96
Pump test data: Well water was ft. after hours pumping gp
Est. Yield 40 gpm: Well water was ft. after hours pumping gp
Bore Hole Diameter 12" in. to ft., and in. to
WELL WATER TO BE USED AS: 1 Domestic 2 Irrigation 3 Feedlot 4 Industrial 5 Public water supply 6 Oil field water supply 7 Lawn and garden only 8 Air conditioning 9 Dewatering 10 Monitoring well 11 Injection well 12 Other (Specify below)
Was a chemical/bacteriological sample submitted to Department? Yes No X; If yes, mo/day/yr sample was s
mitted Water Well Disinfected? Yes X No

5 TYPE OF BLANK CASING USED: 1 Steel 2 PVC 3 RMP (SR) 4 ABS 5 Wrought iron 6 Asbestos-Cement 7 Fiberglass 8 Concrete tile 9 Other (specify below)
CASING JOINTS: Glued X Clamped Welded Threaded
Blank casing diameter 5" in. to 0-30 ft., Dia in. to ft., Dia in. to
Casing height above land surface 24" in., weight 2.82 lbs./ft. Wall thickness or gauge No. .258
TYPE OF SCREEN OR PERFORATION MATERIAL: 1 Steel 2 Brass 3 Stainless steel 4 Galvanized steel 5 Fiberglass 6 Concrete tile 7 PVC 8 RMP (SR) 9 ABS 10 Asbestos-cement 11 Other (specify) 12 None used (open hole)
SCREEN OR PERFORATION OPENINGS ARE: 1 Continuous slot 2 Louvered shutter 3 Mill slot 4 Key punched 5 Gauzed wrapped 6 Wire wrapped 7 Torch cut 8 Saw cut 9 Drilled holes 10 Other (specify) 11 None (open hole)
SCREEN-PERFORATED INTERVALS: From 30 ft. to 40 ft., From ft. to
From ft. to ft., From ft. to
GRAVEL PACK INTERVALS: From 24 ft. to 40 ft., From ft. to
From ft. to ft., From ft. to

6 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other
Grout Intervals: From 4 ft. to 24 ft., From ft. to ft., From ft. to
What is the nearest source of possible contamination:
1 Septic tank 2 Sewer lines 3 Watertight sewer lines 4 Lateral lines 5 Cess pool 6 Seepage pit 7 Pit privy 8 Sewage lagoon 9 Feedyard 10 Livestock pens 11 Fuel storage 12 Fertilizer storage 13 Insecticide storage 14 Abandoned water well 15 Oil well/Gas well 16 Other (specify below)
Direction from well? north How many feet? 200'

| FROM | TO | LITHOLOGIC LOG | FROM | TO | PLUGGING INTERVALS |
|---|---|---|---|---|---|
| 0 | 4 | Top Soil | | | |
| 4 | 15 | Clay-Brown-Silty | | | |
| 15 | 33 | Fine Sand-Brown | | | |
| 33 | 39 | FS-CS-Med Gravel-Brown | | | |
| 39 | 40 | FS-CS-Med Gravel-Blue | | | |

CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and w
completed on (mo/day/year) 9/06/96 and this record is true to the best of my knowledge and belief. Kans
Water Well Contractor's License No. 182 This Water Well Record was completed on (mo/day/yr) 10-9-96
under the business name of STRADER DRILLING CO., INC. by (signature) Dale Askren

INSTRUCTIONS: Use typewriter or ball point pen. *PLEASE PRESS FIRMLY* and *PRINT* clearly. Please fill in blanks, underline or circle the correct answers. Send top three copies to Kansas Department of Health and Environment, Bureau of Water, Topeka, Kansas 66620-0001. Telephone: 913-296-5545. Send one to WATER WELL OWNER and retain one for your records.

95.12.5941 38.45.5"N

WATER WELL RECORD Form WWC-5 KSA 82a-1212

1 LOCATION OF WATER WELL: County: Douglas | Fraction: NE ¼ NE ¼ NE ¼ | Section Number: 1 | Township Number: T 13 (S) | Range Number: R 20 (E/W)

Distance and direction from nearest town or city? 1 W. .5 N of Eudora

Street address of well if located within city?

2 WATER WELL OWNER: Howard Whaley

RR#, St. Address, Box # : RR2

City, State, ZIP Code : Eudora, Kansas 66025

Board of Agriculture, Division of Water Resource Application Number:

3 DEPTH OF COMPLETED WELL 50 ft. Bore Hole Diameter 12 in. to ft., and in. to ft

Well Water to be used as: 1 Domestic 2 Irrigation 3 Feedlot 4 Industrial 5 Public water supply 6 Oil field water supply 7 Lawn and garden only 8 Air conditioning 9 Dewatering 10 Observation well 11 Injection well 12 Other (Specify below)

Well's static water level 30 ft. below land surface measured on December month 19 day 1979 year

Pump Test Data: Well water was ft. after hours pumping gpm

Est. Yield 100 gpm: Well water was ft. after hours pumping gpm

4 TYPE OF BLANK CASING USED: 1 Steel 2 PVC 3 RMP (SR) 4 ABS 5 Wrought iron 6 Asbestos-Cement 7 Fiberglass 8 Concrete tile 9 Other (specify below)

Casing Joints: Glued ✓ Clamped Welded Threaded

Blank casing dia 5 in. to 0-40 ft., Dia in. to ft., Dia in. to f

Casing height above land surface 24 in., weight 2.89 lbs./ft. Wall thickness or gauge No .258

TYPE OF SCREEN OR PERFORATION MATERIAL: 1 Steel 2 Brass 3 Stainless steel 4 Galvanized steel 5 Fiberglass 6 Concrete tile 7 PVC 8 RMP (SR) 9 ABS 10 Asbestos-cement 11 Other (specify) 12 None used (open hole)

Screen or Perforation Openings Are: 1 Continuous slot 2 Louvered shutter 3 Mill slot 4 Key punched 5 Gauzed wrapped 6 Wire wrapped 7 Torch cut 8 Saw cut 9 Drilled holes 10 Other (specify) 11 None (open hole)

Screen-Perforation Dia 5 in. to ft., Dia in. to ft., Dia in to f

Screen-Perforated Intervals: From 40 ft. to 50 ft., From ft. to f

From ft. to ft., From ft. to f

Gravel Pack Intervals: From 10 ft. to 50 ft., From ft. to f

From ft. to ft., From ft. to f

5 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other

Grouted Intervals: From 0 ft. to 10 ft., From ft. to ft., From ft. to f

What is the nearest source of possible contamination: 1 Septic tank 2 Sewer lines 3 Lateral lines 4 Cess pool 5 Seepage pit 6 Pit privy 7 Sewage lagoon 8 Feed yard 9 Livestock pens 10 Fuel storage 11 Fertilizer storage 12 Insecticide storage 13 Watertight sewer lines 14 Abandoned water well 15 Oil well/Gas well 16 Other (specify below)

Direction from well North How many feet 200 ? Water Well Disinfected? Yes ✓ No

Was a chemical/bacteriological sample submitted to Department? Yes No ✓ If yes, date sample was submitted month day year: Pump Installed? Yes No ✓

If Yes: Pump Manufacturer's name Model No. HP Volts

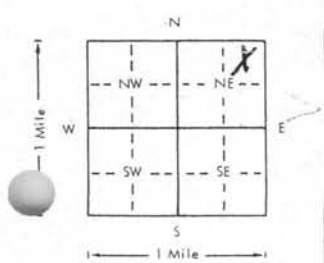
Depth of Pump Intake ft. Pumps Capacity rated at gal./min

Type of pump: 1 Submersible 2 Turbine 3 Jet 4 Centrifugal 5 Reciprocating 6 Other

6 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and wa completed on December month 19 day 1979 yea and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 182

This Water Well Record was completed on December month 26 day 1979 year under the busines name of Strader Drlg Co., Inc. by (signature) Dale Asbren

7 LOCATE WELL'S LOCATION WITH AN "X" IN SECTION BOX:




ELEVATION:

| FROM | TO | LITHOLOGIC LOG | FROM | TO | LITHOLOGIC LOG |
|---|---|---|---|---|---|
| 0 | 6 | Top Soil | | | |
| 6 | 20 | Clay | | | |
| 20 | 35 | Fine Sand | | | |
| 35 | 50 | Course Sand, gravel | | | |

Depth(s) Groundwater Encountered 1. 30 ft. 2. ft. 3. ft. 4. ft. (Use a second sheet if needed)

INSTRUCTIONS: Use typewriter or ball point pen, *please press firmly* and *PRINT* clearly. Please fill in blanks, underline or circle the correct answers. Send top three copies to Kansas Department of Health and Environment, Division of Environment, Water Well Contractors, Topeka, KS 66620. Send one to WATER WELL OWNER and retain one for your records.

WATER WELL RECORD Form WWC-5 KSA 82a-1212 ID No. _____

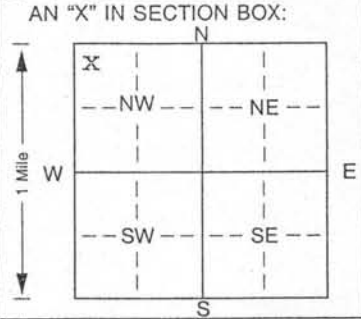
| 1 LOCATION OF WATER WELL: | Fraction | Section Number | Township Number | Range Number |
|---|---|---|---|---|
| County: Douglas | NW ¼ NW ¼ NW ¼ | 1 | T 13 S | R 20E E/W |

Distance and direction from nearest town or city street address of well if located within city?
1 mile north 2½ miles west of Eudora 1919 N. 1500Rd. Eudora 66025

2 WATER WELL OWNER: Virginia Strong
RR#, St. Address, Box # : 3712 Trail Rd.
City, State, ZIP Code : Lawrence, KS. 66049

Board of Agriculture, Division of Water Resources
Application Number:

3 LOCATE WELL'S LOCATION WITH AN "X" IN SECTION BOX:




4 DEPTH OF COMPLETED WELL. 52 ft. ELEVATION:
Depth(s) Groundwater Encountered 1. ft. 2. ft. 3. ft.
WELL'S STATIC WATER LEVEL 27 ft. below land surface measured on mo/day/yr 6-21-2001
Pump test data: Well water was ft. after hours pumping gpm
Est. Yield 50 gpm: Well water was ft. after hours pumping gpm
Bore Hole Diameter 12 in. to ft., and in. to ft.
WELL WATER TO BE USED AS: 5 Public water supply 8 Air conditioning 11 Injection well
1 Domestic 3 Feedlot 6 Oil field water supply 9 Dewatering 12 Other (Specify below)
2 Irrigation 4 Industrial 7 Domestic (lawn & garden) 10 Monitoring well
Was a chemical/bacteriological sample submitted to Department? Yes No X ; If yes, mo/day/yrs sample was submitted
Water Well Disinfected? Yes X No

5 TYPE OF BLANK CASING USED: 5 Wrought iron 8 Concrete tile CASING JOINTS: Glued X Clamped
1 Steel 3 RMP (SR) 6 Asbestos-Cement 9 Other (specify below) Welded
2 PVC 4 ABS 7 Fiberglass Threaded
Blank casing diameter 5 in. to ft., Dia in. to ft., Dia in. to ft
Casing height above land surface 24 in., weight 2.82 lbs./ft. Wall thickness or gauge No. .258

TYPE OF SCREEN OR PERFORATION MATERIAL: 7 PVC 10 Asbestos-cement
1 Steel 3 Stainless steel 5 Fiberglass 8 RMP (SR) 11 Other (specify)
2 Brass 4 Galvanized steel 6 Concrete tile 9 ABS 12 None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE: 5 Gauzed wrapped 8 Saw cut 11 None (open hole)
1 Continuous slot 3 Mill slot 6 Wire wrapped 9 Drilled holes
2 Louvered shutter 4 Key punched 7 Torch cut 10 Other (specify) ft.

SCREEN-PERFORATED INTERVALS: From 36 ft. to 52 ft., From ft. to ft.
From ft. to ft., From ft. to ft.
GRAVEL PACK INTERVALS: From 27 ft. to 52 ft., From ft. to ft.
From ft. to ft., From ft. to ft.

6 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other
Grout Intervals: From 4 ft. to 27 ft., From ft. to ft., From ft. to ft.

What is the nearest source of possible contamination:
1 Septic tank 4 Lateral lines 7 Pit privy 10 Livestock pens 14 Abandoned water well
2 Sewer lines 5 Cess pool 8 Sewage lagoon 11 Fuel storage 15 Oil well/Gas well
3 Watertight sewer lines 6 Seepage pit 9 Feedyard 12 Fertilizer storage 16 Other (specify below)
13 Insecticide storage
Direction from well? West How many feet? 210

| FROM | TO | LITHOLOGIC LOG | FROM | TO | PLUGGING INTERVALS |
|---|---|---|---|---|---|
| 0 | 10 | brown silt | | | |
| 10 | 18 | brown clay | | | |
| 18 | 28 | brown silt | | | |
| 28 | 30 | brown fine sand course sand | | | |
| 30 | 38 | brown fine sand | | | |
| 38 | 40 | brown fine sand course sand med gravel | | | |
| 40 | 41 | blue clay | | | |
| 41 | 52 | grey fine sand | | | |

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and was completed on (mo/day/year) 6-21-2001 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's Licence No. 182 This Water Well Record was completed on (mo/day/yr) 7-2-2001 under the business name of Strader Drilling Co., Inc. by (signature) Dale Strader

INSTRUCTIONS: Use typewriter or ball point pen. *PLEASE PRESS FIRMLY* and *PRINT* clearly. Please fill in blanks, underline or circle the correct answers. Send top three copies to Kansas Department of Health and Environment, Bureau of Water, Topeka, Kansas 66620-0001. Telephone 785-296-5524. Send one to WATER WELL OWNER and retain one for your records. Fee of $5.00 for each constructed well.

WATER WELL RECORD Form WWC-5 KSA 82a-1212

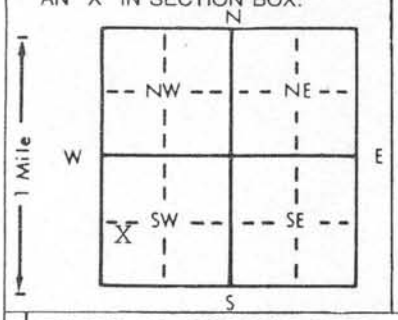
| 1 LOCATION OF WATER WELL: | Fraction | Section Number | Township Number | Range Number |
|---|---|---|---|---|
| County: DOUGLAS | NW ¼ SW ¼ SW ¼ | 1 | T 13 S | R 20 E/W |

Distance and direction from nearest town or city street address of well if located within city?
2 west of Eudora

2 WATER WELL OWNER: Harold Boehle
R#, St. Address, Box # : 1420 E. 1900 Rd.
City, State, ZIP Code : Eudora, KS 66025

Board of Agriculture, Division of Water Resour
Application Number:

3 LOCATE WELL'S LOCATION WITH AN "X" IN SECTION BOX:




4 DEPTH OF COMPLETED WELL 50' ft. ELEVATION:
Depth(s) Groundwater Encountered 1. ft. 2. ft. 3. ft
WELL'S STATIC WATER LEVEL 22' ft. below land surface measured on mo/day/yr 2-15-93
Pump test data: Well water was ft. after hours pumping gp
Est. Yield 50 gpm: Well water was ft. after hours pumping gp
Bore Hole Diameter 12" in. to ft., and in. to
WELL WATER TO BE USED AS: 5 Public water supply 8 Air conditioning 11 Injection well
1 Domestic 3 Feedlot 6 Oil field water supply 9 Dewatering 12 Other (Specify below)
2 Irrigation 4 Industrial 7 Lawn and garden only 10 Monitoring well
Was a chemical/bacteriological sample submitted to Department? Yes No X; If yes, mo/day/yr sample was s
mitted Water Well Disinfected? Yes X No

5 TYPE OF BLANK CASING USED: 5 Wrought iron 8 Concrete tile CASING JOINTS: Glued X Clamped
1 Steel 3 RMP (SR) 6 Asbestos-Cement 9 Other (specify below) Welded
2 PVC 4 ABS 7 Fiberglass Threaded
Blank casing diameter 5" in. to 0-40 ft., Dia in. to ft., Dia in. to
Casing height above land surface 24" in., weight 2.82 lbs./ft. Wall thickness or gauge No. .258

TYPE OF SCREEN OR PERFORATION MATERIAL: 7 PVC 10 Asbestos-cement
1 Steel 3 Stainless steel 5 Fiberglass 8 RMP (SR) 11 Other (specify)
2 Brass 4 Galvanized steel 6 Concrete tile 9 ABS 12 None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE: 5 Gauzed wrapped 8 Saw cut 11 None (open hole)
1 Continuous slot 3 Mill slot 6 Wire wrapped 9 Drilled holes
2 Louvered shutter 4 Key punched 7 Torch cut 10 Other (specify)

SCREEN-PERFORATED INTERVALS: From 40 ft. to 50 ft., From ft. to
From ft. to ft., From ft. to
GRAVEL PACK INTERVALS: From 24 ft. to 50 ft., From ft. to
From ft. to ft., From ft. to

6 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other
Grout Intervals: From 4 ft. to 24 ft., From ft. to ft., From ft. to

What is the nearest source of possible contamination:
1 Septic tank 4 Lateral lines 7 Pit privy 10 Livestock pens 14 Abandoned water well
2 Sewer lines 5 Cess pool 8 Sewage lagoon 11 Fuel storage 15 Oil well/Gas well
3 Watertight sewer lines 6 Seepage pit 9 Feedyard 12 Fertilizer storage 16 Other (specify below)
13 Insecticide storage
Direction from well? south How many feet? 100'

| FROM | TO | LITHOLOGIC LOG | FROM | TO | PLUGGING INTERVALS |
|---|---|---|---|---|---|
| 0 | 6 | Top Soil | | | |
| 6 | 30 | Clay-Brown-Silty | | | |
| 30 | 35 | Fine SAnd-Coarse Sand-Blue | | | |
| 35 | 41 | Fine Sand-Blue | | | |
| 41 | 47 | Fine Sand-Coarse Sand-Brown | | | |
| 47 | 48 | Clay-Blue | | | |
| 48 | 50 | Fine Sand-Coarse Sand-Med Gravel-Brown | | | |

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and w
completed on (mo/day/year) 2-15-93 and this record is true to the best of my knowledge and belief. Kans
Water Well Contractor's License No. 182 This Water Well Record was completed on (mo/day/yr) 4-7-93
under the business name of STRADER DRILLING CO., INC. by (signature) Dale Strader

INSTRUCTIONS: Use typewriter or ball point pen. *PLEASE PRESS FIRMLY* and *PRINT* clearly. Please fill in blanks, underline or circle the correct answers. Send top three copies to Kansas Department of Health and Environment, Bureau of Water, Topeka, Kansas 66620-0001. Telephone: 913-296-5545. Send one to WATER WELL OWNER and retain one for your records.

WATER WELL RECORD Form WWC-5 KSA 82a-1212

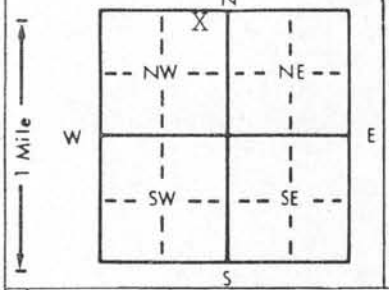
| 1 LOCATION OF WATER WELL: | Fraction | Section Number | Township Number | Range Number |
|---|---|---|---|---|
| County: DOUGLAS | NE ¼ NE ¼ NW ¼ | 2 | T 13 S | R 20 E/W |

Distance and direction from nearest town or city street address of well if located within city?
2 miles east of Lawrence @ 1837 N. 1500 Rd.

2 WATER WELL OWNER: Jeff Wallace
RR#, St. Address, Box # : 1201 E. 13th
City, State, ZIP Code : Lawrence, KS 66044

Board of Agriculture, Division of Water Resources
Application Number:

3 LOCATE WELL'S LOCATION WITH AN "X" IN SECTION BOX:




4 DEPTH OF COMPLETED WELL 52' ft. ELEVATION:
Depth(s) Groundwater Encountered 1. ft. 2. ft. 3. ft.
WELL'S STATIC WATER LEVEL 30' ft. below land surface measured on mo/day/yr 2/24/98
Pump test data: Well water was ft. after hours pumping gpm
Est. Yield 50 gpm: Well water was ft. after hours pumping gpm
Bore Hole Diameter 12" in. to ft., and in. to ft.
WELL WATER TO BE USED AS: 1 Domestic 2 Irrigation 3 Feedlot 4 Industrial 5 Public water supply 6 Oil field water supply 7 Lawn and garden only 8 Air conditioning 9 Dewatering 10 Monitoring well 11 Injection well 12 Other (Specify below)
Was a chemical/bacteriological sample submitted to Department? Yes No X; If yes, mo/day/yr sample was submitted
Water Well Disinfected? Yes X No

5 TYPE OF BLANK CASING USED: 1 Steel 2 PVC 3 RMP (SR) 4 ABS 5 Wrought iron 6 Asbestos-Cement 7 Fiberglass 8 Concrete tile 9 Other (specify below)
CASING JOINTS: Glued X Clamped Welded Threaded
Blank casing diameter 5" in. to 0-45 ft., Dia in. to ft., Dia in. to ft.
Casing height above land surface 24" in., weight 2.82 lbs./ft. Wall thickness or gauge No. .258

TYPE OF SCREEN OR PERFORATION MATERIAL: 1 Steel 2 Brass 3 Stainless steel 4 Galvanized steel 5 Fiberglass 6 Concrete tile 7 PVC 8 RMP (SR) 9 ABS 10 Asbestos-cement 11 Other (specify) 12 None used (open hole)
SCREEN OR PERFORATION OPENINGS ARE: 1 Continuous slot 2 Louvered shutter 3 Mill slot 4 Key punched 5 Gauzed wrapped 6 Wire wrapped 7 Torch cut 8 Saw cut 9 Drilled holes 10 Other (specify) 11 None (open hole)
SCREEN-PERFORATED INTERVALS: From 45 ft. to 52 ft., From ft. to ft.
From ft. to ft., From ft. to ft.
GRAVEL PACK INTERVALS: From 30 ft. to 52 ft., From ft. to ft.
From ft. to ft., From ft. to ft.

6 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other
Grout Intervals: From 4 ft. to 30 ft., From ft. to ft., From ft. to ft.
What is the nearest source of possible contamination: 1 Septic tank 2 Sewer lines 3 Watertight sewer lines 4 Lateral lines 5 Cess pool 6 Seepage pit 7 Pit privy 8 Sewage lagoon 9 Feedyard 10 Livestock pens 11 Fuel storage 12 Fertilizer storage 13 Insecticide storage 14 Abandoned water well 15 Oil well/Gas well 16 Other (specify below)
Direction from well? south How many feet? 50'

| FROM | TO | LITHOLOGIC LOG | FROM | TO | PLUGGING INTERVALS |
|---|---|---|---|---|---|
| 0 | 4 | Top Soil | | | |
| 4 | 15 | Clay-Brown-Silty | | | |
| 15 | 27 | Silt-Brown | | | |
| 27 | 31 | Fine Sand-Brown | | | |
| 31 | 32 | Clay-Blue | | | |
| 32 | 35 | Fine Silt-Brown | | | |
| 35 | 39 | Clay-Brown | | | |
| 39 | 41 | Fine Sand-Brown | | | |
| 41 | 47 | Fine Sand-Coarse Sand-Brown | | | |
| 47 | 52 | Fine Sand-Coarse Sand-Med-Pea Brown | | | |

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and was completed on (mo/day/year) 2/24/98 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 182 This Water Well Record was completed on (mo/day/yr) 3-4-98
under the business name of STRADER DRILLING CO., INC. by (signature) Dale Askren

INSTRUCTIONS: Use typewriter or ball point pen. *PLEASE PRESS FIRMLY* and *PRINT* clearly. Please fill in blanks, underline or circle the correct answers. Send top three copies to Kansas Department of Health and Environment, Bureau of Water, Topeka, Kansas 66620-0001. Telephone: 913-296-5545. Send one to WATER WELL OWNER and retain one for your records.

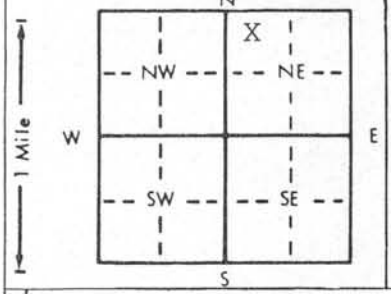
WATER WELL RECORD Form WWC-5 KSA 82a-1212

1 LOCATION OF WATER WELL: County: DOUGLAS | Fraction: NW ¼ NW ¼ NE ¼ | Section Number: 11 | Township Number: T 13 S | Range Number: R 20 E/W

Distance and direction from nearest town or city street address of well if located within city?
2½ miles east of Lawrence

2 WATER WELL OWNER: Daniel E. Lynch
RR#, St. Address, Box # : 642 N. 9th
City, State, ZIP Code : Lawrence, KS 66044
Board of Agriculture, Division of Water Resources
Application Number:

3 LOCATE WELL'S LOCATION WITH AN "X" IN SECTION BOX:




4 DEPTH OF COMPLETED WELL 60' ft. ELEVATION:
Depth(s) Groundwater Encountered 1. ft. 2. ft. 3. ft.
WELL'S STATIC WATER LEVEL 32' ft. below land surface measured on mo/day/yr 04/13/98
Pump test data: Well water was ft. after hours pumping gpm
Est. Yield 50 gpm: Well water was ft. after hours pumping gpm
Bore Hole Diameter 10" in. to ft., and in. to ft.
WELL WATER TO BE USED AS: 1 Domestic 2 Irrigation 3 Feedlot 4 Industrial 5 Public water supply 6 Oil field water supply 7 Lawn and garden only 8 Air conditioning 9 Dewatering 10 Monitoring well 11 Injection well 12 Other (Specify below)
Was a chemical/bacteriological sample submitted to Department? Yes No X; If yes, mo/day/yr sample was submitted
Water Well Disinfected? Yes X No

5 TYPE OF BLANK CASING USED: 1 Steel 2 PVC 3 RMP (SR) 4 ABS 5 Wrought iron 6 Asbestos-Cement 7 Fiberglass 8 Concrete tile 9 Other (specify below)
CASING JOINTS: Glued X Clamped Welded Threaded
Blank casing diameter 5" in. to 0-55 ft., Dia in. to ft., Dia in. to ft.
Casing height above land surface 24" in., weight 2.82 lbs./ft. Wall thickness or gauge No. .258

TYPE OF SCREEN OR PERFORATION MATERIAL: 1 Steel 2 Brass 3 Stainless steel 4 Galvanized steel 5 Fiberglass 6 Concrete tile 7 PVC 8 RMP (SR) 9 ABS 10 Asbestos-cement 11 Other (specify) 12 None used (open hole)
SCREEN OR PERFORATION OPENINGS ARE: 1 Continuous slot 2 Louvered shutter 3 Mill slot 4 Key punched 5 Gauzed wrapped 6 Wire wrapped 7 Torch cut 8 Saw cut 9 Drilled holes 10 Other (specify) 11 None (open hole)
SCREEN-PERFORATED INTERVALS: From ~~22~~ 55 ft. to ~~XXX~~ 60 ft., From ft. to ft.
From ft. to ft., From ft. to ft.
GRAVEL PACK INTERVALS: From 32 ft. to 60 ft., From ft. to ft.
From ft. to ft., From ft. to ft.

6 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other
Grout Intervals: From 4 ft. to 32 ft., From ft. to ft., From ft. to ft.
What is the nearest source of possible contamination: 1 Septic tank 2 Sewer lines 3 Watertight sewer lines 4 Lateral lines 5 Cess pool 6 Seepage pit 7 Pit privy 8 Sewage lagoon 9 Feedyard 10 Livestock pens 11 Fuel storage 12 Fertilizer storage 13 Insecticide storage 14 Abandoned water well 15 Oil well/Gas well 16 Other (specify below)
Direction from well? East How many feet? 100'

| FROM | TO | LITHOLOGIC LOG | FROM | TO | PLUGGING INTERVALS |
|---|---|---|---|---|---|
| 0 | 3 | Top Soil | | | |
| 3 | 23 | Clay-Brown-Silty | | | |
| 23 | 26 | Clay-Dark Brown | | | |
| 26 | 52 | Clay-Grey | | | |
| 52 | 60 | FS-Cs-Med-Pea Chert 1/4x3/8-Brown | | | |

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and was completed on (mo/day/year) 4/13/98 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 182 This Water Well Record was completed on (mo/day/yr) 4-23-98
under the business name of STRADER DRILLING CO., INC. by (signature) Dale Askren

INSTRUCTIONS: Use typewriter or ball point pen. *PLEASE PRESS FIRMLY* and *PRINT* clearly. Please fill in blanks, underline or circle the correct answers. Send top three copies to Kansas Department of Health and Environment, Bureau of Water, Topeka, Kansas 66620-0001. Telephone: 913-296-5545. Send one to WATER WELL OWNER and retain one for your records.

95.14157 38.93148

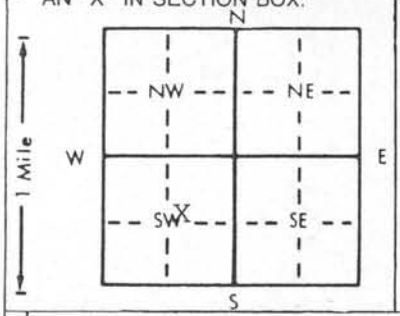
# WATER WELL RECORD Form WWC-5 KSA 82a-1212

1 LOCATION OF WATER WELL: County: DOUGLAS | Fraction: SW ¼ NE ¼ SW ¼ | Section Number: 12 | Township Number: T 13 S | Range Number: R 20 E/W

Distance and direction from nearest town or city street address of well if located within city?
1 3/4 west of Eudora

2 WATER WELL OWNER: Jeff Gazaway
RR#, St. Address, Box # : 15007 W. 85th Terrace (File #40333) Board of Agriculture, Division of Water Resource
City, State, ZIP Code : Lenexa, KS 66215 Application Number:

3 LOCATE WELL'S LOCATION WITH AN "X" IN SECTION BOX:




4 DEPTH OF COMPLETED WELL 68 ft. ELEVATION:
Depth(s) Groundwater Encountered 1. ft. 2. ft. 3. ft.
WELL'S STATIC WATER LEVEL 27' ft. below land surface measured on mo/day/yr 8-23-91
Pump test data: Well water was ft. after hours pumping gpm
Est. Yield 300 gpm: Well water was ft. after hours pumping gpm
Bore Hole Diameter 22" in. to ft., and in. to ft
WELL WATER TO BE USED AS: 1 Domestic 2 Irrigation 3 Feedlot 4 Industrial 5 Public water supply 6 Oil field water supply 7 Lawn and garden only 8 Air conditioning 9 Dewatering 10 Monitoring well 11 Injection well 12 Other (Specify below)
Was a chemical/bacteriological sample submitted to Department? Yes No X; If yes, mo/day/yr sample was submitted
Water Well Disinfected? Yes X No

5 TYPE OF BLANK CASING USED: 1 Steel 2 PVC 3 RMP (SR) 4 ABS 5 Wrought iron 6 Asbestos-Cement 7 Fiberglass 8 Concrete tile 9 Other (specify below)
CASING JOINTS: Glued Clamped Welded X Threaded
Blank casing diameter 12" in. to 0-58 ft., Dia in. to ft., Dia in. to ft
Casing height above land surface 28" in., weight 49 lbs./ft. Wall thickness or gauge No. .375

TYPE OF SCREEN OR PERFORATION MATERIAL: 1 Steel 2 Brass 3 Stainless steel 4 Galvanized steel 5 Fiberglass 6 Concrete tile 7 PVC 8 RMP (SR) 9 ABS 10 Asbestos-cement 11 Other (specify) 12 None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE: 1 Continuous slot 2 Louvered shutter 3 Mill slot 4 Key punched 5 Gauzed wrapped 6 Wire wrapped 7 Torch cut 8 Saw cut 9 Drilled holes 10 Other (specify) 11 None (open hole)
Johnson .125

SCREEN-PERFORATED INTERVALS: From 58 ft. to 68 ft., From ft. to ft.
From ft. to ft., From ft. to ft.
GRAVEL PACK INTERVALS: From 25 ft. to 68 ft., From ft. to ft.
From ft. to ft., From ft. to ft.

6 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other
Grout Intervals: From 0 ft. to 25 ft., From ft. to ft., From ft. to ft.

What is the nearest source of possible contamination:
1 Septic tank 2 Sewer lines 3 Watertight sewer lines 4 Lateral lines 5 Cess pool 6 Seepage pit 7 Pit privy 8 Sewage lagoon 9 Feedyard 10 Livestock pens 11 Fuel storage 12 Fertilizer storage 13 Insecticide storage 14 Abandoned water well 15 Oil well/Gas well 16 Other (specify below)
Direction from well? west How many feet? 420'

| FROM | TO | LITHOLOGIC LOG | FROM | TO | PLUGGING INTERVALS |
|---|---|---|---|---|---|
| 0 | 3 | Top Soil | | | |
| 3 | 29 | Clay-Brown | | | |
| 29 | 49 | Clay-Blue | | | |
| 49 | 50 | Fine Sand-Blue | | | |
| 50 | 51 | FS-CS-Med-Gravel-Blue | | | |
| 51 | 53 | Clay-Blue | | | |
| 53 | 56 | FS-CS-Med-Pea Gravel ¼"-Blue | | | |
| 56 | 68 | " " " " " Chert ½x1-Blue-Grey | | | |
| 68 | 72 | Limestone-Grey | | | |

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and was completed on (mo/day/year) 8-23-91 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 182 This Water Well Record was completed on (mo/day/yr) 9-5-91 under the business name of STRADER DRILLING CO., INC. by (signature) Darle Strader

INSTRUCTIONS: Use typewriter or ball point pen. *PLEASE PRESS FIRMLY* and *PRINT* clearly. Please fill in blanks, underline or circle the correct answers. Send top three copies to Kansas Department of Health and Environment, Bureau of Water, Topeka, Kansas 66620-7320. Telephone: 913-296-5545. Send one to WATER WELL OWNER and retain one for your records.

(739)

WATER WELL RECORD Form WWC-5 KSA 82a-1212 ID No. _____

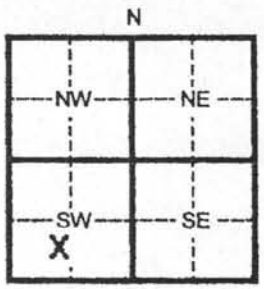
| 1 LOCATION OF WATER WELL: | Fraction | Section Number | Township Number | Range Number |
|---|---|---|---|---|
| County: **Douglas** | ¼ **S** 1/2 **SW** ¼ | **31** | T **12** S | R **21** E/W |

Distance and direction from nearest town or city street address of well if located within city?
**REF: Don Westheffer**

2 WATER WELL OWNER: **Nunemaker-Ross Inc.**
RR#, St. Address, Box # : **1616 North 1700 Road**
City, State, ZIP Code : **Lawrence, Ks 66044**

Board of Agriculture, Division of Water Resources
Application Number: **46589**

3 LOCATE WELL'S LOCATON WITH AN "X" IN SECTION BOX:




4 DEPTH OF COMPLETED WELL **50** ft. ELEVATION: _____
Depth(s) Groundwater Encountered 1 _____ ft. 2 _____ ft. 3 _____ ft.
WELL'S STATIC WATER LEVEL **na** ft. below land surface measured on mo/day/yr _____
Pump test data: Well water was _____ ft. after _____ hours pumping _____ gpm
Est. Yield _____ gpm: Well water was _____ ft. after _____ hours pumping _____ gpm
Bore Hole Diameter **28** in. to **51** ft. and _____ in. to _____ ft.
WELL WATER TO BE USED AS: 5 Public water supply 8 Air conditioning 11 Injection well
1 Domestic 3 Feed lot 6 Oil field water supply 9 Dewatering 12 Other (Specify below)
2 Irrigation 4 Industrial 7 Lawn and garden (domestic) 10 Monitoring well _____
Was a chemical/bacteriological sample submitted to Department? Yes ____ No X If yes, mo/day/yr sample was submitted _____ Water Well Disinfected? Yes X No

5 TYPE OF BLANK CASING USED: 5 Wrought Iron 8 Concrete tile CASING JOINTS: Glued X Clamped ____
1 Steel 3 RMP (SR) 6 Asbestos-Cement 9 Other (specify below) Welded _____
2 PVC 4 ABS 7 Fiberglass _____ Threaded _____
Blank casing diameter **28** in. to **30** ft., Dia _____ in. to _____ ft., Dia _____ in. to _____ ft.
Casing height above land surface **24** in., weight **16.15** lbs./ft. Wall thickness or gauge No. **.500**

TYPE OF SCREEN OR PERFORATION MATERIAL: 7 PVC 10 Asbestos-cement
1 Steel 3 Stainless steel 5 Fiberglass 8 RMP (SR) 11 Other (specify) _____
2 Brass 4 Galvanized steel 6 Concrete tile 9 ABS 12 None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE: 5 Gauzed wrapped 8 Saw cut 11 None (open hole)
1 Continuous slot 3 Mill slot 6 Wire wrapped 9 Drilled holes
2 Louvered shutter 4 Key punched 7 Torch cut 10 Other (specify) _____

SCREEN-PERFORATED INTERVALS: From **30** ft. to **50** ft. From _____ ft. to _____ ft.
From _____ ft. to _____ ft. From _____ ft. to _____ ft.
GRAVEL PACK INTERVALS: From **20** ft. to **50** ft. From _____ ft. to _____ ft.
From _____ ft. to _____ ft. From _____ ft. to _____ ft.

