#NAFOAFALL21

Sky's the Limit: Drone Technology and the Future of Tribes

Presented by: Jeff Krecic
James Grimsley
James Twoteeth

Applications of Drone Technology

Drones can perform many tasks faster, safer and easier than other methods. The number of applications is growing as quickly as the technology is evolving.

Types of Drones

- Multi-Rotor
  - Aerial video and photography
  - Vertical take-off and landing
  - Inspection/documentation of conditions

- Fixed Wing
  - Light weight (safe)
  - Cover large area
  - Accurate aerial photograph, no video

Marketing, Training, etc…

Benefits:

- **Visual appeal**
- **Bird's eye view**
- **Documentation of existing conditions**

300' Transmission
Tower construction

Infrastructure Inspection

Benefits:

- Safety
- Speed
- Documentation of existing conditions
- Thermal and IR cameras
- Gas sensors

750’ Coal Power Plant Chimney

Video With Imbedded Graphics

- **4k video flown with the DJI Inspire.**
- **Image stabilization**
- **Geospatially accurate features composited into video**

Great for Stakeholder presentations

US Army Corp of Engineers,
Turkey Creek Flood Prevention

https://www.youtube.com/watch?v=zashtMqP9lE

Near-Infrared Imager for Agriculture

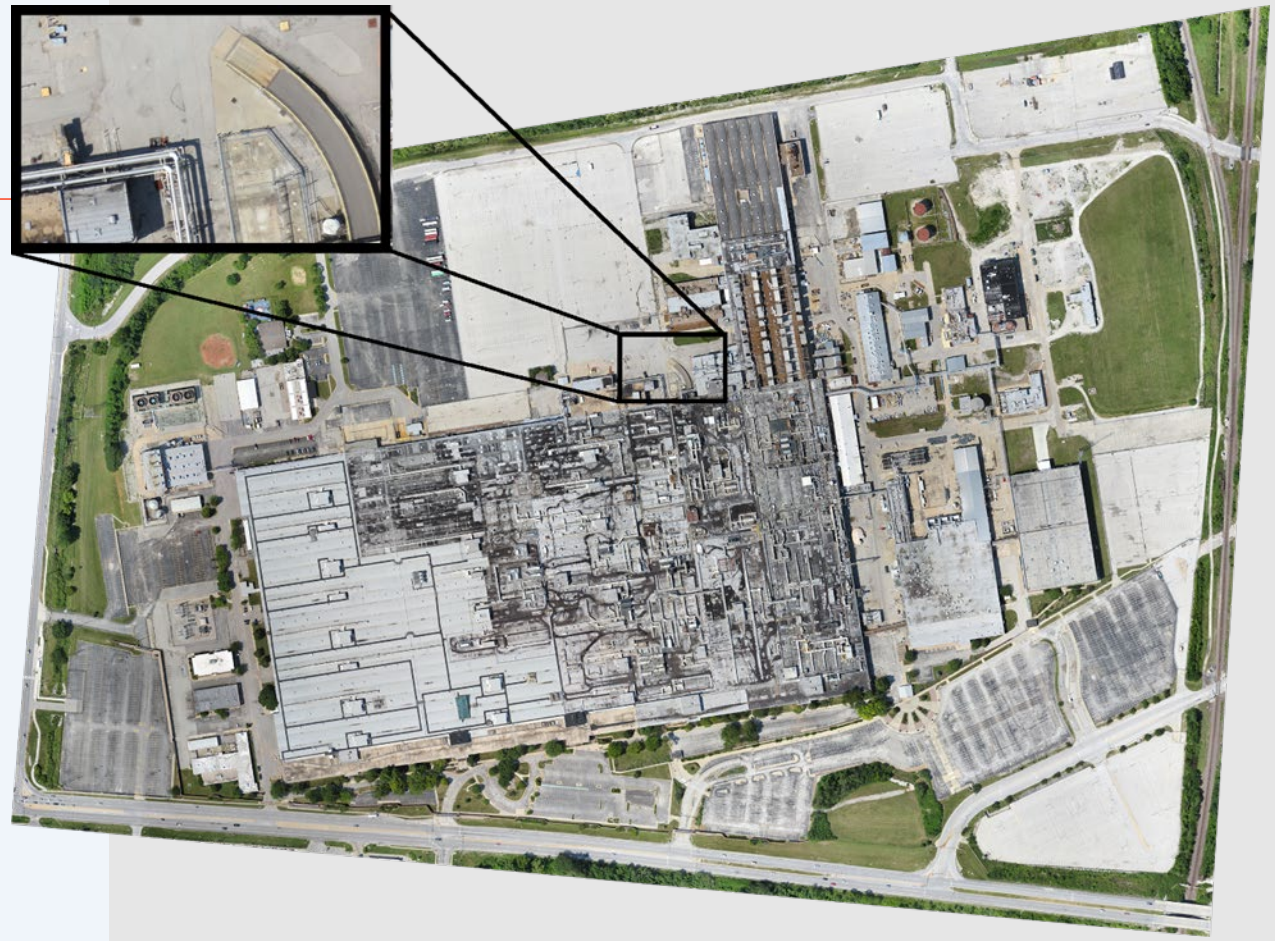
Benefits:

- NDVI to analyze crop health
- Precision application of fertilizers, pesticides and water.
- Save cost and the environment.

