

AGENDA
CITY OF ROELAND PARK, KANSAS
CITY COUNCIL MEETING
ROELAND PARK
Roeland Park City Hall 4600 W 51st Street, Roeland Park, KS 66205
June 17, 2019 7:00 PM

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| <ul style="list-style-type: none"> • Mike Kelly, Mayor • Erin Thompson, Council Member • Jan Faidley, Council Member • Michael Poppa, Council Member • Claudia McCormack, Council Member | <ul style="list-style-type: none"> • Tim Janssen, Council Member • Jim Kelly, Council Member • Tom Madigan, Council Member • Jennifer Hill, Council Member | <ul style="list-style-type: none"> • Keith Moody, City Administrator • Jennifer Jones-Lacy, Asst. Admin. • Kelley Nielsen, City Clerk • John Morris, Police Chief • Donnie Scharff, Public Works Director |
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Admin	Finance	Safety	Public Works
Madigan	Faidley	Janssen	Hill
Thompson	McCormack	Poppa	Kelly

Pledge of Allegiance

Roll Call

Modification of Agenda

I. Citizens Comments

Members of the public are welcome to use this time to make comments about City matters that do not appear on the agenda, or about items that will be considered as part of the consent agenda. Comments about items that appear on the agenda will be taken as each item is considered. Citizens Are Requested To Keep Their Comments Under 5 Minutes. If a large number of people wish to speak, this time may be shortened by the Mayor (Chair) so that the number of persons wishing to speak may be accommodated within the time available. Please turn all cellular telephones and other noise-making devices off or to "silent mode" before the meeting begins.

II. Consent Agenda

Consent agenda items have been studied by the Governing Body and will be acted on in a single motion. If a Council member requests a separate discussion on an item, it can be removed from the consent agenda and placed on new business for further consideration.

- A. Appropriations Ordinance #930
- B. May 20, 2019 Minutes
- C. Aldi CMB License

III. Business From the Floor

A. Applications / Presentations

IV. Mayor's Report

A. Naming of R Park Pavilion

V. Workshop and Committee Reports

VI. Reports of City Liaisons

VII. Unfinished Business

VIII. Ordinances and Resolutions:

- A. Ordinance 981: Amending Section 8-902 Clarifying Mowing of ROW Responsibility**
- B. Resolution 668: Exempting Certain Properties from Mowing Right of Way**

IX. Workshop Items:

- A. Discuss Short-Term Rental Regulations**
- B. Discuss Changing Regular Council Meeting Date and Time**
- C. Discuss City's Willingness to Provide Maintenance at a Mobility Hub**

X. New Business

- A. Approve Task Order for Community Center Conceptual Design Project**
- B. Approve Service Agreement with GBA to Develop Bid Specs for Heating and Cooling Options for Community Center**
- C. Appoint Russell McCorkle to Park Committee**
- D. 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."**
- E. Potential Sale of Property**

XI. Reports of City Officials:

Welcome to this meeting of the City Council of Roeland Park. Below are the Procedural Rules of Council

The City Council 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 City Council meeting unfeasible. Any member(s) of the audience engaging in such conduct shall, at the discretion of the Mayor (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 City Council during Public Comments and/or before consideration of any agenda item; however, no person shall address the Council without first being recognized by the Mayor (Chair). Any person wishing to speak, whether during Public Comments or on an agenda item, shall first complete a Public Comment or Request to Speak form and submit this form to the City Clerk before the Mayor (Chair) calls for Public Comments or calls the particular agenda item
1. **Public Comment on Non-Agenda Items.** The Agenda shall provide for public comment about matters that are within the jurisdiction of the City but are not specifically listed on the Agenda. A member of the public who wishes to speak under Public Comments must fill out a Public Comment Request to Speak form and submit it to the City Clerk before the Mayor (Chair) calls for Public Comments.
 2. **Public Comment on Agenda Items.** Public comment will be accepted on Agenda items. A member of the public, who wishes to speak on an Agenda item, including items on the Consent Agenda, must fill out a Request to Speak form and submit it to the City Clerk before the Mayor (Chair) calls the Agenda item.
- C. **Purpose.** The purpose of addressing the City Council is to communicate formally with the Council regarding matters that relate to Council business or citizen concerns within the subject matter jurisdiction of the City Council. Persons addressing the City Council on an agenda item shall confine their remarks to the matter under consideration by the Council.
- D. **Speaker Decorum.** Each person addressing the City Council, 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 Council meeting. Any person, who so disrupts the meeting

shall, at the discretion of the Mayor (Chair) or a majority of the Council Members present, 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 City Council, each speaker shall limit comments to five minutes. If a large number of people wish to speak, this time may be shortened by the Mayor (Chair) so that the number of persons wishing to speak may be accommodated within the time available.
- F. **Speak Only Once.** 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 Council.** Comment and testimony are to be directed to the Mayor (Chair). Dialogue between and inquiries from citizens at the lectern and individual Council Members, members of staff, or the seated audience is not permitted. Council Members seeking to clarify testimony or gain additional information should direct their questions through the Mayor (Chair). Always speak from the microphone to ensure that all remarks are accurately and properly recorded. Only one speaker should be at the microphone at a time. Speakers are requested to state their full name, address and 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 City Council welcomes your participation and appreciates your cooperation. If you would like additional information about the City Council or its proceedings, please contact the City Clerk at (913) 722.2600.

Item Number: Consent Agenda- II.-A.
Committee 6/17/2019
Meeting Date:



City of Roeland Park
Action Item Summary

Date:
Submitted By:
Committee/Department:
Title: **Appropriations Ordinance #930**
Item Type:

Recommendation:

Details:

Financial Impact

Amount of Request:	
Budgeted Item?	Budgeted Amount:
Line Item Code/Description:	

Additional Information

How does item relate to Strategic Plan?

How does item benefit Community for all Ages?

ATTACHMENTS:

Description
☐ Appropriations Ordinance #930

Type
Cover Memo

The City of Roeland Park, Kansas

4600 West Fifty-First Street

Roeland Park, Kansas 66205

City Hall (913) 722-2600 – Fax (913) 722-3713

Friday, May 17, 2019

Appropriation Ordinance -06/17/2019 - #930

An Ordinance making Appropriation for the payment of certain claims. Be it ordained by the Governing Body of the City of Roeland Park, Kansas:

Section 1: That in order to pay the claims hereinafter stated which have been properly audited and approved, there is hereby appropriated out of the respective funds in the City Treasury the sum required for each claim.

Section 2: This Ordinance shall take effect and be in force from and after its passage. Passed and approved this 17th day of June, 2019.

Attest:

City Clerk

Mayor

Total Appropriation Ordinance	\$	245,037.33
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There are sufficient funds in the General Fund to cover general fund expenditures.

Appropriation Ordinance -06/17/2019 - #930

Vendor	Dept	Acct #	Description	Invoice Description	Check /EFT Date	Amount	Chk #	Check Amount
Adorama, Inc.	101	5307.101	Other Commodities	23626311	06/12/19	86.70	69508	86.70
ADP, LLC	101	5214.101	Other Contracted Services	536043515	06/06/19	224.04	69481	224.04
Automated Information Mapping	101	5305.101	Dues, Subscriptions, & Books	31240/31241	06/06/19	1,090.26	69482	1,090.26
All Copy Products, Inc.	101	5214.101	Other Contracted Services	63607112	05/29/19	645.00	69442	645.00
Abdulfattah Al-Turck	450	5457.450	CARS - Roe 2020	46N066101 77	05/29/19	600.00	69450	600.00
American Fidelity Assurance Co.	101	2052.101	Supplemental Inusrance Payable	2037452	05/29/19	416.66	69443	416.66
American Fidelity Assurance Co.	101	2052.101	Supplemental Inusrance Payable	2039956	06/06/19	416.66	69483	416.66
American Waste Systems, Inc.	101	5292.101	Fireworks	95U00015	06/12/19	315.00	69509	315.00
John Q. Anderson	450	5457.450	CARS - Roe 2020	46N066101 25	05/21/19	1,000.00	32426	1,000.00
Asphalt Sales Company, Inc	300	5221.300	Street Maintenance	140226	06/12/19	426.00	69510	1,393.02
Asphalt Sales Company, Inc	300	5221.300	Street Maintenance	140250	06/12/19	159.22		
Asphalt Sales Company, Inc	300	5221.300	Street Maintenance	140294	06/12/19	807.80		
AT&T	101	5202.101	Telephone	3241 5/21/19	06/06/19	42.16	69484	42.16
Kenneth Bennett	450	5457.450	CARS - Roe 2020	46N066101 50	05/29/19	1,000.00	69451	1,000.00
Kenneth Bennett	450	5457.450	CARS - Roe 2020	46N066101 50	05/29/19	1,500.00	69452	1,500.00
Gisela Bettison-Estrada	450	5457.450	CARS - Roe 2020	46N066101 48	05/29/19	700.00	69453	700.00
Gisela Bettison-Estrada	450	5457.450	CARS - Roe 2020	46N066101 48	05/29/19	150.00	69454	150.00
Blue Sky Cleaners	102	5224.102	Laundry Service	344	06/12/19	133.20	69511	133.20
Boelte-Hall, LLC	101	5256.101	Committee Funds	1913045	06/12/19	41.00	69512	41.00
Bollcom, Inc.	106	5403.106	Office Equipment	8944	06/12/19	95.50	69513	95.50
Breeden Holdings, LLC	102	5260.102	Vehicle Maintenance	1047670	06/12/19	140.95	69514	245.95
Breeden Holdings, LLC	102	5260.102	Vehicle Maintenance	1047676	06/12/19	35.00		
Breeden Holdings, LLC	102	5260.102	Vehicle Maintenance	1047693	06/12/19	35.00		
Breeden Holdings, LLC	102	5260.102	Vehicle Maintenance	1047716	06/12/19	35.00		
Steven Brady	450	5457.450	CARS - Roe 2020	46N066101 27	05/29/19	875.00	69455	875.00
Steven Brady	450	5457.450	CARS - Roe 2020	46N066101 27	05/29/19	1,325.00	69456	1,325.00
Jesse J. Brown	450	5457.450	CARS - Roe 2020	46N066101 73	05/29/19	650.00	69457	650.00
Michael T. Brown	450	5457.450	CARS - Roe 2020	46N066101 49	05/29/19	850.00	69458	850.00
Loretta Carson	450	5457.450	CARS - Roe 2020	46N066101 22	06/06/19	800.00	69493	800.00
Loretta Carson	450	5457.450	CARS - Roe 2020	46N066101 22	06/06/19	550.00	69494	550.00
Charlesworth Consulting, LLC	101	5209.101	Professional Services	501533	06/12/19	2,970.00	69515	2,970.00
City of Overland Park	102	5214.102	Other Contracted Services	41667201901	06/12/19	2,090.12	69516	2,090.12
Columbia Capital Management, L	101	5209.101	Professional Services	19430004	06/12/19	483.75	69517	483.75
Confluence, Inc.	300	5209.300	Professional Services	17001	05/29/19	1,050.00	69444	1,050.00
Mary Cornelius	450	5457.450	CARS - Roe 2020	46N066101 75	06/06/19	650.00	69495	650.00
Caitlin B. Craig	450	5457.450	CARS - Roe 2020	46N066101 28	05/29/19	800.00	69459	800.00
Custom Tree Care, Inc.	106	5263.106	Tree Maintenance	17965	06/12/19	1,907.50	69518	1,907.50
Digital Ally	109	5316.109	K9 Expenses	1107368	06/12/19	20.00	69519	20.00
Linda LaVerne Donnelly	101	5282.101	PTRP	19 PTRP Ck Req	06/12/19	472.46	69520	472.46

Donald R. Edler	450	5457.450	CARS - Roe 2020	46N066101 71	05/29/19	600.00	69460	600.00
Joan Elliott	450	5457.450	CARS - Roe 2020	46N066101 36	05/29/19	1,450.00	69461	1,600.00
Joan Elliott	450	5457.450	CARS - Roe 2020	46N066101 36	05/29/19	150.00		
Joan Elliott	450	5457.450	CARS - Roe 2020	46N066101 36	05/29/19	1,050.00	69462	1,050.00
ETC Institute	101	5214.101	Other Contracted Services	23973	06/12/19	868.75	69521	868.75
Sharon Evans	450	5457.450	CARS - Roe 2020	46N066101 37	06/06/19	2,100.00	69496	2,100.00
Sharon Evans	450	5457.450	CARS - Roe 2020	46N066101 37	06/06/19	500.00	69497	500.00
Jan Faidley	108	5206.108	Travel Expense & Training	6/4/19 Newegg	06/12/19	479.99	69522	479.99
Danika Flax	450	5457.450	CARS - Roe 2020	46N066101 35	05/29/19	700.00	69463	700.00
Jeffrey M. Fries	450	5457.450	CARS - Roe 2020	46N066101 26	05/21/19	900.00	32427	900.00
Jeffrey M. Fries	450	5457.450	CARS - Roe 2020	46N066101 26	05/21/19	450.00	32427	450.00
Harold E. Fuller	450	5457.450	CARS - Roe 2020	46N066101 56	06/06/19	100.00	69498	100.00
Gilmore & Bell, P.C.	200	5209.200	Professional Services	8038364	06/06/19	750.00	69485	750.00
Ty K. Gray	450	5457.450	CARS - Roe 2020	46N066101 6	05/21/19	400.00	32425	400.00
GT Distributors - Austin	102	5308.102	Clothing & Uniforms	INV0694262	06/12/19	120.00	69523	120.00
Mark Harris	450	5457.450	CARS - Roe 2020	46N066101 29	05/29/19	900.00	69464	900.00
Kevin D. Hayden	450	5457.450	CARS - Roe 2020	46N066101 52	05/29/19	1,200.00	69465	1,200.00
Derek Heinz	450	5457.450	CARS - Roe 2020	46N066101 33	05/29/19	550.00	69466	550.00
Beverly Holstein	450	5457.450	CARS - Roe 2020	46N066101 41	05/29/19	1,450.00	69467	1,450.00
Wade Holtkamp	104	5403.104	Office Equipment	12/4/18 Amazon	05/29/19	131.06	69445	131.06
Independent Salt Company	250	5303.250	Sand and Salt	143769IN	06/12/19	7,145.47	69524	7,145.47
Jake's Lawn & Landscape, LLC.	106	5214.106	Other Contracted Services	3497	06/12/19	1,292.00	69525	3,876.00
Jake's Lawn & Landscape, LLC.	106	5214.106	Other Contracted Services	3531	06/12/19	1,292.00		
Jake's Lawn & Landscape, LLC.	106	5214.106	Other Contracted Services	3566	06/12/19	1,292.00		
Brenda Jarvis	101	4215.101	Building Permit	5/19 Permit Over	06/06/19	5.00	69486	5.00
Johnson County Government	101	5218.101	IT & Communication	146087	06/12/19	6,139.75	69526	6,139.75
Kay Jones	450	5457.450	CARS - Roe 2020	46N066101 64	06/06/19	900.00	69499	900.00
Amanda C Jordan	450	5457.450	CARS - Roe 2020	46N066101 65	05/29/19	600.00	69468	600.00
Jennifer Jordan	450	5457.450	CARS - Roe 2020	46N066101 70	05/29/19	550.00	69469	550.00
KAW Valley Engineering Inc.	450	5458.450	CARS 2018	C31447	06/12/19	645.00	69527	645.00
Kansas City Board of Public Utilit	101	5222.101	Traffic Signal Expense	2834 5/24/19	06/12/19	32.83	69528	32.83
Kansas City Mosaics				6/13/2019	06/13/19	2,500.00	32431	2,500.00
KCP & L	101	5201.101	Electric	2644 5/23/19	06/06/19	1,633.15	69487	2,046.70
KCP & L	106	5201.106	Electric	2644 5/23/19	06/06/19	413.55		
KCP & L	106	5290.106	Street Light Electric	1275 6/3/19	06/12/19	1,871.76	69529	1,871.76
Keller Fire & Safety	101	5210.101	Maintenance & Repair Building	276678	06/12/19	260.80	69530	260.80
Michael Kelly	108	5251.108	Mayor Expenses	5/18/19 Exp	06/12/19	31.36	69531	31.36
Key Equipment & Supply	106	5211.106	Maintenace & Repair Equipment	256725	06/12/19	1,733.27	69532	1,733.27
Kansas Gas Service	101	5289.101	Natural Gas	1745 5/13/19	05/29/19	122.42	69446	122.42
Richard Klaus	450	5457.450	CARS - Roe 2020	46N066101 43	05/29/19	525.00	69470	525.00
Richard Klaus	450	5457.450	CARS - Roe 2020	46N066101 43	05/29/19	75.00	69471	75.00
Christine Knap	101	5282.101	PTRP	19 PTRP Ck Req	06/12/19	471.16	69533	471.16
Kansas Judicial Council	103	5305.103	Dues, Subscriptions, & Books	39888	06/12/19	275.00	69534	275.00

