FORT WORTH®

Comparison Between Asphalt & Concrete Pavements in Fort Worth

Omar Elbagalati, PhD, PE

Pavement Management Program Manager

FORT WORTH®

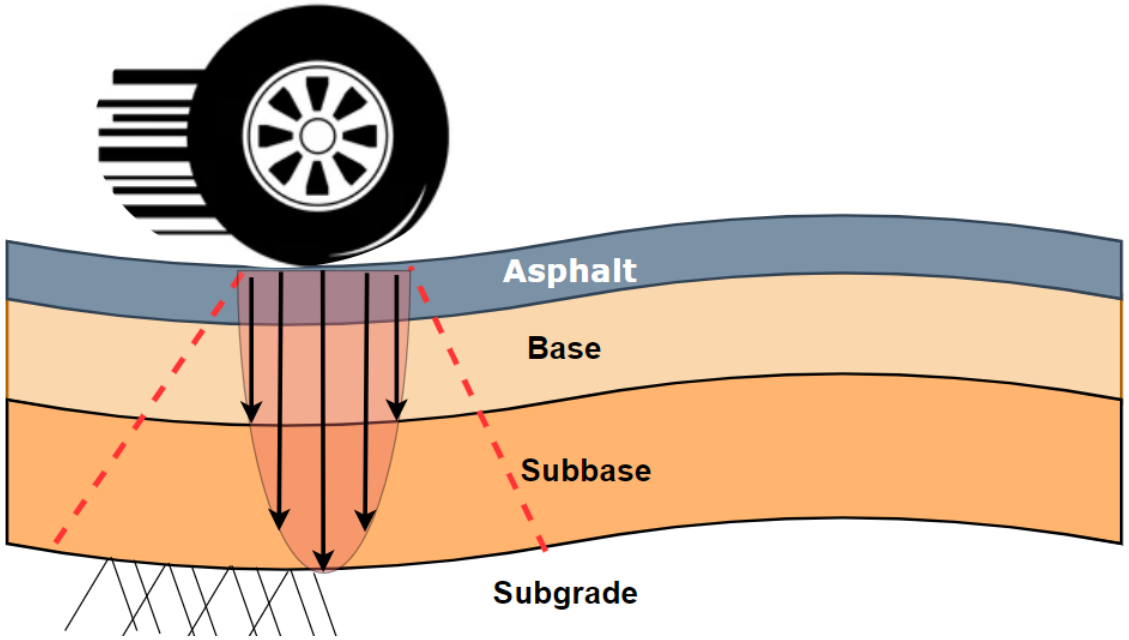
Contents

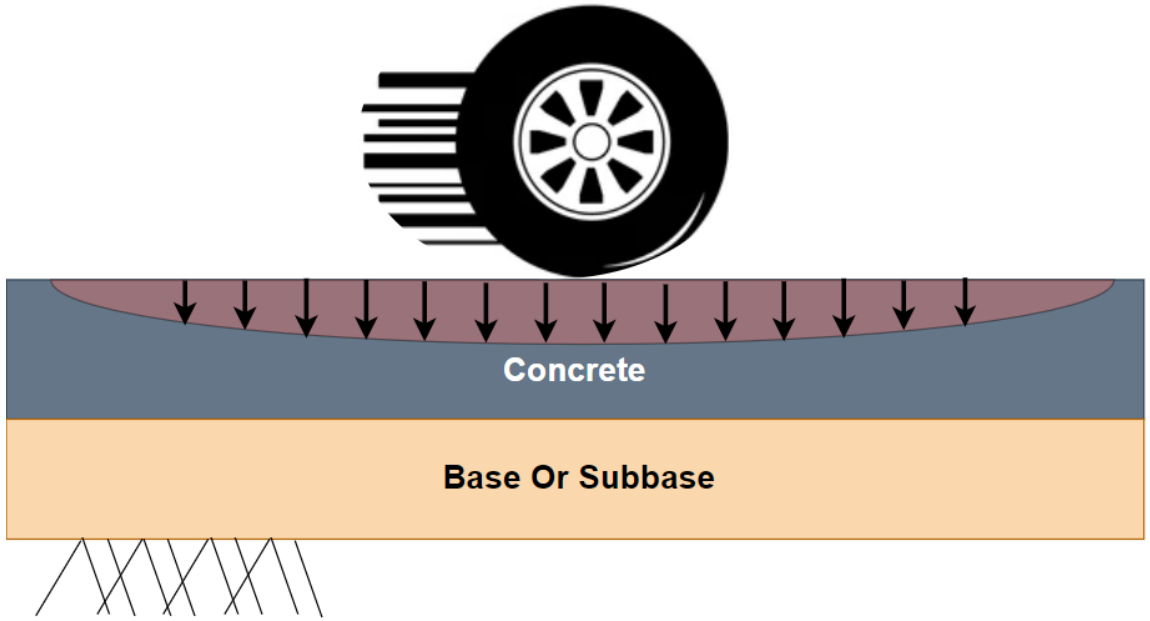
- **Introduction**
- **City of Fort Worth Network**
- **Examples of Asphalt and Concrete Pavements at Various Conditions**
- **Asphalt Vs Concrete Pavements Roughness**
- **Pavement Maintenance Toolbox**
- **Conclusions**

