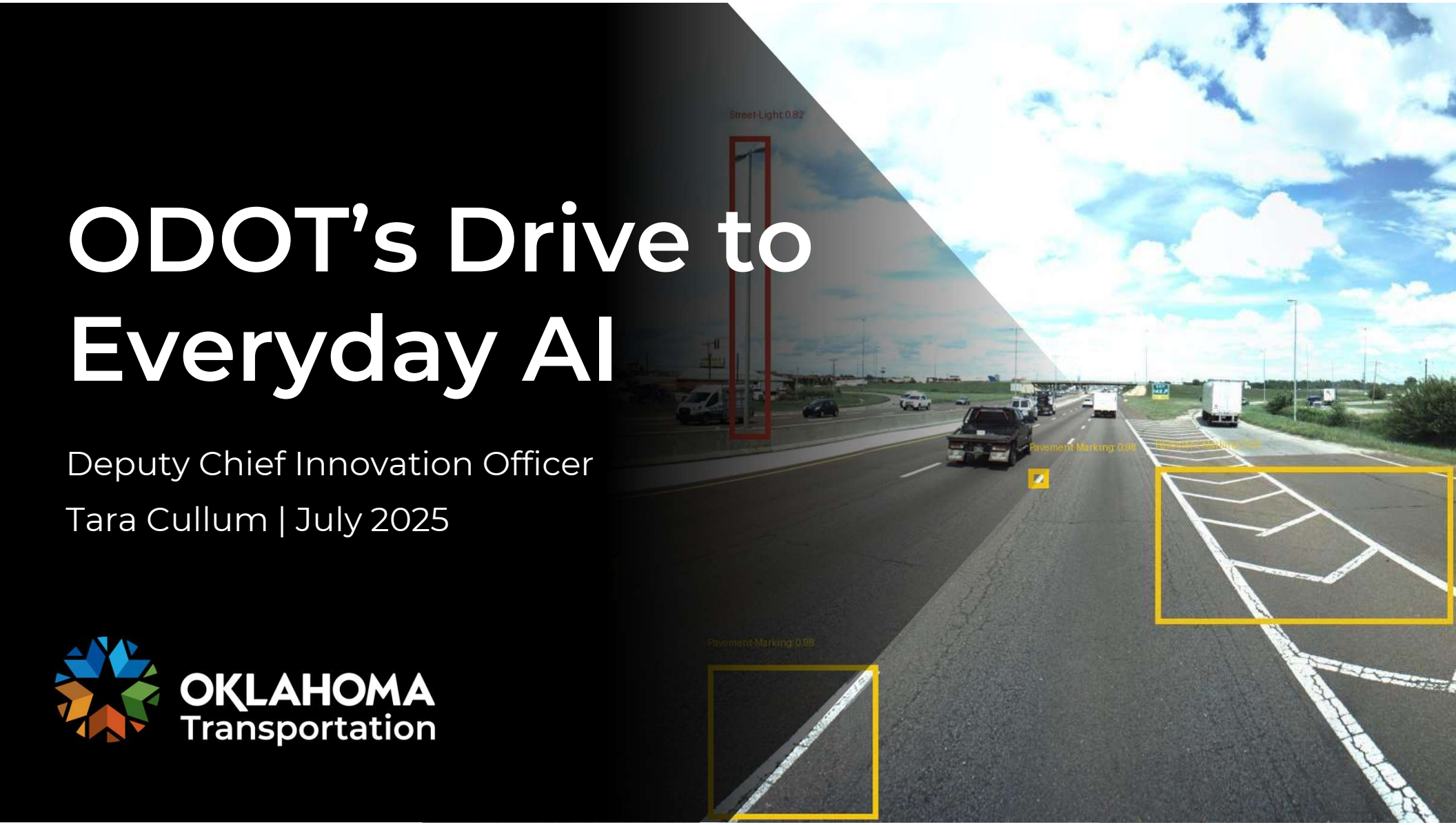
