Urban Pavement Design

History and Current Practices

City of Bismarck

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Overview

• Historical Practices
• Current Practices
Hardsurface Streets (Armor Coating)

- Several chip seals or very thin lift of HMA on existing gravel roadway
- Constructed in the mid 1960’s
- Why? – Quick, cheap and easy
Hardsurface Streets Reconstruction

• Started in 2008
• 10 years to reconstruct all 24 miles
• Approx. $30 million
Past Sections

• No aggregate subgrade prior to mid 2000’s
  • Scrape the vegetables and pave
  • Pavement life was heavily influenced by subgrade conditions
  • Edge damage was a growing issue
Edge Damage Image
Edge Damage Image
Past Sections

• Late 2000’s - Wedge Section
  • Constructed to address edge damage from garbage trucks
  • Constructability Issues
  • Only done for about 2 years
Wedge Section

BROOKSIDE LN. PAVEMENT SECTION
Not to Scale
Functional Classification

Pavement Design based on Functional Classification

• Functional Classification
  • Arterial (Minor/Principal)
  • Collector
  • Local/Residential
Functional Classification
Functional Classification/Zoning

Pavement Design based on Functional Classification or Zoning

- Functional Classification
  - Arterial (Minor/Principal)
  - Collector
  - Local/Residential

- Zoning Classification
  - Industrial
  - Commercial
Arterial Roadways Design

• Arterials
  • AASHTO 93
  • Soil analysis
  • Traffic volumes
  • Usually an exiting rural two lane that is reconstructed
  • No minimum design thickness
Industrial/Commercial Zoned Areas

• Industrial
  • Required to be concrete

• Commercial
  • Minimum of 5” AC and 6” of gravel base
  • Soil Analysis
  • Traffic Volumes (if known)
Collectors/Local

• Collectors
  • Minimum 5” AC with 6” gravel base
  • Future Growth

• Local/Residential
  • Minimum 4.5” AC with 6” gravel base
Process for Pavement Design

1. Functional classification/Zoning
2. Surrounding pavement thickness
3. Soil analysis
4. Traffic volumes
5. Future growth
Challenges of Urban Design

• Traffic loading unknown
• Constrained by curb and gutter
• ¼ of 20 year ESAL loading realized in 1\textsuperscript{st} year
• Consistency for section to section
• Standard section help with budgeting for maintenance process
• Commercial Zones – not known what type of businesses will be built
• Signalized intersection avoidance
• City growth = new traffic routes
City Growth = New Traffic Routes
Questions?
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