

Application and interest of Cape Seal in road maintenance



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A sharp technique

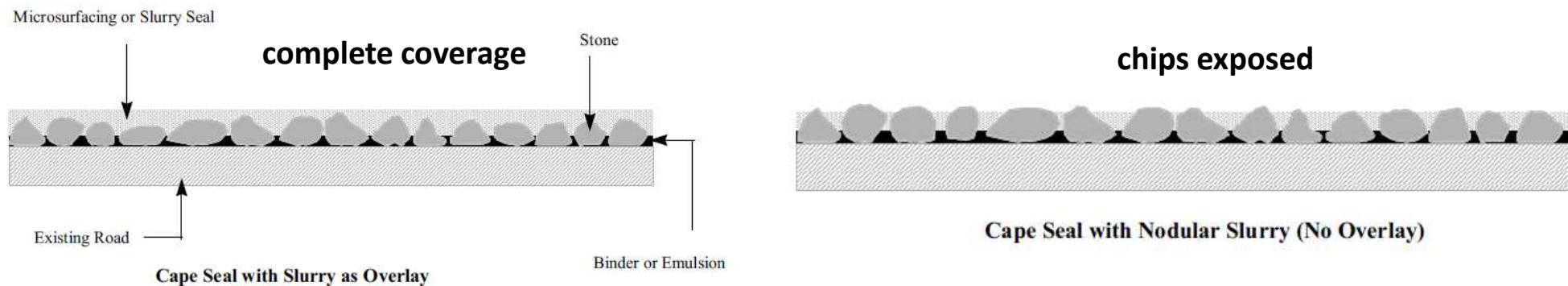
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Background and definition | 1



Background and Definitions

- A Cape Seal consists of the application of a chip seal covered by a slurry-seal or microsurfacing
- Originally developed in South Africa in the late 1950's by the Cape of Good Hope Provincial Administration
- **Modern Cape Seal process** : single layer of chip seal with stones 's size adapted to the traffic + microsurfacing Type II or Type III





Background and Definitions

› Cape Seal are designed to provide

- **An economical initial flexible bituminous layer over granular bases / cold recycled surface**
 - Decrease of the maintenance of granular base
 - Improve customer comfort
 - Eliminating the dust → comfort for residents

- **An economical surface course on existing flexible layer (HMA / chip seal)**
 - To seal the existing pavement
 - To restore surface characteristics of the pavement
 - To correct existing minor defects

Interests of the technique | 2



Technical interests

- › A field of use perfectly fitted to preventive maintenance
 - A good solution for minor defects
 - Partial or global lack of roughness
 - Low severity fatigue cracking
 - Longitudinal and transverse cracking (cracks width less than 2 or 3 mm)
 - Raveling
 - Local bleeding





Technical interests

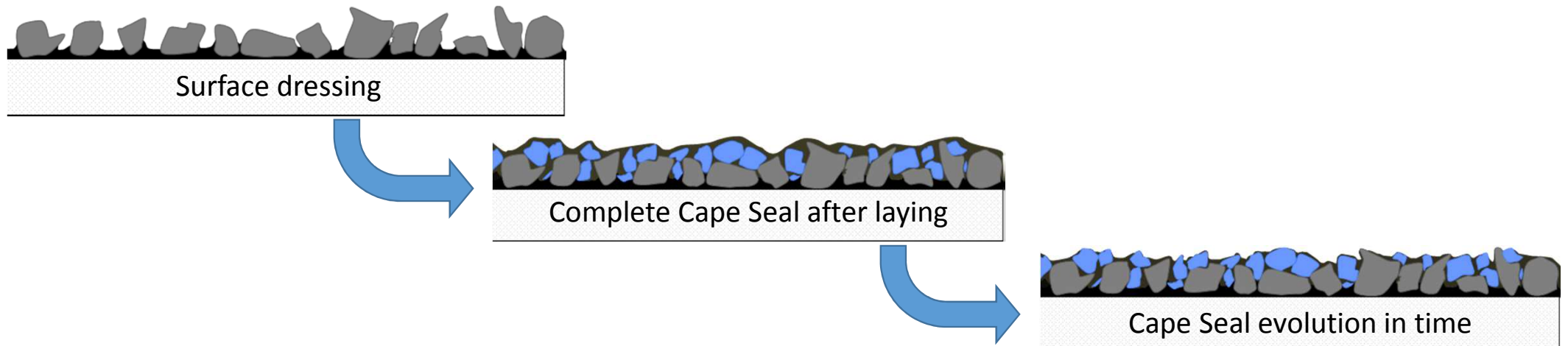
› An effective sealing of the road structure

