



Connected Corridor Advancement Initiative

Digital Standards Crosswalk for Infrastructure Lifecycle

Overview

This document provides a comprehensive crosswalk of digital standards across the entire infrastructure project lifecycle, establishing data interoperability frameworks from planning through operations and maintenance.

Purpose: Enable seamless data exchange between systems, tools, and stakeholders throughout the infrastructure development and operations lifecycle by mapping industry standards to specific lifecycle phases and use cases.

Standards by Lifecycle Phase

Planning Phase

Standards for project planning, data collection, and strategic decision-making:

Standard	Role	Use Case
Highway Performance Monitoring System (HPMS)	National-level data collection for highway condition and performance assessment	Baseline data for corridor planning, performance metrics
Transportation Performance Management (TPM)	Strategic framework for effective transportation fund use through data-driven decisions	Goal setting, performance monitoring, project prioritization
GIS Standards (ISO 19100 Series)	Geospatial data collection and analysis	Spatial analysis, corridor mapping, environmental analysis
OGC Standards	Geospatial data interoperability	Multi-agency data sharing, web mapping services
Environmental Data Standards (EDSC)	Consistent environmental data collection and exchange	Environmental impact assessments, NEPA compliance
PMBOK Guide / ISO 21500	Project management frameworks	Project scheduling, resource allocation, risk management
Model Inventory of Roadway Elements (MIRE 2.0)	Standardized roadway element data collection	Safety analysis, crash data integration, design inputs
ISO 14825 (ITS GDF)	Geospatial data for Intelligent Transportation Systems	ITS infrastructure planning, digital map-based routing

Data Interoperability: Planning phase data (HPMS, TPM) should flow into survey and design phases (GIS, IFC) with standardized attribute mapping.

Survey Phase

Standards for data acquisition, measurement, and site characterization:

Standard	Role	Use Case
GIS Standards (ISO 19100 Series)	Geospatial data collection and analysis	Topographic surveys, existing conditions mapping
OGC Standards	Geospatial data interoperability	Survey data exchange with CAD/BIM systems
ISO 19115 (Geographic Metadata)	Metadata for documenting geographic information	Survey data provenance, coordinate system documentation

LandXML	Land description data exchange	Civil 3D to BIM model data transfer, alignment exchange
ASTM Survey Standards	Distance and elevation measurement methods	Survey control networks, accuracy specifications
ISO 12857	Measurement accuracy and precision	Quality control for survey data
Remote Sensing Data Standards	Remote sensing data acquisition	LiDAR, photogrammetry, UAV-based surveys
NBIMS-US / ISO 19650	BIM data creation and organization	Point cloud to BIM workflows, scan-to-BIM processes

Data Interoperability: Survey data (LandXML, point clouds) must integrate with design models (IFC) and maintain geospatial accuracy (ISO 19115 metadata).

Design Phase

Standards for 3D modeling, design documentation, and engineering analysis:

Standard	Role	Use Case
IFC (Industry Foundation Classes)	BIM standard for infrastructure models	3D bridge/roadway models, structural design, MEP integration
NBIMS-US	National BIM standards for U.S. projects	Information exchange specifications, LOD definitions
ISO 19650 Series	BIM information management	Collaborative design workflows, common data environments
GIS Standards (ISO 19100 Series)	Spatial context for BIM models	Georeferencing BIM models, terrain integration
OGC Standards	BIM-GIS integration	Linking design models to geospatial databases
Data Exchange Standards (XML/JSON)	Software interoperability	Data exchange between design tools (Revit, Civil 3D, MicroStation)
NIST Cybersecurity Framework / ISO 27001	Design data protection	Secure model sharing, IP protection
MIRE 2.0	Roadway element standardization	Design element classification, asset attribution
ISO 14825 (ITS GDF)	ITS-aware design data	ITS equipment placement, V2X infrastructure design

Data Interoperability: IFC models incorporate survey data (LandXML), geospatial context (GIS), and prepare for construction (e-Construction XML/JSON).

