WORK SESSION MEETING
AGENDA
CITY OF CREVE COEUR
CITY COUNCIL
300 NORTH NEW BALLAS RD
APRIL 27, 2015
6:00 PM

CALL TO ORDER

ROLL CALL

DISCUSSION ITEMS

1. **Work Session Minutes Dated March 23, 2015**
   Summary:

2. **Pavement Management**
   Summary: Staff will provide an overview of the pavement management program and discuss 5 year plan as well as the future direction of the program and resource needs. Staff is converting the 5-year pavement plan into report form and it will be sent out to Council members tomorrow for review before the discussions at the work session.

Pursuant to Section 610.022 RSMo., the City Council could, at any time during the meeting, vote to close the public meeting and move to closed session to discuss matters relating to litigation, legal actions and/or communications from the City Attorney as provided under Section 610.021(1) RSMo. and/or personnel matters under Section 610.021(13) RSMo. And/or employee matters under Section 610.021(3) RSMo. and/or real estate matters under Section 610.021(2) or other matters as permitted by Chapter 610.

Posted: _____ posted 04/27/2015
Deborah Ryan, MPCC
City Clerk

City Council
300 North New Ballas Rd
Creve-Coeur, MO 63141

Debbie Ryan
City Clerk
(314) 872-2517
www.creve-coeur.org/

Meeting: 04/27/15 06:00 PM
DOC ID: 1311

COUNCIL MINUTES (ID # 1311)

Work Session Minutes Dated March 23, 2015

WORK SESSION MEETING
MINUTES
CITY OF CREVE COEUR
CITY COUNCIL
300 NORTH NEW BALLAS RD
MARCH 23, 2015
6:00 PM

Present: Mayor Barry Glantz, Council Members, Scott Saunders, Cynthia Kramer, Charlotte D'Alfonso, David Kreuter, AJ Wang, Ellen Lawrence, Robert Hoffman and Robert Kent.

Creve Coeur Staff present: City Administrator Mark Perkins, Assistant to the City Administrator Sharon Stott, Finance Director Dan Smith, Public Works Director Jim Heines, City Engineer Matt Wohlberg, City Attorney Carl Lumley and City Clerk Deborah Ryan.

1. Work Session Minutes Dated March 9, 2015

Council Member D'Alfonso moved, seconded by Council Member Kreuter to approve work session minutes dated March 9, 2015. Passed by unanimous vote.

2. City of Creve Coeur Strategic Plan

Mark Perkins reviewed the updates to the Strategic Plan. (Exhibit A)

Council Member Lawrence asked about possible cost savings for office supplies and suggested online services/purchasing.

Dan Smith stated staff does make some online purchases and receives quotes from time to time from several different sources, but will review opportunities to reduce costs through online purchasing.

Discussed moving the Farmers Market to a location along Olive to allow for more visibility. Discussed for more advertising at local businesses that cater to families (i.e. dance schools, karate, etc) including with performance opportunities. Discussed advertising at the ice arena via whiteboard, etc and do more cross promoting, in terms of all city events.

Adjourned at 6:52 p.m.

City Council
300 North New Ballas Rd
Creve-Coeur, MO 63141

SCHEDULED

Meeting: 04/27/15 06:00 PM
Department: Public Works Department
Category: Presentation
Prepared By: Jim Heines
Department Head: Jim Heines

STAFF REPORT

Pavement Management

Staff will provide an overview of the pavement management program and discuss 5 year plan as well as the future direction of the program and resource needs. Staff is converting the 5-year pavement plan into report form and it will be sent out to Council members tomorrow for review before the discussions at the work session.

DEPARTMENT OF COMMUNITY DEVELOPMENT
OFFICE MEMO

DATE: April 19, 2015

TO: Mark Perkins, City Administrator

FROM: Jim Heines, Director of Public Works

SUBJECT: Pavement Maintenance Program Overview

Composition of Existing Network

The Creve Coeur street network consists of three types of streets, asphalt (with and without curb), concrete slabs (with rolled curb or vertical curb), and combination street (asphalt over concrete slab base). Each of these types of pavement have a separate deterioration rate as well as preservation and repair methods to keep the pavement in good condition. Typically repairs on combination streets are much more expensive, because they must utilize both concrete slab replacement and asphalt overly to complete the repairs.