6 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other _____
Grout Intervals From **0** ft. to **20** ft. From _____ ft. to _____ ft. From _____ ft. to _____ ft.
What is the nearest source of possible contamination:
1 Septic tank 4 Lateral lines 7 Pit privy 10 Livestock pens 14 Abandoned water well
2 Sewer lines 5 Cess pool 8 Sewage lagoon 11 Fuel storage 15 Oil well/ Gas well
3 Watertight sewer lines 6 Seepage pit 9 Feedyard 12 Fertilizer storage 16 Other (specify below)
13 Insecticide storage **none**
Direction from well? How many feet?

| FROM | TO | CODE | LITHOLOGIC LOG | FROM | TO | PLUGGING INTERVALS |
|---|---|---|---|---|---|---|
| 0 | 3 | | Surface | | | |
| 3 | 24 | | Clay | | | |
| 24 | 35 | | Sand & gravel | | | |
| 35 | 50 | | Large gravel | | | |
| 50 | 51 | | shale | | | |

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and was completed on (mo/day/yr) **5-13-07** and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. **554** This Water Well Record was completed on (mo/day/yr) **3-30-07**
under the business name of **Woofter Pump & Well Inc.** by (signature) Jay C Woofter by MR

INSTRUCTIONS: Please fill in blanks and circle the correct answers. Send three copies to Kansas Department of Health and Environment, Bureau of Water, 1000 S W Jackson St., Ste. 420, Topeka, Kansas 66612-1367. Telephone: 913-296-5545. Send one to WATER WELL OWNER and retain one for your records.

KGS Hydrology | Water Well Database Query

# Scan of WWC5 Form

WATER WELL RECORD Form WWC-5 KSA 82a-1212

1 LOCATION OF WATER WELL: County: Douglas | Fraction: NW ¼ SE ¼ SE ¼ | Section Number: 31 | Township Number: T 12 S | Range Number: R 21 (E)W

Distance and direction from nearest town or city street address of well if located within city? 3/4 miles N. From NW Eudora

2 WATER WELL OWNER: Eudora Riverview Golf
RR#, St. Address, Box # : 2504 Alabama
City, State, ZIP Code : Lawrence, Ks. 66046
Board of Agriculture, Division of Water Resources Application Number:

3 LOCATE WELL'S LOCATION WITH AN "X" IN SECTION BOX: N / NW / NE / W / E / SW / SE / S; 1 Mile

4 DEPTH OF COMPLETED WELL 53 ft. ELEVATION:
Depth(s) Groundwater Encountered 1. 19-53 ft. 2. ft. 3. ft.
WELL'S STATIC WATER LEVEL 19 ft. below land surface measured on mo/day/yr 3-29-95
Pump test data: Well water was ft. after hours pumping gpm
Est. Yield 250 gpm: Well water was ft. after hours pumping gpm
Bore Hole Diameter 12¼ in. to 53 ft., and in. to ft.
WELL WATER TO BE USED AS: 1 Domestic 2 Irrigation 3 Feedlot 4 Industrial 5 Public water supply 6 Oil field water supply 7 Lawn and garden only 8 Air conditioning 9 Dewatering 10 Monitoring well 11 Injection well 12 Other (Specify below)
Was a chemical/bacteriological sample submitted to Department? Yes No; If yes, mo/day/yr sample was submitted
Water Well Disinfected? Yes X No

5 TYPE OF BLANK CASING USED: 1 Steel 2 PVC 3 RMP (SR) 4 ABS 5 Wrought iron 6 Asbestos-Cement 7 Fiberglass 8 Concrete tile 9 Other (specify below)
CASING JOINTS: Glued X Clamped Welded Threaded
Blank casing diameter 8 in. to 33 ft., Dia in. to ft., Dia in. to ft.
Casing height above land surface 30 in., weight 200# lbs./ft. Wall thickness or gauge No.

TYPE OF SCREEN OR PERFORATION MATERIAL: 7 PVC
1 Steel 3 Stainless steel 5 Fiberglass 8 RMP (SR) 10 Asbestos-cement
2 Brass 4 Galvanized steel 6 Concrete tile 9 ABS 11 Other (specify) 12 None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE: 1 Continuous slot 2 Louvered shutter 3 Mill slot 4 Key punched 5 Gauzed wrapped 6 Wire wrapped 7 Torch cut 8 Saw cut 9 Drilled holes 10 Other (specify) 11 None (open hole)

SCREEN-PERFORATED INTERVALS: From 33 ft. to 53 ft., From ft. to ft.
From ft. to ft., From ft. to ft.

GRAVEL PACK INTERVALS: From 53 ft. to 20 ft., From ft. to ft.
From ft. to ft., From ft. to ft.

6 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other
Grout Intervals: From 20 ft. to 0 ft., From ft. to ft., From ft. to ft.

What is the nearest source of possible contamination: NONE At the Time
1 Septic tank 2 Sewer lines 3 Watertight sewer lines 4 Lateral lines 5 Cess pool 6 Seepage pit 7 Pit privy 8 Sewage lagoon 9 Feedyard 10 Livestock pens 11 Fuel storage 12 Fertilizer storage 13 Insecticide storage 14 Abandoned water well 15 Oil well/Gas well 16 Other (specify below)
Direction from well? How many feet?

| FROM | TO | LITHOLOGIC LOG | FROM | TO | PLUGGING INTERVALS |
|---|---|---|---|---|---|
| 0 | 15 | Soil, Clay, Silt | | | |
| 15 | 52 | Sand | | | |
| 52 | 53 | Gravel + Limestone | | | |

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and was completed on (mo/day/year) 3-29-95 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 561 This Water Well Record was completed on (mo/day/yr) 4-3-95 under the business name of Evans Energy Dev. Inc. by (signature) Sam E. Evans

INSTRUCTIONS: Use typewriter or ball point pen. PLEASE PRESS FIRMLY and PRINT clearly. Please fill in blanks, underline or circle the correct answers. Send top three copies to Kansas Department of Health and Environment, Bureau of Water, Topeka, Kansas 66620-0001. Telephone: 913-296-5545. Send one to WATER WELL OWNER and retain one for your records.

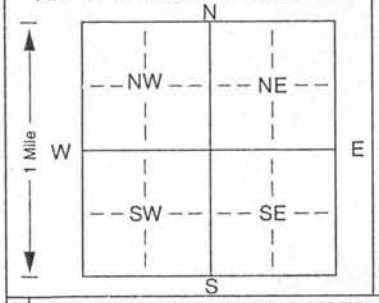
WATER WELL RECORD Form WWC-5 KSA 82a-1212 ID No. _____

| 1 LOCATION OF WATER WELL: | Fraction | Section Number | Township Number | Range Number |
|---|---|---|---|---|
| County: Douglas | near center-E½-NE¼ ¼ | 6 | T 13 S | R 21E E/W |

Distance and direction from nearest town or city street address of well if located within city?
mile northwest of Lecompton

2 WATER WELL OWNER: Mark Neis
RR#, St. Address, Box # : 12775 County Line Rd.
City, State, ZIP Code : Eudora, Ks. 66025
Board of Agriculture, Division of Water Resources
Application Number:

3 LOCATE WELL'S LOCATION WITH AN "X" IN SECTION BOX:




4 DEPTH OF COMPLETED WELL 63 ft. ELEVATION:
Depth(s) Groundwater Encountered 1. ft. 2. ft. 3. ft.
WELL'S STATIC WATER LEVEL 19½ ft. below land surface measured on mo/day/yr 12-14-2001
Pump test data: Well water was ft. after hours pumping gpm
Est. Yield 950 gpm: Well water was ft. after hours pumping gpm
Bore Hole Diameter 24 in. to ft., and in. to ft.
WELL WATER TO BE USED AS: 1 Domestic 2 Irrigation 3 Feedlot 4 Industrial 5 Public water supply 6 Oil field water supply 7 Domestic (lawn & garden) 8 Air conditioning 9 Dewatering 10 Monitoring well 11 Injection well 12 Other (Specify below)
Was a chemical/bacteriological sample submitted to Department? Yes No X ; If yes, mo/day/yrs sample was submitted
Water Well Disinfected? Yes X No

5 TYPE OF BLANK CASING USED: 1 Steel 2 PVC 3 RMP (SR) 4 ABS 5 Wrought iron 6 Asbestos-Cement 7 Fiberglass 8 Concrete tile 9 Other (specify below)
CASING JOINTS: Glued X Clamped Welded Threaded
Blank casing diameter 16 in. to ft., Dia in. to ft., Dia in. to f
Casing height above land surface 24 in., weight 15.54 lbs./ft. Wall thickness or gauge No. .500
TYPE OF SCREEN OR PERFORATION MATERIAL: 1 Steel 2 Brass 3 Stainless steel 4 Galvanized steel 5 Fiberglass 6 Concrete tile 7 PVC 8 RMP (SR) 9 ABS 10 Asbestos-cement 11 Other (specify) 12 None used (open hole)
SCREEN OR PERFORATION OPENINGS ARE: 1 Continuous slot 2 Louvered shutter 3 Mill slot 4 Key punched 5 Gauzed wrapped 6 Wire wrapped 7 Torch cut 8 Saw cut 9 Drilled holes 10 Other (specify) 11 None (open hole)
SCREEN-PERFORATED INTERVALS: From 50 ft. to 63 ft., From ft. to ft
From ft. to ft., From ft. to ft
GRAVEL PACK INTERVALS: From 25 ft. to 63 ft., From ft. to ft
From ft. to ft., From ft. to ft

6 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other
Grout Intervals: From 0 ft. to 25 ft., From ft. to ft., From ft. to ft.
What is the nearest source of possible contamination: 1 Septic tank 2 Sewer lines 3 Watertight sewer lines 4 Lateral lines 5 Cess pool 6 Seepage pit 7 Pit privy 8 Sewage lagoon 9 Feedyard 10 Livestock pens 11 Fuel storage 12 Fertilizer storage 13 Insecticide storage 14 Abandoned water well 15 Oil well/Gas well 16 Other (specify below) Open Field
Direction from well? How many feet?

| FROM | TO | LITHOLOGIC LOG | FROM | TO | PLUGGING INTERVALS |
|---|---|---|---|---|---|
| 0 | 11 | brown silty clay | | | |
| 11 | 18 | brown silt | | | |
| 18 | 22 | brown fs-cs | | | |
| 22 | 27 | brown fs-cs-med-pea | | | |
| 27 | 33 | grey fine sand | | | |
| 33 | 35 | blue clay | | | |
| 35 | 38 | grey fs-cs-med gravel | | | |
| 38 | 42 | blue clay | | | |
| 42 | 49 | fs-cs-med-some pea | | | |
| 49 | 54 | fs-cs-med-pea | | | |
| 54 | 55 | blue clay | | | |
| 55 | 58 | fs-cs-med-pea | | | |
| 58 | 63 | fs-cs-med-pea ½x3/4 | | | |
| 3 | | grey limestone | | | |

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and was completed on (mo/day/year) 12-14-2001 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's Licence No. 182 This Water Well Record was completed on (mo/day/yr) 1-2-2002 under the business name of Strader Drilling co., Inc. by (signature) Dale Askeren

INSTRUCTIONS: Use typewriter or ball point pen. *PLEASE PRESS FIRMLY* and *PRINT* clearly. Please fill in blanks, underline or circle the correct answers. Send top three copies to Kansas Department of Health and Environment, Bureau of Water, Topeka, Kansas 66620-0001. Telephone 785-296-5524. Send one to WATER WELL OWNER and retain one for your records. Fee of $5.00 for each constructed well.

WATER WELL RECORD Form WWC-5 KSA 82a-1212

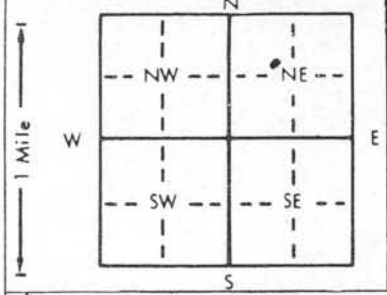
| 1 LOCATION OF WATER WELL: | Fraction | Section Number | Township Number | Range Number |
|---|---|---|---|---|
| County: DOUGLAS | SE ¼ NW ¼ NE ¼ | 6 | T 13 S | R 21 (E)W |

Distance and direction from nearest town or city street address of well if located within city?
3 MILES NORTHWEST OF EUDORA

2 WATER WELL OWNER: CITY OF EUDORA
RR#, St. Address, Box # : 4 EAST SEVENTH STREET
City, State, ZIP Code : EUDORA, KS 66026

Board of Agriculture, Division of Water Resources
Application Number:

3 LOCATE WELL'S LOCATION WITH AN "X" IN SECTION BOX:




4 DEPTH OF COMPLETED WELL 72 ft. ELEVATION:
Depth(s) Groundwater Encountered 1. 18 ft. 2. ft. 3. ft.
WELL'S STATIC WATER LEVEL 18 ft. below land surface measured on mo/day/yr 6/16/98
Pump test data: Well water was 20 ft. after 0.5 hours pumping 329 gpm
Est. Yield 325 gpm: Well water was 22 ft. after 11 hours pumping 521 gpm
Bore Hole Diameter 42 in. to 72 ft., and in. to ft.
WELL WATER TO BE USED AS: (5) Public water supply 8 Air conditioning 11 Injection well
1 Domestic 3 Feedlot 6 Oil field water supply 9 Dewatering 12 Other (Specify below)
2 Irrigation 4 Industrial 7 Lawn and garden only 10 Monitoring well
Was a chemical/bacteriological sample submitted to Department? Yes X No; If yes, mo/day/yr sample was submitted 4/21/97 Water Well Disinfected? (Yes) No

5 TYPE OF BLANK CASING USED: (1) Steel 2 PVC 3 RMP (SR) 4 ABS 5 Wrought iron 6 Asbestos-Cement 7 Fiberglass 8 Concrete tile 9 Other (specify below)
CASING JOINTS: Glued Clamped Welded X Threaded
Blank casing diameter 12 in. to 47 ft., Dia in. to ft., Dia in. to ft.
Casing height above land surface 18 in., weight PITLESS UNIT lbs./ft. Wall thickness or gauge No. 0.375"

TYPE OF SCREEN OR PERFORATION MATERIAL:
1 Steel (3) Stainless steel 5 Fiberglass 7 PVC 10 Asbestos-cement
2 Brass 4 Galvanized steel 6 Concrete tile 8 RMP (SR) 11 Other (specify)
9 ABS 12 None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE:
1 Continuous slot 3 Mill slot (6) Wire wrapped 8 Saw cut 11 None (open hole)
2 Louvered shutter 4 Key punched 5 Gauzed wrapped 7 Torch cut 9 Drilled holes 10 Other (specify)

SCREEN-PERFORATED INTERVALS: From 47 ft. to 72 ft., From ft. to ft.
From ft. to ft., From ft. to ft.
GRAVEL PACK INTERVALS: From 22 ft. to 72 ft., From ft. to ft.
From ft. to ft., From ft. to ft.

6 GROUT MATERIAL: (1) Neat cement 2 Cement grout 3 Bentonite 4 Other
Grout Intervals: From 6 ft. to 20 ft., From ft. to ft., From ft. to ft.

What is the nearest source of possible contamination:
1 Septic tank 4 Lateral lines 7 Pit privy 10 Livestock pens 14 Abandoned water well
2 Sewer lines 5 Cess pool 8 Sewage lagoon 11 Fuel storage 15 Oil well/Gas well
3 Watertight sewer lines 6 Seepage pit 9 Feedyard 12 Fertilizer storage 16 Other (specify below)
13 Insecticide storage
Direction from well? How many feet?

| FROM | TO | LITHOLOGIC LOG | FROM | TO | PLUGGING INTERVALS |
|---|---|---|---|---|---|
| 0 | 2 | TOP SOIL | | | |
| 2 | 17 | BROWN SANDY SILT | | | |
| 17 | 23 | BROWN MEDIUM TO FINE SAND | | | |
| 23 | 38 | GRAY MEDIUM TO COARSE, SOME FINE | | | |
| 38 | 55 | GRAY MEDIUM TO COARSE, SOME GRAVEL | | | |
| 55 | 72 | GRAY COARSE TO MEDIUM | | | |

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed (2) reconstructed, or (3) plugged under my jurisdiction and was completed on (mo/day/year) 6/16/98 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 102 This Water Well Record was completed on (mo/day/yr) 8/5/98 under the business name of LAYNE CHRISTENSEN COMPANY by (signature) Tim Howard

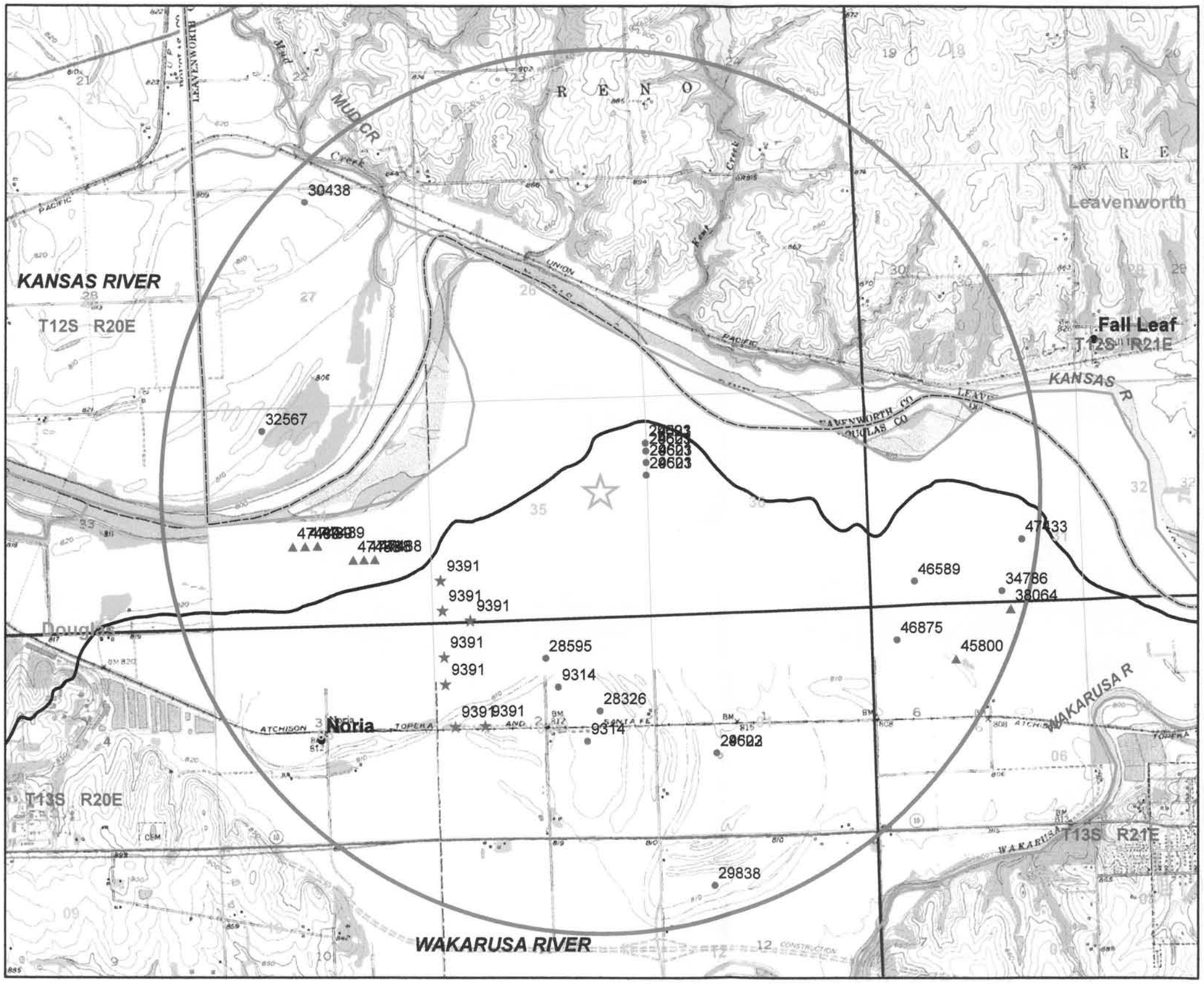
INSTRUCTIONS: Use typewriter or ball point pen. *PLEASE PRESS FIRMLY* and *PRINT* clearly. Please fill in blanks, underline or circle the correct answers. Send top three copies to Kansas Department of Health and Environment, Bureau of Water, Topeka, Kansas 66620-0001. Telephone: 913-296-5545. Send one to WATER WELL OWNER and retain one for your records.

# APPENDIX II.

## Kansas Department of Agriculture, Division of Water Resources,

## Safe Yield Analysis Data

# WIMAS Water Right Development - Map Centered on (E½) 35-12S-20E




**Legend**

**WIMAS_PDS_UMW**

- ★ G_IND
- • G_IRR
- ▲ G_MUN

**Index Map**

0 0.3 0.6 1.2 1.8 2.4 Miles

**This map was created by WIMAS on 9/12/2012 7:49:21 AM**

Report Date Wednesday, September 12 2012

Water Rights and Points of Diversion Within 2.00 miles of point defined as:
2940 ft N and 1320 ft W of the SE Corner of Section 35, T 12S, R 20E
Located at: 95.153247 West Longitude and 38.964996 North Latitude
GROUNDWATER ONLY

| File Number | Use | ST | SR | Dist (mi) | Q4 | Q3 | Q2 | Q1 | FeetN | FeetW | Sec | Twp | Rng | ID | Batt | Auth_Quan | Add_Quan | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A__ 9314 | 00 IRR | NK | G | 1.12 | -- | NE | NW | SE | ----- | ----- | 2 | 13 | 20E | 1 | | 102.00 | 102.00 | AF |
| Same | | | | .89 | -- | NW | SW | NE | ----- | ----- | 2 | 13 | 20E | 2 | | | | |
| A__ 9391 | 00 IND | NK | G | .87 | -- | SW | SW | SW | 283 | 5040 | 35 | 12 | 20E | 1 | | 3685.91 | 3685.91 | AF |
| Same | | | | .80 | -- | SE | SW | SW | 24 | 4375 | 35 | 12 | 20E | 8 | | | | |
| Same | | | | .80 | -- | NW | SW | SW | 1004 | 5063 | 35 | 12 | 20E | 9 | | | | |
| Same | | | | 1.23 | -- | -- | -- | -- | 2778 | 4815 | 2 | 13 | 20E | 3 | | | | |
| Same | | | | 1.16 | -- | -- | -- | -- | 2771 | 4092 | 2 | 13 | 20E | 4 | | | | |
| Same | | | | 1.09 | -- | -- | -- | -- | 3794 | 5028 | 2 | 13 | 20E | 5 | | | | |
| Same | | | | 1.00 | -- | -- | -- | -- | 4453 | 5034 | 2 | 13 | 20E | 9 | | | | |
| A__ 24621 | 00 IRR | NK | G | .33 | -- | SE | NE | NE | 4180 | 50 | 35 | 12 | 20E | 4 | | 24.50 | 24.50 | AF |
| Same | | | | .31 | -- | SE | NE | NE | 3970 | 50 | 35 | 12 | 20E | 5 | | | | |
| Same | | | | .28 | -- | NE | SE | NE | 3680 | 50 | 35 | 12 | 20E | 6 | | | | |
| Same | | | | .25 | -- | NE | SE | NE | 3370 | 50 | 35 | 12 | 20E | 7 | | | | |
| A__ 24623 | 00 IRR | NK | G | 1.30 | -- | CW | NE | SW | 1960 | 3840 | 1 | 13 | 20E | 1 | | 4.60 | 4.60 | AF |
| A__ 28326 | 00 IRR | NK | G | .98 | -- | SW | SE | NE | 3040 | 1315 | 2 | 13 | 20E | 7 | | 36.00 | 36.00 | AF |
| A__ 28595 | 00 IRR | NK | G | .77 | -- | SW | NW | NE | 4350 | 2580 | 2 | 13 | 20E | 8 | | 23.00 | .00 | AF |
| A__ 29502 | 00 IRR | NK | G | 1.30 | -- | CW | NE | SW | 1960 | 3840 | 1 | 13 | 20E | 1 | | 49.30 | 49.30 | AF |
| A__ 29503 | 00 IRR | NK | G | .33 | -- | SE | NE | NE | 4180 | 50 | 35 | 12 | 20E | 4 | | 87.50 | 87.50 | AF |
| Same | | | | .31 | -- | SE | NE | NE | 3970 | 50 | 35 | 12 | 20E | 5 | | | | |
| Same | | | | .28 | -- | NE | SE | NE | 3680 | 50 | 35 | 12 | 20E | 6 | | | | |
| Same | | | | .25 | -- | NE | SE | NE | 3370 | 50 | 35 | 12 | 20E | 7 | | | | |
| A__ 29838 | 00 IRR | NK | G | 1.86 | -- | SE | NW | NW | 4070 | 4000 | 12 | 13 | 20E | 1 | | 26.00 | 26.00 | AF |
| A__ 30438 | 00 IRR | NK | G | 1.87 | -- | NW | NW | NE | 4931 | 2788 | 27 | 12 | 20E | 2 | | 44.00 | 44.00 | AF |
| A__ 32567 | 00 IRR | NK | G | 1.54 | -- | -- | -- | -- | 4750 | 4000 | 34 | 12 | 20E | 2 | | 79.00 | 79.00 | AF |
| A__ 34786 | 00 IRR | NK | G | 1.92 | -- | SE | SW | SE | 300 | 1950 | 31 | 12 | 21E | 1 | | 25.00 | 25.00 | AF |
| A__ 38064 | 00 MUN | NK | G | 1.98 | -- | NE | NW | NE | 5180 | 1855 | 6 | 13 | 21E | 3 | | 190.70 | 141.97 | AF |
| A__ 45800 | 00 MUN | LO | G | 1.85 | -- | SE | SE | NW | 3870 | 3110 | 6 | 13 | 21E | 7 | | 245.51 | 66.01 | AF |
| A__ 46589 | 00 IRR | LR | G | 1.54 | -- | NC | S2 | SW | 575 | 3960 | 31 | 12 | 21E | 2 | | 150.00 | 150.00 | AF |
| A__ 46875 | 00 IRR | KE | G | 1.54 | -- | SE | NW | NW | 4613 | 4547 | 6 | 13 | 21E | 9 | | 32.00 | 32.00 | AF |
| A__ 47433 | 00 IRR | HK | G | 1.97 | -- | SE | NW | SE | 1530 | 1428 | 31 | 12 | 21E | 6 | | 91.50 | 91.50 | AF |
| A__ 47488 | 00 MUN | HK | G | 1.09 | -- | SE | NW | SE | 1590 | 1640 | 34 | 12 | 20E | 8 | G 2 | 1290.41 | 784.16 | AF |
| Same | | | | 1.14 | -- | SE | NW | SE | 1590 | 1902 | 34 | 12 | 20E | 6 | B 2 | | | |
| Same | | | | 1.04 | -- | SE | NW | SE | 1590 | 1378 | 34 | 12 | 20E | 7 | B 2 | | | |
| A__ 47489 | 00 MUN | HK | G | 1.34 | -- | SE | NE | SW | 1953 | 3046 | 34 | 12 | 20E | 5 | G 2 | 1290.41 | .00 | AF |
| Same | | | | 1.39 | -- | SW | NE | SW | 1953 | 3346 | 34 | 12 | 20E | 3 | B 2 | | | |
| Same | | | | 1.28 | -- | SE | NE | SW | 1953 | 2746 | 34 | 12 | 20E | 4 | B 2 | | | |

| Total Net Quantities Authorized: | Direct | Storage |
|---|---|---|
| Total Requested Amount (AF) = | .00 | .00 |
| Total Permitted Amount (AF) = | 907.66 | .00 |
| Total Inspected Amount (AF) = | 216.01 | .00 |
| Total Pro_Cert Amount (AF) = | .00 | .00 |
| Total Certified Amount (AF) = | 4305.78 | .00 |
| Total Vested Amount (AF) = | .00 | .00 |
| TOTAL AMOUNT (AF) = | 5429.45 | .00 |

An * after the source of supply indicates a pending application for change for the file number

# APPENDIX III.

## Potential Pollution Sources in the Area

1. Septic tank drain fields and cesspools especially in sandy loam soils can be a potential contamination source of the aquifer. Kansas Department of Health and Environment requires all public water supply ells to have at least 20 feet of grout sealed casing at the top of the well to prevent contamination and entry of flow into the well. However, most older domestic wells do not have grout seals to a safe depth below surface thus becoming a potential sources of contamination of the aquifer. There is supposed to be 100 feet separation between a septic tank drain field and a domestic well on a property.

2. Cattle or other livestock feeding operation can be a source of pollution to an aquifer, depending on the soil type and depth to static water level, especially if located within the effective radius of influence of a well. The effective radius of influence of a well is dependent upon the pumping rate of the well and aquifer characteristics. Domestic wells have a small effective radius of influence usually less than 50 feet. The effective radius of influence can be one thousand feet or more for an irrigation well or other large capacity well.

3. Chemical fertilizer and herbicides applied to corn planted next to the wells as shown next to Eudora Well No. 6 is a potential threat of contamination to the City wells. This threat of contamination is increased with irrigation, especially on sandy soils. Major portions of Hall and Merrick Counties in Nebraska have nitrates nearly double that of the KDHE and EPA regulations for Nitrates in public water supply due to irrigation and chemigation of corn on sandy loam soils similar to the alluvial soils shown in Bulletin 206, Part 2, Ground Water in the Kansas River Valley Junction City to Kansas City, Kansas by Stuart W. Fader. The Newman Terrace clay loam soils offer more protection of the aquifer from fertilizer.

4. Abandoned wells or old domestic wells that were drilled long ago with thin wall casing that have corroded through the years and were not grout sealed, can allow storm water runoff to flow directly into the aquifer resulting in direct contamination to the City wells. Such a well may exist west of Eudora Well No. 7 under the old windmill tower in the picture.

## WICHITA SAND PIT STUDY

Sedgwick County Department of Environmental Resources organized and conducted much of the efforts to determine which sand pits to study in more detail. The study group obtained assistance from the U.W. Bureau of Reclamation in drilling and installing three (3) monitoring wells around each of six (6) sites selected for study. Funds were obtained for the U.S. Geological Survey to sample and analyze surface water from the pits, ground water from the monitoring wells, and pit bottom sediment at four (4) sites located at the northwest edge of Wichita. The USGS analyzed the water samples for 18 physical and chemical properties, five (5) bacteriological values, 40 inorganic constituents, 118 pesticides and degradate compounds, and 134 organic compounds other than pesticides. The USGS analyzed the bottom sediments for five (5) physical and chemical properties, 45 inorganic constituents, and 32 organic compounds. The four pits in the Phase I sampling were; Barefoot Bay, Ridge Port, Mooring, and Cropland. Later two south pits were sampled which were; Kingston Cove and Pine Bay Estates.

Maize retention pond/ground-water pit is used for storage of storm water runoff. A special sampling of the storm water flow into the pit was made by others within 30 minutes of when flow commenced and within one to two hours following a storm event. The TDS of the storm water flow was very low at 49 to 111 mg/L when compared to the computed values in the analysis of data of 46 to 83 mg/L by the Kansas Geological Survey. Organic compounds found in the runoff water of concern was Alachlor at 3.8 µg/L in the first June 2007 runoff sample, Alachlor of 3.0 µg/L in the second June 2007 sample. The drinking water MCL for Alachlor is 2 µg/L. However, in the October 2007 pond sample Alachlor was significantly reduced by sunlight and bacterial activity of the pond. The Maize detention pond appears to be an effective means of removing storm water runoff with high bacteria content from the Big Slough waterway.

Storm water runoff into the sand pits does contribute to ground water recharge. The study showed no *significant* evidence of contamination of ground water by storm water runoff into the pits. The key word is *significant* contamination. Trace levels of some organics and mineral constituents such as iron, manganese and the ammonium ion were detected in the down gradient monitoring wells in slightly greater concentrations than the up gradient monitoring wells. On the contrary, most organic contaminants were reduced by the sunlight and bacterial activity existing within the sand pit lakes. Bacterial levels were never greater than the level recommended by KDHE for body contact.

Although some of the pits had piped storm water runoff into the pits from streets, broad width flow ways with grass filtering would capture silt and other contaminants prior to entering the ponds or pits. Road side drainage ditches may have a broad width overflow channels into nearby pits temporarily storing the storm water surge allowing orderly flow through natural water courses. The long term accumulation of silts, sediments and other solids will eventually restrict the recharge to the ground water system as has occurred at the Sedgwick County Zoo pit.

Residential areas have the greater potential for ground water contamination than rural areas. However, the spring runoff from corn fields with atrazine must be bounded by grass filter strips and flows need to be routed in grass waterways to capture sediments with atrazine attached.

**Hydraulic Impacts of Quarries and Gravel Pits**

Prepared by

J>A. Green, J.A. Pavlish, R.G. Merritt, ans J.L. Leete

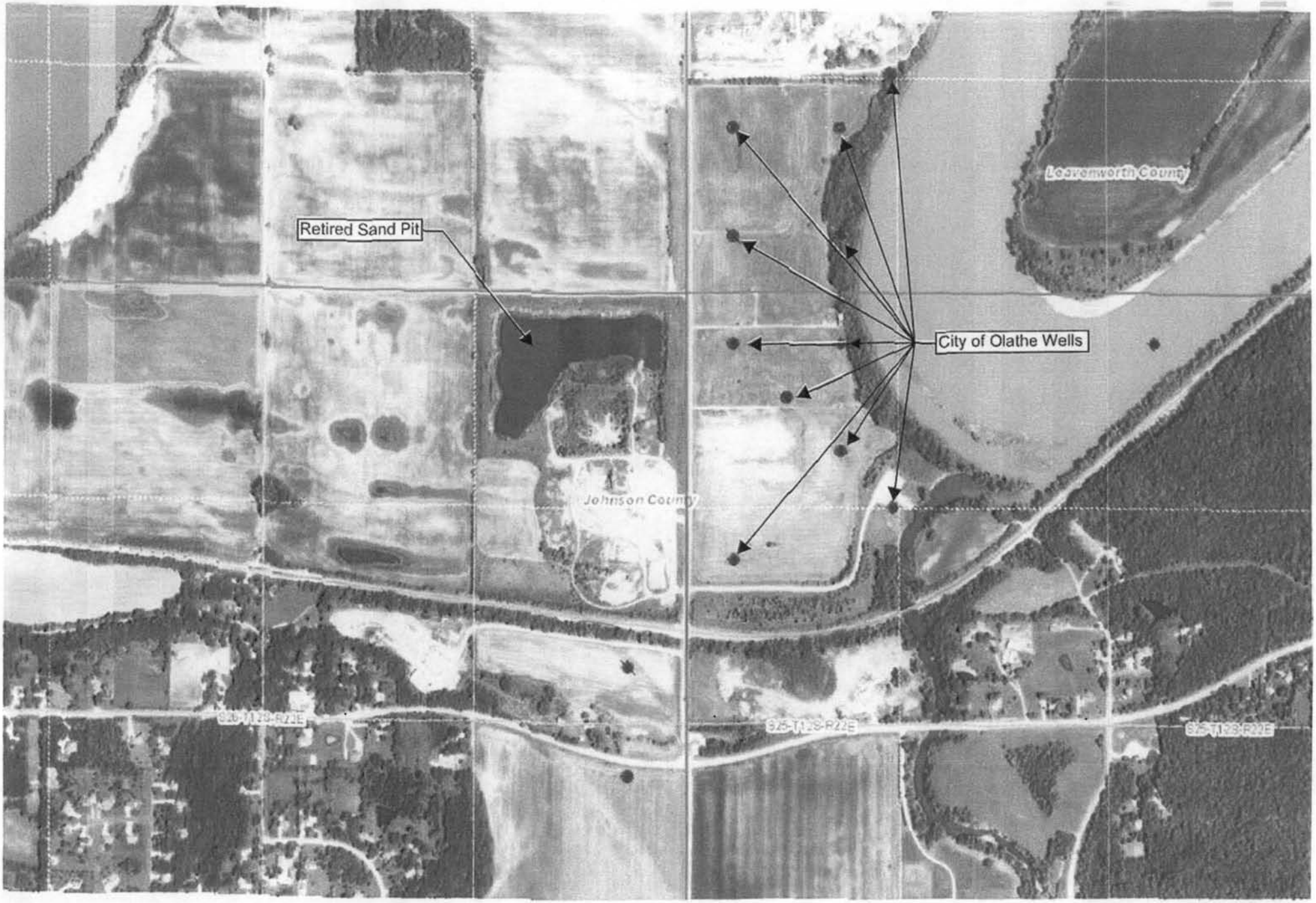
Minnesota Department of Natural Resources

Division of Waters

2005

The Division of Waters, MDNR studied three sand pits in the report, two of which were in saturated alluvial sediments and one was above the water table. The conclusion of this study was that sand mining had minimal impact on aquifer water levels. In one sand pit, ground water temperature changes were noted but were not consistent.


2079


Retired Sand Pit
City of Olathe Wells
Leavenworth County
Johnson County

# APPENDIX IV.

# RESUME' AND PERSONAL INFORMATION

**Name:** Carl E. Nuzman, P.E., P.Hg.
3314 NW Huxman Road
Silver Lake, KS 66539

Phone: (785) 582 4054
Cell: (785) 224 9929
cnuzman@embarqmail.com

**Position:** Consulting Engineer / Hydrogeologist

**Academic and Professional Certifications:**
Master of Science in Water Resources Engineering, Department of civil Engineering, University of Kansas, 1955.
Bachelor of Science in Agricultural Engineering, Kansas State University, 1053.
Professional Engineer, first licensed in Kansas in 1962, KS-4481. Formerly licensed in the following states: MO-E12525, IA-6334, SC-4099, FL-15102, AL-16858, AZ-23209, IL-062-043392, IN-PE-60880547, LA-23209, MS-10041, MI-33050, NE-E-12525, NC-15121, NM-10625, OH-E-51179, OK-15653, TN-018707, VA-0402-018380, and WI-E-25841.
Professional Hydrogeologist, Certified in 1986 by the American Institute of Hydrology, P.,Hg-385.

**Professional Positions:**

- Consultant – 1997 to Present
- Layne GeoSciences, Inc. Mission Woods, KS, Vice-president and Principal Hydrologist – 1988 to 1997
- Groundwater Management, Inc. Kansas city, KS, Vice President and Chief Hydrologist, 1985 to 1988
- Layne Western Company, Inc. Hydrology Division Manager and Chief Hydrologist 1970 to 1985
- Layne Western Company, Inc. Kansas City, MO, Sales Engineer 1967 to 1970
- Kansas Water Resources Board, Topeka, KS, Hydrologist III 1966
- Kansas State Board of Agriculture, Division of Water Resources, Topeka, KS, Assistant Engineer 1957 to 1965

**Specialized Competence:**

- Surface and ground water hydrology
- Project management and supervision
- Water well treatment and rehabilitation/ground water quality
- Well and well field design and construction
- Modeling of ground water aquifers
- Water treatment and distribution piping
- Injection well design and operation
- Water pumps and associated equipment including suction flow control devices

**Applicable Experience:**
Mr. Nuzman has extensive experience in the areas of ground water modeling, water well and well field design and construction, water well treatment and rehabilitation, and soil and ground water remediation. He served at technical advisor to the Attorney General of Kansas in working with the U.S.Geological Survey Analog Model laboratory in Phoenix, AZ in doing the first model work of the Equus Beds aquifer north of Wichita in 1961. He was the first to model the Ogallala aquifer in SW Kansas using the passive element, steady state, electric analog model technique in 1966.

