



**CITY OF BELTON
CITY COUNCIL
BUDGET WORK SESSION AND WORK SESSION
TUESDAY, FEBRUARY 16, 2016 – 6:30 P.M.
CITY HALL ANNEX
520 MAIN STREET
AGENDA**

- I. CALL BUDGET WORK SESSION TO ORDER – 6:30 P.M.
 - A. Review of Estimated Revenue and Proposed Expenditures for Major funds.
 1. Water & Wastewater
 2. Golf
 3. Street
 4. General
- II. ADJOURN BUDGET WORK SESSION
- III. CALL WORK SESSION TO ORDER – 7:30 P.M.
- IV. ITEMS FOR REVIEW AND DISCUSSION
 - A. PRESENTATION OF THE MARC/ OPERATION GREEN LIGHT (OGL) TRAFFIC STUDY OF THE SIGNALIZED INTERSECTIONS ALONG THE 163RD STREET CORRIDOR AND MARKEY PARKWAY.

Ray Webb with OGL will present the study findings

Page 5
 - B. STREET PRESERVATION REPORT.

David Frazier and Jeff Fisher will present the report

Page 37
 - C. REPORT ON THE NORTH SCOTT CORRIDOR PLAN AND CONSULTANT RECOMMENDED INITIATIVES.

Jay Leipzig will present the report

Page 61
 - D. PHASE 2 OF THE SIDEWALK COST SHARE PROGRAM FOR REPAIRS AND REPLACEMENTS.

Page 67

E. CITY ATTORNEY ANNUAL REPORT.

Page 73

F. CITY ATTORNEY OFFICE RENOVATIONS.

Page 79

G. REVIEW OF JANUARY 2016 FINANCIAL REPORT.

H. OTHER BUSINESS

V. ADJOURN

SECTION IV
A



CITY OF BELTON CITY COUNCIL INFORMATION FORM

AGENDA DATE: February 16, 2016

DIVISION: Transportation

COUNCIL: Regular Meeting Work Session Special Session

<input type="checkbox"/> Ordinance	<input type="checkbox"/> Resolution	<input type="checkbox"/> Consent Item	<input type="checkbox"/> Change Order	<input type="checkbox"/> Motion
<input type="checkbox"/> Agreement	<input type="checkbox"/> Discussion	<input type="checkbox"/> FYI/Update	<input checked="" type="checkbox"/> Presentation	<input type="checkbox"/> Both Readings

ISSUE/RECOMMENDATION:

MARC / Operation Green Light (OGL) staff will present findings of a recent traffic study of the signalized intersections along the 163rd Street corridor and Markey Parkway. The objective of this project was to improve coordinated movements along these corridors while minimizing the delay on the side streets.

Timings of the City of Belton signalized intersection will be adjusted in the future to meet the recommendations of the report.

PROPOSED CITY COUNCIL MOTION:

Not applicable / Information only

BACKGROUND:

Operation Green Light (OGL) was developed through MARC as a cooperative effort to improve the coordination of traffic signals along major routes throughout the metropolitan area. OGL helps synchronize traffic signals around the region, especially those that cross jurisdictional boundaries and helps reduce delays, improve traffic flow and cut emissions that contribute to ozone pollution. OGL also provides local agencies an effective tool to manage traffic signal operations into the future and respond to changes in vehicle traffic patterns.

In June 2015, the City of Belton agreed to partner with OGL and include the 163rd Street corridor and Markey Parkway on the regional system. Since then OGL has assisted staff on several occasions with citizen concerns and also coordinated the traffic study being presented. The proposed coordination of the signals along 163rd will improve movement along the corridor. Future changes in traffic may warrant additional timing changes that will be monitored by OGL and Belton staff. Funding for the program is paid annually through the Transportation budget.

IMPACT/ANALYSIS:

Not applicable

STAFF RECOMMENDATION, ACTION, AND DATE:

Staff recommends completing the proposed changes to the signals over the next month.

LIST OF REFERENCE DOCUMENTS ATTACHED:

OGL Presentation



Agenda

- MARC / OGL Region
- OGL Regional Operations
- System Features
- Performance Measures
- 163rd St. improvements



Kansas City Region

- 2 States
- 9 Counties
- 120 Cities
- 2.1 m Pop.
- 16,000 Lane Miles
- 4,400 Sq Miles



MARC GREENLIGHT **OGL Program**

What OGL Does

Mission: Operation Green Light monitors and manages the existing transportation system through safe and efficient traffic signal operations to reduce travel time, fuel consumption and air pollution.



Elements include:

- Traffic Signal Timing / Coordination
- Regional Communication Network
- Signal Management Software
- Video Monitoring of Traffic

MARC GREENLIGHT **Program Partners**

FHWA (MO & KS)	Shawnee
KANSAS	Unified Government/KCK
KDOT	Westwood
Bonner Springs	
Fairway	MISSOURI
Lansing	MoDOT
Leavenworth	Belton
Leawood	Gladstone
Lenexa	Independence
Merriam	Kansas City
Mission	Lee's Summit
Mission Woods	Liberty
Prairie Village	North Kansas City
Olathe	Raymore
Overland Park	

MARC GREENLIGHT **OGL Corridors**



Legend

MARC GREENLIGHT *Operations*

Operation Green Light

- Traffic Signal Timing / Coordination
- Improving:
 - Traffic Flow & Air Quality
 - Incident Response
- 24 Partner Cities and Agencies
 - 2 to be added in 2017
- 692 OGL Intersections
- \$1.1M Program (2015/16)




MARC GREENLIGHT *OGL Operations*

- 4 Full Time Staff
 - 1 Program Manager
 - 3 Signal Analysts
- \$1.2m Annual Cost
 - Contract - Network Support
 - Contract - TransSuite
 - Contract - Signal Timing
- Formal Agreements
 - STP Funds for Local Share
 - Outline of Responsibilities




MARC GREENLIGHT *OGL Operations*

- Maintain Regional OGL network
- Monitor/Troubleshoot Signals
 - Detection problems etc.
 - TransSuite's split logger
- Signal Coordination Plans
 - Develop
 - Implement and tweak
 - Measure effectiveness
 - Maintain and adjust
- Incident Management, KCSCOUT



Performance Measures

- Reduces delays up to 21%
- Reduce fuel consumption up to 18%
- Reduce harmful emissions up to 15%
- Traffic Signal System benefits up to 40:1*




MAP OF CORRIDOR WITH SIGNAL COORDINATION POINTS

Performance Measures

Signal Coordination Benefit Example

- M-291
- 28,000 ADT
- 14 Signals
- 5.5 Mile Corridor
- \$702,000 Savings / Year
- Benefit / Cost Ratio 28:1



OGL System Benefits

Corridor	Benefit : Cost
Johnson Dr.	23 : 1
North Oak	11:1
Ward Parkway	37:1
Shawnee Mission Parkway	60:1
Noland Road	18:1
75 th Street	7:1
Red Bridge	12:1
M-291 (Liberty area)	28:1

MARC GREENLIGHT System Software



The screenshot displays the MARC GreenLight System Software interface. It features a central map showing a traffic intersection with various data panels and controls. The interface includes a top navigation bar with the MARC GreenLight logo and the title 'System Software'. Below the map, there are several panels: a left sidebar with project information, a top toolbar with various icons, and a right sidebar with a list of data points or signals. The map itself shows a complex intersection with multiple lanes and traffic signals.

MARC GREENLIGHT Belton/OGL Traffic Signals

- 163rd Street Overview
 - Cornerstone
 - Ramps (MoDOT)
 - Markey Parkway Intersection
 - Givan St.
- Markey Parkway
 - Towne Center Dr.
- For future consideration
 - Commercial entrance at Turner Rd
 - Menards Signal
 - Hobby Lobby Signal



The slide titled 'Belton/OGL Traffic Signals' provides an overview of the traffic signal system. It lists key locations and features: 163rd Street Overview (Cornerstone, Ramps (MoDOT), Markey Parkway Intersection, Givan St.), Markey Parkway (Towne Center Dr.), and future considerations (Commercial entrance at Turner Rd, Menards Signal, Hobby Lobby Signal). An aerial map on the right shows the geographic context with yellow callouts pointing to these specific locations.

MARC GREENLIGHT 163rd St. Improvements

163rd St. Corridor Objectives

- Improve coordination
- Minimize side-street delay
- Review all times of day
- Identify potential corridor deficiencies
- Recommend improvements



The slide titled '163rd St. Improvements' outlines the objectives for the corridor. The objectives are: Improve coordination, Minimize side-street delay, Review all times of day, Identify potential corridor deficiencies, and Recommend improvements. A photograph on the right shows a traffic intersection with a traffic light and a sign.

MARC GREENLIGHT **163rd St. Improvements**

Improvement Process

- ✓ Completed
 - Data collection, July and August
 - Existing timing plans / schedules
 - Traffic Modeling (Synchro 9)
 - Project meetings
 - Draft Plan
- Next step
 - Implementation
 - Field review / monitoring



MARC GREENLIGHT **163rd St. Improvements**

Existing Weekday Time of Day Schedule

Signal Control #	AM	Midday	PM	Off-Peak	Late PM	Overnight
163 rd St. # 1	6:30 AM - 10:00 AM (112 sec)	10:00 AM - 1:30 PM (100 sec)	1:30 PM - 3:30 PM (100 sec)	3:30 PM - 6:30 PM (100 sec)	6:30 PM - 10:00 PM (70 sec)	10:00 PM - 6:00 AM (70 sec)
163 rd St. # 2	Phase	4:00 PM - 6:30 PM (100 sec)		Phase	Phase	
Overnight (all) Signal(s)	Phase					



Proposed Weekday Time of Day Schedule

Signal Control #	AM	Late AM	Midday	PM	Overnight
163 rd St. # 1	6:30 AM - 1:30 PM (112 sec)	1:30 PM - 3:30 PM (100 sec)	3:30 PM - 6:30 PM (100 sec)	6:30 PM - 10:00 PM (70 sec)	Phase
Overnight (all) Signal(s)	Phase				

MARC GREENLIGHT

Summary

- All clearance intervals updated
- Markey Parkway/Town Center Dr., free
- Cornerstone (protected arrow vs ball)
- Overnight free (not coordinated)
- Weekend Schedule
- Implementation





MARC GREENLIGHT

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MARC GREENLIGHT

Questions?

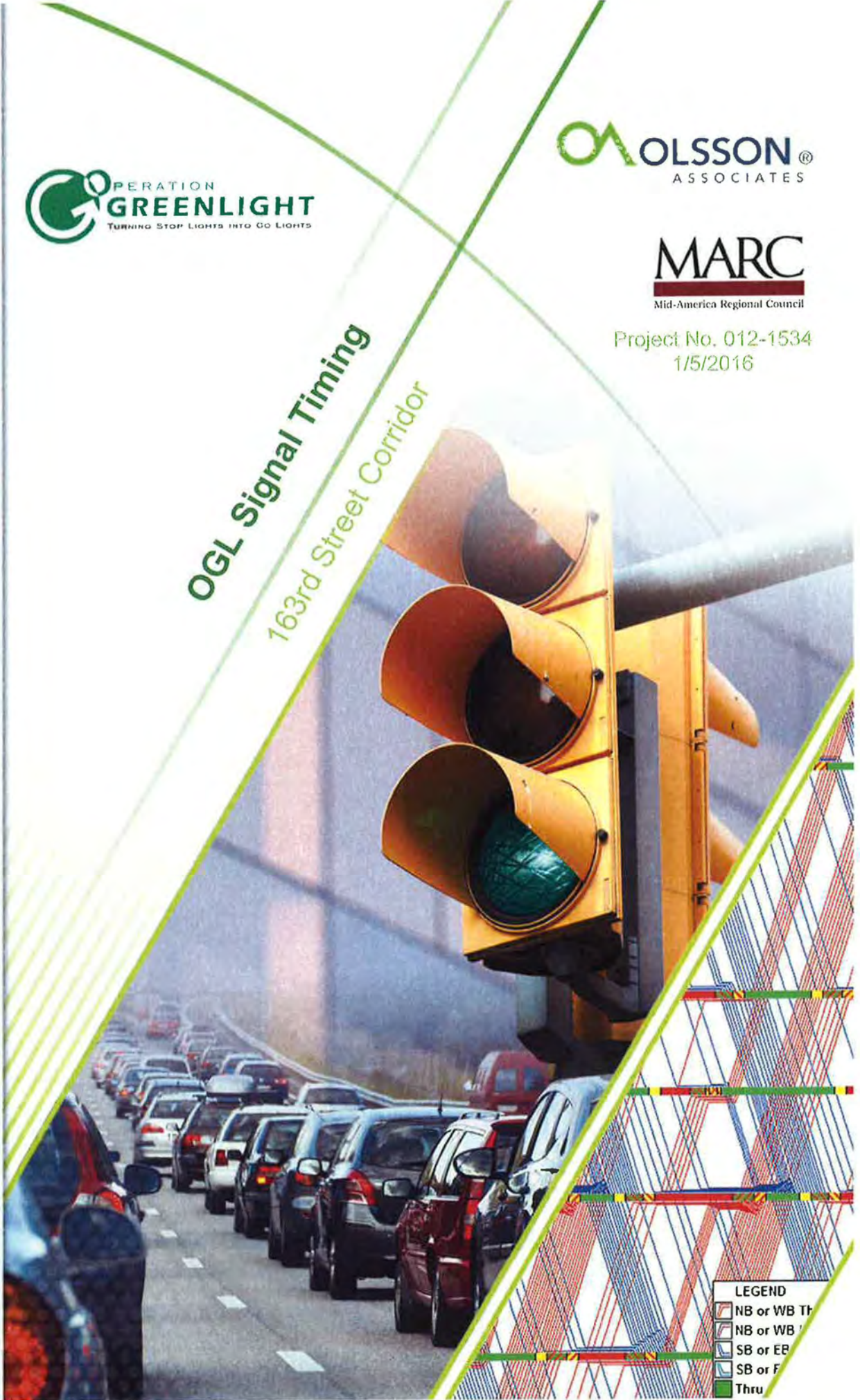
www.marc.org/transportation/ogl



Project No. 012-1534
1/5/2016

OGL Signal Timing

163rd Street Corridor



LEGEND	
	NB or WB Thru
	NB or WB Left
	SB or EB
	SB or EB
	Thru

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1.0 Introduction & Objective

This report summarizes the measures taken to observe and evaluate existing signalized intersections within the Operation Green Light (OGL) 163rd Street corridor. Several of the signalized intersections along this corridor are new intersections. Traffic signal timings were developed to improve operations along the 163rd Street corridor, which consists of six signalized intersections along two roadways, 163rd Street (also known as Route Y by MoDOT) and Markey Parkway, within Belton, Missouri.

