GOVERNING BODY WORKSHOP AGENDA
ROELAND PARK
Roeland Park City Hall 4600 W 51st Street, Roeland Park, KS 66205
Monday, February 4, 2019 6:00 PM

- Mike Kelly, Mayor
- Erin Thompson, Council Member
- Vacant, Council Member
- Michael Poppa, Council Member
- Claudia McCormack, Council Member
- Tim Janssen, Council Member
- Jim Kelly, Council Member
- Tom Madigan, Council Member
- Jennifer Hill, Council Member
- Keith Moody, City Administrator
- Jennifer Jones-Lacy, Asst. Admin.
- Kelley Bohon, City Clerk
- John Morris, Police Chief
- Donnie Scharff, Public Works Director

Admin	Finance	Safety	Public Works
Kelly	Thompson	McCormack	Poppa
Madigan	Vacant	Janssen	Hill

I. DISCUSSION ITEMS:

1. Discuss Continued Participation in Mental Health Co-Responder Partnership
2. 2019 CDBG El Monte Design Task Order
3. Direction on Process for Planning Improvements at the Aquatic Center
4. Discuss Heating and Cooling Options for Community Center
5. Review of Software Used by the City
6. Discussion on Policy for Employee Tuition Assistance
7. Executive Session - “I move to recess the City Council into executive session in order to discuss the potential of a real estate transaction, pursuant to the real estate exception of the Kansas Open Meetings Act, K.S.A.75-4319(b)(6). The open meeting to resume at ____ in Council chambers.”

II. NON-ACTION ITEMS:

III. ADJOURN

Welcome to this meeting of the Committee of the Whole of Roeland Park.
Below are the Procedural Rules of the Committee

The governing body encourages citizen participation in local governance

processes. To that end, and in compliance with the Kansas Open meetings Act (KSA 45-215), you are invited to participate in this meeting. The following rules have been established to facilitate the transaction of business during the meeting. Please take a moment to review these rules before the meeting begins.

A. **Audience Decorum.** Members of the audience shall not engage in disorderly or boisterous conduct, including but not limited to; the utterance of loud, obnoxious, threatening, or abusive language; clapping; cheering; whistling; stomping; or any other acts that disrupt, impede, or otherwise render the orderly conduct of the Committee of the Whole meeting unfeasible. Any member(s) of the audience engaging in such conduct shall, at the discretion of the City Council President (Chair) or a majority of the Council Members, be declared out of order and shall be subject to reprimand and/or removal from that meeting. **Please turn all cellular telephones and other noise-making devices off or to "silent mode" before the meeting begins.**

B. **Public Comment Request to Speak Form.** The request form's purpose is to have a record for the City Clerk. Members of the public may address the Committee of the Whole during Public Comments and/or before consideration of any agenda item; however, no person shall address the Committee of the Whole without first being recognized by the Chair or Committee Chair. Any person wishing to speak at the beginning of an agenda topic, shall first complete a Request to Speak form and submit this form to the City Clerk before discussion begins on that topic.

C. **Purpose.** The purpose of addressing the Committee of the Whole is to communicate formally with the governing body with a question or comment regarding matters that are on the Committee's agenda.

D. **Speaker Decorum.** Each person addressing the Committee of the Whole, shall do so in an orderly, respectful, dignified manner and shall not engage in conduct or language that disturbs, or otherwise impedes the orderly conduct of the committee meeting. Any person, who so disrupts the meeting shall, at the discretion of the City Council President (Chair) or a majority of the Council Members, be declared out of order and shall be subject to reprimand and/or be subject to removal from that meeting.

E. **Time Limit.** In the interest of fairness to other persons wishing to speak and to other individuals or groups having business before the Committee of the Whole, each speaker shall limit comments to two minutes per agenda item. If a large number of people wish to speak, this time may be shortened by the Chair so that the number of persons wishing to speak may be accommodated within the time available.

F. **Speak Only Once Per Agenda Item.** Second opportunities for the public to speak on the same issue will not be permitted unless mandated by state or local law. No speaker will be allowed to yield part or all of his/her time to another, and no speaker will be credited with time requested but not used by another.

G. **Addressing the Committee of the Whole.** Comment and testimony are to be directed to the Chair. Dialogue between and inquiries from citizens and individual Committee Members, members of staff, or the seated audience is not permitted. Only one speaker shall have the floor at one time. Before addressing Committee speakers shall state their full name, address and/or resident/non-resident group affiliation, if any, before delivering any remarks.

H. **Agendas and minutes** can be accessed at www.roelandpark.org or by contacting the City Clerk

The governing body welcomes your participation and appreciates your cooperation. If you would like additional information about the Committee of the Whole or its proceedings, please contact the City Clerk at (913) 722.2600.

Item Number: **DISCUSSION ITEMS- I.-1.**
Committee Meeting Date: **2/4/2019**

City of Roeland Park
Action Item Summary

Date:	1/31/2019
Submitted By:	Cheif Morris
Committee/Department:	Public Safety
Title:	**Discuss Continued Participation in Mental Health Co-Responder Partnership**
Item Type:	Discussion

Recommendation:

Staff is looking for direction from the Council on if they wish to exit the MOU with Johnson County for Mental Health Co-Responder Services.

Details:

Roeland Park entered into the attached MOU for shared mental health co-responder services with Johnson County and 8 other NE JOCO cities in 2016. Prairie Village/Mission Hills and Leawood are exiting this MOU and starting their own shared co responder MOU with JOCO. These are the two largest cities which cover 63% of the co-responder costs. A city may withdraw from the MOU with 60 days advance notice. Roeland Park's portion of the 2018 cost was $6,151. With the other two cities leaving that cost would increase to $19,428 in 2019. The City budgeted $7,725 for this service in the 2019, the budget increase was purely inflationary. Below is the cost allocation proposed:

City	Population	%	COST
Merriam	11245	0.3338975	$ 32,194.00
Mission	9443	0.2803908	$ 27,035.00
Roeland Park	6786	0.2014965	$ 19,428.00
Fairway	3972	0.1179405	$ 11,372.00
Westwood	1658	0.049231	$ 4,747.00
Westwood Hills	392	0.0116396	$ 1,122.00
Mission Woods	182	0.0054041	$ 521.00
Total	33678	1	$ 96,419.00

Attached is a line item budget reflecting the costs included in the $96,419 total. It also projects what the cost will be for 2020 and 2021.

The 20% cost allocated to Roeland Park is equivalent to adding .2 FTE's to the police department staff. Police Department FTE's were increased by 1 for the new school resource officer in 2018; a K-9 was

staff. Police Department FTE's were increased by 1 for the new school resource officer in 2018; a K-9 was also added in 2018.

Shawnee Mission Medical center has been asked to join the MOU in Leawood and Prairie Village's place. They have declined at this time.

During the first 6 months of 2018 the Co-responder has responded to a call for service 15 times in Roeland Park. A detail of disposition for those 15 contacts is incorporated in the table below, which also reflects dispositions for all other cities with a co-responder as well as the co-responder activity for the NE communities sharing 1 co-responder:

Disposition

	Service City	Admit to Psych. InPatient Unit	Continue with existing	Co-Responder	Detox	Jail	MCRT	No Action	Referral to other agency	Referred to Psych. inpatient	None
All Cities	Lenexa	37	176	142	3	26	52	115	132	3	7
	Olathe	8	234	249	1	4	17	106	81	9	9
	Overland Park	5	180	75	0	0	22	163	56	19	5
	Shawnee	6	84	140	2	23	21	80	203	8	9
	NE CR	3	86	141	1	4	23	96	35	11	10
	TOTAL	59	760	747	7	57	135	560	507	50	40
NE CR	Leawood	0	37	72	1	3	11	48	16	4	6
	Merriam	1	16	17	0	0	4	12	2	3	2
	Mission	0	10	9	0	0	3	7	2	1	1
	Mission Woods	0	1	0	0	0	0	0	0	0	0
	Prairie Village	2	14	33	0	1	2	26	14	2	1
	Roeland Park	0	6	5	0	0	2	1	0	1	0
	Fairway	0	1	0	0	0	0	0	1	0	0
	Westwood	0	0	5	0	0	0	0	0	0	0
	Westwood Hills	0	1	0	0	0	1	2	0	0	0

Please review the attached documents for additional details concerning the benefits of the program, types of activities performed by the co responder, and number of events by service type provided to Roeland Park during 2018.

The adopted 2019 budget reflects $7,725 for Co-responder services. The difference between what is budgeted and the $19,428 co-responder cost now projected $11,703. The adopted 2019 budget anticipated $47,125 in expense for animal control services. In total 2019 animal control related costs should be around $35,000, the decline due to switching to contracting with Mission for this service. This results in $12,000 of resources that could be applied to the co-responder cost increase.

How does item relate to Strategic Plan?

How does item benefit Community for all Ages?

Additional Information

ATTACHMENTS:

Description	Type
Executed MOU for Co Responder Services	Cover Memo
2019 Co-Responder	Cover Memo
Co-Responder	Cover Memo
Budget Document	Cover Memo
JOCO Presentation	Cover Memo

JOHNSON COUNTY MENTAL HEALTH CO-RESPONDER PROJECT
COOPERATIVE MEMORANDUM OF UNDERSTANDING

I. Purpose

A. This Agreement is a proposed collaborative effort amongst the cities of Leawood, Prairie Village, Merriam, Mission, Roeland Park, Fairway, Westwood, Westwood Hills and Mission Woods (collectively, the "Cities") and Johnson County Mental Health Center (JCMHC) to address potential mental health and co-occurring substance use disorder issues in our jurisdictions by sharing resources and expenses to fund a shared co-responder position dedicated to the Cities (herein referred to as the "Project").

B. The purpose of the Project is to find ways that the mental health and criminal justice systems of Johnson County, specifically within the Cities, can work in partnership to improve service response to individuals who suffer from mental health issues and have co-occurring substance use disorders, or who are in danger of becoming alcoholics or drug abusers.

C. The purpose of this Memorandum of Understanding is to:

1. delineate the responsibilities of the parties to the Project;

2. maximize interagency cooperation; and

3. formalize the relationships between the parties and their employees regarding Project operations, policies, planning and training.

II. Parties.

The participating entities in the Project and this MOU are:

A. the Johnson County Mental Health Center/JCMHC;

B. the City of Leawood, through the Leawood Police Department;

C. the City of Prairie Village, through the Prairie Village Police Department;

D. the City of Merriam, through the Merriam Police Department;

E. the City of Mission, through the Mission Police Department;

F. the City of Roeland Park, through the Roeland Park Police Department;

G. the City of Fairway, through the Fairway Police Department; and

H. the City of Westwood, through the Westwood Police Department.

I. the City of Westwood Hills, through the Westwood Police Department

J. the City of Mission Woods, through the Westwood Police Department

JCMHC and the cities of Leawood, Prairie Village, Merriam, Mission, Roeland Park, Fairway, Westwood, Westwood Hills and Mission Woods are collectively referred to herein as the "Parties" or individually as a "Party".

III. Organizational Structure, Control and Responsibilities.

A. Organizational Structure.

1. The oversight of the Project will be cooperatively provided by the Parties.

2. Each Party will designate one individual to be that Party's point of contact. These points of contact will make up the Project Leadership Team.

3. The Parties will facilitate regular meetings of the Project Leadership Team and any other appropriate individuals to address the progress of the Project, as well as other justice and mental health related projects or issues.

B. Roles and Responsibilities of the Parties.

1. JCMHC will hire, employ and supervise one Qualified Mental Health Professional (the "co-responder") as part of the Project.

2. JCMHC expressly represents and warrants to each City that the co-responder is not and shall not be construed to be an employee of any City and that the status of JCMHC is that of independent contractor for the Cities for which JCMHC is solely responsible for co-responder's actions and inactions. JCMHC also agrees that neither it, nor the co-responder may enter into contracts or agreements on behalf of any City or to otherwise create obligations of any City to third parties.

3. The Cities will participate in the interview and hiring process with JCMHC, though JCMHC will retain the ultimate decision-making authority regarding the hiring and employment of the co-responder.

4. JCMHC shall provide the co-responder with a vehicle and cell phone for the co-responder's use in his/her Project duties.

5. The co-responder will work in cooperation with the Cities to assist the Cities with individuals who suffer from mental health issues and co-occurring substance use disorders and who are contacted by law enforcement.

6. The co-responder will report to JCMHC for administrative matters (e.g. leave, pay, benefits) and for other matters unrelated to the case-specific work assignments of the Project. The co-responder will coordinate with the City with regard to respective case-specific work assignments.

7. It shall be the joint responsibility of JCMHC and the co-responder to regularly and in a timely manner inform the Cities of scheduled vacation, training, annual leave, or sick leave. The co-responder will observe holidays as set by Johnson County, Kansas government. When the co-responder is on leave for any reason, back-up coverage will not be provided.

8. The co-responder shall be subject to the personnel policies and procedures of JCMHC. To the extent they are not in conflict with JCMHC policies, each City's personnel policies shall also apply to the co-responder when he/she is working in or coordinating with that particular City. It shall be the responsibility of each individual City to inform or train the co-responder on the personnel policies applicable to him/her. Performance appraisals will be handled by JCMHC, except that the Cities will be given the opportunity to provide written comments for discretionary use by JCMHC in the appraisal process.

9. The City of Leawood shall serve as host site for the Project and will provide an office designated for the use of the co-responder. In addition to the office at the Leawood Police Department the co-responder shall be provided a designated work space or office, as available, in other cities.

10. The City of Leawood will provide the co-responder with a portable police radio. JCMCH will provide him/her a laptop computer and any other equipment necessary to fulfill Project duties.

11. The co-responder position will be a salaried exempt position which will work full-time (40 hours per week, 5 days per week), allocating work time between the Cities as calls for service and workload requires.

12. The Cities shall reimburse JCMHC for the co-responder personnel costs incurred by JCMHC including, but not limited to, salary, retirement, expenses, disability, and all other employment-related benefits incident to the co-responder's employment with JCMHC within the limits of the Project Budget Addendum, attached hereto and incorporated herein by reference (the "Addendum"). JCMHC will invoice each City its pro rata share on a quarterly basis in accordance with the Addendum.

13. As law enforcement officers respond to the scene of a call and it is determined that assistance of the co-responder will aide in the disposition of the call, the responding officer will work jointly with the co-responder, either directly or through dispatch.

14. The co-responder's time will be shared among and between the Cities. It is the intent of the Parties that the shared time will be reasonably equal to the percentages shown on the attached Addendum. The Parties shall meet regularly to determine the appropriate scheduling. However, the Cities shall work cooperatively in this regard and if a City to which the co-responder is not assigned at the particular time has a situation which would benefit from co-responder assistance, that City shall contact the co-responder and request assistance as available.

15. Co-responder training shall be provided by JCMHC including, but not limited to, issues related to confidentiality. Additional training, as appropriate, may be provided as needed by the Cities.

16. The Cities will provide training to the co-responder and their respective employees on the Project with regard to Project goals and protocols, including communication protocols for determining the need for the co-responder, situational awareness training, and information security training and credentialing as required by Criminal Justice Information System (CJIS) and KCJIS (Kansas Criminal Justice Information System).

17. In the event that the co-responder is on leave and/or busy on another case, the Cities may employ the traditional process for requesting JCMHC services as needed.

18. If the co-responder has complaints, suggestions, comments, or concerns regarding the policies, procedures, practices or decisions of the Cities, the co-responder is to first present such concerns to their immediate JCMHC supervisor who may, in turn, pursue discussions with the respective City. However, it is permissible and encouraged for the co-responder to communicate with City staff regarding daily issues pertaining to efficient and effective case processing.

19. In any instance in which the co-responder, in the judgment of a City, may have engaged in misconduct or failure to fulfill the mission or purpose of the Project as requested, the City shall notify JCMHC, in writing, of the details of the alleged misconduct or failure. JCMHC shall then undertake an appropriate review of the allegations and, in the event the allegations are confirmed, implement any necessary or appropriate discipline up to, and including, termination of the co-responder, after discussion with the Project Leadership Team, as deemed appropriate.

20. Should the Project be terminated for any reason, JCMHC is solely responsible for any and all decisions as to whether to continue to employ a co-responder. The co-responder shall have no recourse against any City for any employment decision(s) made by JCMHC, including termination of the Project or termination of the co-responder.

21. Equipment and other tangible property provided to the co-responder by any City as part of the Project will remain property of the respective City and must be returned to

the respective City immediately upon termination of the co-responder, or within thirty (30) days of the termination of the Project, unless otherwise agreed to in writing.

22. The co-responder shall, to the extent practical, keep a general account of time spent working for each City, including types of activities, police calls, and training.

C. Legal Status.

This MOU is authorized by K.S.A. 12-2908 as a contract between municipalities to perform governmental services or activities, is not an interlocal agreement as contemplated by K.S.A. 12-2901 et seq.; and does not create a new or separate legal entity. Each Party shall be responsible for the actions and responsibilities arising under this MOU of its respective employees.

D. Confidentiality; Inquiries.

1. The Parties shall adhere to all applicable laws and policies regarding the confidentiality of data or information obtained during the Project. To the extent required by law, the Parties shall comply with HIPAA, and are to maintain the confidentiality of personal health information (PHI), sharing that PHI only to the extent necessary to coordinate treatment or disposition of the crisis situation.

2. As a general rule, all outside inquiries regarding the Project shall be directed to the respective Public Information Officer representing the involved City. Any inquiries involving mental health case supervision issues shall be directed to JCMHC.

IV. Effective Date, Duration, Termination, Insurance and Funding.

A. This MOU shall become effective upon execution by all Parties.

B. This MOU may be executed in one or more counterparts, including by facsimile, each of which when compiled in its entirety shall together constitute one and the same instrument.

C. The term of this MOU is for the duration of the Project.

D. Any Party may terminate its relationship with the Project and withdraw from the Project and this MOU at any time, by written notification to the other Parties at least (60) days prior to termination. The terminating Party will be responsible for its pro rata share of the costs of the Project up to and including the last date of its participation, regardless of the use of the co-responder. Notice of termination shall be delivered to the Project Leadership Team. If one or more Cities terminate its relationship to the Project, then the JCMHC and remaining Cities may agree to continue the Project under this MOU by amending the pro rata shares in the Addendum, renegotiate this MOU, or terminate the MOU.

E. Insurance – The Parties shall each carry and maintain in force for the duration of the Project insurance coverage, underwritten by insurer(s) lawfully authorized to write insurance in the state of Kansas, of the minimum types and limits as set forth below:

1. All Parties shall carry Commercial General Liability
    a. $1,000,000 Combined Single Limit, for bodily injury, personal injury, and property damage liability per occurrence
    b. $2,000,000 annual aggregate

    Coverage must include Premises and Operations; Contractual Liability; Products and Completed Operations Liability.

2. All Parties shall carry Commercial Automobile Liability - $500,000 Combined Single Limit, for bodily injury, personal injury, and property damage liability per accident covering all owned, non-owned, and hired vehicles. Provided, however, it is understood and agreed by the Parties that the JCMHC provided vehicle shall be covered primarily by JCMHC's automobile liability self-insurance and insurance program.

3. JCMHC shall carry Professional Liability
    a. $1,000,000 Combined Single Limit, for bodily injury, personal injury, and property damage liability per occurrence
    b. $3,000,000 annual aggregate

4. Cities shall carry Law Enforcement Liability
    a. $1,000,000 Combined Single Limit, for bodily injury, personal injury, and property damage liability per occurrence
    b. $2,000,000 annual aggregate

5. As respects each Party's employees:
    a. Statutory Workers' Compensation
    b. Employer's Liability:
        i. Bodily Injury by Accident $500,000 Each Accident:
        ii. Bodily Injury by Disease $500,000 Policy Limit
        iii. Bodily Injury by Disease $500,000 Each Employee

Provided, however, it is understood and agreed by the Parties that the co-responder shall be covered primarily by the JCMHC Workers' Compensation and Employer's Liability self-insurance and excess insurance coverage.

Each Party shall furnish the other with Certificate(s) of Insurance verifying the required insurance is in full force and effect in accordance with this MOU. Certificate Holders shall be the Parties as shown on attached exhibit A.

Board of County Commissioners and JCMHC
Johnson County, Kansas

c/o Risk Manager
111 South Cherry Street, Suite 2400
Olathe, Kansas 66061-3486

Prior to cancellation or non-renewal, each Party agrees that it or its Agent shall provide Certificate Holder not less than thirty (30) days advance written notice of such change. Renewal certificate(s) of insurance shall be provided by the Parties within ten (10) business days of insurance renewals.

F. Expenditure of funds as part of the Project will be subject to the respective budgetary processes of each Party. To the extent that this MOU is interpreted as requiring any expenditure of funds by any City, the Parties acknowledge that the Cities are obligated only to pay expenditures as may lawfully be made from: (a) funds budgeted and appropriated for that purpose during that City's current budget year; or (b) funds made available from any lawfully operated revenue producing source.

G. This MOU shall inure to the benefit of, and shall be binding upon, the Parties and their respective successors.

Tim DeWeese, Executive Director
Johnson County Mental Health Center

CITY OF LEAWOOD CORPORATE SEAL KANSAS

City of Leawood:

By: _____
Peggy Dunn, Mayor

ATTEST:

_____
Debra Harper, City Clerk

APPROVED AS TO FORM:

_____
Patricia A. Bennett, City Attorney

City of Prairie Village:

By: _____
Laura Wassmer, Mayor

ATTEST:

_____
Joyce Mundy, City Clerk

APPROVED AS TO FORM:

_____
Catherine Logan, City Attorney

City of Merriam:

By: _____
Ken Sissom, Mayor

ATTEST:

_____
Juli Pinnick, City Clerk

APPROVED AS TO FORM:

_____
Michelle Daise, City Attorney

City of Westwood:

By: _____
John Ye, Mayor

ATTEST:

_____
Fred Sherman, City Clerk

APPROVED AS TO FORM:

_____
Ryan Denk, City Attorney

City of Westwood Hills:

By: _____
Paula Schwach, Mayor

ATTEST:

_____
Beth O'Bryan, City Clerk

APPROVED AS TO FORM:

_____
James Orr, City Attorney

City of Mission Woods:

By: _____
Robert Tietze, Mayor

ATTEST:

_____
Shelley Floyd, City Clerk

APPROVED AS TO FORM:

_____
~~Steve Mauer~~, City Attorney
Jessica B. James

City of Mission:

By: _____
Steve Schowengerdt, Mayor

ATTEST:

_____
Martha Sumrall, City Clerk

APPROVED AS TO FORM:

_____
David Martin, City Attorney

City of Roeland Park:

By: _____
Joel Marquardt, Mayor

ATTEST:

_____
Kelley Bohon, City Clerk

APPROVED AS TO FORM:

_____
Neil Shortlidge, City Attorney

City of Fairway:

By: _____
Jerry Wiley, Mayor

ATTEST:

_____
Kathy Axelson, City Clerk

APPROVED AS TO FORM:

_____
Stephen Chinn, City Attorney

ADDENDUM
PROJECT BUDGET

The total annual cost for the Project shall not exceed $94,664.08, except for overtime approved in advance by each City's point of contact, as approved in each City's budget. JCMHC shall invoice each City on a quarterly basis according to its pro rata share, determined by population, as follows:

City	Percent	Annual Share of Cost
Leawood	36%	$34,452.44
Prairie Village	23%	$22,054.73
Merriam	13%	$11,747.39
Mission	11%	$9,717.07
Mission Hills	4%	$3,623.04
Mission Woods	<1%	$178.10
Roeland Park	8%	$6,970.28
Fairway	4%	$3,991.45
Westwood	2%	$1,559.13
Westwood Hills	<1%	$370.45

Exhibit A

Board of County Commissioners and JCMHC
Johnson County, Kansas c/o Risk Manager
111 South Cherry Street, Suite 2400
Olathe, Kansas 66061-3486

City of Leawood Kansas
4800 Town Center Drive
Leawood, Kansas 66211

City of Prairie Village Kansas
7700 Mission Road
Prairie Village, Kansas
66208

City of Merriam Kansas
9001 W. 62nd Street,
Merriam, Kansas
66202

City of Mission Kansas
6090 Woodson
Mission, Kansas
66202

City of Roeland Park Kansas
4600 W. 51st Street
Roeland Park, Kansas
66205

City of Westwood
4700 Rainbow Boulevard
Westwood, Kansas
66205

City of Westwood Hills
2216 West 49th Street
Westwood Hills, Kansas
666205

City of Fairway Kansas
4210 Shawnee Mission Parkway, Suite #100
Fairway, Kansas
66205

City of Mission Woods Kansas
4700 Rainbow
Westwood, Kansas
66205

Johnson County Mental Health Co-Responder Partnership Overview

John Morris
Chief of Police

Mental Health Co-Responder

- **Mental Health Co-Responders** - The Mental Health Co-responder Program embeds a mental health clinician from JCMHC within most of the police departments within Johnson County. The goal of the program is to provide the right intervention at the right time in an effort to prevent unnecessary arrests, decrease trips to the emergency rooms and reduce repeat calls for service for our law enforcement partners. The Co-Responder's primary responsibility is to respond on scene with a law enforcement officer on calls when behavioral health is identified as a possible contributing factor. Additionally, co-responders conduct outreach and follow-up calls to individuals who had police contact as a result of a behavioral health crisis, with the intention of getting the individual the help they need to avoid future police contact. The Co-Responder often works with the Crisis Intervention Team (CIT) trained officers in providing community based interventions as well as follow up and referrals.

Why the need for a Co-Responder

- Funding for MH from the State is decreasing.
- Assist law enforcement with difficult calls.
- Assist individuals and families that are in need of help in the community.
- Help prevent a situation from escalating into a crime and a citizen going to jail, when what they need is mental health treatment.
- Suicide prevention.

Benefits

- Higher quality of service with face to face intervention compared to phone assessment.
- Right intervention at the right time.
- Less jail beds utilized.
- More efficient use of law enforcement time.
- Builds stronger relationships with law enforcement.
- Measuring the negative: what if a co-responder had not been part of the intervention.

Other Benefits

- Citizens
  - Knowledge of resources available.
  - A point of contact for questions and concerns.
- Community
  - Decreased use of hospital ER for MH reasons.
  - Increased access for citizens with MH issues.
- Law enforcement
  - Increased education/training about MH.

Collaborative Project

- Johnson County Mental Health.
- Roeland Park, Merriam, Mission, Fairway, Westwood, Westwood Hills, Mission Woods.
- Cost sharing based on population.
- 2018 Roeland Park Cost $6,151.00
- 2019 estimate Roeland Park Cost $19,428

Current M.O.U.

- Ay party may terminate its relationship with the Project and withdraw from the project and MOU at any time, by written notification to the other Parties at least (60) days prior to termination. The terminating Party will be responsible for its pro rate share of the costs of the project up to and including the last date of its participation, regardless of the use of the co-responder.

2018 Activity in Roeland Park by a Co-Responder

- 32 Contacts , which is 3.8% of total contacts in N.E. JOCO.
- 22.9 Hours, which is 3.8% of total hours in N.E. JOCO.
- 0 Emergency room avoided incidents in RP.
- 0 Jail avoided incidents in RP.
- 1-911 response , 1 assess by phone, 1 outreach, 6 follow-ups, 6 care coordination, 1 family education, 3 officer education, 13 reviewed reports.

Increased Cost Estimate of Co-Responder Services

- The increase of cost is associated with the City of Leawood & Prairie Village to establish their own Co-Responder unit.
- Additional funding from a local hospital not obtained thus creating a greater cost to each city.
- RP increase would be $13,277 from the previous year.

Co-Responder Cost / Call

- 2018 RP Shared Cost @ $6151.00
- 32 Calls for service contact divided by $6151.00 = $192.00 per call.

- 2019 RP Shared Cost @ $19,428
- Average of 32 Calls for service contact would be @ $607.00 per call. Up $415.00 per call.

Roeland Park are CIT Trained Officers

- CIT is community based. As an innovative program, the CIT model encourages communities, families, law enforcement officers and mental health professionals to work together.
- Greater efficiency in obtaining care for persons involved in mental health crisis.
- Reduces recidivism and arrests by diverting individuals with a mental illness to appropriate community mental health providers.
- Enhances officer skills in responding safely and creatively to mental health crisis situations and increases citizen confidence in reporting incidents.
- Increases collaboration and cooperation between criminal justice and mental health systems.
- Responds immediately. CIT trained officers are a part of departments regular patrol division.
- CIT officers reduce likelihood of physical confrontations and personal injury to both the officer and the individual. Improves satisfaction from the mentally ill and their family.

Mental Health in the Community

- According to the U.S. Department of Health and Human services, approximately one in five American adults will have a mental health problem in any given year. Knowing that, the local community's need to respond to mental health emergencies in a compassionate, appropriate manner is key. Johnson County continues to meet the community's challenges and needs through the co-responder program.

Recap of the Co-Responder

The purpose of the Project is to find ways that the mental health and criminal justice systems of Johnson County, specifically within the Cities, can work in partnership to improve service response to individuals who suffer from mental health issues and have co-occurring substance use disorders, or who are in danger of becoming alcoholics or drug abusers.

Contacts / Co-Responder

- If you or someone you know is having a mental health emergency, **please call 913-268-0156.**
- For inquiries into the co-responder program, contact Jessica Murphy at **913-826-4200.**

Director for JOCO Emergency Services

- **Rob MacDougall, LMSW**
- **Director of Emergency Services**
- Johnson County Mental Health Center
- 6000 Lamar Ave Suite 130, Mission, KS 66202
- Direct (913) 826-4077 | Crisis (913) 268-0156
  Fax (913) 826-1608

RSI Services

-
- **24/7 Crisis Stabilization Services**
- ***for adults, 18 and older***
- **24-hour Triage**
- **Sobering Unit**
- **Crisis Observation Unit**

- **(Mental Health)**
- **Crisis Stabilization Unit**

- **New Location!**
- **(Beginning January 29, 2018)**
- **1301 North 47th Street**
- **Kansas City, KS 66102**
- **913-956-5620**
- **24-hour Crisis Line: 913-788-4200**
-

Questions ?

JOCO

THE JOHNSON COUNTY GOVERNMENT MAGAZINE FALL 2017

Features

Johnson County Co-Responders

County approves FY2018 budget

Johnson County's Co-Responder program

New solutions for law enforcement's interactions with mental health

by CHRIS DEPUSOIR

The Johnson County Co-Responder program deploys a mental health professional who is embedded with police personnel and responds on-site with law enforcement when mental illness is identified as a factor in a call. Individuals who suffer from a mental illness are disproportionately represented in the criminal justice system. This innovative program effectively provides follow up and engagement with people to get them into local services and prevent them from being incarcerated, ending up in emergency rooms or potentially involved in continued police interactions.

In 2010, when Johnson County received a grant from the Bureau of Justice Assistance, an agency of the U.S. Department of Justice, the county's co-responder program was born. The first local government to participate and implement a co-responder was the city of Olathe, the second largest city in the county, keeping the program going even after exhausting the grant funds.

"Continued funding by the city of Olathe once the grant ended was an indication of the great value they saw and received in the co-responder program," said Assistant County Manager Maury Thompson.

The city of Olathe was the first local jurisdiction to add a co-responder and they recently added a second part-time mental health professional.

Overland Park joined the co-responder program in 2013. Next year, they will add a second, giving them 16 hours of coverage.

What is a Co-Responder

A co-responder is a Johnson County Mental Health Center (JCMHC) employee, who is embedded in one or more county law enforcement agencies. The goal is to address and de-escalate situations in the field alongside law enforcement officers. These Masters-level mental health clinicians meet the Kansas statute requirements of Qualified Mental Health Professionals, although their individual degrees, backgrounds and specialties may vary. They are trained to make quick assessments and provide crisis intervention at the scene of an emergency. While co-responders are employees of JCMHC, cities or jurisdictions fund the position, paying for the technology and clinical skill these professionals bring.

"Not only does the co-responder program save local officers time that they can dedicate to law enforcement activity, but the person with a mental illness receives the assessment and treatment they need."

— *Assistant County Manager Maury Thompson*

The mental health co-responder has an office within a law enforcement department, although they aren't sworn officers and do not dress in police uniforms. By having offices with a partnering law enforcement agency, the mental health staff is able to build trust and communication with police colleagues. They also provide training for officers and offer techniques on the best ways to respond to persons who may have a mental illness. The co-responder receives additional training to acclimate to this unique position including non-emergency driving training, radio usage, ride-a-longs and use of police department computer systems.

The co-responder has access to electronic medical record information which can provide pertinent information in response to a call. The clinician always works in the field alongside law enforcement, never alone, and only once a scene is deemed safe. These professionals have a range of key skills and qualities including comfort in managing high-risk situations, excellent diagnostic skills for adults and minors, understanding of and working within HIPAA, expert knowledge of community resources and more.

Goals and community impact

The goal of the co-responder program is to identify and address the needs of mentally ill individuals in their interactions with law enforcement. As a result, communities hope to reduce unnecessary arrests or trips to emergency rooms as default solutions for dealing with mentally ill residents. Avoiding the emergency room also decreases the likelihood of a situation escalating since law enforcement is not having to take the person into custody. The program helps people access services more quickly in an attempt to reduce future contact with law enforcement.

"Not only does the co-responder program save local officers time that they can dedicate to law enforcement activity," said

JOHNSON COUNTY KANSAS
Co-Responder

The cities of Shawnee and Lenexa currently share a co-responder. However, in 2018, each city will have its own full-time co-responder.

Several cities in northeast Johnson County joined the co-responder program this year sharing one mental health professional among Fairway, Leawood, Merriam, Mission, Mission Hills, Mission Woods, Prairie Village, Roeland Park, Westwood and Westwood Hills.

Thompson, "but the person with a mental illness receives the assessment and treatment they need."

After incidents, the co-responder can help to coordinate care for people. They can utilize the JCMHC Mobile Crisis Response Team (MCRT) to engage struggling persons to consider or enter services. Community partners such as hospitals, EMS and others can meet with clients and treatment providers to introduce the co-responder and crisis intervention team to open discussions and participate in crisis planning.

Co-responders can reach out to suicide survivors (family and friends) a few weeks after a completed suicide to check in with survivors and see if they need any resources. In additon, to help reduce the effects of trauma, co-responders are also starting follow up after significant events. With the Overland Park fire this spring, a co-responder on the scene as well as three co-responders participated in a community support group the following weekend.

Moving forward

The program started at the county level from discussions with the criminal justice coordinator and the city of Olathe and has expanded over the past seven years. The Overland Park Police Department joined the program three years later. In 2016, the cities of Lenexa and Shawnee added a co-responder, sharing one mental health professional. Earlier this year, the program expanded to 14 cities as another shared co-responder was added for northeast Johnson County cities: Fairway, Leawood, Merriam, Mission, Mission Hills, Mission Woods, Prairie Village, Roeland Park, Westwood and Westwood Hills. Existing partners are making more changes too. That's seven cities and 10 police departments partnering with a Johnson County co-responder. In addition, Med-Act, Johnson County's emergency medical service, shares a community outreach clinician co-responder to assist on emergency medical calls.

This summer, the city of Olathe added a part-time co-responder, funded through the Olathe Health System. In January 2018, Lenexa and Shawnee will each have a full-time professional and Overland Park will have a second full-time co-responder, providing them with 16 hours of co-responder coverage.

In addition, Johnson County Mental Health has partnered with the Johnson County EMS System Medical Director Program, which provides medical oversight to all Fire and EMS agencies in the county, providing the EMS System a co-responder that works specifically with Fire and EMS agencies to address frequent utilizers of 911 and those Fire/EMS patients who have mental illness and substance abuse issues.

"Allowing our prehospital providers to have access to a qualified mental health professional for patients with complex social needs is a true asset. This collaboration between mental health and EMS is a big breakthrough that is long overdue," said Ryan Jacobsen MD, medical director, Johnson County EMS System. "Many of our patient's needs are not met by a simple ride in the ambulance to the hospital. The program creates another option for patients to get the help they need."

Over time, local resources such as hospital beds for inpatient mental health facilities and the ability to hold people for involuntary detoxification have decreased. According to Johnson County Mental Health, as the demand for mental health services has increased, funding has decreased, leading to cuts in services, including emergency mental health services.

Information is collected and used to maintain and expand the local co-responder programs because of its successful outcomes. The data that current co-responders enter in the JCMHC electronic medical record software is essential to maintaining clinical history and treatment coordination after mental health interactions, including contact , if an arrest or emergency room was avoided, if substance abuse is indicated, or suicide threats or attempts.

According to the U.S. Department of Health and Human services, approximately one in five American adults will have a mental health problem in any given year. Knowing that, the local community's need to respond to mental health emergencies in a compassionate, appropriate manner is key. Johnson County continues to meet the community's challenges and needs through the co-responder program.

If you or someone you know is having a mental health emergency, **please call 913-268-0156.**

For inquiries into the co-responder program, contact Jessica Murphy at **913-826-4200.**

WEB EXTRA

Check out a video about the co-responder program online at **jocogov.org/jocomag**.

Overland Park Co-Responder

Personnel

Position	Name	Annual Salary/Rate	2019	2020	2021
Co-Responder Salary	TBD	27/hr	$56,160	$57,845	$59,580
			$56,160	$57,845	$59,580

Fringe Benefits

Component	Rate	2019	2020	2021
Fica	0.0765	$4,296	$4,425	$4,558
Workers Compensation	0.01468	$824	$849	$875
Unemployment Tax	0.0025	$140	$145	$149
Life Insurance	0.0019	$107	$110	$113
Health Insurance	$13,841	$27,682	$29,620	$31,693
KPERS(Retirement)	0.1056	$5,930	$6,108	$6,292
		$38,979	$41,257	$43,680

Supplies

Items	Rate	2019	2020	2021
General Office Supplies	$27.50/mo	$329	$329	$329
Copies	100/mo copies x $.05075/copy	$61	$61	$61
		$390	$390	$390

Other

Item	Rate	2019	2020	2021
Co-Responder Training / QMHP Licensing		$350	$350	$350
Cellular Phone Allowance	$45/mo	$540	$540	$540
		$890	$890	$890

Total Project Budget Summary		2019	2020	2021
Personnel		$56,160	$57,845	$59,580
Fringe Benefits		$38,979	$41,257	$43,680
Supplies		$390	$390	$390
Other		$890	$890	$890
	Total	$96,419	$100,382	$104,541

City of Overland Park / JCMHC Co-Responder Project
Three Year Projections

A Personnel

				DOJ Grant Funded				Other Funding
				Year 1 (9 Mos)		Year 2 (12 Mos)		Year 3 (12 Mos)
Position	Name	Annual Salary/Rate	Level of Effort	Federal	Match	Federal	Match	
Co-Responder Salary	To be selected	$ 65,728	1	49,296	-	65,728	-	67371.2
JCMHC Supervision	Rob MacDougall	$ 61,963	0.05	-	3,098	-	4,131	
Lenexa CIT Officer	To be selected	$82,056	0.15		12,308		16,411	
Shawnee CIT Officer	To be selected	$93,350	0.15		14,003	-	18,671	
				49,296	29,409	65,728	39,212	67,371

B Fringe Benefits

		Year 1 (9 Mos)		Year 2 (12 Mos)		Year 3 (12 Mos)
Component	Rate	Federal	Match	Federal	Match	
Fica	0.0765	3,771	-	5,028	-	5,154
Workers Compensation	0.003133	154	-	206	-	211
Unemployment Tax	0.0031	153	-	204	-	209
Life Insurance	0.00011	5	-	7	-	7
Health Insurance	$11,501	8,626	-	11,501	-	12,651
KPERS(Retirement)	0.1033	5,092	-	6,790	-	6,959
		17,801	-	23,736	-	25,191

C Travel

				Year 1 (9 Mos)		Year 2 (12 Mos)		Year 3 (12 Mos)
Purpose of Travel	Location	Item	Rate	Federal	Match	Federal	Match	
Grantee Meeting, 1 per year	Washington, DC	Airfaire	350/flight x 4 persons 1st Yr/2 persons 2nd Yr	1,400	-	700	-	-
		Hotel	230/night x 4 persons x 2 nights Yr 1, 2 staff, 3 nights Yr 2	1,840	-	1,380	-	-
		M & IE Per Diem	71/day x 4 persons x 3 days Yr 1 & 71/day x 2 persons x 4 days	852	-	568	-	-
		Ground Transportation		900	-	600	-	-
Local Travel - Vehicle Rental to be split by Lenexa/Shawnee		Rental of Vehicle Including Maintenance	313/Mo		2,817		3,756	-
Local Travel - Lenexa/Shawnee Fuel Cost		Fuel	Est 1,250 miles/mo at $3.50/gallon avg 25 MPG	-	1,575	-	2,100	-
				4,992	4,392	3,248	5,856	-

D Equipment None

E Supplies

		Year 1 (9 Mos)		Year 2 (12 Mos)		Year 3 (12 Mos)
Items	Rate	Federal	Match	Federal	Match	
General Office Supplies	$27.50/mo	246	-	329	-	-
Printer		348	-	-	-	-

Laptop Computer w/ docking station		2,583	-	-	-	-
Copies	100/mo copies x $.05075/copy	46	-	61	-	-
		3,223		390	-	-

F Contracts

		Year 1 (9 Mos)		Year 2 (12 Mos)		Year 3 (12 Mos)	
Name	Service	Federal	Match	Federal	Match		
Dr. Alex Holsinger	Evaluation	3,750	-	5,000	-	-	8,750

G Construction Not Applicable

H Other

		Year 1 (9 Mos)		Year 2 (12 Mos)		Year 3 (12 Mos)
Item	Rate	Federal	Match	Federal	Match	
Co-Responder Training/QMHP Licensing		350	-	350	-	350
Dispatcher Training	18 staff x $90	1,620	-	-	-	-
Cellular Phone Allowance	$45/mo	405		540	-	
			-			540
		2,375	-	890	-	890

	Year 1 (9 Mos)		Year 2 (12 Mos)		Year 3 (12 Mos)
Total Project Budget Summary	Federal	Match	Federal	Match	
A Personnel	49,296	29,409	65,728	39,212	67,371
B Fringe Benefits	17,801	-	23,736	-	25,191
C Travel	4,992	4,392	3,248	5,856	-
D Equipment	-	-	-	-	-
E Supplies	3,223	-	390	-	-
F Contracts	3,750	-	5,000	-	-
G Construction	-	-	-	-	-
H Other	2,375	-	890	-	890
Total	81,437	33,801	98,992	45,068	93,452

180,429
78,869
259,298
0.30

Mental Health Calls in Roeland Park

What does a Co-Responder do?

- On-scene response and assessment + state hospital screenings, if needed
- Provide outreach by phone or to the home (always with an officer)
- Review police reports
- Suicide and trauma survivor follow-up
- Training for officers

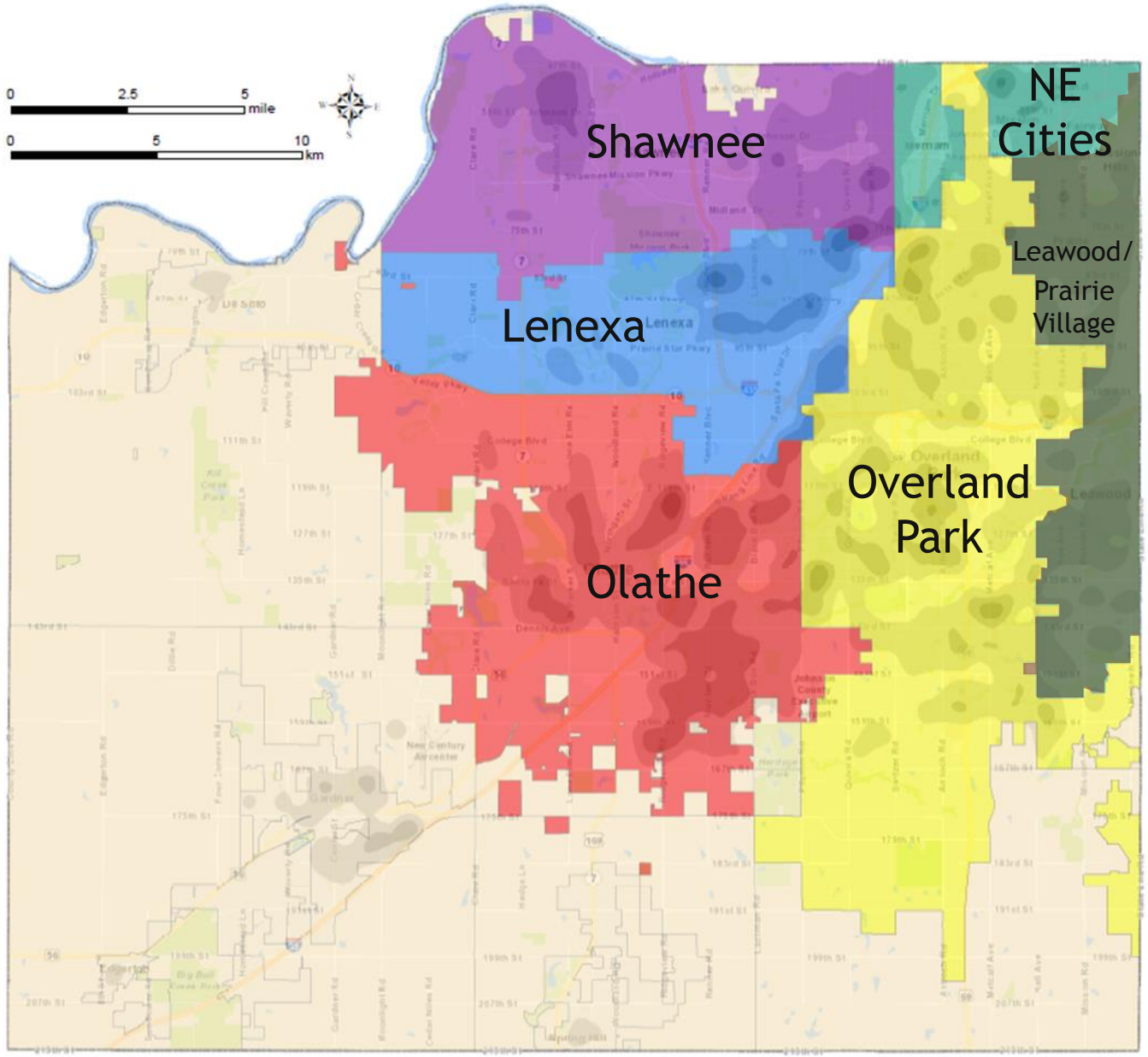
Why Mental Health Co-Responder?