The composition of the street network is as follows:

Pavement Type	Portion of network
Asphalt	54%
Concrete	16%
Combination	30%

Although the construction of the asphalt and concrete streets are simply standard construction, the combination streets were created in the 1970's & 1980's by covering deficient concrete slabs with asphalt. This approach produced a smooth road at a lower cost than concrete repairs, which was the immediate result the city was looking for at the time. However, paving deteriorated streets also hid the deteriorated concrete base slabs, which are the foundation of the roadway. Again in the 1990's/2000's, the same process occurred where the cost to replace all of the deficient slabs was beyond the city's budgeting capabilities, so again only a few of the worst slabs were replaced before the concrete base was covered up with an asphalt overlay.

While cost effective at the time, it is unfortunate that this practice continued. The high cost of major repairs or reconstruction was postponed to the future. That future is now. There are now a number of streets and subdivisions in the city which will require, at a minimum, significant slab replacement and overlay treatment. This being said, there are also a number of streets for which reconstruction is the City's best – and perhaps only - option.

Pavement Evaluation Process

There is no one single method of evaluating pavement that is a comprehensive view of pavement condition as well as how a street may fit within the that year's budget much less projecting future budgets. For this reason, staff uses several methods to rate pavement conditions and the results

of these assessments along with historical knowledge of specific streets and many years of experience allow staff to assemble appropriate street repair lists which will fit within the prescribed budget amount. A brief description of the evaluation tools we use, along with their capabilities and limitations, are listed below:

GBA Master Series - Pavement Condition Index Ratings

The GBA Master Series program is a tool which staff uses to identify streets which are candidates for a pavement maintenance application. The program catalogs the amount and severity of standard pavement deficiencies that are recorded during a pavement inspection. The software uses this information to determine the pavement condition index (PCI) rating for that section of roadway. The program will then depreciate the PCI rating over time based upon an industry standard deterioration curve to estimate current or future PCI ratings.

Staff evaluates 25% of the city's pavement network each year in an effort to keep the information in the system up to date and relevant, thus not solely depending on the accuracy of the deterioration curve to set PCI ratings. Consistently updating the pavement conditions means that recent repairs are reflected in the conditions, and such updates decrease the likelihood that rapid condition changes will go unnoticed.

The primary benefit of a pavement management software program is that it provides a repeatable and objective process that results in an easy-to-understand rating that can be compared across pavement types. This allows the City to track the progress of the pavement network, identify problem areas and trends, and model the performance of the system using particular budgets. In short, the pavement maintenance system is a useful planning tool for the management of a pavement network.

Pavement management software is best used to predict repairs on asphalt streets where the conditions deteriorate somewhat predictably over time. The software is less effective for predicting the conditions of concrete streets, where each slab can behave differently, and failures are sometimes abrupt.

The limitation of the pavement rating system is that it is blind to other issues. The software can use a PCI to suggest that a certain level of repair is necessary, but it cannot tell whether that repair is appropriate. Furthermore, the scenarios that can be run through the softwayre provide repair suggestions based upon the software's and/or user's criteria. These suggestions may provide a good starting point for the development of a pavement maintenance program, but evaluation of these suggestions is required to ensure that the program is feasible and makes sense.

Visual Inspections

This is probably the most valuable evaluation tools staff uses to determine the state of deterioration, and sub-surface conditions of base rock/pavement or subgrade. There are a number of indicators which may be visible to the trained eye which offer a wealth of information regarding the level of deterioration and the remaining pavement life of a section of road. The stresses identified during the visual inspection of the pavement surface can go much deeper identifying subsurface deterioration and/or inferior base.

Staff uses the network listing of streets identified by PCI rating as a starting place to perform onsite visual inspections of each street on the list. The results of the visual

inspection further define the condition of the pavement and what is the appropriate treatment for its condition.

Concrete Pavement Maintenance Program

City staff reviews the City's concrete pavement network annually to prepare a recommendation for the repair and improvement locations for that year's concrete pavement replacement project. This review involves considering each concrete slab on a scale of 1-5, generally as follows:

Rating	Description
1	A new slab with no problems.
2	A good and serviceable slab with only minor problems and wear. Examples could be minor joint spalling or a hairline crack. None of the issues with this level of slab is an immediate concern.
3	A slab in fair condition with generally minor cracking or some moderate cracking with no signs of movement within the slab. This level of slab has indications that repairs will be necessary in the future, but the slab is not in immediate need of a repair.
4	A damaged slab that exhibits cracking or spalling that needs to be addressed. Slabs in this condition might be broken with the individual sections beginning to move independently.
5	A failed slab that poses an immediate concern to traffic and/or pedestrians. Such a slab might have collapsed. The slab is often closed to traffic due to the hazard.

