James Johnson
City of Long Beach
Councilmember, Seventh District

R-19

Date: May 3, 2011

To: Honorable Mayor and Members of the City Council

From: Vice Mayor Suja Lowenthal, Second District
Councilmember Gary DeLong, Third District
Councilmember James Johnson, Seventh District

Subject: Improving our Residential Streets Efficiently and Equitably

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RECOMMENDATION:

Request that the City Manager, subsequent to the adoption of the Capital Improvement Program on an annual basis, present Councilmembers with recommendations for residential street work allocating 50% of each District's residential street repair funding to preventative street maintenance and 50% to street repaving or rebuilding.

DISCUSSION

Due to years of difficult budget cuts, zero General Fund dollars are currently dedicated citywide for ongoing street maintenance, such as slurry sealing asphalt streets. Citywide money for residential street repairs in FY11 was provided by Measure R in the amount of $3,131,201, which was distributed to the nine districts in allocations determined by both need and an equitable distribution through the districts. Typically, these funds are used to repave or rebuild streets at a cost of approximately $3.50 and $6.50 per square foot, respectively. In construction, maintaining a street can be as much as 13 times cheaper, as slurry sealing costs approximately $0.50 per square foot.

While council districts have taken different approaches to the use of their limited residential street work dollars, a "worst first" strategy has sometimes been utilized in which the worst streets in a district are the first slated for repaving or replacement. While such an approach is intuitive, it is not the most efficient use of scarce dollars. According to the City Auditor's 2008 street review, "Extensive research has demonstrated that it is more economical in the long run to invest early in maintaining streets that are still in good condition than it is to defer maintenance until streets have deteriorated and more expensive repairs are needed. (Long Beach Streets Review Phase II, page 2). Additionally, the

American Public Works Association states that "[p]reventing streets in good condition from slipping into deterioration will break the chronic cycle" of paying more money for worse roads. (The Hole Story: Facts and Fallacies of Potholes, 11)

At the same time, there is a need for the City to tackle the worst streets that diminish the quality of life in our neighborhoods. Therefore, it would be prudent for the City to spend resources on both preventative maintenance and making essential repairs.

Money spent on preventative maintenance such as slurry sealing reduces street degradation and postpones the costly repaving or rebuilding resulting from deferred maintenance. Public Works has estimated that over a 20 year period, and assuming a consistent annual investment of $4 million in residential street repair, reallocating residential street funding to 50% maintenance (e.g., slurry seal) and 50% repair could result in efficiency savings of approximately $30 million. By pursuing a consistent investment in preventative maintenance, we can get better streets over the long run with the same amount of financial resources.

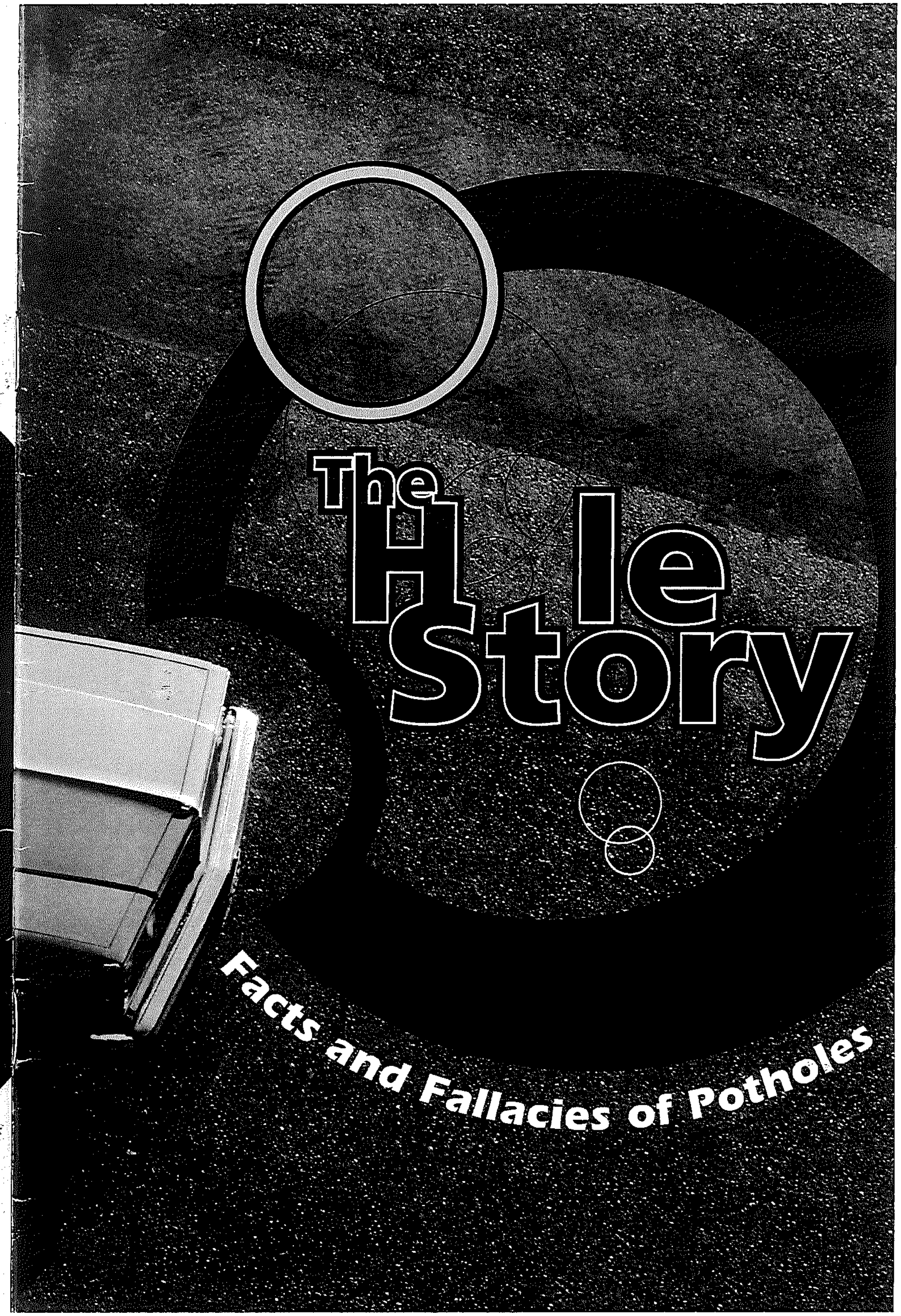
Under this proposal the City Manager, through the Public Works Department, would present each Councilmember with a proposed allocation of residential street work every year that splits existing dollars equally between maintenance and major repairs (i.e., traditional repaving or rebuilding) for each district. Maintenance activities could consist of slurry sealing or other techniques that maintain street quality at a cost significantly less than reconstruction. While each Councilmember would retain the discretion to modify this proposed allocation to accommodate any special needs in the district, presenting a proposed maintenance allocation would encourage the re-institutionalization of routine street maintenance in Long Beach and focus more on our City's long-term needs than short-term fixes. Pothole repairs are budgeted for separately by the City, and would not be affected by this proposal.

