

WELCOME



Best Practices for Commercial and Industrial Parking Lots



2019 63rd Annual Asphalt Paving Conference

Join us April 10-11, 2019

Commercial and Industrial Parking Lot Training

SCHEDULE

Wednesday, April 10	Thursday, April 11
8:00 am - Registration	8:00 am - 12:00 pm - Training
8:30 am - 1:00 pm - Training	1:00 pm - 4:00 pm - Training
5:30 pm - 10:00 pm - Dinner, transportation, and beverages included with registration.	

Reserve Your Spot Space is Limited

APAM

- How to Build**
Considerations for Constructing Quality Pavements
- How to Maintain**
Maximize the ROI of Your Pavement Investment
- How to Rehabilitate**
Proactive Pavement Rehabilitation Options
- What Lies Ahead**
The latest in Asphalt Technologies

APA ASPHALT PAVEMENT ALLIANCE

Dan Staebell

Asphalt Pavement Alliance

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Research & Technology

Pavement Economics Committee

- 4 Task Groups

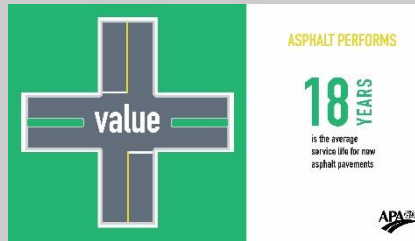
Other Research

- Asphalt Institute
- NCAT

Future Research

Market Research & Communications

Go-To-Market Task Group



Deployment Activities

Deployment Task Group



ASPHALT PAVEMENT ALLIANCE

To establish asphalt pavement as the preferred choice for quality, performance and the environment.



Mission

Total Tons

Table 3: Summary of 2017 Estimated and Reported Asphalt Mixture Tons in Each State

State	Tons, Millions		Reported % of Estimated	State	Tons, Millions		Reported % of Estimated
	Estimated	Reported			Estimated	Reported	
Alabama	7.0	4.9	70%	Montana	4.2	*	*
Alaska	5.1	*	*	Nebraska	2.8	0.5	18%
American Samoa	0.03	*	*	Nevada	3.4	1.3	38%
Arizona	6.5	1.2	18%	New Hampshire	3.0	2.5	83%
Arkansas	6.0	1.9	32%	New Jersey	10.2	4.0	39%
California	26.0	5.9	23%	New Mexico	3.0	0.9	30%
Colorado	5.3	2.0	38%	New York	16.5	7.3	44%
Connecticut	4.9	2.8	57%	North Carolina	16.0	6.4	40%
Delaware	1.5	*	*	North Dakota	2.7	1.2	44%
District of Columbia	1.4	*	*	Ohio	14.8	11.6	78%
Florida	16.5	4.6	28%	Oklahoma	4.8	2.4	50%
Georgia	14.6	2.2	15%	Oregon	5.4	1.4	26%
Hawaii	1.1	0.8	73%	Pennsylvania	19.8	7.7	39%
Idaho	2.8	1.7	61%	Puerto Rico	1.6	NCR	NCR
Illinois	13.0	2.1	16%	Rhode Island	2.0	*	*
Indiana	11.8	6.6	56%	South Carolina	7.6	3.9	51%
Iowa	3.9	1.6	41%	South Dakota	2.0	*	*
Kansas	2.0	1.1	55%	Tennessee	9.2	2.5	27%
Kentucky	4.4	4.4	100%	Texas	20.0	7.9	40%
Louisiana	7.8	1.2	15%	Utah	4.0	3.5	88%
Maine	1.7	2.0	118%	Vermont	1.9	*	*
Maryland	7.8	2.4	31%	Virginia	12.0	4.9	41%
Massachusetts	6.5	5.0	77%	Washington	6.0	4.5	75%
Michigan	13.7	9.0	66%	West Virginia	2.6	1.5	58%
Minnesota	6.9	6.0	87%	Wisconsin	12.0	8.7	73%
Mississippi	4.8	2.8	58%	Wyoming	2.5	0.1	4%
Missouri	6.5	3.9	60%	Total	379.4	163.0†	43%

NCR No Companies Responding

* Fewer than 3 Companies Reporting

† Total Reported Tons includes values from state with fewer than 3 Companies Reporting

SAPA Estimated Tons

Numbers do not add up exactly due to rounding

Asphalt Pavement
Industry Survey on
Recycled Materials and
Warm-Mix Asphalt Usage
2017