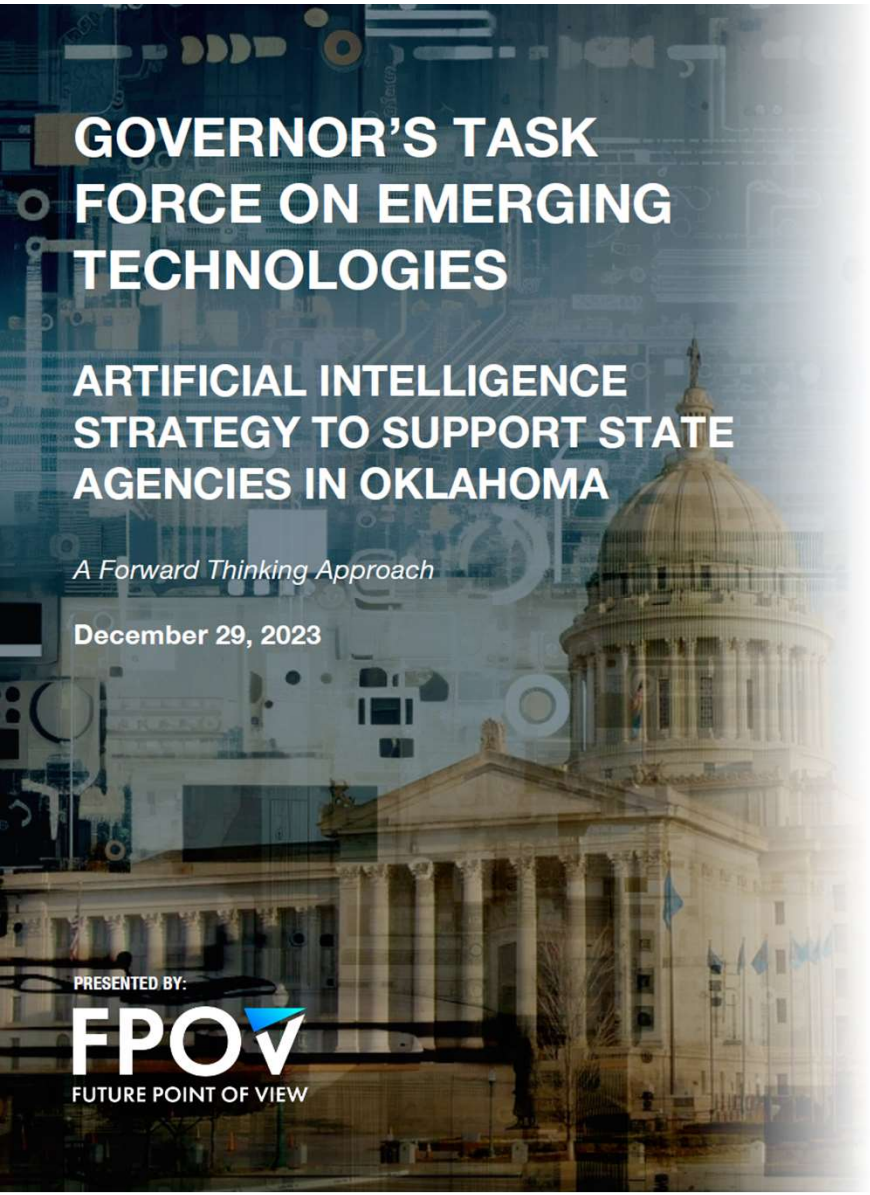
ODOT's Drive to Everyday AI

