# Quality Improvement through Simplification

**OR**

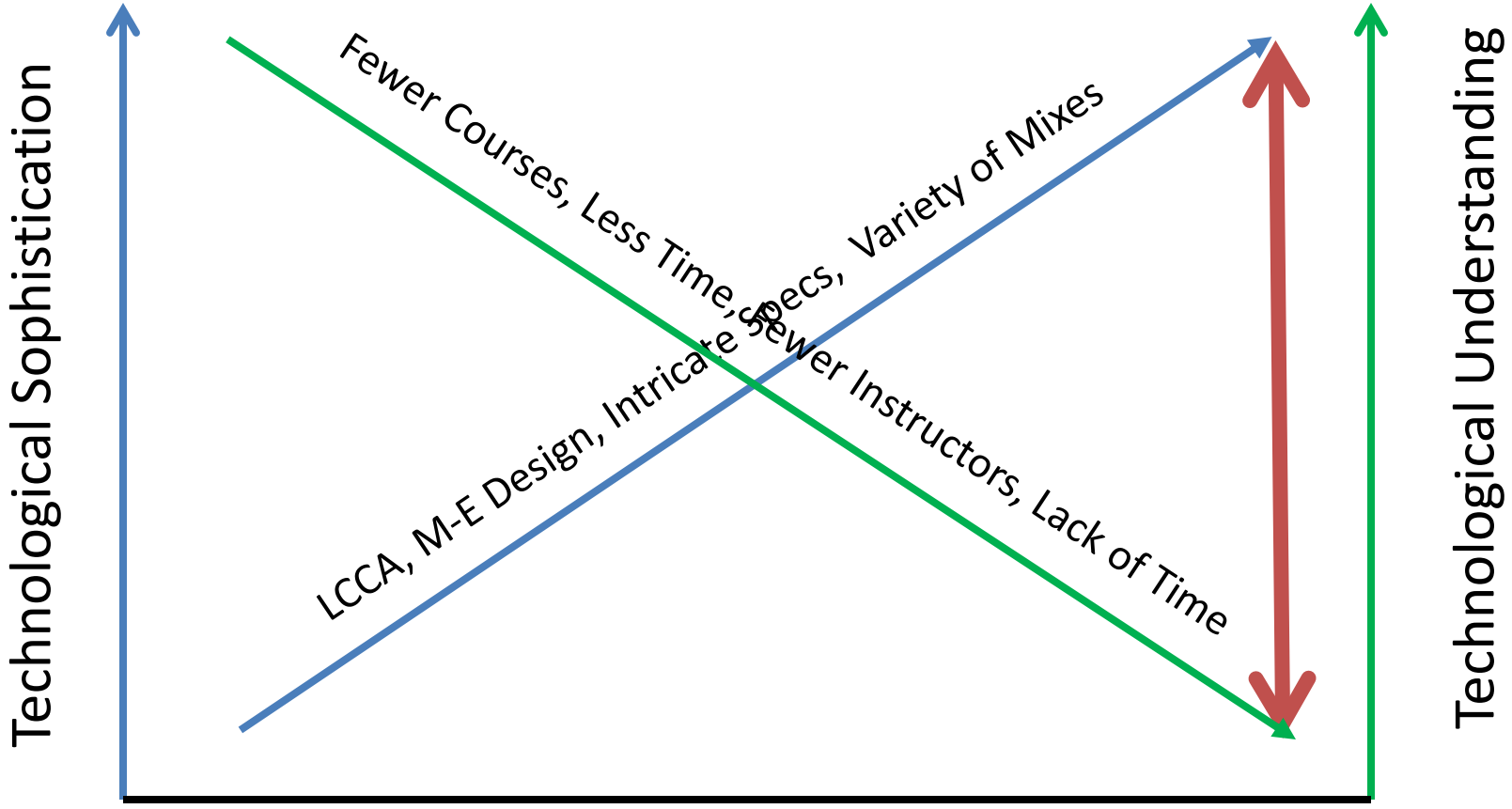
**Fighting Entropy**

**in**

**Pavement**

**Engineering and Construction Knowledge!**

# For many engineers, contractors, and consultants



# Issues

- Pavement Design
- Material Quality
- Mix Type Selection
- RAP Content
- Life Cycle Costs
- 5-minute Construction Screw Ups