FORT WORTH®

Flexible Vs Rigid Pavement

Flexible Vs Rigid Pavement





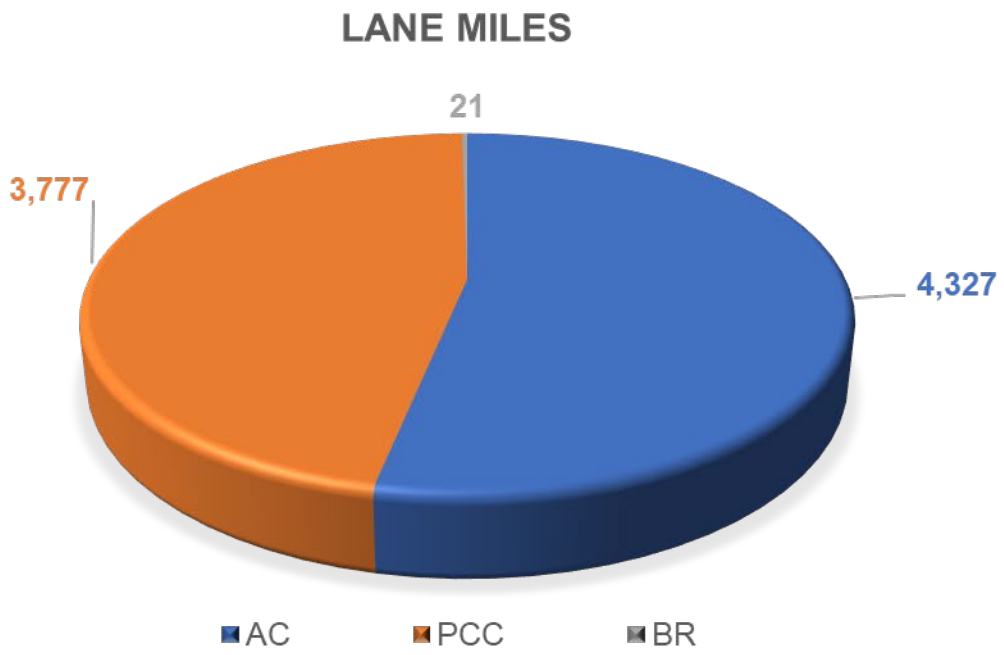
FORT WORTH®

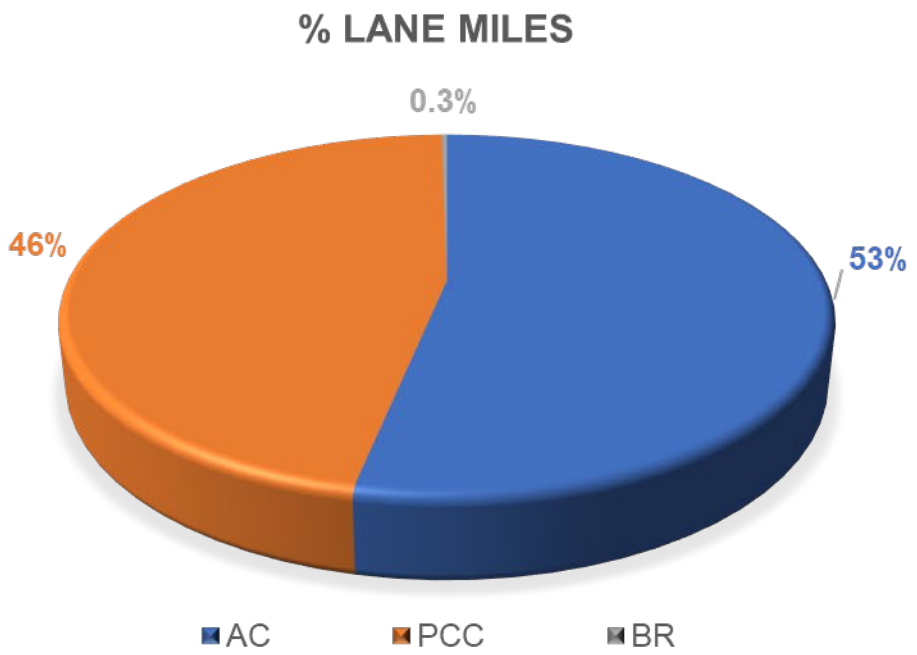
Flexible Vs Rigid Pavement

Flexible	Rigid
Load transfer through **all layers**	Load carried by **the slab**
Relatively **lower** initial cost	**Higher** initial cost
Higher life cycle cost Requires more frequent maintenance	**Lower life cycle cost** Requires less frequent maintenance
Design life of **20 years** with Overlay and preventive maintenance	Design life of **30 years** with Join seal and preventive maintenance
Vulnerable to temperature and oil	**Immune** to temperature and oil
Faster construction process	**Slower** construction process
Road can be used for traffic within **24 hours**	Road can't be used for traffic until **14 days** of curing

