Urban Pavement Design

History and Current Practices

City of Bismarck

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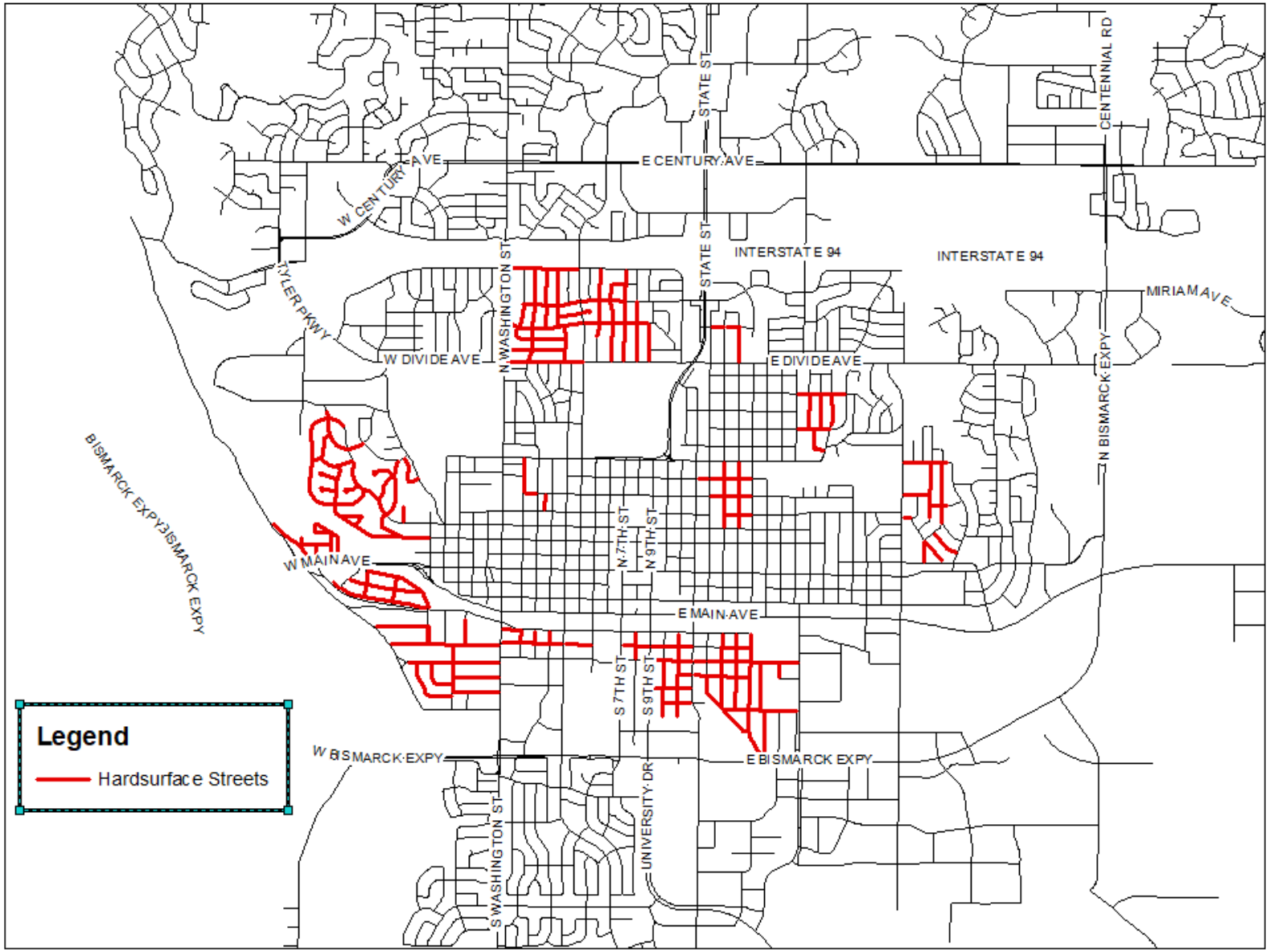
Overview

