TRB MEPDG Workshop
Traffic & Axle Weight Data

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January 13, 2008

Presentation Outline

• WIM program (prior to MEPDG)
• WIM program & MEPDG implementation
  – sensors and locations
• Data quality
• Utilizing WIM data
  – MEPDG & AASHTO ‘93
• Future efforts

VDOTs Early Traffic Data & WIM Program

• 1980s to early 1990s
  – prescreening trucks at pull-off scales
  – development of ESAL factors
• 1990s
  – piezoelectric sensors (LTPP sites)
  – 17 WIM sites around Virginia
  – primarily volume & classification data
  – data drifted over time and with temperature

Traffic Data & WIM Program in 2000

• Existing count stations
  – 270 continuous
    • all with classification
  – approximately 17,000 short-term
    • 6,100 w/ classification
• 6 existing WIM sites
  – DMV monitored
  – associated with truck pull-off scales
WIM data - Initial MEPDG Implementation

- MEPDG implementation committees
  - established by VDOT in 2000
- Traffic data committee
  - focused on VDOT's WIM program
  - evaluate existing data sources
  - determine additional needs

WIM data - Initial MEPDG Implementation

- VTRC study, 2003
  - Traffic Data Plan for M-E Pavement Designs
    - B. Cottrell, T. Schinkel, T. Clark
    - [http://vtrc.virginia dot.org](http://vtrc.virginia dot.org) (click on “Reports”)
- WIM sites
  - based on TT truck volumes (TMG)
    - > 1,000 per day
    - < 1,000 per day
    - < 100 per day (optional)

WIM data - Initial MEPDG Implementation

- Site selection guidelines
  - smoothness is the key
- Sensors
  - piezoelectric (older type)
    - did not consistently meet ASTM standards
  - bending plates
    - reliable, but safety concerns
  - load cells
    - reliable and safe, but expensive

WIM data - Current MEPDG Implementation

- 16 sites monitored by VDOT & 6 by DMV
  - 10 with TT truck count > 1,000 per day
  - 12 with TT truck count < 1,000 per day
- Equipment
  - primarily Kistler quartz piezoelectric sensors
    - reliable, least expensive alternative, 5yr± life
  - bending plates at LTPP site
  - DMV sites are load cells
Choosing New WIM Sites

- Quartz piezoelectric sensors
  - approx. $30,000 per lane
- New asphalt overlays (HMA and SMA)
  - IRI < 40-45 in/mi
  - sites evaluated using LTPP software
- Construct a location (not preferred = $$$)
  - VDOT has built concrete and asphalt pads
  - both ground to achieve desired smoothness
Data Quality

- Calibrated using known axle loads
  - continuously checked for drift
  - minor rutting found to affect data
    - corrected by grinding
  - adjustment about every 6 months
- Goal
  - ASTM Type I

WIM data uses in M-E Design

- Load spectra
  - statewide vs. regional
  - vehicle classification specific
  - administrative classification specific
  - modeling by statistical distributions / equations

- Truck weight policy decisions
  - effects (costs) of increased weight limits

Axle Load Spectra

Class 9 - Primary

Axle weight, kips

frequency of occurrence

Class 9 - Interstate

Axle weight, kips

frequency of occurrence
WIM Data Uses in AASHTO ’93 Design

• ESAL factor
  – vehicle classification specific
  – administrative classification specific
  – depends on knowledge (or estimate) of SN
  – current VDOT values (flexible) = 0.37 & 1.28
  – revised primary = 0.63 & 1.03
    • SN = 4.75, \( p_1 = 2.85 \)
  – revised interstate = 0.37 & 1.05
    • SN = 6.0, \( p_1 = 3.0 \)

Future Efforts

• Equipment
  – maintain & evaluate existing WIM sites
  – replace sites when needed
  – add new sites when advantageous

• Data
  – revised ESAL factors for ’93 AASHTO design (flexible & rigid)
  – default load spectra for MEPDG

VDOT MEPDG Traffic Team

• Materials Division
  – Trenton Clark, chair
  – Mohamed Elfino

• Research Council
  – Ben Cottrell
  – Brian Diefenderfer

• Traffic Engineering Division
  – Tom Schinkel
  – Hamlin Williams
  – Richard Bush

• Richmond District
  – William Hughes