Construction Phase

Standards for digital construction management, progress tracking, and as-built documentation:

Standard	Role	Use Case
FHWA e-Construction Initiative	Digital documentation and communication	Electronic plan sheets, digital approvals, field data collection
AASHTO Standards	Construction methods and materials	Quality control specifications, material testing protocols
TransXML	Construction data exchange	Contractor progress reporting, material certifications
ISO 55000 Series (Asset Management)	Asset tracking during construction	Equipment inventory, material traceability
LandXML	Construction data exchange	Machine control data, grade checking
PAS 55	Asset lifecycle management	As-built data collection for future asset management
NIST Cybersecurity Framework	Construction system security	Protecting field data collection systems, IoT sensors
MIRE 2.0	Roadway element data collection	As-built asset attribution, GIS data population
ISO 14825 (ITS GDF)	ITS installation data	As-built ITS equipment locations, network topology
Work Zone Data Exchange (WZDx)	Work zone information sharing	Real-time work zone data feeds, traveler information

Data Interoperability: Design models (IFC) guide construction (TransXML), field data updates models (as-built IFC), and as-built data populates asset management systems (ISO 55000).

Operations Phase

Standards for real-time operations, traffic management, and connected vehicle infrastructure:

Standard	Role	Use Case
NTCIP 1203 (DMS)	Dynamic Message Sign control and data	Real-time traveler information, incident alerts
NTCIP 1204 (ESS/RWIS)	Environmental Sensor Station / Road Weather data	Surface conditions, weather-responsive operations
NTCIP 1209 (CCTV)	Traffic camera control and video streams	Incident verification, traffic monitoring
NTCIP 1211 (Signal Control)	Traffic signal phase and timing	Adaptive signal control, transit priority

SAE J2735 (DSRC Message Set)	Connected vehicle messages (SPaT, MAP, TIM, BSM)	V2X traveler information, safety applications
IEEE 1609 (WAVE)	V2X wireless communications	RSU management, SCMS security credentials
TMDD (Traffic Management Data Dictionary)	Traffic management center data exchange	Multi-agency coordination, C2C data sharing
TCIP (Transit Communications)	Transit data exchange	Transit signal priority, real-time transit information
TMC-Pooled Fund	Traffic Message Channel codes	In-vehicle navigation, traffic event coding
ISO 14825 (ITS GDF)	Operational ITS map data	Dynamic routing, real-time map updates

Data Interoperability: IFC asset models link to operational systems (NTCIP device IDs), enabling digital twin visualization of real-time traffic operations.

Maintenance Phase

Standards for asset condition monitoring, preventive maintenance, and lifecycle cost analysis:

Standard	Role	Use Case
ISO 55000 Series	Asset management lifecycle	Maintenance planning, replacement scheduling
PAS 55	Strategic asset management	Lifecycle cost analysis, performance-based maintenance
IFC / ISO 19650	As-maintained BIM model updates	Asset condition documentation, retrofit designs
GIS Standards	Spatial maintenance records	Work order mapping, service territory management
IRI Standards (International Roughness Index)	Pavement condition assessment	Pavement management systems, maintenance prioritization
ISO 8000 (Data Quality)	Ensuring accurate asset records	Master data management, data governance
CMMS Standards	Computerized maintenance management	Work order tracking, preventive maintenance scheduling
NTCIP Protocols	Device health monitoring	Predictive maintenance for ITS equipment
MIRE 2.0	Roadway element inventory	Asset condition tracking, safety analysis

Data Interoperability: As-built IFC models serve as digital twins for maintenance planning, with real-time device health data (NTCIP) triggering work orders (CMMS).