FISCAL IMPACT

If all Councilmembers were to utilize the staff recommended allocation outlined in this memo, and assuming a consistent annual investment of $4 million, efficiency savings to the city are estimated at $30 million dollars over 20 years in terms of street repairs avoided with proper maintenance.

Attachments:
The Hole Story: Facts and Fallacies of Potholes
Long Beach Streets Review Phase II (pages 2, 3, 13, 14)

American Public Works Association
2345 Grand Boulevard,
Suite 500
Kansas City, MO 64108
(816) 472-6100
fax: (816) 472-1610
www.apwa.net



Why Are They Called Potholes?

Have you ever wondered why "potholes" are called potholes? They don't look like pots. They are shaped only a little like a pot. So how did they come to be called by their common name?

The spring 1998 issue of Maine Local Roads News reprinted an article by L.M. Boyd that was originally published in a 1993 edition of the Pothole Gazette. According to Mr. Boyd, potters (pottery makers) in 15th and 16th century England would take advantage of the ruts that wagon and coach wheels gouged into the roads. These potters would dig in the deep ruts to reach clay deposits that they would take as a cheap source of raw material for making clay pots. Teamsters, driving wagons and coaches over these roads, knew who and what was causing these holes and referred to them as "potholes."

Introduction

We've all heard a lot about "infrastructure" problems lately. And as we bump over the potholes in our local streets, it is easy to feel frustrated and wonder–"Why don't 'they' do something?"

Ironically "they"–your local public works or street department–are probably equally frustrated by increased costs, budget reductions, and deferred maintenance; and "they" probably are as anxious as you to do something.

Unfortunately, neither the national media blitz on infrastructure nor local finger pointing will solve your community's pothole problem. Real solutions can only come from a committed and cooperative effort by informed citizens and local public officials. Difficult decisions have to be made and tough priorities set.

In an effort to facilitate this dialogue, the American Public Works Association (APWA) has drawn together some of the engineering facts of local street maintenance and presented them in a short question-and-answer format. We hope that based on this information you and other citizens in your community can become a positive and effective force in working with your local officials for better streets.

What causes a pothole?

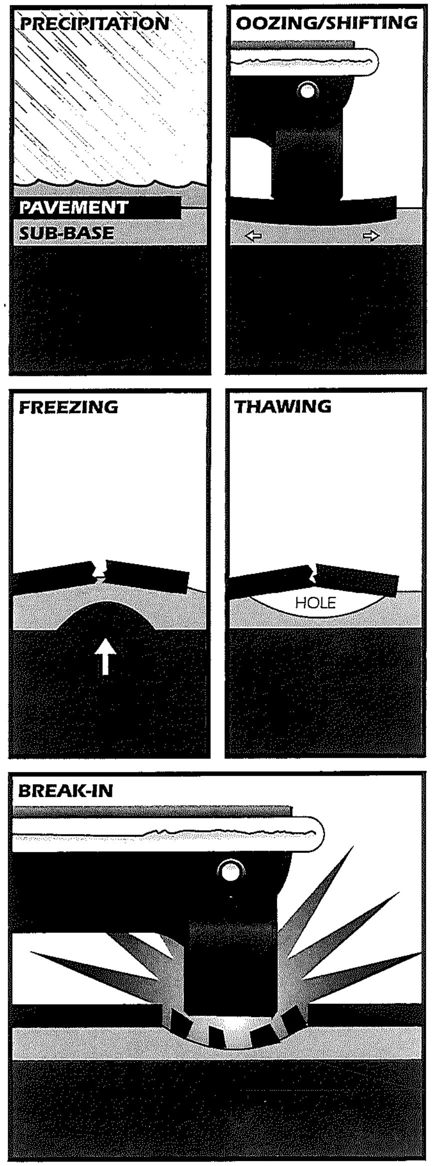
The word pothole brings to mind the painful image of that round crater in the middle of the street whose depth and sharp edges play havoc with your car's tires, steering, and suspension system. For the sake of our discussion, let us expand our definition of a pothole to include any hole in the pavement that causes noticeable impact on your automobile and driving.

Simply stated, potholes are created when the pavement or the material beneath it–called the base or subbase–cannot support the weight of the traffic it carries. Two factors are always present in such a failure: TRAFFIC and WATER.

Traffic

Pavements are designed to carry specific types of loads and volumes of usage. Traffic that is too heavy for the pavement design can cause, initially, small hairline (fatigue) cracks in the pavement. After many repeated tire passages over the pavement, these cracks will develop into larger, visible cracks. Even if the design weight of vehicles using a pavement is not exceeded, higher volumes of traffic than it was designed for can also cause fatigue cracking.