City of Fort Worth Network

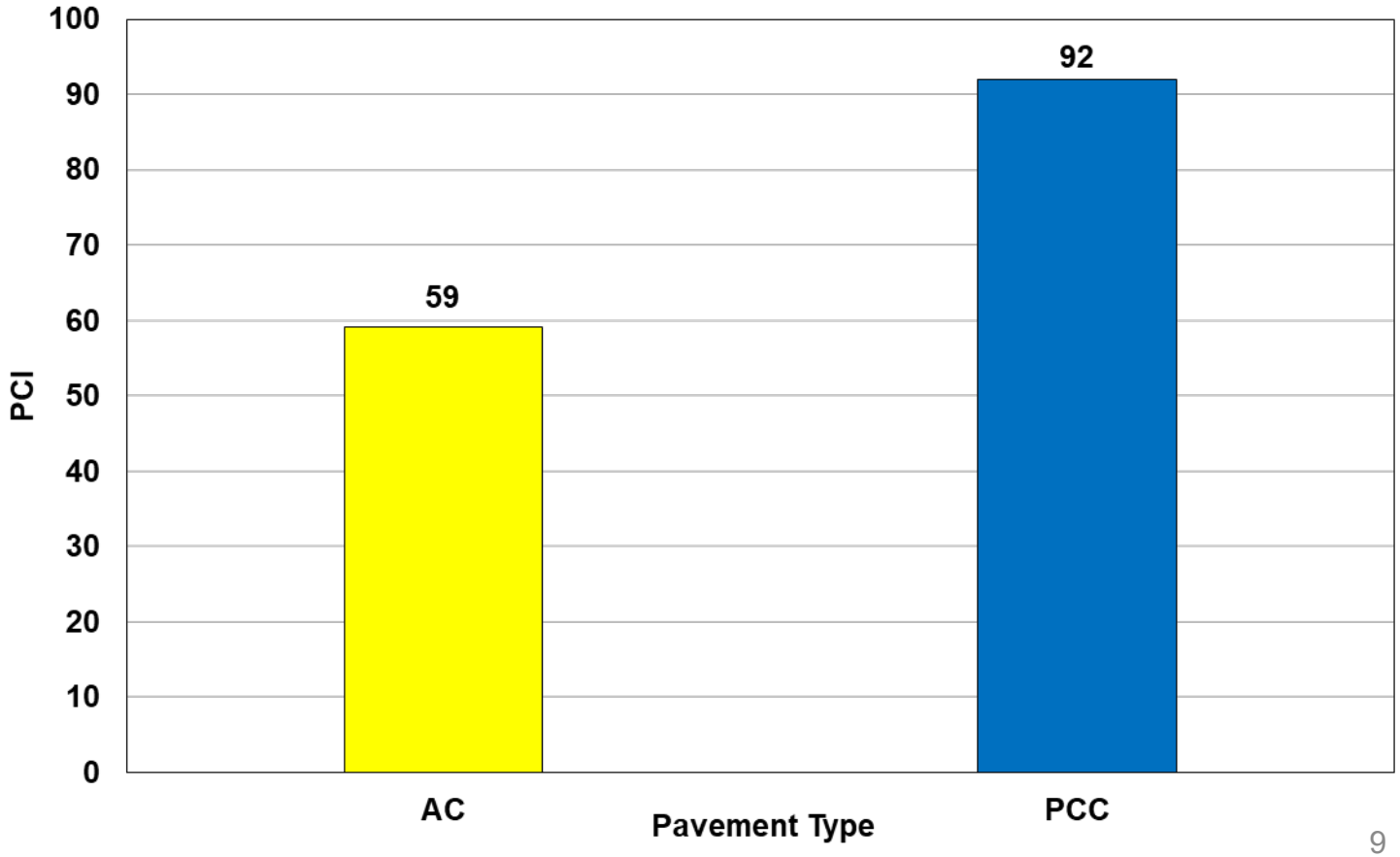
Flexible Vs Rigid Pavement





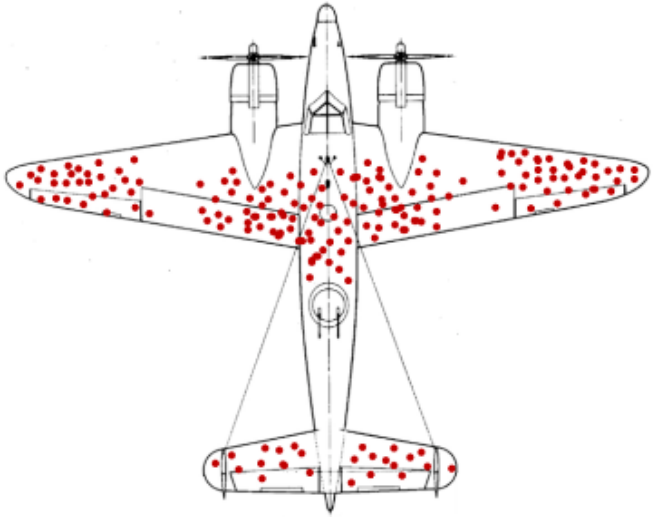
Pavement Condition Statistics

Overall Network Average PCI = 74

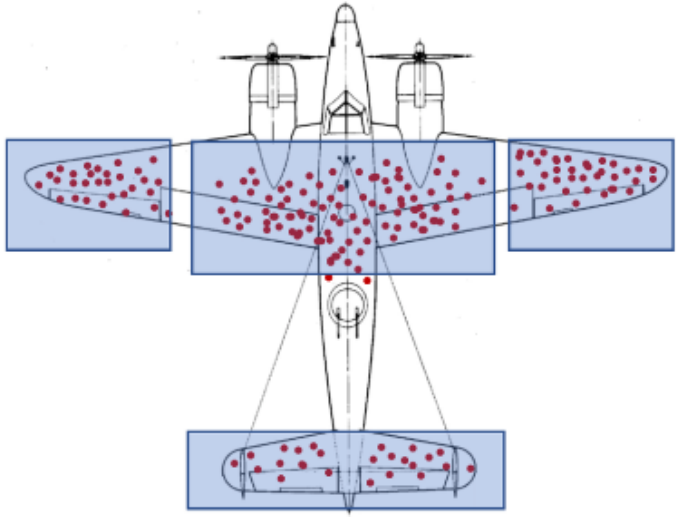


Pavement Condition Statistics

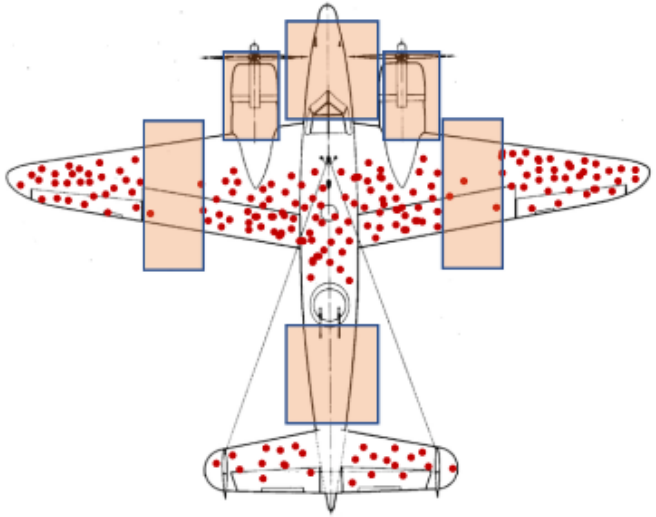
Survival Bias Theory



Our data if only from returning flights. Here we is a visualization of the places that bullet holes were observed.