The majority of the study intersections within the corridor are currently running free operations and not running time of day plans. Each individual intersection acts alone rather than working together to provide progression for major movements throughout the corridor. Traffic volumes along the corridor are relatively low during the peak traffic hours, however it is believed that traffic progression would improve along the corridor with a coordinated signal system. Coordinating the signal system is expected to offer improved measures of effectiveness (MOEs) over the existing timings; a comparison of MOEs is detailed in the report (**Section 5.5**).

The primary objective of this project is to improve coordinated movements for vehicles traveling north/south along 163rd Street and east/west along Markey Parkway while minimizing the delay on the side-streets. Signal optimization for the corridor will be completed for the AM, Midday, and PM peak hour periods. A time of day schedule will also be reviewed based on 12-hour traffic volumes.

A secondary objective of the project is to identify potential corridor deficiencies of intersections along the 163rd Street corridor. Any design alternatives or improvements along the corridor will be described in the report.

2.0 Description of Corridor

The study corridor contains five signalized intersections along 163rd Street including Cornerstone Drive, Interstate 49 (I-49) northbound and southbound ramps, Markey Parkway, and Givan Street, and one signalized intersection along Markey Parkway at Town Center Drive. Between the intersections of 163rd Street with Markey Parkway and Markey Parkway with Town Center Drive is a signalized intersection for a commercial drive that has not yet been developed and the signal has not been turned on. The signalized intersection of 163rd Street with Route 58 is currently coordinated with the signals along Route 58 but will be considered for cross coordination with 163rd Street.

163rd Street has a speed limit of 35 mph along the entire corridor and Markey Parkway has a speed limit of 35 mph between Town Center Drive and 163rd Street. 163rd Street's lane configuration throughout is a four-lane divided roadway with a raised median separating the two northbound and two southbound lanes of traffic. South of M-58, 163rd Street becomes a two-lane undivided roadway. Markey Parkway throughout the corridor is also a new four-lane divided roadway with a few right-in/right-out access drives existing between the signalized intersections. All of the intersections are currently running free for all study periods with the exception of the intersection of 163rd Street and M-58 which is coordinated east/west along M-58 for all study periods and the intersections of 163rd Street and I-49 NB/SB ramps which have a PM timing plan. Further discussion of the existing time of day schedule and field observations are described in **Section 4**.

The location of the corridor is shown in **Figure 1**.

Figure 1: 163rd Street Corridor Intersections



Source: Google Earth Pro

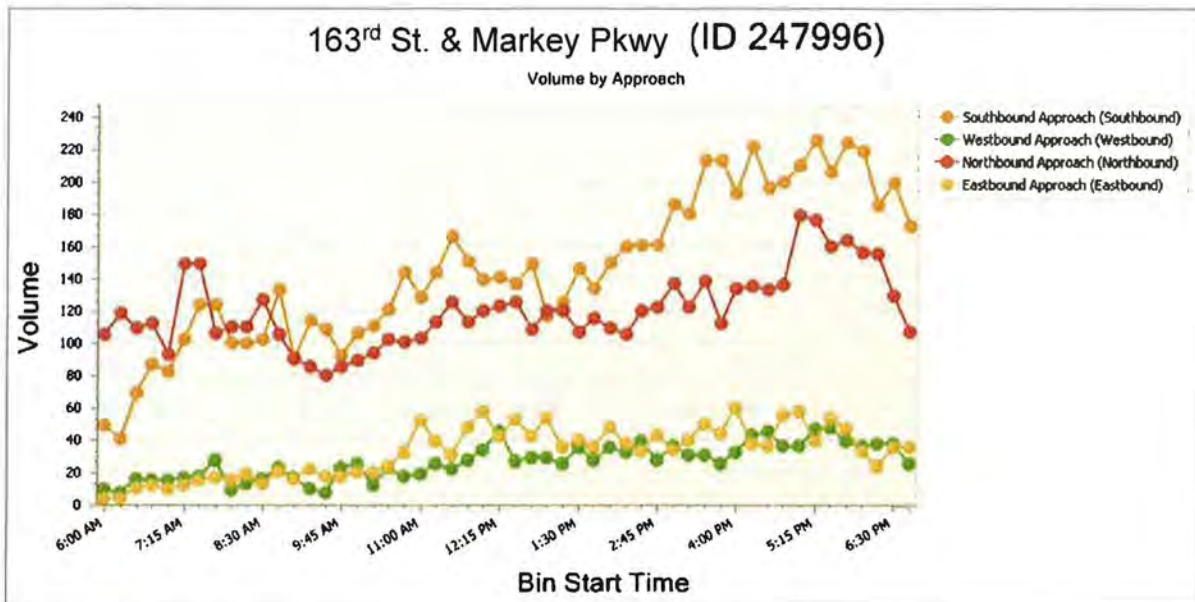
3.0 Data Collection

OGL staff completed traffic counts for an average weekday on July 22nd and August 11th-12th of 2015. The traffic volumes were input into traffic signal timing software, Synchro (Version 9.1), and were used to analyze proposed timing plans for the 163rd Street corridor.

Side-street volumes vary throughout the corridor. None of the side street traffic along the corridor is very significant with the exception of the 163rd Street and M-58 intersection which is the connection of two major roadways at an intersection.

Figure 2 depicts the typical weekday 15-minute volumes at the intersection of 163rd Street and Markey Parkway. This data was used to help determine the weekday time of day patterns. Additional weekday 15-minute volumes are attached for the remaining intersections along the corridor.

Figure 2: 163rd Street Weekday Traffic Volumes at Markey Parkway



4.0 Existing Roadway & Traffic Conditions

4.1 Time of Day Schedule

Intersections along the 163rd Street corridor currently run free with the exception of 163rd Street with M-58 and the intersections of 163rd Street with the I-49 NB/SB ramps during the PM peak hour. The intersection of 163rd Street with M-58 runs a 110 second cycle length during the AM period, 100 second cycle during the Midday period, and 140 second cycle length during the PM period matching the cycle lengths of the adjacent signals along the M-58 corridor. The intersections of 163rd Street with the I-49 NB/SB ramps run 100 second cycle lengths during the PM peak hour period; the remainder of the day the I-49 intersection ramps run in free operation. **Table 1** depicts the weekday time of day schedule while **Table 2** outlines the weekend time of day schedule at study intersections.

Table 1: Existing Weekday Time of Day Schedule

	AM*	Midday*	PM*	Off Peak*	Late PM*	Overnight*
163rd Street & M-58	6:00 AM – 10:00 AM (110 sec.)	10:00 AM – 1:30 PM (100 sec.)	1:30 PM – 7:00 PM (140 sec.)	7:00 PM – 8:30 PM (100 sec.)	8:30 PM – 10:00 PM (70 sec.)	10:00 PM – 6:00 AM (Free)
163rd Street & I-49 NB/SB Ramps	(Free)		4:00 PM – 6:30 PM (100 sec.)	(Free)		
Remaining Corridor Intersections	(Free)					

*Time Period (Cycle Length)

Table 2: Existing Weekend Time of Day Schedule

	AM*	Off Peak*	Midday*	PM*	Late PM*	Overnight*
163rd Street & M-58	8:00 AM – 9:00 AM (70 sec.)	9:00 AM – 10:00 AM (100 sec.)	10:00 AM – 7:00 PM (140 sec.)	7:00 PM – 8:30 PM (100 sec.)	8:30 PM – 10:00 PM (70 sec.)	10:00 PM – 8:00 AM (Free)
Remaining Corridor Intersections	(Free)					

*Time Period (Cycle Length)

5.0 Arterial Analysis & Timing Plan Development

5.1 Clearance Intervals & Pedestrian Timings

The yellow and red clearance interval time periods and pedestrian walk and clearance times were reviewed and, if necessary, calculated in accordance with criteria outlined in the Institute of Transportation Engineers (ITE) and the Manual on Uniform Traffic Control Devices (MUTCD) for the study intersections. Clearance intervals at all corridor intersections are currently set to a default of typical values rather than ITE recommended calculated values with the exception of 163rd Street and M-58 which was calculated with the M-58 OGL corridor. Thus, Olsson field measured and calculated the clearance interval and pedestrian times; however the timings were not incorporated into the proposed timing plan as pedestrian activity is understood to be minimal along the corridor. Signals could break coordination upon pedestrian activation and will work themselves back into coordination after a brief transition period which may last a few cycles after the pedestrian crossing has completed.

Table 3 below depicts the proposed movement splits and associated pedestrian times necessary to safely cross the intersection leg. Pedestrian times for the intersection of 163rd Street and M-58 remain consistent with timings calculated for the M-58 corridor.

Table 3: Pedestrian Time vs Green Time

Intersection	Direction	Pedestrian Time	Maximum Green Time*		
			AM	Midday	PM
163rd St & Cornerstone Dr	Eastbound	30	22.8	26.8	33.8
	Westbound	24	22.9	25.9	39.9
	Northbound	40	7.0	10.0	10.0
	Southbound	34	5.7	8.7	8.7
163rd St & I-49 NB Ramp	Eastbound	15	27.4	24.4	25.4
	Westbound	16	27.4	24.4	25.4
	Northbound	-	12.2	19.2	18.2
	Southbound	-	-	-	-
163rd St & I-49 SB Ramp	Eastbound	14	29.5	30.5	25.5
	Westbound	16	29.5	30.5	25.5
	Northbound	-	-	-	-
	Southbound	-	12.2	19.2	34.2
163rd St & Markey Pkwy	Eastbound	39	10.4	12.4	10.4
	Westbound	52	9.7	9.7	8.7
	Northbound	40	14.6	21.6	31.6
	Southbound	52	16.4	21.4	32.4
163rd St & Givan St	Eastbound	36	7.0	6.0	5.0
	Westbound	40	8.0	9.0	12.0
	Northbound	37	22.4	28.4	38.4
	Southbound	36	22.5	31.5	41.5
Markey Pkwy & Town Center Dr	Eastbound	23	38.6	38.6	38.6
	Westbound	25	38.1	38.1	38.1
	Northbound	32	33.2	33.2	33.2
	Southbound	32	33.1	32.1	32.1

*If Maximum Green Time < Pedestrian Time then controller will break coordination if pushbutton is actuated to service that pedestrian movement.

5.2 Development of Optimized Timing Plan

The optimized AM, Midday, and PM timing plans focused on maximizing two-way north/south progression along 163rd Street while providing adequate green-time for side-street movements and keeping the cycle length relatively small to minimize delay. The intersection of 163rd Street and M-58 will remain on the M-58 corridor coordination plan during all times of day.

During the AM peak hour period the Markey Parkway and Town Center Drive intersection is proposed to remain running uncoordinated (free) during all time periods due to light traffic in all directions. It is recommended to coordinate all of the intersections along 163rd Street. All coordinated intersections along 163rd Street are proposed to run a 70 second cycle length. Some min green times had to be reduced in order to accomplish a 70 second cycle length along the corridor. Although this results in some smaller splits, it is expected, given the low volumes along the 163rd Street, the cycle length will accommodate the traffic throughout the corridor.

During the Midday timing plan similar signal changes as mentioned with the AM time period are recommended. All coordinated intersections along 163rd Street are proposed to run an 80 second cycle length to accommodate heavier turning movements during the Midday period.

During the PM timing plan it is proposed to run a 90 second cycle length along 163rd Street to accommodate the increased mainline traffic moving along the corridor and the I-49 interchange traffic. At the I-49 interchange a dummy phase, phase 4, was added since the southbound left-turn volumes are heavy while the northbound left-turn volumes are much lighter. The dummy phase will allow the northbound movement to gap out and progress the turning traffic through the interchange.

In order to provide two-way progression between the I-49 interchange and Cornerstone Drive, Cornerstone Drive was reviewed to determine if the protected/permissive left-turn phasing could be reduced to permissive only for all approaches. The elimination of the protected left-turn phases will reduce the number of phases serviced and, as a result, reduce the amount of green time needed. The reduction in green time necessary would allow the signal to be run at a shorter cycle length, and give more opportunity for progression in both directions.

To review the need for protected/permissive phasing at Cornerstone Drive, the MoDOT left-turn phasing spreadsheet found in MoDOT's *Engineering Policy Guide* (EPG), section 902.5.23 was evaluated. The results of MoDOT Phasing warrants for the AM, Midday, and PM peak hour periods are depicted in **Table 4** below.

Table 4: Cornerstone Drive MoDOT Left-turn Phasing Warrant

Time of Day	Direction	Phasing Warranted
AM	Northbound (Cornerstone)	Permissive
	Southbound (Cornerstone)	Permissive
	Eastbound (163rd Street)	Permissive
	Westbound (163rd Street)	Permissive
Midday	Northbound (Cornerstone)	Permissive
	Southbound (Cornerstone)	Permissive
	Eastbound (163rd Street)	Permissive
	Westbound (163rd Street)	Permissive
PM	Northbound (Cornerstone)	Permissive
	Southbound (Cornerstone)	Permissive
	Eastbound (163rd Street)	Permissive
	Westbound (163rd Street)	Protected/Permissive

As the above table depicts, permissive phasing is adequate for all three peak hour periods with exception of the PM peak hour period for westbound traffic traveling along 163rd Street. Based on the spacing of adjacent interchange signal, it is anticipated that vehicles will be metered creating gaps for westbound left-turn traffic. It is recommended to eliminate the protected phases at the intersection and revisit if future concerns arise.

5.3 Optimized Time of Day Schedule

The optimized time of day schedule is based on 12-hour traffic count data collected by OGL staff. Weekday traffic count data contained volumes for all movements at the intersections along the corridor.

Table 5 depicts the proposed time of day schedule for the weekday periods. The time of day schedule is based on the intersection of 163rd Street and Markey Parkway volumes only. Changes to the time of day plan may be needed during implementation.

