

# White Paper: Strategic Asphalt Pavement Management and Sealcoating Guidelines

## Pavement Asset Classification

For the purpose of maintenance planning and resource allocation, asphalt pavement infrastructure is systematically classified into three primary categories: residential, commercial, and public roadways. A facility such as a public library is appropriately designated under the commercial building category due to its traffic volume and functional requirements, guiding the selection of suitable maintenance protocols.

## Asphalt Pavement Composition

Asphalt pavement is an engineered composite material predominantly composed of approximately 95% aggregate (crushed stone, sand, and gravel) and 5% bitumen. The aggregate provides the necessary structural framework, while bitumen, a viscous hydrocarbon binder derived from crude oil, acts as the cohesive agent. The performance and durability of the pavement can be optimized through the incorporation of supplementary materials, such as Recycled Asphalt Pavement (RAP) and chemical modifiers.

## Benefits of Asphalt Sealcoating

The implementation of a strategic sealcoating regimen is a critical measure for asset protection, significantly extending the service life of asphalt pavements. Sealcoating functions as a barrier, effectively mitigating the deteriorating effects of environmental factors, such as UV radiation and water intrusion, and chemical exposure from vehicle fluids. This proactive measure substantially reduces the frequency and associated costs of major rehabilitation or replacement.

- **UV and Oxidation Protection:** Shields the pavement from sun damage, which causes the bitumen to harden and become brittle, leading to surface cracking.
- **Water Intrusion Prevention:** Fills surface voids and hairline cracks, preventing water from penetrating the base layer, which is the primary cause of structural failure (potholes and alligator cracking).
- **Chemical Resistance:** Creates a barrier against damaging fluids like oil, gasoline, and de-icing salts.
- **Aesthetics and Curb Appeal:** Restores the pavement's original rich black color, enhancing the property's overall appearance.

- **Cost-Effectiveness:** Extends the pavement life cycle, offering substantial savings compared to premature resurfacing or replacement.

## Considerations and Requirements for Sealcoating

While sealcoating is highly beneficial, successful application requires strict adherence to specific procedural and environmental conditions.

### Potential Drawbacks and Requirements:

- **Periodic Reapplication:** To sustain its protective and aesthetic qualities, the sealant requires reapplication on a cyclical basis, typically every 2-3 years.
- **Optimal Environmental Conditions:** Application must be conducted when both the ambient and pavement temperatures are consistently above 50°F (10°C) and when no precipitation is forecast for the immediate post-application period.
- **Limited Structural Repair:** Sealcoating is strictly a preventative surface treatment and does not possess structural repair capabilities. All necessary structural damage (e.g., significant cracks, potholes) must be completed and cured prior to sealant application.
- **Application Quality:** Substandard or uneven application can compromise long-term effectiveness, potentially resulting in issues such as peeling, flaking, or premature wear.
- **Mandatory Curing Period:** The treated surface must be allowed an adequate curing period to ensure the sealant is fully hardened and non-slip before being opened to vehicular traffic.

## Industry Guidelines and Standards

While no specific sealcoating standards are issued by the International Organization for Standardization (ISO), authoritative organizations such as the **Asphalt Institute** and the **International Slurry Surfacing Association (ISSA)** provide comprehensive best-practice guidelines. These recommendations emphasize:

- **Meticulous Surface Preparation:** Ensuring the pavement is impeccably clean and free of all contaminants.
- **Appropriate Material Selection:** Utilizing asphalt emulsion mixes that align with the specific application and traffic demands.
- **Uniform Application:** Employing suitable equipment to ensure a consistent and even layer thickness.

- **Strict Adherence to Specifications:** Following the material manufacturer's curing and application instructions precisely.

## Recommended Sealcoating Schedule

Pavement Type	Initial Application	Regular Maintenance	Rationale
New Asphalt	Minimum of 90 days to 1 year, or after the first winter	Not Applicable	Premature sealing can trap volatile oils, leading to softening, peeling, and
Residential	After Initial Cure	Every 2 to 3 years	Lower traffic volume and load stress.
Commercial Lots	After Initial Cure	Every 1 to 2 years	Increased load capacity and higher traffic intensity demand a shorter

**Adjustment Note:** The frequency of sealcoat application must be increased for pavements located in harsh climate zones or those subject to unusually high traffic volumes and loads.

## Indicators Signaling the Need for Sealcoating

The following observable pavement characteristics are reliable indicators that a sealcoat application is necessary:

- The pavement surface exhibits a significant faded or gray color, indicating oxidation.
- The appearance of fine, hairline cracks across the surface.
- Water no longer exhibits a "beading" (hydrophobic) effect on the surface.
- Oil and gas stains are visibly being absorbed into the asphalt matrix.
- The pavement has not received a sealcoat application in five or more years.

## Temperature and Best Practices Constraints

### Temperature Constraints:

Cold ambient conditions significantly compromise sealcoating effectiveness. If the ambient temperature falls below 50°F (10°C), the chemical adhesion of the sealant to the asphalt surface

will be substantially reduced. This poor adhesion leads to rapid wear, premature fading, cracking, and increased susceptibility to structural failures like potholing.

#### **General Sealcoating Best Practices:**

1. **Pavement Suitability:** Sealcoating is best suited for low-to-moderate traffic areas (e.g., residential driveways, commercial parking lots). It is generally not recommended for high-traffic public roadways due to potential concerns regarding reduced traction and excessive rapid wear.
2. **Preparation:** The pavement must be meticulously cleaned—free of dirt, debris, and petroleum-based contaminants—to guarantee optimal sealant adhesion. All existing cracks must be professionally sealed prior to the surface treatment.
3. **Material Selection:** The choice of sealcoating material (e.g., asphalt emulsion, coal tar, acrylic) must be judiciously made, considering the specific application, anticipated traffic volume, and adherence to all local environmental regulations (e.g., VOC restrictions).
4. **Curing Time:** An adequate curing period, typically 24–48 hours depending on prevailing weather conditions, is essential to ensure the seal coat is fully cured before the pavement is reopened to vehicular traffic.

#### **Conclusion and Professional Experience**

The strategic maintenance of asphalt pavement is a critical component of overall facility asset management. Based on extensive professional experience managing over 50 commercial parking lots, the diligent adherence to the recommended sealcoating schedules and best practices detailed herein has proven to be an exceptionally cost-effective strategy. In a portfolio managed for over 30 years, only one lot required total replacement—a facility acquired without a proper maintenance history. The approximate cost for replacing that one deteriorated lot was \$85,000, which is comparable to the scale of the new library parking lot. This experience demonstrates that preventative sealcoating is paramount to maximizing the lifespan and minimizing the life-cycle cost of asphalt assets.

**Prepared By: John M. Zeller Construction Consultant Building Expansion Committee**