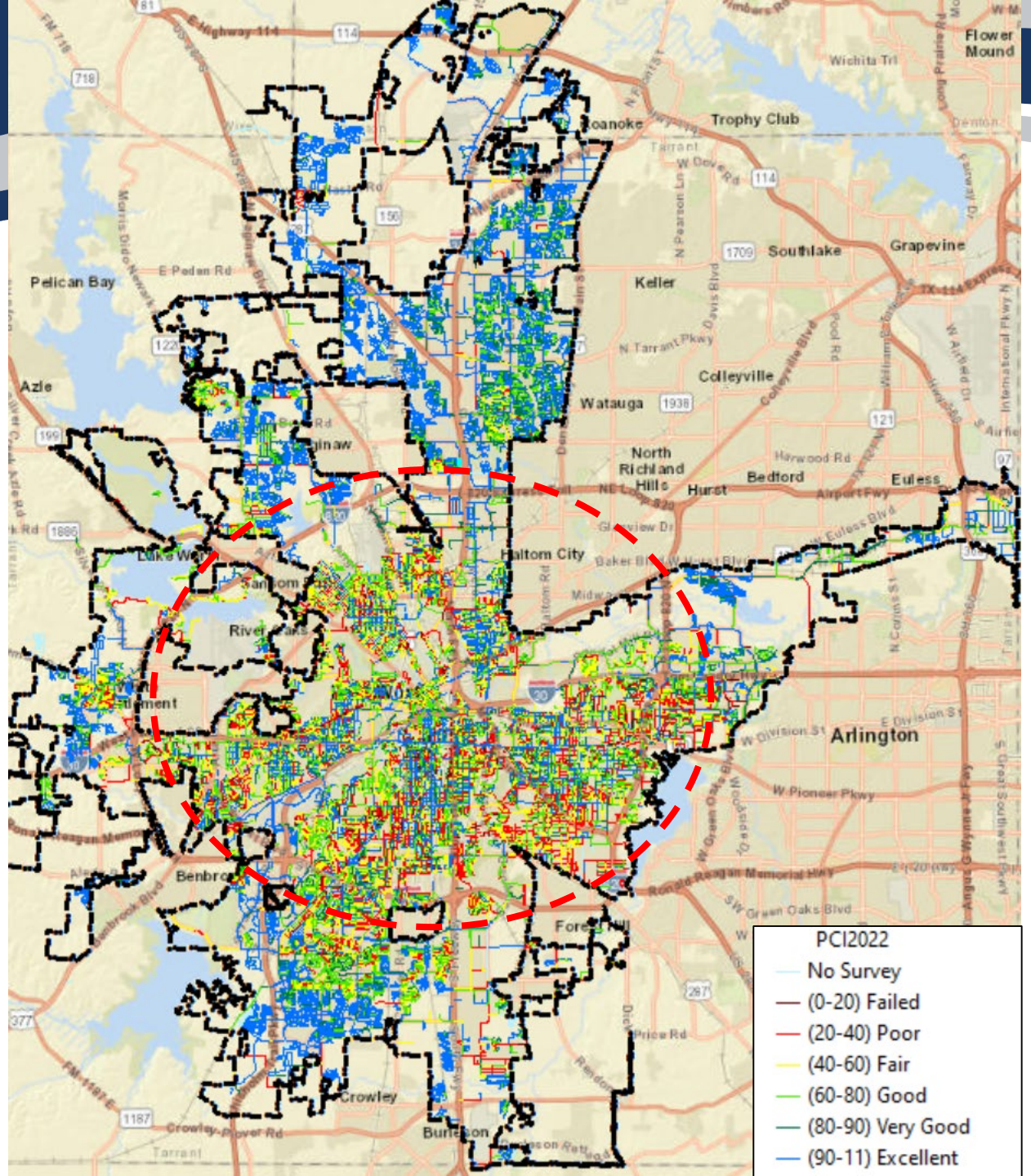


And initial guess at how to fix this might be to apply additional armor platting to the parts of the plane with the most holes…



…. However this is where planes that *returned* had bullet holes. The planes we want to protect are the ones that did *not* return, so we should place armor there.

PCI Map


Flower Mound
Trophy Club
Roanoke
Southlake
Grapevine
Keller
Pelican Bay
Colleyville
Watauga
Azle
North Richland Hills
Hurst
Bedford
Euless
Haltom City
Arlington
Crowley
PCI2022
No Survey
(0-20) Failed
(20-40) Poor
(40-60) Fair
(60-80) Good
(80-90) Very Good
(90-11) Excellent