Information Series 138

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Commercial Tons

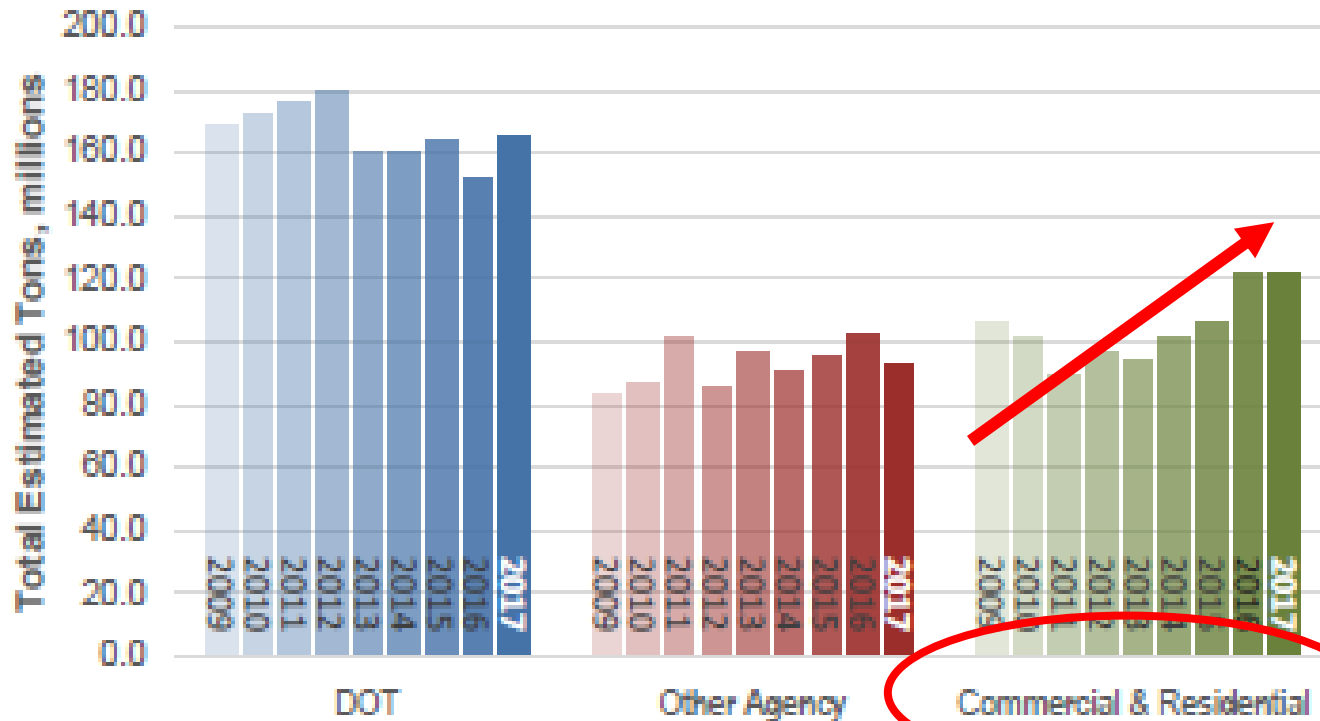


Figure 2: Estimated Total HMA/WMA Asphalt Mixture Production by Sector, 2009–2017

Asphalt Pavement
Industry Survey on
Recycled Materials and
Warm-Mix Asphalt Usage
2017
Information Series 138

Big NEED

- As of 2015, the Bureau of Transportation Statistics estimates that there are over 250 million registered light vehicles (car, light trucks and motorcycles) in the United States. While estimates of parking totals have varied, most studies conclude that we have between 4 and 8 parking spaces per vehicles in this country. Perhaps that number isn't terribly surprising. After all, we park our cars at home, at work, at church, at the shopping mall, etc. But combined, that means we have between **1 billion and 2 billion parking spaces in America alone.**
- Billions of parking spaces is a lot, but it can be tough to wrap your head around that number. So, if we were to build 1 billion parking spaces side by side, it would cover an area equivalent to the size of Connecticut.....

<https://av-future.com/impact/parking/>



Have you ever heard this?

It's just a
parking lot!
It is a
parking lot!



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7 Keys

Handout

- Pick your Mix
- Dig Deep
- Drain the Rain
- Build a Base
- Trucking Along
- The Green Scene
- Pave and Save

Pay attention to details

7 Keys to Highly Successful Parking Lots

Information courtesy Plantmix Asphalt Industry of Kentucky
www.paiky.org

1 PICK YOUR MIX
Asphalt mixtures can be manufactured with different combinations of aggregates, liquid asphalt, and additives and should be designed specifically for the application. The combination of materials that perform well in a parking lot typically are different from those used on high-traffic roadways. Long-lasting parking lot mixtures should be fine graded to prevent moisture intrusion and should have a high liquid asphalt content for durability.