Kansas One-Call System, Inc.	101	5220.101	Street Light Repair & Maintenance	9050433	06/12/19	180.00	69535	180.00
Kansas State Treasurer	103	5228.103	Fees Due State of Kansas	5/19	06/12/19	2,769.00	69536	2,769.00
The Legal Record	101	5204.101	Legal Printing	L80305	06/12/19	41.32	69537	199.37
The Legal Record	101	5204.101	Legal Printing	L80306	06/12/19	158.05		
Lexington Plumbing & Heating Co	290	5210.290	Maintenace And Repair Building	85927	06/12/19	310.50	69538	310.50
Lippert Mechanical Service Corp	106	5210.106	Maintenace & Repair Building	SI2053882	06/12/19	270.00	69539	2,125.33
Lippert Mechanical Service Corp	290	5210.290	Maintenace And Repair Building	SI2052364	06/12/19	620.83		
Lippert Mechanical Service Corp	290	5210.290	Maintenace And Repair Building	SI2053833	06/12/19	964.50		
Lippert Mechanical Service Corp	101	5285.101	Pool Operations	SI2053816	06/12/19	270.00		
Henry J. Loring	450	5457.450	CARS - Roe 2020	46N066101 20	05/29/19	450.00	69472	450.00
Lowe's Business Acct./GEMB	101	5210.101	Maintenance & Repair Building	1760 6/12/19	06/06/19	(4.98)	69488	199.80
Lowe's Business Acct./GEMB	300	5221.300	Street Maintenance	1760 6/12/19	06/06/19	92.88		
Lowe's Business Acct./GEMB	300	5221.300	Street Maintenance	1760 6/12/19	06/06/19	(10.21)		
Lowe's Business Acct./GEMB	106	5259.106	Traffic Control Signs	1760 6/12/19	06/06/19	31.50		
Lowe's Business Acct./GEMB	106	5262.106	Grounds Maintenance	1760 6/12/19	06/06/19	9.28		
Lowe's Business Acct./GEMB	106	5306.106	Materials	1760 6/12/19	06/06/19	25.55		
Lowe's Business Acct./GEMB	106	5318.106	Tools	1760 6/12/19	06/06/19	55.78		
Lynn Peavey Company	102	5307.102	Other Commodities	358166	06/12/19	28.85	69540	28.85
Randy Mano	450	5457.450	CARS - Roe 2020	46N066101 61	06/06/19	500.00	69500	500.00
Mauer Law Firm PC	101	5215.101	City Attorney	204562/63	06/12/19	13,775.00	69541	13,775.00
Linda Mau	101	5282.101	PTRP	19 PTRP Ck Req	06/12/19	482.98	69542	482.98
MEI Total Elevator Solutions	101	5210.101	Maintenance & Repair Building	803913	06/12/19	480.00	69543	480.00
Midwest Public Risk	101	5250.101	Insurance & Surety Bonds	PL2019051586	06/12/19	42,846.96	69544	47,396.32
Midwest Public Risk	290	5250.290	Insurance & Surety Bonds	PL2019051586	06/12/19	4,549.36		
Shawn M. Mikulich	450	5457.450	CARS - Roe 2020	46N066101 68	05/29/19	550.00	69473	550.00
Moss Printing	101	5301.101	Office Supplies	12314	06/12/19	122.02	69545	122.02
James L. Myers	450	5457.450	CARS - Roe 2020	46N066101 13	05/29/19	400.00	69474	400.00
Northeast Johnson Cty. Chamber	108	5206.108	Travel Expense & Training	30213	06/12/19	15.00	69546	30.00
Northeast Johnson Cty. Chamber	108	5206.108	Travel Expense & Training	30218	06/12/19	15.00		
Cheryl Nevins	450	5457.450	CARS - Roe 2020	46N066101 78	06/06/19	550.00	69501	550.00
Newman Traffic Signs	106	5259.106	Traffic Control Signs	TRFINV011844	06/12/19	177.14	69547	686.05
Newman Traffic Signs	106	5259.106	Traffic Control Signs	TRFINV011932	06/12/19	508.91		
Office of the Chief Financial Officer	105	5206.105	Travel Expense & Training	6/6/19	06/12/19	75.00	69548	75.00
Wex Bank	102	5302.102	Motor Fuels & Lubricants	6/13/2019	06/13/19	471.45	32429	471.45
Pitluck Law, LLC	103	5209.103	Professional Services	5/28/19	06/12/19	150.00	69549	150.00
Precision Concrete Cutting Midwest	250	5454.250	Sidewalk Project	13717	06/12/19	7,251.00	69550	7,251.00
Principal Life Insurance Company	107	5130.107	City Paid Life/ST Disability	0001 5/18/19	05/29/19	119.72	69447	119.72
Wex Bank	106	5302.106	Motor Fuels & Lubricants	6/13/2019	06/13/19	2,121.67	32430	2,121.67
Colleen Marie Quinter	450	5457.450	CARS - Roe 2020	46N066101 81	06/06/19	550.00	69502	550.00
Colleen Quinter	101	4220.101	Electrical Permit	5/19 Permit Over	06/06/19	30.00	69489	30.00
Rejis Commission	102	5214.102	Other Contracted Services	416233	06/12/19	229.69	69551	229.69
Riteway Maintenance & Supply, Inc.	101	5214.101	Other Contracted Services	19291	06/12/19	1,600.00	69552	2,530.00
Riteway Maintenance & Supply, Inc.	101	5214.101	Other Contracted Services	19310	06/12/19	930.00		

Lawrence H Roederer	101	5282.101	PTRP	19 PTRP Ck Req	06/12/19	626.02	69553	626.02
Ha-Jung Roh	115	5271.115	Composte Bin Rebate Program	5/19 Comp.Bin Rb	06/12/19	40.00	69554	40.00
Olivia Rollf	450	5457.450	CARS - Roe 2020	46N066101 55	05/29/19	1,500.00	69475	1,500.00
Jason Ross	101	5282.101	PTRP	19 PTRP Ck Req	06/12/19	312.02	69555	312.02
James A. Russell	450	5457.450	CARS - Roe 2020	46N066101 47	05/29/19	1,250.00	69476	1,250.00
Saltus Technologies	360	5315.360	Machinery & Auto Equipment	190451	06/12/19	1,716.62	69556	1,716.62
George Schlegel	101	5230.101	Art Commissioner	Recurring Check	06/01/19	100.00	69449	100.00
SHI International Corp.	103	5266.103	Computer Software	B09976348	06/06/19	1,143.70	69490	1,143.70
Shirley J Smith	101	5282.101	PTRP	19 PTRP Ck Req	06/12/19	501.01	69557	501.01
Staples Advantage	101	5301.101	Office Supplies	8054435525	06/12/19	90.67	69558	174.45
Staples Advantage	101	5304.101	Janitorial Supplies	8054435525	06/12/19	83.78		
Amy Soecker	450	5457.450	CARS - Roe 2020	46N066101 51	06/06/19	600.00	69503	600.00
Sturges Word Communications, I	101	5209.101	Professional Services	1248	06/12/19	1,250.00	69559	1,250.00
Terminix Processing Center	101	5214.101	Other Contracted Services	386514870	06/12/19	84.00	69560	141.00
Terminix Processing Center	106	5214.106	Other Contracted Services	385862759	06/12/19	57.00		
Nathan Tofteland	450	5457.450	CARS - Roe 2020	46N066101 23	05/29/19	950.00	69477	950.00
TransUnion Risk & Alternative	102	5214.102	Other Contracted Services	4.57712E+11	06/12/19	50.00	69561	50.00
Turn-Key Mobile, Inc.	360	5315.360	Machinery & Auto Equipment	31658	06/12/19	3,401.00	69562	3,401.00
Upper 90 Properties, LLC.	450	5457.450	CARS - Roe 2020	46N066101 39	05/29/19	1,700.00	69478	1,700.00
US Bank				6/13/2019	06/13/19	1,159.08	32428	1,159.08
USIC Locating Services, LLC	101	5220.101	Street Light Repair & Maintenance	332844	06/12/19	1,634.94	69563	1,634.94
Bonnie S. Vanderhoff	450	5457.450	CARS - Roe 2020	46N066101 59	05/29/19	650.00	69479	650.00
Vance Brothers	300	5221.300	Street Maintenance	ZL57758	06/12/19	254.80	69564	254.80
Verizon Wireless	102	5202.102	Telephone	9830762614	06/06/19	371.18	69491	491.21
Verizon Wireless	104	5202.104	Telephone	9830762614	06/06/19	80.02		
Verizon Wireless	106	5202.106	Telephone	9830762615	06/06/19	40.01		
Water District No 1 of Johnson Cc	101	5287.101	Water	1391 5/15/19	05/29/19	196.26	69448	196.26
Water District No 1 of Johnson Cc	101	5287.101	Water	1593 5/24/19	06/06/19	171.41	69492	767.70
Water District No 1 of Johnson Cc	106	5287.106	Water	1593 5/24/19	06/06/19	596.29		
Waters Edge Aquatic Design	101	5209.101	Professional Services	4/12-6/5/19	06/12/19	540.00	69565	5,872.50
Waters Edge Aquatic Design	300	5209.300	Professional Services	4/12-6/5/19	06/12/19	5,332.50		
WriteAway Transcription	101	5214.101	Other Contracted Services	6923	06/12/19	280.50	69566	280.50
Zahner Metal Conservation				6/13/2019	06/13/19	1,307.00	32432	1,307.00
Todd N. Zimmer	450	5457.450	CARS - Roe 2020	46N066101 12	05/29/19	400.00	69480	400.00
Forte	101	5214.101	Other Contracted Services	5/31/19 All Acct	05/31/19	247.12		
KPERS	101	2040.101	KPERS Accrued Employee	5/24/19	05/24/19	1,856.27		
KPERS	101	2040.101	KPERS Accrued Employee	6/6/19	06/06/19	1,909.65		
KPERS	107	5123.107	KPERS City Contribution	5/24/19	05/24/19	3,059.76		
KPERS	107	5123.107	KPERS City Contribution	5/24/19	05/24/19	5.09		
KPERS	107	5123.107	KPERS City Contribution	6/6/19	06/06/19	3,147.73		
KP&F	101	2045.101	KP&F Employee Withholding Paya	5/24/19	05/24/19	2,295.90		
KP&F	101	2045.101	KP&F Employee Withholding Paya	6/6/19	06/06/19	2,292.04		
KP&F	107	5131.107	KP&F City Contribution	5/24/19	05/24/19	7,106.01		

KP&F	107	5131.107	KP&F City Contribution	6/6/19	06/06/19	7,094.09		
Kansas State Treasurer	200	5615.200	Bond Interest 2014-1	5/30/19 Bond Pmt	05/30/19	2,542.50		
Kansas State Treasurer	200	5629.200	Interest Bonds - 2011-2	5/30/19 Bond Pmt	05/30/19	11,903.75		
Kansas State Treasurer	200	5645.200	Interest Bonds - 2012-1	5/30/19 Bond Pmt	05/30/19	10,858.75		
Kansas State Treasurer	450	5645.450	Bond Interest - 2012-1	5/30/19 Bond Pmt	05/30/19	1,445.00		
Miller Management Systems, LLC	101	5214.101	Other Contracted Services	Recurring EFT	05/20/19	1,800.00		
Wex Bank	102	5302.102	Motor Fuels & Lubricants	190,523,011,551.00	05/23/19	2,083.09		
Wex Bank	106	5302.106	Motor Fuels & Lubricants	190,523,013,365.00	05/23/19	445.78		
Wex Bank	106	5302.106	Motor Fuels & Lubricants	59,278,508.00	06/12/19	<u>911.18</u>		
Kansas Payment Center					05/30/19	138.46	69440	138.46
Kansas Payment Center					05/30/19	138.92	69441	138.92
Kansas Payment Center					06/13/19	138.46	69505	138.46
Kansas Payment Center					06/13/19	<u>138.92</u>	<u>69506</u>	<u>138.92</u>

\$	245,037.33
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Item Number: Consent Agenda- II.-B.
Committee 6/17/2019
Meeting Date:



City of Roeland Park
Action Item Summary

Date:
Submitted By:
Committee/Department:
Title: **May 20, 2019 Minutes**
Item Type:

Recommendation:

Details:

Financial Impact

Amount of Request:	
Budgeted Item?	Budgeted Amount:
Line Item Code/Description:	

Additional Information

How does item relate to Strategic Plan?

How does item benefit Community for all Ages?

ATTACHMENTS:

Description
May 20, 2019 Minutes

Type
Cover Memo

CITY OF ROELAND PARK, KANSAS
CITY COUNCIL MEETING MINUTES
Roeland Park City Hall
4600 W 51st Street, Roeland Park, KS 66205
Monday, May 20, 2019 6:00 P.M.

- | | | |
|---|---|--|
| <ul style="list-style-type: none">○ Mike Kelly, Mayor○ Jan Faidley, Council Member○ Jennifer Hill, Council Member○ Tim Janssen, Council Member | <ul style="list-style-type: none">○ Jim Kelly, Council Member○ Tom Madigan, Council Member○ Claudia McCormack, Council Member○ Michael Poppa, Council Member○ Erin Thompson, Council Member | <ul style="list-style-type: none">○ Keith Moody, City Administrator○ Jennifer Jones-Lacy, Asst. Admin.○ Kelley Nielsen, City Clerk○ John Morris, Police Chief○ Donnie Scharff, Public Works Director |
|---|---|--|

Admin

Madigan
Thompson

Finance

Faidley
McCormack

Safety

Janssen
Poppa

Public Works

Hill
Kelly

Pledge of Allegiance

Mayor Kelly called the meeting to order at 6:04 p.m. and led everyone in the Pledge of Allegiance.

Roll Call

City Clerk Nielsen called the roll and all Governing Body members were present.

Modification of Agenda

There were no modifications to the agenda.

I. CITIZENS COMMENTS

Traci & Donald Edwards (5250 Neosho) Ms. Edwards stated the property she owns contains a large gas pipeline, utilities for KCP&L and a large area utilized by AT&T. She has received a letter from the City requesting that she mow the area that has previously been maintained by the utility companies on the property. She is concerned about the safety issues and there are signs on the property by the gas company that no one should be on the property by the gas line. Mrs. Edwards also expressed concerns with her husband mowing due to health-related issues. Mrs. Edwards also has a letter from the gas company stating that they are responsible for maintaining the area.

Mayor Kelly said his understanding is there was no direction given by the Governing Body to limit public mowing as a cost-saving measure. It was noted the former Public Works director made the sole decision to no longer mow the property.

City Administrator Moody said that he, Public Works Director Scharff and Code Enforcement Officer Holtkamp have reviewed the information and made the determination that this area is right-of-way, and as stated in the City Code it is the property owner's responsibility for maintaining the right-of-way in front, or the side of their home as is applicable in this situation.

Mrs. Edwards reiterated that she has a letter stating it is the pipeline company's responsibility to maintain those areas. Mr. Moody said they would be happy to look at the letter with her.

Mayor Kelly recommended Mr. and Mrs. Edwards and staff coordinate with one another to discuss this.

CMBR Poppa said the matter was discussed earlier between himself, the Mayor and CMBR Kelly and they would propose to put it on a Workshop agenda in June. He would also like to discuss if this situation would fit into their Neighbors Helping Neighbors program.

CMBR Kelly added that he spoke with Mr. Moody and they definitely would like to look into this further to determine what is best for the resident and the City so as to come to an agreement.

Mayor Kelly said they look forward to working with Mr. and Mrs. Edwards to address the problem and thanked them for bringing it to their attention.

Pat O'Connell - Mr. O'Connell, previous owner of the property, said AT&T wanted to buy the land, but they did not want to sell it. AT&T paid \$4,000 and entered into a 99-year lease that they will take care of all the maintenance and plant trees on the property. They have taken care of the lot for 20 years and did so until about 2 years ago.

CMBR Hill recommended that the City temporarily mow the property until it can be discussed at the June Workshop. Mayor Kelly said it has been mowed.

CMBR Madigan also wanted to move this item for discussion at a June Workshop.

Galen Hanson (5536 Juniper) Mr. Hanson spoke about the upcoming mill rate in the budget process. He stated that when it was anticipated that Walmart was leaving it would create a \$700,000 shortfall in taxes and taxpayers approved an increase on property tax. Walmart did not leave and Mr. Hanson said the 2014 external and internal statements both indicate there was a \$450,000 increase in property taxes from that which resulted in double taxation due to the continued receipt of Walmart sales tax and the property tax increase. He said this has resulted in \$2 million of excess taxes. Mr. Hanson also noted that the City has established a \$1.4 million special reserve fund with the money then being transferred to a special infrastructure fund. He perceives this as a violation of public trust and that the proceeds are being used for something other than what the citizens were told it was going to be used for. Mr. Hanson would like to see the mill rate and capital improvement projects put to the public for a vote, and when adjusting the mill rate to consider all points of view of its citizens and not just a select few. Mr. Hanson provided several examples of residents who have stated they are having issues paying their increased property taxes. He also asked for the Governing Body to consider an expanded Community Foundation for those who do still want to contribute.

CMBR Poppa asked for clarification on the \$1.4 million special reserve fund. City Administrator Moody stated the reserve fund has been set aside in the case of an extended substantial loss of sales taxes and that was at the direction of the Council. The General Fund holds that \$1.4 million amount. The General Fund also keeps a reserve equal to 25 percent of the annual operating expenses. Both figures together are the General Fund's target ending balance. If the target is met, then the General Fund's extra reserves are transferred to the Special Infrastructure Fund which is a capital improvement fund and supports a variety of projects such as parks, pools, streets, stormwater, sidewalks and is available for any type of capital improvement.

Mayor Kelly reminded everyone of the Property Tax Assistance Program which could potentially help some of those mentioned by Mr. Hanson who have an excess tax bill and would direct them to Finance Director Ms. Jones-Lacy for further information.

Mr. Hanson further commented that it is an artificial tax being collected in excess. As an auditor, he said the process seems too complex and the rate is too high.

II. CONSENT AGENDA

A. Appropriations Ordinance #929

B. May 6, 2019 Council Minutes

MOTION: CMBR HILL MOVED AND CMBR POPPA SECONDED TO APPROVE THE CONSENT AGENDA AS PRESENTED. (MOTION CARRIED 8-0)

III. BUSINESS FROM THE FLOOR

Applications/Presentations

A. Committee Report - Arts

Marek Gliniecki, Chair of the Arts Advisory Committee, reported that the mosaic art is complete at the entrance to Bella Roe Plaza.

The event for sculptor Jorge Blanco has tentatively been scheduled for May 29th. The Citizens Sculpture Initiative for R Park has a call list and will be calling everyone that is involved to inform them of the exact time it will take place. The sculpture has been delivered and events are dependent on the weather.

The Arts and Park Committees are working together on a Nall Park sculpture, the theme of which is whimsical. They are beginning the process of looking at sculptors and their work.

The mosaic artist for Bella Roe is also working on a mosaic for the swimming pool called "Splash" and is in the final stages of completion.

Four sculptures have been transferred from Roe Boulevard to the Community Center. For safety reasons, it has been decided to move the sculpture closest to the gazebo with a location to be determined.

CMBR Madigan commented that he and his wife observed the mosaics at Bella Roe and said it is a lot nicer than the fountain that was there. He thanked Mr. Gliniecki for the work he and the committee did on that.

IV. MAYOR'S REPORT

A. Proclamation - World Elder Abuse Awareness Day June 15, 2019

B. Proclamation - Arbor Day

Mayor Kelly said as a Community for All Ages they would like to draw attention to June 15th as World Elder Abuse Awareness Day and that as a City they respect all of its citizens and can help the elder population by maintaining and improving social support with places such as senior centers, human services and transportation options.

June 29th is Arbor Day and Mayor Kelly noted that Roeland Park has been a Tree City USA for the past 26 years. He said they continue to keep trees prominent in Roeland Park which is important not only to clean the air and provide a habitat for wildlife but that they also bring a source of joy.

