CITY OF LANSING
Council Chambers
800 1st Terrace
Lansing, KS 66043

COUNCIL AGENDA
Regular Meeting
Thursday, December 17, 2015
7:00 P.M.

WELCOME TO YOUR CITY COUNCIL MEETING

Regular meetings are held on the first and third Thursday of each month at 7 pm and are televised on Cable Television Channel 2 on Monday 7 pm, Tuesday 10 am & 7 pm, Friday 5 pm, Saturday 1 pm and Sunday 7 pm.

Any person wishing to address the City Council, simply proceed to the microphone in front of the dais after the agenda item has been introduced and wait to be recognized by the Mayor. When called upon, please begin by stating your name and address. A time designated "Audience Participation" is listed on the agenda for any matter that does not appear on this agenda. The Mayor will call for audience participation. Please be aware that the city council and staff may not have had advance notice of your topic and that the city council may not be able to provide a decision at the meeting. If you require any special assistance, please notify the City Clerk prior to the meeting.

Call To Order

Pledge of Allegiance

Roll Call

OLD BUSINESS:

1. Approval of Minutes

NEW BUSINESS:

Audience Participation

Council Consideration of Agenda Items:

2. Resolution No. B-6-15 Kansas PRIDE Program
3. Renewal Request for Special Use Permit (336 Fawn Valley Ct)
4. Sidewalk Fee Refund Request
5. Executive Session: Non-Elected Personnel

Reports:

City Attorney; City Engineer; City Administrator; Councilmembers

Other Items of Interest

6. Department Vehicle and Equipment Mileage Reports
7. Certificate of Completion – Dennis Thompson – 59th Annual Asphalt Paving Conference
8. Thank you – Police Department
9. K-7 Corridor Management Plan

Adjournment

TO: Tim Vandall, City Administrator

FROM: Sarah Bodensteiner, City Clerk

DATE: December 11, 2015

SUBJECT: Agenda Summary

AGENDA SUMMARY

Call To Order
Pledge of Allegiance
Roll Call

OLD BUSINESS:

1. **Approval of Minutes**
   The special meeting minutes of December 3, 2015 and the regular meeting minutes of December 3, 2015, are attached.
   - **ACTION:** A motion to approve the special meeting minutes of December 3, 2015 and the regular meeting minutes for December 3, 2015, as presented.

NEW BUSINESS:

Audience Participation
Presentation

Items for Council Consideration:

2. **Resolution No. B-6-15 Kansas PRIDE Program**
   - A resolution pledging support for the Kansas PRIDE Program
   - **ACTION:** A motion to adopt Resolution B-6-15 supporting the Kansas PRIDE Program.
3. **Renewal Request for Special Use Permit (336 Fawn Valley Ct)**
   - A special use permit renewal for more than 4 animals.
   - **ACTION:** A motion to approve the special use permit for 336 Fawn Valley Ct.
4. **Sidewalk Fee Refund Request**
   - A request has been submitted to refund the sidewalk fee for a new single family dwelling located on a dead end part of North 8th Street.
   - **ACTION:** A motion to approve or deny the sidewalk fee refund.
5. **Executive Session: Non-Elected Personnel**
   - **ACTION:** A motion to recess into Executive Session for _____ minutes to discuss personnel matters of non-elected personnel beginning at _____PM and returning at_____PM.

Reports: City Attorney; City Engineer; City Administrator; Councilmembers

Proclamations

Other Items of Interest

6. Department Vehicle and Equipment Mileage Reports
7. Certificate of Completion – Dennis Thompson – 59th Annual Asphalt Paving Conference
8. Thank you – Police Department
9. K-7 Corridor Management Plan

Adjournment

AGENDA SUMMARY

TO: Tim Vandall, City Administrator

FROM: Sarah Bodensteiner, City Clerk

DATE: December 8, 2015

SUBJECT: Approval of Minutes

The special meeting minutes for December 3, 2015 and the regular meeting minutes for December 3, 2015, are enclosed for your review.

Action:
Staff recommends a motion to approve the special meeting minutes for December 3, 2015 and the regular meeting minutes for December 3, 2015, as presented.

AGENDA AGENDA AGENDA ITEM # 1

CITY OF LANSING
CITY COUNCIL MEETING

SPECIAL MEETING MINUTES
December 3, 2015

Call To Order:
The special meeting of the Lansing City Council was called to order by Mayor Gene Kirby at 5:30 p.m.

Roll Call:
Mayor Gene Kirby called the roll and indicated which councilmembers were in attendance.

Councilmembers Present:
Ward 1: Dave Trinkle and Kevin Gardner
Ward 2: Andi Pawlowski and Don Studnicka
Ward 3: Jesse Garvey and Kerry Brungardt
Ward 4: Gregg Buehler and Tony McNeill (arrived at 6:03 p.m.)

Councilmembers Absent:

NEW BUSINESS:
COUNCIL CONSIDERATION OF AGENDA ITEMS:
Interviews for Leavenworth County Fire District No. 1 Board of Trustees Lansing Representatives: The Governing Body interviewed the applicants for the Leavenworth County Fire District No. 1 Board of Trustees Lansing Representatives.

Representative Lynn Jenkins Request for Signature of Guantanamo Bay Letter: Councilmember Pawlowski moved to authorize Mayor Kirby to execute the letter written and provided by Representative Lynn Jenkins in opposing the closure and transfer of detainees of Guantanamo Bay to Fort Leavenworth. Councilmember Gardner seconded the motion. The motion was unanimously approved.

ADJOURNMENT: Councilmember Pawlowski moved to adjourn. Councilmember Buehler seconded the motion. The motion was unanimously approved. The meeting was adjourned at 6:28 p.m.

ATTEST:

Louis E. Kirby, Mayor

Sarah Bodensteiner, City Clerk

CITY OF LANSING
CITY COUNCIL MEETING

REGULAR MEETING MINUTES
December 3, 2015

Call To Order:
The regular meeting of the Lansing City Council was called to order by Mayor Gene Kirby at 7:00 p.m.

Roll Call:
Mayor Gene Kirby called the roll and indicated which councilmembers were in attendance.

Councilmembers Present:
Ward 1: Kevin Gardner and Dave Trinkle
Ward 2: Andi Pawlowski and Don Studnicka
Ward 3: Jesse Garvey and Kerry Brungardt
Ward 4: Tony McNeill and Gregg Buehler

Councilmembers Absent:

OLD BUSINESS:

Consent Calendar: Councilmember Buehler moved to approve the regular meeting minutes of November 19, 2015. Councilmember Garvey seconded the motion. The motion was unanimously approved.

NEW BUSINESS:

Audience Participation: Mayor Kirby called for audience participation and there was none.
Presentation

COUNCIL CONSIDERATION OF AGENDA ITEMS:

Consent Calendar: Councilmember Buehler moved to approve the Consent Calendar as presented. Councilmember Pawlowski seconded the motion. The motion was unanimously approved.

Leavenworth County Fire District No. 1 Board of Trustees Candidate Selection: Mayor Kirby stated we are going to have discussion now if you want to make your case or have anything to say, now's the time to say it.

- Councilmember Studnicka asked are you talking to us. We don't have a motion on the floor.
  - Councilmember Pawlowski stated you don't have to have a motion to discuss.
    - Councilmember Studnicka stated I don't have any discussion items.
- Councilmember Buehler asked are we doing this one at a time or are we doing it as the sheet says and nominating both of them at once.
  - Mayor Kirby stated I would like one nomination at a time. If we nominate two people at a time and you want one and not the other we could be here all night.

Councilmember Brungardt moved to appoint Marcus Majure to represent the City of Lansing on the Leavenworth County Fire District No. 1 Board of Trustees. Councilmember Studnicka seconded the motion.

The appointment was approved, with Councilmembers Garvey and Trinkle voting against the nomination

Councilmember Garvey moved to appoint Lisa Snodgrass to represent the City of Lansing on the Leavenworth County Fire District No. 1 Board of Trustees. Councilmember Brungardt seconded the motion.

The appointment was denied, with Councilmembers McNeill, Studnicka, Trinkle, Gardner, Pawlowski, and Buehler voting against the nomination.

Councilmember Buehler moved to appoint James Fricke to represent the City of Lansing on the Leavenworth County Fire District No. 1 Board of Trustees. Councilmember Studnicka seconded the motion. The appointment was unanimously approved.

Tree Board Appointment: Councilmember Gardner moved to re-appoint John Bennett to the Lansing Tree Board for a term ending December 31, 2018. Councilmember McNeill seconded the motion. The motion was unanimously approved.

Parks and Recreation Advisory Board Appointments: Councilmember Trinkle moved to re-appoint Michelle Briggs, Barbara Hindman, Bob Lamborn, Garrett Martin, and Mike Williams to the Lansing Parks and Recreation Advisory Board for a term ending December 31, 2017. Councilmember Pawlowski seconded the motion. The motion was unanimously approved.

Ordinance No. 957: Vacating a Permanent Drainage Easement in Gamble's Crossing Subdivision: Councilmember Pawlowski moved to adopt Ordinance No. 957: An ordinance vacating a permanent drainage

easement across lots 6 and 7, Gamble's Crossing. Councilmember Trinkle seconded the motion. The motion was unanimously approved.

Public Hearing on the Proposed Amended 2015 Budget: Councilmember Studnicka moved to open the public hearing. Councilmember Trinkle seconded the motion. The motion was unanimously approved.

- Mayor Kirby stated in order to provide additional spending authority to help the families participating in the Mayor's Christmas Tree Program, staff recommends amended the budget from $3,200.00 to $5,200.00; no additional ad valorem tax will be levied.
- Councilmember Studnicka asked how many more other families will we be able to help with that increase.
    - City Clerk Sarah Bodensteiner replied we'll be adding an additional family of about nine people.
        - Councilmember Studnicka stated one family of nine.
            - Councilmember Pawlowski stated but that's not the whole amount.
                - City Clerk Sarah Bodensteiner replied no, it's not just for the one family; we have them plus the other 23 families that we are taking care of this year.
                    - Councilmember Studnicka asked so we're adding one big family.
                        - City Clerk Sarah Bodensteiner responded correct, to the already existing 23 families of over 100 people total.
- Councilmember Pawlowski stated and this is already money that you've had donated.
    - City Clerk Sarah Bodensteiner stated yes.
        - Mayor Kirby stated this is all donated money, it's not tax dollars, it can't be spent for anything else, and I can give you a little history.
- Finance Director Beth Sanford stated I can give you a little history. Typically we spend between $3,600.00 and $4,000.00 on this program each year. However when we did the budget for 2015, at the time we did it the fund balance was getting low in that fund, so we could not budget as much as we had been budgeting each year, we could only budget what we projected would come in as revenue and the existing fund balance. So, therefore, that number was bumped down to $3,200.00. Well, in the end of 2014, we had an increase in the number of donations, which raised the amount of fund balance in that fund. So really we're not going to spend more than what we normally do...
    - Councilmember Studnicka interjected but you need the spending authority.
        - Finance Director Beth Sanford stated but we need the spending authority to do it, and at the time we couldn't give that spending authority because we didn't have the monies.
- Mayor Kirby stated this started 3 or 4 weeks ago because the tags weren't flying off the trees, to be quite honest with you, and we want to provide for all those tags on the trees.
- Councilmember McNeill asked when is the date for the tags to actually be delivered.
    - Councilmember Buehler stated the 9th.
        - Councilmember McNeill stated right, so I mean how do we know people aren't bringing stuff. I know I've got like six of them at my house and I know we're actually shopping right now, because it's not due until the 9th.
            - Councilmember Buehler stated but it's all the tags that are left.
                - Councilmember McNeill stated you're saying you counted all of those.
                    - Mayor Kirby stated there are two trees, actually three trees with tags on them. There's one here, and there's one at IHOP, and there's also one at the library which is for books. We try to buy these kids a set of clothes, a pair of shoes, a coat, a toy, $10.00 per family for a gift card for groceries, actually $10.00 per family member, so if you have a family of 5 you get $50.00 and if you've been to the store lately, $50.00 doesn't buy you much.
- Councilmember McNeill asked so the fund balance is because people donated more money and we didn't authorize the spending of that fund.
    - Finance Director Beth Sanford replied we had already set the budget and we're not probably going to spend $5,200.00, but it's silly to amend it for $500.00 and find out we needed to spend $600.00. This gives us that authority should we need it; we're not anticipating that we're going to use all of it.
- Mayor Kirby stated I'm just going to give you a little history here, I bothered them today, so I'm going to let you have it. June 2014 we had a balance of $1,959.00, last year we raised $6,988.00, and we spent $3,760. So this year we started with a balance of $5,223.00, so far we've raised $4,388.00. If we were to spend the entire $5,200.00, we would still have a balance of $4,421.00.
- Councilmember Gardner asked so we'll be able to take care of all the needs.
    - Mayor Kirby replied yes.

Councilmember Studnicka moved to close the public hearing. Councilmember Trinkle seconded the motion. The motion was unanimously approved.

Councilmember Studnicka moved to adopt the amended 2015 budget as presented. Councilmember Buehler seconded the motion. The motion was unanimously approved.

Councilmember Pawlowski moved to recess into executive session for 10 minutes, beginning at 7:13 p.m. for Attorney Client Privilege and returning at 7:23 p.m. Councilmember Brungardt seconded the motion. The motion was unanimously approved.

Councilmember Studnicka moved to return to open session at 7:23 p.m. Councilmember Garvey seconded the motion. The motion was unanimously approved.

REPORTS:

City Attorney: City Attorney had nothing to report.
City Engineer: City Engineer had nothing to report.
City Administrator: City Administrator Tim Vandall had notion to repot.
Governing Body: Councilmember Buehler stated nothing important happened on this day in history. He did mention that the first Laurel and Hardy film came out.
Councilmember McNeill congratulated the newest Fire Board members.
Councilmember Studnicka reminded everyone of the Mayor's Christmas Tree Lighting on Sunday.
Councilmember Trinkle seconded Councilmember Studnicka's remarks
Councilmember Gardner thanked and congratulated the volunteers.
Councilmember Pawlowski passed along a message from the Methodist Church that the concrete is done and the parking lot will be paved next Wednesday.

ADJOURNMENT: Councilmember Pawlowski moved to adjourn. Councilmember Garvey seconded the motion. The motion was unanimously approved. The meeting was adjourned at 7:25 p.m.

ATTEST:

Louis E. Kirby, Mayor

Sarah Bodensteiner, City Clerk

TO: Tim Vandall, City Administrator

FROM: Sarah Bodensteiner, City Clerk

DATE: December 1, 2015

SUBJECT: Resolution No. B-6-15: Kansas PRIDE Program

Lansing PRIDE is asking that the City Council adopt Resolution B-6-15 pledging their support to the Kansas PRIDE Program. Having an annual resolution in support of PRIDE is very worthwhile and confirms the City's on-going commitment to the organization.

Action: Staff recommends a motion to adopt Resolution B-6-15 supporting the Kansas PRIDE Program as presented.

AGENDA AGENDA AGENDA AGENDA AGENDA ITEM # 2

KANSAS PRIDE PROGRAM
ENTRY GOVERNMENT RESOLUTION
YEAR 2016

Resolution No. B-6-15

WHEREAS, local municipal government has a responsibility to develop the capacity to undertake a viable community development effort; and

WHEREAS, community development needs and problems can best be determined and solved through a cooperative effort between elected officials and those citizens they represent; and

WHEREAS, the Kansas PRIDE Program, co-administered by the Kansas Department of Commerce & Housing and K-State Research and Extension, has been reviewed and found to be a means to improve our community, and

WHEREAS, the Mayor and Council do herewith pledge their full support, endorsement, and cooperation in carrying out the requirements of the Kansas PRIDE Program.

NOW THEREFORE BE IT RESOLVED, that the community of the City of Lansing urges its citizens to join this effort and hereby declares this city to be an official entrant in the PRIDE Program for the year of 2016.

PASSED AND APPROVED THIS 17th DAY OF DECEMBER IN THE YEAR OF 2015.

{SEAL}

_____

Louis E. **Kirby, Mayor**

Attest:

_____

Sarah **Bodensteiner, City Clerk**

TO: Tim Vandall, City Administrator

FROM: Ben Ontiveros, Captain

DATE: December 9, 2015

SUBJECT: Request for Special Use Permit (336 Fawn Valley Ct)

Gradin and Nancy Junn has submitted a request to renew a special use permit for 336 Fawn Valley Ct. to have more than four animals on their property. Animal Control Officer Dave Asmus conducted a re-inspection and found the property to still be in compliance with city ordinances. There have been no complaints for this property.

Action:
A motion to approve the special use permit for 336 Fawn Valley Ct.

AGENDA ITEM # 3

CITY OF LANSING

ANIMAL PERMIT APPLICATION

Applicant Name: Gradin & Nancy Junn

Address: 336 Fawn Valley Ct. (Street) Lansing (City) KS (State) 66043 (Zip Code)

Proposed Location (if different): " (Street) " (City) " (State) " (Zip Code)

Mailing Address (if different): " (Street) " (City) " (State) " (Zip Code)

Telephone (Day): 913-704-7390 Telephone (Evening): 913-704-7390 Email: NancyJunn@yahoo.com

Property Owner Name: Gradin & Nancy Junn Property Owner Telephone:

Property Owner Address: 336 Fawn Valley Ct. (Street) Lansing (City) KS (State) 66043 (Zip Code)

Number of Each Type of Animal: 1 dog, 3 cats, foster animals through Rescue K-9 1st & Street Cats Rescue

General Description of Each Animal: 1 rabbit, 2 guinea pigs, & 1 bearded dragon

Noises or Odors Anticipated: Nothing out of the ordinary barking when neighbor dogs are barking

Housing Arrangements for All Such Animals including Safety or Structure, Locks, Fencing, etc.: Back yard is fully fenced

Interest in Such Animal(s): Family pets and enjoy fostering animals

Any Information Regarding Vicious or Dangerous Propensities of All Such Animals:

Safety Precautions to be Taken: Animals are socialized and up to date on shots. Stay in the fenced area & are rarely home alone

Prior Incidents Involving Public Health or Safety: None.

LICENSE INFORMATION

Type of License: ☒ More than 4 Animals ($25.00) ☐ Other: _____ ($25.00)

Renewal: ☒ Yes ☐ No

I declare under penalty of false statement that, to the best of my knowledge and belief, the statements made herein are true and correct.

Signature: _____ Date: 12/2/15

No license shall be issued until the applicant or premise complies with all codes and ordinances of the City of Lansing. The Police Department may also review this application and schedule an inspection prior to license approval.

FOR OFFICIAL USE ONLY:

Application Received By: _____ (Signature) 12/2/15 (Date)

Cost: 25.00 License Period: Jan 1 2016-Dec 31 2016

Amount Received: 25.00 ☐ Cash ☒ Check ☐ Credit

Additional Information Required: ☐ Copy of Insurance ☐ Indemnity Statement ☐ Vaccination Information ☐ Spay/Neuter Information ☐ Identification Photographs

Inspection Scheduled: _____

Police Signature: _____

Council Meeting Date 12-17-15 ☐ Approved ☐ Denied

TO: Tim Vandall, City Administrator

THRU: John W. Young, Director of Public Works

FROM: Rebecca Savidge, Building Inspector II

DATE: December 10, 2015

SUBJECT: Sidewalk Refund Request

A building permit was issued for a new single family dwelling in an older lot in town, which has been a vacant lot, located on a dead end part of North 8th Street. There is currently no sidewalk or curbing on this street. A sidewalk fee was charged on the building permit, as a payment that goes into the sidewalk fund. The city requires all new single family dwellings not located in a subdivision be charged a sidewalk fee. This fee is based on the amount of road frontage multiplied by the current cost adopted for sidewalk fee.

The property has a frontage of 125' and the current fee for the sidewalk construction is $15.00 with a total amount charged to the property owners to be deposited into the sidewalk fund was $1875.00, This is the amount that the property owners are requested be refunded to them.

The property owners are Mr. and Mrs. Lister. The owners have submitted a request to the Council to ask for a refund of this fee requirement. See the attached letter.

Chapter 14, Article 1 Section 14-202 addresses the requirement to pay into a sidewalk fund, and a copy of this code has been attached for further review.

Action: Staff is prepared to act pursuant to Council determination.

AGENDA AGENDA AGENDA AGENDA AGENDA ITEM # 4

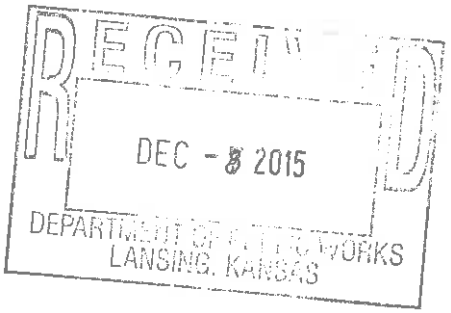
Ardina N. Lister
901 ~~713~~ N. 8th street
Lansing, Kansas 66043

8 December 2015

SUBJECT: Request for a waiver of city code chapter 14 Art I section 14-202

My husband and I are currently having a home built in Lansing, Kansas, a portion of the property that we purchased is located on North 8th St Lot #28. This property is located on a dead end street west of 900 North 8th St. Currently there are no sidewalks on either side of the street which is fine with us, we really have no need for sidewalks or ditches, the way the property is configured we see know issues with water drainage. Adding sidewalks would not make difference either way because there will be no pedestrian traffic using them. My husband is a retired veteran and I am on disability and this is something that we cannot afford in our budget, therefore we would like to ask that the city wave this side walk fund.
Thank you for your assistance in this matter.

