

# Nall Avenue: A Green Street

## LOCAL GOVERNMENT THAT WORKS!

When engineering staffs in Leawood and Overland Park, Kansas decided to use concrete pavement instead of asphalt when reconstructing Nall Avenue between 143<sup>rd</sup> and 159<sup>th</sup> streets, they made the right choice for local residents. Choosing concrete pavement over asphalt pavement was not only fiscally sound, it was also the most sustainable choice.



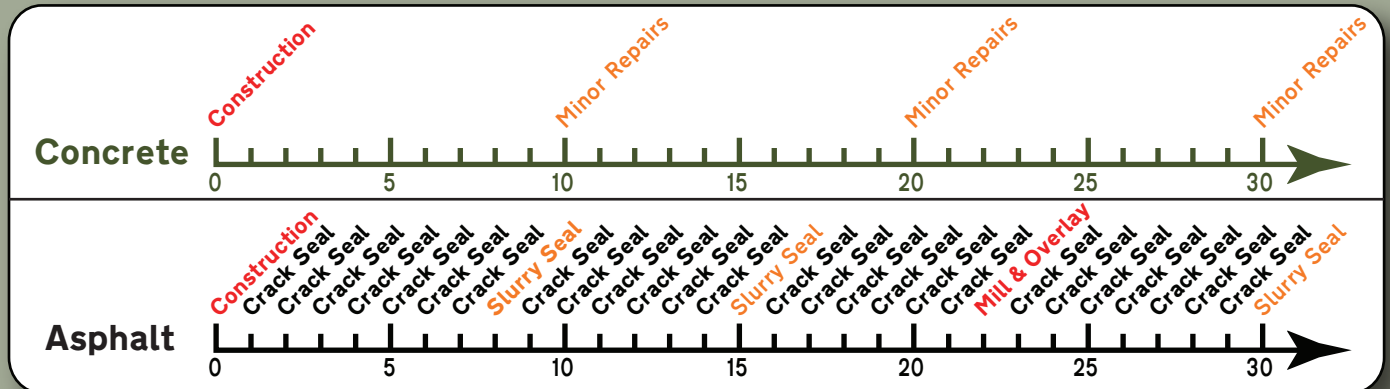
Reconstruction of Nall Avenue between 143<sup>rd</sup> and 159<sup>th</sup> in Leawood and Overland Park, Kansas involved building a new concrete roadway that is 9 inches thick, 4 lanes wide, and approximately 1.7 miles long. This concrete roadway was designed to easily serve the ever increasing traffic in Leawood and Overland Park for the next 30 years or more; although approximately 8,000 vehicles currently transverse this section each day, it is forecasted that 25,000 vehicles will cross this section daily by the year 2030!

See inside for specifics on how concrete pavement is the most sustainable choice for Nall Avenue >>>

# HOW IS CONCRETE PAVEMENT

## Longevity

Concrete pavement has long been considered the most cost effective and sustainable pavement choice due to its ability to carry heavy traffic loads for long periods of time while requiring only minimal routine maintenance and repairs over its performance life. This is clearly reflected in the city of Leawood's Pavement Management system. Below is a figure that illustrates the city's construction and maintenance schedule for both asphalt and concrete pavements.



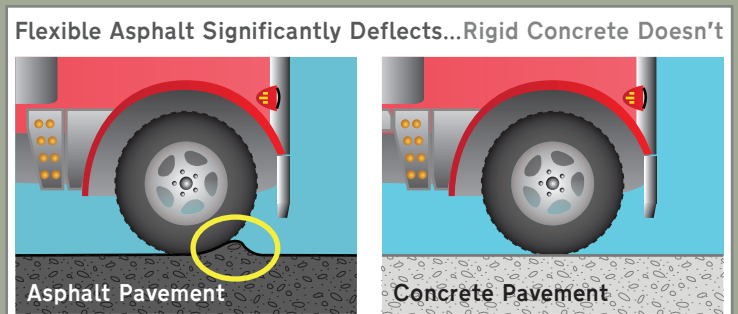
As shown, asphalt pavements require almost continuous maintenance and overlay activities during the life of the pavement, with each activity consuming not only more paving materials, but also more fuel (and emitting more greenhouse gases and pollution associated with increased fuel consumption). Each maintenance and rehabilitation activity likely also causes traffic congestion, which in turn wastes more fuel and contributes even more greenhouse gases and pollution.

Because concrete pavements typically require little if any maintenance over their design life, the life cycle cost and life cycle sustainability of a concrete pavement is significantly lower than that of an asphalt pavement.

## Fuel Savings

According to Fuel Usage Factors published by Federal Highway Administration (FHWA), the construction of this four-lane wide, 9 inch thick concrete pavement section required almost 81,000 fewer gallons of diesel fuel and 7,000 fewer gallons of gasoline than the construction of an alternate 10.5" thick asphalt pavement. Moreover, it took only one day to pave a whole mile of this pavement, two lanes wide, thus clearly illustrating that concrete pavement can be constructed even faster than asphalt pavement.