A common scenario for traffic induced fatigue cracking runs like this. Over time, a street designed for residential or



light commercial traffic becomes a local public transit route, or it begins to carry increasingly heavy commercial traffic when numbers of trucks begin making deliveries to a local supermarket, strip mall or mall. Fatigue cracks can also be caused by age, expansion and contraction due to extremes in daily temperatures, or from inadequately restored utility cuts.

Water

Water worsens the cracked pavement problem. Ideally, water should, and does, flow over the impervious surface of a properly crowned and sloped pavement to a gutter, storm drain or ditch and quickly flows away. But, when water seeps into the subbase–through cracks in the surface, from ponding in weed clogged ditches or debris clogged storm drains, or from a rising water table–it attacks the subbase from beneath and softens it much like dry hard ground softens to mud. Over a period of time, the subbase material shifts or oozes outward to the sides of the weakened point, leaving a void and nothing to support the pavement above it.

After a while, repeated flexing of the pavement above the void due to repeated wheel loadings of passing vehicles causes the now unsupported pavement to weaken, seriously crack, and ultimately fail or collapse.

In cold climates, this process is dramatically accelerated due to freeze-thaw action. Water is the only substance that expands as it freezes and passes from a liquid to a solid state. When water in cracks and the subbase freezes, it acts like a can of soda pop left by mistake in the freezer expanding the crack or pushing the pavement up. Under repeated freeze-thaw conditions, a flexible asphalt pavement may generate localized humps and a rigid concrete pavement will develop cracks. If the expansive forces are severe, a piece of pavement may actually pop out!

How does water get into the pavement? What can be done to prevent it?

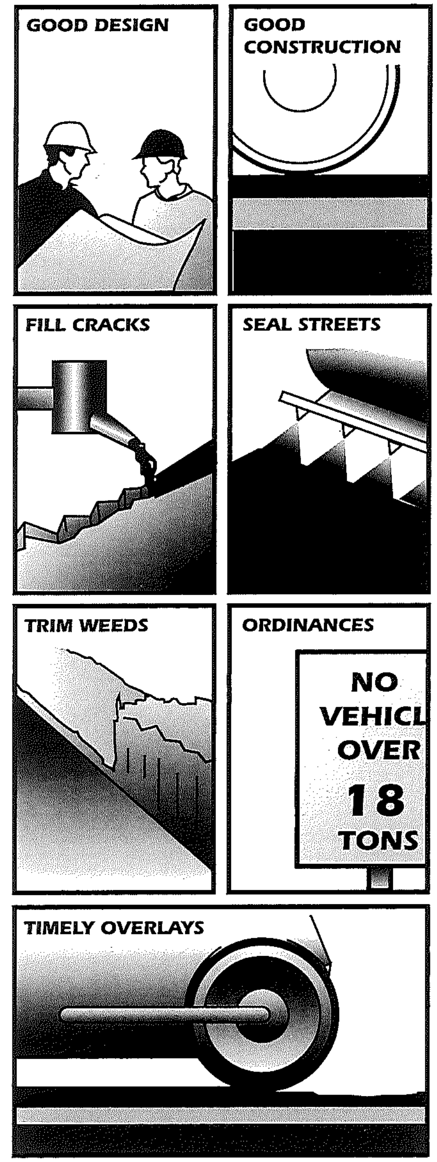
Ideally, water should run off the impervious surface of a pavement in good condition and flow quickly into a gutter and storm drain or ditch to be carried away. Problems develop, however, when the pavement cracks due to age, expansion and contraction due to temperature changes, fatigue from heavy traffic loads, or from inadequately restored utility patches. Water can also permeate the subbase from weed clogged ditches or from rising water tables attacking the subbase from beneath.

And, yes something can be done about these problems! Good construction and maintenance practices can alleviate many drainage problems. Additional strength in the form of bituminous and concrete overlays can be added to streets experiencing increased vehicular loads. Cracks that develop can be filled in a timely manner, and on some pavements periodically the entire surface of the street can be sealed with a thin coat of liquid asphalt mixed with sand or crushed stone to make it water-resistant. Portions of the pavement can be removed and recycled back as a new road surface. Ditches along the sides of roads can be kept mowed, and drains can be kept unclogged by periodic cleaning. In addition, communities can adopt subdivision ordinances to ensure adequate pavement design of streets which may in the future serve as collectors or through streets. Truck routing regulations can restrict truck traffic to major arterials designed to carry their weight, and tighter permitting requirements, also, can result in better restoration of pavements over and adjacent to utility cuts.

> In the final analysis good design, high-quality materials, and continuous maintenance can substantially prolong the life of pavements and minimize the emergence of potholes.

Every spring they patch the same potholes...Why don't they just do it right the first time?

There are many reasons for this seemingly wasteful repetition of effort. A pothole can be repaired, and the repair last indefinitely–if the causes of the initial failure (poor drainage, weakened subbase, etc.) are also corrected, if the right materials are used, and if the patch is bonded to the old pavement well enough to prevent water from seeping into the subbase along the edge of the patch. Correct patching can take significant amounts of time, manpower, and money. If a local agency is suffering from a squeezed budget, deferred maintenance, and the consequent pothole proliferation, thorough patching may require so much time, manpower, and money that some potholes would have to go unfilled. Instead, many agencies place temporary patches on all potholes with the intention of returning to make permanent repairs on as many as time and money permit. In the meantime, the temporary patches often admit water, and because the subbase was already weakened, subsequent freeze-thaw cycles and repeated traffic loads on the unrepaired subbase cause the patched area to cave in again. Even a permanent patch may fail if underlying



drainage problems persist or if a complete bond was not achieved between the patch and surrounding pavement.

New patching techniques, materials and equipment developed as part of the U.S. Department of Transportation's Strategic Highway Research Program (SHRP) are capable of providing effective cost and manpower solutions to many of the abovementioned problems. For more information on SHRP products see the Washington State Department of Transportation web site at http://www.wsdot.wa.gov, the Federal Highway Administration web site at http://www.fhwa.gov, or the American Association of State Highway and Transportation Officials web site at http://www.aashto.org. Public agencies that do not have Internet access can contact the American Public Works Association for paper copies of the information on these sites.