Slabs that would have a 1 or 2 rating are in good condition and are not recorded. A list of all of the slabs that rate 3, 4, or 5 is compiled by staff and is reviewed each year during the capital improvement planning process. This review gives staff some perspective on the City's annual concrete pavement network needs and greatly influences which concrete repairs are recommended. For example, emergency issues were noted for slabs on Bergerac and Wedgewood, hence the inclusion of these streets into the proposed repair program for FY2016.

Cost to Benefit Ratio

An additional means of pavement repair evaluation is currently under development by City staff is measure of the "benefit" for the repair to each street. The concept involves the calculation of a benefit factor based upon a set of measurable criteria. Specifically, the following equation is used to determine this benefit factor:

$$\text{Benefit factor} = \frac{(\text{Traffic Volume})*(\text{Life of Repair})}{(\text{Pavement Condition})*(\text{Cost of Repair})}$$

With this ratio, the benefit is directly proportional to the traffic volume and life of repair, but it is inversely proportional to the pavement condition and cost to repair.

All things being equal, repairs would be made that address the lowest PCI that cost the least, impact the most motorists, and have the longest life. Rarely, however, are all things equal, even between two streets. The benefit calculation an attempt to account for these differences and can be useful in determining which street is the most appropriate to repair, particularly among streets that are considered for the same repair.

The benefit calculation will suggest repairs that offer the most cost-effective impact for motorists. This calculation is limited, though, in that it will likely never find that the reconstruction of a residential street is the most appropriate project.

Testing

Several years ago city staff began awarding an annual pavement testing contract which included gathering core sample information prior to construction of road treatments as well as material testing during the construction to monitor quality control.

The cost of materials testing during construction is low relative to the cost of the project. Such testing verifies that the materials and construction methods are according to the project specifications. The assurance that this testing provides is essential for construction projects.

Core testing is another tool staff uses to determine pavement/base thickness and soil subgrade type. Generally pavement/base thickness and soil subgrade type are uniform throughout an existing roadway, and this is valuable information when planning pavement rehabilitation for a specific street.

Pavement thickness information is particularly valuable for asphalt streets that are considered for resurfacing. During the resurfacing process, the pavement thickness will initially be reduced by about two inches. Pavement thickness samples are needed to determine whether the milled-down pavement will be thick enough to support the construction vehicles that will construct the new pavement surface. A pavement base that is too thin can lead to outright pavement failure during paving, and this would be costly to repair.

Concrete core testing is typically not used by staff as a planning tool. Generally, the concrete and its base are replaced if the concrete slab has failed. At the point of failure, the characteristics of the concrete would not be important to the decision of whether to replace the failed slab.

Concrete core testing could be useful to determine whether or not to rehabilitate or reconstruct a combination street. For many combination streets, the history of the subdivision or the surface distresses provide a good indication that reconstruction is the only option. For small residential streets, the lower cost of rehabilitation might be an attractive option, and core drilling could provide information that suggests whether that option is viable. For combination streets, however, removal of the surface asphalt typically gives the best indication of whether the street can be repaired and resurfaced or the street simply needs to be replaced.

Testing can be expensive, though. Many tests are available that can determine various material properties, but some require laboratory time that costs hundreds of dollars per test. The City needs to evaluate whether the information gathered from the materials testing is useful and worth the investment. With combination streets, for example, core testing has its limitations and will only provide results for the precise location where the sample was extracted. Although cores are able to identify the thickness of the different layers used in road construction, they are not able to accurately identify the overall quality of concrete base pavement slabs.