MOTION: CMBR HILL MOVED AND CMBR KELLY SECONDED TO DECLARE JUNE 15, 2019, AS WORLD ELDER ABUSE AWARENESS DAY AND JUNE 29, 2019, AS ARBOR DAY IN ROELAND PARK. (MOTION CARRIED 8-0.)

V. REPORTS OF CITY LIAISONS AND COMMITTEES

A. MARC - Bike and Pedestrian (Jim Kelly and Mike Kelly)

No report was given.

B. MARC - First Tier Suburbs (Erin Thompson and Claudia McCormack)

No report was given.

C. Stormwater Management Advisory Council

No report was given.

D. Pool Advisory Committee

CMBR Madigan reported that they are making great strides in Roeland Park taking over the pool and that Johnson County Parks and Recreation (JCPRD) has come up with some excellent ideas. They have removed the Plexiglas at check-in to make for easier communication. Also the climbing wall and the diving board will be up and they will also be able to be used at the same time.

With the assistance of the Northeast Johnson County Chamber of Commerce, JCPRD, and the City, there will be a ceremony to commemorate the City taking over ownership of the pool. CMBR Madigan sees this as a great public relations opportunity and a positive highlight. He hopes to get human interest stories from this out of the local media.

CMBR Madigan said he, CMBR Hill and CMBR Kelly are happy with what has happened in the past year while they have served on the committee.

The Roeland Park Aquatics Center is scheduled to open May 25, 2019.

E. Ad-Hoc Development Committee

No report was given.

F. 47 Committee

CMBR McCormack said they have renamed their committee to the 47 Committee and includes the overlay business district of the government of Kansas City, Kansas, Roeland Park, and Westwood. The committee is being restructured and trying to define ways to best help the merchants in the area to not only grow, but to grow the area. They will also be discussing work on the street plans, something that is on the horizon.

The committee is also planning a Foodie Fest that will be talked about in more detail later in the meeting.

VI. UNFINISHED BUSINESS

There was no unfinished business discussed.

VII. NEW BUSINESS

A. Request Free Swim Day at RPAC in Conjunction with Aquatics Center Ceremony

Mayor Kelly said there has been a proposal made to have the free swim day and it is appropriate that this should go before the Council for their approval.

CMBR Madigan said that Roeland Park should not pass up any opportunity for positive marketing. He said a free swim day would bring people from all over. It will also bring people in to see what they have to offer and believes there will be an up-tick in pool memberships or at the very least Super Pool passes.

Ms. Jones-Lacy mentioned that JCPRD weighed in on the date and the Northeast Johnson County Chamber was coordinate the event and they are grateful for that. She thanked CMBR Poppa for spearheading that. A suggested date for the ceremony is June 15th.

CMBR Madigan said he will contribute a \$2 bill to pay Johnson County Parks and Rec for the pool instead of \$1.

CMBR Faidley question about the availability of the community center on the day of the ceremony and noted that the larger room is not available on any of the Saturdays for coordinating the event. She also asked if they would need a tent in the parking lot for the ceremony.

Ms. Jones-Lacy said it would all depend on what they would like the ceremony to entail. One option is that the ceremony could be done at the pool. All of the details of the events have not been completed and the Chamber is helping to coordinate the event.

CMBR Poppa said the idea was to have it at the pool since it is a change of hands from JCPRD to Roeland Park and being at the Aquatics Center would best signify that change of ownership.

CMBR Madigan said his suggestion was to use the community center as he would like to see elected officials on all levels be invited to the ceremony.

MOTION: CMBR MADIGAN MOVED AND CMBR HILL SECONDED FOR A FREE SWIM DAY ON JUNE 15, 2019, THE DAY OF THE AQUATICS CENTER CEREMONY. (MOTION CARRIED 8-0)

B. Award Bid for 2019 NSRP Rosewood Street Reconstruction Project to Freeman Concrete

Mayor Kelly said the next item for discussion was the Neighborhood Street Reconstruction Project for Rosewood Street between Alder and 55th. This project has come before the Council before but it now has a current Street Pavement Index below 40. He said this is an opportunity to reshape the street using the pay-as-you-go approach.

Public Works Director Scharff stated that staff is recommending the Council award the bid to Freeman Concrete at a not-to-exceed price of \$496,782. The project will entail a total reconstruction of the street, new curb and gutter, a new subgrade and asphalt and installation of a new sidewalk on the east side of the street.

MOTION: CMBR THOMPSON MOVED AND CMBR POPPA SECONDED TO AWARD THE 2019 NSRP ROSEWOOD RECONSTRUCTION PROJECT TO FREEMAN CONCRETE AT A COST NOT TO EXCEED \$496,782. (MOTION CARRIED 8-0)

C. Award Bid for 2019 CDBG El Monte Mill and Overlay Project to Freeman Concrete

CMBR Faidley inquired as to whether there was any concern about the percentage of work being performed by the subcontractors and Freeman Concrete being the lowest bidder, whether that might require them to modify their contract. City Administrator Moody said this is primarily a mill and overlay project and an asphalt contractor will do the work. Freeman was the general bidder and they are subcontracting out the asphalt portion of the project. Mr. Miller, the City engineer, provided an explanation in the packet of why he believes it appropriate to allow for the general contractor to have a smaller percentage of the cost going towards them versus one of their subs.

CMBR Faidley also asked if there is a concern about quality of work. City Administrator Moody said Freeman Concrete has done work for the City in the past and they have been very pleased with their work and they are a very reputable contractor.

MOTION: CMBR THOMPSON MOVED AND CMBR JANSSEN SECONDED TO AWARD THE 2019 CDBG EL MONTE STREET PROJECT TO FREEMAN CONCRETE, LLC.

D. Amend Community Center and Pool Management Agreement Johnson County Parks and Rec

This item is a proposed amendment to the Community Center Joint Use Agreement and Pool Management Agreement with Johnson County Parks and Recreation Department to allow the facility maintenance position, currently employed by JCPRD, to become a City employee. The City currently pays all the wages and benefits of the position through their contractual agreements with JCPRD, but staff is recommending to amend the agreement to make this position a City employee.

City Administrator Moody said he has reviewed existing contracts for the community center and for the pool, and those agreements contemplated maintenance performed by this position. Therefore, if the maintenance will be completed by this position and the position becomes a City employee amendments need to be made to the agreements to reflect that. The City attorney has developed the amendments and the redline changes are in the enclosed packet for review. To date, they have not heard from JCPRD if they are supportive of the changes, but they do support the concept of switching from JCPRD to the City.

Mayor Kelly asked staff to address the financial impact of the change and Mr. Moody said it should be a net zero effect.

There was a brief discussion of the maintenance of the 20-year old facility and that there has been a turnover of employees in this position. Now, that the City will own the facility it makes sense to have the person in their employee. They are also not inheriting an existing employee. JCPRD is in the process of recruiting and the City will be a part of the process. This position will bring the total number of City employees to 32.

MOTION: CMBR KELLY MOVED AND CMBR POPPA SECONDED TO APPROVE THE AMENDMENTS TO THE COMMUNITY CENTER JOINT USE AGREEMENT AND POOL MANAGEMENT AGREEMENT WITH

E. Amend Employee Handbook and Approve Job Descriptions

Staff is recommending that the Council adopt the reflected changes to the Employee Handbook as well as edits to the City Job Classification Plan and also to approve new maintenance-related job descriptions. City Administrator Moody said the job descriptions were developed for the Community Center attendant and maintenance facilities specialist based upon what JCPRD already had in place and they have been formatted to be consistent with the City's job descriptions. Secondly, the positions have also been incorporated into the appropriate pay grade.

There is also a third element of amending the employee handbook relative to benefits for part-time employees. It provides for the accrual of paid time off and holiday time for permanent part-time employees. They are proposing to remove that as it is not common for part-time employees to accrue paid time off.

CMBR Madigan noted that most of the City's part-time employees are with the Police Department. He said he had concerns about taking away the benefits of those who put their lives on the line for the City. City Administrator Moody said the police part-timers do not work enough throughout the year to qualify for these accruals. Even though they are on the payroll throughout the year, they do not work 15 or 20 hours a week. They cover for those on vacation, those who are sick, or work a special event.

CMBR McCormack expressed concerns that this would also affect the pool employees who would become City employees.

MOTION: CMBR POPPA MOVED AND CMBR THOMPSON SECONDED TO ADOPT THE REFLECTED CHANGES TO THE EMPLOYEE HANDBOOK, EDITS TO THE CITY JOB CLASSIFICATION PLAN, AND APPROVE NEW MAINTENANCE-RELATED JOB DESCRIPTIONS. (MOTION CARRIED 7-1 WITH CMBR MCCORMACK VOTING NO.)

F. Food Fest September 8, 2019, Special Event Permit and Financial Contribution Request

Mayor Kelly said this item is to approve a special event permit for the 47 Foodie Fest on September 8, 2019, at the southwest corner of 47th Street and Mission Road, to waive the associated fee with the event, and to also approve the request for a contribution to the event to help with promotional kits, activities and entertainment.

Ms. Jones-Lacy said the event is an effort to brand the district as its own district with all of the businesses on this corridor. In the packet are some branding and marketing materials they will have. This is a joint effort between the cities and Roeland Park is being asked to support the event in both approving the special event permit, waiving the \$75 fee, and contributing \$3,000, which would be accounted for during the budget process when they do the amended process and the contribution will be paid out of the Community Events budget. They will also be working with CMBR Hill and the Community Engagement Committee to also coordinate their efforts.

CMBR Faidley asked if it would be possible to have a Roeland Park table there with some of their own rebranding merchandise. Ms. Jones-Lacy said it is possible, but the idea is to promote the district itself and with their own merchandise.

CMBR Janssen asked if there is an alternative date for bad weather. Ms. Jones-Lacy said it is rain or shine. They are booking a band and having a lot of detailed coordination, so they will stick with that day.

Mayor Kelly said he appreciates the work that Ms. Jones-Lacy has done on this committee, not only with this upcoming event, but that when she undertakes something it is well done and they appreciate her representing Roeland Park on that committee.

MOTION: CMBR HILL MOVED AND CMBR POPPA SECONDED TO APPROVE THE SPECIAL EVENTS PERMIT FOR THE 47 FOODIE FEST ON SEPTEMBER 8, 2019, AT THE SOUTHWEST CORNER OF 47TH STREET AND MISSION ROAD, AND TO WAIVE THE \$75 FEE ASSOCIATED WITH THE EVENT, AND TO CONTRIBUTE \$3,000 TOWARD THE EVENT TO HELP COVER PROMOTION, KIDS ACTIVITIES AND ENTERTAINMENT. (MOTION CARRIED 8-0)

VIII. ORDINANCES AND RESOLUTIONS

A. Amend Non-Discrimination Regulations

Staff recommended the adoption of the edits to the Non-Discrimination regulations of the City as they were previously discussed at a past Workshop. They have been reviewed and accepted by the City attorney and are intended to promote consistency among other non-discrimination ordinances within other Johnson County cities and other Roeland Park ordinances regarding cost assessment and also to reduce exposure to potential litigation.

CMBR Janssen asked if all business employers are required to have a business license in Roeland Park. He asked if contractors that come into the City are required to hold a business license as well. Outside contractors are required to have a business license when working within the City.

CMBR Faidley asked if they wanted to consider a higher penalty than up to \$500, or possibly go up to \$1,000. The City attorney said the new language is for actual damages or a civil penalty in the amount of up to \$500 for each violation.

MOTION: CMBR POPPA MOVED AND CMBR MADIGAN SECONDED TO ADOPT THE EDITS TO THE NON-DISCRIMINATION ORDINANCE TO MAKE ROELAND PARK'S POLICY AND PROCEDURES CONSISTENT WITH OTHER RECENTLY ADOPTED NON-DISCRIMINATION ORDINANCES. (MOTION CARRIED 8-0)

B. Ordinance Establishing an Aquatics Advisory Committee

The proposed Aquatics Advisory Committee would include a mixture of elected officials and appointed officials from the City of Roeland Park. Ordinance No. 980 was developed and has been reviewed by the City Attorney.

CMBR Faidley asked when the committee would become operational. City Administrator Moody said they generally do a recruitment advertisement for positions on their committees. Once that recruitment

process is complete and the members have been appointed the committee will be in effect. It is up to the Council, however, how long they want to wait before they start considering recommendations for appointment.

Mayor Kelly said he has received interest from CMBR Janssen and CMBR Madigan to be on the committee. He also added that time is of the essence.

CMBR Madigan said in forming the committee they need to keep in mind the demographics of those who use the pool, that they are a Community for All Ages, and also recommended including those on the youth commission.

CMBR Janssen asked if the new pool staff member would be on the committee. City Administrator Moody said he does not see a staff member as being a voting member, but certainly it would be a good idea that they should attend the meetings and provide reports to the committee.

CMBR Madigan said he would like to see this reviewed by the third Monday so they are not taking too long. CMBR McCormack said she would like this on or before the June 1 switchover.

CMBR Poppa said it is a citizens' advisory committee and they have to follow ordinance regulations for committees. Staff will be taking applications, the Mayor will make appointments and then the Council will confirm them.

CMBR Thompson said the ordinance language states terms begin January 1 of each year and believes it should be at time of appointment. City Administrator Moody said it keeps it consistent with the other committees. If someone is appointed mid-year, then they will fill the seat throughout the remainder of the year and go through the process again for January.

All Governing Body members agreed to a special call meeting if needed for this committee.

MOTION: CMBR MADIGAN MOVED AND CMBR MCCORMACK SECONDED TO APPROVE ORDINANCE NO. 980 (MOTION CARRIED 8-0)

IX. REPORTS OF CITY OFFICIALS

City Administrator Moody said he received notice from the Government Finance Officers Association (GFOA) on May 2nd that the City of Roeland Park, Kansas has received the GFOA's Distinguished Budget Presentation Award. The recognition is presented to the individuals/department designated as being primarily responsible for having achieved the award. The award has been presented to Jennifer Jones-Lacy, Finance Director and Assistant City Administrator for the City of Roeland Park. Mr. Moody read the letter into the record.

(Applause)

Ms. Jones-Lacy said she was surprised and thanked everyone.

Mayor Kelly thanked her for continuing to make the City look good.

X. ADJOURN

MOTION: CMBR THOMPSON MOVED AND CMBR KELLY SECONDED TO ADJOURN. (MOTION CARRIED 8-0)

(Roeland Park City Council Meeting Adjourned at 7:29 p.m.)

Kelley Nielsen, City Clerk

Mike Kelly, Mayor

Item Number: Consent Agenda- II.-C.
Committee 6/17/2019
Meeting Date:



City of Roeland Park
Action Item Summary

Date: 6/14/2019
Submitted By: Kelley Nielsen
Committee/Department: Admin.
Title: **Aldi CMB License**
Item Type: Other

Recommendation:

To approve CMB license for Aldi.

Details:

Financial Impact

Amount of Request:	
Budgeted Item?	Budgeted Amount:
Line Item Code/Description:	

Additional Information

How does item relate to Strategic Plan?

How does item benefit Community for all Ages?

ATTACHMENTS:

Description
Aldi CMB License

Type
Cover Memo

Fee: \$75.00

KEEP THIS LICENSE POSTED CONSPICUOUSLY AT ALL TIMES

No.

DEALER'S RETAIL LICENSE

From: 08/01/2019

To: 12/31/2019

To All Whom it May Concern:

*License is hereby granted to **CMB Aldi** to sell at retail*

CEREAL MALT BEVERAGES

For sale in original and unopened containers and NOT for consumption on premises

4801 ROE Boulevard

in the City of Roeland Park in Johnson County, Kansas,

Application therefor, on file in the office of the City Clerk of said City, having been approved by the governing body of such City as provided by the Laws of Kansas and the rules, regulations and ordinances pertaining thereto.

This License will expire on 12/31/2019, unless sooner revoked, is not transferable, nor will any refund of the fee be allowed thereon.

Given under our hands and the corporate seal of said City, on this date: 06/17/2019

Mayor

City Clerk

Item Number: Mayor's Report- IV.-A.
Committee 6/17/2019
Meeting Date:



City of Roeland Park
Action Item Summary

Date: 6/14/2019
Submitted By: Arts Advisory and Parks and Trees Committees
Committee/Department: Admin.
Title: **Naming of R Park Pavilion**
Item Type: Other

Recommendation:

The Arts Advisory and Parks and Trees Committee have a joint recommendation on the naming of the R Park Pavilion.

Details:

Financial Impact

Amount of Request:	
Budgeted Item?	Budgeted Amount:
Line Item Code/Description:	

Additional Information

How does item relate to Strategic Plan?

How does item benefit Community for all Ages?

Item Number: **Ordinances and Resolutions:- VIII.-**
 A.
Committee **6/17/2019**
Meeting Date:



City of Roeland Park
Action Item Summary

Date: 6/14/2019
Submitted By: Keith Moody
Committee/Department: Neighborhood Services
Title: **Ordinance 981: Amending Section 8-902 Clarifying Mowing of ROW Responsibility**
Item Type: Ordinance

Recommendation:

Approve Ordinance 981 which clarifies the requirement for property owners to maintain adjacent right-of-way.

Details:

During review of Section 8-902 of the City Code it was determined by staff and the city attorney that the current language does not contemplate lots with triple frontage, odd shape lots (triangles, five sided lots) or through lots (internal lots that have frontage on two parallel streets). The new language plainly states that property owners are responsible for mowing the right of way or easement abutting their property, this is the intent of the current language, just expressed simply.

Below is the current language, the proposed language is reflected in the attached ordinance.

8-902. - Owner to Cut Noxious Weeds and Grass.

The owner, as defined in section 8-901 hereof, of any lot or tract of land, including the front or side portion to the paved street within the dedicated portion of the street, easement or right-of way on such land, shall keep the lot or tract of land free and clear of all noxious weeds as defined by K.S.A. 2-1314, and amendments thereto, noxious plants and noxious weeds as defined in 8-901 hereof, and grass in excess of eight inches in height or in length if such grass is matted down.
(Ord. No. 500, § 1)

Financial Impact

Amount of Request:	
Budgeted Item?	Budgeted Amount:
Line Item Code/Description:	

Additional Information

How does item relate to Strategic Plan?

How does item benefit Community for all Ages?