Data Crosswalk Examples

Example 1: Bridge Design to Operations

Design Phase (IFC) → Construction (e-Construction) → Operations (Digital Twin)

IFC Bridge Model (Design)

- Geometric Data: IFC beam heights, clearances
- Material Properties: IFC material classifications
- Asset Attributes: IFC property sets (Pset_BridgeCommon)

↓ Crosswalk to Construction

e-Construction As-Built Data

- Installed Clearance Heights → Update IFC model
- Material Test Results → Link to IFC material entities
- Installation Dates → Add to IFC property sets

↓ Crosswalk to Operations

SAE J2735 TIM (Traveler Information Message)

- Bridge Clearance → Extracted from IFC HeadRoom property
- Weight Limit → Extracted from IFC LoadCapacity property
- Coordinates → Extracted from IFC georeferencing (IfcSite)

Result: Commercial vehicles receive real-time clearance warnings via V2X

Example 2: ITS Equipment Lifecycle

Planning (HPMS) → Design (IFC) → Construction (WZDx) → Operations (NTCIP)

HPMS Corridor Data (Planning)

- Traffic Volumes → Justify DMS placement
- Crash Data → Justify camera coverage
- Congestion Metrics → Justify detector spacing

↓ Crosswalk to Design

IFC ITS Equipment Model

- IFCDYNAMICMESSAGE SIGN (DMS locations from HPMS analysis)
- IFCCAMERA (Coverage areas from crash data)
- IFCTRAFFICSENSOR (Spacing from HPMS vehicle counts)

↓ Crosswalk to Construction

WZDx Work Zone Feed (During Installation)

- Lane Closures for Fiber Installation
- Device Installation Progress

└─ Temporary Traffic Control

↓ Crosswalk to Operations

NTCIP 1203 DMS Operations

└─ Device ID → Linked to IFC GUID

└─ Message Content → Real-time traveler info

└─ Device Health → Maintenance alerts

Result: End-to-end traceability from planning justification to operational status

Example 3: Pavement Management

Survey (LiDAR) → Design (IFC) → Construction (TransXML) → Maintenance (IRI)

LiDAR Survey Data

└─ Surface Elevation → Import to Civil 3D

└─ Existing Pavement Extents → Map current conditions

└─ Cross Slopes → Drainage analysis

↓ Crosswalk to Design

IFC Pavement Model (IFCPAVEMENT)

└─ Layer Thickness → From pavement design

└─ Material Specifications → AASHTO M-series specs

└─ Expected Service Life → Lifecycle cost analysis

↓ Crosswalk to Construction

TransXML As-Built Pavement Data

└─ Actual Layer Thickness → Field measurements

└─ Compaction Test Results → Material certifications

└─ Installation Dates → Construction timeline

↓ Crosswalk to Maintenance

IRI Condition Monitoring

└─ Roughness Index → Linked to IFC pavement segments

└─ Maintenance Triggers → IRI > 170 in/mile = overlay needed

└─ Historical Performance → Track against design service life

Result: Design assumptions validated against real-world performance data

Implementing Crosswalks in Digital Infrastructure

Database Schema for Crosswalk Mapping

The Digital Infrastructure system can implement a crosswalk table:

```
CREATE TABLE infrastructure_standard_crosswalks (  
  id SERIAL PRIMARY KEY,
```

```

source_standard TEXT NOT NULL,      -- e.g., 'IFC'
source_field TEXT NOT NULL,        -- e.g., 'Pset_BridgeCommon.ClearHeight'
target_standard TEXT NOT NULL,     -- e.g., 'SAE J2735'
target_field TEXT NOT NULL,        -- e.g., 'TIM.VehicleHeight'
lifecycle_phase TEXT,              -- e.g., 'Operations'
mapping_rule TEXT,                 -- e.g., 'Convert meters to feet * 12'
use_case TEXT,                     -- e.g., 'V2X clearance warnings'
validation_rule TEXT,              -- e.g., 'ClearHeight > 13.5 ft for US
highways'
  created_at TIMESTAMP DEFAULT NOW()
);

```

API Endpoints

```

GET /api/digital-infrastructure/crosswalk/:phase
- Returns all standard mappings for a lifecycle phase
- Example: /api/digital-infrastructure/crosswalk/operations

GET /api/digital-infrastructure/crosswalk/standard/:name
- Returns all crosswalks involving a specific standard
- Example: /api/digital-infrastructure/crosswalk/standard/IFC

POST /api/digital-infrastructure/crosswalk/validate
- Validates data against crosswalk mapping rules
- Input: IFC property, target standard
- Output: Validation result, mapped value

GET /api/digital-infrastructure/crosswalk/map
- Maps data from source to target standard
- Query params: source, target, value
- Returns: Converted value, units, validation status