Deputy Chief Innovation Officer

Tara Cullum | July 2025

OKLAHOMA Transportation





Context

- **Late 2023: Statewide strategy is published** by Oklahoma Governor's Task Force on Emerging Technologies
- **AI efforts are developed and implemented through central IT agency:** Oklahoma Management and Enterprise Services (OMES)
- **ODOT partners with OMES Data Services** to initiate multiple proof-of-concept projects specific to Transportation
- **OMES AI initiatives on behalf of all state agencies will eventually benefit & enhance ODOT's day-to-day**

ODOT's AI Focus

Proof-of-Concepts Complete, Begin Phase 2:

- Asset Inventory Computer Vision
- Deeds Rights-of-Way Digitization

Scheduled Proof-of-Concept:

- Construction Plans Automation
  (similar to Deeds Rights-of-Way but with construction plan docs and data)

Asset Inventory Computer Vision
ODOT GIS

PHASE 1 | PROOF-OF-CONCEPT

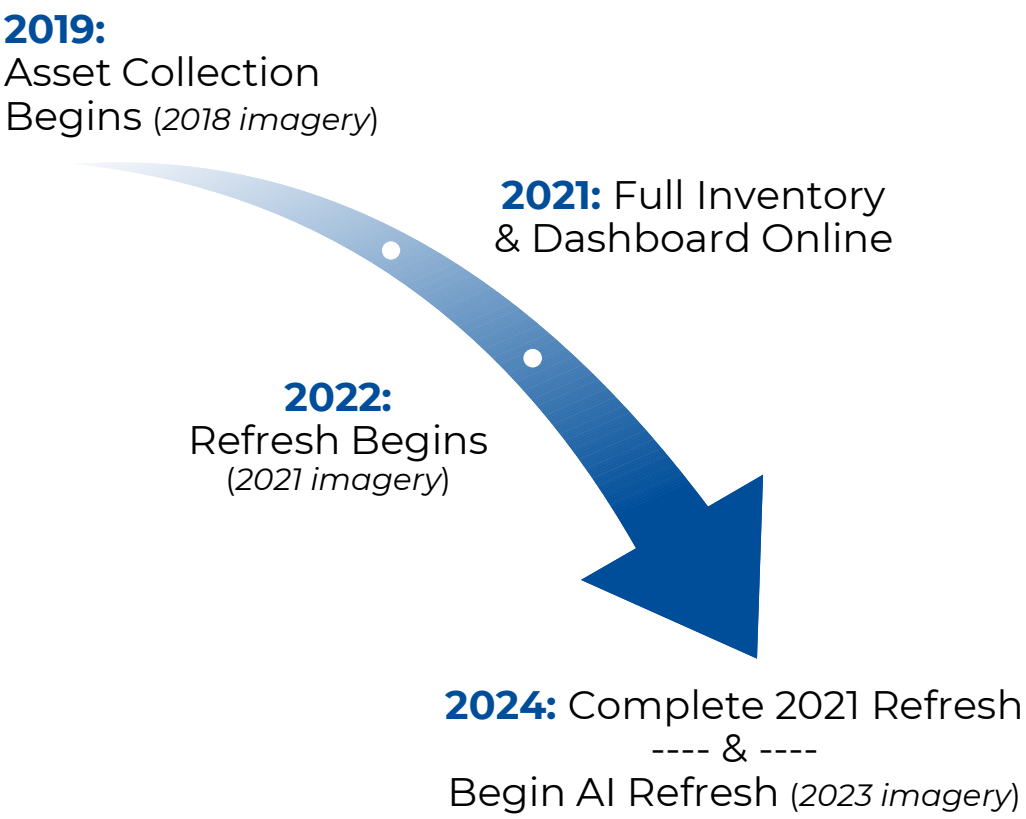
Testing Site: Small section of interstate in Oklahoma City Metro

OMES Cost: $18,000

ASSET INVENTORY COMPUTER VISION | ODOT GIS

THE MANUAL REVIEW PROBLEM

- Inventory includes assets such as guard rails, rumble strips, signs (no billboards), lights, and pavement markings, etc.
- **Annual inventory inspections required multiple employees to physically review thousands of pictures for indication of damaged or missing assets** *(see timeline →)*
- Training AI to compare these images at a machine's pace allows these employees to redirect their attention to other priorities