In addition, recent research by the Canadian and Swedish governments shows that trucks consume less fuel on concrete pavements than on asphalt pavements, due to lower deflections under loading. In fact, truckers will save almost 700 gallons per year on this short section (1.7 miles) of roadway. Imagine how much fuel can be saved if more roads were paved with concrete!



# THE RIGHT CHOICE?

## Reduced Greenhouse Gases

The fuel savings from choosing concrete pavement result in significant reductions in greenhouse gases. The fuel savings realized during construction alone translate to roughly 930 fewer tons of CO<sub>2</sub> emitted into our atmosphere. The fuel savings realized as a result of the improved vehicle fuel economy on concrete over this short section of roadway will result in an 8 ton reduction in CO<sub>2</sub> in the next year alone! That might not seem like much, but over the 30 year design life of this pavement this amounts to at least another 500 tons of CO<sub>2</sub> when accounting for traffic increases.

## Incorporation of Waste Materials

Over 1,100 tons of slag (a byproduct of iron ore smelting) were incorporated into the concrete pavement as a partial replacement for portland cement (the glue that binds the aggregates together in concrete). This not only takes material out of the waste stream and reduces disposal, but it also decreases the cost while improving the longevity and performance of the concrete pavement.



## Recycling

Over 5,400 tires were recycled as part of this project. The tires were burned as fuel at the cement kiln to make the Portland cement used for this concrete pavement. This not only removed the tires from the waste stream, but it allowed for their reuse as fuel, reducing the amount of other fuels needed for cement production.

## Use of Locally Available Materials

All the materials used for this concrete pavement were produced locally (within a 500 mile radius), including aggregates, sand, slag, cement & water. This reduces the cost as well as the environmental footprint associated with hauling materials. The liquid asphalt in an asphalt pavement, however, is often imported from much farther away – even overseas.



## Did You Know?

Because Permanent Paving, Inc. constructed the concrete pavement in long, continuous sections, this portion of Nall Avenue is exceptionally smooth, providing a very comfortable and quiet ride to motorists. The cities of Leawood and Overland Park anticipate that this concrete pavement will easily survive its 30 year design life so this section will prove the long-term serviceability of concrete pavement!

See back for even more reasons on how concrete pavement is the right choice for Nall Avenue >>>

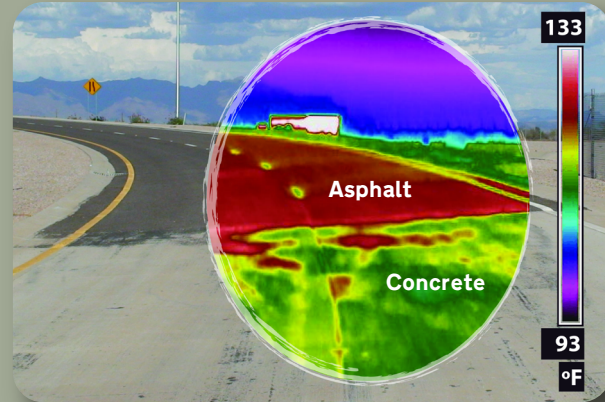
# WAIT, THERE'S MORE...

## Improved Safety

The lighter color of concrete increases the amount of light reflected from its surface (this is sometimes referred to as albedo). This will enhance both vehicle and pedestrian safety in low light situations. In fact, for the same lighting setup, the concrete pavement will be better illuminated at night than an asphalt pavement. This increased reflectivity also has the potential to significantly reduce utility costs associated with street lighting (a potential cost savings of up to 33% exists).

## Urban Heat Island Mitigation

During daytime hours, concrete's high reflectivity means that more of the sun's incoming radiation is reflected back into the atmosphere, lowering the amount of heat absorbed by the pavement and its surroundings (this heat retention is often referred to as urban heat island). This in turn reduces the cooling requirement during the summer heat, and can substantially lower the associated energy demand.



## Did You Know ?

The U.S. Green Building Council (USGBC) does not currently have a Leadership in Energy and Environmental Design (LEED) rating system specifically for roadway pavements. However, current LEED rating systems do recognize the sustainability benefits of several features of this pavement, including:

- Energy and Atmosphere: Optimizing Energy Performance
- Materials & Resources: Recycled Content 10% and 20%
- Materials & Resources: Regional Materials 10% and 20%
- Sustainable Sites: Heat Island Effect - Non-Roof



All these advantages add up to a pavement that is going to serve the motorists of Leawood, Overland Park, and the surrounding Kansas City area for a very long time, at an optimally low cost and in the most sustainable way possible. Thanks to the forward thinking and sound decision-making by city engineers during the design phase and the high level of construction quality achieved by Permanent Paving, Inc., and Miles Excavating, the cities of Leawood and Overland Park, Kansas will have a green street in Nall Avenue for generations.

References: NRC-Canada, CSTT-HVC-TR-068, Taylor and Patten, January 2006. Technical Advisory T5080.3, Federal Highway Administration, 1980. LEED for New Construction & Major Renovations, Version 2.2, October 2005, SR385P, Green Highways, 2007, American Concrete Pavement Association. Pavements4Life.com. USGBC. Buzzi Unicem USA. Holcim (US). Permanent Paving, Inc. Penny's Concrete.