Repair/Replacement Applications by Level of Deterioration

Public Works staff is responsible to maintain the city's pavement network, which measures approximately 154 lane miles. Each year staff assembles a list of streets which are recommended to receive maintenance applications utilizing the American Public Works Association (APWA) Best Management Practices (BMPs) and according to their pavement type and level of deterioration. For asphalt streets this could range from patching and a micro-surface application to a total reconstruction. Likewise, for a concrete street, the appropriate treatment could range from crack sealing to a total replacement. A listing of the treatments associated with pavement type and the appropriate intervals are listed below:

Asphalt Pavement Treatment Type	Pavement Age since Last Treatment	Life Expectancy of Treatment	Unit Cost
Micro-surface	5-7 years	5 years	$6/SY*
Ultra-thin asphalt overlay	8-10 years	10 years	$9/SY*
2" Rotomill/Overlay	14-16 years	15 years	$20/SY
Total Reconstruction	20+ years	20 years	$70/SY

* Including staff time and materials for prep work.

Concrete Pavement Treatment Type	Pavement Age since Last Treatment	Life Expectancy of Treatment	Unit Cost
Crack Sealing	when new and every 5 years	5 years	$0.30 per LF*
Asphalt Joint repairs	15 years	2-3 years	$500 per ton*
Concrete Joint Replacement	10-30 years	10-15 years	$110/SY
Selective Slab Replacement	10-40 years	30-40 years	$55/SY
Total Reconstruction	40-50+ years	30-40 years	$60/SY

* Including staff time and materials to complete work.

Combination streets are a hybrid construction utilizing a concrete base pavement with an asphalt overlay. This being the case, treatments from both lists above may be appropriate and recommended at the proper interval along the deterioration curve.

All of the above treatments are listed in order of expense starting with the least expensive treatments first. Less expensive treatments can be repeated several times before being forced to step to the next level of treatment. Each time a treatment is performed to the entire street, the pavement conditions are improved, and the PCI jumps back to a minimum of 98-99, restarting the pavement on its deterioration curve. Lower-level or spot repairs will improve the PCI, but only as much as the repair addressed. This is a good example why the APWA as well as city staff promotes early preventative maintenance treatments to roads which are a low cost means of extending the life of pavements. Their philosophy is "Keep Good Streets Good".

3-5 Year Pavement Replacement Plan

Each year when drafting the annual pavement repair/replacement program, staff projects out 3-5 years based on the funding amounts identified in the 5-year Capital Improvement Plan. The specific streets and the appropriate treatments identified within the 3-5 year plan are based upon:

- Results of pavement evaluations
- Historical knowledge of pavement on specific streets
- Available and anticipated budgets

- Neighborhood or Block Approach
- Opportunistic repairs (utility companies replacing their mains in a particular neighborhood could expedite or postpone repair/replacement work)

Ultimately a diverse approach to maintaining the pavement network is the best plan. It is important to invest in low cost preventative maintenance applications which allow staff to address more pavement at a lower cost. Unfortunately there will always be streets which we cannot address during the window of opportunity to use the lower cost applications and we will have to let them go a few more years untreated until they qualify for the next level of treatment.

It is a challenge to assign the correct pavement applications to the appropriate streets while meeting the approved budget for any year, much less a 3-5 year period. Due to a number of variables such as extreme weather, accelerated or delayed deterioration of surface and/or base pavement, missed opportunities to complete preventative maintenance applications, projects being constructed by outside agencies affecting timing of city repairs, it is hard to accurately project street repairs beyond 5-years. Attempting to project a long term plan (5-20 years) may be perceived by the public as a recommendation or commitment by the city to perform repair/replacements or even reconstruction in a specific year or time frame.

City staff depends heavily on the annual visual inspections of the projected street list in order to obtain the up to date condition of the pavement that is being recommended for a specific treatments. This not only helps staff through the evaluation process, it allows staff to determine and recommend the appropriate streets for the annual pavement maintenance program.

Pavement Treatment Schedule

Preparation for a Micro-surface or even an Ultra-thin overlay begins as early in the year as possible to allow our in-house staff time to remove and replace damaged pavement prior to sealing the surface with either application. Both of these applications as well as rotomill/overlay are completed in one construction season unless concrete curb replacement is required. When this occurs, staff recommends completing concrete curb replacement the year before the overlay is scheduled. A phased approach over two years not only helps with staging two contractors to complete work on a schedule, it also allows the curb to fully cure before placing a rotomill machine, paving machine, and heavy trucks on fresh concrete.