With the taxes I pay, the streets ought to be perfect!...Yet they seem to be falling apart.

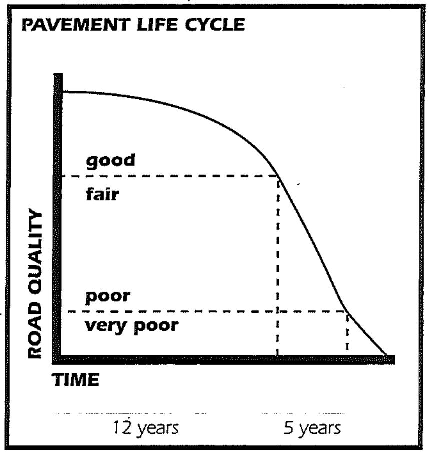
A 1998 study by the American Society of Civil Engineers (ASCE) noted that 59 percent of America's urban and rural roads are in poor, mediocre, or fair condition. As defined by the ASCE and Federal Highway Administration, "poor" roads are in need of immediate improvement, "mediocre" roads need improvement in the near future to preserve usability, and "fair" roads will likely need improvement in the future. As of FY 99 the national shortfall in funding just to keep roads and bridges in their present condition is $29.7 billion per year, and to improve their condition it would take an additional $18.8 billion per year.

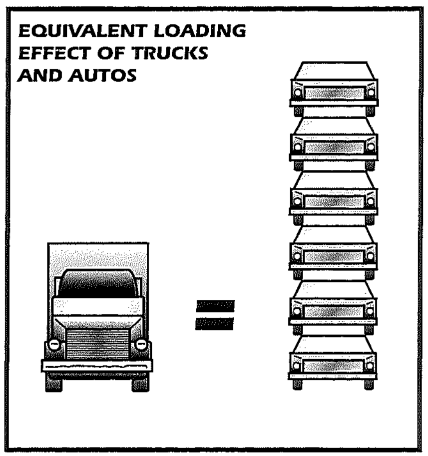
Age

From the moment they are built, pavements begin deteriorating, but not at the same rate each year. Indeed, with routine maintenance a pavement may "ride" well for many years. After a critical point, however, the materials that make up pavements begin to lose their ability to hold together, to resist the intrusion of water and chemicals, and to carry the weight of traffic. When this critical point is reached, pavements begin to crack and "suddenly fall apart." This normal life cycle is shown by the curved line in the figure at the right.

Increased Traffic

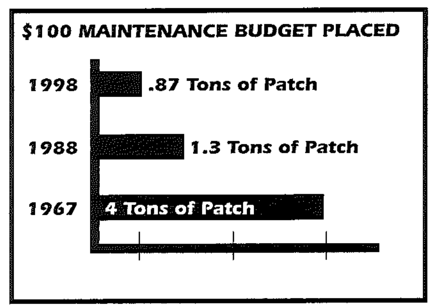
However, age is not the only problem. The amount of traffic traveling on roads and streets has dramatically increased, shortening the life of our pavements. Between 1970-95 vehicle miles traveled in the U.S. doubled, but from 1985-95 capital investment and maintenance expenditures, in constant dollars, decreased by 17%. The growth in the number of vehicles has outpaced population growth by 50% during the past two decades. But, far more damaging has been the growth in truck traffic and individual truck/trailer axle weights during this same period of time. Pavement design criteria estimates that a typical 18-wheeler has the equivalent loading effect on pavements as do between 3,000 and 6,000 passenger vehicles. The effect of this weight increase in terms of decreasing pavement life span has been estimated to be between 10% for thick pavements such as those found on interstate highways and 90% for the thinner pavements on local roads and streets.





Inflation

Inflation has severely eroded the buying power of the maintenance dollar. The material, labor and equipment cost to place a ton of patching material in 1967 was $25 per ton. Today these same costs can be $115 per ton–more than four times as much. Just to stay even with inflation (let alone keep up with accelerating deterioration) local revenues dedicated to street maintenance would have had to quadruple! They have not. Indeed, most states and municipalities dependent on flat rate gasoline tax revenues saw per vehicle mile revenue decreases over much of the last two decades due to increased fuel efficiency.



Deferred Maintenance

Facing the squeeze of increased costs, less revenue, and citizen resistance to tax increases, many state and local governments have chosen to make "low profile" or "painless" budget cuts. One way to trim operating budgets is to defer preventive and demand maintenance procedures on streets and roads. Preventive maintenance procedures like periodically applying seal coats may have been postponed, "saving" money but allowing more water to seep into the subbase, thereby, accelerating a deterioration rate already fueled by increased age and traffic. Demand type maintenance procedures like patching areas with alligator cracking may have been postponed allowing the condition to worsen and the distressed area to expand. By deferring maintenance, communities start down a spiraling path of deteriorating infrastructure and increasingly costly backlogs of required repairs.

But why won't deferred maintenance save money in the long run?

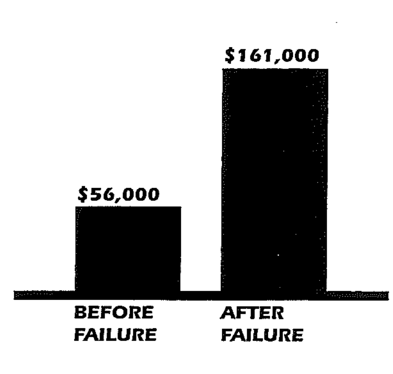
Referring to the pavement deterioration on the opposite page, Mike Sheflin, Transportation Commissioner of Ottawa-Carlton, Canada, answered the question this way: "Those who carry out low-cost rejuvenation and resurfacing before rapid deterioration begins extend the pavement life for a fraction of the cost of those who wait 'just a couple of years'...Ask why they waited and the universal answer is 'to save funds.'"

Deferring maintenance has been a popular solution during recent periods of revenue shortfall, and now local governments are facing the consequences. The street for which an overlay was deferred several years ago now needs a complete rehabilitation or reconstruction at five times the cost.