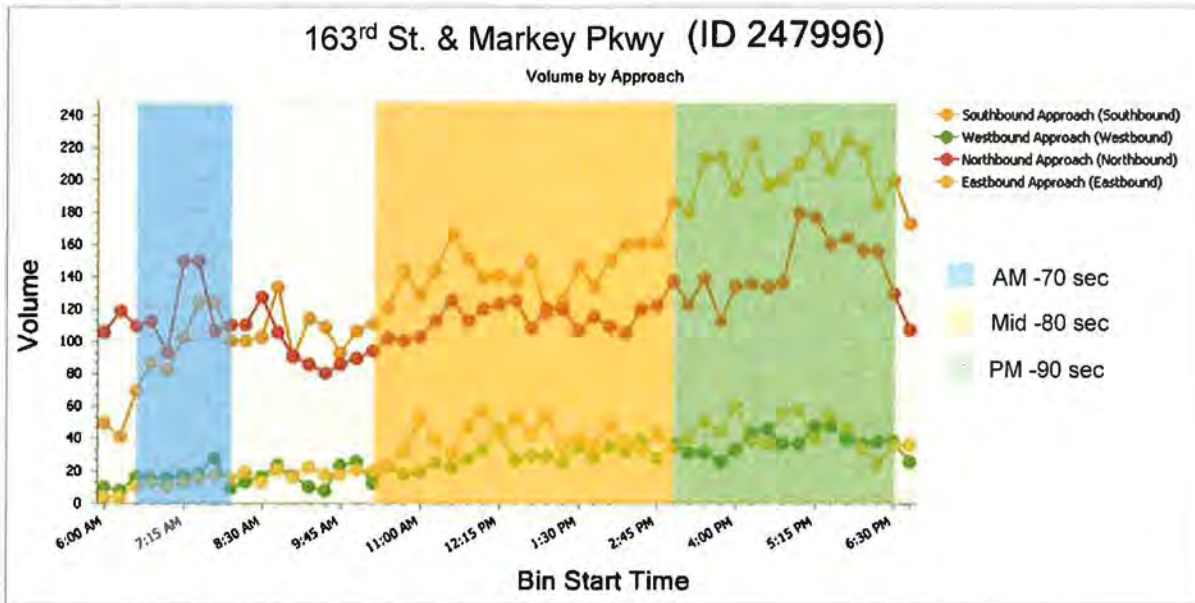
Table 5: Proposed Weekday Time of Day Schedule

	AM*	Late AM*	Midday*	PM*	Overnight*
Markey Parkway & Town Center Drive	(Free)				
Remaining Corridor Intersections	6:30 AM – 8:00 AM (70 sec.)	8:00 AM – 10:15 AM (Free)	10:15 AM – 3:00 PM (80 sec.)	3:00 PM – 6:30 PM (90 sec.)	(Free)

*Time Period (Cycle Length)

The weekday time of day schedule was updated slightly to provide all intersections with the same time of day schedule to fit current traffic patterns. **Figure 3** depicts the typical weekday 15-minute volumes along 163rd Street and Markey Parkway with the proposed time of day schedule overlaid.

Figure 3: 163rd Street Weekday Traffic Volumes & Time of Day Schedule



A weekend time of day schedule will be completed utilizing split logger information.

5.4 Measures of Effectiveness

The proposed signal timings are expected to improve mainline traffic flow while continuing to provide adequate time for side-street movements. One way to gauge the performance of the proposed timings is to compare various measures of effectiveness (MOEs) of the existing timing plan to the proposed timings. **Table 6** below details some MOE's of the existing timing plan in comparison with the proposed timing plan for the AM and PM peak time periods for the 163rd Street and Markey Parkway network and **Table 7** details MOE's along 163rd Street.

Table 6: Network Measures of Effectiveness Comparison

	Control Delay/Veh (sec/veh)	Stops/Vehicle	Average Speed (mph)
AM Existing Timings	5	0.51	19
AM Proposed Timings	5	0.40	22
AM Comparison	0	-0.11	+3
Midday Existing Timings	5	0.52	19
Midday Proposed Timings	5	0.41	22
Midday Comparison	0	-0.11	+3
PM Existing Timings	5	0.55	19
PM Proposed Timings	5	0.42	23
PM Comparison	0	-0.13	+4

Table 7: 163rd Street Measures of Effectiveness Comparison

	Control Delay/Veh (sec/veh)	Stops/Vehicle	Average Speed (mph)
AM Existing Timings	16	0.52	20
AM Proposed Timings	10	0.40	23
AM Comparison	-6	-0.12	+3
Midday Existing Timings	16	0.55	20
Midday Proposed Timings	9	0.41	24
Midday Comparison	-7	-0.14	+4
PM Existing Timings	18	0.52	18
PM Proposed Timings	10	0.42	21
PM Comparison	-8	-0.10	+3

The data contained within **Tables 6 & 7** suggests that the proposed timing plan will result in reduced delay, reduced stops, and increase average speed for vehicles traveling throughout the network as well as along 163rd Street during the AM, Midday, and PM time periods.

6.0 Preliminary Timings Summary

Traffic signal timings were developed to improve operations within the 163rd Street corridor through observation and evaluation of the existing intersections. Prior to coordination plans being developed, the majority of intersections were running free operations and had no time of day plans. Coordinating the signal system can offer improved MOE's throughout the corridor.

Based on analysis, the following time of day schedule is proposed:

Table 8: Proposed Weekday Time of Day Schedule

	AM*	Late AM*	Midday*	PM*	Overnight*
Markey Parkway & Town Center Drive	(Free)				
Remaining Corridor Intersections	6:30 AM – 8:00 AM (70 sec.)	8:00 AM – 10:15 AM (Free)	10:15 AM – 3:00 PM (80 sec.)	3:00 PM – 6:30 PM (90 sec.)	(Free)

*Time Period (Cycle Length)

7.0 Implementation

8.0 Post-Implementation Summary

Change Period = $L + V / (2a + 64.4g) + (W + L) / V$

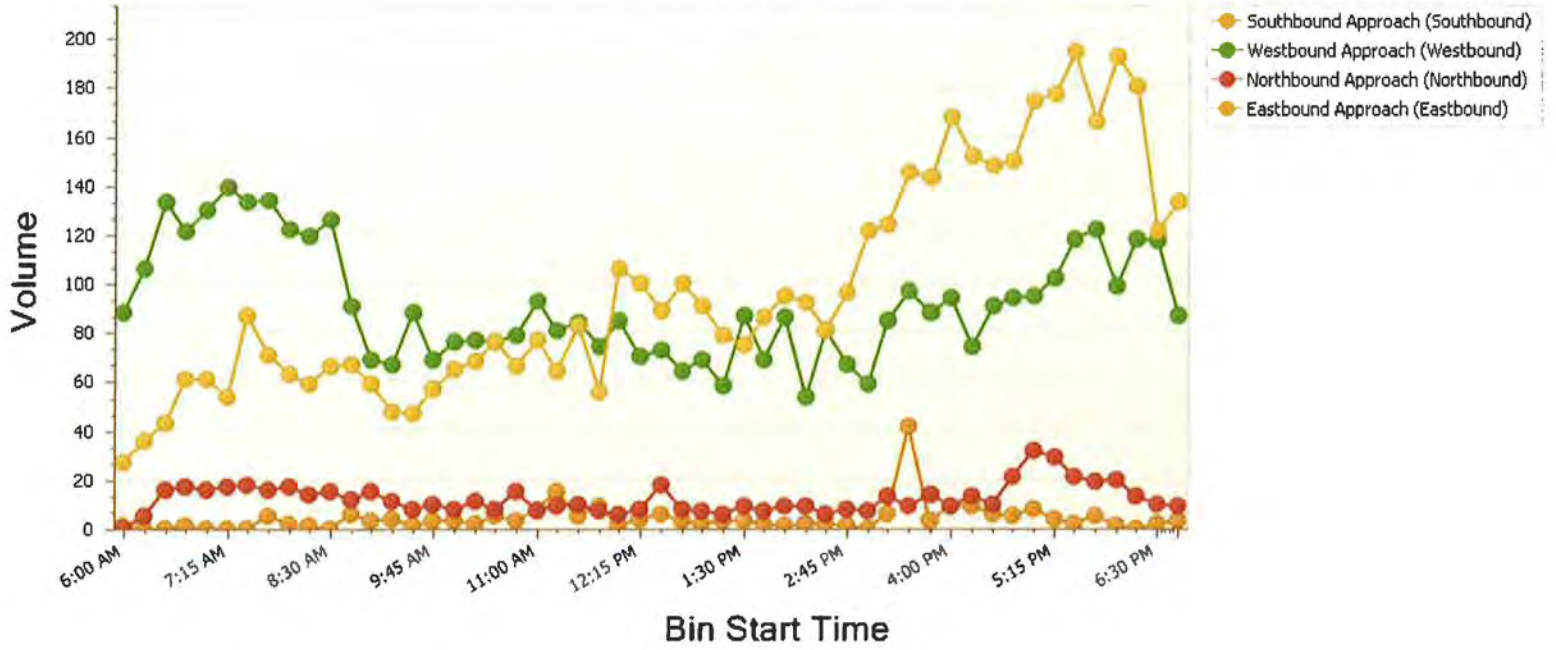
CP = nominal clearance period (yellow plus all red) seconds
 V = pedestrian reaction time, recommended as 1.0 sec
 W = approach speed (ft/sec)
 L = person grade (positive for upgrade, negative for downgrade)
 a = clearance rate or deceleration rate (ft/sec²)
 64.4 ft/sec² = 32.2 m/sec² (gravity)
 W = width of extraction, ft
 L = length of vehicle, recommended as 20 ft

CP = nominal clearance period (yellow plus all red) seconds
 V = pedestrian reaction time, recommended as 1.0 sec
 W = approach speed (ft/sec)
 L = person grade (positive for upgrade, negative for downgrade)
 a = clearance rate or deceleration rate (ft/sec²)
 64.4 ft/sec² = 32.2 m/sec² (gravity)
 W = width of extraction, ft
 L = length of vehicle, recommended as 20 ft

Location			Equation Inputs				Vehicle Times Calculated				Pedestrian Times				Nominal Vehicle Times			Notes	
CO	RTE	CITY	CROSS STREET	Direction	g	a	L	Yellow	Red	CP	CP Check	Direction	Ped Clear	Min. Walk Time*	Yellow	Red	CP		
Alameda	V	San Jose	Constitution	Southbound	0.00	0.00	20	4.5	0.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	JMS	For detection of leg at the intersection reference the traffic signals
Alameda	V	San Jose	Constitution	Northbound	0.00	0.00	20	4.5	0.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	JMS	For detection of leg at the intersection reference the traffic signals
Alameda	V	San Jose	Constitution	Southbound	0.00	0.00	20	4.5	0.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	JMS	For detection of leg at the intersection reference the traffic signals
Alameda	V	San Jose	Constitution	Northbound	0.00	0.00	20	4.5	0.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	JMS	For detection of leg at the intersection reference the traffic signals
Alameda	V	San Jose	Constitution	Southbound	0.00	0.00	20	4.5	0.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	JMS	For detection of leg at the intersection reference the traffic signals
Alameda	V	San Jose	Constitution	Northbound	0.00	0.00	20	4.5	0.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	JMS	For detection of leg at the intersection reference the traffic signals
Alameda	V	San Jose	Constitution	Southbound	0.00	0.00	20	4.5	0.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	JMS	For detection of leg at the intersection reference the traffic signals
Alameda	V	San Jose	Constitution	Northbound	0.00	0.00	20	4.5	0.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	JMS	For detection of leg at the intersection reference the traffic signals
Alameda	V	San Jose	Constitution	Southbound	0.00	0.00	20	4.5	0.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	JMS	For detection of leg at the intersection reference the traffic signals
Alameda	V	San Jose	Constitution	Northbound	0.00	0.00	20	4.5	0.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	JMS	For detection of leg at the intersection reference the traffic signals
Alameda	V	San Jose	Constitution	Southbound	0.00	0.00	20	4.5	0.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	JMS	For detection of leg at the intersection reference the traffic signals
Alameda	V	San Jose	Constitution	Northbound	0.00	0.00	20	4.5	0.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	JMS	For detection of leg at the intersection reference the traffic signals

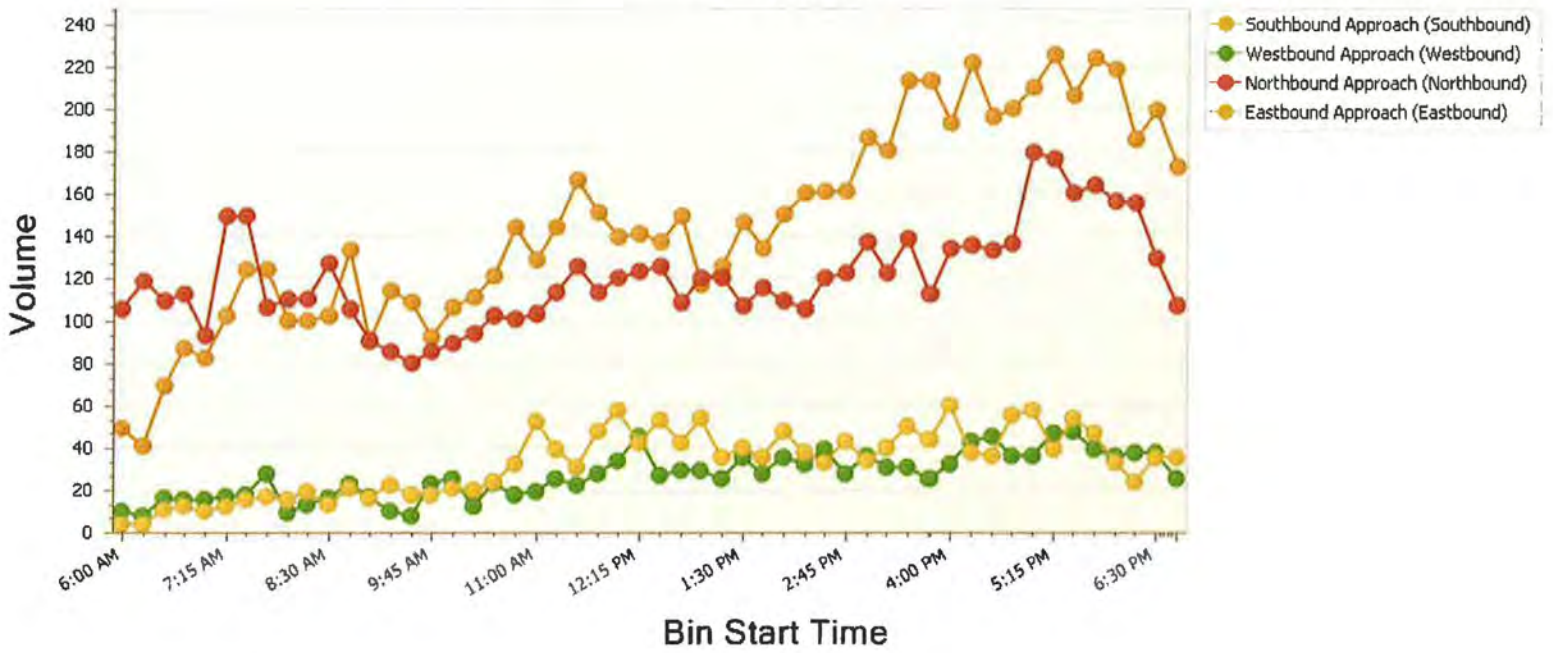
Y Rd & Cornerstone (ID 247994)

