J-07

CITY COUNCIL REPORT

July 14, 2009

TO: John Szerlag, Acting City Manager

FROM: Brian P. Murphy, Asst. City Manager/Economic Development Services
Steven J. Vandette, City Engineer

SUBJECT: Current Local Road Conditions and Analysis of Road Maintenance Funding

For the last several years we have utilized our Pavement Management System (PMS) to project the overall condition of our local roads based on our current $2 million/year funding level for maintenance work. The results that were presented during the '09-10 budget study meetings and the previous two years showed that $2 million/year did not keep up with needed repairs. An additional $637,000 was budgeted this year, which brings the total budget for '09-10 to $2.637 million. Despite the additional funds our overall road conditions are projected to decline from Moderate (Fair) to Poor over the next 5 years, as can be seen in the attached Local Road Condition graph.

The funding amount needed to maintain the system within the Fair range throughout the next 5 years is estimated at $5 million per year.

Current Local Road Condition Estimate:

The attached map of Current Local Road Conditions for 2009 represents an estimate of current road conditions based on a 2003 field inventory of pavement defects, estimates of deterioration based on pavement deterioration curves and manual data entries from each year's pavement maintenance work since 2003. When the Pavement Management System (PMS) was initiated in 2003 the plan was to resurvey the roads every 3-5 years to ensure accuracy in the data model results. The accuracy of the output from the system depends largely on the pavement defects survey and the accuracy of the pavement deterioration curves. Since streets degrade at different rates due to a variety of factors such as pavement type, thickness, original concrete quality, drainage, traffic and unique factors such as the presence or absence of ASR, the pavement deterioration models may not be accurate for all streets. Therefore, it is important to periodically resurvey the streets to recalibrate the deterioration models and assure accuracy of the output.

Comparison of 2009 and 2014 Local Road Condition Estimate:

The map of Current Local Road Conditions for 2009 indicates that 2% of the local road system is rated poor, 15% is Fair and 83% is rated Good. These overall ratings, as discussed in more detail above, are an estimate of the current condition based on our historical data and augmented with field reviews by staff. These rating categories are based on the Overall Condition Index (OCI) for each road segment (block) being less than 70 for Poor, between 70 and 85 for Fair, and greater than 85 for Good.

The overall rating of the entire local road system for 2009 (see attached graph) is within the Moderate range. This overall rating is a weighted average of all street OCI ratings for the entire local road system and for an overall Moderate rating the weighted average OCI for the system falls between 70 and 85.

With the funding level for maintenance at $2.637 million for this year and $2.0 million each year thereafter the future condition 5 years from now in 2014 is estimated to decline due to an inability to keep pace with needed repairs. In 2014 the overall condition rating of the roads in Troy falls into the Poor range. The map of Projected Local Road Conditions for 2014 indicates that roads in the Poor category increase to 10%, Fair increases to 38% and Good decreases to 52% based on the foregoing funding levels. At $5.0 million per year the overall road condition is estimated to remain in the Moderate (Fair) category.

In summary, we can conclude that the current $2.0 million funding level will not be adequate to keep up with needed repairs to keep the overall condition of our roads from slipping into the poor range

Pavement Management System Accuracy Issues and Future Condition Assessments:

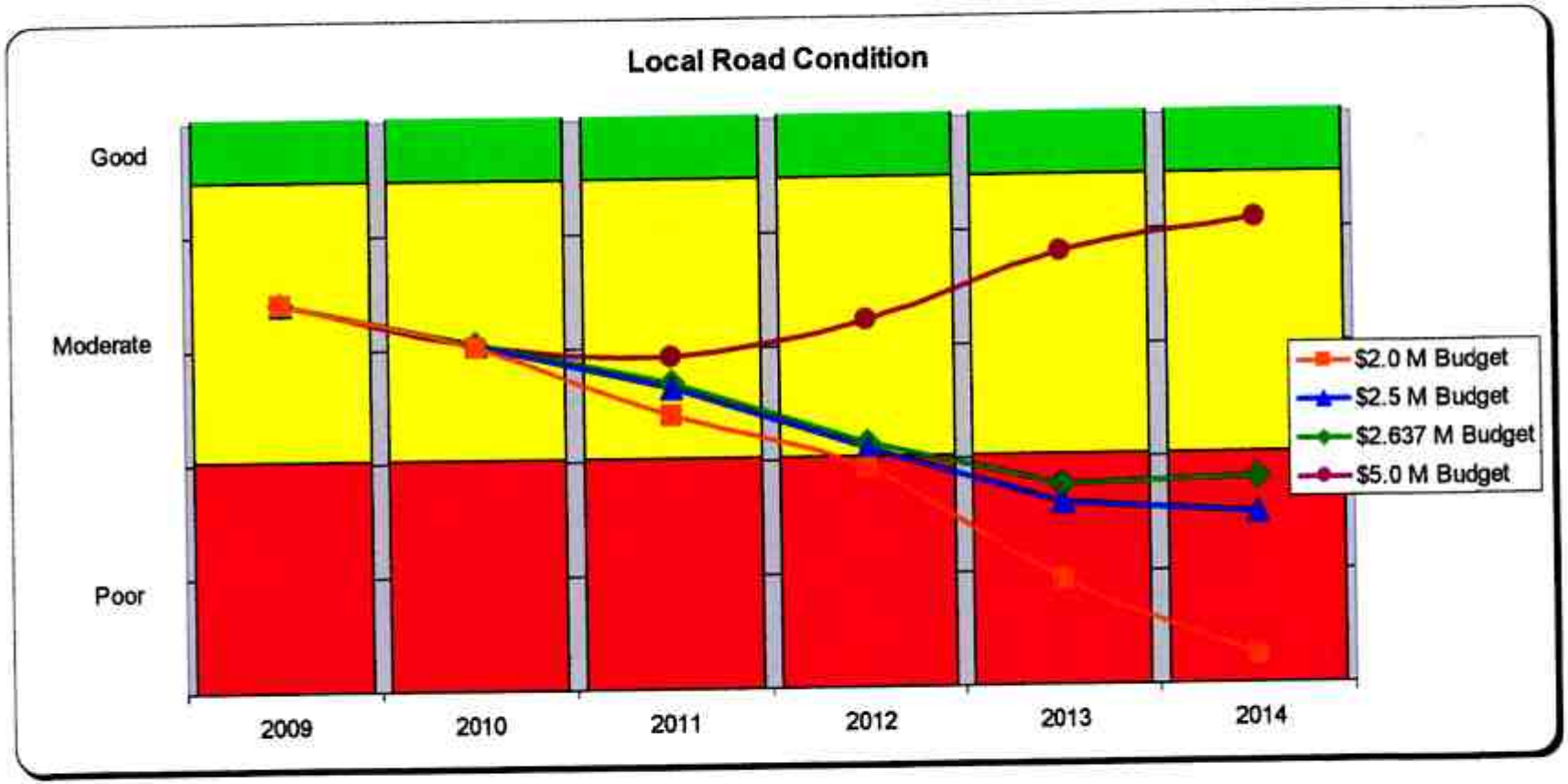
Due to operations budget reductions and a change in budget requirements, which now require the field inventory work to be an operating expense, the $45,000 cost to perform the road inventory work by an outside contractor has not been budgeted since 2003. Since the condition data is old and since we know there are some ASR affected streets that have deteriorated more rapidly than others, some streets may be shown as Fair on the attached map rather than their true condition which may be in the Poor range. Fortunately, the mileage of ASR affected local streets in Troy is relatively small so the overall condition map we believe is a fair approximate representation of the overall condition of our local road system, but certainly not as accurate as it could be. It is estimated that approximately 5% of our local road system has ASR, but just because a pavement has ASR does not mean that it will automatically fail. Some roads identified as having ASR have deteriorated very slowly while others have experienced rapid deterioration.