ATTACHMENTS:

Description		Type
 Ordinance 981 Amending Section 8.902		Cover Memo

**CITY OF ROELAND PARK, KANSAS
ORDINANCE NO. 981**

**AN ORDINANCE REGULATING THE MAINTENANCE OF EASEMENTS
AND RIGHT-OF-WAYS LOCATED ON PRIVATE PROPERTY IN THE
CITY OF ROELAND PARK, KANSAS; AMENDING ARTICLE 9 OF 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 9 of the Code of the City of Roeland Park, Kansas, currently reads:

Sec. 8-902. - Owner to Cut Noxious Weeds and Grass.

The owner, as defined in section 8-901 hereof, of any lot or tract of land, including the front or side portion to the paved street within the dedicated portion of the street, easement or right-of way on such land, shall keep the lot or tract of land free and clear of all noxious weeds as defined by K.S.A. 2-1314, and amendments thereto, noxious plants and noxious weeds as defined in 8-901 hereof, and grass in excess of eight inches in height or in length if such grass is matted down.

SECTION 2. Article 9 of the Code of the City of Roeland Park, Kansas, is hereby amended to read as follows:

Sec. 8-902. - Owner to Cut Noxious Weeds and Grass.

Unless otherwise set forth by resolution of the City Council, the owner, as defined in section 8-901 hereof, of any lot or tract of land **which abuts or fronts a City right-of-way or easement shall keep the City right-of-way or easement** free and clear of all noxious weeds as defined by K.S.A. 2-1314, and amendments thereto, noxious plants and noxious weeds as defined in 8-901 hereof, and grass in excess of eight inches in height or in length if such grass is matted down.

SECTION 3. This ordinance shall take effect upon its publication, or the publication of a summary thereof, in the official City newspaper.

PASSED by the City Council the ____ day of June, 2019. **APPROVED** by the Mayor.

Mike Kelly, Mayor

ATTEST:

Kelley Nielsen, City Clerk

APPROVED AS TO FORM:

Steven E. Mauer, City Attorney

Item Number: **Ordinances and Resolutions:- VIII.- B.**
Committee **6/17/2019**
Meeting Date:



City of Roeland Park
Action Item Summary

Date: 6/17/2019
Submitted By: Jennifer Jones-Lacy
Committee/Department: Neighborhood Services
Title: **Resolution 668: Exempting Certain Properties from Mowing Right of Way**
Item Type: Resolution

Recommendation:

Approve Resolution no. 668 exempting certain properties from the requirement to maintain grounds in the right-of-way.

Details:

At the June 3rd workshop, the Governing Body gave direction to exempt the properties at 5250 Neosho and 4940 Southridge from the requirement to maintain the adjacent right-of-way. It had been the policy of the City that property owners maintain adjacent ROW. Ordinance No. 981 attempts to codify this policy including for lots with triple frontage, odd shape lots (triangles, five sided lots) or through lots (internal lots that have frontage on two parallel streets).

It has since been determined that there are a few additional properties where the city has been maintaining the rights-of-way in addition to the two properties listed above. Maps of those properties are attached illustrating the areas the City will continue to maintain and the resolution includes these properties as well.

Per direction from Council at the prior workshop the attached resolution was prepared by the City Attorney which memorializes the unique circumstances contributing to the City mowing unique/unusual public right of way.

The staff report from the last workshop is in "additional information" below.

Financial Impact

Amount of Request:	
Budgeted Item?	Budgeted Amount:
Line Item Code/Description:	

Additional Information

Cutting Grass in City Right of Way

During a public works audit in April 2018, the properties at 5250 Neosho and 4940 Southridge were identified as having right of ways (ROWs) adjacent to their properties that were being maintained by the City (see attached map). After reviewing City Code, staff determined that these ROW areas are an extension of their front yards. Therefore, the property owners are responsible for cutting the grass. See attachment or below for the referenced section of the City Code.

The cost to cut the grass is approximately \$20 per cutting, 15 cuttings per year, \$300 for each property per year.

The property at 4940 Southridge was vacant in early 2018. Staff was unable to contact the property owner. It was sold at auction in late 2018 and reconditioned by an investor. In May 2019, staff was unable to contact the new property owner. A grass notice was later sent outlining City code on grass cutting responsibility in ROW. The property owner of 4940 Southridge contacted staff directly to dispute grass cutting responsibility in the ROW. He stated that it was not reasonable for him to cut this grass due to its large area and the fact that it was too thick to cut with his push mower. Staff spoke to Public Works who stated that the ROW grass area at 4940 Southridge had been cut by the City for over 20 years.

In April 2018, staff met with the property owner at 5250 Neosho and provided a letter outlining the staff determination that the City would no longer be cutting the grass in the property's adjacent ROW. The property owner stated that the City has been cutting the grass in this area the last few years. Prior to the City cutting the grass, the grass was cut by AT&T due to utilities being located in this area. After he reviewed the letter, the property owner agreed to accept responsibility and cut the grass.

In May 2019, the property owner at 5250 Neosho contacted staff regarding responsibility of ROW grass cutting. He changed his mind about accepting responsibility for cutting the ROW grass. He said that AT&T or the City should cut this due to the utility equipment in the area. He added that he does not feel safe to cut around the utility equipment. Staff investigated this area further and gathered the following information. The area south of 5250 Neosho contains several large AT&T utility cabinets. Staff recently spoke to the former property owner of 5250 Neosho who lives in the neighborhood. He stated that approximately 20 years ago, for approximately \$4,000 he sold AT&T land use rights to install the equipment. The land agreement did not transfer ownership. As a courtesy, AT&T cut the grass in the area. The grass area south of the AT&T equipment is ROW containing 2 above ground gas regulators.

Staff recently spoke to an area AT&T field technician. He stated the grass cutting service for areas such as the equipment on Neosho was eliminated for budget reasons. The technician added that in similar circumstances, areas such as these had a land use agreement, which means the property owner still owns and maintains the land. While we don't have the paperwork on this particular property, the technician indicated that this is most likely what occurred on this property as well. He

also indicated that it is safe to mow around this equipment. The technician offered to watch this area at 5250 Neosho and try to cut it as long as his manager approves funding.

In May 2019, staff opened code violation cases on 5250 Neosho and 4940 Southridge for long grass over 8 inches. The grass at 5250 Neosho has been cut and the case closed. The long grass at 4940 Southridge still remains. The code case at 4940 Southridge has been temporary suspended pending review by the Governing Body. Both property owners wish to appeal to the Governing Body for exemptions to have the City cut the ROW grass.

8-902. - Owner to Cut Noxious Weeds and Grass.

The owner, as defined in section 8-901 hereof, of any lot or tract of land, including the front or side portion to the paved street within the dedicated portion of the street, easement or right-of way on such land, shall keep the lot or tract of land free and clear of all noxious weeds as defined by K.S.A. 2-1314, and amendments thereto, noxious plants and noxious weeds as defined in 8-901 hereof, and grass in excess of eight inches in height or in length if such grass is matted down. (Ord. No. 500, § 1)

How does item relate to Strategic Plan?

How does item benefit Community for all Ages?

ATTACHMENTS:

Description	Type
 Resolution 668 with Attachments	Cover Memo

CITY OF ROELAND PARK, KANSAS

RESOLUTION NO. 668

A RESOLUTION FINDING THAT THE CITY OF ROELAND PARK, JOHNSON COUNTY, KANSAS SHALL BE ABLE TO MOW GRASS ADJACENT TO 5250 NEOSHO, 4940 SOUTHRIDGE, 4700 ROE PARKWAY, 4710 ROE PARKWAY, 4800 SKYLINE DRIVE, AND 5031 ROE BOULEVARD.

WHEREAS, a triangular area of property located adjacent to 5250 Neosho, Roeland Park, Kansas, specifically on the Northwest corner of Neosho and West 52nd Place (“Neosho ROW”) was previously mowed by the City of Roeland Park, Kansas (“City”) and prior to that by AT&T until this practice stopped in April 2018; and

WHEREAS, the property owner of 4940 Southridge was cited for a code violation for grass over 8 inches in an area of said property located beginning at the corner of Roe Lane and Southridge Street and running along Roe Lane adjacent to 4940 Southridge (“Southridge ROW”) in the City; and

WHEREAS, approximately three (3) acres of land on the east and west sides of Roe Parkway north of 48th Street, specifically land adjacent to 4700 Roe Parkway and 4710 Roe Parkway (“Parkway ROW”) is in need of maintenance; and

WHEREAS, an area of land adjacent to 5031 Roe Boulevard, specifically on the Southeast corner of Roe Boulevard and Roe Lane (“Boulevard ROW”) is in need of maintenance; and

WHEREAS, the property adjacent to the Boulevard Apartments, along the northwest corner of Roe Boulevard and Skyline Drive at 4800 Skyline Drive (“Skyline ROW”) is in need of maintenance; and

WHEREAS, the City is agreeable to mowing said right of ways so long as it has available resources and funding to do so; and

WHEREAS, the City has the right to terminate its agreement for said mowing at any time with single notice to owner(s); and

WHEREAS, the City accepts no ownership or liability for accident or injury occurring on said Southridge ROW, Neosho ROW, Roe Parkway ROW, Roe Boulevard ROW and Skyline ROW.

NOW THEREFORE, BE IT RESOLVED BY THE GOVERNING BODY OF THE CITY OF ROELAND PARK, KANSAS:

1. The City Council hereby authorizes the City to mow grass located adjacent to: 5250 Neosho, Roeland Park, Kansas, specifically on the Northwest corner of Neosho and West 52nd Place; the corner of Roe Lane and Southridge Street and running along Roe Lane adjacent to 4940 Southridge; the Northwest corner of

Roe Boulevard and Skyline Drive adjacent to 4800 Skyline Drive; the Southeast corner of Roe Boulevard and Roe Lane adjacent to 5031 Roe Boulevard; and three (3) acres running east and west along Roe Boulevard north of 48th Street adjacent to 4700 Roe Parkway and 4710 Roe Parkway.

2. The areas of mowing are more particularly demonstrated in the maps attached to this resolution as Exhibit A and incorporated as if fully set forth herein.

ADOPTED by the Governing Body this 17th day of June, 2019.

Mike Kelly, Mayor

ATTEST:

Kelley Nelson, City Clerk

APPROVED AS TO FORM:

Steve Mauer, City Attorney

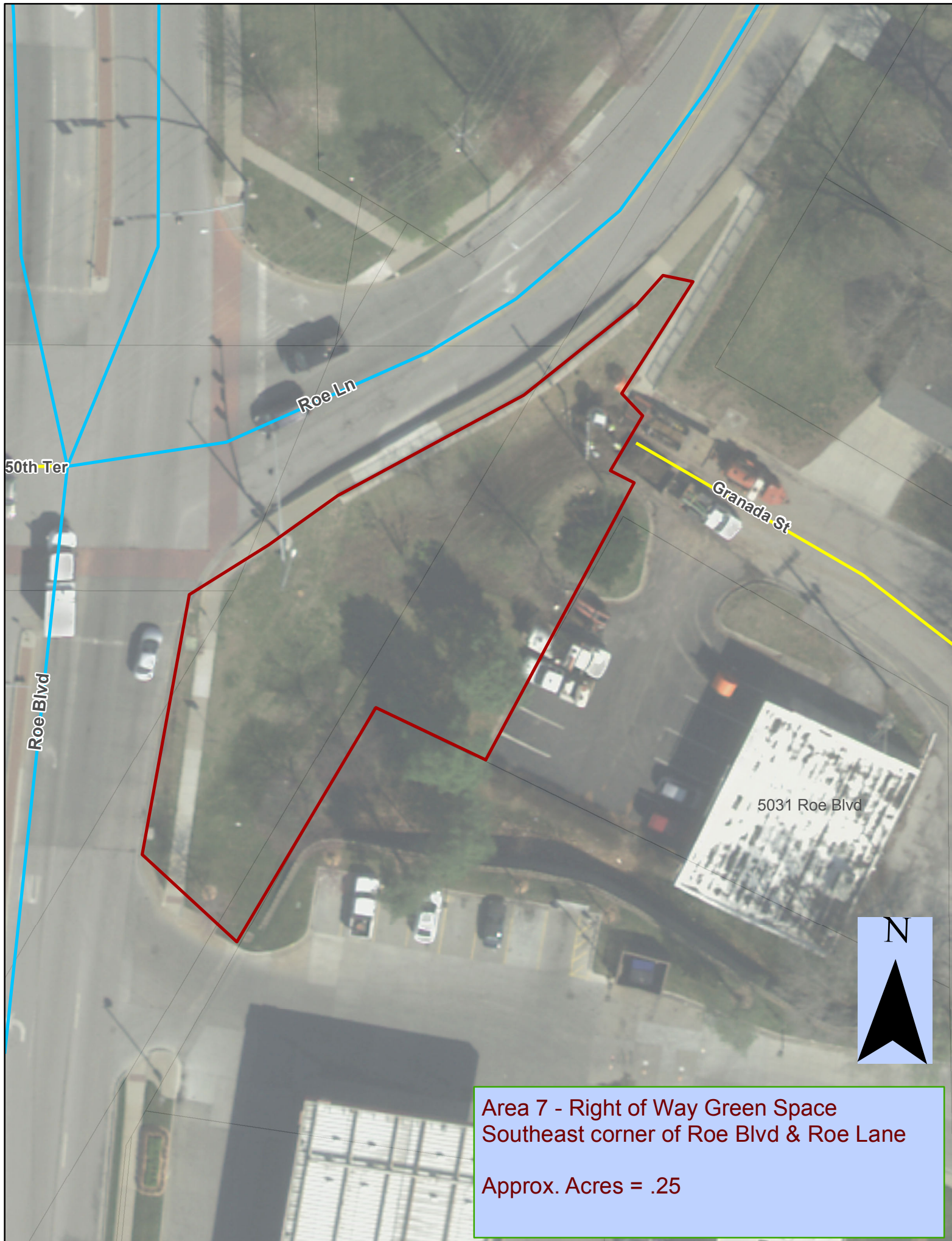
Satellite

4940 SOUTHRIDGE



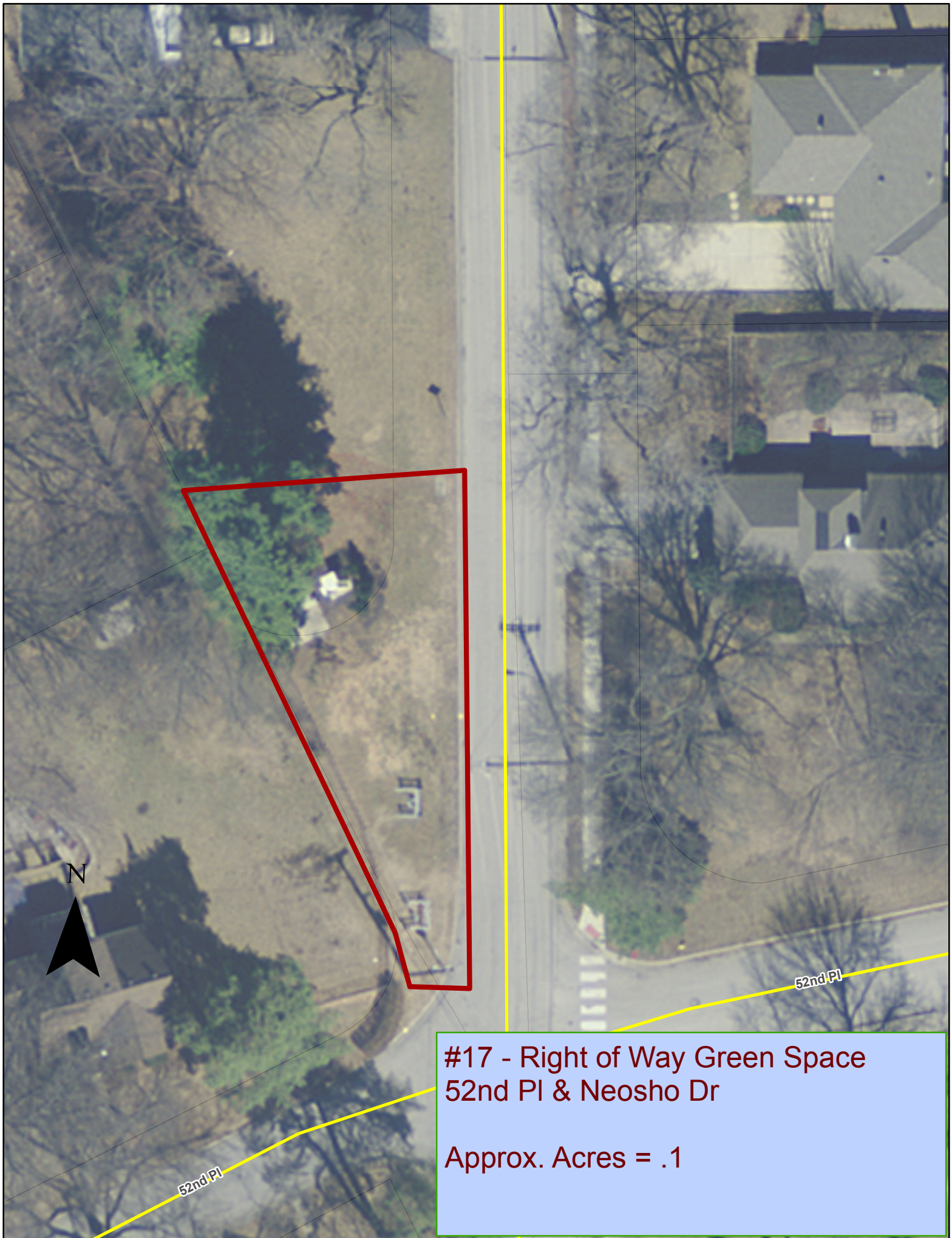
Area 4 - North Roe Blvd Right Of Way
Roe Blvd, North of 48th Street (east & west)

Approx Acres = 3



Area 7 - Right of Way Green Space
Southeast corner of Roe Blvd & Roe Lane

Approx. Acres = .25



#17 - Right of Way Green Space
52nd Pl & Neosho Dr
Approx. Acres = .1

Item Number: Workshop Items- IX.-A.
Committee 6/17/2019
Meeting Date:



City of Roeland Park

Action Item Summary

Date: 6/16/2019
Submitted By: Wade Holtkamp
Committee/Department: Neighborhood Services
Title: **Discuss Short-Term Rental Regulations**
Item Type:

Recommendation:

To review the recommendations of the Ad Hoc Short-Term Rental Committee and discuss amending City code and policy.