3 DRAIN THE RAIN
Water can be detrimental to a soil subgrade and paving materials so drainage should be a strong consideration in the design and construction of any parking lot. The pavement surface must be sloped to provide adequate drainage and to avoid low areas that could lead to ponding of water. A minimum combined slope of 2 percent is recommended. In contrast, porous pavements are different and are designed so that the water drains through the surface pavement layers and is slowly released to the underlying ground. For more information on porous asphalt pavements, visit www.porouspavement.net.



2 DIG DEEP
The quality and strength of existing subgrade soil is a significant factor in the design and performance of your parking lot. Perform a geotechnical analysis and testing to establish current site conditions which will guide site grading activities in terms of moisture content and compaction. The pavement thickness will be heavily influenced by the strength of the onsite soils.



4 BUILD A BASE
All structures need a solid foundation and a well-prepared base will pay dividends in building a long-lasting pavement structure. Quality materials and good compaction are essential to establish a strong working platform. Most projects will use a 4- to 6-inch layer of compacted dense-graded aggregate (DGA), which serves as an important foundation for the pavement system.



5 TRUCKING ALONG
Passenger cars, pickup trucks, and sport utility vehicles are relatively lightweight and have little influence in pavement thickness. In contrast, the anticipated size, weight, and frequency of commercial trucks are sensitive parameters in this analysis and will have a big influence on pavement thickness. The cumulative effect of traffic may be expressed as Equivalent Single Axle Loads (ESALs) for the purpose of pavement design.



6 THE GREEN SCENE
Asphalt is the most recycled product in America and experts recognize that mixtures using reclaimed asphalt pavement (RAP) result in quality pavements. Recycling and reusing materials saves landfill space and is environmentally responsible. Some asphalt producers also recycle asphalt roofing shingles (RAS), use warm-mix asphalt to conserve fuel and improve compaction, and producing porous asphalt mixtures that are used in porous pavements for stormwater management. On building projects with requirements for LEED, these green materials and practices may assist designers and owners in achieving certification.



7 PAVE AND SAVE
With proper base preparation and DGA placement, the asphalt mixture can be evenly placed and well compacted for optimal performance. Quality paving contractors are capable of building parking lots to meet compressed building schedules to better serve their customers. Asphalt pavements remain the most versatile and economic pavement product and have decades of proven performance.





LEARN MORE AT WWW.DRIVEASPHALT.ORG

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Pick your Mix

- Parking vs. Highway
 - Static
 - Rolling



The Glue that Binds!

- Asphalt Cement Binder - **Important**
 - What is PG
 - What grade and Where?

Viscoelastic = Materials that are time and temperature susceptible.



2018 ASPHALT PARKING LOT DESIGN GUIDE

CHAPTER 3 — CONSTRUCTION

20-Year Design ESALs	Typical Use	Asphalt Mixture Type	Subgrade Type		Asphalt with Crushed Aggregate Base		Recommended Surface Layer PG Binder Designation
			Rating	Description	Total Asphalt Thickness (in.)	Base Thickness (in.) [1]	
< 2 million	Residential driveways School and recreational areas Playgrounds and tracks Bike paths Sidewalks Parking lots (<50 stalls)	LT	Good-to-excellent	Gravels and coarse sands. SSV ≥ 5.0	3.0	6.0 - 8.0	S
			Medium	Clays and silts with low plasticity. SSV = 4.0 - 4.9.	3.5	6.0 - 10.0	S
			Poor	Clays and silts with high plasticity; sugary (incompactable) sands. SSV = 2.5 - 3.9.	4.0	9.0 - 12.0	S

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< 2 million	Low-volume roadways Subdivision streets Collector streets Town roads County roads Parking lots (≥50 stalls)	LT	Good-to-excellent	Gravels and coarse sands. SSV ≥ 5.0	3.0 - 3.5	6.0 - 10.0	S or H
			Medium	Clays and silts with low plasticity. SSV = 4.0 - 4.9.	3.5 - 4.0	6.0 - 12.0	S or H
			Poor	Clays and silts with high plasticity; sugary (incompactable) sands. SSV = 2.5 - 3.9.	4.0 - 4.5	9.0 - 14.0	S or H

[1], [2] Because a parking lot asphalt pavement is likely to be re-constructed in the future without replacing the base, it may be desirable to use a thicker base course than those specified here. Consider adding up to four inches when considering base thickness for parking lot pavements.