The Engineering Department has taken steps to establish a new rating system for all local streets based on the PASER road rating system. This system has been adopted by the State of Michigan Asset Management Council; is currently used by the Road Commission for Oakland County for major roads (Troy map attached) and is accepted by MDOT on submittals for federal funding consideration. Although it is not as sophisticated as our current PMS, it is capable of providing similar results at a much lower cost.

PASER is a "windshield" road rating system that uses a 1 to 10 rating scale, with a value of 10 representing a new road and a value of 1 representing a failed road. Condition ratings are assigned by monitoring the type and amount of visual defects along a road segment while driving the segment. The PASER system interprets these observations into a condition rating.

Some of the advantages to this survey system aside from its lower cost are: 1) The ability of in house staff to do the survey work after receiving training; 2) The ability to do the survey every year to maintain accuracy; and 3) The software, RoadSoft GIS, that's used to analyze the data is free. RoadSoft GIS is an asset management software package created and distributed free of charge by the Michigan Technology Institute's Technology Development Group. The current version of the program was designed with a special module to collect PASER rating data. Attached is a PASER rating table that describes each pavement surface rating.

We will be moving toward this new system in the '09-10 budget year and plan to utilize it for the next budget preparation phase in 2010.


Local Road Condition
Good
Moderate
Poor
2009
2010
2011
2012
2013
2014
$2.0 M Budget
$2.5 M Budget
$2.637 M Budget
$5.0 M Budget

Current Local Road Conditions
2009

LOCAL ROAD
Pavement Analysis Results
Estimated Current Condition
Paved City Owned Local Streets

- Poor - 5.90 miles
- Fair - 36.39 Miles
- Good - 212.27 miles

Projected Local Road Conditions 2014

Analysis based on $2.637M for 2009, & $2M for maintenance each succeeding year.

LOCAL ROAD
Pavement Analysis Results
Projected Condition 2014
Paved City Owned Local Streets