- 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



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

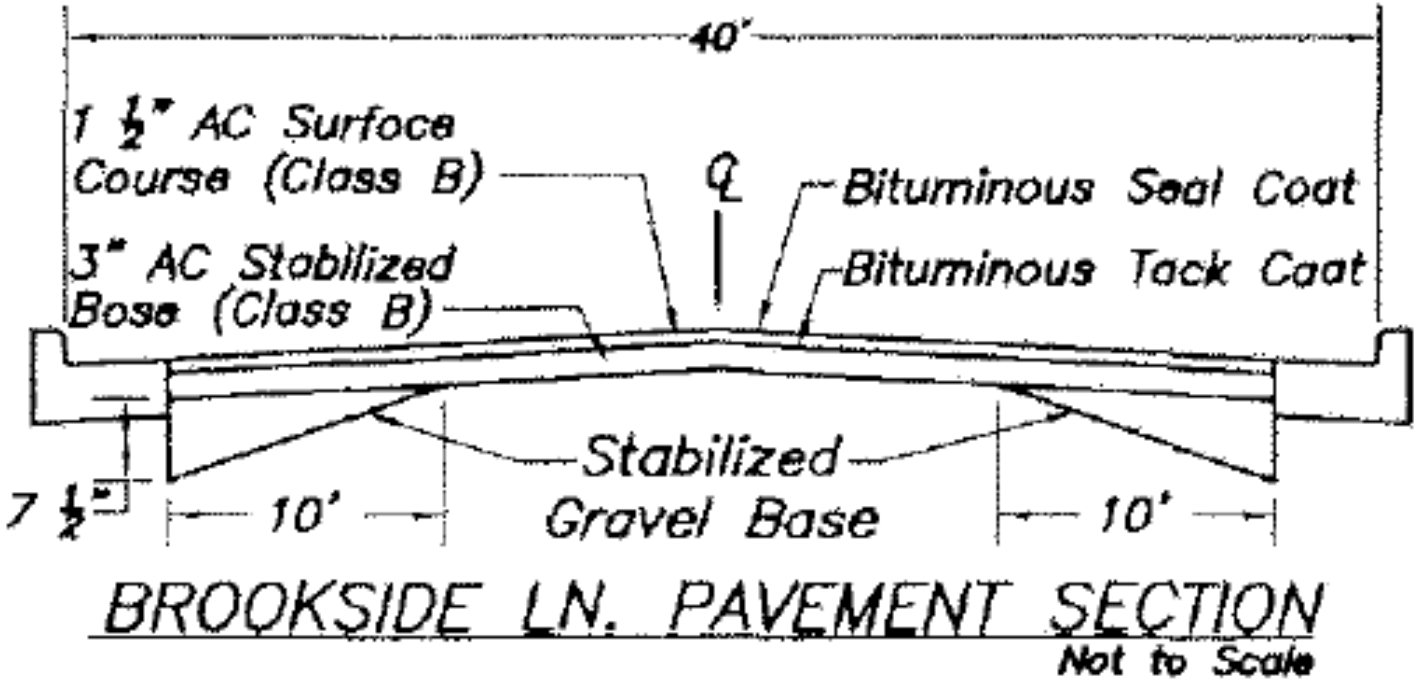
Edge Damage Image

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

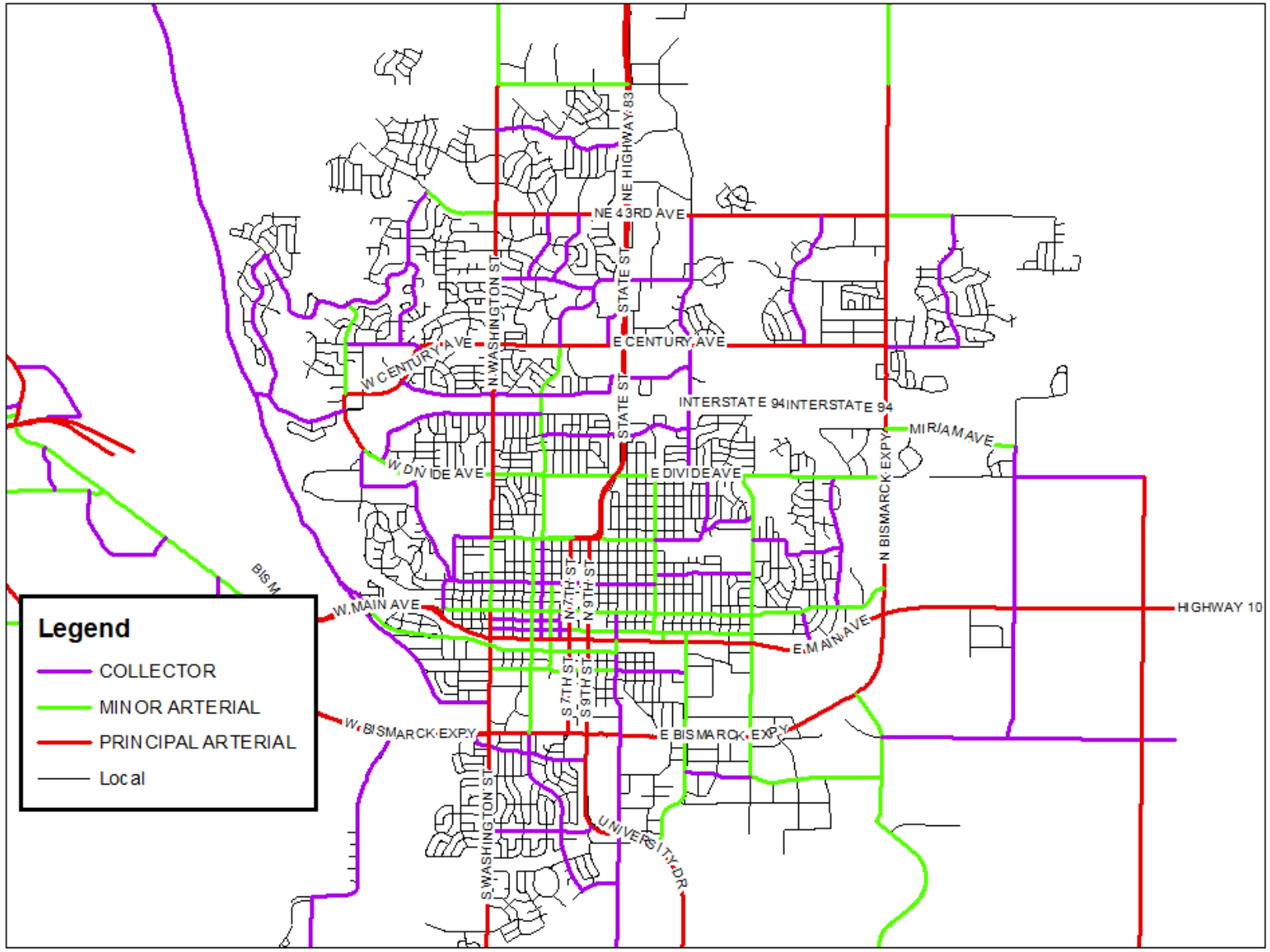


Functional Classification

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


SPECIAL OPERATIONS

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 1st 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 Routs

Questions?

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