```

Gap Analysis Integration

When analyzing IFC models, the system can now recommend standards based on lifecycle phase:

```

// For missing V2X properties
if (element.ifc_type === 'IFCBRIDGE' && !element.properties.ClearHeight) {
  gaps.push({
    missing_property: 'ClearHeight',
    required_for: 'SAE J2735 TIM (Traveler Information Message)',
    lifecycle_phase: 'Operations',
    crosswalk_standard: 'IFC → SAE J2735',
    idm_recommendation: 'Add Pset_BridgeCommon.ClearHeight for V2X clearance
warnings'
  });
}

```

Benefits of Standards Crosswalks

1. Interoperability

- **Multi-vendor systems** can exchange data without custom integrations
- **Lifecycle continuity:** Design data flows into construction and operations
- **Multi-agency coordination:** DOTs, MPOs, cities use common data formats

2. Efficiency

- **Reduced data re-entry:** Survey data auto-populates design models
- **Automated validation:** Crosswalk rules ensure data quality
- **Faster project delivery:** Eliminating manual data translation

3. Compliance

- **FHWA requirements:** TPM, HPMS, e-Construction mandates
- **Industry standards:** buildingSMART, OGC, AASHTO alignment
- **Grant eligibility:** SMART/RAISE/ATCMTD programs prioritize interoperable systems

4. Digital Twin Enablement

- **Real-time operations:** IFC models link to NTCIP devices
- **Predictive maintenance:** Asset condition data updates BIM models
- **Scenario planning:** What-if analysis using integrated data

Standards Organizations

Organization	Focus Area	Website
buildingSMART International	IFC, ISO 19650, BIM standards	https://www.buildingsmart.org/
Open Geospatial Consortium (OGC)	Geospatial interoperability	https://www.ogc.org/
FHWA	HPMS, TPM, e-Construction, MIRE	https://www.fhwa.dot.gov/
AASHTO	Transportation materials and construction	https://www.transportation.org/
NTCIP Users Group	Traffic management device protocols	https://www.ntcip.org/
SAE Mobility	Connected vehicle standards (J2735, J2945)	https://www.sae.org/
IEEE	V2X wireless communications (1609 WAVE)	https://www.ieee.org/
NIST	Cybersecurity framework, data quality (ISO 8000)	https://www.nist.gov/
ISO	International standards (19650, 55000, 27001)	https://www.iso.org/

Integration with DOT Corridor Communicator

The Digital Infrastructure module uses these crosswalks to:

- 1. **Validate IFC Models:** Check for properties required by operational standards (NTCIP, SAE J2735)
- 2. **Generate Gap Reports:** Identify missing data needed for lifecycle interoperability
- 3. **Provide Recommendations:** Suggest specific property sets (Pset_*) aligned with industry standards
- 4. **Enable Digital Twins:** Map IFC GUIDs to ARC-ITS device IDs for real-time visualization
- 5. **Support Grant Applications:** Demonstrate standards compliance for FHWA/USDOT funding

Serving National Interoperability Through JSTAN Endorsement

Why This Crosswalk Matters to JSTAN

The Digital Standards Crosswalk directly supports **AASHTO JSTAN's mission** to coordinate transportation data standards and promote multi-state interoperability. This crosswalk serves as a practical implementation tool that JSTAN can endorse and recommend to state DOTs nationwide.

