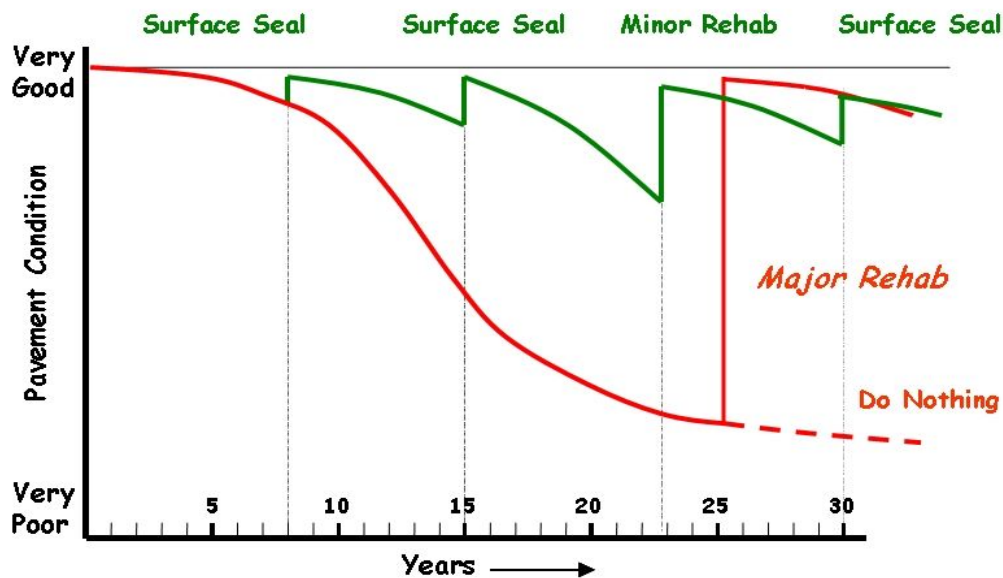


STREET NETWORK ANALYSIS

Each year the Public Works Department (Engineering Division) completes an assessment of the street system to determine how to properly maintain and care for our streets. The Public Works Department is budgeted \$4.5M to \$5.5M to improve the City's street network. Staff uses an asset management software program called *Lucity* to run scenarios given allotted budgets to assist in prioritizing the scope of work for the annual street resurfacing 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 Pavement Condition Index (PCI). The PCI 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, and slurry 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 or slurry seal and to commit to this type of maintenance on a regular basis.

Along with results from *Lucity*, Staff analyzes the Pavement Condition Index by subdivision and considers other characteristics of the subdivision. The City of Louisville maintains approximately 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 concrete walk, curb, and gutter pan and drainage crosspans. Deficient concrete improvements that exhibit large cracks, settlement, and ponding water are 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 seal, chip seal or slurry seal may not be enough to properly repair street distress. Street resurfacing activities typically includes asphalt patching, leveling and when appropriate asphalt mill and overlay, hot chip seal or in extreme cases, full reconstruction.

Pavement Preservation/Resurfacing/Reconstruction

Asphalt Patching

Asphalt pavement within the street that exhibits areas of severe cracks, alligating and settlement may require patching. Asphalt patching includes saw cutting and removing sections of material that exhibit distresses mentioned. The subgrade is checked for stability, processed, compacted and then new asphalt is placed to match surrounding finish grade. It is quite typical for most streets to contain some quantity of asphalt patching.

If the failure is within the top layer of asphalt or if the distress consists of large, wide transverse cracks, the proper way to repair these pavement distresses is by an asphalt mill patch of either 1 ½" in depth (top section of asphalt) or 3" in depth (for wide, transverse cracks). An asphalt mill machine is used to remove the limits of asphalt surfacing 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 patch, 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 and helps reduce reflective cracks. 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 (leveler course) 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 dependent on the condition of the street (presence of dips, holes, ruts, etc.). Although the asphalt leveler 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 leveler surface be properly sealed to prevent water from penetrating beneath the leveled surface.



Crack Seal

Crack Seal includes the application of specialized material into longitudinal and traverse pavement cracks of approximately 1-inch. The crack sealant material bonds to the walls of the crack and can move vertically and horizontally with the pavement. Crack sealant prevents water intrusion and debris from entering open cracks, prevents or delays pothole formation.

Chip Seal

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.



Slurry Seal

This pavement preservation procedure is a surface application of a special dense graded high quality aggregated, polymer-modified emulsion and other modern additives. Slurry Seal is cold applied then restorative treatment that improves safety by providing a high skid resistance surface and keeps air/water out and stops oxidation of the existing pavement.

Mill and Overlay

Mill and Overlay is the paving process of removing the top 1 1/2 to 3 inches of an existing asphalt section by milling and application of new asphalt material (overlay).

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 a Condition Index (PCI) 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.