BOLT-ON:

AN ACCELERATED HIGH-PERFORMANCE APPROACH TO WIDENING ROADS

TXAPA
Texas Asphalt Pavement Association

50 YEARS IN 50 DAYS

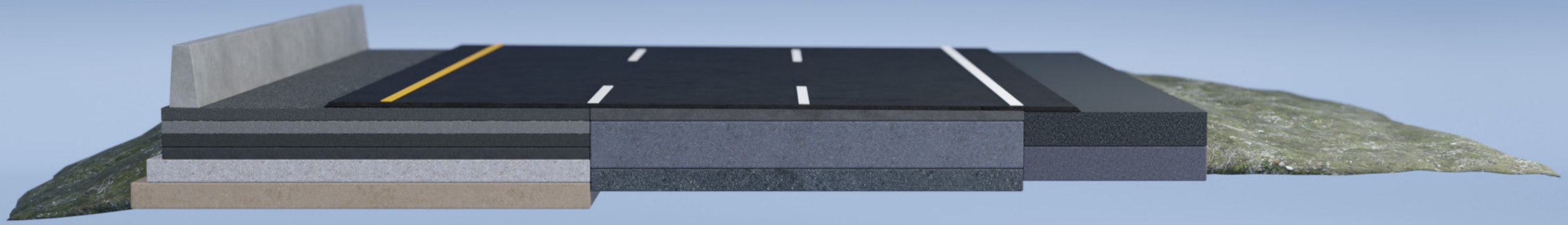
Texas Roads Under Pressure

- Texas is experiencing unprecedented population growth.
- Traffic volume, congestion, and pavement stresses are increasing.
- We need a strategy to expand the capacity of Texas roads **safely, quickly,** and **efficiently.**

According to Texas A&M's Texas Transportation Institute (TTI), the number of **registered vehicles in Texas has risen by 172 percent** in the past four decades. In that same period, **highway capacity has increased only 19 percent.**

What is Bolt-On?

- Adds **new lanes to existing roads** without disturbing the original pavement structure
- Works to widen either **asphalt** or **concrete** pavement structures
- **One mile** in each direction constructed in just **50 working days**
- **50-year service life** using **Heavy Duty Pavement** and **Perpetual Pavement** designs and renewable surfaces
- Maintains lane widths and a shoulder **increasing safety**



Bolt-On Integrates TxDOT Priorities

SAFETY

- CTBs (concrete traffic barriers) on inside lane only, maintaining lane and shoulder widths
- Accelerated construction times
- Fewer work zone reconfigurations

DELIVERY

- Construction completed in just 50 working days per lane mile
- Same specifications and bid process
- Faster delivery, less expensive, more value

