



# SEALCOATING PRINCIPLES & PRACTICES

*FOR THE PROTECTION & PRESERVATION  
OF ASPHALT SURFACES*

## **PART I-GENERAL**

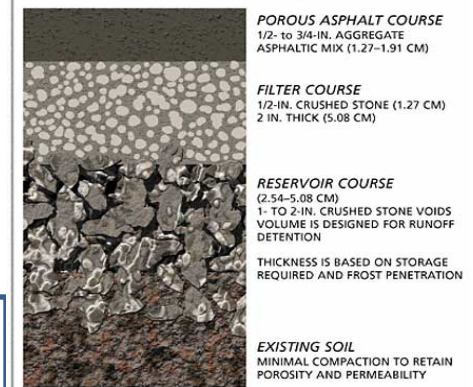
PRESENTED BY –  
Girish C. Dubey  
President, STAR, INC.  
April, 2021

# OBJECTIVES

## 1. To understand Asphalt Pavements , their;

- a. Basic construction and make up,
- b. Strengths and weaknesses,
- c. Why they have to be protected?
- d. How can they be protected?

**Figure 1.** Porous Asphalt Paving:  
A Typical Cross-Section



## Concept of SEALCOATINGS

## 2. Overall Savings and value to the property owner.



# OBJECTIVES

## 3. Sealcoating Materials:

- a. Refined Tar Based sealcoatings (RTS)
- b. Asphalt Emulsion Based sealcoatings (AE).
- c. Specialty Resins (LP-Low PAHs) based sealers.
- d. Acrylic/Polymers based sealcoatings.

## 4. Sealcoating Application:

- a. Equipment
- b. Mix Design compositions
- c. Application details and Cautions

## 5. Drying and cure of sealcoatings

## 6. Good Sealcoating Practices

## 7. Do and Don'ts.

## 8. Trouble-shooting

## 9. Commonly asked questions.



## ROAD CONSTRUCTION

### A. PRIOR HISTORY OF ROAD CONSTRUCTION:

Constructed with Clay, Limestone, Rocks-

*Functional but severely damaged by rain:*

The aggregates absorbed water, became soft and lost their strength to support loads.

**Roads were destroyed in no time.**



### B. ASPHALT AS A PAVING MATERIAL-

Dates back to 615 BCE in Babylon.

Used in the US since mid-19<sup>th</sup>. Century.

The first true asphalt road was built in 1870, in front of the city hall in Newark, NJ, by a Belgian chemist

A by-product of petroleum refining process was plentiful and had excellent;

- **Adhesive (Gluing) properties,**
- **Water Proofing (repellency)**  
will not let water penetrate the pavement and damage it.
- **Flexibility-** Pavement surface will flex under traffic without cracking.

**ASPHALT KEPT WATER OUT OF THE PAVEMENTS,  
KEEPING THE BASE DRY AND FUNCTIONAL**



# What is Asphalt

**Naturally Occurring Material as:**  
**Crude Petroleum( decay of marine life)**  
**Asphalt Lakes**  
**Mineral Deposits- Gilsonite in Utah.**

**It is a Highly complex mixture of (>5000) compounds) which are mostly aliphatic or open chain compounds.**

**Majority of the asphalt is produced as a by-product of Crude Petroleum Refining.**

## **ASPHALT- Its outstanding Properties.**

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**TOTAL MILES OF ROADS IN THE US- 4.1 MILLION  
TOTAL MILES OF PAVED ROADS- 2.7 MILLION  
PAVED WITH ASPHALT- 2.4 (est.) MILLIONS.**

# WHAT IS ASPHALT

***IT IS A BY-PRODUCT OF PETROLEUM REFINING PROCESS.***

**CRUDE PETROLEUM-** ORIGINATED FROM THE DECAY OF MARINE LIFE OVER MILLIONS OF YEARS.

CRUDE PETROLEUM



REFINING PROCESS



→ REMOVE LIGHTER FRACTIONS:  
SOLVENTS, GREASE, OIL....