Mapping and 3D Modeling

Orthomosaics

- **Stitching multiple images together seamlessly**
- **Orthorectification – stretching the image to match the spatial accuracy of a map**
- **½ inch pixel detail.**



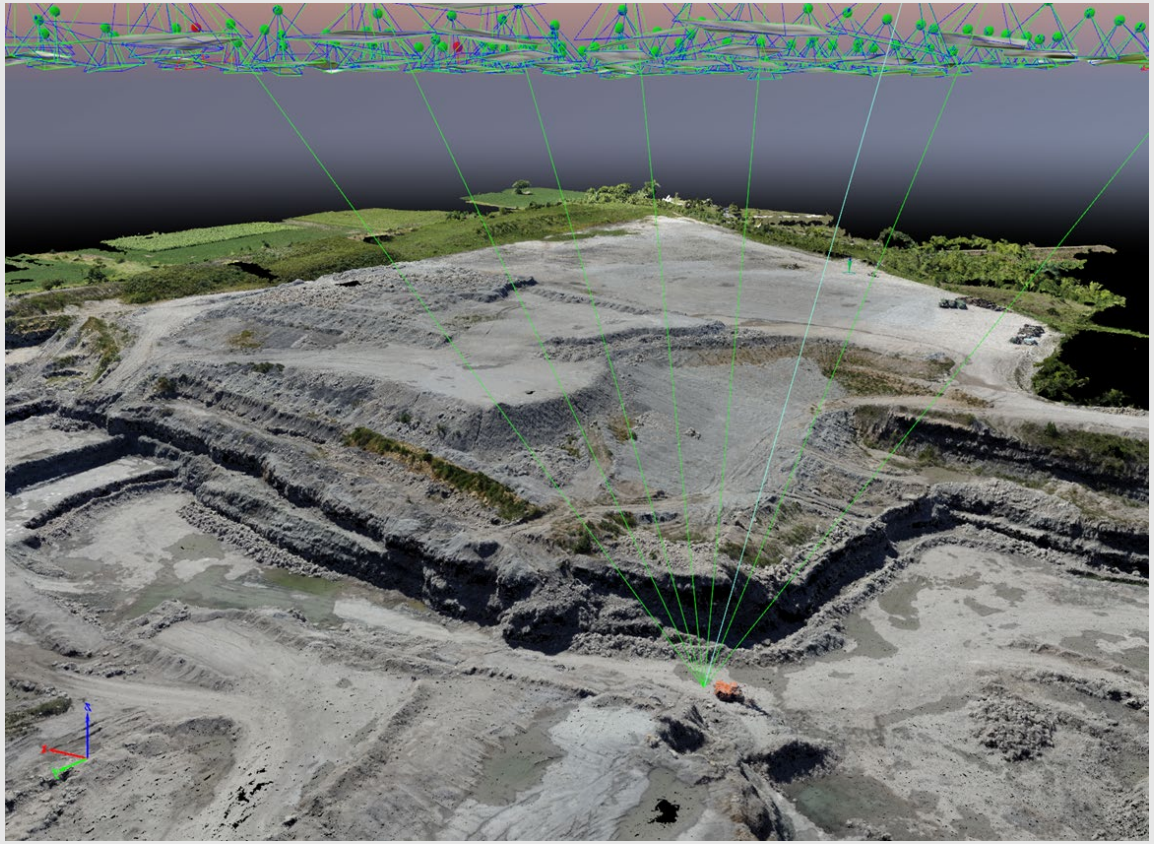
Bannister Federal Complex

Kansas City, MO

Mapping and 3D Modeling

Colorized Point Cloud

- **Pixel Matching**
- **Structure from Motion**
- **Create a 3D point cloud equivalent to first return LiDAR.**