Ardina N. Lister



ARTICLE 2. SIDEWALKS

14-201 APPLICATION FOR, COMMERCIAL AND INDUSTRIAL BUILDING OR LAND USE PERMITS

(All uses not specified in Sec. 14-202.) Any person hereinafter applying for a building or land use permit for any structure or purpose, including any residential use of a density four-plex or greater, and including the major remodeling of any structure, which shall be defined as remodeling costing twenty-five percent (25%) or more of the appraised value of said structure, for use other than single family or two-family occupancy, shall, as a condition thereof, be required to construct a sidewalk along any public street or streets adjacent to the parcel of land associated with such building or land use building permits. In lieu of construction of the sidewalk, and at the discretion of the Governing Body, the person applying for a building or land use permit may contribute to the Capital Improvements Sidewalk Fund an equivalent amount per linear foot, based on sidewalk type and current construction cost estimate as set forth in a schedule updated annually by the Public Works Department, of the required sidewalk along the entire street frontage of said tract or building lot. Such contribution shall take the form of cash or certified check, and shall be nonrefundable.

14-202 SINGLE FAMILY AND TWO-FAMILY, DWELLING REQUIREMENT

Where sidewalks are required on tracts or other locations as identified on the engineering plans for the subdivision, any person hereinafter applying for a building permit for any structure for single family or two-family occupancy shall, as a condition thereof, be required to construct sidewalks adjacent to such parcels of property. Where sidewalks were not identified as a requirement on the engineering plans of the subdivision, and were not previously installed on lots, tracts, or other locations, any person hereinafter applying for a building permit for any single family or two-family structure shall, as a condition thereof, contribute to the Capital Reserve Sidewalk Fund an equivalent amount per linear foot, based on sidewalk type and current construction cost estimate as set forth in a schedule updated annually by the Public Works Department,, of the required sidewalk along the entire street frontage of said lot, tract, or other location. Such contribution shall take the form of cash or certified check, and shall be nonrefundable.

14-203 REVOCATION OF PERMITS

In the event any person shall fail to provide sidewalks as set forth in this chapter, prior to the occupancy of such building, no certificate of occupancy shall be issued.

TO: Governing Body

FROM: Tim Vandall, City Administrator

DATE: December 10, 2015

SUBJECT: Executive Session

Action: Recess into Executive Session to discuss personnel matters of non-elected personnel.

AGENDA AGENDA AGENDA AGENDA ITEM # 5

9

Lansing Police Department

Nov-2015

Vehicle Fleet End of Month Report

Unit	Year	Make/Model	Mileage as of 11/02	Mileage as of 12/07	Miles Driven	Current Use	Future Use	Comments
1	2013	Ford Explorer	41447	42447	1000	Patrol	Patrol	Fit for patrol duty
2	2012	Dodge Charger	16190	16487	297	Lieutenant	Lieutenant	Limited Use - Lieutenant
3	2015	Ford Explorer	4410	5362	952	Limited	Limited	Fit for patrol duty
4	2015	Ford Explorer	2793	3852	1059	Limited	Limited	Fit for patrol duty
5	2012	Dodge Charger	16129	16359	230	Captain	Captain	Limited Use - Captain
6	2013	Ford Explorer	28310	28310	0	Patrol	Patrol	Down For Repairs
7	2002	Ford Explorer	115889	116054	165	Patrol	Patrol	Limited Use - Detective
8	2011	Dodge Charger	49577	50879	1302	Patrol	Patrol	Fit for patrol duty
9	2012	Chevy Tahoe	59942	61610	1668	Patrol	Patrol	Fit for patrol duty
10	2011	Dodge Charger	25280	25410	130	Chief	Chief	Limited Use - Chief
11	2003	Ford F150	72657	72826	169	Animal Control	Animal Control	Fit for Animal Control duties
13	2010	Dodge Charger	76823	78055	1232	Patrol	Patrol	Fit for patrol duty
14	1995	Ford EOC Vehicle	162103	162103	0	EOC	EOC	Limited Use - EOC
15	2006	Dodge Charger	114863	115797	934	Sergeants	Sergeants	Fit for patrol duty
16	2007	Ford Van	13024	13024	0	Transport	Transport	Limited Use - Transport
17	2010	Dodge Charger	83674	86399	2725	Patrol	Patrol	Fit for patrol duty
					0			
				Mileage Total:	11863			

Lansing Public Works Department

Monthly Fleet Report

Month November **Year** 2015

Vehicles

Year	Make	Model	Description	Mileage Starting	Mileage Ending	Miles Driven	Comments
2008	Ford	LT	LT. Pick-up Ext	43,758	44,484	726	
2007	Ford	LT	LT. Pick-up Ext	29,677	29,818	141	
1998	Ford	1/2 ton	Pick-up	56,042	56,222	180	
2001	Ford	Ranger	LT. Pick-up Ext	112,797	113,140	343	
2005	Ford	Ranger	LT. Pick-up Ext	37,079	37,123	44	
2000	Ford	Explorer	SUV	177,657	178,118	461	
2005	Sterling	LT 8500	Dump Truck	44,540	44,592	52	
2007	Elgin	Crosswind J+	Street Sweeper	4,293	4,301	8	
1992	Ford	700	Dump Truck	62,347	62,349	2	
1999	Ford	F350 4x4	Dump Truck	82,862	82,862	0	
2000	Ford	F350 4x4	Pick-up Utility	91,048	91,430	382	
2002	Ford	F350 4x4	Dump Truck	66,973	67,228	255	
2011	International	7400	Dump Truck	8,890	8,952	62	

Equipment

Year	Make	Model	Description	Hours Starting	Hours Ending	Hours Used	Comments
1997	JD	770BH	Grader	4,910	4,914	4	
2004	IR	DD-24	Asphalt Roller	242	242	0	
2006	IR	185	Air Compressor	159	160	1	
1993	Ford	5030	Tractor	356	368	12	
1997	Bobcat	763	Skid Steer	1,966	1,967	1	
2014	Case	580 SNWT	Backhoe	203	219	16	
2002	Crafco	110	Crack Sealer	734	736	2	
2003	Kubota	L3710	Tractor	1,368	1,369	1	
2009	Case	465	Skid Steer	460	461	1	
2004	Case	621D	Front Loader	2,013	2,013	0	at wastewater plant

Nov-15			
City Influent	32.50 MG	City Avg Daily	1.083
LCF Influent	11.72 MG	LCF Daily Avg	.391 MG
Total Biosolids	1.07 MG	Precip	4.18"

Vehicles

Year	Make	Model	Description	Mileage Start	Mileage Ending	Miles Driven	Current Use	Comments
1995	Dodge	3500	Flatbed Truck	86748	86754	6	Collection System	
1999	Sterling	Vactor	Jet Truck	7935	7935	0	Collection System	
2002	Ford	350	Pick Up Truck	85192	85433	241	Ops/Maint.	
2006	Ford	Cr Vic	Sedan	142882	142983	101	Ops/Maint.	
2005	Ford	550	Flatbed Truck	40500	40568	68	Ops/Maint.	
2005	Freightliner	M2106	Dump Truck	16837	16922	85	Biosolids Disposal	
Total						501		

Equipment

Year	Make	Model	Description			Hours Used	Current Use	Comments
1991	Case	1825	Uni-Loader	934	934	0	Plant Activities	
1999	Sterling	Vactor	Jet Truck	2189	2189	0	Collection System	
1999	Aries	Saturn III	Camera Trailer	331	331	0	Collection System	
2004	John Deere	7920	Tractor	1035	1039	4	Biosolids Disposal	
2005	Polaris	Ranger #1	Utility Vehicle	860	865	5	Operations	
2004	Case	621D	Loader	2090	2091	1		
2005	Polaris	Ranger #2	Utility Vehicle	926	929	3	Maintenance	
2006	JCB	531-70	Telehandler	476	478	2	Plant Activities	

KU CONTINUING EDUCATION
The University of Kansas

Certifies that

Dennis Thompson

has participated in the

59th Annual Asphalt Paving Conference

December 3, 2015
Lawrence, KS

Earned: 6 PDHs

Stacy Walters
Program Manager

Sharon D. Graham
Assistant Vice Chancellor

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To Whom it may concern:

On December 6th at 7:40 pm I was stopped by Officer Trevor Osen badge number 1540. I would like to offer my thanks and appreciation for his professionalism and respect. My interaction with this officer proved to me that "Good Officers" still exist. I fully support and back up all LEO's, all except those who abuse their power and authority. This department has a few of those bad apples, but Officer Trevor Osen is not one of those. In closing, Officer is very professional and respectful, two things that certain officers need to learn. And it is good to see Officers LIKE HIM out serving their community.

Thomas White

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K-7 CORRIDOR MANAGEMENT PLAN APPENDIX E:

K-7 NORTH INTERIM STRATEGIES | LEAVENWORTH & WYANDOTTE COUNTIES

PARSONS BRINCKERHOFF

JULY 2015

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ACKNOWLEDGMENTS

The K-7 North Interim Strategies Appendix to the K-7 Corridor Management Plan was developed with the input, support and guidance from the Project Core Team and K-7 Corridor Review Committee. The Core Team included representatives from the Kansas Department of Transportation, the Federal Highway Administration, the City of Basehor, the City of Lansing, the City of Leavenworth, Leavenworth County, and the Unified Government of Wyandotte County and Kansas City, Kansas.

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EXECUTIVE SUMMARY

PURPOSE OF APPENDIX E

The purpose of Appendix E to the K-7 Corridor Management Plan is to identify interim strategies, and to review long-term strategies, for the segment of Kansas Highway 7/U.S. Highway 73 (K-7) from Parallel Parkway to Gilman Road in Leavenworth and Wyandotte Counties. The analysis was guided by the Kansas Department of Transportation (KDOT), the cities of Basehor, Lansing and Leavenworth, Leavenworth County and the Unified Government of Wyandotte County and Kansas City, KS.

LONG-TERM STRATEGY FOR K-7

Previous studies have determined that the long-term vision for this segment of K-7 is a freeway (four-lane divided highway with interchanges and full control of access). Funding to upgrade this segment of K-7 to a freeway will not likely be available within the year 2040 planning horizon given current levels of transportation funding for the region.

GOALS FOR INTERIM STRATEGIES

The goals for the interim strategies include minimizing traveler delay along K-7 and reducing the number of crashes occurring at intersections. Interim strategies should have a construction cost that would allow implementation within the next five to ten years.

POTENTIAL INTERIM STRATEGIES

A range of interim strategies were analyzed, including:

- **Base Scenario:** Continuing the current practice of installing traffic signals, when warranted, at major intersections. The Base Scenario was used as a baseline for comparing the benefits and impacts of the other Interim Strategies.
- **Conventional Lane Additions:** Adding dual left turn lanes, right turn lanes, and minor road through lanes where appropriate, along with adding traffic signals at all major intersections.
- **Median U-Turn Intersection:** Direct left turns for the major and minor roads are prohibited at the main intersection and are instead redirected to U-turn crossovers on K-7.
- **Restricted Crossing U-Turn Intersection:** Minor road through and left turn movements are not allowed at the main intersection, but are instead redirected to U-turn crossovers on K-7

TRAFFIC FLOW ALONG K-7

K-7 was upgraded to a four-lane divided expressway in the mid 1960s to provide sufficient capacity for growing traffic volumes. When originally opened, through traffic on K-7 had uninterrupted flow along the corridor.

The addition of traffic signals has had a significant impact on the flow of traffic along K-7. Traffic signals provide three separate phases for vehicle movements: phase 1 for K-7 left turning vehicles, phase 2 for K-7 through and right turning vehicles, and phase 3 for minor road vehicles. This limits the portion of the traffic signal cycle that can be dedicated to the flow of through traffic on K-7. As shown in FIGURE ES.1, K-7 through traffic receives approximately 50 percent of the traffic signal cycle during peak hours even though this traffic makes up roughly 84 percent of the vehicles entering a typical intersection.

FIGURE ES.1 - Available "Green" Time for K-7 Through Traffic

Currently, it takes approximately eight minutes to travel from Parallel Parkway to Gilman Road. If the current practice of installing traffic signals at major intersections continues, the travel time will eventually increase by 50 percent or more.

CONCERNS FOR THE K-7 CORRIDOR

Public officials and area residents have expressed concerns for the increasing travel time along K-7 due to the installation of traffic signals as well as for the number and severity of crashes occurring at intersections.

PREVIOUS STUDIES/PLANS

K-7 Corridor Management Plan – February 2006:

The study to develop the K-7 Corridor Management Plan was initiated by the Kansas Department of Transportation (KDOT) and the communities along K-7. The purpose of the study was to address local concerns and to identify transportation improvements necessary to serve traffic well into the future.

The primary objectives were to:

- Determine future facility type (freeway vs. urban arterial)
- Develop access requirements and street network system
- Determine right-of-way preservation needs
- Develop a phased implementation plan
- Execute a memorandum of understanding

The vision for K-7 in the year 2030 is to upgrade the existing expressway to a 4-lane freeway to safely and efficiently accommodate the expected volume of traffic. The vision for K-7 at a time when "full build-out" of developable properties along the corridor occurs is a 4-lane freeway north of Hollingsworth Road and a 6-lane freeway south of Hollingsworth Road.

Conceptual interchange layouts were developed to establish general right-of-way needs for future interchanges to be located at:

- Parallel Parkway,
- Leavenworth Road,
- Donahoo Road,
- Hollingsworth Road,
- Polfer/Fairmount Road, and
- McIntyre Road.

K-7 Economic Development Strategy – January 2012:

In early 2011, the Mid-America Regional Council (MARC), in conjunction with a number of other partners along the K-7 corridor, initiated the K-7 Corridor Economic Development Strategy for a segment of K-7 in Leavenworth and Wyandotte Counties.

The purpose of the study was to "assist each community in understanding the future market potential for economic development activity, both individually

EXECUTIVE SUMMARY

and collectively, as well as its interrelationship with future transportation and infrastructure improvements."

Due to the uncertainty about when the ultimate freeway plan will be funded and implemented, the strategy focused on anticipated development, economic benefits and implementation issues during the transition from the current configuration to the proposed freeway.

The study recommended the "Growing Together" concept that further integrates the idea of corridor-wide planning coordination, cooperation, and on-going collaboration among all jurisdictions in the planning area. This strategy will require a comprehensive set of design guidelines and development standards for use throughout the entire K-7 Corridor study area.

The future conversion of the freeway is recommended to occur generally from south to north. Future interchange priorities are Parallel Parkway, Donahoo Road, Polfer/Fairmount Road, and McIntyre Road – in sequential order. While Leavenworth Road, Hollingsworth Road, and Marxen Road may eventually need an interchange with K-7, their interim condition could include the removal of the existing K-7 intersection and/or construction of an overpass/ underpass - with no direct connection to K-7.

5-County Regional Transportation Study – April 2013:
The Kansas Department of Transportation (KDOT), the Mid-America Regional Council (MARC), and the Lawrence-Douglas County Metropolitan Planning Organization completed a two-phase study to assess the changing transportation needs in Douglas, Johnson, Leavenworth, Miami, and Wyandotte Counties.

Transportation strategies were developed for 17 key corridors including K-7. Specific recommendations for K-7 north of State Avenue are:

System Management Strategies

- S7: Coordinate traffic signal phasing and timings from 4H Road to Parallel Parkway
- S23: Follow the recommendations of the K-7 Corridor Management Plan

Demand Management Strategies

- D13: Construct park & ride facility near 4H Road and near the northern junction of K-7 and K-92
- D15: Implement commuter transit service connecting the cities of Lansing and Leavenworth with State Avenue, I-70, Shawnee Mission Parkway, and College Boulevard
- D18: Implement peak and off-peak transit service connecting the cities of Lansing and Leavenworth with State Avenue and I-70

Increased Capacity Strategies

- C24: Construct expressway intersection enhancements from the City of Lansing to State Avenue

Summary of Previous Study Recommendations

	K-7 Corridor Management Plan	K-7 Economic Development Strategy	5-County Transportation Study
Gilman Road	Intersection	Intersection	Intersection Enhancements
McIntyre Road	Interchange	Interchange	Intersection Enhancements
Marxen Road	Overpass	Overpass	Intersection Enhancements
Polfer/ Fairmount Road	Interchange	Interchange	Intersection Enhancements
Hollingsworth Road	Interchange	Overpass	Intersection Enhancements
Donahoo Road	Interchange	Interchange	Intersection Enhancements
Leavenworth Road	Interchange	Overpass	Intersection Enhancements
Parallel Parkway	Interchange	Interchange	Intersection Enhancements

TABLE ES.1 Summary of Recommendations from Previous Studies

summary of the recommendations from the three previous studies is shown in TABLE ES.1

TRAFFIC ANALYSIS

Future (year 2040) traffic volumes were forecasted for the morning and evening peak hours at Parallel Parkway, Leavenworth Road and Polfer/ Fairmount Road. The results from Polfer/Fairmount Road were used to represent the future conditions at the other intersections within the corridor.

Analysis of the existing intersection geometry with future traffic volumes showed that the intersections will operate at a reasonable Level of Service (LOS) during the AM and PM peaks, except for the K-7 and Parallel Parkway intersection during the PM peak, which will operate at LOS F. Traffic operations at the K-7 and Parallel Parkway intersection during the PM peak fail primarily due to the expected volume of southbound left turning and westbound right turning vehicles.

Analysis of the potential Interim Strategies showed that each of the strategies would operate at acceptable Levels of Service for all AM and PM peak periods, including the Parallel Parkway evening peak.

SAFETY ANALYSIS

Intersection Crashes: Three years of crash data and crash reports (2011-2013) along the K-7 project corridor were provided by KDOT. The data was reviewed to determine existing crash patterns and crash rates at the eight intersections between Gilman Road and Parallel Parkway. The data was analyzed for crash numbers, locations, types, severity, time-of-day, weather conditions and light conditions

There have been a total of 110 crashes at the eight intersections in the three years: 39 in 2011, 36 in 2012 and 35 in 2013 (see FIGURE ES.2). The analysis showed that approximately 64 percent of all the crashes were collisions with other vehicles and 20 percent were animal related. Rear end crashes accounted for approximately 57 percent of the collisions with other motor vehicles.

EXECUTIVE SUMMARY

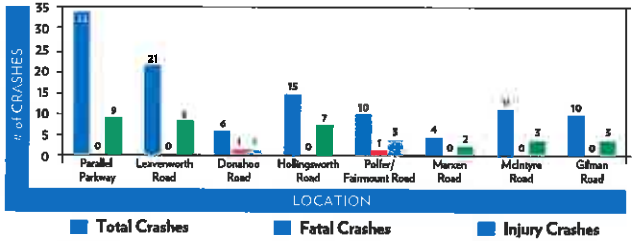

FIGURE ES.2 - Number and Severity of Intersection Crashes (K-7 Corridor 2011 -2013)

Highway Section Crash Rates: Crash rates were used to compare the segment of K-7 between Parallel Parkway and Gilman Road to two other similar segments along K-7 and to the average statewide crash rates for similar roadways.

State average (2009 – 2013) highway crash statistics including Total, Fatal, Injury and Critical crash rates were provided by KDOT. FIGURE ES.3 shows the crash rates at the K-7 segment in this study compared to two other similar sections and to the average statewide crash rates.

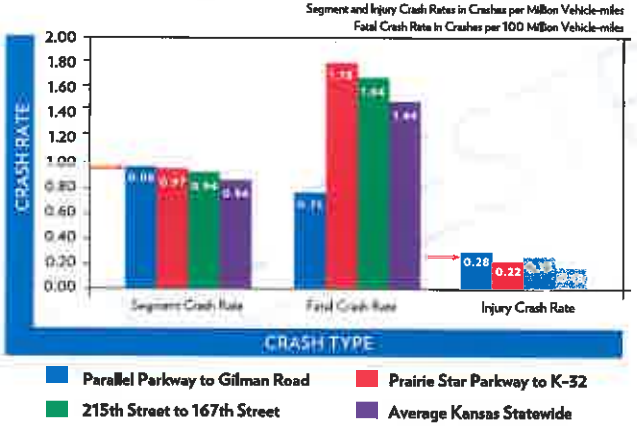

FIGURE ES.3 - Crash Rates for K-7 Corridor and Similar Roadways

CHARACTERISTICS OF POTENTIAL INTERIM STRATEGIES

Base Scenario: The base scenario assumes that traffic signals will continue to be installed at the major intersections along this segment of K-7. Each additional traffic signal will have an impact on the flow of traffic along K-7 highway. With traffic signals at each major intersection, travel times on K-7 from Parallel Parkway to Gilman Road will increase approximately 50 percent.

No significant change in crash numbers or severity would be expected at the intersections with existing traffic signals. Intersections with new traffic signals would likely see a reduction in right angle collisions and an increase in rear end collisions. Overall, no significant change in crash number or severity was assumed.

Conventional Lane Additions: This strategy involves the construction of additional travel lanes at the intersections such as creating dual left turn lanes, additional right turn lanes or additional through lanes for the minor road. The intent of these lane additions is to minimize the traffic signal "green" time requirements for the minor traffic movements and add all "green" time savings to the signal phase for K-7 through traffic. By the year 2040, traffic signals are assumed to have been installed at all major intersections along K-7.

Traffic operations are similar to the existing signalized intersections with specific lane additions addressing the heaviest traffic turning movements. This strategy provides slightly more traffic signal "green" time to K-7 through traffic and therefore provides somewhat better travel times than signalized intersections with no geometric changes.

