

# Esri News

## for State & Local Government

Fall 2025

### Maps Reveal Hidden Housing Realities in Massachusetts to Address an Affordability Crisis

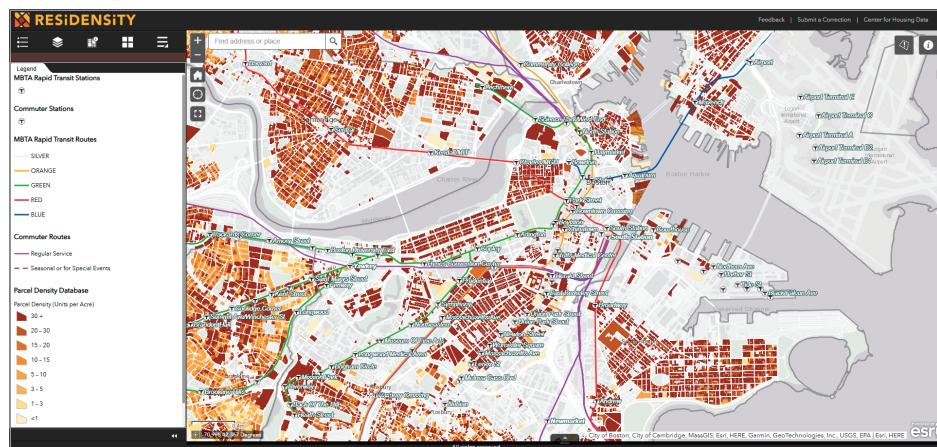
By Keith Cooke, Director of Planning and Community Development, Esri

Picture an ideal Main Street: shops nestled side-by-side, apartments above, pedestrians browsing cafés and bookstores. This quintessential American scene is ironically illegal to build in most cities today, deemed too dense by modern zoning laws.

Density—the number of units in a given area—is typically governed by zoning laws. Most US zoning regulations, dating to the early 20th century, restrict housing types in specific zones. This approach constrains supply, drives up prices, and undermines housing affordability.

Today, roughly 75 percent of residential land is zoned for single-family homes (see sidebar on page 5). By understanding and reforming these laws, communities can foster economic growth and promote development. In Massachusetts, one group is working to make this possible statewide.

The Massachusetts Housing Partnership (MHP) helps residents, volunteers, policymakers, and local leaders visualize the density that already exists in their communities. Residensty, an interactive web tool developed and launched by MHP's Center for Housing Data, uses geographic information system (GIS) technology to display housing units per acre and by population level.



#### A Bigger Vision

Massachusetts is no stranger to the housing affordability crisis. In 2024, the state's median price for a single-family home was \$609,900; in Boston, it was \$900,000.

In response, the state legislature in 2021 passed the Massachusetts Bay Transportation Authority (MBTA) Communities Law, which requires half of the state's 351 municipalities to allow multifamily housing in locations with good access to transit. In 2024, Governor Maura Healey passed the Affordable Homes Act, authorizing \$5.16 billion in spending over the next five years, along with nearly 50 policy initiatives to counter rising housing costs.

MHP, a public nonprofit, consults on local and state housing policy with data and tools that help communities meet the new requirements. Additionally, MHP has loan programs that support the construction and preservation of multifamily housing. It has lent \$1.5 billion toward affordable housing development since its founding in 1985.

Each municipality makes its own zoning rules, but in this case, the state requires localities to adopt compliant zoning to add greater density around transit stations. When the MBTA Communities Law passed, it required communities with transit stops to allow 15 housing units per acre, equivalent to a small apartment building or cluster of

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# The Skadi Series™

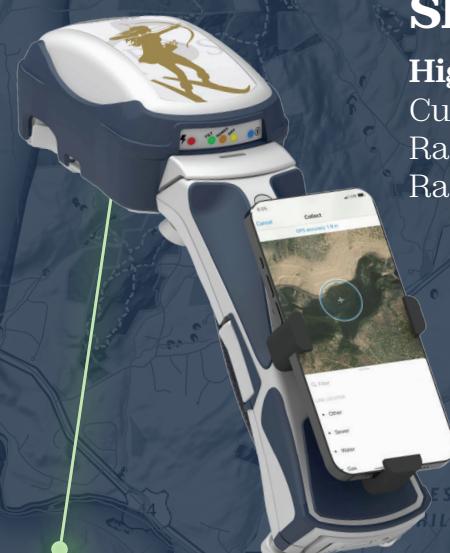
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# Maps Reveal Hidden Housing Realities in Massachusetts to Address an Affordability Crisis

continued from cover

townhouses. This state mandate became a polarizing element of the law.

"If you're not aware of what 15 units per acre looks like, it's something that can sound really scary," said Tom Hopper, director of the Center for Housing Data at MHP. "Density is objective; it's something that we can use to set standards and guidelines, but it's also something that can be misinterpreted really easily."

It can be difficult for residents to grasp how people and buildings occupy space. A three-story development seems tall until it's compared to the height of a typical utility pole—both are usually around 30 feet.

Hopper and his team make GIS maps to reframe how people think about density. "We realized that, for people to become comfortable with the level of density outlined in the law, we needed to contextualize it in the neighborhoods they love," Hopper said.

Hopper's work on Residensty was inspired by an earlier success. In 2019, the Center for Housing Data launched the Transit-Oriented Development Explorer (TODEX), with interactive maps revealing densities around Greater Boston's 261 transit stations. The tool proved popular with municipalities and residents. Hopper set out to expand it to the whole state.

## Data Informs the Density Conversation

Residensty and TODEX rely on the same dataset, which requires drilling down to the parcel level of data to determine how many units are in each plot of land. This data comes from MassGIS, the state's GIS team, which gathers and updates land use and housing tax assessment maps from each municipality.

In Residensty, the state's Next Generation 911 addressing system and third-party real estate data are combined with MassGIS data to create a picture of density in Massachusetts. Users can zoom in and out of neighborhoods or search specific addresses to get detailed parcel information.

"If you want to find out where the densest development in your neighborhood is, or if you're looking for developments that are over 15 units per acre, you can see it in the interface. It gives people a really accurate and data-driven approach for conversations about density," said Matija Jankovic, MHP senior research analyst.

Members of MHP's community assistance team, which has helped over 130 municipalities comply with the MBTA Communities Law, use Residensty to find existing examples of density in the communities they advise. Instead of giving city councillors an

abstract illustration of a dense housing development, consultants can point to an apartment building that already fulfills zoning requirements as a model to inform future development.

In Braintree, a suburb south of Boston, city councillor Meredith Boericke turned to the tool to highlight the positive impact that zoning updates could have on the city's economic vitality. With Residensty, she identified existing multifamily properties that exceeded the rule of 15 units per acre. This helped constituents understand what density already looked like in their community and allowed them to visualize future housing developments accurately.

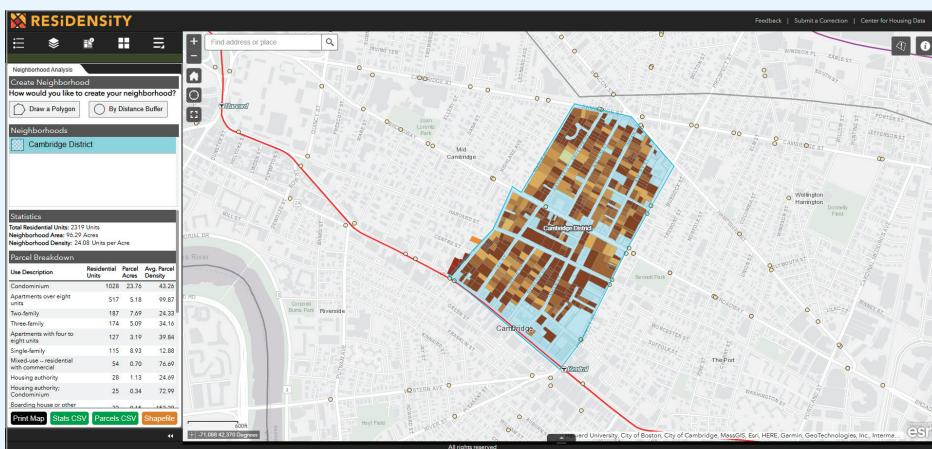
Across the state, Residensty is making an impact. Local planners and municipal staff frequently access it to examine parcels and investigate density in their municipalities. Housing advocates and residents use it to explore neighborhoods and communicate development patterns. People post screenshots from the tool to their social media accounts, spurring conversations about housing. And passionate residents use it to bolster their pro-housing messaging at zoning meetings and city council sessions.

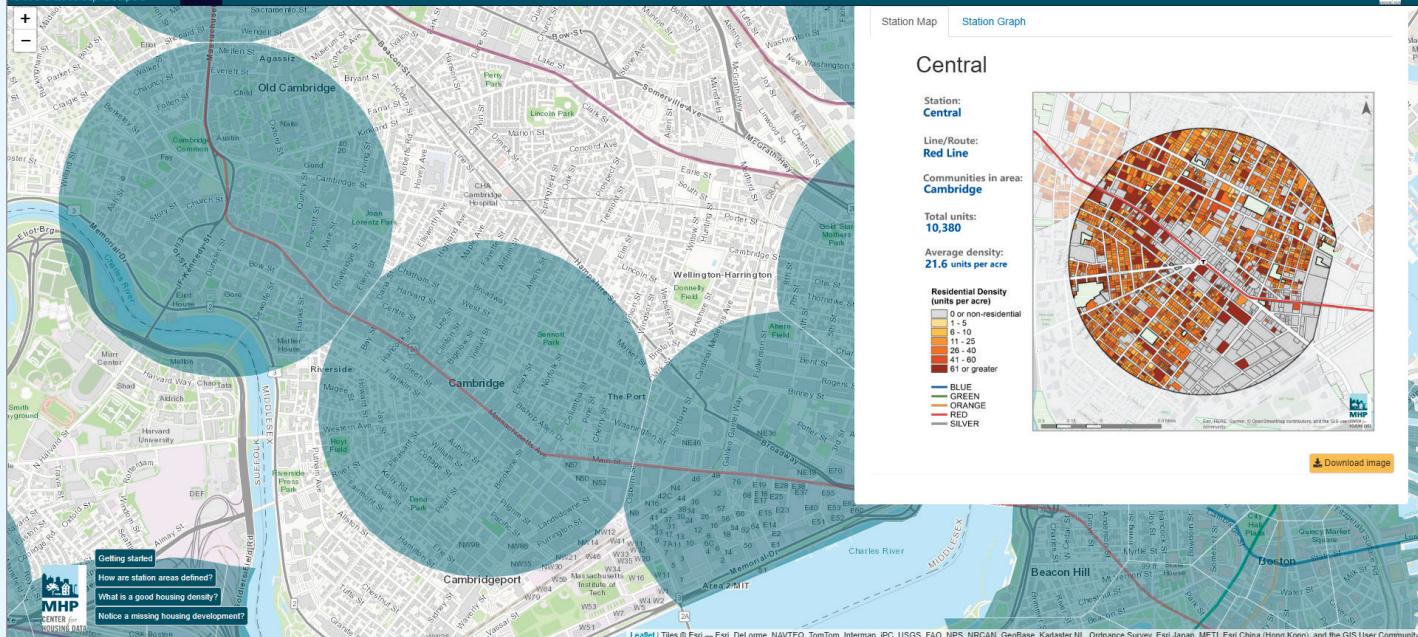
"Before this tool, there wasn't a comprehensive way to look at density in the state," Jankovic said. "It's really interesting to see how patterns are concentrated and how there are very clear spatial dynamics at play."