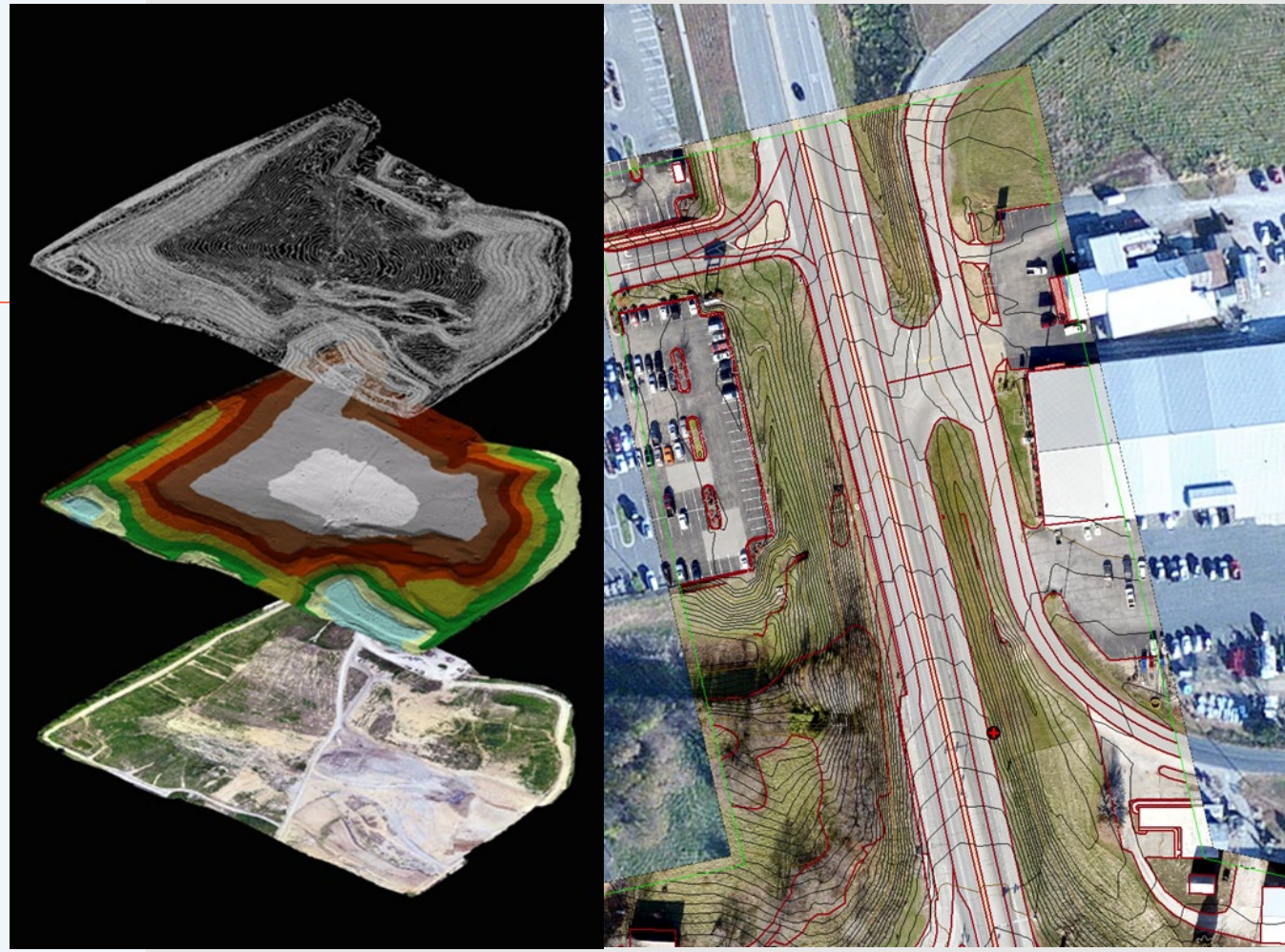


Quarry, 3D colorized point cloud

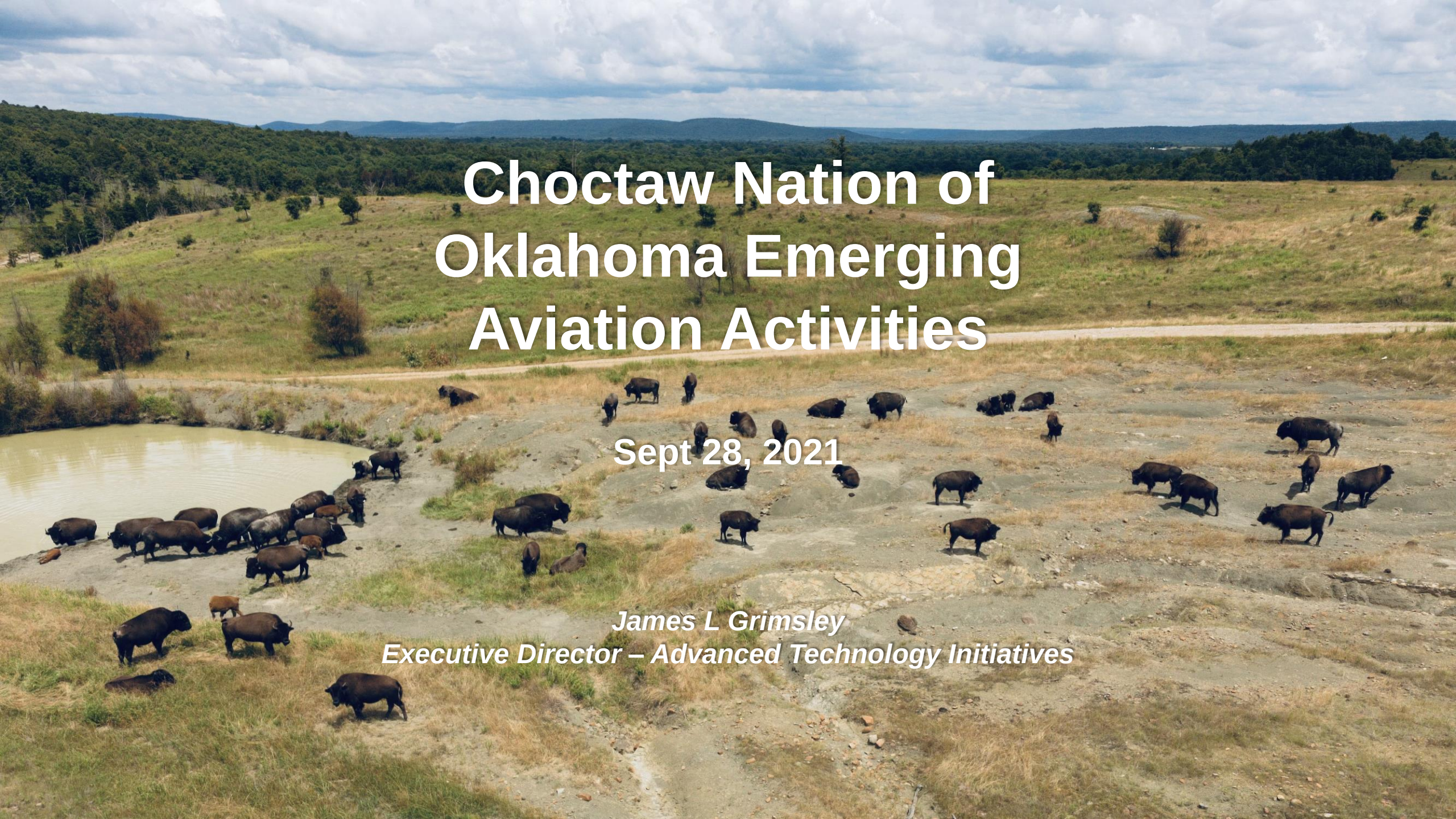
Mapping and 3D Modeling

Surface Models and Mapping

- **Create contours**
- **Volume calculations**
    - Earth moving
    - Stockpiles
- **Mapping infrastructure**



Quarry, 3D colorized point cloud



Choctaw Nation of Oklahoma Emerging Aviation Activities

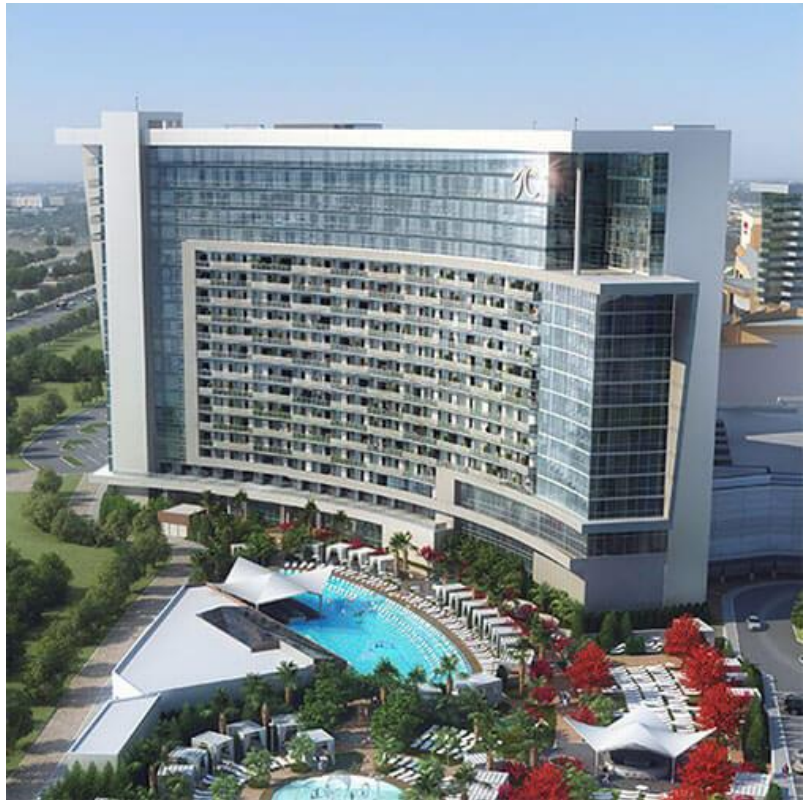
Sept 28, 2021

James L Grimsley
Executive Director – Advanced Technology Initiatives

THE CHOCTAW NATION

The Choctaw Nation consists of 10½ counties in the southeastern part of Oklahoma. The Choctaw Nation is bounded