A minor safety improvement was assumed for the Conventional Lane Additions strategy as slightly fewer stops would be required for northbound and southbound traffic.

Median U-Turn (MUT) Intersection: The MUT intersection eliminates direct left turns from both intersecting streets and thus reduces the number of traffic signal phases and conflict points at the main crossing intersection, improving intersection operations and safety.

The MUT intersection replaces direct left turn movements at the intersection with indirect left turn movements that utilize U-turns, typically located in the median of the major roadway.

The MUT intersection provides traffic operational benefits, particularly for through movements, by reducing the number of intersection signal phases and shortening overall signal cycle length.

Compared with conventional intersections, MUT intersections increase traffic throughput by 15 to 40 percent and reduce vehicles stopping in the network by 20 to 40 percent.

The *FHWA Median U-Turn Intersection Informational Guide, August 2014,* notes that injury crash rates were 30 percent lower at MUT intersections than at conventional intersections.

Restricted Crossing U-Turn (RCUT) Intersection: The RCUT intersection differs from a conventional intersection by eliminating the left-turn and through movements from the minor street approaches. To accommodate these movements, the RCUT intersection requires drivers to turn right onto the major road and then make a U-turn maneuver at a one-way median opening typically 600 to 800 feet away from the main intersection. On the major street approaches, the left turns are accommodated similar to left turns at conventional intersections.

RCUT intersections are best suited for corridors where the major road has significantly higher traffic volumes than the minor roads and where minor road through traffic is a small percentage of the overall traffic entering the intersection. In the case of K-7, the majority of the minor road traffic entering an intersection makes a turn onto the highway.

A signalized RCUT intersection can provide favorable progression along a corridor. RCUT signalized intersections typically require only two phases, which can maximize the green time for the major road through movement. Efficient progression can be provided in both directions with any speed or signal spacing.

The *FHWA Restricted Crossing U-Turn Intersection Informational Guide* notes that RCUT intersections reduced total crashes between 27 and 44 percent. Injury crashes were reduced 42 to 54 percent. Recent studies in Tennessee and Minnesota have shown even higher reductions in fatal and injury crashes.

EXECUTIVE SUMMARY

FINDINGS

The findings of the study focus on traffic safety, intersection operational performance, travel times, driver expectations and estimated construction costs.

Safety – Conflict Points: The Median U-Turn Intersection (MUT) and the Restricted Crossing U-Turn Intersection (RCUT) have significantly fewer conflict points than the conventional intersection design in the Base Scenario and Conventional Added Lanes Strategy.

Safety – Crash Reduction: The RCUT intersection shows the greatest potential for reducing the total number of crashes as well as the number of fatal and injury crashes.

Intersection Performance: The RCUT intersection provides a somewhat better Level of Service and lower delays for most intersection/traffic conditions than the other two alternatives.

K-7 Corridor Travel Times: K-7 through vehicles comprise approximately 80 percent of the traffic at each intersection. The RCUT intersection results in the lowest travel times for the K-7 corridor, particularly the option where only the intersections of Parallel Parkway, Leavenworth Road and Polfer/Fairmount Road are controlled by traffic signals. In this option, K-7 through and right turning vehicles are free flowing at the unsignalized intersections and the remaining traffic movements are controlled by stop signs.

Minor Road Left Turn Travel Times: Minor road left turn vehicles make up approximately two percent of the traffic at each intersection. Overall, the Conventional Added Lanes strategy provides the best service to the left turning traffic from the minor roads. RCUT and MUT intersections increase the travel distance for minor road left turn drivers which in general increased travel times for those movements.

Driving Task: The driving task varies for the three potential Interim Strategies. Factors include driver expectations for how the intersection operates, how traffic movements are routed and the potential for traffic violations.

Conventional Lane Additions: This intersection design is very similar to the existing intersections and changes such as dual left turns, are intersection features that are familiar to area drivers.

Median U-Turn (MUT) Intersection: This intersection design type would be new to the Kansas City metropolitan area. As the left turn movements for both intersecting roadways are rerouted, drivers will need to learn how to make an indirect left turn. One of the region's public works directors provided his experience implementing MUT intersections in another state. He advises that while there is certainly a learning curve at new installations, drivers adjust fairly quickly to the new design and are "encouraged" to make left turns at the appropriate locations by other drivers in the traffic stream.

Restricted Crossing U-Turn (RCUT) Intersection: The RCUT intersection design including the use of U-turns would also be new to the region. However, a similar design for the main intersection has been used at other intersections in the Kansas City metropolitan area, including an intersection on K-7 south of the study area at 75th Street and at several intersections along Shawnee Mission Parkway.

Estimated Construction Cost: The MUT and RCUT intersections would have the lowest estimated construction costs. As many of the RCUT intersections would not require a traffic signal, it would be the lowest cost strategy.

RECOMMENDATIONS

The Restricted Crossing U-Turn (RCUT) intersection is the recommended Interim Strategy for all major intersections on K-7 from Parallel Parkway to Gilman Road. Signalized RCUT intersections are recommended for the intersections with Parallel Parkway, Leavenworth Road and Polfer/Fairmount Road. The remaining intersections could initially operate using stop signs to control the K-7 left turns, the U-turn crossovers and the minor road approaches.

Advantages of the RCUT Intersection Include:

- The greatest probable reduction in total crashes and fatal/injury crashes. Right angle collisions, which are often the most severe, are significantly reduced at RCUT intersections.
- Reduction in the total number of vehicle conflict points from 32 to 14 and a reduction in "crossing" conflict points from 16 to 2. RCUT intersections have the fewest conflict points of the potential strategies that were considered.
- The lowest K-7 corridor travel times. Even lower travel times if only three of the intersection utilize traffic signals.
- Allows the coordination of traffic signals to create the largest possible progression bands for both direction of travel on K-7. RCUT intersections create two separate one-way roadways for northbound and southbound K-7 which in theory allows for "perfect" progression. Some of the benefit of signal coordination may be lessened due to the large spacing between traffic signals which will allow some dispersion of vehicle platoons.
- The RCUT intersection provides a more equitable split of traffic signal "green" time. The RCUT intersection allows use of a 2-phase traffic signal instead of the three phases used at the existing traffic signals on K-7. A 2-phase signal provides more efficient movement of traffic for K-7 and with a shorter overall cycle length, improvement for the minor road as well.
- RCUT intersections will delay the need to install new traffic signals at those intersections that are currently unsignalized.
- The greater throughput for K-7 extends the future date where additional lanes are needed to provide adequate capacity for traffic growth.

Disadvantages:

- Increases the travel distance for minor road left turn and through drivers.
- May increase travel time for minor road left turn and through drivers. However, more efficient traffic signals and time savings as drivers continue their trip along K-7, will likely reduce or erase an initial increase in travel time.

FIGURE ES.4 - Restricted Crossing U-Turn Intersection

SECTION ONE
INTRODUCTION

1.1 PURPOSE OF APPENDIX E

The purpose of Appendix E to the K-7 Corridor Management Plan is to identify interim strategies and to review long-term strategies for roadway improvements at the major intersections along the segment of Kansas Highway 7/U.S. Highway 73 (K-7) from Parallel Parkway to Gilman Road in Leavenworth and Wyandotte Counties. The analysis was guided by the Kansas Department of Transportation (KDOT), the cities of Basehor, Lansing and Leavenworth, Leavenworth County and the Unified Government of Wyandotte County and Kansas City, KS. The goals for the interim strategies include minimizing traveler delay along K-7 and reducing the number of crashes occurring at intersections. Interim strategies should have a construction cost that would allow implementation within the next five to ten years.

A RANGE OF INTERIM STRATEGIES WERE ANALYZED, INCLUDING:

- Continuing the current practice of installing traffic signals, when warranted, at major intersections
- Adding dual left turn lanes on the K-7 approaches to each intersection and adding turn lanes and/or through lanes to the side roads to reduce the signal "green time" dedicated to the minor traffic movements
- Alternative intersections designs: the Restricted Crossing U-Turn (RCUT) intersection and the Median U-Turn (MUT) intersection

1.2 BACKGROUND INFORMATION

Concerns have been expressed by area residents and public officials about the increased travel times on K-7 from the south end of the City of Lansing to I-70, resulting from the addition of traffic signals. Concerns have also been raised for traveler safety at major intersections within this corridor.

Previous studies have determined that the long-term vision for this segment of K-7 is a freeway (four-lane divided highway with interchanges and full control of access). Funding to upgrade this segment of K-7 to a freeway will not likely be available within the year 2040 planning horizon.

The 5-County Regional Transportation Study analyzed this route and recommended enhancing the expressway intersections as an interim measure to improve the flow of traffic and to minimize traveler delay due to the current traffic signal operation.

1.3 TRAFFIC FLOW ALONG K-7

K-7 was originally a rural two-lane highway that connected the Cities of Lansing and Leavenworth with the City of Olathe, passing through the western edge of the Kansas City metropolitan area. As vehicle volumes increased, the two-lane highway no longer had sufficient traffic-carrying capacity to maintain smooth traffic flow. Congestion developed at intersections, travel time along the corridor increased, and the number of crashes grew. To address these issues, K-7 was upgraded to a four-lane divided expressway in the mid 1960s. When originally opened, through traffic on K-7 had uninterrupted flow along the corridor.

Increasing traffic on Parallel Parkway, Leavenworth Road and Polfer/Fairmount Road resulted in delays to drivers on the side streets and a rise in the number of crashes occurring at the intersections with K-7. Traffic signals were installed to address these issues. Traffic signals along this segment of K-7 have three phases:

- K-7 left turns
- K-7 through and right turns
- Side road left turn, through and right turns

The cycle length (time necessary for all three phases) and the "split" times for each phase have a significant impact on the flow of K-7 traffic. While signals benefit side road traffic, they have a negative impact on the movement of highway traffic. Traffic signal timings, including yellow change intervals and all red clearance intervals, result in through traffic on K-7 having a green light only about 50% of the time during peak periods, although this movement makes up over 84% of the traffic entering each intersection. FIGURE 1.1 shows the percentage of signal green time compared to the percent of traffic entering a typical intersection of K-7.

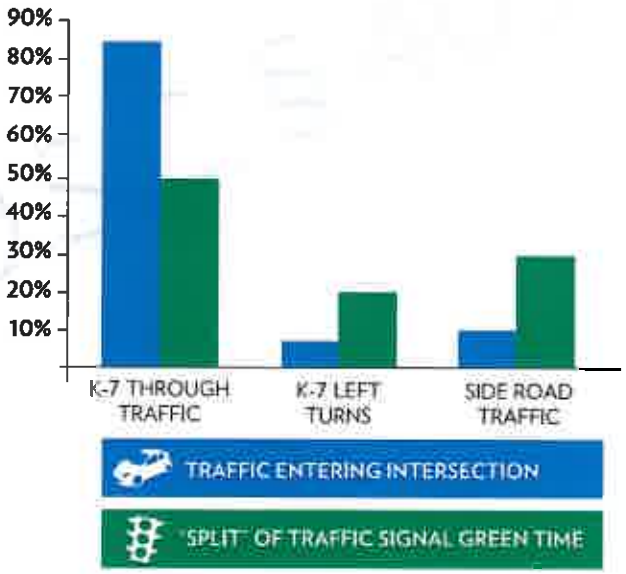

FIGURE 1.1 - Percentage of a Traffic Signal's Green Time Compared to Traffic Movements

Public officials and area residents are again expressing concerns regarding increased travel time along the K-7 corridor as well as traveler safety at intersections.

SECTION ONE
INTRODUCTION

1.4 FOCUS AREA

The focus area for the K-7 North Interim Strategies is shown in FIGURE 1.3 and covers the majority of Segment 3 as identified in the K-7 Corridor Management Plan. Specifically, the intersections included in the analysis for the addendum are, from north to south:

- Gilman Road
- McIntyre Road
- Marxen Road
- Polfer/Fairmount Road (existing traffic signal)
- Hollingsworth Road
- Donahoo Road
- Leavenworth Road (existing traffic signal)
- Parallel Parkway (existing traffic signal)

FIGURE 1.2 - Looking northward along K-7 near Hollingsworth Road
Source: Google Earth

K-7 in this area is a four-lane expressway with a 60-foot wide median for the majority of its length, with a somewhat wider median near Parallel Parkway. A typical example of this corridor is shown in FIGURE 1.2. Traffic volumes on K-7 are currently 20,000 vehicles per day (vpd) and are expected to grow to 30,000 vpd by the year 2040.

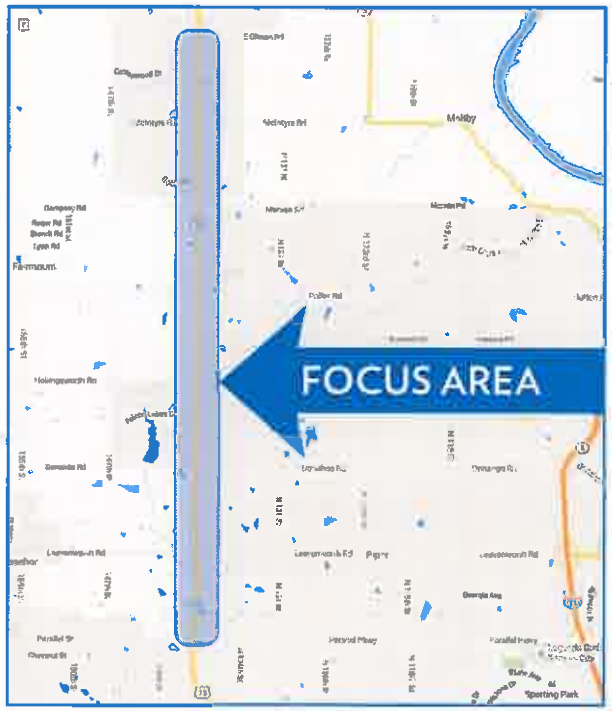

FIGURE 1.3 - Focus area for K-7 Interim Strategies
Source: Google Maps

1.5 STRATEGIES DEVELOPMENT CORE TEAM

A Core Team of stakeholders guided the development of the interim intersection improvement strategies for K-7. The Core Team included the Kansas Department of Transportation (KDOT), the Federal Highway Administration, and the following cities and counties along this segment of K-7: City of Basehor, City of Lansing, City of Leavenworth, Leavenworth County, and the Unified Government of Wyandotte County and Kansas City, Kansas.

1.6 STRATEGIES DEVELOPMENT APPROACH

The approach for developing the interim strategies included the following tasks:

Stakeholder/Public Involvement

In addition to the Core Team, updates were provided three times to the K-7 Corridor Review Committee that represents cities and counties along K-7 that have been involved in the Corridor Management Plan. Two rounds of meetings were also held for public officials and the general public.

Review Previous Studies

Previous studies were reviewed to document issues that were identified and the recommendations that were made for this segment of K-7.

Traffic and Safety Analysis

Traffic forecasts were developed and analyzed for the years 2020 and 2040. Intersection operations were analyzed for the base scenario of continuing to install traffic signals at intersections when warranted, conventional lane additions, and two Alternative Intersection designs. Crash data was analyzed for each intersection and the potential crash reduction for each strategy was estimated.

Concept Designs

Concept layouts for roadway geometry, traffic signing, and traffic signals were developed for each potential strategy. Turning movement analyses were completed for each of the Alternative Intersection designs. Planning level cost estimates were developed for each strategy.

SECTION TWO
CORRIDOR CONDITIONS

2.1 K-7 CONDITIONS

Highway US-73/K-7 (K-7) is a key travel corridor connecting the communities of Lansing and Leavenworth, KS with the greater Kansas City metropolitan area. K-7 is used daily by commuters as well as drivers making longer, interstate trips. This segment of K-7 currently carries approximately 20,000 vehicles per day.

2.2 ANALYSIS LOCATIONS & CONDITIONS

2.2.1 Parallel Parkway (Existing Traffic Signal)

The intersection of K-7 and Parallel Parkway (FIGURE 2.1) is located at the southern end of the study corridor. West of the intersection, Parallel Parkway is a two-lane road that connects the City of Basehor to K-7. As it approaches K-7, the road widens to provide a left turn lane for eastbound to northbound traffic. East of the intersection, Parallel Parkway is a four-lane road that passes through the northern portion of the Legends retail area then connects to I-435 and eastward into Kansas City, KS. As it approaches the intersection, the inside westbound through lane becomes a dedicated left turn lane.

The intersection is controlled by a traffic signal with phases for 1) northbound and southbound K-7 left turn traffic, 2) northbound and southbound K-7 through traffic, and 3) eastbound and westbound Parallel Parkway traffic.

Differences in the roadway profile elevations for the northbound and southbound lanes of K-7 would require potential U-turns to be located approximately 1,600 feet south and 1,450 feet north of the intersection.

The forecasted traffic volumes, for the year 2040 PM peak hour, show that the existing number of lanes at the intersection is not adequate to accommodate the expected traffic. The overall intersection level of service will be LOS F. High volumes of southbound left turns and westbound right turns exceed the capacity of those intersection approaches.

Parallel Parkway to Leavenworth Road: Between these intersections are four crossovers, one frontage road connection and several entrances as shown in FIGURE 2.2. The K-7 Corridor Management Plan recommends eliminating these access points and replacing the direct access to K-7 with connections to proposed new roads. These roads would be constructed as development and funding allows. It appears that the crossover and two access points on K-7 south of Leavenworth Road could be closed as the properties also have access to Leavenworth Road.

FIGURE 2.1: Aerial photo of K-7 and Parallel Parkway Source: Google Earth

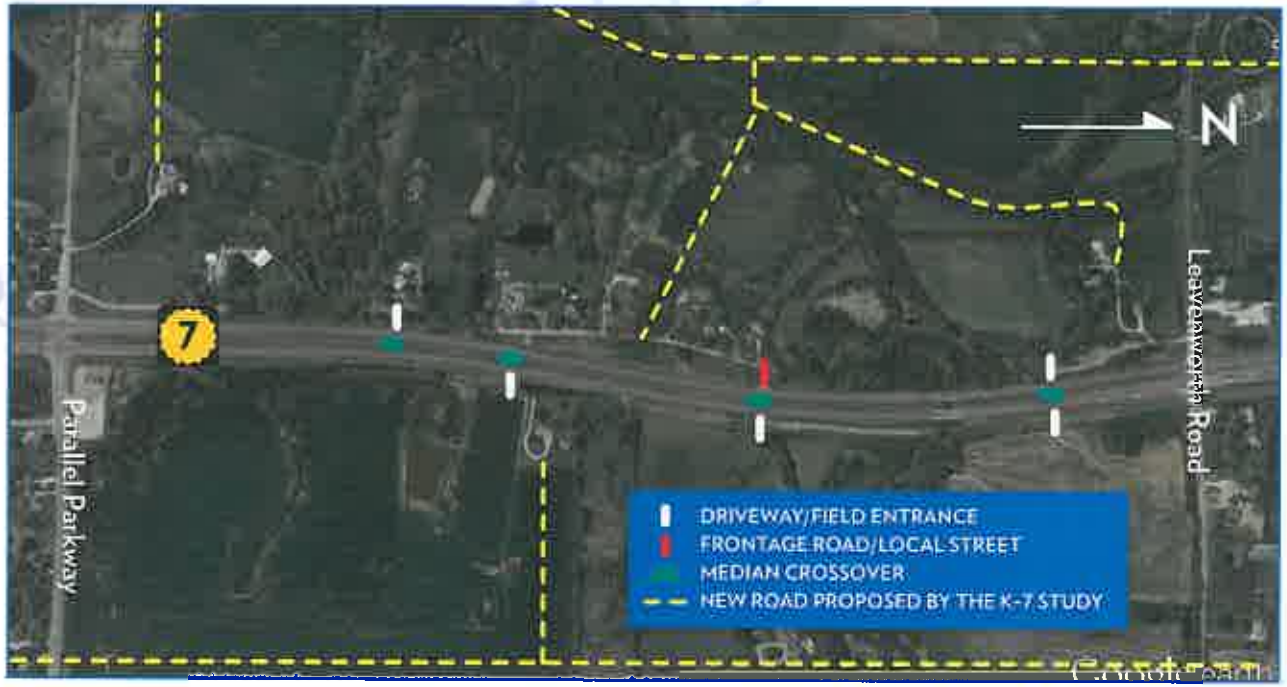

FIGURE 2.2: Driveway and Crossover Locations on K-7 between Parallel Parkway and Leavenworth Road Source: Google Earth

SECTION TWO
CORRIDOR CONDITIONS

2.2.2 Leavenworth Road (Existing Traffic Signal)

Leavenworth Road is a two-lane facility that widens to provide left turn lanes at the intersection with K-7 (FIGURE 2.3). Leavenworth Road connects to I-435 approximately 4.5 miles east of K-7. Northbound K-7 has a left turn lane, two through lanes and a right turn lane at the intersection. Southbound K-7 has a left turn lane and two through lanes, but no right turn lane. The intersection is controlled by a traffic signal with phases for 1) northbound and southbound K-7 left turn traffic, 2) northbound and southbound K-7 through traffic, and 3) eastbound and westbound Leavenworth Road.

FIGURE 2.3: Aerial photo of K-7 and Leavenworth Road Source: Google Earth

A creek crosses K-7 approximately 1,100 feet south of Leavenworth Road. Potential U-turn locations are approximately 650 feet south of Leavenworth Road and 1,300 feet north of the intersection.