Volume by Approach



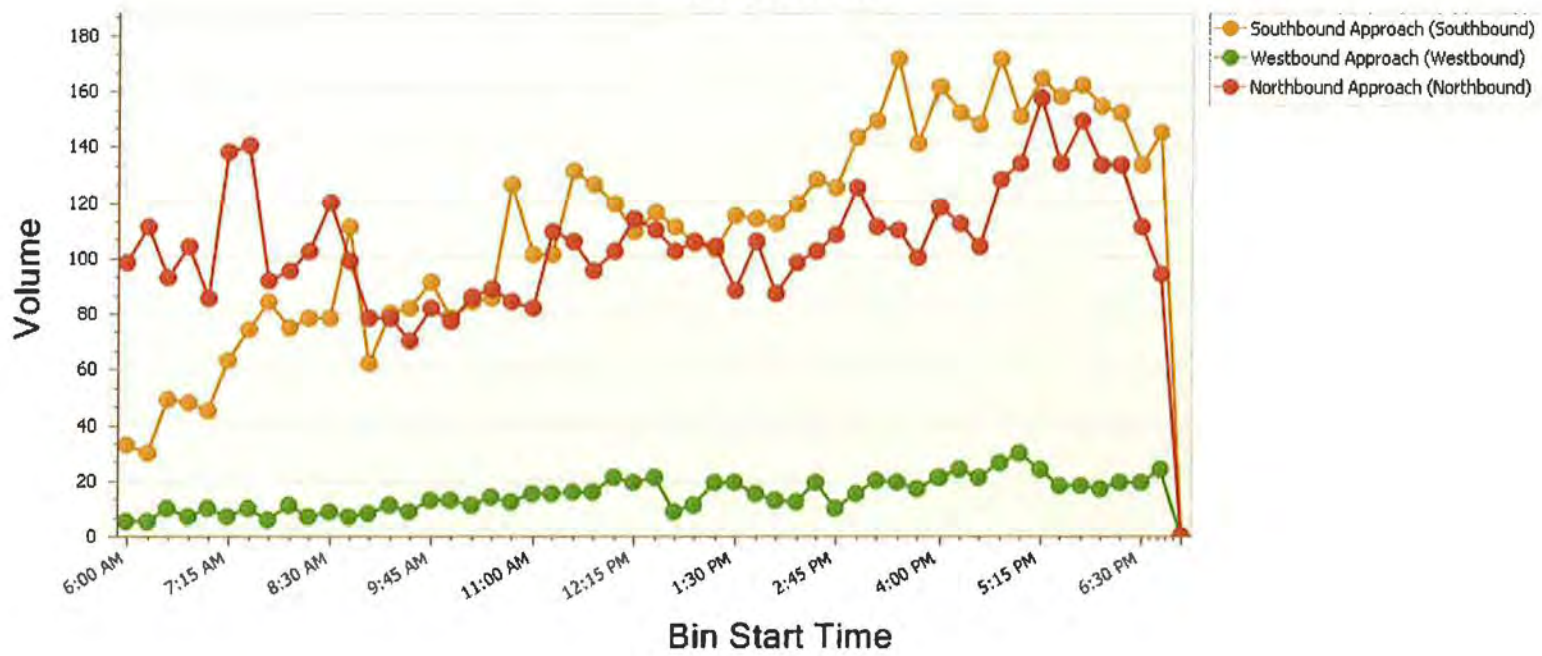
Y Rd & Markay Pkwy (ID 247996)

Volume by Approach



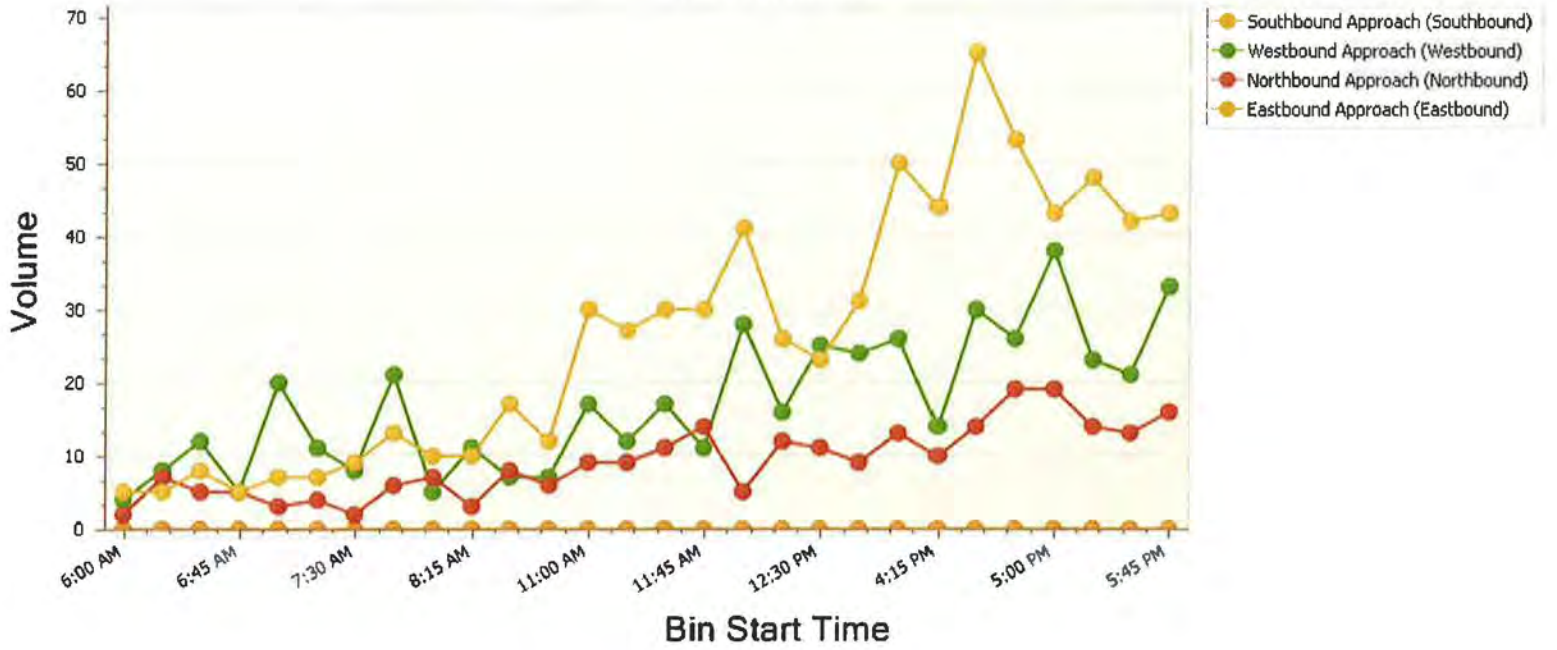
Y Rd & Givan (ID 247995)

Volume by Approach



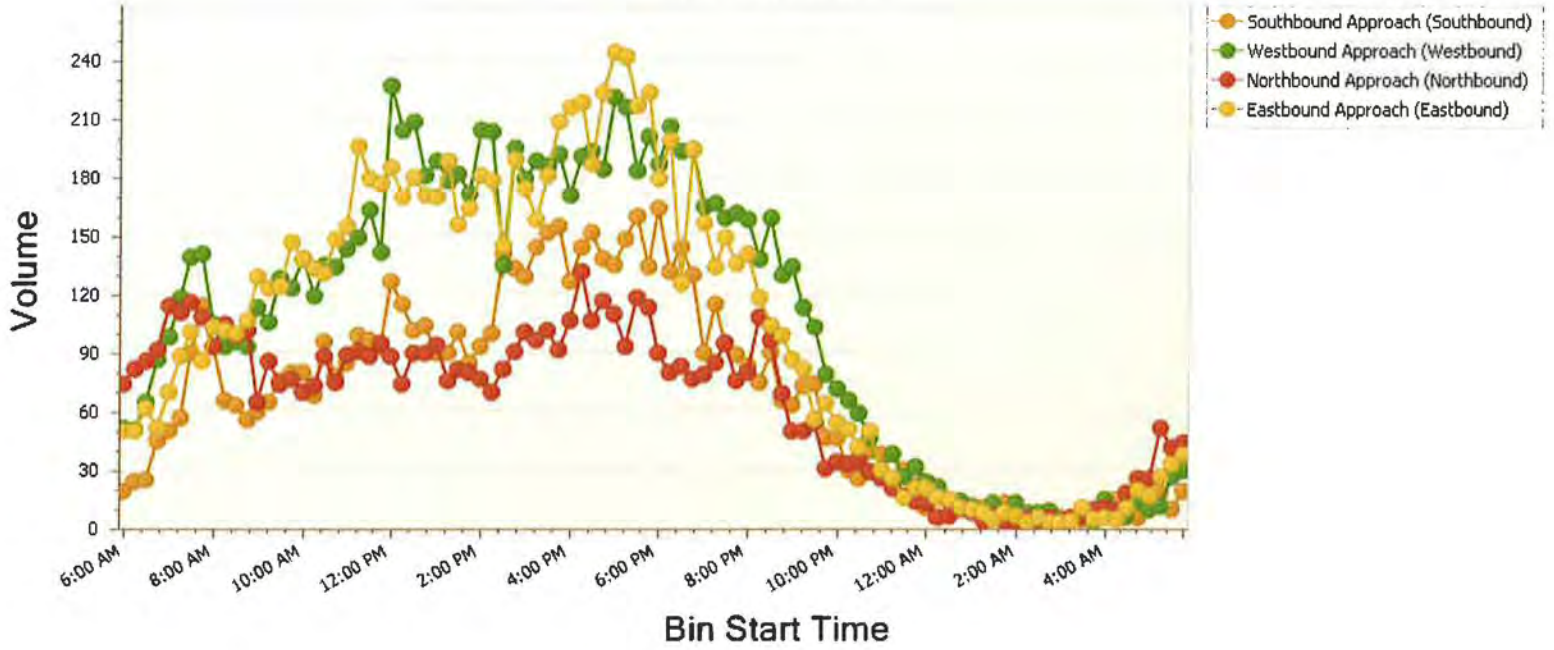
Markey Pkwy & Town Center (ID 262589)

Volume by Approach



Y & 58 (ID 250878)

Volume by Approach



SECTION IV
B



CITY OF BELTON CITY COUNCIL INFORMATION FORM

AGENDA DATE: February 16, 2016

DIVISION: Transportation

COUNCIL: Regular Meeting Work Session Special Session

<input type="checkbox"/> Ordinance	<input type="checkbox"/> Resolution	<input type="checkbox"/> Consent Item	<input type="checkbox"/> Change Order	<input type="checkbox"/> Motion
<input type="checkbox"/> Agreement	<input checked="" type="checkbox"/> Discussion	<input type="checkbox"/> FYI/Update	<input type="checkbox"/> Presentation	<input type="checkbox"/> Both Readings

ISSUE/RECOMMENDATION:

Staff has been working to put together a Street Preservation proposal for the FY2017 budget with an anticipated \$750,000 of additional funding from the Capital Improvement Sales Tax Fund and typical budgeted funds for a total of \$1,247,000. This proposal includes 2" and 4" mill and overlay, reconstructs, and a small chip seal program. The attached report also includes information about the chip seal program. Staff will be prepared to discuss and answer questions related to the attached report and recommendations.

PROPOSED CITY COUNCIL MOTION:

None at this time

BACKGROUND:

See attached Street Preservation Report

IMPACT/ANALYSIS:

None at this time

STAFF RECOMMENDATION, ACTION, AND DATE:

Staff will bring ordinances related to contract approval once budget is approved.

LIST OF REFERENCE DOCUMENTS ATTACHED:

Street Preservation Report

MAINTENANCE REPORT

FY2017/18 Street Preservation

Proposal

The City of Belton

Prepared by:



Transportation Division

520 Main Street

Belton, MO 64012

January 2016

Maintenance Report

1.0 Introduction and Purpose

A quality transportation system (streets, bridges, curbs, sidewalks and storm sewers) is important to a safe and vibrant community, and the City of Belton continues to develop strategies to improve in this area. Staff has been working diligently to methodically assess and evaluate the system routinely; document the work and describe the needs so effective strategies can be implemented. Staff has managed the stagnant revenues in the recent past by keeping employee costs stable and implementing many other cost-effective measures to reduce some expenditures so that as much actual on-the-ground work as possible may be performed each year. With revenues more recently trending up, more work will be accomplished. But it is uncertain if annual revenues from the half-cent local transportation sales tax and motor fuel taxes will trend high enough and remain high enough that the City can catch up.

The purpose of this report is to detail the proposed maintenance activities for the FY2017 and FY2018 Street Preservation Programs with an additional one-time \$750,000 of funding injected into the Transportation Divisions Capital Outlay account from Capital Improvements Sales Tax fund.