After joining Layne Western in 1967, he has conducted numerous water well pumping tests, aquifer modeling projects and well field design and construction for multiple Cities and Companies throughout the United States and in some foreign countries. He has consulted on deep disposal wells and designed a ground water recharge facility. He has provided the foundation dewatering design for numerous construction projects. He has provided expert testimony on a variety of hydrologic issues. He has prepared specifications and bidding documents for both municipal and industrial well construction, pumps and controls for a variety of projects.

**Publications:**

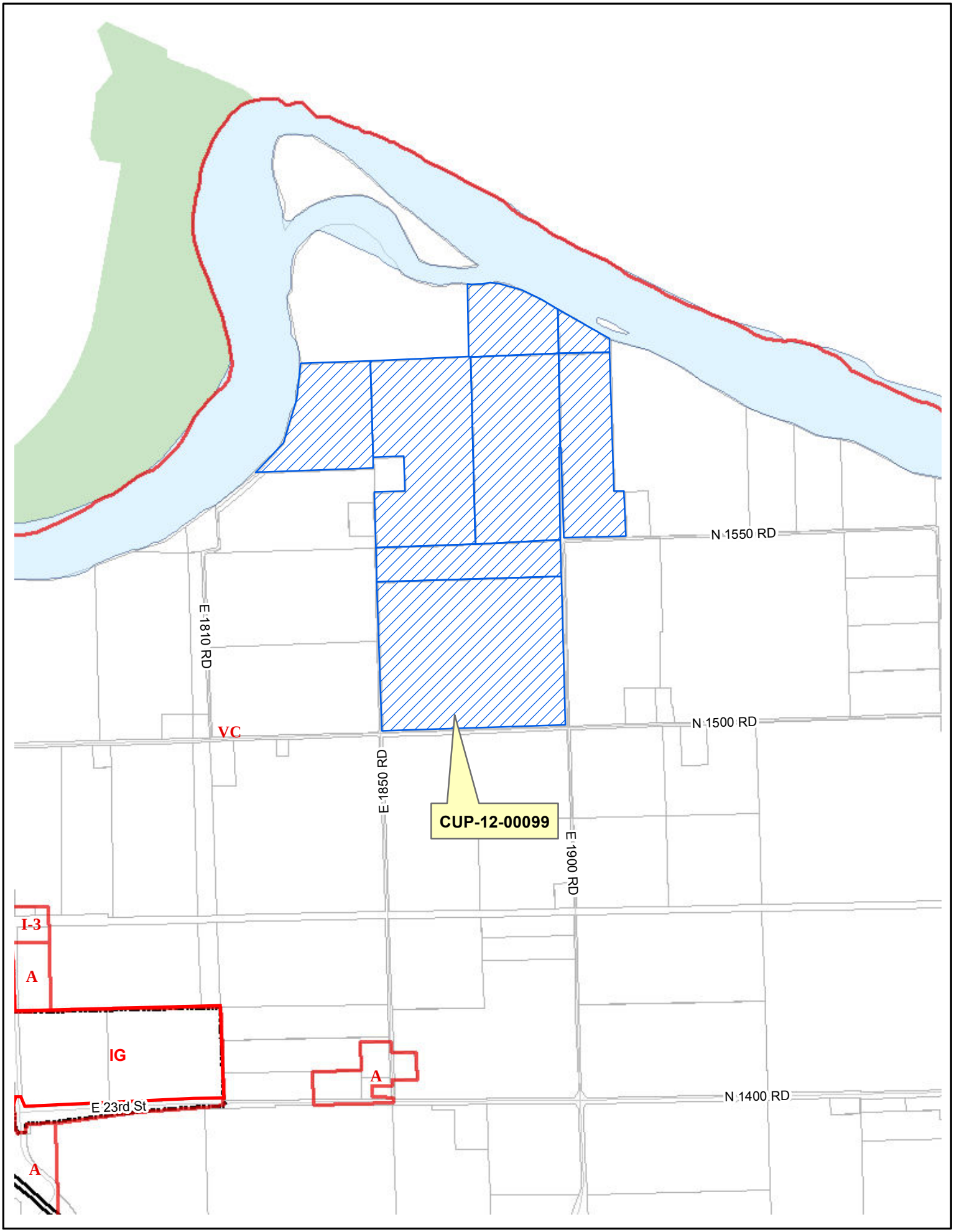
- Nuzman, Carl E. (1989) "Well Hydraulic Flow concept", Published in *Recent advances in Ground-Water Hydrology*, by the American Institute of hydrology pgs 72-77.
- Nuzman, Carl E. (1978, revised 1985) "Ground-Water and Well Efficiency" Published by Doerr metal Products, Larned, KS pgs 67.
- Winslow, John D. and C. E. Nuzman, (1966): "Electric Analog Model of the Kansas River alluvium in the vicinity of Topeka, Kansas", Kansas Geological Survey. Lawrence, KS.
- Contributor to the "Handbook of Ground-Water Development", by Roscoe Moss Company, Los Angeles, CA on Well Rehabilitation. 1990.
- Contributing author "Ground-Water Development handbook M-21" and contributed to the revised edition of Manual M-21 by the American Water Works Association, Denver, CO.
- Other technical papers and numerous client reports of study have been made.

**Inventions:**

- Co-inventor of a filament wound fiber glass water well screen;
- Inventor of an In-situ Ground Water Treatment System, assigned to Layne Western Company, Inc;
- Co-inventor of a patent of a non-vortexing passive pump intake strained for boiling water reactor nuclear power plants and used on other water resource applications.

**Professional Societies:**

- American Society of Biological and Agricultural Engineers
- American Society of Civil Engineers
- American Geophysical Union
- American Institute of Hydrology
- American Water Works Association
- National Ground Water Association
- National Society of Professional engineers
- Kansas Society of Professional Engineers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# MEMORANDUM

| | |
|---|---|
| **TO:** | City of Eudora Planning Commission |
| **CC:** | City of Eudora Staff |
| **FROM:** | Scott Michie, City of Eudora Planning Advisory Consultant |
| **SUBJECT:** | **Staff Findings,** Penny Sand Conditional Use Permit to Douglas County |
| **DATE:** | **September 10, 2012** **County Agenda of 9-24-2012, Sand Pit CUP** |

The City of Eudora plans and code requirements are met in the subject sand pit application. These staff findings are submitted based on the three City zoning standards considered for a permit application most similar to the county's CUP:

**Eudora Standard 1: Whether the proposed use meets City regulations.**
**Staff Finding:** The subject application does not conflict with City of Eudora regulations, because the sand dredging site is at or beyond the outer northwest edge of the City's Planning Area; and as such, does not impede the City's long-standing public policies for: a) utilization and conservation of the natural resources northwest of the City, b) protection of its planned long term industrial areas, and c) minimization of industrial traffic through town on Main Street heading south to K-10 Highway.

**Eudora Standard 2: Whether the proposed use complies with the Comprehensive Plan.**
**Staff Finding:** The application does not conflict with the City of Eudora Comprehensive Plan. The City plan calls for preservation of the river floodplain natural resources in its planning area, recognizing them as "the most prominent natural features north and west of the City." As the current processing plant is outside of the City's planning area, and the expanded sand dredging would be partially beyond the City's planning area, the operation may be considered outside of the area of City concern for "preservation of the river floodplains in its planning area." In addition, the Penny Sand application complies with the industrial land use recommendation of the City Map by directing industrial traffic west of the City:

> *Industrial areas should have reasonable and convenient access to major arterials and railroad facilities as required. The use of local streets and traffic that cuts through the community off of arterial streets is strongly discouraged as it increases road maintenance and traffic conflicts.*

**Eudora Standard 3: Whether the proposed use and site plan will be objectionable or detrimental to the public welfare of the community under the circumstances of the particular case regarding setback, height, density and similar aspects.**
**Staff Finding:** No such objection or detriment is found in this case.

Review and analysis by Terrane Resources Company should be considered before the public can be assured against harm as to long-term potential impacts of the proposed sand pit operation on City of Eudora public water wells.

End of Memorandum

# Friends Kaw

September 21, 2012

Douglas County Commission
1100 Massachusetts Street
Lawrence, KS 66044-3040

RE: CUP for proposed Penny's Concrete Inc. Pit Mine

Friends of the Kaw, Inc. is a 501 c 3, grassroots environmental organization whose mission is to protect and preserve the Kansas River for present and future generations. Towards that end, we have advocated - since our inception in the early 1990's - that in-river sand and gravel operations move out of the river and onto the land (pit mining) due to (a) irreparable harm done to the river's channel, banks and ecosystem; and (b) degradation of our drinking water quality; (c) degradation to public water intake supply systems; and bridge structures.

The Kansas River has been commercially mined (dredged) for sand and gravel since the early 1900's. Past dredging activities are documented to have caused significant damage to riverbed, habitat, and water quality.

The Army Corps is currently considering a proposal from five private dredging companies to increase dredging on the Kaw close to 50%, from 2.2 million tons to 3.2 million tons of sand per year.

The following preliminary findings come from a study funded by the Kansas Department of Wildlife and Parks (KDWP) and carried out by Kansas State University researchers Melinda Daniels and Craig Paukert. The scientists have documented riverbed incision in dredged reaches, which is most likely also causing excessive bank erosion both upstream and downstream of dredge sites.

Private in-channel dredging operations on rivers like the Kansas River cause deepening and widening of the channel and accelerate erosion of the banks. As a result, dredging lowers the water level of the river and the adjacent water table in the floodplain. This creates the risk for harm to public river uses (such as water treatment facilities, municipal wells, bridge footings, etc.) as well as to fish communities throughout the watershed, including endangered species.

**KANSAS** RIVERKEEPER®

WATERKEEPER ALLIANCE



**Friends of the Kaw**
P.O. Box 1612,
Lawrence, KS 66044
Kansas City:
913-963-3460,
Lawrence:
785-312-7200

Report River Pollution:
1-866-RIV-KEEP

Email:
Riverkeeper@KansasRiver.org

Website:
http://KansasRiver.org

Friends of the Kaw recently interviewed Daniels for its public comment to the U.S. Army Corps of Engineers. "If you take 3.2 million tons from the river bottom, then the river will take 3.2 million tons from the riverbanks, trying to balance the sediment load in the system," Daniels said. "That's the simple physics of how water works in river channels to transport sediment. Landowners along the river, particularly farmers with unforested river banks next to their fields should be worried. So should anyone with a water intake pipe or a creek in their backyard. The effects of in-channel dredging will propagate both upstream and downstream from the dredge site until a hard control point, like a dam or a bedrock outcrop, is reached. That means up tributary streams as well as the main river."

Daniels surveyed major dredge holes on the Kansas River with a sophisticated new measuring technology, an acoustic Doppler instrument that mapped river channel topography and measured water velocity. The researchers discovered that while the Kansas River averages four to five feet deep, active dredge holes can measure up to forty feet deep.

The researchers also discovered that these deep dredge holes can migrate up and down river - sometimes very rapidly, depending on water conditions. Even during small flow increases, researchers documented the upslope lip of a dredge hole traveling upstream.

"People used to think the dredge holes just filled up, but now we know they don't. The holes first cause erosion upstream and downstream and then eventually do fill in, but not before causing a net loss of sediment from the bed and banks of the channel, meaning the channel does not simply go back to its original state," Daniels said. "If there's no bedrock, or physical structure like the Bowersock Dam to stop them, those dredge holes cause channel erosion that will keep on going through the entire river network. Their effects can even travel up the tributaries." Unless a bridge footing or other engineering infrastructure in the river is armored, the migrating hole could erode that physical structure as well.

The technical term for this river phenomenon is a "migrating head cut." Here's how it works:
The Kansas River is a sand bed river. Sand is a light sediment, and water transports it easily. When dredgers excavate into the riverbed, that hole creates a steep wall (or head cut) where the river depth suddenly increases. Water rushes rapidly over that wall, gaining speed and picking up sand from the upstream edge. At the same time, some sand falls into the hole. The water passing over the hole then picks up new sediment downstream, causing erosion there as well. The hole starts to expand, both upstream and downstream.

Over time, repeated dredging deepens and widens the river by removing sediment from the system. The result is that the river bottom lowers, along with the water level. This can leave the intakes for water treatment plants stranded. Dredging on the Missouri River has been scaled back recently because of similar problems propagating into the lower Kansas River and other tributaries to the Missouri.

When the river deepens, the water table in the floodplain lowers. Daniels said that this creates the potential for less water storage, which could affect the many municipal wells along the river. A lower water table also affects river vegetation and forests. For example, the cottonwood – the state tree of Kansas – can't survive unless its roots can reach a good water supply.

The deep dredge holes may affect fish populations, too. "The river's physical habitat is significantly different between dredged and un-dredged areas," noted Daniels.

However, dredging's most major environmental impacts for fish are not limited to the Kaw. Since migrating head cuts can also affect river tributaries, Daniels said the K-State study raises questions about risks to the habitat of endangered species (like the Topeka Shiner) that live in these smaller streams.

Daniels said that knowledge of the environmental impacts of dredging is incomplete without studying dredging's impacts on the entire Kansas River system.

"We need a new environmental impact study that considers the impacts of dredging on fish that live in the tributaries as well," said Daniels. Right now, the U.S. Army Corps of Engineers is depending on an environmental impact statement (EIS) dating from 1991.

Before Daniels and Paukert carried out their study, the effect of sand and gravel dredging on the Kansas River had not been seriously studied. This study was the first time such sophisticated measuring technology has been used.

"The Army Corps has studied similar conditions with sand dredging on the Missouri River," said Daniels. "They are aware of the problems, and if dredging is a problem for the Missouri River, then it's going to be a problem for the Kansas River. Simply shifting the problem from the Missouri to the Kansas is not a good strategy."

How fast will the dredge holes move? Water movement on the Kaw is greatly influenced by how much water the Army Corps releases from upstream reservoirs. Extreme rains plus reservoir releases can add a lot of extra velocity to the Kansas River system. In some circumstances, this may mean the dredge holes have the potential for very rapid movement.

**Friends of the Kaw understands that sand is needed for a healthy construction economy and we believe enough geological studies provide evidence that sand can be reasonably and efficiently obtained from "off-river" pit mines in the Kansas River valley. Friends of the Kaw has reviewed the plans drafted by Land Plan Engineering for Penny's Concrete, Inc. proposed pit mine. We support this application for a pit mine by Penny's Concrete, Inc. However, we encourage the Douglas County Commission and Planning Commission to carefully consider and address the residential neighbors' concerns.**

Sincerely,

Laura Calwell, Kansas Riverkeeper for Friends of the Kaw

Cc: Phil Struble, Land Plan Engineering

# LEAGUE OF WOMEN VOTERS®
OF LAWRENCE/DOUGLAS COUNTY





Lawrence-Douglas County Planning Commission
Eudora Planning Commission
City Hall
Lawrence, Kansas 66044

RE: ITEM NO. 1: CONDITIONAL USE PERMIT FOR PENNY SAND PIT; N 1500 RD & E 1850 RD (MKM)

Dear Chairman Liese and Planning Commissioners:

The League of Women Voters of Lawrence/Douglas County bases its letters and communications on its adopted Environmental Positions. Based on excerpts from these Positions which read, to "...preserve the social and physical environment...avoid pollution of air, water, and land...[support] the conservation of agricultural land...at the county level...," we are asking that you carefully consider the environmental impact of the Penny Sand Pit excavation operation.

We recognize that the utilization of our natural resources is a necessary feature of human activities, but that we must also do it wisely and with careful consideration for preserving a sustainable environment. Therefore, based on the material available in the Staff Report, we cannot support the pit mining for sand proposed in the current request for **CUP-12-00099** and urge that the Planning Commissions deny the application.

Our reasons are as follows:

1. Contamination of the Eudora water supply is a distinct possibility based on the professional research of Professor Carl McElwee, a recognized authority on groundwater and water resources.

2. Contamination of nearby wells of neighboring properties would likely occur.

3. Chances for the permanent reorientation of the Kansas River course would be increased, especially in a flood, an environmental misfortune that many in Douglas County have attempted to avoid using containment measures.

4. Loss of irreplaceable Capability Class I and II agricultural soils would occur. *This loss would be permanent, whereas the gain from the sand production would be relatively short-lived.*

5. The effects of the mining operation would be counter to several statements and policies that *Horizon 2020* encourages us to follow.

6. Reclaiming the land and providing a safe and stable environment during the 30-year initial approval period of the CUP will be very expensive for the operator of the project. Maintaining the lake will also be someone's financial responsibility. *There is no requirement for providing a bond or other financial guarantee to the County in the event that the owner of the project goes bankrupt or otherwise fails.*

7. Because of the number of conditions required to be met, it can be predicted that these conditions will be costly to monitor and difficult to properly enforce. This will make it less of a positive revenue gain for the County.

For these reasons and others not mentioned here, we urge the Planning Commissions to recommend denial of this open pit mining **CUP-12-00099.** We appreciate the careful consideration that the Planning Commissions give to issues such as this. Thank you.

Best regards,

Melinda Henderson, President
LWV Lawrence/Douglas County

Alan Black, Chair
Land Use Committee

# Comments on the Carl Nuzman report:

# "Evaluation of Penny's Concrete and Sand LLC,

# Proposed Sand Pit Operation on Ground Water"

**By**

**Carl D. McElwee, Ph.D**

**Emeritus Professor**

**Geology Department**

**University of Kansas**

**Lawrence, KS**

**September 18, 2012**

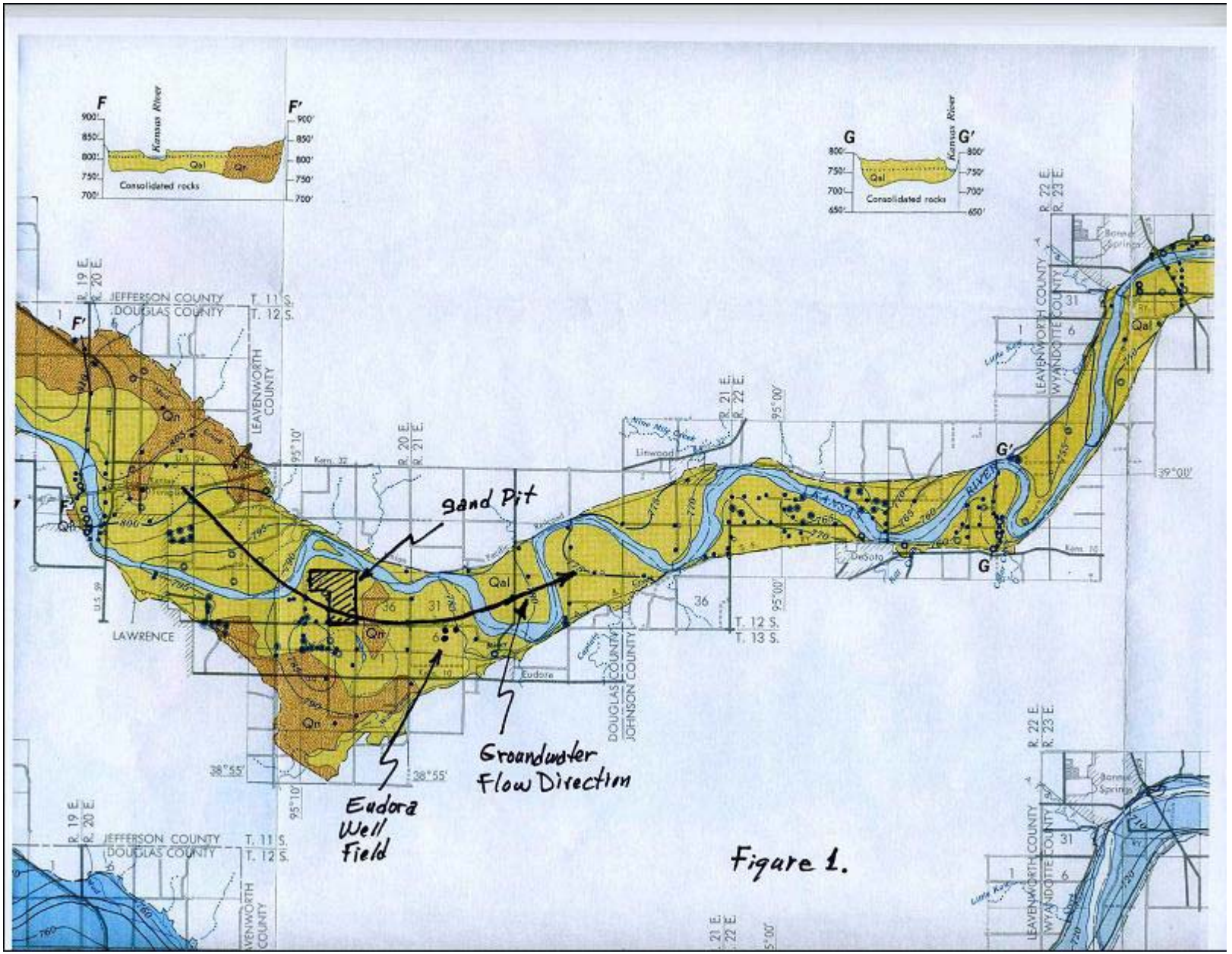
## Introduction

Mr. Nuzman has brought together a considerable amount of data regarding the proposed project. He is a respected member of the scientific community studying groundwater. As is always the case, the data must be interpreted and analyzed to draw conclusions. I would like to point out some places where the data may be interpreted and analyzed in an alternate and reasonable manner to arrive at different conclusions. In addition, I would like to bring out some other points that need to be considered in evaluating the possible impact of this pit mining operation.

## Groundwater Gradient direction

The gradient of groundwater is the driving force that causes it to move. Mr.Nuzman mainly uses the water level data of Kansas Geological Survey (KGS) Bulletin 130, Part 1. The generalized static water table map that he uses (Exhibit D) gives too much weight to water moving down the Wakarusa River Valley (which joins the Kansas River Valley just south of the proposed sand pit). This distorts his ground water gradient and leads to the conclusion given in Exhibit F that the capture zone for the Eudora Well Field is south of the proposed pit.

On the other hand, if one considers the newer report KGS Bulletin 206, Part 2, it shows that the Kansas River is the major force and that water moves down the valley generally from west to east more or less parallel to the valley walls. The resulting groundwater gradient and flow direction is shown in Figure 1 below. This data shows that water will move from the proposed sand pit to the Eudora Well Field. I have done calculations of capture curves (area of groundwater capture in a given time by the well) and travel times based on work that I published in *Ground Water* (McElwee, 1991, A copy of that paper has been supplied to the DG CO Planning Office). That work shows that the minimum travel time between the proposed sand pit and the Eudora Well Field could be about 5.5 years. In addition, the 6 and 8 year capture curves significantly overlie the proposed sand pit, as shown in Figure 2 below. Details of this work are given in Appendix I.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Consolidated rocks
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DOUGLAS COUNTY
LEAVENWORTH COUNTY
WYANDOTTE COUNTY
JOHNSON COUNTY
LAWRENCE
Eudora
DeSoto
Linwood
Bonner Springs
Qn
Qm
Qal
Sand Pit
Groundwater Flow Direction
Eudora Well Field
T. 11 S.
T. 12 S.
T. 13 S.
R. 19 E.
R. 20 E.
R. 21 E.
R. 22 E.
R. 23 E.
95°10'
95°00'
38°55'
39°01'

Figure 1.

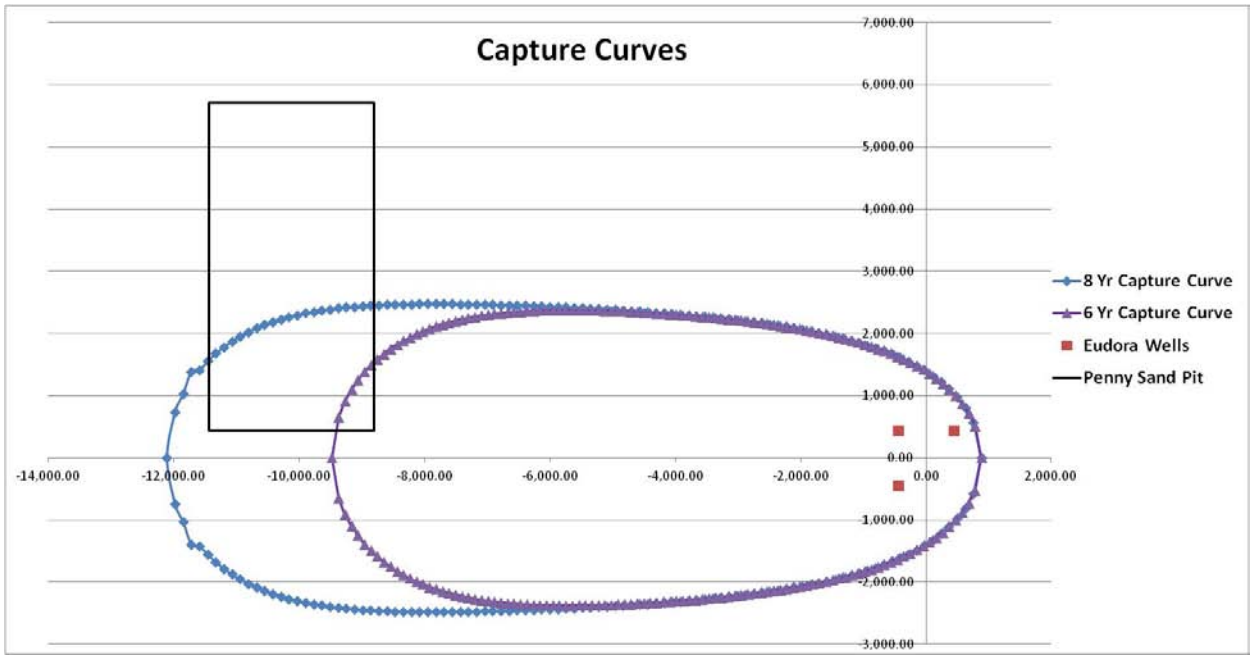


Figure 2.

Both of the KGS reports referred to are old and can't be relied on for absolute numbers. However, they do allow us to reach some general conclusions. In addition, there is a lot of variability in the aquifer (things change with space and time). So, the conclusion must be that one can't state with certainty that the proposed sand pit will have no effect on the Eudora Well Field. Of course there are many other private wells that are down-gradient from the proposed sand pit and much closer that could also be affected.

## Effect of Pit on Water Levels and Quality in Aquifer

Mr. Nuzman states on page 8 that "The static water level elevation in the sand pit will be about the same as the water surface elevation in the Kansas River." That is probably true if the pit is close to the river. This means that the water level in the aquifer will be lowered around the pit, because the water levels in the aquifer are generally a little higher than the river level. This could negatively affect some nearby wells. Mr. Nuzman also states that "Sand pits beneficially support the yield of wells that are down-gradient from a pit that is within the area of influence of a well." In other words the well would be pumping water from the pit. This means

that the quality of the well water would depend on the quality of the water in the pit. In general, the quality of surface water in rivers and lakes is much poorer than the quality of groundwater. So there is the potential for pollution.

If this pit is allowed, a huge deep lake (about 70 feet deep on average) will be created. This will be a flow-through lake, which means that groundwater from up-gradient will flow in one side of the lake and flow out the down-gradient side of the lake. The net result is a continual mixing of the groundwater and the surface water from the pit, which then continues to flow down the valley in the aquifer to the next user of the groundwater.

As the well drilling logs in Mr. Nuzman's reports shows, the overburden (soil, silt, and clay) that must be removed to access the sand is substantial. It is in the range of 15-23 feet in most places, in some areas less and some areas more. However, most logs in the vicinity of the proposed sand pit indicate about 23 feet of overburden to be dealt with. This is a major logistics problem that must be dealt with while keeping any surface runoff out of the pit. There is the potential for pollution from surface runoff. This overburden material has been the filter material to keep pollutants out of the deeper aquifer, removing it exposes the aquifer. The resulting piles of surficial material may contain fertilizer and pesticide residue and daughter products from their decay. Apparently, the plan is to emplace at least some of this material back into the pit. If this is done, the overburden material should be extensively tested for possible pollutants before such use.

Mr. Nuzman mentions that a few investigations have been made on the effect of sand pits on groundwater quality and that they have not shown any significant human health effect. However, one can't infer from these few studies that there will never be a problem. In fact, at least one of those studies (KGS OFR 2008-4) did come to the conclusion that there was a measurable interconnection between the sand pit waters and the local aquifer and that there was a potential for pollution. The following is a direct quote from the conclusions of that study.

"The concentration distributions of pesticides and organics other than pesticides at the four pit sites in northwest Wichita, as well as the general pattern in iron, manganese, and ammonium ion concentrations in the downgradient well waters relative to the upgradient well and pit waters, indicate that surface water in the sand pits flows into the ground water in the southeast to south-southeast

direction of the ground-water flow at the study sites. The evidence for connection between the surface and ground waters at the two southern Wichita sites is not as strong as for the four northwest Wichita sites. However, distribution of some constituents and chemical properties do fit the general pattern of entrance of pit water into the ground water. This would be expected to occur most prominently when surface runoff into the pits increases the hydraulic gradient between the pit surface and ground-water levels. Thus, stormwater runoff containing contaminants can enter ground water through the sand pits and impact ground-water quality"

## Effect of Pit on the River System

Material has previously been provided that shows the river bank in the vicinity of this proposed sand pit is unstable and has moved over time. Geologic history tells us this river will move again, we just don't know when. During a flood event the river could change course and breach the proposed sand pit. This would have a dramatic effect on the river system. Since the sand pit is deep (about 70 feet) and the river is very shallow, the pit would capture the bed load of the river and cause the river to become unstable. This would result in deepening the channel upstream (head cutting) and degradation of the channel downstream. It would take years for the river to reach a new stable equilibrium. Pits should not be allowed in areas where pit capture is a possibility.

## Conclusions

I have shown that a reasonable interpretation of the available groundwater data indicates that the proposed sand pit could indeed have an effect on the Eudora Well Field and other local wells. The net effect will be a flow-through lake that mixes up-gradient aquifer water with sand pit water and sends it down-gradient into the aquifer and further down the valley. This behavior has been documented in studies of sand pits and aquifers. So, the conclusion is that any pollution must be prevented. The huge amount of overburden produced and its handling could be a source of pollution. Finally, the unstable nature of the river bank in this area makes it possible that the sand pit could capture the river during high flows and cause a channel change. If this were to happen, the river bed would be unstable for years until a new equilibrium was reached.

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## Resume

Name: **CARL D. McELWEE**

Telephone: 785-864-2728 (Geology Dept. Office)

785-843-4164 (Home)

Present Address: 1564 E. 1850 Rd.

Lawrence, Kansas 66046 USA

**Education:**

B.A., William Jewell College, Physics, 1965

M.A., The University of Kansas, Physics, 1967

Ph.D., The University of Kansas, Physics, 1971

**Professional Experience:**

Professor of Geology, The University of Kansas, Lawrence, Kansas, 1997-2009, now retired.

Senior Scientist, Special Projects/Office of the Director, Kansas Geological Survey, The University of Kansas, Lawrence, Kansas, 1998-2002.

Senior Scientist, Mathematical Geology Section, Kansas Geological Survey, The University of Kansas, Lawrence, Kansas, 1987-1998.

Senior Scientist, Geophysics and Geochemistry Section, Kansas Geological Survey, The University of Kansas, Lawrence, Kansas, 1986-1987.

Associate Scientist, Geohydrology Section and Geophysics and Geochemistry Section, Kansas Geological Survey, The University of Kansas, Lawrence, Kansas, 1974-1986.

Geophysicist, Texaco Inc., Bellaire, Texas, 1970-1974.

**Honors, Memberships, and Affiliations:**

NSF Undergraduate Research Grant (2 years, 1963-1965)

Graduation with Honors, William Jewell College (1965)

NSF Traineeship for Graduate Work (4 years, 1965-1969)

Mobil Oil Fellowship (1 year, 1969-1970)

Sabbatical leave awarded for groundwater research in The Netherlands (Aug.-Dec., 1984)

Sabbatical leave awarded for groundwater research in the United Kingdom (Jan.- May, 1993)

Center for Teaching Excellence Outstanding Graduate Teaching Award, Dept. of Geology, Univ. of Kansas, 2001.

Sabbatical leave awarded to start writing a book on groundwater modeling, Fall Semester 2002.

Leo M. & Robert M. Orth Water Resources Scholarship, Dept. of Geology, 2008

**Present Major Scientific Interests:**

Theoretical description of flow systems • Characterization of aquifer heterogeneity by field, laboratory, and modeling activities • Model studies of groundwater availability in Kansas • Sensitivity of groundwater models to variations in transmissivity and storage • Modeling of chemical quality of groundwater systems • Application of seismic techniques to groundwater exploration and evaluation

**Professional Journal Articles**

McElwee, C.D., and Yukler, M.A., 1978, Sensitivity of groundwater flow models with respect to variations in transmissivity and storage: *Water Resources Research*, v. 14, no. 3, p. 451.

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**Appendix I.**

This calculations presented here is based on work I did and published back in 1991 in the *Ground Water* journal. I have supplied to the Planning Department a copy of that article for reference. This work shows that the minimum travel time from the Penny sand pit to the Eudora Well Field is about 5.5 years. This is from the closest point of the pit to the center of the well field. I have also calculated the 6 and 8 year capture curves for the Eudora Well field. The work shows that these capture curves include significant portions of the proposed pit.

The important parameters are as follows:

K - hydraulic conductivity - I used 1000ft/day. This is a measure of how fast water moves in the aquifer. The Nuzman report uses data from a well test on Eudora No. 8 and reports 8800 gpd/ft2, which is 1176 ft/day. This also agrees with data I have personally collected from the Kansas River Valley.

I - Hydraulic gradient (slope) of the ground water system - I used .0005, which is about 5ft in 2 miles. Bulletin 130, Part 1 and Bulletin 206, part 2 from the Kansas Geological Survey show head maps of the area in question that support this number.

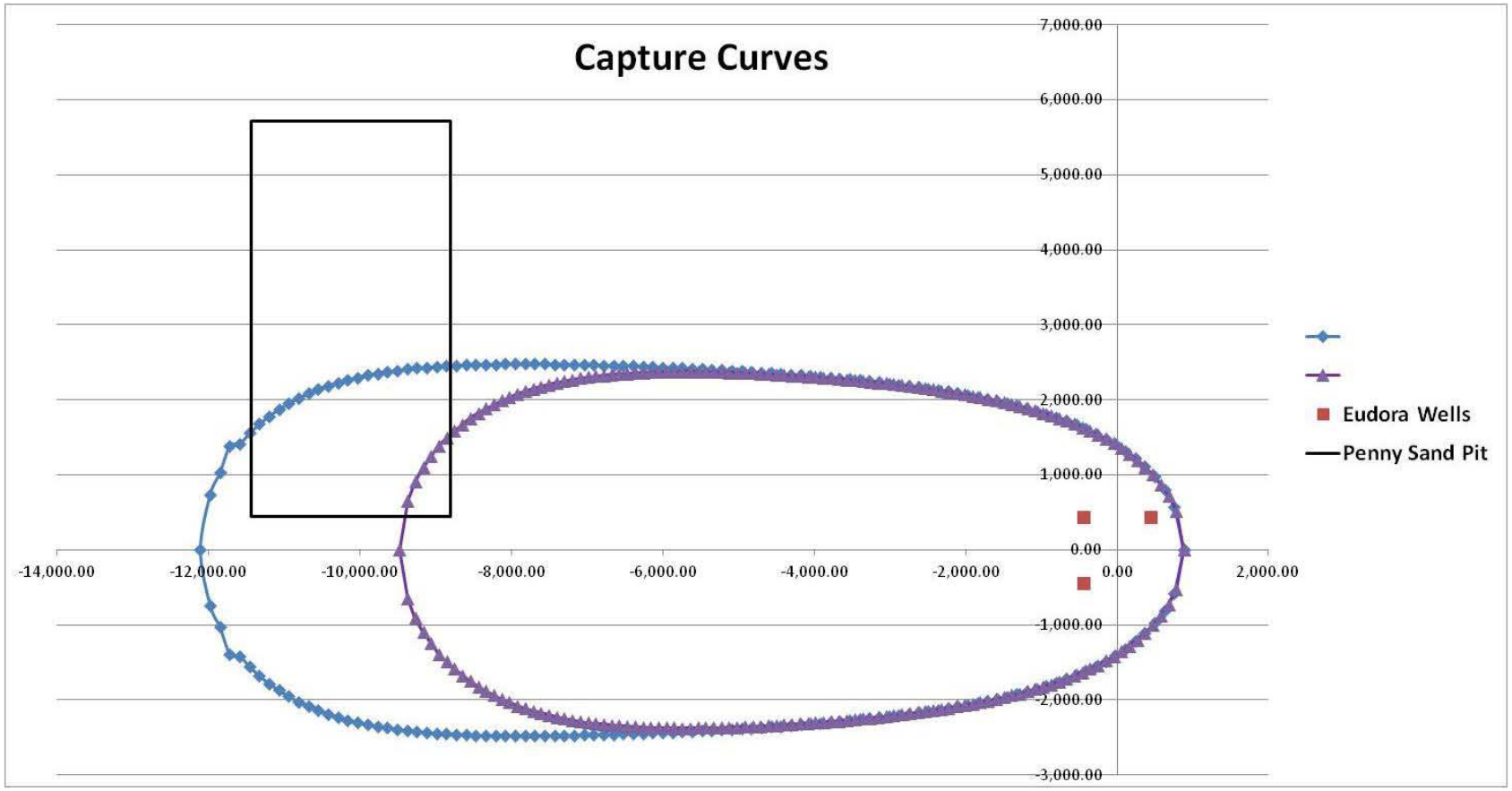
qo = -KI = -0.5 ft/day - average Darcy velocity in the aquifer - Multiplying the above two values gives this result.

B - Effective saturated thickness of aquifer - I used 30 feet. Although the aquifer has greater saturated thickness, the upper part is much finer material and has much less hydraulic conductivity. I have seen this consistently in my field work.

n - effective porosity (a measure of the pore space that water flows through) - I used 0.15 which is an average value suggested by the work of Bull 260, and also is consistent with my field work.