## Insights to Build a Better Future

Since its launch, Residensty has revealed development patterns that have prompted important conversations. The tool uncovered where land is being used efficiently and identified areas that could benefit from higher-density developments.

There were also some unexpected discoveries. "Residensty highlights the





differences between types of housing. We've seen single-family neighborhoods that are actually denser than some multifamily developments. To me, that says you can achieve density in a number of different ways that fit community needs. We always talk about multifamily versus single-family, but it's a lot more complex than that," Hopper said.

Adding to that complexity are accessory dwelling units (ADUs), which are smaller, secondary housing units located on the same lot as a single-family

home. Examples include converted basements, attic spaces, or detached structures like backyard cottages. ADUs can provide affordable housing options and help increase the overall density of a neighborhood without significantly altering its character.

The Massachusetts Executive Office of Housing and Livable Communities is using the Residensity dataset to ask questions about where ADUs would be most appropriate and how a statewide ADU policy might impact residents.

The tool also caught the attention of other researchers, some from environmental, transit, and public health organizations. Staff members from the National Zoning Atlas contacted Hopper's team to talk about scaling parcel-level unit count and density data to the national level. A handful of states have expressed a desire to develop similar tools, but it's hard to do without accurate statewide tax assessor and parcel data.

With insights from data-rich maps, town centers have the potential to look like the quintessential Main Street again. But housing is just a piece of the puzzle. Maps can reveal how much land is relegated to urban sprawl, such as parking lots or commercial development like warehouses. In cities that prioritize density, maps show how communities have made room for local parks and other public spaces for everyone to enjoy.

"It's not just about housing and transit, but knitting all of this stuff together: civic life, environmental planning, resilience, and climate impact," Hopper said. "Analysis like this always highlights how far we have to go, but it's valuable, and we can use this information to communicate better."

To learn how GIS helps state and local governments inform policy decisions, please visit [go.esri.com/PlanSmarter](http://go.esri.com/PlanSmarter).

## Cambridge Eliminates Single-Family Zoning

In one of the denser parts of Massachusetts, Cambridge's city council voted to end single-family zoning in 2025 to address a housing affordability crisis. Cambridge is currently the state's most expensive community for renters, with a median rent of \$2,900 for a one-bedroom apartment. Rents increased by 40 percent in 2022, when vacancy rates across Greater Boston fell below 1 percent.

Tom Hopper, director of the Center for Housing Data at the Massachusetts Housing Partnership, told GBH News, "People want to live here, and we may not have produced enough housing to actually accommodate that need."

The reformed zoning code allows residential buildings up to six stories tall in every neighborhood. Cambridge projects that 4,800 new units could be built by 2040, as opposed to just 350 under the previous code.

The code change removes dozens of barriers for developers, including minimum lot sizes, limits on units per lot, and parking minimums. Without these restrictions, more housing should reduce the cost for everyone.

# Fatality Analysis Reporting System in ArcGIS Living Atlas of the World

By Steven Aviles, GIS Engineer, Esri

Understanding where and how fatal motor vehicle crashes occur is crucial to making roads safer, informing public policy, and supporting transportation planning. A new feature layer sourced from the National Highway Traffic Safety Administration's (NHTSA) Fatality Analysis Reporting System (FARS) is now available in ArcGIS® Living Atlas of the World, providing data on motor vehicle fatal crashes from 2019 through 2023, across the United States.

By default, the layer is symbolized at larger extents, such as national and county levels, to show the distribution of fatal crashes by time of day using clustering. As you zoom in to local levels, individual point locations are displayed to show the location and time of day that a fatal crash took place.

The FARS Fatal Motor Vehicle Crashes 2019 to 2023 layer, along with several web maps and an accompanying dashboard, are all available in ArcGIS Living Atlas to

help support the geographic information system (GIS) community in advancing transportation safety toward the goal of zero motor vehicle deaths.

This goal is shared by the Vision Zero Network as well as the US Department of Transportation's Federal Highway Administration and its Safe System approach. While reaching zero deaths may be an ambitious goal, no loss of life on our roads is acceptable—and it requires a collective effort to systematically eliminate traffic fatalities and serious injuries.

## What Is FARS?

The Fatality Analysis Reporting System is a nationwide census of motor vehicle traffic crashes that result in the death of a vehicle occupant or a nonmotorist (such as a pedestrian or cyclist) within 30 days of the crash. Operated by NHTSA, the system collects and standardizes crash data reported by law enforcement

agencies from all 50 US states, the District of Columbia, and Puerto Rico.

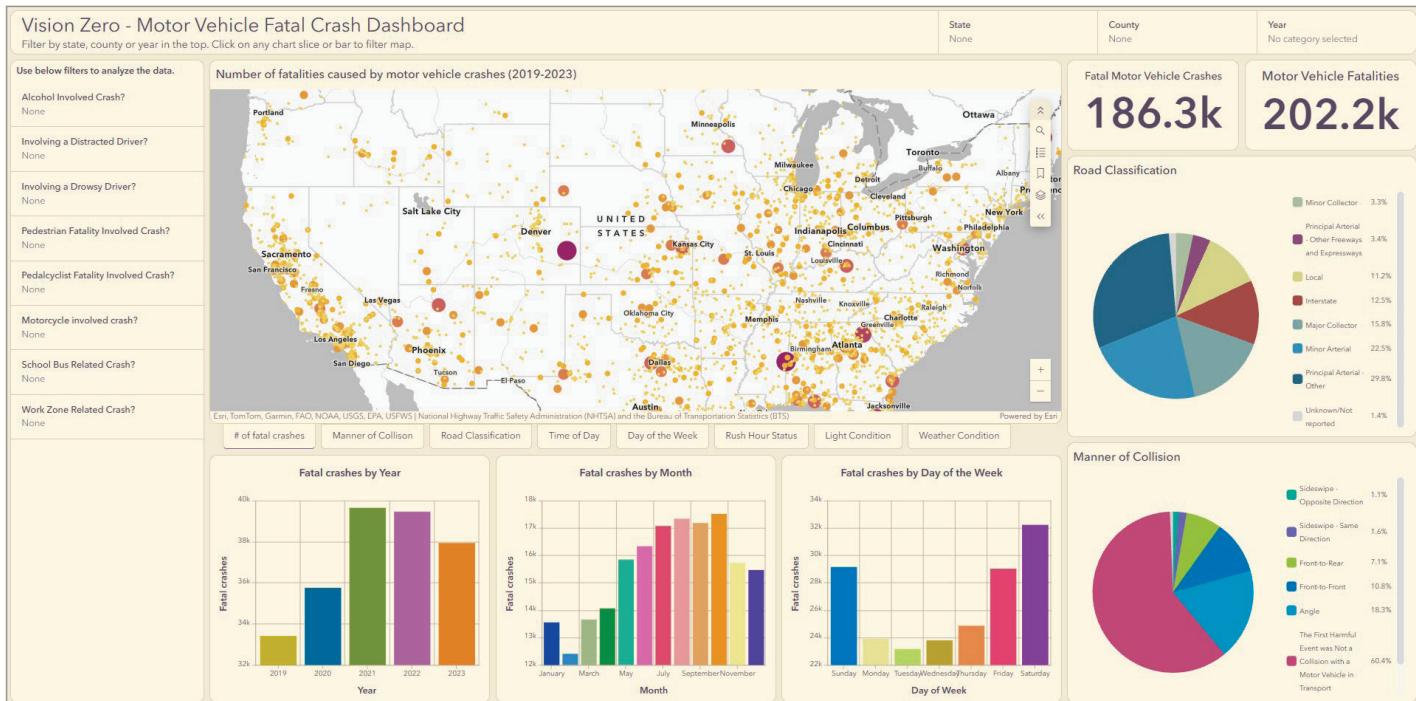
FARS data is obtained solely from the states' existing documents:

- Police crash reports
- Crash report supplements
- State vehicle registration files
- State driver records
- State roadway classification data
- Death certificates
- Toxicology reports
- Emergency medical service reports

## What the Layer Includes

This new Fatal Motor Vehicle Crashes layer provides detailed geospatial information for analyzing fatal crashes:

- Precise crash location, including latitude/longitude and address
- Time of crash—hour, minute, day, day of week, month, year, rush-hour status, daytime versus nighttime, etc.
- Driving conditions, such as weather and lighting conditions



- Roadway information, such as the type of road and whether the crash occurred at an intersection or junction
- Number and type of people involved such as pedestrians, cyclists, motorists
- Driver condition, such as alcohol or drug use, drowsiness, or distracted driving
- Manner of collision—vehicle-to-vehicle collision, nonvehicle collision, angle of collision, etc.

Each record includes a rich set of attributes to support in-depth analysis of crash patterns and contributing risk factors.