Leavenworth Road to Donahoo Road: FIGURE 2.4 shows three crossovers, three local road connections and three entrances located between the two intersections. The K-7 Corridor Management Plan recommends eliminating these access points and replacing the direct access to K-7 with connections to proposed new roads.

Cider Hill Family Orchard and event center is located at an entrance on the east side of K-7 approximately one quarter mile north of Leavenworth Road. This location generates a considerable volume of traffic at certain times of the year.

FIGURE 2.4: Driveway and Crossover Locations on K-7 between Leavenworth Road and Donahoo Road Source: Google Earth

SECTION TWO
CORRIDOR CONDITIONS

2.2.3 Donahoo Road

Donahoo Road is a two lane facility that is stop sign controlled at K-7 (FIGURE 2.5). The roadway widens at the intersection with a median created by pavement markings. Donahoo Road provides a connection to I-435 approximately 4.5 miles east of K-7. West of K-7, Donahoo Road extends approximately 1,000 feet where it connects with 141st Street.

Northbound K-7 has a left turn lane, two through lanes and a right turn lane at the intersection. Southbound K-7 has a left turn lane and two through lanes, but no right turn lane. Potential U-turn locations are approximately 950 feet north and approximately 1,575 feet south of the intersection.

Donahoo Road to Hollingsworth Road: FIGURE 2.6 shows access points between these intersections are limited to one field entrance and the right-in, right-out connection of Falcon Lakes Road that intersects K-7 from the west. Falcon Lakes Road serves the Falcon Lakes Golf Club and related residential development.

The K-7 Corridor Management Plan recommends eliminating these access points and replacing the direct access to K-7 with connections to proposed new roads.

FIGURE 2.5: Aerial photo of K-7 and Donahoo Road Source: Google Earth

FIGURE 2.6: Driveway and Crossover Locations on K-7 between Donahoo Road and Hollingsworth Road Source: Google Earth

SECTION TWO
CORRIDOR CONDITIONS

2.2.4 Hollingsworth Road

Hollingsworth Road is a two-lane facility that is stop sign controlled at its intersection with K-7 (FIGURE 2.7). There is no widening for turn lanes. Northbound K-7 has a left turn lane, two through lanes and a right turn lane. Southbound K-7 has only two through lanes. Concerns were expressed during the public open house meetings regarding the lack of left turn and right turn lanes on southbound K-7.

West of K-7, Hollingsworth Road crosses the north end of the Falcon Lakes Golf Club and related residential development. Hollingsworth Road ends approximately four miles east of K-7 at N 107th Street/Hutton Road. Potential U-turn locations are approximately 800 feet north and approximately 1,200 feet south of the intersection.

Hollingsworth Road to Polfer/Fairmount Road: FIGURE 2.8 shows access points between these intersections including five crossovers, five entrances and two connections with frontage roads.

The K-7 Corridor Management Plan recommends eliminating these access points and replacing the direct access to K-7 with connections to proposed new roads.

FIGURE 2.7: Aerial photo of K-7 and Hollingsworth Road Source: Google Earth

FIGURE 2.8: Driveway and Crossover Locations on K-7 between Hollingsworth Road and Polfer/Fairmount Road Source: Google Earth

SECTION TWO
CORRIDOR CONDITIONS

2.2.5 Polfer/Fairmount Road (Existing Traffic Signal)

Polfer/Fairmount Road is a two-lane facility at its intersection with K-7 (FIGURE 2.9). K-7 has a left turn lane, two through lanes and a right turn lane on the northbound and southbound approaches. The intersection is controlled by a traffic signal.

Since the signal was installed, concerns have been raised regarding the increased delays to through travelers on K-7 who are frequently required to stop at the intersection.

Potential U-turn locations are approximately 1,300 feet north and approximately 900 feet south of the intersection.

Polfer/Fairmount Road to Marxen Road: FIGURE 2.10 shows access points between these intersections including four crossovers and six driveways. The K-7 Corridor Management Plan recommends eliminating these access points and replacing the direct access to K-7 with connections to proposed new roads.

FIGURE 2.9: Aerial photo of K-7 and Polfer/Fairmount Road Source: Google Earth

FIGURE 2.10: Driveway and Crossover Locations on K-7 between Polfer/Fairmount Road and Marxen Road Source: Google Earth

SECTION TWO
CORRIDOR CONDITIONS

2.2.6 Marxen Road

Marxen Road intersects K-7 from the east forming a "T" intersection (FIGURE 2.11). A driveway is located on the west side of K-7, slightly north of Marxen Road. Marxen Road is a two-lane facility that is stop sign controlled at K-7. K-7 has two through lanes in each direction and has not been widened to provide a left turn or right turn lane.

Concerns were expressed during the public open house meetings regarding the lack of left turn and right turn lanes on southbound K-7.

Potential U-turn locations are approximately 800 feet north and approximately 920 feet south of the intersection.

Marxen Road to McIntyre Road: FIGURE 2.12 shows access points between these intersections including four crossovers, two frontage road connections and five driveways. The K-7 Corridor Management Plan recommends eliminating these access points and replacing the direct access to K-7 with connections to proposed new roads.

FIGURE 2.11: Aerial photo of K-7 and Marxen Road Source: Google Earth

FIGURE 2.12: Driveway and Crossover Locations on K-7 between Marxen Road and McIntyre Road Source: Google Earth

SECTION TWO
CORRIDOR CONDITIONS

2.2.7 McIntyre Road

McIntyre Road is a two-lane facility that is stop controlled at its intersection with K-7 (FIGURE 2.13). There is no widening for turn lanes. K-7 has a short left turn lane and two through lanes on each approach to the intersection. South 139th Street parallels K-7 on the west and intersects McIntyre Road approximately 80 feet west of the highway. McIntyre Road is a local connection between highways K-7 and K-5. This segment of McIntyre Road is being considered by Leavenworth County for an improvement project.

FIGURE 2.13: Aerial photo of K-7 and McIntyre Road Source: Google Earth

Potential U-turn locations are approximately 700 feet north and approximately 700 feet south of the intersection.

McIntyre Road to Gilman Road: FIGURE 2.14 shows access points between these intersections including one crossover, one local road connection and two driveways. The K-7 Corridor Management Plan recommends eliminating these access points and replacing the direct access to K-7 with connections to proposed new roads.

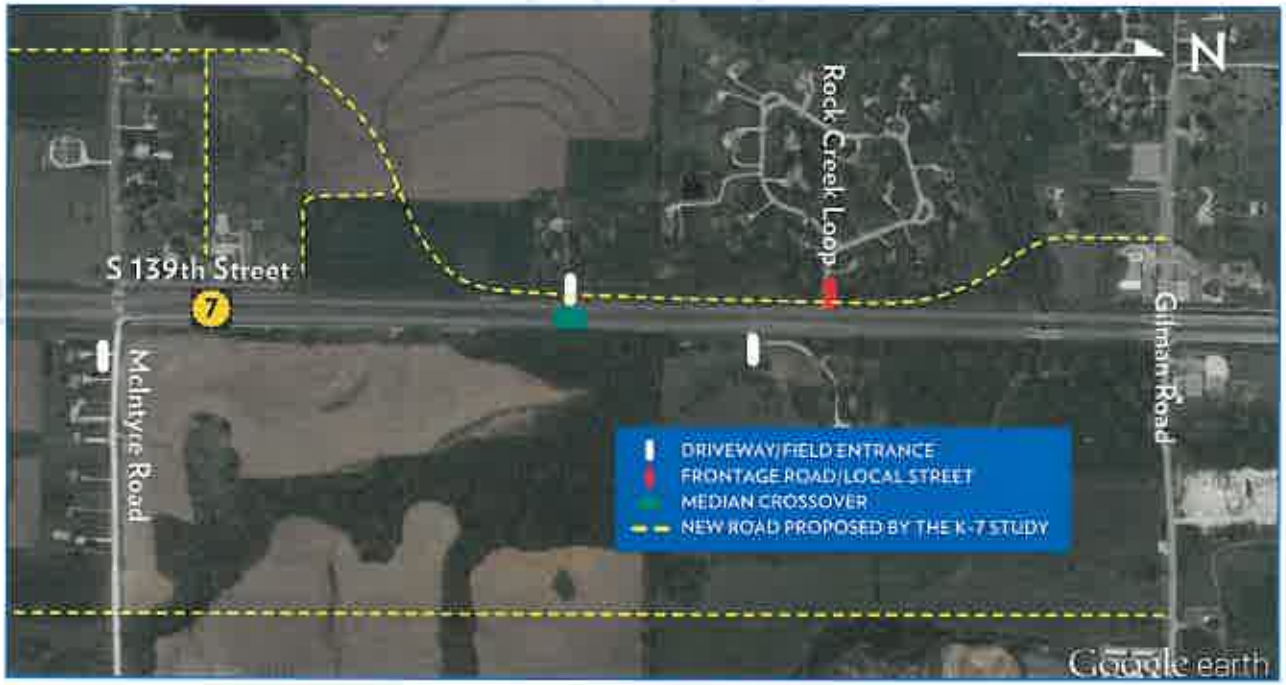

FIGURE 2.14: Driveway and Crossover Locations on K-7 between McIntyre Road and Gilman Road Source: Google Earth

SECTION TWO
CORRIDOR CONDITIONS

2.2.8 Gilman Road

The K-7 intersection with Gilman Road (FIGURE 2.15) is located at the north end of the analysis corridor. Gilman Road is a two-lane facility that widens at the intersection with K-7 to provide a left turn lane, through lane and right turn lane on the eastbound approach and a shared through/left turn lane and a right turn lane on the westbound approach. Gilman Road is controlled by stop signs at the intersection. A warrant for traffic signals has been satisfied at this intersection. K-7 has a left turn lane and two through lanes northbound and a left turn lane, two through lanes and a right turn lane southbound. A pedestrian crossing is located on the west leg of the intersection.

A 50 mph speed limit begins approximately one quarter mile south of Gilman Road and continues northward into the City of Lansing.

A creek crossing K-7 approximately 600 feet south of Gilman Road and would impact the location of a potential U-turn. A U-turn would need to be located approximately 2,200 feet south of the intersection. A potential U-turn could be located approximately 600 feet north of the intersection.

FIGURE 2.15: Aerial photo of K-7 and Gilman Road Source: Google Earth

SECTION THREE

PREVIOUS STUDIES AND PLANS

Several previous studies have analyzed traffic operations and potential for economic development along K-7. These studies were reviewed to document the issues that were identified and the recommendations that were made for this segment of the K-7 corridor.

3.1 K-7 CORRIDOR MANAGEMENT PLAN – FEBRUARY 2006

The study to develop the K-7 Corridor Management Plan was initiated by the Kansas Department of Transportation (KDOT) and the communities along K-7. The purpose of the study was to address local concerns and identify transportation improvements necessary to serve traffic in the future.

The primary objectives were to:

- Determine future facility type (freeway vs. urban arterial)
- Develop access requirements and street network system
- Determine right-of-way preservation needs
- Develop a phased implementation plan
- Execute a memorandum of understanding

Segment 3 of the study area shown in FIGURE 3.1 contains the area being analyzed for Appendix E: K-7 North Interim Strategies.

3.1.1 Corridor Issues

A number of corridor issues were identified including limited roadway capacity, growing travel time along the corridor, appropriate access management measures, and impacts to land use/development.

Capacity: Traffic projections for the year 2030 showed large increases in the volumes of passenger and commercial vehicles using K-7. It was determined that an "urban arterial" facility would not have the capacity to accommodate the anticipated traffic volumes.

Travel Times: In the year 2004, the travel time from State Avenue to Muncie Road/K-5 was approximately 10 minutes. With no changes to the roadway, travel time is estimated to increase to 27.6 minutes by the year 2030. Estimated travel times in 2030 would be 14 minutes with K-7 as a 6-lane arterial and 9 minutes as a 6-lane freeway.

Access Management: Access to K-7 must be appropriately managed to maximize traffic flow and safety.

Land Use: As congestion increases, adjacent land uses are negatively impacted due to excessive travel delay. K-7 and local streets must function as a system to adequately serve traffic demands and provide logical connections to properties adjacent to K-7.

FIGURE 3.1: K-7 Corridor Management Plan Study Area Map

3.1.2 Recommendations

The K-7 Corridor Management Plan was the first step in a long term effort to ensure effective development along K-7 through the safe and efficient management of traffic and access. A number of recommendations were identified in the study:

K-7 Corridor Review Committee: KDOT and the local communities along K-7 established a Corridor Review Committee to meet periodically to review the Corridor Management Plan, assess development issues, and evaluate compliance with the Plan

Memorandums of Understanding: Memorandums of Understanding were developed between KDOT and each of the K-7 communities.

Future K-7 Facility Type: The vision for K-7 in the year 2030 is to upgrade the existing expressway to a 4-lane freeway to safely and efficiently accommodate the expected volume of traffic. The vision for K-7 at a time when "full build-out" of developable properties along the corridor occurs is a 4-lane freeway north of Hollingsworth Road and a 6-lane freeway south of Hollingsworth Road.

Interchanges/Overpass/Intersection: Conceptual interchange layouts were developed to establish general right-of-way needs for future interchanges to be located at:

- Parallel Parkway,
- Leavenworth Road,
- Donahoo Road,
- Hollingsworth Road,
- Polfer/Fairmount Road, and
- McIntryre Road.

In addition, an overpass would be constructed at Marxen Road, while Gilman Road would remain an at-grade intersection.

Access Management/Corridor Preservation: Access management is necessary to protect safety for the motoring public and the operational efficiency of the K-7 corridor. Corridor preservation is the application of planning efforts to identify needed right-of-way and control or protect it for a future transportation facility.

Interim Improvements: Given the limitations on funding for transportation improvements, the Plan concluded that it may be decades before a freeway is constructed for Segment 3 of the K-7 corridor. Interim improvements to the existing intersections along K-7 may be needed to accommodate growing traffic

SECTION THREE

PREVIOUS STUDIES AND PLANS

demands. Interim improvements may include additional traffic signals, additional turn lanes, reducing access to K-7, and preserving important tracts of land for future improvements.

3.2 K-7 ECONOMIC DEVELOPMENT STRATEGY – JANUARY 2012

In early 2011, the Mid-America Regional Council (MARC), in conjunction with a number of other partners along the K-7 corridor, initiated the K-7 Corridor Economic Development Strategy for a segment of K-7 in Leavenworth and Wyandotte Counties. The corridor study area extended from the Kansas River in Bonner Springs to the City of Leavenworth.

The purpose of the study was to "assist each community in understanding the future market potential for economic development activity, both individually and collectively, as well as its interrelationship with future transportation and infrastructure improvements."

Due to the uncertainty about when the ultimate freeway plan will be funded and implemented, the strategy focused on anticipated development, economic benefits and implementation issues during the transition from the current configuration to the proposed freeway.

The study included a market analysis to assess the viability of various future development options that may occur along the corridor as well as an assessment of priorities for the transportation investments necessary to eventually convert the facility to a freeway over time.

3.2.1 Corridor Issues

Roadway Function: The K-7 corridor serves dual and somewhat competing roles, providing a major transportation route for commuters and providing access for development properties. This corridor has developed from a rural highway to a major artery that currently services residents in Leavenworth, Lansing, Basehor, Kansas City, Kansas and Bonner Springs, providing a conduit to access jobs, shopping and entertainment.

Timeframe for Freeway Construction: Due to the uncertainty of a time frame for the actual construction of the freeway, communities have not yet been able to fully realize their potential economic development opportunities within the study area.

Population and Employment Growth: Recent developments such as the Cerner Corporation campus, the Livestrong Sporting Park, the Hollywood Casino, and the new Wyandotte County fairgrounds, may produce near and long term population and employment growth in Wyandotte and Leavenworth Counties.

- Projected population growth 2008-2040
  - Leavenworth County: 24,499
  - Wyandotte County: 27,752
- Project employment growth 2008-2040
  - Leavenworth County: 8,562
  - Wyandotte County: 20,269

3.2.2 Market Analysis Conclusions

Given current market conditions, in which the residential, retail, and office markets in the western suburbs and the overall Kansas City area continue to see limited expansion, this market study does not attempt to predict the market for various product types over the next one to three years. Instead, this study focuses more on the macroeconomic projections for office, retail, and residential uses over the next 20 to 30 years.

In general, the K-7 corridor is well positioned to enjoy additional growth over the next few decades as new developments at the Kansas Speedway area, and in particular the Cerner campus, spur ongoing growth in western Wyandotte County.

Lansing and Leavenworth struggle with the possibility that the area to the south along K-7 may gain additional stop lights over several miles, limiting access to their communities to a certain extent, through increased traffic volume. In addition, potential upgrades of K-5 may reduce real estate demand along the K-7 corridor somewhat and potentially shift some of the aggregate demand to the K-5 corridor.

Key Takeaways and Recommendations for the Parallel Parkway to Lansing District:

- "The cities along this portion of the corridor should collectively work to limit new growth in the short term along this section of K-7 in order to minimize investments in infrastructure improvements and focus growth to areas already primed for significant growth, including the I-70 and I-435 corridors."
- "As part of this effort, the cities should work collectively to limit the number of new traffic signals installed along K-7 through this stretch. Limiting signalized access would help to prevent leapfrog development in the area."
- "The cities should help to steer residential growth to areas near K-7 that are already serviced by trunk infrastructure."

3.2.3 Final Concept and Recommendations

Upon reviewing and evaluating each of the initial planning scenarios, the Core Team for the K-7 Economic Development Strategy unanimously selected and supported moving forward with the "Growing Together" concept, and requested the planning team to further refine this plan as a guide for economic growth and development of the K-7 Corridor.

Growing Together Concept: The Growing Together concept further integrates the idea of corridor-wide planning coordination, cooperation, and on-going collaboration among all jurisdictions in the planning area. This strategy will require a comprehensive set of design guidelines and development standards for use throughout the entire K-7 Corridor study area.

Future Interchange Phasing: Conversion of K-7 to a freeway is an ambitious proposal that is unlikely to be funded and constructed at one time.

A sequential and prioritized approach for future freeway improvements is incorporated into this strategy to maximize the benefits for improved travel times, safety, and surrounding economic development opportunities. These improvements are anticipated to be conceived and completed in a manner consistent with the current Memorandums of Understanding (MOU's) throughout the corridor.

The future conversion of the freeway is recommended to occur generally from south to north. Completion of the I-70 and K-7 Highway interchange would occur first, followed by the Kansas Avenue interchange.

Future interchange priorities further north include Parallel Parkway, Donahoo Road, Polfer/Fairmount Road, and McIntyre Road – in sequential order.

While Leavenworth Road, Hollingsworth Road, and Marxen Road may eventually need an interchange with K-7, their interim condition could include the removal of the existing K-7 intersection and/or construction of an overpass/underpass - with no direct connection to K-7.

SECTION THREE

PREVIOUS STUDIES AND PLANS

3.3 5-COUNTY REGIONAL TRANSPORTATION STUDY – APRIL 2013

The Kansas Department of Transportation (KDOT), the Mid-America Regional Council (MARC), and the Lawrence-Douglas County Metropolitan Planning Organization completed a two-phase study to assess the changing transportation needs in Douglas, Johnson, Leavenworth, Miami, and Wyandotte Counties.

3.3.1 Corridor Issues

The 5-County Region is the fastest growing area in the State of Kansas. A number of high-impact developments are having a significant impact on regional travel patterns.

FIGURE 3.2 shows traffic flow on K-7 between US-24 and K-5 becoming moderately congested by the year 2040.

Funding for transportation is limited, so the region must prioritize the needs and develop a wider range of strategies to improve the operation and safety of the transportation system.

3.3.2 Recommendations

Transportation strategies were developed for 17 key corridors including K-7/US-73. Specific recommendations for K-7 north of State Avenue are shown on FIGURE 3.3 and are detailed below:

System Management Strategies

- S7: Coordinate traffic signal phasing and timings from 4H Road to Parallel Parkway
- S23: Follow the recommendations of the K-7 Corridor Management Plan

Demand Management Strategies

- D13: Construct park & ride facility near 4H Road and near the northern junction of K-7 and K-92

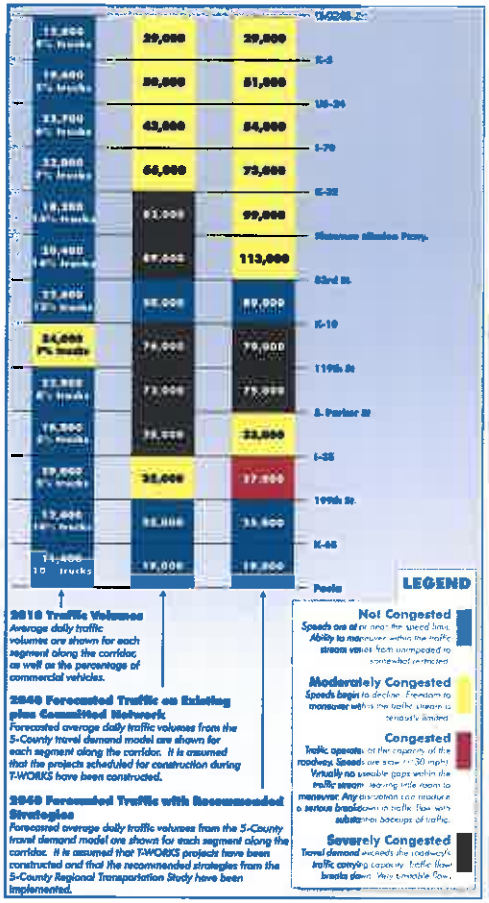

FIGURE 3.2: Current and Future Traffic Volumes and Level of Congestion
Source: 5-County Regional Transportation Study Phase 2 Report

FIGURE 3.3: Transportation Strategies for K-7
Source: 5-County Regional Transportation Study Phase 2 Report

- D15: Implement commuter transit service connecting the cities of Lansing and Leavenworth with State Avenue, I-70, Shawnee Mission Parkway, and College Boulevard
- D18: Implement peak and off-peak transit service connecting the cities of Lansing and Leavenworth with State Avenue and I-70

Increased Capacity Strategies

- C24: Construct expressway intersection enhancements from the city of Lansing to State Avenue

3.4 PREVIOUS INTERCHANGE/ INTERSECTION/OVERPASS LOCATION RECOMMENDATIONS

TABLE 3.1 shows a comparison of the recommended treatments for each major intersection from the three previous studies.