Q - Pump rate of the Eudora Well Field - I used 83425 ft3/day which is the approved water right of 227.77 MGY or about 433gpm.

These parameters can be used to calculate the average travel times and capture curves for parcels of water moving under the influence of the natural groundwater flow system and the influence of the pumping in the Eudora Well Field. The details of the background material to arrive at the formulas used in the following pages are given in the above referenced *Ground Water* article. The pages that follow show the capture curves for 6 and 8 years and the average minimum travel time between the sand pit and the Eudora Well Field. A capture curve outlines the area of groundwater that will flow to the pumping well in a given amount of time.


Capture Curves
7,000.00
6,000.00
5,000.00
4,000.00
3,000.00
2,000.00
1,000.00
0.00
-1,000.00
-2,000.00
-3,000.00
-14,000.00
-12,000.00
-10,000.00
-8,000.00
-6,000.00
-4,000.00
-2,000.00
0.00
2,000.00
Eudora Wells
Penny Sand Pit

| | | | | | | |
|---|---|---|---|---|---|---|
| qo = | -0.5 | Average Darcy Velocity | | | | |
| n = | 0.15 | Effective Porosity | | | | |
| Q = | 83425 | Well Discharge | | | | |
| B = | 30 | Effective Aquifer Thickness | | | | |
| X = | -8800 | Distance traveled along X axis | | | | |
| t = | | Time of travel | | | | |
| | | | | | | |
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| | | | | | | |
| | | | | | | |
| | **t =** | **2005** | **days =** | **5.49** | **years** | |
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$$X = \frac{qo}{n}t + \frac{Q}{2\pi qoB} ln\left(1 + \frac{2\pi qoB}{Q}X\right)$$

$$t = \left[\frac{n}{qo}\right]\left[X - \frac{Q}{2\pi qoB} ln\left(1 + \frac{2\pi qoB}{Q}X\right)\right]$$

6 yr. Capture Curve Data

| X(Ft) | Y(Ft) |
|---|---|
| 8.8508E+02 | 0.0000E+00 |
| 7.8145E+02 | -5.1844E+02 |
| 6.7783E+02 | -7.2470E+02 |
| 5.7420E+02 | -8.7735E+02 |
| 4.7057E+02 | -1.0015E+03 |
| 3.6694E+02 | -1.1069E+03 |
| 2.6331E+02 | -1.1989E+03 |
| 1.5969E+02 | -1.2804E+03 |
| 5.6059E+01 | -1.3536E+03 |
| -4.7568E+01 | -1.4198E+03 |
| -1.5120E+02 | -1.4802E+03 |
| -2.5482E+02 | -1.5357E+03 |
| -3.5845E+02 | -1.5867E+03 |
| -4.6208E+02 | -1.6340E+03 |
| -5.6571E+02 | -1.6778E+03 |
| -6.6933E+02 | -1.7187E+03 |
| -7.7296E+02 | -1.7568E+03 |
| -8.7659E+02 | -1.7925E+03 |
| -9.8022E+02 | -1.8259E+03 |
| -1.0838E+03 | -1.8573E+03 |
| -1.1875E+03 | -1.8869E+03 |
| -1.2911E+03 | -1.9147E+03 |
| -1.3947E+03 | -1.9410E+03 |
| -1.4984E+03 | -1.9659E+03 |
| -1.6020E+03 | -1.9894E+03 |
| -1.7056E+03 | -2.0117E+03 |
| -1.8092E+03 | -2.0328E+03 |
| -1.9129E+03 | -2.0529E+03 |
| -2.0165E+03 | -2.0720E+03 |
| -2.1201E+03 | -2.0901E+03 |
| -2.2238E+03 | -2.1074E+03 |
| -2.3274E+03 | -2.1239E+03 |
| -2.4310E+03 | -2.1396E+03 |
| -2.5346E+03 | -2.1546E+03 |
| -2.6383E+03 | -2.1689E+03 |
| -2.7419E+03 | -2.1825E+03 |
| -2.8455E+03 | -2.1956E+03 |
| -2.9491E+03 | -2.2081E+03 |
| -3.0528E+03 | -2.2200E+03 |
| -3.1564E+03 | -2.2314E+03 |
| -3.2600E+03 | -2.2423E+03 |

| | |
|---|---|
| -3.3637E+03 | -2.2527E+03 |
| -3.4673E+03 | -2.2627E+03 |
| -3.5709E+03 | -2.2722E+03 |
| -3.6745E+03 | -2.2813E+03 |
| -3.7782E+03 | -2.2899E+03 |
| -3.8818E+03 | -2.2982E+03 |
| -3.9854E+03 | -2.3060E+03 |
| -4.0891E+03 | -2.3135E+03 |
| -4.1927E+03 | -2.3206E+03 |
| -4.2963E+03 | -2.3272E+03 |
| -4.3999E+03 | -2.3335E+03 |
| -4.5036E+03 | -2.3394E+03 |
| -4.6072E+03 | -2.3449E+03 |
| -4.7108E+03 | -2.3500E+03 |
| -4.8144E+03 | -2.3547E+03 |
| -4.9181E+03 | -2.3590E+03 |
| -5.0217E+03 | -2.3628E+03 |
| -5.1253E+03 | -2.3662E+03 |
| -5.2290E+03 | -2.3691E+03 |
| -5.3326E+03 | -2.3715E+03 |
| -5.4362E+03 | -2.3733E+03 |
| -5.5398E+03 | -2.3746E+03 |
| -5.6435E+03 | -2.3753E+03 |
| -5.7471E+03 | -2.3754E+03 |
| -5.8507E+03 | -2.3747E+03 |
| -5.9544E+03 | -2.3733E+03 |
| -6.0580E+03 | -2.3712E+03 |
| -6.1616E+03 | -2.3681E+03 |
| -6.2652E+03 | -2.3642E+03 |
| -6.3689E+03 | -2.3592E+03 |
| -6.4725E+03 | -2.3531E+03 |
| -6.5761E+03 | -2.3458E+03 |
| -6.6797E+03 | -2.3372E+03 |
| -6.7834E+03 | -2.3272E+03 |
| -6.8870E+03 | -2.3156E+03 |
| -6.9906E+03 | -2.3024E+03 |
| -7.0943E+03 | -2.2873E+03 |
| -7.1979E+03 | -2.2702E+03 |
| -7.3015E+03 | -2.2510E+03 |
| -7.4051E+03 | -2.2293E+03 |
| -7.5088E+03 | -2.2051E+03 |
| -7.6124E+03 | -2.1781E+03 |
| -7.7160E+03 | -2.1480E+03 |

| | |
|---|---|
| -7.8196E+03 | -2.1145E+03 |
| -7.9233E+03 | -2.0773E+03 |
| -8.0269E+03 | -2.0360E+03 |
| -8.1305E+03 | -1.9903E+03 |
| -8.2342E+03 | -1.9396E+03 |
| -8.3378E+03 | -1.8833E+03 |
| -8.4414E+03 | -1.8209E+03 |
| -8.5450E+03 | -1.7515E+03 |
| -8.6487E+03 | -1.6740E+03 |
| -8.7523E+03 | -1.5871E+03 |
| -8.8559E+03 | -1.4891E+03 |
| -8.9596E+03 | -1.3913E+03 |
| -9.0632E+03 | -1.2478E+03 |
| -9.1668E+03 | -1.0945E+03 |
| -9.2704E+03 | -9.0492E+02 |
| -9.3741E+03 | -6.4783E+02 |
| -9.4777E+03 | 0.0000E+00 |
| -9.3741E+03 | 6.4783E+02 |
| -9.2704E+03 | 9.0492E+02 |
| -9.1668E+03 | 1.0945E+03 |
| -9.0632E+03 | 1.2478E+03 |
| -8.9596E+03 | 1.3913E+03 |
| -8.8559E+03 | 1.4891E+03 |
| -8.7523E+03 | 1.5871E+03 |
| -8.6487E+03 | 1.6740E+03 |
| -8.5450E+03 | 1.7515E+03 |
| -8.4414E+03 | 1.8209E+03 |
| -8.3378E+03 | 1.8833E+03 |
| -8.2342E+03 | 1.9396E+03 |
| -8.1305E+03 | 1.9903E+03 |
| -8.0269E+03 | 2.0360E+03 |
| -7.9233E+03 | 2.0773E+03 |
| -7.8196E+03 | 2.1145E+03 |
| -7.7160E+03 | 2.1480E+03 |
| -7.6124E+03 | 2.1781E+03 |
| -7.5088E+03 | 2.2051E+03 |
| -7.4051E+03 | 2.2293E+03 |
| -7.3015E+03 | 2.2510E+03 |
| -7.1979E+03 | 2.2702E+03 |
| -7.0943E+03 | 2.2873E+03 |
| -6.9906E+03 | 2.3024E+03 |
| -6.8870E+03 | 2.3156E+03 |
| -6.7834E+03 | 2.3272E+03 |

| | |
|---|---|
| -6.6797E+03 | 2.3372E+03 |
| -6.5761E+03 | 2.3458E+03 |
| -6.4725E+03 | 2.3531E+03 |
| -6.3689E+03 | 2.3592E+03 |
| -6.2652E+03 | 2.3642E+03 |
| -6.1616E+03 | 2.3681E+03 |
| -6.0580E+03 | 2.3712E+03 |
| -5.9544E+03 | 2.3733E+03 |
| -5.8507E+03 | 2.3747E+03 |
| -5.7471E+03 | 2.3754E+03 |
| -5.6435E+03 | 2.3753E+03 |
| -5.5398E+03 | 2.3746E+03 |
| -5.4362E+03 | 2.3733E+03 |
| -5.3326E+03 | 2.3715E+03 |
| -5.2290E+03 | 2.3691E+03 |
| -5.1253E+03 | 2.3662E+03 |
| -5.0217E+03 | 2.3628E+03 |
| -4.9181E+03 | 2.3590E+03 |
| -4.8144E+03 | 2.3547E+03 |
| -4.7108E+03 | 2.3500E+03 |
| -4.6072E+03 | 2.3449E+03 |
| -4.5036E+03 | 2.3394E+03 |
| -4.3999E+03 | 2.3335E+03 |
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| -4.1927E+03 | 2.3206E+03 |
| -4.0891E+03 | 2.3135E+03 |
| -3.9854E+03 | 2.3060E+03 |
| -3.8818E+03 | 2.2982E+03 |
| -3.7782E+03 | 2.2899E+03 |
| -3.6745E+03 | 2.2813E+03 |
| -3.5709E+03 | 2.2722E+03 |
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| -3.3637E+03 | 2.2527E+03 |
| -3.2600E+03 | 2.2423E+03 |
| -3.1564E+03 | 2.2314E+03 |
| -3.0528E+03 | 2.2200E+03 |
| -2.9491E+03 | 2.2081E+03 |
| -2.8455E+03 | 2.1956E+03 |
| -2.7419E+03 | 2.1825E+03 |
| -2.6383E+03 | 2.1689E+03 |
| -2.5346E+03 | 2.1546E+03 |
| -2.4310E+03 | 2.1396E+03 |
| -2.3274E+03 | 2.1239E+03 |

| | |
|---|---|
| -2.2238E+03 | 2.1074E+03 |
| -2.1201E+03 | 2.0901E+03 |
| -2.0165E+03 | 2.0720E+03 |
| -1.9129E+03 | 2.0529E+03 |
| -1.8092E+03 | 2.0328E+03 |
| -1.7056E+03 | 2.0117E+03 |
| -1.6020E+03 | 1.9894E+03 |
| -1.4984E+03 | 1.9659E+03 |
| -1.3947E+03 | 1.9410E+03 |
| -1.2911E+03 | 1.9147E+03 |
| -1.1875E+03 | 1.8869E+03 |
| -1.0838E+03 | 1.8573E+03 |
| -9.8022E+02 | 1.8259E+03 |
| -8.7659E+02 | 1.7925E+03 |
| -7.7296E+02 | 1.7568E+03 |
| -6.6933E+02 | 1.7187E+03 |
| -5.6571E+02 | 1.6778E+03 |
| -4.6208E+02 | 1.6340E+03 |
| -3.5845E+02 | 1.5867E+03 |
| -2.5482E+02 | 1.5357E+03 |
| -1.5120E+02 | 1.4802E+03 |
| -4.7568E+01 | 1.4198E+03 |
| 5.6059E+01 | 1.3536E+03 |
| 1.5969E+02 | 1.2804E+03 |
| 2.6331E+02 | 1.1989E+03 |
| 3.6694E+02 | 1.1069E+03 |
| 4.7057E+02 | 1.0015E+03 |
| 5.7420E+02 | 8.7735E+02 |
| 6.7783E+02 | 7.2470E+02 |
| 7.8145E+02 | 5.1844E+02 |
| 8.8508E+02 | 0.0000E+00 |

8 yr. Capture Curve Data

| X(Ft) | Y(Ft) |
|---|---|
| 8.8516E+02 | 0.0000E+00 |
| 7.5519E+02 | -5.7893E+02 |
| 6.2523E+02 | -8.0688E+02 |
| 4.9526E+02 | -9.7403E+02 |
| 3.6530E+02 | -1.1087E+03 |
| 2.3533E+02 | -1.2220E+03 |
| 1.0536E+02 | -1.3199E+03 |
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| | |
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| -1.2111E+04 | 0.0000E+00 |
| -1.1982E+04 | 7.4132E+02 |
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| -7.0428E+03 | 2.4684E+03 |
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| -2.4604E+01 | 1.4059E+03 |
| 1.0536E+02 | 1.3199E+03 |
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| 4.9526E+02 | 9.7403E+02 |
| 6.2523E+02 | 8.0688E+02 |
| 7.5519E+02 | 5.7893E+02 |
| 8.8516E+02 | 0.0000E+00 |

| Wells X (map in) | Wells Y (map in) | Wells X (ft) | Wells Y (ft) |
|---|---|---|---|
| -0.25 | 0.25 | -440 | 440 |
| -0.25 | -0.25 | -440 | -440 |
| 0.25 | 0.25 | 440 | 440 |

| Pit X (map in) | Pit Y (map in) | Pit X (ft) | Pit Y (ft) |
|---|---|---|---|
| -5 | 0.25 | -8800 | 440 |
| -6.5 | 0.25 | -11440 | 440 |
| -6.5 | 3.25 | -11440 | 5720 |
| -5 | 3.25 | -8800 | 5720 |
| -5 | 0.25 | -8800 | 440 |

GROUND WATER

# Computer Notes

## Capture Zones for Simple Aquifers

by Carl D. McElwee[a]

**Abstract.** **The protection and cleanup of aquifers is a matter of high priority for all states and the federal government. One concept that is receiving increased attention is that of wellhead protection. Capture zones showing the area influenced by a well within a certain time are useful for both aquifer protection and cleanup. If hydrodynamic dispersion is neglected, a deterministic curve defines the capture zone. Analytical expressions for the capture zones can be derived for simple aquifers. However, the capture zone equations are transcendental and cannot be explicitly solved for the coordinates of the capture zone boundary. Fortunately, an iterative scheme allows the solution to proceed quickly and efficiently even on a modest personal computer. Three forms of the analytical solution must be used in an iterative scheme to cover the entire region of interest, after the extreme values of the x coordinate are determined by an iterative solution. The resulting solution is a discrete one, and usually 100-1000 intervals along the x-axis are necessary for a smooth definition of the capture zone. The presented program is written in FORTRAN and has been used in a variety of computing environments. No graphics capability is included with the program; it is assumed the user has access to a commercial package. The superposition of capture zones for multiple wells is expected to be satisfactory if the spacing is not too close. Because this program deals with simple aquifers, the results rarely will be the final word in a real application. However, the program is useful as a first phase in developing wellhead protection or aquifer cleanup schemes.**

### Introduction

The protection and cleanup of aquifers is a matter of high priority for all states and the federal government, as evidenced by the large number of laws and regulations that have been established in recent years. One concept that is receiving increased attention is wellhead protection, where certain potentially polluting activities are banned or regulated within an area that would affect a well within a certain time period. In terms of aquifer cleanup, one would like to know what area of an aquifer will be influenced by a discharge well within a certain time period. These areas are commonly referred to in the literature as capture zones. If hydrodynamic dispersion is neglected, a deterministic curve (sharp front) can be used to define the capture zone. Because real-world aquifers are very complex, exhibiting heterogeneity, anisotropy, and other complicating factors, the calculation of realistic capture zones is difficult. Possible techniques range from simple analytical methods to complex numerical procedures.

The calculation of sharp front movement for wells in infinite aquifers dates at least to Muskat (1937). More recently, Bear and Jacobs (1965) have investigated the movement of water bodies injected into isotropic homogeneous aquifers with uniform regional flow by analytical methods. Most ground-water texts present a steady-state analytical solution for the ground-water divide in an isotropic homogeneous aquifer with one pumping well located in a uniform regional flow field (see for example Todd, 1980, pp. 121-123); this corresponds to an infinite-time capture zone. Javandel et al. (1984, pp. 175-204) present semianalytical methods for calculating pathlines and time-related capture zones for multiple wells in simple aquifers (isotropic, homogeneous, uniform thickness, uniform regional flow, and steady state). However, their computer program is rather complex. EPA (1990) has recently sponsored development of a program to calculate wellhead protection areas (WHPA); but again the program is fairly complex. Javandel and Tsang (1986) propose infinite-time capture zone curves as a tool for aquifer cleanup; again, they use analytical methods for simple aquifers. A few authors have utilized numerical methods to calculate time-related capture zones in the presence of aquifer heterogeneity. Kinzelback (1986, pp. 227-230) presents the formalism for considering a heterogeneous velocity distribution. Shafer (1987) presents the formalism and gives examples of capture zones in heterogeneous aquifers.

The purpose of the present paper is to present a program for calculating time-related capture zones in simple aquifers. The program is short and efficient and adaptable to a range of computing environments from personal computers to mainframes. Because the program assumes simple

[a]Senior Scientist, Kansas Geological Survey, 1930 Constant Avenue, Lawrence, Kansas 66047.

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aquifer conditions (isotropic, homogeneous, uniform thickness, uniform regional flow, and steady state), it should be used with care in a real-world situation. However, the program should be a useful initial planning tool for aquifer protection or cleanup.

## Basic Equations

The basic equations that are used to describe the capture zone curves are taken from Bear and Jacobs (1965). As mentioned in the introduction, this formulation assumes an aquifer with a constant regional hydraulic conductivity (K). A regional flow direction and magnitude ($q_o$) also is assumed constant and given by the Darcy equation.

$$q_o = -K \frac{\partial h}{\partial s} \tag{1}$$

h is the regional hydraulic head (without the pumping well), and s is the direction of the head gradient perpendicular to lines of constant head. In what follows, it will be assumed the x axis is parallel (or antiparallel) to the regional flow direction. The aquifer is assumed to be of constant thickness (B) and constant effective porosity (n). At this point, a well pumping at a rate Q is superimposed upon the regional system, and a new steady-state head configuration is established. The object is to calculate the area of the aquifer that will contribute water to the well during a specified time period; or alternatively, to calculate the area affected by injection for a given time interval, after the well is in steady state with the regional system. The curves surrounding these affected areas are loosely called capture curves for a given time period. It is convenient to define three dimensionless parameters:

$$\bar{x} = \frac{2\pi q_o B}{Q} x \tag{2}$$

$$\bar{y} = \frac{2\pi q_o B}{Q} y \tag{3}$$

$$\bar{t} = \frac{2\pi q_o^2 B}{nQ} t \tag{4}$$

$q_o$, B, Q, and n are the previously defined Darcy velocity, aquifer thickness, pumpage rate, and effective porosity, respectively. x, y, and t are the space and time coordinates in the real world; whereas $\bar{x}$, $\bar{y}$, and $\bar{t}$ are their dimensionless counterparts. Using these dimensionless variables, Bear and Jacobs (1965) show that the capture curves are given by the following equation.

$$\exp(\bar{x} - \bar{t}) = \cos \bar{y} + \frac{\bar{x}}{\bar{y}} \sin \bar{y} \tag{5}$$

Unfortunately, equation (5) is a transcendental equation which cannot be solved explicitly for either $\bar{x}$ or $\bar{y}$.

There are two cases where equation (5) can be simplified somewhat. When $\bar{t} \to \infty$, equation (5) reduces to

$$\bar{x} = -\frac{\bar{y}}{\tan \bar{y}} \tag{6}$$

which is the familiar form for the ground-water divide (Todd, 1980, pp. 121-123). From equation (6), it is seen that as $\bar{x} \to \infty$, the limiting value of $\bar{y}$ is $\pm \pi$. The stagnation point occurs at $\bar{y} = 0$ and $\bar{x} = -1$; this result can be obtained from equation (6) by taking the limit as $\bar{y} \to 0$ (see Figure 1). Another useful simplification of equation (5) results when $\bar{y} = 0$; this corresponds to the two points where the capture curve crosses the $\bar{x}$ axis. Taking the limit as $\bar{y} \to 0$ of equation (5) gives the extreme values $\bar{x}_e$,

$$\exp(\bar{x}_e - \bar{t}) = 1 + \bar{x}_e \tag{7}$$

(See Figure 1 for examples of $\bar{x}_e$.) A slight rearrangement of equation (7) gives the form

$$\bar{t} = \bar{x}_e - \ln(1 + \bar{x}_e) \tag{8}$$

Equations (5) and (8) will form the basis for calculating capture curves at a given normalized time $\bar{t}$. Unfortunately, both are transcendental equations, so iterative techniques will be used to obtain their solution. The resulting curves will enclose the area of the aquifer containing water either injected or discharged by the well up to time $\bar{t}$. The curves represent sharp fronts (deterministic curves) because hydrodynamic dispersion has been neglected. Those who are not interested in the mathematical details of solution may wish to skip to the section describing the computer program availability.

## Iterative Solution

The capture curves given by equation (5) are symmetric about the $\bar{x}$ axis; and the x axis is assumed to be parallel to the regional hydraulic gradient with its origin at the well. The requirement that the origin be at the well is relaxed in the computer program. From the discussion in the previous section, the limits on the coordinates are $-1 \leq \bar{x} \leq \infty$ and $-\pi \leq \bar{y} \leq \pi$. The solution that we shall obtain is a numerical one at discrete values of $\bar{x}$. The approach that we shall take involves solving equation (8) for the extreme values of $\bar{x}$ at a certain $\bar{t}$. The region bounded by these two extremes will be discretized to give a certain number of discrete values of $\bar{x}$ (usually between 100 and 1000). Let $\bar{x}_i$ represent one of these values. At that point with $\bar{t}$ and $\bar{x}$ known, equation (5) will be solved to obtain $\bar{y}$. Unfortunately, no single form of equation (5) seems to work well for the full range of coordinates. (Three forms will be used later.)

The extreme values of $\bar{x}$ are found by solving equation (8). Rearranging equation (8) slightly allows an iterative solution scheme to be developed (one-point method, Atkinson, 1989, pp. 76-83).

$$\bar{x}_e^{(m+1)} = \bar{t} + \ln[1 + \bar{x}_e^{(m)}] \tag{9}$$

The m in equation (9) is an iteration index. An initial guess for $\bar{x}_e$ must be known, but $\bar{x}_e = 0$ always seems to work well. Iteration continues on equation (9) until convergence occurs. If the initial guess for $\bar{x}_e$ is zero and $\bar{t}$ is positive, it is clear that equation (9) will converge on a positive value. If $\bar{t}$ is small, then $\bar{x}_e$ also will be small and the logarithmic term of equation (8) can be written as a series expansion to yield

$$\bar{t} = \frac{\bar{x}_e^2}{2} - \frac{\bar{x}_e^3}{3} + \frac{\bar{x}_e^4}{4} - \ldots \quad (10)$$

Solving for the lowest power of $\bar{x}_e$ gives

$$\bar{x}_e^{(m+1)} = \sqrt{2}\left[\bar{t} + \frac{\bar{x}_e^{(m)3}}{3} - \frac{\bar{x}_e^{(m)4}}{4} + \ldots\right]^{1/2} \quad (11)$$

Iterating equation (11) works well for small values of $\bar{t}$ and $\bar{x}_e$.

Equations (9) and (11) work well for the positive value of the $\bar{x}$ extremes; however, a slightly different version is needed to find the negative extreme value. Rearranging equation (7) slightly gives the following iterative solution.

$$\bar{x}_e^{(m+1)} = \exp(\bar{x}_e^{(m)} - \bar{t}) - 1 \quad (12)$$

Clearly, if $\bar{t} \to \infty$, equation (12) gives an extreme value of $-1$. If the initial guess for $\bar{x}_e$ is zero and $\bar{t}$ is positive, the result for the first iteration will be negative. Experience has shown that equation (12) converges rapidly on the negative value of $\bar{x}_e$.

Now that the extreme values of $\bar{x}$ are known for a particular $\bar{t}$, we can pick a discrete value $\bar{x}_i$ located between these two extremes. The only unknown in equation (5) is now $\bar{y}$, and an iterative solution can be set up. The most obvious iterative form is obtained from equation (5) by multiplying by $\bar{y}$ and $\exp(\bar{t} - \bar{x})$ to obtain

$$\bar{y}_i^{(m+1)} = \exp(\bar{t} - \bar{x}_i) \cdot [\bar{y}_i^{(m)} \cos \bar{y}_i^{(m)} + \bar{x}_i \sin \bar{y}_i^{(m)}] \quad \ldots . \quad (13a)$$

However, numerical experiments show that equation (13a) does not have as wide a region of convergence as we would like. The convergence properties of equation (13a) can be changed by adding $\bar{y}_i$ to each side of the equation (Atkinson, 1989, pp. 76-83). The resulting equation which we shall use is

$$\bar{y}_i^{(m+1)} = \frac{\bar{y}_i^{(m)}}{2} + \frac{1}{2}\exp(\bar{t} - \bar{x}_i) \cdot [\bar{y}_i^{(m)} \cos \bar{y}_i^{(m)} + \bar{x}_i \sin \bar{y}_i^{(m)}] \quad (13b)$$

As long as $|\bar{y}_i| \leq \pi/2$ and $\bar{x} \geq 1$, equation (13b) works well.

An alternate form of equation (5) can be obtained by solving for $\cos \bar{y}$ and then taking the inverse cosine function.

$$\bar{y}_i^{(m+1)} = \cos^{-1}\left[\exp(\bar{x}_i - \bar{t}) - \frac{\bar{x}_i}{\bar{y}_i^{(m)}} \sin \bar{y}_i^{(m)}\right] \quad (14)$$

Numerical experiments show that this form works well for all values of $\bar{x}$ and $\bar{y}$ as long as $\bar{t} \leq 1$. For $\bar{t} \geq 1$, equation (14) can be used only for $\bar{x} \leq 1$.

The final form of equation (5) needed to fill in all remaining values of $\bar{x}$, $\bar{y}$, and $\bar{t}$ is given by rearranging and solving for the tangent of $\bar{y}_i$.

$$\tan \bar{y}_i = \left(\frac{\bar{y}_i}{\bar{x}_i}\right) \cdot \left(\frac{\exp(\bar{x}_i - \bar{t})}{\cos \bar{y}_i} - 1\right) \quad (15)$$

Using the trigonometric identity $\tan(-\theta) = \tan(\pi - \theta)$ allows us to rewrite equation (15) in iterative notation.

$$\bar{y}_i^{(m+1)} = \pi - \tan^{-1}\left[\left(\frac{\bar{y}_i^{(m)}}{\bar{x}_i}\right) \cdot \left(1 - \frac{\exp(\bar{x}_i - \bar{t})}{\cos \bar{y}_i^{(m)}}\right)\right] \quad \ldots . \quad (16)$$

Numerical experiments show that this equation works well for $\bar{t} > 1$ and $\bar{x} > 1$ if $|\bar{y}_i| > \pi/2$. Clearly, equation (16) has a problem at $\bar{y} = \pi/2$ because the cosine function is zero. Therefore, special provision must be made to prevent equation (16) from being used too near the region where $\bar{y} = \pi/2$.

The iterative equations (13), (14), and (16) for $\bar{y}$ require an initial guess for the $m = 0$ iteration. That question was avoided in the above paragraphs where the equations were developed. However, in practice, this presents no problem. Using the extreme values of $\bar{x}$, a discrete set of $\bar{x}_i$'s are calculated by dividing the region between the extremes into an integral number of steps (usually between 100 and 1000). Solution then proceeds sequentially from the negative $\bar{x}$ extreme to the positive $\bar{x}$ extreme. At each of the extreme values of $\bar{x}$, we know that $\bar{y} = 0$. Therefore, as we step through the solution we will always know the value of $\bar{y}$ at the previous $\bar{x}$ value, and we can use this as the initial guess for $\bar{y}$ at the current value of $\bar{x}$. If at least 100 steps in $\bar{x}$ are used, the value of $\bar{y}$ does not change dramatically in one step and the above procedure is very efficient. As the solution proceeds, the appropriate equation (13), (14), or (16) is selected depending on the values of $\bar{t}$, $\bar{x}$, and the current value of $\bar{y}$.

## Computer Program

A simple computer program to calculate capture curves based on the material presented here has been written in FORTRAN and is available at nominal cost from the Publication Sales Office of the Kansas Geological Survey. Computer Program Series #90-5 is a publication containing the material of this paper as well as a more detailed description of the program workings, a FORTRAN listing, some sample data sets with output, and an IBM compatible disk containing the program. We commonly run the program on an IBM AT compatible computer; however, it can be adapted easily to a wide variety of computer environments. Usually only the input and output statements need modification.

## Results and Application

The results of using the algorithms discussed here are shown in Figure 1 for $\bar{t}$ values of 1, 3, 5, and $\infty$. The $\bar{t} = \infty$ curve corresponds to the normal ground-water divide. Equations (13), (14), and (16) can be applied only in certain regions of $\bar{t}$, $\bar{x}$, and $\bar{y}$ as discussed earlier. These various regions are shown on Figure 1, each with a different background pattern. Figure 1 was produced with a commercially available graphics package directly from the output file of the program. No graphics capability is included in the program; it is assumed that the user has access to a similar package.

In a real-world application, one will not be dealing with the dimensionless quantities $\bar{t}$, $\bar{x}$, and $\bar{y}$ but with actual time

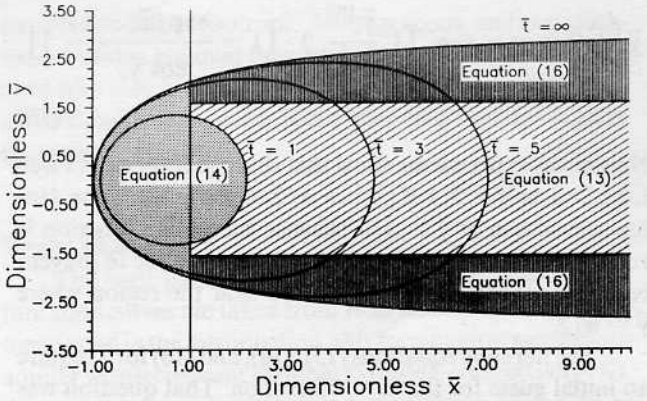


**Fig. 1. Capture zones and regions of equation application.**

and distances. However, equations (2), (3), and (4) provide the necessary conversions, so the simple user interface in the main program provides the connection to a specific application. Parameters may be given in any consistent set of units. To begin, one must know the average value of hydraulic conductivity and the regional hydraulic gradient vector (direction and magnitude). These quantities are used in equation (1) to calculate the specific discharge or Darcy velocity ($q_o$). Knowing the average regional thickness of the aquifer (B), the effective porosity (n), and the discharge (or injection) rate of the well (Q), the program can calculate $\bar{t}$ from equation (4) for the actual time of interest. The program then calculates the $\bar{x}_i$ and $\bar{y}_i$ of the capture curve of interest. These values of $\bar{x}$ and $\bar{y}$ are used with equations (2) and (3) to solve for the real-world coordinates x and y, which can then be plotted on an appropriate map base. Currently, the program assumes that the x axis is parallel to the regional hydraulic gradient; but, the well may be located at arbitrary coordinates. If the x axis assumption is not true, an appropriate rotation of coordinates will be needed before plotting on the desired map base.

## Discussion

Strictly speaking, the program presented here only deals with one well in a uniform, homogeneous, isotropic aquifer with uniform, steady, regional flow. In practice these conditions are rarely satisfied. However, the type of analysis presented here can be very useful as a first phase in developing wellhead protection or aquifer cleanup schemes (Javandel and Tsang, 1986). If conservative aquifer parameters are used, the analysis presented here should outline a maximum capture zone. The program presented here only deals with one well; however, the approximate result for several wells can be obtained by applying the program once for each well and superimposing the results. As long as the capture zones do not overlap, the approximate result should be very good. As the well spacing gets smaller and the capture zones overlap, the approximate results will deviate more from the correct solution; as long as the well spacing is greater than or equal to $Q/\pi q_o B$, the results are expected to be acceptable (see Javandel and Tsang for details of superimposing multiple wells). For the final analysis, if heterogeneity and nonuniform flow are very important, a more complex program such as that presented by Shafer (1987) should be used.

The program presented here is useful for planning wellhead protection and aquifer cleanup schemes. However, the user must always be mindful of its limitations. The presented program is simple and can be embedded in many computing environments, including personal computers, work stations, and mainframes. We have used the program on a work station interfaced with a geographical information system (GIS) to plot capture zones for several wells in Kansas (Woods et al., 1987; Whittemore et al., 1987; and Merchant et al., 1988). The program is presented here in the hope that it will be useful to others.

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* * * * *


*Carl D. McElwee graduated in 1965 from William Jewell College with a B.A. in Physics. He received the M.A. and Ph.D. degrees from the University of Kansas in 1967 and 1971, respectively. His research area was solid-state physics. From 1971 to 1974 he worked for Texaco, Inc., in Houston, Texas, as a Research Geophysicist. Since 1974 he has worked for the Kansas Geological Survey in the Geohydrology, Geophysics, and Advanced Projects Sections. His area of special interest is the quantitative description of aquifer systems by field measurements and modeling.*

Sept. 9, 2012

***Lawrence Douglas County***
***Metropolitan Planning Office***
6 East 6th Street,
P.O. Box 708,
Lawrence, KS 66044

Planning Staff:

As interested property owners, we are writing this letter to object to the Conditional Use Permit (CUP) that Penny Sand Co. has applied for near 1500N and 1850E. This CUP asks permission for a pit mining operation for sand removal. This would completely change the agricultural setting of the area. If allowed, this CUP would subject the area to dramatically increased industrial activity, including noise, dust, and environment destruction. We ask that you deny the CUP for the following reasons:

(1)The affected area has some interesting Douglas County history associated with it and contains some historic houses.

(2) The river bank in the vicinity of this proposed pit mining operation is unstable and has moved considerably over recent times. If pit mining is allowed in this area, in times of flood the chances of a dramatic river channel change is magnified greatly.

(3) On this proposed 434 acre pit mining site, the majority of the area is covered by some of the highest quality soils as defined by the US Department of Agriculture. It seems very short sighted to produce sand for short term gain and lose the potential for significant food and fiber production indefinitely.

(4)There is a large amount of overburden (unusable soil, silt and clay) that must be removed (typically 23-24 feet). Removing this much overburden will create an environmental nightmare

(5) Opening this pit operation will expose one of the most prolific aquifers in this region to potential pollution. This aquifer is a magnificent resource that must be protected and preserved for the future.

(6)Several neighboring house wells could be affected by this pit. Just down the valley about 1 5/8 miles lies the Eudora Public Water Supply Well Field; it could also be affected by the proposed pit mining operation.

Thank you for your consideration of our concerns.

# Penny Sand Pit Petition

| Name | Address | Phone Number | email |
|---|---|---|---|
| Print: Carl McElwee | 1564 E. 1850 Rd. | 785 | cmcelwee@ku.edu |
| Signature: Carl McElwee | Lawrence, KS 66046 | 843-4164 | |
| Print: MARGERY McELWEE | 1564 E 1850 Rd | 785 | |
| Signature: Margery McElwee | Lawrence KS 66046 | 843-4164 | |
| Print: Rick Gaebler | 1555 E 1850 Rd | 785-393- | |
| Signature: Rick Gaebler | Lawrence KS | 9028 | |
| Print: Esther McCabria | 1455 E 1900 Rd | 542 | BMccabria@aol.com |
| Signature: E. McCabria | Eudora, KS 66025 | 2492 | |
| Print: Robert McCabria | 1455 E 1900 Rd | 542 | " |
| Signature: Robert E McCabria | Eudora, KS 66025 | 2492 | |
| Print: Scott | 1964 N 1550 Rd | 785 | Scothjackson |
| Signature: Scott Jackson | Eudora 66025 | 331 6561 | 1964@yahoo.com |
| Print: Bruce Perkins | Eudor 66025 | 785 | BrucePerkins55@ |
| Signature: Bruce Perkins | | 764 6295 | Gmail.com |
| Print: Philip R Ernst | 826 Mass, Lawrence | 843-2313 | |
| Signature: Ernst | | | |
| Print: NORMA L. SCHMILZ | 1610 E. GLENN DR. | | |
| Signature: Norma L. Schmilz | LAWRENCE, KS 66044 | 843-0943 | |
| Print: AL W DEATHE | 1918 N 1500 RD | | AWDVKD@ |
| Signature: Al W Deathe | EUDORA KS | 542-2352 | SUNFLOWER.COM |
| Print: ViAnn K. Deathe | 1918 N 1500 Rd | | |
| Signature: ViAnn K Deathe | Eudora, KS 66025 | 542-2352 | |

# Penny Sand Pit Petition

| Name | Address | Phone Number | email |
|---|---|---|---|
| Print: Gregory Shype | 1394 E 1900 Rd | 785 | KS wiker@ |
| Signature: Gregory Shype | Eudora, Ks 66025 | 542-227[illegible] | hotmail.com |
| Print: Virginia S. Strong | 3712 Trail Rd. | 785 843- | |
| Signature: Virginia S. Strong | Lawrence, Ks 66049 | 2393 | |
| Print: DAVID VERTAČNIK | 1403 E 1850 Road | 785 842-4428 | david.vek.u.edu |
| Signature: David Vertačnik | Lawrence, KS | | |
| Print: Wendy Leet Vertacnik | 1403 E. 1850 Rd | 785- | vertacnik@ |
| Signature: Wendy Leet Vertacnik | Lawrence. KS 66046 | 842.4428 | sunflower.com |
| Print: Dr Karen Johnston | 1928 N 1500 Rd | 785 | drkarenjohnston |
| Signature: K Johnston | Eudora KS 66025 | 393 2933 | @gmail.com |
| Print: Linda Knabe | 39460 W 145th ST | 785 | Knabefarms@ |
| Signature: Linda Knabe | Eudora, Ks 66025 | 542 2228 | wildblue.net |
| Print: Richard Knabe | Same | | |
| Signature: Richard Knabe | | | |
| Print: PETER SHENOUDA | 1411 E. 1850 Road | 785-856- | PShenouda@hotmail.com |
| Signature: Peter Shenouda | Lawrence, KS 66046 | 3999 | |
| Print: Building Blocks Daycare | 1411 E. 1850 Road | 785- | buildingblocks@ |
| Signature: ~~Peter Shenouda~~ | Lawrence, KS 66046 | 856- 3999 | Sunflower.com |
| Print: Steve BOYER | Eudora K.S. | 785-218- | |
| Signature: Steve Boyer | 2027 N 1500 RD | 2491 | |
| Print: Nancy Jackson | 1964 N 1550th Rd | 785-331- | nancyjackson66@ |
| Signature: Nancy Jackson | Eudora, KS 66025 | 8743 | gmail.com |

# Penny Sand Pit Petition

| Name | Address | Phone Number | email |
|---|---|---|---|
| Print: Daniel C. Brune | 242 E. Cairo Dr. | 480-967-8622 | dbrune@asu.edu |
| Signature: Daniel C. Brune | Tempe, AZ 85282 | | |
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# Penny Sand Pit Petition

| Name | Address | Phone Number | email |
|---|---|---|---|
| Print: DOUGLAS GILMORE | 826 W 59 Ter KC MO 64113 | 816 444 3516 | |
| Signature: Douglas Gilmore | | | |
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| Signature: | | | |

# Building Blocks Daycare Center
# 1411 E 1850 Road
# Lawrence, KS 66046
# (785) 865-3999

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To: ***Lawrence Douglas County***
***Metropolitan Planning Office***
6 East 6th Street,
P.O. Box 708,
Lawrence, KS 66044

We want to object to the greatly increased heavy truck traffic on 442 due to this application, which will interfere with our customers dripping off and picking up children. We are a licensed daycare center near the proposed Penny Sand Plant. We are licensed for 129 children that can attend our center. We have over 30 teachers that work at the center. Parents and teachers drive daily between 7 AM to 6 PM Monday through Friday. Few years back we requested the Burlington Rail Road and the State of Kansas to review the increased traffic going through 1850 Road. Within a few months of the study both the State and Burlington implemented a railroad crossing due to the increased traffic.