Research and field experience have repeatedly shown that over the long run maintaining good roads in good condition costs substantially less per year than allowing them to deteriorate to the point that major rehabilitation or reconstruction is required. The Michigan Department of Transportation recently issued a report that documented overall budget savings of $6 for every $1 spent performing timely preventive maintenance actions. Copies of this study and the MI DOT Highway Preventive Maintenance Program Guidelines can be obtained from APWA.

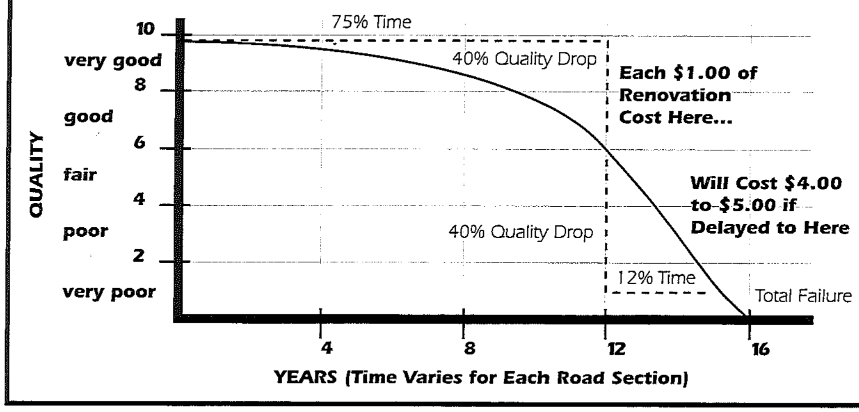
WHY? The cost of a rehabilitation effort in terms of time and materials is substantially higher than the cost of routine maintenance and timely resurfacing. In Lee County, Florida, it

COMPARISON OF RECONSTRUCTION VS. OVERLAY (LEE COUNTY, FLORIDA)

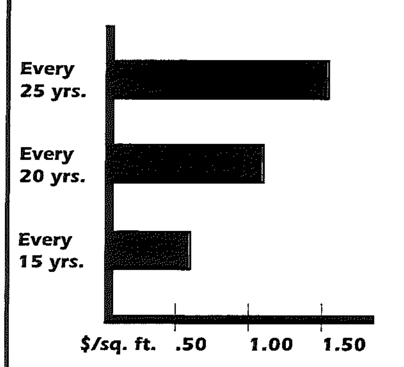


costs $175,660 to reconstruct one mile of 24-foot wide collector roadway and it costs $34,860 to overlay the same type of roadway with 1.5 inches of asphalt concrete. In terms of materials and work effort an overlay placed before failure involves only the thickness of the overlay whereas after failure, reconstruction of the same roadway involves 12-inches of subbase material, 8-inches of base material and the thickness of the asphalt surface. Clearly, periodic maintenance of a good road is less expensive than reconstructing it. However, what about the cumulative cost of periodic maintenance? Won't several seal coats or overlays add up to the cost of a rehabilitation project? Fort Collins, Colorado, compared two maintenance strategies: one involved performing high quality maintenance coupled with "appropriately timed" overlays; the other involved deferring overlays several years

COST OF 'TIMELY' MAINTENANCE



ANNUALIZED COST TO OVERLAY EVERY 15, 20, 25 YEARS

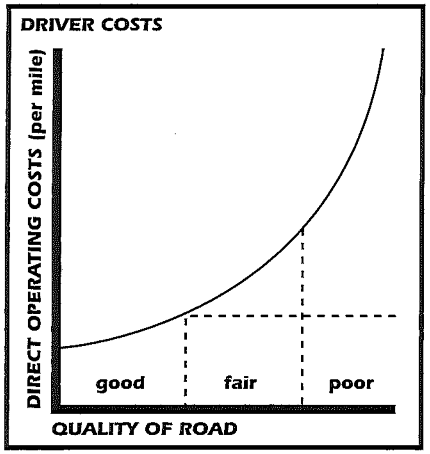


and then carrying out a major rehabilitation. Their analysis found the second strategy to be four times as expensive as the first. Another, more comprehensive study conducted by Thomas R. McDonald, a noted pavement maintenance consultant and author, found that the cumulative cost of a well maintained pavement over a 15 year design life was 3.4 times less than a non-maintained pavement.

In addition to being less costly, the periodic "upward bumps" in the appearance and ride quality of a well maintained pavement give the public a positive perception of the stewardship being exercised over public property.

Don't my driving costs go up on poor pavements?

YES! Poorly maintained roads mean direct out-of-pocket costs to you and every other vehicle owner. Motorists "pay" for poorly maintained pavements in damaged tires, more frequent front-end alignments, more frequent



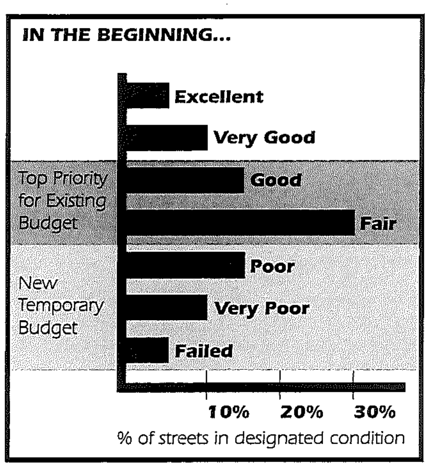
replacement of suspension system components and more frequent traffic accidents–not to mention increased travel times. An FHWA study concluded that the annual cost to all motorists in the U.S. due to operating on poorly maintained roads was $134. See the figure above showing the relationship between pavement condition and user costs.