Details:

Late 2018, the Council Council formed an Ad Hoc committee to review current regulations on short-term rentals within the City. The Committee consisted of Council members Madigan, Janssen, and Mayor Kelly. The committee members met several times to review the existing regulations and some of the enforcement issues that exist under the current code. Those challenges include:

1. **Regulations require the residence to be owner occupied** - This is difficult to determine. However we have recently updated our application to require a notarized signature for the applicant stating that they are the owner-occupant.
2. **The Owner must live in the short-term rental at least 320 days/year** - This is difficult to prove.
3. **Hosts of a short-term rental must provide notice to their neighbors "across the street and adjacent"** - This isn't entirely clear which neighbors are required to be notified.
4. **Noncompliance Issue** - If someone is not compliant, the current code does not allow the City to assess fees to their property taxes. Furthermore, there is no fee specified for noncompliance, it is up to the judge to determine.

After discussing these issues with staff, below are some recommendations to the City Code.

1. Impose fines of \$700 per month for non-compliant rentals (this would hold true for short-term and regular rentals).
2. Non-payment of fines would be assessed against the rental's property taxes.

3. Require a photo of the City permit on the online platform advertising the short-term rental (Airbnb, VRBO, HomeAway, etc.).
4. Require each short-term rental to have a local contact available for any issues if the homeowner is out of town (within 30 concentric miles).
5. Applicants must notify residents within 100 feet of the property either by certified mail, return receipt requested or via signed affidavit. If 25%-33% of the neighboring homeowners submit opposition to the short-term rental to City Hall, the application will be reviewed by the City Planning Commission for approval. If more than 1/3 of the homeowners notified submit opposition to the short-term rental to City Hall, the application will be denied.

The Committee did not reach a consensus on whether the short-term rental should remain owner-occupied, and if so, how many days they should reside in the home. This requires continued discussion from Council.

In addition, the Committee suggests several administrative changes to the policy.

- Require the applicant to attest to complete a safety checklist with their application. Checklist will be created by the City Building Official.
- Require the applicant display the City's contact info as well as a contact for the local representative prominently within the residence.

Financial Impact

Amount of Request:	
Budgeted Item?	Budgeted Amount:
Line Item Code/Description:	

Additional Information

How does item relate to Strategic Plan?

How does item benefit Community for all Ages?

Item Number: Workshop Items- IX.-B.
Committee 6/17/2019
Meeting Date:



City of Roeland Park
Action Item Summary

Date: 3/29/2019
Submitted By: Keith Moody
Committee/Department: Admin.
Title: **Discuss Changing Regular Council Meeting Date and Time**
Item Type:

Recommendation:

Discuss alternative council meeting and workshop dates/times.

Details:

Attached is the section of the City Code that specifies the date and time of the council meetings and workshops.

Providing a council meeting on the first and third Monday of each month would allow for the council to take action quicker and possibly avoid the need for a special called meeting to act on items that are time sensitive. This format would also avoid the need to move items from the workshop agenda to the council meeting agenda, which occurs periodically on the 3rd Monday workshop.

Having the workshop "following the council meeting" would also add flexibility to the schedule. The City Attorney confirms that using this language to describe when the workshop would start is permissible. Items referred from workshop to a council meeting for action would flow to the council meeting in two weeks (generally).

Executive sessions would generally be planned for the end of the workshop to be respectful of audience member's time.

Financial Impact

Amount of Request: N/A	
Budgeted Item?	Budgeted Amount: N/A

Line Item Code/Description:

Additional Information

https://library.municode.com/ks/roeland_park/codes/code_of_ordinances?nodeId=CHIAD_ART2GOBO_S1-205ME

How does item relate to Strategic Plan?

The change in meeting dates is intended to provide for timely action by council with a logical process respectful of audience members time.

How does item benefit Community for all Ages?

N/A

ATTACHMENTS:

Description	Type
▣ Meetings City Code	Cover Memo

Sec. 1-205. - Meetings.

The regular meetings of the Governing Body shall be held on the third Monday of each month at 7:00 p.m. in the Council Chambers of the Roeland Park City Hall, 4600 W. 51st Street, Roeland Park, Kansas, or at such other location as may be designated in a notice of meeting. In case the third Monday of any month falls on a holiday, the regular meeting shall be held on the next secular day thereafter that is not a legal holiday.

(Ord. 771, § 1; Code 2007; Ord. No. 900, § 1, 11-17-2014)

Sec. 1-206. - Special Meetings.

Special meetings of the Governing Body shall be called by the Mayor at any time upon written request of not fewer than three members of the City Council.

(Ord. 786, § 1; Code 2007)

State Law reference— K.S.A. 14-111.

Sec. 1-207. - Workshops.

The regular meetings of the Governing Body Workshop shall be held on the first and third Mondays of each month at 6:00 p.m. in or adjacent to the Council Chambers of the Roeland Park City Hall, 4600 W. 51st Street, Roeland Park, Kansas, or at such other location as may be designated in a notice of meeting. In case the first or third Monday of any month falls on a holiday, the regular meeting may be held on the next secular day thereafter that is not a legal holiday or the fourth Monday of the same month. The procedure for a Councilmember to add a topic as an agenda item for a Workshop meeting shall be as follows:

- (1) A Councilmember generates an idea for an agenda topic;
- (2) The Councilmember gains the support of two (2) other Councilmembers;
- (3) The Councilmember submits a completed Action Form to the City Administrator;
- (4) The City Administrator takes the completed Action Form to the agenda-setting meeting with the Mayor and Council President;
- (5) Space is identified for discussion of the topic on an upcoming Workshop agenda (not necessarily the next Workshop meeting); and
- (6) The topic is placed on an upcoming agenda and workshopped.

(Ord. No. 931, § 2, 9-19-2016)

Editor's note— Ord. No. 931, § 2, adopted Sept. 19, 2016, repealed the former § 1-207, and enacted a new § 1-207 as set out herein. The former § 1-207 pertained to adjourned meetings and derived from Code 1986.

Item Number: Workshop Items- IX.-C.
Committee 6/17/2019
Meeting Date:



City of Roeland Park

Action Item Summary

Date: 6/3/2019
Submitted By: Jennifer Jones-Lacy
Committee/Department: Admin
Title: **Discuss City's Willingness to Provide Maintenance at a Mobility Hub**
Item Type:

Recommendation:

The City Council approve the use of Public Works crews to maintain a bus shelter/mobility hub if KCATA were to construct a shelter in the commercial area along Roe Boulevard.

Details:

The City of Roeland Park has been working with KCATA, Johnson County and the property management of the Roeland Park Shopping Center to determine if the vacant lot to the south of Taco Bell is a viable option for a mobility hub or bus shelter in Roeland Park. City staff was working with the property management of Bella Roe to place a mobility hub where the non-operational fountain is currently located to the north of US Bank, but those talks have fallen through.

Shawn Strate with KCATA indicated that the location south of Taco Bell is preferable as people already park there and use those bus stops. Confluence has identified other mobility hub location options in the Aldi and Walgreens shopping area. The property management group for the Walmart site has indicated they are open to the possibility of a mobility hub there.

In Johnson County, it is customary for the City in which a bus shelter or mobility hub exists to be maintained by that City. There is also precedence for these shelters to be maintained by the City even when they are on private property, as is the case in Overland Park. The Governing Body needs to determine if it is willing to support the maintenance of a shelter or mobility hub using Public Works staff and equipment. The demands are minimal and would entail removing trash, which crews will do as part of their park runs, and periodic power washing of the shelter (public works has a portable pressure washer). Mr. Strate indicated that KCATA shelters in Kansas City, MO are power washed weekly. However, an appropriate schedule can be determined based on usage and need.

This is hypothetical at this time and the property owner has not yet determined whether they would allow such a shelter on their property. However, if they do wish to move forward, and the Council were to agree to maintaining the facility, we would enter into a maintenance agreement with Johnson County and the property owner to do so.

Financial Impact

Amount of Request: N/A	
Budgeted Item?	Budgeted Amount:
Line Item Code/Description:	

Additional Information

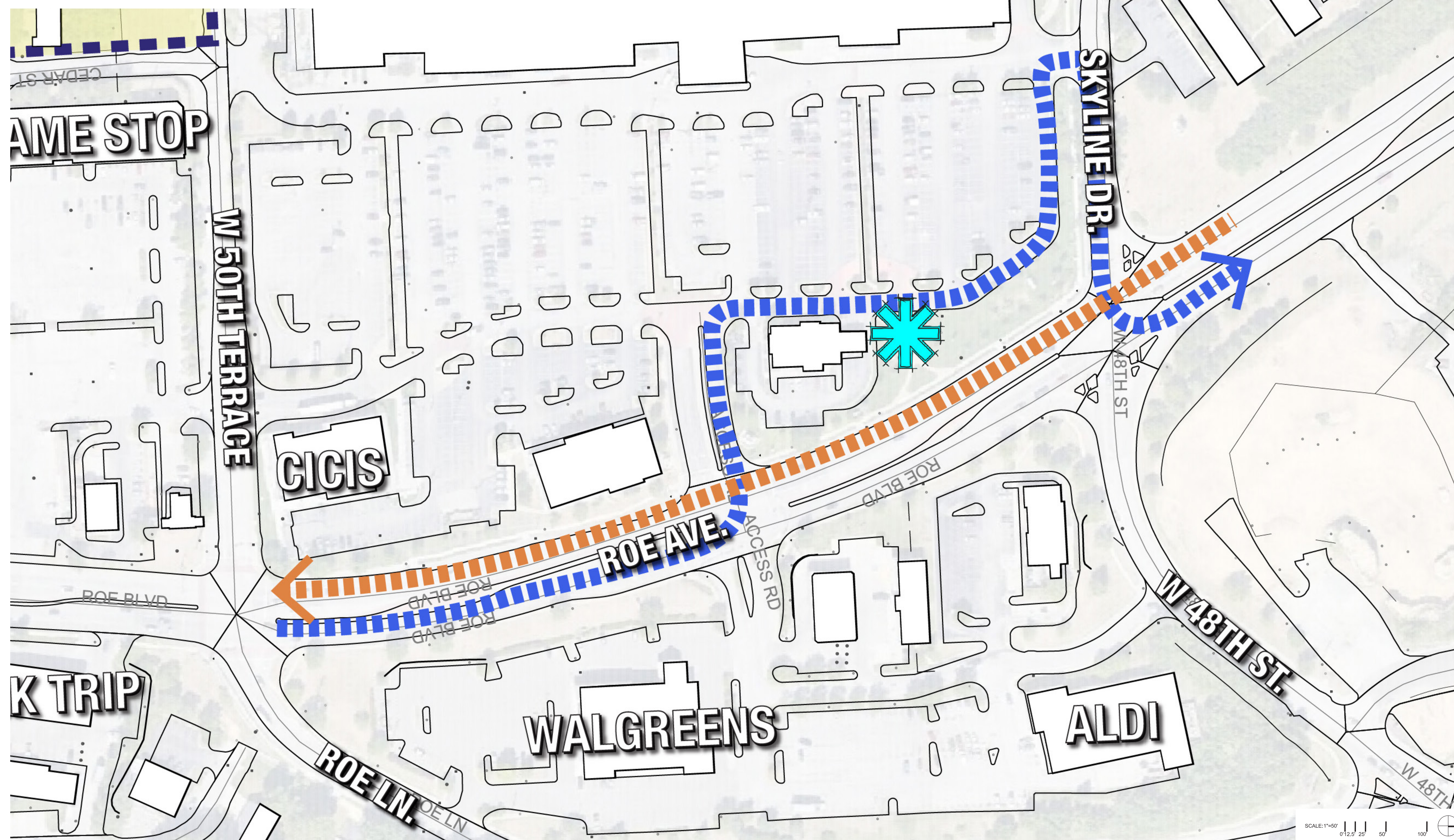
How does item relate to Strategic Plan?

How does item benefit Community for all Ages?

ATTACHMENTS:

Description	Type
 Mobility Hub Concepts from Confluence	Cover Memo

CHARACTER IMAGES:



DEVELOPMENT LEGEND:

- Existing Building
- Northbound Transit
- Southbound Transit
- Transit Hub



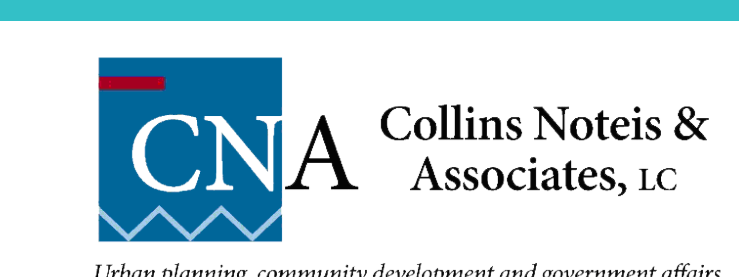
MOBILITY HUB CONCEPT



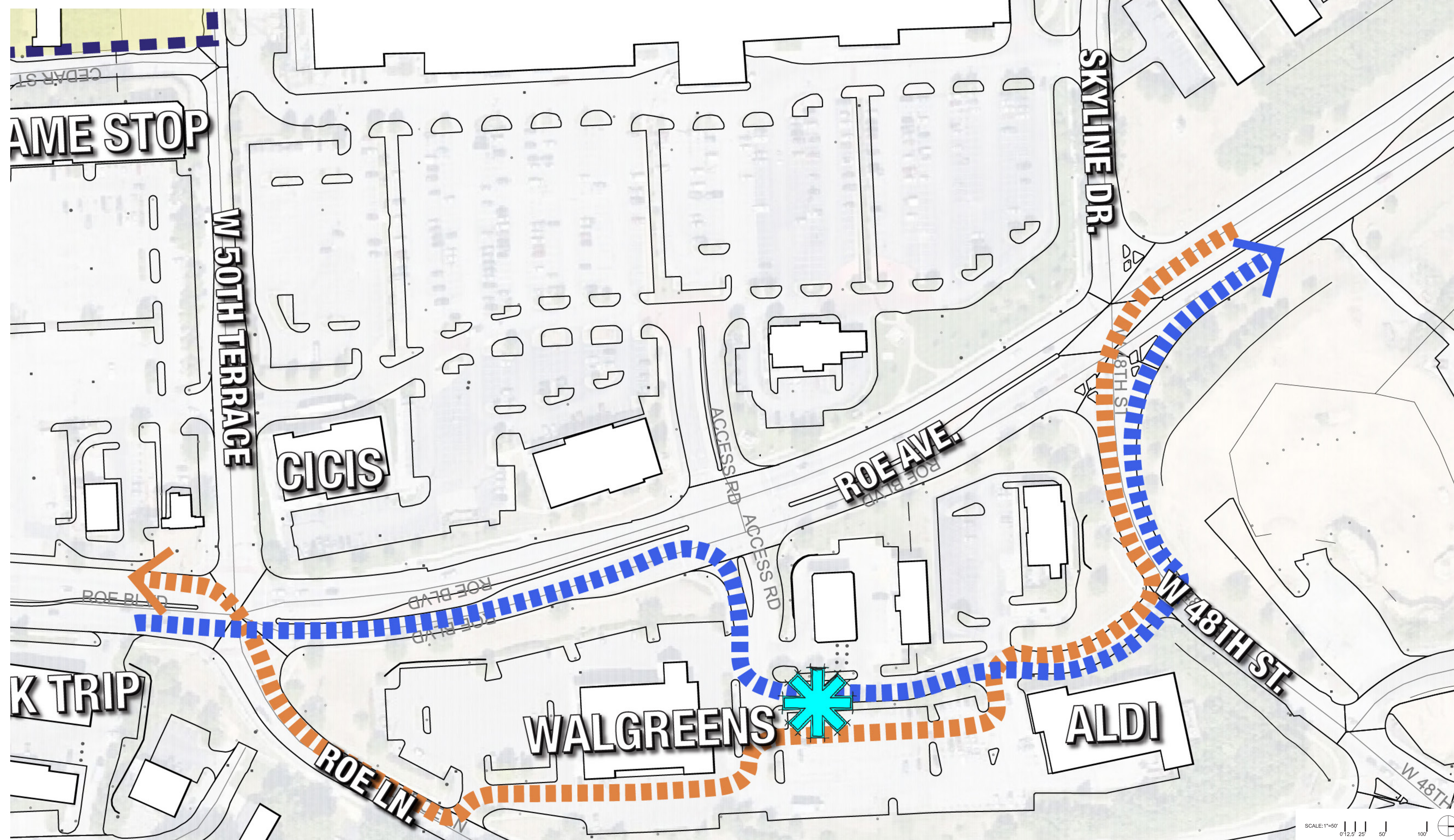
ROE BOULEVARD AND JOHNSON DRIVE CORRIDOR PLAN
ROELAND PARK, KANSAS

MAY 29, 2019

CONFLUENCE



CHARACTER IMAGES:



DEVELOPMENT LEGEND:

- Existing Building
- Northbound Transit
- Southbound Transit
- Transit Hub



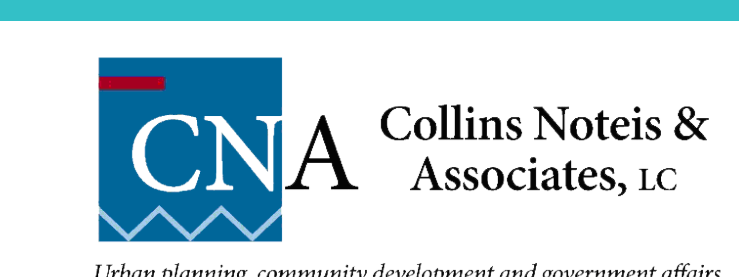
MOBILITY HUB CONCEPT

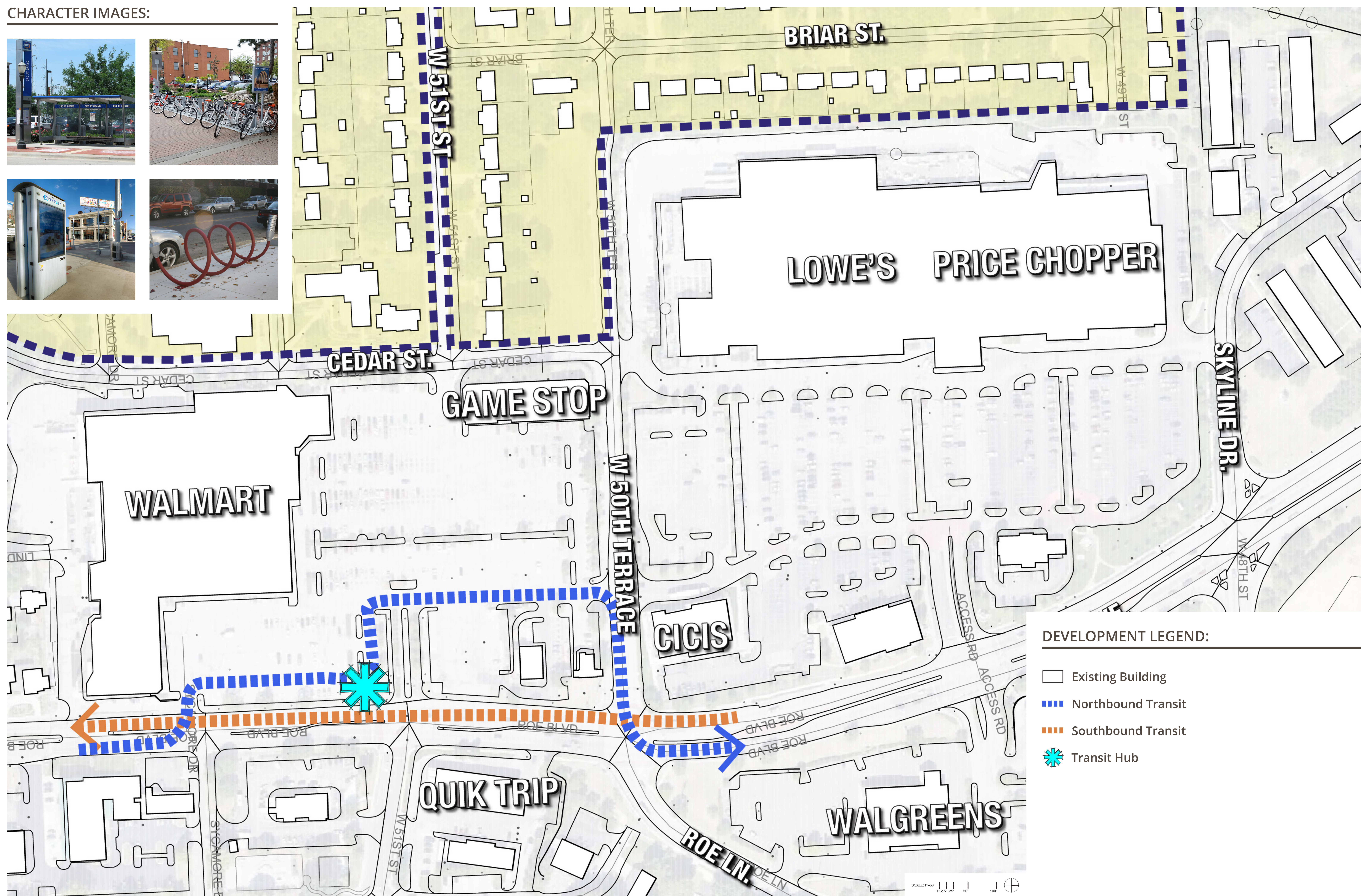


ROE BOULEVARD AND JOHNSON DRIVE CORRIDOR PLAN
ROELAND PARK, KANSAS

MAY 29, 2019

CONFLUENCE

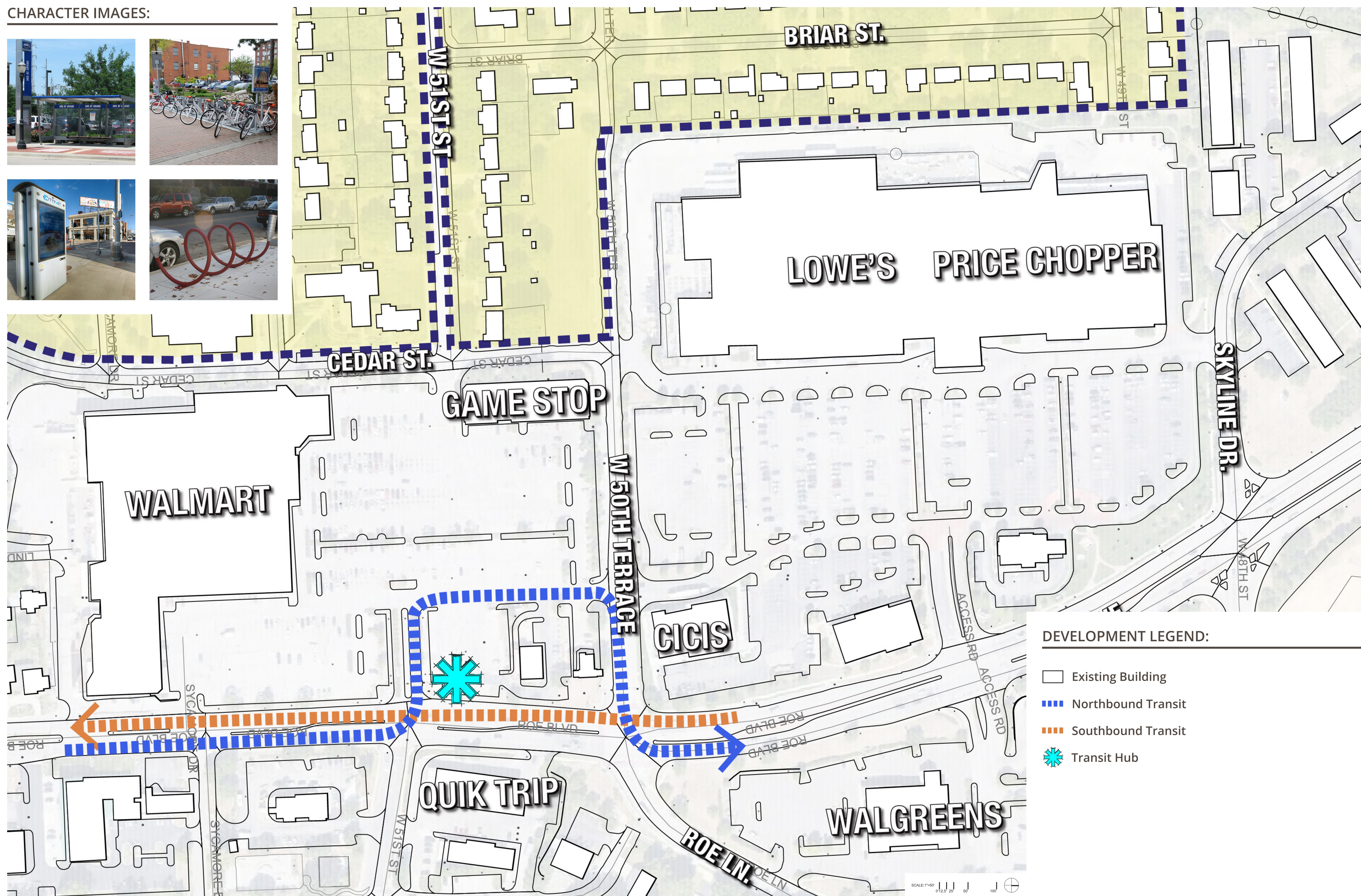




DEVELOPMENT LEGEND:

- Existing Building
- Northbound Transit
- Southbound Transit
- Transit Hub

CHARACTER IMAGES:



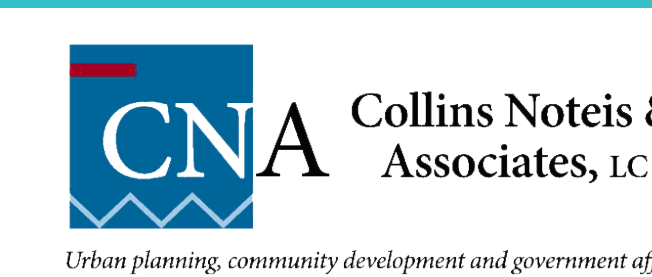
MOBILITY HUB CONCEPT



ROE BOULEVARD AND JOHNSON DRIVE CORRIDOR PLAN
ROELAND PARK, KANSAS

MAY 29, 2019

CONFLUENCE



Item Number: New Business- X.-A.
Committee 6/17/2019
Meeting Date:



City of Roeland Park
Action Item Summary

Date: 5/17/2019
Submitted By: Keith Moody
Committee/Department: Admin.
Title: **Approve Task Order for Community Center Conceptual Design Project**
Item Type:

Recommendation:

Staff recommends approval of the task order with the City Engineer to move forward on the 2019 Concept Design objective for the Community Center.

Details:

Below is a copy of the 2019 Objective related to design efforts for the Community Center:

1. Community Center – Exterior and Interior Concept Design Renderings Improvement Plan

Justification: The City of Roeland Park during the past 8 years has invested in updating structural components at the Community Center including plumbing, roofing, HVAC, electrical, painting. Many of the ongoing maintenance items are contained in the

CIP plan.

The City has not invested in a design concept to guide visioning to get ideas about possibilities for the space and further renovation of the community center. The schematic plan would give vision to update the dated Community Center interior design (walls, flooring, lighting) and update the exterior design which reflects an out of date 50's era elementary school. The uses planned for the facility should also be taken into consideration so that the design/form follows function.

The design concept would provide direction for the CIP and how to maximize use of the community center. The goal of this concept design would be to assess the practical assets of the community center and to guide interior and exterior design improvements that build a sense of community, increase usage of space and income from rentals and bring forth a health and wellness campus that promotes connection for the City of Roeland Park. An Ad Hoc Committee consisting of the Finance Committee members and residents with architectural expertise would administer the project in concert with a selected architectural firm.

Cost Estimate: \$30,000 **Account 5209.290**

Completion Date: December 1, 2019

Responsible Party: Finance Committee, City Administrator

Submitted By: Becky Fast and Tom Madigan

Attached is the task order from SFS reflecting the scope of services and fee they propose for the project. It does reflect SFS staff attending 3 meetings and facilitating the process, it does not reflect a community engagement process with serrates and such. Nor does it provide for producing construction plans. The Objective does not contemplate building new structures and therefore the scope does not reflect that broad of a process.

Financial Impact

Amount of Request: \$19,500	
Budgeted Item?	Budgeted Amount: \$30,000
Line Item Code/Description: 5209.290	

Additional Information

The task order has had audio visual assessment added to the scope per the request at the prior

workshop. This had not impact on the fee.

How does item relate to Strategic Plan?

Effort helps to ensure the City is getting the most out of our recreation facilities.

How does item benefit Community for all Ages?

A community for all ages lens will be applied during the discussions/planning effort.

ATTACHMENTS:

Description	Type
SFS Task Order- Community Center Interior & Exterior Design Project	Cover Memo



May 20, 2019

Keith Moody
City Administrator
City of Roeland Park
4600 W 51st Street
Roeland Park KS 66205

Re: **City of Roeland Park Kansas On-Call Architectural Services**
Roeland Park Community Center Aesthetic Upgrades: Conceptual Design
Task Order No. 04
SFS Project No. 191022-04

Mr. Moody,

We appreciate the opportunity to work with the City of Roeland Park on this project. On behalf of the SFS Architecture team please find below the proposed scope of work and fees for the above referenced task order. If you have questions or comments regarding this information, please do not hesitate to call.

PROJECT UNDERSTANDING

Task Order Description

The Roeland Park Community Center is located in an existing building originally constructed as an elementary school in the 1950's. The City seeks to develop a design concept to refresh the interior and exterior building aesthetics to a more contemporary reflection of the amenities and activities offered in the facility. This concept design will guide the vision for future improvements and renovations that may occur at the facility by maximizing use of a community center. SFS Architecture will work with an Ad Hoc Committee of City Staff, JCPRD (facility manager) and residents to steer the design concept and discuss programming opportunities.

SCOPE OF WORK

Basic Services

Basic Services for this task order will include the discipline of Architecture for the following tasks:

- Facility Assessment
 - Visual Observations of Physical Conditions
 - Analysis of Existing Audio-Visual Systems and Expansion Opportunities
 - Accessibility Compliance Review
- Conceptual Design
 - SFS will create a 'base model' in Autodesk Revit v2020 for use in developing the conceptual design options and renderings as well as for future use for improvements planning, design documentation, and bid documents.
 - Interior and exterior improvements that:
 - Assess the practical assets of the community center,
 - support a sense of community,
 - increase usage of the space to enhance income potential from rental opportunities,
 - promote health and wellness by developing more of a campus feel that promotes connection for the City of Roeland Park,
 - consider existing Audio-Visual systems and potential expansion into other spaces
 - Produce plans, diagrams, and renderings to illustrate the design concept.



Basic Services Assumptions

The schedule and fees are based on the following assumptions:

- (3) meetings will require attendance by SFS Architecture.
- Access to the project site and building(s) for purposes of observing existing conditions and assessing solutions.

Basic Services Exclusions

The following items are specifically excluded from the Basic Services noted above:

- Structural, Mechanical, Electrical, Plumbing, and Fire Protection Engineering;
- Geotechnical investigations and recommendations;
- Traffic studies, roadway design and public improvements;
- Hazardous materials abatement assessment and design.

Supplemental Services

Supplemental Services for the following disciplines and tasks are as indicated below:

<i>Discipline</i>	<i>Included? (X = Yes/No if left blank)</i>
Civil Engineering	
Landscape Architecture	
Aquatics Design	
Audio-Visual Design	
Telecommunications and Data Systems	
Acoustic Consultant	
Furniture, Fixtures, and Equipment (FFE) Design and Procurement	
Security Systems	
Third-Party Cost Estimating	
<i>Other:</i>	

A description of each Supplemental Service included above:

Deliverables

Deliverables anticipated for the above scope of work include:

- Assessment Report:
 - Physical Conditions and Accessibility Compliance
- Conceptual Design:
 - Floor Plans: Layout, Finish Plan
 - Building Elevations with finishes
 - Renderings: (3) Interior views and (2) Exterior views
 - Materials Board: Interior and Exterior

Schedule

Wk June 10, 2019	Kick Off Meeting: Goals and Vision
Wk August 19, 2019	Preliminary Concept Alternatives Review
Wk Sept. 16, 2019	Confirm Concept Design Direction
October 15, 2019	Deliverables Complete



COMPENSATION

Professional Fees

SFS architecture proposes to provide the above services for a not-to-exceed (NTE) fee of Nineteen Thousand Five Hundred Dollars (\$19,500.00).

Reimbursable Project Expenses

Expenses incurred by SFS or the consultants for reproduction, postage, local travel, and deliveries will be billed as the architect's actual cost plus 10%.

Invoicing

Invoicing will occur monthly for services rendered and are due upon receipt.

Respectfully submitted,

Brian Garvey AIA LEED AP
Principal

AUTHORIZATION TO PROCEED

By signing below, it authorizes SFS Architecture to proceed with the work outlined above.

Signature

Printed Name / Title

Date

Item Number: New Business- X.-B.
Committee 6/17/2019
Meeting Date:



City of Roeland Park

Action Item Summary

Date: 5/31/2019
Submitted By: Keith Moody
Committee/Department: Admin.
Title: **Approve Service Agreement with GBA to Develop Bid Specs for Heating and Cooling Options for Community Center**
Item Type:

Recommendation:

Staff recommends approving a scope of services with GBA to develop bid specifications for HVAC options at the Community Center. The intent is to decommissioning the boiler and convert 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, but the existing duct work can be reused.

Council discussed the concept on their 1/24/19 workshop and directed staff to expand the scope to reflect conventional high efficiency forced air units, heat pump units or earth contact thermal units. Staff asked the City Architect for a scope and fee to develop bid documents as well as GBA. GBA was asked due to their familiarity with the building as they completed an energy audit for the facility in 2012 (attached). GBA's fees is considerably less than the fee proposed by SFS (\$72,500) because they have completed all of the investigatory MEP work.

Fall will be a good time to complete the work (when A/C and heat are used minimally), and replacing these items is good timing as the boiler and A/C units being decommissioned/replaced are older and the project improves energy efficiency at the facility.

Financial Impact

Amount of Request: \$9,800	
Budgeted Item?	Budgeted Amount: N/A
Line Item Code/Description:	

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.

How does item relate to Strategic Plan?

The project will extend the life of one of our primary public facilities and enhance the energy efficiency of the facility.

How does item benefit Community for all Ages?

N/A

ATTACHMENTS:

Description

- GBA Community Center HVAC Replacement Proposal
- Community Center Energy Audit

Type

- Cover Memo
- Cover Memo



9801 Renner Boulevard,
Suite 300
Lenexa, KS 66219

May 29, 2019

Mr. Keith Moody
City of Roeland Park
4600 W 51st Street
Roeland Park, KS 66205

SUBJECT: Proposal – HVAC Improvements

GENERAL DESCRIPTION

The Roeland Park Community Center uses a hot water condensing boiler providing heat for rooms on the south side of the building. The boiler is oversized and has a system volume that is too small, causing excessive cycling. The excessive cycling contributes to significantly reduced efficiency, faults and reduced service life. The city would like to replace the boiler system and existing cooling only split systems with new split systems that contain integral heat.

PROJECT DESCRIPTION:

GBA will provide an assessment of the areas currently served by the condensing boiler system and recommendations to replace that system. The final deliverable will be a summary of findings with equipment selections and specifications for 3 options.

SCOPE OF SERVICES

Site Visits:

GBA will make an initial site visit at the project start. GBA's site visit will include a kickoff meeting and time for field work to gather the necessary data for the assessment. The field work will include gathering data from the existing HVAC system. Duct routings and dimensions will be based on existing drawings.

Assessment:

1. GBA will complete a load calculation to determine the appropriate capacity for any new equipment to be installed.
2. GBA will consider the existing spaces, calculated loads, and make equipment recommendations to re-serve the spaces without a boiler. GBA will consider the following options:
 - a. Split system with condensing furnace and high efficiency condensing unit
 - b. Split system heat pump system
 - c. Ground source heat pump system
3. Each option presented will have an estimated annual operating cost, energy consumption and life cycle cost associated with that option.
4. GBA will evaluate the feasibility of combining the 8 separate existing air handlers into fewer split systems to reduce the number of pieces of equipment.