Examples of Asphalt and Concrete Pavements at Various Conditions

50ish PCI

40ish PCI

Asphalt Vs Concrete Pavements Roughness

Roughness Comparison

Table 2-4. Federal Requirements for Pavement Condition Thresholds

Metric	Good	Fair	Poor
IRI (inches/mile) (all types)	<95	95-170	>170

Federal

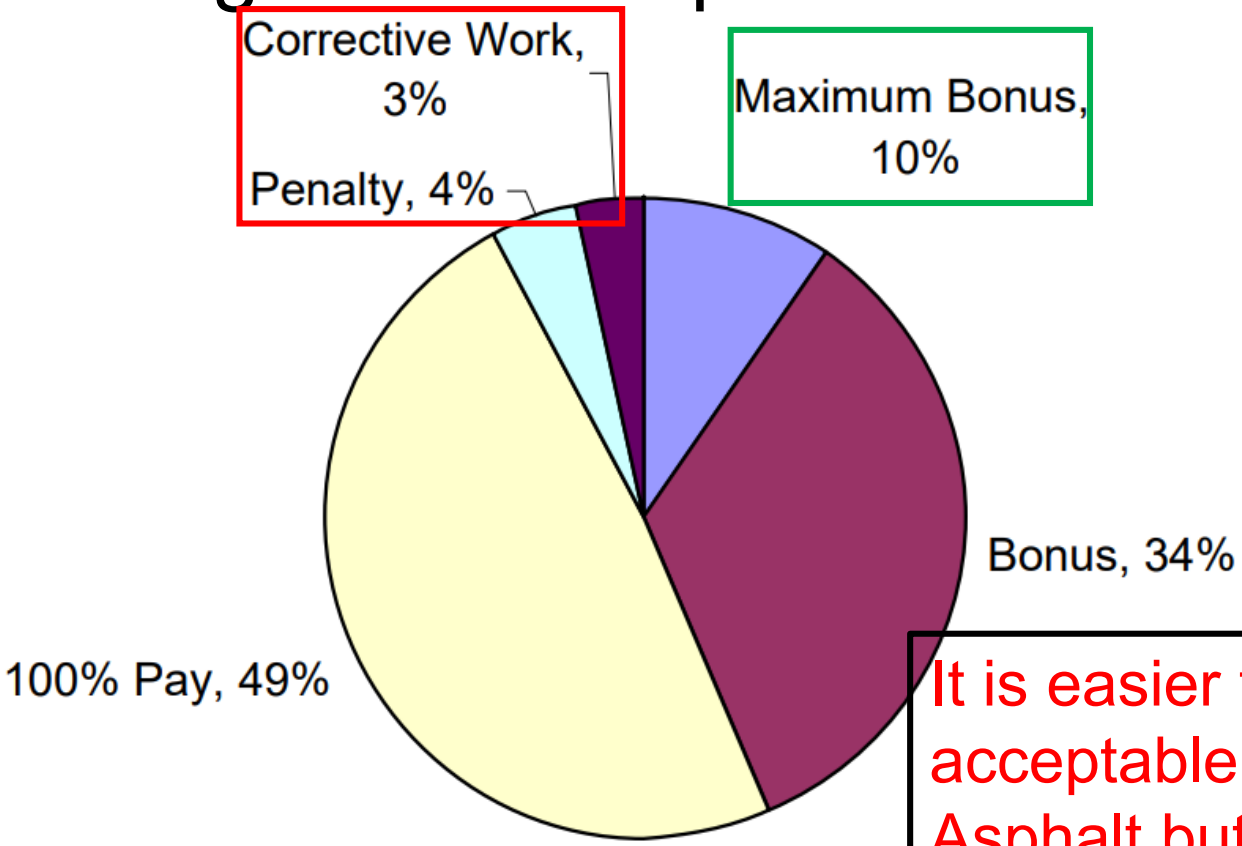
FORT WORTH®

Roughness Comparison

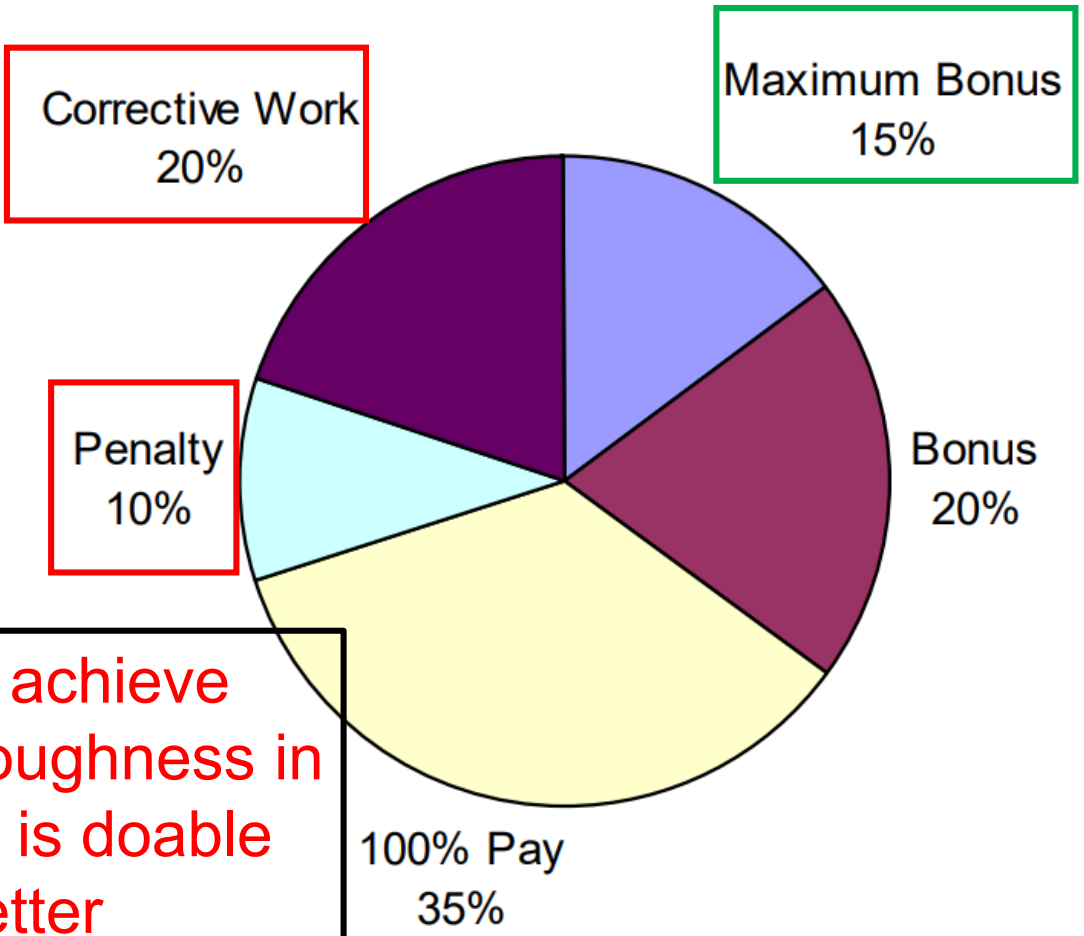
	Asphalt	Diamond Ground PCCP	Un-ground PCCP
IRI incentive range	Max bonus <= 30 Scaled bonus 30-39	Max bonus <= 30 Scaled bonus 30-39	Max bonus <= 60 Scaled bonus 60-69
IRI 100% pay range	40-60	40-60	71-89
IRI disincentive range	61-70	61-70	90-100
Corrective work range	71 or above	71 or above	101 or above