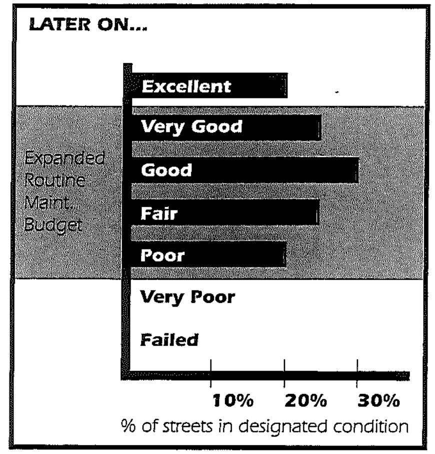
Which costs more - street or car maintenance?

Would paying high taxes for street maintenance produce a net savings to me in vehicle maintenance costs? In many areas a temporary local tax increase of 4 to 5 cents per gallon of gasoline would be more than adequate to meet all pavement maintenance needs. With today's fuel-efficient vehicles, this amounts to less than one-half cent per mile. Compare this additional "tax burden" with the 2 to 3 cents per mile every driver pays for driving on poor pavements, and it is not hard see which option is the real burden on your pocketbook. Either way you look at it, you and every other driver pay a high price for the potholes that result from deferred maintenance.

Is there any way out of this chronic cycle of paying more money for worse roads?

Yes, although it may be painful at first. Most municipal governments find themselves with a street condition profile that looks something like that





shown above, where 30% to 40% of the streets are in poor or failed condition.

Patching and rehabilitating streets in "poor" or worse condition can consume a street department's budget. Meanwhile, streets that are in good condition but at a point where "timely' lower-cost periodic maintenance is needed to keep them in this condition are left unattended. These streets then slip into the rapid deterioration phase a few years later and increase the percentage of poor to failed streets.

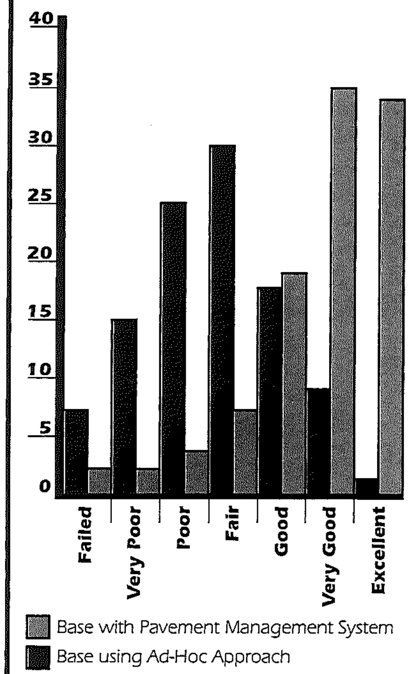
Communities wanting to break this downward spiral will have to exert enough political discipline to reverse their street maintenance prorates. This means that "good" streets in need of periodic maintenance will have to be ranked ahead of what might be termed "failed" or crisis streets when allocating street maintenance funds. Preventing streets in good condition from slipping into deterioration will break the chronic cycle, but it won't save the already failed streets. To bring these streets back up to an acceptable condition a separate new, "capital repair" budget will have to be established. Ideally, the funds for this new budget will come from the dedication of temporary local gasoline taxes. Once these streets are brought into good repair, a modest expansion the regular street maintenance budget will be sufficient to keep the entire pavement network at the point where timely applications of periodic maintenance actions produce optimal value for every street maintenance budget dollar.

Does this solution work?

Three examples suggest that it does. Several years ago, the Kansas Department of Transportation (KDOT) adopted a strategy of maintaining pavements in the "reverse order" described above. After the first four years, quantities of aggregate and asphalt used by KDOT for surface repairs and resurfacing were reported to be progressively lower each succeeding year until they leveled out at significantly lower annual usage levels.

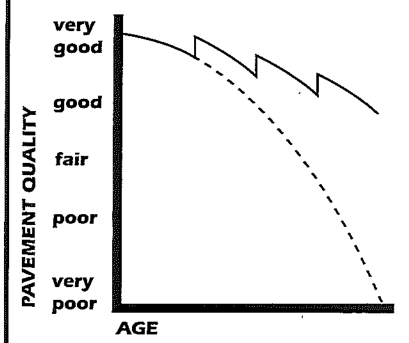
The U.S. Army Corps of Engineers recently compared the maintenance practices at two Army bases. One base used a pavement management system, Micro PAVER, to help determine optimum timing and the most cost-

COMPARISON OF PAVEMENT MAINTENANCE STRATEGIES



effective strategies for periodic maintenance actions. The other base allocated its budget on the ad hoc basis of which roads were in the worst condition. Both bases had nearly identical budgets, but an evaluation of the pavement network conditions on both (on a scale of 0 to 100, with 100 being excellent) found that the first base had an average condition rating of 75 compared with second base's average of 41.

NET EFFECT OF PERIODIC MAINTENANCE IS TO EXTEND THE USEFUL LIFE OF A PAVEMENT



The Michigan Department of Transportation (MI DOT) recently completed a multi-year study on the impact of proactive preventive maintenance programs and has produced a 14-minute videotape, Protecting our Pavements: PREVENTIVE Maintenance. This videotape explains in non-technical terms how applying the right treatment at the right time can significantly extend the service life of a pavement and can save money in the long run. Copies of this videotape can be obtained from any FHWA Division office, state DOT, or FHWA Local Technical Assistance Program Technology Transfer (LTAP T2) Center. You can find the LTAP T2 Center for your state on the Internet at www.ltapt2.org or by calling the American Public Works Association at (202) 393-2792.

Is the current federal gas tax adequate to meet maintenance needs?

The current construction, reconstruction, and maintenance expenditures by all levels of government equals about $62 billion per year. Roughly 60% of this amount is spent at state level on 800,000 miles of interstate and state highways and the remaining 40% is spent by local government agencies on the 2,900,000 miles of roads and streets for which they are responsible. As noted earlier, the American Society of Civil Engineers estimates that an additional national investment of almost $30 billion per year is needed to keep our roads and bridges in their current condition, and another $19 billion per year is needed to accomplish needed improvements.