2.0 Brief History

Street Preservation is a term summarizing all activities involved in maintaining the transportation system and includes both in-house maintenance operations and out-sourced contracted services. The Transportation Divisions budget allocates funding of materials for in-house work in its Street Preservation account, typically \$100-\$150K annually. In-house activities include:

- Pothole Patching and larger asphalt repairs
- Crack Sealing
- Minor storm sewer repair
- Curb and sidewalk repair for the Cost-Share Program

The Transportation Divisions budget also allocates funding for out-sourced contracted services in its Capital Outlay/Improvement account, typically \$400-\$600K annually. Outsourced activities include:

- Overlay of varying depths per conditions
- Micro-Surfacing per appropriate condition rating



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- Chip Seal (new in 2015) per appropriate condition rating
- Large curb repair/replacement projects

In October 2014, staff presented information to Council for street preservation maintenance activities that included several action items:

- ✓ Spend preservation money on out-sourced activities every other year. This maximizes the dollars spent
- ✓ Focus available resources on maintaining streets meeting current condition standards so they do not fall into the poor/failed range.
- ✓ Provide crews with equipment that is efficient and cost effective.
- ✓ Utilize technology to manage infrastructure and material usage.
- ✓ Development of citizen cost-share program
- ✓ Partner with neighboring cities in developing maintenance contracts that maximize dollars

Figure 2.1: details focus on different street preservation activities



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Figure 2.2: details funding for Street Preservation in FY2016 (2015)

	Miles completed	Total Cost	Cost per Mile
Overlay / Reconstruct	0.9	\$247,775	\$275,306
Chip Seal	8.1	\$309,254	\$38,180
Base Repair	0	\$119,900	0

The information in figure 2.2 details the outsourced funding spent on overlay and chip seal and outlines the cost per mile for these maintenance activities.

2015 was the first year in many that the Public Works completed a chip seal program. This is a maintenance activity many cities have been utilizing, including Overland Park, Raytown and Kansas City. Some lessons were learned during the 2015 chip-seal program and although it is not a popular method, it is the technically preferred for maintaining streets not only in cost but also effectiveness. Chip Seal is not a long term fix for streets but can extend the life of the pavement several years before an overlay or even reconstruct is recommended for maintenance.

Chip-seal is generally preferred over micro-seal because it does get a couple of more years of life; it is more cost effective; and it can be used on streets that fall in the low side of the OCI range. Streets in this low side of the range will not be good micro-seal candidates, and instead would require the more expensive overlay if chip-seal is not an option.

3.0 Analysis and Data

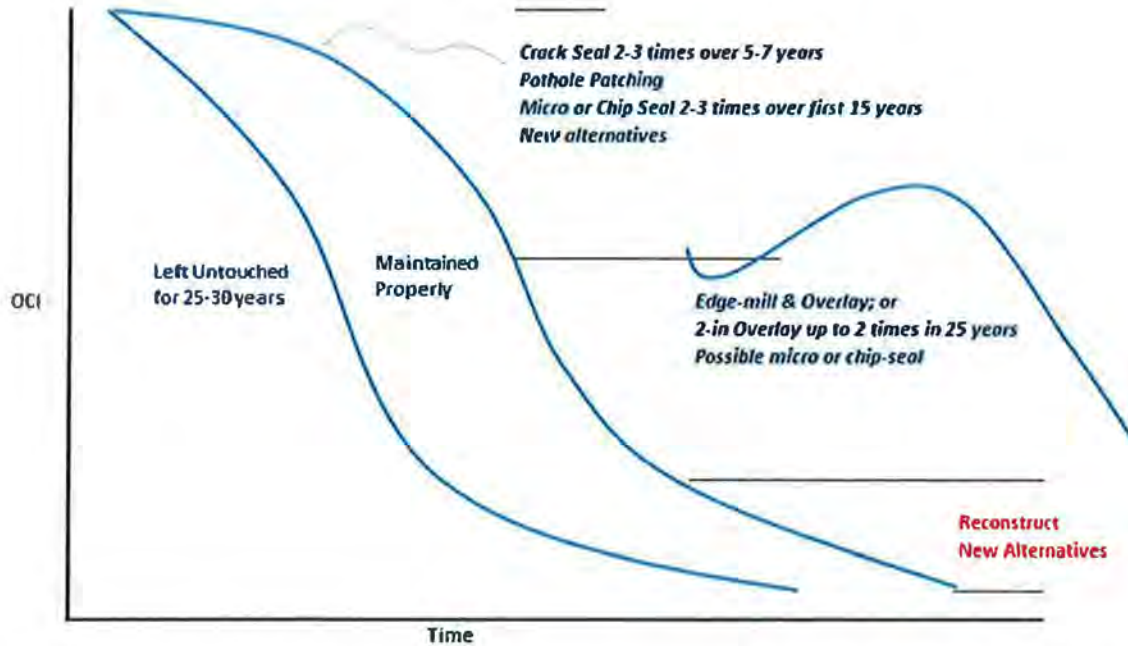
Preparation of a proposal for the annual street preservation program is challenging due to budget constraints, deteriorating conditions of streets, and the type of maintenance activities required to maintain streets at an acceptable level. The department continues to focus on the "Do Best First" approach which means maintaining the good streets so they don't fall into the poor / failed range of the Overall Condition Index (OCI) scale (55-0). See figure 2.1. The life cycle of a street is important to remember when decisions are being made to allocate funding for street preservation. Figure 3.1 describes how a street reacts when maintenance activities are applied at specific times. If these activities are not completed then the life of the street is shortened, thus requiring expensive



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overlay and even reconstruction. The potential for additional funding in FY2017 is a welcomed proposal and will be very effective in this proposed plan, but future injections of similar levels of funding will be necessary.

Figure 3.1 Life cycle of street



Although additional dollars should be focused on the 0-55 range, there is concern about the street segments in the "Fair" category as many segments in this range are imminently going to fall below 55 in the near term.

Staff continues to focus on the data being collected through its asset management software, Cartegraph. Figure 3.2 details the condition of the entire street network including total miles, miles of streets with an OCI range between 0 and 55 and the percentage of the streets in relation to total miles.

The results of the data in Figure 3.2 detail the need to focus preservation funding on residential streets.

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Figure 3.2 Street network by functional classification

	Ave OCI	Linear Miles	OCI 0-55 in miles	%
Major Arterial	75.7	13.5	0.1	0.9%
Minor Arterial	32.0	3.5	0.9	26.9%
Commercial Collector	82.1	11.7	1.9	15.9%
Residential Access	64.8	9.7	2.5	26.2%
Residential Collector	76.5	21.3	0.8	3.9%
Residential Local	65.1	56.5	15.2	26.8%
Total	66.0	116.1	21.5	18.5%

Staff utilized Cartegraph to look at all streets with an OCI range of 0-55. Figure 3.3 details those streets in red.

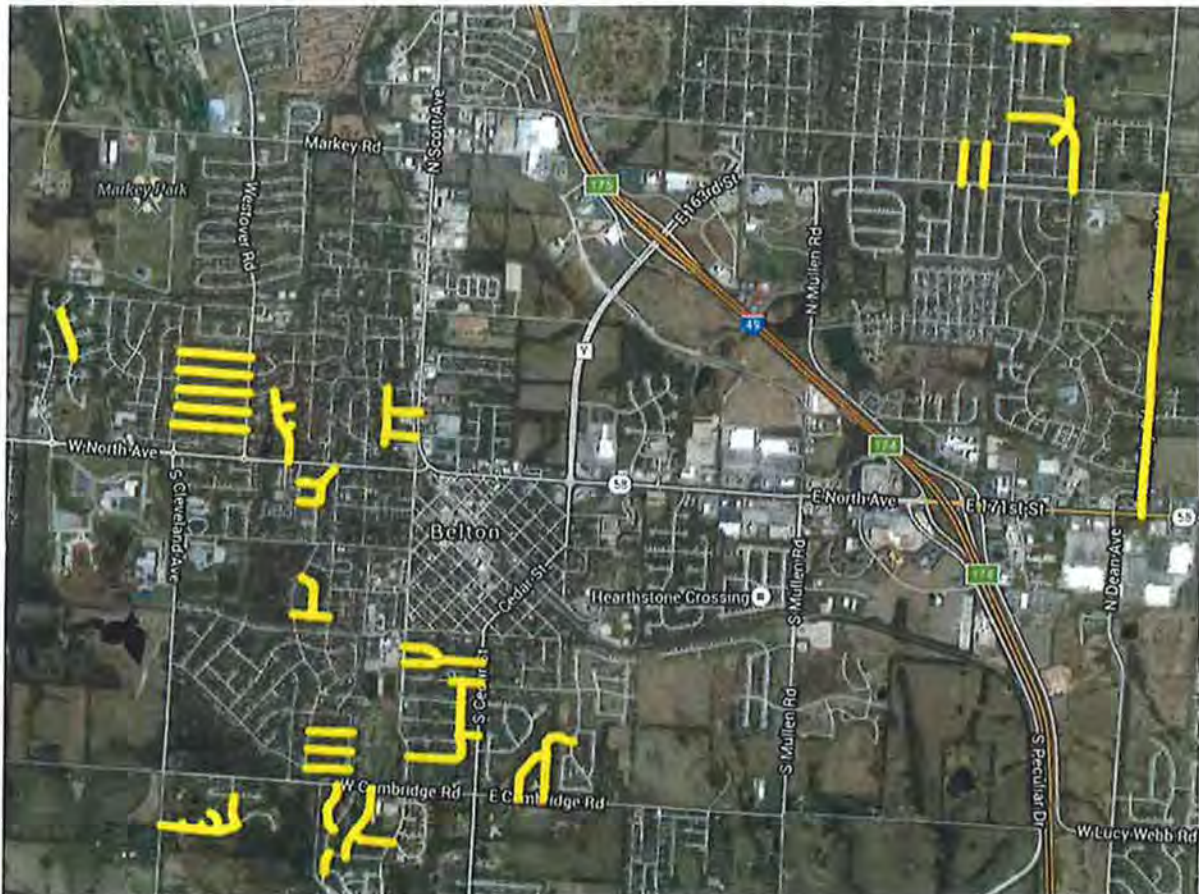
Figure 3.3 Condition Ratings 0-55



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The OCI range along with expert staff knowledge of the system, street segments were selected initially to determine what type of maintenance could be performed and at what cost. Options included 2" mill and overlay and 4" overlay (both requiring some level of base patching as well); and full depth reconstruct with subgrade stabilization. **The underlying assumption for the following proposals is that the preservation fund in FY17 will be \$1,247,000.** Figure 3.3 depicts those streets proposed for an overlay (2-in and 4-in) and reconstructs. The streets proposed for reconstruction are listed in figure 3.4. The projected cost to complete this work is depicted in figure 3.5.

Figure 3.3 Overlay / Reconstruct Streets



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Figure 3.4 Streets proposed for reconstruction

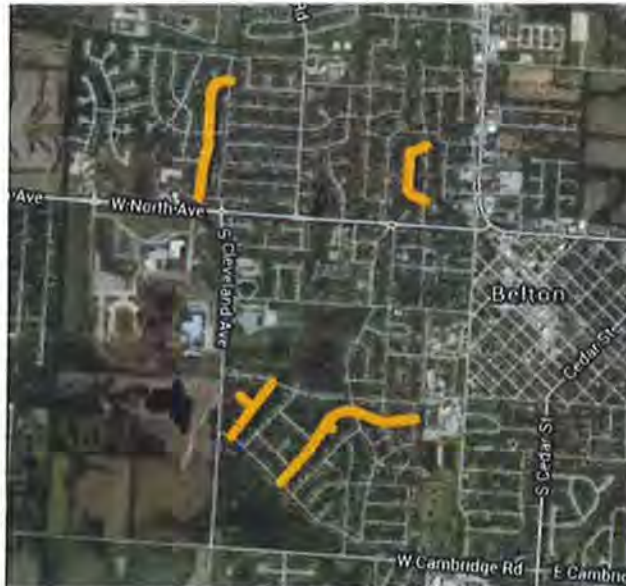
Westover / 178th Terr to Timbercreek Dr	Timbercreek Dr / Westover to Cleveland
Timbercreek Ct	Elm Ct
Crestview Ct	SpringValley Rd / Harris to 163rd
Mulberry / Gale to Melody	

Figure 3.5 Overlay / Reconstruct- Estimated Cost

Total Cost	\$1,173,083
Miles Complete	8.6
Per Mile	\$136,405
Avg OCI	35.2

The second component of the proposed preservation program for FY2017 includes chip seal. The four streets selected have a good base, however the streets were overlaid years ago above the curb and the top surface is deteriorating causing the OCI rating to be lower. Profile milling of these streets will be needed to lower the profile of the street followed by a double chip seal. Figure 3.6 depict these streets in orange. The projected cost to complete this project is detailed in Figure 3.7.

Figure 3.6 Proposed double chip seal



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Figure 3.7 Estimated cost for double chip seal

Total Cost	\$86,603
Miles Complete	1.5
Per Mile	\$57,735
Avg OCI	36

The two FY17 proposed projects combine for a total of approximately \$1,259,686. If the City chooses not to use the chip-seal method, three streets proposed in Figure 3.6 would be eliminated, leaving only Pacific Drive that would then be overlaid.

Staff is recommending the City use all three methods [overlays, chip-seal, micro-seal] per the street segments OCI rating and appropriateness. If the City chooses to continue using chip-seal on appropriate segments, there will be a transition period over multiple years where staff will be overlaying and possibly micro-sealing streets based on their OCI in areas where chip-seal has been done or will be done in the future.

For example, if in a neighborhood a segment requires an overlay but other segments only need a chip-seal, then both will occur, and over time, it is possible the entire neighborhood will receive a chip-seal. This will establish a sort of baseline year for future applications.

Another example might include a neighborhood where an overlay is performed and a segment adjacent to it only needs a micro-seal; then both might occur, and over time, the entire neighborhood might receive a chip-seal to again establish that baseline for future applications.