Pick your Mix

- Understand Asphalt Cement – Binder
 - Proper % Binder
 - Performance Grade (PG)
 - Ask for guidance!
 - Physical Location of Use
 - Base or Surface
 - Polymer additives
- **Warning:** Improper Selection can result in:



Not Stiff

Just Right!

Mix Targets

- Start with trials to learn best fit.
- Learn from variations
- Monitor and QC Checks

Typical AC Values @ 4% Air Voids

NMAS	VMA	0% ABS	1% ABS	2% ABS
9.5mm (3/8")	15.5	5.0%	5.6%	6.2%
12.5 mm (1/2")	14.5	4.6%	5.2%	5.8%
19mm (3/4")	13.5	4.2%	4.8%	5.4%

Add 0.2% to above AC values to achieve 3.5% Air.

- Possible use in lower lifts.
- Surface = Performance testing?

Rap Percent Use

- Manage Percentage
- Liquid Binder
- Mix Design = Performance

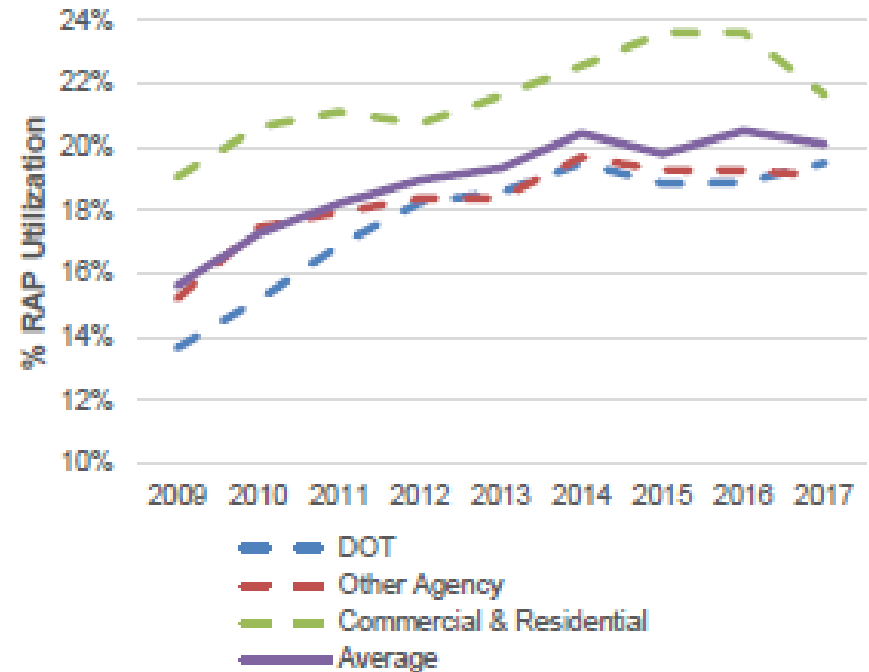


Figure 5: Average Percent RAP Used by Sector

Dig Deep

- Subbase Platform
 - Understanding Support = Critical Part of Design
 - Investigate



Drain the Rain

- Moisture Bad
 - Subgrade
 - Surface $>1\%$
- Drainage System
- *“Pay me now or pay me later”*
- *Success starts from the ground up!*



Build A Base

- Structural Platform
- Paving Platform
- Type and Technique





Critical Pavement Design Loading and Pavement ESAL's

Trucking Along

- Nothing Temporary-Plan and design for the long term...
- 1 Loaded Semi = 3000 Cars
 - ESAL Calculation Pavement Interactive
- Cars Minimal Impact –
 - Design Minimum (See SAPA)

Pavement Thickness Schematic




Thickness Design Guides

PaveXpress
A Simplified Pavement Design Tool



PaveXpressdesign.com

PaveXpress PAVEInstruct Pavement Design Education Logout



Learning Pavement Design with PaveXpress

The PaveInstruct learning module is a web-based pavement design education system with video instruction by leading industry experts. PaveInstruct accompanies PaveXpress, a web-based software created to design flexible and rigid pavements using AASHTO 93/98. The education modules within PaveInstruct correlate with the design modules in PaveXpress and provide technically sound pavement design and instruction.

