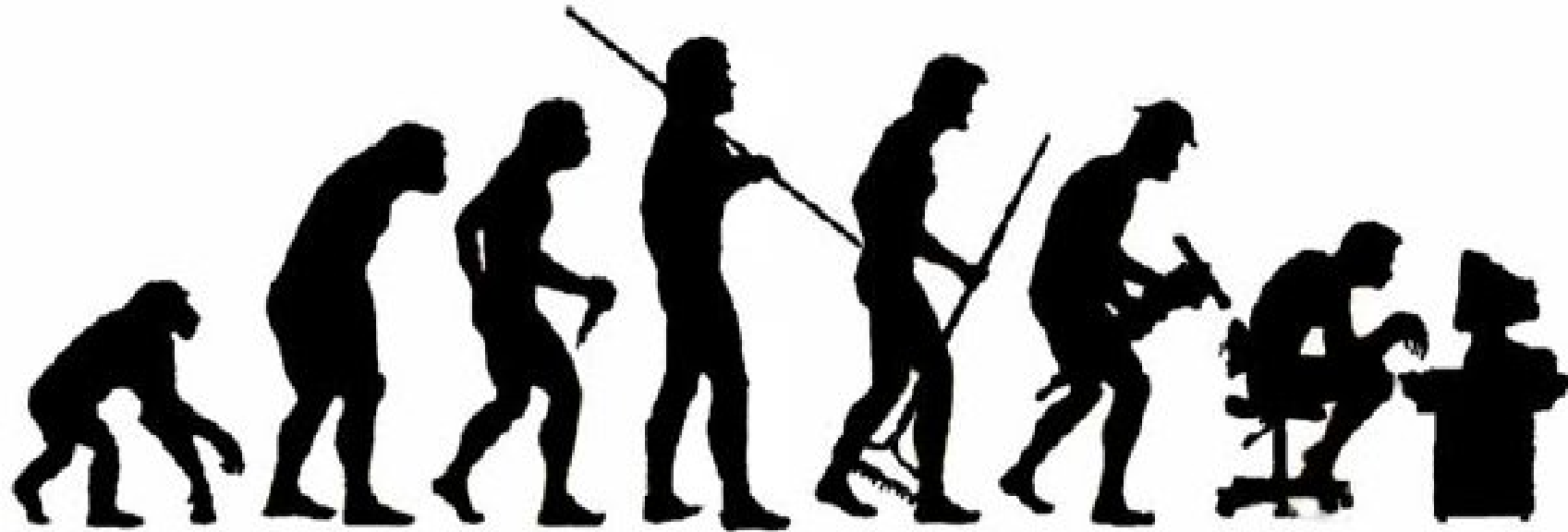


New Generation Pavement Design with Nanotechnology

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Evolution of Structural Design Approaches



Pre 1950's
Experience

1960's
Development of
Empirical Methods

1980's
Initial
Mechanistic-
Empirical
Methods

1990's
NCRHP 1-37A
M-E Design

2000's
Implementation
of M-E Methods
Perpetual Pavements

AASHO Road Test

- 1958 - 1960 near Ottawa, Illinois
- Soil uniform and representative of large portion of US
- 4 large and 2 smaller loops
- Variables included
 - pavement thickness
 - load magnitude
 - environmental effects
- Introduced concept of serviceability (PSI)
- Forms basis of AASHTO Method

AASHO Road Test



Figure 1. Looking east, Loops 5 and 2 in foreground.

1993 AASHTO Design Equation

(Strictly Empirical - Based on AASHO Road Test)

$$\log W_{18} = Z_R S_0 + 9.36 \log(SN+1) - 0.20 + \frac{\log \left[\frac{\Delta PSI}{4.2 - 1.5} \right]}{0.4 + \frac{1094}{(SN+1)^{5.19}}} + 2.32 \log M_R - 8.07$$

- Main Inputs
 - Traffic
 - Reliability
 - Variability
 - Performance

Resilient Modulus of the subgrade soil

Solve the Equation for Target Structural Number SN

1993 AASHTO Structural Design Method

Determine Depths of individual pavement layers...