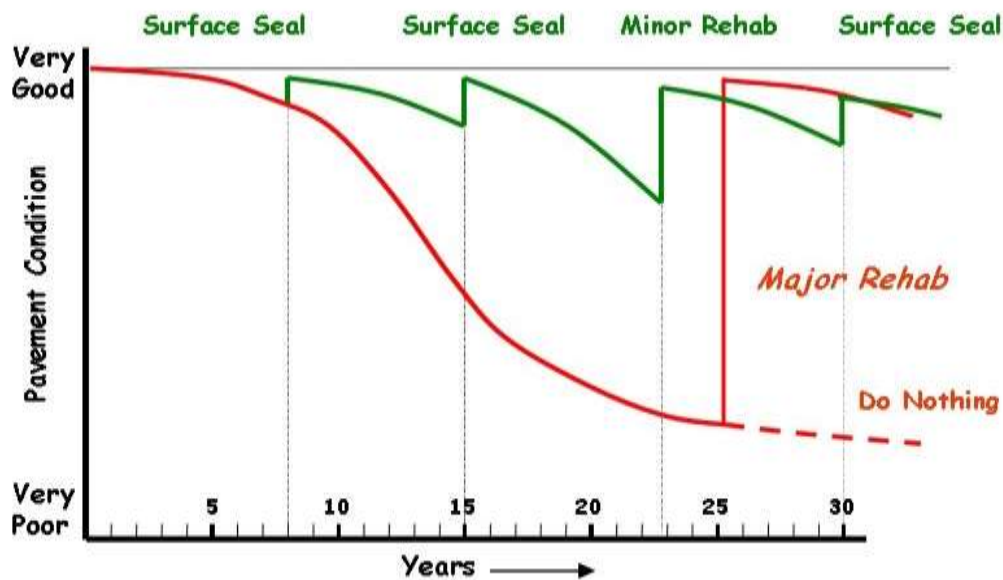


STREET NETWORK ANALYSIS

Each year the Public Works Department completes an assessment of the street system to determine how to properly maintain and care for our streets. The Public Works Department was budgeted \$1,250,000 in 2013 to improve the street network. An asset management software program called *Cartegraph* is utilized to run scenarios given allotted budgets to assist in prioritizing for the annual street project. The scenarios consider the following factors when determining which roads receive maintenance activities: classification (Arterial, Collector, and Local), traffic loading, history of maintenance activities, severity of distresses, drainage, date of initial construction, and feedback from the City Council and from residents. The software program allows Staff to run analysis on the entire street system and properly rank activities based on each pavements Overall Condition Index (OCI). The OCI is a ranking from 0 – 100 (0 = Very Poor, 100 = Very Good/New). Consider the following graph showing life of a pavement:

Pavement Management with "Good Roads Cost Less" Preservation Strategies



The above graph also shows how properly timed preservation strategies for pavement can greatly reduce costs and extend the lives of our pavements. The preservation methods that the City of Louisville focuses on include crack sealing, chip sealing, double chip sealing, slurry sealing and hot chip sealing. Just like protecting and sealing wood siding on a house, it is key to “caulk” cracks in our pavements with crack sealant, to “seal” the pavement through applications of chip, slurry, or hot chip seals and to commit to this type of maintenance on a regular basis.

Along with results from *Cartegraph*, Staff analyzes the Overall Condition Index by subdivision and considers other characteristics of the subdivision. The City of Louisville maintains 1000 segments of pavement adding up to 263 lane miles of asphalt.

The annual street resurfacing project is also accompanied by the replacement of selected sidewalk and curb and gutter. Deficient curb, gutter, sidewalk, and drainage crosspans that exhibit large cracks, settlement, and ponding water will be replaced.

Typical street resurfacing projects are 45 contract days in length. The Public Works Department selects a qualified asphalt Contractor through the public bidding process. Per Contract Specifications, it is the responsibility of the Contractor to produce a construction schedule, to determine the means of moving through the City to complete the project, and for providing notification and publicly held neighborhood meetings to discuss the work to be completed.

Due to the age of some of the streets in the City, crack sealing and chip sealing may not be enough to properly repair the street. Street resurfacing activities may also include asphalt full depth patching, asphalt leveling, asphalt mill patching, and other methods of pavement preservation, or in extreme cases, full reconstructions of asphalt sections.