- Poor - 25.54 miles
- Fair - 96.64 miles
- Good - 132.39 miles

PASER Rating System

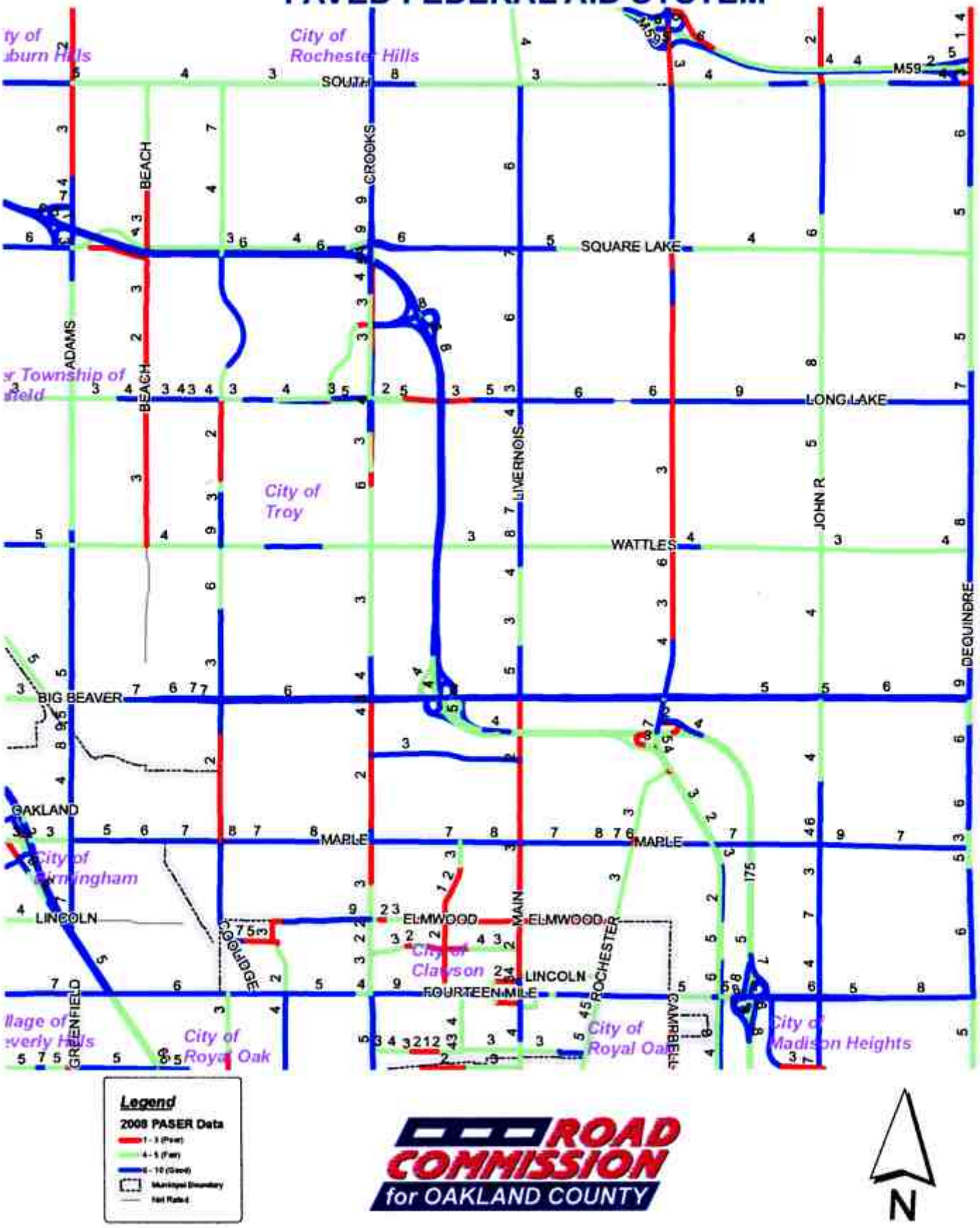
This chart describes the PASER rating system.

Surface Rating		Visible Distress	General Condition / Treatment Measures
10	Excellent	None	New construction
9	Excellent	None	Recent overlay, like new.
8	Very Good	No longitudinal cracks except reflection of paving joints. Occasional transverse cracks, widely spaced (40' or greater).	Recent sealcoat or new road mix. Little or no maintenance required.
7	Good	Very slight or no raveling, surface shows some traffic wear. Longitudinal cracks (open 1/4") spaced due to reflection or paving joints. Transverse cracks (open 1/4") spaced 10 feet or more apart, little or slight crack raveling. No patching or very few patches in excellent condition.	First signs of aging. Maintain with routine crack filling.
6	Good	Slight raveling (loss of lines) and traffic wear. Longitudinal cracks (open 1/4" - 1/2") due to reflection and paving joints. Transverse cracking (open 1/4" - 1/2") some spaced less than 10 feet. Slight to moderate flushing or polishing. Occasional patching in good condition.	Show signs of aging, sound structural condition. Could extend life with sealcoat.
5	Fair	Moderate to severe raveling (loss of lines and coarse aggregate). Longitudinal cracks (open 1/2") show some slight raveling and secondary cracks. First signs of longitudinal cracks near wheel path or edge. Transverse cracking and first signs of block cracking. Slight crack raveling (open 1/2"). Extensive to severe flushing or polishing. Some patching or edge wedging in good condition.	Surface aging, sound structural condition. Needs sealcoat or non-structural overlay.