# Current Pavement Standards

**TABLE VIII**

MINIMUM PAVEMENT THICKNESS CRITERIA

| **FLEXIBLE PAVEMENTS** | | | |
|---|---|---|---|
| STREET CLASSIFICATION | SUBGRADE TREATMENT | BASE MATERIAL | SURFACE TREATMENT |
| RESIDENTIAL | 6-in Lime-Stab. | 6-in. Limestone, 6-in. Cement Stabilized Base or 4-in. HMAC | 2-in. HMAC |
| MINOR COLLECTOR | 6-in Lime-Stab. | 8-in. Limestone, 8-in. Cement Stabilized Base or 5-in. HMAC | 2-in. HMAC |
| COLLECTOR & ARTERIAL | *Design based upon Geotechnical Report, but not less than pavement structure shown for a minor collector.* | | |

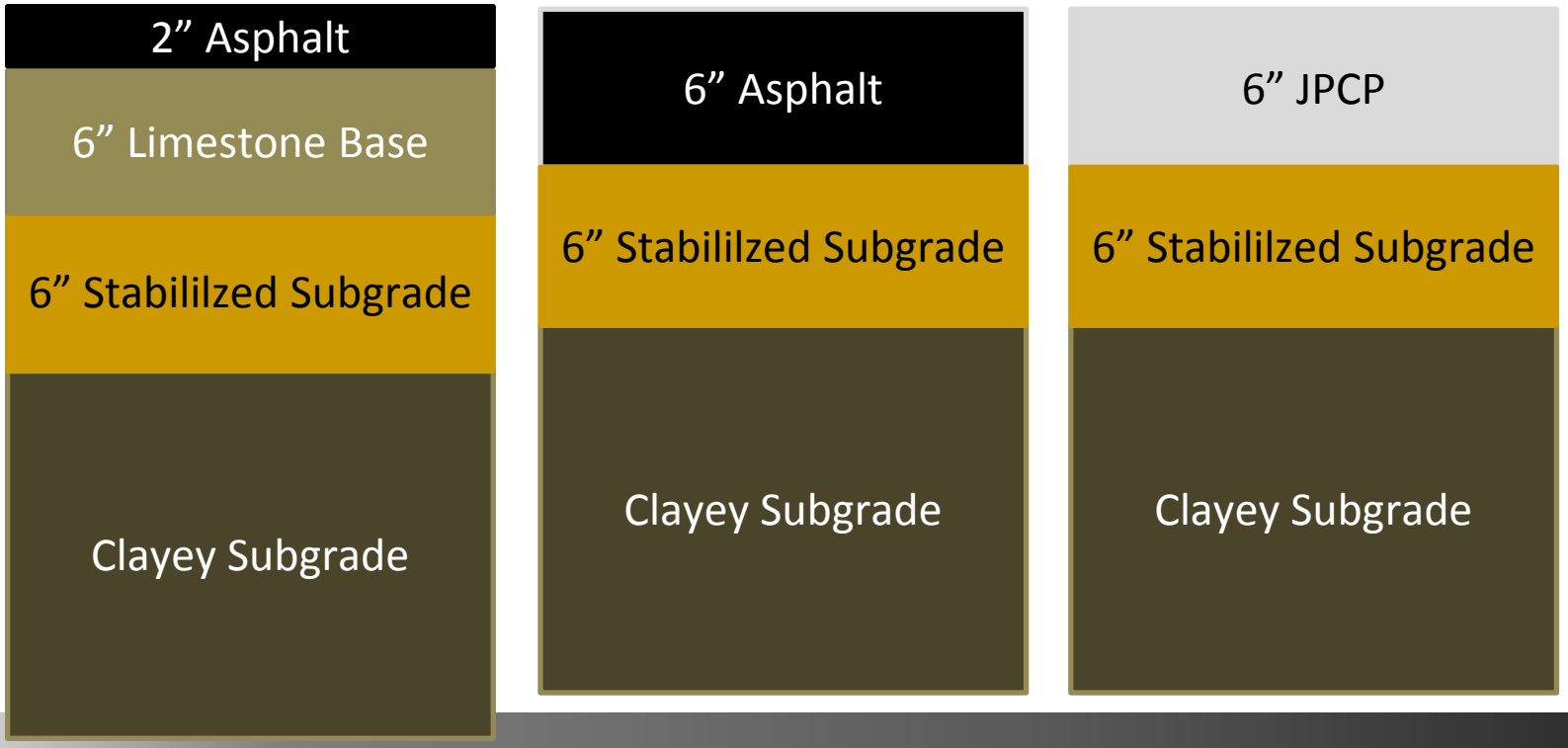
| **RIGID PAVEMENTS** | | |
|---|---|---|
| STREET CLASSIFICATION | SUBGRADE TREATMENT | CONCRETE PAVEMENT |
| RESIDENTIAL (includes alleys) | 6-in Lime-Stab. | 6-in. |
| COLLECTOR AND PRIVATE LOCAL STREETS | 6-in Lime-Stab. | 8-in. |
| ARTERIAL | Design based upon Geotechnical Report, but not less than pavement structure shown for a collector. | |