	K-7 Corridor Management Plan	K-7 Economic Development Strategy	5-County Transportation Study
Gilman Road			
McIntyre Road	Interchange	Interchange	Intersection Enhancements
Muncie Road	Overpass	Overpass	
Polfer/ Fairmount Road	Interchange	Interchange	Intersection Enhancements
Hollingsworth Road		Overpass	
Donahoe Road	Interchange	Interchange	Intersection Enhancements
Leavenworth Road		Overpass	
Parallel Parkway	Interchange	Interchange	Intersection Enhancements

TABLE 3.1: Intersection Recommended Treatments

SECTION FOUR

TRAFFIC DATA & ANALYSIS

4.1 EXISTING TRAFFIC CONDITIONS

KDOT's most recent Average Annual Daily Traffic (AADT) map shows a maximum AADT of 21,100 along the K-7 section between Parallel Parkway and Gilman Road (FIGURE 4.1) based on counts recorded in 2014.

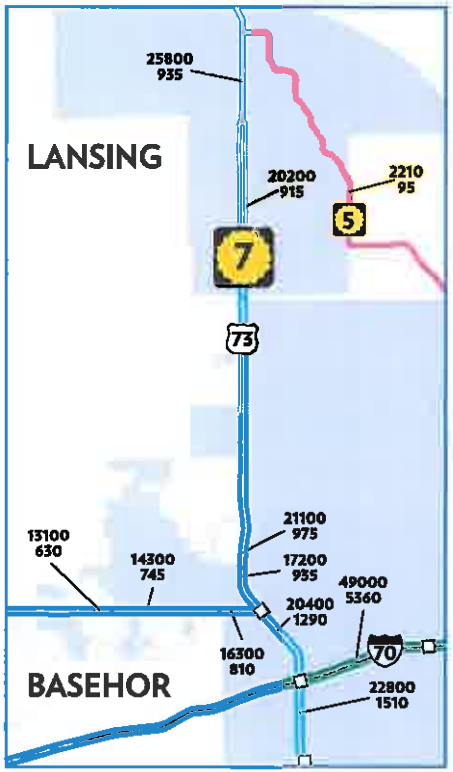

FIGURE 4.1 - Lansing and Basehor AADT Count Maps
Source: KDOT District Maps (ksdot.org)

Morning and evening peak hour turning movements were collected at the three signalized intersections of K-7 with Parallel Parkway, Polfer/Fairmount Road and Leavenworth Road. The counts at Polfer/Fairmount Road and at Parallel Parkway were collected during the month of December 2014, while the counts at the Leavenworth Road intersection collected in May 2014 were obtained from KDOT. The traffic counts were analyzed to determine existing Level of Service conditions at each individual intersection. The counts were also used in conjunction with growth factors to provide forecasted volumes for future conditions at the intersections.

The existing traffic signal timings and operation conditions were modeled using Trafficware Synchro v9, a traffic analysis and optimization software that uses Highway Capacity Manual methodology to determine intersection. PTVs VISSIM v7 software was then used to analyze the intersections' operations to determine measures of effectiveness such as the Level of Service (LOS), intersection delay and segment travel times.

TABLE 4.1 shows results of the existing intersection LOS delay and travel times along the K-7 segment between Parallel Parkway and Gilman Road.

YEAR	ALTERNATIVE	MOE	INTERSECTION
LEAVENWORTH ROAD			
2014 AM	NO BUILD	DELAY (Sec) LOS	8.1 A
2014 PM	NO BUILD	DELAY (Sec) LOS	11.7 B
PARALLEL PARKWAY			
2014 AM	NO BUILD	DELAY (Sec) LOS	12.5 B
2014 PM	NO BUILD	DELAY (Sec) LOS	15.7 B
POLFER/FAIRMOUNT ROAD			
2014 AM	NO BUILD	DELAY (Sec) LOS	8.5 A
2014 PM	NO BUILD	DELAY (Sec) LOS	10.0 A

K-7 TRAVEL TIME (Parallel Parkway to Gilman Road) in Min:Sec				
	NB AM	NB PM	SB AM	SB PM
NO BUILD	7:56	8:02	7:53	8:08

TABLE 4.1 - Existing LOS, Delay and K-7 Segment Travel Times

4.2 FORECAST TRAFFIC CONDITIONS

Traffic forecasting is the process of estimating future traffic volumes along a roadway to be used for long range planning purposes. The K-7 traffic forecasting data was retrieved from a 5-County Regional Transportation Study Traffic Demand Model (TDM) for the years 2010 and future year 2040. A TDM is a computer model used to estimate traffic demand on a roadway for future planning purposes by using four major assumptions: Trip generation (trips to be made), Trip distribution (where the trips go), Mode choice (modes of travel distribution), Trip assignment (route trip predictions).

The model was used to generate growth factors by movement and by approach at each of the three signalized intersections. The use of growth factors by movement was preferable in order to capture traffic growth brought about by expected economic development along the K-7 corridor. AM and PM growth factors are shown in TABLES 4.2 and 4.3.

Due to limited economic development along the corridor between the year 2010 and 2014, the field turning movement counts collected in May and December 2014 (TABLES 4.4 and 4.5) were relatively close to the volumes from the 2010 base year TDM counts. It was decided that the year 2014 could logically be assumed as the base year for forecasting purposes. Growth factors from the TDM were applied to the 2014 turning movement counts to forecast demand volumes for the year 2020 and 2040.

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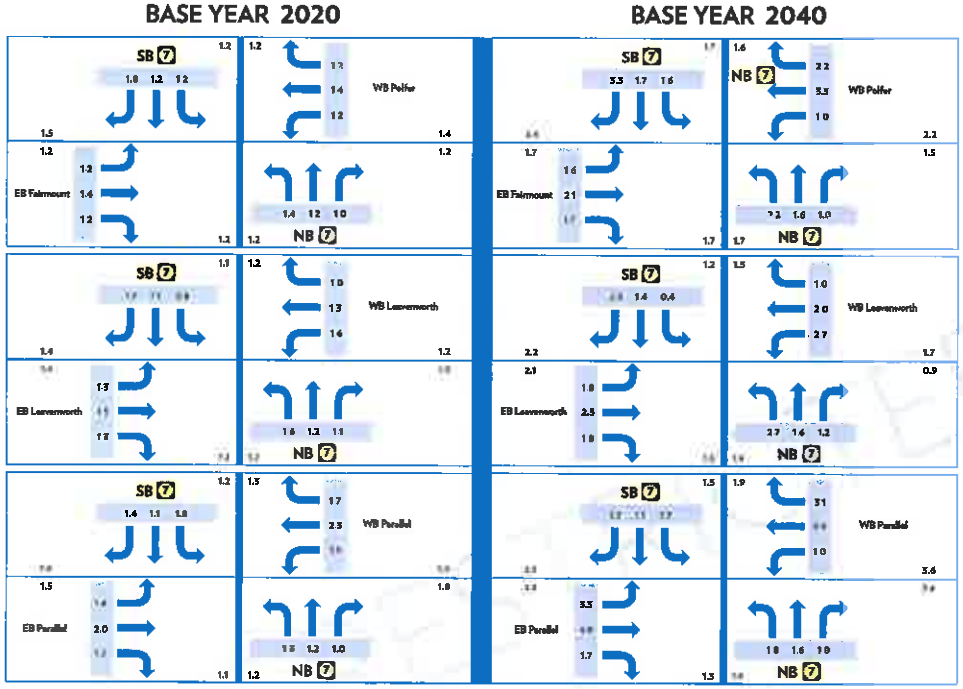

TABLE 4.2 - AM Peak Hour K-7 Growth Factors from Base Year to 2020 and 2040

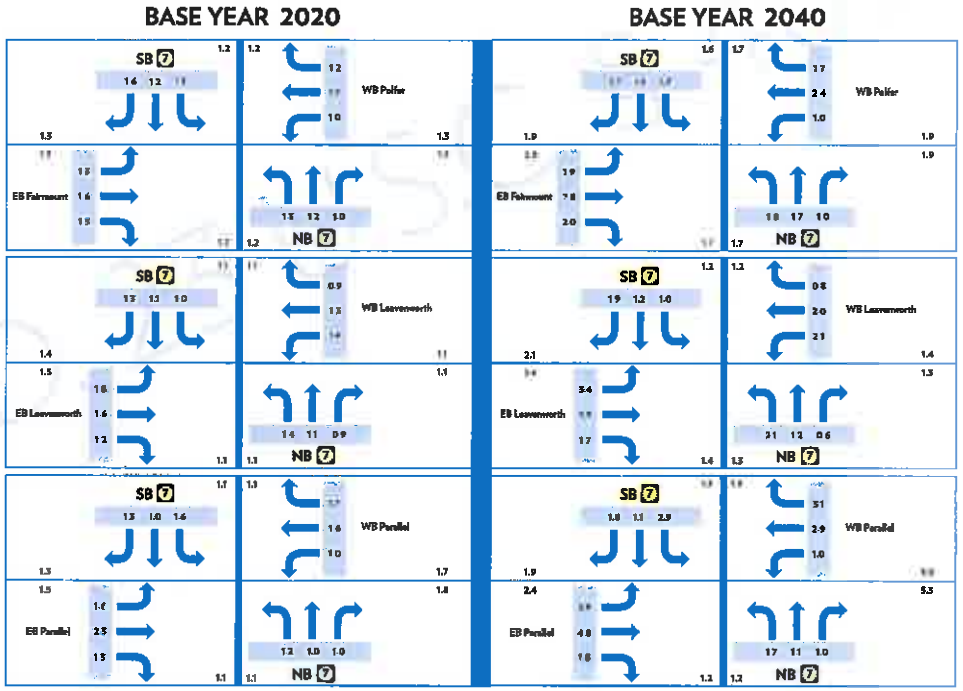

TABLE 4.3 - PM Peak Hour K-7 Growth Factors from Base Year to 2020 and 2040

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2014 AM PEAK

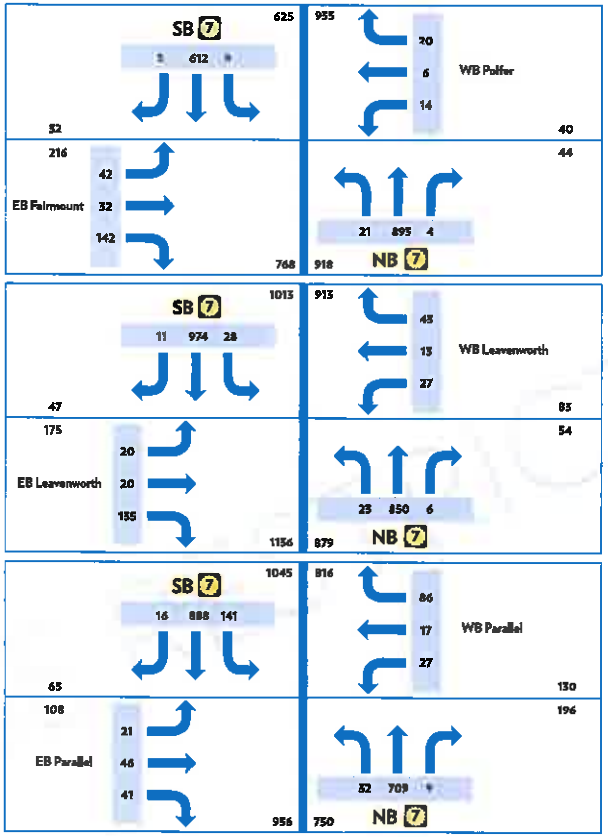

TABLE 4.4 - 2014 AM Peak Hour Volumes

2014 PM PEAK

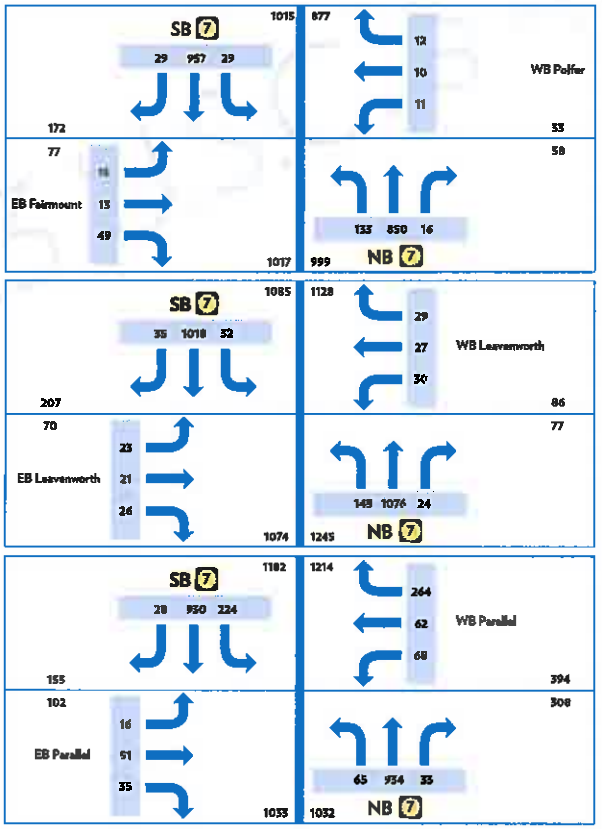

TABLE 4.5 - 2014 PM Peak Hour Volumes

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4.2.1 2020 Traffic Forecasts

Growth factors between the base year 2014 and the future year 2020 ranged from 1.0 to 2.3.

In the AM peak hour at the Polfer Intersection, forecasts show traffic volumes almost doubling at the southbound right (SBR) and westbound through (WBT) movements. In the PM peak hour, the largest forecasted growth (growth factors greater than 1.5) includes SBR, and eastbound through (EBT) movements.

At the Leavenworth Road intersection, highest growth movements greater than 1.5 in the AM peak hour include the westbound left (WBL) and northbound through (NBL) movements and in the PM peak hour the eastbound left (EBL) and EBT movements.

At the Parallel Parkway intersection, growth factors greater than 1.5 in the AM peak hour include westbound right (WBR), WBT, EBL and EBT movements and in the PM peak hour the WBR, WBT and EBL and EBT movements. TABLE 4.6 and TABLE 4.7 show the AM and PM peak hour forecasted traffic volumes for the year 2020.

2020 AM PEAK

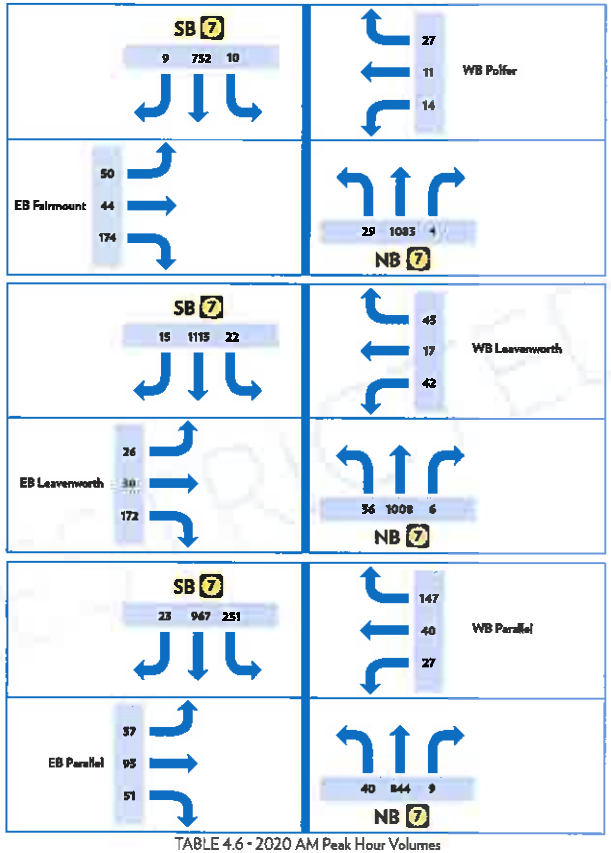

TABLE 4.6 - 2020 AM Peak Hour Volumes

2020 PM PEAK

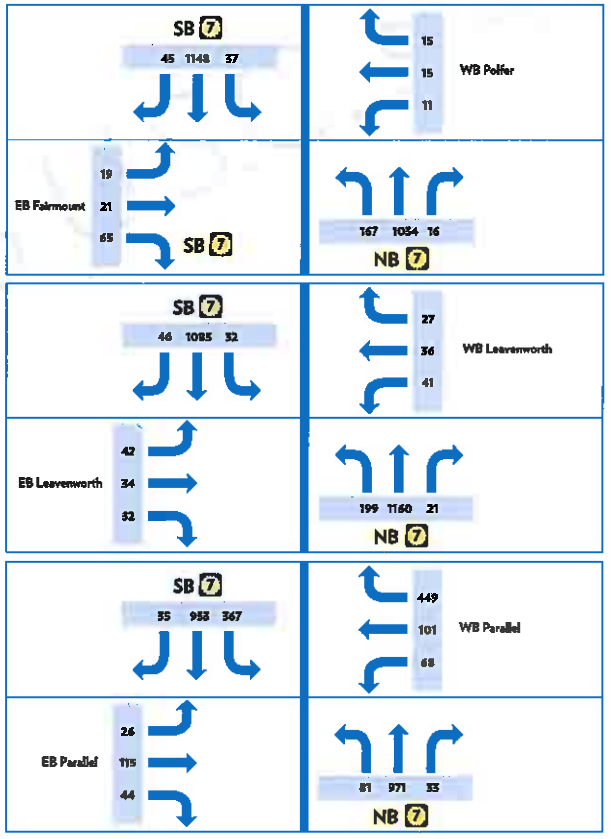

TABLE 4.7 - 2020 PM Peak Hour Volumes

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4.2.2 2040 Traffic Forecasts

Growth factors between the base year 2014 and the future year 2040 ranged from 1.0 to 5.0.

In the AM peak hour at the Polfer/Fairmount Road intersection, forecasts show traffic volumes tripling at the southbound right (SBR) and westbound through (WBT) movements. In the PM, the largest forecasted growth (> 2.5) includes SBR, and EBT.

At the Leavenworth Road intersection, movements with growth factors greater than 2.5 in the AM include the WBL and NBL movements and in the PM the EBL and EBT movements.

At the Parallel Parkway intersection, growth factors higher than 3 in the AM include SBL, WBR, WBT, EBL and EBT movements and in the PM the WBR, and EBT movements.

TABLE 4.8 and TABLE 4.9 show the AM and PM peak hour forecasted traffic volumes for the year 2040.

2040 AM PEAK

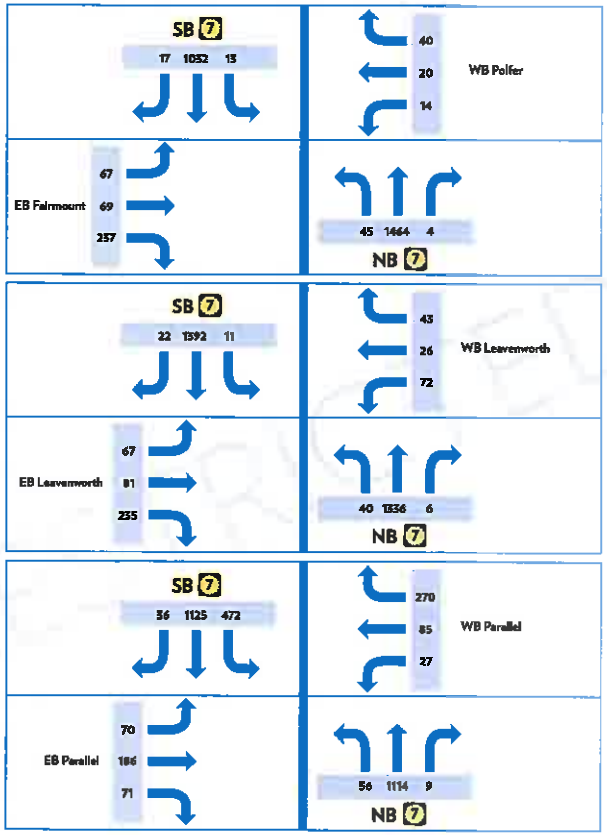

TABLE 4.8 - 2040 AM Peak Hour Volumes

2040 PM PEAK

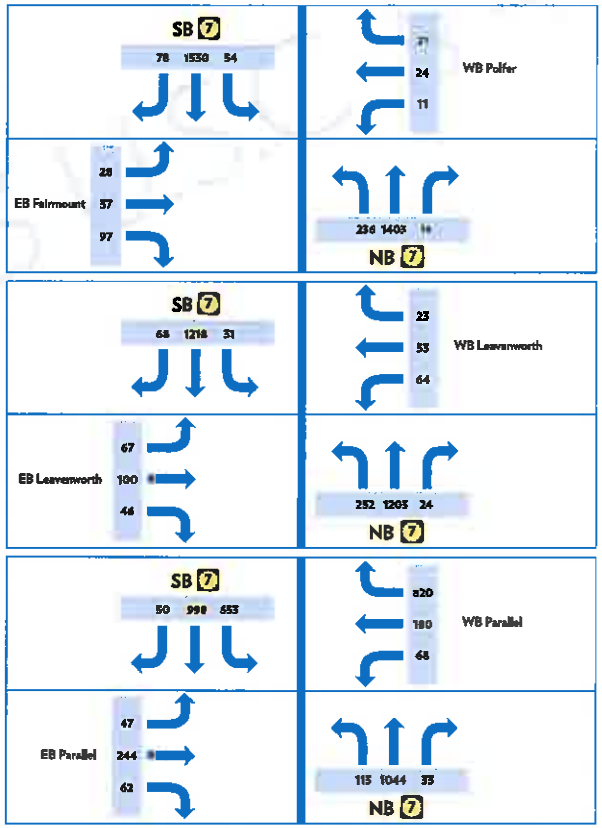

TABLE 4.9 - 2040 PM Peak Hour Volumes

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4.2.3 VISSIM Traffic Analysis

The 2010 Highway Capacity Manual (HCM 2010) is the basic engineering guideline for conducting Level of Service (LOS) evaluations. This manual addresses a broad range of transportation facilities and provides the overall framework for analyzing and reporting traffic operations using the LOS structure. TABLE 4.10 shows the average control delay and a description of the operation for each Level of Service for a intersection with controlled by a traffic signal.