## ArcGIS Living Atlas—Value-Added Technology for GIS Users

The feature layers have all the details and enhancements you'd expect from ArcGIS Living Atlas:

- Informative aliases and field descriptions
- Domain fields to help users more easily interpret attribute values
- Clustering symbology to show the distribution of types of crashes at the

- national level
- Individual points of data symbolized at local levels
- Additional fields calculated such as Date of Crash, Rush Hour, Time of Crash (in three-hour intervals)
- Multiple years of data merged to see patterns over time
- Related tables from the person-level and vehicle-level auxiliary files to provide additional context on individual records of people and vehicles involved in a crash

## How You Can Use This Layer

Transportation analysts, safety planners, and GIS professionals can use this layer to

- Identify high-crash corridors and intersections.
- Monitor safety trends over time.
- Support Vision Zero, Safe Streets and Roads for All, and High Injury Network initiatives.
- Integrate data with demographic and traffic volume layers for risk analysis.

- Create compelling data visualizations and interactive maps.

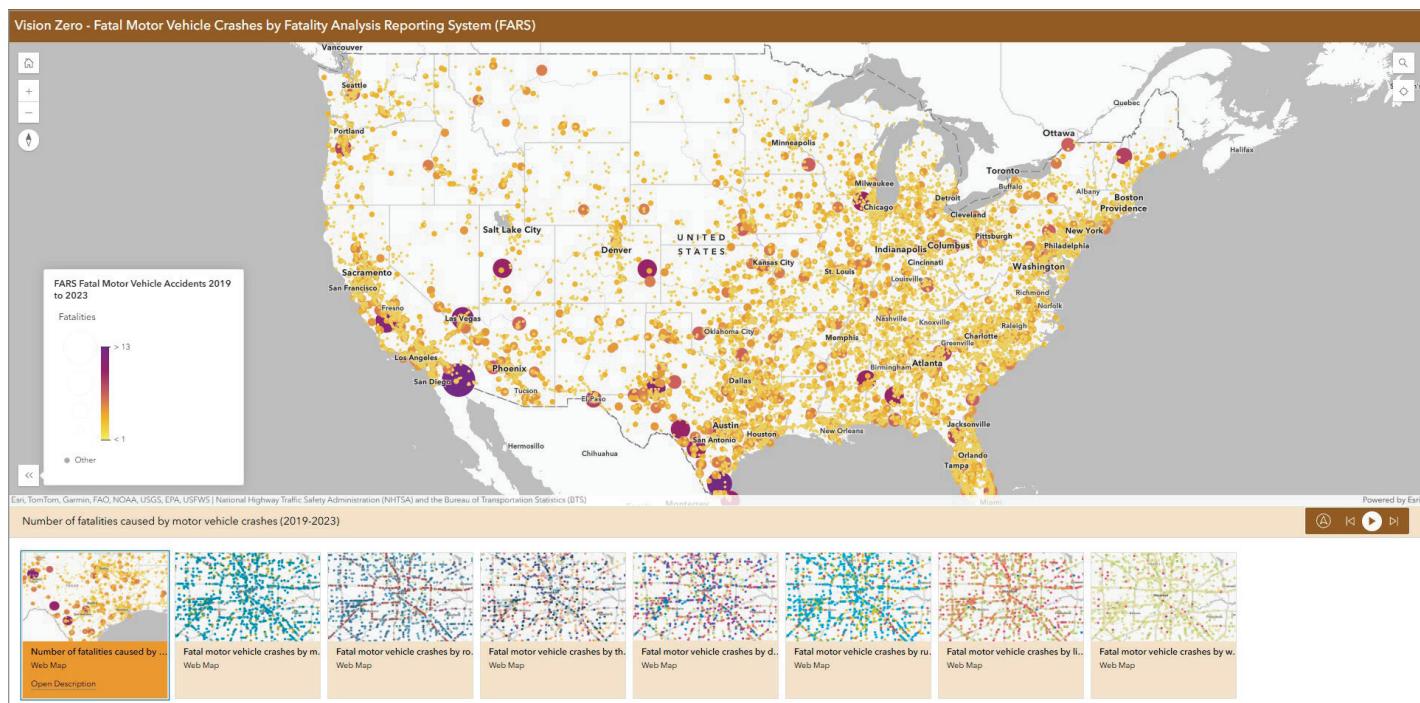
## Try It in Your Workflows

You can add the Fatal Motor Vehicle Crash layer directly into your ArcGIS projects, use it in ArcGIS Dashboards, or bring it into ArcGIS StoryMaps<sup>SM</sup> to communicate safety trends to stakeholders and the public.

- Add to your map in ArcGIS Online with your own supplemental data.
- Analyze crashes in space and time using the Space Time Cubes tool in ArcGIS Pro.
- Create custom dashboards and reports.
- Deploy this data in the Traffic Crash Analysis solution.



To learn more, please visit  
[go.esri.com/SLGFARS](https://go.esri.com/SLGFARS)



# Clay County Enhances PLSS with Remonumentation & ArcGIS Parcel Fabric

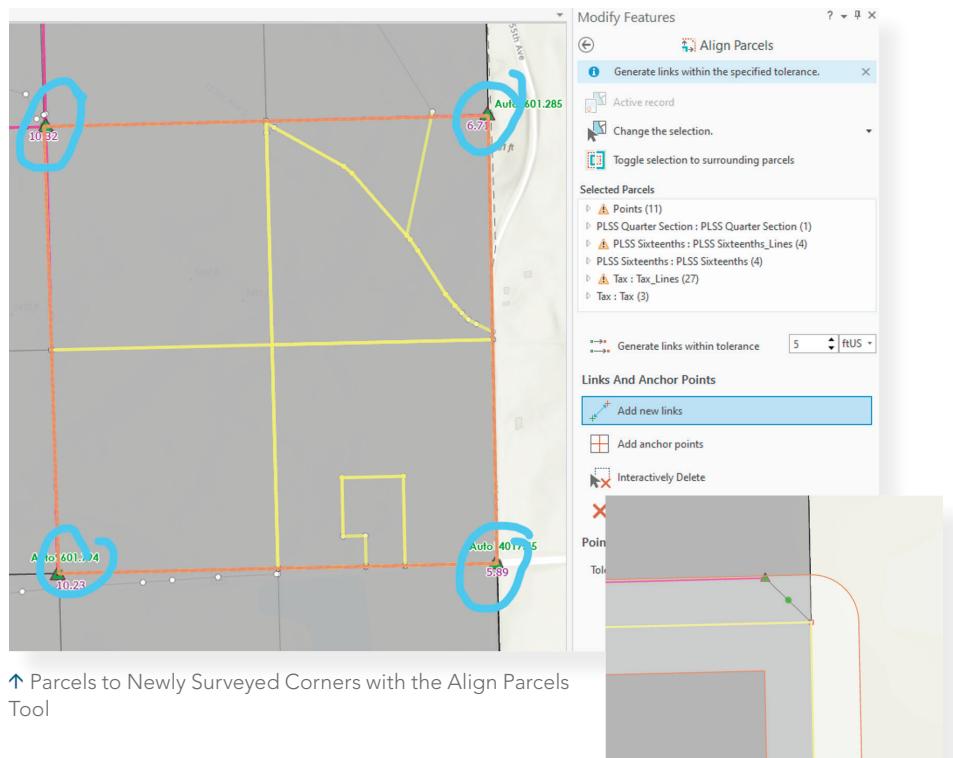
Planning and executing a countywide program to improve the accuracy of countywide control data

Clay County, Minnesota, prioritizes sharing its parcel data with the public and other users. With data constantly on display, accuracy is critical.

The Public Land Survey System (PLSS) is the foundation on which the county's land records data is built. It is essential for maintaining accurate data, supporting data-driven decisions, and linking historical data to present-day needs.

However, the county's original control points lacked x,y coordinates, which necessitated improvements within ArcGIS Parcel Fabric to ensure more accurate parcel representation. For even greater accuracy, the county initiated a remonumentation program, which involved re-establishing and documenting the original survey points with precise coordinates.

This project was crucial to ensuring that parcel data remains reliable and up to date. In turn, this supports the county's ongoing efforts to provide accurate and accessible land information.



↑ Parcels to Newly Surveyed Corners with the Align Parcels Tool

## Implementing Clay County's Multiyear Remonumentation Program

The county's multiyear remonumentation program consisted of three phases:

1. Surveyor resurveys the PLSS corners
2. Move control points in the fabric
3. Align existing parcel layers to new or remonumented corner point locations

To drive the success of this program, the county undertook significant planning and careful preparation. Key tasks included deciding how the work would be done, whether by a contractor or internal staff, and securing and planning around funding. Clay County budgeted an annual amount to support the project.

The county also developed assumptions and rules for the alignment process to ensure consistency and accuracy. They took a systematic

approach, breaking down the process into manageable chunks to maintain control and quality. Additionally, the county identified editors who were highly detail-oriented and well-versed in ArcGIS Parcel Fabric to oversee the alignment process.

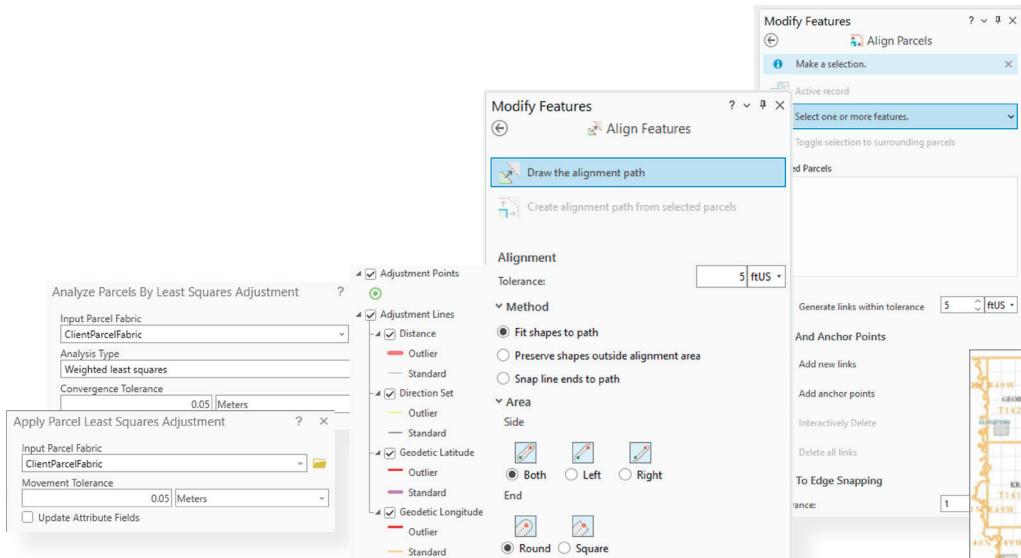
With major tasks defined and a plan in place, surveyors began collecting data in the field, focusing on one area at a time.

