



Frameworks for Microsurfacing and Chip Seal Project Selection: *The Key to Long-Term Performance*

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Background

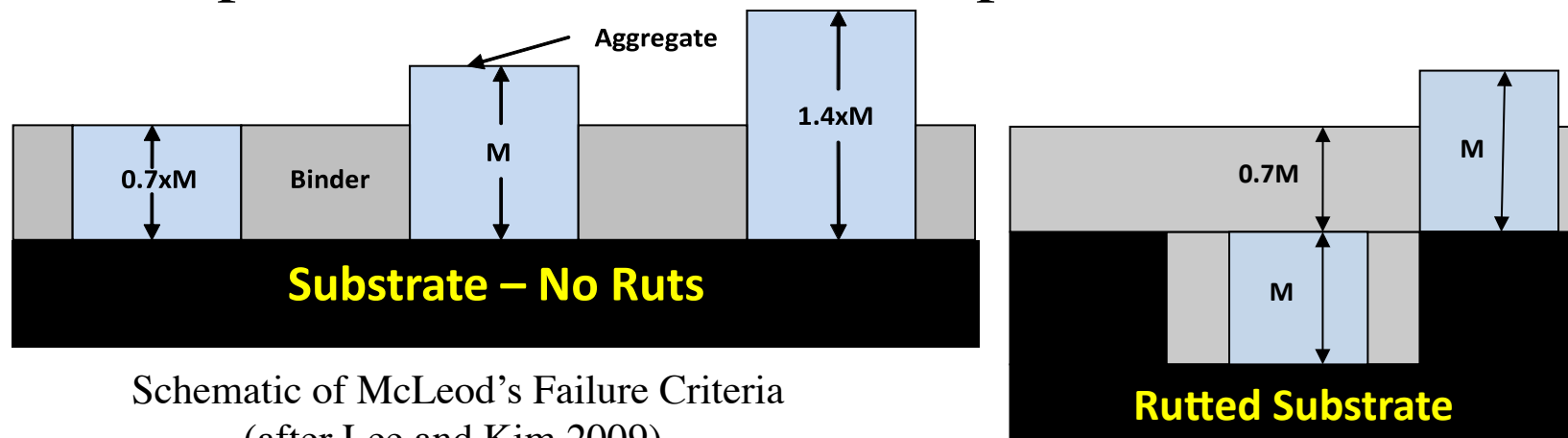
- **The Pavement Preservation mantra:**
 - “Place the right treatment, on the right road, at the right time” (Galehouse, Moulthrop, & Hicks, 2003)
- **Project Selection = Right road & time**
- **Chip Seal & Microsurfacing have no structural capacity**
 - Cannot repair failed pavement
 - Will fail early is placed on the wrong substrate.

Pavement Preservation Project Selection Factors

- Evaluate pavement distresses in substrate
- Evaluate surface texture;
- Evaluate traffic conditions: volume, speed, percentage of trucks, need for traffic control etc.;
- Evaluate climatic and seasonal characteristics;
- Evaluate options available aggregate selection;

Surface Distress: Rutting

- Rut cause
 - Mix instability/structural failure: not a PPT candidate
 - Layer densification/Abrasion: Chip seal if –
 - Rut depth < Average Least Dimension (M) of Chip
 - Depth > M: Micro to fill ruts prior to PPT



Schematic of McLeod's Failure Criteria
(after Lee and Kim 2009).

Surface Distress: Oxidation/Raveling

- With severe map cracking – no PPT
- Severe raveling – Chip seal
 - General – double treatment
 - Localized – single treatment with chip large enough to fill voids left by raveling
- Minor cracking - Microsurfacing

Surface Distress: Bleeding

- Amount of bleeding/flushing determines appropriate treatment
- Minor/localized: Chip seal
- Minor/localized to the wheel paths: Micro
- Major/localized to the wheel paths: Retexture prior to PPT to remove excess bitumen
 - Shotblasting
 - Micromilling
 - Ultra High Pressure Watercutting

Shotblasting



Micromilling



Watercutter Retexturizing in New Zealand



BEFORE

AFTER



Surface Distress: Friction Loss

- Reason for friction loss drives PPT selection
- Bleeding in wheel paths – retexture to regain skid numbers...no need for surface treatment
- Polishing – Micro or chip seal
 - Strip seal
 - Micro in the wheel paths only
 - If minor rutting,
either full width
 - Greater rutting, micro rut fill + full width



Surface Texture/Hardness

- Important not to add bitumen where there is already too much.
- Use data to select aggregate size/gradation
- Soft surface = early failure from flushing/loss of skid resistance.
- Measure using TNZ T/3 Sand Circle Test or ASTM Sand Patch.