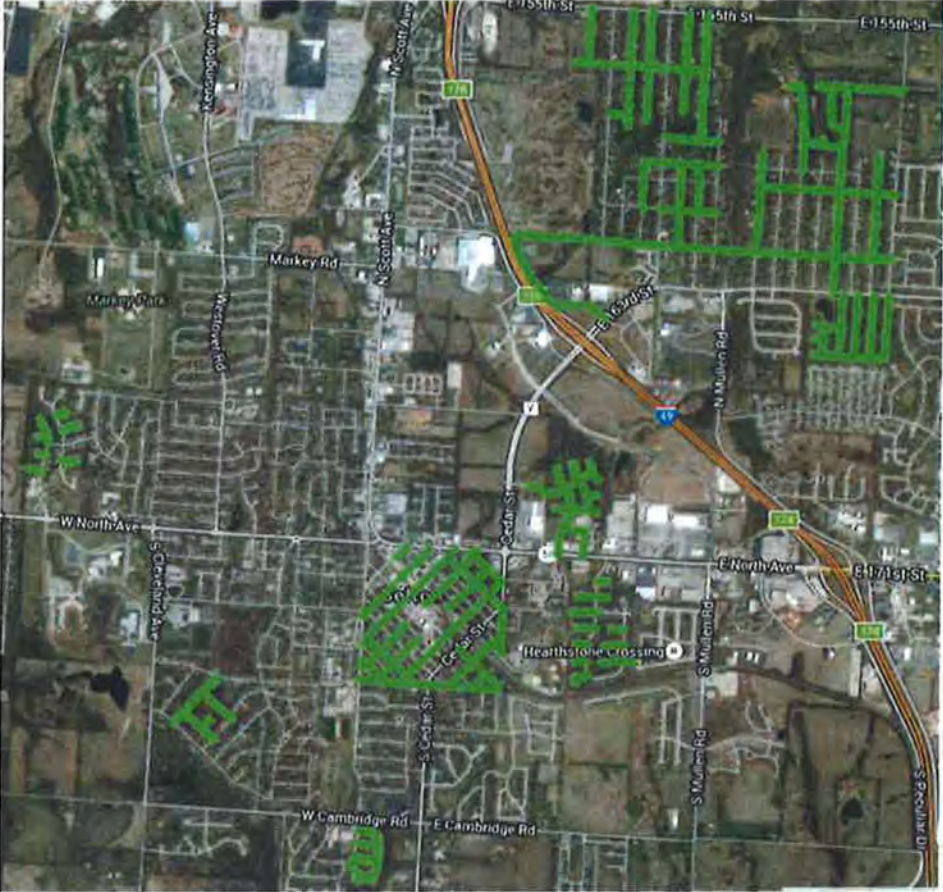
A third likely example is that certain thoroughfares like North Scott and 163rd are micro-sealed again in the near future. Once the City's preservation program has been in this routine for some time, the overall system condition and management thereof will be relatively systematic - if a reasonable level of funding is in place on an annual basis.

The following is an illustration, Figure 3.7, of the preservation program for FY18 proposing chip-seal at a normal funding level of \$600,000. If council chooses to only use overlays / reconstructs as an approved maintenance approach, 2/3 of the proposed streets would have to be eliminated. The purpose of the subsequent illustration, Figure 3.8, is to give Council an idea for what an additional injection of similar levels of funding could do in the future, if not too distant:



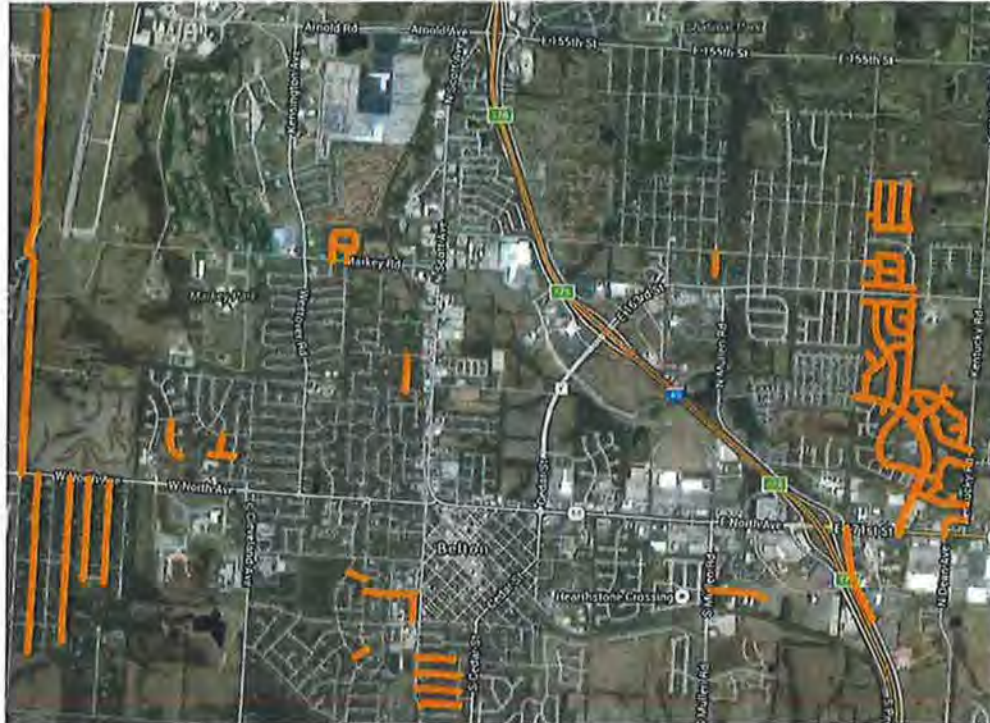
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Figure 3.7 Proposed Chip Seal in FY2018



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Figure 3.8 Future Overlay / Reconstruct if additional funding is allocated



If the City chooses not to use chip-seal, then those segments will be addressed by overlays and micro-seal methods. Micro-seal is slightly more expensive and can only be used on the segments in high side of the range. Overlays would then be used on the segments on the low side of the range, and would result in roughly 60% less miles repaired.

4.0 Recommendation

Staff's recommendation is strictly based on expert knowledge of current system conditions, empirical evidence of the effectiveness of certain maintenance methods, and funding levels. See Attachment A for study commissioned by the City of Overland Park that evaluates chip-seal versus micro-seal.

As a follow up to this year's chip-seal program, staff met with Gary Lyons and Shawn Brost of Vance Brothers and reviewed each segment of road. In their expert opinion the chip seal placed is not completely cured because the work was done later in the summer, however, the product is functioning like it should. There are areas that are thin,

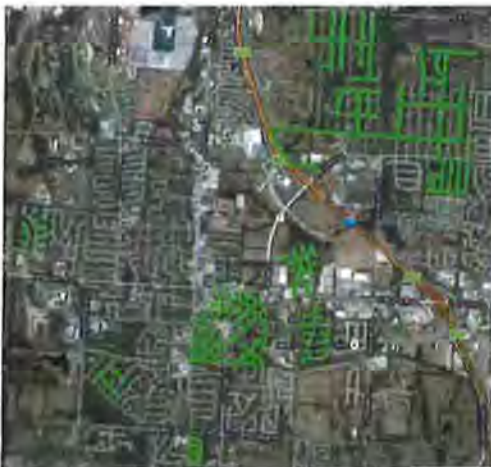
Maintenance Report

and they plan to come back late march to re-treat those areas per the contract. This is common practice; the difference is that the work was done in later summer and so that follow-up work is in the following spring. The loose gravel is attributed directly to the timing of the work and the lack of warm months after completion. It is typical that four rounds of sweeping is necessary and that is the case here, and until Spring temperatures have a chance to complete the process, staff will sweep as needed. Finally, the fact that the City chip-sealed later in the summer just means it will be April-May before the application has completely cured.

It is worth noting that the contractor used the design mix that best fit the streets conditions. On segments that fall in the lower end of the range, they use the larger gravel and more oil to fill in the cracks and deficiencies in the street. On streets with better ratings, they will recommend smaller gravel and less oil.

The two-part proposal displayed in Figures 3.3 and 3.6 for FY17 and figure 3.7 for FY18 is staff's recommendation going forward. Again, if chip-seal (with a few improvements) is not going to continue, then the proposals would be modified to conduct maintenance activities to include only overlays and micro-surfacing. This will reduce the amount of work with the anticipated budget in FY18 approximately 60%.

Figure 3.9 Left photo shows proposed chip seal streets in FY2018 (17.5 miles). Right photo details streets that may be overlaid with same proposed funds in FY2018 (5.3 miles).



Attachment A
Overland Park Study



**STATISTICAL STUDY OF CHIP AND MICRO-
SURFACING EFFECTIVENESS
OVERLAND PARK PUBLIC WORKS DEPARTMENT
OVERLAND PARK, KANSAS**

Prepared For:

**PUBLIC WORKS DEPARTMENT
CITY OF OVERLAND PARK
8500 Santa Fe Drive
Overland Park, Kansas**

Prepared By:

**KAW VALLEY ENGINEERING, INC.
14700 West 114th Terrace
Lenexa, Kansas 66215**

February 26, 2013

Project No. C12G6525

February 26, 2013

C12G6525

Public Works Department
c/o Mr. Michael Ross, P.E.
City of Overland Park
8500 Santa Fe Drive
Overland Park, Kansas 66212

**RE: STATISTICAL STUDY OF CHIP AND MICRO-SURFACING EFFECTIVENESS
OVERLAND PARK PUBLIC WORKS DEPARTMENT
OVERLAND PARK, KANSAS**

Dear Mr. Ross:

Kaw Valley Engineering, Inc. is pleased to submit this report on the statistical study of chip and micro-surfacing effectiveness for the City of Overland Park, Kansas. This evaluation was performed in general accordance with the City of Overland Park agreement for pavement engineering services dated January 8, 2013.

This study involved a statistical analysis of the condition data from roadways that experienced chip and micro-surfacing over the last 20 years. This report contains our assessment, conclusions, and recommendations.

We appreciate the opportunity to perform this work for you, and look forward to answering any questions or comments which may have been generated as a result of this assessment.

If you have any questions, please do not hesitate to contact us at (913) 894-5150.

Respectfully submitted,
Kaw Valley Engineering, Inc.

Jeffrey A Frantzen, Ph.D., P.E.
Materials Engineer

James Barry, R.G.
Geologist

Copies submitted: (3)
Electronic Copies: (1)

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2.0 INTRODUCTION	1
3.0 PAVEMENT CONDITION DATA FOR SEALING PROJECTS.....	1
4.0 STATISTICAL ANALYSIS PROCEDURE.....	2
4.1 EFFECTIVENESS OF SEAL TREATMENTS	4
5.0 CONCLUSION.....	5
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1.0 EXECUTIVE SUMMARY

The results of this statistical study of chip seal and micro-surfacing effectiveness indicates chip seals provide better performance and will have longer effective lives than micro-surfacing treatments. The statistical study presented in this report shows that there is generally an observable average of 3 to 8 condition rating point improvement in the performance of chip seals over micro-surfacing. This improvement corresponds to a 2 to 4 year improvement in surface treatment life from a chip seal treatment when compared to micro-surfacing treatments.

2.0 INTRODUCTION

The City of Overland Park's engineering staff has observed in their condition rating data apparent poorer performance from micro-surfacing projects when compared with maintenance projects that used chip sealing methods. The engineering staff has suggested that the observed apparent difference in performance behavior could be confirmed statistically by using the City's pavement condition data.

Kaw Valley Engineering, Inc. was requested by Michael Ross, Manager of Technical and Administrative Services and Tony Rome, Senior Civil Engineer of the Public Works Department to conduct a statistical study to answer the above question. The services subsequently provided were in general accordance with the City of Overland Park agreement for pavement engineering services dated January 8, 2013.

This report presents our evaluation of the effectiveness of chip and micro-surfacing methods of pavement preservation used on the Overland Park roadway system. Conclusions and recommendations presented in the report are based on pavement condition rating data provided by the Overland Park Public Works Department, pavement performance models developed by Kaw Valley Engineering for privately-owned pavement systems in the Kansas City metropolitan area, standard statistical methods of analysis, and the requirements outlined in the LIMITATIONS section of this report.

3.0 PAVEMENT CONDITION DATA FOR SEALING PROJECTS

Historic pavement condition data from the Overland Park pavement management system was provided for analysis. This historic condition data consisted of pavement condition readings, location, and age data for both chip seal and micro-surfacing projects. This data was provided to Kaw Valley Engineering in Excel spreadsheet form for further analysis. The pavement condition data was originally organized in terms of pavement classes and rating segments. This organizational system was not conducive to a statistical analysis between pavement preservation types. Several ways of organizing the data were tried but the most effective method involved arranging it into groups on the basis of 1) sealing method, 2) pavement class (Pavement Classes 2, 4 and 5 were studied), and 3) age. Partitioning the condition data into segments by the age of the seal and sorting them into age segments of 1 year intervals facilitated statistical comparison.

The data sets were subsequently resorted by Mr. Rome into groups organized by pavement class, seal type, and age of preservation treatment. The data was also filtered to remove older chip-sealed pavement segments that had been reconstructed and were not statistically comparable to more recent pavements. This additional filtering provided data sets that were statistically consistent and representative of current pavement types and maintenance methods.

4.0 STATISTICAL ANALYSIS PROCEDURE

After the condition rating data had been filtered, statistical analysis of the data was begun. The rating data was organized into groups for statistical comparison. The rating segments in each pavement class and seal type consisted of age groups from 0-1 years, 1-2 years, 2-3 years, 3-4 years, 4-5 years, and in the case of the Class 2 and 5 data, 5-6 years in age. Measures of central tendency (mean) and dispersion (standard deviation and variance) were then calculated for each year segment for both the chip seal and micro-surfacing condition data.

Since the analysis involves comparisons between the performance of chip seals and micro-surfacing, the pavement condition data frequency distributions for each year segment needed to be checked to see if they were normally distributed. Data must be normally distributed if tests involving comparisons between data sets are to be done (such as comparisons between means). Probability paper and the chi square test were used to determine if the condition data for each year-long segment was normally distributed. The chi-square test was conducted at a 1% significance level. Table 1 presents the results of the analysis of normality for the data sets.