RESIDUE: ASPHALT



ASPHALT IS A VERY COMPLEX MIXTURE OF OVER 5000 COMPOUNDS.

# ASPHALT PAVEMENTS

## WHAT THEY ARE AND HOW ARE THEY CONSTRUCTED ?

Pavements are the solid floor of any construction that carries traffic;

- **VEHICULAR :**

High Traffic :Highways, Roads, Streets,

Low traffic : Airport runways, aprons, parking lots, driveways, service stations..

- **PEDESTRIAN:** Walkways, Playgrounds, Schools, etc.

## CONSTRUCTION

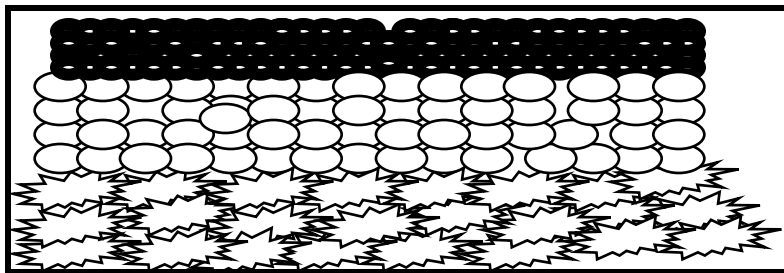
The earth is removed and

- Filled with large aggregates (gravel, rocks, limestone- **Base course**

- Filled with smaller aggregates- **Sub-base course**

- Covered with hot molten asphalt (5-10% By weight) mixed with finer aggregates- top course.

THIS TOP LAYER, SO TO SPEAK , IS THE " ROOF OF THE PAVEMENT".



→ **TOP COURSE, Asphalt Hot-Mix.**

→ **SUB-BASE COURSE**

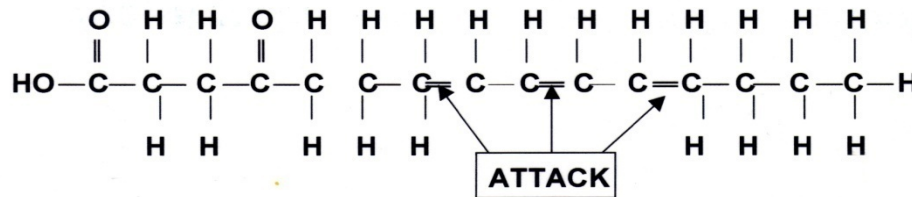
→ **BASE COURSE**

**THE CONSTRUCTION VARIES WITH THE TRAFFIC LOAD REQUIREMENTS.**

## SHORTCOMINGS

### 1. DETERIORATES UNDER SUN'S ULTRAVIOLET RAYS

Unstable (aliphatic) compound in asphalt breakdown.



### 2. Attacked or Dissolved by:

#### a. DISSOLVED BY PETRO-CHEMICALS: GASOLINE, OILS, FATS, GREASE ETC.

- Same origin-crude petroleum.
- Natural Affinity-Co-existed in nature over mils. Of yrs.
- Like dissolves like.

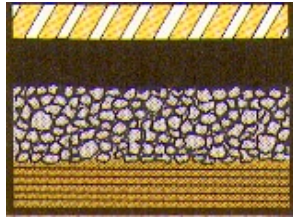


#### b. DEICING SALTS- Attack unstable compound in asphalt

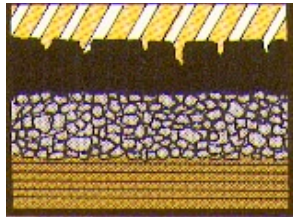
#### c. WATER- Strips asphalt from aggregates.



