From: Bohl, James
To: Black, Tobie
Subject: FW: Pavement Rehabilitation Methods
Date: Tuesday, May 07, 2013 4:35:14 PM

For file tomorrow. jb

-----Original Message-----
From: Mejaki, Dale E.
Sent: Tue 5/7/2013 4:21 PM
To: Carroll, Jim; Bohl, James
Subject: RE: Pavement Rehabilitation Methods

The clarification is in the context and definition of the type of "pavement structure" .
Concrete pavement is consider a rigid pavement structure while asphalt is considered a flexible one. Asphalt atop concrete is a called a "composite" pavement. Yes, expansion joints provide relief for any movement of concrete due to expansion/contraction but remains a rigid support while the composition of asphalt allows more of that flexibility. Hope this helps.

Some excepts on the definitions are noted below. Thanks/Dale

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COMPOSITION AND STRUCTURE OF RIGID PAVEMENT

Rigid pavements normally use Portland cement concrete as the prime structural element. Depending on conditions, engineers may design the pavement slab with plain, lightly reinforced, continuously reinforced, prestressed, or fibrous concrete. The concrete slab usually lies on a compacted granular or treated subbase, which is supported, in turn, by a compacted subgrade. The subbase provides uniform stable support and may provide subsurface drainage. The concrete slab has considerable flexural strength and spreads the applied loads over a large area. Figure 1 illustrates a typical rigid pavement structure. Rigid pavements have a high degree of rigidity. Figure 2 show how this rigidity and the resulting beam action enable rigid pavements to distribute loads over large areas of the subgrade. Better pavement performance requires that support for the concrete slab be uniform. Rigid pavement strength is most economically built into the concrete slab itself with optimum use of low-cost materials under the slab.

There are two main types of pavement (road structure), flexible and rigid. Rigid roads are more complex to build, requiring more specialised equipment. The current preference within the road building industry is to flexible and composite roads (see later). Rigid roads consist of a thick concrete top surface. Where voids appear below the surface, in a flexible road, the surface will sink. This will not (normally) happen with a rigid or composite road. The danger here is that in exceptional circumstances where a large void has appeared, eventually the unsupported concrete will collapse. Composite pavements (road structure) are where a flexible layer has been added on top of the surface of a rigid road, or where a concrete layer exists below a bitumen top surface.

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From: Carroll, Jim
Sent: Tue 5/7/2013 3:36 PM
To: Mejaki, Dale E.
Subject: RE: Pavement Rehabilation Methods

Dale:

Ald. Bohl has a question about the following sentence that is in the response to Question #1:

"The underlying joints and cracks will reflect through to the surface since the asphalt is a flexible surface atop a rigid base."

He wants to know if you meant this to read the other way around?..i.e., say that "asphalt is a rigid surface on a flexible base." He is questioning this since it is his understanding that concrete has expansion joints that renders some flexibility and he has always thought that asphalt doesn't have that flexibility and as a result it is an inflexible surface.

Any clarification would be appreciated.

Jim Carroll

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From: Mejaki, Dale E.
Sent: Monday, April 22, 2013 4:13 PM
To: Carroll, Jim
Cc: Dellemann, Jeffery; Dziewiontkoski, Mary; Viktora, Robert; Polenske, Jeffrey S.; Frasch, William
Subject: RE: Pavement Rehabilation Methods

See our comments in red below. Thanks/Dale

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From: Carroll, Jim
Sent: Tue 4/16/2013 11:17 AM
To: Dziewiontkoski, Mary
Cc: Frasch, William; Mejaki, Dale E.
Subject: Pavement Rehabilation Methods

Mary

DPW's Bill Frasch recommended to Richard Pfaff that LRB contact you about the following request:

It is the understanding of Ald. Bohl, the resurfacing of the N River Trail Dr from W Florist Av and W Lynx Av involved the "crack and seat" method of pavement rehabilitation prior to the overlaying with asphalt. The resurfacing of W Florist Av from N 119th St to N River Trail Dr did not involve the "crack and seat" method. It is believed that the street segment that was cracked and seated was completed a few years prior to the project that was not cracked and seated; however, the project that was not cracked and seated is experiencing cracking due to thermal expansion and contraction, while the other project has not deteriorated. Ald. Bohl is interested in comparing the costs and benefits of using the crack and seat method as compared to other pavement rehabilitation methods used by the City, and has the following specific questions:

1. What is the criteria relating to determining for which pavement rehabilitation projects the crack and seat method is used?

The overriding criteria is the condition of the existing concrete pavement. Concrete pavement is a rigid structure that we want to preserve as long as the slabs remain solid and intact.

If the slabs are not broken and cracked, the pavement can easily and effectively be resurfaced to improve the surface with no structure improvements required. Failure along the joints may be present but the pavement as a whole remains intact. The underlying joints and cracks will reflect through to the surface since the asphalt is a flexible surface atop a rigid base. Reflective cracking becomes more evident during the winter cycles, is not a defect of the asphalt (but the underlying concrete) and is addressed with routine crackfilling maintenance. The pavement structure however, remains intact and functional. The section of Florist from Lovers Lane to 119th was paved in a similar manner in 2009 and exhibits the same reflective cracking.

When the concrete pavement has deteriorated and the slabs are cracked and broken, they are no longer performing as rigid structure but as a flexible one that can move, shift and settle. Voids may also develop. Not a good candidate for resurfacing without addressing the base conditions. Extensive base repairs would be required to maintain the concrete as a rigid base. Crack and seating essentially completes the action already started and breaks the pavement slabs into smaller defined sizes. The pavement is then rolled to firmly seat the concrete pieces into a firm flexible pavement base that can be

resurfaced. Concrete pavements where crack and seating is used are further along the deterioration curve and is a last step before reconstruction.

2. What is the additional cost per appropriate unit of measurement to use the crack and seat method as compared to streets overlaid without this method?

If crack and seating was not used, portions of the existing deteriorated concrete pavement would need to be repaired in order for resurfacing to be effective. Average City contract cost are:

Crack and seating = $1.00 per square yard

Concrete base repairs = $40 per square yard.

3. How long does the crack and seat method extend the life of resurfacing projects over streets overlaid without this method?

It is not the service length of the asphalt resurfacing (which is essentially the same) but the entire pavement life that must be considered.

Crack and seating only delays the inevitable reconstruction of a deteriorating roadway nearing the end of its useful life. These roadways will need to be reconstructed in 20-25 years.

However, if the concrete can be preserved and resurfaced, that asphalt surface will last as long but more importantly, could be removed and resurfaced again for more service life before needing to be reconstructed.

4. How does the inches of thickness of overlay placed over cracked and seated pavement compare to the overlay thickness for streets overlaid without this method?

The asphalt thickness is the same.

5. What are the costs per appropriate unit of measurement of repairing overlays that experience cracking for streets overlaid without this method?

All asphalt pavements will exhibit cracking during it's service life. Routine crackfilling is the only maintenance required and is completed every 10-12 years at a current cost of $0.50 per square yard.

I'd appreciate it if you could respond to Ald. Bohl's questions by Monday April 22nd. Please let me know if meeting that deadline is a problem.

Thanks

Jim Carroll

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