Please realize that we already have the following people using 442 (Old K 10).

- Up to 129 parents dropping children during the day.
- Over 30 teachers coming to our facility during the day.
- Public school buses coming to our facility to drop children at the center.
- Our current vans driving during the day to pick and bring back children from different schools in Lawrence and Eudora.
- Folks visiting Pendleton during the year to purchase vegetables and fruits.
- Folks that work in Eudora and travel to Lawrence for employment.
- Folks that live in KC and work in Lawrence use the back road (442) to get to work.

Currently everyone in the neighborhood have a well for water source to either their house or business. We can't afford to lose our only source of water. I just can't imagine digging that many acres won't affect our only water source to the facility. Without water we would lose our children and would be forced to close the facility as water is a requirement by KDHE and would eliminate over 30 jobs.

We request that you deny the permit for the safety of the children, teachers and everyone traveling on the highway.

Sincerely,

Peter Shenouda

Peter Shenouda

Sept. 25, 2012

***Lawrence Douglas County***
***Metropolitan Planning Office***
6 East 6th Street,
P.O. Box 708,
Lawrence, KS 66044

Ms. Mary Miller:

It is unfortunate that last night's Planning Commission meeting on Item 1 degenerated into a chaotic situation, resulting in deferral for a month before some information could be communicated to the Commissioners. As I have communicated to you some weeks ago I am unable to be at the Oct. 22 Planning Commission meeting due to a commitment scheduled months ago and which is unchangeable. As the property owner most affected by this proposed CUP involving the Penny Sand Pit, as the leader of the local property owner opposition group (see signed petition), and as a qualified groundwater professional (who has submitted material for review) it would seem to be deprivation of due process to hold the meeting to discuss this issue when I can not be present. Therefore, I am respectfully asking the Douglas County Planning Commission to defer this item until the November meeting.

Thank you for your consideration. If I may answer any questions, please contact me.

Carl McElwee
1564 E. 1850 Rd.
Lawrence, KS 66046
785-843-4164
cmcelwee@ku.edu

THE LAW OFFICES OF
**DANIEL L. WATKINS**
901 NEW HAMPSHIRE STREET, SUITE 200
LAWRENCE, KANSAS 66044

TELEPHONE: (785) 843-0181
DANWATKINS@SUNFLOWER.COM
FACSIMILE: (785) 749-5652

October 3, 2012

Mr. Bruce Liese, Chairman
Lawrence/Douglas County Planning Commission
c/o Scott McCullough, Director
6 East 6th Street
Lawrence, KS 66044

Dear Chair and Commissioners:

You have a request from Carl McElwee to defer the hearing regarding Bill Penny's application for a Conditional Use Permit to extract sand from a parcel of land east of Lawrence, Kansas and north of County Road 1500. While we appreciate Mr. McElwee's circumstances, we believe it is important to proceed with consideration of the application. Penny's has been diligent in meeting submittal schedules and delivering additional information to staff on a timely basis. The matter has already been deferred once due to the request of Eudora.

The Corps of Engineers has notified us that river dredging permits in this vicinity will be suspended beginning December 31, 2012. Our application was developed and submitted on a schedule that would allow dredging of sand from an off-river pit coincident with the loss of the river dredging permits if a permit application is considered and approved this fall. Deferral of this application for another month will make this schedule very difficult to meet.

Mr. McElwee has submitted considerable information for the Planning Commission to consider in its deliberations. While his presence could certainly add emotion to the arguments he has presented, the multiple written submissions and petitions fully convey his position.

We respectfully request the Lawrence-Douglas Metropolitan Planning Commission proceed with the public hearing on October 22, 2012.

Sincerely,

Dan Watkins

MEMORANDUM

532 Oklahoma Street Lawrence, KS 66046 12 October 2012

To: Lawrence Douglas County Metropolitan Planning Office

From: Stan Roth, Retired Biology Teacher, USD 497 for 40 years

Re: Penny Sand Company Application for Continual Use Permit

Please deny the Penny Sand Company request for a pit mining operation for sand removal near roads 1500 North and 1850 East. This would negatively impact the surrounding agriculture activity that has sustained the local economy for decades. There are issues relating to environmental degradation that must be taken into account in the long term. The operation would result in displacement of overburden, result in instability of the nearby river channel bank, and negatively impact the ground water aquifer.

Also, the approval of this request would result in the disruption of the contemporary farming economy and adversely affect the Douglas County history of the area.

Douglas County Planning Commission
6 East 6th Street
Lawrence, Kansas 66044

October 11, 2012

Re: Proposed Conditional Use Permit for extension of sand and gravel extraction in an area adjacent to 1564 E. 1850 Road. This site lies directly south of the Kansas River midway between Lawrence and Eudora.

I recommend that this proposal be DENIED.

This conclusion is based on my many years of study and mapping of the Kansas River, including publication, in 2009, of an atlas of Historical Channel Changes of the Kansas River and its Major Tributaries. In reviewing available data I find several reasons that excavation within the proposed area could have several negative effects for the general public.

1) Potentially most serious would be pollution of the water supply for the city of Eudora. Underlying the flat valley floor in this region is a sequence of interlayered sand and gravel that approaches 100 feet in thickness. A large volume of water occupies the spaces between grains of this sediment. This water seeps slowly eastward in a downvalley direction, some being captured by both private and municipal wells. Less than two miles east of the proposed new excavation site is the well field that supplies potable water for the public water system of the City of Eudora. In other words, Eudora's water supply passes through sands lying beneath the proposed new extraction pit.

Any sand-and-gravel operation requires the presence of at least a few motors and transient vehicles that will inevitably leak contaminating fluids which can seep into and through subsurface sediments and become part of the downstream movement of the ground water. Furthermore, this area on the valley floor is subject to inundation during major floods. The high level surface flow also could pick up contaminants from the new sand pit and carry them downvalley to the Eudora well field.

Inspection of detailed maps or aerial photographs of the Kansas River Valley west of Eudora reveals that the proposed extraction site lies farther north (as well as west) of the Eudora well field. It might therefore be argued that pollutants from the proposed sand pit would pass downvalley north of the well field location and so have no influence on the wells. However, records of the location of the river channel during the past few hundred years show that the stream has locally been flowing from northwest to southeast. That means that sand bodies accumulating in the channel would be elongated in that direction, an orientation that could lead subsurface water movement to go from the pollutant source of the new pit directly to the Eudora well field.

This all means that opening a new sand and gravel extraction pit at the proposed location could seriously endanger the purity and integrity of Eudora's water supply.

2) Data currently available to me do not define the precise location of the well that supplies water to the house at 1564 E 1850 Rd. Excavation on the proposed new site for sand and gravel extraction could seriously impinge on the supply of water from that private well. In fact, opening and deepening of the new pit might divert all local groundwater flow from the well and leave the residence with no water supply at all. The situation certainly requires assessment.

3) At the northwestern corner of the proposed new operation the Kansas River follows a sharp, almost V-shaped bend to the north and then back to the southeast. This bend has been actively shifting shape and location during the past several decades. It can be assumed that this dynamic will continue at least into the near future. The trend suggests that the channel will soon cut off or cut through the sharp bend by eroding through the location of the present sand and gravel operation. This channel move could also cut away at least the northern part of the proposed new operation. Such a shift of channel position would negatively affect the new extraction operation, and might

establish a new channel dynamic that would affect streamflow in both downstream and upstream locations. Final effects and configurations cannot immediately be determined, but could involve unexpected erosion into productive cropland.

Several predictable effects of establishment of a new sand and gravel extraction operation adjacent to 1564 East 1850 Road between Lawrence and Eudora tend to have negative impacts on nearby parts of the local valley floor. However, it is endangerment of the well field for the City of Eudora municipal water supply that demands closest attention. Chance of contamination of that resource is completely unacceptable for the public welfare.

Wakefield Dort Jr.

Wakefield Dort, Jr.

Emeritus Professor Geology
The University of Kansas

Oct. 11, 2012

***Lawrence Douglas County***
***Metropolitan Planning Office***
6 East 6th Street,
P.O. Box 708,
Lawrence, KS 66044

Ms. Mary Miller:

As you know I will be out of town on Oct. 22, so I can not be at the Planning Commission meeting. So, I want to make sure that all is in readiness for that meeting. I have supplied you with additional information already and I want to alert you to additional incoming information.

First of all, the Eudora City Council meet on Monday Oct. 8 and as part of their regular meeting they held a study session concerning the Penny Sand Pit CUP. Penny Sand presented their plans for the site, then Mr. Nuzman reviewed his report. At that point I presented my report (of which you have a copy) summarizing my comments on Mr. Nuzman's report pointing out alternate interpretations and shortcomings. Then Doug Heimke of the Kansas Rural Water Association gave his thoughts on the project. Next, the Eudora City Council hydrogeology consultant Mr. Ned Marks made a presentation on the pertinent hydrogeology of the valley aquifer. Then Mr. Scott Michie advised them of certain planning considerations. Finally, the Eudora City Council deliberated on their position with regard to the Penny Sand Pit CUP. The net result was that they voted to oppose the CUP application and write a letter to your office to that effect. I must say that they made a great effort to study the situation carefully before making their decision.

We have exchanged emails regarding Dr. Juracek of the USGS. I provided you with a letter summarizing conversations that I had with him concerning the bank stability issue. The net result was that he agreed with what I had said about that. In addition, the other local expert on the Kansas River, Dr. Dort (who is retired from the KU Geology Dept.) is writing a letter opposing the CUP application based on water quality and bank instability issues. You should receive that letter soon.

I hope you will be rewriting the staff report to reflect all this new information. In particular water quality and bank instability issues must be reflected as areas of major concern. Your staff report points out that preservation of quality farm land is also a major consideration. Based on all this new information, I hope your rewritten staff report will recommend denial of the CUP application.

Since I can not be present for the Oct. 22 meeting, I have prepared a 5 minute video presentation which I would like to have played at the meeting. I am no longer asking for the consideration of this Penny Sand Pit CUP to be deferred to the Nov. meeting. I think that would be unfair to the many opponents who will be showing up for the second time, since it was deferred at the Sept. meeting. To defer it again and ask them to keep coming out for meeting after meeting would be wrong. I do ask for a fair hearing of all the available information and that a very thoughtful deliberation be made.

Thank you for your consideration. If I may answer any questions, please contact me.

Carl McElwee
1564 E. 1850 Rd.
Lawrence, KS 66046
785-843-4164
cmcelwee@ku.edu

Oct. 2, 2012

***Lawrence Douglas County***
***Metropolitan Planning Office***
6 East 6th Street,
P.O. Box 708,
Lawrence, KS 66044

Ms. Mary Miller,

After reading your staff report which contains the following information:

"Staff contacted a hydrologist with the USGS (United States Geological Survey) Midwest Division, Kyle E Juracek, for his opinion on the impact of the dredging operation and pit on the river channel. Mr. Juracek indicated that the location of a lake could result in channel change in the event of a flood but pointed out that the river channel may change as a result of a flooding event even without a lake in close proximity."

I felt that the situation involved in this request for a CUP had not been made entirely clear to Dr. Juracek. The situation is fairly complex and deserves some more description. After making an appointment to see Dr. Juracek, I showed him Dr. Dort's work characterizing the river bank movement over the last 100 plus years, gave him a plan view map of the proposed sand pit excavation area to create the lake, and explained to him that the sand excavation would proceed to bedrock in the area. We discussed the fact that the river is trying to cut off the meander in this area. I pointed out that the proposed excavation pit (about ¾ mile wide East to West) would nearly connect the two sides of the meander.

Dr. Dort's work shows the river bank in the vicinity of this proposed sand pit is unstable and has moved over time. Geologic history tells us this river will move again, we just don't know when. During a major flood event the river could try to move again and breach the proposed sand pit.

The presence of such a large deep pit as requested at this site would make it much easier (since so much material has been removed) for the river in times of flood to cut off the meander at this site by flowing through the pit area. This would create a huge nick point (deepened point in the river bed about

50-60 feet deep) that would have a destabilizing effect on the river bed, with head cutting upstream and bed degradation downstream for some time to come, until a new stable river bed gradient was created. This erosion of the river bed could propagate upstream to the Bowersock Dam and downstream an unknown distance.

I have sent a copy of this letter to Dr. Juracek for review and he has not disagreed with my statements. I encourage you to contact him and discuss this matter with him and to ask him any questions you may have.

Thank you for your consideration. If I may answer any questions, please contact me.

Carl McElwee
Emeritus Professor of Geology
University of Kansas
Lawrence, KS 66045
785-843-4164
cmcelwee@ku.edu

**City Of Eudora, Kansas**

*Mayor Scott Hopson*

October 17, 2012

Bruce Liese, Chairman
Lawrence – Douglas County Metropolitan Planning Commission
First floor, 6 E. 6th Street
Lawrence, Kansas 66044

Dear Mr. Liese,

The purpose of this letter is to inform the Douglas County Planning Commission of the vote by the Eudora City Council taken October 8, 2012 concerning the Conditional Use Permit (CUP) application by Penny Sand Company for proposed dredging operations near the Kansas River at the corner of North 1500 and East 1850 roads. The City Council voted unanimously to recommend denial of the CUP application.

The City Council heard two hours of testimony from hydrology experts, for and against the Penny Sand CUP application, and from the general public at their October 8th meeting. Eudora's recommendation for denial is based on public concern for protection of the aquifer and water table that serve as the sole source of water for the City's municipal well supply. Our analysis shows there is potential for surface water to negatively impact our water source should the CUP allow the removal of over-burden soil—built up over decades of natural flooding and silting—and the excavation to bedrock at depths of 50- to 70-feet below current grade at the site. We look forward to presenting this letter and a summary of these hydrology findings to your commission at an upcoming public hearing on this matter. Attached to this letter are several documents that were presented at the City Council meeting on October 8th. Thank you for considering the recommendation of our city council and for cooperating with our planning commission in this and other planning and zoning matters inside Eudora's designated "Planning Area."

Sincerely,

Scott Hopson

Scott Hopson
Mayor

Cc: Douglas County Commission (via e-mail)
Craig Weinaug, County Administrator (via e-mail)
Eudora City Council (via e-mail)
Scott McCullough, Director Planning and Development Services (via-e-mail)

(785)542-4111 (785)542-1237 Fax
4 East Seventh Street P.O. Box 650 • Eudora, Kansas 66025-0650

# TERRANE RESOURCES CO

P.O. BOX 173 STAFFORD, KS 67578-0173 620-234-5200

17 September, 2012

Mr. John Harrenstein, City Manager
City of Eudora
P.O. Box 650
Eudora, KS 66025-0650

Re: Penny Sand CUP

Mr. Harrenstein,

This letter and enclosed Exhibit is in response to the City of Eudora's request we review and make recommendations regarding the proposed Penny Sand Facility CUP.

We have reviewed the data prepared by Dr. Carl McElwee, data submitted by Penny Sand, KGS publications, data prepared by Mr. Carl Nuzman and well log information.

Exhibit 1 is a copy of a map we modified from the Nuzman report. It shows the following:

The water table contours from the 1930 and 1974 KGS reports.
The 10 year area of influence delineated by Nuzman.
The 6 and 8 year areas of influence delineated by McElwee.
The proposed Penny Sand Facility
The test borings in the NW portion of the proposed sand facility.
Proposed observation well sites

The data indicates there has been a shift in the local ground water flow direction. The 1930 data indicates a WSW to ENE flow direction. Mr. Nuzman's Source Water Protection Area SWPA delineation tracks to the WSW from the City's well field. The 1974 data used by Dr. McElwee indicates the ground water flow has a more west to east orientation. Additionally, the 1974 shows there is less saturated thickness in the aquifer in and up-gradient of the City's well field. The SWPA delineated by McElwee extends more due west from the City's well field and further up-gradient.

It is important to understand both of these delineations are based on 83 and 39

year old water level data respectively. Both delineations used similar pumping scenarios by the City wells but do not include any potential impact local irrigation systems may have on the overall area of influence. Additionally, there is nothing in the data that suggest the existing sand operation is having any affect on the aquifer.

There are some fundamental aspects of aquifer characterization which need to be addressed. If the pumping of the City's wells remain constant (no decrease in pumping rate) and the saturated thickness decreases (lowering of the water table) then the cones of depression increase around each well. The increase in the size of the cone of depression will increase the area contributing water to the well field. If the saturated thickness continues to decrease due to seasonal or long term lowering of the water table then transmissivity and hydraulic conductivity characteristics of the aquifer can be affected. Therefore, any permanent lowering of the water table can have an impact on the area of influence to the well field which can have a deleterious effect on pumping rates.

The delineations prepared by Mr. Nuzman and Dr. McElwee represent the areas which will contribute water to the well field over time. The immediate cones of depression associated with the wells caused by pumping may not extend much more than ½ mile from the wells.

If the proposed sand pit has no affect on the water table, within the pit area, then it will yield water to the aquifer more readily than the surrounding aquifer and become a recharge area to the aquifer. If the water level in the pit is lower than the existing water level in the aquifer then it becomes a drain on that portion of the aquifer and will impact surrounding water levels in the aquifer.

Any changes to the water table can affect ground water flow direction. It appears there has been an apparent shift in the ground water flow direction by about 20 degrees between 1930 and 1974.

We have no data which indicates what affect the proposed sand pit will have on the water table. If there is no change to the water table then the affects should be minimal. However, if the sandpit caused a permanent lowering of the water table then it can have a negative affect on the recharge area to the City's well field. This will be readily apparent during periods of drought.

According to the conversation from the informal meeting held at Eudora it is our understanding the Division of Water Resources (DWR) assumes there will be no net loss of water from the aquifer under normal conditions due to evaporation. During periods of drought and extend periods of heat it would not be

unreasonable for this pit to lose and inch of water in a 24 hour period. That amount of water would equal 27,154 gallons per open acre of water. That value times 300 acres equals 8,146,200 gallons per day. This is the equivalent of 25 acre feet of water per day or a well that pumps 5657 gallons per minute 24/7.

At this time we would tend to agree with DWR's zero net loss on an average year. However, as we are currently seeing there are some years that do not get average rainfall. This is important because when the sandpit will be losing potentially large quantities of water due to evaporation the City will be pumping large quantities of water to meet demands.

Based on the limited data it appears there is the potential for impairment during periods of drought or extreme heat.

It is our understanding the sandpit will be excavated through the entire sand and gravel formation and extend to the bedrock. This process will open the entire saturated thickness to the pit. Should a contaminant enter the pit, whether it is biological or chemical, it will have access to the zone the City wells are completed in. The lower zone of the aquifer in this area is typically more prolific and has better transmissivity characteristics than the upper portions. Therefore, any contamination that makes it to the bottom of the aquifer will move faster than if it entered through the soil profile.

The well logs we rec'd from Penny Sand are informative but of limited use as they are only for a small area in the northwest portion of the sand operation. This area of the operation is remote to the City's well field. The installation of some observation wells around the perimeter of the proposed sand pit would be beneficial. At this time we recommend observation wells near the southwest and the southeast corners and near the middle of the east side of the proposed sand pit.

Additional observation wells between the proposed sand pit and the City's well field should be installed as well. Unless, existing wells can be identified, evaluated and utilized.

We do not have any recent data to evaluate the potential, negative or positive, impact of the proposed sandpit.

In order to evaluate any changes the proposed sand pit will have on the aquifer a comprehensive evaluation of the existing data, the installation of observation wells and collecting current and on going data will be needed.

Quite frankly, the delineations presented indicate the complexity of this area. Without current data, the actual effects on the aquifer are estimates at best.

Using existing wells and adding observation wells to fill in the gaps, data can be collected which will better identify, delineate and evaluate the potential affects to the aquifer.

Below is a brief outline of the proposed process we recommend the City of Eudora consider regarding Source Water Protection Area (SWPA) delineation.

**Data Collection and Review**
Review City files and select data for copies.
Review KDHE files at Lawrence, Topeka and State Archives as needed.
Compile well database and ground truth existing wells and associated data.
Recommend meeting with KRWA staff and bring them onboard to help with the SWPA plan compilation, implementation, presentation to neighbors and City and County Planning and Zoning Commissions.

**Aquifer Testing and Observation Well Installation**
Analysis of existing data may provide some of the information needed. We anticipate having to run at least one series of aquifer tests to determine the area of influence and evaluate potential well interference.

The existing data for the City wells and domestic wells can be utilized, additional observation wells may have to be installed. Some of the observation wells should be installed before the aquifer tests are run.

The wells shown in the KGS database will be of limited usage unless their locations are verified.

All wells and surface water access points, utilized in the testing process, will have to be surveyed in by a licensed surveyor.

**Aquifer and Testing Data Compilation**
Individual well and multiple well data will have to be evaluated.

The projection and plotting of actual areas of influence will be based on actual and current data. Once this is done we can estimate changes to the area of influence based on aquifer variables, changes in pumping rates, additional wells, saturated thickness changes, etc.

**Additional Recommendations**

We strongly suggest the City ask Penny Sand to postpone their meeting with Planning and Zoning. This would allow the City to obtain clarification of some of the data and present their concerns directly to Penny Sand and their consultants. It has been our experience that direct negotiations will be more beneficial and less expensive than trying to negotiate through the Planning and Zoning Process. If a mutual agreement can be reached between the City and Penny Sand, then the City simply recommends the modified plan be approved by Planning and Zoning.

Historically, it was thought the public should have complete and unrestricted access to a city's data and well field operations. We do not believe going into great detail as to how the City's wells function and the areas which directly impact the viability of the well field need be publicized.

We recommend the City monitor water levels in and around their well field. Either by utilizing existing wells if available or by installing a series of observation wells. From this network a detailed ground water flow regime map can be prepared. Additionally, seasonal variations in ground water flow can be monitored.

Once the City has a detailed Source Water Protection Area (SWPA) delineated then it can be referenced in future planning and zoning determinations.

We suggest requesting Penny Sand install, monitor and analyze samples and data from no less than three observation wells near the southwest and southeast corners and near the center of the east side of the proposed sand pit. If there are existing wells on the property, which can be used, they should be evaluated and used if possible. It would be beneficial if these wells could be installed before excavation begins. Samples should be collected in the spring and late fall to establish a baseline on quality and water levels should be measured monthly.

The main component as to whether this proposed sandpit will be an issue will depend how much impact the City's well field has on the aquifer. It is possible the data to make that determination already exists. Much of the data gathered during the construction of the wells should be available. It is important the wells be evaluated as they are operated, not as a single event or pumping well.

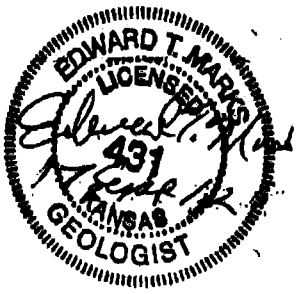
John, this is a complex issue, which may be exactly as Mr. Nuzman and Dr. McElwee have described it. It has been our experience it takes detailed analysis of the data to establish areas of influence and develop a meaningful SWPA delineation.

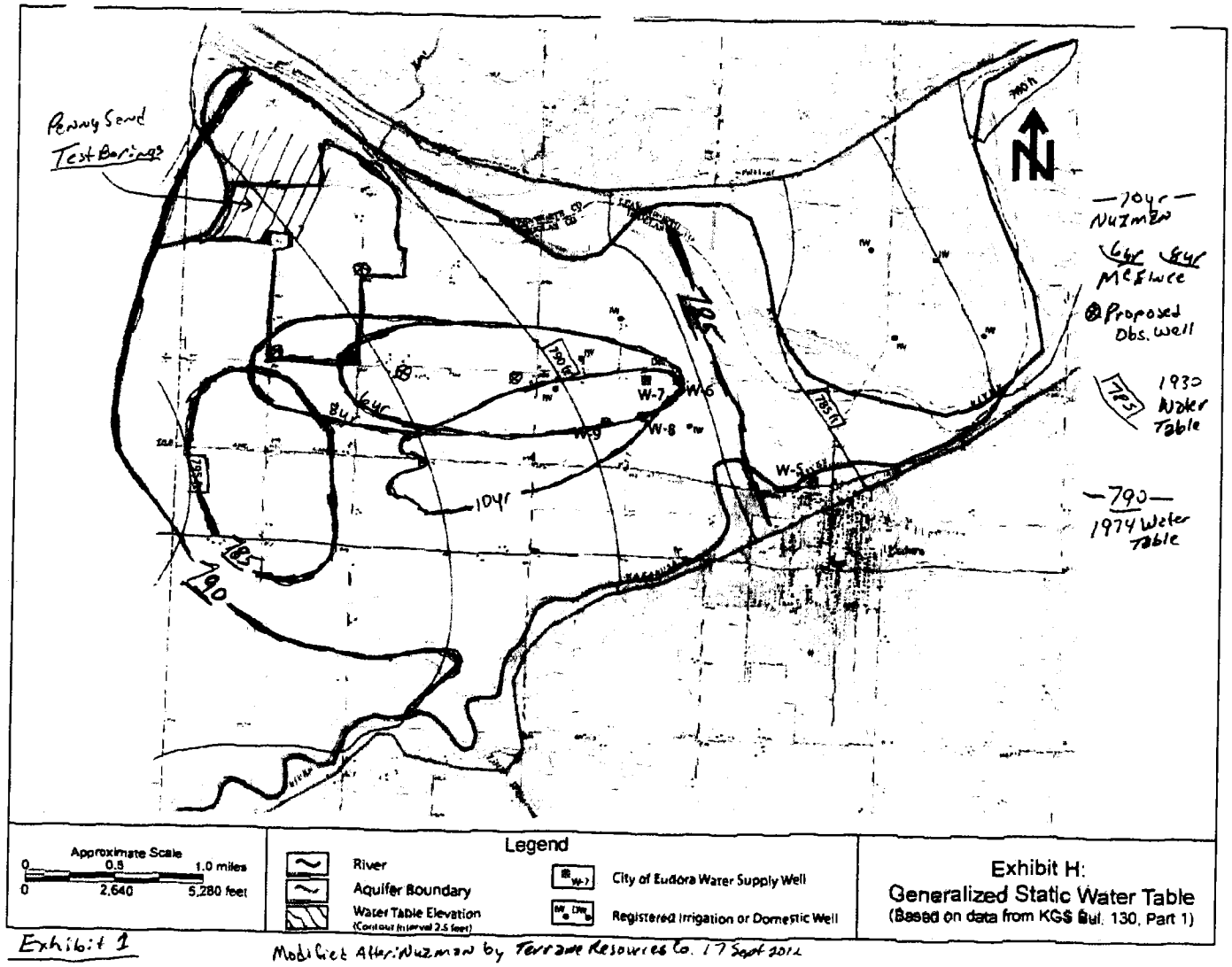
As Always if you or any of your colleagues have any questions do not hesitate to contact us.

Respectfully submitted

Edward "Ned" T. Marks, Geologist
Terrane Resources Co.
terrane@sbcglobal.net

Encl.




Penny Sand Test Borings
N
—1041—
Nuzman
6yr
6yr
McElwee
Proposed Obs. Well
1930 Water Table
—790—
1974 Water Table
W-7
W-6
W-8
W-9
W-5
1041
790
785
Approximate Scale
0 0.5 1.0 miles
0 2,640 5,280 feet
Legend
River
Aquifer Boundary
Water Table Elevation
(Contour Interval 2.5 feet)
City of Eudora Water Supply Well
Registered Irrigation or Domestic Well
Exhibit H:
Generalized Static Water Table
(Based on data from KGS Bul. 130, Part 1)
Exhibit 1
Modified After Nuzman by Terrane Resources Co. 17 Sept 2012

KANSAS
RURAL
WATER
association
Quality water, quality life

P.O. Box 226 • Seneca, KS 66538 • 785/336-3760
FAX 785/336-2751 • http://www.krwa.net

October 11, 2012

Mayor Scott Hopson
City of Eudora
P.O. Box 650
Eudora, Kansas 66025-0650

RE: Sand and Gravel
Dredging Proposal

Dear Mr. Hopson:

Thank you for allowing me the opportunity to present written information and to speak before the city council on October 8, 2012. It was obvious that the city council wanted to take the time to understand the issue and by inviting all of the interested parties to speak, they have a very good understanding of the risks and benefits moving a nearby sand and gravel dredging operation off of the Kansas River and onto the floodplain.

It should be clear to most people that removing material from the river bed will cause the river system to react to the disturbance. Sand and gravel doesn't regenerate in the river. This material in the Kansas River and its alluvium is a mixture of the material deposited from the glaciers and material eroded from the Flint Hills, the Dakota Sandstone and the Rocky Mountains. The likelihood of "new" sand and gravel coming downstream is severely limited by the existing large dams on the Kansas River and its tributaries. Initially, this disturbance will affect the bed upstream and downstream as the river attempts to restore the previous slope with sediment in the channel and / or from the banks. As it is believed that the U.S. Army Corps of Engineers will suspend the permits allowing in-stream dredging on much of the Kansas River in 2013 because of these impacts to the river, companies that use or sell sand and gravel will be looking for new sources of this material.

Unfortunately, not much planning has occurred in the counties where the Kansas River and its associated sand and gravel resources are located. This lack of comprehensive planning to identify the best locations for off-stream sand and gravel dredging operations is causing conflicts between the sand and gravel companies hoping to move onto the floodplain and public water systems that depend on the groundwater in the sand and gravel aquifers. Other interested parties affected by this change in dredging policy are transportation departments, power companies, airports, pipelines, railroads, etc. Until this planning is done, public water systems, especially those water systems that do not have treatment facilities that are capable of treating surface water or groundwater under the direct influence of surface water, will need to be vigilant in protecting their source water supplies. They will have to be actively involved in the planning process.

I believe the city council was correct in reaching a decision to recommend denial of the conditional use permit. While it was speculated in one report that the off-stream sand dredging operation would not cause "contamination" of the aquifer, no evidence was presented in written form or verbally that the proposed pit could not introduce constituents common in surface water to the groundwater supply through the beds of gravel (exposed in the sides of the pit) which extend into the aquifer. Water systems such as yours, do not have a surface water treatment plant because of the natural filtration property of the relatively undisturbed aquifer. Creating a condition that could allow bacteria, viruses, protozoa such as *Cryptosporidium* (a parasite that is resistant to chlorine disinfection), or toxins from decaying algae to enter your water supply is unreasonable and unacceptable. A fact sheet on cryptosporidiosis is enclosed.

You can reach me by telephone at 785/640-4701, by e-mail at dhelmke@krwa.net or by writing to 6847 SE 29th Street, Tecumseh, Kansas 66542-9571. You can follow me on Twitter at @KRWA_WaterRghts. Please be reminded that the KRWA website at http://www.krwa.net has news and information for water and wastewater utilities, including water rights, source water protection and training opportunities.

Sincerely,

Douglas S. Helmke

Douglas S. Helmke, L.G.
Water Rights / Source Water Specialist
Kansas Rural Water Association

DSH
Enclosure
c: KRWA
JOHN HARRENSTEIN ✓

# Facts About Cryptosporidiosis

## What is cryptosporidiosis?

Cryptosporidiosis is a gastrointestinal illness caused by *Cryptosporidium*, a infectious pathogen that lives in the intestines of humans and mammals. Both the disease and the organism itself are commonly referred to as **Crypto**. Crypto is one of the most common causes of waterborne diseases in the United States: outbreaks related to recreational and drinking water increase every year. It is highly contagious and when left untreated, a person can become re-infected and/or infect others. Crypto is commonly transmitted by swallowing organisms from water, food, hands or other surfaces that have been contaminated with the organism. Crypto is most common during the summer and early fall. It occurs most frequently in young children (under the age of 10) and their caregivers. While anyone can be infected with Crypto, people with weakened immune systems (malnourished children, the elderly, patients receiving cancer chemotherapy patients with HIV/AIDS, etc.) can develop serious, life-threatening illnesses from Crypto.

## Symptoms

Crypto symptoms usually begin within 2 to 10 days after exposure and generally last one to two weeks in people with healthy immune systems. Common symptoms include watery diarrhea, stomach cramps or pain, dehydration, nausea, vomiting, fever and weight loss.

## Diagnosis

Diagnosis of Crypto can be complex and time-consuming because the organisms are very small and difficult to see under a microscope. Confirming a diagnosis of Crypto normally involves examining multiple stool samples over a period of several days.

## Other Facts about Crypto

- The word "Crypto" comes from a Greek word meaning "hidden."
- Crypto is resistant to chlorine and other chemicals commonly used in recreational and drinking water.
- Crypto is not killed by alcohol gels and hand sanitizers.
- People can continue to pass Crypto in their stools for several weeks following illness.
- When doctors suspect Crypto, they sometimes treat patients before a definitive diagnosis is secured.
- If you suspect you or a loved one has Crypto you should consult your doctor or primary care clinician.
- Transmission of Crypto is not limited to ingesting contaminated water. Food and person-to-person transmission may be at least as important as drinking water and may be more likely to transmit higher dose exposures.

## How Can Crypto be Prevented and Treated?

*You can help to break the chain of transmission of Crypto if you:*

- Avoid swallowing water while swimming, boating, or engaging in other recreational activities.
- Wash raw fruits and vegetables thoroughly with clean water before eating them.
- Wash you hands carefully before you eat, after using the restroom or changing diapers, after you have cared for anyone with diarrhea, and any time you may have been in contact with contaminated surfaces.
- Stay away from swimming pools and other recreational waters if you or a family member has had diarrhea.

*Supportive Care and Treatment*

- Doctors recommend drinking plenty of fluids to prevent dehydration during infection with Crypto and other illness causing diarrhea.
- A prescription medicine called nitazoxanide (Alinia®) may be used to treat Crypto in both adults and children 12 months of age and over.
- Nitazoxanide is available as a tablet for adults and as a liquid suspension. A three-day treatment regimen is recommended.
- Side effects of nitazoxanide are similar to those of a placebo (sugar pill).
- Nitazoxanide has not been shown to be effective for the treatment of diarrhea caused by Crypto in HIV-infected or patients or patients with weak immune systems.

National Foundation for Infectious Diseases
4733 Bethesda Avenue, Suite 750, Bethesda, MD 20814
(301) 656-0003 Web site: www.nfid.org August, 2008

# Facts About Cryptosporidiosis

**FACT:** According to the CDC, Crypto has become one of the most common causes of waterborne diseases (recreational and drinking water) in the United States, with outbreaks increasing annually

**FACT:** Crypto is a chlorine-resistant pathogen that poses a serious public health threat because contamination of drinking or swimming pool water can lead to large community outbreaks

**FACT:** Crypto is spread by contact with contaminated water, food and surfaces. Swallowing water during recreational water activities is a common way Crypto is spread.