<p>PAVEInstruct</p> <p>Instruction</p> <p>Please click below to enter the PaveInstruct learning module system. Presentations are available in short clips or in full format.</p> <p>Learning Center</p>	<p>PAVEXpress</p> <p>Design</p> <p>Please click below to enter the PaveXpress design system.</p> <p>Learn More</p>
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The Green Scene



- Asphalt Pavement #1 Recycled Material
- RAP = Recycle Asphalt Pavement
 - Resources Saved / 100% Reusable
 - Aggregate
 - Binder
- LEED v4
- EPD's = Environmental Product Declarations

LEEDv4 USGBC

- 1-3 Points
- Recycle
- Storm Water
- EPD's



Asphalt Pavements & LEED v4

Asphalt offers sustainability benefits across the entire life cycle of a pavement — from production to placement, during in-use, and at end of life. As the most consistently recycled material in the U.S., asphalt has a proven track record of utilizing post-consumer recycled content. But it's not just about recycling.

Here are some of the ways asphalt pavements can help contribute to a project's LEED credits¹:

POINT 1

MRC Building Product Disclosure and Optimization – Environmental Product Declarations
Asphalt mix suppliers can readily develop product specific Type III EPDs using NAPA's Emerald Eco-Label Tool.

POINT 1

MRC Building Product Disclosure and Optimization – Sourcing of Raw Materials
Asphalt pavements commonly contain 15-40% recycled content, and sometimes as high as 100%. Recycled content is recognized under Option 2, Leadership Extraction Processes.

POINTS 2 UP TO

MRC Construction and Demolition Waste Management
Every new asphalt pavement contains the raw materials for the next generation of roads, runways, trails, and parking lots. If an old pavement is to be removed, the contractor can provide documentation of waste diversion.

POINTS 3 UP TO

SSc Rainwater Management
Porous asphalt pavements can be an important component of a building's stormwater management strategy.



Asphalt — Performance for a Lifetime
www.AsphaltPavement.org/sustainability

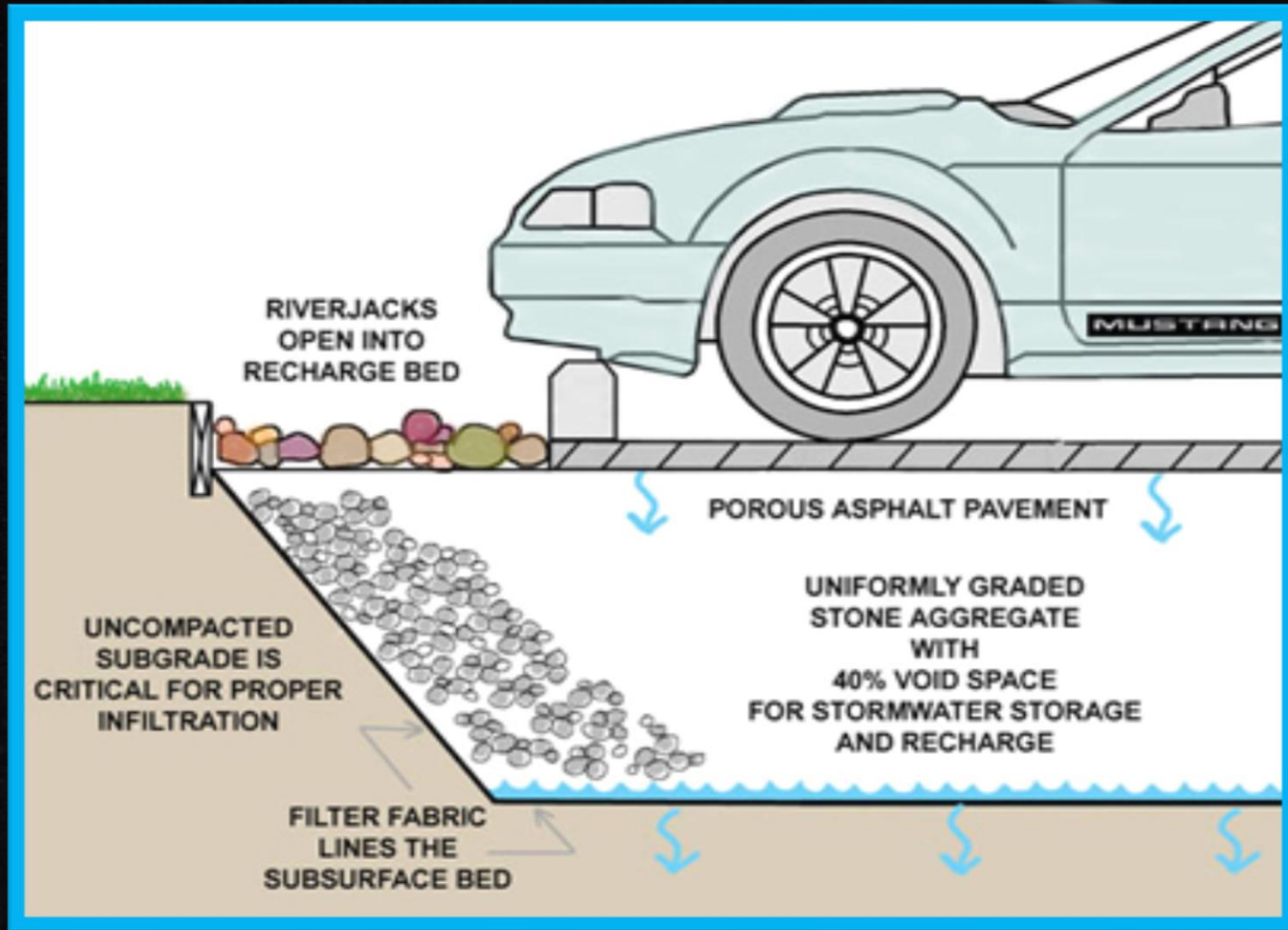
¹Credits listed here are available under LEED v4 BD+C: New Construction. Specific credits for other LEED programs may vary.
SSc = Sustainable Sites credit; MRC = Materials & Resources credit