- Suicide prevention
- Unnecessary trips to the ER
- Reduce repeat calls of service by connecting to treatment

The right intervention at the right time by the right person

Program Awards

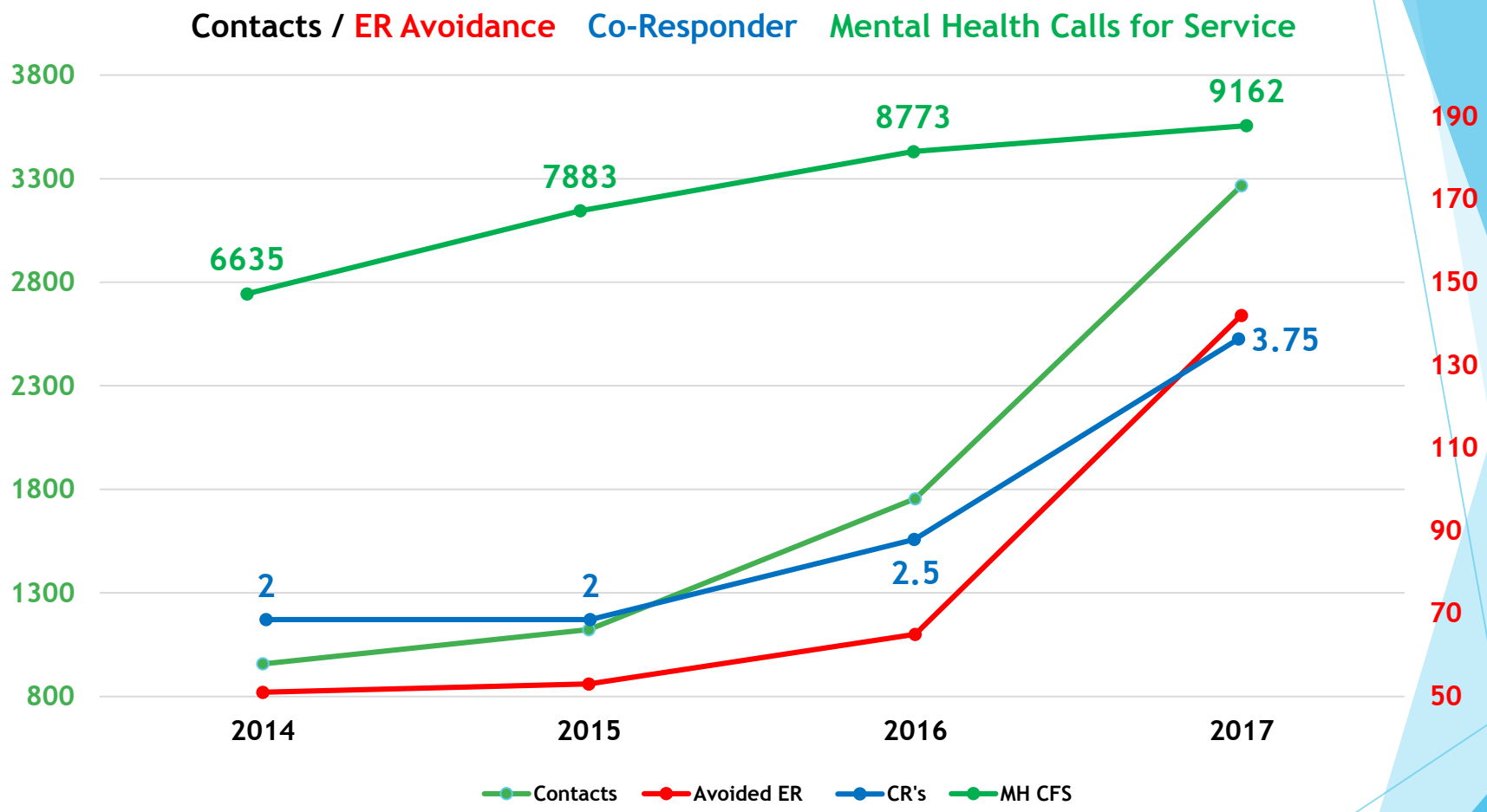
- **Outstanding Achievement in Local Government Innovation** awarded by Transforming Local Government *(April 2013)*
- **Accessible Community Service** awarded by the City of Olathe *(Oct 2013)*
- **NACo Achievement** awarded by National Association of Counties *(July 2016)*
- **Excellence in Community Service** awarded by United Community Services of Johnson County *(Dec 2017)*



Current

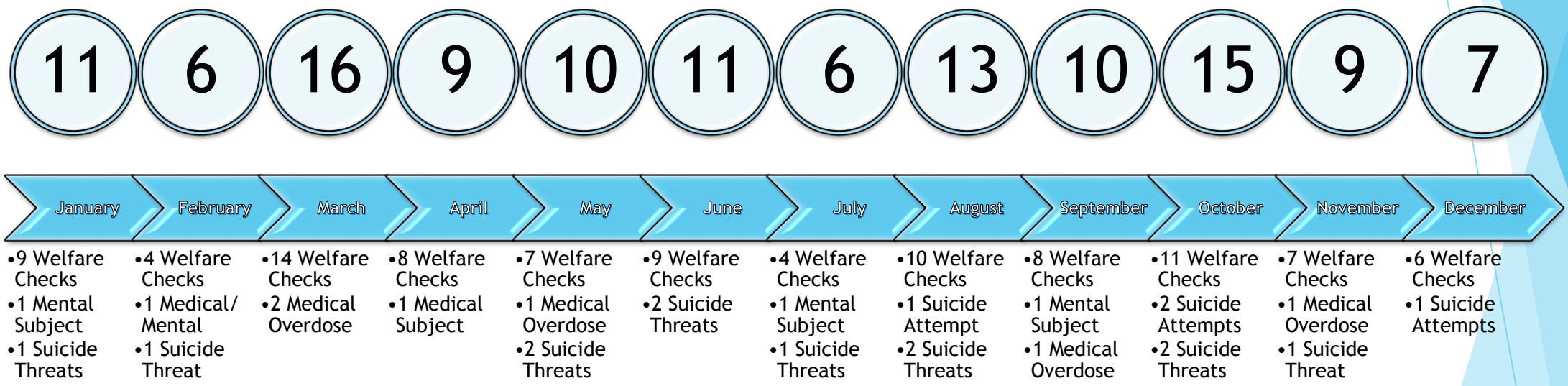
Co-Responder Coverage

Correlation of Co-Responder Data



Roeland Park Calls For Service

Mental Health Related Calls



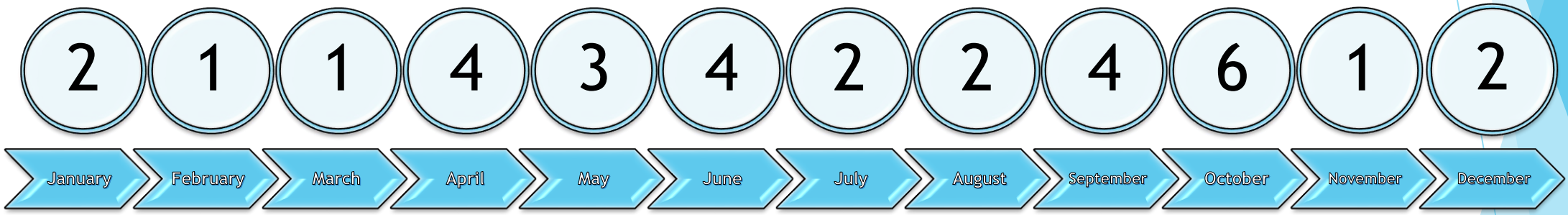
Calls For Service

Mental Health Related Calls

	January	February	March	April	May	June	July	August	September	October	November	December	
Roeland Park PD	11	6	16	9	10	11	6	13	10	15	9	7	123
Merriam PD	34	25	26	30	32	40	32	37	50	31	18	34	389
Mission PD	13	14	20	18	29	21	24	15	22	33	24	29	262
Westwood PD	4	2	8	3	3	9	5	3	7	8	4	5	61
Fairway PD	1	1	2	3	4	3	7	2	3	5	3	2	36

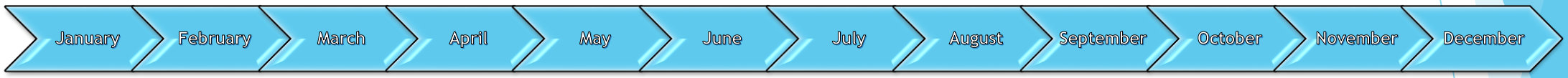
Johnson County
Mental Health Co-Responder

CR Roeland Park Contacts per Month and Dispositions



911 Response	Assess by Phone	Outreach	F/U by Phone	F/U by Phone Attempt	Care Coordination	Family Education	First Responder Education	Info Only/ Reviewed Report
1	1	1	1	5	6	1	3	13

Johnson County
Mental Health Co-Responder



All CR Contacts per Month

11	8	21	23	28	21	22	22	29	49	28	32

CR Roeland Park Contacts per Month

2	1	1	4	3	4	2	2	4	6	1	2

Roeland Park Mental Health Calls per Month

11	6	16	9	10	11	6	13	10	15	9	7

Johnson County
Mental Health Co-Responder

CR Contacts per Month

	January	February	March	April	May	June	July	August	September	October	November	December	
Roeland Park PD	2	1	1	4	3	4	2	2	4	6	1	2	32
Merriam PD	7	5	9	16	11	9	10	10	20	29	11	16	153
Mission PD	2	0	8	3	14	6	10	10	5	12	16	12	98
Fairway PD	0	0	0	0	0	2	0	0	0	2	0	2	6
Westwood PD	0	2	3	0	0	0	0	0	0	0	0	0	5

Item Number: **DISCUSSION ITEMS- I.-2.**
Committee Meeting Date: **2/4/2019**

City of Roeland Park

Action Item Summary

Date:	1/30/2019
Submitted By:	Donnie Scharff
Committee/Department:	Public Works
Title:	**2019 CDBG El Monte Design Task Order**
Item Type:	Agreement

Recommendation:

Approval of the design task order with Larkin, Lamp, Rynearson for the 2019 CDBG El Monte project at a cost not to exceed $21,777.

Details:

The City received $136,000 in Community Development Block Grant (CDBG) funding for the year 2019 to be applied toward the El Monte Street mill & overlay. Staff intends to use our on-call City Engineer Larkin, Lamp, Rynearson to perform the design and inspection of the project. This task order is the total cost for these services.

This project limits are from 47th St to the dead end cul da sac. The scope entails spot curb replacement along with a mill & overlay of the asphalt surface. The original CDBG application reflected 4 new streetlights as well as the spot curb repair with a mill an overlay. The city requested $166,000 in CDBG funding but only received $136,000. Removing the proposed installation of new streetlights from the scope will keep the City's matching contribution at the initial commitment for the project of $30,000.

How does item relate to Strategic Plan?

How does item benefit Community for all Ages?

Additional Information

CDBG Funds - $136,000

City Matching Funds - $30,000
Total Project Funding - $166,000

ATTACHMENTS:

Description	Type
2019 El Monte Design Task Order	Cover Memo
2019 CDBG El Monte Application	Cover Memo
El Monte Street Map	Cover Memo
2019 CDBG El Monte Cost Estimate	Cover Memo

City of Roeland Park – 2019 CDBG El Monte Street Mill and Overlay

Contract: 2019 CDBG El Monte Street Mill and Overlay

Ordinance or Resolution:	Task Agreement No: 19-2	Funding Amount: $21,777 Purchase Order No:

Project Title: 2019 CDBG El Monte Street Mill and Overlay

Contractor/Consultant: Larkin Lamp Rynearson 9001 State Line Road, Suite 200 Kansas City, MO 64114	Division Manager: Civil Design Group Daniel G. Miller, P.E. – Civil Design Group Leader
Project Management Manual reviewed:	Attachments (Gantt Chart, etc.): None

PROJECT Scope (can be in the form of an attachment):

1. Mill and Overlay: Contract Documents, Bidding, Construction Administration and Observation. No field or boundary survey, easements, or right-of-way dedication/vacation. Design and installation of new street lights are excluded from project. See attachment.

The attached services will be provided for an hourly rate not to exceed $21,777, including direct expenses.

Staff Signatures		**Partner Signatures**	
Mayor: Mike Kelly	**City Administrator:** Keith Moody	**Division Manager:** Daniel G. Miller, P.E.	**Company Principal (if different):** Tony O'Malley, P.E.
Signature: Date:	Signature: Date:	Signature: Date: 1/17/2019	Signature: Date:

Project Type: Design __X___ Construction __X___ Property Acquisition_____ Conceptual/Problem Solving_____ Surveying_____

Project Discipline(s): Transportation __X___ Planning_____ Water_____ Wastewater_____ Stormwater_____

Report(s) Received:

Work on File:

This Task Agreement is subject to all the provisions included in the On-Call Professional Services Agreement, Public Works Department, Engineering Division by and between the City and Larkin Lamp Rynearson (Professional), **dated 1/1/2017.**	

Attach scope of work, budget, and other supporting material

LARKIN LAMP RYNEARSON
9001 State Line Road Suite 200
Kansas City Missouri 64114
(816) 361-0440 www.LRA-inc.com

CIVIL DESIGN GROUP FEE ESTIMATE

PROJECT TITLE 2019 CDBG - El Monte St - Mill and Overlay
LOCATION Roeland Park, Kansas
DATE 12/28/2018

PROJECT #
BY Dan McGhee

Classification:	Civil Design Group Leader	Sr. Project Manager IV	Project Engineer III	Project Designer IV	Construction Observer	Admin Asst.	Subtotal of Hrs per Item	Subtotal of Fee per Item
Associate:	Miller	McGhee	Schliecher	McMurry	Jones	Cunningham		
Hourly Rate:	$215.00	$172.00	$101.00	$100.00	$92.00	$66.00		
Design & Bidding Services								
Prepare Final Plans	1	4		16			21	$2,503.00
Prepare Permit Applications (none anticipated)							0	$0.00
Utility Meetings, Coordination, Updates		3	2	2			7	$918.00
Neighborhood/Council Meetings (assume 1)	2	2					4	$774.00
Prepare Final Opinion of Probable Const. Costs	1	2		2			5	$759.00
Prepare Bid Documents and Specifications	2	12		4		4	22	$3,158.00
Answer Questions During Bidding		2					2	$344.00
Attend Bid Opening		1					1	$172.00
Tabulate Bids			2				2	$202.00
Analyze Bids and Recommendation Letter	1	2					3	$559.00
Subtotal of Hours per Associate	7	28	4	24	0	4	67	
Subtotal of Fee per Associate	$1,505.00	$4,816.00	$404.00	$2,400.00	$0.00	$264.00		
						Labor Fee		$9,389.00
						Reimbursables	5%	$469.45
						Contingency	5%	$469.45
						Subtotal of Engineering Services		**$10,327.90**
Construction Administration								
Prepare Contract Documents	1	4				4	9	$1,167.00
CDBG Reporting, Documentation	2	12					14	$2,494.00
Conduct Preconstruction Meeting	2	2	2				6	$976.00
Review Shop Drawings		1					1	$172.00
Review Pay Requests		2					2	$344.00
Answer Questions During Construction		2		2			4	$544.00
Perform Final Walk Through		1					1	$172.00
Prepare Record Drawings				4			4	$400.00
Subtotal of Hours per Associate	5	24	2	6	0	4	41	
Subtotal of Fee per Associate	$1,075.00	$4,128.00	$202.00	$600.00	$0.00	$264.00		
						Labor Fee		$6,269.00
						Reimbursables	5%	$313.45
						Contingency	5%	$313.45
						Subtotal of Construction Administration		**$6,895.90**
Construction Observation								
Construction Observation								
Part Time, 20 Hours / Week / 10 Day Construction	2	2	0	0	40	0	44	$4,454.00
Subtotal of Hours per Associate	2	2	0	0	40	0	44	
Subtotal of Fee per Associate	$430.00	$344.00	$0.00	$0.00	$3,680.00			
						Labor Fee		$4,454.00
						Reimbursables	0.58/mi	$98.60
						Contingency	0%	$0.00
						Construction Observation Fee Total		**$4,552.60**

Project Fee Summary

Design Engineering and Bidding	$10,327.90
Construction Administration and Observation	$11,448.50
PROJECT TOTAL	**$21,776.40**

JOHNSON COUNTY
Human Services

Johnson County

PLEASE SUBMIT WITH YOUR 2019 APPLICATION

It is your obligation to make certain that your application is complete. Use this list to make sure and turn in with your signed application.

A FINAL REVIEW LIST
INITIAL EACH ITEM TO VERIFY

KM All five parts of the Application are **TYPED** and completed.

KM Each individual question has been answered.

KM Font size is 12 or larger throughout application and application is typed.

N/A Total request for nonprofit or faith-based community does not exceed $35,000 per agency (page 20 of application handbook).

N/A Total request for city or county department does not exceed $100,000 each program year (page 19 of application handbook).

KM Total request for city or county department may be $200,000, but in 2019 they would be ineligible to apply (page 19 of application handbook).

KM The appropriate official signed the original application in two places: on page 2 of the Project Summary and page 2 of the Certifications.

KM 7 copies + 1 original (8 total) 7 copies three-hole punched, but NOT THE ORIGINAL.

KM The original and the copies are not stapled or bound, a clip is used.

KM 8 colored maps, 8½ x 11, are included showing where the activity will take place.

KM If the activity is carried out at more than one location, a separate sheet and map is included with complete addresses for each location.

KM For a City - documentation of city council holding a public hearing and proof of publication is included.

N/A For a Nonprofit - a copy of your 501(c)(3) IRS tax exemption is included.

N/A For a Nonprofit or Faith-based community - documentation of a formal board action endorsing this application is included.

KM The previous 2 years (2017 & 2018) Performance Measures are attached. Page 2, Part 2 of Project Narrative.

KM In Section 3, total revenue is equal to total expenses.

KM Page limits were not exceeded.

KM Conflict of interest information received, signed and understood. Please submit hard copy.

KM DUNS # completed on Page 1 of Part 1, Project Summary.

KM Fair Housing Activities completed on Page 2 of Part 1, Project Summary.

KM Strategic Priorities questions completed on Page 2 of Part 1, Project Summary.

Person completing form: Keith Moody (Printed Name) City Administrator (Title)

Signature: _____ Date: 5-18-18

http://www.jocogov.org/dept/community-development/application-information

Integrity Bulletin
U.S. Department of Housing and Urban Development
Office of Inspector General
Summer 2016

7 Keys to Handling Conflicts of Interest

Conflicts of interest arise when officials or staff stand to benefit--either directly themselves or indirectly through business partners or relatives--from the awarding or contracting of grant funds. Grantees are encouraged to avoid conflicts of interest to the extent possible. When conflicts of interest arise, grantees must identify, disclose, and manage them in compliance with applicable rules and regulations. When conflict-of-interest issues are overlooked or hidden, this creates problems for the individuals involved, as well as grantees, subrecipients, or contractors. This bulletin discusses common types of conflicts of interest, offers best practices for avoiding and managing them, and the potential consequences of not handling them appropriately.

Identify, disclose, and manage all real and apparent conflicts of interest through elimination, mitigation, or waivers.

1. Know the Requirements

In general, conflicts of interest occur when one's private interest and public duties overlap, resulting in a real or perceived lack of independence or impartiality. Common situations include:

- Elected officials voting on awarding of funds to organizations where a family member is on the staff or where the elected official is on the subrecipient's board;
- Executive directors of subrecipients entering into contracts with companies they are affiliated with through employment of, or ownership by, themselves or their relatives;
- Grantee officials or staff who have relatives who may benefit from a subrecipient's programmatic activities; and
- Failure to notify the U.S. Department of Housing and Urban Development (HUD) about conflicts of interest, or late and or incomplete requests for exceptions.

The existence of a conflict of interest does not necessarily mean that any individual acted improperly or illegally, but it does mean that, unless properly handled and addressed, he or she could end up being in violation of Federal rules. Therefore, all such cases must be identified and resolved by eliminating the conflict or obtaining a written exception.

Two sets of conflict-of-interest rules exist -- one for procurement activities and others for non-procurement, sub-granting/program delivery activities.

A. **Procurement Standards**: Regulations at 2 CFR (Code of Federal Regulations) 200.318(c) require non-Federal entities to maintain written standards of conduct

Regulations are in transition between grants issued before December 26, 2014 (when 2 CFR Part 200 went into effect), and those issued later. See the footnote below for more detail.[1]

Example of a Procurement Conflict of Interest

- A Neighborhood Stabilization Program (NSP) grantee funded a subrecipient to rehabilitate 28 homes. The subrecipient failed to report a conflict-of-interest situation when it entered into two contracts with a construction company that was 50 percent owned by the NSP subrecipient's executive director. Although the subrecipient stated that it had disclosed all relationships to the grantee in the proposal process, the grantee overlooked HUD's conflict-of-interest requirements and the requirements found in the agreement. Because the grantee approved the proposal and awarded the agreement, the subrecipient believed that there were no conflict-of-interest issues. The grantee should have flagged the conflict of interest situation during its risk assessment of the subrecipient and prohibited the use of the executive director's construction firm.

B. **Non-procurement Standards**: Regulations at 2 CFR 200.112 require HUD to establish conflict-of-interest policies for Federal awards and require non-Federal entities to disclose in writing any potential conflict of interest to HUD or a pass-through entity in accordance with HUD's policy. HUD is finalizing its conflict-of-interest policy, but entities are still expected to use the policies developed under the various Community Planning and Development (CPD) program-specific regulations. In general, all CPD program regulations prohibit grant-assisted activity benefitting relatives of people who work for the grantee or the pass-through entity.

Example of Non-Procurement Conflict of Interest

- A city awarded a Community Housing Development Organization (CHDO) $215,975 in HOME funds to sell and construct one single-family home. At the time of the award, a city official's daughter was the president of the CHDO. The city official abstained from voting on the basis that there was a relationship with the executive director. However, the city was required to disclose these relationships to HUD and had not done so. The city should have developed and implemented written procedures to ensure compliance with HUD's conflict-of-interest regulations, including disclosure of potential conflict-of-interest situations.

2. Train Employees

Grantees and subrecipients ought to build an organizational culture that is conscious of potential conflicts of interest so that action can be taken to avoid or mitigate conflicts as they arise. Provide conflict-of-interest training for all employees, including those of the organization and

[1] For more detail see Special Directive SD-2015-01, dated February 26, 2015, "Transition to 2 CFR Part 200," Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, Final Guidance. (http://portal.hud.gov/hudportal/documents/huddoc?id=15-01sdn.pdf)

the governing authority, the organization's leadership and, as appropriate, the organization's agents. To have the most impact, the organization should have a written policy requiring annual conflict-of-interest training, and legal counsel or other qualified individuals should review the policy with employees (and board members), subrecipient officers, and pass-through entity staff at least annually. Documenting training is a best practice. The organization should:

- Provide training;
- Require that staff annually submit certifications regarding outside businesses, outside employment, and volunteer positions;
- Record a certification of attendance at trainings; and
- Follow up with annual refresher sessions.

3. Create Procedures to Document Compliance

Conflict-of-interest policies and procedures should describe how conflicts will be handled. When a conflict or potential conflict of interest exists, the person with the conflict should advise the board or management committee in writing and seek guidance on how to resolve the conflict. Conflict-of-interest notifications usually include:

- The person's name, position, phone number and address;
- Details of the nature of the conflict of interest, (perceived, apparent, or actual);
- Date of notification; and
- Requested action to address the conflict of interest (recusal, exemption request, etc.).

The notification and subsequent actions should be recorded in minutes of board or management meetings. Record-keeping best practices includes documenting:

- Conflict-of-interest notifications;
- Cases of failure to disclose;
- Disclosure by others (for example colleague or member of the public);
- Reviews or investigations of alleged conflicts;
- Assessment of the matter and how it was considered;
- Action taken or resolution; and
- Annoying or trivial claims.

4. Implement the Regulations

Often people are unaware that their activities are in conflict with the best interests of the organization. A goal should be to raise awareness, encourage disclosure and discussion of issues that may constitute a conflict, and constantly encourage a "culture of candor."

Leadership and culture are important aspects of compliance. Boards or leaders should establish a culture of compliance and honesty and encourage disclosure by establishing a protocol for staff to self-report possible conflicts, raise suspected conflict-of-interest issues, or ask for guidance, without fear of retaliation. Leadership should appoint an individual or office to ensure conflict-of-interest rules are implemented and followed. However, the protocol should not rely solely on

voluntary compliance, but also on procedures to allow grantees and subrecipients to report and have independent checks made to ensure that conflicts do not exist.

Monitoring is a best practice that entails having someone review the names of the principals of businesses that may become subrecipients, contractors or suppliers to determine whether there are apparent or real conflicts of interest with staff or agents of the awarding entity or pass-through entity. Many organizations circulate a questionnaire each year (usually in conjunction with training) to find out whether any board member, officer, or employee has a conflict of interest. Typically, the questionnaire asks them to disclose existing conflicts and reminds them to disclose any that may crop up in the future.

Monitors should also determine whether subrecipients have conflicts of interest in sub-awards and contracts by asking them to disclose the names of their immediate family and business partners and those of the principals of the organizations and contractors with which they transact grant project business.

The primary goal in managing conflicts of interest is to ensure that as decisions are made, they are seen to be made on proper grounds, for legitimate reasons, and without bias or unfairness.

5. Know the Consequences

Violating conflict-of-interest rules can have serious consequences for a grant program. Bad publicity surrounding undisclosed conflicts may seriously undermine the public trust in the program as well as damage personal reputations. Audits and investigations can result in the grantee's having to repay Federal funds, or individuals being fired or prosecuted.

A Conflict of Interest Can Lead to Criminal Actions

In some cases, conflicts of interest can lead to criminal prosecutions. It's not that the conflict of interest itself is a criminal act, but it can lead to other acts, such as deliberately hiding relationships, financial gains or other advantages through false statements, misrepresentations, or filing false documents, which are crimes. With such personal risk at stake, it is easy to see why disclosures of conflicts of interest are so important.

Example of a Prosecution Resulting from a Conflict of Interest

- A former planning commissioner and her ex-boyfriend were convicted on Federal corruption charges. The pair took part in a scheme in which she steered more than $2 million in contracts and loans to him. She got the agency to award a computer contract to the ex-boyfriend's company. The contract, which started at $8,900, escalated to about $1 million over 5 years. The former planning commissioner did not reveal details of her personal relationship with the ex-boyfriend and helped keep his name off the contracts his company received. She knowingly hid the conflict of interest and personally benefited from her actions. As a result, she and her ex-boyfriend were convicted. Sentencing is pending.

If you have knowledge of possible fraud, promptly report it to your local HUD Office of Inspector General (OIG) or online to the OIG hotline on OIG's Web site at https://www.hudoig.gov/report-fraud.

6. Request an Exception

HUD may grant an exception to non-procurement conflicts of interest on a case-by-case basis. It is the recipient's responsibility to submit a written request for an exception to its local HUD CPD office. When submitting a request, the recipient must provide the following documentation as threshold requirements for consideration:

- A public disclosure of the conflict (include how the disclosure was made); and
- An opinion of the recipient's attorney that the exception does not violate State or local law.

HUD determines whether threshold requirements are met and whether the circumstances fall within exception criteria permitted by the regulations. Remember that submitting a request does not authorize a recipient to engage in any activity or enter into any contract that constitutes a conflict. The recipient may proceed only after receiving the approval in writing from HUD.

7. Get Help

Conflict-of-interest requirements are often nuanced and must be reviewed case by case. HUD provides assistance when conflict-of-interest situations arise or are in question. You can get help from your local CPD office when such issues arise.

5-22-17

Keith Moody
City Administrator

Bottom line:
Conflicts of interest are situations not allegations…
BUT they must be disclosed and managed properly.

Mayor

JOHNSON COUNTY/OLATHE 2019 CDBG APPLICATION
PUBLIC FACILITIES and IMPROVEMENTS
PART 1 - PROJECT SUMMARY

For CDBG Staff Use Only.
Date Received: _____ Amount Requested: _____
Matrix Code: _____
Environmental Status: _____ Code Citation: 24 CFR 58. _____
National Objective Code: _____ Code Citation: 24 CFR 570.208_____

The Project Summary may not exceed two (2) pages.

1. Applicant

Name:	City of Roeland Park	Phone: 913 722 2600
Address:	4600 W 51st Street	WEB Site: www.Roelandpark.org
City/ZIP:	Roeland Park, KS 66205	DUNS #: 044744308

2. Contact person responsible for all communications concerning this proposed project.

Name:	Jose Leon	E-mail: jleon@roelandpark.org
Address:	4800 Roe Parkway	Phone: 913 722 5435
City/ZIP:	Roeland Park, KS 66205	

3. Title of the proposed project: CDBG El Monte Street Improvement Project

4. Address/location for the proposed project: El Monte Street- 4708 to 4816; see **Exhibit E** for complete address list.

5. Amount of CDBG funds being requested: $166,000
Type and Amount of funds the applicant is committing to this project:
Design & Construction Inspection $20,000 + $10,000 for Construction = $30,000

6. In TWO sentences provide a concise description of the project. Mill and overlay asphalt surface as well as curb replacement along street in area with largest concentration of neighborhoods containing low/mod income level families. Street lighting will be enhanced by removing City owned street lights from old KCPL poles and placing them on City specified poles adding one more light on the street for improved lighting.

7. If this Public Facility/Improvement project benefits an area, provide each Census 2010 Tract & Block Group for the entire service benefit area. Please provide the rational for your service area.
Census Tract(s): 501
Block Group(s): Block Group 1 of Census Tract noted above.
Boundaries of service area: The service area for the El Monte Street project (Census Tract 501, Block Group 1, Blocks: 1002 and 1008) includes those single-family lots fronting on El Monte as this is a residential cul-de-sac (dead end).
Rational for boundaries of benefit area: El Monte is not through street, it serves the lots adjacent to it, therefore the service area is limited to the lots adjacent to this street.

Income characteristics of the residents of the area: see table below

Sevice Area: El Monte Street Project					
County	Census Tract	Block Group	Lomod Population	Total Population	% of Lowmod Population in Service Area
Johnson	501	1	555	1325	41.89%
		Totals	555	1325	41.89%

Please include a map with the service area circled and all census tract/block groups in the service area labeled. Attached as **Exhibit A**

8. **How many PEOPLE will benefit from this project?** Estimate 48 people, based upon 19 single family lots benefitting with an average household of 2.5 persons.

9. **Citizen Participation- For Applications by Cities (not County Departments /Agencies)** CDBG grant application options and project scopes were discussed at an open Council Workshop on March 6, 2017 and a public hearing was held at the City Council meeting on April 16, 2018. Citizen input was solicited at these meetings, minutes from those meetings and the notice of Public Hearing are attached as **Exhibit B.**

10. **Fair Housing Activities-must be completed by all applicants. Describe what actions will be taken to further Fair Housing.** The City of Roeland Park proclaims the month of April as "Fair Housing Month", the proclamation is attached as **Exhibit C.**

11. **Does your project address any of Johnson County's strategic priorities? Yes**
If yes, please briefly explain: Strategic Priority No. 3 – Develop a vision and finance plan for transportation in the county to help increase the economic health of Johnson County, the State of Kansas and the metropolitan areas. Strategic Priority No. 4 – Advance the self-sufficiency of vulnerable populations, including those with intellectual and developmental disabilities, those with mental health needs, those who are aging and those who are housing insecure.

This project will return a border street in Roeland Park to good condition. This street is within a quarter mile of bus service and connects to the sidewalk system and established bike routes within the community. In addition, the projects will enhance the appearance and safety of this neighborhood and encourage self-sufficiency and private investment coalescing to enhance the quality of life for the vulnerable populations concentrated in the neighborhood.

12. **SIGNATURE:** _____ **Date:** 5.18.18

(Signature of Mayor/Director of County or City of Olathe Department/Chairman of Board)

Mayor Mike Kelly

Please Type/Print Name

JOHNSON COUNTY/OLATHE 2019 CDBG APPLICATION
PUBLIC FACILITIES and IMPROVEMENTS
PART 2 - PROJECT NARRATIVE

The Project Narrative may not exceed two (2) pages.

NEED the Project is addressing

1. Clearly describe the specific local need this project will address.

The City completed a city-wide pavement condition assessment using lidar in 2015. Each block of street was given a condition score and related classification. The segment of El Monte to be resurfaced is classified as Poor based upon the condition score. This classification is suited to a mill and overlay as it has not reached a point where total reconstruction is necessary but is beyond the point where a sealing approach would be effective (chip seal or slurry seal). Completing a mill and overlay now will extend the life of the street a minimum of ten years.

2. Describe the major local factors that contribute to the problem.

This is a residential cul-de-sac vs collector street; this decreases the priority score making it difficult for the street to compete for limited street maintenance resources. The street has not had any maintenance performed in the last 6 years.

3. Provide current, up-to-date, county/city-specific data that substantiates the need.

The City's Capital Improvement Plan is programed out for 10 years, using a two-part scoring system to prioritize projects and allocate resources based upon priority. El Monte is not included in the Capital Improvement Plan within that 10-year period due to having more capital demands than resources available and due to the disadvantage, this street has in scoring compared with higher traffic through streets.

The PROJECT – Performance Measurement
Summarize the following information using the chart on the next page:

- Clearly state the goal(s) of the 2019 project.
- Identify the inputs of the project.
- Specifically describe the activities you propose to conduct which will help achieve program goals.
- Clearly state what will be the direct products/outputs of the project.
- Clearly state the objectives/outcomes of the project.
- Clearly state how and when the achievement/impact of program objectives will be measured.

Please submit 2017 & 2018 forms from previous years' applications along with the actual results for 2017.

Roeland Park was awarded CDBG Funds for 2018, project has not yet been completed.

2019 Project Narrative

Goal	Inputs	Activities	Measurable Outputs	Outcomes	Actual Results
Enhance the quality of residential streets in Census Tract 501. Improve the quality of life in this neighborhood. Encourage private maintenance and investment in the neighborhood through public investment.	$195,000 Budget Consulting Engineer: Design, Bid, Contract Administration, Construction Inspection Administrative Staff	Administration of CDBD Grant Preparation of plans & specification. Competitive bid process. Construction observation and Davis Bacon oversight. Construction activities.	Mill and Overlay .17 Miles of residential streets Remove and Replace 492 L.F. of curb and gutter Remove and replace 240 square yards of driveway adjacent to the curb and gutter replaced. Remove and replace 3 streetlights and adding a 4th street light.	Improved street condition and safety. Increased maintenance and investment in private properties.	The City will measure the impact when the project has reached Final Completion. The quantities reflected in the pay estimates will measure achievement of program objectives. The street condition will be reassessed following completion to verify improved condition. Private investment will be measured through building permit value and change in assessed values during the subsequent 5 years.

JOHNSON COUNTY/OLATHE 2019 CDBG APPLICATION
PUBLIC FACILITIES and IMPROVEMENTS
PART 3 - BUDGET and TIMELINESS

The Budget & Timeliness Section may not exceed two (2) pages.

BUDGET NARRATIVE

The information to be provided below pertains only to the proposed project for which you are requesting CDBG funds.

1. Project Title: CDBG El Monte Street Improvement

2. 2019 Total Project Budget

Revenues
(These funds must directly support and be essential to the implementation of this proposed project.)

List All Revenue Sources For This Project	Amount
Funds requested from:	
Johnson County CDBG:	**166,000**
Olathe CDBG:	
Overland Park CDBG:	
Shawnee CDBG:	
***Other Project Revenue:	
Other Federal Funds	
State/Local Funds	**30,000**
Private Funds	
Other: TIF Funds	
CARS Funds	
Total Project Revenue	**196,000**

Expenses

Source	Amount
Personnel	
Equipment	
Supplies	
Space Rent/Utilities	
Other- Consulting Engineer	**20,000**
Other- Construction Contract	**176,000**
Total Project Expenses	**196,000**

Total project revenue must equal total project expenses.
*****All other project revenue must be specified. Sources must be noted.**

3. **Describe precisely what CDBG funds will be used to pay for.**

2" mill and overlay of asphalt street, replace failed sections of curb and any adjacent driveway aprons as needed. Replacing street lights and adding an additional street light to better luminate the street. A project location and layout map along with the cost estimate for the project is provided in **Exhibit D.**

Timeliness

HUD imposes a timeliness requirement for the expenditure of CDBG funds on the County.

1. **Will this project be ready to proceed as of January 1, 2019?** Yes.

2. **If not ready, when will the project proceed?**

3. **When is this project scheduled to be completed?** December 1, 2019.

4. **Describe any circumstances that might prevent this activity from being completed by December 1, 2019.**

5. **CDBG History**
If your organization has received CDBG funding in the past, please provide the information below. Roeland Park last received CDBG funds in 2000.

Program year	2016	2017	2018
Award in Program Year	0	0	100,000
Expended in Program Year (Will agree to your reimbursement request forms.)	0	0	0
Number of PEOPLE served (Will agree to final project beneficiary form.)	0	0	85
Balance Remaining (if applicable)	0	0	100,000

JOHNSON COUNTY/OLATHE 2019 CDBG APPLICATION
ALL PROJECTS
PART 4 – ENVIRONMENTAL QUESTIONS

HUD requires that an Environmental Review be performed on any project supported by CDBG funds.

To assist us in determining the level of Environmental Review necessary for this proposed project.

Since this project is a **PUBLIC FACILITIES/IMPROVEMENTS** project:

1. **Please provide the address or location of the project.** El Monte Street- 4708 to 4816; refer to **Exhibit E** for complete address list.

1. **Is the facility/improvement in place and will it be retained in the same use without change in size or capacity of more than 20 percent? Yes**

3. **Is the project located in a flood zone area? No**

4. **Is the location in a primarily residential area? Yes**

JOHNSON COUNTY/OLATHE 2019 CDBG APPLICATION
PART 5 - CERTIFICATIONS

The Applicant certifies that:

(a) It possesses legal authority to make a grant submission and to execute a community development and housing program.

(b) Its governing body has in an official meeting open to the public duly adopted or passed as an official act a resolution, motion or similar action authorizing the person identified as the official representative of the sub recipient to submit the final statement and all understandings and assurances contained therein, and directing and authorizing the person identified as the official representative of the sub recipient to act in connection with the submission of the final statement and to provide such additional information as may be required.

(c) The grant will be conducted and administered in compliance with:

(1) Title VI of the Civil Rights Act of 1964 (Pub. L. 88-352; 42 U.S.C. Subsection 2000 et seq.);

(2) The Fair Housing Act (42 U.S.C. 3601-20).

(d) It will affirmatively further fair housing.

(e) It has developed its proposed activity so as to give maximum feasible priority to activities that benefit low- and moderate-income families or aid in the prevention or elimination of slums or blight. The proposed use of funds may also include activities which the sub recipient certifies are designed to meet other community development needs having a particular urgency because existing conditions pose a serious and immediate threat to the health or welfare of the community, where other financial resources are not available to meet such needs.

(f) It will not attempt to recover any capital costs of public improvements assisted in whole or in part with funds provided under section 106 of the Act or with amounts resulting from a guarantee under section 108 of the Act by assessing any amount against properties owned and occupied by persons of low- and moderate-income, including any fee charged or assessment made as a condition of obtaining access to such public improvements, unless: (1) funds received under section 106 of the Act are used to pay the proportion of such fee or assessment that relates to the capital costs of such public improvements that are financed from revenue sources other than Title 1 the Act; or (2) for purposes of assessing any amount against properties owned and occupied by persons of moderate income, the grantee certifies to the Secretary that it lacks sufficient funds received under section 106 of the Act to comply with the requirements of subparagraph (1).

(g) It will comply with the acquisition and relocation requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1990 as required under Section 570.606(a) and Federal implementing regulations; the requirements in Section 570.606(b) governing the residential anti-displacement and relocation assistance plan under section 104(d) of the Act (including a certification that the sub recipient is following such a plan); the relocation requirements of Section 570.606(c) governing displacement subject to section 104(k) of the Act; and the relocation requirements of Section 570.606(d) governing optional relocation assistance under section 105(a)(11) of the Act.

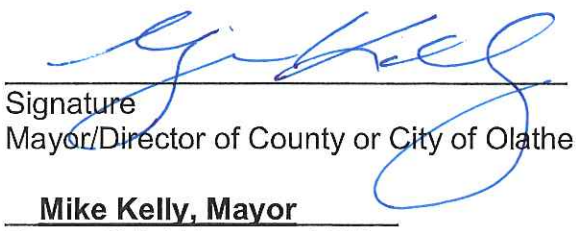
(h) To the best of my knowledge and belief that:

1. No Federal appropriated funds have paid or will be paid, by or on behalf of it, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement;

2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant loan, or cooperative agreement, it will complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions; and

3. It will require that the language of paragraph (h) of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub recipients shall certify and disclose accordingly.

(i) It will comply with the other provisions of the Act and with other applicable laws.



Signature

5·18·18

Date

Mayor/Director of County or City of Olathe Department/ Chairman of Board

Mike Kelly, Mayor

Please Print Name and Title

Exhibit A: Service Area

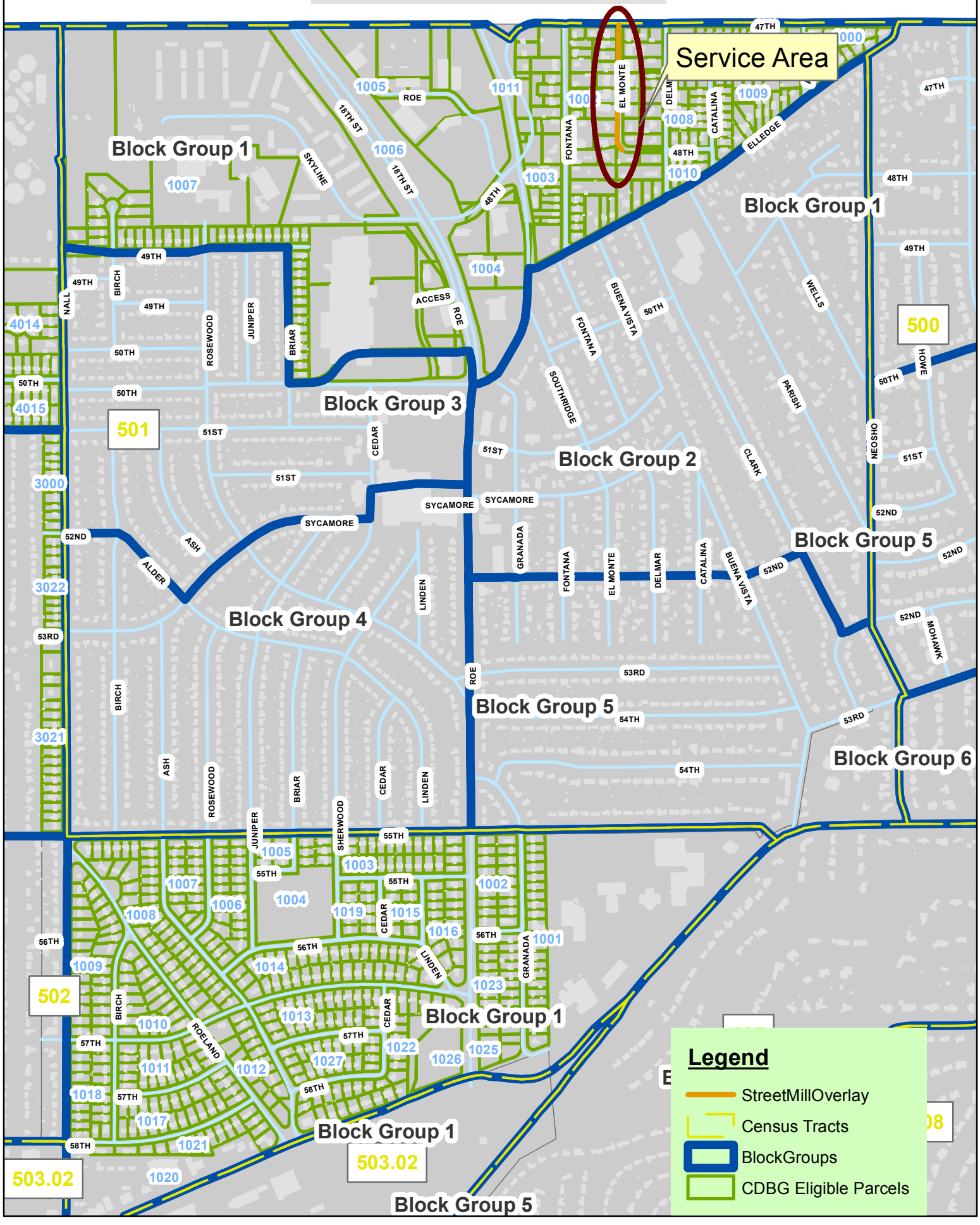


Exhibit B

Excerpt of Minutes 3/6/2017
GOVERNING BODY WORKSHOP MINUTES
Roeland Park City Hall
4600 W 51st Street, Roeland Park, KS 66205
Monday, March 6, 2017 6:00 P.M.