Table 1 - Results from the Chi-Square Test for Normality			
Pavement Class	Segment Age	Distribution Type	
		Chip Seal	Micro-surfacing
Class 2	0-1 years	Non-normal Distribution	Non-normal Distribution
Class 2	1-2 years	Non-normal Distribution	Non-normal Distribution
Class 2	2-3 years	Non-normal Distribution	Non-normal Distribution
Class 2	3-4 years	Non-normal Distribution	Non-normal Distribution
Class 2	4-5 years	Non-normal Distribution	Non-normal Distribution
Class 2	5-6 years	Non-normal Distribution	Insufficient data
Class 4	0-1 years	Non-normal Distribution	Not-normal Distribution
Class 4	1-2 years	Normal Distribution	Near-normal Distribution
Class 4	2-3 years	Normal Distribution	Near-normal Distribution
Class 4	3-4 years	Normal Distribution	Near-normal Distribution
Class 4	4-5 years	Near-normal Distribution	Normal Distribution
Class 4	5-6 years	Near-normal Distribution	Insufficient data
Class 5	0-1 years	Near-normal Distribution	Near-normal Distribution
Class 5	1-2 years	Normal Distribution	Near-normal Distribution
Class 5	2-3 years	Normal Distribution	Near-normal Distribution
Class 5	3-4 years	Normal Distribution	Near-normal Distribution
Class 5	4-5 years	Normal Distribution	Normal Distribution
Class 5	5-6 years	Normal Distribution	Insufficient Data

If the chi-squared test indicated the data set was not normally distributed (the distribution was highly skewed or had a long tail) a square-root transformation was used to put the data into normal or near-normal form in order to run the statistical tests. Condition data sets for Class 2 and Class 4 pavements generally required a data transformation to place the data into normally-distributed form for analysis. Condition data for Class 5 pavements generally had a normal to near-normal distribution and the data was analyzed without resorting to a transformation.

Once the data sets had been placed in normal form, a statistical analysis could be conducted to determine if micro-surfacing and chip seals gave equivalent pavement performance. The statistical tests used to in the analysis were the t-test, to indicate if the data sets came from the same overall population (in other words, if they performed equally well), and the f-test, to determine if the data sets under consideration had the same variability. The f and t-tests were conducted at a 1% significance level. Table 2 presents the results of these analyses.

Pavement Class	Segment Age	t-Test	f-Test
Class 2	0-1 years	Means are different	Variance is different
Class 2	1-2 years	Means are different	Variance is different
Class 2	2-3 years	Means are different	Variance is different
Class 2	3-4 years	Means are different	Variance is different
Class 2	4-5 years	Means are different	Variance is different
Class 2	5-6 years	Means are different	Variance is different
Class 4	0-1 years	Means are different	Variance is different
Class 4	1-2 years	Means are different	Variance is different
Class 4	2-3 years	Means are the same	Variance is different
Class 4	3-4 years	Means are the same	Variance is different
Class 4	4-5 years	Means are the same	Variance is similar
Class 4	5-6 years	Insufficient data	Insufficient data
Class 5	0-1 years	Means are different	Variance is similar
Class 5	1-2 years	Means are the same	Variance is similar
Class 5	2-3 years	Means are different	Variance is different
Class 5	3-4 years	Means are different	Variance is different
Class 5	4-5 years	Means are different	Variance is different
Class 5	5-6 years	Insufficient data	Insufficient data

Examination of the results of the t-test in Table 2 indicates the performance of chip seals and micro-surfacing are in general not equivalent for Class 2 and 5 pavements. On Class 4 pavements, similar performance is achieved between the two sealing methods in the middle years of their effective life. Table 3 presents the average condition rating between the two maintenance methods.

Pavement Class	Segment Age	Chip Seal Rating	Micro-surfacing Rating	Rating Difference
Class 2	0-1 years	93.2	86.6	6.6
Class 2	1-2 years	87.1	80.9	6.2
Class 2	2-3 years	83.9	75.9	8.0
Class 2	3-4 years	80.2	71.7	8.5
Class 2	4-5 years	79.4	71.7	7.7
Class 2	5-6 years	78.0	71.8	6.2
Class 4	0-1 years	97.5	90.9	6.6
Class 4	1-2 years	92.4	85.3	7.1
Class 4	2-3 years	78.2	81.0	-1.3
Class 4	3-4 years	78.4	79.5	-1.1
Class 4	4-5 years	80.4	75.1	5.3
Class 4	5-6 years	86.1	Insufficient data	Insufficient data
Class 5	0-1 years	96.4	91.9	4.5
Class 5	1-2 years	94.5	92.1	2.4
Class 5	2-3 years	93.8	84.7	9.1
Class 5	3-4 years	92.3	81.9	10.4
Class 5	4-5 years	93.1	77.9	15.2
Class 5	5-6 years	93.2	Insufficient data	Insufficient data

4.1 EFFECTIVENESS OF SEAL TREATMENTS

The results of the analysis clearly indicated that chip seals generally outperformed micro-surfacing. Examining the data presented in Table 3, it can be seen that for Class 2 pavements, chip seals had an average performance rating of 7.7 condition rating points better than micro-surfacing in all age groups. For Class 5 pavements, the chip seals outperformed the micro-surfacing by an average of 8.3 points. Only on the Class 4 pavements did the data show somewhat similar performance between the two types of seals (chip seals outperforming micro-surfacing by 3.3 condition rating points). Looking at an average improvement for all classes over a five year period, chip seals outperformed micro-surfacing by an average of 6.3 points.

These results can be converted to an equivalent surface treatment life by comparing the condition ratings for the roadways with a pavement condition rating curve such as that shown in Figure 1. This curve in Figure 1 is adapted from a pavement performance model for asphalt pavements developed by Kaw Valley Engineering for privately-owned pavement systems in the Kansas City metropolitan area. Using the graph presented in Figure 1, when one looks at the apparent pavement age for a given pavement condition rating, it can be seen that micro-surfaced roads appear to be aging more quickly than chip seals (generally appearing to be 7 to 9 years old for a 5 year old treatment). The trend of the observations from this study indicates micro-surfaced pavements will require re-application of a maintenance treatment to the pavement 2 to 4 years earlier than chip sealed roadways.

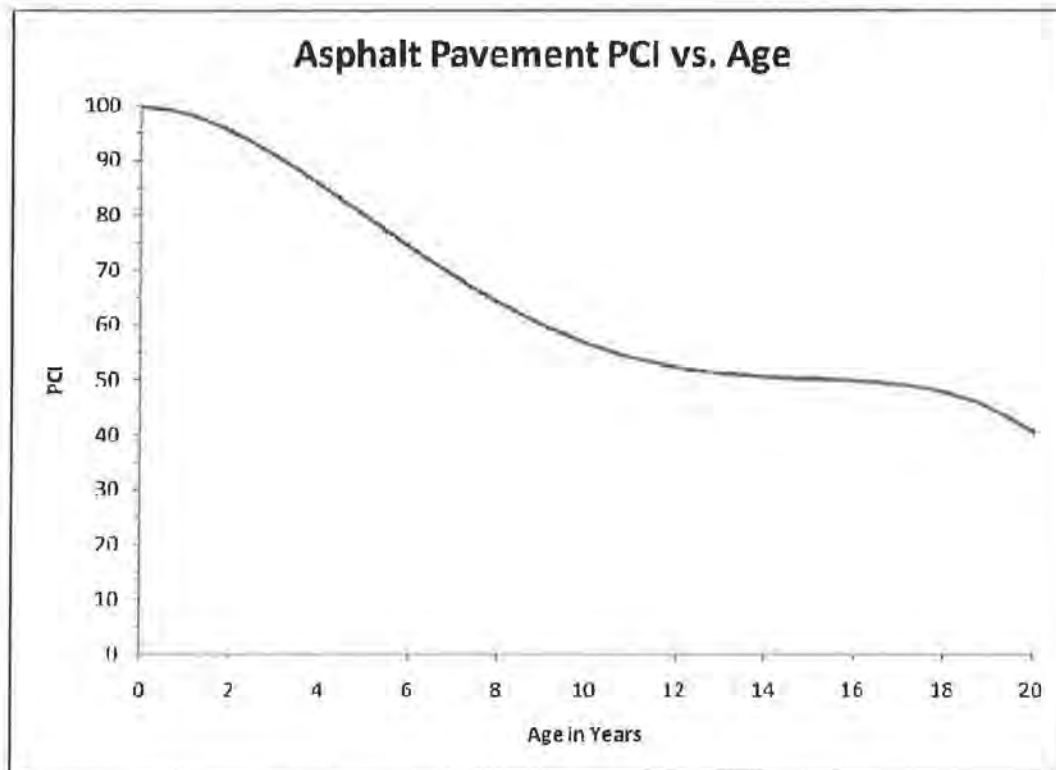


Figure 1. Asphalt Pavement Condition Rating versus Age

5.0 CONCLUSION

The results of this statistical study of chip seal and micro-surfacing effectiveness indicates chip seals provide better performance and will have longer effective lives than micro-surfacing treatments. There is generally an observable average of 3 to 8 condition rating point improvement in the performance of chip seals over micro-surfacing. This improvement corresponds to a 2 to 4 year improvement in surface treatment life from a chip seal treatment when compared to micro-surfacing treatments.

6.0 LIMITATIONS

The analyses, conclusions, and recommendations contained in this report are based on the site conditions at the time of the pavement condition survey. This report was prepared for the exclusive use of the City of Overland Park and their designated representatives as it relates to the pavement management aspects discussed herein. It should be made available to others for information on factual data only and not as a warranty of pavement or subsurface conditions included in the report.

SECTION IV
C



CITY OF BELTON
CITY COUNCIL INFORMATION FORM

MEETING DATE: February 16, 2016

ASSIGNED STAFF: Jay C. Leipzig, AICP, Director, Community and Economic Development

<input type="checkbox"/> Ordinance	<input type="checkbox"/> Resolution	<input type="checkbox"/> Consent Item	<input type="checkbox"/> Change Order
<input type="checkbox"/> Agreement	<input checked="" type="checkbox"/> Discussion	<input type="checkbox"/> FYI/Update	<input type="checkbox"/> Public Hearing

ISSUE

As you are aware, the North Scott Corridor Plan was adopted by the City Council. As result of the adoption of this plan, City staff has been working on several initiatives and would like to provide an update, as well as discuss possible incentive programs that could help to spark redevelopment.

REQUESTED COUNCIL ACTION

No action at this time, discussion item only.

BACKGROUND

During the Work Session on February 16, 2016 the Community Planning and Economic Development Director will be providing a summary of consultant recommended initiatives, “next steps” and an overview of the initiatives currently in-the-works by City staff.

❖ **Summary of Next Steps Identified by the Plan:**

- Extend Markey Parkway,
- Create the Zoning Category of Flex-Industrial/Commercial Zoning & Update the Current Zoning Map,
- Update the Belton Comprehensive Plan to Include Flex Zoning Classification,
- Work with Belton Park Department and the Railroad to Provide Recreational opportunities,
- Implement Incentive Programs to Attract New Development,
- Provide Incentive Programs to Revitalize Existing Properties,
- Develop Design Guidelines for New Development.

❖ **Overview of City Staff initiatives, to Date:**

1. **Create Zoning Category of Flex-Industrial/Commercial Zoning, Update the Current Zoning Map, Update Belton’s Comprehensive Plan to Include Flex Zoning Classification and Develop Design Guidelines** - Pending FY2017 budget approval, Confluence will begin Phase 2 of the North Scott Corridor plan, which will create the zoning category of flex industrial, update the current zoning map, update Belton’s comprehensive plan to include flex zoning and develop the design guidelines for the corridor.
2. **Area Wide Environmental Site Assessment (ESA), Missouri Department of Natural Resources (MDNR), Brownfields / Voluntary Cleanup Section (BVCP) - Brownfields Inventory**

Program Background –MDNR BVCP has completed a Brownfield Inventory of the North Scott Corridor. The definition of “brownfield” is real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Typical contaminants found on Brownfield sites include: solvents, pesticides, heavy metals, asbestos, lead-based paint, petroleum products.

The Missouri Brownfield Redevelopment Program is administered by the Department of Economic Development and the Department of Natural Resources. The program’s purpose is to facilitate the redevelopment of blighted areas that have real or perceived contamination.

This inventory was performed by a grant funded by the Environmental Protection Agency (EPA) and was completed from the City right-of-way. The Area Wide ESA report concludes that 48 of the 245 parcels warrant further investigation. There is grant money available from the EPA to conduct further testing, known as Phase I and Phase II environmental testing. The City must apply on behalf of the property owner, with the property owner’s permission. By completing these assessments, risk is minimized for future investment.