**FACT:** The tell-tale sign of Crypto infection is ***frequent, watery diarrhea that is not like other cases of diarrhea***. Other symptoms include dehydration, weight loss, stomach cramps or pain, fever, nausea and vomiting. Symptoms generally begin within two to ten days after exposure and last one to two weeks

**FACT:** Crypto is highly contagious and when left untreated, a person can become re-infected and/or infect others. Crypto can be shed in the stool for many weeks after symptoms clear

**FACT:** Dehydration is the most common problem people develop after being infected with Crypto

**FACT:** Persons with weak immune systems may develop prolonged illness with severe dehydration and other life-threatening complications

**FACT:** Maintenance of adequate fluid intake is vital for persons with Crypto and other types of diarrhea

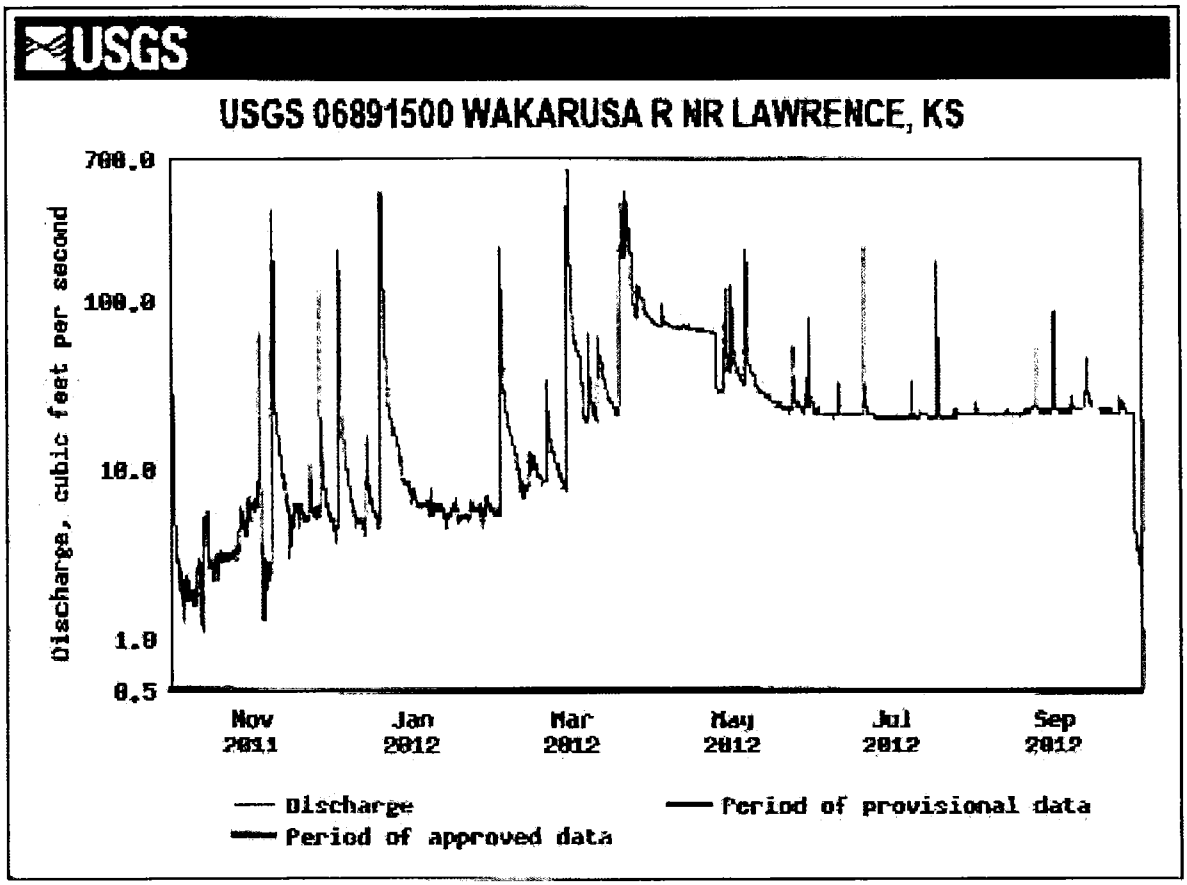
**FACT:** Persons who suspect diarrhea related to Crypto should consult a health-care provider.

National Foundation for Infectious Diseases
4733 Bethesda Avenue, Suite 750, Bethesda, MD 20814
(301) 656-0003 Web site: www.nfid.org August, 2008

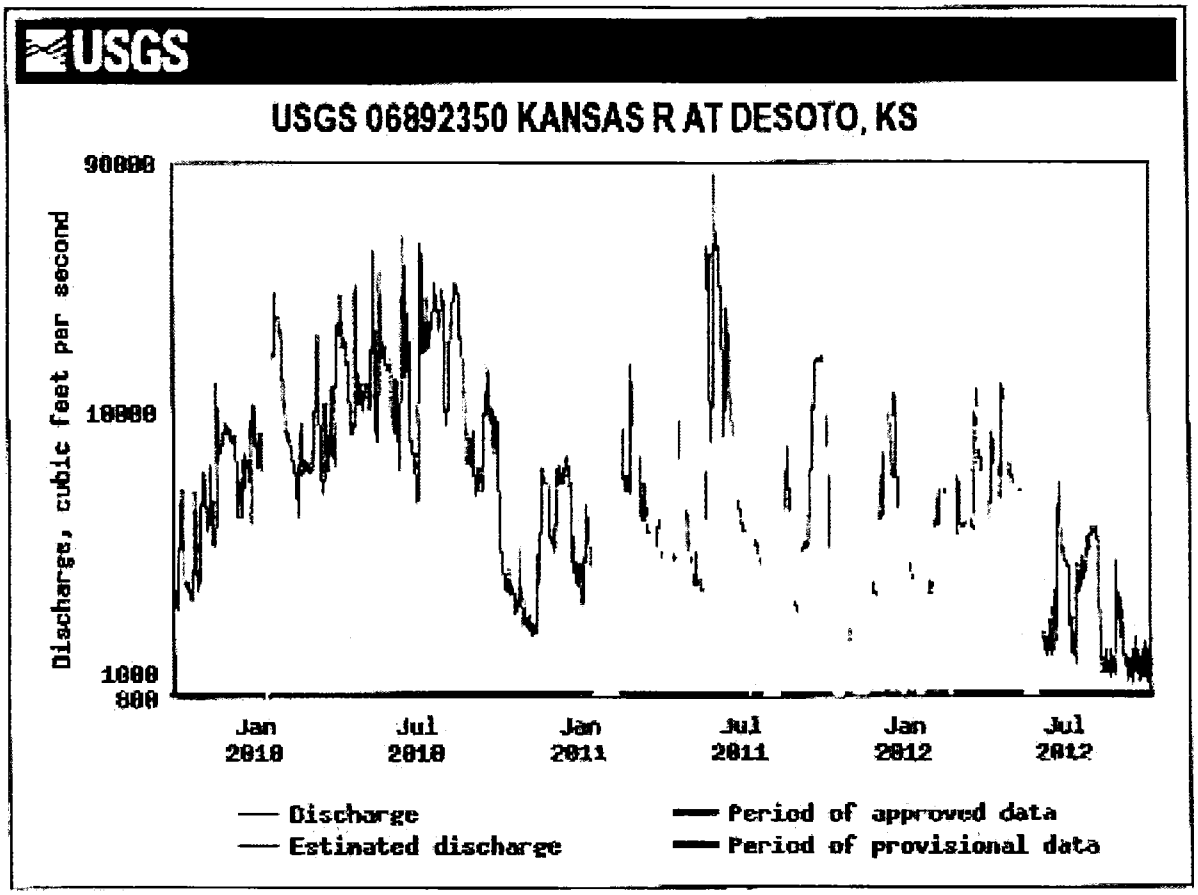
Comments Regarding the *Evaluation of a Sand Pit Operation for Penny's Concrete and Sand LLC* by Carl E. Nuzman

1. In Exhibit B, mentioned on page No. 3 of *Evaluation of Penny's Concrete and Sand LLC's Proposed Sand Pit Operation on Ground Water For the Lawrence Facility* dated September 12, 2012, Mr. Nuzman provides a "cross section" of "selected" wells, three with very detailed geologic information and two with incomplete information which do not fully penetrate the aquifer. The detailed well logs show coarse sand and gravel and one of the well logs shows boulders. This kind of material in an aquifer usually allows for high transmissivity, which is a measurement on how water flows through the aquifer formation. His report then discounts the recorded water levels on these well logs due to precipitation, drought, well test pumping, etc. and are therefore unreliable for water level use. His report then relies on "pre-development conditions", which haven't existed since the 1950's.

2. Mr. Nuzman concludes that the Wakarusa River is important to aquifer recharge, but does not supply any data showing flow in the Wakarusa River. Below is a graph showing recent flow. (From http://waterdata.usgs.gov/ks/nwis/rt)




The above graph shows instantaneous water flow in the Wakarusa River near Lawrence since October 1, 2011. Notice that some events of "high" flow have occurred but most was below 10 c.f.s. until March of this year. Releases from Clinton Reservoir contributed to an average flow of about 20 c.f.s. since June of 2012.




This graph shows the measured flow in the Kansas River near De Soto. Note that the average flow is over 100 times greater than the Wakarusa River and therefore more likely to contribute more recharge to the alluvial aquifer. At some times, flow is more than a 1,000 times greater.

3. On Page 5, Mr. Nuzman concludes that the "overappropriated" condition of the aquifer will serve to intercept any contaminants upgradient from the public water supply wellfields. Of the 4,868 acre-feet appropriated in his "effective" area, 3,686 acre-feet is the authorized total (over 75%) of just one water right. Water Right, File No. 9,391, which was last used in 2002, was recently obtained by the City of Lawrence. The City of Lawrence will not be "drawing" contaminants away from the other public water suppliers by the operation of this water right if it draws contaminants toward their wells.

4 In Section 6, no detailed information is given, including the name of the "particle tracking" analysis software that was used to generate the map identified as Exhibit F. Reference is given to K.G.S. Bulletin No. 130, part 1, which was published in 1958, which does not include a particle tracking model. It is likely (but not determined) that water level data from the 1958 report was used when the un-named software was used to generate the map. His previous comments about overappropriation are ignored when he uses the water level data from the 1950's to explain the normal conditions of today.

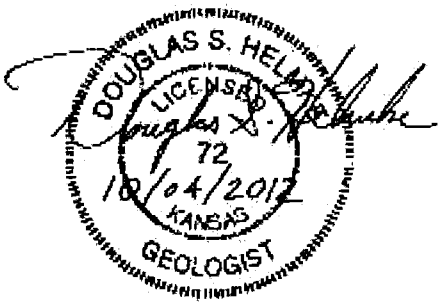
5. In Section 8, the report seems to contradict previous comments regarding the sand pit's lack of influence on water quality. Mr. Nuzman states that sand pits beneficially support the yield of wells that are down-gradient from a pit that is within the area of influence of a well. If this is true, the quality of the water in the pit will be extended into the aquifer some unknown distance.

6. In Section 9, "Conclusions", it is stated that present regulations require 200 feet of separation between a well and a surface water source. This regulation applies to public water supply wells where the screen of a well is less than 50 feet from the surface of the ground unless approved surface water treatment is employed. This regulation is drafted to account for wells in close proximity to rivers. It was not written to account for wells near pits that fully penetrate the aquifer. If the water being pumped by public water supply wells have biological, chemical or turbidity characteristics similar to surface water, it would be surprising that KDHE would not rule that the water is under the direct influence of surface water.

7. Mr. Nuzman does not mention this conclusion taken directly from Bulletin No. 130, part 1: "Wisconsinan and Recent alluvium in this portion of the Kansas River valley has an average thickness of 55 feet. This alluvium is an excellent aquifer, because the lower portion everywhere consists of several feet of permeable sand or gravel. Surficial silts several feet thick generally overlie the coarse-textured deposits and, where sandy, permit recharge from local precipitation. During periods of heavy pumpage the ground-water body, which normally discharges into Kansas River, receives large quantities of recharge from the river, increasing severalfold the amount of ground water available to properly spaced and constructed wells. Adequate quantities of ground water of fair quality are available for future municipal, irrigational, and industrial expansion in this part of the Kansas River valley."

A fully-penetrating pit likely is a greater contributor of recharge to the aquifer with minimal filtration, than a river that does not fully penetrate the aquifer. How much influence the pit has on groundwater quality has not been adequately determined. No analysis has been performed which will evaluate the behavior of the aquifer during periods of high pumpage by multiple wells, minimal precipitation in the immediate area and high flow in the Kansas River due to upstream reservoir releases, either. This worse-case scenario should be evaluated before making a determination that a sand pit will have no impact on groundwater water quality.

Submitted to the City of Eudora
October 4, 2012
Douglas S. Helmke, L.G.
Kansas Rural Water Association



# Comments on the Carl Nuzman report: "Evaluation of Penny's Concrete and Sand LLC, Proposed Sand Pit Operation on Ground Water"

**By**

**Carl D. McElwee, Ph.D**

**Emeritus Professor**

**Geology Department**

**University of Kansas**

**Lawrence, KS**

**September 18, 2012**

## Introduction

Mr. Nuzman has brought together a considerable amount of data regarding the proposed project. He is a respected member of the scientific community studying groundwater. As is always the case, the data must be interpreted and analyzed to draw conclusions. I would like to point out some places where the data may be interpreted and analyzed in an alternate and reasonable manner to arrive at different conclusions. In addition, I would like to bring out some other points that need to be considered in evaluating the possible impact of this pit mining operation.

## Groundwater Gradient direction

The gradient of groundwater is the driving force that causes it to move. Mr.Nuzman mainly uses the water level data of Kansas Geological Survey (KGS) Bulletin 130, Part 1. The generalized static water table map that he uses (Exhibit D) gives too much weight to water moving down the Wakarusa River Valley (which joins the Kansas River Valley just south of the proposed sand pit). This distorts his ground water gradient and leads to the conclusion given in Exhibit F that the capture zone for the Eudora Well Field is south of the proposed pit.

On the other hand, if one considers the newer report KGS Bulletin 206, Part 2, it shows that the Kansas River is the major force and that water moves down the valley generally from west to east more or less parallel to the valley walls. The resulting groundwater gradient and flow direction is shown in Figure 1 below. This data shows that water will move from the proposed sand pit to the Eudora Well Field. I have done calculations of capture curves (area of groundwater capture in a given time by the well) and travel times based on work that I published in *Ground Water* (McElwee, 1991, A copy of that paper has been supplied to the DG CO Planning Office). That work shows that the minimum travel time between the proposed sand pit and the Eudora Well Field could be about 5.5 years. In addition, the 6 and 8 year capture curves significantly overlie the proposed sand pit, as shown in Figure 2 below. Details of this work are given in Appendix I.

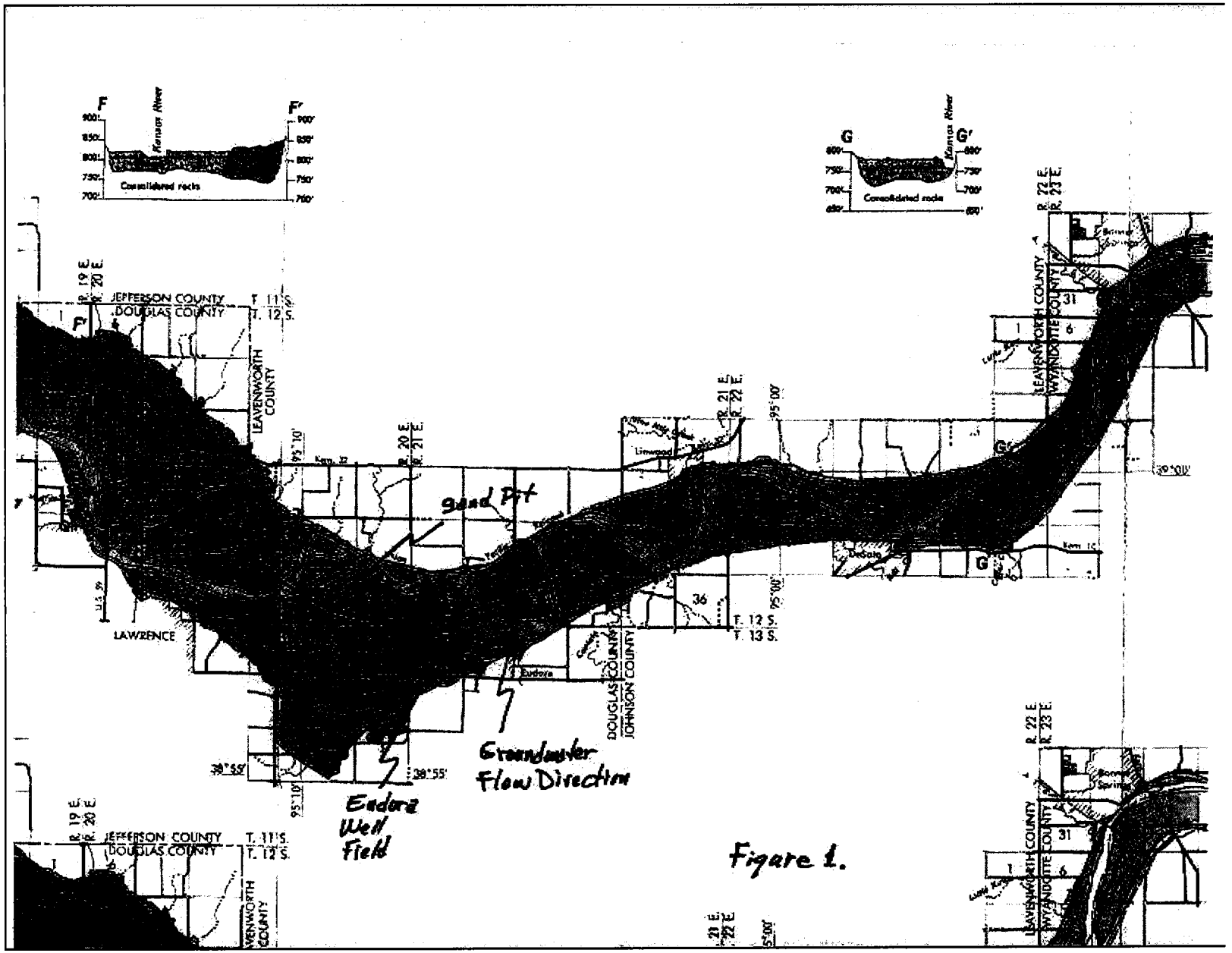

F
F'
Kansas River
Consolidated rocks
G
G'
Kansas River
Consolidated rocks
JEFFERSON COUNTY
DOUGLAS COUNTY
LEAVENWORTH COUNTY
WYANDOTTE COUNTY
JOHNSON COUNTY
LAWRENCE
Eudora
Bonner Springs
Gravel Pit
Groundwater Flow Direction
Eudora Well Field
T. 11 S.
T. 12 S.
T. 13 S.
R. 19 E.
R. 20 E.
R. 21 E.
R. 22 E.
R. 23 E.
95° 10'
95° 00'
38° 55'

Figure 1.

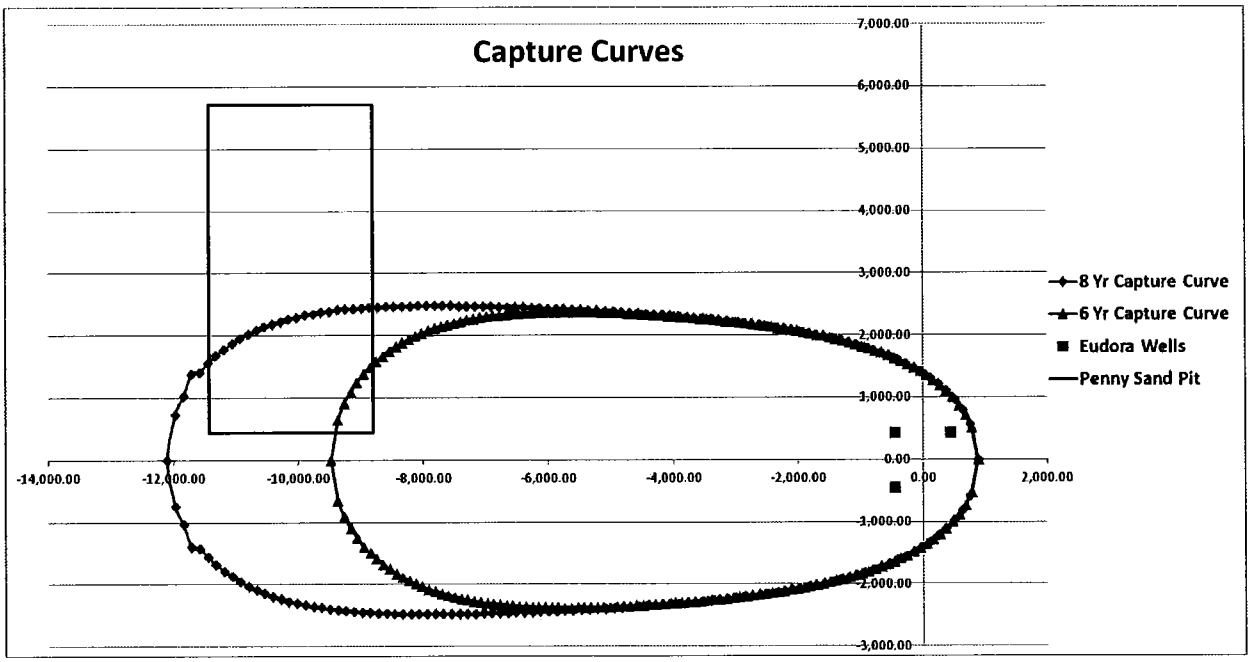



Figure 2.

Both of the KGS reports referred to are old and can't be relied on for absolute numbers. However, they do allow us to reach some general conclusions. In addition, there is a lot of variability in the aquifer (things change with space and time). So, the conclusion must be that one can't state with certainty that the proposed sand pit will have no effect on the Eudora Well Field. Of course there are many other private wells that are down-gradient from the proposed sand pit and much closer that could also be affected.

**Effect of Pit on Water Levels and Quality in Aquifer**

Mr. Nuzman states on page 8 that "The static water level elevation in the sand pit will be about the same as the water surface elevation in the Kansas River." That is probably true if the pit is close to the river. This means that the water level in the aquifer will be lowered around the pit, because the water levels in the aquifer are generally a little higher than the river level. This could negatively affect some nearby wells. Mr. Nuzman also states that "Sand pits beneficially support the yield of wells that are down-gradient from a pit that is within the area of influence of a well." In other words the well would be pumping water from the pit. This means

that the quality of the well water would depend on the quality of the water in the pit. In general, the quality of surface water in rivers and lakes is much poorer than the quality of groundwater. So there is the potential for pollution.

If this pit is allowed, a huge deep lake (about 70 feet deep on average) will be created. This will be a flow-through lake, which means that groundwater from up-gradient will flow in one side of the lake and flow out the down-gradient side of the lake. The net result is a continual mixing of the groundwater and the surface water from the pit, which then continues to flow down the valley in the aquifer to the next user of the groundwater.

As the well drilling logs in Mr. Nuzman's reports shows, the overburden (soil, silt, and clay) that must be removed to access the sand is substantial. It is in the range of 15-23 feet in most places, in some areas less and some areas more. However, most logs in the vicinity of the proposed sand pit indicate about 23 feet of overburden to be dealt with. This is a major logistics problem that must be dealt with while keeping any surface runoff out of the pit. There is the potential for pollution from surface runoff. This overburden material has been the filter material to keep pollutants out of the deeper aquifer, removing it exposes the aquifer. The resulting piles of surficial material may contain fertilizer and pesticide residue and daughter products from their decay. Apparently, the plan is to emplace at least some of this material back into the pit. If this is done, the overburden material should be extensively tested for possible pollutants before such use.

Mr. Nuzman mentions that a few investigations have been made on the effect of sand pits on groundwater quality and that they have not shown any significant human health effect. However, one can't infer from these few studies that there will never be a problem. In fact, at least one of those studies (KGS OFR 2008-4) did come to the conclusion that there was a measurable interconnection between the sand pit waters and the local aquifer and that there was a potential for pollution. The following is a direct quote from the conclusions of that study.

"The concentration distributions of pesticides and organics other than pesticides at the four pit sites in northwest Wichita, as well as the general pattern in iron, manganese, and ammonium ion concentrations in the downgradient well waters relative to the upgradient well and pit waters, indicate that surface water in the sand pits flows into the ground water in the southeast to south-southeast

direction of the ground-water flow at the study sites. The evidence for connection between the surface and ground waters at the two southern Wichita sites is not as strong as for the four northwest Wichita sites. However, distribution of some constituents and chemical properties do fit the general pattern of entrance of pit water into the ground water. This would be expected to occur most prominently when surface runoff into the pits increases the hydraulic gradient between the pit surface and ground-water levels. Thus, stormwater runoff containing contaminants can enter ground water through the sand pits and impact ground-water quality"

## Effect of Pit on the River System

Material has previously been provided that shows the river bank in the vicinity of this proposed sand pit is unstable and has moved over time. Geologic history tells us this river will move again, we just don't know when. During a flood event the river could change course and breach the proposed sand pit. This would have a dramatic effect on the river system. Since the sand pit is deep (about 70 feet) and the river is very shallow, the pit would capture the bed load of the river and cause the river to become unstable. This would result in deepening the channel upstream (head cutting) and degradation of the channel downstream. It would take years for the river to reach a new stable equilibrium. Pits should not be allowed in areas where pit capture is a possibility.

## Conclusions

I have shown that a reasonable interpretation of the available groundwater data indicates that the proposed sand pit could indeed have an effect on the Eudora Well Field and other local wells. The net effect will be a flow-through lake that mixes up-gradient aquifer water with sand pit water and sends it down-gradient into the aquifer and further down the valley. This behavior has been documented in studies of sand pits and aquifers. So, the conclusion is that any pollution must be prevented. The huge amount of overburden produced and its handling could be a source of pollution. Finally, the unstable nature of the river bank in this area makes it possible that the sand pit could capture the river during high flows and cause a channel change. If this were to happen, the river bed would be unstable for years until a new equilibrium was reached.

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## Resume

Name: **CARL D. McELWEE**

Telephone: 785-864-2728 (Geology Dept. Office)

785-843-4164 (Home)

Present Address: 1564 E. 1850 Rd.

Lawrence, Kansas 66046 USA

**Education:**

B.A., William Jewell College, Physics, 1965

M.A., The University of Kansas, Physics, 1967

Ph.D., The University of Kansas, Physics, 1971

**Professional Experience:**

Professor of Geology, The University of Kansas, Lawrence, Kansas, 1997-2009, now retired.

Senior Scientist, Special Projects/Office of the Director, Kansas Geological Survey, The University of Kansas, Lawrence, Kansas, 1998-2002.

Senior Scientist, Mathematical Geology Section, Kansas Geological Survey, The University of Kansas, Lawrence, Kansas, 1987-1998.

Senior Scientist, Geophysics and Geochemistry Section, Kansas Geological Survey, The University of Kansas, Lawrence, Kansas, 1986-1987.

Associate Scientist, Geohydrology Section and Geophysics and Geochemistry Section, Kansas Geological Survey, The University of Kansas, Lawrence, Kansas, 1974-1986.

Geophysicist, Texaco Inc., Bellaire, Texas, 1970-1974.

**Honors, Memberships, and Affiliations:**

NSF Undergraduate Research Grant (2 years, 1963-1965)

Graduation with Honors, William Jewell College (1965)

NSF Traineeship for Graduate Work (4 years, 1965-1969)

Mobil Oil Fellowship (1 year, 1969-1970)

Sabbatical leave awarded for groundwater research in The Netherlands (Aug.-Dec., 1984)

Sabbatical leave awarded for groundwater research in the United Kingdom (Jan.- May, 1993)

Center for Teaching Excellence Outstanding Graduate Teaching Award, Dept. of Geology, Univ. of Kansas, 2001.

Sabbatical leave awarded to start writing a book on groundwater modeling, Fall Semester 2002.

Leo M. & Robert M. Orth Water Resources Scholarship, Dept. of Geology, 2008

**Present Major Scientific Interests:**

Theoretical description of flow systems • Characterization of aquifer heterogeneity by field, laboratory, and modeling activities • Model studies of groundwater availability in Kansas • Sensitivity of groundwater models to variations in transmissivity and storage • Modeling of chemical quality of groundwater systems • Application of seismic techniques to groundwater exploration and evaluation

**Professional Journal Articles**

McElwee, C.D., and Yukler, M.A., 1978, Sensitivity of groundwater flow models with respect to variations in transmissivity and storage: *Water Resources Research,* v. 14, no. 3, p. 451.

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## Appendix I.

This calculations presented here is based on work I did and published back in 1991 in the *Ground Water* journal. I have supplied to the Planning Department a copy of that article for reference. This work shows that the minimum travel time from the Penny sand pit to the Eudora Well Field is about 5.5 years. This is from the closest point of the pit to the center of the well field. I have also calculated the 6 and 8 year capture curves for the Eudora Well field. The work shows that these capture curves include significant portions of the proposed pit.

The important parameters are as follows:

K - hydraulic conductivity - I used 1000ft/day. This is a measure of how fast water moves in the aquifer. The Nuzman report uses data from a well test on Eudora No. 8 and reports 8800 gpd/ft2, which is 1176 ft/day. This also agrees with data I have personally collected from the Kansas River Valley.

I - Hydraulic gradient (slope) of the ground water system - I used .0005, which is about 5ft in 2 miles. Bulletin 130, Part 1 and Bulletin 206, part 2 from the Kansas Geological Survey show head maps of the area in question that support this number.

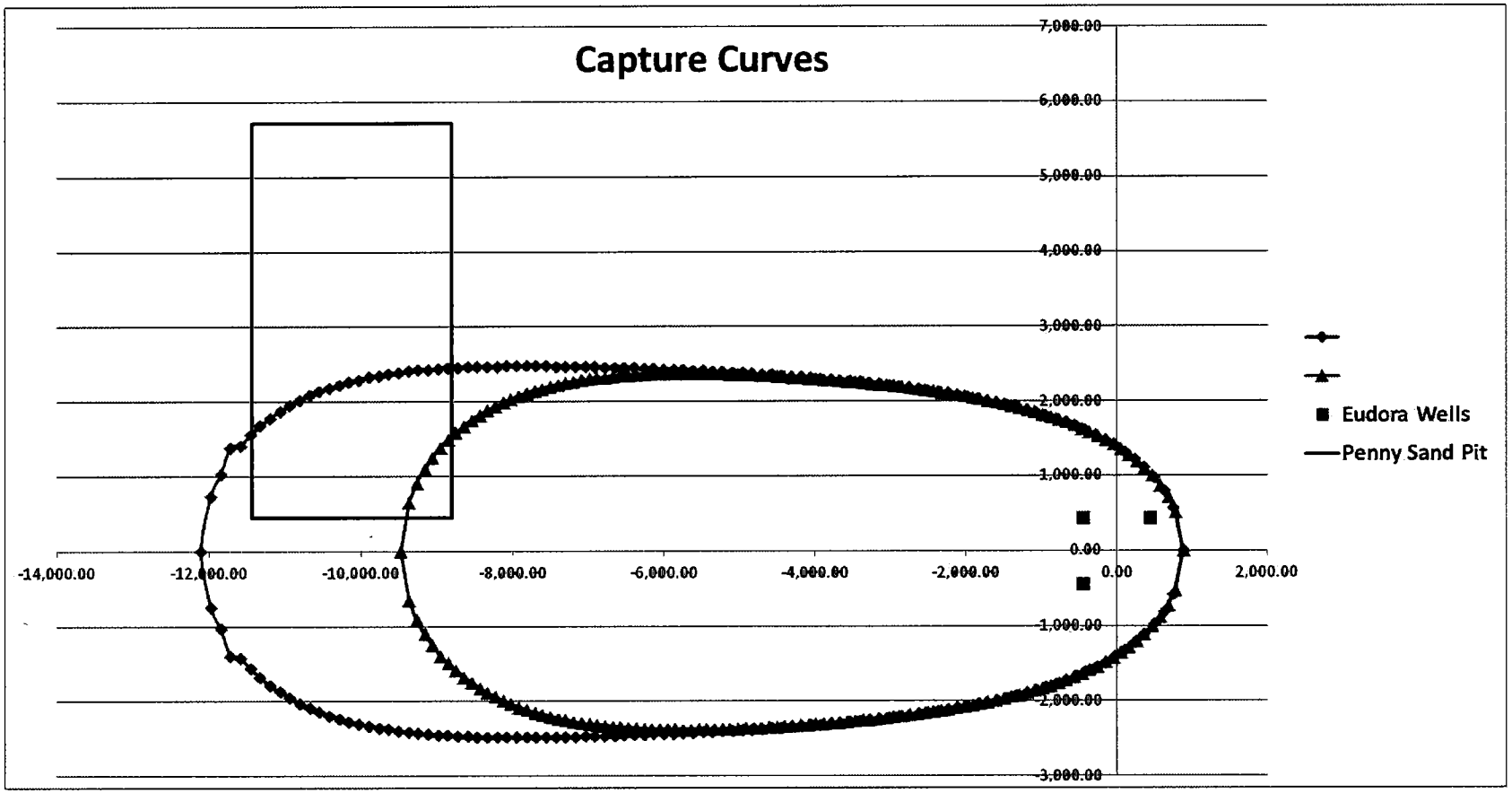
qo = -KI = -0.5 ft/day - average Darcy velocity in the aquifer - Multiplying the above two values gives this result.

B - Effective saturated thickness of aquifer - I used 30 feet. Although the aquifer has greater saturated thickness, the upper part is much finer material and has much less hydraulic conductivity. I have seen this consistently in my field work.

n - effective porosity (a measure of the pore space that water flows through) - I used 0.15 which is an average value suggested by the work of Bull 260, and also is consistent with my field work.

Q - Pump rate of the Eudora Well Field - I used 83425 ft3/day which is the approved water right of 227.77 MGY or about 433gpm.

These parameters can be used to calculate the average travel times and capture curves for parcels of water moving under the influence of the natural groundwater flow system and the influence of the pumping in the Eudora Well Field. The details of the background material to arrive at the formulas used in the following pages are given in the above referenced *Ground Water* article. The pages that follow show the capture curves for 6 and 8 years and the average minimum travel time between the sand pit and the Eudora Well Field. A capture curve outlines the area of groundwater that will flow to the pumping well in a given amount of time.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-4,000.00
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0.00
2,000.00
Eudora Wells
Penny Sand Pit

| | | |
|---|---|---|
| qo = | -0.5 | Average Darcy Velocity |
| n = | 0.15 | Effective Porosity |
| Q = | 83425 | Well Discharge |
| B = | 30 | Effective Aquifer Thickness |
| X = | -3800 | Distance traveled along X axis |
| t = | | Time of travel |

$$X = \frac{qo}{n}t + \frac{Q}{2\pi qoB} ln\left(1 + \frac{2\pi qoB}{Q}X\right)$$

$$t = \left[\frac{n}{qo}\right]\left[X - \frac{Q}{2\pi qoB} ln\left(1 + \frac{2\pi qoB}{Q}X\right)\right]$$

**t = 2005 days = 5.49 years**

6 yr. Capture Curve Data

| X(Ft) | Y(Ft) |
|---|---|
| 8.8508E+02 | 0.0000E+00 |
| 7.8145E+02 | -5.1844E+02 |
| 6.7783E+02 | -7.2470E+02 |
| 5.7420E+02 | -8.7735E+02 |
| 4.7057E+02 | -1.0015E+03 |
| 3.6694E+02 | -1.1069E+03 |
| 2.6331E+02 | -1.1989E+03 |
| 1.5969E+02 | -1.2804E+03 |
| 5.6059E+01 | -1.3536E+03 |
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| -4.6208E+02 | -1.6340E+03 |
| -5.6571E+02 | -1.6778E+03 |
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|---|---|
| -2.2238E+03 | 2.1074E+03 |
| -2.1201E+03 | 2.0901E+03 |
| -2.0165E+03 | 2.0720E+03 |
| -1.9129E+03 | 2.0529E+03 |
| -1.8092E+03 | 2.0328E+03 |
| -1.7056E+03 | 2.0117E+03 |
| -1.6020E+03 | 1.9894E+03 |
| -1.4984E+03 | 1.9659E+03 |
| -1.3947E+03 | 1.9410E+03 |
| -1.2911E+03 | 1.9147E+03 |
| -1.1875E+03 | 1.8869E+03 |
| -1.0838E+03 | 1.8573E+03 |
| -9.8022E+02 | 1.8259E+03 |
| -8.7659E+02 | 1.7925E+03 |
| -7.7296E+02 | 1.7568E+03 |
| -6.6933E+02 | 1.7187E+03 |
| -5.6571E+02 | 1.6778E+03 |
| -4.6208E+02 | 1.6340E+03 |
| -3.5845E+02 | 1.5867E+03 |
| -2.5482E+02 | 1.5357E+03 |
| -1.5120E+02 | 1.4802E+03 |
| -4.7568E+01 | 1.4198E+03 |
| 5.6059E+01 | 1.3536E+03 |
| 1.5969E+02 | 1.2804E+03 |
| 2.6331E+02 | 1.1989E+03 |
| 3.6694E+02 | 1.1069E+03 |
| 4.7057E+02 | 1.0015E+03 |
| 5.7420E+02 | 8.7735E+02 |
| 6.7783E+02 | 7.2470E+02 |
| 7.8145E+02 | 5.1844E+02 |
| 8.8508E+02 | 0.0000E+00 |