ASSET INVENTORY COMPUTER VISION | ODOT GIS

PHASE 1 | DATA DRIVEN OUTCOMES

Image Recognition Key Insights

- **Robust Image-Recognition System:** Establish a business-grade image recognition system focused on precision and reliability.
- **Geolocation Extraction via OCR:** Utilize Optical Character Recognition (OCR) to accurately extract Latitude and Longitude details from each image's information banner.
- **Geospatial Mapping for Change Visualization:** Develop a systematic approach for mapping geographical coordinates to visually represent year-over-year changes.
- **Assessment of Location Accuracy:** Formulate a method to evaluate the delta error in the relative locations of identified objects across consecutive years.
- *Note: All photographs were captured from a moving vehicle, adding a layer of complexity to object recognition and positional accuracy tasks.*

ASSET INVENTORY COMPUTER VISION | ODOT GIS

PHASE 1 | SUCCESS

- **Tech Cost Savings** from Original SOW:
  - $400,000 (first-year cost savings)
  - $100,000 (annual maintenance costs)
- **Saves** an estimated **10,000 hours** – ***at least*** – **of manual review** per year
- **5 full-time employees able to focus on other priorities** and complex aspects of their jobs

ASSET INVENTORY COMPUTER VISION | ODOT GIS

PHASE 2

- **Model Enhancement:** optimized object detection
- Transition to **advanced polygon-based bounding** method
- **Comprehensive integration** across entire highway network
- Signage classification and textual content analysis (as in, **the type of sign & words printed on it**)

ASSET INVENTORY COMPUTER VISION | ODOT GIS

PHASE 2 | ENTERING PRODUCTION

Statewide Highway System deployment is set to start next week! (last two weeks of July 2025)

↓ Right Now ↓

1st Priority – Required Assets

- Signs (perpendicular to the street, not parallel)
- Light Poles
- Guardrails/Barriers
- Rumble Strips
- Pavement Markings

↓ Later/New Project ↓

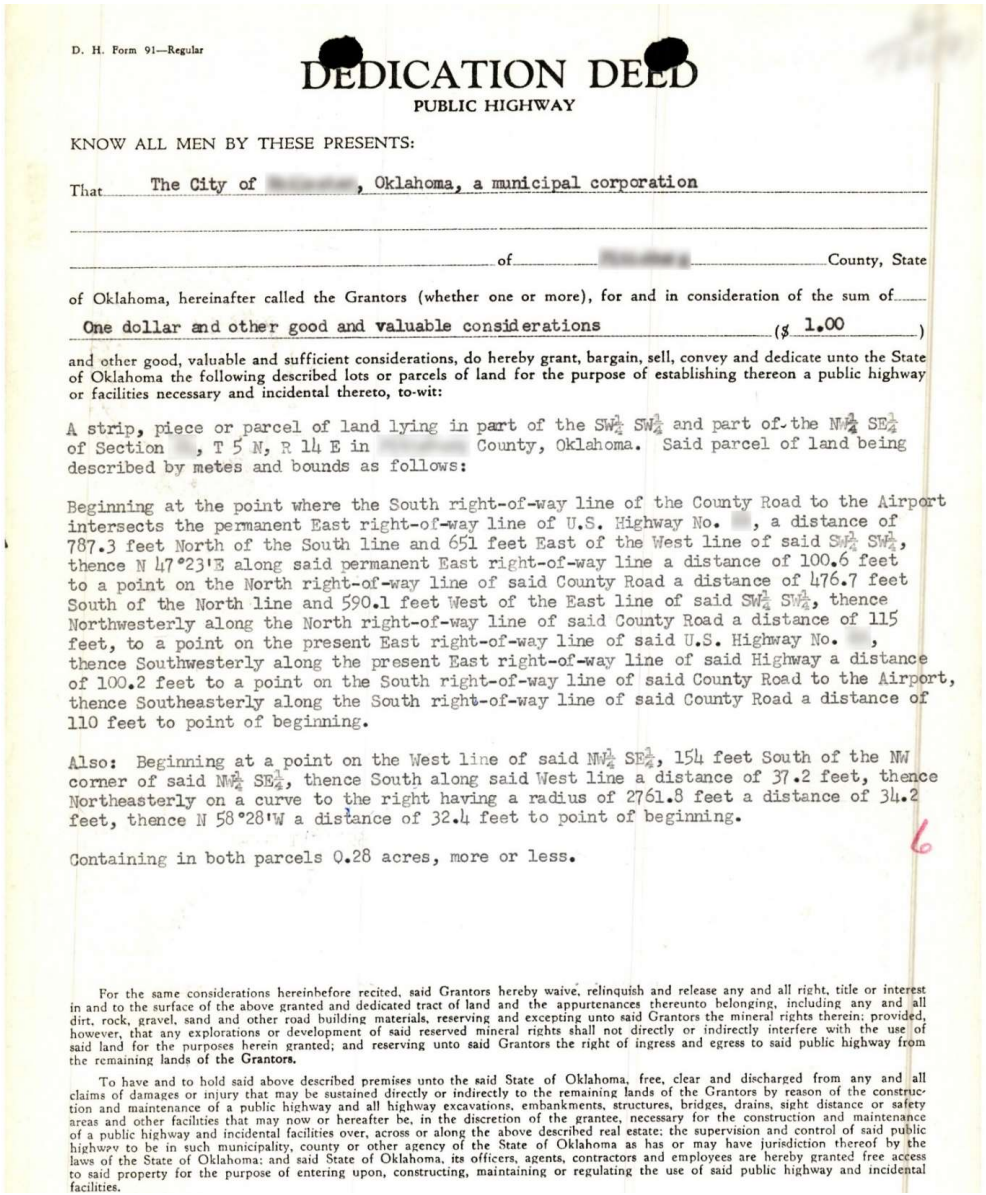
2nd Priority – Components of signals & lights *(requires more model training)*