Traffic Conditions

- Traffic-related PPT selection issues
 - Time to open to traffic
 - Cost of traffic control
 - Congestion in work zones
 - Night work
 - Aggregate “whip-off” – windshield breakage
 - Binder “whip-off” – Claims for removal from paint
 - Local “sensitivity” to construction issues
 - Upper management “sensitivity” to complaints

Traffic Conditions

- Post construction issues
 - Road noise
 - Need for drainage
 - Maintenance of skid numbers
- Chip seal
 - ü Traffic control during cure
 - ü Temperature sensitivity during night work
 - ü “Big” chips
 - ü High road noise
 - ü Great drainage
- Microsurfacing
 - ü Open to traffic fast
 - ü Not as sensitive to cool temperatures
 - ü “Little” chips – no whip-off
 - ü Low road noise
 - ü Low drainage

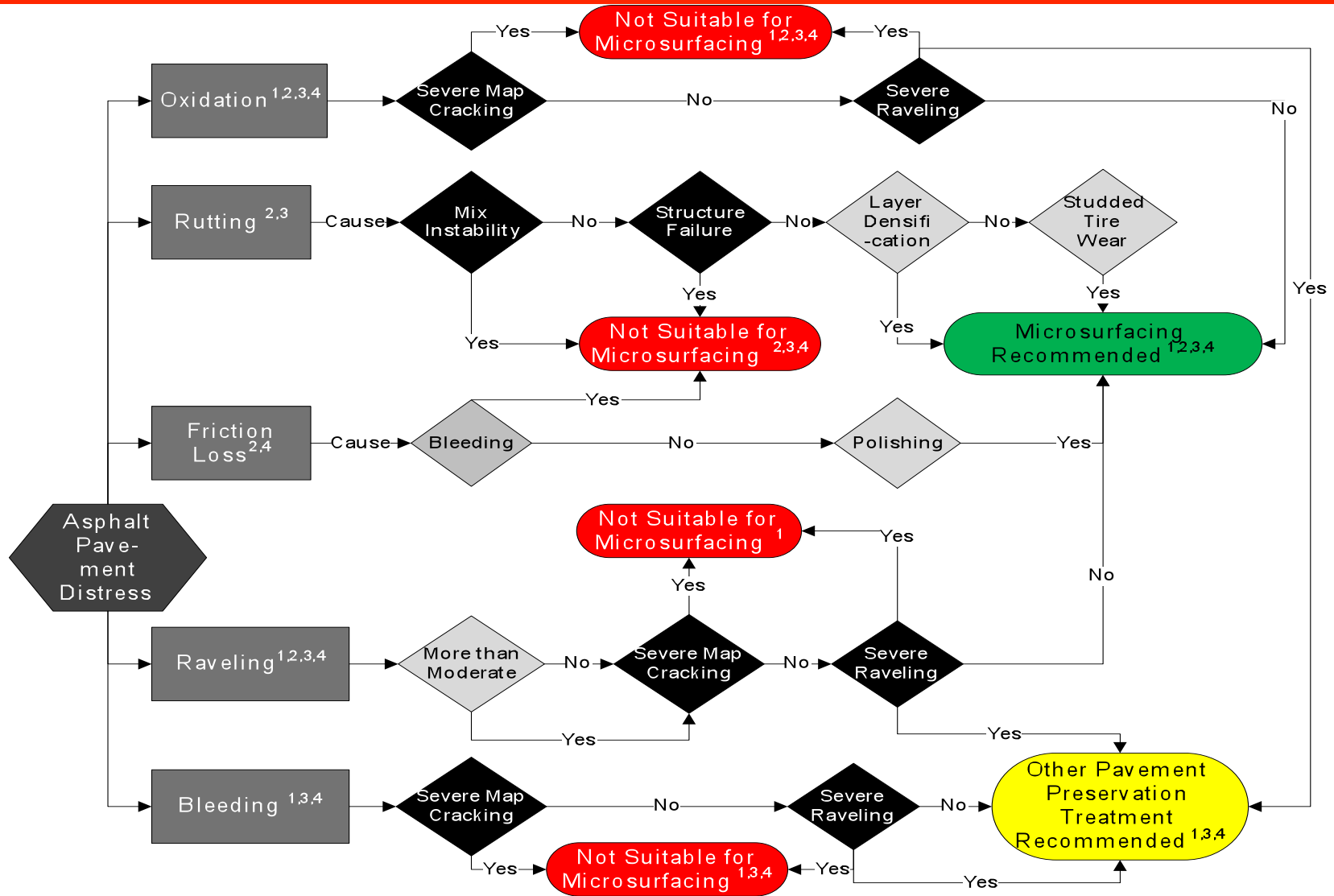
Climatic and Seasonal Conditions

- Length of season
 - Let as early as possible to give maximum time to install without temperature constraints
- Potential for sudden rain showers
- Need to snow plow; Use of chains/studded tires
- Chip seal – more temperature/weather sensitive than micro

Available Aggregate

- Aggregate quality
 - Aggregate degradation during construction – changing the gradation on the road’s surface
 - Aggregate degradation after construction – polishing, fracturing
- Micro requires high quality aggregate
 - time since crushing: “hot” rock – surface free energy
- Chip seal
 - Minimize number of times it is handled

Microsurfacing Framework - Asphalt



Summary

- PPTs are shown to be cost effective IF:
 - Applied to good substrate
 - Applied with a bias to long-term performance versus a bias to short-term complaints
- MUST characterize the surface before selecting PPT
- Need to DESIGN these treatments rather than treat like a commodity.
- Local knowledge trumps research

Questions???