4	Fair	Severe surface raveling. Multiple longitudinal and transverse cracking with slight raveling. Block cracking (over 25 - 50% of surface). Patching in fair condition. Slight rutting or distortions (1" deep or less).	Significant aging and first signs of need for strengthening. Would benefit from recycling or overlay.
3	Poor	Closely spaced longitudinal and transverse cracks often showing raveling and crack erosion. Block cracking over 50% of surface. Some alligator cracking (less than 25% of surface). Patches in fair to poor condition. Moderate rutting or distortion (1" or 2" deep). Occasional potholes.	Need patching and major overlay or complete recycling.
2	Very Poor	Alligator cracking (over 25% of surface). Severe distortions (over 2" deep). Extensive patching in poor condition. Potholes.	Severe deterioration. Need reconstruction with extensive base repair.
1	Failed	Severe distress with extensive loss of surface integrity.	Failed. Needs total reconstruction.

Note: Individual pavements will not have all of the types of distress listed for any particular rating. They may have only one or two types.

2008 PAVEMENT CONDITION
ROAD COMMISSION FOR OAKLAND COUNTY
PAVED FEDERAL AID SYSTEM



Legend

2008 PASER Data

- 1 - 3 (Poor)
- 4 - 5 (Fair)
- 6 - 10 (Good)
- Municipal Boundary
- Not Rated

ROAD COMMISSION for OAKLAND COUNTY

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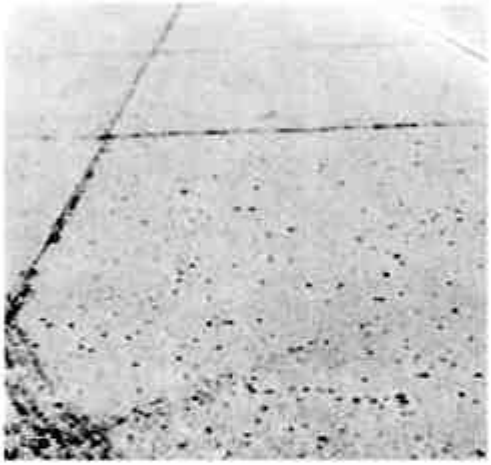
RATING 7

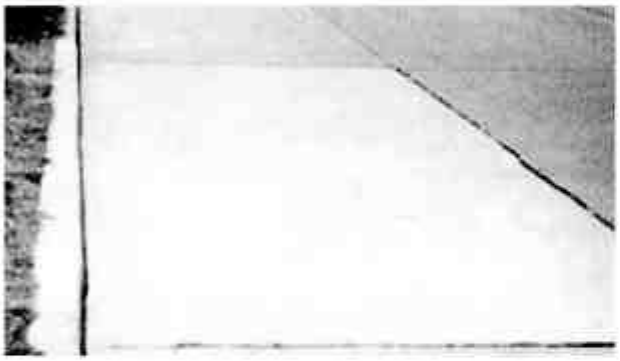
GOOD — May require some routine sealing or maintenance

First signs of transverse cracking, patching or repair; more extensive pop-outs or scaling; some manhole displacement, isolated heave or settlement. May need some sealing or routine maintenance.

◄ **Residential street pavement in good condition after many years of service. May only need periodic joint sealing maintenance.**



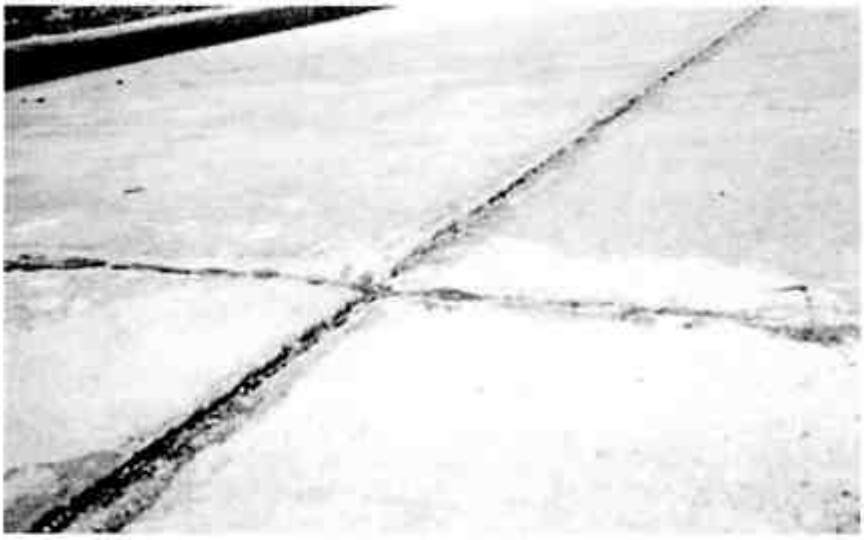
◄ **Extensive pop-outs. Pavement is unsightly but still provides good level of service.**