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Porous Pavement



Porous Pavement



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https://youtu.be/_-5S9LIyYvQ

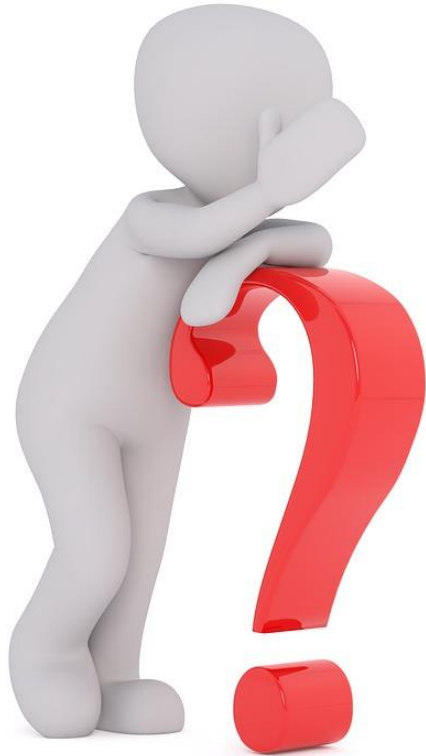




Pave and Save

Pave and Save

- Select Qualified Contractor
 - SAPA List
- Inspect – Inspect – Inspect
 - Oversight = Sleep like a baby!
- Ask Questions



Handy Checklist

Checklist for Parking Lots

To achieve the longest life, lowest maintenance costs, and best performance from an asphalt parking lot, the entire construction process should be monitored for the quality of both its materials and workmanship. It is important in case of claims that the parking lot be photographed before, during, and after construction. A new parking lot project begins with a subgrade of compacted soil and the base layers and continues through the paving process. The following checklist is designed to help the onsite inspector or owner's representative identify key aspects of the process and understand best practices known to produce a quality pavement project. The checklist is based upon national recommendations, local recommendations may vary depending upon climate, materials, and practices.

Project Review

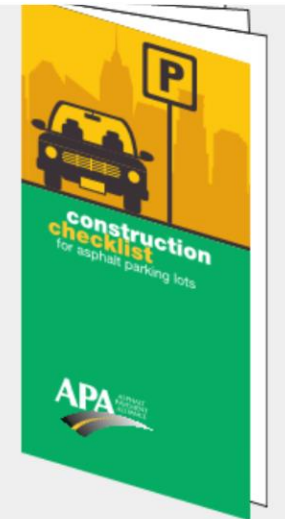
Every paving project should start with a detailed review of the project's contract, plans, and specifications. Any questions arising from this review should be directed to the design firm's

Asphalt Mixture

Prior to starting this project, the design engineers determined the depth of each pavement layer and the type of asphalt mixture to be used. Your responsibility is to verify that the correct, specified asphalt mixtures are coming to the site. You can check and collect the truck delivery tickets to verify and document asphalt type and tonnage arriving on the project.