## Updating and Aligning Parcel Data

After the surveyors collected a substantial amount of new corner data and the county updated the control points in the fabric, the next step was to update the county's parcel data to reflect the resurveyed corners. The county enlisted the help of Esri partner Pro-West & Associates, Clay County's geographic

**“**We have a robust workflow for the entire life cycle of the program, from resurveying in the field to aligning parcels to the correct control. As we work through each area, the process will continue until the entire county is complete. Seeing progress is exciting and will be valuable to everyone who relies on us for accurate property information. We're looking forward to seeing it through to completion. **”**

**Mandy Olson**  
GIS Coordinator, Clay County



information system (GIS) partner for 30 years, after realizing that more capacity was needed for such a large effort.

"We are a small department, with just myself working on Parcel Fabric; it quickly became clear that we couldn't do this ourselves," said Mandy Olson, GIS coordinator for Clay County. "In fact, we calculated that with current budgeted annual funding, completing the project could take up to 108 years! We needed a bigger team, and we needed experts."

Working in Parcel Fabric, the project team established a process to align the data, whether moving parcels to a new control, aligning all features along PLSS boundaries, or moving parcels to a new control with weights on data.

The alignment process was completed for a defined area before starting the cycle again in the next area.

"We have a robust workflow for the entire life cycle of the program, from

resurveying in the field to aligning parcels to the correct control. As we work through each area, the process will continue until the entire county is complete," said Olson. "Seeing progress is exciting and will be valuable to everyone who relies on us for accurate property information. We're looking forward to seeing it through to completion."

As the remonumentation process continues, Clay County is making improvements for users and adding value along the way.

A new online corner map will be rolled out shortly. This will put accurate data in the hands of those who need it as early as possible. It will have search capabilities to help users efficiently find the answers they need.

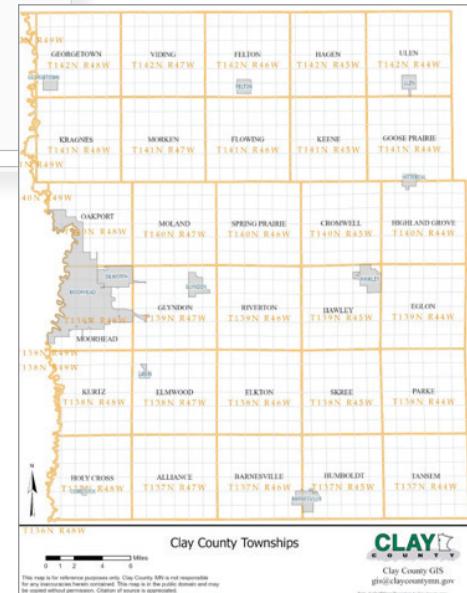


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## Key Takeaways

- Clay County's original land survey control points lacked precise coordinates, which affected the accuracy of its parcel data.
- To address this, the county launched a multiyear effort to re-establish survey points, update control data, and align parcels using ArcGIS Parcel Fabric, with support from a long-time GIS partner.
- As a result, the county is delivering more accurate and accessible land information, including a new online corner map that helps users quickly find what they need.

← Alignment Process and Tools Used in ArcGIS Pro



↑ Clay County, Minnesota, Public Land Survey System

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# PIT Embraces GIS, Digital Twin, and BIM for Future-Ready Operations

In 2004, Pittsburgh International Airport (PIT) underwent a transformation when its major carrier abruptly left, forcing the airport to shift away from operating as a regional hub and significantly reducing flights. This process, known as dehubbing, had a profound impact on not only the airport but also the surrounding community, causing significant economic disruptions.

The dehubbing of PIT saw 90 percent of flights disappear overnight. Over the last decade in particular, the airport's chief executive has aggressively pursued re-creating PIT as an origin-and-destination facility, making it clear to stakeholders that hub status simply cannot be wished back into existence. Today, PIT welcomes nearly 10 million passengers annually—a meaningful figure when considered against the scale of its former operations and its impressive infrastructure.

PIT is addressing its evolving status and former economic challenges through the integration of geographic information system (GIS) technology and the development of a digital twin. These

efforts support the organization's aim to reshape its operations and improve its long-term economic viability.

## Realigning the Business After Dehubbing with a GIS Win

The initial adoption of GIS at PIT was driven by the need to better understand the location and interconnections of the airport's facilities. However, limited resources posed significant challenges. Julia Arnone, PIT's planning services manager, did much of the foundational work herself during nights and weekends, which she described as being a "0.25-person operation" as there was no one else doing the job. With the knowledge that GIS could help the organization break down information silos and improve workflow efficiencies, Arnone kept at it.

One of the first major GIS successes at PIT was addressing the airport's concession spaces. After dehubbing, many businesses vacated. When the concessions program operator left, the airport found itself needing more precise data to verify which spaces were occupied and determine which of the keys left behind

opened which doors. By creating a survey form and web map application, initially using ArcGIS Survey123 and later migrating to ArcGIS Field Maps, the airport was able to track control of concession spaces and identify issues such as long-term unauthorized occupancies.

This effort not only resolved operational challenges but also helped garner management's support for GIS initiatives. The capabilities and easy use of the key and concessions applications, as well as several smaller use cases, helped build support from a very low base. There was initial cautiousness from senior management about bringing on what seemed only to be yet another software solution, but the situation has shifted to where Pittsburgh International Airport has recently joined the Esri Advantage Program and is recruiting more staff dedicated to GIS.

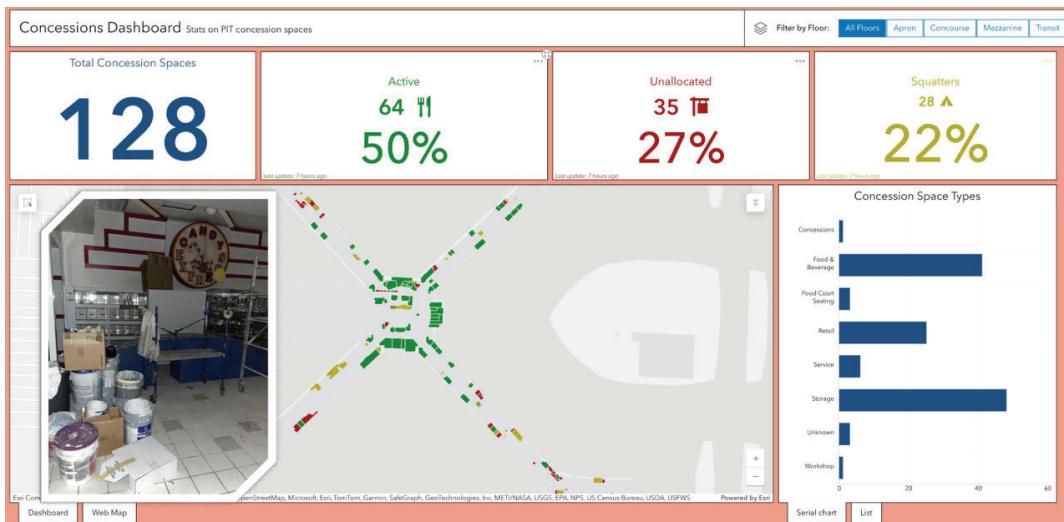
## Realizing the Benefits of GIS-BIM Integration

Efforts to realign the airport and maintain its operational and economic relevance are ongoing, with several infrastructure projects underway. These include renovations to the existing airside fire restricted terminal, the closure of a half-mile rail link between the old landside and airside terminals, various developments across the 8,800-acre campus, and the construction of a new terminal set to open in fall 2025. To ensure the success of these projects, the airport has embraced building information modeling (BIM) as a design standard. GIS-BIM integration has been retroactively applied to its existing facilities. This integration has driven the widespread adoption of GIS as a critical management tool.

The construction of the new terminal brought a clear opportunity to integrate



↑ The Digital Twin of the Airport



← The Concessions Dashboard displays statistics on the concession spaces in the airport.

BIM for operations and maintenance. The airport's planning team took the lead, integrating BIM data into ArcGIS Pro and sharing the results in 3D through Scene Viewer™. Arnone highlighted the ease of using modern GIS tools, even for users without deep technical expertise.

By leveraging BIM and GIS, PIT is creating a unified source of truth for internal staff and external consultants, streamlining workflows and breaking down information silos.

GIS-BIM integration has already begun to transform operations at PIT. For instance, geolocation and geofencing tools are being built to assist the airport's fire department in locating fire-suppression lines and optimizing the use of the department's new fire truck's 3,000-foot hose. Similarly, ground maintenance crews can use GIS-based apps to manage mowing boundaries effectively.

The planning team is also streamlining inspections and reporting. Previously, inspections across the 8,800-acre campus relied on manual processes, requiring days to compile data. Now, GIS-based forms allow field inspectors to update information in real time, including images of anomalies, significantly improving efficiency. These efforts are paving the way for future advancements, such as integrating asset management with GIS to track work orders,

inspections, and utility meters using automated processes.

### BIM Successes Pave the Way for an IoT Environment

BIM developments have captured senior management's attention, serving as a catalyst for integrating asset management with GIS. For example, Revit models of the new and existing terminals are being integrated into geospatial systems to map asset locations precisely. This progress paves the way for advanced asset management, transitioning from 2D floor plans to 3D models, with the Esri Advantage Program playing a central role in the integration.

The airport's IT department is advancing efforts to create an Internet of Things (IoT) environment, where even small objects on the campus provide valuable data. Combining sensors with machine learning, the airport can generate heat maps and use GIS analyses to improve operations and the passenger experience.