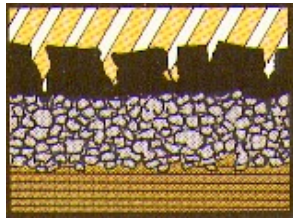
# HOW ASPHALT BREAKS DOWN



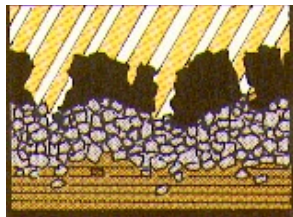
**The top layer degrades from the elements soon after the asphalt installation.**



**Surface cracks develop, Asphalt becomes brittle, water seeps in, and cracks widen, damaging the base.**



**Trapped water weakens the foundation and further damage occurs under traffic and seasonal freeze / thaw cycles.**



**Further asphalt damage is done over time. Chunks of asphalt begin to break away and potholes quickly develop.**



**End of The Pavement**



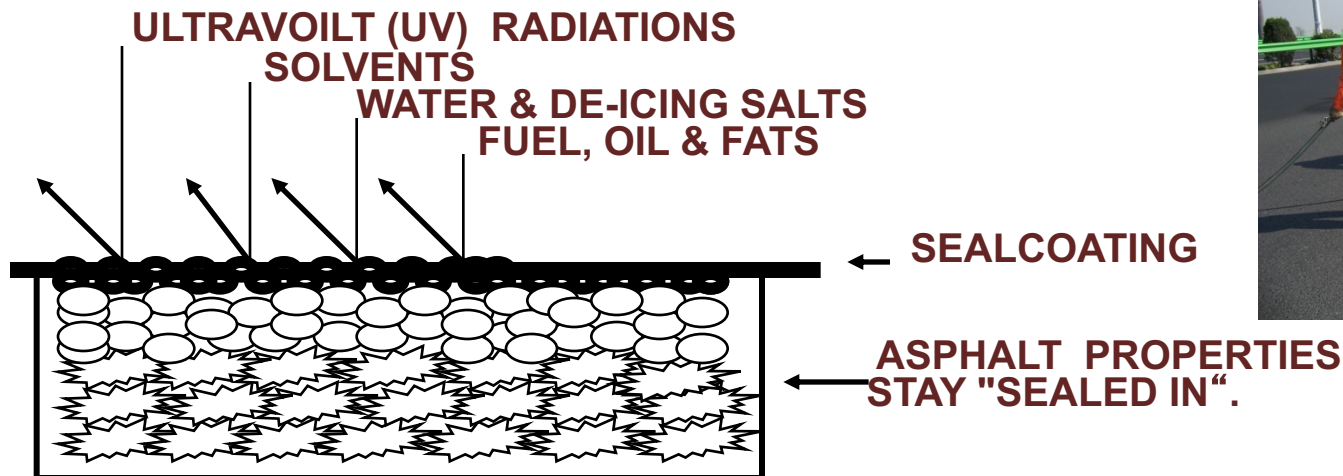
## HOW TO PROTECT ASPHALT PAVEMENTS :

# SEALCOAT !

APPLY A COATING ON THE ASPHALT SURFACE THAT WILL:

**FORM A BARRIER COAT** TO SHIELD THE ASPHALT PAVMENT FROM THE ELEMENTS THAT DESTROY ASPHALT

SUN'S UV RAYS,  
GAS, OIL, FAT AND PETROCHEMICALS,  
WATER AND DE-ICING SALTS



***SEALS IN THE EXCELLENT PROPERTIES OF ASPHALT***



# SEALCOATINGS

**Are Specialty Coatings for the protection and preservation of asphalt surfaces.**

- 1. Refined Tar (RTS)-** Workhorse of the industry- 60-70%
- 2. Asphalt Emulsion (AE)-** Mostly on the west coast, made inroads east of the continental divide in last 20-25 years- 20-30%.
- 3. Specialty Resins, Low PAHs Type-New-**  
Introduced in 2014, market share-10-15%.  
*Compliant with most regions where RTS are banned.*
- 4. Acrylic Polymer Coatings-** Have been around for over 25 years-Less than 1% share .