on the east by the State of Arkansas, on the south by the Red River, on the north by the South Canadian, Canadian and Arkansas Rivers. The western boundary generally follows a line slightly west of Durant, then due north to the South Canadian River.

THE CHOCTAW NATION



May 2018: Choctaw Nation of Oklahoma selected as only tribal government to participate in the FAA UAS Integration Pilot Program (IPP).

October 2020: Choctaw Nation started the FAA BEYOND program as the UAS IPP ended. BEYOND program is 4 years.

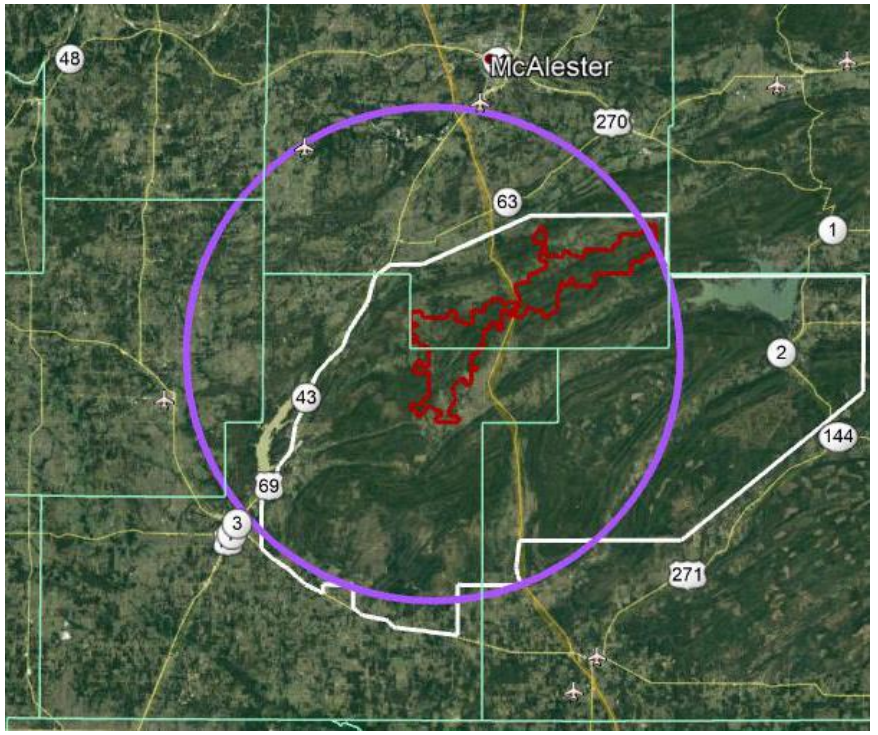
Choctaw Nation Selected to Participate in FAA Drone Program Known as UASIPP

