



# VERIFICATION OF PAVEMENT AND BRIDGE PROFILES

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# AGENDA

- REQUIREMENTS
- STATE OF THE PRACTICE
- ISSUES
- PROPOSED RESEARCH





# CONTRACTOR COLLECTED PROFILES

- **STATES HAVE INCENTIVIZED PAVEMENT SMOOTHNESS SINCE THE 1980s.**
- **MANY STATES HAVE MIGRATED TO CONTRACTOR-COLLECTED DATA FOR A VARIETY OF GOOD REASONS**



# 23 CFR REQUIREMENTS

- **23 CFR 637.207 QUALITY ASSURANCE PROGRAM**
  - **(1)(ii) Quality control sampling and testing results may be used as part of the acceptance decision provided that:(A) The sampling and testing has been performed by qualified laboratories and qualified sampling and testing personnel.(B) The quality of the material has been validated by the verification sampling and testing. The verification testing shall be performed on samples that are taken independently of the quality control**
- **23 CFR 637.203 DEFINITIONS**
  - **Quality control. All contractor/vendor operational techniques and activities that are performed or conducted to fulfill the contract requirements.**
  - **Verification sampling and testing. Sampling and testing performed to validate the quality of the product.**
- **23 CFR 637.205 Policy**
  - **Verification sampling and testing. The verification sampling and testing are to be performed by qualified testing personnel employed by the STD or its designated agent, excluding the contractor and vendor.**



# **STEWARDS OF PUBLIC DOLLARS**

- **EVEN WITHOUT THE 23 CFR REQUIREMENT THERE IS A RESPONSIBILITY**
- **SIZEABLE EXPENDITURE NATIONWIDE WHEN YOU CONSIDER INCENTIVES, DISINCENTIVES, CORRECTIONS, ETC.**
  - **NEED TO QUANTIFY**



# STATE OF THE PRACTICE

- **THESE EXAMPLE SPECIFICATIONS AND PROCEDURES WERE CHOSEN BASED ON DIVERSITY OF PRACTICE**
  - **THE GOOD, THE BAD, AND THE UGLY**
  - **AVAILABLE ON A STATE'S WEBSITE**
- **DOES NOT INCLUDE STATES WHERE PROFILES ARE ONLY COLLECTED BY THE STATE OR ITS AGENT**



# STATE OF UTOPIA

- **CONTRACTOR EQUIPMENT AND OPERATOR CERTIFIED**
- **CONTRACTOR RESPONSIBLE FOR QUALITY CONTROL**
- **VERIFICATION**
  - **STATE PERFORMS VERIFICATION ON AN ANNUAL BASIS ON A PORTION FROM EACH CONTRACTOR'S MRI DATA**
    - **25 PERCENT OF CONTRACTS**
    - **10 PERCENT OF LANE MILES**
    - **IF A PROJECT IS REVIEWED A GOAL OF 50 PERCENT OF THE LANE MILES WILL BE COLLECTED**



# STATE OF UTOPIA



- **VERIFICATION**

- **MRI THRESHOLD**

- **<6.1 IN/MI FOR 80 PERCENT OF 0.1-MILE SECTIONS**
    - **<4.1 IN/MI FOR AVERAGE OF LANE**

- **DISPUTE RESOLUTION – SIDE-BY-SIDE RUNS**

- **<6.1 IN/MI FOR 80 PERCENT OF 0.1-MILE SECTIONS**
    - **<4.1 IN/MI FOR AVERAGE OF LANE**

# STATE OF PLAY

CONTRACTOR EQUIPMENT AND OPERATOR CERTIFIED  
VERIFICATION

RESULTS AND PROFILES SUBMITTED TO THE STATE

NO FORMAL PROCESS

QUESTIONABLE RESULTS WERE INVESTIGATED





# STATE OF BLISS

- **CONTRACTOR EQUIPMENT AND OPERATOR CERTIFIED**
- **CONTRACTOR RESPONSIBLE FOR QUALITY CONTROL**
- **VERIFICATION**
  - **PAPER REVIEW OF ONE PROFILE PER PROJECT**
  - **STATE COLLECTS DATA ON 80 PERCENT OF PROJECTS ANNUALLY**
  - **IF NO SPECIFIC QUESTIONS BY THE DISTRICT, A GENERAL COMPARISON IS COMPLETED FOR ONE LANE OF PAVEMENT SMOOTHNESS DATA COMPARING LOT AND LOCALIZED ROUGHNESS**



# STATE OF EMERGENCY

- **CONTRACTOR EQUIPMENT AND OPERATOR CERTIFIED**
- **CONTRACTOR RESPONSIBLE FOR QUALITY CONTROL**
- **VERIFICATION**
  - **NONE**