For asset management, the integration of weather and traffic data aims to enable predictive maintenance. Arnone envisions a future where all airport systems are interconnected through a comprehensive digital twin.

"The first step is integrating all the data across departments," Arnone explains. "Then, real-time sensors and machine learning can create a basic digital twin. The ultimate goal is to predict and optimize everything within the built environment."

### The Digital Twin Vision for Pittsburgh International Airport

PIT aims to develop a comprehensive digital twin of its facilities within three to five years. This involves integrating existing data, applying real-time sensors, and leveraging machine learning to achieve predictive insights. The airport also plans to automate inspections and enhance environmental monitoring, including dashboards for outflows and disposal. "The end goal is to achieve predictability across our built environment," says Arnone.

PIT's ambitions also include improving public access to retail information. By embracing GIS, BIM, and digital twin technologies, PIT is transforming into a modern, efficient airport, better serving the Pittsburgh region while leading the way in sustainability and innovation.



To learn how airports gain a competitive advantage with GIS, please visit [go.esri.com/PITAirport](http://go.esri.com/PITAirport)

# Bridging the Gap to Economic Mobility with GIS:

## A Framework for Building Inclusive and Prosperous Communities

### Public Safety

Neighborhood Revitalization,  
Transparent Policing, Response Time



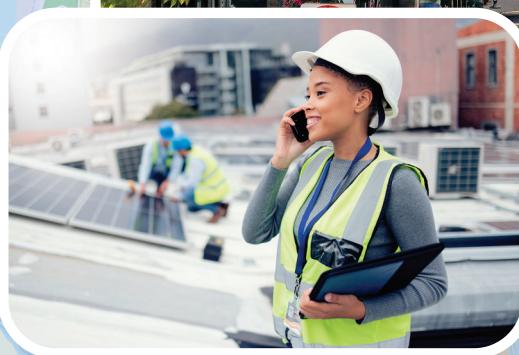
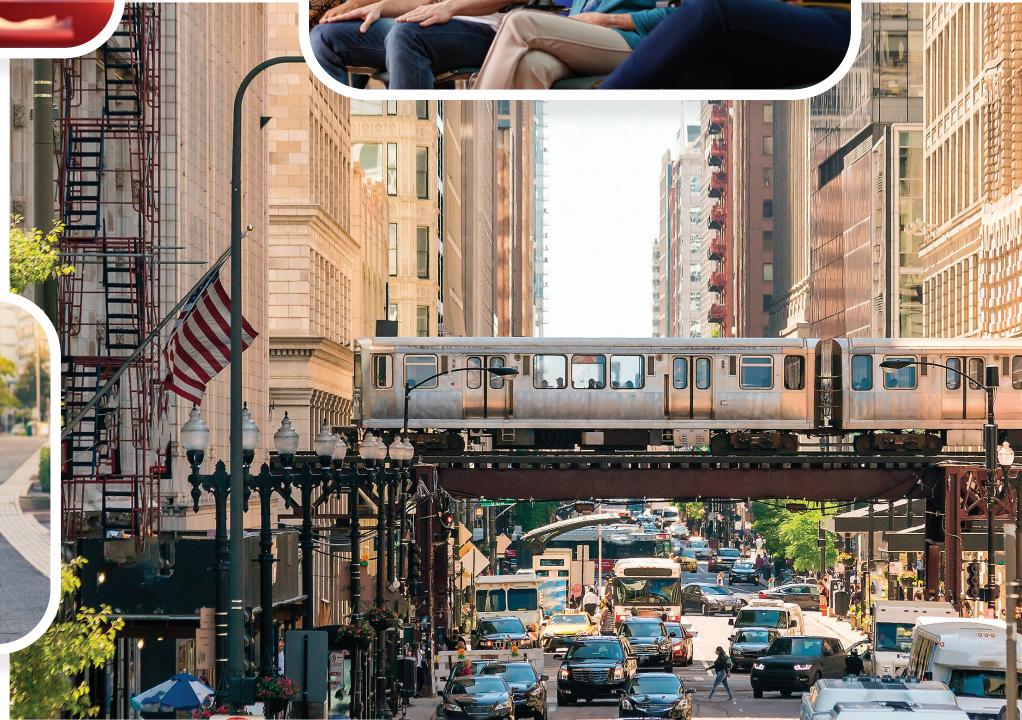
### Social Equity

Age, Gender, Accessibility, Affordable  
Housing, Demographics



### Transportation Equity

Access to Transit, Transit Cost,  
Infrastructure Investment



### Energy Equity

Power Outage Restoration Plans, Investment in Clean Energy

## Education

Workforce Development, Child Care Access, Digital Equity



## Health Equity

Access to Health Care, Food Security, Park Accessibility, Social Determinants of Health



## Environmental Justice

Conservation, Land Management, Safe Water



### Quality of Life:

Enable targeted interventions to enhance residents' overall well-being



### Inclusive Infrastructure:

Expand access to public resources that improve opportunities for advancement



### Civic Inclusion:

Prioritize transparency and accountability to increase community engagement



### Financial Stability:

Invest in the potential of disadvantaged populations to boost economic security



To learn more, please visit  
[go.esri.com/BridgeTheGap](http://go.esri.com/BridgeTheGap).

# Redlands Police and Local Businesses Use GIS to Keep Shoppers Safe

Redlands, in Southern California, is known for its orange groves and Victorian homes. It's located between Los Angeles and Palm Springs in San Bernardino County, split by the I-10 and I-210 freeways. With over 73,000 residents, it's a lively city that draws visitors for its restaurants, shops, nightlife, and cultural events.

When Redlands started to reclaim its pre-COVID vibrancy in 2023, local businesses, especially those at the Citrus Plaza and Mountain Grove shopping centers, encountered a troubling uptick in retail theft and other crimes. In response, the Redlands Police Department (RPD), under the leadership of Chief Rachel Tolber, has taken a data-driven approach using geographic information system (GIS) technology.

## The Challenge

Upon being sworn in as the first female police chief in 2023, Chief Tolber, along with the 148 full-time RPD personnel, faced a significant surge in retail theft

that coincided with the reopening of businesses and commercial centers. The rise in thefts was multifaceted, influenced by the return to prepandemic activity levels and the effects of California's Proposition 47. This law, enacted before the pandemic, decriminalized certain types of crimes and reclassified shoplifting of merchandise valued under \$950 as a misdemeanor, potentially contributing to the rise in retail theft and other criminal activities.

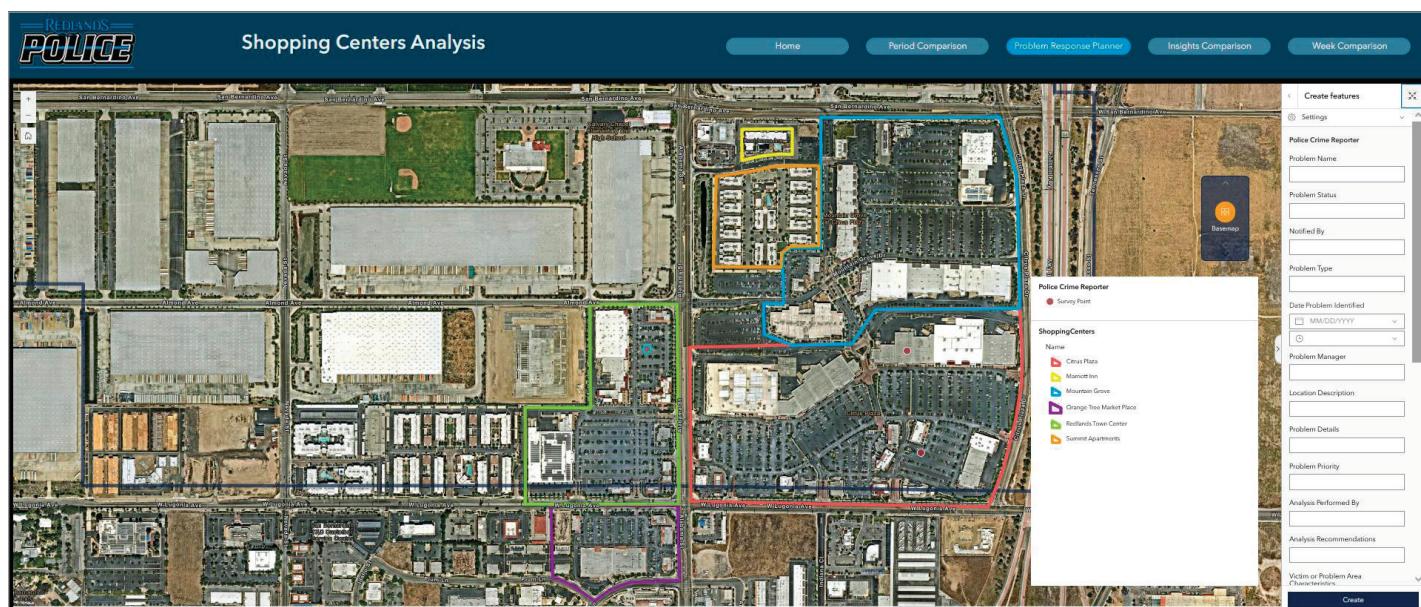
The Citrus Plaza and Mountain Grove retail centers are at the heart of shopping and entertainment in Redlands. Located near the I-210 and I-10 freeways and populated by big-box retail stores, a movie theater, restaurants, and many smaller retailers, the shopping area had become the epicenter of the increasing crime incidents. Emboldened, thieves seemed more organized than the usual shoplifters who had been active in Redlands stores previously. This rising lawlessness began to threaten the economic viability of local businesses, put store employees

in dangerous situations, and made shoppers feel less safe.

Retailers turned to RPD for a solution to the growing problem, and Chief Tolber and her executive team knew that it was necessary to understand the issues and then implement an evidence-based approach to problem-solving. As a graduate of the National Institute of Justice's Law Enforcement Advancing Data and Science (LEADS) Scholars Program and a founding member of the American Society of Evidence-Based Policing, Chief Tolber's background emphasized the importance of leveraging data and technology, which led RPD to address this challenge by implementing GIS for mapping and analysis.

