TRB MEPDG Workshop

Traffic & Axle Weight Data

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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 VDOTs 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.virginiadot.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
Load Cell Sensors
Quartz Piezoelectric Sensors
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 - Interstate

- Steering
- Single
- Tandem

frequency of occurrence

axle weight, kips
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, \( p_t = 2.85 \)
  – revised interstate = 0.37 & 1.05
    • SN = 6.0, \( p_t = 3.0 \)
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
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  - Hamlin Williams
  - Richard Bush

- Richmond District
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