I. DISCUSSION ITEMS

10. Review CDBG Applications

City Administrator Moody said this is the first time the City is going through the Community Development Block Grant (CDBG) process and they are submitting three project applications with each project costing around $250,000. They are looking to optimize the process. He said if the City receives funds one year, then they are not eligible for next year. CDBG would pay for 80 percent of the project and the City would kick in the remaining 20 percent. He asked if Governing Body is okay with the submission of three, and if asked, which would be their priority.

CMBR Janssen said the mill and overlay or the sidewalks would be his first choice, but narrowed it to sidewalks.

CMBR Fast said the Community Center would be her first choice. She said she served on the CDBG application review for a few years. In her experience they wanted to see projects that wouldn't normally come out of the general fund such as street and sidewalk repairs.

City Administrator Moody said when he asked for examples of what projects they have done, they were largely for public infrastructure. Street overlays and sidewalk programs are common as they are flexible. The money cannot be spent on the project prior to the money being awarded and would not be reimbursed. Currently the funds for 2017 projects have not yet been released yet. The projects have to be flexible, but they must be completed by December of that year. Mill and overlay is the easiest to fix and the sidewalk is a bit more in depth.

City Administrator Moody said he believed the street project and sidewalk had the greatest opportunity to be funded.

III. ADJOURNMENT

CMBR Fast adjourned the meeting.

(Roeland Park Governing Body Workshop Adjourned at 9:10.)

The Legal Record
P.O. Box 273
Olathe, KS 66051-0273
(913) 780-5790

ATTN: KELLEY BOHON
CITY OF ROELAND PARK
4600 W 51ST STREET
ROELAND PARK KS 66205-3500

Proof of Publication

STATE OF KANSAS, JOHNSON COUNTY, SS; Pam Kruse, of lawful age, being first duly sworn, deposes and says that she is Legal Notices Billing Clerk for The Legal Record which is a newspaper printed in the State of Kansas, published in and of general paid circulation on a weekly, monthly or yearly basis in Johnson County, Kansas, is not a trade, religious or fraternal publication, is published at least weekly fifty (50) times a year, has been so published continuously and uninterrupted in said County and State for a period of more than one year prior to the first publication of the notice attached, and has been entered at the post office as Periodicals Class mail matter. That a notice was published in all editions of the regular and entire issue for the following subject matter (also identified by the following case number, if any) for 1 consecutive week(s), as follows:

HEARING - 2019 FISCAL YEAR CDBG
4/10/18

Pam Kruse
Legal Notices Billing Clerk

Subscribed and sworn to before me on this date:
April 10, 2018

Penny Knight
Notary Public

PENNY KNIGHT
Notary Public-State of Kansas
My Appt. Expires Dec. 31, 2021

NOTICE OF PUBLIC HEARING
First published in The Legal Record, Tuesday, April 10, 2018.
NOTICE OF PUBLIC HEARING

OFFICIAL NOTICE

TO WHOM IT MAY CONCERN AND TO ALL PERSONS INTERESTED:

Please take notice that the City of Roeland Park, Kansas will hold a Public Hearing to solicit input on potential uses for the 2019 fiscal year Community Development Block Grant Funds (CDBG). Said hearing will be held on Monday, April 19, 2018 at 7 p.m. at City Hall, 4600 W. 51st Street in Roeland Park, KS. All interested persons are invited to attend and comment at this hearing. Projects will be proposed in the fields of Public Facilities/Improvements. For a list of the projects being considered or to suggest a project in advance of the meeting, please contact Jose Leon at 913-722-2600.
4/10

L72957
Publication Fees: $14.81

CITY COUNCIL MEETING MINUTES
Roeland Park City Hall
4600 W 51st Street, Roeland Park, KS 66205
Monday, April 16, 2018, 7:00 P.M.

- Mike Kelly, Mayor
- Becky Fast, Council Member
- Jennifer Hill, Council Member
- Tim Janssen, Council Member
- Jim Kelly, Council Member
- Tom Madigan, Council Member
- Claudia McCormack, Council Member
- Michael Poppa, Council Member
- Erin Thompson, Council Member
- Keith Moody, City Administrator
- Jennifer Jones-Lacy, Asst. Admin.
- Kelley Bohon, City Clerk
- John Morris, Police Chief
- Jose Leon, Public Works Director

Admin	**Finance**	**Safety**	**Public Works**
Kelly	Thompson	McCormack	Poppa
Madigan	Fast	Janssen	Hill

PLEDGE OF ALLEGIANCE
Mayor Kelly called the meeting to order and led everyone in the Pledge of Allegiance.

ROLL CALL
City Clerk Bohon called the roll and all Governing Body members were present.

MODIFICATION OF AGENDA
There were no modifications to the agenda.

PUBLIC HEARING ON CDBG APPLICATIONS
Mayor Kelly opened the public hearing stating that the Community Development Block Grant is a federal program through HUD that provides communities with resources to address a wide range of development needs. There are three projects before the Governing Body for consideration. The City is limited to a potential $200,000 in CDBG funds every two years and Mayor Kelly reviewed the requirements for receiving those funds.

City Administrator Moody said having three projects is a requirement of the process and they have been able to identify projects that meet the criteria. The projects need to show that 33.92 percent of the population that benefits from those improvements are qualified to be low to moderate income families. The total cost of the projects is $260,000 and with $200,000 being requested, the $60,000 would be a local match from the City.

City Administrator Moody added that this is a competitive process. The City was fortunate to be awarded $100,000 in a CDBG grant for 2018 for a street project that is still under design but will be completed this year. He further stated there is no guarantee that any application is awarded funds. One of the projects is a cul-de-sac street project, one is an ADA accessible sidewalk along Nall to Nall Park, and the third is a mill and overlay project with curb replacement and lighting improvements.

Mr. Moody said he felt strongest about the street-related improvement project because it is clear who the benefactors are of the improvements.

Mayor Kelly agreed with staff's recommendation for street improvements noting that those repairs would not come from the budget and the funds could be directed elsewhere for other improvements such as the Community Center and the Aquatics Center.

CMBR Fast said she served on the CDBG committee, which is made up of citizens, and the scoring is very subjective. She felt the Community Center would be a better candidate because it has a wider community reach and would, therefore, choose the Community Center and Aquatics Center projects.

City Administrator Moody said pre-2000 the Community Center was a location for CDBG funding in the past and felt the project would certainly qualify.

CMBR Janssen asked for information on the El Monte project. Public Works Director Leon said the street is in fair condition. He said it will take more than street resurfacing, chip seal or UBAS to correct what's going on with the street. There is also some curb that needs to be replaced and they are requesting to add street lighting in some of the darker areas of the street.

CMBR Poppa said in the report the street is listed as poor. Public Works Director Leon said he would re-evaluate the street's condition to make certain the report is accurate.

CMBR Madigan stated he would support the Community Center and the pool for CDBG funding. He said there are water and parking issues and the whole skyline campus at the site has been ignored for far too long.

Mayor Kelly opened up the floor, but there were no public comments.

The Council was polled for their choice of projects.

The Community Center and Aquatics Center were supported by CMBRS Fast, Madigan, Hill, and McCormack

The El Monte street project was supported by CMBRS Janssen, Thompson, Kelly, and Poppa,

Mayor Kelly said the items that they would like to see accomplished for the Aquatics Center and the Community Center are line items as a community improvement project as well as in the budget for 2019 and those would be properly addressed there. He said having the funds for El Monte gives them a potential added benefit and he would chose that project to break the tie.

I. **CITIZENS' COMMENTS**

Mary Klier - Ms. Klier spoke in support of a year-round pool. She said that Roeland Park wants to be known as friendly, for family and a place to establish roots and you can have all of those things with a swimming pool. The pool is an investment in the City's youth and the community.

Bonnie Boyles (7212 Cherokee Dr., Prairie Village) - Ms. Boyles spoke to her family ties to the area, their use of the pool and is in support of year-round operations.

Dennis Mueller (12513 W. 121st St., Overland Park) Mr. Mueller is the swim coach for Bishop Miege High School and has been coaching in Roeland Park for over 20 years. His team has been unable to find a place to practice but was offered some time at the Kansas City Swim Academy. He said if the Roeland Park Aquatics Center is gone, the swim team at Bishop Miege could be gone. He also said that his program is growing and they are looking to increase rental usage next year. He concluded saying that as long as the pool is there, they will be there.

Chas Peterson (5031 W. 47th St.) Mr. Peterson also spoke in support of a year-round pool saying that having a zero-depth ten lane facility teaching environment is hard to come by not just for the competitive teams but for the whole community.

II. CONSENT AGENDA

A. Appropriation Ordinance # 915

B. March 19, 2018 Council Minutes

CITY OF ROELAND PARK

Proclamation

Fair Housing Month

WHEREAS, the Congress of the United States passed the Civil Rights Act of 1968, of which Title VIII declared that the law of the land would now guarantee the rights of equal housing opportunity; and

WHEREAS, the City of Roeland Park is committed to the mission and intent of Congress to provide fair and equal housing opportunities for all, and today, many realty companies and associations support fair housing laws; and

WHEREAS, the Fair Housing groups and the U.S. Department of Housing and Urban Development have, over the years, received thousands of complaints of alleged illegal housing discrimination and found too many that have proved, upon investigation, to be in violation of the fair housing laws; and

WHEREAS, equal housing opportunity is a condition of life in our City that can and should be achieved;

Therefore, be it resolved that Mayor Mike Kelly on behalf of its citizens of Roeland Park, proclaims the month of April

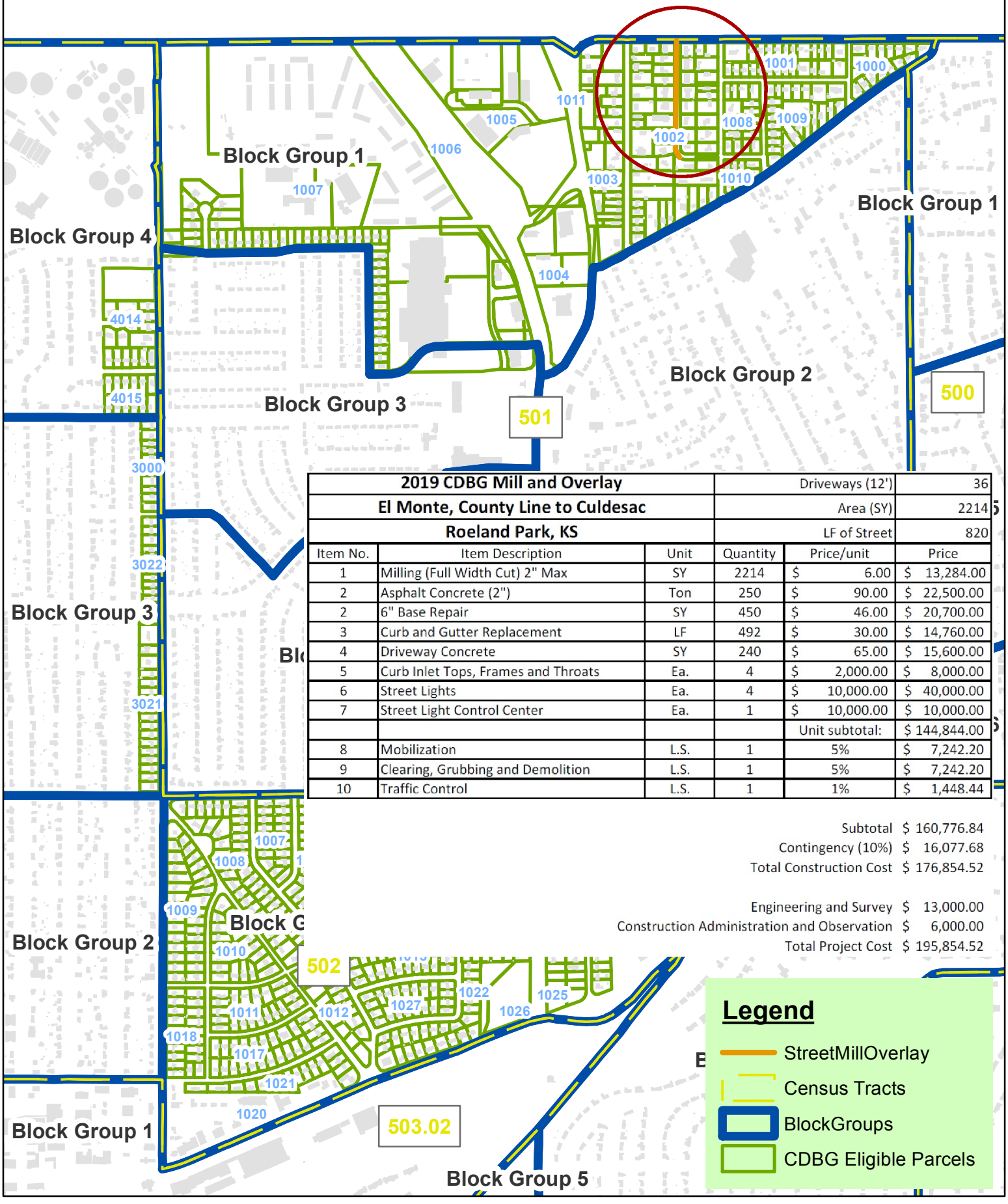
Fair Housing Month

And expresses the hope that this year's observance will promote fair housing practices throughout the City

Dated this 16th day of April, 2018.

MIKE KELLY
Mayor

Exhibit D: Project Location and Cost Estimate



2019 CDBG Mill and Overlay				Driveways (12')	36
El Monte, County Line to Culdesac				Area (SY)	2214
Roeland Park, KS				LF of Street	820
Item No.	Item Description	Unit	Quantity	Price/unit	Price
1	Milling (Full Width Cut) 2" Max	SY	2214	$ 6.00	$ 13,284.00
2	Asphalt Concrete (2")	Ton	250	$ 90.00	$ 22,500.00
2	6" Base Repair	SY	450	$ 46.00	$ 20,700.00
3	Curb and Gutter Replacement	LF	492	$ 30.00	$ 14,760.00
4	Driveway Concrete	SY	240	$ 65.00	$ 15,600.00
5	Curb Inlet Tops, Frames and Throats	Ea.	4	$ 2,000.00	$ 8,000.00
6	Street Lights	Ea.	4	$ 10,000.00	$ 40,000.00
7	Street Light Control Center	Ea.	1	$ 10,000.00	$ 10,000.00
				Unit subtotal:	$ 144,844.00
8	Mobilization	L.S.	1	5%	$ 7,242.20
9	Clearing, Grubbing and Demolition	L.S.	1	5%	$ 7,242.20
10	Traffic Control	L.S.	1	1%	$ 1,448.44

Subtotal	$ 160,776.84
Contingency (10%)	$ 16,077.68
Total Construction Cost	$ 176,854.52
Engineering and Survey	$ 13,000.00
Construction Administration and Observation	$ 6,000.00
Total Project Cost	$ 195,854.52

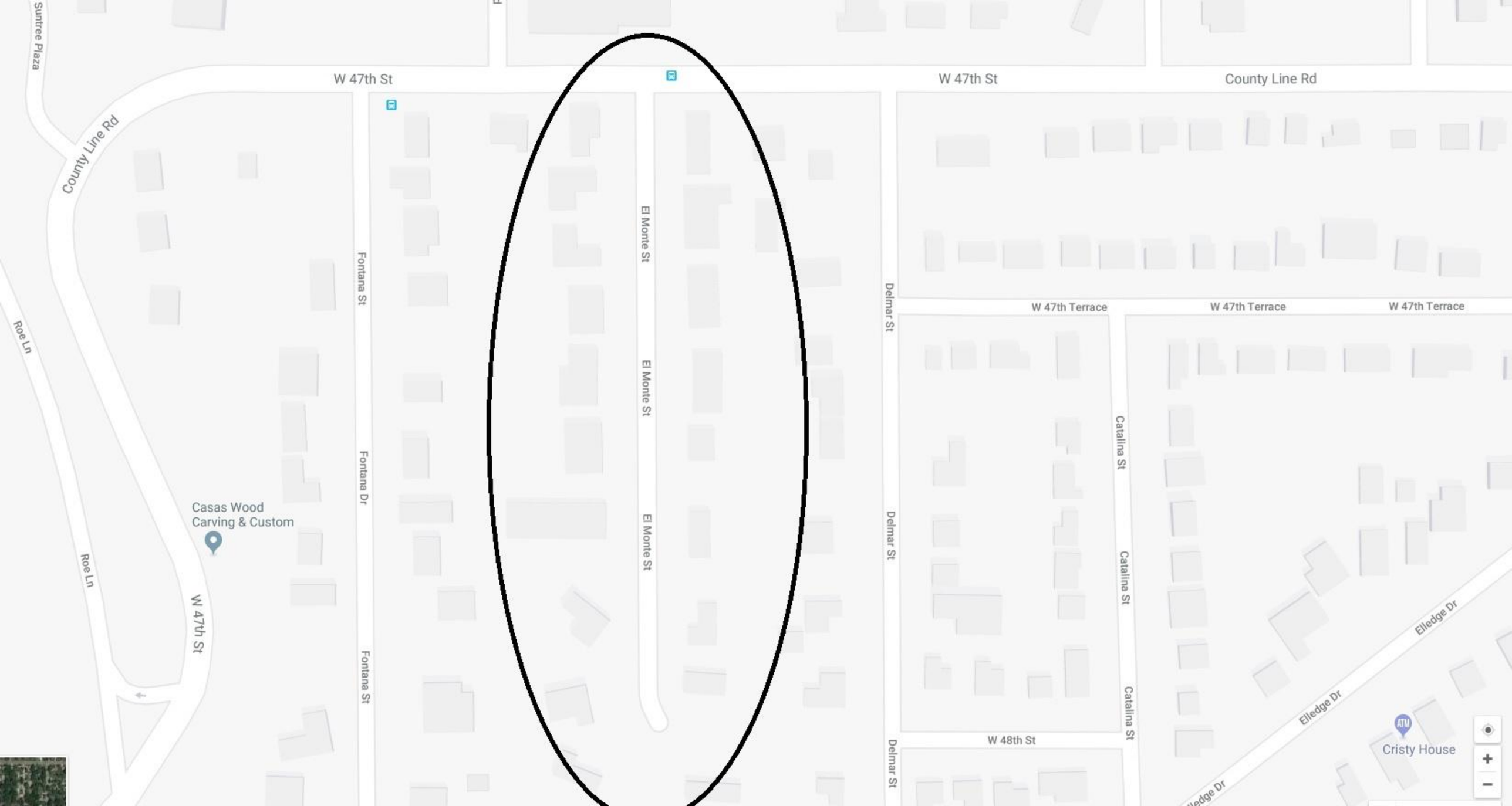
Legend

- StreetMillOverlay
- Census Tracts
- BlockGroups
- CDBG Eligible Parcels

Exhibit E: Service Area Addresses

Addresses- Elmonte Street Project:

Number	Street Name
4708	Elmonte St
4712	Elmonte St
4716	Elmonte St
4724	Elmonte St
4730	Elmonte St
4740	Elmonte St
4800	Elmonte St
4808	Elmonte St
4816	Elmonte St
4811	Elmonte St
4801	Elmonte St
4747	Elmonte St
4731	Elmonte St
4721	Elmonte St
4725	Elmonte St
4709	Elmonte St
4707	Elmonte St
4704	47th St
4705	47th St


Suntree Plaza
W 47th St
W 47th St
County Line Rd
County Line Rd
Roe Ln
Roe Ln
W 47th St
Fontana St
Fontana Dr
Fontana St
El Monte St
El Monte St
El Monte St
Delmar St
Delmar St
Delmar St
W 47th Terrace
W 47th Terrace
W 47th Terrace
Catalina St
Catalina St
Catalina St
W 48th St
Elledge Dr
Elledge Dr
Elledge Dr
Casas Wood
Carving & Custom
ATM
Cristy House

LARKIN LAMP RYNEARSON
9001 State Line Road Suite 200
Kansas City Missouri 64114
(816) 361-0440 www.LRA-inc.com

1/30/2019

2019 CDBG Mill and Overlay					
El Monte, County Line to Cul-de-sac					
Roeland Park, KS					
Item No.	Item Description	Unit	Quantity	Price/unit	Price
1	Force Account	Set	1	$ 12,000.00	$ 12,000.00
2	Mobilization	L.S.	1	$ 7,500.00	$ 7,500.00
3	Clearing, Grubbing and Demolition	L.S.	1	$ 5,000.00	$ 5,000.00
4	Traffic Control	L.S.	1	$ 1,500.00	$ 1,500.00
5	Erosion Control	L.S.	1	$ 2,000.00	$ 2,000.00
6	Asphalt Mill (2") (Full Width)	SY	2214	$ 4.50	$ 9,963.00
7	Asphalt Concrete Surface (2")	Ton	250	$ 90.00	$ 22,500.00
8	Base Repair (Asphalt) (4" Repair)	SY	450	$ 60.00	$ 27,000.00
9	Curb and Gutter (Type A) (Remove and Replace)	LF	492	$ 35.00	$ 17,220.00
10	Driveway (Residential) (6" Concrete)	SY	240	$ 80.00	$ 19,200.00
11	Curb Inlet Tops, Frames and Throats	Ea.	4	$ 2,900.00	$ 11,600.00
14	Sodding	SY	400	$ 7.00	$ 2,800.00
15	Contractor Construction Staking	LS	1	$ 2,500.00	$ 2,500.00

Total Construction Cost	$ 140,783.00
Engineering	$ 10,328.00
Construction Administration and Observation	$ 11,449.00
Material Testing	$ 2,111.75
City Project Administration	$ 703.92
Total Project Cost	$ 165,375.66

Notes:
1. Assumes no survey or additional road easement / right-of-way will be required
2. No street light replacement and associated easements
3. Estimates half of the driveway aprons, 20% base repair, and 30% curb replacement

Item Number: **DISCUSSION ITEMS- I.-3.**
Committee Meeting Date: **2/4/2019**

City of Roeland Park

Action Item Summary

Date:	2/1/2019
Submitted By:	Keith Moody
Committee/Department:	Admin.
Title:	**Direction on Process for Planning Improvements at the Aquatic Center**
Item Type:	Discussion

Recommendation:

Staff is looking for direction from the Governing Body on the format to be followed as improvements at the Aquatic Center are considered and potentially planned.

Details:

Council has taken action to confirm the Aquatic Center season will follow a standard Memorial Day to Labor Day schedule. This is consistent with the recommendation included in the Water's Edge final report. That report includes three options:

1. Complete needed repairs. <$400k
2. Complete needed repairs and add some basic amenities (shade, lighting, seating). <$1 million
3. Complete needed repairs and make significant modifications to the facility that make it more family friendly. >$2 million

Staff is looking for direction on how the governing body would like to work through these options. The Pool Advisory Committee that has been focused on the pool management agreement and addressing needed repairs is a committee structure that is spelled out in the 1996 Aquatics Center agreement between the City and JCPRD. 4 of the seven committee members are JCPRD appointed and 3 are City appointed. The process of identifying what if any improvements would be incorporated into the facility should be lead by the city and it's representatives since as of 6/1/19 JCPRD will no longer have an ownership/financial interest in the facility. As the City considers physical changes to the pool it would be advisable to have committee members who have backgrounds in pool facility design, construction, maintenance, operations and programming. As it happens Jim Wilson, who serves on the current pool advisory board as a JCPRD representative and is a JCPRD staff member is also a Roeland Park resident.

Another option would be for the governing body to serve as the pool committee through the process of determining the scope, design, construction and funding of the improvements.

Regardless of the approach selected, it is recommended that Lauren Ozburn with Water's Edge be retained as an advisor/consultant to the process. Her knowledge of the feedback provided by users as well as her aquatics operational expertise will be assets during this important planning process.

How does item relate to Strategic Plan?

How does item benefit Community for all Ages?

Additional Information

Attached is the section of the code dealing with committee formation.

Because this issue has the potential for significant financial impacts to the city's budget including the prospect of issuing debt and requesting voter approval of a funding source, it is an effort that the governing body may wish to work through first hand vs delegating to a committee. On the flip side, a committee of respected local leaders advocating for a cause can be an effective way of shepherding an issue through what could ultimately become a ballot question.

ATTACHMENTS:

	Description	Type
🗋	Committee Formation	Cover Memo

ORDINANCE NO. 930

AN ORDINANCE RELATING TO THE ESTABLISHMENT OF AD HOC COMMITTEES AND TASK GROUPS OF THE GOVERNING BODY; ADDING ARTICLES 14 AND 15 TO CHAPTER I OF THE CODE OF THE CITY OF ROELAND PARK, KANSAS; ADDING SECTIONS 1-1401, 1-1402, 1-1403, 1-1404, 1-1405, 1-1406, 1-1407, 1-1501, 1-1502, 1-1503, 1-1504, 1-1505, 1-1506 AND 1-1507 TO THE CODE OF THE CITY OF ROELAND PARK, KANSAS

BE IT ORDAINED BY THE GOVERNING BODY OF THE CITY OF ROELAND PARK, KANSAS:

SECTION 1. Article 14 is hereby added to Chapter I of the Code of the City of Roeland Park, Kansas, and shall be titled "Ad Hoc Committees." Article 15 is hereby added to Chapter I of the Code of the City of Roeland Park, Kansas, and shall be titled "Task Groups."

SECTION 2. Section 1-1401 is hereby added to the Code of the City of Roeland Park, Kansas and shall read as follows:

1-1401. **Purpose.** Ad hoc committees shall be project- or subject-based. The duration of the committee shall be twelve months or until completion of the project or study of the subject.

SECTION 3. Section 1-1402 is hereby added to the Code of the City of Roeland Park, Kansas and shall read as follows:

1-1402. **Creation and Establishment.** Ad hoc committees shall be established by the Governing Body, with the approval of a majority vote at a City Council meeting. Ad hoc committees shall consist of up to four members of the Governing Body. If five or more of the Governing Body want to be on an ad hoc Committee, then the subject will be returned to a Governing Body workshop. In addition, City residents, Roeland Park business owners and members of the City Staff may be included on the committee; provided that non-Governing Body members shall not exceed 2/3 of the total committee membership. City residents and Roeland Park business owners desiring to become a member of an ad hoc committee must submit a volunteer application and shall be appointed by the Mayor and approved by a majority vote at a City Council meeting.

SECTION 4. Section 1-1403 is hereby added to the Code of the City of Roeland Park, Kansas and shall read as follows:

1-1403. **Compensation.** Members of ad hoc committees shall serve without compensation.

SECTION 5. Section 1-1404 is hereby added to the Code of the City of Roeland Park, Kansas and shall read as follows:

1-1404. **Duties and Responsibilities.** It shall be the duty of an ad hoc committee to review current uses and practices as they relate to the project or subject for which the committee was established. The committee shall report to the Governing Body from time to time. The committee may make recommendations to the Governing Body concerning policies in connection with the project or subject for which the committee was established, which may include actionable items for approval by the Governing Body at a City Council meeting. As deemed appropriate by the Governing Body, City Staff will support committee activities, either directly (as members of the committee) or indirectly.

SECTION 6. Section 1-1405 is hereby added to the Code of the City of Roeland Park, Kansas and shall read as follows:

1-1405. **Advisors.** The City Council may designate or employ, with or without compensation, such advisors to an ad hoc committee as the City Council shall hereafter determine to be necessary and advisable to accomplish the purposes for which the committee was established.

SECTION 7. Section 1-1406 is hereby added to the Code of the City of Roeland Park, Kansas and shall read as follows:

1-1406. **Meetings, Rules and Regulations.** The committee shall elect a Chair at its first meeting who shall preside over meetings and report to the City Council. The committee may elect a Vice Chair who shall assume the duties of Chair when the Chair is not available. The committee shall elect a Secretary to take minutes. The committee may adopt such rules and regulations as deemed necessary. Meetings of the committee shall be subject to the requirements of the Kansas Open Meetings Act.

SECTION 8. Section 1-1407 is hereby added to the Code of the City of Roeland Park, Kansas and shall read as follows:

1-1407. **Code of Ethics.** The Code of Ethics for Elective and Appointed Offices, as adopted pursuant to Charter Ordinance No. 29, and any amendments thereto, shall apply to the members of any ad hoc committee.

SECTION 9. Section 1-1501 is hereby added to the Code of the City of Roeland Park, Kansas and shall read as follows:

1-1501. **Purpose.** Task Groups shall be task- or topic-based. The duration of the task group shall be as long as needed to complete the work.

SECTION 10. Section 1-1502 is hereby added to the Code of the City of Roeland Park, Kansas and shall read as follows:

1-1502. **Creation and Establishment.** Task groups shall be established by the Governing Body, with the approval of the consensus of a majority of the Governing Body

members present at a Workshop meeting. Task groups shall consist of up to four members of the Governing Body.

SECTION 11. Section 1-1503 is hereby added to the Code of the City of Roeland Park, Kansas and shall read as follows:

1-1503. Compensation. Members of task groups shall serve without compensation.

SECTION 12. Section 1-1504 is hereby added to the Code of the City of Roeland Park, Kansas and shall read as follows:

1-1504. Duties and Responsibilities. It shall be the duty of a task group to review current uses and practices as they relate to the task or topic for which the task group was established. The task group shall report its findings to the Governing Body at a City Council or Workshop meeting upon the conclusion of its research. As deemed appropriate by the Governing Body, a task group may rely upon City Staff for information or resources.

SECTION 13. Section 1-1505 is hereby added to the Code of the City of Roeland Park, Kansas and shall read as follows:

1-1505. Advisors. The City Council may designate or employ, with or without compensation, such advisors to a task group as the City Council shall hereafter determine to be necessary and advisable to accomplish the purposes for which the task group was established.

SECTION 14. Section 1-1506 is hereby added to the Code of the City of Roeland Park, Kansas and shall read as follows:

1-1506. Meetings. Meetings of task groups shall be informal and no officers shall be established for task groups. No minutes of task group meetings shall be required. Meetings of the task group shall be subject to the requirements of the Kansas Open Meetings Act.

SECTION 15. Section 1-1507 is hereby added to the Code of the City of Roeland Park, Kansas and shall read as follows:

1-1507. Code of Ethics. The Code of Ethics for Elective and Appointed Offices, as adopted pursuant to Charter Ordinance No. 29, and any amendments thereto, shall apply to the members of any task group.

SECTION 16. This ordinance shall take effect upon its publication in the official City newspaper.

PASSED by the City Council this 20th day of June, 2016. APPROVED by the Mayor.

Joel Marquardt, Mayor

ATTEST:

Kelley Bohon, City Clerk

APPROVED AS TO FORM

Neil R. Shortlidge, City Attorney

Item Number: **DISCUSSION ITEMS- I.-4.**
Committee Meeting Date: **2/4/2019**

City of Roeland Park

Action Item Summary

Date:	1/25/2019
Submitted By:	Keith Moody
Committee/Department:	Admin.
Title:	**Discuss Heating and Cooling Options for Community Center**
Item Type:	Discussion

Recommendation:

Staff recommends decommissioning the boiler and converting two A/C only air handling units to combined heat and A/C air handling units to provide heat to the spaces currently served by the boiler.

Details:

The Community Center currently employs a boiler system to heat the rooms along the interior of the U shape (or south side) of the building. This is office and some restroom space. Over the past two years we have experienced the boiler shutting down as a result of the burner cycling on and off frequently. Generally a boiler's burner should run for 10 to 15 minutes before turning off, ours runs for about 2-3 minutes. This is due to the fact that the burner is too large for the circulation volume now served by the boiler. The boiler was replaced in 2007 and we suspect the new boiler was sized based upon the original boiler size. The original boiler was sized to serve the entire facility, however over the years as combined (heating and A/C) air handling units were added the load (area heated) by the boiler decreased resulting in the boiler being larger than it should be, this results in the boiler being less efficient. The boiler is modern and has sophisticated monitoring systems that can sense out of parameter measures caused by short cycle runs, the boiler shuts down as a precaution. The boiler system can be taken out of service, either being left in place or physically being removed.

The two A/C only air handling units which serve the areas heated by the boiler were manufactured in 1996 with 12 SEER and 8 SEER efficiencies. These units use R-22 refrigerant with is becoming more difficult to find and thus more expensive. Replacing these units with combined heat and A/C units can be accomplished within the utility closet footprint. The replacement is estimated to improve energy efficiency for both heating and A/C by 10-20%. We are not able to calculate a dollar savings since we do not have gas or electric consumptions per heating/cooling piece of equipment.

Staff has reflected replacing the forced air units at the center in a systematic manner within our CIP. Instead of replacing the two A/C only forced air units with A/C only, this approach would replace them with combined units and decommission the boiler system. Gas line would need to be extended to both units (included in the attached cost estimate), but the existing duct work can be reused. The cost estimate also reflects relocating the condensing units from the ground to the roof. This makes them less prone to theft and enhances the appearance of the landscaping areas adjacent to the building.

The conversion is simple to accomplish, spring is a good season (a time when A/C and heat are used minimally), timing is good as the boiler and A/C units being decommissioned/replaced are older and the project improves energy efficiency at the facility.

How does item relate to Strategic Plan?

How does item benefit Community for all Ages?

Additional Information

Attached is an energy efficiency audit completed for the facility in 2012. It recommends increasing the efficiency of the heating/cooling systems as these systems are replaced.

Staff is also looking at what opportunities may exist to consolidate the number of air handling units serving the rooms on the outside of the U, currently each room has its own combined air handling unit.

Replacing lighting at the facility with LED's is a phased project included in the CIP.

ATTACHMENTS:

Description	Type
Community Center Energy Audit	Cover Memo

RESOURCEFUL KANSAS
ENERGY ASSESSMENT

CITY OF ROELAND PARK

March 12, 2012

GBA
architects
engineers

GBA
architects
engineers

March 12, 2012

City of Roeland Park
Attn: Aaron Otto
4600 West 51st Street
Roeland Park, KS 66205

SUBJECT: Roeland Park Energy Assessment

Dear Mr. Otto:

creating remarkable solutions
for a higher quality of life

Our integrated team is eager to present the City of Roeland Park with an energy assessment tailored to meet your future energy goals. We are confident that our projections and analysis will help in determining cost effective and efficient energy conservation, energy efficiency and renewable energy generation retrofits in a seamless capacity. As included in the findings:

- The Community Center exhibits a lower efficiency and a lower energy operation cost than the average public assembly building in the United States.
- Recommended quick-fix energy conservation measures with a payback of less than five years have the potential to reduce energy consumption by an estimated 12% of the current yearly consumption, resulting in potential energy savings of $3,650 per year.

Please don't hesitate to contact me at 913.492.0400 or jgunby@gbateam.com, should you have additional questions. We have enjoyed working with your organization and we hope our assessment will allow the City of Roeland Park to integrate a fundamental shift toward an energy-efficient Kansas economy.

Best Regards,

GEORGE BUTLER ASSOCIATES, INC.

Jennifer Gunby, PE, LEED AP
Project Engineer

9801 Renner Boulevard
Lenexa, Kansas
66219-9745

913.492.0400
913.577.8200 fax

ONE Program Overview

TWO Building Energy Assessment

THREE Renewable Energy Evaluation

FOUR Transportation Energy Impacts

FIVE Resource Information

SIX Appendix

ONE | PROGRAM OVERVIEW

Resourceful Kansas

Resourceful Kansas is dedicated to engaging communities throughout the state in making a fundamental shift toward a less energy-intensive, more efficient economy. With assistance provided by the Department of Energy (DOE), the Resourceful Kansas team which is comprised of Riley County, Kansas, Kansas State University and GBA is committed to increasing energy conservation, energy efficiency, and renewable energy deployment in Kansas through this innovative program. Please continue to visit the Resourceful Kansas website at www.ResourcefulKansas.org as additional information and resources will be provided.

GBA

The Resourceful Kansas Energy Assessment was completed by GBA and is provided at no charge to your organization as it is included in the Resourceful Kansas program and funded by the DOE grant. The GBA Energy Assessment team is highlighted in the following:

- Building Energy Assessment
  - Kent Dyck, PE, LEED AP, CEM
  - Kevin Juhl, PE
  - Brian Huff
- Renewable Energy Evaluation
  - Jennifer Gunby, PE, LEED AP
  - Megan Walter, PE, LEED AP
- Transportation Energy Impacts
  - Dave Mennenga, PE, PTOE
  - Paul Bertrand, PE, PTOE

Since 1969, GBA has offered a wide-range of architectural and engineering services to public and private sector clients. For more information please visit www.gbateam.com. A complete summary of firm qualifications is provided following this overview.

Overview

This report contains the findings of a walk-through energy audit and a subsequent energy assessment. Observations from the walk-through and the assessment findings are summarized in the following Building Energy Assessment, Renewable Energy Evaluation and Transportation Energy Impacts.

Technical Assistance

GBA is available throughout the program to provide Technical Assistance to your organization. Our multi-discipline team of architects, engineers and construction managers are available to support all Resourceful Kansas participants and help constituents move through the various stages of energy conservation, energy efficiency and renewable energy projects. The scope of Technical Assistance we are able to provide varies, but is provided at no charge as it is also included in the Resourceful Kansas program and funded by the DOE grant.

Case Studies and Public Outreach

In an effort to increase outreach to entities unable to participate in the Resourceful Kansas program, GBA will publicize participant case studies, innovative projects and success stories. Case Studies highlighting projected reduction in energy consumption, comparisons to actual savings achieved and actual project cost will be featured, in addition to project highlights. As such, Case Studies will be published on the Resourceful Kansas website, showcasing vital energy efficiency results produced throughout the State of Kansas.

Additionally, press releases will help publicize Resourceful Kansas beyond program participants. GBA will write and distribute press releases on your behalf that will highlight your involvement with Resourceful Kansas, and promote the energy conservation, energy efficiency and renewable energy projects your organization implements. Case Studies and Public Outreach are incorporated in the Resourceful Kansas program and funded by the DOE grant.

Contact Us

Please contact Jennifer Gunby at 913.577.8375 or jgunby@gbateam.com with questions regarding the Energy Assessment, Technical Assistance, Case Studies and Public Outreach, or requests for assistance needed to move ahead with your sustainable energy projects.

Should you have questions regarding the Resourceful Kansas program or any suggestions to improve the program and website, please contact David Carter at 785.532.6026 or dcarter@k-state.edu.

Please continue to visit the Resourceful Kansas website at www.ResourcefulKansas.org as additional information and resources will be provided.

Disclaimer

The information in the Resourceful Kansas Energy Assessment is presented in response to the Agreement between George Butler Associates, Inc. (GBA) and the Department of Energy, through the Resourceful Kansas program. The information presented herein is based on best practices, commercially available information and virtual data. GBA makes no guarantees, expressed or implied, as to the actual outcome of the opportunities described in this report.

Firm Profile

GBA is a full-service professional design firm providing a wide range of engineering and architectural services to clients in the public and private sectors. These clients include cities, counties, state and federal agencies, school districts, commercial and residential developers, major corporations, hospitals, educational institutions, utility companies, professional service firms, and contractors.

Since GBA's establishment in 1969, the firm has grown dramatically in both size and capability. Some of this growth can be attributed to the expanded use of services by many of GBA's earliest clients. GBA's growth is also the result of the firm's ability to attract a highly qualified staff of professionals representing a broad spectrum of design and planning disciplines. This enables GBA to organize "in-house" project teams with the specialized experience uniquely suited for each project. With an experienced multi-disciplined staff, GBA provides clients with a wide range of project types and design capabilities including

- Water treatment and distribution
- Sewage collection and treatment
- Roadways and bridges
- Traffic analysis and engineering
- Storm water management
- Lake and dam design & restoration
- Building design and space planning
- Business and industrial parks
- HVAC systems
- Energy studies and retrofit
- Utility studies and systems
- Fire protection and life safety
- Park and recreation facilities
- Residential development
- Urban planning
- Environmental studies and permitting
- Commissioning

GBA has worked hard to establish and maintain a reputation for uncompromising quality, on-time project completion, and fair and reasonable fees.

Each project is considered in its entirety, within the boundaries specified by the client and with the comprehensive experience and expertise of the GBA staff. The result is an innovative, functional, and cost-effective design.

TWO | BUILDING ENERGY ASSESSMENT

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1.0 Executive Summary

The City of Roeland Park was one of the Resourceful Kansas participants in Round 4 of the program selected to receive a customized energy assessment of a single building, multi-building, renewable energy, or a transportation study analysis. Roeland Park chose a single-building analysis of the Community Center. GBA Architects + Engineers conducted the single-building assessment and prepared this report.

1.1. Impact of Buildings

According to the US Green Building Council (USGBC), residential and commercial buildings consume more than 30% of the total energy and 60% of the electricity used in the United States. Small reductions in the energy usage of each building can result in large reductions in negative environmental impacts and total greenhouse gas emissions. For many facilities, reduced energy usage will result in significant cost savings and reduced building operating costs.

1.2. Summary of Building Energy Consumption Benchmarks

Energy usage and energy costs of the Community Center were analyzed and compared to available benchmark data to determine the approximate energy efficiency of the facility. The following table is a summary of those findings. Reference *Section 5.0 Energy Usage Analysis for* more details of this analysis.

Building	Energy Cost Index		Energy Use Index		Energy Star Target Finder Score	
	Index	Percent Comparison to Weighted Average Energy Cost	Index	Percent Comparison to Weighted Average Energy Consumption	Score	Percent Comparison to Weighted Average Energy Consumption
Community Center	$1.60/ft^2/yr		99.5 Mbtu/ft^2/yr		Not Applicable[1]	
National Average	$1.89/ft^2/yr (entire country)	15% less expensive	93.9 Mbtu/ft^2/yr (entire country)	6% less efficient		

[1] Energy Star does not contain comparable building use categories.

Table 1.0.A: Community Center Building Energy Benchmark Summary

The following energy conservation measures were developed based on the walkthrough and subsequent analysis. Reference *Section 6.0 Energy Conservation Measures* for more details.

Option Number	Description of ECM	Estimated Potential Yearly Energy Savings			Estimated Cost To Implement ECM	Payback Period (years)	Degree of Implementation Difficulty
		% Of Total Bldg Energy Usage	(MBtu/yr)	($)			
Roeland Park Community Center							
1	Replace T12 lamps with T8 lamps in all light fixtures.	0.52%	9,800	$310	$0	0.0	★
2	Replace T12 light fixtures with T8 light fixtures.	2.60%	49,100	$1,570	$37,300	23.8	★ ★
3	Replace 2-lamp fluorescent light fixtures with LED light fixtures.	4.69%	88,600	$2,840	$78,700	27.7	★ ★
4	Replace incandescent lamps with compact fluorescent lamps.	2.16%	40,900	$1,310	$280	0.2	★
5	Replace split systems with new Energy Star rated split systems.	1.53%	28,900	$530	$6,730	12.7	★ ★ ★
6	Install programmable thermostats and implement night and weekend setbacks on HVAC system units.	9.88%	186,700	$2,030	$3,800	1.9	★ ★

Table 1.0.B: Energy Conservation Measures Summary

1.3. Implemented Energy Conservation Measures

A list of energy efficiency steps already implemented by the Community Center contributing to improved energy efficiency is as follows:

- The hot water boiler is a condensing boiler.
- Lighting levels meet IESNA recommended levels.
- The building windows are double pane and most contain shading.
- New doors have recently been installed.

1.4. Overview of Report Findings

The overall report findings can be summarized as follows:

- The Community Center exhibits a lower efficiency and a lower energy operation cost than the average Public Assembly building in the United States.
- For the Community Center, the recommended quick-fix ECMs with a payback of less than five years have the potential to reduce the energy consumption by an estimated 12% of the current total yearly consumption with a resulting potential energy savings of $3,650 per year. See *Section 6.7 Recommended ECMs to Implement* for the selection process of recommended ECMs.

Since the analysis indicates the analyzed building is less efficient but less costly to operate, there appears to be a discrepancy between the cost of energy versus the energy usage efficiency at the Community Center. A potential reason for this discrepancy is the current utility rate structure of the Community Center is lower than the national average for Public Assembly buildings and skews the energy cost baseline in that direction.

Since the only ECMs quantified in this Resourceful Kansas assessment were quick-fix items, additional opportunities to reduce energy usage and cost are likely, but require additional in-depth analysis outside the scope of this assessment to determine approximate energy usage and cost savings. Additional ECMs which the Roeland Park could consider are as follows:

- Adjust HVAC building occupied cooling/heating setpoint temperatures.
- Refrigerant piping insulation replacement.
- Install low flow fixtures.

See *Section 6.8 Non-Quantified ECM Suggestions* for more detailed information about these additional Non-Quantified ECMs.