Deliverables:

The final deliverable will be a summary containing the findings of the assessment. The summary will include the following:

- Recommendations for replacement
- Equipment Schedules
- Equipment Specifications

Schedule

The estimated schedule is as follows:

Project Award and PO Issued July 1, 2019
Kickoff Meeting and Field work..... July 3, 2019
Final Summary of Findings and Specifications/Schedules July 17, 2019

Assumptions and Exclusions:

1. Detailed design, construction drawings and construction period services including shop drawings review are not included.
2. Owner will provide GBA complete access to the area of the study and current management personnel during normal working hours for the purpose of inspecting existing site for the assessment.
3. System equipment and installation costs to be provided by Jeff Lippert with Lippert Mechanical Service Corp.
4. Soil analysis, and boring are not included. Design of a ground source water loop is excluded. Cost data to be based on typical boring depths and sizes for ground loops.

Fee and Basis of Payment

GBA proposes to provide the services outlined above for the lump sum fee amount of **\$9,800.00**.

Invoicing will occur at the end of the project. Services provided per the attached terms and conditions which shall be signed and returned.

Sincerely,

GEORGE BUTLER ASSOCIATES, INC.

_____ Date: _____

Michael Glasker, P.E.
Vice President
GBA

Contract terms and fees accepted by:

_____ Date: _____

Keith Moody
City of Roeland Park



CITY OF
ROELAND PARK

March 12, 2012



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.

9801 Renner Boulevard
Lenexa, Kansas
66219-9745

913.492.0400
913.577.8200 fax

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.

A handwritten signature in blue ink, appearing to read "J. Gunby".

Jennifer Gunby, PE, LEED AP
Project Engineer

GBA Companies
Lenexa, KS
Kansas City, MO
O'Fallon, MO
St. Louis, MO
St. Joseph, MO
Omaha, NE
Rock Island, IL
Chicago, IL
Cary, NC

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 ft³ 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/ft³ 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 Btu/h; 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.

Utility	Provider	Yearly Totals					
		2009/10			2010/11		
		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

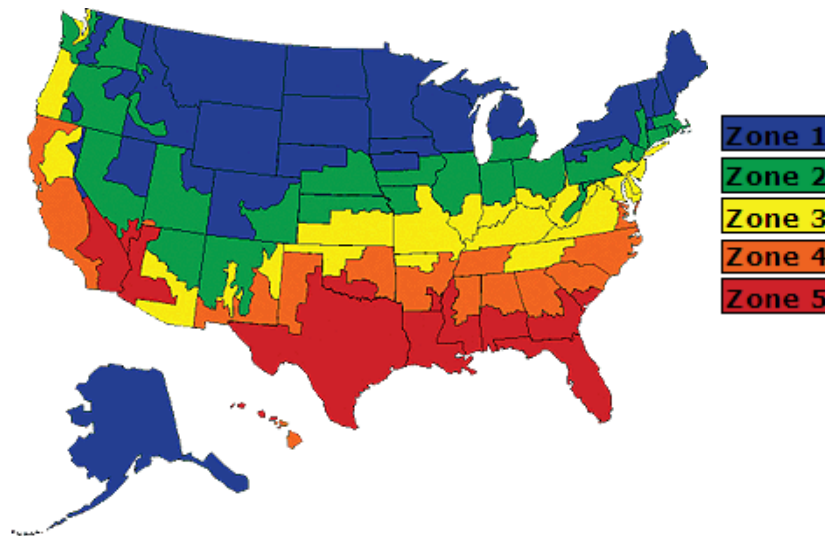
Table 4.4.A: Greenhouse Gas Equivalencies

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.

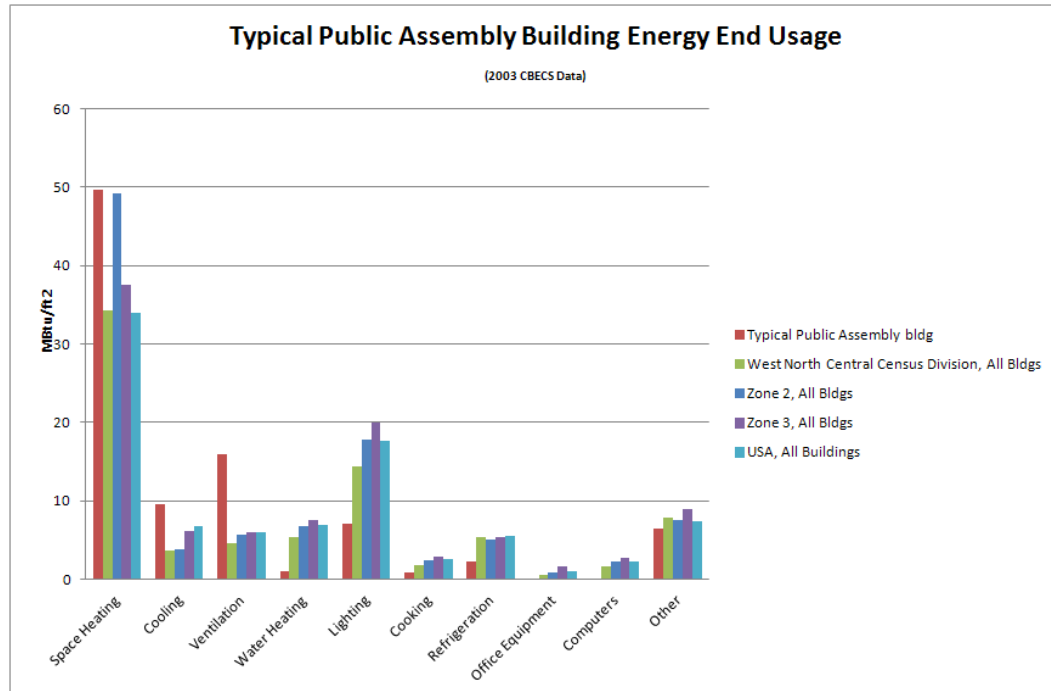


Figure 4.5.B: Typical Public Assembly Building Energy End Usage

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 façade 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/ihtml/ihtmlductliner.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

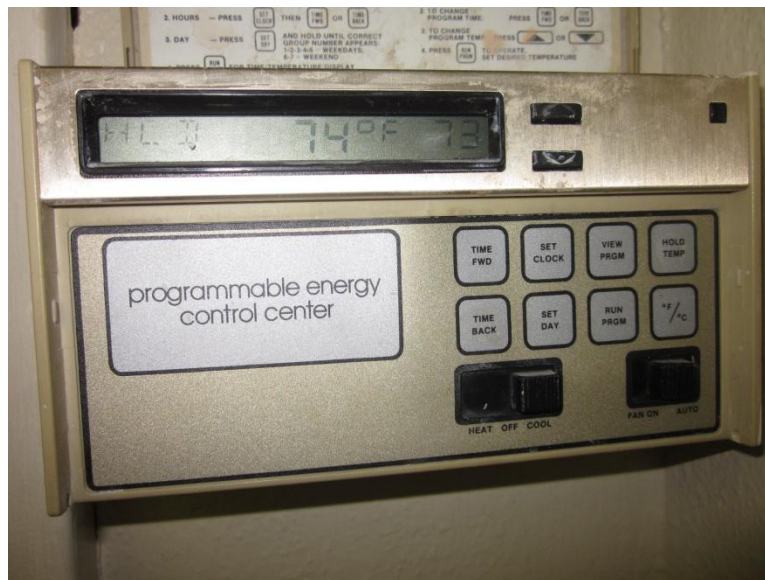


Figure 4.11.B: Typical Programmable Split System Thermostat

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

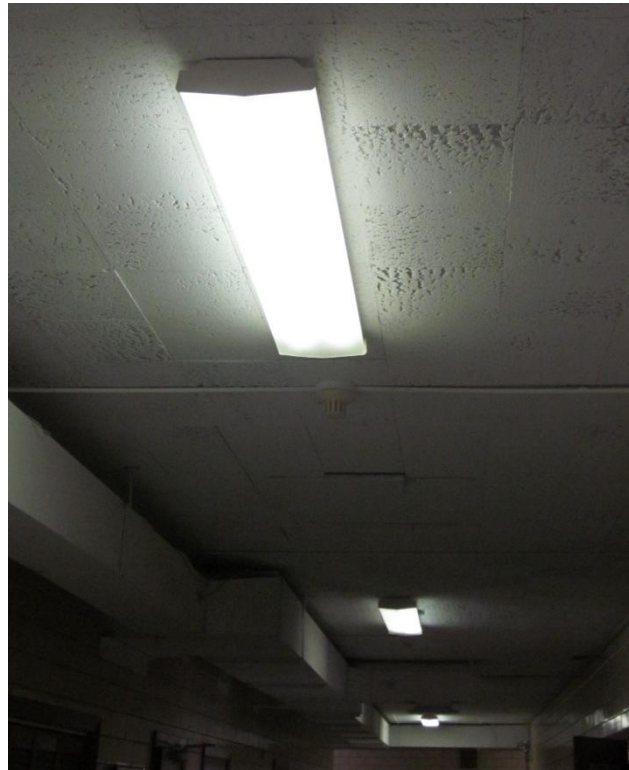


Figure 4.13.C: Typical Hallway Lighting

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.

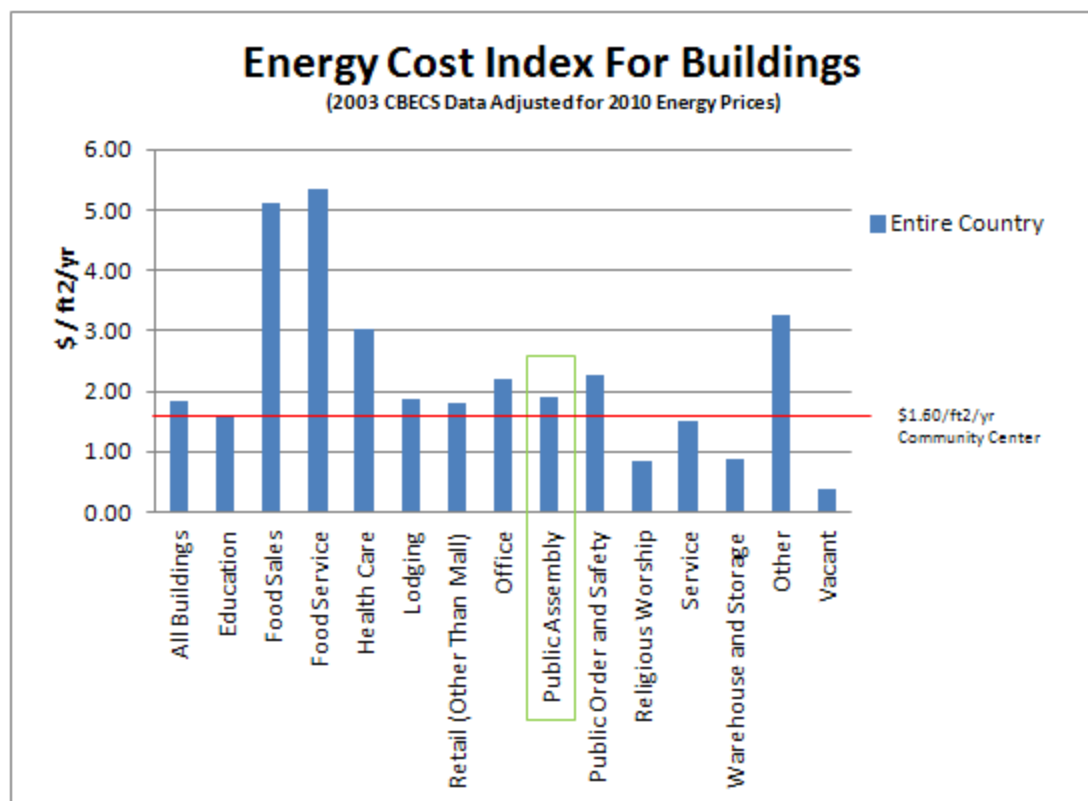


Figure 5.2.A: Energy Cost Index

The average value of the ECI for a Public Assembly building is \$1.89/ft²/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.

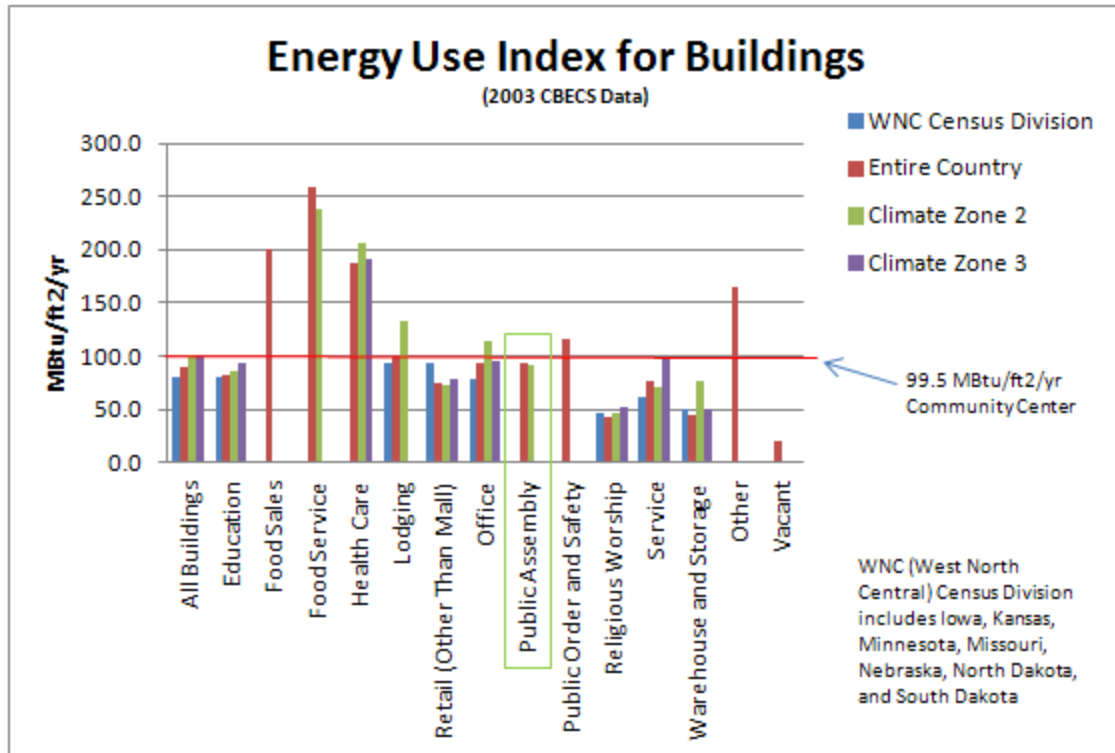


Figure 5.2.B: Energy Use Index

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/ft²/yr
- For Climate Zone 2: 90.8 Mbtu/ft²/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 begin 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.

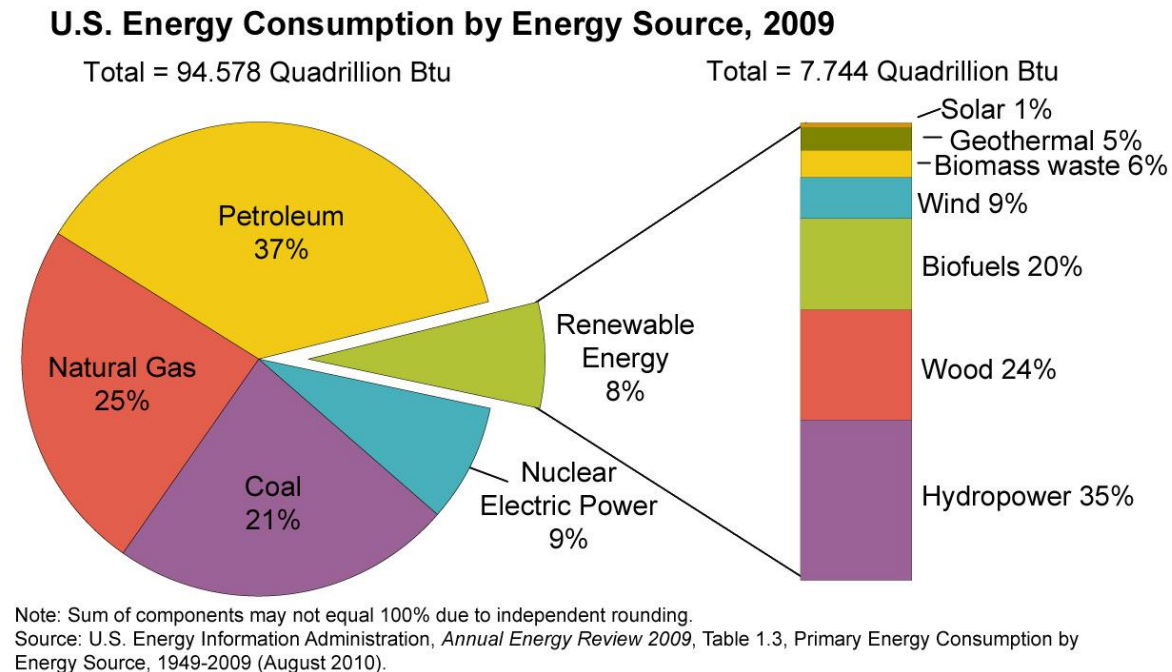


Figure 2.1: US Energy Administration US Energy Consumption by Energy Source graph

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.

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.



Image courtesy of the DOE

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 in 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

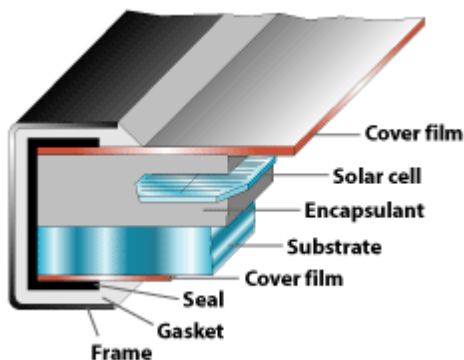


Figure 2.3.1b Flat Panel System (DOE)

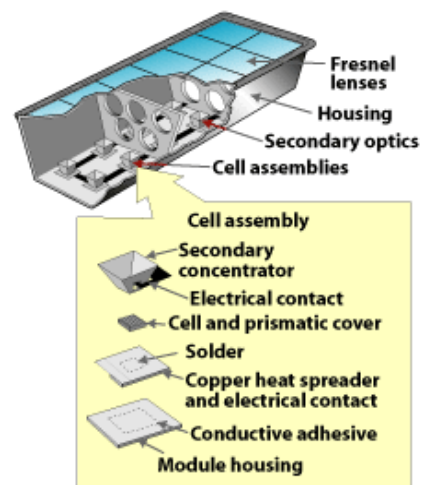


Figure 2.3.1c Concentrator System (DOE)

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.