- Waterproofing performance is correlated to the quantity of binder / m²
 - With Cape Seal **2.4 kg/m² of bitumen**
surface dressing 1.75 kg/m² of 69% emulsion + 16 kg/m² of microsurfacing
 - With a double layer surface dressing 6/10 mm and 2/4 mm **1.59 kg/m² of bitumen**
1 kg/m² for the first layer + 1.3 kg/m² for the second of 69% emulsion
 - With a double layer microsurfacing **1.65 kg/m² of bitumen**
slurry seal 0/4 + microsurfacing 0/6 : all together 22 kg/m²

Technical interests

› Excellent surface characteristics

- *No loose chipping in the future thanks to the final microsurfacing*
- *Skid resistance improved on a second step thanks to the appearance of the tops of the chips of the surface dressing*





Environmental interests

› A reinforced durability

- With Cape Seal, the macrotexture of the chips brings a good level of friction in time (especially in the wheel paths)
- No routine maintenance : no loose chipping

› Environmentally friendly

- Based on cold processes using bitumen emulsions
- Produced and laid directly on the jobsite (reduction of the emissions due to the transport)
- Acoustic performance :
 - 2 dBA lower in comparison with a surface dressing

Site organization interests

› Furtive jobsites :

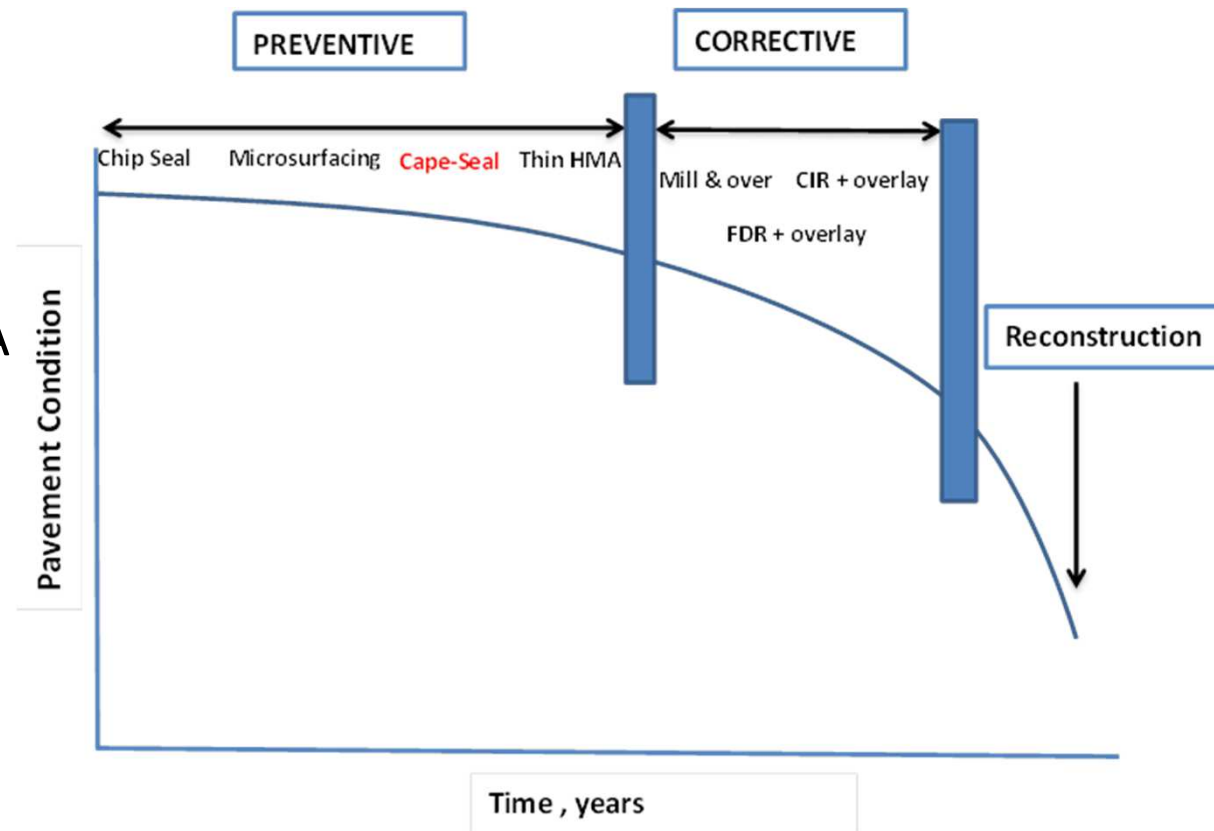
- *One single company for the whole laying*
- *Very fast realization*
 - *Cape Seal can be applied in 1 day*
 - *Rate of application up to 15 000 m² / day*
- *Less inconveniences to the road users*



Economic interests

› A cost effective way

- A **preventive** maintenance solution
- Fill the gap between chip seal and HMA
- Alternative to **more costly overlay**
- To **extend the life** of city roads
- Raises **the value of the street**
- To **delay** heavier corrective works