- Pole Type
- Base Type
- Control Box Type
- Signal Type
- Visor and Backing Plate Type

↓ Eventually ↓

3rd Priority – Ideal

- Auxiliary Lanes



D. H. Form 91—Regular

DEDICATION DEED

PUBLIC HIGHWAY

KNOW ALL MEN BY THESE PRESENTS:

That The City of [redacted], Oklahoma, a municipal corporation

of [redacted] County, State of Oklahoma, hereinafter called the Grantors (whether one or more), for and in consideration of the sum of One dollar and other good and valuable considerations ($ 1.00) and other good, valuable and sufficient considerations, do hereby grant, bargain, sell, convey and dedicate unto the State of Oklahoma the following described lots or parcels of land for the purpose of establishing thereon a public highway or facilities necessary and incidental thereto, to-wit:

A strip, piece or parcel of land lying in part of the SW¼ SW¼ and part of the NW¼ SE¼ of Section [redacted], T 5 N, R 14 E in [redacted] County, Oklahoma. Said parcel of land being described by metes and bounds as follows:

Beginning at the point where the South right-of-way line of the County Road to the Airport intersects the permanent East right-of-way line of U.S. Highway No. [redacted], a distance of 787.3 feet North of the South line and 651 feet East of the West line of said SW¼ SW¼, thence N 47°23'E along said permanent East right-of-way line a distance of 100.6 feet to a point on the North right-of-way line of said County Road a distance of 476.7 feet South of the North line and 590.1 feet West of the East line of said SW¼ SW¼, thence Northwesterly along the North right-of-way line of said County Road a distance of 115 feet, to a point on the present East right-of-way line of said U.S. Highway No. [redacted], thence Southwesterly along the present East right-of-way line of said Highway a distance of 100.2 feet to a point on the South right-of-way line of said County Road to the Airport, thence Southeasterly along the South right-of-way line of said County Road a distance of 110 feet to point of beginning.