***Preserve The Property Value While  
Enhancing The Curb Appeal.***

# BENEFITS OF SEALCOATINGS

## A REGULAR MAINTENANCE PROGRAM:

### 1. SAVES MONEY FOR THE OWNER;

RULE OF THUMB- The pavement life can be extended by over 3 times at 1/3<sup>rd</sup> the cost of replacement..

### 2. PROTECTS & PRESERVES ASPHALT PAVEMENTS.

### 3. BEAUTIFIES THE PAVEMENT & ENHANCES THE BUSINESS IMAGE.

### 4. CLEANING BECOMES EASIER;

Rain washes off dirt and debris faster.  
Faster snow melt and removal.  
Traffic markings last longer, improved visibility.

### 5. ENHANCES SAFETY-

Better visibility.  
Lessened person injury chances.

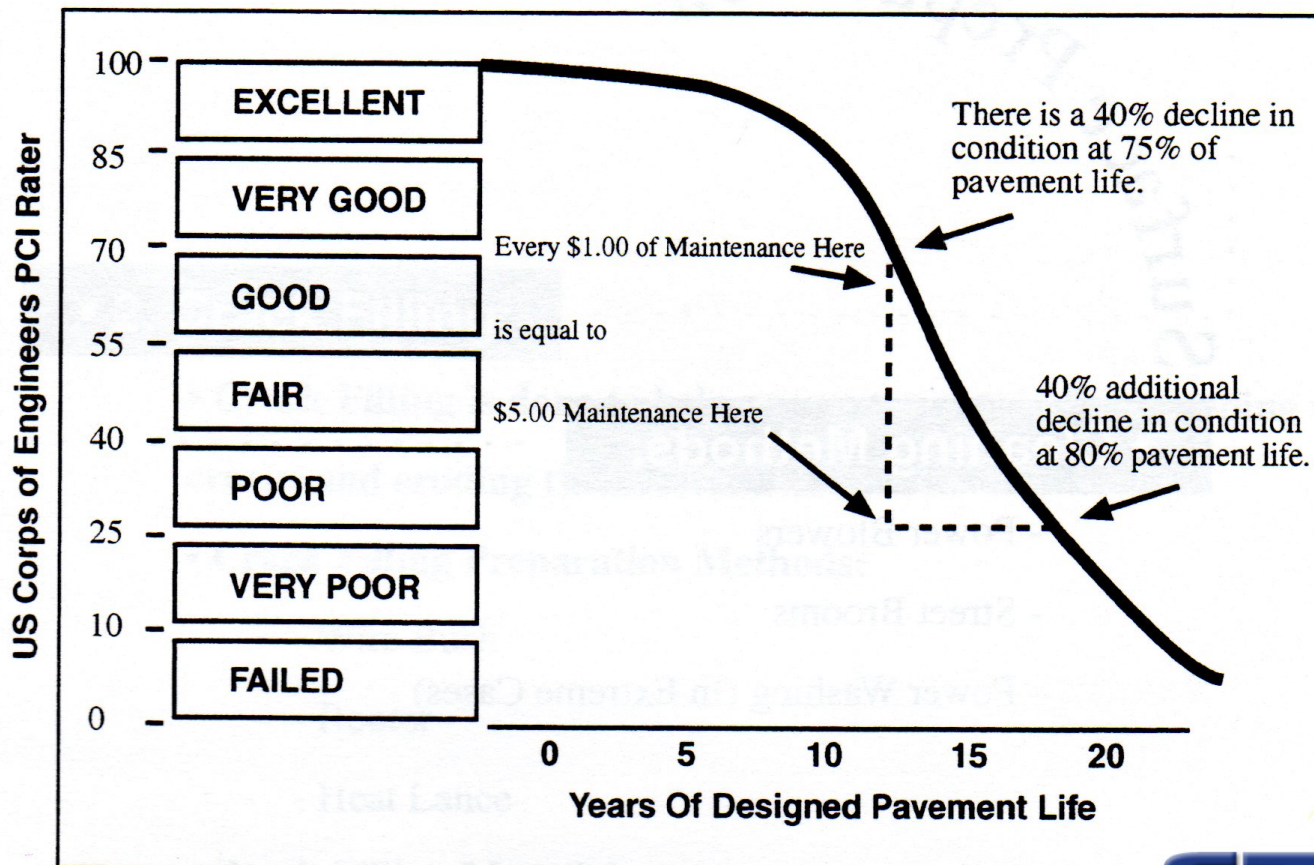


**\$ave  
TIME**



# Pavement Preservation Program Cost-Benefits Analysis

Normal Detroration Rate APWA Graph  
Source (American Public Works Association)

