

CITY OF DALLAS: USE OF STREET ASSESSMENT TOOLS TO SELECT CAPITAL PROJECTS

Presented to the

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Purpose

Describe Dallas' method of assessing street conditions – as a tool for selecting pavement improvement projects

Overview

- Dallas is a major US city with extensive roadways to manage
- Measure street conditions over 24-month cycle
- Rate street conditions by PCI (*pavement condition index*)
 - grade ranking: A, B, C, D, E
- Overall “satisfactory” level was 82% at close of FY13
 - Rates are on a decline
- Accurate projections needed as tool to select projects for bond funding

Dallas' streets

- 11,700 lane-miles of streets
 - 444 are arterials 292 concrete; 152 asphalt
 - 4,507 are collectors..... 3,748 concrete; 759 asphalt
 - 5,327 are local (residential) ... 2,918 concrete; 2,409 asphalt
- Arterial:
 - A high-capacity road to deliver traffic from collector roads to freeways and to serve urban centers with efficiency
- Collector:
 - A low- to moderate-capacity road serving traffic from local streets to arterials
- Local:
 - A street that primarily serves the properties on it
- Improved / Unimproved
 - All 3 street types are further designated as either “improved” with curbs and gutter, or “unimproved” without curbs and gutter.

Life expectancy of city streets

- Typical life of street is 20 to 50 years, depending on:
 - Pavement design
 - Traffic loads
 - Soil conditions
 - Weather/precipitation patterns
 - Maintenance schedule
- National standard (ASTM D-6433) sets method for determining Pavement Condition Index (PCI)
 - IMS* projects that streets without proactive maintenance will degrade annually at the following rates:
 - Satisfactory streets (graded A and B): 0.6% - 6.1%
 - Unsatisfactory streets (graded C, D, and E): 2.1% - 3.1%

• (IMS) Infrastructure Management Services is a consulting firm based in Chandler AZ which has gathered pavement data from both across the US and internationally to create a series of roadway deterioration curves. The curves are updated periodically, at about 5 year intervals.

Causes for Pavement Degradation

- Our streets degrade because of:
 - Shifting soil --- swelling/shrinking soils in DFW are a major factor in road design
 - Age
 - Usage – we often put heavier traffic on our streets that shorten their lives
 - ie; buses and garbage trucks on residential streets and collectors
 - Under-designed streets
 - Harsh weather -- hot and dry, versus wet and cold in other areas of country

These factors cause streets to crack and buckle, allowing for ***water infiltration*** that undermines the base material
- Streets degrade at different rates
 - A, B and E streets degrade the slowest
 - C and D streets degrade the fastest
- 62% of our streets are in C condition >>>>>>

A:	1.5%
B:	16.4%
C:	62.0%
D:	12.0%
E:	8.1%

Street Condition Ratings

Rating		Description	PCI
Satisfactory	A	Excellent Pavements that have no distress (mostly new or newly rehabilitated surfaces)	100-85
	B	Good Very good ride quality - requires preventive maintenance (slurry seal or similar) if any	85-70
	C	Fair Acceptable ride quality, though road surfaces are becoming worn – slurry, microsurfacing, partial reconstruction or similar is needed to prevent rapid deterioration	70-45
Unsatisfactory	D	Poor Marginally acceptable ride quality – microsurfacing, chip sealing, or partial reconstruction, resurfacing or rehabilitation is needed to prevent rapid deterioration	45-35
	E	Very Poor Pavements that have extensive amounts of distress and requires partial or full reconstruction or restoration	< 35

How our streets are evaluated

- Visual inspections started in 1975 in Dallas
 - Ratings made by visual review of the pavement by trained staff
 - Ratings tended to be subjective from day-to-day
- Upgrade in evaluation method in 2008
- Streets are reviewed on a roughly 24-month cycle using the **Data Collection Van**, which utilizes:
 - Series of recording cameras
 - Lasers for crack detection
 - Laser profilers for roughness detection
 - Ground penetrating radar for subsurface conditions
 - Visual survey by 2-person team, to confirm and supplement mechanical readings
- Street rating system is repeatable and consistent.
- Ratings based on extent and severity of distress (roughness, cracking, etc.)
- Dallas uses assigned letter grades: A (best) to E (worst)