by STACY HUTTO

Chief Gary Batton and representatives from the City of San Diego, California; Innovation and Entrepreneurship Investment Authority, Herndon, Virginia' Kansas Department of Transportation, Topeka, Kansas; Lee County Mosquito Control District. Ft. Myers, Florida; Memphis-Shelby County Airport Authority, Memphis Tennessee; North Caroline Department of Transportation, Raleigh, North Carolina; North Dakota Department of Transportation, Bismarck, North Dakota; The City of Reno, Nevada; and the University of Alaska –Fairbanks, Fairbanks, Alaska learned they had been chosen for the initial Unmanned Aircraft Systems, or drone, Integration Pilot Program, or UASIPP, when U.S. Transportation Secretary Elaine L. Chao made the announcement on Wednesday, May 9.

Choctaw Nation of Oklahoma Emerging Aviation Technology Test Center

- The Choctaw Nation of Oklahoma (CNO) is the third largest federally-recognized Native American tribe in the United States.
- CNO is constructing an advanced aviation testing center located on 44,000+ acres of tribally-owned land in Southeastern Oklahoma.
- The test range is 25 miles long and can support a variety of testing scenarios for emerging aviation technology such as safe beyond visual line of sight (BVLOS) operations of unmanned aircraft and rapid access to flight testing for electric vertical take-off or landing (eVTOL) systems.
- CNO is making considerable investments in infrastructure (buildings, landing facilities, ground-based radar, communications links, etc.) to support a variety of test activities.
- The CNO was the only tribal government selected to participate in the Federal Aviation Administration (FAA) Unmanned Aircraft Systems Integration Pilot Program (UASIPP) and is the only tribal government participating in the follow-on FAA BEYOND program.
- Package delivery, linear infrastructure inspection and weather research will be our focus during the BEYOND program.



Red outline
– Ranch boundaries
White outline
– Authorized airspace
Purple outline
– Radar coverage

Ground-Based Radar System

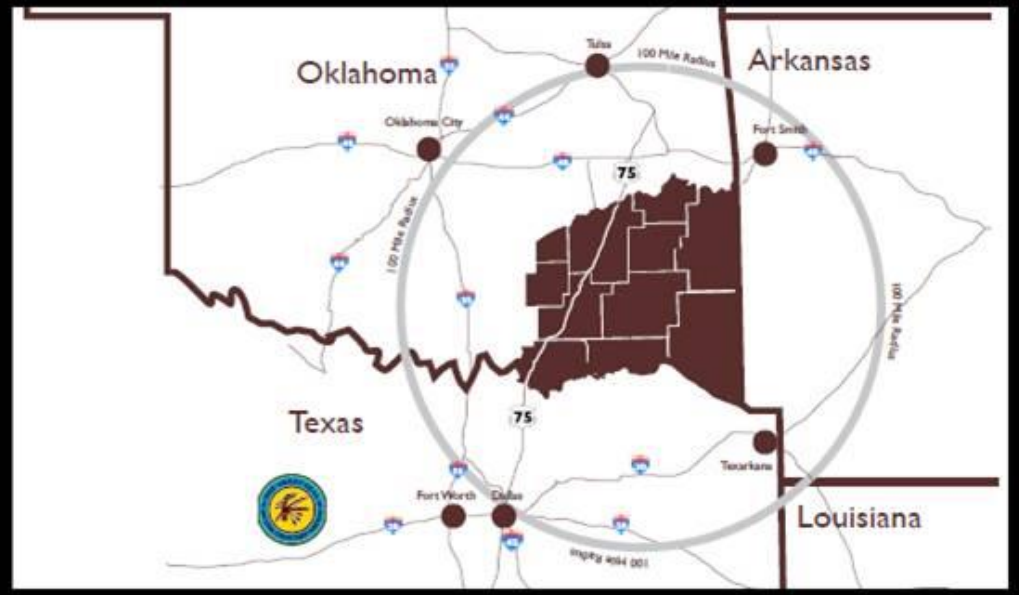
Our Vision…..


Runway
Geological Survey Boundary
Vertiport
Battery / storm shelters
Small
Small
Small
Large
Large
Quad
Maker's
1000
Helipad
Service Drive
Hangars
Utility Tanks
Parking Cover
Propane Tanks
New Access Road To Hangars
Snake Path Overlook
Native grasses wildflowers
Nation Art
Flagpoles
Helipad
RV Park
Recreation and Bathhouse
Tower
Patio
OPS and Welcome Center
Parking
Entry Drive
New Gate house and sign
Landscape Screen

THE CHOCTAW NATION

Choctaw Ranch is:

- 135 miles to Plano, TX
- 115 miles to Tulsa, OK
- 118 miles to Ft. Smith, AR
- 150 miles to Oklahoma City, OK
- 155 miles to DFW Airport



“Emerging technologies can be an ‘equalizer’ for quality of life and safety for rural and remote areas.”