Most of this additional national investment in pavement and bridge maintenance will have to be spent on our interstate and state highway systems to correct the type of deferred maintenance problems described earlier in this publication. Until problems with the national highway system are corrected, more than 85% of the funds spent on the maintenance of local roads and streets must come from local taxes. Thus, federal funds and discussions on how much money will be included in this or that authorization bill are of very little consequence when it comes to paying for the maintenance of local roads and streets.

The sad truth is that we are going to have to pay the price of long-deferred maintenance at every level of government - federal, state and local. For central cities in large metropolitan areas, this is going to be particularly difficult because suburban commuters who make extensive use of city street networks reside outside these cities and tend to pay local fuel taxes at gas stations near their homes. In these areas a regional approach of allocating revenues from local gasoline taxes would seem to be most appropriate.

What can I do to help?

You have already started by becoming informed about the problem. Learn more about the specifics of your local situation by talking to the staff in your public works, street or highway department. Invite your public works director, street superintendent or county engineer to speak to community groups. Find out how pavement maintenance is being managed in your community. What is your local budget and how does it compare with what is actually needed? Inquire about plans for implementing a pavement management system. Work with your local officials to determine whether truck routing ordinances are needed or whether regulations governing utility cuts need to be strengthened. Finally, if the local facts show that additional revenue must be raised to break the cycle of deterioration in your street system, support your local officials in this effort. Inform your fellow citizens of the consequences of deferred maintenance and that, in one way or another, we all pay for potholes.

References

Allen, Peter and Lorick, Harry, "PMS pumps up California county's roadway conditions," Pavement Maintenance, July 1993, p.28-29.

Kuennen, Thomas, "Pavement Maintenance: It's just a matter of time," Pavement Maintenance & Reconstruction, June/July 1997, p.15-17.

McDonald, Thomas R., "How to keep high-quality pavement for low cost," Pavement Maintenance, July 1993, p.347-349.

Transportation Research Board, Transportation Research Record No. 1597, Maintenance of Highway Pavements and Structures, National Academy Press, Washington, DC, 1997.

Transportation Research Board, Special Report 244, Highway Research - Current Programs and Future Directions, National Academy Press, Washington, DC, 1994.

Transportation Research Board, National Cooperative Highway Research Program Synthesis 223, Cost-Effective Preventive Pavement Maintenance, National Academy Press, Washington, DC 1996.

U.S. Army Corps of Engineers, Cold Regions Research and Engineering Laboratory, Pothole Primer: A public administrator's guide to understanding and managing the pothole problem, Hanover, New Hampshire, 1989.

U.S. DOT, Federal Highway Administration, publication no. FHWA-SA-97-049, Utility Cuts in Paved Roads, Washington, DC, 1996

U.S. DOT, Federal Highway Administration and Michigan DOT, Protecting our pavements: PREVENTIVE Maintenance, videotape, 14:14 min., 1998.

For information on how to obtain referenced items contact the American Public Works Association at (816) 472-6100, fax (816) 472-1610 or e-mail: paver@apwa.net.

Executive Summary

This report was commissioned by the Office of the City Auditor of Long Beach and was prepared by Public Financial Management (PFM). The report represents Phase II of the Long Beach Streets Review ("the Review"). In Phase I of the Review, PFM conducted an assessment of the Long Beach Streets Capital Improvement Program (CIP) that identified how the City could make more effective and full use of Streets CIP funding sources; improve budget practices; reduce project backlogs; improve project tracking; and address staffing levels.

The Phase II Review builds on Phase I and focuses on other issues regarding the delivery of streets capital improvements. The Phase II Review is organized into five main sections:

- An assessment of the current condition of Long Beach's streets, and an analysis of how various levels of investment in Long Beach's streets infrastructure may affect the condition of the City's streets over time.
- A comparison of Long Beach's street conditions and streets maintenance practices in relation to other California cities.
- A review of DPW's contracting practices and general approach to contract management.
- A comparison of DPW costs relative to those of other California cities.
- An examination of DPW's streets infrastructure performance measure practices.

The following are PFM's key findings and recommendations for Phase II. These recommendations are followed by the recommendations for Phase I for reference.

- **Invest early in preventive street maintenance in order to realize the greatest potential cost savings.** Extensive research has demonstrated that it is more economical in the long run to invest early in maintaining streets that are still in good condition than it is to defer maintenance until streets have deteriorated and more expensive repairs are needed. According to a March 2008 The Road Information Program (TRIP) report, a preventive approach to street maintenance can reduce the life cycle costs of a pavement surface by approximately one-third over a 25-year period.[1] Specifically in the case of Long Beach, the cost of deferring street maintenance at critical junctures in a street's life cycle can mean the difference between applying a slurry seal treatment at a cost of $0.30 per square foot for a street still in good condition and applying an overlay treatment at a cost of $2.34 per square foot for a street in deteriorating condition – an expense almost 7 times as great.

- **Improve oversight mechanisms for contractor work.** Given current DPW staffing levels, any proposed increase in engineering and/or maintenance project volume would require DPW to delegate more management responsibility to its contractors. In order to ensure proper contractor oversight under this arrangement, DPW should increase its use of project tracking reports and electronic communication technology, such as a comprehensive project website. Such a website would include all deliverables and important notifications, as well as a publicly accessible portion to keep citizens aware of traffic delays and construction progress. DPW can further increase contractor oversight through the use of quantitative performance measures, many of which are outlined in this report.

- **Implement a comprehensive kick-off meeting prior to the beginning of every project.** This kickoff meeting should establish clear objectives, expectations, and lines of accountability for all involved parties in order to improve communication and coordination. Problems and solutions should be documented as they occur and posted on an open forum for the group to review. Following the completion of a project, a project coordinator should use the project tracking system and log to prepare reports that will aid future project managers and build institutional knowledge.