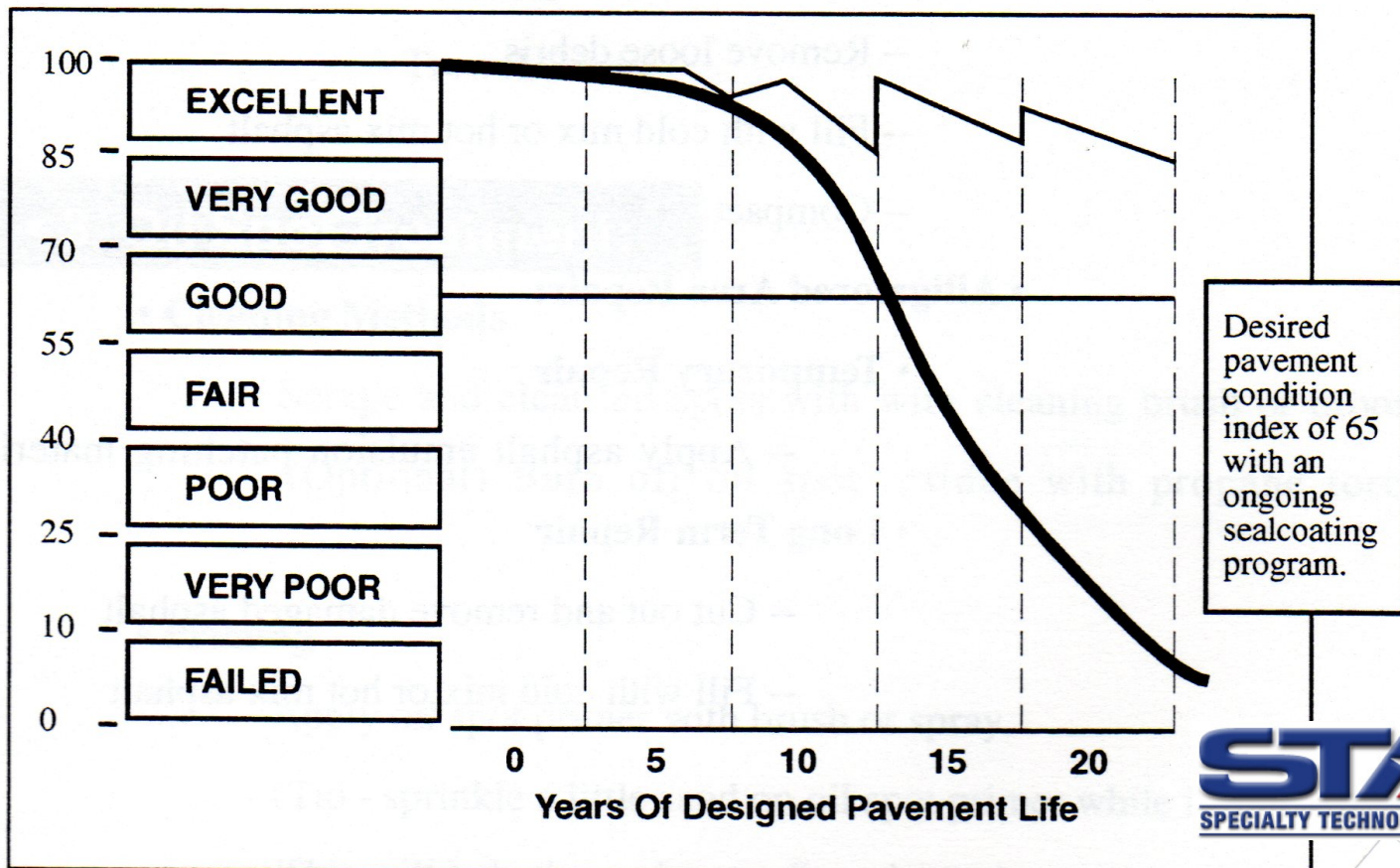




# ECONOMICS OF SEALCOATING