Engineers have adopted the concept of LOS to provide a method to describe, evaluate, and compare operations on transportation facilities. All LOS calculations conducted as part of this study are for motor vehicles only. These calculations are based on the driver's perception of the traffic conditions. LOS A is the most favorable operating condition while LOS F has the longest delays and represents a congested condition. LOS D is generally considered to be the minimum acceptable operational condition, depending on the facility type.

LEVEL OF SERVICE	DESCRIPTION	AVERAGE CONTROL DELAY PER VEHICLE (Seconds/Vehicle)
A	Little to no delay. Progression is either exceptionally favorable or the cycle length is very short.	≤ 10
B	Volume-to-Capacity ratio is low and either progression is highly favorable or the cycle length is short.	> 10 - 20
C	Progression is favorable or the cycle length is moderate. Individual cycle failures may begin to appear at this level.	> 20 - 35
D	Volume-to-Capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are noticeable.	> 35 - 55
E	Volume-to-Capacity ratio is very high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.	> 55 - 80
F	Volume-to-Capacity ratio is very high, progression is very poor, and the cycle length is long. Most cycles fail to clear to the queue.	> 80

TABLE 4.10 - Level of Service Descriptions

Traffic signal timings were optimized conducted in Synchro v9 and then transferred to VISSIM v7. Signal settings were then modified as needed to adjust the clearance intervals at crossovers.

Once the VISSIM networks were complete, an internal QA/QC review was conducted by Parsons Brinckerhoff. This review covered the following aspects of VISSIM networks: geometry, signal timings, connector lane change distances, driver behavior, vehicle fleet, traffic compositions, reduced speed areas, speed decisions, network scale, right turn on red/stop signs, conflict area and priority rules, transit, pedestrians, pavement markings, model resolution, seed interval, model time period, volume validation, speed validation, and Measures of Effectiveness (MOE) summaries.

Comments were provided by the QA/QC reviewer as applicable for each of the aspects of the VISSIM network. Upon reviewing the comments made, follow-up questions and comments were submitted to the project team. After review of all comments with the project team, the VISSIM analyzer was run to produce excel data files which cover the following aspects of the network (where applicable or coded): overall network performance, delay (including intersection-level LOS using signalized intersection criteria), movement group delay, travel times, travel time delay, queue lengths, and volumes.

Traffic analysis results from VISSIM were averaged over 10 different seeds. A seed is one complete simulation using stochastic inputs. By averaging multiple stochastic inputs, a more reliable overall average model can be obtained. If vehicles are unable to enter the network, measures of effectiveness will be underestimated for the particular approach and actual operating conditions will be worse than indicated.

Calibration of the model occurred using 2014 traffic volumes but without knowing the existing signal timings in the field. 2014 signal timings were optimized in Synchro prior to transfer to VISSIM. Volumes successfully calibrated to within 10% or 20 vehicles of the turning volumes.

Signalized intersection capacity analyses were based on HCM 2010 Chapter 18, Signalized Intersections. However, for the unconventional intersections evaluated, there is not yet standard guidance on the proper way to analyze unconventional intersections with their multiple turning paths. For instance, should the delay for the minor street's left turn at a median U-turn include the travel time to the crossover? Should the delay at the crossover be counted separate from the main intersection? For the purposes of this study, the main intersection along with any crossovers were considered to be part of one intersection and grouped as a single node in VISSIM. The output "VehDelay" is used to determine delays for each movement at the intersection. "VehDelay is determined by subtracting the theoretical (ideal) travel time from the actual travel time). The theoretical travel time is the travel time which could be achieved if there were no other vehicles and/or no signal controls or other reasons for stops. Reduced speed areas are taken into account." (source PTV Manual Section 10.10.23)

As vehicle delay alone may not provide a complete picture of the operations of the intersections, the average travel time was also calculated. The travel time beginning and ends were set in the exact same locations for each individual intersection and alternative. Summary of effectiveness is shown in TABLES 4.11 and 4.12.

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YEAR	ALTERNATIVE	MOE	INTERSECTION
Leavenworth Road			
2020 AM	NO BUILD	DELAY (Sec) LOS	9.4 A
2020 AM	MUT	DELAY (Sec) LOS	6.1 A
2020 AM	RCUT	DELAY (Sec) LOS	5.7 A
2020 PM	NO BUILD	DELAY (Sec) LOS	13.5 B
2020 PM	MUT	DELAY (Sec) LOS	7.1 A
2020 PM	RCUT	DELAY (Sec) LOS	9.0 A
Parallel Parkway			
2020 AM	NO BUILD	DELAY (Sec) LOS	15.5 B
2020 AM	MUT	DELAY (Sec) LOS	17.9 B
2020 AM	RCUT	DELAY (Sec) LOS	12.5 B
2020 PM	NO BUILD	DELAY (Sec) LOS	44.2 D
2020 PM	MUT	DELAY (Sec) LOS	29.4 C
2020 PM	RCUT	DELAY (Sec) LOS	19.4 B

YEAR	ALTERNATIVE	MOE	INTERSECTION
Polfer/Fairmount Road			
2020 AM	NO BUILD	DELAY (Sec) LOS	10.3 B
2020 AM	MUT	DELAY (Sec) LOS	5.9 A
2020 AM	RCUT	DELAY (Sec) LOS	4.4 A
2020 PM	NO BUILD	DELAY (Sec) LOS	11.9 B
2020 PM	MUT	DELAY (Sec) LOS	5.8 A
2020 PM	RCUT	DELAY (Sec) LOS	8.0 A

K-7 TRAVEL TIME (Parallel Parkway to Gilman Road) In Min:Sec

ALTERNATIVE	NB AM	NB PM	SB AM	SB PM
NO BUILD	8:02	8:19	7:59	8:20
MUT	7:57	8:08	7:43	7:48
RCUT	7:38	7:48	7:40	7:50

TABLE 4.11 - Measures of Effectiveness Summary Year 2020

YEAR	ALTERNATIVE	MOE	INTERSECTION
Leavenworth Road			
2040 AM	NO BUILD	DELAY (Sec) LOS	14.2 B
2040 AM	MUT	DELAY (Sec) LOS	13.8 B
2040 AM	RCUT	DELAY (Sec) LOS	9.9 A
2040 AM	CONVENTIONAL LANES	DELAY (Sec) LOS	12.9 B
2040 PM	NO BUILD	DELAY (Sec) LOS	18.6 B
2040 PM	MUT	DELAY (Sec) LOS	16.6 B
2040 PM	RCUT	DELAY (Sec) LOS	12.1 B
2040 PM	CONVENTIONAL LANES	DELAY (Sec) LOS	17.2 B
Parallel Parkway			
2040 AM	NO BUILD	DELAY (Sec) LOS	32.7 C
2040 AM	MUT	DELAY (Sec) LOS	30.5 C
2040 AM	RCUT	DELAY (Sec) LOS	22.5 C
2040 AM	CONVENTIONAL LANES	DELAY (Sec) LOS	21.6 C
2040 PM	NO BUILD	DELAY (Sec) LOS	[illegible]
2040 PM	MUT	DELAY (Sec) LOS	36.4 D
2040 PM	RCUT	DELAY (Sec) LOS	31.2 C
2040 PM	CONVENTIONAL LANES	DELAY (Sec) LOS	27.2 C

YEAR	ALTERNATIVE	MOE	INTERSECTION
Polfer/Fairmount Road			
2040 AM	NO BUILD	DELAY (Sec) LOS	17.4 B
2040 AM	MUT	DELAY (Sec) LOS	11.3 B
2040 AM	RCUT	DELAY (Sec) LOS	7.2 A
2040 AM	CONVENTIONAL LANES	DELAY (Sec) LOS	10.8 B
2040 PM	NO BUILD	DELAY (Sec) LOS	16.2 B
2040 PM	MUT	DELAY (Sec) LOS	17.3 B
2040 PM	RCUT	DELAY (Sec) LOS	10.2 B
2040 PM	CONVENTIONAL LANES	DELAY (Sec) LOS	13.6 B

K-7 TRAVEL TIME (Parallel Parkway to Gilman Road) In Min:Sec

ALTERNATIVE	NB AM	NB PM	SB AM	SB PM
NO BUILD	9:38	9:55	9:41	12:02
MUT	9:07	8:54	9:26	10:50
RCUT	8:08	8:45	8:29	9:07
CONV. LANES	9:04	9:29	9:16	9:48

TABLE 4.12 - Measures of Effectiveness Summary Year 2040

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5.1 INTERSECTION CRASH ANALYSIS

Three years of crash data and crash reports (2011- 2013) along the K-7 project corridor were provided by KDOT. The data were reviewed to determine existing crash patterns and crash rates within a distance of 0.1 miles at the eight intersections between Gilman Road and Parallel Parkway. The data were analyzed for crash numbers, locations, types, severity, time-of-day, weather conditions and light conditions.

There have been a total of 110 crashes at the eight intersections in the three years: 39 in 2011, 36 in 2012 and 35 in 2013. The highest and second highest number of crashes occurred at the signalized intersections of K-7 and Parallel Parkway and K-7 & Leavenworth Road respectively (FIGURE 5.1).

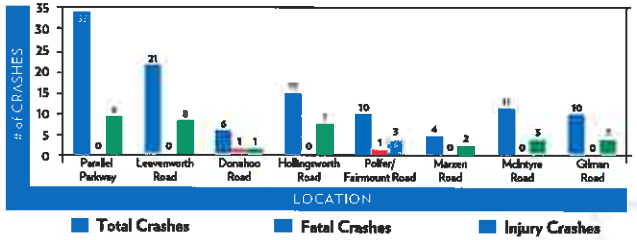

FIGURE 5.1 - Crash Location and Severity on K-7 Corridor (2011 -2013)

The 'types of crashes' analysis showed that approximately 64% of all the crashes were collisions with other vehicles, and 20% were animal related crashes. Of the collisions with other motor vehicles, rear end crashes accounted for 57% approximately (FIGURE 5.2).

The rear end crashes were observed to have higher occurrences at the three signalized intersections on K-7. Sixteen of the 40 rear end collisions occurred at Parallel Parkway, nine at the Leavenworth Road Intersection, and five at the Polfer/Fairmount Road intersection. Six of the 20 angle side impact crashes also occurred at the Parallel Parkway intersection, the remaining crashes were almost evenly distributed within the other seven intersections.

There were two fatal crashes within the study corridor within the three years. One occurred in 2011 at the K-7 and Donahoo Road intersection and the other in

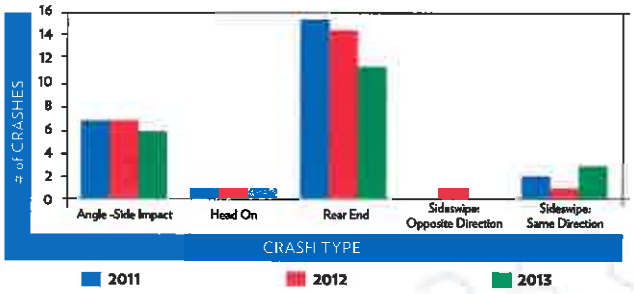

FIGURE 5.2 - Types of Collisions with Other Motor Vehicles

2012 at the K-7 & Polfer/Fairmount Road intersection. The number of injury and Property Damage Only (PDO) appear to remain quite steady through the three years. FIGURE 5.3 shows the crash types and severity, with the "Other Motor Vehicle" crashes accounting for the highest numbers in all severity categories.

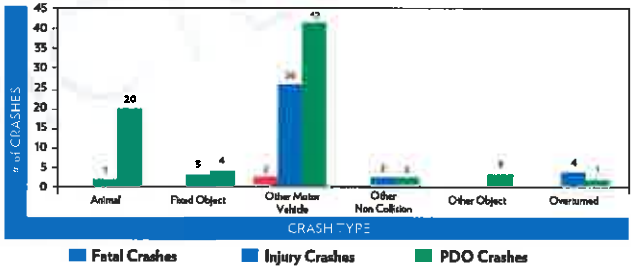

FIGURE 5.3 - Types and Severity of Crashes on K-7

The time of day when the crashes occurred showed the majority occurring during the afternoon and evening hours between 1 pm and 9 pm (FIGURE 5.4). The animal related crashes were seen to occur primarily between the hours of 4 am to 7 am and also 5 pm and 10 pm The highest number of 'Other Motor Vehicle' crashes occurrences was between 1 pm and 5pm.

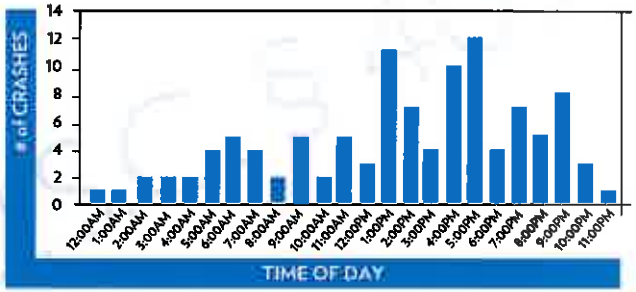

FIGURE 5.4 - Crash Times on K-7 betweeen Parallel Parkway and Gilman Road

Inclement weather did not appear to have any effect on the crashes and numbers. 85% occurred under no adverse weather conditions and 9% during rainy conditions. Only five of the total crashes occurred during snow and freezing rain conditions.

Given the rural conditions along the K-7 expressway, street lighting is minimal along the corridor as well as the intersections with fewer developments. An analysis of the lighting conditions showed that 61% of the crashes occurred during day, 21% at night with no streetlights, and 12% at night with streetlights on. The rest of the crashes occurred during the dawn or dusk hours.

	2011	2012	2013
DARK: No Street Lights	9	8	6
DARK: Street Lights On	4	5	4
DAWN	1	2	0
DAYLIGHT	23	20	23
DUSK	2	1	1

TABLE 5.1 - Number of Annual Crashes and Lighting Conditions

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Twelve of the 21 animal related crashes occurred during the night with no street lights and five during the night with street lights on. Only 12 of the 70 "Other Motor Vehicle" crashes occurred during the night. Crash severity with relation to the lighting conditions showed the fatal, injury and PDO numbers to be highest during the day.

5.2 CONFLICT POINTS COMPARISON

Conflict points are areas of an intersection or roadway where vehicle movement paths cross, merge and diverge.

Conventional Intersection Conflict Points

A conventional intersection has a total of 32 conflict points. Four "crossing" conflict points are where through vehicles cross the path of a through vehicle from the other roadway, 12 "crossing" conflict points involve left turning vehicles, eight conflicts occur where vehicle paths merge and eight where vehicle paths diverge (FIGURE 5.5). Severe injuries and fatalities occur more frequently at "crossing" conflict points, therefore intersection designs that reduce the number of these type of conflicts generally have fewer injury and fatal crashes.

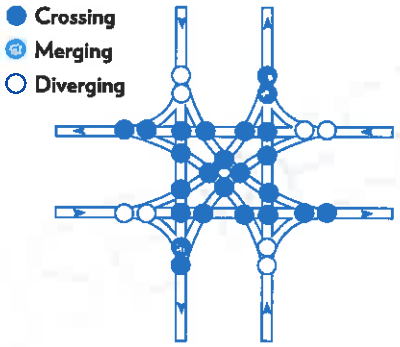


FIGURE 5.5 - Conflict Points at a Conventional Intersection

Median U-Turn (MUT) Intersection Conflict Points

The Median U-Turn (MUT) intersection, compared to a conventional intersection, reduces total conflict points from 32 to 16 and crossing conflict points from 16 to 4.

Removing direct left turns reduces some of the conflict points with the greatest crash type severity, namely left-through angle ("T-bone") collisions. This type of collision ranks second behind head-on collisions for the chance of severe injury (FIGURE 5.6).

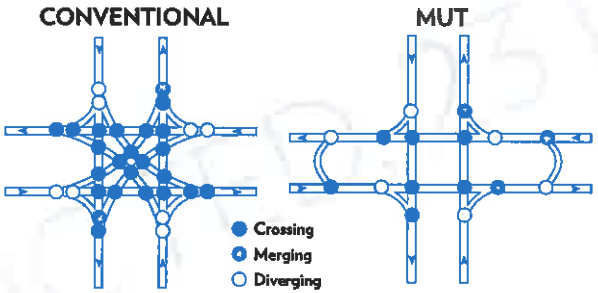


FIGURE 5.6 - Intersection Conflict Point Comparison (MUT vs. Conventional)

Restricted Crossing U-Turn (RCUT) Conflict Points

The Restricted Crossing U-Turn (RCUT) intersection compared to a conventional intersection reduces total conflict points from 32 to 14 and crossing conflicts from 16 to 2. Crossing maneuvers can result in angle crashes a crash type that is generally more severe than other types. RCUT conflict points are shown in FIGURE 5.7.

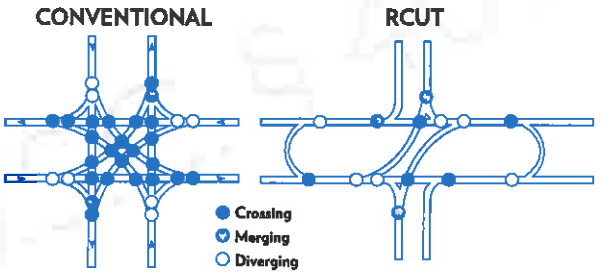
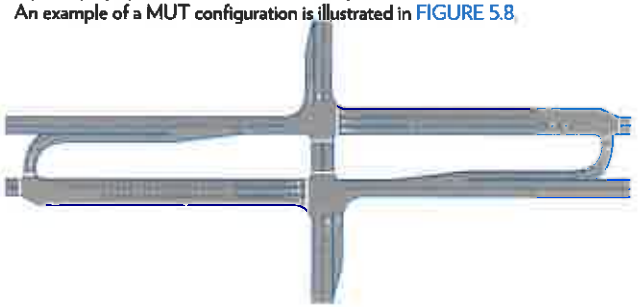


FIGURE 5.7 - Intersection Conflict Point Comparison (RCUT vs. Conventional)

5.3 SAFETY IMPACTS

Median U-turn Safety Impacts

There have been a number of research studies involving the safety performance of MUT intersections, and they generally show reductions in mean crash rates, especially injury-related crashes, when compared to conventional intersections. An example of a MUT configuration is illustrated in FIGURE 5.8.



The *FHWA Median U-Turn Intersection Informational Guide, August 2014,*
FIGURE 5.8 - U-Turn (MUT) Configuration

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notes that injury crash rates were 30% lower at MUT intersections than at conventional intersections (TABLE 5.2).

DATASET	RATE TYPE	GROUP	MEAN CRASH RATES (Crashes/MVE)	STANDARD DEVIATION	ALPHA
Corridor	ALL	MUT (Reduction) Conventional	1.554 (14%) 1.806	0.784 0.679	73
Intersection Related	ALL	MUT (Reduction) Conventional	1.388(16%) 1.644	0.593 0.643	80
	PDO	MUT (Reduction) Conventional	0.982 (9%) 1.077	0.392 0.467	49
	Injury	MUT (Reduction) Conventional	0.407 (30%) 0.58	0.266 0.252	97

"Alpha" denotes the confidence level that the two rates are statistically different

TABLE 5.2 - Crash Rate Comparison of MUT and Conventional Intersections
Source: FHWA Median U-Turn Intersection Information Guide

Right-turn/U-turn conflicts: where the U-turn crossover is aligned with a street or driveway that permit only right turns, U-turns from the crossover and right turns from the street/driveway may potentially conflict.

Driver expectancy for left turns from side streets: drivers approaching the main intersection on the side street and intending to turn left will normally position their vehicle in the left-most lane. As MUT intersections require these drivers to first turn right then make a U-turn, clear, concise signing is needed far enough in advance of the intersection.

Driver expectancy for left turns from the main roadway: drivers approaching the main intersection on the major roadway will be positioned in the correct lane. Signing is needed to draw these drivers through the main intersection to the U-turn crossover.