Comparison Cities

- Similar size and population

- | | | |
|-----------------|--------------|---------------------|
| • Phoenix | Indianapolis | Miami / Dade County |
| • Charlotte | Detroit | |
| • San Francisco | San Jose | |

- Other Texas cities—

- | | |
|-------------|-------------|
| • Ft. Worth | Austin |
| • Houston | San Antonio |

- Cities with similar or complex traffic issues

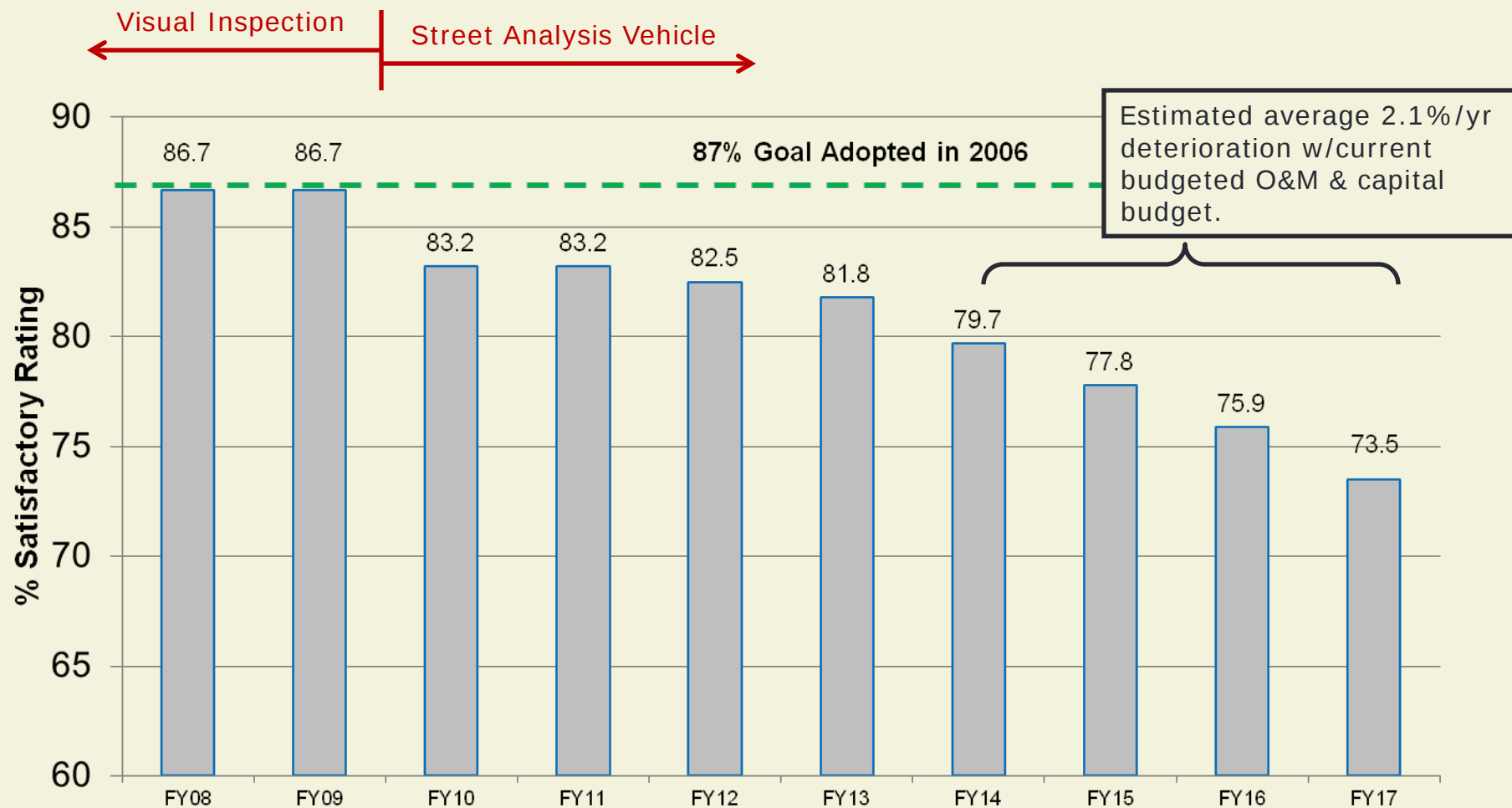
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| • NYC | LA | Chicago |
| • St. Louis | Portland | Seattle |
| • San Diego | | |