BOLT-ON

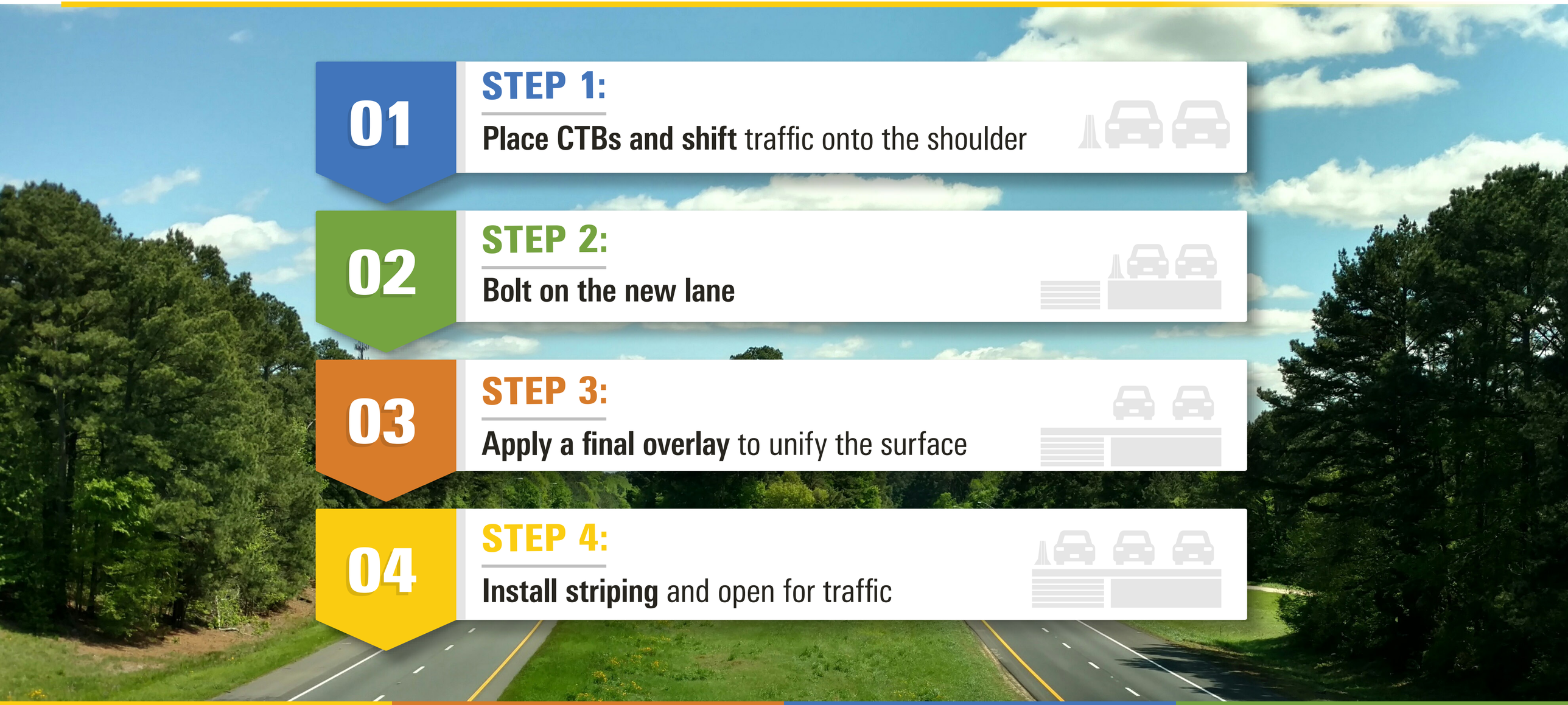
INNOVATION

- Up to 50 years of service life utilizing Perpetual and Heavy Duty Asphalt Pavement design concepts
- Utilizes existing resources, minimal disruption

STEWARDSHIP

- Best utilization of resources including existing pavement structure and bridges
- Renewable surface ensures usability with minimal disruptions for years to come

The Bolt-On Process



01

STEP 1:

Place CTBs and shift traffic onto the shoulder

02

STEP 2:

Bolt on the new lane

03

STEP 3:

Apply a final overlay to unify the surface

04

STEP 4:

Install striping and open for traffic

50 Working Days Start to Finish

Duration to construct one-mile in each direction:

DAYS 1-6:
Move traffic and set CTBs

DAYS 4-33:
Perform earthwork, stabilized base, prime coat, and surface treatment

DAYS 19-43:
Place HMA base/intermediate layers and move CTBs

DAYS 44-50:
Place final HMA surface and striping

Design and Materials

DESIGN CONCEPTS

Heavy-Duty Asphalt Pavement and **Perpetual Asphalt Pavement***

STRUCTURAL STRENGTH

- Resists bottom-up fatigue cracking
- Minimal to no rutting

DURABILITY

Resists damage due to heavy traffic volume and environment

PERFORMANCE

No significant structural rehabilitation needed throughout design life

MATERIALS OPTIONS

SMOOTH, LONG-LASTING

- SuperPave
- Stone Matrix Asphalt
- Modified Binders

SAFE, SUSTAINABLE

Permeable Friction Course

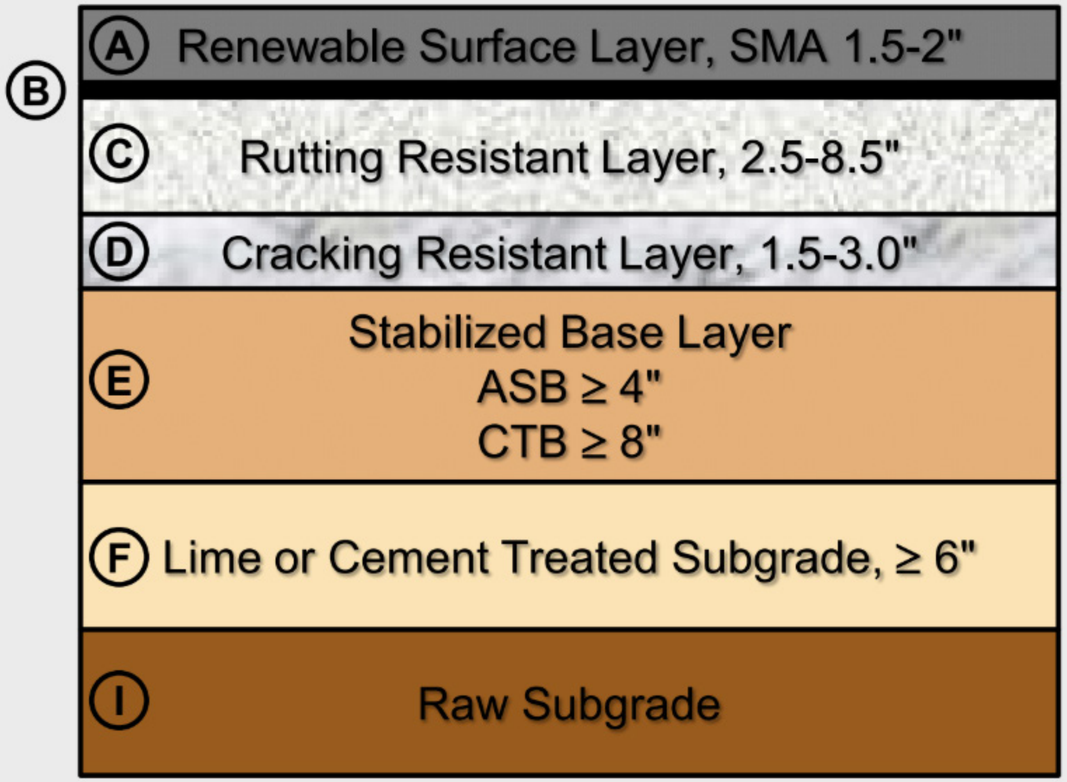
- Reduces wet-weather fatalities
- Can be used in storm water management