Ask Yourself –

- ☐ Is this the correct mix type for the project and the layer you are constructing?
- ☐ Is the mix type specified being installed at the minimum lift thickness?
- ☐ Does the truck delivery ticket match the approved mix design?
- ☐ How many tons are estimated to pave the project?
- ☐ Does the paving foreman know how many tons he expects to use?
- ☐ How many dump trucks are scheduled to deliver the mix from the plant and how many tons are in each round?
 - The goal is to balance the mix delivery schedule to avoid having to start and stop the paving operation.
- ☐ Are there enough trucks on the run to haul the mix needed to complete the job?
 - If you have 5 trucks on the round each carrying 25 tons = 125 tons per round.
 - If each round takes 1 hour to make, then the production rate is 125 tons per hour.
 - If the job requires 1,000 tons at 125 tons per hour = 8 hours to get the mix to the job.
- ☐ Are the truck bodies cleaned of debris and are they tarped when they arrive on site?
- ☐ Is an approved release agent being used?
DIESEL FUEL is not allowed!
- ☐ Is the temperature of the mix arriving at the site within the project guidelines?



Contact us today
for your free copy of
Construction Checklist

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Recap

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- Dig Deep
- Drain the Rain
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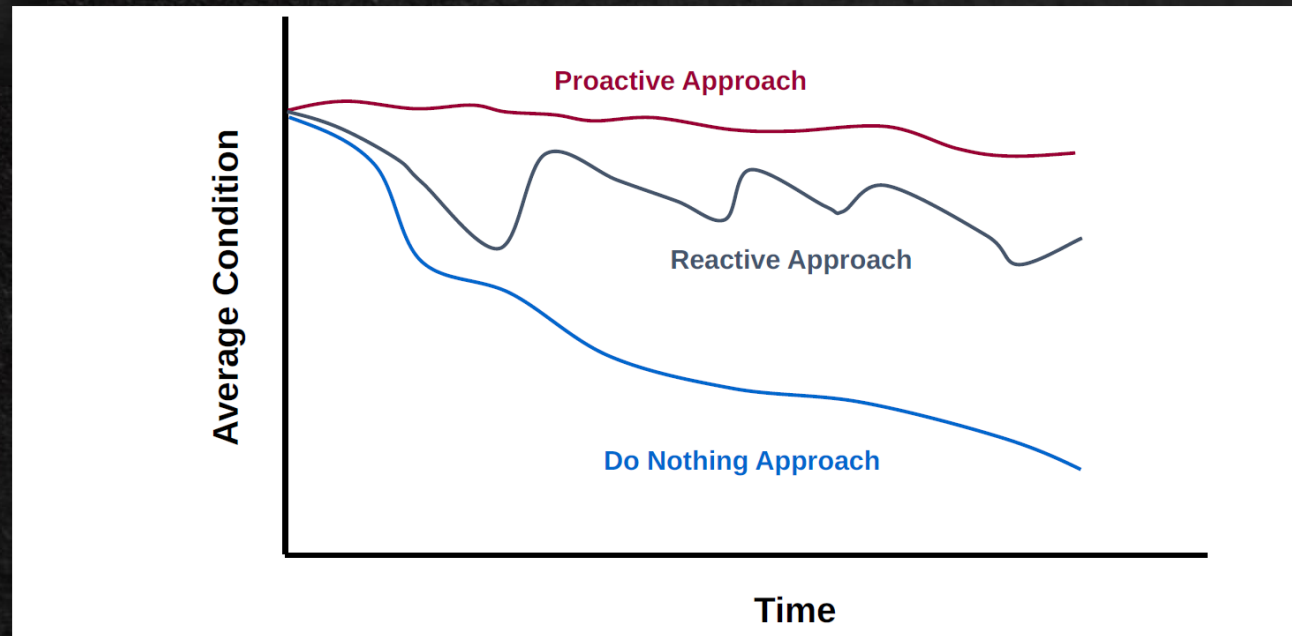
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Property Investment – Value



Which Approach?



Property Investment Strategy

- Undervalued Asset
- Define Asset Value
- Parking Lots vs Roadways

According to International Parking Institute stated...
In 2012, a surface lot parking space cost an average of \$4,500 to construct.