- **Extend the use of performance measurements.** While DPW currently publishes a list of several qualitative and quantitative metrics which it uses to measure performance, PFM recommends that this list be expanded in order to enable DPW to more efficiently allocate scarce resources; aid DPW in the development and justification of budget proposals; and hold DPW more accountable to the general public for its stewardship of Long Beach's streets. Specifically, DPW should track more detailed information on an annual basis regarding the average pavement condition of its streets infrastructure by street type and geographic area, as well as the total number of lane miles that are slurry sealed, repaved, and reconstructed. In addition, DPW should make greater use of efficiency metrics to gauge the cost effectiveness of key performance outputs. For ease of analysis, DPW should reclassify its expenditure costs in order to better reflect the relationship between street repair costs and street types.

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[1] The Road Information Program (TRIP) Report (March 2008), "Keep Both Hands on the Wheel: Metro Areas with the Roughest Rides and Strategies to Make our Roads Smoother," 19. http://www.tripnet.org/UrbanRoadsReportMarch2008.pdf.

The Importance of Investing in Preventive Street Maintenance

It is important to recognize that while deferring street maintenance in the short run may result in a temporary decrease in expenditures, the long run costs of adopting such an approach will almost always exceed the short run savings.

Two key drivers help to explain why deferring street maintenance typically results in significant increases in long run total costs. The first concerns the rate at which street quality declines over time. Controlling for climate and traffic volume, streets tend to deteriorate only 40 percent in quality in the first 75 percent of their useful life, but then experience another 40 percent drop in quality in the next 12 percent of their useful life.[8]

The second concerns the pronounced cost differential between repairing a street in poor condition and repairing a street in good condition. It has been estimated that deferred street repair can cost up to five times as much as early street repair.[9] As the preceding section explains, due to rising construction prices, this gap could potentially widen further.

Accordingly, **a short-term targeted investment in maintaining streets that are still in good condition will yield significant cost savings over their useful life.**

DPW engineers estimate that an average street in Long Beach will last approximately 20 years. Using current DPW data, the following chart depicts an average Long Beach street's expected life cycle, along with associated maintenance costs at various pavement condition levels. The chart reinforces the general notion that a preventive approach to street maintenance is preferable to a "worst-first" approach, given that the marginal cost of rehabilitating a street accelerates as the quality of a street deteriorates. In addition, the chart indicates specific points along the curve where a targeted investment in street maintenance can realize significant savings. For example, the chart shows that the last opportunity in an average street's life cycle to apply a slurry seal treatment at a cost of $0.30 per square foot is approximately 16.5 years, after which time the cost of maintenance increases 680 percent to $2.34 per square foot for an overlay treatment.

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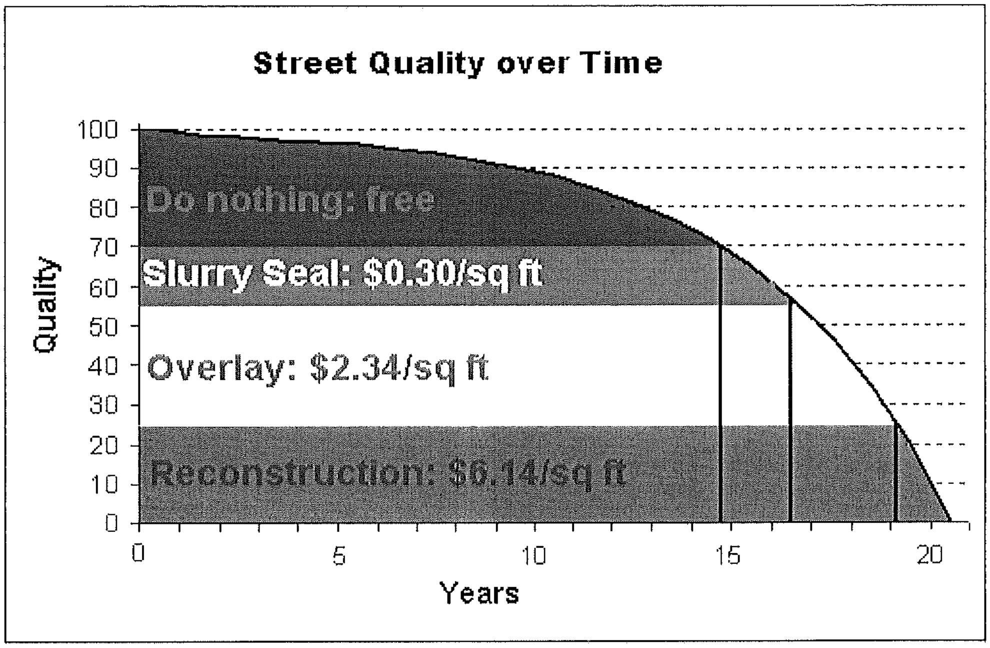
[8] Metropolitan Transportation Commission (March 2000). *The Pothole Report: An Update on Bay Area Pavement Conditions,* 11. http://www.mtc.ca.gov/library/pothole/pothole.pdf.
[9] Ibid.



The Effect of Different Funding Scenarios on Long Beach's Average Street Condition

The preceding discussion has shown why the return on investment in street maintenance is sensitive not only to size but also to timing. In order to illustrate how Long Beach's average street quality might be affected by both of these investment considerations, PFM worked with DPW's pavement management engineer to run several different funding scenarios through Paver to see what their effects would be on the average condition of Long Beach's streets over a 15-year period. Given the uncertainty of future PPI levels, we ran each scenario assuming 4, 6, and 8 percent annual inflation. These inflation assumptions are generally in line with recent economic forecasts.[10]

It should be noted that the following simulations assume a fully optimized use of street rehabilitation resources. In other words, resources are allocated based on their relative rate of return on investment on a citywide basis, without regard to other potential policy considerations. If a different approach were taken to prioritize how resources are allocated, then the street quality curves presented below would have a different shape. It is important for the City to weigh these potential trade-offs between equity and efficiency in the course of developing its overall street maintenance investment strategy.

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[10] The Association of General Contractors (AGC), *Construction Inflation Alert* (March 2008), 14. http://www.agc.org/galleries/econ/AGC_CIA08_webFinal.pdf.