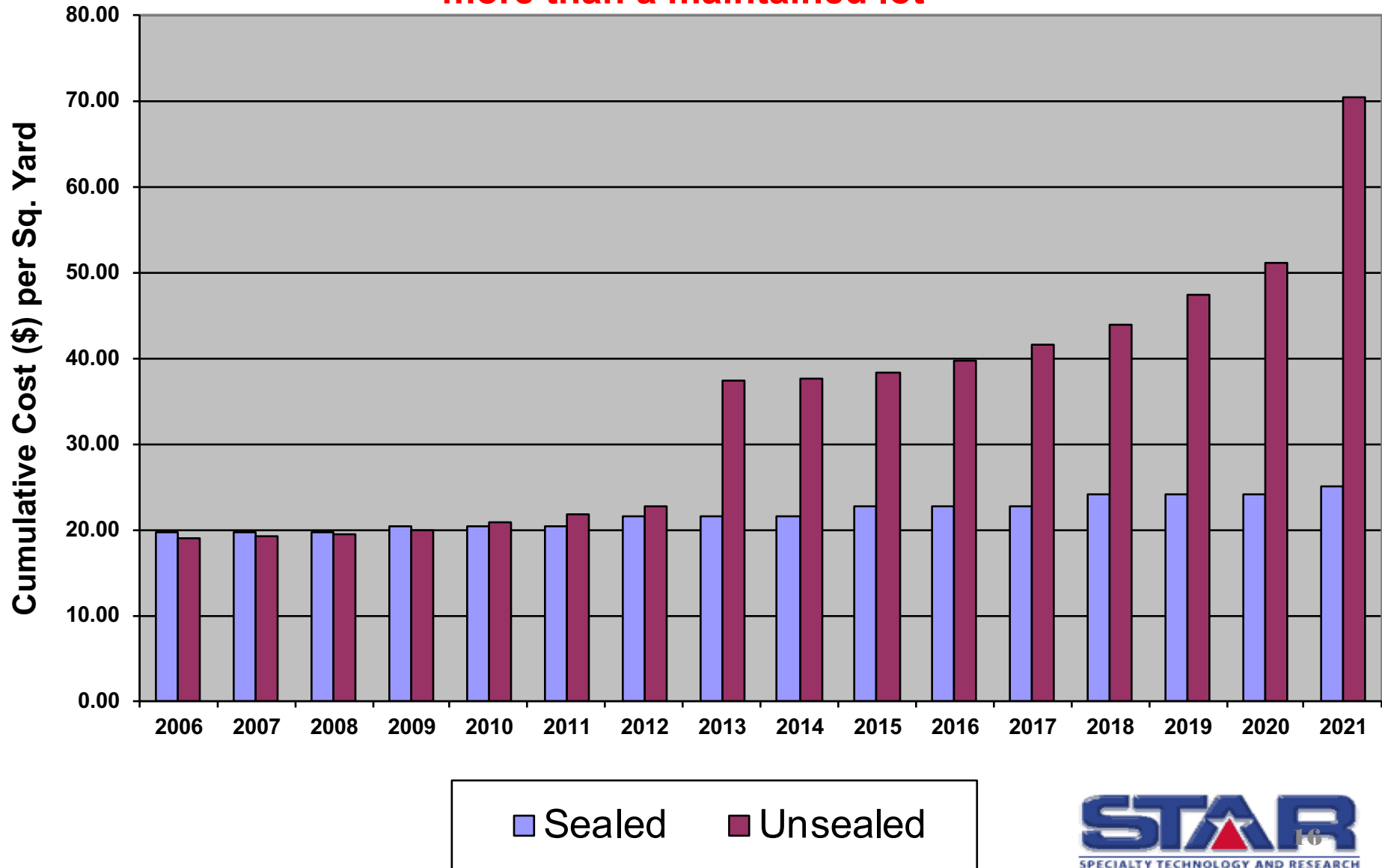
REGULAR MAINTENANCE RESTORES LOST PROPERTIES