What Lies Ahead – Techniques

- Joint Construction



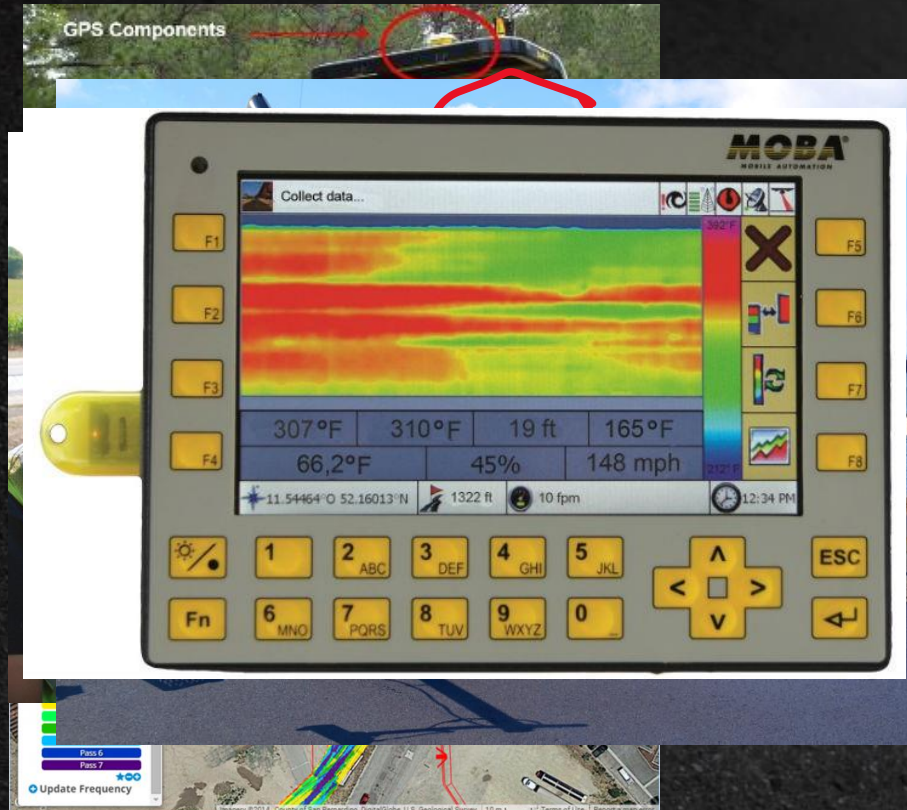
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What Lies Ahead – Equipment

- Joint Construction
- Intelligent Compaction
- Temperature Monitor



What Lies Ahead- Facilities

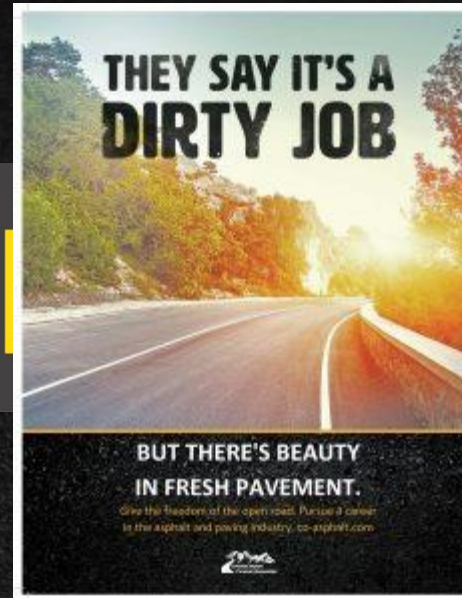
- Owners & Developers
 - Online Shopping
 - Heavy Duty Paving-Key
 - Repurpose Buildings
 - Repurpose Parking Lot
 - Adaptability – Flexible - Recycle



What Lies Ahead

- Construction Industry
 - Workforce Development
 - WOA
 - FFA
 - Millennials/Gamers

WO



What Lies Ahead

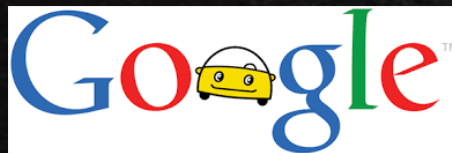
- Vehicle Changes
 - Electric Vehicles
 - Autonomous Vehicles
 - Cars
 - Trucks



Who Are the Primary Players Behind Next-gen Transportation?

Include:

- Amazon
- Intel
- Tesla
- Google
- Uber
- Lyft



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MY POINT – What Lies Ahead!

**Build for Today
with your EYE
on Tomorrow!**

- Build Flexible
- Watch for Change
- Understand Performance
- Seek Knowledge
- Look for Information
- Ask Questions

Which One?



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Asphalt Benefits

- Versatile
- Adaptable to change
- Fast
- Smooth
- Atheistically pleasing
- Durable
- Rehabilitation Option!



Close Out - Final

- Remember the Keys
- Lessons Learned
 - **It IS a Parking Lot**



Join us
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