A range of products fitting
with each type of road

| 3



The use limits

- › Given the delicacy of the operation involving 2 products, there should be clear and effective communication between the 2 contractors
- › Compulsory cleanliness of the support to ensure a good bonding
- › No reinforcement capacity
- › Deformation of the support < 20 mm
 - Measured by the 3 meters beam

Worldwide technic

- Two well-tried products
- Coverage over a wide area
- Availability even in remote areas
 - Use of local aggregates
 - Emulsion plants
 - Qualified team



> Florida Cape Seal -on existing pavement

■ Step 1 : Road preparation

- Corrections of defects : pre level , ruts or cracks filling

■ Step 2 : Chip Seal application

- Apply CRS-2 emulsion 0,35 gal / SY (1,6 l/m²)
- Spread stone (5 – 10 mm) 18 – 20 Lbs /SY (10 – 12 kg/ m²)

■ Step 3 : Microsurfacing Application

- Remove excess aggregates if needed
- Apply ISSA Type II (ISSA A-143) 28 – 30 Lbs /SY (15 – 18 kg / m²)

Delay between chip seal and microsurfacing are variable depending on local specifications

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› Example of Cape Seal, Quebec— over granular base

▪ Context for municipalities

- Take in charge of 50% of roads
- Some of their roads are still with a granular base as wearing course
- Imbalance in the number of kilometers of roads to the number of inhabitants. Lack of monetary resources of municipalities seeking maintenance of their roads to average costs
- Want to find economical technique with a surface texture similar to asphalt overlay

Example of Cape Seal ,Quebec – over granular base

▪ Step 1 : Road preparation

- Overlay if necessary / Reshape / prime-coat

▪ Step 2 : Chip Seal application

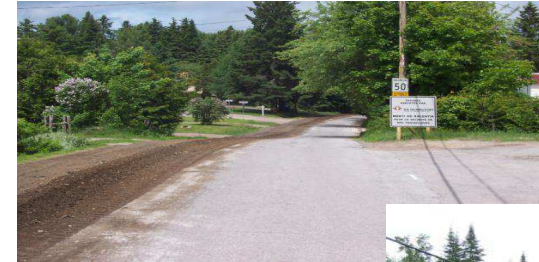
- Apply emulsion (CMS or HF) 0,47 gal / SY (2,2 L/m²)
- Spread stone (0 - 20 mm) 46 Lbs /SY (25 kg/ m²)

▪ Step 3 : Microsurfacing Application

- Apply ISSA Type III (ISSA A-143) 30 Lbs /SY (15 – 18 kg / m²)

Delay between chip seal and microsurfacing :
1 to 2 weeks

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Example of Cape Seal in Chile

Two options for granular subgrade

Chip Seal	Mono – Layer 10/20	18 – 21 Kg/m ²
	Cationic Rapid setting emulsion	1,8 – 2,1 kg/m ²
Microsurfacing	Aggregates 0-6 or 0/10	15 – 17 kg/m ²
	Cationic quick set emulsion	1,5 – 1,8 kg/m ²

Two options for existing asphalt course

Chip Seal	Mono – Layer 5 / 12	13 – 16 Kg/m ²
	Cationic Rapid setting emulsion	1,3 – 1,6 kg/m ²
Microsurfacing	Aggregates 0-6 or 0/10	11 – 15 kg/m ²
	Cationic quick set emulsion	1,1 – 1,5 kg/m ²

› Laying

- The microsurfacing is laid immediately after the chip-seal, on the same day



Belgium : « surface dressing sealed by a microsurfacing »

› Specificities of Cape Seal in Belgium :

- Surface dressing :

Grading of the chippings (mm)	Dosing of chippings (l/m ²)	Dosing of residual binder (kg/m ²)
4/6,3	4 à 6	1
6,3/10	5 à 7	1,2

Microsurfacing :

Grading of the microsurfacing (mm)	Spreading rate (kg/m ²)
0/4	17,5
0/6,3	19
0/10	19

› Laying

- No traffic on the surface dressing
- The microsurfacing is laid immediately after the surface dressing, on the same day



France

- › Surface dressing + GRIPFIBRE®
 - Chips 6/10 mm for the surface dressing
 - Dosage of the emulsion according to the french SETRA 1995 Guide
 - Dosage of the chips slightly underdosed (5 to 7 l/m²) comparatively to the 1995 guide (8 to 9 l/m²)
 - Grading 0/6 mm for the GRIPFIBRE® (16 kg/m²)



A sharp technique | 4

Very specific know-how

- › Highly skilled teams with the specific know-how are required
- › The product is not produced in a plant but directly on the jobsite
 - Dosages will have to be adjusted to the conditions
 - Build up cohesion of the emulsions has to be monitored
- › The contractor has to master the re-opening to traffic in order to ensure the safety of road users



CONCLUSION CAPE SEAL

- › An effective maintenance technique
- › Should be more widely used among the countries especially in Europe
- › Economic and environmentally friendly
- › Key product in a period of financial restraints