8 yr. Capture Curve Data

| X(Ft) | Y(Ft) |
|---|---|
| 8.8516E+02 | 0.0000E+00 |
| 7.5519E+02 | -5.7893E+02 |
| 6.2523E+02 | -8.0688E+02 |
| 4.9526E+02 | -9.7403E+02 |
| 3.6530E+02 | -1.1087E+03 |
| 2.3533E+02 | -1.2220E+03 |
| 1.0536E+02 | -1.3199E+03 |
| -2.4604E+01 | -1.4059E+03 |

| | |
|---|---|
| -1.5457E+02 | -1.4824E+03 |
| -2.8454E+02 | -1.5510E+03 |
| -4.1450E+02 | -1.6130E+03 |
| -5.4447E+02 | -1.6694E+03 |
| -6.7444E+02 | -1.7210E+03 |
| -8.0440E+02 | -1.7683E+03 |
| -9.3437E+02 | -1.8118E+03 |
| -1.0643E+03 | -1.8521E+03 |
| -1.1943E+03 | -1.8893E+03 |
| -1.3243E+03 | -1.9240E+03 |
| -1.4542E+03 | -1.9562E+03 |
| -1.5842E+03 | -1.9863E+03 |
| -1.7142E+03 | -2.0144E+03 |
| -1.8441E+03 | -2.0408E+03 |
| -1.9741E+03 | -2.0655E+03 |
| -2.1041E+03 | -2.0887E+03 |
| -2.2340E+03 | -2.1106E+03 |
| -2.3640E+03 | -2.1313E+03 |
| -2.4940E+03 | -2.1507E+03 |
| -2.6239E+03 | -2.1692E+03 |
| -2.7539E+03 | -2.1866E+03 |
| -2.8839E+03 | -2.2031E+03 |
| -3.0138E+03 | -2.2188E+03 |
| -3.1438E+03 | -2.2337E+03 |
| -3.2738E+03 | -2.2479E+03 |
| -3.4037E+03 | -2.2614E+03 |
| -3.5337E+03 | -2.2742E+03 |
| -3.6637E+03 | -2.2865E+03 |
| -3.7936E+03 | -2.2982E+03 |
| -3.9236E+03 | -2.3093E+03 |
| -4.0536E+03 | -2.3200E+03 |
| -4.1835E+03 | -2.3302E+03 |
| -4.3135E+03 | -2.3399E+03 |
| -4.4435E+03 | -2.3493E+03 |
| -4.5734E+03 | -2.3582E+03 |
| -4.7034E+03 | -2.3668E+03 |
| -4.8334E+03 | -2.3750E+03 |
| -4.9633E+03 | -2.3829E+03 |
| -5.0933E+03 | -2.3904E+03 |
| -5.2233E+03 | -2.3976E+03 |
| -5.3532E+03 | -2.4046E+03 |
| -5.4832E+03 | -2.4112E+03 |
| -5.6132E+03 | -2.4175E+03 |

| | |
|---|---|
| -5.7431E+03 | -2.4236E+03 |
| -5.8731E+03 | -2.4293E+03 |
| -6.0031E+03 | -2.4348E+03 |
| -6.1330E+03 | -2.4401E+03 |
| -6.2630E+03 | -2.4450E+03 |
| -6.3930E+03 | -2.4497E+03 |
| -6.5229E+03 | -2.4540E+03 |
| -6.6529E+03 | -2.4581E+03 |
| -6.7829E+03 | -2.4619E+03 |
| -6.9128E+03 | -2.4653E+03 |
| -7.0428E+03 | -2.4684E+03 |
| -7.1728E+03 | -2.4712E+03 |
| -7.3027E+03 | -2.4735E+03 |
| -7.4327E+03 | -2.4755E+03 |
| -7.5627E+03 | -2.4769E+03 |
| -7.6926E+03 | -2.4779E+03 |
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| -7.9526E+03 | -2.4782E+03 |
| -8.0825E+03 | -2.4774E+03 |
| -8.2125E+03 | -2.4758E+03 |
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| -8.4724E+03 | -2.4701E+03 |
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| -8.7324E+03 | -2.4602E+03 |
| -8.8623E+03 | -2.4534E+03 |
| -8.9923E+03 | -2.4451E+03 |
| -9.1223E+03 | -2.4351E+03 |
| -9.2522E+03 | -2.4234E+03 |
| -9.3822E+03 | -2.4095E+03 |
| -9.5122E+03 | -2.3934E+03 |
| -9.6421E+03 | -2.3746E+03 |
| -9.7721E+03 | -2.3530E+03 |
| -9.9021E+03 | -2.3281E+03 |
| -1.0032E+04 | -2.2995E+03 |
| -1.0162E+04 | -2.2669E+03 |
| -1.0292E+04 | -2.2297E+03 |
| -1.0422E+04 | -2.1874E+03 |
| -1.0552E+04 | -2.1393E+03 |
| -1.0682E+04 | -2.0848E+03 |
| -1.0812E+04 | -2.0230E+03 |
| -1.0942E+04 | -1.9528E+03 |
| -1.1072E+04 | -1.8730E+03 |
| -1.1202E+04 | -1.7819E+03 |

| | |
|---|---|
| -1.1332E+04 | -1.6775E+03 |
| -1.1462E+04 | -1.5568E+03 |
| -1.1592E+04 | -1.4155E+03 |
| -1.1722E+04 | -1.3905E+03 |
| -1.1852E+04 | -1.0325E+03 |
| -1.1982E+04 | -7.4132E+02 |
| -1.2111E+04 | 0.0000E+00 |
| -1.1982E+04 | 7.4132E+02 |
| -1.1852E+04 | 1.0325E+03 |
| -1.1722E+04 | 1.3905E+03 |
| -1.1592E+04 | 1.4155E+03 |
| -1.1462E+04 | 1.5568E+03 |
| -1.1332E+04 | 1.6775E+03 |
| -1.1202E+04 | 1.7819E+03 |
| -1.1072E+04 | 1.8730E+03 |
| -1.0942E+04 | 1.9528E+03 |
| -1.0812E+04 | 2.0230E+03 |
| -1.0682E+04 | 2.0848E+03 |
| -1.0552E+04 | 2.1393E+03 |
| -1.0422E+04 | 2.1874E+03 |
| -1.0292E+04 | 2.2297E+03 |
| -1.0162E+04 | 2.2669E+03 |
| -1.0032E+04 | 2.2995E+03 |
| -9.9021E+03 | 2.3281E+03 |
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| -9.6421E+03 | 2.3746E+03 |
| -9.5122E+03 | 2.3934E+03 |
| -9.3822E+03 | 2.4095E+03 |
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| -9.1223E+03 | 2.4351E+03 |
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| -8.8623E+03 | 2.4534E+03 |
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| -7.6926E+03 | 2.4779E+03 |
| -7.5627E+03 | 2.4769E+03 |
| -7.4327E+03 | 2.4755E+03 |

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|---|---|
| -7.3027E+03 | 2.4735E+03 |
| -7.1728E+03 | 2.4712E+03 |
| -7.0428E+03 | 2.4684E+03 |
| -6.9128E+03 | 2.4653E+03 |
| -6.7829E+03 | 2.4619E+03 |
| -6.6529E+03 | 2.4581E+03 |
| -6.5229E+03 | 2.4540E+03 |
| -6.3930E+03 | 2.4497E+03 |
| -6.2630E+03 | 2.4450E+03 |
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| -5.6132E+03 | 2.4175E+03 |
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| -4.9633E+03 | 2.3829E+03 |
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| -4.7034E+03 | 2.3668E+03 |
| -4.5734E+03 | 2.3582E+03 |
| -4.4435E+03 | 2.3493E+03 |
| -4.3135E+03 | 2.3399E+03 |
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| -4.0536E+03 | 2.3200E+03 |
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| -3.2738E+03 | 2.2479E+03 |
| -3.1438E+03 | 2.2337E+03 |
| -3.0138E+03 | 2.2188E+03 |
| -2.8839E+03 | 2.2031E+03 |
| -2.7539E+03 | 2.1866E+03 |
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| -2.4940E+03 | 2.1507E+03 |
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| -1.9741E+03 | 2.0655E+03 |
| -1.8441E+03 | 2.0408E+03 |

| | |
|---|---|
| -1.7142E+03 | 2.0144E+03 |
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| -1.4542E+03 | 1.9562E+03 |
| -1.3243E+03 | 1.9240E+03 |
| -1.1943E+03 | 1.8893E+03 |
| -1.0643E+03 | 1.8521E+03 |
| -9.3437E+02 | 1.8118E+03 |
| -8.0440E+02 | 1.7683E+03 |
| -6.7444E+02 | 1.7210E+03 |
| -5.4447E+02 | 1.6694E+03 |
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| -2.8454E+02 | 1.5510E+03 |
| -1.5457E+02 | 1.4824E+03 |
| -2.4604E+01 | 1.4059E+03 |
| 1.0536E+02 | 1.3199E+03 |
| 2.3533E+02 | 1.2220E+03 |
| 3.6530E+02 | 1.1087E+03 |
| 4.9526E+02 | 9.7403E+02 |
| 6.2523E+02 | 8.0688E+02 |
| 7.5519E+02 | 5.7893E+02 |
| 8.8516E+02 | 0.0000E+00 |

| Wells X (map in) | Wells Y (map in) | Wells X (ft) | Wells Y (ft) |
|---|---|---|---|
| -0.25 | 0.25 | -440 | 440 |
| -0.25 | -0.25 | -440 | -440 |
| 0.25 | 0.25 | 440 | 440 |

| Pit X (map in) | Pit Y (map in) | Pit X (ft) | Pit Y (ft) |
|---|---|---|---|
| -5 | 0.25 | -8800 | 440 |
| -6.5 | 0.25 | -11440 | 440 |
| -6.5 | 3.25 | -11440 | 5720 |
| -5 | 3.25 | -8800 | 5720 |
| -5 | 0.25 | -8800 | 440 |

Douglas County Planning Commission
6 East 6th Street
Lawrence, Kansas 66044

October 11, 2012

Re: Proposed Conditional Use Permit for extension of sand and gravel extraction in an area adjacent to 1564 E. 1850 Road. This site lies directly south of the Kansas River midway between Lawrence and Eudora.

I recommend that this proposal be DENIED.

This conclusion is based on my many years of study and mapping of the Kansas River, including publication, in 2009, of an atlas of Historical Channel Changes of the Kansas River and its Major Tributaries. In reviewing available data I find several reasons that excavation within the proposed area could have several negative effects for the general public.

1) Potentially most serious would be pollution of the water supply for the city of Eudora. Underlying the flat valley floor in this region is a sequence of interlayered sand and gravel that approaches 100 feet in thickness. A large volume of water occupies the spaces between grains of this sediment. This water seeps slowly eastward in a downvalley direction, some being captured by both private and municipal wells. Less than two miles east of the proposed new excavation site is the well field that supplies potable water for the public water system of the City of Eudora. In other words, Eudora's water supply passes through sands lying beneath the proposed new extraction pit.

Any sand-and-gravel operation requires the presence of at least a few motors and transient vehicles that will inevitably leak contaminating fluids which can seep into and through subsurface sediments and become part of the downstream movement of the ground water. Furthermore, this area on the valley floor is subject to inundation during major floods. The high level surface flow also could pick up contaminants from the new sand pit and carry them downvalley to the Eudora well field.

Inspection of detailed maps or aerial photographs of the Kansas River Valley west of Eudora reveals that the proposed extraction site lies farther north (as well as west) of the Eudora well field. It might therefore be argued that pollutants from the proposed sand pit would pass downvalley north of the well field location and so have no influence on the wells. However, records of the location of the river channel during the past few hundred years show that the stream has locally been flowing from northwest to southeast. That means that sand bodies accumulating in the channel would be elongated in that direction, an orientation that could lead subsurface water movement to go from the pollutant source of the new pit directly to the Eudora well field.

This all means that opening a new sand and gravel extraction pit at the proposed location could seriously endanger the purity and integrity of Eudora's water supply.

2) Data currently available to me do not define the precise location of the well that supplies water to the house at 1564 E 1850 Rd. Excavation on the proposed new site for sand and gravel extraction could seriously impinge on the supply of water from that private well. In fact, opening and deepening of the new pit might divert all local groundwater flow from the well and leave the residence with no water supply at all. The situation certainly requires assessment.

3) At the northwestern corner of the proposed new operation the Kansas River follows a sharp, almost V-shaped bend to the north and then back to the southeast. This bend has been actively shifting shape and location during the past several decades. It can be assumed that this dynamic will continue at least into the near future. The trend suggests that the channel will soon cut off or cut through the sharp bend by eroding through the location of the present sand and gravel operation. This channel move could also cut away at least the northern part of the proposed new operation. Such a shift of channel position would negatively affect the new extraction operation, and might

establish a new channel dynamic that would affect streamflow in both downstream and upstream locations. Final effects and configurations cannot immediately be determined, but could involve unexpected erosion into productive cropland.

Several predictable effects of establishment of a new sand and gravel extraction operation adjacent to 1564 East 1850 Road between Lawrence and Eudora tend to have negative impacts on nearby parts of the local valley floor. However, it is endangerment of the well field for the City of Eudora municipal water supply that demands closest attention. Chance of contamination of that resource is completely unacceptable for the public welfare.

Wakefield Dort Jr.

Wakefield Dort, Jr.

Emeritus Professor Geology
The University of Kansas

Virginia Strong
3712 Trail Road
Lawrence, Kansas 66049



October 22, 2012

Lawrence-Douglas County Planning Commission
6 East 6th Street
Lawrence, Kansas 66044

**Subject: Penny Sand Pit Conditional Use Permit Hearing**

To the Commissioners:

I believe that if you approve the Conditional Use Permit (CUP) requested on behalf of William Penny and Van LLC to be considered at tonight's Commisssion meeting, you will be aiding a crime against nature and *demolishing* thousands of cubic yards of prime Kaw Valley soil. I form this belief upon the common sense in continuing to make this land available for farming, and around the unintended consequences of granting the permit. As a member of the family that for several decades owned one of the adjoining parcels (on the southeast corner of the intersection of North 1500 Road and East 1900 Road), my concerns are informed by familiarity with the immediate neighborhood and its history of use, as follows:

- The prospect of a quarry dug deeper than 25 feet below the present ground level makes me question its consequences for the quality of the local aquifer, which already leaves something to be desired.
- For several years copper acetoarsenite (a highly toxic and water-insoluble pesticide and dye) was applied for pest control to some of the land under discussion, at the time planted in potatoes. Can the permit applicants rule out any reasonable possibility that remnants of that pesticide might be disturbed and made airborne by the proposed development?
- The fully excavated gravel pit is proposed to be turned into a lake, which would become a breeding ground for hordes of mosquitoes — as if we need more of those swarming around. There is also the question of how a quarry would fare in the event of a catastrophic flood, which ought to be investigated regardless of any guarantees.
- The parcel under discussion is a well-known and established resting place for migrating geese. The consequences of destroying its present character would presumably be unfortunate for the geese, the neighbors (as such), or both.
- My understanding is that the land purchases making up the parcel under discussion were made at a bargain, a fact that can be verified as a matter of public record. Would Mr. Penny be in a position to apply for the CUP at issue, if he had been called upon to purchase the land at par value? *[Continued on next page]*

- *[Continued from previous page]* If the proposed quarry is dug, how likely is it that the affected land — both that covered by the quarry, and adjoining land — could be sold at par value at any time in the foreseeable future?
- In what time frame does the proposed quarry promise to deliver higher tax revenues to the County than it could if farmed?

Finally, how much of this development process is illuminated by greed, and how much by the desire to put the targeted land to a use about which the residents of Douglas County can feel some pride?

In summary I count a number of concerns about the permit application, including at least two conceivable threats to public health that are peculiar to the area that it covers. Were I to put it more subjectively and succinctly, I could call the development plan behind the permit application hare-brained. However, that would insult the hares. I request that you consider the concerns that led to that judgment.

Sincerely,
Virginia Schaake Strong
(785) 843-2293

CC: Lawrence *Journal-World*

Oct. 2, 2012

***Lawrence Douglas County***
***Metropolitan Planning Office***
6 East 6th Street,
P.O. Box 708,
Lawrence, KS 66044

Ms. Mary Miller,

After reading your staff report which contains the following information:

"Staff contacted a hydrologist with the USGS (United States Geological Survey) Midwest Division, Kyle E Juracek, for his opinion on the impact of the dredging operation and pit on the river channel. Mr. Juracek indicated that the location of a lake could result in channel change in the event of a flood but pointed out that the river channel may change as a result of a flooding event even without a lake in close proximity."

I felt that the situation involved in this request for a CUP had not been made entirely clear to Dr. Juracek. The situation is fairly complex and deserves some more description. After making an appointment to see Dr. Juracek, I showed him Dr. Dort's work characterizing the river bank movement over the last 100 plus years, gave him a plan view map of the proposed sand pit excavation area to create the lake, and explained to him that the sand excavation would proceed to bedrock in the area. We discussed the fact that the river is trying to cut off the meander in this area. I pointed out that the proposed excavation pit (about ¾ mile wide East to West) would nearly connect the two sides of the meander.

Dr. Dort's work shows the river bank in the vicinity of this proposed sand pit is unstable and has moved over time. Geologic history tells us this river will move again, we just don't know when. During a major flood event the river could try to move again and breach the proposed sand pit.

The presence of such a large deep pit as requested at this site would make it much easier (since so much material has been removed) for the river in times of flood to cut off the meander at this site by flowing through the pit area. This would create a huge nick point (deepened point in the river bed about

50-60 feet deep) that would have a destabilizing effect on the river bed, with head cutting upstream and bed degradation downstream for some time to come, until a new stable river bed gradient was created. This erosion of the river bed could propagate upstream to the Bowersock Dam and downstream an unknown distance.

I have sent a copy of this letter to Dr. Juracek for review and he has not disagreed with my statements. I encourage you to contact him and discuss this matter with him and to ask him any questions you may have.

Thank you for your consideration. If I may answer any questions, please contact me.

Carl McElwee
Emeritus Professor of Geology
University of Kansas
Lawrence, KS 66045
785-843-4164
cmcelwee@ku.edu

Douglas County Planning Commission
6 East 6th Street
Lawrence, Kansas 66044

October 11, 2012

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2) Data currently available to me do not define the precise location of the well that supplies water to the house at 1564 E 1850 Rd. Excavation on the proposed new site for sand and gravel extraction could seriously impinge on the supply of water from that private well. In fact, opening and deepening of the new pit might divert all local groundwater flow from the well and leave the residence with no water supply at all. The situation certainly requires assessment.

3) At the northwestern corner of the proposed new operation the Kansas River follows a sharp, almost V-shaped bend to the north and then back to the southeast. This bend has been actively shifting shape and location during the past several decades. It can be assumed that this dynamic will continue at least into the near future. The trend suggests that the channel will soon cut off or cut through the sharp bend by eroding through the location of the present sand and gravel operation. This channel move could also cut away at least the northern part of the proposed new operation. Such a shift of channel position would negatively affect the new extraction operation, and might

establish a new channel dynamic that would affect streamflow in both downstream and upstream locations. Final effects and configurations cannot immediately be determined, but could involve unexpected erosion into productive cropland.

Several predictable effects of establishment of a new sand and gravel extraction operation adjacent to 1564 East 1850 Road between Lawrence and Eudora tend to have negative impacts on nearby parts of the local valley floor. However, it is endangerment of the well field for the City of Eudora municipal water supply that demands closest attention. Chance of contamination of that resource is completely unacceptable for the public welfare.

Wakefield Dort Jr.

Wakefield Dort, Jr.

Emeritus Professor Geology
The University of Kansas

**Recess LDCMPC**

**Convene Joint Meeting with Eudora Planning Commission**

**ITEM NO. 2 CONDITIONAL USE PERMIT FOR PENNY SAND PIT; N 1500 RD & E 1850 RD (MKM)**

**CUP-12-00099**: Consider a Conditional Use Permit for sand excavation and extraction for Penny Sand Pit, approximately 434 acres located on the NE Corner of N 1500 Road & E 1850 Road. Submitted by Landplan Engineering, for William Penny & Van LLC, property owners of record. *Joint meeting with Eudora Planning Commission. Deferred by Planning Commission on 9/24/12.*

**STAFF PRESENTATION**

Ms. Mary Miller presented the item.

*Eudora Planning Commissioners present were Kurt von Achen, Jason Hoover, Johnny Stewart, Glenn Bartlett, and Richard Campbell.*

Mr. McCullough said the by-laws state the applicant has 10 minutes to present. Staff recommended the applicant have 40 minutes to present with a 5 minute rebuttal after the public hearing. He also suggested granting 5 minutes for each individual audience member instead of 3 minutes.

**APPLICANT PRESENTATION**

Mr. Dan Watkins, attorney representing property owner, said the staff report did a good job of covering the golden factors and the applicant agreed with the conditions. He said he would discuss one other possible condition to address concerns about monitoring of ground water in the area. He said the application was to move sand dredging from on-river to off-river. He said the Corps of Engineer was restricting on-river dredging over time. He stated in this particular area sand dredging on-river would be restricted as of December 31st. He said there were many off-river sand pit areas in Kansas. He said usually they were right next to the river and many times right next to towns, even in close proximity to ground water supplies and wells. He stated the Conditional Use Permit would utilize the existing Conditional Use Permit so the stockpiling, processing, scale house, and truck loading would all take place where it currently takes place now, with no change. He said the access and truck traffic would stay the same. He said the staff report did a good job of setting out why this particular site was recommended for approval. He said the use of sand dredging was permitted in the valley channel area and had been allowed for the past 30 years. He said the site had excellent access to major transportation networks, was 7,000' from the Eudora wellhead protection area, and outside the FAA 10,000' restrictive area. He said the impacts listed by staff regarding stockpiling, groundwater, river channel, visual, and activity would be the same impacts that have been going on in the area for 30 years. He stated the groundwater issue was already present from the current river dredging. He said the river channel had the potential to change because it changes sometimes, over hundreds of years. He said in 1993 when it flooded, because the banks were fortified by the Penny's operations it didn't cut through. He said visually it would change slightly because there would be dredging in the area as it proceeded south. He said there were few sites that met all the things this site does. He said regarding preservation of the river channel, they would be moving dredging off-river. Regarding preservation of quality soil, this area was currently farmed and most would continue to be farmed for many years as the dredging moved south. He said they had a few neighborhood meetings to talk with the neighbors about the impacts and concerns they have. He said they tried to address some of the concerns with adequate buffers. He said that dredging was highly regulated, by state and federal agencies, with many protections built into this.

Mr. C.L. Maurer, Landplan Engineering, discussed the phasing plan. He said they would strip off areas approximately 10 acres in size and build a berm as they go around. He showed pictures of the dredging machine. He said the noise would be contained by the pit and would bounce upward, not out. He said there would be three observation wells on the western side. He said there would be one control well. He showed slides of the area on the overhead. He also showed slides of active and inactive sand pits in other communities.

Mr. Mehrdad Givechi, traffic engineer, said it would not increase the number of truck traffic in and out of the site because it would not generate additional sand distribution. He stated on average there would be 4-5 trucks in and 4-5 trucks out during the peak hour of operation. He said a few minor items needed to be looked at, none of which would be required, but desired for improved safety. He said they were proposing to realign the driveway on the north side of 1500 Road to make a four-legged intersection so there would be no offset in the driveway and Noria Road to the south. He said they would pave about 100' of the proposed driveway to the north in order to prevent gravel from being tracked to 1500 Road. He said the pavement on 1500 Road was not capable of handling truck traffic. He said the traffic would not use 1500 Road so the intersection would be improved to handle the truck traffic in and out of the site. He stated if the distribution increased there would be a need for an east bound dedicated right turn lane at old K-10 and 1057 Road. He said the pavement was already there but needed to be improved to a full dedicated right turn lane. He said he received comments from KDOT regarding the interchange. He said that the count was higher than usual due to road/bridge improvements in the area and that when traffic was normalized they could look at the intersection functioning with the South Lawrence Trafficway. He said as the South Lawrence Trafficway was built in the area KDOT would close the Noria Road intersection and Noria Road would go over existing K-10. He stated it would only effect background traffic and not traffic in and out of the site. He said the applicant agreed to all of the improvements.

Mr. Phil Struble, Landplan Engineering, discussed groundwater issues and said he would cover six pertinent issues. He said Penny's had a permit through the end of the year and has had one for the last 30 years for dredging sand. He said they had been penetrating the aquifer for 30 years with permission from the EPA and Corps of Engineers. He said the permits were not being suspended due to ground water quality. He said the groundwater was there safely today and that the aquifer had already been fully penetrated. He said dredging was 7,000' from Eudora's wells. He said microorganisms would not survive several hundred feet of ground water conditions and that pollutants in the river water would not last long before they would become ground water and no longer river water. He said if Eudora decided to treat water for surface water they would need a trickling sand filter. The sand pit was 7,000' of sand filter, which was better than what Eudora's sand filter could do by itself. He said a concept had been brought up called nick point, which was the fear that when the river flooded the area it would create a vertical cut in the riverbank all the way up the Kansas River to Bowersock Dam. He said even with flooding in the past 25 years the riverbank had not moved at all because it had been maintained. Mr. Struble showed a table on the overhead from the KDHE design guidelines as it relates to private wells, which showed the minimum required setback was 50' and the recommended was 400'. He stated the nearest private water well to Penny's was 1,200'. He said a sand pit was nothing more than a water well that was measured in acres, not inches. He said there was very little difference between the sand pit and a water well. He said just because there was more water impounded in a pit did not make it draw more water into the pit, away from neighboring uses, than what a water well would. He said it would not make what goes into the pit go out of the pit faster or further than anything else. He said the sand around it did not know it was a pit or a water well. He said there were some differences, such as no water consumption out of the pit. He said the water pulled out of the sand pit was put right back into the pit. He said the State Statutes governed how water evaporation was dealt with and that they would have to go to the State of Kansas if they were in an area that evaporates greater than 18" net evaporation per year. He said 5-6" evaporation, such as Douglas County receives, does not have to be accounted for to the State. He said Penny's was regulated and had to protect groundwater supply from pollution. He showed a map of Kansas corridor sand pits and water wells. He said there had not been a single instance where a sand pit polluted a private or public well.

**PUBLIC HEARING**

Mr. Carl McElwee (via prerecorded video that was shown on the overhead) did not want to see industrial activity encroach on three sides of his property. He said there was a petition from 23 local property owners that opposed the sand pit. He expressed concern that historical houses in the area would not be protected and that good agriculture land would be lost. He said once the overburden was stripped off there was the potential for pollution of the very productive underlying aquifer. He said neighboring wells could be affected adversely by lowered water levels and quality problems caused by mixing pit surface water with aquifer water. He felt

the Eudora well 'capture curve' would include the sand pit. He said a large flow-thru lake would be created by the pit, which would mix pit surface water with aquifer ground water and send it further down the river, possibly leading to quality issues. He expressed concern about a nick point being created in the river. He felt the aquifer should be safeguarded and agricultural land protected. He asked Planning Commission to deny the Conditional Use Permit.

Mr. Scott Michie, Eudora Consultant Staff Planner, said the City of Eudora finding was that it does conform with land use and planning policies from a development standpoint. He said Eudora's recommendation was based on Mr. Ned Marks study.

Mr. Ned Marks, geologist hired by the City of Eudora, reviewed the report he wrote that was included in the packet. He said if a contaminant entered through the pit it would have access to the deeper portion of the aquifer that the Eudora wells were completed in. He said any contamination that made it to the bottom of the aquifer would move faster than if it had entered through the soil profile. He said no recent data to evaluate the potential negative or positive impact of the proposed pit was available at this time. He said there was some concern that the water level in the pit would be the same as the water level in the river. He felt the options were to either not approve the Conditional Use Permit or to approve with limitations.

Mr. Doug Helmke, geologist with the Kansas Rural Water Association, said he provides technical assistance to public water systems on water rights and source water protection. He said he advised the City of Eudora to oppose the proposed Conditional Use Permit for a sand dredging operation in the vicinity of their well field, as there had been no reliable information presented that would guarantee that the sand pit would not introduce biological or chemical contaminates into the aquifer. He said surface water used for drinking water required much more treatment than ground water, with much higher infrastructure treatment testing and labor expenses. If the water quality was changed to resemble surface water in any way KDHE would likely require a surface water treatment facility to be constructed if Eudora wanted to continue the use of their existing water rights.

Mr. Scott Jackson, lives east of the proposed sand pit, felt it was wasteful to reduce 400 acres of good agricultural land into something that could not be used. He said a 30" berm was a good idea but felt fertilizer, pesticides, and herbicides would blow into the lake and part of the aquifer. He said even if it took 7-12 years to reach the Eudora wells it would still be there and what would they do then.

Ms. K.T. Walsh agreed with what Mr. Jackson said regarding reclaiming the land back to farmland. She said she was a member of Friends of the Kaw and was surprised they were in favor of the Conditional Use Permit. She wanted to see alternatives proposed.

Mr. Kerry Altenbernd said it was prime agricultural land. He stated there were studies that show one thing and other studies that show something different. He said there would be future floods of the area. He asked Planning Commission to be careful with their decision.

**COMMISSION DISCUSSION**

Eudora Commissioner Johnny Stewart asked who would pull the samples from the monitoring wells.

Mr. Marks said he oversees drilling on a lot of different operations and has been involved with installing monitoring and observation wells so if he was involved with the project he would be onsite when that was done.

Eudora Commissioner Stewart asked who would control the proposed monitoring wells to the west.

Mr. Marks said that would probably be a determination between the applicant and City of Eudora.

Eudora Commissioner Stewart asked if there would be a condition that the City of Eudora would have access to take samples from the wells.

Mr. Marks said one of his recommendations was that the City of Eudora would have access to collect samples and collect water level data at different times of the year.

Eudora Commissioner Richard Campbell inquired about accumulation of data.

Mr. Marks said if he was involved with the project the first thing he would do was pull all the available information he could find and compile it. He said they would look at the historical information and compare it to the present day information. He said the City of Eudora would have to do a well field analysis, an aquifer test, and collect site specific aquifer characteristic data that could be put back into the models to calibrate and verify.

Eudora Commissioner Campbell inquired about the time period.

Mr. Marks said it could easily take 6-8 months.

Eudora Commissioner Stewart asked Mr. Helmke how he became aware of this situation.

Mr. Helmke said the City of Eudora asked for his opinion on the facts presented.

Eudora Commissioner Stewart asked if it was a paid opinion.

Mr. Helmke said no.

Eudora Commissioner Stewart asked what his role was with the Kansas Rural Water Association.

Mr. Helmke said half his time was spent giving advice on water rights, perfecting water rights, and offering opinions on whether other existing water rights should be purchased. He said the other half of his job was development of source water protection plans.

Eudora Commissioner Stewart asked what his key concern was.

Mr. Helmke said there appeared to be beds of gravel in the aquifer and it was his understanding that there may be a minimal amount of filtration in those beds of gravel. He said if the beds of gravel were exposed in the sides of the pit there was a good chance it would create a preferential flow path of water to the wells, which may contain common contaminates such as bacteria and viruses.

Eudora Commissioner Campbell asked if this was his area of expertise.

Mr. Helmke said it was his job to look at the worst case scenarios and try to protect the water supply from those things. He said he was not saying it would happen but that nobody could probably say there was no risk with the sand pit.

Eudora Commissioner Campbell asked if the studies Mr. Marks discussed could be completed in a year or less.

Mr. Helmke said he would have to defer to Mr. Marks because he had more experience with those kind of aquifer studies and well tests.

Eudora Commissioner Campbell inquired about the gravel data.

Mr. Helmke said he had not seen what was at the pit and away from the pit in the direction of Eudora's well field.

Eudora Commissioner Campbell asked if it was a different kind of study.

Mr. Helmke said no, it was what Mr. Marks talked about with understanding how well the wells operate, what drawdown cones they create, and probably an evaluation of what happens in a dry time of year when there would be large demands of the ground water aquifer and also if the water in the river was high.

Eudora Commissioner Stewart asked why the ground water was hard to clean once contaminated.

Mr. Helmke said if the presence of contamination shows up 12 years away from where it was introduced there would still be current contamination coming through the system to the water wells.

**APPLICANT CLOSING COMMENTS**

Mr. Watkins said there had been no evidence presented that river water would navigate to Eudora wells. He said there were many sand pits and were highly regulated and not contaminating wells in much closer proximity than the Eudora wells. He said there would be no light or oxygen for the ground water and that would limit the possible contaminants to nitrates and salt, primarily. He said KDHE recommends a 100' setback for this particular use and that Penny's would have a 300' setback from Mr. McElwee's house, which was upstream from the sand pit. He said they would be 1200' from any other well in the area and 7,000' from the Eudora wells. He stated the aquifer was already exposed to river water today and had been for 30 years. He said there was no evidence that there was migration or contamination. He said there was a need for sand and that valley channels were the place to get it. He stated the impacts listed by staff were the same that had existed for 30 years. He felt this was as close to an ideal site as any.

Eudora Commissioner Stewart asked Mr. Watkins if samples could be collected from the monitoring wells.

Mr. Watkins said yes, as often as they wanted to.

**COMMISSION DISCUSSION**

Commissioner Britton asked why the Corps of Engineers was ending the current permit.

Ms. Miller said she believed it was because of damage to the habitat on the river caused by on-river dredging.

Mr. Struble said in 1990 the Corps of Engineers got together with the Kansas River Dredgers and created an operating program that would monitor what happens in the Kansas River and it was a 20 year program that technically started in 1992 and expires at the end of this year. Part of that program was that they shoot cross sections of the entire Kansas River to monitor degradation of the riverbed as it exists on an every other year basis. He said the operating permit says that if any section degradation was more than 2' they would suspend those permits until that section aggregates back up and then permits can be reissued. He said it had nothing to do with environmental issues.

Commissioner Britton asked why it was important for the river to come back up 2'.

Mr. Struble said to maintain the hydraulic grading of the Kansas River through the whole section. He said if one section goes down then there is bank degradation and other negative impacts.

Commissioner Britton said those sounded like environmental factors.

Mr. Struble said the rule was only that if the riverbed degradation was more than 2' than the permit would be suspended.

Commissioner Josserand asked if that was degradation away from the actual dredging site.

Mr. Struble said that was correct.

Commissioner Josserand asked if it would be correct to say that in recent years there had been a concern about in-river dredging and the urging of non-river sand extracting methods.

Mr. Struble said yes but that it was not just limited to Kansas.

Commissioner Josserand asked if there was a shortage of sand that was driving up development costs in Douglas County.

Mr. Struble said yes. He said it had not been unusual in the last 3 years for the majority of sand used in Lawrence to be trucked in from other places. He said the trucking cost becomes part of the cost of sand.

Commissioner Josserand inquired about the potential risks of rechanneling of the river.

Mr. Struble said that was a difficult question to answer. He said rivers move and it was hard to control rivers. He said the approach was that they were trying to do the best they could. He said Penny's rock armored the banks and received compliments from the Corps of Engineers for doing that. He said there was only one access road to the site and Penny's wanted to protect their investment. He said they had had a number of meetings with the Corps of Engineers to discuss these types of issues. He stated they would be willing to a condition to provide rock armor on the back side.

Commissioner Josserand asked if they should we be worried about an evulsion event.

Mr. Struble said the Corps of Engineers responsibility ends at the top of the bank. He said the Corps of Engineers encouraged the dredging to relocate off-river.

Commissioner Josserand asked if the Corps of Engineers had announced any policy in Kansas that they would refuse all river dredging.

Mr. Struble said no. He said they were in the process of negotiating a new 20 year river dredging permit. He said that did not mean that they would get to dredge for 20 years.

Commissioner Culver asked Mr. Struble how many current sand pit operations were in Douglas County.

Mr. Struble said the number extracting sand was zero.

Commissioner Belt inquired about increased demand for sand.

Mr. Struble said there was no change for the demand of sand.

Commissioner Belt wondered if hydraulic fracturing pulled the market in that direction.

Mr. Struble said he was not involved in that and said he would suspect the sand not involved in that.

Commissioner Liese said he was sensitive to times when one city, such as Eudora, draws a conclusion that was different from what Lawrence decides. He asked staff to comment.

Mr. McCullough said staff had some experience with these types of applications. He said they were looking county wide and have an active exercise to try and find out where in the county staff could support these types of uses, taking into account several different elements. He said there was a second application much closer to Eudora where staff supported Eudora's opposition. He said there was a lot of discussion at the time regarding proximity, and if it moved to the west between Lawrence and Eudora would staff support it. He stated when staff weighed all the issues, such as demand, location, prime agricultural soil, traffic, and with this being an existing location for the use of dredging of sand, staff felt obligated to support this. He said regarding the issue of wells, there was an argument that the data was unknown, which could become known through

monitoring. He said they did not hear the same type of testimony that they did when it was adjacent and much closer to the wells of Eudora. He said the testimony to date on this site was that there was potential and much farther away. He felt there should be some exercise in determining how steps could be taken to mitigate the impact.

Commissioner Liese asked how the number of years for the 30 year Conditional Use Permit was determined.

Ms. Miller said that was a standard number of years for a quarry because of the time it takes.

Commissioner Liese asked if there were any other conditions regarding testing that could reassure the citizens of Eudora.

Mr. McCullough said he thought they would need to develop a condition that spoke to that very issue. He said if it came out as a recommendation to the County Commission staff would need to take the time to meet with the City of Eudora and applicant to negotiate the condition out.

Commissioner Liese asked if a condition could be that one year of testing take place before further development.

Mr. McCullough said it could be a condition.

Commissioner Liese asked if Bismarck Lake was a sand pit.

Mr. Watkins said it was.

Commissioner Liese asked if there was a sand pit being developed just north of Lecompton on the other side of the river.

Mr. Watkins said yes. He said he thought it was being developed by MPM from Manhattan, who applied for the one that was too close to the airport, so they developed in Jefferson County.

Commissioner Liese asked how big the Penny's sand pit would be compared to the one being built near Lecompton.

Mr. Struble said it would be a third bigger than the one in Lecompton.

Eudora Commissioner von Achen said once a Conditional Use Permit was approved with the intention that testing would be done the horse was already out of the barn. He felt that the item should be deferred until testing could be done. He wondered who would pay for the error if the applicant was wrong. He felt they should negotiate something such as a surety bond, insurance policy, or surcharge on sand sold out of the pit that would establish a fund to take care of any problems that could develop. He said it was a difficult issue because they needed sand but water was a vital resource and they should not be gambling with it.

Commissioner Liese said he was pretty adamant about voting against the last sand pit proposal. He inquired again about conditioning it.

Mr. McCullough said it could be a condition but it would need to be framed very carefully. He said there were different ways to get at the issue.

Commissioner Burger asked if Eudora had a water development plan that was 30 years long.

Eudora Commissioner Stewart said he could not answer that. He stated half the people in the country get their water from ground source. He suggested the option that if contamination was found in the monitoring wells

then the Conditional Use Permit would have a clause that would shut down the plant until the cause and effect were known.

Commissioner Liese asked the applicant to respond to that option.

Mr. Struble said it was not unusual for operations like this to have a plan to what would be done. He said the monitoring well plan included a control well. He said they were concerned that if something was found in the monitoring wells they would want to know it was from Penny's or coming through from somewhere else. He stated even if more research was done in 6-8 months, a lot of that water would not even get to the monitoring wells in that time period. He said depending on whatever pollutant was discovered in the wells there would be a little different progression of plan. He said they were willing to have conversations about it.

Commissioner Burger inquired about monitoring wells in the 10 year area.

Mr. Struble showed possible locations for monitoring wells on the overhead.

Commissioner Burger said the observation wells made sense in 30 years but she wondered what made sense to the engineers and scientists as the process proceeded.

Mr. Struble said his geologist was not present this evening to speak about that.

Commissioner Britton asked why monitoring wells were part of the plan if the whole idea was 1,200'-7,000' of soil and sand would get rid of contaminants that could be cause by the sand pit.

Mr. Struble said the monitoring wells were part of the first comments from the City of Eudora regarding Penny's application. He said they were not part of the original plan.

Commissioner Britton asked if his position was that the monitoring wells were not necessary because even if something showed up in the monitoring wells there was no way it was actually getting to the well being used.

Mr. Struble said that was correct.

Mr. Watkins said there were certain things that do not break down, such as salt and nitrates. He said they would want to know if those were coming through so that was the idea for the observation wells. He said if those were detected then it would need to be determined where they were coming from. He said the existing operation had access to the aquifer. He said there was no evidence that there were nitrates or salt in any well in the valley. He said the monitoring wells provided an answer to the 'what if' questions and would show if it was happening and allow time to do something about it.