Resurfacing Techniques/Reconstruction Activities

Asphalt Full Depth Patching

Asphalt within the street that contains severe cracks, alligatoring and settlement may be required to be patched. This includes saw cutting and removing sections of asphalt. The subgrade is checked for suitability, compaction, and then new asphalt is placed to match surrounding finish grade. It is quite typical for most streets to contain some quantity of asphalt full depth patching.

Asphalt Mill Patching

Some pavements show failure within the top layer of asphalt or exhibit large, wide transverse cracks that must be addressed and repaired prior to additional maintenance activities. The proper way to repair these pavement distresses is to complete an asphalt mill patch of either 1 ½" in depth (top section of asphalt) or 3" in depth (cases for wide, transverse cracks). If these cracked areas were not properly repaired, they would quickly reflect into the upper chip sealed or asphalt leveler layers. An asphalt mill is used to remove the limits of asphalt to be repaired. In the case of a 1 ½" mill patch, the top layer is milled out and new asphalt is placed and compacted to grade. For 3" mill patches, the existing transverse crack is milled down and a pavement reinforcing membrane placed in the bottom of the patching area. This membrane provides extra structural integrity to the patched area. New asphalt is then placed in the patch limits and compacted to grade.

Asphalt Leveling

In order to improve drainage, re-establish centerline crowns, eliminate holes and dips, and to improve the "ride" of resurfaced streets, a thin layer of asphalt is placed on top of existing pavement. This activity is only completed once streets have been crack sealed and patched. The asphalt leveler is placed with a traditional paver and is typically ¾" to 1" in depth. However, the depth varies dependant on the condition of the street (presence of dips, holes, etc). Although the asphalt leveling surface is smooth and looks like a brand new street, if not covered by another pavement preservation treatment, this thin section would exhibit premature failure, cracks, and movement within 1 -2 years. Therefore, it is essential that the asphalt leveled surface be properly sealed to prevent water from penetrating beneath the leveled surface.

Chip Seal

Due primarily to the structural traits of Chip Seal and cost effectiveness of this type of maintenance application, the City of Louisville has adopted a chip seal program to prolong the life of our pavements. Chip Seal is a surface application used to maintain, protect and prolong the life of an existing pavement section. The finished surface will improve skid resistance, improve the overall appearance, provide a weatherproof membrane to repel moisture from damaging the base asphalt layers, resists reflection of small surface cracks and ultimately extends the useful life of the existing pavement. Local streets are sealed with a 1/4" chip that provides a less abrasive, smoother surface while collector streets are sealed using a 3/8" chip that better handles higher traffic loads. On average, chip seal costs approximately \$3.00 per square yard of asphalt, as compared to \$6.00 to \$8.00 per square yard for traditional asphalt overlays.



Hot Chip Seal

A Hot Chip Seal is a surface treatment that combines a Chip Seal and a thin lift of open graded friction course (OGFC) providing a double application of material. The finish product provides a waterproof membrane, reduces traffic noise and provides a strong wearing surface that will improve the profile of the existing asphalt. As seen in the picture below, Hot Chip Seal is applied with a traditional asphalt paver.



Complete Street Reconstruction

Some pavement segments are beyond the ability to simply resurface through the efforts of patching, leveling or sealing. These streets usually contain an Overall Condition Index (OCI) of 0 to 10. The street segments that meet this criterion tend to exhibit extremely high severity longitudinal cracking, transverse cracking, alligator cracking and drainage issues. In a reconstruction effort, once concrete curb, gutter and sidewalk has been replaced, the existing asphalt section is completely removed. If poor soils are present in the subgrade of the street, extra attention and effort may be required to correct the issue. In cases where high levels of expansive clay soils are discovered, the subgrade may require treatment through the addition of lime or cement to stabilize the soil. Local streets are typically reconstructed with a 6" thick section of asphalt, Collector streets are reconstructed with an 8" section of asphalt, and Arterial streets are reconstructed with a 10" section of asphalt. Depending on the scope of the project each year, the annual street project may contain one or two street reconstructions per year, depending on available funds.