2.0 Report Objectives and Scope

The overall objectives of this report are to provide a benchmark of current energy usage and to offer practical suggestions for areas of further investigation into energy conservation measures, or ECMs, that will reduce energy consumption and corresponding energy costs with acceptable paybacks without impacting the comfort of the occupants and the function of the building. These energy conservation measures are also sometimes called energy conservation opportunities, or ECOs.

There are varying levels of degree to the complexity and accuracy of building energy assessments. Assessments can range from brief, high-level overviews to in-depth technical analyses. The assessments provided by Resourceful Kansas are of the prior type and are patterned on what is defined by the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) as a Level 1 Audit. It is the simplest audit out of the three types defined by the Society and has the purpose of providing a low-cost, general overview of a building's energy usage profile and potential ECM opportunities.

To accomplish the above listed objectives, a walkthrough audit was conducted at the facility during which GBA gathered information on the current utility usage, the mechanical HVAC systems, the mechanical HVAC controls, the building envelope, the electrical lighting, and other building systems. The walkthrough audit was followed by an assessment of the gathered information and then GBA developed this report outlining the findings and ECMs.

Some of the suggestions will be "quick-fix" items that can be implemented with little-to-no further analysis, a minimal amount of capital expenditure, and little-to-no inconvenience in their implementation. Quick-fix items are sometimes referred to as "low hanging fruit". Other suggestions will be more of the "engineered solutions" type requiring additional technical analysis and perhaps engineering design with higher capital expenditure requirements and more complexity in their implementation.

The simpler ECM suggestions in this report will include energy savings, implementation costs, and payback details which are based on various assumptions and other estimation calculation techniques. The listed savings, costs, and payback periods in this report are meant as a guide for decision making but should not be taken as values with a high degree of accuracy. Prior to implementation of any of the ECM suggestions, Roeland Park should conduct analysis or design of sufficient detail to develop more accurate energy and cost savings numbers to support

implementation. An ASHRAE Level 2 Audit is one of the methods by which to develop more accurate saving analysis.

The higher complexity ECM suggestions in this report that require more time than what is available in the Resourceful Kansas energy assessment will include a description of the ECM but will not contain savings, costs, and payback information. Further analysis which would likely include engineering design should be conducted to develop energy and cost saving numbers. An ASHRAE Level 2 or 3 Audit are some of the methods by which to accomplish this.

After review of this report, it is hoped the building owner or operator will be able to determine whether to invest additional real time and money into further investigating the details of the suggested ECMs and to develop a prioritized list of ECMs to implement on the road towards energy savings.

Note: This report was intended for color printing. Printing this report in black and white will make color coded figures difficult to distinguish.

3.0 Definitions

The following are definitions for a variety of concepts, terms, and units utilized in this report.

- 2-pipe system: A pipe system for delivering either heating hot water or chilled water to HVAC component located throughout the building. One pipe is used to supply water to each component and one pipe is used to return the water to the heating or cooling source. This type of system does not allow simultaneous heating and cooling operations in a facility. All units are in heating mode or all units are in cooling mode at any one time.

- 4-pipe system: A pipe system for delivering both heating hot water and chilled water to HVAC components located throughout the building. This type of system allows simultaneous heating and cooling operations to occur in a facility. HVAC units have the capability of engaging heating mode or cooling mode at any time.

- air conditioner: An appliance, system, or mechanism designed to dehumidify and extract heat from an area. Usually this term is reserved for smaller self contained units such as a residential system.

- air handling unit, air handler, or AHU: A central unit consisting of a blower, heating and cooling elements, filter racks or chamber, dampers, humidifier, and other central equipment in direct contact with the airflow. This does not include the ductwork through the building.

- Btu or BTU: This energy unit stands for British Thermal Unit and is commonly utilized in the United States (the majority of the rest of the world uses kWh or kJ). A Btu is defined as the amount of energy required to increase the temperature of 1 pound of water by 1 degree Fahrenheit, at normal atmospheric pressure. Some other designations related to this unit are MBtu (1000 Btu) and MMBtu (1,000,000 Btu).

Note that some organizations denote kBtus as 1,000 Btus and MBtus as 1,000,000 Btus. However, this report will utilize the convention that 1 MBtu = 1000 Btu and 1 MMBtu =1,000,000 Btu.

- Btuh or Btu/hr or Btu hour: This power unit is associated with the Btu. A Btuh describes the power of heating and cooling systems, such as furnaces, stoves, barbecue grills, and air conditioners. In many instances, the unit's power rating is abbreviated to just "BTU" or "Btu" but Btuh is the technically correct unit. Another designation related to this unit is ton of refrigeration (12,000 Btuh)

- cf: cubic feet or ft^3 is a measure of volume.

- condenser: A component in the basic refrigeration cycle that ejects or removes heat from the system. The condenser is the hot side of an air conditioner or heat pump. Condensers are heat exchangers, and can transfer heat to air or to an intermediate fluid (such as water or an aqueous solution of ethylene glycol) to carry heat to a distant sink, such as ground (earth sink), a body of water, or air (as with cooling towers).

- constant air volume or CAV: A system designed to provide a constant airflow. This term is applied to HVAC systems that have variable supply-air temperature but constant airflow rates. Most residential forced-air systems are small CAV systems with on/off control.

- DX: A type of HVAC equipment, "DX" stands for direct expansion refrigeration which refers to the process step in which the refrigerant is cooled. DX units are typically utilized for smaller capacity systems and therefore are almost exclusively utilized in residential and are very common in commercial buildings. A DX unit consists of four components: compressor, condenser, expansion valve loop, and evaporator. The portion of the DX unit that absorbs the heat from the space is the evaporator. The portion of the unit where heat is expelled to the atmosphere is the condenser. The compressor operates off of electricity and compresses the refrigerant. The expansion valve loop is where the direct expansion occurs and the refrigerant is converted from a liquid to a vapor, i.e. cooled.

  The typical method by which the hot refrigerant gas is cooled at the condenser section is through cool airflow. Therefore, most DX units can be installed in a building without any supporting utilities except for electricity. When all four components of a DX unit are self-contained, the unit is called a packaged air handling unit or air conditioner. If the unit is located on the roof, the unit is called a rooftop unit, or RTU. If the condenser and compressor are located separately from the remaining components of the DX unit, the system is called a split system. The split system concept allows part of the unit to be located indoors while the heat rejection portion, the condenser and compressor, are located outdoors. Refrigerant piping and control wiring typically are routed between the different components of the split system.

- ECM: *Energy Conservation Measure* is a suggested improvement to a facility that will reduce the usage of energy.
- ECO: *Energy Conservation Opportunity* is an alternate name for an ECM.
- economizer: An air-side economizer for an HVAC system is the set of components and the controls in an HVAC unit that introduce cooler outside air as a means of cooling the indoor space during the appropriate times of the year. Also known as "free cooling," an economizer will reduce the energy consumption of the cooling equipment. Economizers can be implemented in cold and temperate climates, but are most often not appropriate in hot and humid climates.
- energy: The capacity to do work and for most buildings, energy is provided through common energy sources such as electricity, natural gas, fuel oil, and propane.
- evaporator: A component in the basic refrigeration cycle that absorbs or adds heat to the system. Evaporators can be used to absorb heat from air or from a liquid. The evaporator is the cold side of an air conditioner or heat pump.
- fan coil unit or FCU: A small terminal unit that is often composed of only a blower and a heating and/or cooling coil, as is often used in hotels, condominiums, or apartments. Typically a fan coil unit is not connected to ductwork, and is used to control the temperature in the space where it is installed, or serve multiple spaces. It is controlled either by a thermostat or manual on/off switch.
- HVAC: Stands for heating, ventilating, and air conditioning and refers to the technology of indoor or automotive environmental comfort. An HVAC unit is a piece of equipment providing environmental comfort to an enclosed space. An HVAC system typically refers to the HVAC unit, the ductwork routing air to and from the unit, the dampers, and the end supply and return devices at all the spaces being served by the unit.
- kW: This power unit is equal to 1000 watts and 3,412 Btu/hr. Appliances, some equipment, and light bulbs all contain a kW or watt rating.
- kWh: The kilowatt hour is most commonly utilized as a billing unit for energy delivered to consumers by electric utilities. Energy is the capacity to do work and for most buildings, energy is provided through common energy sources such as electricity, natural gas, fuel oil, and propane. A kWh is equivalent to 1000 watt hours and 3,412 Btu.
- MBtu: This energy unit is equal to 1,000 Btu.
- Mbtu/h: This power unit is equal to 1,000 Btu/hr.
- MMBtu: This energy unit is equal to 1,000,000 Btu.
- MMBtu/h: This power unit is equal to 1,000,000 Btu/hr.

- Mcf: This billing unit stands for a volume in thousands of cubic feet and is typically utilized for natural gas.
- packaged unit: An air-handling unit that includes internal heating and cooling devices.
- power: Power is the rate at which energy is generated or consumed.
- rooftop unit or RTU: an air handling unit, typically a packaged unit meant for outdoor installation.
- simple payback: Simple payback is a common economic analysis method. In the context of energy efficiency, it calculates the amount of time it will take to recover installation costs based on annual energy cost savings. It does not take into account the concept of present/future values, inflation, discount rates, tax rates, or a project's profitability. The advantage of this method is it provides a very simple definition and calculation formula. For quick payback periods of five years or less, this method works as a go/no-go indicator. For longer payback periods, additional study or analysis is probably required to gain a more accurate picture of the profitability of the investment.
- terminal unit: A small component that contains a heating coil, cooling coil, automatic damper, or some combination of the three. Used to control the temperature of a single room.
- therm: This energy unit is equal to 100,000 Btu or 10^5 Btu and is typically utilized as a billing unit for natural gas. To convert between therms and Mcf, the energy content of the natural gas needs to be known. For approximation purposes, a natural gas energy content of 1000 to 1050 Btu/ft^3 is typically utilized.
- ton of refrigeration: This power unit stands for the rate of heat removal required to freeze a short ton (2000 pounds) of water at 32 °F in 24 hours. It is only utilized in refrigeration and is equal to 12,000 Btuh; 12,660 kJ/h; and 3.517 kW.
- variable air volume: An HVAC system that has a stable supply-air temperature, and varies the airflow rate to meet the temperature requirements. Compared to constant air volume systems, these systems conserve energy through lower fan speeds during times of lower temperature control demand. Most new commercial buildings have VAV systems.
- variable frequency drive: A method of motor control which varies the motor output to meet demand. VFDs are frequently used on fans or chilled water and heating hot water pumps to reduce energy consumption at light loads.

4.0 Facility Description

4.1. Facility Summary

4.1.1 Description

The Community Center is a single story building with a basement. The basement contains mechanical HVAC equipment, hot water heaters and space for storage. The first floor provides space for offices, rental rooms, day care and a kitchen. The following figure is a recent satellite photograph of the Community Center.

Figure 4.1.A: Recent Satellite Photograph of the Community Center

4.1.2 Square Footage

The total square footage, 19,000 square feet, will be used in the calculations that follow in this report. An accurate square footage number is important as energy usage and energy cost data is normalized by building square footage to benchmark a facility. When determining the square footage of a facility for the purpose of an energy assessment, only those spaces that are heated, cooled, and lit should be included.

4.1.3 Facility History

The Community Center was originally built in 1953 as a school. The City of Roeland Park has owned the building for more than 30 years.

4.1.4 Building Type Classification

National energy benchmarking data utilized by Resourceful Kansas is collected and sorted by building type. Due to the nature of the schedule and usage of the building, the Community Center is classified as having Public Assembly space.

4.2. Geographic Weather Information

ASHRAE Weather and Design Data is contained in each ASHRAE Fundamentals Handbook and is individually tabulated for over 1,000 locations in the United States. The following is weather data from the ASHRAE handbook for the nearest weather station, Kansas City, MO (from weather station #724463 located at the Kansas City Downtown Airport).

4.2.1 Physical Location

4.2.1.a. Latitude: 39.12 N

4.2.1.b. Longitude: 94.59 W

4.2.1.c. Elevation: 751 ft

4.2.2 Design

The following temperatures are ASHRAE 1% design numbers for heating and cooling seasons rounded to the nearest whole number. These temperatures were derived statistically and represent the maximum and minimum values that will not be exceeded for 99% of the year on average. The use of annual percentiles to define design conditions ensures that they represent the same probability of occurrence in any climate, regardless of the seasonal distribution of extreme temperature and humidity. ASHRAE data is typically utilized in HVAC design to size equipment.

4.2.2.a. Winter Dry Bulb: 9°F

4.2.2.b. Summer Dry Bulb/Wet Bulb: 94°F/76°F

4.2.3 Extreme Annual

The following temperatures represent the mean daily maximum and minimum for the entire year over all the years of collecting weather data.

4.2.3.a. Summer: 101°F dry bulb

4.2.3.b. Winter: -2°F dry bulb

4.2.4 Heating and Cooling Degree Days

A heating degree day is calculated to project the demand for energy required to heat a structure. It is measured by taking the outdoor temperature every half hour. If the temperature is below a certain reference base temperature deemed the point at which a building requires heating, heating degree days begin to accrue. The larger the temperature difference between the base temperature and the outside air, the larger the resulting calculated degree days and the resulting heating energy required.

The sum of heating degree days over a larger period of time, such as a month or year, is useful as a comparison to other locations in order to judge the climate difference of the locales. A heating degree day total four times the value of another building signifies the location with the larger value will require approximately four times the energy to heat a building with similar build

of construction. Cooling degree days follow the same concept but begin to accrue when an outside air temperature reading is above the point at which cooling is needed.

Based on historical information obtained from the National Oceanic and Atmospheric Administration collected between 1971 and 2000, the following heating and cooling degree day information was compiled for Kansas City, MO. The heating and cooling degree day base temperature for this data was set at 65°F.

	Heating Degree Days	Cooling Degree Days
January	1035	0
February	795	0
March	582	5
April	292	30
May	71	123
June	5	324
July	0	492
August	1	432
September	47	209
October	234	40
November	583	2
December	948	0
Yearly Total:	4593	1657

Table 4.2.A: Heating and Cooling Degree Days for Kansas City, MO (65° Base)

4.3. Utility Usage

Historical monthly utility billing data including usage and rates was provided by the City of Roeland Park, and is summarized below.

		Yearly Totals					
		2009/10			2010/11		
Utility	Provider	Energy Usage	MMBtu	Costs	Energy Usage	MMBtu	Costs
Electric	KCP&L	193,680 kWh	661	$18,822	189,360 kWh	646	$20,713
Natural Gas	Kansas Gas Service	1,093 Mcf	1,147	$10,207	1,185 Mcf	1,244	$9,627
Totals:			1,808	$29,029		1,890	$30,340

Table 4.3.A: Facility Utility Usage and Cost Summary

4.3.1 Electric

KCP&L is the electric provider for this building. A detailed utility usage and cost summary is as follows:

Facility Historical Utility Records

Utility Type: Electrical
Provider: KCP&L

	2009/10			2010/11		
	Rate * ($/kWh)	Usage (kWh)	Monthly Cost ($)	Rate * ($/kWh)	Usage (kWh)	Monthly Cost ($)
December	$0.0963	11,440	$1,102	$0.0970	11,760	$1,141
January	$0.0962	10,720	$1,031	$0.1006	10,640	$1,070
February	$0.0952	11,680	$1,112	$0.1016	11,680	$1,187
March	$0.1047	10,000	$1,047	$0.1095	10,960	$1,200
April	$0.0974	13,200	$1,286	$0.1105	12,800	$1,415
May	$0.1003	13,120	$1,317	$0.1176	14,320	$1,684
June	$0.0913	26,560	$2,425	$0.1084	21,600	$2,342
July	$0.0969	26,880	$2,604	$0.1003	30,640	$3,073
August	$0.0996	26,080	$2,597	$0.1137	23,600	$2,683
September	$0.1027	19,360	$1,989	$0.1215	16,240	$1,973
October	$0.0914	13,760	$1,258	$0.1134	13,280	$1,506
November	$0.0971	10,880	$1,056	$0.1215	11,840	$1,439
Yearly Averages	$0.0972	16,140	$1,569	$0.1094	15,780	$1,726
Yearly Totals		193,680	$18,822		189,360	$20,713

* Rates are an average value for each full month and include all monthly charges, surcharges, taxes, and fees.

Table 4.3.B: Electrical Utility Usage and Cost Summary

4.3.2 Natural Gas

Kansas Gas Service is the natural gas provider for this facility. A detailed utility usage and cost summary is as follows:

Facility Historical Utility Records

Utility Type: Natural Gas
Provider: Kansas Gas Service

	2009/10				2010/11			
	Rate* ($/MMbtu)	Usage (Mcf)	Usage (MMbtu)	Monthly Cost ($)	Rate* ($/MMbtu)	Usage (Mcf)	Usage (MMbtu)	Monthly Cost ($)
December	$8.3537	150	157	$1,311	$6.7813	165	173	$1,174
January	$8.2937	289	303	$2,515	$7.6517	268	282	$2,156
February	$9.4536	187	196	$1,852	$7.4546	257	270	$2,012
March	$9.2724	188	197	$1,827	$7.9291	148	155	$1,229
April	$9.6996	75	79	$762	$8.0600	96	101	$815
May	$9.2331	40	42	$385	$8.5303	50	53	$451
June	$9.7482	24	26	$250	$9.0117	29	30	$270
July	$9.8676	22	23	$223	$9.3661	21	22	$206
August	$9.8930	21	22	$219	$9.6441	18	19	$181
September	$9.8338	20	21	$211	$9.6685	19	19	$188
October	$9.0390	20	21	$188	$9.3370	18	19	$180
November	$7.5510	59	61	$464	$7.6077	96	101	$766
Yearly Averages	$8.8953	91	96	$851	$7.7400	99	104	$802
Yearly Totals		1,093	1,147	$10,207		1,185	1,244	$9,627

* Rates are an average value for full month and include all monthly charges, surcharges, taxes, and fees.

Table 4.3.C: Natural Gas Utility Usage and Cost Summary

4.4. Greenhouse Gas Equivalencies

The US Environmental Protection Agency provides a greenhouse gas equivalency calculator on its website that converts annual energy use into the corresponding tons of carbon dioxide emissions from power plants as well as a variety of other equivalent quantities to place energy usage and energy conservation in more familiar terms. The following table lists greenhouse gas equivalencies calculated for the Community Center's 2010/11 energy usage.

Greenhouse Gas Equivalencies
2010/11 Electricity Usage: 189,360 kWh 2010/11 Natural Gas Usage: 1,244 MMBtu
2010/11 Emission Equivalencies
213 tons of carbon dioxide equivalent
Annual greenhouse gas emissions from 38 passenger vehicles
CO2 emissions from 21,640 gallons of gasoline consumed
CO2 emissions from 449 barrels of oil consumed
CO2 emissions from 2.5 tanker trucks worth of gasoline
CO2 emissions from the electricity use of 23 homes for one year
CO2 emissions from the energy use of 16 homes for one year
CO2 emissions from 4,950 barrels of oil consumed
Carbon sequestered annually by 41 acres of pine or fir forests
Carbon sequestered annually by 1.9 acres of forest preserved from deforestation
CO2 emissions from 8,043 propane cylinders used for home barbeques
CO2 emissions from burning 1.1 railcars worth of coal
Greenhouse gas emissions avoided by recycling 67 tons of waste instead of sending it to the landfill
Annual CO2 emissions from 0.00005 coal fired power plants

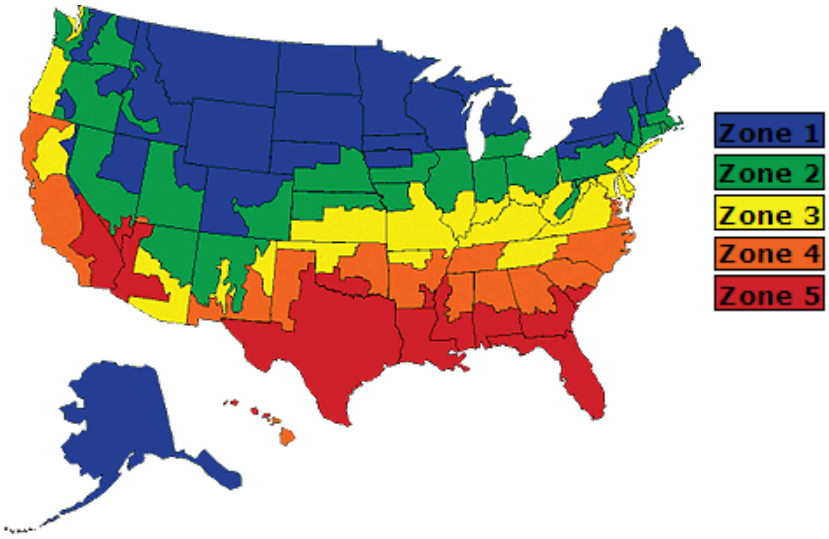
Table 4.4.A: Greenhouse Gas Equivalencies

4.5. Commercial Buildings Energy Consumption Survey Data

The Commercial Buildings Energy Consumption Survey (CBECS) is nationwide in scope and is conducted by the Energy Information Administration. The CBECS collects information on the stock of U.S. commercial buildings, their energy-related building characteristics, and their energy consumption and expenditures. Commercial buildings include all buildings in which at least half of the floor space is used for a purpose that is not residential, industrial, or agricultural, so they include building types that might not traditionally be considered "commercial," such as schools, correctional institutions, and buildings used for religious worship. The CBECS was first conducted in 1979; the eighth, and most recently released survey, was conducted in 2003. Data

is compiled by the Commercial Buildings Energy Consumption Survey every four years on a national scale to help determine the benchmark for each usage type of building.

Additionally, the CBECS data is broken into climate zones and geographic areas to provide more accurate comparisons. Regions with similar climates are grouped together in zones based on the cooling degree day and heating degree day criteria listed in the keynotes of the following figure.



Climate Zone	Cooling Degree Days	Heating Degree Days
1	Fewer than 2,000	More than 7,000
2	Fewer than 2,000	5,500 to 7,000
3	Fewer than 2,000	4,000 to 5,499
4	Fewer than 2,000	Fewer than 4,000
5	2,000 or More	Fewer than 4,000

Figure 4.5.A: Climate Zone Map for CBECS

The State of Kansas is split into two climate zones: The northern half is Climate Zone 2 (green) while the southern half is Climate Zone 3 (yellow). Based on heating and cooling degree days, Roeland Park is in Climate Zone 3 (yellow).

The CBECS data is additionally compiled for different contiguous regions of the country. Kansas is part of the West North Central Region (WNC) along with Iowa, Minnesota, North Dakota, South Dakota, Missouri and Nebraska.

Based on 2003 CBECS data, the figure below illustrates the breakout of energy usage for different end uses within the average Public Assembly building. This information is very useful in prioritizing energy conservation measures since an ECM for an end usage with a higher percentage of the overall facility energy usage would likely result in a larger energy reduction and

resulting cost savings. Heating and ventilation in these types of facilities are the largest categories to focus on.

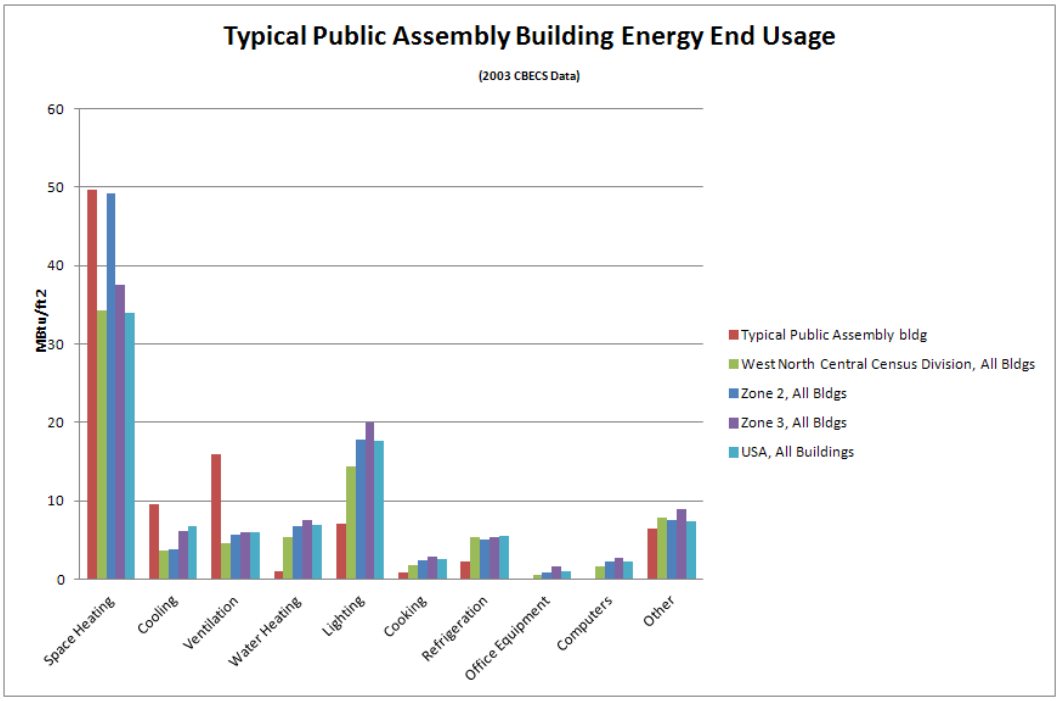


Figure 4.5.B: Typical Public Assembly Building Energy End Usage

Specific individual end use energy consumption was not measured or calculated for the Community Center since such an effort is beyond the scope of a Level I energy audit.

4.6. Envelope

4.6.1 Walls

The walls for the building consist of concrete masonry unit (CMU) walls with an exterior brick facâde as shown in the figure below. The amount of wall insulation was not observed during the walk-through.

Figure 4.6.A: South Wall Elevation

4.6.2 Roof

The building contains a built up roof. Community Center staff indicated that the roof leaks. The roof was not accessible to GBA during the walkthrough audit.

4.6.3 Glazing

Typical windows in this facility consist of double pane windows with a metal frame. Staff indicated the windows were replaced in approximately 2000. Most windows have some type of shading.

A picture of a typical double pane window can be seen in the image below.

Figure 4.6.B: Typical Double Pane Window

4.6.4 Building Entrances

The main building entrances consist of doors with hollow-metal frames with a large percentage covered in glazing. None of these entrances contain vestibules. Staff indicated the doors were replaced in approximately 2000. See the figure below for a photo of a typical main exterior entrance.

Figure 4.6.C: Typical Main Entrance

4.7. Heating Hot Water System

The Community Center utilizes a condensing natural gas hot water boiler for heating. The boiler supplies hot water for air handlers and fan coil units serving the offices, main hallway and multi-purpose room. The boiler manufacturer is Fulton, model number PHW-1000. The boiler has an input of 1,000 Mbtu/h, an output of 900 Mbtu/h and a minimum efficiency of 90%. A picture of the condensing boiler can be seen in the image below.

Figure 4.7.A: Community Center Condensing Boiler

The 2011 ASHRAE Handbook – HVAC Applications (Chapter 36, Tables 3 and 4) indicates the median service life for a steel tube boiler is approximately 30 years. At 5 years old, the Community Center boiler should still have plenty service life left if maintained properly.

4.8. Piping Systems

Piping systems circulate heating hot water to terminal equipment locations. The insulation on all the hot water piping appeared to be in good shape.

4.9. HVAC Units

An assortment of air handling units, split systems and fan coil units serve the Community Center.

4.9.1 Fan Coil Units

Fan coils in offices, hallways and the multi-purpose room operate on the heating hot water system for heating purposes. A typical example of a fan coil can be seen below.

Figure 4.9.A: Typical Fan Coil Unit

The 2011 ASHRAE Handbook – HVAC Applications (Chapter 36, Tables 3 and 4) indicates the median service life for a fan coil unit is approximately 20 years. If fan coils are found to be older than this they should be replaced when funds become available.

4.9.2 Split Systems

Eleven split systems serve the Community Center. A split system consists of an indoor air handling unit and an outdoor condensing unit which are interconnected by refrigerant piping. The following tables describe each split system in more detail.

Condenser Unit Manufacturer	Model	Nominal Cooling Capacity	Refrigerant	Installation Date	SEER / EER	Area Served
Carrier	38AE012 500	10.5-ton	R-22	1986	EER 9.3	Multi-Purpose Room
Carrier	38EH036330DL	3-ton	R-22	1986	SEER 9.0	Room 1
Carrier	38EH036330DL	3-ton	R22	1986	SEER 9.0	Room 2
Carrier	38EH036330DL	3-ton	R22	1986	SEER 9.0	Room 3
Carrier	38EH036330DL	3-ton	R22	1986	SEER 9.0	Fitness Room
Carrier	*	*	R-22	*	*	Room 4
Carrier	38EN060530	5-ton	R-22	1987	SEER 8.0	Daycare
Carrier	38EN048520	4-ton	R-22	1987	SEER 8.0	Outreach Office
Lennox	HS29-090-3Y	7.5-ton	R-22	2004	EER 10.3	West Hall
Trane	TTA072C300A0	6-ton	R-22	1996	Unknown	Neighbors Place
Lennox	HS29-060-9Y	5-ton	R-22	2001	SEER 11.5	East Hall and Offices

*Name plate information missing or illegible

Table 4.9.A: Split System Condensing Unit Summary Table

AHU Manufacturer	Model	Input Heating Capacity	Installation Date	Area Served
Carrier	40RR014	41.8 kW	1986	Multi-Purpose Room
Carrier	58GS100-3	100 Mbtuh	1986	Room 1
Carrier	58GS100-3	100 Mbtuh	1986	Room 2
Carrier	58GS100-3	100 Mbtuh	1986	Room 3
Carrier	58GS100-3	100 Mbtuh	1986	Fitness Room
Carrier	58GS125-4	125 Mbtuh	1986	Room 4
Carrier	58GS125-4	125 Mbtuh	1986	Daycare
Carrier	TWE090A100BB	Electric / Unknown	2008	Outreach Office
Lennox	Unknown	Unknown	Unknown	West Hall
Trane	TWE090A100BB	Electric / Unknown	1996	Neighbors Place
Lennox	Unknown	Unknown	Unknown	East Hall and Offices

Table 4.9.B: Split System AHU Summary Table

A typical carrier condensing unit can be seen in the figure below.

Figure 4.9.B: Typical Carrier Condensing Unit

A picture of a typical carrier air handling unit can be seen in the figure below.

Figure 4.9.C: Typical Carrier Vertical Air Handler

The 2011 ASHRAE Handbook – HVAC Applications (Chapter 36, Table 4) indicates the median service life for a split system air conditioner is approximately 15 years. All of the split systems components except for those serving the west hall, outreach office and the east hall are past their useful life and should be replaced when funds become available.

All of the split systems utilize the refrigerant HCFC-22, also known as R-22. R-22 has been the refrigerant of choice for commercial heat pump and air-conditioning systems for more than four decades. However, releases of R-22, such as those from leaks, contribute to ozone depletion. In addition, the manufacture of R-22 results in a by-product (HFC-23) that contributes significantly to global warming. US regulations are phasing out the manufacture of R-22 over the coming years in compliance with international treaties. By 2020, all production and importation of R-22 in the US will be eliminated. A limited amount of R-22 stockpiles and reclaimed refrigerant will still be available after 2020, but pricing for this refrigerant will be subject to supply and demand and all indications are future price increases will be substantial as increases in R-22 prices are already evident. Some air handling equipment can be converted to alternate refrigerants after modifications to the equipment. However, the conversion can be costly depending on the system and efficiencies of the equipment are reduced which increases operation costs. As each split system approaches the end of its useful life, Roeland Park should closely monitor the price of R-22 refrigerant as at some point a new DX unit utilizing alternate refrigerants will be more cost effective than the addition of R-22.

Insulation on some refrigerant pipes serving condensers at the Community Center was damaged or missing, allowing energy loss to the atmosphere. The figure below shows a picture of typical damaged insulation.

Figure 4.9.D: Typical Damaged Refrigerant Pipe Insulation

4.9.3 Ductwork

Only a limited amount of exposed ductwork was observed during the audit walkthrough and all of the observed supply ductwork was internally lined with insulation. It is assumed all remaining supply ductwork in the Community Center is internally lined as well.

Internal duct insulation can pose health and comfort hazards for building occupants as the insulation ages. If the air stream in the ductwork ever contains moisture, the internal insulation can collect mold and bacteria which can in turn migrate through the rest of the ductwork system and be discharged into occupied spaces. If internal insulation is present and deteriorating, it should be evaluated and at some time replaced. Several studies have been conducted that quantify health and comfort issues from a building that contains internal insulation that is beyond its service life (Reference *Guidance for Insulating New HVAC/Ductwork* at http://www.ehs.ucsb.edu/units/ih/ihrsc/ihpdf/ihductliner.pdf and *Air Duct Cleaning* at http://epa.gov/iaq/pubs/airduct.html).

4.10. Domestic Hot Water

Two hot water heaters provide the domestic hot water to the Community Center. One heater is manufactured by State Industries with a model number of GS650YBRT while the other is manufactured by AO Smith with a model number of FCG50238.

Figure 4.10.A: Water Heater

4.11. HVAC Controls

The Community Center contains a combination of pneumatic and digital controls. The split systems are controlled by digital thermostats. Two of the digital thermostats appeared to be programmable while the remainder of the thermostats are of the non-programmable type. All programmable thermostats appeared to be set to "hold" with no setbacks being implemented. Manual setback is not currently implemented on the split system non-programmable thermostats.

Reference the following figures for photos of the typical split system thermostats.

Figure 4.11.A: Typical Non-Programmable Split System Thermostat

Figure 4.11.B: Typical Programmable Split System Thermostat

The Community Center staff indicated the HVAC systems served by the heating hot water system are controlled by a pneumatic control system. Thermostats controlling the fan coil units on the hot water system are the non-programmable type without locking covers. Reference the following figure for a photo of the typical non-programmable thermostat. Manual setback is not currently implemented on this equipment.

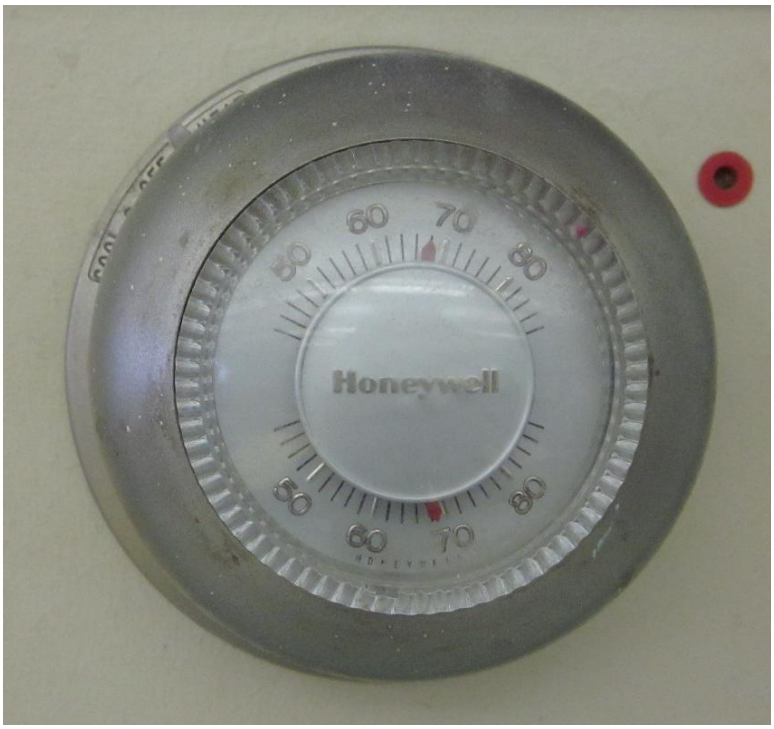


Figure 4.11.C: Typical Non-Programmable Thermostat

4.12. Plumbing Fixtures

Plumbing fixtures installed at the Community Center are not low flow fixtures. Reference the following figures for photos of a typical water closet and lavatory faucet.

Figure 4.12.A: Typical Water Closet

Figure 4.12.B: Typical Lavatory Faucets

4.13. Building Lighting

The Community Center contains a variety of light fixtures and lamp types. GBA observed the type, quantity, and intensity of lighting in multiple locations. The following table summarizes the lighting observed at each location.

Roeland Park Community Center								
Room or Area	Quantity	Fixture Type	Quantity	Fixture Type	Average Measured Foot-Candle Level	IESNA Recommended Levels		
						Foot-Candle Level	Room Type	+33% Variance Level (Foot-Candles)
Room 2 - Dance	18	2-lamp T12 Fluorescent			64	50	Standard Classroom	67
Room 3	18	2-lamp T12 Fluorescent			58	50	Standard Classroom	67
Room 4 - Fitness	36	2-lamp T12 Fluorescent			54	50	Standard Classroom	67
Day Care	27	2-lamp T12 Fluorescent			52	50	Standard Classroom	67
Room 6 - Outreach	15	2-lamp T12 Fluorescent			38	50	Standard Classroom	67
IFC Private Office 1	3 (1 burnt out)	2-lamp T12 Fluorescent			35	50	Private Office	67
IFC Private Office 2	2	2-lamp T12 Fluorescent	1	75-watt Incandescent	25	50	Private Office	67
Main Office	2	4-lamp T12 Fluorescent			38	35	Open Office Area	47
Multi Service Center Office	2	4-lamp T12 Fluorescent			48	35	Open Office Area	47
50 Plus Office	6	2-lamp T12 Fluorescent			40	35	Open Office Area	47
Multi Purpose Room	29	1-lamp 8' T12 Fluorescent	12	300-watt Incandescent	21	30	Gymnasium	40
Hallways	24	2-lamp T12 Fluorescent			15	20	Hallway	27

Table 4.13.A: Community Center Lighting Levels

Pictures of typical lighting installations are included below.

Figure 4.10.A: Typical Rental Room Lighting

Figure 4.10.B: Multi-Purpose Room Lighting

Figure 4.13.C: Typical Hallway Lighting

4.14. Schedules

4.14.1 Building Operating Hours

The Community Center is utilized during normal operation hours by staff and the surrounding community. Currently, HVAC setbacks are not implemented during typically unoccupied periods.

GBA calculated the total yearly operation time for lighting for specific areas of the building as follows:

Building Operation Time			
Building Area	Avg. Hours/Day	Days/Year	Hours/Year
Office Areas	9.0	251	2,259
Rental Rooms	12.7	302	3,844
Daycare	12.0	251	3,012

Table 4.14.A: Building Operation Time

The 251 days a year is adjusted for weekends and the 2011 Federal Holidays released by the US Office of Personnel Management.

4.15. Additional Key Observations

The following are additional observations and recommendations resulting from the walkthrough audit of the Community Center.

4.15.1 Outside Ventilation Air

GBA did not observe outside ventilation air supply to the interior of the Community Center during the walkthrough audit. Ventilation air supply may have been overlooked since GBA did not perform a thorough review of the building. However if outside ventilation air supply is not being provided, the Roeland Park should consider implementation of such a system in order to comply with local building codes and improve the internal air quality of the facility. Several studies have been conducted that quantify health and productivity gains from a building that contains healthy indoor air quality (Reference U.S. EPA Indoor Air Quality guides at http://www.epa.gov/iaq/pubs and Lawrence Berkeley National Laboratory Indoor Air Quality Scientific Findings Resource Bank at http://www.iaqscience.lbl.gov/sfrb.html).

5.0 Energy Usage Analysis

5.1. Utility Rate Analysis

Reference the prior published historical monthly utility billing data in *Table 4.3.B: Electrical Utility Usage and Cost Summary* and *Table 4.3.C: Natural Gas Utility Usage and Cost Summary* for facility utility costs.

5.1.1 Electricity Bill Description

Electric rates for most commercial and industrial clients are comprised of multiple types of charges and fees, depending on the provider and the facility's rate schedule. The following

provides a brief explanation of the more common types of charges and fees. Consult your electricity utility provider for specific values and more detailed explanations of the actual charges and fees on the monthly utility bills.

- A customer charge is a flat rate per month that is independent of energy usage.
- An energy charge is typically a per kilowatt-hour charge set by the provider for a specific amount of energy usage. Many times the energy charge operates on a stepped schedule. The amount of steps varies by provider and rate schedule.
- A demand charge is a cost that is based on the greatest rate of electricity used during any fifteen minute time period. The demand charge rate is typically calculated per kilowatt and is typically higher in cooling season than during heating season.
- A fuel charge allows the electric provider to recoup the cost of the fuel utilized to generate its electricity. It varies from month to month.
- A transmission charge is sometimes applied to cover the cost of transmission line upkeep.
- An environmental charge is a cost to offset the expense for the provider to upgrade its equipment to meet new environmental standards also changes from month to month.
- A franchise fee is a variable fee passed on to the city or municipality in which the facility is located.
- State and county taxes are also components to the electric bill.
- Some electric utilities charge a fee for low power factor. Low power factor describes a condition in which the electrical system of a building experiences large inductive loads due to the quantity of transformers and motors. The inductive loads create more electrical energy losses than what is typical for a building. These losses are experienced after the meter meaning that more power is paid for than is actually usable.

5.1.2 Natural Gas

Depending on the natural gas provider and the building's rate schedule, a natural gas bill will contain a variety charges and fees. The following provides a brief explanation of the more common types of charges and fees. Consult your natural gas utility provider for specific values and more detailed explanations of the actual charges and fees on the monthly utility bills.

- A service charge is a constant amount charged every month and is independent of how much gas is delivered.
- The delivery charge typically varies from month to month and is based on the amount of gas delivered.
- The gas system reliability surcharge is a fixed monthly amount based on the total amount of annual gas usage.
- The cost of gas is a charge per amount of gas delivered that varies from month to month based on the market rate of natural gas.
- The Ad Valorem tax surcharge rider is intended to recover changes in the real estate and personal property taxes.

- The Electronic Flow Measurement charge is usually a monthly fee assessed per meter. This applies to those buildings that have elected to install a meter with greater reporting capabilities than a standard meter.
- A franchise fee is a variable fee passed on to the city or municipality in which the facility is located.
- State and county taxes are also components to the natural gas bill.

5.2. Overall Building Benchmarks

5.2.1 Energy Cost Index, ECI

5.2.1.a. Definition

The Energy Cost Index (ECI) is an index that tracks the energy costs of buildings normalized to square footage and is used to provide a benchmark for comparison of buildings of the same usage type. The ECI is calculated by dividing the total annual energy costs with the square footage of the facility being heated, cooled, and lit. A calculated ECI can then be compared to a national database of other ECI values compiled on the basis of building usage type.

The national database of ECI values is developed by the Commercial Buildings Energy Consumption Survey (CBECS). Reference *Figure 4.5.B: Typical Public Assembly Building Energy End Usage* for more information concerning this survey data.

The premise of the ECI is that the building usage type will be the primary driver of energy cost. Therefore when comparing Energy Cost Index numbers, a person should keep in mind that ECI numbers do not account for the location specific energy costs. The price of energy, including gas and electricity, varies greatly across the United States. The Small Business and Entrepreneurship Council develop an Energy Cost Index every year quantifying the differences in electric costs for each state. According to their research, in 2010 Kansas electricity costs were approximately 17% less than the US average. The relatively inexpensive cost of electricity in certain parts of the country, including Kansas, can drive the ECI value down and potentially skew the conclusions drawn from a comparison to other buildings where electricity costs are higher.

The ECI data presented in the 2003 survey data was tallied for the energy costs being reported at that time. As with most commodities, energy prices have increased substantially in the intervening time period. To account for this increase, GBA adjusted the ECI data based on the average increase to energy costs reported by the U.S. Energy Information Administration during the same time period. GBA's analysis resulted in a 16% increase in natural gas prices and a 33% increase in average electric prices since 2003. Since the energy usage breakout for the typical building audited by the Resourceful Kansas program is 75% from electric utilities and 25% from natural gas, the weighted average increase in energy costs for most buildings is 29% from 2003 to 2010.

Additionally, the ECI calculation does not account for different climate zones. An ECI developed for a building in a temperate zone will compare very well to an ECI calculated for buildings of the same usage type in a far-north zone requiring a lot of heating or in a far-south zone requiring a lot of cooling. A favorable comparison could therefore be due more to differences in climate as opposed to differences in energy efficiency.

ECI comparisons are one of the main benchmark tools available to energy auditors. However, the evaluator and the building owner should be aware of the above stated considerations before drawing final conclusions. A better benchmark index to utilize is the Energy Use Index, discussed later in this report.

5.2.1.b. Community Center ECI Analysis

The following table summarizes the calculation for the ECI based on the total energy costs from *Table 4.3.A: Facility Utility Usage and Cost Summary* as well as the overall building area square footage from *Section 4.1.2 Square Footage*.

Building (Column 1)	2010/11 Total Yearly Energy Costs (Column 2)	2010/11 Total Building Square Footage (Column 3)	2010/11 ECI (Column 2 / Column 3)
Community Center	$30,340	19,000 ft^2	$1.60 /ft^2/yr

Table 5.2.A: Tabular ECI Analysis Summary

The following figure graphically compares the ECI values to the adjusted 2003 CBECS ECI national averages for various building usage types.