The schedule for rehabilitation of concrete streets, also known as slab replacement, is dependent on the size of the subdivision and quantity of deteriorated slabs. In most subdivisions with significant repair needs, slab replacement is phased over 2-3 years. This approach allows staff to spread capital pavement funding across the city, performing pavement repairs in several locations each construction season. Currently staff is working on year 2 of a 3 year plan in the Royalgate subdivision. In addition, due to the amount of concrete streets in the Fernview and Bellerive Estates subdivisions, we are working on a multi-year slab replacement plan methodically working our way through those subdivisions. Staff has recommended starting concrete slab replacement in other subdivisions this year and in following years in the projected 3-5 year pavement maintenance plan. The key to this plan is to be able to concentrate enough resources in a neighborhood in order to make a significant improvement in a short period of time. Spreading the program into too many locations at once would result in drawn-out construction for everyone.

The remaining type of street construction is the total reconstruction of a roadway. Each year staff recommends the reconstruction of at least one failing road in the city. The actual reconstruction of a road is completed in one construction season, however in the event that design is required, it will take place in the year(s) preceding construction in preparation for bidding and construction.

It is a delicate science to address all the different levels of pavement treatments each year. Removing one street or neighborhood from a treatment plan will have a ripple effect on the 3-5 year plan. It may also force those streets to miss the opportunity to receive a lower cost preventative maintenance application. In addition, finding another street that fits into the budget may be a significant challenge.

DEPARTMENT OF PUBLIC WORKS
STAFF MEMORANDUM

DATE: April 17, 2015

TO: Mark Perkins, City Administrator

CC: Jim Heines, Director of Public Works

FROM: Matt Wohlberg, P.E., City Engineer

SUBJECT: Cost Review for Concrete Coring and Testing versus Asphalt Milling
2015 Roadway Reconstruction Project

Staff has reviewed the costs associated with taking and sampling pavement cores, as requested by the City Council at their meeting on Monday, April 13. Specifically, the City Council recommended that the City perform the following statistical analysis of each "combination" street (i.e. concrete base pavement with asphalt surface pavement) that is considered for reconstruction in an effort to ascertain the conditions of the concrete base pavement:

- 20 cores to be taken per street
- Concrete core strength for each core
- Chloride ion test for each core
- Entrained air content for each core

Staff estimates that the cost of the number of cores and the types of testing requested would amount to approximately $39,168. This estimate is based upon the testing and coring costs in the City's current contract with Geotechnology, Inc.

The Council's request for sampling was initially made as a suggested alternative to the asphalt milling that was performed on Spoede Woods Drive and Chalet Court as part of the 2015 Roadway Reconstruction Project. The milling costs for that project total approximately $21,615, based upon the contract costs for this work.

An itemized estimate for both the testing and the milling is attached, as it would relate to Spoede Woods Drive and Chalet Court.

Attachments: Itemized costs for milling, coring, and testing

Work Completed Through 2015 Roadway Reconstruction Program

				Cost Per Street			
Work Item	**Quantity**	**Unit**	**Unit Cost**	**Spoede Woods Court**	**Chalet Court**	**Total Cost**	**Comments**
Milling	6862	SY	$ 3.15	$ 11,806.20	$ 9,809.10	$ 21,615.30	

Total Cost: $ 21,615.30

Concrete Coring and Testing as Suggested by City Council

				Cost Per Street			
Work Item	**Quantity**	**Unit**	**Unit Cost**	**Spoede Woods Court**	**Chalet Court**	**Total Cost**	**Comments**
Coring Machine	3	Day	$ 125.00	$ 187.50	$ 187.50	$ 375.00	Assumes 10-15 cores per day.
Concrete Coring	240	Inch	$ 9.00	$ 1,080.00	$ 1,080.00	$ 2,160.00	Assumes 40 cores at 6 inches each
Concrete Strength Test	40	Each	$ 45.00	$ 900.00	$ 900.00	$ 1,800.00	
Chloride Ion	120	Each	$ 100.00	$ 6,000.00	$ 6,000.00	$ 12,000.00	Typically, three tests per core.
Core air content	40	Each	$ 570.00	$ 11,400.00	$ 11,400.00	$ 22,800.00	
Vehicle trip charges	3	Day	$ 11.05	$ 16.58	$ 16.58	$ 33.15	

Total Cost: $ 39,168.15