## The Solution

The first question Tolber and her team needed to answer was, is there actually a problem? To answer that, RPD started with an analysis and review of current and historical data. They wanted to



↑ Redlands Police Department uses data-driven dashboards combining maps, statistics, charts, and trend lines to give police and retailers a complete picture of activity and trends affecting area shopping centers.

At the end of the day, we're here to ensure that our community is safe, and data and technology like dashboards can help us solve different crime and community issues by showing us where there are hot spots, and how we can best utilize resources to respond most effectively. //

**Rachel Tolber,**  
Chief of Police, Redlands Police Department (RPD)

know if crime and incidents were rising, where and when they were occurring, and if there were hot spots or patterns that could be used to drive response.

RPD uses ArcGIS Enterprise for mapping and analysis of crime data. They had used ArcGIS Dashboards in the past to visualize and share information, and they turned to Esri again to analyze and understand this challenge. City of Redlands crime analyst Amy Varela examined around the shopping centers. She worked with City of Redlands GIS supervisor Claudia Caceres to build a retail theft dashboard that could be used by RPD command staff to understand the problem and make data-driven decisions.

Updated nightly and designed with user-friendly, interactive features, these dashboards allow officers to explore trends and answer critical questions independently. Hosted in ArcGIS Experience Builder, the dashboards provide insights such as identifying hot spots, pinpointing the busiest locations, tracking current trends, identifying common incident types, and determining peak times by day and hour.

In March of 2024, after analyzing data and consulting with local merchants, RPD assigned a dedicated community engagement team (CET) of officers to patrol retail centers and work directly with retailers. To address challenges comprehensively, RPD command staff and officers are now using the dashboards to understand the problem holistically. These tools enable officers and command staff to quickly identify



↑ Redlands Police Department uses interactive dashboards to drive strategy briefings between command staff and officers.

problem areas and measure key performance indicators (KPIs), such as the number of arrests, repeat offender patterns, and overall trends in retail center activity. By analyzing this data, the team gains a clearer understanding of how enforcement efforts are impacting crime and disorder.

CET is also actively engaging with local retailers, using the data from dashboards to support a collaborative approach to problem-solving. CET and property managers regularly meet to review the dashboard data trends, including the business locations of the highest number of calls for service, top crimes of concern, as well as crime prevention tips and communication between retail security and law enforcement. These meetings facilitate open discussions that prioritize problem-solving and accountability.

## Results

Though less than a year old, the implementation of the dashboards and CET has already yielded positive results. Retailers have a better understanding of the causal factors that they can often address without even involving the police. Increased officer visibility has acted as a deterrent to would-be criminals. Officers are engaging with groups of teenagers and preemptively deterring possible disturbances. Homeless individuals encountered by officers can be connected to local resources for housing and treatment. Shoppers who see officers in the retail centers feel more safe and secure.

Somewhat surprisingly, since the initiative has started, reported incidents have gone up. But when the data is looked at more closely, one can quickly see why. CET officers assigned to the shopping centers are taking more reports and making more arrests because they are better positioned to spot suspicious activity, contact suspicious individuals, and respond to incidents. As Deputy Chief Stephen Crane puts it, "Just within the first couple months, we saw a big impact with the visibility, and the business owners are obviously super happy. But also knowing that when a call goes out, the [CET] team's already on scene, or they are seeing the incident as it occurs."

The combination of data, technology, analysis, and collaborative policing is proving so successful that the police department plans to use this approach to support other public safety initiatives. Frustrated by the rise in retail crimes, California voters recently approved Prop 36, making shoplifting a felony for repeat offenders and increasing penalties for certain drug offenses. Equipped with GIS, RPD plans to grow its community engagement team to provide more coverage to address these concerns, as well as develop additional dashboards to support other police missions and teams.



To learn how GIS helps police keep communities safe, please visit [go.esri.com/GIS4LawEnforcement](https://go.esri.com/GIS4LawEnforcement)



# esri SAG AWARD

SPECIAL ACHIEVEMENT IN GIS

Esri acknowledged the achievements of several domestic and international organizations with the Special Achievement in GIS (SAG) Award ceremony at the annual Esri User Conference (Esri UC) in San Diego, California. The SAG Awards recognize innovative and intelligent applications of GIS technology. Esri users are nominated by Esri leaders and distributors, and finalists are selected by Esri president Jack Dangermond. These organizations set new standards throughout the GIS community.

Organizations from around the world are honored at Esri UC. They span industries including agriculture, public works, economic development, education, transportation, health and human services, law enforcement, emergency response, and utilities.

"The SAG Awards highlight extraordinary achievements and efforts to improve our world," said Dangermond. "Each year, I look forward to being part of this ceremony. It is a tradition that means a great deal to Esri and to GIS professionals."

Here are the US state and local government users recognized this year. See the full list of SAG Award winners at [go.esri.com/SAGAwards25](http://go.esri.com/SAGAwards25).

## Organization

- Allegheny County Airport Authority
- City of Bakersfield
- City of Detroit, Department of Innovation and Technology
- City of Eugene, OR
- City of Maumelle
- City of Naperville, IL
- City of New Bedford Mayor's Office and City of New Bedford Information Technology
- City of North Las Vegas
- City of Oklahoma City Police
- City of Overland Park, KS
- City of Plano, TX
- City of Seguin
- Cleveland, OH, Office of Urban Analytics and Innovation
- Municipality of Anchorage
- NYC Mayor's Office of Climate & Environmental Justice
- Town of Leesburg
- City of Mesa
- St. Louis Development Corporation and Houseal-Lavigne
- Clayton County, GA
- County of DeSoto GIS Department
- County of Los Angeles: Anti-Racism, Diversity and Inclusion (ARDI) Initiative and County of Los Angeles
- County of Montgomery, MD
- County of Rock, WI
- County of Sherburne
- Erie County, PA, Department of Health





- Essex County Office of Public Health, NJ
- Hamilton County
- Mobile County Commission
- Pinal County, AZ
- Saint Louis County Board of Elections
- Scott County, IA
- North Carolina Department of Transportation and North Carolina Department of Information Technology
- Texas Division of Emergency Management (TDEM)
- Tennessee Department of Environment & Conservation
- ERM
- Fire Department of New York Incident Management Team
- Nuveen Natural Capital
- Inland Empire Health Plan
- Linn County, IA
- San Diego Sheriff's Department and San Diego Law Enforcement Coordination Center (SD-LECC)
- Port of Corpus Christi
- Enbridge
- Adams County Health Department
- CapMetro
- Eugene, OR, Department of Public Works, Parks and Open Space Division
- Mid-America Regional Council and Greater Kansas City Housing Partnership
- Spokane Regional Emergency Communications
- Mid-Shore Council on Family Violence
- Colorado Division of Fire Prevention and Control Department of Public Safety
- Commonwealth of Kentucky Office of Broadband Development
- Connecticut State Historic Preservation Office
- Florida Department of Agriculture and Consumer Services (FDACS) and State of Florida
- Maine Office of GIS
- New York State Office of General Services and New York State Office of Information Technology Services
- North Carolina Department of Environmental Quality
- Office of State Planning Coordination
- Office of the Chief Technology Officer
- South Carolina Department of Administration
- State of Idaho
- State of Louisiana Department of Transportation & Development
- State of Minnesota
- State of Montana Department of Revenue
- State of Nebraska, Office of Chief Information Officer and State of Nebraska, Office of the Governor
- State of Wyoming Department of Transportation
- Tennessee Comptroller of the Treasury
- Highline Water District
- Hampton Shaler Water Authority
- Santa Margarita Water District

# Creating a GIS-Powered Safe Routes to School Program

## Taking Action: Creating Safe Routes to School with Smart Mapping

Parents know the quiet fear that creeps in once the front door shuts and their child sets off for school. Will they get to school safely? For many families, questions like this are not just anxious thoughts; they reflect realities shaped by unsafe roads, missing sidewalks, and a lack of reliable data. When a child is injured on the way to class or misses school because the route feels too risky, it is not just a transportation issue—it's a community failure.

Metro, the regional government serving 1.7 million residents in the greater Portland, Oregon, area, took a careful look at how kids travel to school and recognized that stronger policies were needed. Metro staff needed a smarter way to see the problem. With the help of geographic information system (GIS) technology, Metro has begun reshaping how communities protect young commuters by turning static reports and

disparate datasets into a comprehensive application that Portlanders can access to make more informed decisions about pedestrian safety.

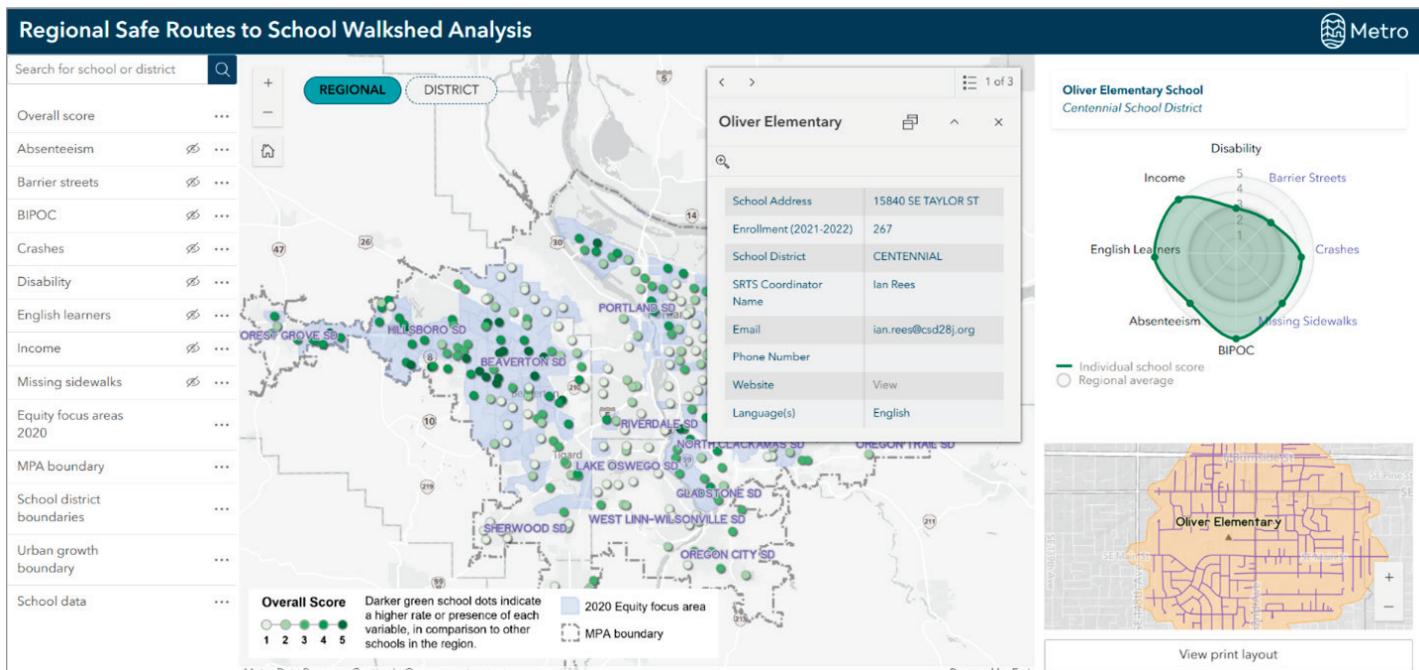
### Using Data to Turn Static Maps into Actionable Tools