How do others rate their streets?

- Most larger cities (some smaller) use visually-based surveys to assess street conditions
- Visual survey data may be input to a database system to store and analyze the information
- Examples:
 - Portland, OR: StreetSAVER software
 - Detroit, MI: Paver Rating Scale
- A small handful utilize a data-acquisition vehicle (like Dallas)
- Examples:
 - Houston, TX: MicroPAVER system
 - Los Angeles, CA: MicroPAVER system

Condition of Streets – Expected Deterioration

Street Condition Ratings - 2008-2017

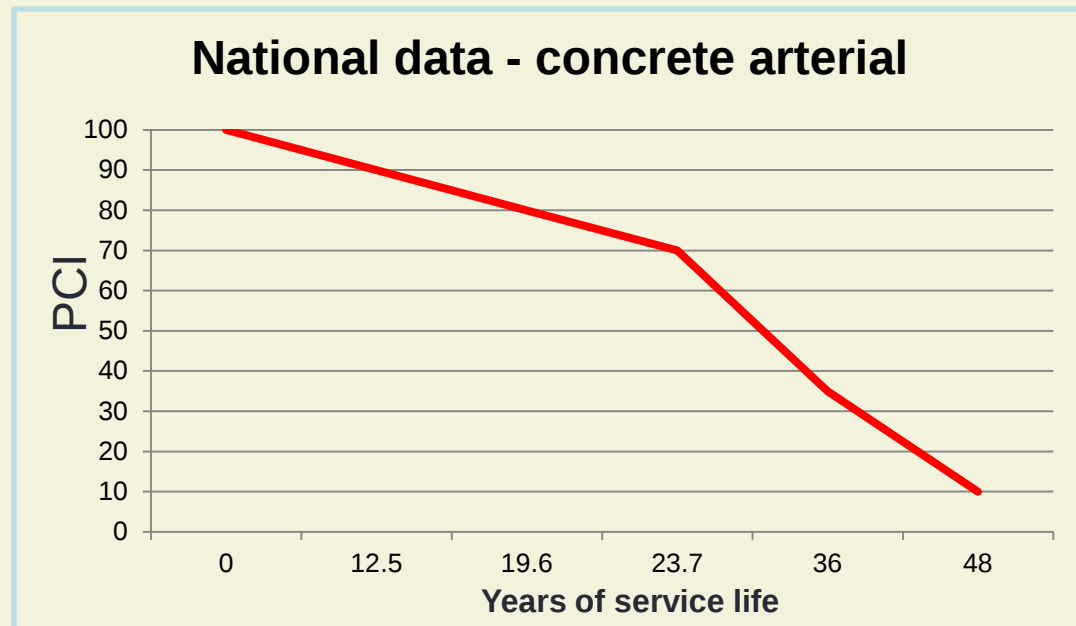


Citywide rating decreased from 86.7% to 83.2% in FY10 due to deferred maintenance and development of a more precise condition rating system. Continued analysis of local degradation rates will lead to refinement of these projections.