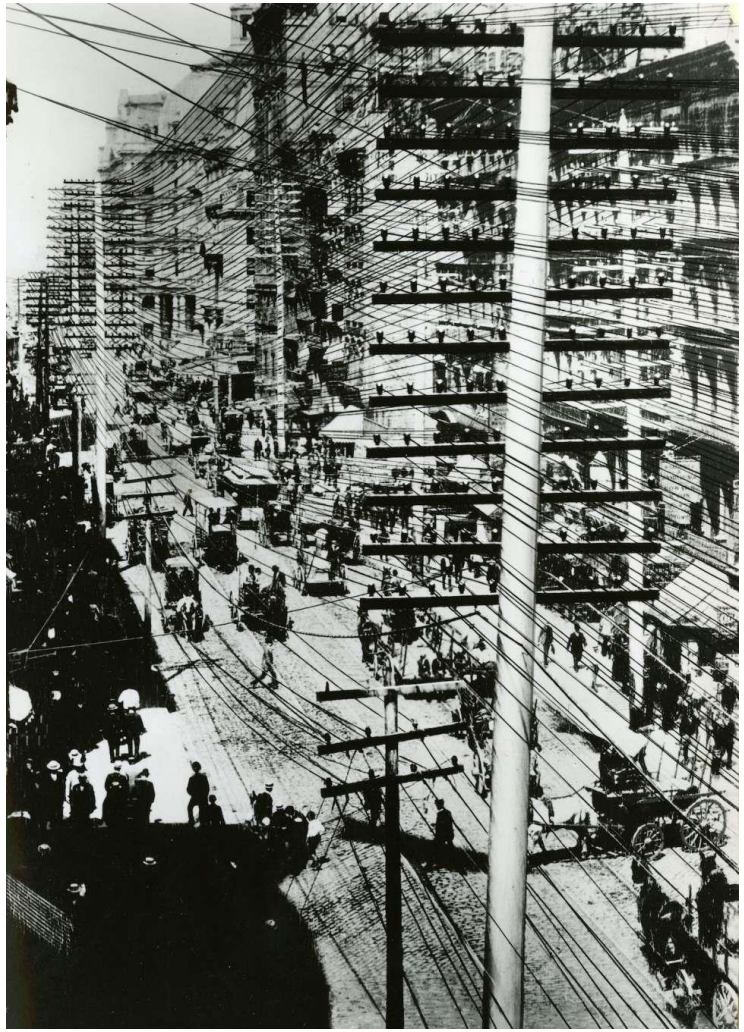
National Rural Health Association Policy Brief

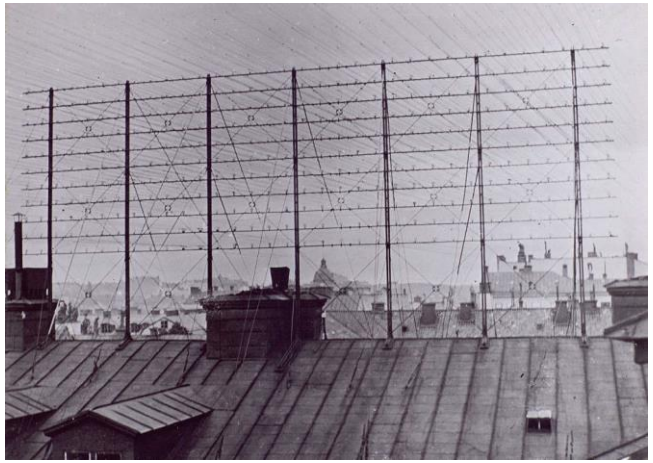
EMS Services in Rural America: Challenges and Opportunities