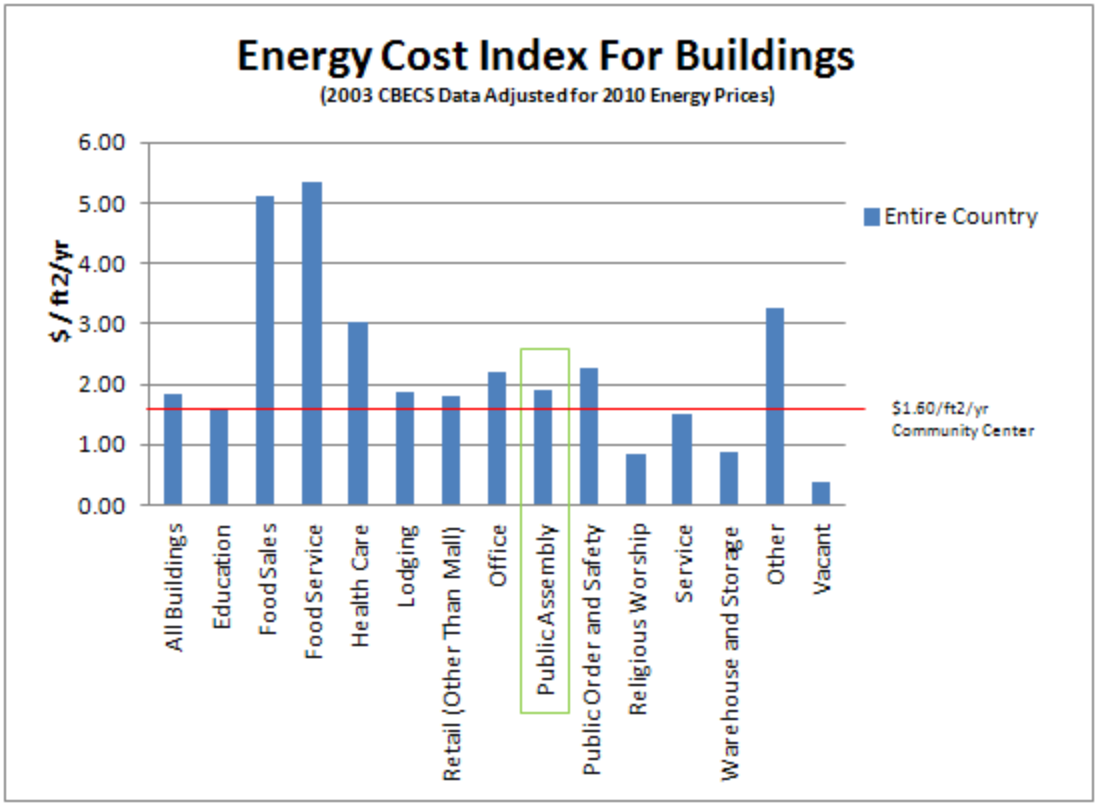


Figure 5.2.A: Energy Cost Index

The average value of the ECI for a Public Assembly building is $1.89/ft^2/yr. Comparing the national ECI values, the Community Center is approximately 15% less expensive to operate than the weighted national average.

5.2.2 Energy Use Index, EUI

5.2.2.a. Definition

The Energy Use Index (EUI) is an index that tracks the energy usage of buildings normalized to square footage and is used to provide a benchmark for comparison of buildings of the same usage type. The EUI is calculated by dividing the total annual energy consumed with the square footage of the facility being heated, cooled, and lit. A calculated EUI can then be compared to a national database of other EUI values compiled on the basis of building usage type, climate type, and geographic area.

Just like the ECI national database, the EUI national database of values is developed by the CBECS. Because the EUI calculation considers just the total energy consumed, the variability of energy costs do not factor in. Unlike the ECI data, the EUI data is broken down by climate type.

Due to the removal of cost and climate variability, the EUI is a better index to consider over the ECI when evaluating a building's energy usage benchmark. Users of EUI data, however, should be aware that indices developed with this method do not differentiate between the quality of the building energy going into the calculation. Energy varies in its quality or ability to do useful work and a straight conversion between energy units does not convey the effectiveness of each unit type. Electricity is a higher quality energy source than fuel based energy. The efficiency of an electrical piece of equipment is typically higher than that of a natural gas or heating oil unit. If a building utilizes a combination of energy sources, the different energy types have to be converted to a common unit to calculate an EUI. A comparison of the EUIs for two different buildings of the same usage type and in the same climate zone but with very different energy usage mixes could result in flawed conclusions.

5.2.2.b. Community Center EUI Analysis

The following table summarizes the calculation for the EUI based on the total energy usage from *Table 4.3.A: Facility Utility Usage and Cost Summary* as well as the overall building area square footage from *Section 4.1.2 Square Footage*.

Building (Column 1)	2010/11 Total Yearly Energy Consumption (Column 2)	2010/11 Total Building Square Footage (Column 3)	2010/11 EUI (Column 2 / Column 3)
Community Center	1,889,926 Mbtu	19,000 ft^2	99.5 $Mbtu/ft^2/yr$

Table 5.2.B: Tabular EUI Analysis Summary

The following figure graphically compares the EUI values to the 2003 CBECS EUI national averages for various building usage types. Within a building usage type, the data is further broken into categories for the entire country, for Climate Zone 2, Climate Zone 3 in which Roeland Park is located, and for the West North Central (WNC) region of the country.

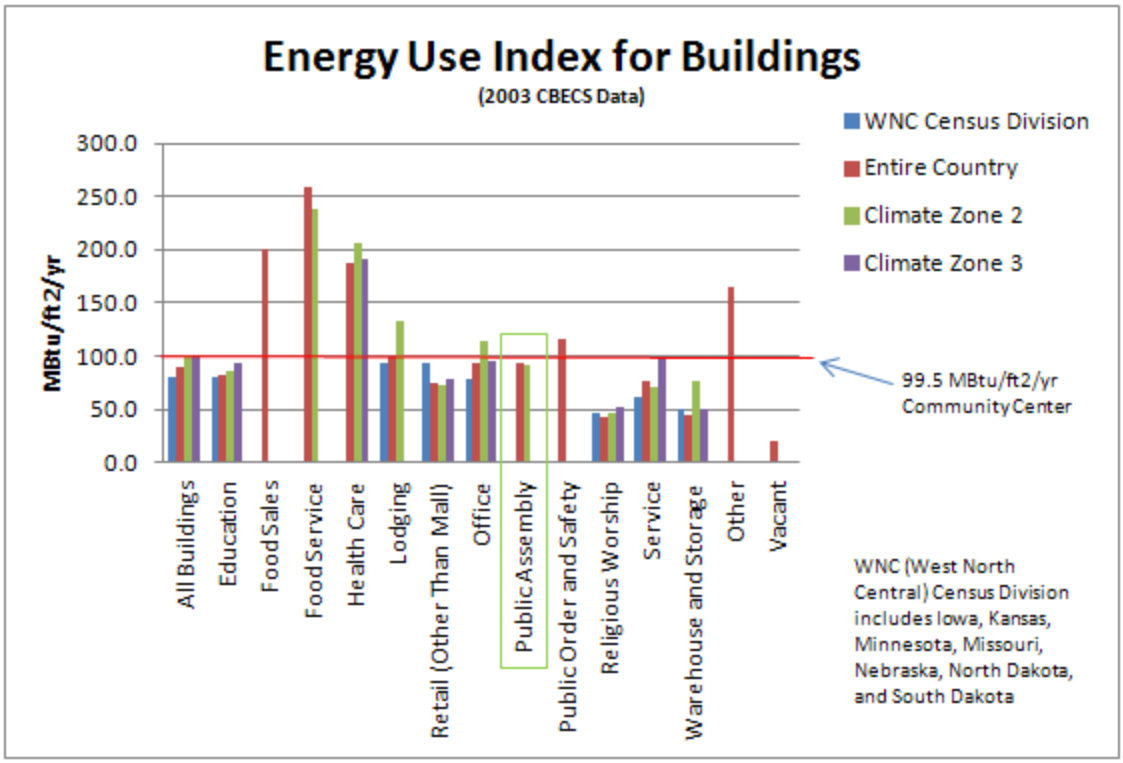


Figure 5.2.B: Energy Use Index

The average values of the EUI for Public Assembly buildings broken out for the different categories are as follows:

- For the entire country: 93.9 Mbtu/ft^2/yr
- For Climate Zone 2: 90.8 Mbtu/ft^2/yr
- For Climate Zone 3: No Data Available
- For the West North Central (WNC) region: No Data Available

Since data is not available for climate zone 3, the most appropriate average index category with which to compare Roeland Park, KS is the entire country. Comparing the EUI values, Community Center is approximately 6% less efficient than the national average.

5.3. DOE Energy Star Target Finder

The US Environmental Protection Agency has developed a tool to classify existing and new buildings energy efficiency and to help set targets in achieving greater efficiencies. The US Department of Energy has made this tool available on its website as a part of their Energy Star initiative. This rating system includes a very accurate comparison with other US buildings that has incorporated many factors that the ECI and EUI did not account for. Target Finder uses information such as building size, climate, operating hours, number of occupants, number of computers, and energy usage to provide the best possible benchmark for any particular building.

In Target Finder, the performance of an average building is assigned a rating of 50. To receive recognition from the EPA as having a building worthy of the Energy Star label, a building has to receive a rating of 75 or greater. Target Finder additionally provides goals in Energy Reduction percentage, Energy Usage Intensity, and Total Energy Usage for the target building to reach the Energy Star rating.

Due to the nature of usage for the Community Center, there is no category within the DOE Energy Star Target Finder which to compare the facility.

5.4. Summary of Building Energy Consumption Benchmarks and Rankings

The following table summarizes the findings of this section and provides percentage comparisons to average buildings.

Building	Energy Cost Index		Energy Use Index		Energy Star Target Finder Score	
	Index	Percent Comparison to Weighted Average Energy Cost	Index	Percent Comparison to Weighted Average Energy Consumption	Score	Percent Comparison to Weighted Average Energy Consumption
Community Center	$1.60/ft^2/yr		99.5 Mbtu/ft^2/yr		Not Applicable[1]	
Average	$1.89 /ft^2/yr (Entire Country)	15% less expensive	93.5 Mbtu/ft^2/yr (Entire Country)	6% less efficient		

[1] Energy Star does not contain comparable building use categories.

Table 5.4.A: Building Energy Consumption Benchmarks and Rankings Summary

The following conclusions can be drawn from the preceding table:

- The Community Center costs less to operate as compared to typical Public Assembly buildings.
- The Community Center is less energy efficient than the average Public Assembly building.

Since the analysis indicates the analyzed building is less efficient but less costly to operate, there appears to be a discrepancy between the cost of energy versus the energy usage efficiency at the Community Center. A potential reason for this discrepancy is the current utility rate structure of the Community Center is lower than the national average for Public Assembly buildings and skews the energy cost baseline in that direction.

6.0 Energy Conservation Measures

Following the walkthrough audit and developing the analysis on the energy consumption of the building, GBA examined what changes could be implemented to the facility in order to reduce energy consumption. The following list outlines the ECMs GBA developed:

Option Number	Description of ECM	Estimated Potential Yearly Energy Savings			Estimated Cost To Implement ECM	Payback Period (years)	Degree of Implementation Difficulty
		% Of Total Bldg Energy Usage	(MBtu/yr)	($)			
Roeland Park Community Center							
1	Replace T12 lamps with T8 lamps in all light fixtures.	0.52%	9,800	$310	$0	0.0	★
2	Replace T12 light fixtures with T8 light fixtures.	2.60%	49,100	$1,570	$37,300	23.8	★ ★
3	Replace 2-lamp fluorescent light fixtures with LED light fixtures.	4.69%	88,600	$2,840	$78,700	27.7	★ ★
4	Replace incandescent lamps with compact fluorescent lamps.	2.16%	40,900	$1,310	$280	0.2	★
5	Replace split systems with new Energy Star rated split systems.	1.53%	28,900	$530	$6,730	12.7	★ ★ ★
6	Install programmable thermostats and implement night and weekend setbacks on HVAC system units.	9.88%	186,700	$2,030	$3,800	1.9	★ ★

Table 6.0.A: Energy Conservation Measures Summary

In the sections that follow, these suggested energy conservation measures are described in more detail. As mentioned previously, the listed energy savings, cost savings, implementation costs, and payback periods are based off of preliminary information and assumptions commensurate with the preliminary nature of a Level 1 type of energy audit.

6.1. ECM #1: Lamp Replacement

The Community Center currently utilizes 34-watt, T12 lamps in the majority of its existing light fixtures.

The energy savings gained by replacing 34-watt, T12 lamps with 32-watt, T8 lamps can be as high as 6%. While T8 lamps are interchangeable with T12 lamps, resulting in an easy installation, switching the lamp types will only work when the ballasts are rated for T8 lamps. Most older types of ballasts were not designed to work with T8 lamps and in those cases other ECM options should be considered other than a direct lamp replacement.

The following table summarizes the energy and cost savings for this relamping option:

ECM Action	Watts Saved per Lamp	Estimated Quantity of Lamps to be Replaced	Total Power/Energy Saved	Total Cost Savings
Lamp Replacement	2	426	2,881 W	
Total per Year:			9,144 kW/yr (9,800 Mbtu/yr)	$310

Table 6.1.A: ECM Option 1 Lamp Replacement ECM Analysis

The above analysis assumes the following:

- All T12 lamps utilized in the facility are 34-watt lamps.
- The number of hours / year that lighting is operational is per *Section 4.14.1 Building Operating Hours*.
- The average electrical rate per *Table 4.3.B: Electrical Utility Usage and Cost Summary*.
- Any reduction in service life of T8 lamps operating in magnetic ballasts is negligible.
- Existing fixture ballasts are rated for T8 lamps.

Since T8 and T12 lamps cost the same, a like-for-like replacement of the lamps does not incur additional material costs. If the re-lamping occurs as part of the normally scheduled maintenance to replace burned out lamps, no additional labor is required to implement this ECM. Therefore, the implementation cost is $0. The following table outlines the payback for this ECM option:

Total Estimated Cost Saving / Year	Total Estimated Cost To Implement	Simple Payback Period Years
$310	$0	0.0

Table 6.1.B: ECM Option 1 Payback Analysis

If a check of the existing ballasts indicates a rating not compatible with T8 lamps, another option to consider is the replacement of the fixture with a new fixture with T8 lamps and electronic ballasts.

6.2. ECM #2: Light Fixture Replacement

An alternative option to replacing lamps with higher efficiency lamps is the replacement of the whole fixture with higher efficiency fixture units. Higher efficiency fixtures will contain electronic ballasts and T8 lamps. This option will result in approximately 400% more energy savings than just lamp replacement in the previous section. This option may also be necessary due to new federal regulations issued by the US Department of Energy. These new regulations stipulate minimum energy efficiency levels of all fluorescent lamps/ballast systems which will require manufacturers to phase out T12 fluorescent systems from the marketplace. To meet these regulations, lighting manufacturers will phase out production of 70% of all T12 lamps sold in the

United States by July 2012. The types of lamps affected are all 40 watt and 34 watt, 4 foot lamps with an efficacy of 89 lumens per watt or greater and all U-bend lamps with an efficacy of 84 lumens per watt or greater. A limited amount of T12 stockpiles will still be available after 2012, but pricing for these lamps will be subject to supply and demand and all indications are future price increases will be substantial. If the lighting in the Community Center includes light fixtures only rated for T12 lamps, these fixtures will therefore need to be replaced in order to utilize T8 lamps.

The following table summarizes the energy and costs savings for this relamping option:

ECM Action	Watts Saved per Fixture	Estimated Quantity of Fixtures Replaced	Total Power/Energy Saved	Total Cost Savings
Fixture Replacement	20	213	4,260 W	
Total per Year:			14,400 kWh (49,100 Mbtu)	$1,570

Table 6.2.A: ECM Option 2 Light Fixture Replacement ECM Analysis

The above analysis assumes the following:

- The number of hours / year that lighting is operational is per *Section 4.14.1 Building Operating Hours*.
- The average electrical rate per *Table 4.3.B: Electrical Utility Usage and Cost Summary*.
- 205, 2-lamp strip light fixtures and 4, 4-lamp lay-in fixtures are upgraded in the Community Center.
- Existing light fixtures contain magnetic ballasts.
- Existing lamp type is 34-watt, T12.

Cost data from 2011 RS Means estimates a labor and material cost of $177 per 2-lamp fixture and $253 per 4-lamp fixture (including lamps and ballasts) to remove, disconnect, and reinstall another it its place.

The following table contains the simple payback analysis for this ECM:

Total Estimated Cost Saving / Year	Total Estimated Cost To Implement	Simple Payback Period Years
$1,570	$37,300	23.8

Table 6.2.B: ECM Option 2 Payback Analysis

The payback period for this ECM could be reduced if building maintenance personnel provide the labor to replace the light fixture.

CAUTION: Depending on the age and type, ballasts may contain PCB compounds, a hazardous material. Additionally, fluorescent lamps may contain mercury, another hazardous material. The EPA has strict disposal guidelines for both types of materials. The City of Roeland Park will need

to confirm if such materials are present and if so, ensure the EPA hazardous waste disposal guidelines are followed.

6.3. ECM #3: Light Fixture Replacement with LED Light Fixtures

An alternative option to replacing the light fixtures with T8 fluorescent fixtures is replacing the fixtures with LED fixtures. LED lamps have made significant advancements in recent years to produce natural colors and sufficient lumens for lighting applications. Each 4000 lumen LED fixture consumes 44 watts and has a similar light output to a 2-lamp T8 fluorescent light fixture.

The following table summarizes the energy and costs savings for this lighting option:

ECM Action	Watts Saved per Fixture	Estimated Quantity of Fixtures Replaced	Total Power/Energy Saved	Total Cost Savings
Install LED lighting	37	205	7,585 W	
Total per Year:			26,000 kWh (88,600 Mbtu)	$2,840

Table 6.3.A: ECM Option 3 LED Fixture Analysis

The above analysis assumes the following:

- The number of hours / year that lighting is operational is per *Section 4.14.1 Building Operating Hours*.
- The average electrical rate per *Table 4.3.B: Electrical Utility Usage and Cost Summary*
- 205, 2-lamp strip light fixtures are upgraded in Community Center.
- Existing light fixtures are 2-lamp fixtures with magnetic ballasts.
- Existing lamp type is 34-watt, T12.

Cost data from vendor quotes indicates a labor and material cost of $384 per fixture (including lamps and ballasts) to remove, disconnect, and reinstall another it its place.

The following table contains the simple payback analysis for this ECM:

Total Estimated Cost Saving / Year	Total Estimated Cost To Implement	Simple Payback Period Years
$2,840	$78,700	27.7

Table 6.3.B: ECM Option 3 Payback Analysis

The payback period for this ECM could be reduced if building maintenance personnel provide the labor to replace the light fixture.

6.4. ECM #4: Incandescent Lamp Replacement

The Community Center currently utilizes 75-watt, 100-watt and 300-watt incandescent lamps in some of its existing light fixtures.

The energy savings gained by replacing incandescent lamps with compact fluorescent lamps can be high as 78% while retaining a similar light output. A 75-watt, incandescent lamp can be replaced with an 18-watt, compact fluorescent lamp, while 100-watt and 300-watt incandescent lamps can be replaced with 23-watt and 65-watt compact fluorescents, respectively. Compact fluorescent lamps are typically interchangeable with incandescent lamps.

This option may also be necessary due to new federal regulations issued by the US Department of Energy. These new regulations stipulate minimum energy efficiency levels of incandescent lamps which will require manufacturers to phase out incandescent lamp systems from the marketplace. The types of lamps affected are all 100 watt to 40 watt lamps. The phase out will began with 100 watt lamps on January 1, 2012, will continue with 75 watt lamps on January 1, 2013 and be completed with the phase out of 60 and 40 watt lamps on January 1, 2014. A limited amount of 75 watt incandescent lamp stockpiles will still be available after 2013, but pricing for these lamps will be subject to supply and demand and all indications are future price increases will be substantial.

The following table summarizes the energy and cost savings for this relamping option:

ECM Action	Watts Saved per Lamp	Estimated Quantity of Lamps to be Replaced	Total Power/Energy Saved	Total Cost Savings
75-watt Incandescent Lamp Replacement	57	1	57 W	
100-watt Incandescent Lamp Replacement	77	6	462 W	
300-watt Incandescent Lamp Replacement	235	12	2,820 W	
Total per Year:			12,000 kW/yr (40,900 Mbtu/yr)	$1,310

Table 6.4.A: ECM Option 4 Incandescent Lamp Replacement ECM Analysis

The above analysis assumes the following:

- The number of hours / year that lighting is operational is per *Section 4.14.1 Building Operating Hours*.
- The average electrical rate per *Table 4.3.B: Electrical Utility Usage and Cost Summary*.

The estimated cost for an 18-watt or 23-watt compact fluorescent is $5 each as indicated by retailers while the estimated cost for a 65-watt compact fluorescent is $20 each.

The following table contains the simple payback analysis for this option.

Total Estimated Cost Saving / Year	Total Estimated Cost To Implement	Simple Payback Period Years
$1,310	$280	0.2

Table 6.4.B: ECM Option 4 Payback Analysis

The simple payback calculation above does not account for the increased service life of compact fluorescent lamps. This effect could further improve the payback period.

6.5. ECM #5: Split System Replacement with an Energy Star Rated Unit

Recent improvements in technology have increased the efficiency of new split systems above and beyond what was available when the existing split systems at the Community Center were installed. There are several standard metrics for comparing the energy efficiency of split systems. The Energy Efficiency Ratio (EER) measures the efficiency of a system in cooling mode. It can be calculated by dividing the cooling capacity of the unit by the electrical input in watts. The Seasonal Energy Efficiency Ratio (SEER) is similar to the EER, but it is calculated by dividing the total amount of cooling done in a season by the total electrical usage for the season in watt-hours. The larger the value of the EER or SEER rating, the more efficient the unit is.

The minimum requirements for a split system to qualify for an Energy Star rating can be seen in the table below.

Type	Cooling Capacity	SEER	EER
Split System, All Heating Types	<65,000 Btuh	14.0	12.0
Split System, Electric Heat	>65,000 Btuh, <240,000 Btuh	N/A	11.7
Split System, Gas Heat		N/A	11.5

Table 6.5.A: New Split System Performance Ratings

The Annual Fuel Utilization Efficiency (AFUE) measures the amount of fuel a gas-fired heater converts to heat to the amount of fuel that enters the unit. The AFUE is normally shown as a percentage. The higher the AFUE percentage, the more efficient the gas-fired heater is. A recent survey of Energy Star rated split systems found the average unit to have an AFUE of 95%.

The 5-ton Carrier split system serving the daycare room has a SEER rating of 8.0. GBA performed an analysis to help determine the energy savings of replacing the existing units with higher efficiency split systems:

ECM Action	Heating Energy Saved	Cooling Energy Saved	Total Energy Saved	Total Cost Savings Per Year
Install Energy Star Rated Split System	16,300 Mbtu	12,600 Mbtuh	28,900 Mbtuh	$530

Table 6.5.B: ECM Option 5 Energy Star Rated Split System ECM Analysis

The above energy savings is derived with the following assumptions:

- The average electrical and natural gas rate per *Table 4.3.B: Electrical Utility Usage and Cost Summary* and *Table 4.3.C: Natural Gas Utility Usage and Cost Summary* respectively.
- The energy used by the split system can be approximated from *Figure 4.5.B: Typical Public Assembly Building Energy End* Usage.
- The space served by the split system is 1,750 square feet.
- The energy consumption of each split system is proportional to the SEER or EER rating.
- The AFUE value of the existing split systems is 80%.
- The 5-ton Carrier split system has a SEER rating of 8.0.
- A new Energy Star rated split system has a SEER of 14.0 and an AFUE of 95%.

Cost data from 2011 RS Means estimates the cost to replace the existing split systems with Energy Star rated units to be $6,730. The following table summarizes the simple payback analysis:

Total Estimated Cost Saving / Year	Total Estimated Cost To Implement	Simple Payback Period Years
$530	6,730	12.7

Table 6.5.C: ECM Option 5 Payback Analysis

The cost savings calculated above is for a single split system. It is likely other split systems at the Community Center are beyond their expected service life and may need to be replaced as well, and would lead to greater energy savings.

6.6. ECM #6: HVAC Setbacks

A night or weekend setback is a schedule programmed into an HVAC system to allow the system to heat or cool a space less on nights and weekends when the building is unoccupied and less comfortable temperatures do not impact personnel. When an HVAC system is upgraded from having no capability for setback to being equipped with the capability to have night and weekend setbacks, the Energy Efficiency and Renewable Energy Office of the US Department of Energy (DOE) estimates an energy savings of up to 1% per degree of setback for setbacks lasting at least 8-hrs per day.

Currently, all split systems and fan coils in the Community Center are controlled by outdated thermostats with no setback capability. No manual setback is currently implemented on the thermostats by Community Center staff or maintenance personnel. This causes the HVAC system to continue to heat/cool more than needed during unoccupied times.

GBA assumed programmable thermostats could be installed to replace the existing outdated thermostats to provide automatic setback at nights, weekends, and holidays. The following table contains the ECM analysis for this option:

ECM Action	Estimated Heating/Cooling Energy Usage Per Year	Calculated System Savings	Total Energy Saved per Year	Total Cost Savings
Install Automatic Controls	1,357,800 Mbtu	14%	186,700 Mbtu	$2,030

Table 6.6.A: ECM Option 6 Automatic Controls ECM Analysis

The above analysis assumes the following:

- A 10 degree Fahrenheit setback is implemented.
- The setback lasts 11 hours.
- The existing boiler consumes 95% of the natural gas consumed by Community Center (5% of the natural gas usage is by the hot water heaters).
- The estimated energy usage by these HVAC units is calculated from the average cooling season electricity usage minus the average heating season electricity usage.
- The utility rate utilized to calculate cost savings is found in *Section 4.3. Utility Usage*.
- All of the building can be setback.

RS Means estimates the cost to implement simple automatic or programmable controls for the split systems and fan coil units to be $3,800. The following table summarizes the simple payback analysis:

Total Estimated Cost Saving / Year	Total Estimated Cost To Implement	Simple Payback Period Years
$2,030	$3,800	1.9

Table 6.6.B: ECM Option 6 Payback Analysis

6.7. Recommended ECMs to Implement

To develop a recommended ECM list from all listed ECMs in *Section 6.0*, GBA utilized the following criteria:

- All ECMs with payback greater than five years were not included.
- When multiple ECMs were suggested that were mutually exclusive (meaning only one of the group could realistically be implemented), only one ECM from the group was chosen based on a combination of total energy savings and ease of implementation.

Based on the above criteria, the following table contains the final recommended list of ECMs that merit additional investigation.

Option Number	Description of ECM	Estimated Potential Yearly Energy Savings			Estimated Cost To Implement ECM	Payback Period (years)	Degree of Implementation Difficulty
		% Of Total Bldg Energy Usage	(MBtu/yr)	($)			
Type Name Here							
1	Replace T12 lamps with T8 lamps in all light fixtures.	0.52%	9,800	$310	$0	0.0	★
4	Replace incandescent lamps with compact fluorescent lamps.	2.16%	40,900	$1,310	$430	0.3	★
6	Install programmable thermostats and implement night and weekend setbacks on HVAC system units.	9.88%	186,700	$2,030	$3,800	1.9	★ ★
Sub Totals for Type Name Here		12.56%	237,400	$3,650	$4,230		

Table 6.7.A: Recommended ECM List

The last column of the preceding table is a relative ranking on degree of difficulty to implement with respect to complexity of installation and interruption of normal operations. The provided ranking is based on the limited information GBA gathered during the audit walkthrough and from GBA's past experience on similar projects. This ranking can be utilized as a guide to prioritize ECMs. However, it is also important for these ECMs to be evaluated by Roeland Park's decision makers to develop a customized priority ranking based on considerations or existing conditions better known to Community Center personnel as well as to determine which projects fit internal investment or funding criteria.

6.8. Non-Quantified ECM Suggestions

The following suggestions are not included in *Table 6.0.A: Energy Conservation Measures Summary* since the analysis to quantify the energy savings is outside the scope of a Level 1 Audit.

6.8.1 Adjust HVAC Building Occupied Cooling/Heating Setpoint Temperatures

Changing the occupied temperature setpoint at which a heating, ventilating, and air conditioning unit is required to keep a space can produce considerable energy savings. A change of 1°F will produce a drop in heating and cooling energy use by about 3 percent. GBA recommends an occupied heating setpoint temperature of 68°F, an unoccupied heating setpoint of 60°F, an occupied cooling setpoint temperature of 78°F, and an unoccupied cooling setpoint of 85°F. If cold spots, drafts, and humidity can all be controlled effectively, these temperature setpoints can provide a comfortable environment.

It is recommended that when resetting the thermostats, the temperature set point should be gradually changed over the course of a few weeks to help occupants adjust.

6.8.2 Refrigerant Piping Insulation Replacement

The insulation on refrigerant piping serving the condensers on the north side of the building is either damaged or completely missing in some places. Reference *Figure 4.9.D: Typical*

Damaged Refrigerant Pipe Insulation for a description of the existing system. Damaged or missing pipe insulation and jacketing allows for a significant amount of heat transfer to the outside air to occur. Insulation can be installed quickly and inexpensively.

6.8.3 Install Low Flow Fixtures

Replacing old plumbing fixtures with new low-flow fixtures can conserve water and reduce water and wastewater bills. In 1994, the US Energy Policy Act (EPACT) limited the flow of new water closets to 1.6 gallons per flush. Pre-1994 water closets flow 3.4 gallons or more per flush. Lavatory faucets were limited to a flow rate of 2.2 gallons per minute, however new low flow fixtures can have flow rates as low as 0.5 gallons per minute. A typical pre-1994 lavatory faucet can have flows of 3 gallons or more per minute. While replacing a lavatory faucet or water closet is relatively easy, care should be taken when analyzing the cost benefit of this type of measure as payback periods can be large. The following table compares low-flow fixture flow rates with the standard flow rates on common older fixtures.

Plumbing Fixture Type	Low-Flow Fixture Flow Rate	Old Fixture Flow Rate
Water Closets	1.6 gallons per flush	3.5 gallons per flush
Urinals	1.0 gallons per flush	2.5 gallons per flush
Showerheads	2.5 gallons per minute	5.0 gallons per minute
Sinks	2.5 gallons per minute	4.0 gallons per minute
Lavatories	0.5 gallons per minute	3.0 gallons per minute

Table 6.8.A: Plumbing Fixture Flow Rates

7.0 Conclusion

Congratulations. This basic energy assessment provided by GBA on behalf of Resourceful Kansas is hopefully your organization's first step in one of many in focusing more on energy efficiency as a strategy and in implementing real world solutions that make a difference. The next step is the implementation of the options that make the most sense for the specific needs of your organization.

7.1. Energy Action Plan

7.1.1 General

After an energy audit of any detail level has been completed, it's a good idea to create an energy action plan. The purpose of such a plan is to provide a roadmap to the participating organization for continuous improvement and to provide concrete steps for moving forward to achieve specific energy goals and objectives. The plan can be as simple as a single goal, such as lowering the total energy consumption of your facility by a percentage. The plan can also be much more complex involving the creation of a team of people who will champion the effort. Whatever form it ends up taking, a plan is necessary to maximize the results for your organization.

7.1.2 Recommended Approach to Energy Management

For a lot of organizations involved in receiving an energy assessment, knowing how to proceed with the recommendations listed in an energy assessment or audit can be a difficult or confusing task. The following section aims at assisting the implementation process by providing suggested prioritization as well as practical descriptions of the benefits and potential pitfalls for each ECM.

7.1.2.a. Creation of an Energy Sustainability Team: Identify an energy sustainability management team with responsibility for implementing the improvement program from start to finish. Create a core team with representatives from all aspects of operations, maintenance and management. Consider appointing an Energy Manager whose only responsibility is energy conservation (and possibly recovery) for your facility.

7.1.2.b. Implement a continuous gathering and benchmarking data program: Start with the utility usage and cost information gathered as part of this Resourceful Kansas energy assessment and continue to track the energy use of your facility (e.g., from gas, fuel oil and electricity bills). Make this data readily available to the team (on the computer network or on-line). Using the Resourceful Kansas calculated benchmarks as a baseline energy performance, continue to benchmark the gathered utility usage data.

7.1.2.c. Develop Goals: Based on the information contained in this energy assessment report, identify quantifiable energy improvement goals that complement your facility's mission, goals, and strategic direction.

7.1.2.d. Devise a Plan: Develop a plan for implementing the Energy Conservation Measures outlined in this assessment. Start with "low hanging fruit" and focus on energy intensive operations (reference *Section 4.5 Commercial Buildings Energy Consumption Survey Data*) for a good starting place). Consider renewable energy options and opportunities for energy generation using alternative methods. Determine costs and payback periods for various options.

7.1.2.e. Implement improvements: Based on the plan devised in the prior step, assign responsibilities and establish deadlines. Consider alternative financing approaches. Fully engage and train your operations staff. Be aware that Resourceful Kansas has additional resources available to assist with the technical side of implementing improvements such as assistance with writing study and construction project proposals.

7.1.2.f. Monitor and measure results: Track performance, review progress towards energy goals, and develop a plan for maintaining energy efficient equipment. Re-evaluate your goals in light of new information and priorities, and make changes to your program as necessary. Consider conducting more in-depth energy audits for issues not covered by the Resourceful Kansas assessment or new areas uncovered by subsequent conversation and investigation.

7.1.2.g. Communicate success: Communicate the successes of your energy management program to employees, management, and your community.

7.2. Additional ECM Investigation Suggestions

The following suggestions are a partial list of additional ECMs outside the scope of a Level I Energy Audit for investigation by Roeland Park.

7.2.1 Reset Hot Water Temperature Controls

The heating hot water temperature controls for thermal comfort systems in buildings are set to maintain a constant indoor air temperature. The setpoint temperatures can many times be lowered in winter without compromising occupant comfort. Additionally, the setpoints can be adjusted for unoccupied time frames. Both forms of adjustment will reduce energy consumption and result in energy savings. Technical assistance should be obtained to evaluate whether this strategy is feasible.

Energy can also be saved by turning down the temperature of domestic hot water heaters. An approximate energy savings of 8.33 Btu per gallon per degree Fahrenheit can be realistically attained. Caution should be taken not to drop the outlet temperature of the domestic hot water heater too low. The Federal Housing Administration's Minimum Property Standards require a minimum hot water supply temperature of 140°F to reduce waterborne pathogens such as Legionella.

7.2.2 Clean and Maintain Equipment

HVAC equipment maintenance is very important in sustaining the energy efficiency of a system. The following recommendations fall under this category:

- Clean or replace filters
- Clean electrical contacts and working parts of relays.
- Clean heat transfer surfaces on radiators, convectors, baseboard, and finned-tube units.
- Clean room air inlets and outlets.
- Clean heating, cooling and dehumidification coils.
- Clean reflectors on infrared heaters. Clean inlet and discharge screens on fans.
- Clean air intake louvers, filters and controls, evaporator and condenser coils on units and make sure that air flow is unrestricted.

These appropriate operational methods are key to maintaining the manufacturer's stated efficiencies.

7.2.3 Adjust Fan, Motor, and Belt Drive Systems

The advertised efficiency of any type of HVAC unit is based on a properly lubricated and adjusted fan, motor, and belt drive system. A maintenance program should already exist to check these items on a regular basis. If this is not already part of the operational routine, it is recommended that it be included.

7.2.4 Replace Inefficient HVAC Systems

Older equipment design and implementation strategies can sometimes operate inefficiently. Years of operation can impact a unit's efficiency. Older HVAC design philosophies did not

always place high importance on energy efficiency. As a result, large decreases in energy consumption can be realized with new and properly designed HVAC equipment and systems.

7.2.5 Reduce Evening Cleaning of Facilities

Cleaning staff scheduled to work at night will typically prolong HVAC equipment and lighting operation to include the time required to conduct their cleaning activities. If possible, schedule cleaning activities during normal business hours in order to minimize or eliminate prolonged use of the HVAC and lighting systems.

7.2.6 Caulk and Weather-strip

It is estimated that an energy savings of 10% to 15% can be achieved by caulking and weather-stripping windows and doors on exterior exposures.

7.2.7 Add Insulation to Walls and Roof

Heat transfer through the roof and walls of a facility accounts for 10% to 20% of the energy lost in most buildings. Adding insulation can reduce energy bills but, technical expertise is required the appropriate manner in which to upgrade a building.

7.2.8 Install LED Lamps

LED lamps have made significant advancements in recent years to produce natural colors and sufficient lumens for lighting applications. Energy savings of 80-92% are possible compared to standard incandescent lamps. Additionally LED lamps run cooler which can reduce HVAC costs.

7.3. Technical Assistance

An additional benefit available at no cost to participating organizations in Resourceful Kansas is limited technical assistance support provided by GBA. If in the next 1 to 6 months your organization has a technical question or needs support in getting one of the recommended ECM options off the ground, you can contact GBA for assistance. Reference **Section One - Program Overview** for more information on the Resourceful Kansas Technical Assistance.

THREE | RENEWABLE ENERGY EVALUATION

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1.0 Introduction

Renewable energy is a growing industry that has the potential to end the emission of greenhouse gases, stop dependence on foreign resources and improve national security. With traditional energy costs on the rise, communities across the nation have seen the firsthand benefits of implementing on-site renewable energy. The cost of energy produced from a renewable source is stable and numerous case studies have highlighted significant energy savings over the lifetime of a project.

The following pages provide an overview of how the City of Roeland Park can use renewable energy technology to create a successful project that reaps the benefits from clean energy generation, lowers their utility bill, and secures a stable source of power.

2.0 Renewable Energy

2.1 Types of Renewable Energy

Renewable energy is traditionally defined as energy derived from resources which are naturally replenished. Renewable energy sources include sunlight, wind, rain, tides, geothermal heat and biological materials. Renewable energy technologies include:

- Wind - Wind Turbines
- Solar - Photovoltaic Systems
- Geothermal
- Biomass
- Hydropower
- Hydrogen and Fuel Cells

Certain technologies have a better application based on availability. For instance, renewable energy technologies such as wind, solar, geothermal, biomass and hydrogen fuel cells are best suited for the state of Kansas; whereas hydropower is not.

The U.S. Department of Energy: Energy Efficiency & Renewable Energy (EERE) website is an excellent resource for renewable energy technology information, programs and research (see Section Five—Resource Information). The U.S. Department of Energy funds research, development and deployment projects to advance the use and adoption of clean, renewable energy technologies.

While renewable energy sources have been used for energy generation for hundreds of years, they only account for a small percentage of the total energy consumed in the U.S as shown below.

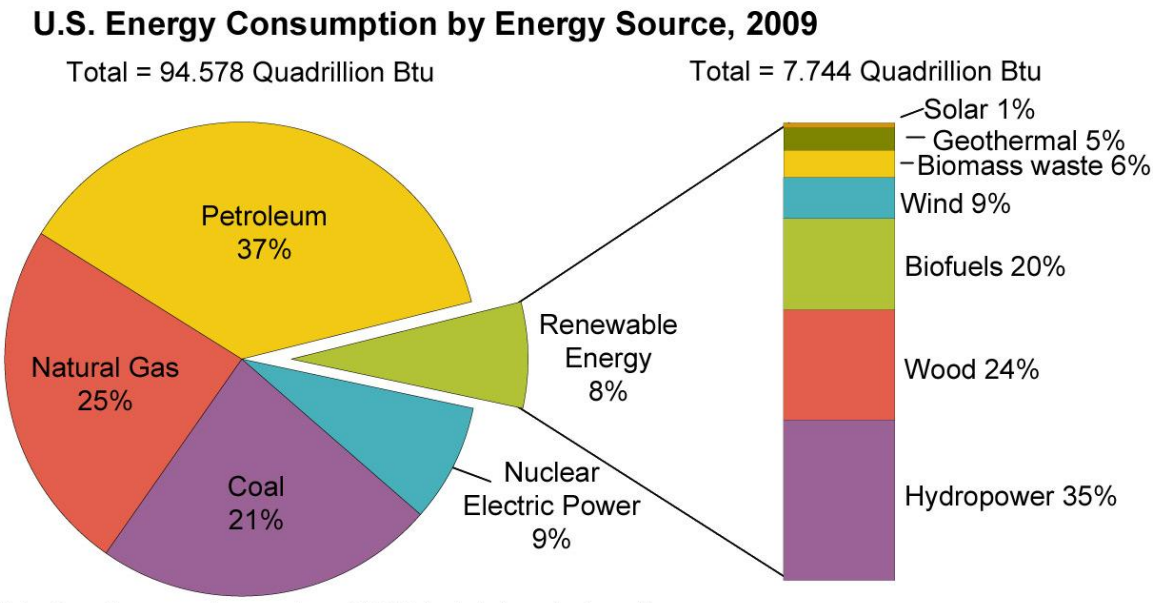


Figure 2.1: US Energy Administration US Energy Consumption by Energy Source graph

2.2 Wind Energy Technologies

Through the years wind has been used to pump water, mill grains and to generate electricity. Wind generated electricity does not create pollutants and does not depend on finite natural resources and unstable foreign governments. If properly located wind turbines have little to no impact on the natural environment adjacent to where they are installed. The wind industry is growing rapidly. At the end of 2010 the US had an installed wind power capacity of 40,180 MW, which is an 849% increase since 2001 (DOE–EERE). The US has a goal of generating 20% of the nation's energy, or 305 GW, with wind by the year 2030. This will require the installation of an additional 260 GW of capacity in the next 19 years. An important contribution to this goal is the distributed (small) wind technology sector.

Cities, campuses and building owners can benefit greatly from generating power on-site with small to medium sized wind turbines. Wind turbines are one of the more economically feasible options for on-site electricity generation. There are many factors that must be carefully considered to have a successful wind turbine installation. The efficiency with which a turbine can generate electricity depends on factors such as wind speed, wind frequency and height of the turbine as well as less obvious factors like wind turbulence and local geography.

Wind speed and frequency has the most direct impact on the amount of power that can be generated on a particular site and varies with the height above the ground. The National Renewable Energy Laboratory (NREL) has created a map of the United States which depicts the wind power classification at various heights. Wind power classification is a combination of the average wind speed and the frequency of the wind. This map is an excellent resource for preliminary evaluations, but surrounding geography can create areas that are "shaded" from the wind or areas with wind

speeds that exceed the average, so local wind conditions should be evaluated on a case-by-case basis.


Image courtesy of the DOE

Turbines perform more efficiently in laminar (smooth) wind flows rather than turbulent flows. Turbulent air flows are typically caused by obstructions that interrupt the air flow such as trees and buildings. Therefore, turbines should be located far enough away from any such obstruction. Another option is to mount the turbine on a monopole or tower allowing it to be above the trees and adjacent buildings. However, a taller tower requires a larger foundation to resist the structural and wind loads. Consideration of local zoning requirements also need to be made. Taller structures will sometimes require special permitting. If zoning regulations will not permit the installation of a tower, it is possible to mount smaller turbines to a building or an auxiliary structure such as a light pole.

Wind turbines typically fall into two categories based on the axis about which they rotate. Horizontal axis wind turbines look like airplane propellers and are the most common configuration. Vertical axis wind turbines consist of blades or sails rotating about a main shaft which is vertical.

2.2.1 Horizontal Axis Wind Turbines

Horizontal axis wind turbines (HAWTs) consist of blades, typically 2 or 3, that rotate about a shaft that is connected to the generator. They are further categorized into upwind and downwind configurations. The most common configuration is upwind where the wind hits the blades before going by the tower. The upwind configuration is the most efficient because there is no wind shading or turbulent air flow caused by the tower. This configuration does require the blades to be stiff enough to avoid deflecting and striking the tower. These stiffer blades increase the stress and fatigue on the hub and nacelle. A yaw controller is needed with the upwind configuration, either mechanical or wind controlled, to ensure the blades are pointed into the wind. These obstacles are not insurmountable but do require consideration.

The downwind configuration is less efficient than the upwind configuration because of the forces associated with the turbulent air flow created by the tower. The downwind configuration has the advantage of being able to use flexible blades which tend to be less expensive to manufacture and save the stress and fatigue on the hub. However, this does create an opportunity for fatigue failures in the blades. Downwind turbines do not require yaw controllers since the wind itself assures the blades are properly oriented for optimal generation.

2.2.2 Vertical Axis Wind Turbines

Vertical axis wind turbines (VAWTs) have a configuration that can operate with wind from any direction and do not require a yaw controller to optimize operation. The axis of rotation on a VAWT allows the generator to be mounted on the ground, simplifying maintenance and reducing the stresses that must be resisted by the foundation. One advantage when compared to HAWTs is that the loss in efficiency associated with turbulent air flows is much less pronounced in VAWTs, allowing

them to be installed on roofs and other lower structures. But, all roof mounted turbines must be carefully evaluated before they are installed. The structure must be assessed by an engineer to ensure that the extra weight and vibrations caused by the turbine do not disturb the building.

VAWTs may stall during a gusty wind and are prone to dynamic instability, both of which reduce the amount of power that can be generated and can cause maintenance problems. Like HAWTs, the blades of a VAWT are subject to the effects of fatigue which must be accounted for or a catastrophic failure could occur. Additionally, VAWTs have a smaller swept area resulting is less energy generation.

2.3 Solar Energy Technologies

Harvesting energy from the sun requires a photovoltaic (PV) system (also called a solar electric system). The photovoltaic process is the direct conversion of light into electricity at the atomic level. Solar modules or cells, often called an array, absorb the sun's rays and convert them to electricity. When sunlight falls on the solar modules a DC (Direct Current) electrical current naturally occurs creating an instantaneous power output. The DC current from a module is relative to irradiance. Irradiance is the intensity of light that reaches the solar cells as well as the cell temperature. To provide electrical power to a building, the DC electricity is fed into an inverter which converts the energy to standard AC (Alternating Current).