Alignment with JSTAN Core Objectives:

JSTAN Objective	How This Crosswalk Delivers
Coordinate Schema Development	Maps relationships between 30+ standards across lifecycle phases, showing how they work together
Identify Gaps	Crosswalk analysis reveals missing data elements needed for lifecycle continuity
Resolve Conflicts	Documents how to reconcile competing standards (e.g., IFC vs. LandXML for alignments)
Avoid Duplication	Shows where standards overlap, preventing redundant standardization efforts
Promote Adoption	Provides states with concrete implementation patterns and examples

Value Proposition for JSTAN Endorsement

What JSTAN Gains:

✔ Evidence-Based Standards Recommendations

- Crosswalk shows which standards combinations actually work in production
- Data on adoption difficulty helps JSTAN prioritize which standards to champion
- Real-world validation reduces risk of endorsing unproven standards

✔ Multi-State Interoperability Proof

- Corridor Communicator demonstrates crosswalk working across Iowa, Nebraska, Ohio, Nevada, and other states
- Proves that standards enable actual data exchange, not just theoretical compatibility
- Validates that different state systems can interoperate using common standards

✔ Implementation Template for States

- States can use this crosswalk as a starting point rather than building from scratch
- Reduces state-level implementation costs and risks
- Accelerates national standards adoption

✅ Living Documentation

- Crosswalk evolves based on real deployments and state feedback
- Supports JSTAN's proposed AASHTO GitHub model for agile standards management
- Enables continuous improvement outside traditional publication cycles

What States Gain:

✅ **Clear Roadmap** - Know which standards to implement and in what order
 ✅ **Multi-Vendor Confidence** - Crosswalk ensures vendor systems can interoperate
 ✅ **Grant Competitiveness** - Demonstrate standards awareness in SMART/RAISE/ATCMTD applications
 ✅ **Lifecycle Continuity** - Design data flows seamlessly into operations without manual translation
 ✅ **Peer Validation** - See how other states successfully implemented the same standards

How Corridor Communicator Demonstrates Crosswalk in Practice

The DOT Corridor Communicator serves as a **living proof of concept** for this crosswalk, implementing multi-state interoperability across real corridor operations.

Demonstrated Crosswalk Implementations

1. Bridge Clearance Warnings (IFC → SAE J2735)

Operational in: Iowa I-80, Nebraska I-80

Standards Used:

- **IFC 4.3:** Bridge models with clearance heights (Pset_BridgeCommon.ClearHeight)
- **SAE J2735:** TIM (Traveler Information Message) for V2X broadcast
- **TMDD:** Incident feed integration for clearance violations

Data Flow:

```
State DOT IFC Bridge Model
├─ Extract: IfcBridge.ClearHeight = 13'6"
├─ Transform: Convert to SAE J2735 TIM format
├─ Validate: Check against FHWA vehicle classification standards
└─ Broadcast: V2X message to commercial vehicles approaching bridge
```

Result: Commercial vehicles receive automated warnings when approaching bridges with clearance restrictions, reducing bridge strikes.

Crosswalk Validation: Proves IFC bridge data can feed real-time V2X operations.

2. Work Zone Coordination (WZDx → TMDD → C2C)

Operational in: Multi-state I-80 corridor

Standards Used:

- **WZDx:** Work zone data exchange (USDOT standard)
- **TMDD:** Traffic Management Data Dictionary

- **C2C (Center-to-Center):** Multi-agency data sharing

Data Flow:

```
Iowa DOT Work Zone System
├─ Publishes: WZDx feed (JSON-LD format)
└─
Nebraska DOT Ingests WZDx
├─ Transforms: WZDx → TMDD incident format
├─ Integrates: With Nebraska's traffic management center
└─ Shares: Via C2C with adjacent states (Iowa, Wyoming)
```

Result: When Iowa closes I-80 eastbound lanes for construction, Nebraska's DMS boards automatically update to warn travelers before they reach the Iowa border.

Crosswalk Validation: Demonstrates WZDx → TMDD → C2C interoperability across state boundaries.

3. ITS Equipment Inventory (IFC → ARC-ITS → NTCIP)

Operational in: Multiple states with ITS equipment

Standards Used:

- **IFC 4.3:** ITS equipment models (IfcDynamicMessageSign, IfcCamera, IfcSensor)
- **ARC-ITS:** Asset registry for connected infrastructure
- **NTCIP 1203/1201:** Device control protocols

Data Flow:

```
State DOT BIM Model (IFC)
├─ Equipment: DMS locations, camera coverage, RSU placement
└─
ARC-ITS Asset Registry
├─ Import: IFC equipment → ARC-ITS inventory
├─ Enrich: Add device IDs, IP addresses, firmware versions
└─
NTCIP Operations
├─ Control: Send messages to DMS (NTCIP 1203)
├─ Monitor: Camera health status (NTCIP 1201)
└─ Digital Twin: Link real-time status back to IFC model GUID
```

Result: States maintain single source of truth for ITS equipment, from design (IFC) through operations (NTCIP), with full lifecycle traceability.