STRUCTURAL STRENGTH

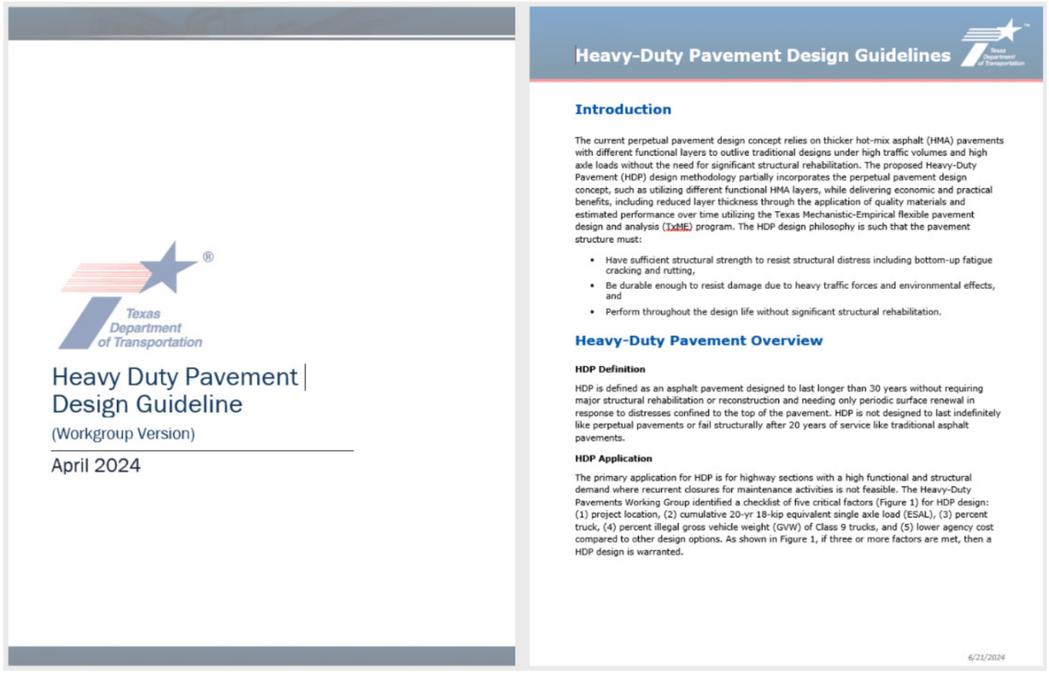
SuperPave-B and **SuperPave-C** mixes

**HDP functional layers are comparable to Perpetual Pavements but with reduced thickness.*

Heavy Duty Pavement Layer Structure



(a) For New or Reconstruction



Texas Department of Transportation

Heavy Duty Pavement Design Guideline

(Workgroup Version)

April 2024

Heavy-Duty Pavement Design Guidelines

Introduction

The current perpetual pavement design concept relies on thicker hot-mix asphalt (HMA) pavements with different functional layers to outlive traditional designs under high traffic volumes and high axle loads without the need for significant structural rehabilitation. The proposed Heavy-Duty Pavement (HDP) design methodology partially incorporates the perpetual pavement design concept, such as utilizing different functional HMA layers, while delivering economic and practical benefits, including reduced layer thickness through the application of quality materials and estimated performance over time utilizing the Texas Mechanistic-Empirical flexible pavement design and analysis (TxME) program. The HDP design philosophy is such that the pavement structure must:

- Have sufficient structural strength to resist structural distress including bottom-up fatigue cracking and rutting,
- Be durable enough to resist damage due to heavy traffic forces and environmental effects, and
- Perform throughout the design life without significant structural rehabilitation.

Heavy-Duty Pavement Overview

HDP Definition

HDP is defined as an asphalt pavement designed to last longer than 30 years without requiring major structural rehabilitation or reconstruction and needing only periodic surface renewal in response to distresses confined to the top of the pavement. HDP is not designed to last indefinitely like perpetual pavements or fail structurally after 20 years of service like traditional asphalt pavements.

HDP Application

The primary application for HDP is for highway sections with a high functional and structural demand where recurrent closures for maintenance activities is not feasible. The Heavy-Duty Pavements Working Group identified a checklist of five critical factors (Figure 1) for HDP design: (1) project location, (2) cumulative 20-yr 18-kip equivalent single axle load (ESAL), (3) percent truck, (4) percent illegal gross vehicle weight (GVW) of Class 9 trucks, and (5) lower agency cost compared to other design options. As shown in Figure 1, if three or more factors are met, then a HDP design is warranted.

6/21/2024

Source:

TxDOT Heavy-Duty Pavement Design Guidelines, Page 3

Full Reconstruct vs. Bolt-On: A Better Way to Build

Category	Full Reconstruction	Bolt-On Concept
Cost Per Pavement Structure Items of Work	3x higher	
Timeline to Construct Pavement Structure Items of Work	2x longer	
Estimated Durability	30 years	30-50 years
Economic Impact	Reduced capacity (more traffic disruption, more lane closures, and slower construction time)	Capacity maintained (fewer traffic disruptions, fewer lane closures, faster construction time)
Safety	Increased crash risk (barriers on both sides, narrow lanes, limited emergency access)	Better safety (barriers on one side only, shoulders maintained, access for emergencies)
Sustainability	Requires 100% new or recycled materials	Requires 60% fewer materials
	More temporary pavements required (adds construction time, increases costs, emissions)	Fewer temporary pavements required

Keeping People Safe, Traffic Moving

- Smooth traffic transitions
- Fewer detours and lane closures
- Emergency vehicle access

Let's Build the Future Together

Statewide, the **Asphalt Pavement Industry is fully equipped** with untapped capacity—existing crews, equipment, and plants—prepared to meet demand and construct Bolt-On projects.