Getting to school should be safe and easy, but for many students, it is neither. Variables like traffic, missing sidewalks, and unsafe intersections can turn a short walk, a bike ride, or a bus ride into a daily risk. To address these challenges, Metro launched the Safe Routes to School (SRTS) program to promote students' walking and rolling safely, but it lacked a clear method for identifying the safest routes or the most critical safety gaps. While Metro had previously gathered data to support its regional understanding of school needs, staff needed up-to-date data and a way to share that data with a growing number of

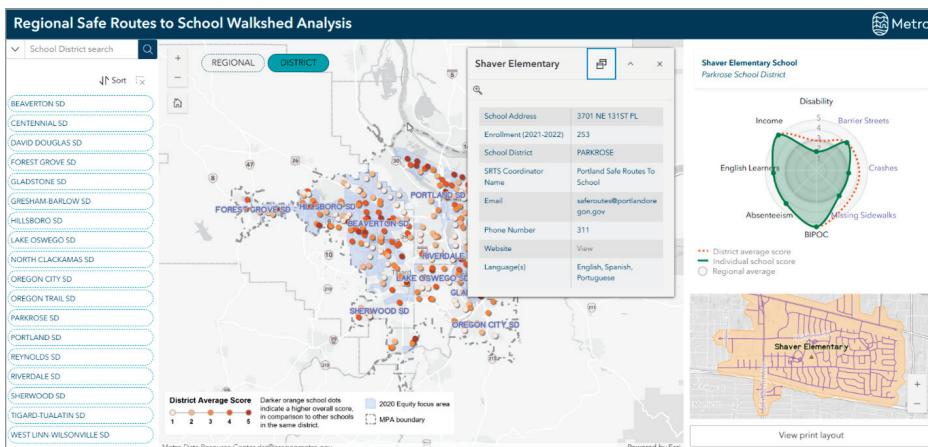
SRTS programs in the region.

Recently, Metro developed a powerful tool to help. Hosted by ArcGIS Enterprise and built using ArcGIS Experience Builder, the new Regional Safe Routes to School Walkshed Analysis app maps over 330 schools across the region and gives planners, regional partners, and communities a clear, interactive way to explore school walksheds and identify where safety improvements like new sidewalks, crossing guards, or safer intersections can make the biggest impact.

At the heart of the app is a custom radar chart—powered by ArcGIS Network Analyst™, a spatial analysis extension in ArcGIS Pro—that evaluates each school's walkshed using a range of dynamic transportation and demographic factors. These include crashes, sidewalk availability, and the percentage of students who have



↑ With Metro's Regional Safe Routes to School Walkshed Analysis app, the public can zoom in to and out of their respective neighborhoods and see where nearby schools' walksheds rank.



↑ Users can also turn on the school district layer and see how a specific school ranks in comparison to the district's average. This provides insight into where infrastructure investments need to be prioritized.

a disability. The app calculates a vulnerability index for each school area and visualizes it through the radar chart, allowing users to quickly assess the safety needs surrounding their school, as well as better understand the school's student demographics.

"As users interact with the app, they can click on individual schools or gain a comprehensive understanding of which school walksheds may pose greater risks," said Julie Stringham, Metro senior geospatial developer. "It is a simple, powerful way for the community to explore school walksheds and identify areas that may need more attention."

The app provides a dynamic, data-driven platform that empowers communities to make informed decisions. As Noel Mickelberry, senior transportation planner at Metro, noted, "I found our previous analyses to provide such helpful data but thought that the information should be more accessible to all our partners." Now, with the app, that vision is a reality.

## Bridging the Gaps: How a Regional Tool Is Aligning Safety Efforts

Although this app supports many planning efforts within Metro, the impact goes beyond staff use. For the first time, families, school employees, and community groups can explore this information themselves. The interactive

design makes it easy to advocate for changes, apply for funding, or better understand the challenges students face. This kind of open access helps build trust and include everyone.

The app also fosters collaboration. Metro, the Portland Bureau of Transportation, and local municipal governments across the region now use the same data to guide decisions. This has led to better coordination, more consistent planning, and smarter resource allocation, especially in communities with the greatest safety and equity needs.

Stringham added, "The app is not just a high-tech solution, it is something that meets a real need. Projects like this serve a very direct and important need in our region," she said. "This is going to end up impacting the lives of families in the Portland region, which would help bring more visibility towards decision-makers to allocate funding for new sidewalks to be made."

## Empowering Communities with Data to Prioritize Funding

This app supports nearby cities by helping local officials identify and prioritize the areas where pedestrian infrastructure is most needed. As a regional government agency, Metro serves 24 cities and three counties, which may individually lack the data or tools to target sidewalk and safety improvements

effectively. This app fills that gap by offering actionable insights into which schools need attention most. Metro provides the app as a shared resource to help coordinate efforts across cities. It also supports funding applications by offering data that can justify requests for programs like Regional Travel Options (RTO). Cities are encouraged to use the app to strengthen their proposals and secure funding for critical infrastructure. Together, these efforts impact over 44,000 students and their communities, making daily travel safer and more accessible.

"The backbone of this tool is the enterprise data we've carefully maintained, but the real value comes from how it inspires action," Jake Lovell, Metro geospatial product specialist, explained. "It is not just about making our own data more accessible; it is about empowering partners across the region to plan smarter, apply for funding more effectively, and replicate this model for other critical programs. This has become a service for innovation, both within Metro and beyond."

Looking ahead, the Metro team plans to connect this work with other major safety efforts across the region, including the organization's Safe Streets for All and Vision Zero initiatives. These programs share the goal of making streets safer for everyone, especially the most vulnerable road users.

As Metro continues to modernize its tools and data strategies, this project stands as a strong example of how technology can support safer, smarter, and more equitable transportation, not just for students but for entire communities.



To learn how to modernize transit operations with GIS, please visit [go.esri.com/TransitOps](https://go.esri.com/TransitOps)



# Enhancing Government Operations with Unified Address and Road Data Management

The integration of ArcGIS Roads and Highways with Esri's Address Data Management solution is a significant development for government agencies that are responsible for managing road characteristics, assets, and address data. This unified approach transforms how organizations operate, collaborate, and respond to various needs.

## Challenges of Siloed Data

Traditionally, different departments within organizations maintain their own road centerlines, each with its own update schedule, centerline breakpoints, and business rules. When road changes occur, such as extensions, realignments, or reconstructions, the associated data doesn't always follow, leading to inconsistencies, miscommunication,

and missed opportunities. Address data and centerline networks have long been siloed, with permitting and planning teams editing address points, transportation and public works teams managing roads in different schemas, and emergency services working on their own Next Generation 911 (NG911) compliant copies. This results in duplication and massive inefficiencies.

## Importance of Linear Referencing

Linear referencing is a critical concept in managing road data. It offers a different way of describing locations, not by named features or address blocks, but by measuring distance along a line. This approach is particularly useful for continuous road attributes like speed limits or the number of lanes, which can

change partway along a road segment in the middle of an address block range. By using linear referencing, organizations can track changes precisely and maintain location context.

## Address Data Management Solution

Esri's Address Data Management solution offers tools and workflows to maintain, improve, and share accurate address information. It supports comprehensive address repository management, including road centerlines and site addresses, and features preconfigured attribute rules for data quality. The solution automates editing tasks, validates addresses, and identifies errors. It also facilitates public address requests and reporting. By streamlining workflows,



enhancing data quality, and promoting stakeholder engagement, it ensures reliable information for critical services such as 911, permitting, and assessment.

## ArcGIS Roads and Highways

ArcGIS roads and highways provides a comprehensive suite of tools designed for three core areas: administration, route management, and event management. These tools enable organizations to maintain a dynamic, accurate, and authoritative road network over time. The product now supports a shared centerline model where roads and highways and address data management operate off the same geodatabase, ensuring one road centerline serves both linear referencing needs and address ranges.

## Key Features and Benefits

The integration of ArcGIS Roads and Highways with the Address Data Management solution offers several key features and benefits:

- **Unified Centerline:** A single centerline representation is used by both addressing and transportation teams, ensuring consistency and reducing duplication.
- **Automation:** Edits to roads and addresses can now happen in a single session using tools that speak to each other, reducing manual effort and increasing confidence in the data.
- **Event Behaviors:** Configurable business rules called event behaviors automatically update events and keep them in alignment with the centerline when roads change, ensuring that all data remains synced.
- **Validation Tools:** Preconfigured attribute rules enhance quality assurance in editing workflows by automating the creation of address features, as well as helping to identify common errors in address information, such as address range overlaps or duplicate site addresses.
- **Web-Based Editing:** Multiple stakeholders can collaborate and edit data in real time using web-based editing through ArcGIS Experience Builder.

## Example Workflow

1. An analyst in the city planning department uses the Address Data Management solution tools to input a new subdivision. They create new centerlines and site address points using the solution's simplified editing workflows while also ensuring data consistency.
2. A public works analyst then uses ArcGIS Roads and Highways tools to create routes and manage business data by leveraging the product's ability to handle complex road management tasks.

3. A pavement engineer then performs pavement edits as the condition changes over time by using ArcGIS Experience Builder widgets in a web application.