Weaving on the major roadway: the potential exists for some weaving movements to take place between through vehicles on the major street and vehicles turning right from the minor street and moving to the left lanes to reach the U-turn crossover. In most cases, vehicles turning right from the minor street will wait for a gap suitable to move into the U-turn crossover lanes without weaving with or impeding through traffic.

Potential for violating left turn prohibition: while signing and geometrics can deter vehicles from making direct left turns at the main crossing intersection, there is no physical barrier to making illegal left turns. Proper overhead and ground-mount signing, marking, and geometric design that positively guide vehicles are all important factors in discouraging prohibited left turns at the main crossing intersection.

Restricted Crossing U-Turn Safety Impacts

An example of a RCUT configuration is shown in FIGURE 5.9. There have been two noteworthy studies of RCUT intersections with stop signs and one noteworthy study of RCUT intersections with merges. These studies are noted in the *FHWA Restricted Crossing U-Turn Intersection Information Guide, August 2014* and the findings are shown in TABLE 5.3.

North Carolina Study: The analysis examined crash data from the period

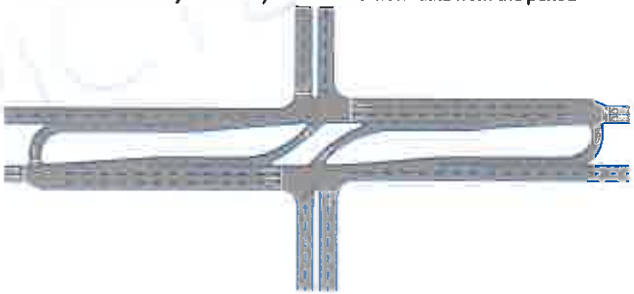

FIGURE 5.9 - Crossing U-Turn (RCUT) Configuration

before when the intersection was operated as a conventional stop-controlled intersection with a two-way median opening and after RCUT intersection installation. The sample included 13 RCUT intersections across the state where a two-lane rural minor road intersects a four-lane high-speed (greater than or equal to a posted speed of 55 miles per hour [mph]) major road. Fatal and injury, angle, and left-turn crashes decreased by more than half following the RCUT intersection installation, while sideswipe, rear-end, and other types of crashes tended to decrease by a lesser degree or increase.

Missouri Study: The locations were on rural, four-lane highways; one major road had a speed limit of 70 mph while the other sites had speed limits of 65 mph. One site had three legs, and the others had four legs. Major road average annual daily traffic (AADT) ranged from 10,000 to 26,000 vpd while minor road AADT ranged from 400 to 1,300 vpd. As in North Carolina and Maryland, the researchers observed a large reduction in angle crashes after the RCUT intersection installation.

Maryland Study: Researchers completed a safety analysis of RCUT intersections with merges in Maryland in 2012. The analysis examined crash data before RCUT intersection installation (when the intersection was operated as a conventional stop-controlled intersection with a two-way median opening) and after RCUT intersection installation. The sample included nine RCUT intersections on US-15 in central Maryland and US-301 on the Eastern Shore of Maryland where a two-lane rural minor road met a four-lane, 55 mph major road. Typically, the distance from the main junction to a U-turn crossover was approximately 2,000 feet. The field observations showed there were fewer conflicts at RCUT intersections than comparable conventional intersections during several hours of data collection.

Minnesota Study: The MnDOT analyzed four sites where RCUT intersections were constructed. Findings showed that total crashes were reduced by 40%, the combination of fatal and injury crashes were reduced by 70% and the

	North Carolina	Maryland	Missouri
Number of RCUT Intersection Sites	13	9	5
Type of Traffic Control	stop	merge	stop
% Decrease in Total Crashes	27	44	35
% Decrease in Injury Crashes	51	42	54

TABLE 5.3 - Notable RCUT Crash Rate Studies and Results

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SAFETY ANALYSIS

combination of fatal and severe injury crashes were reduced by 100%. Right angle crashes were reduced by 95.5%. Multi-vehicle crashes were reduced from 34 crashes in the before period to 11 in the after period (67.6% reduction).

RCUT Intersections with Signals: There are no known empirical, rigorous safety analyses of signalized RCUT intersections. FHWA has commissioned a study to determine a Crash Modification Factor (CMF) for replacing a conventional signalized intersection with a signalized RCUT intersection, and results are expected in 2015.

RCUT intersections with stop signs or signals controlling the minor street and crossovers do not create weaving movements on the major street. Instead, drivers must wait for an acceptable gap or a green signal. In contrast, RCUT intersections with acceleration lanes and merges at the minor street and the U-turn crossovers do create weaving movements.

5.4 CRASH RATES & STATEWIDE COMPARISON

A crash rate comparison of the K-7 section between Parallel Parkway and Gilman Road was used to determine how the roadway segment compares to two other similar segments along K-7 and also to the average statewide crash rates.

State average five-year (2009 – 2013) highway crash statistics including total, fatal, injury and critical crash rates were provided by KDOT. Crash rates for similar segments along the K-7 highway were also provided for comparison purposes.

Segment crash rates were calculated using the equations provided by the Federal Highway Guide.

"The crash rates for total and injury crashes on a roadway are calculated as:

$$R = \frac{C \times 1{,}000{,}000}{V \times 365 \times N \times L}$$

The crash rate for fatal crashes is calculated as follows and expressed in terms of fatal crashes per 100 million vehicle-miles of travel:

$$R = \frac{C \times 100{,}000{,}000}{V \times 365 \times N \times L}$$

The variables in this equation are:

R = Crash rate expressed as crashes per million vehicle-miles of travel, for total and injury crashes or 100 million vehicle-miles of travel for fatal crashes

C = Total number of crashes in the study period

V = Average Annual Daily Traffic (AADT)

N = Number of years of data

L = Length of the roadway segment in miles"

(Source: Federal Highway Administration, 2011)

FIGURE 5.10 shows crash rates at the K-7 project section compared to two other similar sections and to the average statewide crash rates.

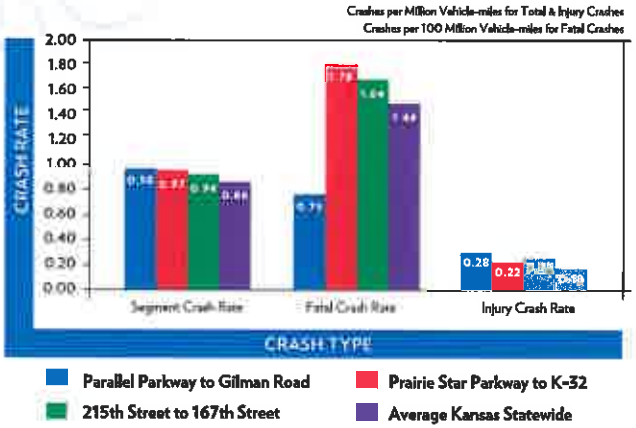

FIGURE 5.10 - Segment Crash Rates Compared to Other Sections and to the State

SECTION SIX

POTENTIAL STRATEGIES

The long term transportation strategy for K-7 is to convert this highway to a fully access controlled freeway. As funding for an improvement of this magnitude is not likely by the year 2040, this study was initiated to identify interim strategies that would cost effectively address traffic flow and safety issues.

Several potential interim strategies were analyzed to determine their impacts on vehicle delays at traffic signals, travel times along the K-7 corridor from Parallel Parkway to Gilman Road, and potential reduction of existing crash numbers and severity. Traffic growth was forecasted for the year 2040 so that the analysis covers the expected conditions throughout the operational service life of the interim strategies.

The potential strategies that were analyzed include the:

- **Base Scenario** – traffic signals added at all major intersections with no added traffic lanes
- **Conventional Lane Additions** – adding dual left turn lanes, right turn lanes, and minor road through lanes where appropriate, along with adding traffic signals at all major intersections
- **Median U-Turn Intersection** – direct left turns for the major and minor roads are prohibited at the main intersection and are instead redirected to U-turn crossovers on K-7
- **Restricted Crossing U-Turn Intersection** – minor road through and left turn movements are not allowed at the main intersection, but are instead redirected to U-turn crossovers on K-7

6.1 BASE SCENARIO

The base scenario assumes that traffic signals will continue to be installed at the major intersections along this segment of K-7. Existing traffic signals are shown as red circles on FIGURE 6.1 and are located at:

- Polfer/Fairmount Road
- Leavenworth Road
- Parallel Parkway

For analysis purposes, additional traffic signals shown as yellow circles in FIGURE 6.1 are assumed to be installed by the year 2040 at:

- Gilman Road
- McIntyre Road
- Marxen Road
- Hollingsworth Road
- Donahoo Road

6.1.1 Safety Performance

No significant change in crash numbers or severity would be expected at the intersections with existing traffic signals. Intersections with new traffic signals would likely see a reduction in right angle collisions and an increase in rear end collisions. Overall, no significant change in crash number or severity was assumed.

6.1.2 Traffic Flow Performance

Each additional traffic signal will have an impact on the flow of traffic along highway K-7. With traffic signals at each major intersection, travel times on K-7 from Parallel Parkway to Gilman Road will increase approximately 50 percent.

The existing traffic signals along K-7 have three phases: one for the left turns from K-7, one for K-7 through and right turn traffic, and one for the minor road. Each phase includes a green indication when traffic is moving, a yellow "change" interval and an "all red" clearance interval. During peak travel periods, K-7 through and right turn traffic make up approximately 84% of the traffic at these intersections, but can be allotted only about 50% of the traffic signal cycle length (FIGURE 6.2).

FIGURE 6.2 - Traffic Signal Cycle Split Allotted to K-7 Through Traffic

As minor road left turn traffic volumes or crashes increase, a fourth phase is often added. This further reduces the green time available for K-7 through traffic and increases travel times along K-7 (FIGURE 6.3).

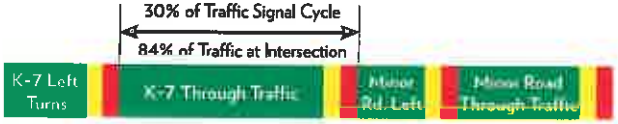

FIGURE 6.3 - Traffic Signal Cycle Split Allotted to K-7 Through Traffic

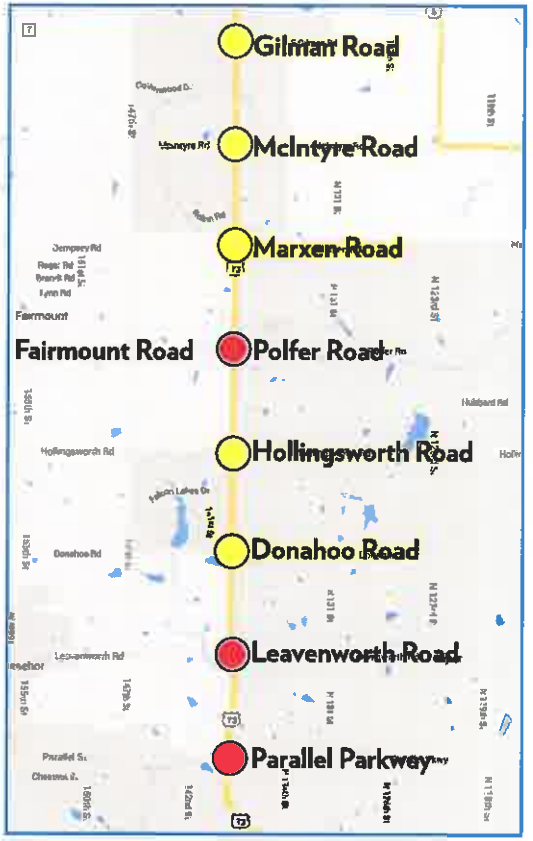

FIGURE 6.1 - Existing and Potential Traffic Signal Locations
Source: Google Maps

SECTION SIX
POTENTIAL STRATEGIES

6.2 CONVENTIONAL LANE ADDITIONS

This strategy involves the construction of additional travel lanes at the intersections such as creating dual left turn lanes, additional right turn lanes and additional through lanes for the minor road. The intent of these lane additions is to minimize the traffic signal "green" time requirements for the minor traffic movements and add all "green" time savings to the signal phase for K-7 through traffic. By the year 2040, traffic signals are assumed to have been installed at all major intersections along K-7.

- At Parallel Parkway, this strategy added two additional right turn lanes on the east leg of the intersection, one additional right turn lane on the west leg, and created dual left turn lanes for northbound and southbound K-7.
- At Leavenworth Road, this strategy added a right turn lane on the east and west legs of the intersection and added a second left turn lane for northbound to westbound traffic.
- At Polfer/Fairmount Road, this strategy added a left turn lane and a right turn lane on both the east and west legs of the intersection as well as a second left turn lane for northbound to westbound traffic.

6.2.1 Safety Performance

A minor safety improvement was assumed for the Conventional Lane Additions strategy as slightly fewer stops would be required for northbound and southbound traffic.

6.2.2 Traffic Flow Performance

Traffic operations are similar to the existing signalized intersections. However, specific lane additions address the heaviest traffic turning movements. This strategy provides slightly more traffic signal "green" time to K-7 through traffic and therefore provides somewhat better travel times that signalized intersections with no geometric changes.

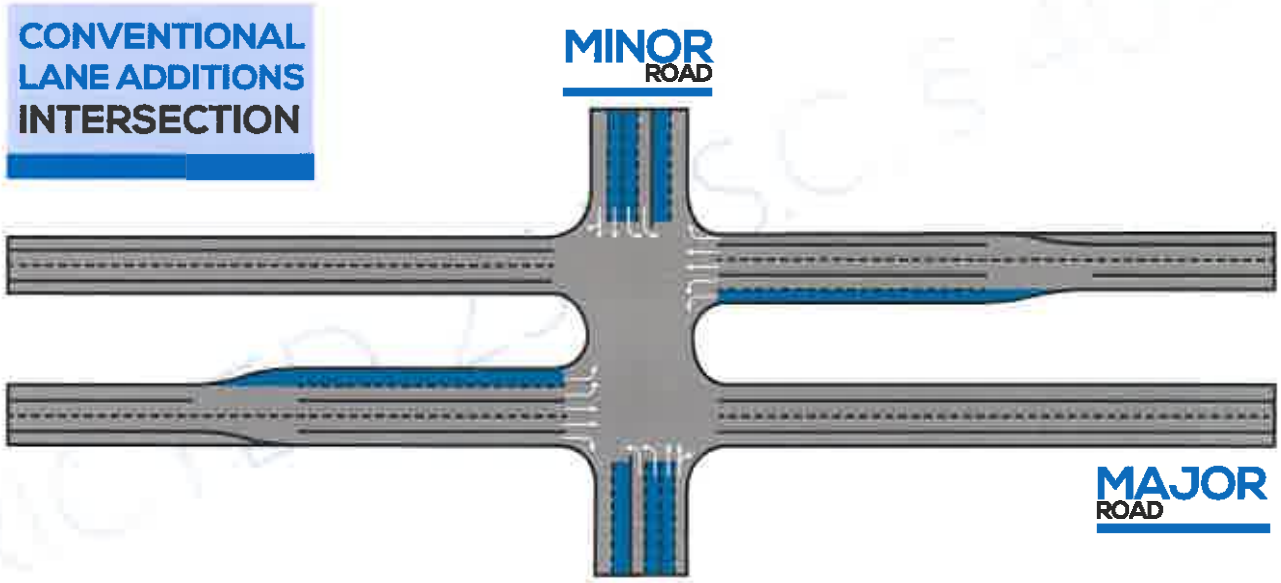

FIGURE 6.4 - Conventional Lane Additions

SECTION SIX
POTENTIAL STRATEGIES

6.3 MEDIAN U-TURN INTERSECTION (MUT)

The Median U-Turn Intersection (MUT) is one of several "Alternative Intersection Designs" that offer the potential to improve safety and reduce delay at a lower cost and with fewer impacts than traditional solutions.

The MUT intersection eliminates direct left turns from both intersecting streets and thus reduces the number of traffic signal phases and conflict points at the main crossing intersection, improving intersection operations and safety.

The MUT intersection replaces direct left turn movements at the intersection with indirect left turn movements that utilize U-turns, typically located in the median of the major roadway.

As shown by the yellow dotted line in FIGURE 6.5, the major street left turns are directed through the main crossing intersection, make a U-turn movement at a downstream directional crossover, and proceed back to the main crossing intersection. Drivers then turn right onto the minor street.

Minor street left turns, shown by the red dotted line, are directed to turn right onto the major street, make a U-turn movement at the directional crossover, typically 600 to 800 feet downstream, and then proceed through the main crossing street.

6.3.1 Safety Performance

The number of conflict points (points where one traffic movement crosses another) at an intersection has a correlation with the number of collisions that occur and is often used as a surrogate measure to compare different intersection design alternatives. As shown in the Safety Analysis discussion in Section Five, the MUT intersection has 16 conflict points compared to 32 at a conventional intersection.

Severe injuries and fatalities occur more frequently at "Crossing" conflict points. The MUT intersection, compared to a conventional intersection, reduces crossing conflict points by 75 percent (from 16 to 4).

The *FHWA Median U-Turn Intersection Informational Guide, August 2014*, notes that injury crash rates were 30 percent lower at MUT intersections than at conventional intersections.

6.3.2 Traffic Flow Performance

The MUT intersection provides traffic operational benefits, particularly for through movements, by reducing the number of intersection signal phases and shortening overall signal cycle length. Despite having to drive an additional distance compared to left turns at a conventional intersection, MUT intersection left turns often have equal or less delay and travel times compared to a conventional intersection.

Compared with conventional intersections, MUT intersections increase traffic throughput by 15 to 40 percent and reduce vehicles stopping in the network by 20 to 40 percent.

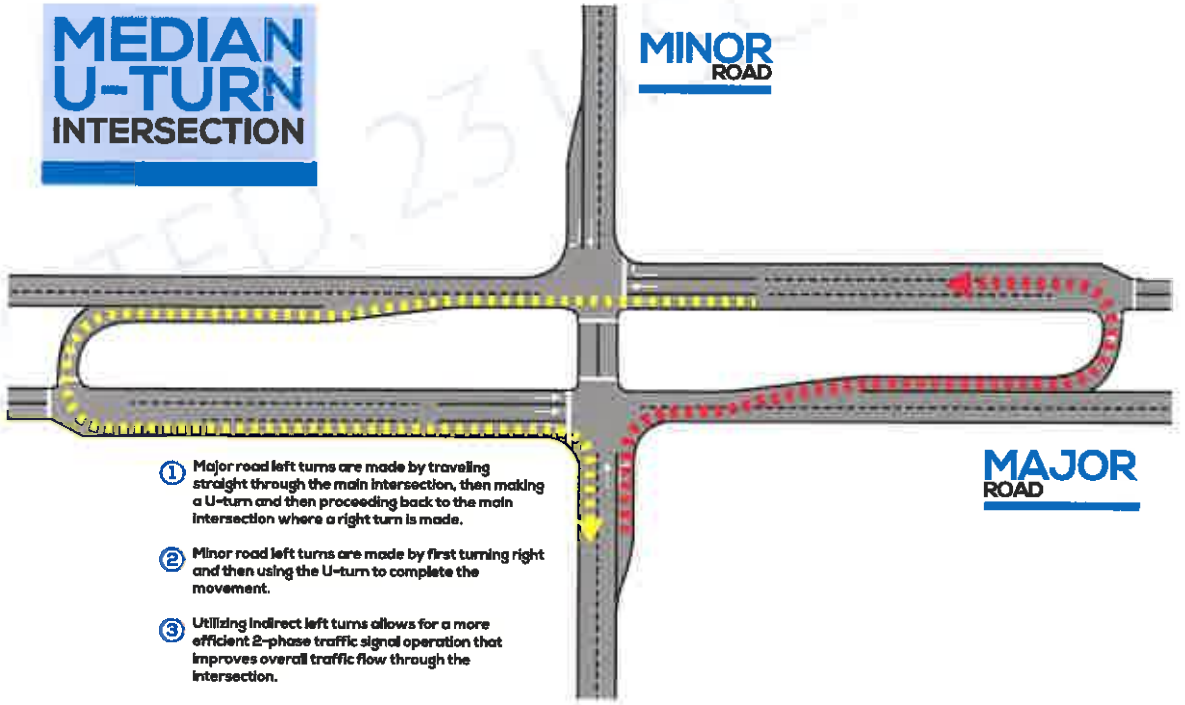

FIGURE 6.5 - Median U-Turn Intersection

SECTION SIX
POTENTIAL STRATEGIES

6.4 RESTRICTED CROSSING U-TURN (RCUT) INTERSECTION

The Restricted Crossing U-Turn (RCUT) intersection is an "Alternative Intersection Design" that offers improved traffic flow along the major roadway and significantly reduces the number and severity of crashes that occur at intersections.

The RCUT intersection differs from a conventional intersection by eliminating the left-turn and through movements from the minor street approaches. To accommodate these movements, the RCUT intersection requires drivers to turn right onto the major road as shown in FIGURE 6.6 and then make a U-turn maneuver at a one-way median opening typically 600 to 800 feet away from the main intersection.

On the major street approaches, the left turns are typically accommodated similar to left turns at conventional intersections. In some cases, such as rural unsignalized RCUT intersection designs, left-turn movements from the main street could also be removed.

6.4.1 Safety Performance

The number of conflict points (points where one traffic movement crosses another) at an intersection has a correlation with the number of collisions that occur and is often used as a surrogate measure to compare different intersection design alternatives. As shown in the Safety Analysis discussion in Section Five, the RCUT intersection has 14 conflict points compared to 32 at a conventional intersection.