NOTE:

☐Lime stabilization is the most commonly used for local clay soils. If other types of stabilization are desired, please submit information.

# Pavement Design

- Developers given choice of sections
- Example: equivalent sections



# Next Steps

- Build the Cheapest Pavement with Little or No Inspection
- Allow Construction Traffic (Not Accounted for in Design)
  - 90 to 200 concrete trucks
  - 180 brick trucks
  - 120 lumber trucks
  - ??? heavy equipment deliveries
- Pavement Starts Failing

# Pavement Maximum Allowable Loads

- What are the maximum allowable design ESAL's for our pavement standards and are they equivalent ?
  - Flexible Pavement
    - Residential – 74,000 ESALs
    - Minor Collector – 87,000 ESALs
  - Rigid Pavement
    - Residential – 260,000 ESALs
    - Minor Collector – 830,000 ESALs
- Rigid Pavement over 3.5 times as many for residential
- Rigid Pavement over 9.5 times as many for minor collector

# Proposed Pavement Standards

**TABLE VIII**

MINIMUM PAVEMENT THICKNESS CRITERIA

**FLEXIBLE PAVEMENTS**

| STREET CLASSIFICATION | SUBGRADE TREATMENT | BASE MATERIAL | SURFACE TREATMENT |
|---|---|---|---|
| RESIDENTIAL | 6-in Lime-Stab. | 6-in. Limestone, 6-in. Cement Stabilized Base or 4-in. HMAC | 2-in. HMAC |
| MINOR COLLECTOR | 6-in Lime-Stab. | 8-in. Limestone, 8-in. Cement Stabilized Base or 5-in. HMAC | 2-in. HMAC |
| COLLECTOR & ARTERIAL | *Design based upon Geotechnical Report, but not less than pavement structure shown for a minor collector.* | | |

**RIGID PAVEMENTS**

| STREET CLASSIFICATION | SUBGRADE TREATMENT | CONCRETE PAVEMENT |
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NOTE:

- Lime stabilization is the most commonly used for local clay soils. If other types of stabilization are desired, please submit information.

# Life Cycle Cost Analysis

- FAA 20-year LCCA
  - Asphalt Pavement: Overlay at year 17
    - Salvage Value = Overlay Cost
  - Concrete Pavement: No rehab before year 20
    - Salvage Value = **Cost of Entire Runway Construction** (lighting, striping, landscaping, drainage, etc.)
- Midwestern City
  - Used probabilistic LCCA with no training and less data
- Another airport – Exist asphalt pvmt 40 years old
  - Asphalt overlay every 10 years
  - Microsurfacing every 7 years
  - Crack sealing every 3 years

# Parking Lot Specification

- Required polymer in 2-inch AC surface
- Use combination ASTM and AASHTO specs – pick and choose but have no way to verify.
- Use TxDOT spec no. without TxDOT designation.
- Require mix design for OAC and asphalt content range (e.g., 5 to 7%) but have allowance of ±0.3%.
- Conflicting mix types in specs and on plans.
- Density requirements tighter than the agency they came from.
- Different definitions of lot as one day's production, 1000 tons and 2000 tons in the same spec.

# Construction

- Layer thickness
  - Aggregate Base ± ½”
  - 2” Asphalt Surface ± ¼”? Maybe ± ½”?
  - 6” Asphalt Surface ± ¼”
- Density at Curbs

# 5-minute Screw Up

# The Rest of the Street

# Job Site is not Driver's Ed Class

# Attention to Detail!

# What Can We Do?

- Have a discussion about it and come up with solutions!
- Possibilities:
  - Design catalogs for low-volume roads
  - Simplified specifications (4 pages, not 40)
  - Reach out to engineers about common problems and solutions
    - Webinars
    - Seminars
    - YouTube?
- We need to act!