Maintenance Program to Maintain a Pavement Condition by Rehabilitating at Various Time Intervals



# Economics of Sealcoating

**Un-maintained Asphalt costs 3 times  
more than a maintained lot**



# WHAT ARE SEALCOATINGS ?

**SEALCOATINGS ARE WATER-BASED COATINGS,**

**MADE BY DISPERSING:** (Batch or Mill process)

1. Refined Tar (RTS), Specialty Low PAHs resins, or Asphalt Emulsifi
2. Water
3. Clays, and
4. Surfactants, Emulsifiers, Polymers.



# WHAT ARE SEALCOATINGS ?

## WHY WATER-BASED?

1. SAFE TO HANDLE AND STORE.
2. NON-FLAMMABLE
3. EASE OF WATER CLEAN UP OF TOOLS,
4. NO SOLVENT FUMES OR HAZARDS OF SOLVENT
5. EASY TO APPLY WITH BRUSH, SQUEEGEE

## APPLICABLE SPECIFICATIONS

ASTM, 5727-00,  
U.S. FEDERAL AVIATION ADMINISTRATION  
(FAA SPECS.)  
ASPHALT SEALCOATING MANUFACTURERS  
ASSOCIATION (ASMA)  
COMMERCIAL SPECIFICATIONS



**STAR**<sup>®</sup>  
SPECIALTY TECHNOLOGY AND RESEARCH



# **Now you know**

## **WHAT SEALCOATINGS DO?**

### **1. Protect the Asphalt pavements from:**

Sealcoats form a barrier coat to shield asphalt pavements from The damaging elements;

- ☐ Breakdown under sun's UV radiation,
- ☐ Oxidation,
- ☐ De-icing salts and water
- ☐ Gasoline, oil, fats, etc.,
- ☐ Petrochemicals, anti-freeze, etc.



### **2. Extends the life of the pavement by avg. 3 times.**

Seals the asphaltic oils in the pavement and keeps them functional (flexible) for a long time.

3. Reduces overall up maintenance cost of the pavement.
4. Improves the curb appeal.
5. Adds to the over-all value of the property.



# PLEASE !PLEASE!! PLEASE !!!

## DO NOT OVERSELL SEALCOATINGS!!

1. Sealcoatings are **not** designed to repair the pavement defects

- ☐ Cracks, surface or structural.
- ☐ Alligatored cracks.
- ☐ Lose chunks of asphalt,
- ☐ Deteriorating shoulders.



2. Do **not** over-promise, sealcoating will make the pavement look like new.

3. Do not sealcoat over

- ☐ Gravel or dirt roads
- ☐ Wood
- ☐ Gilsonite coated pavements



# Now You Know The Basics !

- ☐ What are pavements,
- ☐ How asphalt Pavements are constructed
- ☐ What is asphalt- Its strengths and weaknesses
- ☐ How asphalt can be protected- **SEALCOATINGS !**
- ☐ Sealcoatings- Protects & Preserves asphalt
- ☐ Extend the life of asphalt pavements by more than 3 times.
- ☐ Costs Less than 1/3 the cost. Of pavement replacement.

**Ready to sealcoat ?  
Yes, You Are !  
Let Us Get Started !!**

***See the next presentation  
Part II on Application.***



**Thanks for watching this presentation.**

**For questions, comments or suggestions,  
Please contact your local STAR PLANT  
professionals or Contact**



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