The advantage to using a PV system for on-site renewable energy is the frequent ability to locate near or on the buildings they service, which inherently provides efficiency and less costs associated with infrastructure. Solar electricity has been in use for more than 50 years and is proven to be highly dependable.

There are several ways to incorporate a PV system into an existing building or integrate into a new construction project. Installation can be relatively simple and inexpensive as systems are compatible with standard construction practices. A few additional pieces of equipment are needed to administer a complete PV system such as an electric meter with the ability to circulate unused energy back to the grid. A PV system can be installed in multiple methods such as roof mounted, ground mounted, or as a parking shade structure.

Roof mounting is the most popular application for PV systems. Products are available that work with any pitch of roof, whether a steep residential or low slope commercial. PV panels can be mounted to a roof without puncturing the roof membrane. Most installations involve a frame system that holds the panels off the roof at the appropriate angle. Other installations are applied directly to the roof.

Ground mounted PV systems can be cheaper to install because a review of the roof support structure is not necessary. Access for educational presentations and annual maintenance is easier than a roof mounted installation. Preparation of the site for PV system installation is necessary to reduce maintenance issues. For instance, natural grasses surrounding the PV system will create difficulty for

mowers and could potentially block the sunlight. Mounting height and security will also need to be considered in order to prevent tampering with the PV panels.

A PV system integrated into a parking shade structure is an innovative solution to reduce the heat island effect of an asphalt covered parking lot. Whether it is the top story of a parking structure or VIP parking in a surface lot, PV panels can offer an aesthetically pleasing way to provide covered parking. Furthermore, the power generated from the PV systems can supply the amount of electricity to operate the exterior lighting and other safety features present in typical parking lots.

Depending on the method of installation and project budget, the selected mounting system can allow for adjustments to the tilt angle to increase output. General guidelines for tilt angle recommend using the location's latitude as the tilt angle during fall and spring. The tilt angle should be adjusted to the latitude plus 15 degrees in the winter and the latitude minus 15 degrees in the summer. Manual and automated adjustable PV mounting systems are available. Manual operations require easy access to the system by a maintenance worker to meet Occupational Safety and Health Administration (OSHA) standards. Automated PV systems provide optimum output by 'chasing the sun' during the day and throughout the year. However automatic tracking systems can be cost prohibitive and manually adjusting (passive tracking) can be time consuming.

There are two types of PV systems:

- Flat Panel - most common, lightweight
- Concentrator Systems – use less solar material with reflectors and lenses

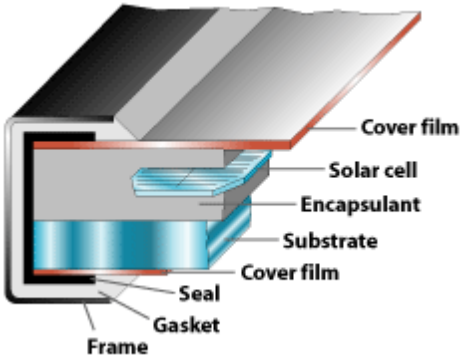


Figure 2.3.1b Flat Panel System (DOE)

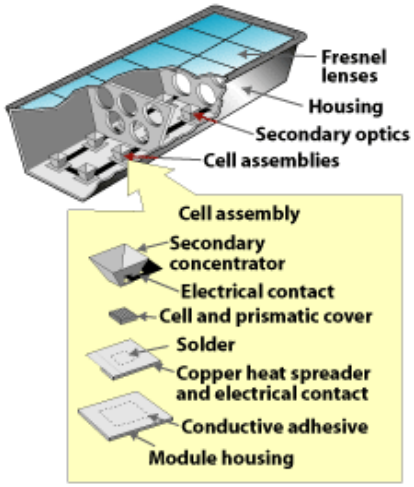


Figure 2.3.1c Concentrator System (DOE)

An engineer or supplier can assist a building or property owner in the design, installation and operation of the chosen PV system. Several PV technologies are available for public purchase.

2.4 Geothermal Technologies

The ancient Romans used water found in naturally occurring hot springs to feed public baths and under-floor heating and without realizing it implemented the first commercial application of a geothermal system. Modern geothermal systems are typically classified as geothermal power plants

or ground-source heat pumps which use the naturally occurring temperatures found below the earth's surface to either generate electricity or regulate the temperature of a finished space.

2.4.1 Geothermal Power

Geothermal power plants are typically built near edges of the tectonic plates that make up the earth's crust, but advancing technologies are increasing the viable area and improving the drilling and extraction processes, where extremely high temperatures from the magma of earth's outer cores heats groundwater to 300 – 500°F. Many of the newer geothermal power plants use a binary cycle to create electricity.

In a binary system, ground water is pumped out of the ground and into a heat exchanger which heats a secondary fluid in a closed loop to the point at which it flashes to vapor, that vapor is used to drive a turbine that is connected to a generator. According to the Geothermal Energy Association, the U.S. currently has 3,086 MW installed capacity and it is expected to increase to 5,400 MW installed capacity by the year 2015. Geothermal power has the potential to become a widely used power source that could reduce dependency on greenhouse gas producing electricity.

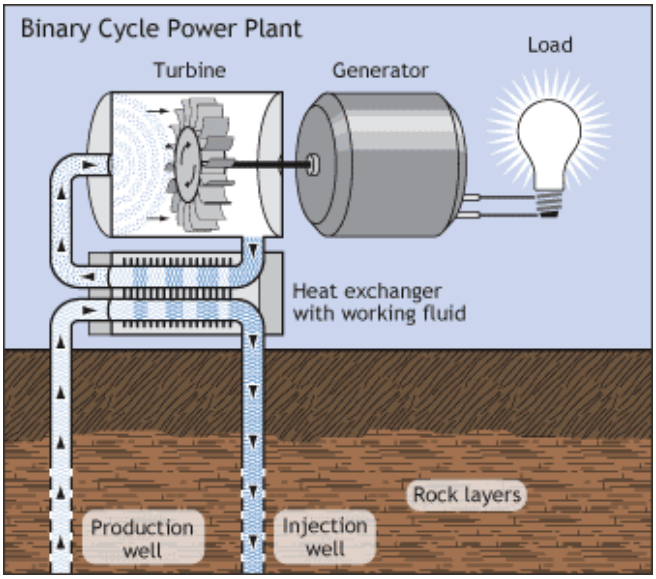


Figure 2.4.1 Binary Cycle Plant (DOE)

2.4.2 Ground-Source Heat Pump

Geothermal heat pumps function by pumping water, or a refrigerant, through a loop of pipes that are either buried in the ground or at the bottom of a pond or lake. The relatively constant temperature found at the bottom of a pond or under the ground is used to transfer heat into or out of the water/refrigerant which is then pumped through a heat exchange. This heats or cools the air within a space as needed. There are two types of geothermal heat pump systems, open loop systems and closed loop systems.

As the name suggests, open loop systems draw groundwater or pond water into the building and use it to heat/cool the space and then inject this water back into the source when finished. Open loop systems have some drawbacks that must be overcome in design:

- The inlet and outlet must be spaced far enough apart to ensure thermal recharge of the source.
- Groundwater typically contains minerals and other substances that can be corrosive to equipment.
- Pond water typically has silt, sediment and other contaminants that must be considered in the design.
- A pond must be deep enough to ensure that the water temperature always exceeds 40°F at the inlet to minimize the risk of freezing water damaging the equipment.

Closed loop systems are configured in horizontal, vertical or surface water loops. Horizontal loops consist of pipes buried a few feet below the surface. These systems are simpler to install but require a large area dedicated to the piping which is approximately 2500 square feet for each ton of cooling. In a vertical loop system the pipes are buried in vertically drilled wells that are several hundred feet deep. These deeper systems require consideration to the site's geology. Vertical loop systems have a smaller footprint of approximately 300 square feet for each ton of cooling, when compared to horizontal loop systems. The final closed loop configuration is a surface water loop. This configuration consists of horizontal loops placed at the bottom of a pond or lake. This system's efficiency is dependent on the seasonal temperature variations of the water and the size of the body of water.

2.5 Biomass Technologies

Biomass is an energy source from living, or recently living organisms. The most common source of biomass energy is from yard waste such as dead trees, limbs, woodchips, grass clippings, etc. that are incinerated. The heat produced is used to power a boiler, produce steam and generate electricity. In general it takes about 1-ton of wood to produce 1-MW of electricity, so the cost of transporting wood waste is a limiting factor that makes this technology difficult for most regions.

2.6 Biofuel Technology

Biofuels are generally defined as fuels that are derived in some shape or form from biomass waste. Biodiesel and bioalcohol are the more common forms of biofuels that are produced currently. The most common bioalcohol is ethanol which is used as an additive to conventional gasoline as a way to offset some of the negative impacts associated with oil extraction and refinement. Biodiesel is typically formed through a chemical reaction between lipids (vegetable oil, animal fat, etc.) with an alcohol. This produces a fuel that can be used to completely replace petroleum based diesel or mixed with it without the need for any modifications to the engine.

2.7 Hydroelectricity Technology

Hydroelectricity is the generation of electrical power through the use of flowing or falling water to drive turbines connected to generators. The most common application of hydropower is found in dams. Potential energy is stored in the reservoir behind a dam and can be harnessed to generate electricity. One example of hydroelectricity is the Hoover Dam, built on the Colorado River which has a capacity of generating 2,080-MW and on average produces 4.2-TW*h/year. Other less common types of hydroelectricity generation include tidal power which uses the rise and fall of the oceans waves to generate power. Underground power stations utilize the natural height differences between two waterways, such as a waterfall, and construct an underground tunnel that routes the water from the higher elevation waterway through a turbine and then discharges it back into the lower elevation waterway.

2.8 Fuel Cell Technology

Fuel cells generate electricity as a result of a chemical reaction between a reactant and an oxidizing agent. This process can continue indefinitely as long as the necessary reactant and oxidizing agent flows are maintained. The most common fuel cell today is a hydrogen fuel cell which uses hydrogen

as the reactant and oxygen as the oxidizing agent. The only byproduct of this chemical reaction is water. Fuel cells can generate electricity with very little impact on the climate. Fuel cells are currently more expensive than other renewable energy sources but advancements in this technology should make it a more viable solution.

2.9 Renewable Energy Benefits

2.9.1 Cleaner Electricity

Renewable energy generation avoids or greatly reduces air and water pollutants, water consumption, and land-use impacts associated with traditional energy generation sources. However, the manufacturing of the technology required to convert the renewable resource to energy is not without impact. Overall, renewable energy technologies have a significantly lower environmental impact when compared to traditional energy technologies.

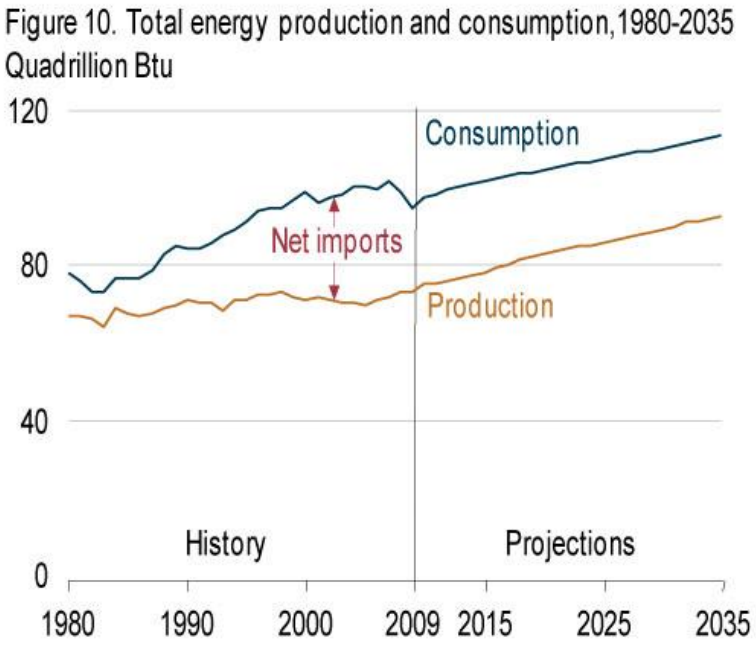
In Kansas, every megawatt (MW) of renewable energy installed will prevent approximately 1,750 metric tons of carbon dioxide from being released into the atmosphere each year. This is equivalent to the emissions from 334 passenger vehicles.

2.9.2 Carbon Footprint Reduction

An alternative method to reduce a facility's carbon footprint is the purchase of Renewable Energy Certificates (RECs) or Carbon Offsets. A REC is an agreement to purchase electricity from a facility that is certified by "Green-e" or another nationally recognized entity. These organizations verify that the electricity being generated is using methods that are cleaner than the average retail electricity produced in the facility's region. Carbon Offsets are similar to RECs, but the capital is used in a project with the goal of reducing carbon dioxide emissions. Since both of these options are investments in non-tangible services, care should be taken to ensure any purchase is from a nationally recognized and independently audited entity.

2.9.3 Energy Independence and Security

A diversified energy portfolio reduces the dependence on imported fossil fuels and the associated volatile prices. Generating local energy helps keep the economic benefits in the community. The decentralized energy generation also helps to reduce the burden on the national grid, improving its reliability. Renewable energy paired with energy storage can provide for uninterrupted continuation of essential operations, typically governmental and emergency operations, and can help maintain the safety and integrity of infrastructure in times of crisis.



See Annual Energy Outlook 2011 (AEO2011), early release overview release date December 16 2010, full report release date April 2011, report number: DOE/EIA-0383ER (2011), www.eia.gov.

Figure 2.9.3: DOE Total Energy Production and Consumption graph

Renewable energy, by definition, will never cease. Renewable energy sources will be naturally replenished, unlike traditional energy sources that will someday be depleted. Many options for domestic renewable energy technologies exist, creating domestic economic benefits.

2.9.4 Educational and Marketing Opportunities

Renewable energy generated onsite can provide clean, locally generated power, as well as lower utility bills. However, there are additional benefits that cannot be summarized in environmental or economic terms. Most consumers prefer sustainable business practices, and many renewable energy technologies provide a very conspicuous statement of commitment to sustainability. Publicity generated from taking steps towards independent and clean energy generation will spread throughout the community and across the state.

2.10 Renewable Energy Mandates

A Renewable Portfolio Standard (RPS) is a mandate requiring electric utilities to generate or purchase a certain percentage of their total energy generation from renewable sources, by a certain date. Purchased funds subsidize the cost of renewable energy generation from off-site sources. Electric utilities can use Renewable Energy Credits (RECs) or Green Tags to comply with the RPS mandate. The REC purchaser receives a certificate representing the units of energy generated as the renewable energy is remotely placed on the grid. RECs are a tradable commodity in an emerging market and not available in all states or counties.

The first State RPS was set in 1983 by Iowa. Discussions for a National RPS have been ongoing since 1997. The National RPS currently being debated is for 25% by 2025. As of February 11th, 2011, 36 states established RPS mandates, also known as, Alternative Energy Portfolio Standard (AEPS) or a Renewable or Alternative Energy Goal.

Figure 2.10: DSIRE Renewable Portfolio Standards, Mandates or Goals map

In May 2009, the Kansas Legislature adopted a Renewable Energy Standards Act (RES Act), which requires utilities in the state to generate electricity from renewable resources equal to 20 percent by 2020. To meet the requirements of the RES Act, Westar for example, which currently has 301 megawatts of renewable energy generation, estimates it will need another 700 MW between 2011 and 2020.

3.0 Resources and Requisites

3.1 Project Property and Surrounding Area

The City of Roeland Park Community Center, 4850 Rosewood Dr, is located in a residential area. North of the Community Center is the Roeland Park Dome and to the east is the Roeland Park Swimming Pool. There are apartments to the north and single family homes to the south of the recreational complex.

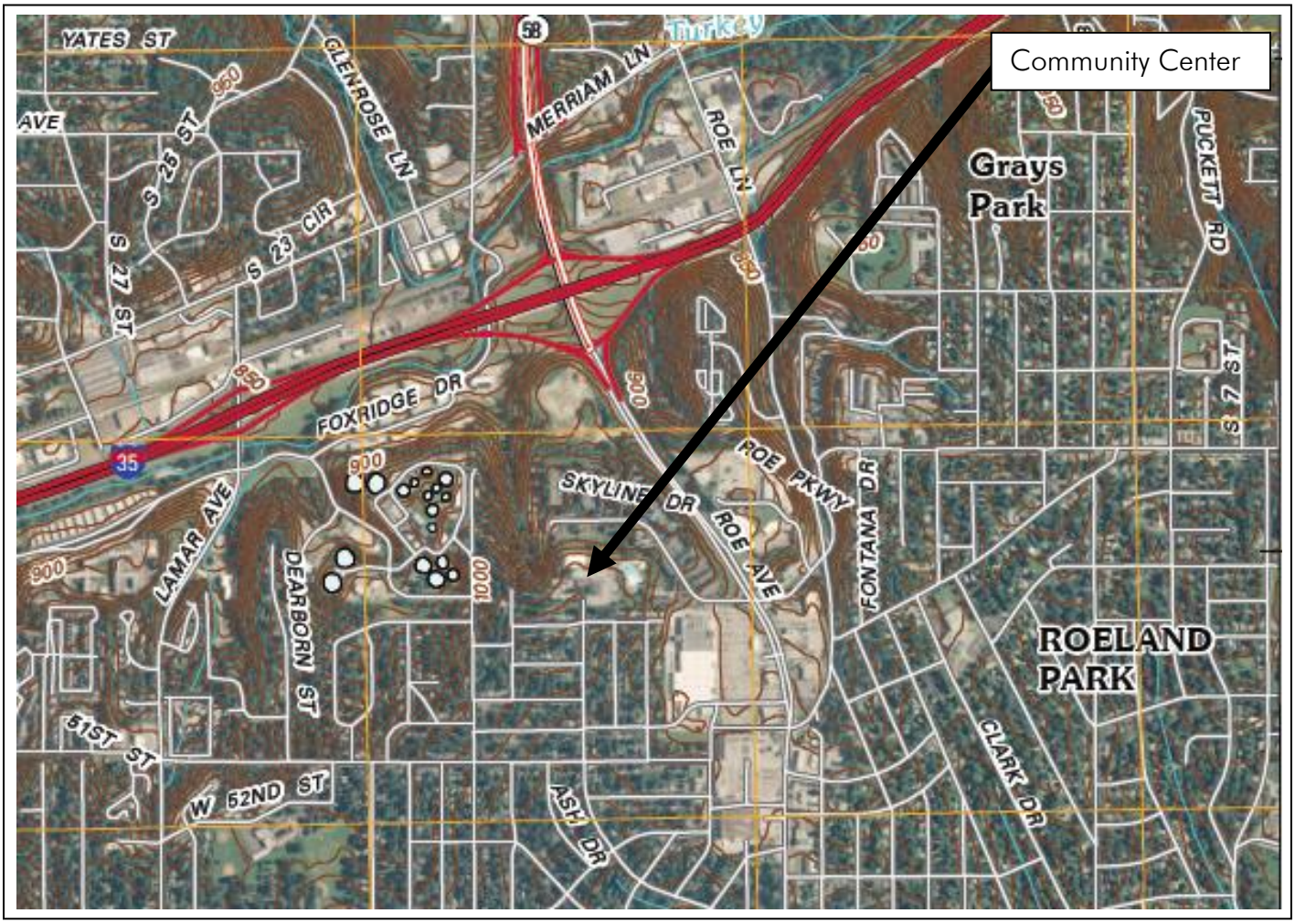


Figure 3.1a: USGS Topo Map

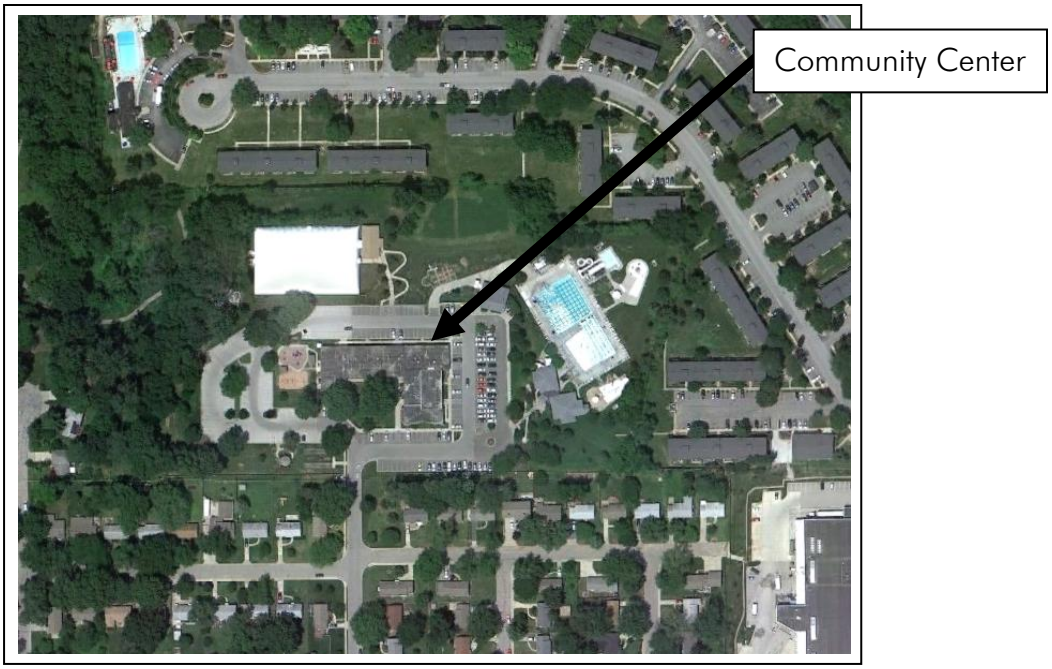


Figure 3.1b: Aerial Photo of the Roeland Park Community Center and Surrounding Area

3.2 Wind Resource

The average annual long-term Wind Resource at the Roeland Park Community Center is 6.34 m/s at a 60m hub height and 5.23 m/s at a 30m hub height (based on 200m resolution, wind Navigator).

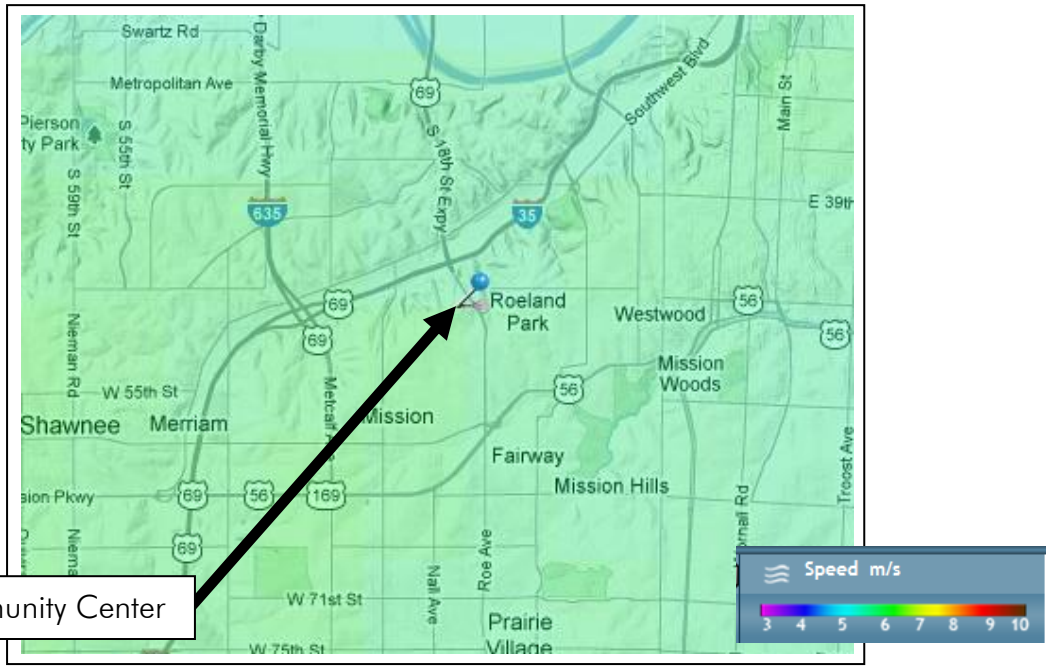


Figure 3.2a: Wind Resource map of Roeland Park at 60m

With an annual energy consumption from December 2010 to November 2011 of 189,360 kWh for the Community Center, a recommended scale of wind energy generation would be 50-100kW. Final sizing for any wind energy project would be contingent on the availability of a net metering agreement, permitting restrictions and siting restrictions. At the average annual wind speed and an assumed electric rate of 10.94¢/kWh, the table below illustrates estimated energy production and associated energy value of selected mid-range wind turbines. The table values are for estimating purposes only.

Nameplate Capacity	Example Manufacture and Model	Wind Speed (m/s) at Hub Height (m)	Annual Energy Production (AEP)[1]	First Year Energy Value	Estimated turn-key project cost
20 kW	Jacobs Wind Systems, Jacobs 31-20	5.23 at 30	22,562 kWh	$2,468	$225,000
50 kW	Endurance Wind Power, E-3120	5.23 at 30	127,458 kWh	$13,944	$450,000
100 kW	Northern Power Systems, Northern Power 100	5.54 at 37	186,120 kWh	$20,362	$580,000
225 kW	Aeronautica Windpower, AW 29-225	5.67 at 40	395,890 kWh	$43,310	$815,000
500 kW	Polaris America, P50-500	6.34 at 60	1,364,400 kWh	$149,265	$1,485,000

[1] Based on the wind speed above and the manufactures' published power curve.

Table 3.2a: Annual Energy Production and Value table for Wind

3.3 Solar Resource

The average annual Solar Resource at the Roeland Park Community Center is 4.97 kWh/m^2 (based on NREL's PVWatts Viewer, 40km grid cell). At an assumed electric rate of 10.94¢/kWh, a fixed array tilt of 39.3° and an array azimuth of 180.0°, each 10kW of crystalline photovoltaic installed would generate 13,123 kWh/year.

Solar Radiation	Annual Energy Production (AEP)	First Year Energy Value	Estimated turn-key project cost
4.97 kWh/m^2	13,123 kWh	$1,436	$83,000

Table 3.3a: Annual Energy Production and Value table for Solar

3.4 Technology Siting

Proper siting of renewable technology is a key and crucial component to creating a successful renewable energy project. When siting a wind turbine, industry and permitting authorities suggest, and may require, setbacks. If the local municipality does not have any siting regulations, then the wind turbine should be located one lay down height (the height to the tip of the wind turbine blade) away from property lines and above ground utilities. It is recommended that wind turbines also be sited one lay down height away from occupied buildings. The setback from occupied buildings is often an owner driven directive and not a permitting requirement.

To minimize the impact of turbulence on the turbine's performance, a wind turbine is generally sited away from obstacles such as buildings and trees. The rule of thumb is to place the turbine so that the lowest point of the rotor is 30' above any obstruction within 300'-500', depending on the prevailing wind direction. The setback in areas where topography includes steep hills and cliffs is greater due to additional turbulence. If multiple wind turbines are to be installed, siting guideline for their spacing is based on each turbine's rotor diameter.

Photovoltaic panels should be sited in a location that is isolated from shade and generally faces south. The location should receive full sun exposure from at least 9am to 3pm every day of the year. In regards to the tilt angle, or horizontal slope, a photovoltaic system shall be mounted at an angle equivalent to the site latitude. In Kansas, that is 37 to 40 degrees. Adjusting the angle each season will increase output. If the photovoltaic system is ground mounted, or other system that can be adjusted, latitude plus 15 degrees during winter, latitude minus 15 degrees in summer and at latitude in the spring and fall would increase energy production. Photovoltaic systems that 'chase the sun' during the day and throughout the year will provide optimum energy production. However, automatic tracking systems are generally cost prohibitive.

A preliminary siting analysis was preformed for renewable energy technology at the Roeland Park Community Center. The grass open space north of the Community Center between the dome and the swimming pool is a potential location for a wind turbine. Current and future planned use of this area would need to be taken into consideration. Further analysis of this location or other locations throughout the city can be provided through the Resourceful Kansas Program's Technical Assistance. As for solar energy generation, both roof mounted and ground mounted solar photovoltaic cells are options for renewable energy generation at the Community Center. The installation of a solar energy system requires an area with limited shade.

3.5 Cost for No Action

The future costs of energy are uncertain; predictions on the rate of escalation vary greatly. If carbon emission legislation is enacted, energy prices in regions heavily dependent on coal for electricity generation could see a dramatic price increase. Since 2006, retail electric energy costs in Kansas have increased at about 6% per year on average.

The cost of installing a renewable energy system should be compared against the cost of no action, basically paying for electricity from your current utility provider without the installation of a renewable energy system. Assuming an annual electric utility expense of $20,713, the table below shows the accrued expense of continuing to purchase 100% of the consumed energy. Accrued expense with an annual increase in the rate is also shown.

	Possible Rate Increases			
Length of Time	0.0%	2.5%	5.0%	7.5%
5yrs	$103,565	$111,078	$119,139	$127,779
10yrs	$207,130	$237,339	$272,517	$313,452
15yrs	$310,695	$380,192	$468,269	$580,010
20yrs	$414,260	$541,816	$718,104	$962,689
25yrs	$517,825	$724,680	$1,036,964	$1,512,074
30yrs	$621,390	$931,573	$1,443,920	$2,300,787

Table 3.5: Cumulative Energy Bills

Therefore, an electric utility bill would experience a $994,249 increase over 25 years at an average cost of energy rate increase of 7.5%.

4.0 Permitting and Zoning requirements

4.1 Land Use regulations

For most municipalities, a building permit or a special use permit is required for the installation of renewable energy technologies. Many municipalities now have a wind turbine ordinance for wind turbine installations, and a special use permit would be required for any exemptions.

4.2 Federal Aviation Administration (FAA)

The Federal Aviation Administration (FAA) considers three impacts to airports and airspace: Imaginary Surface, Operational Impact, and Electromagnetic Interference. The FAA must be notified if a proposed structure's construction or alteration is

- taller than 200' above ground level
- within 20,000 feet of a public-use airport with at least one runway over 3,200' long and the structure exceeds a 100:1 surface from any point on the runway
- within 10,000 feet of a public-use airport with the longest runway less than 3,200' long and the structure exceeds a 50:1 surface from any point on the runway
- within 5,000 feet of heliport and the structure exceeds a 25:1 surface

The FAA must be notified through form 7460-1 (Notice of Proposed Construction or Alteration). After filing form 7460-1, it takes approximately 45 days for affected divisions to respond and the FAA to contact you. The FAA will at that point make a Determination of No Hazard to Air Navigation (DNH) or a Notice of Presumed Hazard (NPH). If the structure is issued a NPH, you will be issued a no effect height and an explanation of what you are affecting at the airport or in the airspace. Obstruction marking and or lighting may also be required.

The Charles B. Wheeler Kansas City Downtown Airport is located approximately 30,000 feet from the Roeland Park Community Center. This proximity does not require FAA notification on a proposed structure construction unless it is taller than 200 feet. However, we would recommend filing form 7460-1 (Notice of Proposed Construction or Alteration) or any proposed structure taller than existing buildings on site as a 'good-neighbor' action.

4.3 Department of Defense (DoD)

The Department of Defense is currently designing procedures for notification of wind turbine construction. Until standards are set, they've requested notification of all wind turbine installations, no matter the height or nameplate capacity. A standard form for submitting project information is not yet available. The DoD requests that the latitude, longitude, height and blade radius be emailed to the DoD Energy Siting Clearinghouse. If there are multiple wind turbines, the information should be within a simple spreadsheet.

4.4 National Telecommunications and Information Administration (NTIA)

The Next-Generation Radar (NEXRAD) is a network of high-resolution Doppler weather radars operated by the national weather service. Several federal agencies (National Oceanic and Atmospheric Administration NOAA, Department of Justice DoJ, Department of the Interior DoI, National Aeronautics and Space Administration NASA, Coast Guard and Navy) are interested in any wind turbine that penetrates the NEXRAD Radar Line of Sight (RLOS). There is a potential impact to Long-Range Radar, Weather Radar, Military Training Routes and Special Airspaces. Notification forms can be obtained from and should be submitted to the Department of Commerce and the National Telecommunications and Information Administration.

There are NEXRAD radar stations near Kansas City MO, Wabaunsee County, Wichita, Enid OK, Dodge City, Goodland, and Hastings NE that affect Kansas.

4.5 National Pollutant Discharge Elimination System (NPDES)

A NPDES Construction General Permit from the U.S. Environmental Protection Agency (EPA) and Kansas Department of Health and Environment (KDHE) will be required for any project with a site disturbance greater than one acre. If a NPDES permit is required, a Stormwater Pollution Prevention Plan (SWPPP) will need to be prepared. The project will be required to utilize erosion and sediment control measures to minimize the impact on water quality to meet State and City requirements. The review period for the State on a NPDES permit is approximately 60 days.

It is not anticipated that a NPDES permit will be required for 'behind-the-meter' renewable energy projects, including the installation of photovoltaic systems, a small to mid-sized wind turbine or a vertical well geothermal system. Larger systems, or projects with public access areas (such has shelters, kiosks and parking) may involve a site disturbance greater than one acre.

4.6 Threatened and Endangered Species

The Endangered Species Act of 1973, et seq. (ESA, 16 UDC 35, Public Law 93-205) assigned the Department of Interior, U.S. Fish and Wildlife Service (USFWS) to establish a list of federally protected species. Projects which receive federal funding or federal approval, including permits, must comply with ESA. The Kansas Department of Wildlife and Parks (KDWP) is responsible for the determination of state level status of species.

4.7 Migratory Bird Act

Migratory birds are protected by the Department of Interior and USFWS according to the Migratory Bird Act. The Act states, "Unless permitted by regulations, the Act provides that it is unlawful to

pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. Subject to limitations in the Act, the Secretary of the Interior (Secretary) may adopt regulations determining the extent to which, if at all, hunting, taking, capturing, killing, possessing, selling, purchasing, shipping, transporting or exporting of any migratory bird, part, nest or egg will be allowed, having regard for temperature zones, distribution, abundance, economic value, breeding habits and migratory flight patterns."

Coordination with USFWS should be conducted. The USFWS may require an avian assessment for a mid-to large- scale wind turbine project.

4.8 Bats

Coordination should be done with U.S. Fish and Wildlife Service regarding the need for any surveys including bat assessments. U.S. Fish and Wildlife will determine what surveys if any will be needed for the project.

4.9 Cultural Resources

As directed by Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended), the head of any Federal agency having jurisdiction or license control over a proposed undertaking shall take into account the effect of the undertaking on cultural resources included in or eligible for inclusion in the National Register of Historic Places (National Register).

In compliance with these regulations, consultation with the Kansas State Historic Office (SHPO) is required. The initial consultation shall be in the form of a letter sent to SHPO. They have 30 days to respond with clearance for the project or a request for a cultural resource survey.

4.10 Floodplain

If the Property is located in the Special Flood Hazard Area Subject to the 1% Annual Chance Flood, more commonly known as the 100-yr floodplain, a floodplain development permit will be required. If the project site is also within floodway boundaries, any proposed fill or construction will require a detailed engineering analysis and a No-Rise Certificate. During a project's Schematic Design Phase, Flood Insurance Rate Map (FIRM) should be consulted to make the determination.

4.11 Wetlands and Other Waters of the United States

The U.S. Army Corps of Engineers (Corps) has been delegated authority to regulate waters of the U.S. (wetlands, streams, rivers, ponds, etc.) under the Clean Water Act. Section 404 of the Clean Water Act describe the dredge and fill responsibilities of the Corps. USGS topographic map and an aerial photograph should be consulted. If available, a USFWS National Wetlands Inventory should be reviewed. An onsite delineation of the site should be conducted prior to construction activities. If impacts greater than 1/10 of an acre to waters of the U.S. are proposed then contact with the Corps is required and a Section 404 permit needs to be obtained. If less than ½ acre of impacts is anticipated then a Nationwide Permit may be used. The review time for a Nationwide Permit is 45 days. If the impacts for a project exceed ½ acre, then an Individual Permit will be required. The review time for an Individual Permit is 120+ days.

4.12 National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) (42 USC 4321-4347) requires that Federal agencies consider environmental consequences of major Federal actions and include these considerations in their decision making process. A NEPA document is to provide sufficient evidence and analysis to determine whether implementation of project work would result in significant effects on the environment. A NEPA document may be required for the project if federal funding or federal land is used.

4.13 Wind and Solar Easements

Renewable energy resources can be greatly affected by the environment and by actions of neighboring properties. No laws or ordinances prevent an abutting or neighboring property from constructing a building or structure, installing landscaping or any other actions that would disturb or eliminate access to renewable energy resources.

The State of Kansas does have a Solar Access Policy that allows parties to voluntarily enter into an easement agreement to ensure your access to solar energy resources. The easement must be recorded with the register of deeds for that county.

5.0 Disposition of Energy

The energy from an interconnected generator flows into the utility's grid. It is not possible to know where the specific electrons created from the generator are used. A similar situation is an oil or water pipeline where the specific liquid cannot be tracked through the pipe network. Renewable sourced energy from your generator may supply your plant, your neighbor or another customer across the state. A meter can show the amount of energy created by a generator and/or the amount of energy used by a building. Therefore, some type of an interconnection or net metering agreement needs to be arranged with the utility so that renewable on site energy generation can be used with the utility's energy.

5.1 Interconnection

Renewable energy technologies are typically connected to supplemental energy purchased from a utility and that technology would operate parallel to the utility source. In the utility industry, operation of a privately owned generator parallel to the grid is called an "interconnection".

Keeping your system connected to the grid also allows you to continue to purchase power from the utility when your system generation does not meet your facility's consumption needs. Special rules apply to interconnected customer generators. These rules are intended to protect the utility company's workers, ensure the reliable operation of their system and protect the customer's generator. Utilities require an Interconnection Agreement to be negotiated before you are able to connect to the grid.

There is a statewide Interconnection Agreement standard for Kansas. Due to the language of the legislation and the Kansas Corporation Commission rules, the interconnection standards are on a

utility-by-utility basis. Each utility has a number of technical requirements for interconnection and any interconnection will be required to comply with these rules.

Kansas City Power & Light (KCPL) has a standard procedure that would permit an applicant to interconnect any on-site generators to the utility grid. One must complete an Interconnection Application, which is available on their website and return it with an application fee as well as plans and specifications detailing the generator, inverter, lockable disconnect and other necessary equipment for a complete, safe installation. After the application has been filed, KCPL will review the application to ensure all applicable safety standards have been met and issue an approval/denial within 90 days. After the generator installation is complete, KCPL requires a field inspection to ensure conformance with the approved design at which point the meter will be replaced with a bi-directional meter and the applicant will begin to be credited for the power generated on-site based on the terms of either a net-metering or parallel generation agreement. A planning stage meeting with KCPL is recommended to discuss the project before the preliminary design required to complete the Interconnection Application is begun.

5.2 Separate Meter

The traditional approach is for the utility to provide a meter dedicated to the energy generator, which measures the energy produced and exported to the grid.

Since the federal Public Utility Regulatory Policies Act (PURPA) was passed in 1978, most utilities have been required to purchase energy from private renewable energy providers who can connect to the utility system, at the utility's "avoided cost of energy." The avoided cost is defined by the Federal Energy Regulatory Commission (FERC). Avoided cost is normally much less than the retail rate utilities charge customers. The Kansas Corporation Commission now requires investor-owned utilities to pay 150% of the utility's avoided cost for customer-generated energy.

Other options include selling the energy to the wholesale market or to remote users. Generally these options are not available for small generators.

5.3 Behind the Meter

If the owner of the generator also is an energy consumer, it is usually advantageous to offset retail purchase of energy rather than sell the energy. This is usually accomplished by connecting the generator on the customer's side of the meter servicing the load.

Most utilities are willing to allow such an arrangement and will pay the customer for any excess generation at applicable purchase rates. The disadvantage of this arrangement is that output is not always available when you need it to offset use, and it must be sold to the utility at avoided cost rather than retail purchase rates.

5.4 Net Metering

Recently many utilities, recognizing the value of renewable source energy, have taken the behind-the-meter concept one step further and agreed to offset excess generation against future retail

purchases. This, in effect, allows the customer to use all of the renewable source generation to offset purchase at the retail rates.

Net metering allows a utility customer who produces more electricity than they consume to carry any net excess generation (NEG) forward at the full retail rate to periods where consumption exceeds generation. Any NEG remaining in the customer's account at the end of the accounting period (commonly calendar year) will be granted to the utility. In effect, the utility acts as a battery for the customer's excess generation. A net metered generator must be appropriately sized so as not to exceed expected consumption.

The Kansas City Board of Public Utilities (BPU) voluntarily established a net metering policy in 2009.

In May 2009 the Kansas legislature established a requirement for net metering for customers of Investor-Owned Utilities (IOU) in Kansas (HB 2369). Kansas IOU's are Westar, KCP&L and Empire District. A system capacity limit was set that allows residential systems up to 25 kW and non-residential systems up to 200 kW to offset onsite electricity consumption. There is not customer-generator ownership of the RECs (see section 2.3 Renewable Energy Mandates).

Additionally KCP&L limits the number of customers eligible for a net metering agreement on a first-come, first-serve basis until the total generating capacity of all customers with net metering agreements is equal to 1% of the previous year's peak demand. KCP&L's standard net metering agreement also stipulates that neither the owner-generator nor KCP&L can register or sell RECs for the power generated under this agreement.

6.0 Project Plan

6.1 Successful Projects

Successful small to mid-sized, behind the meter, renewable energy projects generally have several components in common:

- Internal Acceptance
  - Consensus on Project Drivers
  - Facility Acceptance of Project
- Resources & Requisites
  - Renewable Energy Resource
  - Funding
  - Site Selection
  - Adequate Facility Load
- Suitable Technology
  - Appropriate Technology Selection and Specifications
  - Prudent Technology Placement
- External Acceptance
  - Permitting and Zoning Requirements
  - Disposition of Energy

- Project Plan

The project plan outlines how the organization will move forward with the project. The common steps or phases in a renewable energy project are

- Prefeasibility Discussion
- Feasibility Study and Discussion
- Engineering Design
- Construction
- Installation and Commissioning
- Operations and Maintenance
- Decommissioning

6.1 Prefeasibility Discussion

The Prefeasibility Discussion may take a brief amount of time or consist of an extensive evaluation. During this phase, an organization is talking about renewable energy from a 'big picture' standpoint. The objective of this conversation is to determine if an organization is ready to consider a renewable energy installation.

6.2 Feasibility Study and Discussion

The Feasibility Study and Discussion may also take a brief amount of time or consist of an extensive evaluation. During this phase, an organization gathers specific information regarding renewable energy technology installations. Specifics may include recommended technology (type, scale and manufacture), project siting and permitting restrictions, project financing, and desired project timeline. This may be research internal to the organization or a formal study completed by a consulting firm. The objective is to collect enough information that internal acceptance by the organization is achieved.

6.3 Engineering Design

The next three phases, Engineering Design, Construction and Installation and Commissioning, can each be completed as individual phases, or completed together for a turn-key project.

Depending on the type and size of technology, engineering design can take between 2 weeks and 4 months. As an example, a typical engineering design phase for a wind turbine project includes:

- Geotechnical study
- Foundation design
- Electric infrastructure design
- Environmental studies required for permitting
- Site improvement design
- Utility coordination
- Permitting

6.4 Construction

Depending on the type and size of technology, construction can take between a few days to three months, not including the lead time on the selected renewable energy technology. As an example, a typical construction phase for a wind turbine project includes:

- Ordering wind turbine and electrical components
- Filing and/or collecting required permits
- Preparation of the site, including any required construction access improvements and erosion control measures
- Excavation and installation of the foundation
- Excavation and installation of the electrical infrastructure
- Staging of the wind turbine, including blades, nacelle and monopole

6.5 Installation and Commissioning

Following construction of needed infrastructure, the renewable energy technology can be assembled and installed. Depending on the type and size of technology, installation can take between a couple of hours and up to two weeks. Once installed, the system will need to be commissioned to verify it is working as expected. Typically, utility metering data produced from the renewable energy technology is collected over a year for comparison and evaluation. Like the construction phase, weather can greatly affect the schedule of the installation and commissioning.

6.6 Operations and Maintenance

Proper maintenance is important to protect the investment of a renewable energy technology. Once the technology is installed, responsibility for the operations and maintenance. Operation and maintenance packages, as well as extended warrantees, can be purchased from the manufacture or a third party provider. Additional insurance coverage may be needed to protect renewable energy technology.

6.7 Decommissioning

Wind turbines have a typical design life of 20-30 years, photovoltaic systems have a typical design life of 15-40 years, and a geothermal system can last over 50 years. Organizations should plan for the decommissioning of their renewable energy technology at the end of the useful life of the system, including any applicable expenses. In the case of wind turbines, the salvage value of the turbine will not cover the full cost of decommissioning.