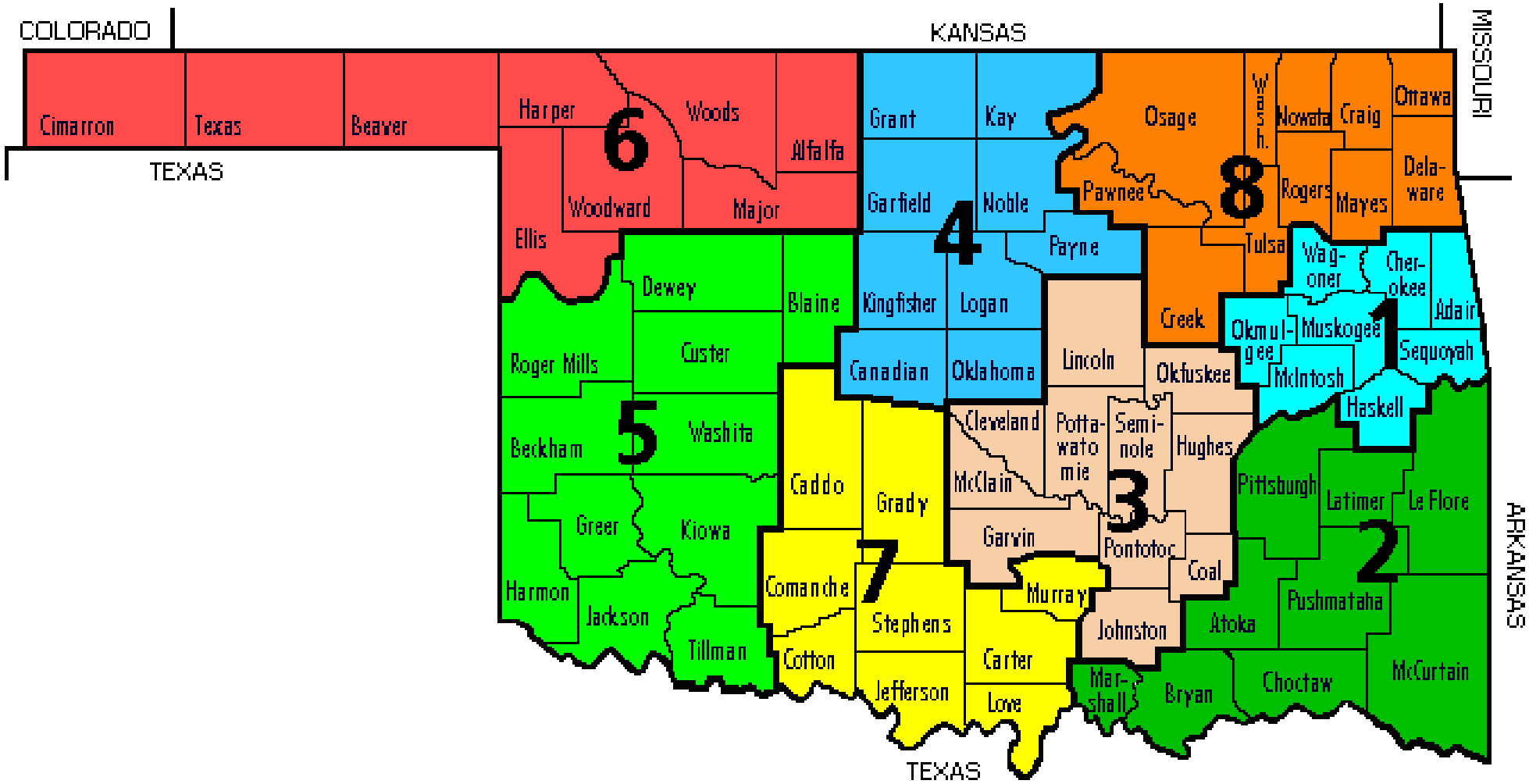
Nikki King, MHSA, Marcus Pigman, MHA, Sarah Huling, BS- ARRT, ARDMS,
and Brian Hanson, PhD

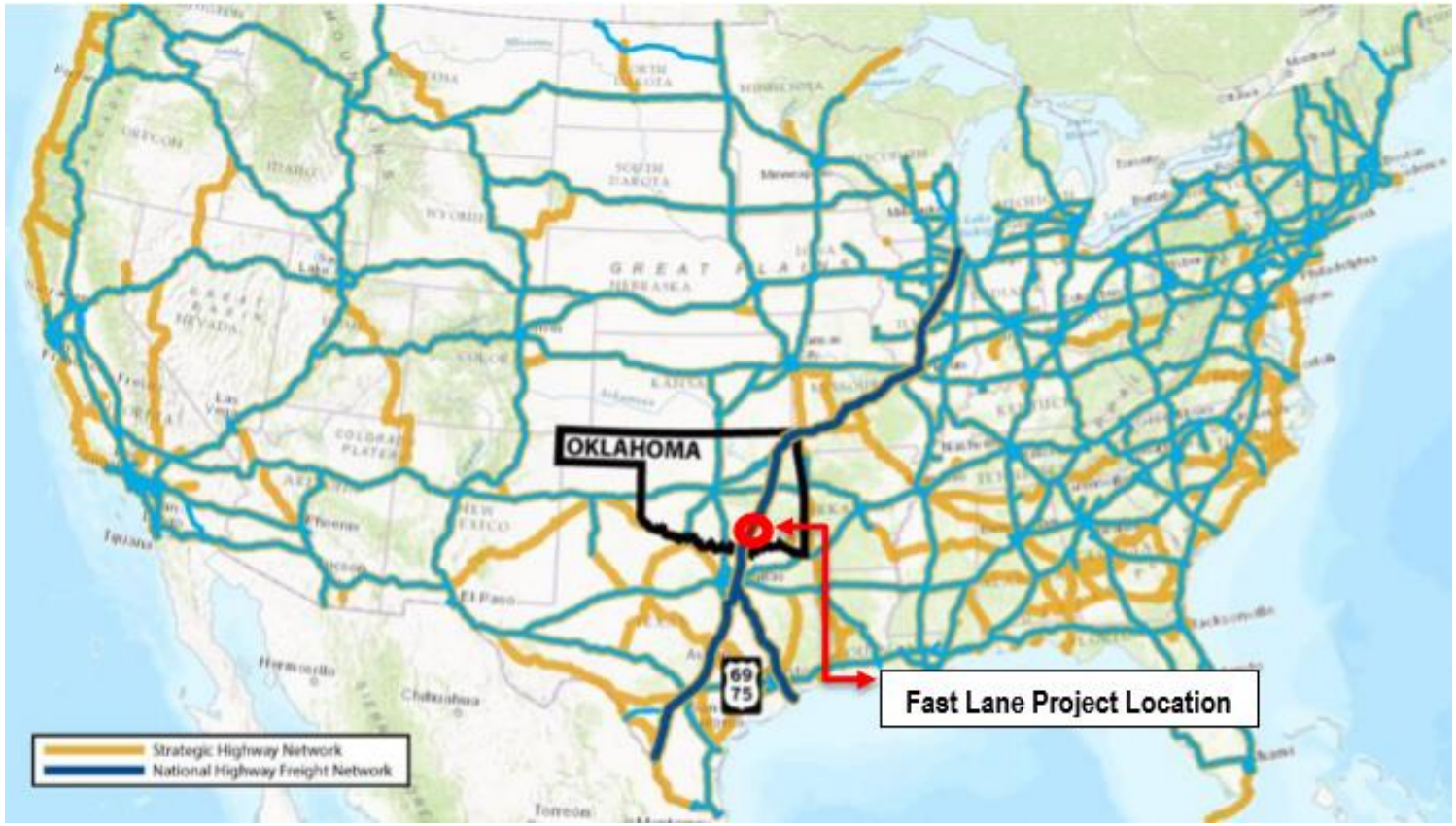
Executive Summary:

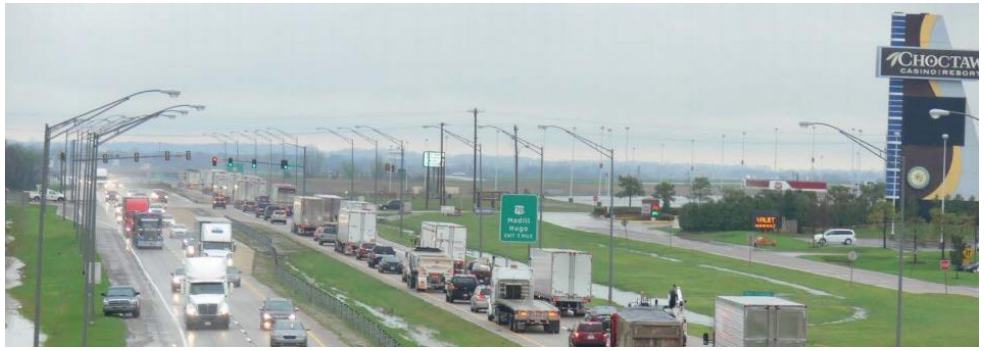
Across the United States, about 57 million people, or 18% of the total population, call rural communities home[1]. While rural America may conjure idyllic images of family farms, the truth is far more staggering. Rural Americans, on average, tend to be older, sicker, and poorer[2]. The Centers for Disease Control (CDC) concludes in a recent report that "percentages of potentially excess deaths among persons aged <80 years from the five leading causes were higher in nonmetropolitan areas than in metropolitan areas"[3]. 26.7% of rural children live in poverty, a nearly 7% increase in recent years due, for the most part, to declining average family incomes[4]. In addition to declining incomes, the gap in life expectancies between rural and urban Americans has also been widening. A study of data that ranged from 1969-2009 found that the average life expectancy of rural Americans was just 76.7, nearly 2.5 years below that of their urban counterparts[5]. However, in some rural regions, the difference between urban and rural life expectancies is as much as 20 years[6]. Despite this clear need for increased healthcare access in rural areas, only 9% of practitioners in the U.S. work in rural America[7]. Additionally, rural hospitals are facing closure crisis, with about 41 percent of Critical Access Hospitals (CAHs) facing negative operating margins, which further decreases possible points of care for people with a pronounced need [8] [9].






COLORADO
KANSAS
MISSOURI
TEXAS
ARKANSAS
TEXAS
Cimarron
Texas
Beaver
Harper
Woods
Alfalfa
Woodward
Major
Ellis
6
Grant
Kay
Garfield
Noble
Osage
Pawnee
Wash.
Nowata
Craig
Ottawa
Rogers
Mayes
Dela-ware
8
Tulsa
Payne
4
Dewey
Blaine
Custer
Roger Mills
Kingfisher
Logan
Canadian
Oklahoma
Lincoln
Creek
Wag-oner
Cher-okee
Adair
Okmul-gee
Muskogee
Sequoyah
McIntosh
Okfuskee
1
Haskell
Beckham
Washita
5
Caddo
Grady
Cleveland
Potta-wato mie
Semi-nole
Hughes
McClain
3
Garvin
Pontotoc
Coal
Pittsburgh
Latimer
Le Flore
2
Greer
Kiowa
Harmon
Jackson
Tillman
Comanche
7
Stephens
Cotton
Jefferson
Murray
Carter
Love
Johnston
Atoka
Pushmataha
Mar-shall
Bryan
Choctaw
McCurtain


OKLAHOMA
69
75
Fast Lane Project Location
Strategic Highway Network
National Highway Freight Network



Townhalls and Community Outreach

- First ever IPP community outreach meeting in the U.S. on July 31, 2018 in Atoka, OK
- Reached thousands of people through multiple townhall meetings, community outreaches, and many industry events

Our predictions…

- We see more activity in the near-term with piloted/crewed eVTOL & AAM systems
  - Clearer regulatory path to operations
  - Can be accommodated much easier in the NAS
- UAS (and especially small UAS) will still require a few years before we can see regular expanded and advanced operations (BVLOS, etc.)
  - Several rulemaking efforts must be completed first

Benefits of Emerging Aviation Technology for Rural and Remote Areas

- Our ground transportation network will be increasingly more difficult to expand and sustain in the future
- Whereas infrastructure expansions such as rural broadband are accelerating, ground transportation infrastructure is not.
- "Democratization" of eVTOL can greatly benefit rural, remote and developing areas.

Yakoke! (“Thank you!”)

James L. Grimsley
uas@choctawnation.com