## Best Practices and Considerations

To maximize the benefits of this integration, organizations should consider the following best practices:

- **Avoid Duplication:** Use one geometry for many departments and purposes.
- **Leverage Out-of-the-Box Schemas:** Configure schemas to meet specific needs. Utilize attribute rules and validation tools to save time and reduce human error.
- **Enable Multiuser Collaboration:** Allow desktop, web, and mobile users to interact with the same up-to-date data, and define authority levels for editing and approving changes.

## Conclusion

The integration of ArcGIS Roads and Highways with the Address Data Management solution is a powerful approach for organizations seeking to unify their address and road data management. By providing a single, authoritative system of record, this integration enhances collaboration, reduces manual effort, and increases data accuracy, and thereby transforms government operations by improving outcomes in various areas, including emergency response, asset management, and public records.



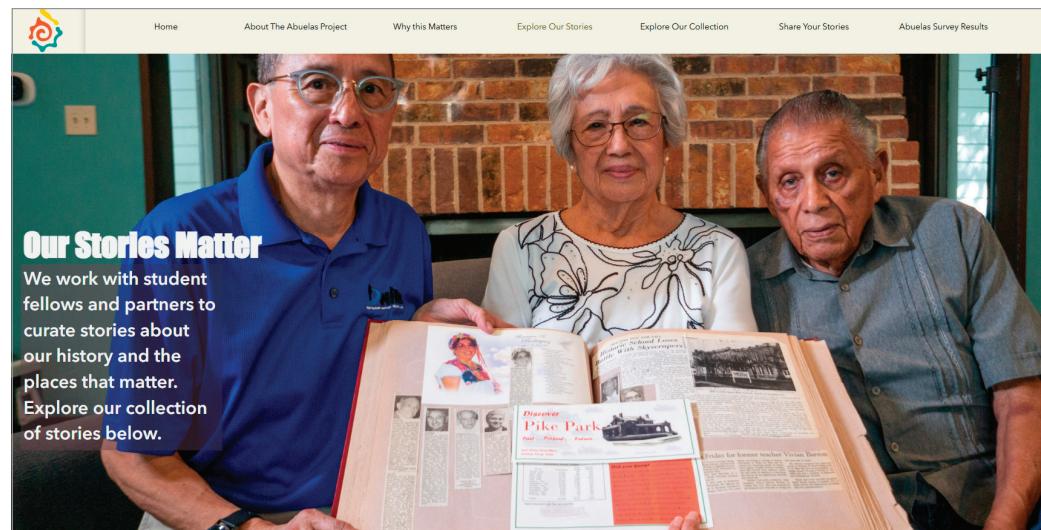
To learn more, please visit [go.esri.com/RoadAddressMgmt](http://go.esri.com/RoadAddressMgmt)

# Immortalizing Latinx Heritage with GIS: The Abuelas Project

To preserve a culture is to sustain people—people with stories that are too valuable to be erased. Yet, that is often the case, especially for communities whose narratives have previously been suppressed. While culture may not always be physical, it is deeply rooted in place.

Recognizing this, The Abuelas Project—an initiative of the Latinos in Heritage Conservation (LHC), a nonprofit supporting Latinx communities—uses geographic information system (GIS) technology to preserve and elevate the culture of their Latinx community through a digital community archive.

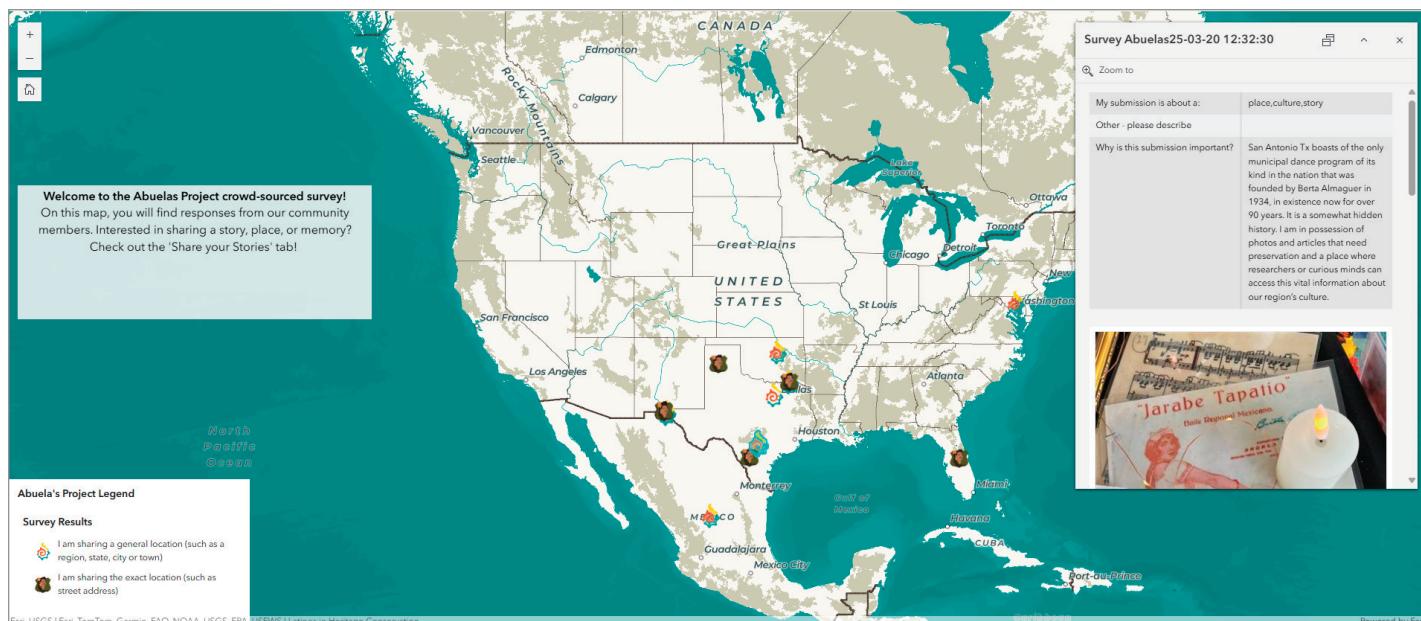
The Abuelas Project documents oral histories, photographs, community-submitted materials, and maps. It is built using ArcGIS technologies and offers a growing, interactive space where communities can share their stories, contribute historical materials, and support recognition of Latinx cultural sites across the United States and Puerto Rico.



## Recognizing Latinx Heritage through GIS

Across the US, Latinx communities remain largely invisible in official preservation records. Although Latinx people represent nearly 20 percent of the US population, fewer than one percent of the more than 95,000 sites

listed on the National Register of Historic Places reflect Latinx history. In Texas, where Latinx communities make up the largest share of the population, over 300,000 records exist for historic sites. Yet only a small number acknowledge places of Latinx significance.



↑ The Abuelas Project Crowdsourced Map

# Abuelas Project Survey

## About My Submission

**My submission is about a:**\*

Please select all the themes your submission falls into

Place (such as a building, a set of buildings, a park, a region, etc)

Art and cultural practice (such as a quinceañera, mural, music, etc)

Story (about a person or persons, event, etc)

Other (such as a family recipe, immigration path, language)

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↑ Users submit their cultural stories through ArcGIS Survey123.

## ← “Explore Our Stories” Section of The Abuelas Project’s ArcGIS Experience Builder Site

The Abuelas Project is working to change that. But first, the question was how? What was the best way to create an outlet that Latinx communities everywhere could easily access to preserve the sites that matter to them? To meet the project's need for broad access and visual impact, LHC used ArcGIS Online—a cloud-based, secure, and scalable software as a service (SaaS) platform for geospatial workflows.

"We explored several tools and ultimately chose ArcGIS because we needed an accessible platform that could support visual storytelling online," said Sehila Mota Casper, executive director of LHC. "This gives communities a powerful way to document and advocate for places they care about."

With ArcGIS Online and a suite of other GIS tools, users can contribute oral histories, photographs, documents, and publicly submitted artifacts that reflect migration, neighborhood change, family memory, and cultural preservation.

For example, LHC built a custom site using ArcGIS Experience Builder, a versatile tool that creates custom web apps for a variety of devices—ensuring the archive remains accessible and interactive.

Using ArcGIS Survey123, a form-centric data collection tool that allows

users to create surveys, LHC created a crowdsourced map featuring neighborhoods, landmarks, family recipes, or stories of migration. Through a simple online form, users can share photos, audio recordings, written reflections, and other materials tied to places that matter. The archive is designed to grow with the community. As more people contribute, it becomes a deeper record of Latinx cultural life, grounded in memory and shaped by those who live it.

Collected information helps build digital stories created with ArcGIS StoryMaps. These interactive stories allow visitors to explore maps, personal narratives, and historical context, covering topics such as the Bracero Program and Latinx life along Route 66. Each story is developed by a team trained in urban planning, geography, and history. The process combines spatial data, testimony, and archival research to support nominations at the local, state, and federal levels.

The Abuelas Project's impact is already taking shape through the stories it has gathered and the communities it continues to engage with. What began as a response to underrepresentation is now a living, evolving archive—built by and for the people it represents.

## A Living Archive in Action

So far, the project has collected 26 oral histories, recorded over 40 hours of interviews, gathered more than 700 photographs, and published seven digital stories. These engaging narratives combine interactive maps, multimedia, and text. Each story is the result of more than 100 hours of research, weaving together spatial data, maps, personal narratives, and historical timelines to support preservation efforts.

Karina Amalbert, the geospatial project manager for LHC, emphasizes the dual nature of working with ArcGIS. It produces complex 3D models and compelling visuals that support their preservation efforts while remaining

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approachable for everyday users. Though capable of sophisticated, multilayered work, the use of GIS in The Abuelas Project remains user-friendly—even to those without technical expertise.

Casper adds, "While [The Abuelas Project] is a cloud-based GIS platform, it's also a very human platform made for the community. It's something my mom can use and become involved in."

Through GIS, The Abuelas Project created a practical avenue to document a history long overdue for recognition. Preserving culture means preserving spaces where it lives—where moments are born and stories take root. Those stories, in turn, preserve the people who came before them.



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