◄ **Recent full depth pavement repair. In very good condition.**

◄ **Transverse crack. Tight, sound pavement.**

◄ **Well sealed transverse crack. Joint repairs in good condition.**

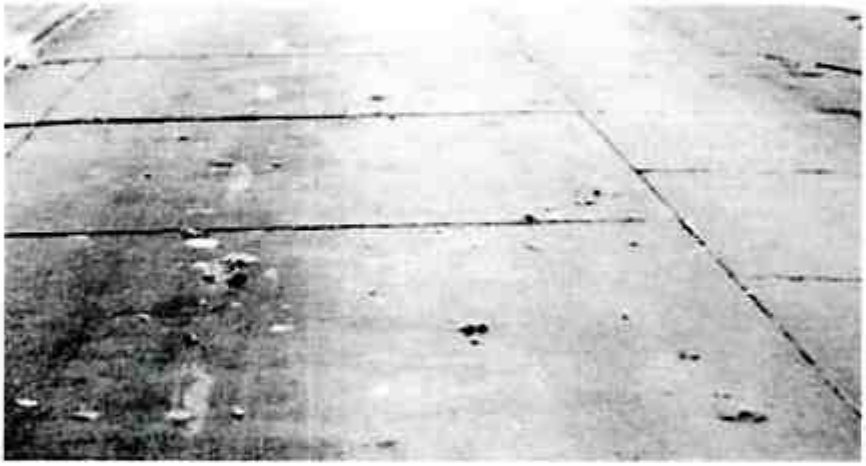


RATING 5

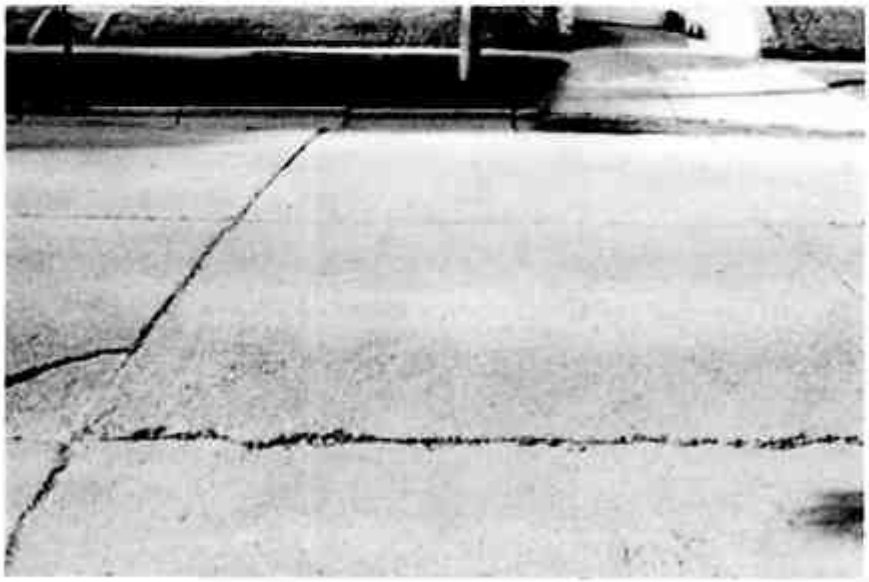
FAIR — Partial depth patching and joint repairs may be needed

First signs of joint or crack spalling, or faulting. Multiple cracking at corners with broken pieces. Patching in fair condition. Surface texturing repairs may be necessary. Some partial depth patching and joint repairs may be needed.