Also: Beginning at a point on the West line of said NW¼ SE¼, 154 feet South of the NW corner of said NW¼ SE¼, thence South along said West line a distance of 37.2 feet, thence Northeasterly on a curve to the right having a radius of 2761.8 feet a distance of 34.2 feet, thence N 58°28'W a distance of 32.4 feet to point of beginning.

Containing in both parcels 0.28 acres, more or less.

For the same considerations hereinbefore recited, said Grantors hereby waive, relinquish and release any and all right, title or interest in and to the surface of the above granted and dedicated tract of land and the appurtenances thereunto belonging, including any and all dirt, rock, gravel, sand and other road building materials, reserving and excepting unto said Grantors the mineral rights therein; provided, however, that any explorations or development of said reserved mineral rights shall not directly or indirectly interfere with the use of said land for the purposes herein granted; and reserving unto said Grantors the right of ingress and egress to said public highway from the remaining lands of the Grantors.

To have and to hold said above described premises unto the said State of Oklahoma, free, clear and discharged from any and all claims of damages or injury that may be sustained directly or indirectly to the remaining lands of the Grantors by reason of the construction and maintenance of a public highway and all highway excavations, embankments, structures, bridges, drains, sight distance or safety areas and other facilities that may now or hereafter be, in the discretion of the grantee, necessary for the construction and maintenance of a public highway and incidental facilities over, across or along the above described real estate; the supervision and control of said public highway to be in such municipality, county or other agency of the State of Oklahoma as has or may have jurisdiction thereof by the laws of the State of Oklahoma; and said State of Oklahoma, its officers, agents, contractors and employees are hereby granted free access to said property for the purpose of entering upon, constructing, maintaining or regulating the use of said public highway and incidental facilities.