Comparing our Projections with National Values

- National rates for street deterioration
 - Rates based on data collected from variety of cities
 - Accumulated and plotted
 - Each curve selected by type of pavement:
 - Concrete arterial
 - Concrete improved road (with curb and gutter)
 - Concrete unimproved (no curb and gutter)
 - Same categories for asphalt roads

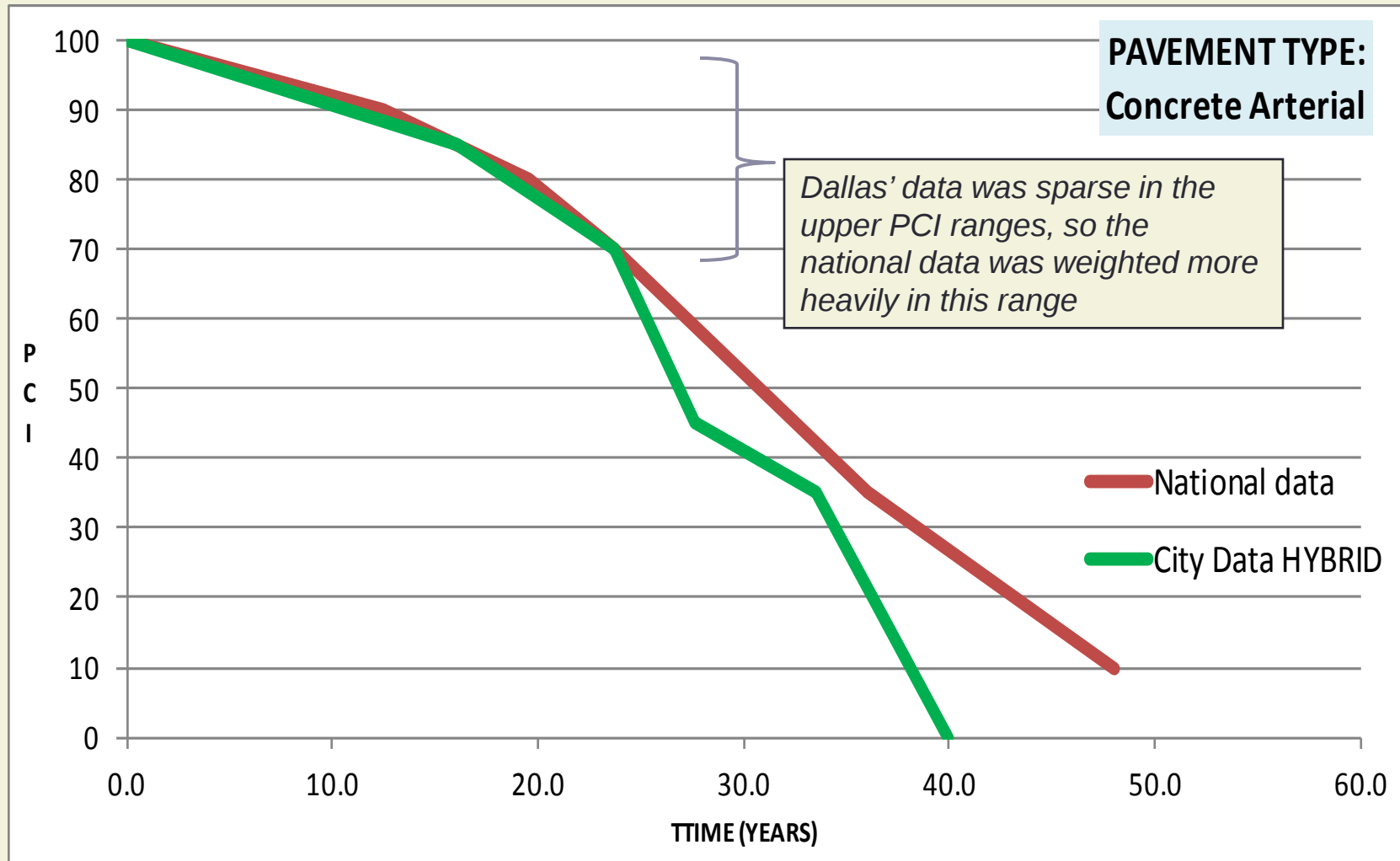
- Example curve:



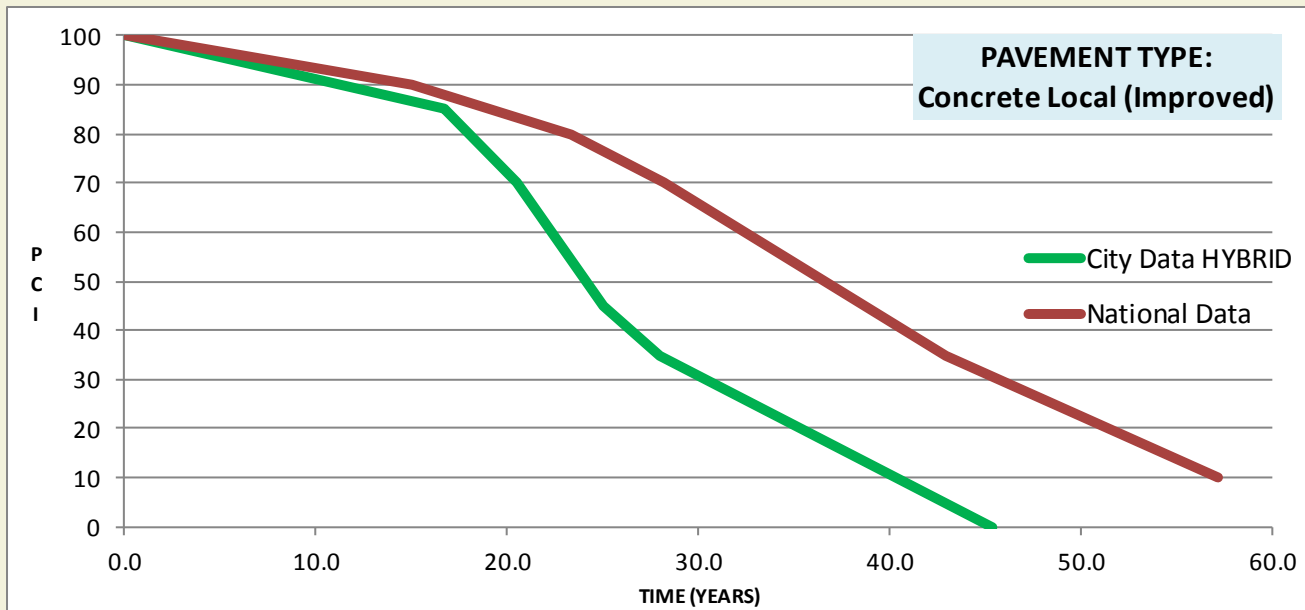
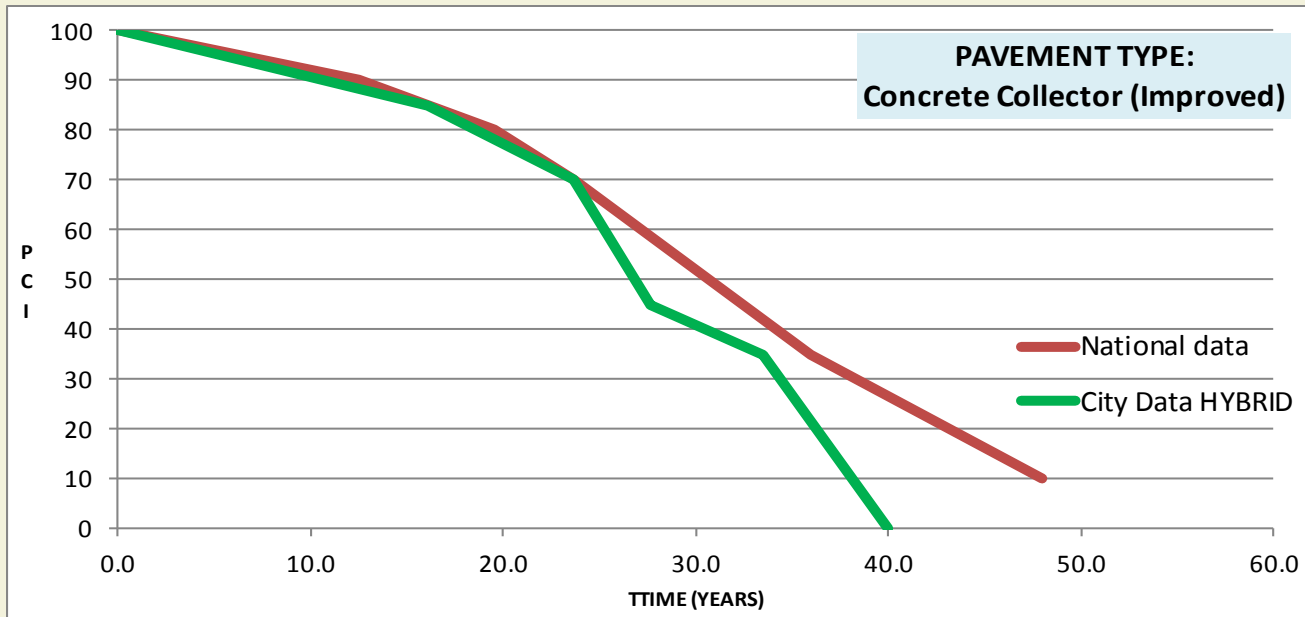
Dallas' data