# STATE OF FLUX

- **CONTRACTOR EQUIPMENT CERTIFIED**
- **VERIFICATION BASED ON 25-FT SECTION**
  - **80 PERCENT OF PAVING PROJECTS**
  - **AVERAGE IRI –  $\pm (2 \% + 2)$**
  - **NUMBER OF DEFECTS –  $\pm (10 \% + 2)$**
  - **NUMBER OF TESTED SECTIONS –  $\pm (1 \% + 1)$**



# STATE OF GRACE

- **CONTRACTOR EQUIPMENT AND OPERATOR CERTIFIED**
- **CONTRACTOR RESPONSIBLE FOR QUALITY CONTROL**
- **VERIFICATION**
  - **NONE**

# STATE OF MIND



- **CONTRACTOR EQUIPMENT AND OPERATOR CERTIFIED**
- **CONTRACTOR RESPONSIBLE FOR QUALITY CONTROL**
- **VERIFICATION**
  - **STATE COLLECTED AT LEAST 10 PERCENT OF MRI MILEAGE PER PROJECT**
  - **MEAN MRIS MUST COMPARE WITHIN 10 PERCENT**



# STATE OF AFFAIRS

- **CONTRACTOR EQUIPMENT AND OPERATOR CERTIFIED**
- **CONTRACTOR RESPONSIBLE FOR QUALITY CONTROL**
- **VERIFICATION**
  - **NO PROJECT-BASED VERIFICATION**
  - **CONTRACTOR MUST PRODUCE CONSISTENT RESULTS ON STATE CONTROL SITES**



# STATE OF READINESS

- CONTRACTOR EQUIPMENT AND OPERATOR CERTIFIED
- CONTRACTOR RESPONSIBLE FOR QUALITY CONTROL
- VERIFICATION
  - STATE OPTION TO VERIFY, NOTIFIES CONTRACTOR
  - MINIMUM OF 25 PERCENT OF EACH SCHEDULED CONTRACTOR SMOOTHNESS TESTING BY AN INDIVIDUAL PROFILER WILL BE VERIFIED.
  - CONTRACTOR SCHEDULES SIDE-BY-SIDE TESTING
- TOLERANCE
  - <6.1 IN/MI FOR 90 PERCENT OF THE 0.1-MILE SECTION
  - <6.1 IN/MI FOR AVERAGE MRI FOR EACH LANE
  - <0.2 PERCENT FOR THE LENGTH OF EACH LANE

# WHICH STATE'S APPROACH

- **IS ADEQUATELY VERIFYING?**
- **IS MOST COST EFFECTIVE?**
- **IS APPROPRIATELY RISK BASED?**



# UNCERTAINTY

- **HOW MUCH DATA?**
- **WHEN DOES IT NEED TO BE COLLECTED?**
- **BUYER'S AND SELLER'S RISK**
- **AVAILABLE AGENCY STAFF AND DOLLARS FOR VERIFICATION**
- **SYSTEM VERSUS PROJECT APPROACH**
- **ARTIFICIAL INTELLIGENCE**



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# **RISK-BASED AND COST-EFFECTIVE AGENCY VERIFICATION OF CONTRACTOR COLLECTED PAVEMENT AND BRIDGE PROFILES**

- **TASK 1 – LITERATURE REVIEW**
- **TASK 2 – SURVEY OF STATE HIGHWAY AGENCIES (SHA) PRACTICE**
- **TASK 3 – FOLLOW-UP INTERVIEWS WITH KEY AGENCIES**
- **TASK 4 – DEVELOP MULTIPLE VERIFICATION AND VALIDATION SCENARIOS FOR CONTRACTOR-COLLECTED PROFILES CONSIDERING: VALUE OF INCENTIVE/DISINCENTIVE, COST OF DATA COLLECTION AND VALIDATION, STATISTICAL VALIDATION TESTING, AGENCY TOLERANCE FOR RISK, ARTIFICIAL INTELLIGENCE**
- **TASK 5 – PILOT TESTING OF SCENARIOS USING TEST TRACK SIMULATIONS**
- **TASK 6 – REFINE SCENARIOS AND TEST WITH DATA COLLECTED FROM KEY AGENCIES, DEVELOP INITIAL GUIDANCE AND TOOLS**
- **TASK 7 – BETA TESTING BY SHAs WITH EVALUATION**
- **TASK 8 – PREPARE THE FINAL GUIDE**



applied pavement  
TECHNOLOGY



# QUESTIONS

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# 23 CFR REQUIREMENTS

- BULLET #1
- BULLET #2
- GREAT POINT
- IMPORTANT DATA GOES HERE
- HERE'S WHERE I'M GONNA IMPRESS YOU
- PREPARE TO BE AMAZED