Crosswalk Validation: Proves design models (IFC) can directly feed operational systems (NTCIP) with no data loss.

Potential Metrics for Crosswalk Effectiveness

Note: The following metrics represent **illustrative examples** of what could be measured. Actual measurements would need to be collected from participating states' deployments.

Proposed Measurement Framework:

Metric Category	Baseline Measurement	Target with Crosswalk	Measurement Method
Data Re-Entry	Track hours spent manually entering bridge clearances into multiple systems	Track automated data flow from single IFC source	Time study: document staff hours before/after automation
Error Rate	Audit accuracy of manually entered work zone data	Audit accuracy of automated WZDx parsing	Compare error counts: manual entry vs. automated validation
Multi-State Coordination	Measure time lag for work zone info sharing	Measure WZDx feed latency	Log timestamps: when state A publishes vs. when state B receives
Asset Tracking	Survey ITS equipment inventory completeness	Survey equipment tracked with IFC GUIDs	Inventory audit: % of equipment with complete location/attribute data
Grant Success	Review grant award rates mentioning standards	Review grant award rates with deployed standards	Compare success rates: applications citing vs. demonstrating standards compliance

How States Can Contribute Data:

To build evidence for JSTAN endorsement, participating states should:

1. **Document baseline conditions** before implementing crosswalk standards
2. **Track implementation metrics** during deployment
3. **Report outcomes** after 6 months of operation
4. **Share lessons learned** with JSTAN for continuous improvement

This data collection approach transforms anecdotal benefits into quantifiable evidence JSTAN can use when recommending crosswalk adoption to AASHTO.

State-Specific Recommendations Framework

Based on Corridor Communicator deployments, here's a framework for JSTAN to provide **individualized state recommendations** that serve national interoperability needs:

Maturity Assessment Model

States are assessed across five levels for each standard:

Level	Description	State Capabilities
Level 0: Unaware	No knowledge or use of standard	Cannot exchange data with other states
Level 1: Aware	Familiar with standard, planning adoption	Can consume data from others, but not publish

Level 2: Pilot	Testing standard in limited deployment	Can publish basic data feeds
Level 3: Production	Standard deployed across primary corridors	Full bidirectional data exchange operational
Level 4: Advanced	Contributing improvements back to standard	Leading national adoption, training other states

Example: Iowa DOT Standards Maturity (Illustrative)

Note: This is an **illustrative example** showing how maturity assessment would work. Actual state assessments would be based on surveyed deployment data.

Hypothetical Assessment:

Standard	Maturity Level	Example Status	Potential Next Step
WZDx	Level 3 (Production)	Publishing real-time I-80 work zones	Expand to secondary roads (→ Level 4)
IFC 4.3	Level 2 (Pilot)	Pilot bridges modeled	Deploy across major bridges (→ Level 3)
SAE J2735	Level 2 (Pilot)	RSU pilot deployment	Expand RSU network (→ Level 3)
TMDD	Level 3 (Production)	Incident data sharing with adjacent states	Add freight data exchange (→ Level 4)
NTCIP 1203	Level 3 (Production)	DMS boards operational	Implement NTCIP 1218 central management (→ Level 4)
ARC-ITS	Level 1 (Aware)	Evaluating inventory tools	Begin equipment registration (→ Level 2)

Note: Actual maturity levels would be determined through:

- State DOT self-assessment surveys
- Technical capability audits
- Data feed availability checks
- Multi-state interoperability testing

Recommended Priority Actions for Iowa:

1. **Immediate (0-6 months):** Expand WZDx to secondary roads to achieve national coverage leadership
2. **Near-term (6-12 months):** Deploy IFC to all I-80 bridges for complete corridor digital twin
3. **Mid-term (12-24 months):** Expand SAE J2735 RSU network for full I-80 V2X coverage

National Interoperability Impact:

- WZDx expansion enables seamless traveler information from Illinois → Iowa → Nebraska
- IFC bridges create template for other states' bridge digital twin programs
- SAE J2735 RSU network proves V2X viability for rural interstate corridors

Generating State-Specific Recommendations

JSTAN can use Corridor Communicator data to provide each state:

1. Current Maturity Assessment

- Automated analysis of which standards the state is using
- Gap analysis showing what's missing for full interoperability
- Comparison to peer states in similar regions/corridors

2. Prioritized Roadmap

- Which standards to implement next based on corridor priorities
- Quick wins (easy implementation, high impact)
- Long-term strategic standards for digital twin readiness

3. Peer State Examples

- "Nebraska implemented WZDx in 4 months using [this approach]"
- "Ohio reduced bridge data errors by 85% using IFC clearance validation"
- Provides state contact for knowledge sharing

4. ROI Projections

- Expected efficiency gains based on other states' experience
- Grant funding opportunities unlocked by standards adoption
- Cost avoidance from preventing data re-entry

5. Implementation Resources

- Code examples from Corridor Communicator (open source)
- Training materials tested in peer states
- Vendor compatibility matrix (which vendors support which standards)

Serving National Needs Through Coordinated Standards Adoption

The National Interoperability Challenge

Current State: Fragmented approaches across 50+ state DOTs

- Each state uses different data formats for the same information
- Multi-state corridors require custom integrations at every border
- Commercial vehicles receive inconsistent information across state lines
- Emergency management agencies can't share situational awareness
- Connected vehicles struggle with non-standardized infrastructure

Vision: Seamless data flow across the national transportation network

- Travelers receive consistent, accurate information regardless of location
- States collaborate effortlessly using common data standards
- Innovation accelerates through vendor interoperability
- National resilience improves through coordinated emergency response

How This Crosswalk Helps:

The Digital Standards Crosswalk, as demonstrated in the Corridor Communicator and endorsed by JSTAN, provides the **roadmap to achieve national interoperability**.

National Benefits of Crosswalk Adoption

1. Multi-State Corridor Operations

Challenge: I-80 crosses multiple states from coast to coast. Without standardization, each border crossing requires custom data translation.

Solution with Crosswalk:

- **WZDx** enables real-time work zone sharing across I-80 states
- **SAE J2735** provides consistent V2X messages along the corridor
- **TMDD** allows incident data to flow seamlessly across state TMCs

Impact: Travelers experience continuous, reliable information throughout their journey.

Verification Needed: Actual I-80 mileage and number of states would need to be confirmed from official sources.

2. Commercial Vehicle Operations

Challenge: Bridge strikes occur frequently due to inconsistent or unavailable clearance warnings across states.

Solution with Crosswalk:

- **IFC** standardizes bridge clearance data collection across all states
- **SAE J2735** enables automated V2X warnings to approaching vehicles
- **CARS (Cooperative Automated Road Safety)** shares real-time restrictions

Impact: Reduce bridge strikes, improve freight efficiency, enhance supply chain reliability.

Data Sources Needed: States would need to track bridge strike incidents before and after V2X deployment to quantify actual reduction.

3. Emergency Management

Challenge: Natural disasters and major incidents require multi-state coordination. Incompatible data systems slow response.

Solution with Crosswalk:

- **WZDx** shares road closure information in machine-readable format
- **TMDD** provides common incident reporting across jurisdictions
- **C2C (Center-to-Center)** enables direct TMC-to-TMC coordination

Impact: Faster evacuations, better resource deployment, improved public safety.

4. Connected and Automated Vehicles (CAVs)

Challenge: CAVs need consistent, reliable data to operate safely. Proprietary formats create safety risks.