Deeds Rights-of-Way Digitization

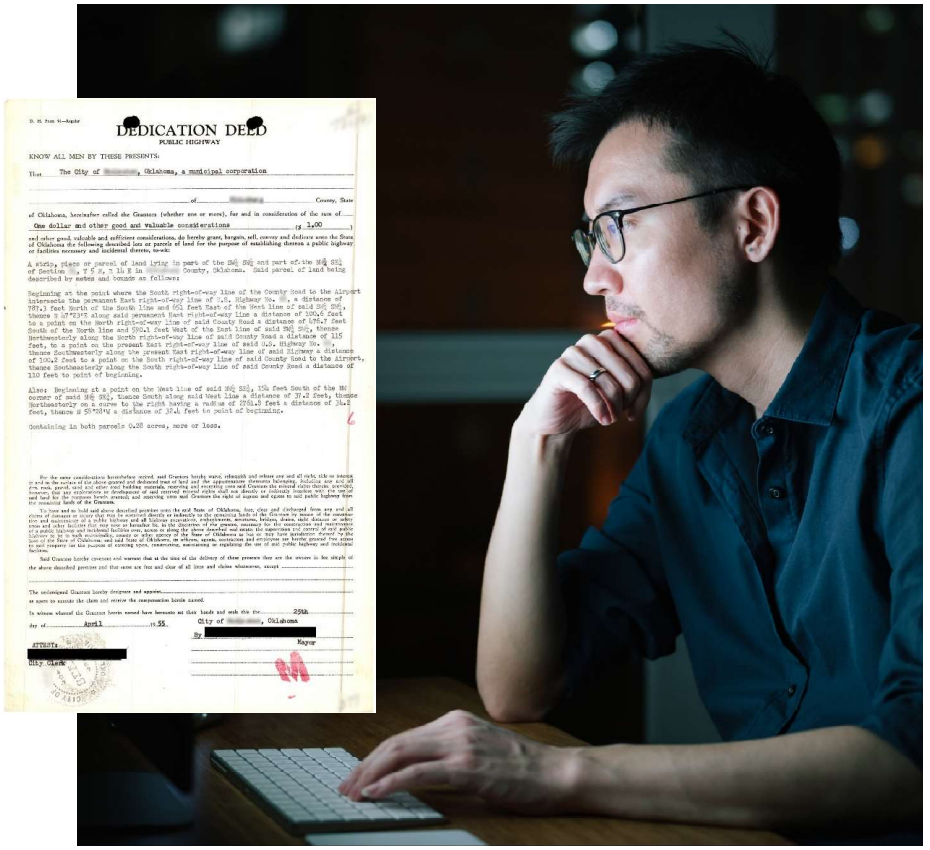
ODOT Right-of-Way & Utilities

PHASE 1 | PROOF-OF-CONCEPT

DEEDS RIGHTS-OF-WAY DIGITIZATION | ODOT RIGHT-OF-WAY & UTILITIES

DOCUMENTS FOR DAYS

- Rights-of-Way parcel deeds must be stored/archived for public requests made through the Open Records Act
- **ODOT needs to digitize 250,000 parcel deeds (all paper records)**
- Manual Process:
  - Document is scanned into an application repository
  - Employee reads deed and plots parcel points based on lengthy location descriptions and coordinates
- ***Doesn't sound too bad, right?***



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DEEDS RIGHTS-OF-WAY DIGITIZATION | ODOT RIGHT-OF-WAY & UTILITIES

DOCUMENTS FOR… YEARS

- *Average Manual Processing Time*: **20 minutes/parcel** (or 3/hour)
- **Manually inputting the data for 250,000 parcels with 20 GIS specialists* would require 83,333 hours to complete**
- Training AI to review and plot parcel location coordinates at a machine's pace not only **saves** over 83,000 hours of work, but also **$6 million in total labor costs** (*GIS specialists are not cheap)
- AI performs optical character recognition (OCR) and provides a consolidated digital deed file with exact plots of land
- **Enables better access for internal and external partners**
  - Modernizes the open records request process
  - Will provide a searchable map view of deeds

DEEDS RIGHTS-OF-WAY DIGITIZATION | ODOT RIGHT-OF-WAY & UTILITIES

PHASE 1 | MACHINE LEARNING

AI **captures deed information** from scanned images (OCR & metadata extraction) **removing manual effort** (converts descriptions into files ingestible by ArcGIS)

Text file with appropriate **"point to point" info to populate an ArcGIS application** with deed direction & distance instructions

Improves **public transparency** of ODOT's document archive

DEEDS RIGHTS-OF-WAY DIGITIZATION | ODOT RIGHT-OF-WAY & UTILITIES

PHASE 1 | MACHINE LEARNING

Key Achievements

- Successfully extracted text from warranty deeds and easements
- Developed a Python script for data processing leveraging GenAI
- **Achieved high accuracy in metadata** *(100% accuracy on all fields, except Book-Page/Court Doc ID)* **and traverse data extraction** *(Straight Line Segments Average 91.5% Accuracy)*

Challenges

- Verification required/potential errors in starting point and curve data in traverses *(Ex: "Northeasterly along a curve to the left with a central angle of 01°20'56" and a radius of 2171.83 feet for 51.13 feet")*
- Improvement opportunity for Book-Page/Court Doc ID

Next Steps & Phase 2

- Improve model accuracy with additional examples (model hardening)
- Optimize prompt engineering for better curve data extraction

DEEDS RIGHTS-OF-WAY DIGITIZATION | ODOT RIGHT-OF-WAY & UTILITIES

PHASE 2 | INTEGRATION

Objective: Integrate with System of Record

- ApplicationXtender → Google Cloud Platform (GCP) → ApplicationXtender
- Seamless integration to enhance data management and accessibility

Goal 1 | Optimize Data Extraction Process

Streamline and improve efficiency in data extraction workflows

Goal 2 | Implement Additional Validation and QA Measures

Strengthen data quality control; reduce errors

Goal 3 | Expand Document Processing Capabilities

Improve processing efficiency

OKLAHOMA Transportation

Questions?

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Thank You

Deputy Chief Innovation Officer

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