◄ **Faulting at longitudinal joint and spalling along joint edge.**



◄ **First signs of transverse joint faulting. Grinding will improve ride.**



▲ **Open cracks with edge spalling. Corner crack and broken corner piece.**

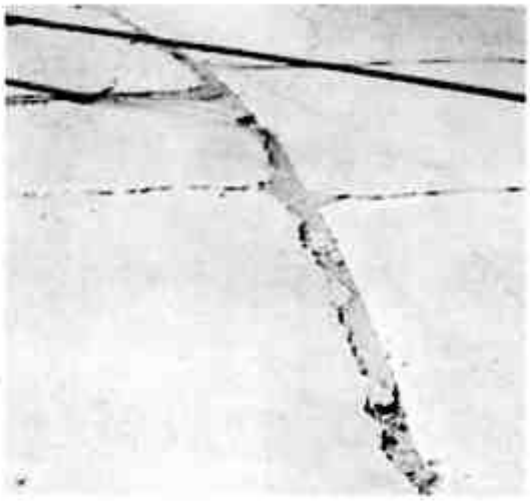
▲ **Isolated manhole problems and joint spalling. Full depth repair required adjacent to manhole.**

PASER Rating System

RATING 3

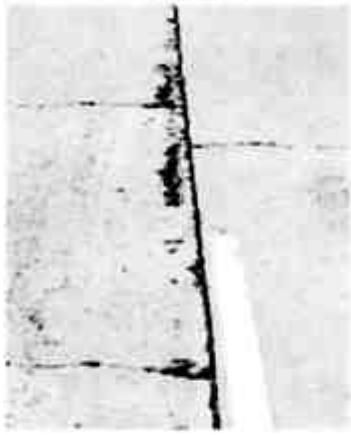
POOR — Extensive full depth patching plus some full slab replacement required

Most joints and cracks are open (1"), spalled, or patched. D-cracking is evident. Severe (1") faulting. Extensive full depth patching required plus some full slab replacement.



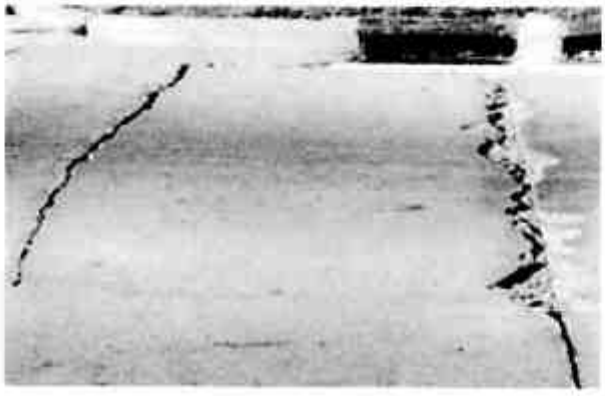
▶ **Joints and cracks badly spalled. Patching is failing. Full depth repairs required.**

Multiple transverse cracks. Poor longitudinal joint with spalling. ▼



▶ **D-cracking (discoloration) at transverse joint and corner cracking. Needs full-depth repair.**

▶ **Discoloration at joints indicates D-cracking. Slab replacement needed.**



▶ **Badly spalled joint and open crack. Slab or joint replacement needed.**

▲ **Failed joint needs replacement.**

RATING 2

VERY POOR — Pavement recycling and reconstruction necessary

◄ Failed patches. Replace entire portion of lane.

▲ Remove and replace pavement around manhole and inlet.

◄ Closely spaced transverse cracks and poor longitudinal joint. Replace slab.

▲ Extensive joint failure. Major rehabilitation or complete replacement needed.

◄ Severe deterioration. Requires extensive reconstruction.