Eudora Commissioner von Achen said another theory was that the aquifer had not been penetrated because the river receives its water from the aquifer. He stated only when there is a huge flood is there minimal charging of the aquifer from the river and that was not very much. He said it was contradictory to what they were saying. He said the river had been polluted his whole life and has not polluted the aquifer because the water flowing down the river does not get into the aquifer, but rather the river was charged by the aquifer.

Commissioner Britton asked Mr. Helmke to comment about the filtering process through 1,200'-7000'.

Mr. Helmke said it was not known.

Eudora Commissioner Campbell said both sides had hired experts and consultants but there was one unpaid expert from the State of Kansas that clearly states there was not enough information.

Mr. Helmke said he did not work for the State of Kansas and that the Kansas Rural Water Association was a private non-profit association.

Eudora Commissioner Campbell felt the only prudent way to proceed was to defer for a year.

Commissioner Liese asked if Mr. Helmke could draw conclusions in a year.

Mr. Helmke said there were other experts more qualified to do those analysis.

Commissioner Liese asked if it could be a condition of the Conditional Use Permit.

Mr. McCullough said it would be a complicated framework for the Conditional Use Permit. He said it would be more beneficial to collect additional data and further analysis, if they felt it was needed. He said it may be prudent to allow that to unfold, be collected, and analyzed. He said it depended on where they were at with the data issue and the potential harm to City of Eudora's wells.

Commissioner Liese asked the applicant to respond to the comment of deferral for 1 year

Mr. Watkins said he did not like it. He said there was no evidence presented that this type of operation caused the kind of problem they were talking about. He said they were willing to do safeguards and if there was any evidence of some pollutant migrating then it would be stopped. He said it was a hypothetical situation that hasn't occurred. He asked Planning Commission to act on the Conditional Use Permit and put conditions on it.

Commissioner Burger asked if there was a reason why 400+ acres was needed for the sand pit operation.

Mr. Watkins said it wasn't needed right away, but over a 30 year time period it would be.

Commissioner Britton inquired about class I and II soils being lost.

Mr. Watkins said some of it could be used in the vicinity and they expected 25% of it to be reclaimed. He said they would gradually lose that area as a farming area as some areas would come back as a farming area but there would be a net loss of farming area.

Commissioner Britton asked if it would still be the same class of soil afterward.

Mr. Watkins said it should be because the topsoil would be put back.

Eudora Commissioner von Achen said Eudora Planning Commission did not participate in the Eudora City Commission Council meeting as was stated earlier. He said he recognized the recommendation would go to County Commission.

Eudora Commissioner Stewart felt the applicant had done a good job of stating their case and felt it had much less potential impact to Eudora water than the last sand pit application. He said with the addition of the monitoring wells if pollution was found it would give Eudora 8-12 years to determine how to handle the contamination headed their way. He said with the appropriate conditions of monitoring well, he was leaning in favor of the Conditional Use Permit.

Eudora Commissioner Campbell said the consultant's, Mr. Helmke, opinion was that there was not enough information to do this and he was not paid by either side, which he felt carried great weight.

**ACTION TAKEN by Eudora**
Motioned by Eudora Commissioner Campbell, seconded by Eudora Commissioner Bartlett, to defer the Conditional Use Permit until the appropriate data was accumulated to let the experts give an opinion.

Eudora Commissioner Kurt von Achen said they needed sand but that water resources were important. He said he would support the motion.

Motion carried 4-1, with Eudora Commissioner Stewart voting in opposition.

**Additional COMMISSION DISCUSSION**

Mr. McCullough said the resolution that established the joint meeting did not spell out the process. He said even a motion to defer would be a recommendation to County Commission for their decision.

Commissioner Britton asked if they would send separate recommendations to County Commission.

Mr. McCullough said that was correct.

Commissioner Liese asked the applicant to respond to who would take care of Eudora if the water was polluted.

Mr. Watkins said the condition of the monitoring wells would detect if there was an issue and stop any subsequent pollution and require the owner to fix it if the problem was coming from the pit. He said in terms of investment, the operator was willing to install the wells and place the wells so that monitoring could take place. He said they were willing to have that sort of condition as protection for the City of Eudora. He said maybe they could work out an agreement that Eudora could monitor the wells anytime. He stated the condition could say that if a problem was detected the operator would have to address it and not operate until it was fixed.

Mr. McCullough said if Planning Commission chose that condition staff could craft some language and send it to County Commission.

Eudora Commissioner von Achen said if pollution was found neighbors and Eudora should not have to pay for any damage.

Mr. Watkins said they have a damage claim if water was affected.

Eudora Commissioner von Achen said the damage claim goes far past the 30 year Conditional Use Permit. He suggested a surcharge of so many cents a ton on the sand to build a fund to give real dollar protection to people downstream. He said if it will never happen then the applicant should make sure it doesn't cost any money. He felt someone else should take the risk, not the City of Eudora.

Commissioner Liese asked if he was talking about escrow.

Eudora Commissioner Kurt von Achen said some sort of surety bond, insurance policy, or some other way to significantly protect people downstream.

Mr. Watkins said there were liabilities as an operator that were insured. He said you can't contaminate water without people having a claim, so there were certain protections, such as early detection. He said this hypothetical situation had not been borne out anywhere. He said putting the kind of conditions they were talking about was what protected the public interest. He said he sympathized with the City of Eudora wanting to protect their water supply. He said Eudora suggested the monitoring wells and then decided the risk was too great.

Eudora Commissioner Kurt von Achen said they should assume the risk.

Mr. Watkins said they would be assuming the risk.

Eudora Commissioner Kurt von Achen said they should accept the ongoing risk.

Mr. Watkins said there was no evidence there was significant risk.

Commissioner Pennie von Achen inquired about the USDA rating the sand in the area as poor quality.

Mr. Watkins said he disagreed with that. He said it was more the level at Mr. McElwee's property that you would have to go down to get the sand. He did not think the operator would be trying to get sand out of the area that was not usable.

Commissioner Culver said he believed it was rated as poor because of the depth they would have to go down to extract, not necessarily the quality of the sand.

Commissioner Pennie von Achen asked about the cost to go down so far for sand.

Mr. Watkins said it affects the return on investment. He said there were not many sites in Douglas County to extract sand.

Commissioner Pennie von Achen asked if the overburden would go back into the pit.

Mr. Watkins said yes, it would be recycled back in.

Commissioner Pennie von Achen inquired about contaminates.

Mr. Watkins said the topsoil would be stockpiled and then the overburden would be recycled. He said if contaminates were found they would need to be addressed.

Commissioner Pennie von Achen asked if the overburden was tested for contaminates.

Mr. Watkins said the observation wells would be for detection. He said the overburden was not currently tested.

Commissioner Belt inquired about additional conditions.

Mr. McCullough said Planning Commission would have to have direct staff on what conditions they wanted to grasp on to. He said they discussed monitoring wells as a way to mitigate potential impacts and pollutants to the aquifer and accepted an argument about protecting the financial position of the City Eudora. He said they also discussed process. He stated typically when an item was deferred it was a short time frame to direct the applicant to go get additional information so Planning Commission could make an analysis and decision. He said Eudora's recommendation was a long term deferral to get that information and negotiate with the City of Eudora regarding some of the issues, and let County Commission make the final decision.

Commissioner Belt asked if deferring was reasonable.

Mr. McCullough said they should be specific as possible and provide proactive language in the motion that they want to move it to County Commission, if that was their desire. He said if they wanted to keep it at the Planning Commission level it would typically be a deferral for one or two months to get specific information. He said Eudora's motion was to have a year's worth of data collected to make decisions about the impact to the wells.

Commissioner Britton felt County Commission should be given the opportunity to make that decision now instead of Planning Commission bottling it up for a year with Penny's left not knowing what to do since their permit expires on December 31, 2012. He felt that was a bad position to put Penny's in. He said he would support passing this along to County Commission with a recommendation of deferral, pending any results of a study to be completed by a consultant selected jointly by the City of Eudora and developer. He felt the deferral should be designed to give the developer the opportunity to explore avenues of giving some financial security to the City of Eudora. He said he would not be supportive of an approval at this point.

Commissioner Belt said the applicant did a nice job of covering as many bases they could reasonably be expected to cover that were factually based. He felt they had a fiduciary responsibility to this municipality as well as a responsibility to Eudora. He did not feel comfortable placing specific conditions that were not reasonable with so many unknowns.

Commissioner Burger expressed concern about the size of the Conditional Use Permit and asked about the size of other operations.

Mr. Watkins said this would probably be the largest sand pit operation on the Kansas River. He said many of them were 70-100 acres in size. He said anything smaller than that would not allow room to dredge.

Commissioner Liese said he was uncomfortable with Lawrence Planning Commission deferring it. He said one of their primary roles was making recommendations. He said he would not vote to defer unless it was for specific information over a short period of time.

Commissioner Culver said it was their responsibility to make a recommendation and a shorter term deferral would not give them the information they would need or would be helpful in making this decision. He felt they had an onus to the applicant, City of Eudora, and Douglas County to give it due process and make a recommendation to the governing body. He said he would not support a deferral at this time.

Commissioner Pennie von Achen said she would support a deferral. She felt the proposal put class I and II soils and water at risk. She said she would not vote in favor of it at this point. She said she could vote for denial but would like more information.

Commissioner Britton said he would support a deferral but felt it didn't matter if they called it deferral or denial because it would be because of the same concerns. He said the important thing was that it went to County Commission one way or the other.

Commissioner Josserand said one of the overlying policy considerations, by a number of people, was to move in-river sand dredging to non-river sand dredging. He said he was concerned about the evulsion risk but said the river would change some day. He said he would prefer the Corps of Engineer be involved to speak to the risks but he understood they were only concerned about the river. He said he was not nearly as concerned for the potential health or water quality risks if there was an appropriate set of monitoring wells. He felt the applicant had tried to explore that issue but it seemed it may not be good enough. He said the only condition he would like to defer to was trying to figure out a better condition regarding testing modification without sending to County Commission but felt they could work with staff on that. He said he would prefer not to defer.

Commissioner Britton said he was sensitive to the issue but not too worried about the impact on neighbors from industrial activity and traffic since that's what's been going on there for several decades. He said it was a valid concern but didn't rise to the level of denial of this request. He said the water issue was a much closer call and was hard to figure out what study to believe or what logical argument to give more weight to. He stated it would make sense to at least explore some sort of method by which the developer could give financial security where they would be on the hook for the cost of addressing a contamination issue. He felt agricultural land and class I and II soils were a much more valuable and rare resource than the sand being extracted. He felt there were ways this could be worked out given more time and opportunity.

Commissioner Liese said Planning Commission was not the deciding body, County Commission was. He said the applicant had done a terrific job of thinking about the community and about the implications of what they were doing. He said he would not vote for denial but would support the proposal with conditions.

Commissioner Culver said he would not support the recommendation for denial. He said Chapter 16 of the Comprehensive Plan, Horizon 2020, says *…encourages the responsible use of marketable natural resources*

*within Douglas County through proper extraction and reclamation methods. They are essential to sustainable development activity, primarily in the form of low cost raw materials, such as sand, gravel, timber, oil, gas, and stone, etc.* He felt there were competing values and that's what makes this difficult. He was concerned about the previous sand pit operation that tried to locate in Douglas County but moved to Jefferson County and now Douglas County has no control or say over that operation. He said if they kick the ball far enough ahead and don't make a decision they would miss the boat to where they could come to a good solution that protects the citizens and allows for natural resources in Douglas County to be utilized in a responsible way. As the applicant mentioned, this was a highly regulated industry with securities, precautions, measurements, and regulations in place for any kind of dredging or sand pit operation and were in place for a reason. He said those would take care of a lot of the issues discussed and continue to evolve to address some of those concerns. He said he supported the application because it was an active site so a lot of the impacts listed in the staff report would remain fairly consistent with the current activity and proposed activity. He said there was a need for sand. He said the applicant was willing to provide an abundance of caution by investing in observation wells and the possibility of discussing the opportunity for the City of Eudora and others to sample the wells on an ongoing basis. He said the unknowns made this difficult. He said they could do years and years of research and still may not know some of the possible effects. He said there was no way to minimize the risk completely. He liked the discussions about ways to protect the City of Eudora and felt the governing body could address some of those. He said he was concerned about the class I and II soils and did not think there was necessarily a full mitigation for that but the applicant was willing to reclaim part of the sand pit area to farmland. He said regarding the pollution concerns there was no evidence of that happening in other sand pit locations. He said it was a tough position because there was a movement to take dredges out of rivers but they hadn't adequately planned for how to replace that. He felt there needed to be alternatives because there was still a need for sand. He was not comfortable supporting a denial but would support recommending approval to County Commission.

Commissioner Liese said Friends of the Kaw were supportive of this proposal but encouraged Planning Commission to carefully consider and address neighbor concerns.

Commissioner Josserand agreed with Commissioner Culver's comments.

Commissioner Burger said she was not comfortable with over 400 acres but the conditions in the staff report were so thorough. She said Horizon 2020 supported this type of resource extraction and Eudora land use documents supported it. She said she would not vote to deny but would be much more comfortable with a similar scale of other sand pits along the river.

**ACTION TAKEN BY Lawrence**

Motioned by Commissioner Britton, seconded by Commissioner von Achen, to deny the Conditional Use Permit.

> Motion failed 3-4-1, with Commissioners Belt, Britton, and von Achen voting in favor of the motion. Commissioners Burger, Culver, Josserand, and Liese voted in opposition. Commissioner Lamer abstained.

Motioned by Commissioner Culver, seconded by Commissioner Josserand, to approve the Conditional Use Permit for Penny Sand Pit and forwarding it to the Board of County Commissioners with a recommendation for approval based on the findings of fact found in the body of the staff report subject to the following conditions:

1.) The approval is contingent upon the issuance of all State and/or Federal permits which are required for this operation.
2.) An agreement designating responsibility for the ongoing maintenance of the berms to the property owner shall be executed and recorded with the Register of Deeds prior to the release of the CUP plans to the Zoning and Codes Office. A copy of the agreement shall be provided to the Planning Office for the file.
3.) A copy of the easement for the off-site access drive shall be provided to the Planning Office for the file prior to the release of the CUP plans to the Zoning and Codes Office.

4.) The applicant shall obtain a Flood Plain Development Permit from the Director of Zoning and Codes prior to the release of the CUP plans.

5.) The reclamation plan shall be revised with the following changes prior to release of the CUP plans:
   a. The plan shall note the requirement that the lake that is being created will have a varied shoreline and will appear natural in appearance.
   b. The plan shall note that the intended use of the lake, when mining and reclamation is complete, is to be a recreational feature.
   c. The plan shall note the maximum slope of the lake shoreline for a specified depth to insure that the slopes are of a grade that it would be possible for a person or animal that accidentally entered the lake to exit.
   d. The plan shall explain the sequential nature of the reclamation process; that overburden produced in one phase will be used to reclaim previously excavated areas.
   e. The reclamation plan shall note that topsoil will be placed over the overburden in areas that are to be reclaimed as farmland, shoreline, or berms. If topsoil is to be stockpiled and stored it must be vegetated to prevent erosion.

6.) The applicant shall submit a revised CUP plan with the following changes:
   a) A detailed landscaping plan for the buffer area surrounding the McElwee house will be submitted.
   b) The Book and Page number of the recorded easement for the off-site access road shall be noted on the CUP plan.
   c) The ownership shall be noted as Van, LLC as well as Penny's Concrete Inc. on the CUP plan.
   d) The on-site residential structure on the east side of the property will be shown on the CUP plan as on the reclamation plan.
   e) If stockpiling of overburden is to occur on the subject property, the CUP or operation plan should note the maximum height and approximate location. The stockpiles should be placed as far from the existing residences as possible.
   f) List the following CUP conditions on the plan:
      i. Hours of operation are 6:30 AM to 6:30 PM, Monday through Friday. No removal, transfer, or placement of overburden is permitted outside these operating hours; however dredging and extraction of sand may exceed these hours when necessary.
      ii. The approval for this Conditional Use is valid for 30 years. An extension request for the CUP must be submitted prior to the expiration date or a new CUP application must be submitted. The Zoning and Codes office shall conduct 5 year administrative reviews to insure compliance with the CUP, operation, and reclamation plans.
      iii. The only exterior lighting in the areas to be excavated will be the dredge lighting as required by the U.S. Coast Guard.
      iv. The scale house, processing plant, sediment pond, and stockpile area, approved with CUP-2-2-79, will be used to serve the subject property.
      v. Sales of overburden, topsoil, sand or aggregate products will occur only on the portion of the property that contains the scale house on the CUP plan.
      vi. Truck traffic will utilize Noria Road (E 1750 Road), and is restricted from using N 1500 Road or E 1850 Road.
      vii. The applicant shall work with the Army Corps of Engineers to determine how the existing wetlands on the property will be treated. Prior to any excavation in Phase 21, the applicant will provide documentation to the Planning Office on the wetlands indicating whether the wetlands will be maintained on site or if they will be mitigated elsewhere. If the wetlands will be maintained on site, the operation plan will be revised to include the protection measures and the property owner shall submit a revised CUP plan for administrative review/approval of the wetland setbacks. If the wetlands are to be mitigated, a revised CUP plan shall be submitted to note the removal of the wetlands.

7.) The following improvements to nearby roads and intersections shall be completed per the County Engineer's approval before issuance of a permit for the Conditional Use :
   a. Realignment of the entrance to the sand facility so that it opposes the Noria Road intersection at N 1500 Road.

b. Pavement of a 100 ft long section of the site access drive just north of N 1500 Road, as recommended in the TIS.
c. Reconstruction of pavement in the Noria Road (E 1750 Road)/N 1500 Road intersection. The existing surfacing is likely a crushed rock base that has been chip sealed. This will not stand up to the increased truck traffic crossing N 1500 Road.
d. Construction of an eastbound right turn lane on Route 442 (N 1400 Road) at Route 1057 (E 1900 Road). This is mentioned as a desirable improvement in the TIS. Pavement on the existing shoulder at this location is not adequate for the projected amount of truck traffic.

8.) The applicant shall install three observation wells and one control well and that the City of Eudora be allowed to monitor those wells on an ongoing basis.

Commissioner Josserand said he would like the County Commission to examine the scope and size and also examine the possibility of what Eudora Planning Commission made reference to regarding risk.

Commissioner Burger said she was uncomfortable with the acreage but would vote in favor. She expressed concern about the flow and movement of the river.

Commissioner Liese asked if the body of water would be useable for recreation.

Mr. Watkins said it could be.

Motion carried 4-3-1, with Commissioners Burger, Culver, Josserand, and Liese voting in favor of the motion. Commissioners Belt, Britton, and von Achen voted in opposition. Commissioner Lamer abstained.

**Adjourn Joint Meeting**
**Reconvene LDCMPC**

Nov. 19, 2012

Douglas County Commission
1100 Massachusetts Street,
Douglas County Courthouse, 2nd level,
Lawrence, KS 66044

Dear Douglas County Commissioners,

I would like to address some concerns I have about the Penny Sand Co. CUP coming up for consideration on Nov. 28, 2012 at your regular meeting. I have supplied considerable material to the Dg. Co. Planning Dept. and I believe that material will be forwarded to you. However, I would like to provide some summary observations about the process as it has progressed to this point.

First, I would like to point out that the staff report has not been revised to reflect the considerable information that has been provided since it was first written on Sept. 24. The first report was written responding only to the material supplied by the applicant, a preliminary letter written by me, and a signed petition by nearby property owners. Since then, much more information has been provided and that is not referenced in the staff report. I have asked on a couple of occasions that the staff report be rewritten to reflect this additional information, but that has not happened. So I feel that the staff report has not properly considered all the available information. I ask you as commissioners to consider all the information provided and give it due consideration. In particular, the following items have been provided since the staff report was written:

A hydrogeological report by me (a qualified groundwater professional),
A clarification letter about Dr. Juracek's remarks mentioned in the original staff report,
A letter describing the meeting with the Eudora City Council,
A letter from Dr. Dort (retired KU Geology Professor),
A letter from the Eudora City Council opposing the CUP.

In particular, I would like to point out some areas of the staff report that need to be reconsidered in light of the additional material supplied.

Staff Report:
"The subject property is located in a large contiguous area of high quality agricultural soils. (Figure 4) There is a conflict between the two natural resources in that the removal of the underground sand deposits will remove the high quality soils in this location. The fact that sand reserves are typically located near the river, and often within the floodplain makes it difficult to avoid locating in areas with high quality soils."

I would like to disagree with this statement. This CUP asks for a pit that extends more than a mile out into the valley away from the river. In general the areas with lesser overburden will be found nearer the river, some with less desirable agricultural lands. It takes detailed planning to locate and map these areas.

Staff Report:
 **Ground water:** …….The applicant provided a study on the impact of the mining activity on groundwater. ……The study was prepared by Carl E. Nuzman, P.E., P.HG, a consulting engineer and hydrogeologist. The following are excerpts taken from the study:
a. The report provided the following information on the quantity of water available for the wells: "A well can decrease in yield due to biological fouling and lack of property maintenance but unless the static water level has a substantial decline reducing the saturated thickness, the yield available from the aquifer remains constant." (Page 5, Nuzman report.)
……..
c. Regarding the impact of the sand pit on the quantity of water available for other wells in the area: "Sand pits beneficially support the yield of wells that are down-gradient from a pit that is within the area of influence of a well." (Page 8, Nuzman report.)
d. "Due to the hydraulic gradient of the valley aquifer system and recharge to the aquifer from rainfall, the aquifer flow to the City wells is from the west-southwest. The Penny sand pit will be a half mile north of the capture zone of the City wells and will have no influence on the Eudora public water supply wells." (page 7, Nuzman report)
……

As for item a., I have indicated in my report that it is likely that this pit will lower the water levels in the area, possibly affecting wells.
As for item c., I have indicated in my report that this effect is due to mixing of pit water with aquifer water and is not a good thing.
As for item d., I have shown in my report that the capture zones for the Eudora Well Field likely do overlap the proposed sand pit. It is impossible to say that the sand pit will have no effect on the well field.

Staff Report:
 **River channel: "**Concern was raised that allowing the pit mining to occur so close to the river could accelerate a change in the river channel, especially during flood events. The river is naturally working to change its channel in this location. Wakefield Dort, a retired KGS professor, examined the channel changes in the Kansas River and Carl McElwee provided an excerpt of one of his publications in his materials. Staff contacted a hydrologist with the USGS (United States Geological Survey) Midwest Division, Kyle E Juracek, for his opinion on the impact of the dredging operation and pit on the river channel. Mr. Juracek indicated that the location of a lake could result in channel change in the event of a flood but pointed out that the river channel may change as a result of a flooding event even without a lake in close proximity."

This statement in the staff report tends to minimize the effect of an open pit being an agent to make it easier for a channel change in the event of a flood. I knew that was not correct, so I personally went to Dr. Juracek and discussed the situation. I drafted a letter summarizing our conversation and had him review it for correctness, then I submitted the letter to the Planning Dept. I have attached an appendix to this letter with email exchanges between Dr. Juracek and

myself confirming that he had no problems with the content of my letter describing the effect of the pit on the bank stability, which could be considerable.

Staff Report:
 **Visual impact: "**……..The reclamation plan should provide details about the lake which is to be created, showing the approximate boundaries, and shape. Development of a lake that is an attractive natural feature could be a positive impact on the area."

I disagree that the lake will be "an attractive natural feature." The water levels at my house were 29 feet below the land surface when my last well was drilled in 2004. With a berm around the lake that means as one walks over the berm the water level in the lake will likely be thirty some feet below that point. Even if they make a smooth slope down to the water level, it does not sound too attractive to me and certainly not a natural feature.

Staff Report:
"…….. however, another concern was raised regarding the perpetual maintenance of the berms in the future to insure that storm water runoff does not enter the lake. Staff recommends that an agreement placing the responsibility for the perpetual maintenance of the berms on the property owner should be executed and recorded with the Register of Deeds prior to the release of the CUP permit."

In other words, if Penny Sand Co. sells the lake to someone else, the new owners suddenly become responsible for maintenance and prevention of potential pollution to the aquifer. I doubt that most people would recognize the responsibility they are being given. The ones to suffer if anything goes wrong in the future would be the people of Eudora in the degradation of their well field.

Next, you have been presented a petition from local property owners who oppose this CUP for a sand pit. The petition contains 23 signatures of local property owners and one signature for a local business. We come before you as concerned tax-paying property owners with valid concerns that need to be addressed. Some of those concerns are as follows.

> This is an historical area with some early houses dating from settlement times to early 1900's that has been traditionally an agricultural area, creeping industrial activity is threatening to change the area.
>
> The Kansas River bank is unstable in the area of this proposed sand pit. The presence of a sand pit will make it easier for a sudden channel change during times of flood stage.
>
> If this request for a sand pit is approved, over 400 acres of high quality agricultural soils will be lost forever. We will lose their potential for food and fiber production for future generations.
>
> A large amount of overburden (about 23 feet of unusable soil, silt and clay) will need to be removed to access the sand and mine down to the bedrock (about 70). This will be a

very mechanically intensive process similar to all strip mining sites that you have seen, with the accompanying noise, dust, and spoil piles.

The overburden acts as a protective filter for the underlying aquifer. Once that has been stripped off there is the potential for pollution of the very productive underlying aquifer.

Neighboring wells could be affected adversely by lowered water levels and quality problems caused by mixing pit surface water with aquifer water.

These are the issues addressed in the petition presented to you.

I am a qualified groundwater professional having spent 35 years in teaching and research at KU. Much of my work has dealt with the Kansas River Valley aquifer. The following is a summary of my findings regarding the sand pit.

Capture curves delineate water that will be drawn to a certain well in a given amount of time. I have shown that the capture curves for the Eudora Well Field very likely include the proposed sand pit, contrary to the conclusions of the Penny Sand groundwater report.

This pit is proposed to be nearly a mile in length from north to south and close to the river on the north. The Penny Sand groundwater report admits that the pit lake water level will be near that of the river, which is generally lower than aquifer levels. The net result will be lower water levels in the aquifer surrounding the pit, which could adversely affect neighboring wells.

A large flow-through lake will be created by this pit, which will mix pit surface water and the aquifer groundwater and then send it further down the river valley aquifer, possibly leading to quality issues.

Removing the very large amounts of overburden and preventing pollution will be an engineering challenge. There will be ample opportunity for making mistakes with unintended consequences. One planned operation is to use the overburden for backfilling the pit. This overburden has been a filter for surficially applied agricultural chemicals, such as fertilizers and pesticides, for many years and should be tested for chemical pollutant residues before using it as fill for the pit.

The Penny Sand groundwater report references a few studies that have not shown significant health effects for humans due to sand pits affecting groundwater. However, those studies definitely establish that the pits do create a connection between the pit surface water and the groundwater by their chemical signatures. One can't assume that there will never be problems with sand pits, with so few studies that have been done on health effects. The groundwater literature contains many case studies of surface water bodies contaminating adjacent aquifers.

The presence of such a large deep pit as requested at this site would make it much easier for the river in times of flood to cut off the meander at this site by flowing through the pit area. This would create a huge nick point (deepened point in the river bed about 50-60 feet deep) that would have a destabilizing effect on the river bed, with head cutting upstream and bed degradation downstream for some time to come, until a new stable river bed gradient was created. This event would flood the pit with poorer quality river water, putting it in direct contact with the aquifer.

Some have suggested the use of monitoring wells to inform if pollution is occurring at this CUP site. Monitoring wells are used extensively in the study of groundwater systems. However, every practicing professional knows of their severe limitations. Where do you put them? How many to use? What depth do you use? Do you use wells with small vertical screens or wells that are fully screened vertically? I know from personal experience that monitoring wells give very limited data and can entirely miss important information. The eastern side and the southern side of the proposed sand pit are probably most critical for monitoring. However, this is a perimeter of about 1 ½ miles and can not be adequately monitored with 2 or 3 wells. The best locations and depths for monitoring wells could only be guessed at, with a high probability of guessing wrong.

The City of Eudora did an in-depth study of the potential effect of the sand pit on the aquifer at their Oct. 8 meeting. After hearing all sides of the issue, including from their own independent consultant, they voted unanimously to oppose this CUP. You have their letter summarizing this meeting. This was the most in-depth study of the situation by far that has been done, and I ask you to give that a very high weight in your consideration of this CUP.

In conclusion, I believe that in the near future, productive agricultural land and clean water resources will be regarded as our most valuable resources for the future of humankind. You can give a legacy to future generations by protecting this high quality farmland and safeguarding this major aquifer. I think future Douglas County residents will thank you for preserving this land and water, which can continue to give its bounty to them. On the other hand, I don't think future generations will thank you for a large unnatural lake occupying several hundred acres, which will continue to be a possible pollution source for the valley aquifer.

I ask you to reject the proposed CUP for all the reasons stated.

Carl McElwee
Emeritus Professor of Geology
University of Kansas
Lawrence, KS 66045
785-843-4164
cmcelwee@ku.edu

## Appendix: Email Exchange with Dr. Juracek of USGS

**From:** Kyle E Juracek [kjuracek@usgs.gov]
**Sent:** Wednesday, October 03, 2012 3:03 PM
**To:** McElwee, Carl D.
**Subject:** Re: Letter to Planning Office

Carl.

I reviewed your letter. I'm o.k. with the content. Although, I didn't see any text requesting that the issue be deferred to the November meeting.

Kyle

---

Kyle Juracek, Ph.D.
Research Hydrologist
U.S. Geological Survey
4821 Quail Crest Place
Lawrence, KS 66049-3839
785-832-3527
kjuracek@usgs.gov

| | |
|---|---|
| From: | "McElwee, Carl D." <cmcelwee@ku.edu> |
| To: | "kjuracek@usgs.gov" <kjuracek@usgs.gov> |
| Date: | 10/02/2012 09:36 AM |
| Subject: | Letter to Planning Office |

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Kyle,

I have drafted a letter summarizing what we talked about yesterday and attached it to this email. Let me know if you have any reservations about anything that I have said. If you know of any other issues that need to be discussed, please point them out to me. Thanks.

Carl

November 23, 2012

Douglas County Commission
Dear Chairman Gaughan,

To prevent further erosion of the Kansas River bank and degradation of bridges and infrastructure upstream and downstream, we support removing sand dredging from the Kansas River. While sand pit extraction also has significant concerns, sand pit mining in an appropriate location remains an important improvement over sand dredging in the Kansas River.

After a recent presentation by Dr. Melinda Daniels summarizing her research on the impacts of sand dredging within the Kansas River, she was asked about the Penny Sand Pit proposal. Dr. Daniels, a Kansas State University Geography Professor, shared concerns that the placement of this sand pit was too close to the Kansas River. She reasoned that if the Kansas River changed course and flowed through this sand pit, it would have the same degradation impacts as in-stream river dredging. We share those concerns.

The proposed location for this sand pit is composed principally of Class I and II soils. (Please refer to the attached soil map indicating Class I soils, shaded red, and Class II soils, shaded yellow.) Horizon 2020 states in Chapter 7 that the “preservation of high-quality agricultural land, which has been recognized as a finite resource that is important to the regional economy, is of important value to the community."

Given that the importance of the preservation of prime soils to our community and the threat of the Kansas River cutting through this sand pit in the future, we recommend rejecting this conditional use permit. We support keeping this land in agricultural production.

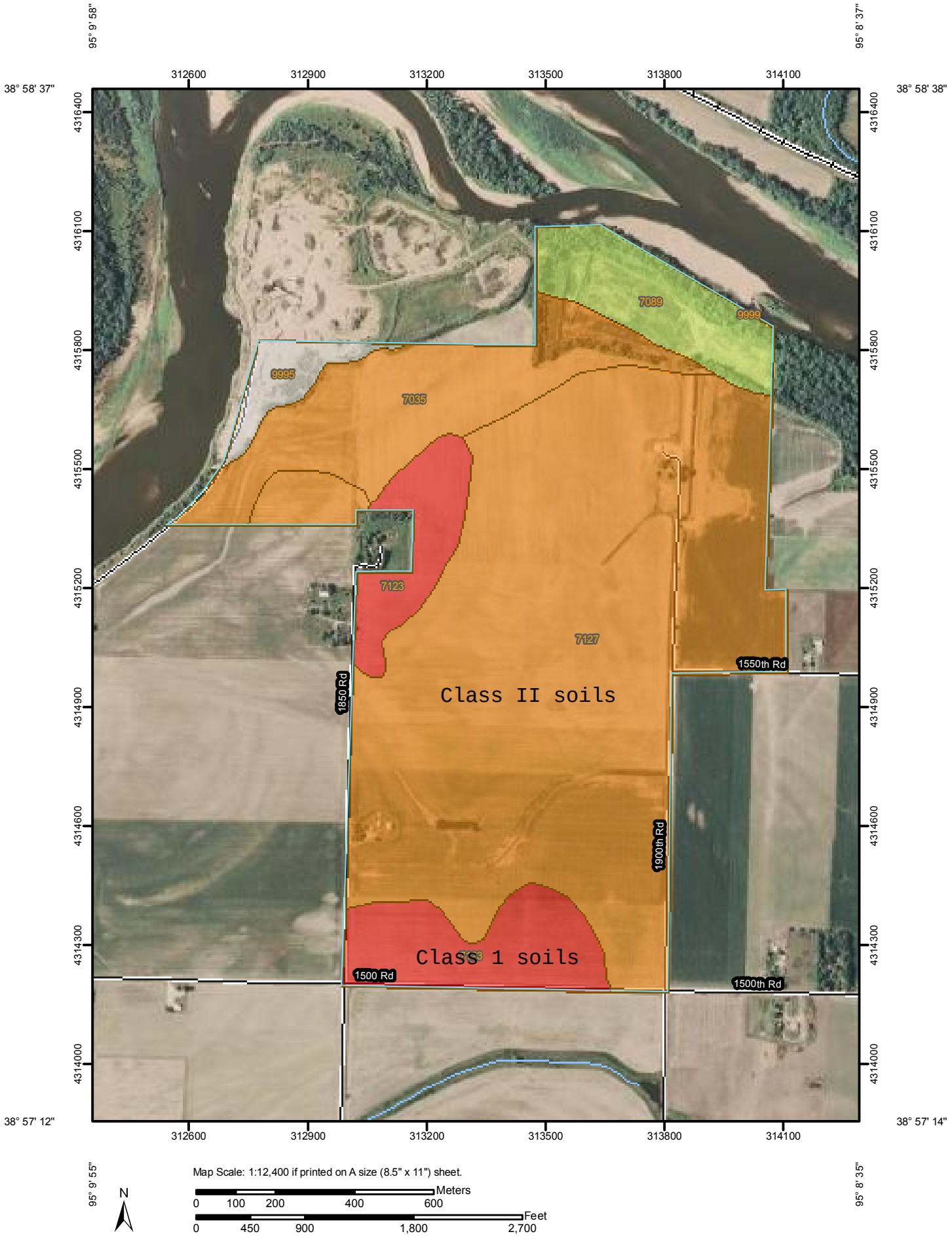
Thank you for your consideration of these comments.

Sincerely,

Jerry Jost and Barbara Clark

Jerry Jost
217 North Fifth Street
Lawrence, KS 66044

Barbara Clark
2050 East 1550 Road
Lawrence, KS 66044


95° 9' 58"
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Class 1 soils
1500 Rd
1500th Rd
38° 57' 12"
38° 57' 14"
95° 9' 55"
95° 8' 35"
Map Scale: 1:12,400 if printed on A size (8.5" x 11") sheet.
N
Meters
0 100 200 400 600
Feet
0 450 900 1,800 2,700

## MAP LEGEND

**Area of Interest (AOI)**

- Area of Interest (AOI)

**Soils**

- Soil Map Units

**Soil Ratings**

- Capability Class - I
- Capability Class - II
- Capability Class - III
- Capability Class - IV
- Capability Class - V
- Capability Class - VI
- Capability Class - VII
- Capability Class - VIII
- Not rated or not available

**Political Features**

- Cities

**Water Features**

- Streams and Canals

**Transportation**

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

## MAP INFORMATION

Map Scale: 1:12,400 if printed on A size (8.5" × 11") sheet.

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 15N NAD83

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

Soil Survey Area: Douglas County, Kansas
Survey Area Data: Version 9, Sep 24, 2012

Date(s) aerial images were photographed: 6/15/2006

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.

# Nonirrigated Capability Class

| Nonirrigated Capability Class— Summary by Map Unit — Douglas County, Kansas (KS045) | | | | |
|---|---|---|---|---|
| **Map unit symbol** | **Map unit name** | **Rating** | **Acres in AOI** | **Percent of AOI** |
| 7035 | Eudora-Bismarckgrove fine sandy loams, overwash, occasionally flooded | 2 | 60.2 | 13.7% |
| 7089 | Stonehouse-Eudora fine sandy loams, overwash, occasionally flooded | 4 | 30.1 | 6.9% |
| 7123 | Eudora silt loam, rarely flooded | 1 | 53.8 | 12.3% |
| 7127 | Eudora-Kimo complex, overwash, rarely flooded | 2 | 284.2 | 64.8% |
| 9995 | Sand Pits | | 10.3 | 2.4% |
| 9999 | Water | | 0.1 | 0.0% |
| **Totals for Area of Interest** | | | **438.7** | **100.0%** |

## Description

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations that show suitability and limitations of groups of soils for rangeland, for woodland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels-capability class, subclass, and unit. Only class and subclass are included in this data set.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have few limitations that restrict their use.

Class 2 soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff: None Specified*

*Tie-break Rule:* Higher

Public Wholesale Water Supply District No. 25

November 26, 2012

Chairman Mike Gaughan
Douglas County Commission
1100 Massachusetts Street
Lawrence, KS 66044

**SUBJECT: CUP 12-00099 (Application Pending)**

Dear Chairman Gaughan and Members of the Commission:

I am the president of Public Wholesale Water Supply District No. 25, a District formed for the purpose of developing a long term public water supply for its members, Rural Water District No. 5, Douglas County and Rural Water District No. 5, Osage County, Kansas. The District has acquired certain land for public water supply wells and is in the process of finalizing acquisition of additional land, all of which will be located approximately three-fourths (3/4) of a mile west of the west edge of the proposed CUP site.

The District has consulted with its engineers and has determined that the uses proposed for this CUP present no threat to PWWSD No. 25's intended uses of its property. As a result, PWWSD No. 25 wishes to advise the Commission that it has no objections to the CUP as proposed.

Thank you very much for your consideration.

Sincerely,
**Public Wholesale Water Supply District No. 25**

Larry Wray

LARRY WRAY, President

946 E 650 Road, Lawrence, KS 66047
Phone: (785) 748-0308 Fax: (785) 748-0019