State of Kentucky

Roughness Comparison



Asphalt



Concrete

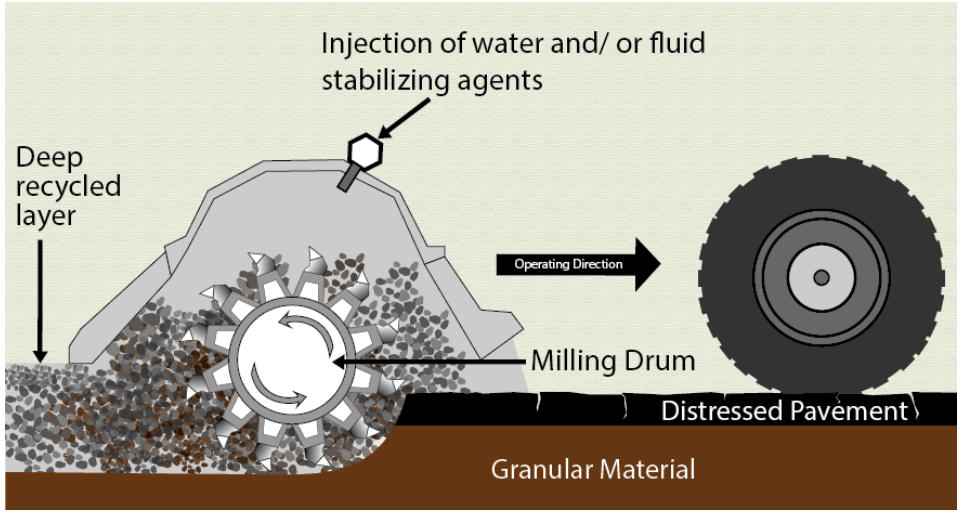
It is easier to achieve acceptable roughness in Asphalt but it is doable to achieve better roughness in concrete

FORT WORTH®

Pavement Maintenance Tool Box

Example of Maintenance Strategies

POL (Reclamation)



Example of Maintenance Strategies

MOL (Mill and Overlay)