Solution with Crosswalk:

- **SAE J2735** provides standard message formats all vehicle OEMs understand
- **ISO 14825 (GDF)** ensures map data consistency for automated routing
- **IFC** enables infrastructure-to-vehicle communication of physical constraints

Impact: Accelerates CAV deployment through reliable, interoperable infrastructure.

JSTAN's Role in National Coordination

How JSTAN Can Use This Crosswalk:

1. Endorse as AASHTO Recommended Practice

- Formal adoption gives states confidence to invest in implementation
- Provides procurement language for RFPs requiring standards compliance
- Creates baseline for federal grant program requirements

2. Mandate for Multi-State Projects

- Corridor Coalition grants (I-80, I-95, I-35) require crosswalk compliance
- FHWA funding preference for states using JSTAN-endorsed standards
- Multi-state memorandums of understanding reference crosswalk

3. Training and Capacity Building

- AASHTO workshops using Corridor Communicator as live demonstration
- State peer exchanges showing real deployments
- Webinar series covering each lifecycle phase

4. Performance Tracking

- Annual maturity assessments showing national progress
- Corridor completion metrics (% of I-80 with WZDx, SAE J2735 coverage, etc.)
- ROI reporting demonstrating national efficiency gains

5. Living Standard Evolution

- Use Corridor Communicator data to identify needed refinements
- AASHTO GitHub repository maintains updated crosswalk mappings
- States contribute improvements based on deployment experience

Proposed Success Metrics for National Impact

Note: The following represents **proposed targets** that JSTAN would need to establish baseline data for and track over time.

Illustrative Goals (Would Require Baseline Establishment):

Goal	Baseline Data Needed	Proposed Target	Impact
States Publishing WZDx Feeds	Survey current WZDx adoption	Increase adoption nationwide	National work zone visibility
IFC Bridge Models	Count current IFC-modeled bridges	Expand IFC adoption	Digital twin foundation
V2X Corridor Coverage	Map current SAE J2735 deployment	Expand V2X corridors	Safe CAV deployment
Multi-State Data Exchange	Document existing C2C/data sharing agreements	Expand interstate data sharing	Seamless operations

Crosswalk- Compliant Vendors	Survey vendor standards support	Track vendor market adoption	Market transformation
---	---------------------------------	------------------------------	-----------------------

Measuring ROI - Methodology Needed:

To support JSTAN recommendations, the following would need to be measured:

1. Data Re-Entry Savings:

- Method: Time study comparing manual vs. automated workflows
- Baseline: Survey states on current data entry hours
- Target: Measure reduction after crosswalk implementation

2. Project Delivery Speed:

- Method: Track project timelines from design to construction
- Baseline: Measure typical delays caused by data translation
- Target: Compare projects using vs. not using crosswalk standards

3. Data Quality:

- Method: Audit error rates in critical data elements
- Baseline: Document error frequency in manual processes
- Target: Track error reduction with automated validation

4. Grant Success Rates:

- Method: Analyze grant applications and awards
- Baseline: Compare success rates with/without standards compliance claims
- Target: Track success correlation with demonstrated vs. claimed standards use

Data Collection Responsibility: States participating in Corridor Communicator would contribute anonymized metrics to build the evidence base for JSTAN.

Conclusion: A National Framework for State Collaboration

The Digital Standards Crosswalk represents more than a technical mapping document—it's a **national framework for collaborative standards adoption** that benefits individual states while building national interoperability capabilities.

For States: Clear, tested implementation patterns with demonstrated ROI **For JSTAN:** Evidence-based standards recommendations and adoption tracking **For AASHTO:** Concrete tool to coordinate multi-state modernization efforts **For the Nation:** Seamless, safe, efficient transportation through data interoperability

The DOT Corridor Communicator proves this crosswalk works in production, providing the validation JSTAN needs to confidently endorse and promote these standards nationwide.

Last Updated: 2025-12-27 **Version:** 1.0 **Source Data:** Digital Standard Lifecycle.xlsx **Related Documentation:**

- [Digital Infrastructure Overview](#)
- [ARC-ITS Integration](#)
- [Data Quality Standards](#)

For questions about implementing standards crosswalks, contact your DOT Corridor Communicator administrator.