Severe injuries and fatalities occur more frequently at "Crossing" conflict points. The RCUT intersection, compared to a conventional intersection, reduces crossing conflict points by 88 percent (from 16 to 2).

The *FHWA Restricted Crossing U-Turn Intersection Informational Guide* notes that RCUT intersections reduced total crashes between 27 and 44 percent. Injury crashes were reduced 42 to 54 percent. Recent studies in Tennessee and Minnesota have shown even higher reductions in fatal and injury crashes.

6.4.2 Traffic Flow Performance

RCUT intersections are best suited for corridors where the major road has significantly higher traffic volumes than the minor roads and where minor road through traffic is a small percentage of the overall traffic entering the intersection. In the case of K-7, the majority of the minor road traffic entering an intersection makes a turn onto the highway.

For minor roads that have fewer than 5000 vehicles per day, unsignalized RCUT intersections should be considered. If unsignalized, stop or yield signs would be used to control left turns from K-7, the minor road approaches and the U-turns.

Several studies have compared signalized RCUT intersections to conventional intersections. They have generally found RCUT intersections to decrease delay and travel time compared to conventional intersections.

A signalized RCUT intersection can provide favorable progression along a corridor. RCUT intersection signals typically require only two phases, which can maximize the green time for the major road through movement at the intersection. Efficient progression can be provided in both directions with any speed or signal spacing.

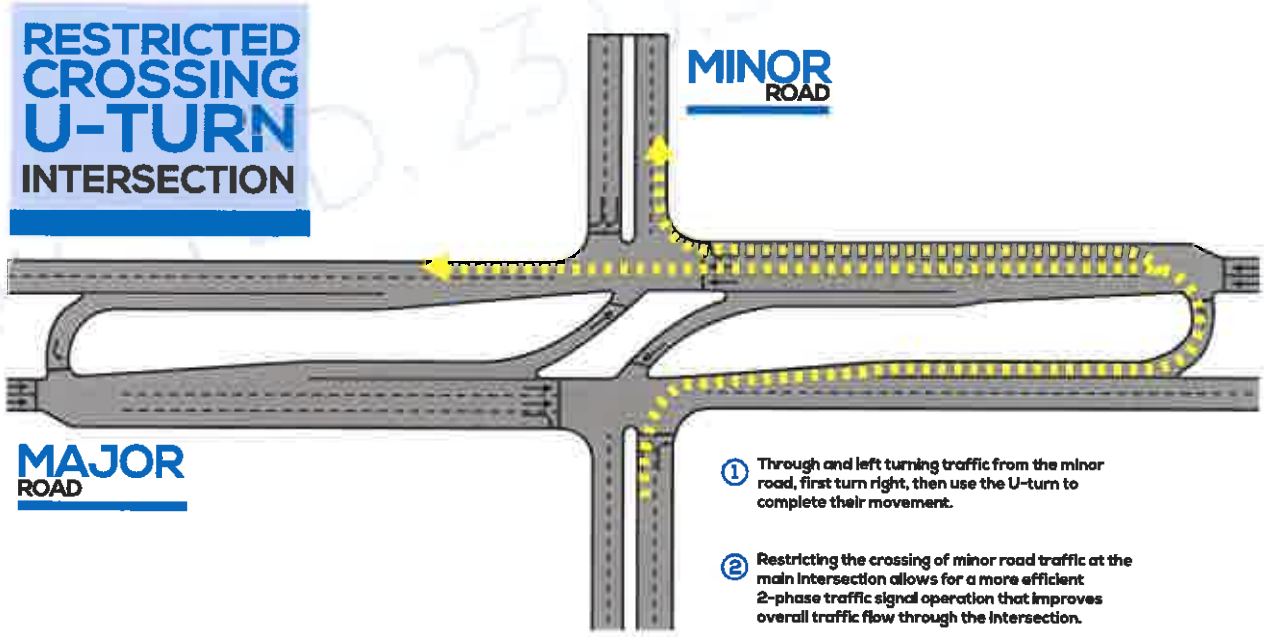

FIGURE 6.6 - Restricted Crossing U-Turn Intersection

SECTION SEVEN

FINDINGS & RECOMMENDATIONS

7.1 FINDINGS

The findings of the study focus on traffic safety, intersection operational performance, travel times, driver expectations and estimated construction costs.

7.1.1 Safety - Comparison of Conflict Points

Conflict points at intersections are locations where two separate vehicle movements cross, merge or diverge. Fatal and injury crashes are most often associated with "crossing" conflict points and include right angle conflicts between through vehicles on intersecting roadways and those involving left turns.

TABLE 7.1 shows the total number of conflict points and the number of crossing conflict points for the Base Scenario and each of the potential strategies.

	Base Scenario	Conventional Added Lanes	MUT Intersection	RCUT Intersection
Total Conflict Points	32	32	16	14
Crossing Conflict Points	16	16	4	2

TABLE 7.1 - Comparison of Conflict Points

The potential for collisions at intersections is greater where there are complex situations created by numerous conflict points, higher speeds and higher traffic volumes. Reducing the number of conflict points typically simplifies the driving task and results in fewer collisions.

The Median U-Turn Intersection (MUT) and the Restricted Crossing U-Turn Intersection (RCUT) have significantly fewer conflict points than the conventional intersection design in the Base Scenario and Conventional Added Lanes Strategy.

7.1.2 Safety - Crash Reduction

The FHWA reports that approximately 40 percent of all crashes and 65 percent of fatal and injury crashes nationally occur at intersections or are intersection related.

Research that examined "before and after" crash data has determined specific reductions in crashes that have resulted from the implementation of a variety of crash mitigation strategies and intersection designs. Crash reduction findings from FHWA's 2014 informational guides for Median U-Turn and Restricted Crossing U-Turn intersections, as well as information from the Crash Modification Factors Clearinghouse, were used in the analysis of the interim strategy alternatives.

TABLE 7.2 shows the crash reduction factors for the potential Interim Strategies. The Base Scenario is assumed to see no reduction in the numbers of crashes that have been occurring at K-7 intersections.

	Base Scenario	Conventional Added Lanes	MUT Intersection	RCUT Intersection
Reduction in Total Crashes	--	5%	16%	30%
Reduction in Fatal/ Injury Crashes	--	2%	30%	52%

TABLE 7.2 - Expected Crash Reduction

The Conventional Lane Addition strategy is expected to have a minor reduction in the number of crashes due to slightly fewer stops for K-7 through traffic. Studies for the MUT and RCUT intersections have shown significant reduction in the number of total and fatal/injury crashes.

The RCUT intersection shows the greatest potential for reducing the total number of crashes as well as the number of fatal and injury crashes.

7.1.3 Safety - Public Concerns

A number of safety concerns were raised by area residents during the Public Open House meetings. These include:

- Leavenworth Road – no southbound right turn lane
- Donahoo Road – no southbound right turn lane
- Hollingsworth Road – no southbound right turn lane nor southbound left turn lane
- Marxen Road – no northbound right turn lane and no southbound left turn lane
- McIntyre Road – no northbound nor southbound right turn lane
- Gilman Road – no northbound right turn lane
- Local street/frontage road connections – no right turn lanes
- Multiple vehicles attempting to use a crossover at the same time – different turning movements conflict with one another
- Slow drivers in the inner through lane ("passing lane") create conflicts with drivers traveling at the speed limit

7.1.4 Intersection Performance

Traffic volumes were forecasted for the year 2040 during morning and evening peak traffic periods, and then used to analyze the expected intersection Level of Service (LOS) and delay for each of the potential Interim Strategies. As discussed in Section Five, Level of Service is a method to describe, evaluate and compare operations on transportation facilities. Signalized intersection LOS is defined in terms of the average total vehicle delay of all movements through an intersection. LOS A is the most favorable operating condition while LOS F has the longest delays and represents a congested condition. LOS D is generally considered to be the minimum acceptable operational condition for an intersection as a whole.

K-7 Intersection	Base Scenario	Conventional Added Lanes	MUT Intersection	RCUT Intersection
2040 AM Peak Period Level of Service (LOS) / Delay *				
Parallel Parkway	C/32.7	C/21.6	C/30.5	C/22.5
Leavenworth Road	B/14.2	B/12.9	B/13.9	A/9.9
Polfer/Fairmount Road & Others	B/17.4	B/10.8	B/11.3	A/7.2
2040 PM Peak Period Level of Service (LOS) / Delay *				
Parallel Parkway	F/151.9	C/27.2	D/36.4	C/31.2
Leavenworth Road	B/18.6	B/17.2	B/16.6	B/12.1
Polfer/Fairmount Road & Others	B/16.2	B/13.6	B/17.3	B/10.2

*Average Intersection Delay in Seconds

TABLE 7.3 - Intersection Level of Service / Average Delay

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FINDINGS & RECOMMENDATIONS

The three potential Interim Strategies provide an adequate level of service during peak traffic periods in the year 2040.

The RCUT intersection provides a somewhat better level of service and lower delays for most intersection/traffic conditions than the other two alternatives.

7.1.5 K-7 Corridor Travel Times

Travel times for the K-7 corridor were determined based upon traffic simulation modeling of the anticipated morning and evening peak traffic conditions in the year 2040. The travel times in TABLE 7.4 are from a point approximately 2,000 feet south of Parallel Parkway to a point approximately 2,000 feet north of Gilman Road. A posted speed limit of 65 mph was used except for the north end of the corridor where the speed limit drops to 50 mph.

For comparison, if K-7 were a freeway with a posted speed limit of 70 mph, the travel time on this segment would be seven minutes.

Time of Day & Direction	Base Scenario	Conventional Added Lanes	MUT Intersection	RCUT* Intersection
AM Peak Northbound	9.6	9.1	9.1	8.1/7.9
AM Peak Southbound	9.7	9.3	9.4	8.5/8.1
PM Peak Northbound	9.9	9.8	8.9	8.7/8.2
PM Peak Southbound	12.0+	9.8	10.8	9.1/8.1

* RCUT results: first travel time assumes all intersections have traffic signals and the second time assumes traffic signals only at Parallel Parkway, Leavenworth Road and Polfer/Fairmount Road.

TABLE 7.4 - K-7 Corridor Travel Times (minutes)

All three potential Interim Strategies would provide lower travel times than the Base Scenario. **The RCUT intersection results in the lowest travel times for the K-7 corridor.** This is particularly evident in the option where only the intersections of Parallel Parkway, Leavenworth Road and Polfer/Fairmount Road are controlled by traffic signals. In this option, K-7 through and right turning vehicles are free flowing at the unsignalized intersections and the remaining traffic movements are controlled by stop signs.

7.1.6 Minor Road Left Turn Travel Times

As the two alternative intersection designs being considered require indirect left turn movements from the minor roads, the question was raised regarding the travel time impacts to these movements. Travel times for left turning traffic from the minor road were determined for the Base Scenario and each of the potential Interim Strategies.

Travel times were calculated by the VISSIM traffic simulation model and include the time necessary to:

- travel 1,000 feet on the minor road approach to the intersection
- experience delay at the main intersection and U-turns
- complete the direct or indirect left turn
- travel 2,000 feet on K-7 leaving the intersection

TABLES 7.5 (AM peak hour) and 7.6 (PM peak hour) show the difference in travel times between the Base Scenario and each potential Interim Strategy for minor road left turns. A negative number indicates less travel time than the Base Scenario and a positive number more time.

K-7 Intersection	Base Scenario	Conventional Added Lanes	MUT Intersection	RCUT Intersection
EB Parallel Parkway	--	-72	-74	-57
WB Parallel Parkway	--	-2	38	54
EB Leavenworth Road	--	2	22	27
WB Leavenworth Road	--	11	7	15
EB Polfer/Fairmount Road & Others	--	-17	2	10
WB Polfer/Fairmount Road & Others	--	-5	20	19

Note: EB indicates eastbound and WB indicates westbound.
Travel times in seconds more than or less than the Base Scenario.

TABLE 7.5 - Minor Road Left Turn Travel Times Compared to the Base Scenario (AM Peak)

K-7 Intersection	Base Scenario	Conventional Added Lanes	MUT Intersection	RCUT Intersection
EB Parallel Parkway	--	-10	-7	4
WB Parallel Parkway	--	-211	-165	-171
EB Leavenworth Road	--	-40	-50	-33
WB Leavenworth Road	--	-10	-20	-10
EB Polfer/Fairmount Road & Others	--	-3	19	18
WB Polfer/Fairmount Road & Others	--	-4	35	32

Note: EB indicates eastbound and WB indicates westbound.
Travel times in seconds more than or less than the Base Scenario.

TABLE 7.6 - Comparison of the Minor Road Left Turn Travel Times to the Base Scenario (PM Peak)

Left turns from the minor road approaches make up about two to three percent of the total traffic entering the intersection. **Overall, the Conventional Added Lanes strategy provides the best service to the left turning traffic from the minor roads.**

7.1.7 Driving Task

The driving task varies for the three potential Interim Strategies. Factors include driver expectations for how the intersection operates, how traffic movements are routed and the potential for traffic violations.

Conventional Added Lanes Intersection: This intersection design is very similar to the existing intersections and changes such as dual left turns are intersection features that are familiar to area drivers.

Median U-Turn (MUT) Intersection: This intersection design type would be new to the Kansas City metropolitan area. As the left turn movements for both intersecting roadways are rerouted, drivers will need to learn how to make an indirect left turn.

The Core Team discussed the potential for drivers to continue to make a left turn at the main intersection, even though this would be a prohibited

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movement. One of the region's public works directors provided his experience implementing MUT intersections in another state. He advises that while there is certainly a learning curve at new installations, drivers adjust fairly quickly to the new design and are "encouraged" to make left turns at the appropriate locations by other drivers in the traffic stream.

Appropriate signing and pavement markings will be needed to properly inform and guide drivers regarding how to drive this intersection type.

Restricted Crossing U-Turn (RCUT) Intersection: The RCUT intersection design, including the use of U-turns, would also be new to the region. However, a similar design for the main intersection has been used at other intersections in the Kansas City metropolitan area. FIGURE 7.1 shows the intersection of K-7 and 75th Street that has the same access control as the RCUT main intersection. This location is approximately ten miles south of the study corridor. FIGURE 7.2 shows the intersection at Shawnee Mission Parkway and Lucille Lane, one of several similar intersections along Shawnee Mission Parkway.

FIGURE 7.1 - Access Controlled Intersection at K-7 and 75th Street, Shawnee, KS

FIGURE 7.2 - Access Controlled Intersection on Shawnee Mission Parkway, Shawnee, KS

At an RCUT intersection, drivers on the major road make left turns at the main intersection, the same as a conventional intersection. The difference in this design is that it requires all minor road traffic to turn right. Those minor road drivers who want to go through or turn left make use of a U-turn to complete these movements. While the right turn may initially be unexpected, the deceleration lane for the U-turn and the U-turn crossover provide a logical route to complete the minor road through and left turn movements.

7.1.8 Estimated Construction Cost

"Planning level" estimated construction costs for one installation were developed for each strategy and are shown in TABLE 7.7 The Base Scenario assumes the cost of a new traffic signal installation at an intersection that is currently controlled by stop signs on the minor road.

	Base Scenario	Conventional Added Lanes	MUT Intersection	RCUT* Intersection
Estimated Construction Cost	$0.2	$1.9	$1.3	$1.3

*The estimated cost for an RCUT intersection can be reduced by $200,000 if it is unsignalized.

TABLE 7.7 - Estimated Construction Cost in $millions

7.2 RECOMMENDATIONS

The selection of the recommended Interim Strategy for K-7 between Parallel Parkway and Gilman Road is based primarily upon how well it addressed the two major goals of minimizing travel time along the K-7 corridor and providing the greatest expected reduction in existing crashes at or related to major intersections.

Other factors that were considered include:

- K-7 through and right turn traffic make up approximately 84 percent of the vehicles entering a typical intersection. Therefore, at intersections with traffic signals, the recommended strategy should provide a more equitable balance in the assignment of green time than that of a signal at a conventional intersection.
- Traffic patterns show that most minor road vehicles turn onto K-7 and that minor road through traffic comprises approximately 2 percent of the vehicles entering a typical intersection along K-7. Therefore, the minor road through movement should not drive the selection of a strategy.
- The estimated construction cost should allow the strategy to be implemented along the corridor within the next five to ten years.
- The strategy should delay the need for additional traffic signals along the corridor.

7.2.1 Recommended Strategy

The Restricted Crossing U-Turn (RCUT) intersection is the recommended Interim Strategy for all major intersections on K-7 from Parallel Parkway to Gilman Road. Signalized RCUT intersections are recommended for the intersections with Parallel Parkway, Leavenworth Road and Polfer/Fairmount Road. The remaining intersections could initially operate using stop signs to control the K-7 left turns, the U-turn crossovers and the minor road approaches.

Advantages of the RCUT intersection include:

- The greatest probable reduction in total crashes and fatal/injury crashes. Right angle collisions, which are often the most severe, are significantly reduced at RCUT intersections.
- Reduction in the total number of vehicle conflict points from 32 to 14 and a

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reduction in "crossing" conflict points from 16 to 2. RCUT intersections have the fewest conflict points of the potential strategies that were considered.

- The lowest K-7 corridor travel times. Even lower travel times if only three of the intersections utilize traffic signals.
- Allows the coordination of traffic signals to create the largest possible progression bands for both direction of travel on K-7. RCUT intersections create two separate one-way roadways for northbound and southbound K-7 which in theory allows for "perfect" progression. Some of the benefit of signal coordination may be lessened due to the large spacing between traffic signals which will allow some dispersion of vehicle platoons.
- The RCUT intersection provides a more equitable split of traffic signal "green" time, as shown in FIGURE 7.3. The RCUT intersection allows the use of a 2-phase traffic signal instead of the three phases used at the existing traffic signals on K-7. A 2-phase signal provides more efficient movement of traffic for K-7, and with a shorter overall cycle length, improvement for the minor road as well.
- RCUT intersections will delay the need to install new traffic signals at those intersections that are currently unsignalized.
- The greater throughput for K-7 extends the future date when additional lanes are needed to provide adequate capacity for traffic growth.

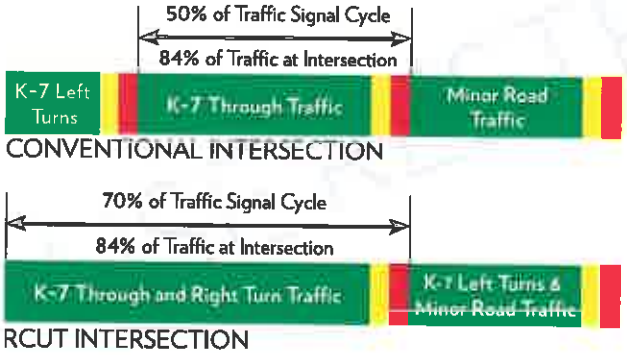

FIGURE 7.3 - Comparison of Traffic Signal Phasing and Green Time Splits

Disadvantages:

- Increases the travel distance for minor road left turn and through drivers.
- May increase travel time for minor road left turn and through drivers. However, more efficient traffic signals and time savings as drivers continue their trip along K-7, will likely reduce or erase an initial increase in travel time.

7.2.2 Implementation

Implementing RCUT intersections as the Interim Strategy for K-7 from Parallel Parkway to Gilman Road has as estimated construction cost in 2015 dollars of approximately $10 million. Working together, KDOT and the cities and counties along the corridor could implement this strategy over the next five to ten years. In comparison, upgrading the corridor to a freeway will have an estimated cost of nearly $300 million as shown in TABLE 7.8. Funding for the long-term freeway solution is not likely within the next twenty years or more given current funding levels.

	Quantity	Unit	Unit Cost	Total
Mainline K-7	7.8	mile	$8,000,000	$62,400,000
Interchange	6	each	$20,000,000	$120,000,000
Overpass	1	each	$10,000,000	$10,000,000
Collector Street	17.2	mile	$4,000,000	$68,800,000
Arterial Street	5.3	mile	$6,000,000	$31,800,000
TOTAL				$293,000,000

TABLE 7.8 - Estimated Cost of Freeway and Local Road System
Source: K-7 Corridor Management Plan (costs updated to 2015 dollars)

Order of Implementation: Several approaches can be taken to determine the priority order of intersection for implementation.

- **Safety:** the three intersections with the highest number of total crashes and injury crashes are Parallel Parkway, Leavenworth Road and Hollingsworth Road. These locations would benefit from the expected reduction in crashes that other states have achieved after converting a conventional intersection to an RCUT intersection.
- **Geometric design:** Hollingsworth Road and Marxen Road lack southbound left turn lanes. Lack of left turn lanes impacts both safety and the smooth flow of traffic along K-7 as left turning vehicles must slow to an appropriate speed in the inside through lane of K-7. The resulting speed differential between turning vehicles and through vehicles disrupts the smooth flow of traffic. These intersections would benefit from the construction of left turn lanes on K-7 that would be provided by an RCUT intersection.
- **Travel time on K-7:** converting the existing signalized intersections at Parallel Parkway, Leavenworth Road and Polfer/Fairmount Road to signalized RCUT intersections. K-7 corridor travel times would benefit from the more efficient traffic signal operation provided by an RCUT intersection.
- **Proof of Concept:** select three intersections such as Hollingsworth Road, Donahoo Road, and Polfer/Fairmount Road as the first locations to construct RCUT intersections to demonstrate how the concept works for unsignalized and signalized intersections.