- Dallas has drafted “deterioration curves” based on locally-acquired data since 2008
 - There are 2-to-4 measurement events for each pavement segment
 - Over 200,000 points of measurement for Dallas' 11,700 lane-miles
 - Some pavement types (such as “improved local road”) are well-represented with numerous data points
 - Some pavement types (arterials and unimproved collectors, for example) have fewer data points
- **All** of Dallas' curves vary noticeably compared to the deterioration curves for national data
 - All show shorter overall lifespan
 - Some sharply, some less so
- Developed “hybrid” deterioration curves
 - Blended use of national curves with Dallas data
 - Used a confidence factor for each set of Dallas' data points
 - Confidence factor is higher where more Dallas data is available
 - Confidence factor is lower where less Dallas data is available

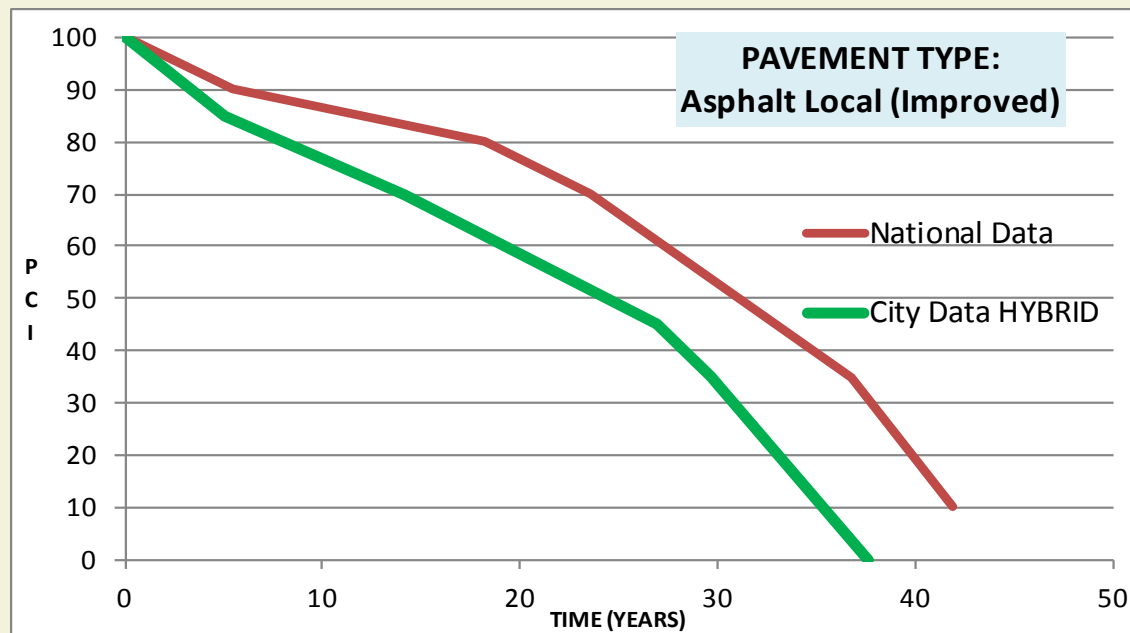
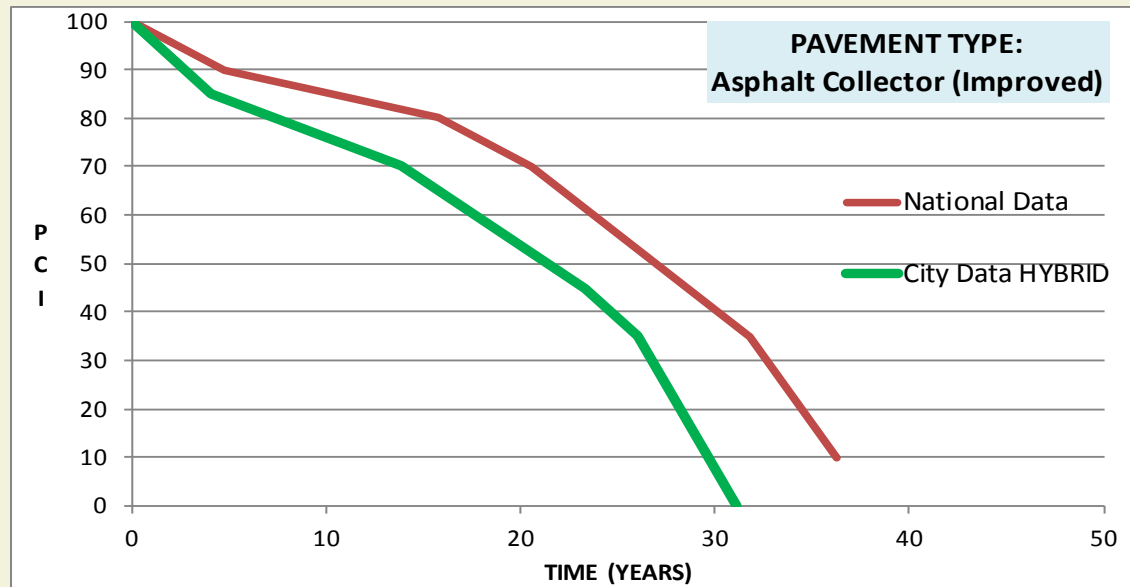
Dallas' data



Dallas' data – CONCRETE streets



Dallas' data - ASPHALT streets



Why the difference ?

- Recent economic recession has decreased most cities' spending on non-essential services --- including street maintenance
- National data is updated on a 5-year cycle
 - Our expectation is that the next 5-year update will reflect similar changes for many of the pavement types
- National data may be based on visual and more objective observations
- Other factors

Overall Condition of Dallas Streets

- 2006: City Council seeking these goals:
 - 87% satisfactory Citywide
 - 80% satisfactory in each Council District
 - 2006 Bond Program intended to accomplish this
 - Also relied on enhanced O&M funds
- 2008-09: Goal reached at 86.7% overall rating
- Rating dropped steadily from that year onward, due largely to economic conditions, to the current rating of about 80%
- How to get back to the 2006 goal?
 - Estimated bond funding is over \$900 million for next four years
 - Increase the annual O&M for street maintenance

How to optimize the capital funds

- Better use of “street condition” projection tools
- Better selection of street treatments and materials based on geographical areas, road usage
- Effectiveness of the various maintenance types and techniques
- Maximization of street life per life long cost of street

Questions & Comments