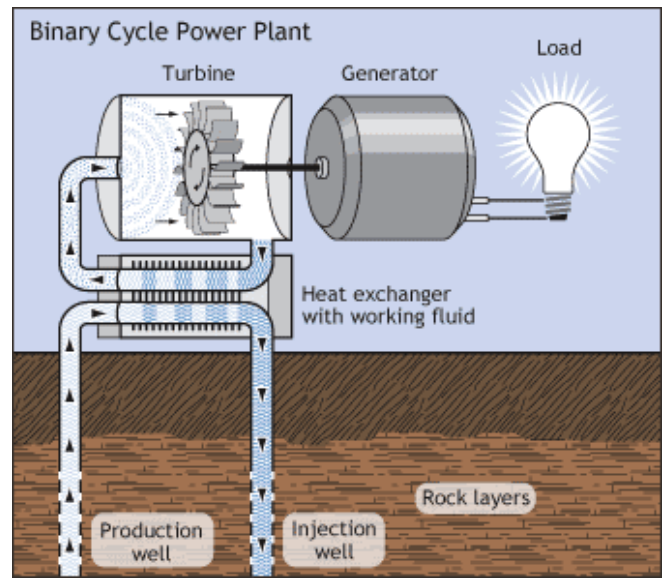


Figure 2.4.1 Binary Cycle Plant (DOE)

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.

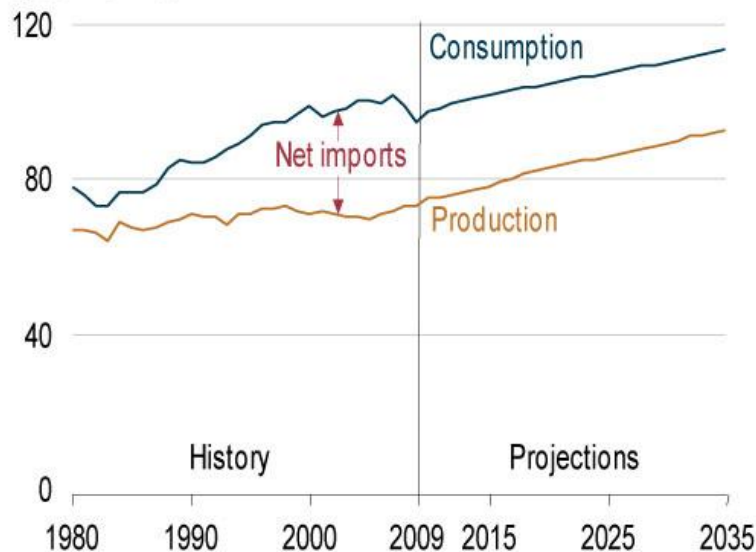
2.9.2 Carbon Footprint Reduction

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.

Figure 10. Total energy production and consumption, 1980-2035
Quadrillion Btu



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

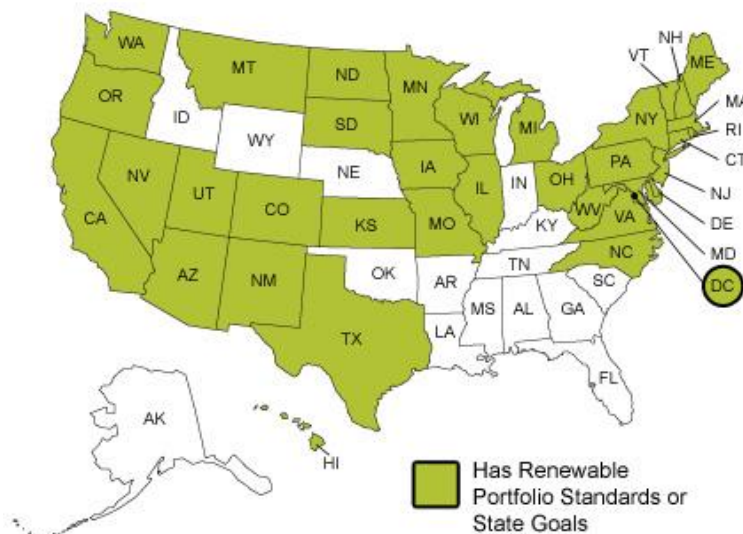
Renewable energy generated onsite can provide clean, locally generated power, as well as lower utility bills. However, there are additional benefits that cannot be summarized in environmental or economic terms. Most consumers prefer sustainable business practices, and many renewable energy technologies 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.

Most States Have Renewable Portfolio Standards, Mandates, or Goals, 2010



Source: Database of State Incentives for Renewables & Efficiency (accessed January 2010).

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.

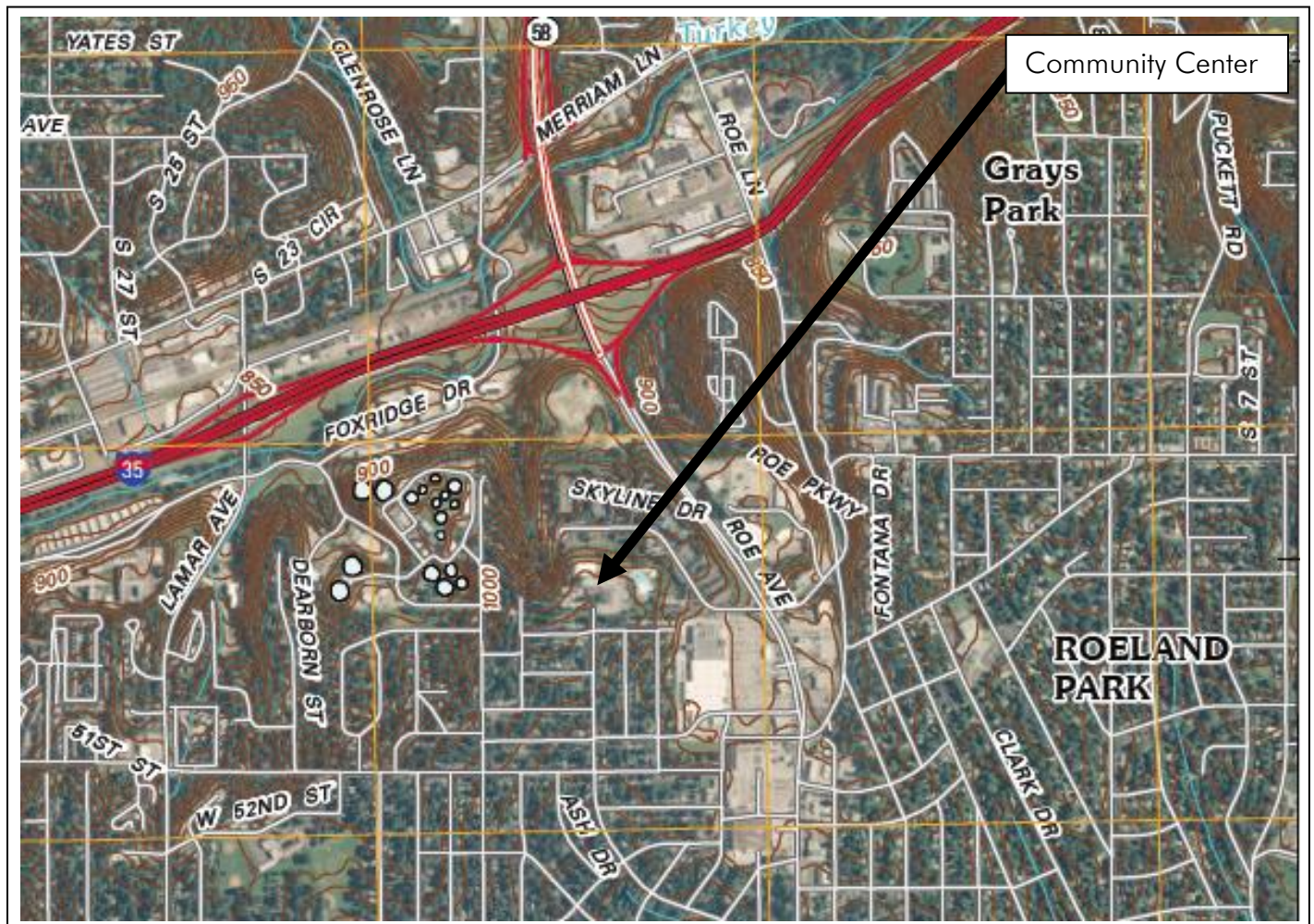


Figure 3.1a: USGS Topo Map

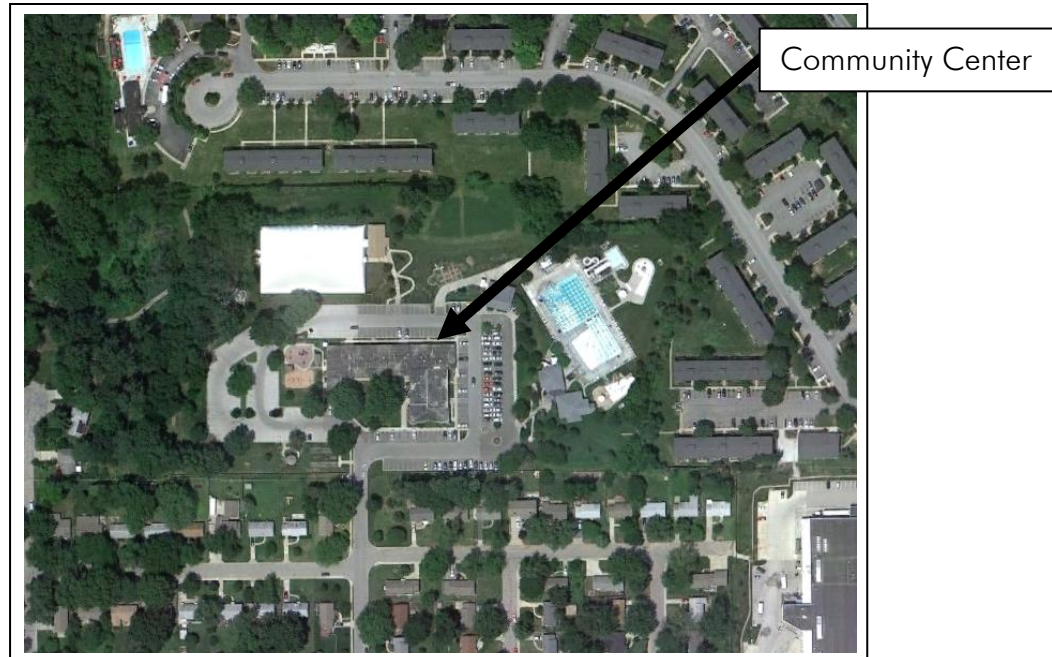


Figure 3.1b: Aerial Photo of the Roeland Park Community Center and Surrounding Area

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).

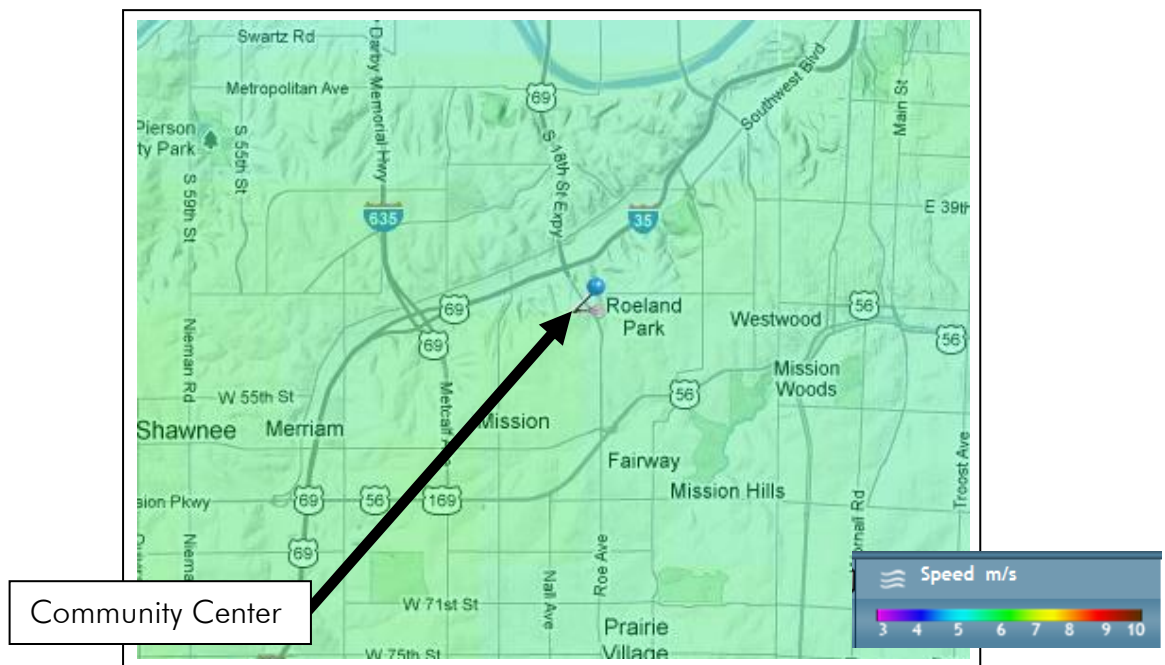


Figure 3.2a: Wind Resource map of Roeland Park at 60m

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/m² (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.

Length of Time	Possible Rate Increases			
	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 as 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 warranties, 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.

FOUR | TRANSPORTATION ENERGY IMPACTS

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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 to 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 be 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	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	5% DB	MCDBR	16.1	17.4	19.4	18.9	17.8	17.3	17.2	17.5	18.5	18.7	16.6	15.6
		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	

CDDn Cooling degree-days base n°F, °F-day
 CDHn 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 horizontal irradiances at solar noon, Btu/h/ft²
 Edh,noon }
 Elev Elevation, ft
 Enth Enthalpy, Btu/lb
 HDDn 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

Median Service Life, Years			Median Service Life, Years			Median Service Life, Years		
Abramson Akalin et al. (2005) (1978)			Abramson Akalin et al. (2005) (1978)			Abramson Akalin et al. (2005) (1978)		
Equipment Item			Equipment Item			Equipment Item		
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			Molded	N/A*	20
Heat pumps			Ductwork			Blanket	N/A*	24
Residential air-to-air	N/A*	15 ^b	Dampers			Pumps		
Commercial air-to-air	N/A*	15	Fans			Base-mounted	N/A*	20
Commercial water-to-air	>24	19	Centrifugal			Pipe-mounted	N/A*	10
Roof-top air conditioners			Axial			Sump and well	N/A*	10
Single-zone	N/A*	15	Propeller			Condensate	N/A*	15
Multizone	N/A*	15	Ventilating roof-mounted			Reciprocating engines		
Boilers, Hot-Water (Steam)			Coils			Steam turbines	N/A*	20
Steel water-tube	>22	24 (30)	DX, water, or steam			Electric motors	N/A*	30
Steel fire-tube		25 (25)	Electric			Motor starters	N/A*	18
Cast iron	N/A*	35 (30)	Heat Exchangers			Electric transformers	N/A*	17
Electric	N/A*	15	Shell-and-tube			Controls		
Burners			Reciprocating compressors			Pneumatic	N/A*	20
Furnaces			Packaged Chillers			Electric	N/A*	16
Gas- or oil-fired	N/A*	18	Reciprocating			Electronic	N/A*	15
Unit heaters			Centrifugal			Valve actuators		
Gas or electric	N/A*	13	Absorption			Hydraulic	N/A*	15
Hot-water or steam	N/A*	20	Cooling Towers			Pneumatic	N/A*	20
Radiant heaters			Galvanized metal			Self-contained		10
Electric	N/A*	10	Wood					
Hot-water or steam	N/A*	25	Ceramic					

*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 (SO₂, SO₃) 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: New Business- X.-C.
Committee 6/17/2019
Meeting Date:



City of Roeland Park
Action Item Summary

Date: 6/13/2019
Submitted By: Mayor Kelly
Committee/Department: Admin.
Title: **Appoint Russell McCorkle to Park Committee**
Item Type:

Recommendation:

To appoint Russell McCorkle to the Parks Committee.

Details:

Financial Impact

Amount of Request:	
Budgeted Item?	Budgeted Amount:
Line Item Code/Description:	

Additional Information

How does item relate to Strategic Plan?

How does item benefit Community for all Ages?

ATTACHMENTS:

Description	Type
□ Russell McCorkle	Cover Memo

Online Form Submittal: Committee Volunteer Form

noreply@civicplus.com

Mon 3/25/2019 3:54 PM

To: Bohon, Kelley <kbohon@roelandpark.org>; Jones-Lacy, Jennifer <jjoneslacy@roelandpark.org>

Committee Volunteer Form

Date	3/25/2019
First Name	Russell
Last Name	McCorkle
Address	5025 W. 56th Street
City	Roeland Park
State	KS
Zip	66205
Email	
Phone	
Place of Employment	<i>Field not completed.</i>
How long have you been a resident of Roeland Park?	Since 1996 on my own. Family moved here in 1963.
How much time do you have to devote per month?	<i>Field not completed.</i>
Board & Committee Interest	Several current members of the Parks committee feel that I can bring another viewpoint to the committee. Living across the street from R Park I see specifically how the park is used and what current and future needs might be. I also regularly walk by other parks in the city.
Select a Board or Committee	Parks
Additional Comments	<i>Field not completed.</i>
Resume	<i>Field not completed.</i>

Email not displaying correctly? [View it in your browser.](#)

Item Number: New Business- X.-D.
Committee
Meeting Date: 6/17/2019



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:

Financial Impact

Amount of Request:	
Budgeted Item?	Budgeted Amount:
Line Item Code/Description:	

Additional Information

How does item relate to Strategic Plan?

How does item benefit Community for all Ages?

Item Number: New Business- X.-E.
Committee 6/17/2019
Meeting Date:



City of Roeland Park
Action Item Summary

Date: 6/17/2019
Submitted By: Jennifer Jones-Lacy
Committee/Department: Admin
Title: **Potential Sale of Property**
Item Type: Agreement

Recommendation:

Council may consider approval of an agreement for the sale of the city-owned property at the northeast corner of Johnson and Roe following executive session.

Details:

Financial Impact

Amount of Request:	
Budgeted Item?	Budgeted Amount:
Line Item Code/Description:	

Additional Information

How does item relate to Strategic Plan?

How does item benefit Community for all Ages?