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1.0 The Need for Sustainable Infrastructure

In many ways, the United States' economy and the American way of life rely heavily upon the everyday transportation of people, goods, and services. As a result, reducing the energy consumption required to sustain the U.S. transportation system and its supporting infrastructure has recently become a major point of emphasis for government policymakers, vehicle manufacturers, and researchers. This portion of the Resourceful Kansas program and participant report focuses on the innovative transportation technologies that are all currently being utilized in an effort to reduce the country's transportation energy use. These methods include: vehicle improvement options; development and use of alternative fuels and power sources; innovative technological uses for infrastructure; fleet management techniques; and other driver education / behavior modification programs.

In general, Americans' continued desire for mobility has created a transportation system that has resulted in a high percentage of our lands being devoted to highways, streets, parking facilities, and other auto-centric uses. The growing congestion associated with automobile dependency has caused expensive delays in both passenger and freight transport, especially in the nation's largest urban areas, that has increased both fuel usage levels and air pollution issues. Today, the U.S. transportation system depends almost entirely on oil, especially for the nation's vast fleet of cars, trucks, and buses. Historically, the transportation sector has accounted for approximately two-thirds of the nation's oil consumption. In 2009, the transportation system in the U.S. consumed about 13 million barrels of oil per day, which represents about 70% of the country's total oil consumption.

Unless actions are taken to reduce the national oil consumption levels, America will continue to be dependent on this non-renewable resource and its ever fluctuating price and availability. Such dependency directly affects the country's national security and balance of trade, because so much of the oil is imported from countries abroad. Dependency on imported oil makes the U.S. consumers vulnerable to supply disruptions and harmful price shocks, especially with so much of the worldwide petroleum reserves located within politically volatile foreign countries. Petroleum-powered transportation also creates air pollution issues, and is currently responsible for generating about one-third of the country's green-house gas emissions. Because large quantities of carbon dioxide are emitted with oil combustion, about 100 urban areas across the country currently experience air quality issues.

Reducing transportation's use of petroleum products has the potential to drastically improve the nation's energy security. Studies have shown that even a one percent improvement in vehicle fuel efficiency could save American consumers over $2 billion annually. Therefore, in order for the U.S. to achieve its future economic and environmental goals, it is vital that the transportation system's dependence on oil is reduced and aided by the creation of a more sustainable infrastructure.

2.0 U.S. Department of Energy Initiatives

In the United States, the federal-level Department of Energy (DOE) is primarily tasked with promoting energy efficiency within America and aiding the research and development of

renewable energy sources to supplant the current reliance on petroleum-based products. The following paragraphs provide brief examples of several specific programs that are especially geared toward the provision of more sustainable technologies and programs for the U.S. transportation system and infrastructure.

2.1. Vehicle Technologies Program

The goal of the DOE's Vehicle Technologies Program (VTP) is to promote the widespread commercialization of advanced vehicle and fuel technologies. Ultimately, the provision of these new strategies will help the U.S. meet all of its sustainable transportation goals by reducing oil consumption, strengthening the economy, and reducing air pollution and green house gas emissions.

The VTP focuses on making collaborative efforts with industry leaders, government and university researchers, all levels of government, and other stakeholders to meet the sustainable transportation challenge through research, development, demonstration, and deployment. The key goals of the VTP are related to the following aspects of vehicle, fuel, and materials technologies:

- Hybrid Electric Systems: In order to enable a more cost-competitive market for hybrid and electric vehicles versus the conventional automobiles already available in the U.S., it will first be necessary to reduce the production cost of the high-energy, high-power battery systems which power these vehicles. In addition to being more affordable, batteries must be recyclable and have improved range, performance, and longevity. The widespread use of advanced electric-drive vehicles offers an opportunity to revolutionize transportation in the U.S. and reduce the nation's oil consumption levels.

- Advanced Combustion Engines: Improving the fuel efficiency of current vehicles with conventional combustion engines is one cost-effective measure that will help serve the overall VTP purpose of reducing petroleum dependency. This particular goal would develop advanced engine technologies that will increase the fuel economy of passenger vehicles between 25% and 40%, as well as for commercial vehicles by 20%, by the year 2015.

- Fuels and Lubricants: The program hopes to identify which components of vehicle fuels and lubricants have the most significant effects on emissions by 2014, and develop cleaner, greener fuels and lubricants for future vehicles.

- Materials Technologies: Fuel efficiency for vehicles can be improved by making them lighter through the development and use of high-performance, cost-effective materials. These improved materials could represent weight reductions for body and chassis components, engine and power train efficiency improvements, and lower-cost components for electric motors and hybrid vehicles. Reducing vehicle weight can potentially reduce vehicle operating costs, but must be done in a manner that does not compromise vehicle safety.

- Outreach, Deployment, and Analysis: In order to accelerate the adoption and use of these many alternative fuels and advanced vehicles technologies, other educational and promotional programs will need to support the ongoing research and development efforts.

2.2. "Clean Cities" Coalitions

One particular program that the DOE is employing to leverage its VTP advancements is called "Clean Cities." This program encourages government-industry partnerships between state and local organizations, within both the public and private business sectors, to support local decisions that encourage reduced petroleum consumption. Currently, the program includes nearly 100 volunteer coalitions across the nation. The overall goal of the "Clean Cities" program is to reduce U.S. petroleum consumption by 2.5 billion gallons per year by the year 2020. The only "Clean Cities" coalition in Kansas is located in the Kansas City metropolitan area and is managed by the Metropolitan Energy Center.

These partnerships help all parties involved to identify their common interests to reduce oil dependency, develop regional economic opportunities, and address urban air quality issues. The "Clean Cities" program hopes to accomplish its goals primarily through three particular strategies:

- Replace petroleum use by vehicles with other alternative and renewable fuels (as further discussed in Section 3.0 of this document).

- Reduce petroleum consumption by promoting smarter driving practices, idle reduction techniques, and the use of more fuel-efficient vehicles and advanced technologies.

- Eliminate petroleum use by encouraging the use of mass transit, trip elimination measures, and congestion mitigation. Also, the program provides public education regarding vehicle choice and fuel-efficient driving practices.

3.0 Vehicle Alternatives

This section will highlight the many advances in vehicle technologies that are either already available or are currently undergoing research and development. Again, through the DOE's Vehicle Technologies Program (VTP) and other programs like it, the ultimate goal is to develop more energy efficient and environmentally friendly technologies that will enable Americans to use less petroleum for transportation-related uses.

3.1. New Vehicle Technologies

Another long-term goal of many of these vehicle improvement programs is to create advanced technologies that will lower vehicle operating costs and reduce negative impacts on the environment. Further, it is hoped that these technologies will provide Americans with greater mobility and freedom, while also improving energy security.

The Alternative Fuels and Advanced Vehicles Data Center (AFDC) is a program resource that is sponsored by the U.S. DOE's "Clean Cities" initiative. The Center serves as a repository for a

wide range of resources and information regarding the use of alternative fuels, fuel blends, and other energy reduction options such as advanced vehicles, fuel economy improvements, and fuel saving techniques like idle reduction and fleet management best practices. National laboratories and other sources contribute the research data that is available through the Center. The data is available for use by any parties that are interested in reducing petroleum consumption, including government policymakers, private entrepreneurs, other fuel users, and consumers.

The following paragraphs will further describe several of the other advanced vehicle technologies that are either under development or are currently available in the United States.

3.2. Advanced Combustion Engines

As mentioned previously, one of the DOE's VTP goals is to make advancements with the internal combustion engines that are currently available for use by the automobile industry. Petroleum consumption and emissions / pollution can be reduced in the most cost-effective manner by simply increasing engine efficiency. By increasing the efficiency of both gasoline- and diesel-powered passenger vehicles, as well as for commercial trucks, these technologies can provide a significant step toward the DOE's fuel economy goals. Other means of improvement, such as recovering wasted heat energy from engine exhaust, are also being investigated. Finally, research is underway to possibly develop new combustion approaches that are more efficient than even diesel combustion, while producing low, near-zero emissions.

3.3. Diesel Vehicles

Diesel vehicles are still among the most fuel-efficient vehicles that are available today. Most advanced diesel vehicles utilize the ultra-low sulfur diesel (ULSD) fuel that is mandated by the U.S. Environmental Protection Agency (EPA). The improved engine efficiency and very low emissions that are provided by today's diesel vehicles are the result of collaborative research and development by industry and governmental agencies.

3.4. Fuel Conversions

One technique that can be used to improve the fuel efficiency of any "conventional" vehicle (i.e., originally operated on gasoline or diesel) is to perform a conversion that allows the vehicle to operate on an alternative fuel type. Although Compressed Natural Gas (CNG) and Liquefied Petroleum Gas (LPG) are currently the most common types of alternative fuel vehicle (AFV) conversions, this alternate fuel type can also include methane gas, ethanol, electricity, or any of the other alternative fuels that will be discussed further in Section 3.0 of this report. AFV's can be "dedicated" to run exclusively on the alternative fuel that they have been converted to use. Converted vehicles can also be configured as "bi-fuel" vehicles that can utilize separate tanks for the vehicle's original gasoline / diesel fuel and for the alternate fuel, so that the desired fuel can be obtained by flipping a switch to change tanks. Such fuel conversions can add up to $10,000 to the original cost of the conventionally-powered vehicle.

It is important to note that converted vehicles in the United States must continue to meet any current, applicable EPA standards for emissions. In addition, commercially-produced (i.e., after-market) vehicle conversions that may require the addition of heavy-weight battery systems or

additional fuel storage tanks that might alter the vehicle's handling by shifting the center of gravity or reducing / changing the payload capacity need to be recertified and/or tested to ensure that they continue to satisfy national vehicle safety standards.

3.5. Hybrid Electric Vehicles

Today, most of the hybrid electric vehicles (HEV's) on the road in the U.S. combine the power of a gasoline-fueled engine with an on-board generator / battery system that is utilized in certain circumstances, especially during coasting or idling conditions, to improve the overall fuel efficiency of the vehicle. These vehicles combine the high fuel economy and low emissions provided by an electric motor with the power, range, and convenience of conventional vehicles fueled by gasoline or diesel. Since electricity converts into high torque mechanical power with almost no loss of energy, hybrid engines alone can improve energy efficiency by about 30% on average. Combined with other factors, such as weight reductions and the reduced need for features like power-assisted steering and braking, HEV's have the potential to be at least two to three times more fuel efficient than similar conventional vehicles.

Most hybrid electric vehicles currently utilize state-of-the-art nickel-metal-hydride batteries, which are also typically recharged through a regenerative process during vehicle braking to recover lost mechanical energy. Battery systems for HEV's are under a state of continuous improvement in an effort to improve their efficiency and allow them to also be recyclable. Currently, significant efforts are also underway by domestic automakers to introduce / refine a new class of Plug-In Hybrid Electric Vehicles (PHEV's) to further advance the hybrid technology field. For instance, General Motors utilizes an advanced lithium-ion battery technology in its recently introduced Chevy Volt PHEV to further improve the efficiency of the vehicle. This new class of vehicles could offer a combination of technologies that allows increased driving range over all-electric vehicles, with potentially large fuel savings and emissions reductions as compared to conventional vehicles. However, the development of improved battery systems is critical to producing affordable electric and/or hybrid vehicles, because the battery is typically the most expensive component in these vehicles' electric drive systems.

3.6. All-Electric Vehicles

All-electric vehicles (EV's) exclusively use electricity as a transportation fuel, usually with an energy storage device, such as a battery system, in order to store the electrical energy needed to power the vehicle's electric motor that drives the wheels. The batteries of an EV are typically charged by plugging the vehicle into a readily-available power source. Some EV's do carry on-board battery charging systems; others must plug into a charger located outside the vehicle. Although there are likely air pollution contributions associated with the production of the electricity actually utilized by an EV, the vehicle itself is considered to be zero-emission because the electric motor itself produces no exhaust or emissions. Also, EV's directly reduce petroleum consumption because they use no other fuel type.

The commercial availability of both heavy-duty and light-duty EV's continues to increase in the United States. Currently, these EV's are still typically a more expensive option than similar conventional and hybrid vehicles. Additional costs of an electric vehicle can be between

$10,000 and $20,000 over similar conventional vehicles. In order to make EV's a competitive option for commercial use, some state and federal tax incentives are offered. Also, some of the additional cost of the EV will obviously be recovered through the future fuel savings realized by using such a vehicle. One current limitation of EV's that should be acknowledged is the shorter travel range that can be provided per charge, as compared to the typical range of a conventional vehicle utilizing gasoline or diesel fuel.

3.7. Flexible Fuel Vehicles

Flexible fuel vehicles (FFV's) include "dual-fuel" systems that can supply both fuels into the engine's combustion chamber at the same time in various calibrated proportions. FFV's are typically capable of operating on gasoline, "E85" which consists of 85% ethanol with 15% gasoline, or a mixture of both fuel types. Although there are currently more than eight million FFV's on the road in the U.S. today, many FFV owners are unaware of their vehicle's full capability.

Unlike other fuel conversion vehicles, FFV's typically contain only one fueling system that includes components that are compatible with ethanol and its higher oxygen content. Otherwise, these vehicles are very similar to conventional vehicles and offer the same engine power, acceleration / speed capability, and payload capacity. This is true whether the vehicle is being powered by either gasoline or ethanol, although fuel economy is noticeably lower when FFV's are operated exclusively on ethanol blends.

3.8. Fuel Cell Vehicles

Fuel cell vehicles, powered by hydrogen, are in an early stage of development. Currently, the U.S. DOE is leading the collaborative efforts of government and industry to develop this technology and the infrastructure that would be needed to support this vehicle type. Fuel cells are more efficient than conventional internal combustion engines, and produce no tailpipe exhaust since the only emission is water vapor. Continued efforts will be required in order to allow hydrogen-powered vehicles to become an affordable, safe, and environmentally-friendly transportation alternative.

4.0 Alternative Vehicle Fuels

Currently, there are more than a dozen alternative vehicle fuels being produced and/or utilized within the United States today. With the recent volatility in gasoline / diesel prices and availability, American consumers are becoming increasingly more interested in utilizing these available fuel alternatives. However, the most common users of these alternative fuel sources at this time continue to be government-regulated agencies and private, commercial fleets. In any case, the future increased use of available alternative vehicle fuels that both improve vehicle efficiency and reduce emissions provides significant potential for reducing national dependency on foreign oil and improving air quality across the country.

The following paragraphs will further describe several of the alternative vehicle fuels that are currently available in the United States. These fuels range from being already commercially available across the country to being the subject of continued research and development.

Currently, alternatively fueled vehicles tend to have lower emissions levels than other similar conventional engines. It is hoped that by the year 2020 this difference will be somewhat reduced, as most conventional vehicles in the nation's fleet are also equipped with advanced emissions control technologies that reduce levels near to those achieved with alternatively fueled vehicles.

4.1. Biodiesel

Biodiesel is a renewable fuel alternative that is produced from a wide variety of animal fats and vegetable oils. Biodiesel is typically blended with petroleum-based diesel fuel, and can be utilized by conventional diesel-operated vehicles. This alternative fuel has an excellent energy balance, as research has shown that it contains 3.2 times the amount of energy that it takes to produce the product. Because it can be produced domestically, biodiesel also represents a clean-burning, renewable substitute for petroleum diesel, and offers several other potential environmental and safety benefits. Compared with petroleum diesel, using biodiesel in a conventional engine substantially reduces the emissions of unburned hydrocarbons, carbon monoxide, and other particulate matter. These emissions reductions increase as the amount of biodiesel that is blended into diesel fuel increases. Biodiesel is safer than petroleum-based diesel because it is less combustible, which makes it easier to handle, store, and transport. Finally, biodiesel is nontoxic, so there are fewer concerns if it is spilled or otherwise released into the environment.

4.2. Electricity

Electricity obtained directly from the power grid can be utilized by any electric-powered vehicles (i.e., all-electric, hybrid, plug-in hybrid). Electricity is easily accessible for short-range driving conditions, and the vehicles that utilize only electricity as a fuel alternative produce no tailpipe emissions. Again, the only emissions that can be attributed to electricity as a fuel source are those generated during the power production process. In general, electricity as a fuel alternative offers several benefits as compared to conventional vehicles: better fuel economy, lower fuel costs, lower emissions, more fueling flexibility, and increased energy security.

4.3. Ethanol Products

Ethanol is a renewable alternative fuel that is also being domestically produced. It is made from "biomass," which collectively refers to the various plant materials used as the fuel source. Varying degrees of energy efficiency are related to the actual production of ethanol from the different biomass fuel sources. Currently, 97 percent of the ethanol produced in the United States is made from corn, which is one of the lowest-cost feedstocks available. However, converting corn into ethanol does require advanced processing and the application of enzymes in order to obtain the desired sugars for ethanol production. Also, the production of one gallon of ethanol from corn requires approximately four gallons of water, another valuable environmental resource in states like Kansas.

Sugar cane and sugar byproducts have long been utilized for ethanol production, particularly in Brazil and other South American countries. The energy requirement to convert sugar into ethanol is about half that for corn conversion. However, sugar resources are currently limited within the

United States. Today, sugar cane as a perennial tropical crop is only produced in four states (i.e., Florida, Louisiana, Texas, and Hawaii), and sugar beet production in the U.S. is limited mostly to several north-central states, including: Michigan, Minnesota, North Dakota, Montana, Idaho, Wyoming, Colorado, and Nebraska. The primary reason that ethanol production from sugar has not become more popular in the United States is that conversion of sugar cane and sugar beets into raw sugar is currently more profitable.

Another ethanol fuel source alternative currently being evaluated involves the use of cellulosic fiber, available from plants and other fibrous sources. Instead of using corn as a fuel source to make ethanol, this process could utilize planted crops like sorghum and switch grass. Alternatively, cellulosic ethanol could be produced from sources like wood chips, corn cobs and stalks, and other non-edible parts of plants. The production of cellulosic ethanol also requires only half as much water (i.e., two gallons of water required for one gallon of ethanol). Although there are currently no commercial scale production plants for cellulosic ethanol, the federal government of the United States has mandated an annual production level of 16 billion gallons by the year 2022.

Chemically, ethanol contains an alcoholic compound similar to that found in consumer beverages. Currently, almost half of the gasoline sold in the U.S. contains some amount of ethanol in a low-level blend (i.e., about 10% in most cases) that helps to both oxygenate the fuel and slightly reduce air pollution emissions. High-level blends of ethanol, such as "E85," are becoming increasingly available for use in flexible fuel vehicles. In terms of reduced petroleum use, it is estimated that ethanol and similar other bio-fuels could replace at least 30% of the gasoline demand in the United States by the year 2030.

4.4. Hydrogen

As an alternative fuel source, hydrogen gas has the potential to allow virtually pollution-free transportation and create independence from imported petroleum-based fuels. Hydrogen is the simplest and most abundant element in the universe, and can be produced from a variety of sources, including fossil fuels, biomass, and the electrolysis of water. Hydrogen could be produced utilizing other renewable energy sources and then subsequently utilized in fuel cell vehicles, potentially changing the entire transportation energy system.

4.5. Natural Gas Fuels

Natural gas is a domestically produced alternative fuel that is usually extracted from gas and oil wells. Natural gas fuels can produce significantly fewer harmful emissions than either gasoline or diesel fuels when used in properly-equipped vehicles. These vehicles typically utilize either compressed natural gas (CNG) or liquefied natural gas (LNG) as an exclusive fuel type, or in combination with gasoline / diesel in certain bi-fuel conversion vehicles. A primary advantage of natural gas as a fuel source is its ready availability through the existing pipeline infrastructures across the nation. Natural gas is a mixture of a variety of hydrocarbons, predominantly methane, but also ethane, propane, other gases, and water vapor.

Currently, natural gas already accounts for approximately one-quarter of the energy that is used within the U.S. Of this amount, equal thirds of the natural gas used supplies residential and commercial uses, industrial uses, and electric power production. Very little natural gas is currently used as a transportation fuel. However, natural gas has a high octane rating and is excellent for use in internal combustion engines utilizing spark ignition. Natural gas is nontoxic, noncorrosive, and presents no threat to soil, surface water, or groundwater.

As a local example of the growing acceptance of natural gas as a cleaner, greener domestic fuel source, in March 2011 the Kansas City, Kansas school district added to its bus fleet 47 vehicles fueled exclusively by CNG. These vehicles are expected to reduce fuel costs by more than one-third, displace 1 to 2 million gallons of diesel fuel use over the service life of the vehicles, and annually eliminate about 150,000 pounds of green house gas production. It should be noted that this school bus fleet purchase was assisted by a large DOE stimulus grant, had the support of the Kansas City region's "Clean Cities" coalition, and will be further aided by a federal tax credit on each gallon of natural gas used that will ultimately allow the school district to realize a $1 per gallon cost savings with CNG versus diesel fuel.

4.6. Propane

Liquefied petroleum gas (LPG), or propane, is already used by many fleet vehicles, including trucks, buses, taxis, police cars, and rental vehicles, both in the U.S. and worldwide. In fact, propane is the third most common engine fuel in the world. The existing propane fueling infrastructure is substantial, allowing propane vehicles to have an adequate driving range that should allow their increased use.

Propane is a gas at normal temperatures and pressures, but is pressurized and stored in an on-board tank on vehicles. Under a pressure of about 300 pounds per square inch (psi), propane becomes a liquid with significantly increased energy density over the gaseous form. For comparison, a gallon of propane has about 25% less energy than a gallon of gasoline. Ignited in its gaseous state within internal combustion engines, propane is a clean-burning alternative fuel that offers significantly lower amounts of carbon dioxide and some other harmful emissions. Propane's ready availability also offers convenience to consumers, as well as safety, since it has the lowest flammability range of all alternative fuels.

4.7. Compressed Air

Compressed air can be utilized as a sole power source, or in a hybrid combination with other gasoline, diesel, or electric sources. Compressed air can be utilized within vehicles to provide propulsion via expanded air, similar to the technology previously utilized in steam engines. Compressed air is stored on-board these vehicles in a tank at higher pressures, which would require filling at a high-pressure pump. Obviously, air as a source involves no flammability issues. The most significant concern appears to be the limited storage capacity of the tanks that can be accommodated on-board the vehicles that would utilize this type of power source. To reduce this concern, some air-powered vehicles are also equipped with small diesel-powered, single-cylinder engines to run on-board compressors that refill the air storage tanks.

4.8. Other Potential Fuels

Several other emerging fuel types are also currently under development. Time will tell whether some of these alternative fuels will offer significant benefits that reduce emissions and increase U.S. energy security. Some of these potential fuels are: Biobutanol; Biogas; Biomass to Liquids (BTL); Coal to Liquids (CTL); Gas-to-Liquids (GTL); Fischer-Tropsch Diesel; Hydrogenation-Derived Renewable Diesel (HDRD); and Ultra-Low Sulfur Diesel.

4.9. Supporting Infrastructure

In most cases, a supporting infrastructure will need to be provided in order to facilitate the use of an alternative fuel source to power advanced vehicle types. The availability of this infrastructure can drastically influence the acceptance of a particular fuel. The supporting infrastructure needs may vary by fuel type, but generally are required to accommodate production, storage, distribution, and dispensing of the fuel.

With this required infrastructure comes an upfront expense and improved planning for fleet operators or consumers that may be caused by the short-term limited availability of filling stations. In most situations, fleet vehicles can be filled in an overnight condition using slow-fill fueling systems. Then, the service range of the fleet will depend on the availability of the particular fuel source within a reasonable distance and at a competitive price. Until such time that filling stations become readily available for each of the various types of alternative fuels, a primary consideration affecting the increased use of advanced vehicle types may be the limited travel range that can be accommodated with only home-based refueling.

For drivers of electric-powered vehicles, there is already an ability to install infrastructure to allow primary charging of the vehicle at the driver's home. Developments are also underway to provide the infrastructure to allow public charging stations throughout primarily urban areas. Administration by municipalities and/or private utility companies will likely be needed to ultimately provide the charging infrastructure needed to support increased adoption of electric vehicles by consumers. The estimated cost of one fast-charging public station for electric vehicles is about $1.5 million, and multiple stations would likely be needed within any given urban area to serve all users. It will also be necessary to improve recycling and reuse options for the batteries associated with electric vehicles. It is also possible that "battery swapping" businesses could be created, so that properly-equipped vehicles could have increased travel range without the need to stop for an extended period of time to perform recharging.

5.0 Light-Source Conversions

The search for more energy-efficient and high-performing electrical light sources was nearly constant throughout the 20th century, and continues still today. Beginning with open arc lamps that were placed on very high towers (e.g., 60 to 150 feet tall) in order to illuminate large areas of towns, communities during the early 20th century began to improve ways to light their streets. The introduction of the incandescent light bulb provided the first low-power electric lighting option that was eventually utilized in cities worldwide, and is still very commonly utilized for traffic signal indications. In the late 1930's, there was some initial experimentation with the first available fluorescent lamps for street lighting applications. However, these fluorescent bulbs

produce a more diffused, non-directional light and use large, fragile lamp housings that made them difficult to utilize for street lighting purposes. Fluorescent bulbs are still occasionally used for some small parking lot and outside building illumination purposes.

The first mercury vapor street light assembly was introduced in about 1948, and was found to provide a major improvement over the previously utilized incandescent bulb technology. Mercury vapor lights produce a much brighter light than incandescent bulbs, which appears to be bluish or blue-green in color. Mercury vapor light bulbs do suffer from depreciation over their service life, becoming dimmer with age while using the same amount of electrical energy. With the passage of the Energy Policy Act of 2005, the sale of new mercury vapor lights was essentially prohibited, beginning in 2008. Therefore, most of the remaining mercury vapor installations utilized by municipalities have either been modified, or will need to be replaced within the near future, in order to utilize the newer illumination technologies that are discussed in the following sections.

5.1. Current Technologies

Beginning in the 1970's, several High Intensity Discharge (HID) lamp technologies were developed that are the most commonly used for street and parking lot lighting applications today.

5.1.1 High Pressure Sodium (HPS)

These types of light bulbs were the first of the HID technologies to be introduced. Initially disliked for their yellowish-orange glow, sodium vapor lights still likely represent the dominant type of street lighting fixture on American roadways. HPS street lighting fixtures require a transformer or ballast to both change the voltage and regulate the current. These HPS fixtures also require an electrical "starter" circuit, and tend to dim slowly over time.

5.1.2 Metal Halide (MH)

These lamps have been utilized to illuminate roadways and parking lots in more recent years. While MH bulbs do cast a truer white light, they tend to be less efficient than sodium fixtures and have not gained as much acceptance. Overall, the higher cost and shorter life expectancy of MH light sources have prevented them from becoming as popular for municipal lighting uses.

5.1.3 Other Light Sources

The development and refinement of other light source types has continued in an effort to provide even more options for municipal street lighting and private parking lot uses. Compact fluorescent lamps (CFL) have been improved with time and have more recently been used for some pedestrian-scale and roadway lighting installations, although such instances are still rare. Another technology that is currently being tested in demonstration projects across the U.S. for street lighting purposes utilizes induction lamps. The induction lamps are fluorescent-type bulbs that use electro-magnetic fields to energize light-emitting gases within the bulb. These sources do not need metal contacts to conduct the electricity and can experience longer life as a result. Currently, induction lighting options available in the U.S. tend to be more expensive than other options for roadway lighting. The larger size of induction bulbs also makes it somewhat more

difficult to effectively control the light that is emitted, making them better suited for pedestrian-scale lighting or other applications with lower mounting heights.

5.2. Light Source Comparisons

The following table offers a comparison of some of the important measures provided by the various types of street lighting technologies, including the light-emitting diode (LED) technology that is discussed in the next section of this report. It should be noted that this comparison table depicts the values for a typical 100-watt rated bulb for each of the respective lighting technologies, although higher powered bulbs are typically utilized for street lighting with current technologies like mercury vapor, MH, and HPS.

	Rated Bulb Wattage	Rated Initial Lumens	Rated Service Life (Hours)
Incandescent	100w	800	4,000
Mercury Vapor	100w	4,200	24,000
High Pressure Sodium	100w	9,500	24,000
Metal Halide	100w	9,000	15,000
Fluorescent	100w	6,000	20,000
Induction	100w	8,000	100,000
Light-Emitting Diode	100w	7,000	100,000

5.3. Light-Emitting Diodes (LED)

Perhaps the most commonly accepted "green" alternative for municipal street and parking lot lighting uses has resulted from the recent development of more effective Light-Emitting Diode (LED) lamps and fixtures. LED's typically consist of clustered arrays of tiny, high-intensity bulbs that produce a brighter, whiter light. This development has come at a critical time when many municipalities are searching for new ways to move toward sustainable infrastructure and improved energy efficiency.

5.3.1 LED Benefits

LED bulbs are purported to offer many potential benefits over the more conventional HPS and MH street and parking lot fixtures that have previously been available. The primary benefits listed for LED bulbs often include: improved energy efficiency; provision of more directional light that eliminates wasted light; rugged construction that provides extended service life; instant starting capability; improved controls, including dimming capability to offer additional power savings; and environmental benefits, since neither mercury nor any heavy metals are utilized during production of LED's. In addition, LED bulbs have been shown to gradually decrease in light output over time, rather than "failing" at once like other available technologies.

5.3.2 LED Uses in Transportation

The primary reasons that LED applications have taken hold within the transportation community are the promises of energy efficiency and increased service life, which would consequently reduce associated maintenance costs. At this time, many communities have begun to evaluate and/or

utilize the available LED fixtures that can be applied along their roadway systems. Numerous demonstration projects have been completed where HPS or MH lighting systems have been replaced with LED fixtures. These types of projects and ongoing evaluations are underway in major cities across the country, such as Los Angeles, San Francisco, Seattle, Pittsburgh, and others, as well as on a smaller scale by several suburban communities within the Kansas City metropolitan area. Ultimately, there will need to be more accurate life-cycle cost assessments of this new LED technology so that municipalities can be comfortable moving forward with this option. LED technology will need to be proven to strike the best balance between brightness, affordability, energy consumption, and other environmental considerations before it will likely gain widespread acceptance.

5.3.3 Street Lighting Applications

Again, the application of LED technology for use in municipal street lighting is currently being assessed to determine whether the marketed benefits of LED's can be realized during actual implementation. Even if the potential energy efficiency benefits of LED lighting fixtures can be proven, these fixtures do typically carry a higher up-front cost of implementation (i.e., fixture costs range from three to five times more than comparable HPS or MH fixtures) that may make installation cost-prohibitive for some municipalities and/or projects. To that end, options like LED / driver "retrofit" kits costing about $500 each have been recently utilized by some local municipalities, such as the City of Shawnee, Kansas, so that the existing light fixture housing can be kept. Also, some of the well-known lighting manufacturers are even providing lending and/or financing opportunities to municipalities and large, private consumers in order to make their LED options more viable for selection.

It is also important to note that the potential energy savings may also be more difficult to recoup when LED's are utilized in some portions of the country where provided electricity is cheaper (i.e., in Kansas and nearby Midwestern states, the typical cost of electrical power is around 5 or 6 cents per kilowatt-hour of usage). The value that can be potentially earned by using LED technologies in states like Kansas is more related to the increased service life of the LED bulbs and fixture hardware, as compared to HPS or MH fixtures. Whereas these previous technologies offer service lives in the range of 10,000 to 20,000 hours (typically three to five years), LED bulbs have been shown to operate effectively for 50,000 to 70,000 hours (between 12 and 16 years). As the LED bulbs and fixture components offer this extended life, the need for periodic maintenance is drastically reduced as well. Eliminating the need for multiple HPS or MH bulb replacements over the time period equivalent to the LED service life, as well as the man-hour labor costs to perform this required maintenance, is likely where local municipalities will realize the most cost savings from installing LED street lighting.

There are still some other concerns that will need to be addressed and evaluated as more demonstration projects are completed, and the life-cycle analysis results become more widely known. Certainly, these results might be expected to vary somewhat, as a variety of different LED products are currently being offered by a wide spectrum of manufacturers. As part of the overall cost comparisons of the alternate street lighting applications, the question of whether LED bulbs offer as much light as other current technologies will need to be answered. Some previous studies have concluded that LED lights consume between 20% and 40% less energy than

conventional light sources, while also producing more light. However, according to a recent study performed by the National Lighting Product Information Program (NLPIP), nearly twice as many LED street lights as HPS lights could be required along a given roadway segment in order to meet the same nationally-accepted roadway lighting criteria. Alternately, more expensive LED fixtures producing nearly twice as many lumens might be needed to provide similar roadway lighting levels. If this more recent finding is further verified, the life-cycle costs of LED projects could then be drastically influenced by the increased installation costs associated with more poles being required at a closer spacing. This increased cost could possibly override, or would at least drastically reduce, the potential long-term energy and maintenance savings associated with LED street lighting fixtures.

5.3.4 Traffic Signal Indications

In this particular transportation-related application, LED's have already virtually replaced both incandescent lamps and the occasional fluorescent bulb. LED indications have been an increasingly popular choice for more than a decade for traffic signal indications, as well as at pedestrian / school crossings or for isolated warning / regulatory sign flashers. Using LED arrays for traffic signal and warning flasher indications has been widely accepted as a most appropriate use of the technology. Whereas the incandescent bulbs previously utilized required re-lamping every two or three years, some LED indications originally installed 10 to 12 years ago are still functional today.

Again, it should be noted that LED indications tend to dim over time rather than failing outright, which is an important benefit and safety consideration where traffic signals and other warning devices are concerned. LED bulbs, while being more energy efficient, also produce less heat than incandescent bulbs; some northern locales have noted that in certain instances, LED indications have demonstrated less ability to melt ice and snow from the face of the traffic signal indications. That issue aside, most municipalities are typically finding that the energy savings and maintenance cost reductions associated with utilizing LED indications in this manner can offset the initial installation costs within a period of three to five years.

6.0 Alternative Power Sources

Other alternative power sources that have been previously developed and available for decades for other applications are now also beginning to find support within the transportation realm, as more energy-efficient and sustainable technologies are investigated. As these innovative technologies are further developed, they will likely find more widespread acceptance and use for powering the municipal street lights, illuminated signs, traffic signals, and other basic transportation infrastructure components that also consume considerable amounts of energy. Most large cities annually spend millions of dollars to operate street lights, signs, traffic signals, and other infrastructure components. Historically, it has been shown that the power required to operate the traffic signal equipment at a single intersection can cost a municipality about $1,000 annually.

The following paragraphs describe several of the more recent, innovative uses of these alternative power sources for transportation-related applications.

6.1. Back-up Battery Systems

Recently, the installation of back-up battery systems has become more commonplace in the transportation industry, especially in association with traffic signals. However, it should be noted that there is currently no federal mandate requiring the provision of back-up power for traffic signals, street lights, or other transportation lighting systems. The "Manual on Uniform Traffic Control Devices (MUTCD)" does require auxiliary power sources to be in place for portable changeable message signs (PCMS) that are typically utilized in a temporary traffic control scenario or other hazardous condition requiring advance warning.

Most municipalities and/or state transportation agencies have adopted a prioritization system to gradually increase the provision of back-up battery systems across their traffic signal networks. In these cases, priority can be given to locations that serve significant traffic volumes, are located along critical state highway or arterial corridors, or involve preemption, as for a signal located near a railroad crossing or a fire station. Although back-up battery systems can easily be installed at any existing traffic signal location, most municipalities seem to prefer making this improvement either when new traffic signals are installed or when old traffic signals reach the end of their useful life and are replaced.

Depending on the features included with the back-up battery system, costs can range from about $3,000 to $5,000 per location. Some high-end systems are also programmable to allow the full operation of the traffic signal, including detection and other ancillary systems, for a certain time period following a power outage, before reverting to only flashing operation. Total operation time on back-up battery power alone can range from 6 hours up to 12 hours in certain cases. It should be noted that the batteries required for such systems typically account for between $800 and $1,200 of the total system cost. Typically, these batteries can be utilized for a period of five to seven years before they need to be replaced, depending upon the frequency of use.

6.2. Solar Power Applications

The use of standalone solar-powered technologies has been prevalent within the transportation industry for at least ten to fifteen years. Initially, these technologies have been utilized at mostly isolated locations where it may be difficult and/or cost-prohibitive to obtain electrical power from the grid. Examples of these existing installations are at pedestrian / school crossings or isolated warning / regulatory signage locations where the desire for additional warning capability is being provided by a flashing beacon. Many solar-powered applications are currently available that combine these flashing indications with a solar array and battery pack that can be mounted on top of the associated sign post. Depending upon manufacturer, type, and options, the typical cost of these solar-powered flasher units is between $1,500 and $2,000 per sign.

Standalone solar power alternatives are also currently available for street and parking lot lighting applications, as demonstrated at the Riley County, Kansas public works facility during the Resourceful Kansas workshop attended by all participating organizations. Several varieties of solar power array configurations are currently available: horizontal mounting on top of the actual lighting fixture housing; offset, angular mounting brackets attached to the pole; and even thin-film solar panels provided in vertical strips on the light pole itself. Depending on the particular

fixture / solar array style, LED power, and manufacturer, the multiple varieties of solar-powered street lights that have been evaluated by Riley County all have typical costs between $5,500 and $7,500 per pole. By comparison, a $3,000 to $4,000 cost is usually associated with each pole for a standard HPS lighting system.

6.3. Combined Solar Power / Wind Generation

Another innovative power alternative that is currently being investigated involves a hybrid system utilizing both solar power and wind turbine generation capabilities to run elements of the transportation infrastructure. Funded by a grant from the U.S. Department of Transportation, the City of Lincoln, Nebraska is partnering with energy and transportation researchers from the University of Nebraska to further evaluate this innovative approach to powering several traffic signal installations within the city.

At each respective location, a small wind turbine and solar panels will be installed and connected to the existing traffic signal and the electrical grid via a smart control system that not only draws power from the grid when needed, but also compensates and switches between the available power sources depending on the local weather conditions. The goal of the research project is to develop and eventually refine this hybrid electrical system to create an "energy-plus" condition, where enough power is generated at each specific location to both operate the traffic signal and also return any excess power to the electrical grid to help offset other transportation costs.

This hybrid solar panel / wind turbine system will be used not only to reduce the operating costs of the adjacent traffic signal, but will also be able to provide some additional charging and operational capacity to the traffic signal's back-up battery systems in the event of an electrical power outage. City public works staff estimates that the cost to install this hybrid power and control system at a given location will add between $15,000 and $20,000 to the cost of a typical traffic signal, or about a 10% cost increase, that will be recouped with future energy savings.

7.0 Fleet Management

A large portion of the total vehicle fleet in the United States is represented by heavy-duty and light-duty trucks used for the transportation of goods, including nearly 500,000 long-haul trucks that cross the nation's interstates and highways each day. In addition, many more transit / school buses, heavy construction-related equipment, and other vehicles that cannot be classified as passenger cars, are operated and managed on a daily basis by governmental agencies, school districts, private companies, and other organizations.

There are a wide variety of methods available to reduce the fuel consumption and emission levels related to these fleet vehicles, as described in the following paragraphs.

7.1. Fuel Economy Strategies

One way that managed vehicle fleets can improve their overall fuel economy, and by extension the "bottom line" expenditures of the company or agency, is through the combined efforts of improvements to the fleet vehicles themselves. These fuel economy improvements can be

achieved by either performing certain vehicle maintenance activities or otherwise improving the vehicles' performance through equipment updates. Also, fleets can likely realize substantial amounts of fuel savings through improved training and education of their drivers to encourage more effective driving techniques.

7.1.1 Vehicle Maintenance

Basic vehicle maintenance can play a large part in fuel efficiency results. Properly inflated tires improve fuel economy and also last longer. A decrease of only 1 psi in tire pressure in four tires has been shown to decrease a vehicle's fuel economy by 0.3%. To combat air pressure loss, some fleets utilize nitrogen inflation, tire pressure monitoring systems, and other technologies to maintain optimum tire pressures. Vehicle fuel economy is also improved by keeping engines properly tuned and utilizing recommended grades of motor oil. Using improper grades of motor oil other than those recommended by the vehicle's manufacturer can decrease fuel economy by 1% to 2%. In some cases, today's synthetic or blended oils can also provide additional fuel economy benefits.

7.1.2 Vehicle Equipment

Another way to save fuel is to install additional specialized equipment on a vehicle, especially for heavy-duty trucks. Tires that offer low rolling-resistance can be used to improve the fuel economy of these vehicles. "Super-single" tires that are not quite as wide as a pair of tires can be installed to replace dual tires on the rear axle of heavy-duty trucks. Aerodynamic improvements on a truck are another means of improving the vehicle's fuel efficiency. Air foils can be attached to the roof of a truck to reduce drag by directing air over the cab and trailer. Similarly, side skirts can be utilized on trailers to improve the aerodynamic performance of the vehicle.

7.1.3 Driver Behaviors

Fleets can also achieve fuel economy improvements through modifications of driving behaviors. Speeding greatly increases fuel consumption for heavy-duty vehicles, especially when vehicles are travelling in excess of 60 miles per hour (mph). Encouraging more conservative acceleration and braking can improve fuel economy, as can reducing vehicle loads and off-loading unnecessary cargo. Finally, better planning of trip routes, or combining trips, can reduce fuel consumption by up to 10% by reducing the miles driven, the time spent in traffic, the number of unnecessary stops, and in some cases, the number of trucks needed for routes.

7.2. Idle Reduction

Idle reduction equipment is primarily targeted toward trucks, buses, construction machinery, and other vehicles that use up to 3 billion gallons of fuel every year in the U.S. while idling. The nation's long-haul truckers use more than 800 million gallons of fuel annually while simply idling during mandated rest periods. During idling, these vehicles also emit large quantities of air pollution and greenhouse gases. Thus, idle reduction technologies and practices can be an important means of reducing both fuel consumption and emissions.

7.2.1 Idle Reduction Benefits

Reducing the idle time for light-duty and heavy-duty trucks, as well as for transit and school buses, saves fuel, engine wear, and ultimately money. In addition, idle reduction also decreases the associated emissions and noise levels.

7.2.2 Idle Reduction Strategies

A variety of technologies are employed to reduce fuel use during idling. On-board equipment, such as automatic engine stop-start controls and auxiliary power units (APU's), can be installed and utilized wherever a vehicle might be stopped. At truck stops and other facilities, electrification systems can be provided to enable trucks to hook up to stations that provide the power needed to maintain heating / cooling systems, and to keep engines warm and batteries charged.

The EPA has also developed and continues to promote other national campaigns, such as the "Clean School Bus USA" program, that are specifically related to reducing school bus idling issues. Obviously, additional health concerns for school-age children are one issue resulting from the emissions and air pollution from school buses. In general, it is recommended that school buses only have their engines running when the vehicle needs to be in motion. Engines should not be allowed to idle when buses are waiting during loading / unloading operations, and idling times should be kept to a minimum whenever the engine is initially being warmed up.

7.3. Best Practices in Fleet Management

A fleet's best management practices program can include a wide variety of different components. The program can include driver training, fleet-wide speed reductions, tire improvements, reduced idling times, vehicle improvements to improve fuel efficiency or aerodynamics, and routing / scheduling modifications. Even when comprehensive program improvements are made throughout a fleet, most experience has shown that effective fuel management ultimately depends on the vehicle drivers.

Therefore, improved training of fleet drivers is typically recommended, especially to encourage various fuel conservation techniques like reduced speeding, less aggressive driving, and stop-and-start driving reductions that can all be classified as "eco-driving." Some agencies and programs have even gone so far as to offer incentives to the employees, sharing the realized fuel savings with the responsible vehicle drivers. Such fleet training and incentive programs have been shown to achieve more than a 10% reduction in annual fuel consumption.

8.0 Modal Choice and Driver Behaviors

Today, the movement of people on the ground is the single greatest use of our transportation energy. In the U.S., most passenger trips are currently made in private automobiles. For a variety of reasons, Americans simply prefer cars to other forms of passenger transport in most cases. Some of the advantages typically related to preference for personal automobile use include on-demand mobility, speed of travel, convenience / reliability, comfort, and status. However, in order to ultimately achieve the nation's fuel energy goals, other options must be considered and utilized at increased levels in the future. This section of the report details these

other modes of transportation and discusses other means of reducing the number of vehicle-miles travelled via personal automobile in this country. In addition, other driver behaviors and choices that directly affect fuel conservation are described, which are ultimately applicable to any passenger car or its driver.

8.1. Improved Modal Choices

Recently, there has been an increased awareness in reducing fuel consumption and harmful emissions from passenger vehicles through the promotion of alternative commuting options, such as transit, biking, walking, and vehicle-sharing practices. Promotional and educational programs are receiving more attention, and more importantly increased funding, from local planning organizations and policymakers in an effort to get more Americans to consider other transportation options.

8.1.1 Transit Options

In 2009, there were about 55 billion passenger-miles of travel accommodated by public transportation systems within the country's largest urban areas. If these public transit options did not exist, congestion and energy consumption costs would be 15% to 20% higher than current levels. However, most transit buses in the U.S. get fewer passenger-miles per gallon of fuel than most automobiles. In order to combat this condition, steps must be taken to better accommodate transit options and increase overall ridership. People typically offer a variety of reasons for avoiding public transportation options: longer trip times, schedule restrictions, comfort issues, and possible harassment or criminal victimization. System improvements can obviously be made by improving transit routes and service times to allow more riders to reach their destinations in a timely manner, and perhaps choose transit over travelling via personal automobile or other similar means. A local example of such improved transit service is Kansas City's MAX bus-rapid-transit (BRT) program, which offers riders express service between the city's most transit-oriented destinations, utilizing shorter vehicle headways and bus priority preemption through congested urban intersections.