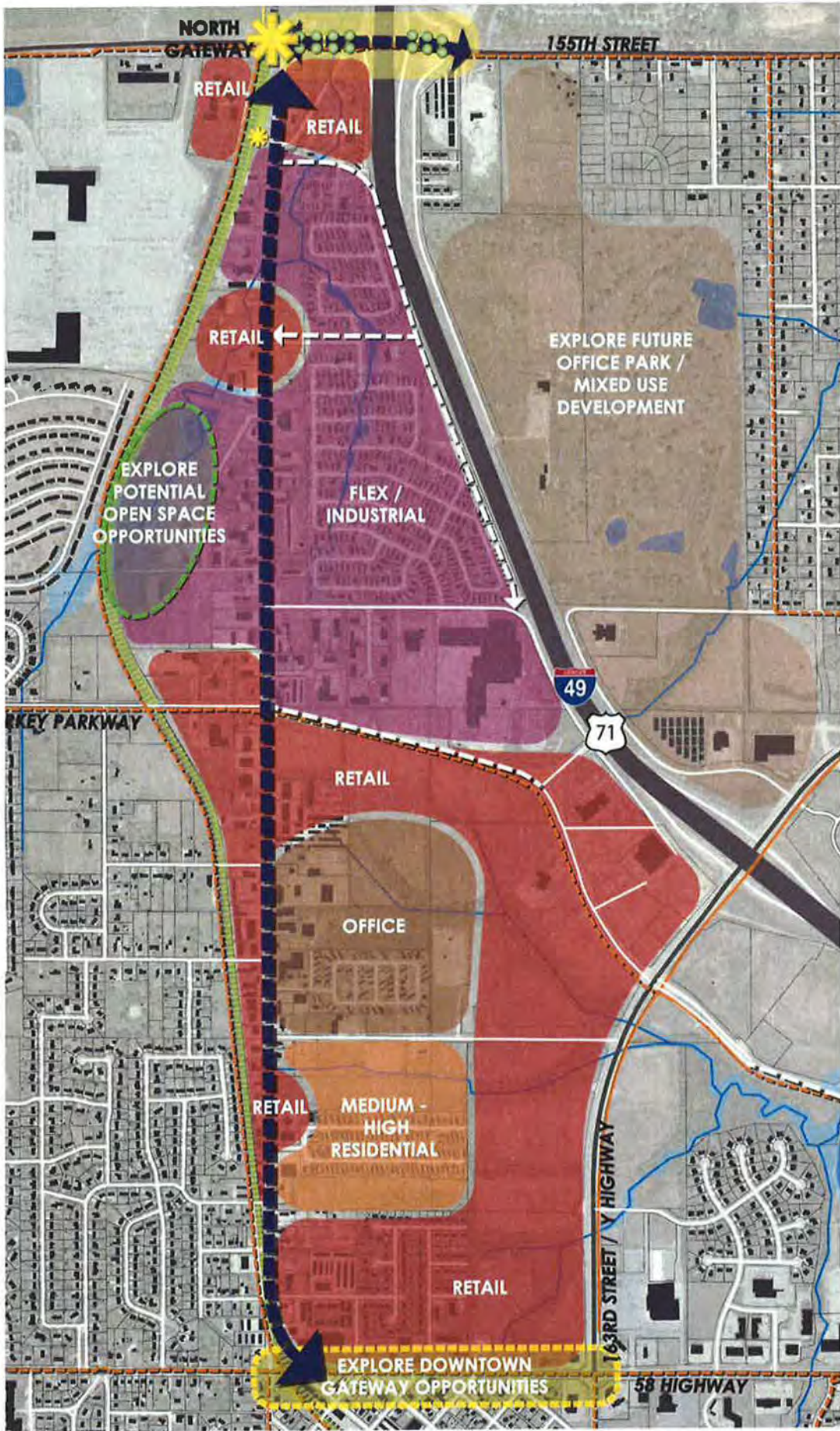
3. Staff is exploring various incentive programs, some of which are lengthy by nature. They include utilizing current code for the redevelopment of property, creating programs that reduce development fees, as well as the possible creation of a Chapter 353 Redevelopment Corporation.

STAFF RECOMMENDATION

No recommendation at this time.

ATTACHMENTS

North Scott Corridor Plan Map



NORTH GATEWAY

155TH STREET

RETAIL

RETAIL

RETAIL

EXPLORE FUTURE OFFICE PARK / MIXED USE DEVELOPMENT

EXPLORE POTENTIAL OPEN SPACE OPPORTUNITIES

FLEX / INDUSTRIAL

KEY PARKWAY

49

71

RETAIL

OFFICE

RETAIL

MEDIUM-HIGH RESIDENTIAL

RETAIL

EXPLORE DOWNTOWN GATEWAY OPPORTUNITIES

763RD STREET / Y HIGHWAY

58 HIGHWAY

SECTION IV
D



CITY OF BELTON CITY COUNCIL INFORMATION FORM

AGENDA DATE: February 16, 2016

DIVISION: Transportation

COUNCIL: Regular Meeting Work Session Special Session

<input type="checkbox"/> Ordinance	<input type="checkbox"/> Resolution	<input type="checkbox"/> Consent Item	<input type="checkbox"/> Change Order	<input type="checkbox"/> Motion
<input type="checkbox"/> Agreement	<input type="checkbox"/> Discussion	<input checked="" type="checkbox"/> FYI/Update	<input type="checkbox"/> Presentation	<input type="checkbox"/> Both Readings

ISSUE/RECOMMENDATION:

In the development of the "Cost Share" program, the second step in its implementation includes notices to property owners who have poor and failed sidewalk to require repairs/replacement. The idea is to send the notices this winter and provide those property owners ample time to comply. The attached notice gives owners until November 1, 2016 to comply and information about how they can participate in the Cost Share Program reducing costs to them for labor, equipment, and fuel. If they choose not to comply, citations will be delivered to them and the Cost Share Program would no longer be available to them.

Staff and the Public Works Committee believed it best when developing the strategy for the codes enforcement component to start with the Voting Ward that has the least amount of needs so the program has time to raise awareness before the more significant areas are addressed. This first round of notices will be delivered in Ward 2.

PROPOSED CITY COUNCIL MOTION:

None

BACKGROUND:

Cost Share program was created and implemented in April 2015 to give property owners additional resources to make repairs and replacements to sidewalk, culverts and curb.

IMPACT/ANALYSIS:

N/A

STAFF RECOMMENDATION, ACTION, AND DATE:

N/A

LIST OF REFERENCE DOCUMENTS ATTACHED:

Sample Letter to Property Owners
Sidewalk Inspection Manual



City Hall Annex
520 Main Street
Belton, MO 64012
816-331-4331
Fax: 816-331-6973

Date

Property Owner / Occupant
Address
Belton, MO 64012

Dear Property Owner / Occupant,

The City of Belton Transportation Division has completed an inspection of the sidewalks in Ward 2. During the inspection, it was determined that ### feet of sidewalk abutting your property is considered poor or failed. The sidewalk is creating an unsafe condition and public nuisance. If you are not the property owner of the above address, please notify the Transportation Division immediately at 816-331-9455.

The City requires that property owners maintain the sidewalks abutting their property and abate public nuisances. I have provided you the pertinent sections of the city regulations regarding sidewalk maintenance standards and abatement issues including Unified Development Code, Section 36-108 (2), Code Sections 14-1(a) and 14-3 (1), (24) and International Property Maintenance Code Chapter 3, Section 302.3.

The City Council has approved a cost-share program to assist property owners with sidewalk maintenance. Under the cost-share agreement, the property owner agrees to pay for all associated materials and the City provides the labor and equipment. Your sidewalk maintenance project is eligible for this program. It requires submitting an application to the Public Works Department. Following receipt of the application, a City representative will calculate the material cost for the work and will go over the information with you before a commitment by either party is made. Once the agreement is signed, payment by the property owner is required for the material before work is scheduled. Additional information about the cost-share agreement including the application can be found on the City's website at www.belton.org.

Whether you are interested in the cost share program or choose to make repairs/ replacements on your own or with a private contractor, **the public nuisance and unsafe condition of your sidewalk must be abated by November 1, 2016.**

For additional information or to answer any questions, please contact the Transportation Division at 816-331-9455.

Respectfully,

C. David Frazier
Transportation Superintendent



CITY OF BELTON
PUBLIC WORKS DEPARTMENT
SIDEWALK INSPECTION MANUAL
(EFFECTIVE 4/18/2013)

Introduction

This manual is prepared to assist users of the City of Belton Public Works Department in identifying conditions and functional deficiencies in concrete sidewalks.

The sidewalk assessment uses criteria guides set out by the Pedestrian and American Disabilities Act (ADA), Midwest Public Risk (MPR) and the U.S. Department of Transportation Federal Highway Administration.

In 2010, the City of Belton inspected all sidewalks in the City limits with the exception of sidewalks on State right-of-ways (Y Highway/58 Highway) in which we had five (5) ratings:

1. **EXCELLENT** – no cracks, no change in elevation, cross slopes are 2% or less, ADA compliant
2. **GOOD** – small cracks, no more than 2 in 4' panel, no change in elevation, 2% or less cross slope, ADA or handicap compliant.
3. **FAIR** – moderate cracking, separation of no more than 1/4", still handicap accessible, cross slope no less than level, change in elevation less than 1/4".
4. **POOR** – Bad cracking, cracks separated more than 1/4", 1/2" to 1-1/2" change in elevation, cross slope more than 2% or falling toward the yard.
5. **FAILED** – Bad cracking, cracks separated more than 1/2", missing pieces, and change in elevation more than 1-1/2", not handicap accessible.

Some panels in the **POOR** rating may be slope cut if between 1/2" to 1-1/2" change in elevation and will still have a cross slope toward the street of no more than 2%. No precast panels can be slope cut.

All panels in the **POOR** and **FAILED** ratings need to be repaired or replaced. Some of the **FAIR** ratings may need to be replaced while repairing other sections. For example, if it does not meet the minimum or maximum cross slope and is adjoined to a panel being replaced. Priority of repair or replacement considers these factors:

- Location
- Level of pedestrian traffic
- Handicap pedestrian in area

Information collected during assessment includes:

- Location (by schools, residential, commercial, proximity to roadway)
- Level of pedestrian traffic
- Description and measurements of any heaving
- Draining not toward street (holds water)
- Low head clearance (branches, guy wires, signs)
- Gaps in sidewalk (missing sections)
- Crushed areas
- Excess slope
- Unsafe manholes and valve boxes
- Backfilling

This information was updated in October of 2011 and mapped on GIS. All repairs are recorded in Cartegraph. A full sidewalk inspection should be completed every three years or more often according to MPR.

SECTION IV
E

**ANNUAL LEGAL DEPARTMENT REPORT
COVERING AUGUST 18 TO DECEMBER 31, 2015
Prepared and Presented by Megan B. McGuire, Esq.
January 26, 2016**

Department Assessments

- Fire Department/Station No. 2 tour and review of organization with N. Larkey
- Emergency Services tour and review of organization with B. Miller
- Economic and Community Development organizational and policy review and community drive around with J. Leipzig
- Police Department tour and review of organization with J. Person
- Municipal Court tour and meeting with Judge Curry and Prosecutor Marshall
Attended two Wednesday night sessions – arraignments and trials
- Orientation with Mayor Davis and community drive around.
- Orientation to Net Standard services for overall information technology services
- Parks facilities tour and organizational review with T. Spalding
- Golf Course facilities tour and organizational review with J. Kennedy

Contracts/Agreements

- Farm lease of city property
- Reimbursement agreement for Public Works
- Development agreements for Markey Parkway detention pond X2
- Tolling Agreement with Missouri Department of Natural Resources
- Club membership agreement for golf Course
- Mowing contract and bid package for Parks
- Sponsorship contracts for Parks
- Purple heart sign installation agreement with Missouri Highway and Transportation Commission
- Security camera/video maintenance agreement for Police/Municipal Court building
- Trash services contracts at city properties
- Public works project agreements, bid packages and bond documents
 - o Mullen Culvert (RCB) Replacement
 - o Markey Parkway Sanitary Sewer Phase II
 - o Cedar Tree Lift Station Abandonment
 - o Concrete Replacement
 - o Mullen Road Widening Phase I Appraisal Supplemental Agreement
 - o Mullen Road Widening Phase I Negotiator Supplemental Agreement
 - o Nexus Stream Relocation
 - o Roof Replacement Service Agreement
 - o Annual Street Striping Program Service Agreement
- Engineering contract templates and bid package standards
- Copy machine lease agreement for Fire Department
- Meetings and document review on Grand Hill CID

Ordinances/ Resolutions

- Resolution for Emergency Management regional mitigation plan
- Ordinance for Vehicle Sales Tax
- Ordinance for election law revisions
- Ordinance for TXRH CID
- Ordinance for Grand Hill CID
- Ordinance for Kenton Brothers security agreement
- Ordinance for business tax continuation of KCP&L
- Reviewed ordinances prepared by others X32

Codes/Regulations/Policies/Procedures

- Consultation on liquor violation and suspension of sales policy and letter
- Rewrote dangerous building codes in consultation with community development staff
- Consultation on code enforcement issues X6
- Consultation with Missouri Department of Natural Resources on hazardous material issue

Planning/Zoning/Economic Development

- Special use permit on day care facility
- Review of City of Peculiar northern boundaries
- Administrative delay issues
- Floodplain management issues
- Access management and site re-development for local business
- Review economic development incentives X4
- Weekly meeting with Economic Developer Director
- Meeting with local title agent company
- Attended Cass County Economic Development meetings X2 and KCADC annual meeting

Sunshine Law

- Consultation provided on record request X3
- Consultation on open meeting issue X2
- Meeting with local newspaper staff on best practices

Subpoenas

- Subpoena review and/or response X2

Business Licenses

- Consultation on business license eligibility X5
- Business license revocation letters X10

Employment/Union

- Consultation on 6 employment issues
 - o FMLA issue
 - o Employment complaints
 - o Medical testing issue
 - o Department reorganization issue
 - o Collective bargaining ordinance and negotiations

Training

- Training session for City Staff on bankruptcy procedures and limitations by outside attorney
- Conducted training session on ordinance writing for efficacy, validity and accuracy

Projects/Consultations

- Seabee property document review
- Surplus construction equipment theft at auction house
- Review and consultation of potential development and redevelopment projects X6
- Downtown re-development
- Water line policy – public/private distinction
- Potential conflict of interest advise X2
- Review and approve all outside counsel billings
- Hotel/motel tax analysis and policy
- Americans with Disability Act compliance review and coordination of staff for improvements

Meetings

- Attend these meetings regularly:
 - City Council
 - Planning and Zoning
 - Future Land Use Planning
 - Board of Adjustment
 - Economic Development update
 - Department Heads Meeting
 - TIF Commission
 - TDD Board
- Attend these meetings as needed:
 - Development Review Committee
 - Parks Board and Subcommittees
 - Tree Board
 - Code Enforcement Advisory Committee
 - Emergency preparedness group

SECTION IV
F

City Attorney Office Renovation Project

2-10-16

NEED: Space needed for individual and group meetings and opportunity for confidential communications with internal clients and external parties/entities. City Attorney and other staff have needs for properly constructed space to have confidential, private communications. The space selected is in the best location for access to main work group, files and clients.

BUDGET:

Architect design for room, walls and door layout	\$2,500
Mechanical and electric design work	\$1,750
Office creation and renovation/construction	\$17,750
Furniture	<u>\$3,000</u>
TOTAL	\$25,000

TIMELINE:

To City Council work session	2-16-16
To City Council for approval of design-build with J.E. Dunn	2-23-16
To engineers to develop design sheets	2-24-16
To City DRC Committee for approval	3-9-16
To JE Dunn project manager for final budget, order materials, hire subs	3-10-16
Order furniture	3-10-16
Construction	Friday, Saturday, Sunday March 18, 19, 20 Friday, Saturday, Sunday March 25, 26, 27
Housekeeping/Clean-up	3-28-16
Furniture delivery/installation	3-29-16

Ron's office

Megan's office

Patti's office

hallway

files / book shelves

Blade's office

TV / weather
communications
moved here or
other office / location

kitchen area

Andre's office