Example of Maintenance Strategies

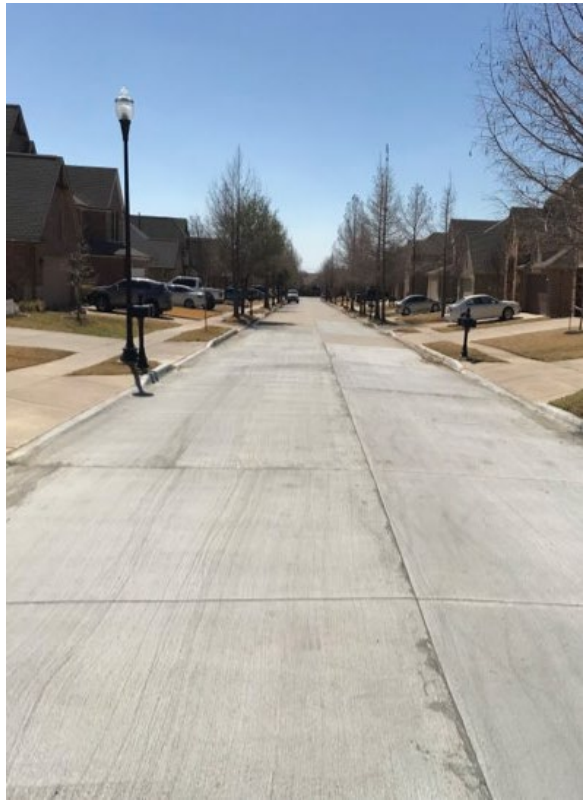
Surface Seal

Example of Maintenance Strategies

Concrete Joint Seal

Example of Maintenance Strategies

Concrete Restoration



Cost and impact of Maintenance Strategies

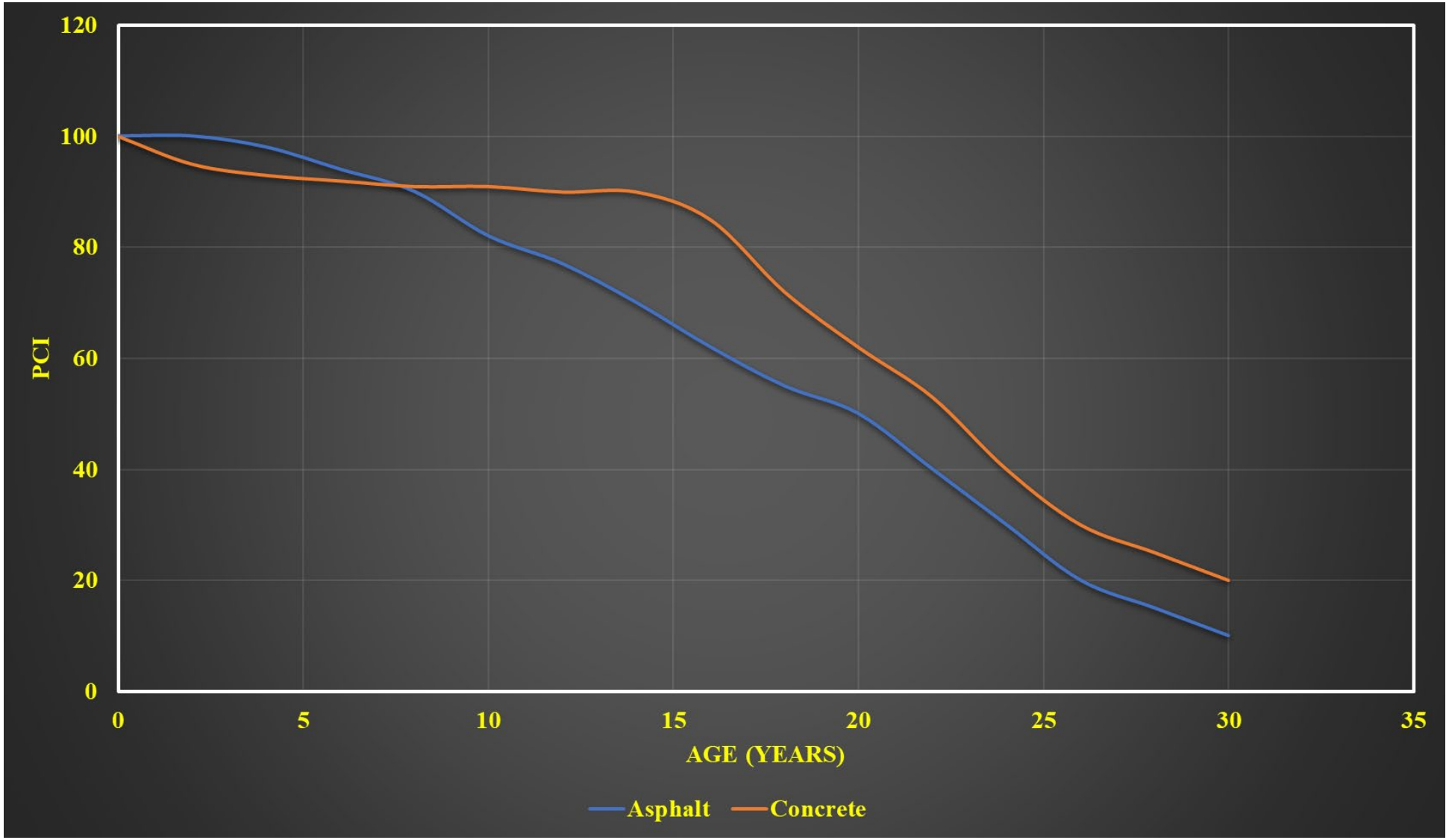
FORT WORTH®

Pavement Management Decision Trees


Asphalt Concrete
Areterial
PCI 91% - 100%
Monitor
PCI 81% - 90%
Crack Seal
PCI 40% - 80%
Base Faliure < 20%
Hot In Replace With Base Repair
Base Faliure 20% - 50%
Overlay With Base Repair
Base Faliure > 50%
Capital Reconstruction
PCI 0% - 40%
Capital Reconstruction
Local / Collector
PCI 91% - 100%
Monitor
PCI 81% - 90%
Crack Distress Quantity > 0
Crack Seal In-house
PCI 60% - 80%
Existing Curb < 50%
In-House Overlay - No Flat Work
Existing Curb > 50%
% Curb Replacement < 10%
In-House Overlay - with Unit Price
% Curb Replacement > 10%
Monitor
PCI 0% - 59%
Existing Curb > 50%
% Curb Replacement < 30%
% Base Faliure < 30%
Contract MOL
% Base Faliure > 30%
Contract POL
% Curb Replacement > 30%
Capital Reconstruction
Existing Curb < 50%
Capital Reconstruction
Rural Road
PCI 91% - 100%
Monitor
PCI 81% - 90%
Crack Distress Quantity > 0%
Crack Seal In-house
PCI 71% - 80%
Base Faliure < 30%
Chip Seal
PCI -0% -70%
% Base Faliure < 20%
In-House Overlay
% Base Faliure >30%
POL
Side Street
In-House
Not Side Street
ILA

FORT WORTH®

Asphalt vs Concrete Pavement Deterioration Models


120
100
80
60
40
20
0
PCI
0
5
10
15
20
25
30
35
AGE (YEARS)
Asphalt
Concrete


2023


2022

FORT WORTH®

conclusions

FORT WORTH®

Conclusions

Concrete pavements have higher ROI if designed, constructed, monitored and maintained correctly. Otherwise, they will be more dangerous, rougher, faster to deteriorate, and more expensive to repair than asphalt.

Thank you

Omar Elbagalati, PhD, PE
Pavement Management Engineering Manager
Transportation and Public Works
817-392-8117 Phone
682-402-8548 Cell
omar.elbagalati@fortworthtexas.gov