8.1.2 Bicycle / Pedestrian Options

The promotion of alternative commuting options must include and accommodate bicycle and pedestrian options. These options obviously combine environmentally-friendly benefits, such as fuel consumption and air pollution reductions, with a valuable exercise component that is a key part of a healthy lifestyle. Therefore, it is important that the transportation infrastructure be improved to include the sidewalks, trails, and accessible crossings that facilitate the end users who choose these alternative transportation options.

8.1.3 Car/Van-Pooling

Encouraging the combination of trips is another way to reduce the number of vehicle-miles travelled on the country's roadways. Car- and van-pooling programs are one relatively easy way that employers can influence their employees to reduce fuel consumption, especially during times when fuel prices are high. Car-sharing is another future possibility that can be utilized to reduce the number of vehicle-miles travelled in this country. Operated similarly to a rental car agency,

users pay one-time registration fees to join such programs that offer vehicles for use on an as-needed basis.

8.1.4 Park-and-Ride Activities

Another option that can be accommodated and promoted by municipal agencies is increased park-and-ride activities. When provided, these parking lots can provide a convenient way for multiple drivers to make shorter trips to the park-and-ride facility before continuing on to their final destination via another transit or car-pooling option.

8.2. Behavior Modifications

Again, there are certain behaviors and choices that can be made by the driver of any given passenger vehicle that could be improved in order to save energy and reduce fuel consumption. As with managed fleet vehicles, some of these recommended methods involve vehicle maintenance and performance measures, while others are dependent upon the actions, choices, and behaviors of the driver.

8.2.1 Vehicle Maintenance / Operations

Proper maintenance of a vehicle goes a long way toward improved fuel economy. These items include making sure that the vehicle has properly inflated tires, the engine is tuned correctly, and replacement of the oil, oil filter, and air filter are occurring at regularly schedule intervals. Old, dirty oil and filters compromise energy efficiency and increase air pollution.

8.2.2 Aggressive Driving

Rapid acceleration and making quick stops can significantly reduce fuel efficiency, as can aggressive highway driving. Anticipating stops, and letting the vehicle coast to a stop also can improve fuel economy. Using the cruise control feature on a vehicle also helps to save fuel by keeping travelling speeds constant. Speeding is also an expensive and wasteful habit that ultimately wastes excess fuel. In general, for each mile an hour in travelling speed above 55 mph, vehicles can lose about 1% of their fuel economy.

8.2.3 Time-of-Day Choices

If possible, employees should take advantage of whatever flexibility their work schedules allow in order to avoid congested peak traffic periods. Staggering working hours so that commuting is performed at less busy times of the day will allow employees to avoid the frustration of stop-and-go traffic during "rush hours." Utilizing phone and internet technologies to "tele-commute" from home, or even working a compressed work week to eliminate the need to commute one day a week, may also be options for some employees. Combining trips and planning routes to accomplish more tasks on a single trip also promotes energy efficiency. Vehicle refueling should never require a special trip, and in larger cities where air quality / ozone conditions are of a concern, refueling of vehicles should be completed either early in the morning or later in the evening.

8.2.4 Other Driver Behaviors

Proper use of the air conditioning unit in a vehicle versus utilizing flow-through or window ventilation can affect fuel economy up to 20%, except at highway speeds when air conditioning is

more efficient. Drivers should also avoid carrying extra weight or unnecessary items when travelling, as every 100 pounds of extra vehicle weight can cause a one-half mile per gallon loss of fuel economy.

9.0 Congestion Management

Especially within more urbanized areas of the country, traffic congestion is one of the most prevalent issues facing communities. However, it is simplistic to classify traffic congestion as a "big city" problem, as congestion has been determined to be on the rise in communities of every size. In general, congestion occurs when the traffic demands at a given point in time exceed the availability of the transportation system, and ultimately affects the mobility of each particular end user, whether they are in a passenger car, freight truck, transit vehicle, or are walking or biking. It is important to note that congestion can be a recurrent problem, such as during commuter peak periods, within certain areas of the city like a central business district or near a shopping mall or other destination, and in certain cases during weekends. Other nonrecurring congestion is related to unforeseen, random events which are unplanned, such as traffic crashes or detrimental weather conditions.

Previous studies have shown the obvious interdependency between urban density, traffic congestion, and transportation-related energy consumption. Many congestion problems result from the inability of the transportation infrastructure to provide for all of the increased demands created by America's dependency on the personal automobile. The resulting congestion that occurs during peak commuting periods can have detrimental effects on the major thoroughfares, on adjacent businesses, and throughout entire metropolitan areas. The increase in urban congestion has consequential impacts upon the environment and wastes valuable energy. Air pollution, noise pollution, parking shortages, and increased fuel usage all result from these congested traffic conditions.

9.1. Congestion Effects on Mobility

Again, the mobility of users of the transportation system can be greatly impeded by the increased congestion that occurs during peak traffic periods. That is not to say that traffic congestion and its related impacts are limited to these times of the day, as more than half of the total delay experienced by transportation system users occurs during the mid-day and overnight hours. Some industries, such as freight and delivery shipping, have attempted to shift the majority of their operations away from these peak "rush hour" times to increase their efficiency. It is also important to realize that increased traffic congestion affects all of the transportation system's users. For instance, transit vehicles can encounter issues as they attempt to maintain their scheduled routes and service times, and pedestrians may find it difficult to cross increasingly busy thoroughfares.

9.2. Direct Costs of Congestion

The issue of traffic congestion is a significant problem that is also very costly to all users. According the "Urban Mobility Report (2010)" published by the Texas Transportation Institute, congestion caused Americans to use an extra 3.9 billion gallons of fuel in 2009, at a total cost of $115 billion. About $33 billion of this delay cost was generated by the effects of congestion

on truck operations. In addition, travel times for urban users were increased by about 4.8 billion hours. On average, every American that commuted by automobile paid an additional $808 over their normal operating costs due to congested roadway conditions. The average user also experienced 34 hours of additional delay due to congestion in 2009, and wasted 28 gallons of fuel traveling during the peak traffic periods.

Locally, the Kansas City metropolitan area was identified within this study as being one of the 50 largest cities in the U.S. Commuters within the Kansas City (KS-MO) area experienced an average annual cost of about $498 per user, consumed an extra 20 gallons of fuel, and spent 21 extra hours in their vehicles because of congestion. Wichita, Kansas was one of the medium-sizes cities also considered in this mobility study, and had similar congestion results as the Kansas City area. Wichita commuters spent about $451 annually for additional congested-related delays and fuel needs. Commuters in the Wichita area were determined to have spent 20 extra hours in their vehicles due to congestion, and consumed about 21 extra gallons of fuel annually.

9.3. Mitigating Congestion

In the past, a common approach to addressing the congestion experienced on a particular roadway or through a busy area of a city was to build new roads, widen existing roads with more lanes, and make other improvements to further increase the capacity provided. In some established areas, this approach has become increasingly difficult to the point that these types of improvements are no longer possible. Instead, attention must shift toward operating the transportation system that is already in place in a more efficient manner to get the most service possible.

Some of the approaches that were previously discussed in Section 7.0 of this report (i.e., changing commuter usage patterns, time-of-day decisions, and travel mode choices) will need to become better accepted by employers and employees alike if congestion is to be significantly mitigated. A balanced and diversified approach to identifying congestion solutions will ultimately be needed. However, at some point, realistic expectations will also be needed, along with recognition that congestion is an urban interaction that can never be completely eliminated.

9.4. Urban Mitigation Methods

As traffic congestion tends to occur more severely within the larger, more urbanized areas of the country, several more advanced methods of mitigating congestion have been previously utilized in these urban areas to reduce the negative impacts to drivers. Some of the mitigation methods that are more commonly implemented in only urbanized areas are described below.

9.4.1 Traffic Signal Synchronization

Traffic signal control systems are a key part of moving traffic through the urban network of highways and streets. The operation of these traffic signals can be a major factor in the overall quality of traffic flow within these urban areas, and significantly influences the travel times, delays, and energy consumption associated with surface transportation. Traffic signal synchronization can be one of the most cost-effective efforts undertaken to reduce transportation energy use. The optimization of a traffic signal system can performed on a corridor-specific basis, throughout an

entire municipal jurisdiction, or even on a regional basis, like the "Operation Green Light" program utilized within the Kansas City metropolitan area. Depending upon the level of sophistication being utilized for a traffic signal system's technology, various equipment, communications, and operational improvements can reduce travel times, fuel consumption, and vehicle emissions by between 10% and 30%.

9.4.2 Ramp Metering

This technology involves providing traffic signal indications on the entrance ramps to certain congested highway segments, in order to better control the downstream arrival of entering vehicles. Generally, ramp metering more evenly distributes the entering vehicles so that they do not arrive downstream as a group, which makes merging more difficult and can disrupt the traffic flows on the mainline highway. Although this approach has been utilized across the country for several decades, the Kansas City Scout program has recently installed the first ramp meters within the Kansas City metropolitan area along the southern portion of the Interstate-435 loop.

9.4.3 Incident Management

The congestion associated with vehicle crashes or mechanical failures is another major factor. On average, these types of incidents are the root cause of between 20% and 30% of the congestion that is experienced on the nation's roadways. Therefore, it is important to quickly remove these obstructions from the roadway that can impede the travel of other vehicles. A variety of methods are typically utilized for incident management. As an example, the Kansas City Scout program utilizes constantly circulating "motorist assist" vehicles on major highways in the area, along with an extensive system of closed-circuit cameras, in order to identify congestion-inducing incidents as soon as possible. Cooperative efforts between the state transportation departments, law enforcement agencies, and tow service operators are coordinated within the program's traffic management center, and ensure that the incident is properly managed in a timely manner. Finally, in order to further minimize the incident's disruption, a series of changeable message signs upstream of the incident are utilized to communicate information and recommended courses of action to drivers headed toward the location of the incident.

9.4.4 Advanced Management Alternatives

Other options are also available to encourage drivers to consider other travel modes that offer energy conservation benefits. High Occupancy Vehicle (HOV) lanes are a method that can be utilized to provide priority travel to vehicles with multiple occupants to encourage transit use, car / van-pooling, and other ride-sharing opportunities. Toll-roads can be provided to help fund transportation infrastructure improvements; in turn, the price structure to utilize these toll roads can even be mode-based and congestion-based so that drivers have incentive to consider other travel modes or make other time-of-day choices.

9.4.5 Land Use Policies

It is important to note that a direct interaction exists between land use planning and the resulting transportation demand. Because private development tends to follow nearby infrastructure improvements, improved land use planning policies can be utilized to both encourage denser

development patterns and promote in-fill redevelopment in order to reduce urban sprawl and the need for vehicle travel. These policies can also be utilized to create Transit Oriented Developments (TOD's) or employ a "Complete Streets" approach that accommodates other non-motorized travel modes, like walking and biking, to reduce vehicle-miles travelled, fuel consumption, and air pollution emissions.

9.5. Rural Mitigation Methods

Within more rural-based areas and small towns or cities, such as those found across the state of Kansas, several of the travel modes and choices discussed previously in Section 7.0 can still be utilized to mitigate congestion wherever it exists. All of these methods offer societal and personal benefits related to energy conservation and reduced environmental impacts.

9.5.1 Non-motorized Transportation

Again, it is important that alternative commuting options like walking and biking be considered and accommodated within the transportation infrastructure. Obviously, in some situations the rural nature of an area may create time or distance restrictions that make these alternative travel modes less feasible.

9.5.2 Ride-Sharing Alternatives

Combined or shared trips can still provide significant benefits to transportation users in rural areas. Car and van-pooling can be beneficial, particularly when users share a common destination a considerable travel distance away (e.g., such as when necessary services are only available in a nearby, larger city). Park-and-ride options can also be accommodated and promoted by municipal agencies to provide a convenient way for drivers to share transportation and reduce the number of vehicles and/or trips required.

10.0 Disclaimer

This portion of the Resourceful Kansas participant report has focused on a wide range of innovative technologies and mitigation techniques that can be used to reduce transportation-related energy consumption. However, additional site-specific studies would also need to be completed in order to determine the best strategies that can be used locally by a given organization to incur transportation energy savings.

FIVE | RESOURCE INFORMATION

- ASHRAE Standard 62.1-2010 Ventilation for Acceptable Indoor Air Quality
  This is the ASHRAE standard for indoor air quality for commercial buildings, and it can be purchased at the following link.
  http://www.techstreet.com/standards/ashrae/62_1_2010?product_id=1720986

- ASHRAE Standard 90.1-2010 Energy Standard for Buildings Except Low-Rise Residential Buildings
  This ASHRAE energy standard sets the bar for energy efficient commercial HVAC design. It is available for purchase at the following link.
  http://www.techstreet.com/standards/ashrae/90_1_2010_i_p_?product_id=1739526

- ASHRAE—Top Ten Things Consumers Should Know About Air Conditioning
  This article is a very basic introduction to a few heating, ventilating, and air conditioning concepts. http://www.ashrae.org/education/page/1455

- Association of Energy Engineers—Certification
  This resource is a wealth of information on a variety of specialized certifications that can be achieved in the Energy Engineering field.
  https://www.aeecenter.org/i4a/pages/index.cfm?pageID=3330

- American Wind Energy Association (AWEA)
  AWEA is a national trade association representing wind power project developers, equipment suppliers, services providers, parts manufacturers, utilities, researchers, and others involved in the wind industry. Their website includes educational resources, policy information, current wind industry news and events. www.awea.org

- Berkeley Lab—High-Performance Buildings
  This is an excellent resource that provides tools to help provide individualized benchmarks for cleanrooms, laboratories, data centers, and healthcare facilities.
  http://hightech.lbl.gov/labs.html

- Climate + Energy Project (CEP)
  CEP's goal is to help halt the Midwest's contributions to global warming and climate change. They support the reduction of greenhouse gas emissions by increasing energy efficiency and developing renewable energies in a sustainable manner. Their website includes resources, tips, events and the CEP Blog. www.climateandenergy.org

- Database of State Incentives for Renewable and Efficiency (DSIRE)
  This site provides links to tax credits, loan programs, utility rebate programs, and other useful renewable energy and energy efficiency incentives and policy information at the local, state and federal level. www.dsireusa.org

- Energy Star—Buildings and Plants
  This resource offers many energy saving tools that are specifically tailored to different building types. The Target Finder tool used in section 4 of this report can be found here. http://www.energystar.gov/index.cfm?c=business.bus_index

- Kansas City Regional "Clean Cities" Coalition (KCRCCC)
  This organization is one local example of a U.S. Department of Energy (DOE) sponsored partnership between private businesses and local governments with a goal to reduce transportation energy consumption. Hosted by the Metropolitan Energy Center (MEC), the website provides resources about local initiatives regarding hybrid vehicles and alternative fuels. http://www.kcenergy.org/kccleancities.aspx

- Kansas State Energy Office (KS SEO)—Kansas Corporation Commission (KCC)
  The SEO is a division of the KCC and administers programs and connects Kansans to objective information about energy conservation, energy efficiency, and alternative energy. Their website provides information on Kansas programs and incentives, additional links, and upcoming events in Kansas. www.kcc.state.ks.us/energy

- National Renewable Energy Laboratory (NREL)
  NREL is the only federal laboratory dedicated to the research, development, commercialization and deployment of renewable energy and energy efficiency technologies. Their Energy Analysis models and tools are available for no cost. www.nrel.gov

- Renewable Energy Law Blog (The Law, Science, and Policy of Renewable Energy Development)
  This blog is written by the law firm of Dunkiel Saunders Elliot Raubvogel & Hand PLLC and provides news and commentary on current events in the area of renewable energy development. The blog also provides a collection of links to General Renewable Energy Resources, Biodiesel Resources, Wind Energy Resources, Geothermal Resources, Solar Resource, Fuel Cell Resources, Ocean/Wave Energy Resources and Biomass Resources. www.renewableenergylaw.blogspot.com

- Resourceful Kansas—Website
  Future updates will include building and renewable energy retrofit case studies that will serve as an example to similar buildings throughout the state, and a discussion board that will allow energy managers across the state to share information. The Resourceful Kansas page will also soon contain a resource page that will link in helpful articles related to energy efficiency. http://www.resourcefulkansas.org

- Sierra Club Kansas Chapter
  Their missions includes practice and promote the responsible use of the earth's ecosystems and resources, and educate and enlist humanity to protect and restore the quality of the natural and human environment. Their website includes events, facts sheets and reports specific to Kansas. www.kansas.sierraclub.org

- Urban Mobility Report (2010)
  The Urban Mobility Report is an annually updated study that is prepared by the University Transportation Center for Mobility at Texas A&M University and the Texas Transportation Institute, with the support of other agencies. The report summarizes the congestion and mobility issues within America's 439 urban areas, as well as some of the potential improvement strategies. http://tti.tamu.edu/documents/mobility_report_2010.pdf

- US Department of Energy
  Government department devoted to advancing energy technology and promoting related innovation in the United States. www.energy.gov

- US Department of Energy—Building Technologies Program
  This resource features software tools such as EnergyPlus, Open Studio, and others that help model the energy usage in a building. It also contains links to other important programs, partnerships, and resources important to commercial buildings owners.
  http://www.eere.energy.gov/buildings/commercial_landing.html

- US Department of Energy—Energy Policy Act of 2005
  This is a link to the legislation passed in 2005 that established energy management goals aimed at Federal facilities and fleets.
  http://www.eere.energy.gov/femp/regulations/epact2005.html

- US Department of Energy—Energy and Carbon Footprints
  This resource lists the energy and carbon footprints of most manufacturing industries in graphical form. http://www.eere.energy.gov/industry/rd/footprints.html

- US Department of Energy—Energy Efficiency & Renewable Energy (DOE EERE)
  This office invests in clean energy technologies that strengthen the economy, protect the environment, and reduce dependence on foreign oil. This website includes information on Energy Efficiency, Renewable Energy and Funding. www.eere.energy.gov

- US Department of Energy--Industrial Technologies Program
  The following website is an excellent resource in helping to manage energy saving projects in industrial facilities. It offers project examples from other industrial facilities, help in identifying opportunities, and energy monitoring tips.
  http://www.eere.energy.gov/industry/bestpractices/identifying_opportunities.html

- US Department of Energy—Industrial Technologies Program Software Tools
  This site includes many helpful software tools that can help energy managers perform self-assessments of their systems. Tools are available for mechanical insulation, steam systems, chilled water systems, pumps, motors, fans, and many others.
  http://www.eere.energy.gov/industry/bestpractices/software.html

- US Energy Information Administration (eia)
  Collects, analyzes, and disseminates independent and impartial energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment. Their 'Learn About Energy' is the primary recommendation for a one-stop website for an explanation of all things energy. www.eia.gov

- US Green Building Council—Intro to LEED
  The US Green Building Council has a very good description of the LEED program. LEED is a program that provides recognition for buildings at different levels of energy efficient design. http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1988

- Wind-Works
  An archive of Paul Gipe's textbooks and articles as well as articles and commentary on wind and solar energy, community power, feed-in tariffs, and advanced renewable tariffs. www.Wind-Works.org

- Windustry
  Promotes progressive renewable energy solutions and empowers communities to develop and own wind energy as an environmentally sustainable asset. Their website features information on events, outreach, education and advocacy. www.windustry.org

SIX | APPENDIX

KANSAS CITY DOWNTOWN AP, MO, USA

WMO#: 724463

Lat: 39.12N Long: 94.59W Elev: 751 StdP: 14.3 Time Zone: -6.00 (NAC) Period: 82-06 WBAN: 13988

Annual Heating and Humidification Design Conditions

Coldest Month	Heating DB		Humidification DP/MCDB and HR						Coldest month WS/MCDB				MCWS/PCWD to 99.6% DB	
			99.6%			99%			0.4%		1%			
	99.6%	99%	DP	HR	MCDB	DP	HR	MCDB	WS	MCDB	WS	MCDB	MCWS	PCWD
1	2.6	8.6	-8.3	3.6	4.7	-2.3	5.0	11.0	24.7	39.4	22.9	37.4	9.8	0

Annual Cooling, Dehumidification, and Enthalpy Design Conditions

Hottest Month	Hottest Month DB Range	Cooling DB/MCWB						Evaporation WB/MCDB						MCWS/PCWD to 0.4% DB	
		0.4%		1%		2%		0.4%		1%		2%			
		DB	MCWB	DB	MCWB	DB	MCWB	WB	MCDB	WB	MCDB	WB	MCDB	MCWS	PCWD
7	17.2	97.2	76.0	94.0	75.8	91.3	75.2	79.7	91.4	78.3	89.6	77.1	88.1	12.0	210

Dehumidification DP/MCDB and HR									Enthalpy/MCDB						Hours 8 to 4 & 55/69
0.4%			1%			2%			0.4%		1%		2%		
DP	HR	MCDB	DP	HR	MCDB	DP	HR	MCDB	Enth	MCDB	Enth	MCDB	Enth	MCDB	
76.5	141.9	86.7	75.0	134.8	85.4	73.4	127.5	83.8	43.8	91.5	42.3	89.3	40.9	88.3	654

Extreme Annual Design Conditions

Extreme Annual WS			Extreme Max WB	Extreme Annual DB				n-Year Return Period Values of Extreme DB							
				Mean		Standard deviation		n=5 years		n=10 years		n=20 years		n=50 years	
1%	2.5%	5%		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
22.6	19.7	18.4	84.4	-2.3	101.2	7.6	3.6	-7.7	103.8	-12.2	105.9	-16.4	107.9	-21.9	110.6

Monthly Climatic Design Conditions

			Annual	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperatures, Degree-Days and Degree-Hours	Tavg		57.0	31.6	36.6	46.4	56.3	66.7	75.7	80.9	78.9	70.4	58.8	45.7	34.4
	Sd			11.60	12.09	10.96	9.43	7.42	6.15	5.59	6.41	8.75	8.90	10.27	11.82
	HDD50		1923	575	388	200	41	1	0	0	0	1	24	200	493
	HDD65		4593	1035	795	582	292	71	5	0	1	47	234	583	948
	CDD50		4466	4	14	88	230	519	770	957	896	613	295	69	11
	CDD65		1657	0	0	5	30	123	324	492	432	209	40	2	0
	CDH74		17289	0	2	48	262	966	3235	5800	4731	1917	318	10	0
	CDH80		7431	0	0	6	59	244	1298	2804	2233	714	73	0	0
Monthly Design Dry Bulb and Mean Coincident Wet Bulb Temperatures	0.4%	DB		64.1	70.1	79.4	86.4	89.6	96.3	100.4	101.2	95.8	86.5	74.9	66.1
		MCWB		54.4	54.8	61.2	68.4	73.5	73.8	77.4	75.8	74.1	69.9	61.9	57.7
	2%	DB		58.2	63.6	73.4	81.0	85.6	92.2	97.6	97.0	90.9	81.5	70.3	60.3
		MCWB		49.0	50.5	59.0	64.7	70.8	75.5	76.8	75.9	73.7	66.9	59.9	52.5
	5%	DB		53.1	58.9	69.4	76.5	82.4	90.1	94.6	93.6	87.5	77.3	65.9	54.7
		MCWB		44.9	48.1	57.6	62.0	69.3	74.7	76.5	75.6	72.6	64.6	57.8	46.5
	10%	DB		47.6	54.2	64.3	72.5	79.5	87.6	91.4	90.8	84.0	73.1	62.1	50.2
		MCWB		40.9	45.5	53.8	59.9	66.9	73.9	75.8	75.0	71.0	62.8	54.1	43.0
Monthly Design Wet Bulb and Mean Coincident Dry Bulb Temperatures	0.4%	WB		57.8	58.6	65.2	70.2	76.2	79.8	81.7	81.1	78.3	72.5	65.4	60.2
		MCDB		62.9	65.5	74.0	83.2	85.8	90.0	93.6	92.6	88.9	81.0	71.0	64.1
	2%	WB		50.2	52.1	62.0	67.1	73.7	77.9	80.0	79.3	76.2	69.4	61.9	54.5
		MCDB		56.4	60.9	70.7	77.7	82.7	88.6	92.4	90.4	86.5	78.9	68.2	58.2
	5%	WB		44.9	49.1	58.7	64.4	71.3	76.3	78.6	77.8	74.3	66.9	58.6	46.8
		MCDB		52.0	58.4	67.4	73.8	80.6	86.9	90.5	89.1	84.4	75.0	64.3	52.9
	10%	WB		41.4	45.7	54.6	61.4	69.0	74.9	77.4	76.4	72.6	64.2	54.7	43.2
		MCDB		47.5	53.5	63.7	70.7	77.2	85.0	88.6	87.5	82.1	71.9	60.8	49.5
Mean Daily Temperature Range		MDBR		16.1	17.4	19.4	18.9	17.8	17.3	17.2	17.5	18.5	18.7	16.6	15.6
	5% DB	MCDBR		23.4	25.8	26.6	23.9	20.2	19.2	19.4	20.6	20.1	23.1	22.5	21.8
		MCWBR		15.9	16.1	16.1	13.8	10.5	8.3	7.4	7.7	9.2	12.1	15.0	15.1
	5% WB	MCDBR		22.1	23.0	23.0	21.0	18.0	17.7	17.3	17.9	17.7	18.9	18.8	19.9
		MCWBR		15.8	15.6	15.6	13.5	10.5	9.1	8.0	8.5	9.5	12.2	14.7	15.2
Clear Sky Solar Irradiance	taub			0.309	0.357	0.400	0.401	0.412	0.435	0.445	0.458	0.394	0.349	0.323	0.302
	taud			2.404	2.122	2.023	2.094	2.145	2.125	2.122	2.059	2.282	2.387	2.442	2.457
	Ebn,noon			274	270	270	278	276	269	265	258	270	272	267	268
	Edh,noon			30	43	51	50	48	49	49	51	39	33	28	27

CDD*n* Cooling degree-days base n°F, °F-day
CDH*n* Cooling degree-hours base n°F, °F-hour
DB Dry bulb temperature, °F
DP Dew point temperature, °F
Ebn,noon } Clear sky beam normal and diffuse hori-
Edh,noon } zontal irradiances at solar noon, Btu/h/ft2
Elev Elevation, ft
Enth Enthalpy, Btu/lb
HDD*n* Heating degree-days base n°F, °F-day
Hours 8/4 & 55/69 Number of hours between 8 a.m. and 4 p.m with DB between 55 and 69 °F
HR Humidity ratio, grains of moisture per lb of dry air
Lat Latitude, °
Long Longitude, °
MCDB Mean coincident dry bulb temperature, °F
MCDBR Mean coincident dry bulb temp. range, °F
MCDP Mean coincident dew point temperature, °F
MCWB Mean coincident wet bulb temperature, °F
MCWBR Mean coincident wet bulb temp. range, °F
MCWS Mean coincident wind speed, mph
MDBR Mean dry bulb temp. range, °F
PCWD Prevailing coincident wind direction, °, 0 = North, 90 = East
Period Years used to calculate the design conditions
Sd Standard deviation of daily average temperature, °F
StdP Standard pressure at station elevation, psi
taub Clear sky optical depth for beam irradiance
taud Clear sky optical depth for diffuse irradiance
Tavg Average temperature, °F
Time Zone Hours ahead or behind UTC, and time zone code
WB Wet bulb temperature, °F
WBAN Weather Bureau Army Navy number
WMO# World Meteorological Organization number
WS Wind speed, mph

Table 4 Comparison of Service Life Estimates

Equipment Item	Median Service Life, Years: Abramson et al. (2005)	Akalin (1978)	Equipment Item	Median Service Life, Years: Abramson et al. (2005)	Akalin (1978)	Equipment Item	Median Service Life, Years: Abramson et al. (2005)	Akalin (1978)
Air Conditioners			**Air Terminals**			**Condensers**		
Window unit	N/A*	10	Diffusers, grilles, and registers	N/A*	27	Air-cooled	N/A	20
Residential single or split package	N/A*	15	Induction and fan-coil units	N/A*	20	Evaporative	N/A*	20
Commercial through-the-wall	N/A*	15	VAV and double-duct boxes	N/A*	20	**Insulation**		
Water-cooled package	>24	15	**Air washers**	N/A*	17	Molded	N/A*	20
Heat pumps			**Ductwork**	N/A*	30	Blanket	N/A*	24
Residential air-to-air	N/A*	15[b]	**Dampers**	N/A*	20	**Pumps**		
Commercial air-to-air	N/A*	15	**Fans**	N/A*		Base-mounted	N/A*	20
Commercial water-to-air	>24	19	Centrifugal	N/A*	25	Pipe-mounted	N/A*	10
Roof-top air conditioners			Axial	N/A*	20	Sump and well	N/A*	10
Single-zone	N/A*	15	Propeller	N/A*	15	Condensate	N/A*	15
Multizone	N/A*	15	Ventilating roof-mounted	N/A*	20	**Reciprocating engines**	N/A*	20
Boilers, Hot-Water (Steam)			**Coils**			**Steam turbines**	N/A*	30
Steel water-tube	>22	24 (30)	DX, water, or steam	N/A*	20	**Electric motors**	N/A*	18
Steel fire-tube		25 (25)	Electric	N/A*	15	**Motor starters**	N/A*	17
Cast iron	N/A*	35 (30)	**Heat Exchangers**			**Electric transformers**	N/A*	30
Electric	N/A*	15	Shell-and-tube	N/A*	24	**Controls**		
Burners	N/A*	21	**Reciprocating compressors**	N/A*	20	Pneumatic	N/A*	20
Furnaces			**Packaged Chillers**			Electric	N/A*	16
Gas- or oil-fired	N/A*	18	Reciprocating	N/A*	20	Electronic	N/A*	15
Unit heaters			Centrifugal	>25	23	**Valve actuators**		
Gas or electric	N/A*	13	Absorption	N/A*	23	Hydraulic	N/A*	15
Hot-water or steam	N/A*	20	**Cooling Towers**			Pneumatic	N/A*	20
Radiant heaters			Galvanized metal	>22	20	Self-contained		10
Electric	N/A*	10	Wood	N/A*	20			
Hot-water or steam	N/A*	25	Ceramic	N/A*	34			

*N/A: Not enough data yet in Abramson et al. (2005). Note that data from Akalin (1978) for these categories may be outdated and not statistically relevant. Use these data with caution until enough updated data are accumulated in Abramson et al.

variety of criteria used in compiling the data, and the diverse objectives in disseminating them, extreme care is necessary in comparing service life from different sources. Designs, materials, and components of equipment listed in Table 3 have changed over time and may have altered the estimated service lives of those equipment categories. Therefore, establishing equivalent comparisons of service life is important.

As noted, service life is a function of the time when equipment is replaced. Replacement may be for any reason, including, but not limited to, failure, general obsolescence, reduced reliability, excessive maintenance cost, and changed system requirements (e.g., building characteristics, energy prices, environmental considerations). Service lives shown in the tables are based on the age of the equipment when it was replaced, regardless of the reason it was replaced.

Locations in potentially corrosive environments and unique maintenance variables affect service life. Examples include the following:

- **Coastal and marine environments**, especially in tropical locations, are characterized by abundant sodium chloride (salt) that is carried by sea spray, mist, or fog.

  Many owners require equipment specifications stating that HVAC equipment located along coastal waters will have corrosion-resistant materials or coatings. Design criteria for systems installed under these conditions should be carefully considered.
- **Industrial** applications provide many challenges to the HVAC designer. It is very important to know if emissions from the industrial plant contain products of combustion from coal, fuel oils, or releases of sulfur oxides (SO_2, SO_3) and nitrogen oxides (NO_x) into the atmosphere. These gases typically accumulate and return to the ground in the form of acid rain or dew.

  Not only is it important to know the products being emitted from the industrial plant being designed, but also the adjacent upwind or downwind facilities. HVAC system design for a plant located downwind from a paper mill requires extraordinary corrosion protection or recognition of a reduced service life of the HVAC equipment.
- **Urban** areas generally have high levels of automotive emissions as well as abundant combustion by-products. Both of these contain elevated sulfur oxide and nitrogen oxide concentrations.
- **Maintenance** factors also affect life expectancy. The HVAC designer should temper the service life expectancy of equipment with a **maintenance factor**. To achieve the estimated service life values in Table 3, HVAC equipment must be maintained properly, including good filter-changing practices and good maintenance procedures. For example, chilled-water coils with more than four rows and close fin spacing are virtually impossible to clean even using extraordinary methods; they are often replaced with multiple coils in series, with a maximum of four rows and lighter fin spacing.

Depreciation

Depreciation periods are usually set by federal, state, or local tax laws, which change periodically. Applicable tax laws should be consulted for more information on depreciation.

Interest or Discount Rate

Most major economic analyses consider the opportunity cost of borrowing money, inflation, and the time value of money. **Opportunity cost** of money reflects the earnings that investing (or lending) the money can produce. **Inflation** (price escalation) decreases the purchasing or investing power (value) of future money because it can buy less in the future. **Time value** of money reflects the fact that

Item Number: **DISCUSSION ITEMS- I.-5.**
Committee Meeting Date: **2/4/2019**

City of Roeland Park

Action Item Summary

Date:	2/4/2019
Submitted By:	Jennifer Jones-Lacy, Asst. City Administrator/Finance Director
Committee/Department:	Administration
Title:	**Review of Software Used by the City**
Item Type:	Discussion

Recommendation:

For informational purposes only at the request of Councilmembers Madigan, Hill and Janssen.

Details:

The above mentioned Councilmembers requested an itemized annual cost of all software used by the City as well as any cost for computer equipment, aside from standard desktops. Below is a summary by department of annual maintenance for software and an annual cost for computer equipment for 2019, without the purchase of the new court software.

Administration

- *Jayhawk Software* - Used for receipting/accounts receivable. $750
- *Civic Plus* - Website support/maintenance. $5,000
- *Plan-IT* - Capital Improvement Planning Software. $725
- *MS Office 365* - Microsoft Office subscription: $6,915
- *Citizen Serve* - Building permitting, animal/business/rental licensing, code enforcement tracking. $7,200
- *Dell VMWare License/Support* - Virtual Machine Server - $562
- *Sire* - Online archiving of City info/business - $2,350
- *Novus Agenda* - Agenda Management Software - $5,600
- *ADP* - Time Clock - $3,000
- *Constant Contact* - Email messaging/marketing - $900

Dept. Total: $33,002

Police Department/Municipal Court

- *Regis* - Subscription Service criminal database - $2,650
- *Johnson County Niche* -Report Management System for Police Dept - $6,000
- *Leads Online* - Criminal investigative info database - $1,758
- *Jayhawk Software* - Court - $750
- *Digiticket* - Digital ticketing software - $2,113
- In Car Computers - Hardware, four year lifespan - $6,000

Dept. Total: $19,271

Public Works
- *ARC Map/ESRI* - map making software - $400

Dept. Total: $400

2019 Grand Total: $52,673

2019 Total with the addition of InCode for Court ($64,730 yr 1) - $115,903

2020 estimate with annual maintenance of InCode ($10,810) - $63,000*
*This assumes a 2.5% price increase for existing software and reflects a 20% increase from 2019 prior to the purchase of Incode.

How does item relate to Strategic Plan?

How does item benefit Community for all Ages?

Additional Information

For reference, wages and benefits for a full time administrative assistant (same pay grade as a court clerk and police records clerk) would be over $60,000 per year.

The software used by the Police to support their efforts has a total annual cost of $12,521. The software currently used to adjudicate the citations generated by the police officer's efforts is $750/yr. The City employs 15.5 FTE police officers working 24/7/365 with their software programs, generating cases that are to be adjudicated by 1.2 FTE's working 5 days a week. Arming those charged with the adjudication process with the most proficient case management software available will enable the City to keep judicial staff at this minimalistic level.

Item Number: **DISCUSSION ITEMS- I.-6.**
Committee Meeting Date: **2/4/2019**

City of Roeland Park

Action Item Summary

Date:	1/24/2019
Submitted By:	Tom Madigan, Jen Hill and Tim Janssen
Committee/Department:	Admin.
Title:	**Discussion on Policy for Employee Tuition Assistance**
Item Type:	Discussion

Recommendation:

We the undersigned, request a discussion agenda item addition to the 2/4/2019 workshop meeting.
Tom Madigan _____ *

Jen Hill _____ *

Tim Janssen _____ *

Details:

In the last four (4) years two (2) salaried Department Heads terminated their position with The City of Roeland Park shortly after received their College/University degree. Each of these employees received funds from the city to assist with their College/University Tuition costs.

While Tuition Assistance is in itself a great enticement for the existing employees and future employees, it is common practice for the employee to continue to work for their employer for a set period of time or to reimburse the employer for all monies expended.

And there is the question of when are the employees attending school and when are they doing course work.

How does item relate to Strategic Plan?

How does item benefit Community for all Ages?

Additional Information

Attached is a summary of neighboring city's tuition assistance policies.

Attached is a redline version of the personnel policy regarding education reimbursement that staff considers comparable to what other Johnson County city's policies reflect.

ATTACHMENTS:

	Description	Type
🗋	Redline Education Reimbursement	Cover Memo
🗋	JoCo City Policy	Cover Memo

- N. EDUCATION REIMBURSEMENT

This policy is applicable to any regular, full-time City employee who has completed his/her required initial probationary period.

1. Policy-

The City will only consider applications for assistance with tuition and book expenses for degree programs (Associate, Bachelor, Master or Doctorate) according to the following criteria:

a) Before beginning a course of study, an employee must receive approval from employee's department head and the City Administration prior to any request for tuition reimbursement;

b) An employee may be reimbursed only for courses of study which the City determines are directly related to the employee's present job or which will enhance the employee's potential for advancement to other jobs within the City;

c) An employee will receive only the amount of the tuition for the classes taken and books; Subject to budget availability, upon successful completion of any approved course with a minimum grade of "C," the City will reimburse up to $2,500 per calendar year.

d) Eligible schools must be accredited by one of the six regional organizations recognized by the U.S. Department of Education;

e) On-line courses are permitted if offered through an eligible school and reviewed and approved through the regular tuition reimbursement process;

f) Tuition reimbursement must be approved by the employee's department head and the City Administration, at least ten (10) business days prior to the first day of class;

g) All documentation regarding tuition reimbursement must be submitted for reimbursement within thirty (30) calendar days of the completion of the final class or payment will not be rendered;

h) Reimbursement will only be considered for courses that are successfully completed with a grade of "C" or better for undergraduate courses or with a grade of "B" or better for graduate-level courses. If an incomplete grade ("I") is received at the end of the term, the class must be successfully completed and documentation submitted for reimbursement within thirty (30) calendar days after completion. The date that the incomplete grade is officially replaced with another grade is the date that will govern with respect to tuition repayment; and

i) The Education Reimbursement Policy will not duplicate other financial aid programs such as Pell Grants, Veteran's Administration Benefits, scholarships, etc. Any financial aid received will be deducted from the tuition and book fees reimbursed by the City.

j) If an employee's request for reimbursement under this policy is approved, he/she will be required to sign a document, in which he/she agrees to re-pay the

reimbursement to the City if he/she is separated from employment within one year after receiving the reimbursement.

2. Time Off For Class Attendance and Study Assignments-

Employees are expected to schedule class attendance and the completion of study assignments outside of their regular working hours. Employees will not be given paid time off, other than vacation and/or bonus days, to attend educational classes or to complete study assignments. In cases where productivity and proper supervision of employees are not adversely affected, management may approve changes in the work schedule to accommodate the pursuit of educational opportunities, however it is expected that educational activities will not interfere with employees' work. Any unsatisfactory job performance during class enrollment may result in forfeiture of educational assistance and/or disciplinary action up to and including termination of employment.

Tuition Assistance –

City of Roeland Park

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1. Policy-

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b) An employee may be reimbursed only for courses of study which the City determines are directly related to the employee's present job or which will enhance the employee's potential for advancement to other jobs within the City;

c) An employee will receive only the amount of the tuition for the classes taken and books;

d) Eligible schools must be accredited by one of the six regional organizations recognized by the U.S. Department of Education;

e) On-line courses are permitted if offered through an eligible school and reviewed and approved through the regular tuition reimbursement process;

f) Tuition reimbursement must be approved by the employee's department head and the City Administration, at least ten (10) business days prior to the first day of class;

g) All documentation regarding tuition reimbursement must be submitted for reimbursement within thirty (30) calendar days of the completion of the final class or payment will not be rendered;

h) Reimbursement will only be considered for courses that are successfully completed with a grade of "C" or better for undergraduate courses or with a grade of "B" or better for graduate-level courses. If an incomplete grade ("I") is received at the end of the term, the class must be successfully completed and documentation submitted for reimbursement within thirty (30) calendar days after completion. The date that the incomplete grade is officially replaced with another grade is the date that will govern with respect to tuition repayment; and

i) The Education Reimbursement Policy will not duplicate other financial aid programs such as Pell Grants, Veteran's Administration Benefits, scholarships, etc. Any financial aid received will be deducted from the tuition and book fees reimbursed by the City.

City of Mission

F-11. Educational Reimbursement. All full-time employees who have been employed by the City for at least one year are eligible for educational reimbursement, as long as the educational opportunity for which reimbursement is sought benefits the employee in the performance of his/her job. Reimbursement will be made after the employee provides proof of completion of the course with at least a 2.0 grade on a 4.0 scale for undergraduate/associate degrees and a 3.0 on a 4.0 scale for

graduate degrees. Approval of the City Administrator with Department Director recommendation is required prior to enrollment, subject to budget and funding availability, and the amount may not exceed $2,000 for any one employee during a calendar year. Employees participating in this program must complete one year of employment for the City following reimbursement; an employee who voluntarily resigns, or who is terminated "for cause," before that time will be required to repay the City any reimbursement provided.

City of Prairie Village

4.11 EDUCATIONAL EXPENSES

To encourage employees' pursuit of educational opportunities that will benefit the City, enhance their current job performance, and improve opportunities for advancement in the City, the City will pay up to fifty percent of educational expenses up to the non-taxable limit for accountable plans, as determined by the Internal Revenue Service. Expenses include tuition, fees and books for any regular employee provided the education and/or training will directly benefit the employee's working skills and/or job performance. Employees will be reimbursed for only the courses necessary to earn one Associate's, one Bachelor's and/or one Master's degree.

Prior to enrolling in each course for which the employee wishes to receive this benefit, the employee must seek the approval of his/her Department Manager. The Department Manager will make a recommendation to by the Mayor, who will make the final determination regarding whether the class is eligible. The individual must be employed by the City at the completion of the course and must provide proof of having an earned grade point of at least 2.0 (C) on a 4.0 scale for undergraduate and graduate courses. The employee will be reimbursed, based upon actual employee cost for tuition, fees, and books necessary for the course. The following are not reimbursable:

- tools or supplies which the employee may keep after the course is completed;
- education involving sports, games, or hobbies, unless job-related; or
- meals, lodging, or transportation.

Any employee who receives federal educational benefits or other similar reimbursement may receive City reimbursement up to fifty percent (50%) of the remaining cost to the employee for eligible expenses, subject to the IRS non-taxable limit for accountable plans. Employees electing to receive this benefit must sign a promissory note in the amount for which they are actually reimbursed by the City indicating their intent to complete one year of employment for the City after reimbursement or repay the note. Employees who are terminated within the one year of employment following the reimbursement of expenses for unsatisfactory performance/conduct will be required to reimburse the expenses that were received. **Employees** will not be required to reimburse the City should any of the following events take place:

- termination of employment for any reason other than unsatisfactory performance/conduct;
- employee has completed one year of employment following the reimbursement of expenses.

In no case will payment be made for an employee who has made it known that he/she plans to resign.

City of Merriam

All regular full-time employees, having completed their introductory period, are eligible to take advantage of educational and vocational courses that may improve performance in their current position and better prepare them for promotion to related and higher level positions in the municipal service. The intent of this benefit is to offset the burden of educational costs not reimbursed otherwise.

The proposed course(s) must show a direct relationship to the employee's work, i.e. to improve the work performance of the present or envisioned future work for the City. Subject to budget availability, upon successful completion of any approved course with a minimum grade of "B," the City will reimburse up to $2,500 per calendar year.

The application form, available from the Human Resources Manager, must be completed and approved prior to enrollment in the course. This application must indicate the education intent of the student and the anticipated course(s) to be taken. After the form is completed, the employee shall submit it to their Department Head who will determine if the course is beneficial to the employee's current job related duties, or future promotional opportunities. Once the Department Head approves the request; it will be forwarded to the City Administrator for final approval. Tuition reimbursement denials may be appealed to the City Administrator.

After completion of the course, the employee must submit a copy of his or her grades and proof of payment for tuition and books to the department director within 90 days of course completion. Requests received after 90 days will be denied. The department director will submit the request to the Human Resources Manager for reimbursement.

If an employee's request for reimbursement under this policy is approved, he/she will be required to sign a document, in which he/she agrees to re-pay the reimbursement to the City if he/she is separated from employment within one year after receiving the reimbursement. The City's educational assistance plan is intended to qualify for favorable tax treatment under Section 127 of the federal tax code.

Item Number: **DISCUSSION ITEMS- I.-7.**
Committee Meeting Date: **2/4/2019**

City of Roeland Park

Action Item Summary

Date:

Submitted By:

Committee/Department:

Title: **Executive Session - "I move to recess the City Council into executive session in order to discuss the potential of a real estate transaction, pursuant to the real estate exception of the Kansas Open Meetings Act, K.S.A.75-4319(b)(6). The open meeting to resume at ____ in Council chambers."**

Item Type:

Recommendation:

Details:

How does item relate to Strategic Plan?

How does item benefit Community for all Ages?