



Solutions, Data Accessibility, and Data Sharing Report

Lassen County Transportation Commission | CA

Lassen County Transportation Commission GIS Needs Assessment and Implementation

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definition of **ACRONYMS**

Below is a definition of acronyms referenced in this document.

Acronym	Full Name
API	Application Programming Interface
ARPA	Archaeological Resources Protection Act
CCPA	California Consumer Privacy Act
CSV	Comma-Separated Values
DSA	Data-Sharing Agreements
FGDC	Federal Geographic Data Committee
FOIA	Freedom of Information Act
GDPR	General Data Protection Regulation
GIS	Geographic Information Systems
HIPAA	Health Insurance Portability and Accountability Act
ISO	International Organization for Standardization
JSON	JavaScript Object Notation
LCTC	Lassen County Transportation Commission
LMUD	Lassen Municipal Utility District
LRB	Lassen Rural Bus
MFA	Multi-Factor Authentication
MOU	Memorandum of Understanding
NG911	Next Generation 911
ODP	Open Data Protocol
OGC	Open Geospatial Consortium
PII	Personally Identifiable Information
RBAC	Role-Based Access Control
SAML	Security Assertion Markup Language
SIR	Susanville Indian Rancheria
WFS	Web Feature Service
WMS	Web Map Service
WMTS	Web Map Tile Service



Executive Summary

The Lassen County Transportation Commission (LCTC), in collaboration with the City of Susanville and the Susanville Indian Rancheria (SIR), has developed a strategic framework to modernize GIS capabilities and support countywide revitalization. This report builds on insights gathered during the Phase 1 Needs Assessment and provides recommended solutions to address those findings. The proposed recommendations align with the Lassen County Regional Plan and Countywide Plan, ensuring data accessibility, sharing, and utilization improvements throughout Lassen County.

Key focus areas of this report include:

- ◆ Dovetail with findings of the countywide strategic plan to ensure optimization of infrastructure and software
- ◆ Identifying data sharing opportunities
- ◆ Recommend methods for sharing data, focus on tools to enhance multimodal travel initiatives, travel demand management, data updates, transportation, and development planning
- ◆ Enhancing collaboration and communication through effective data-sharing strategies.
- ◆ Supporting multimodal travel initiatives, travel demand management, and transportation planning
- ◆ Emphasizing updated and accurate data for continued planning and operational efficiency



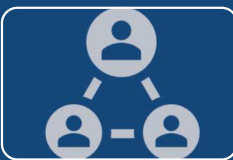
Strategic Recommendations

The strategic recommendations outlined in this report are designed to align with the Countywide and Regional Transportation Plans, ensuring that public services remain effective, equitable, and sustainable.



1. Establish a Regional GIS Data Hub

- Implement ArcGIS Hub or ArcGIS Enterprise as a centralized platform to manage, share, and access geospatial data. This will streamline workflows, improve transparency, and ensure stakeholders have access to authoritative information.



2. Adopt a Unified Data Governance Framework

- Define and enforce clear policies for data ownership, metadata, access controls, and compliance. A formal governance framework ensures data consistency, privacy, and regulatory alignment across departments and agencies.



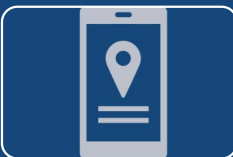
3. Implement Monitoring and Auditing Tools

- Establish audit trails, usage metrics, and performance dashboards to enhance accountability, detect issues early, and support continuous improvement in data practices.



4. Expand GIS Applications for Multimodal Transportation

- Develop applications that integrate walking, biking, transit, and ride-share data to identify service gaps and optimize connectivity. This promotes equitable access and supports climate resilience goals.



5. Deploy Field-Ready Utility GIS Solutions

- Adopt ArcGIS Solutions for Water and Sewer Utilities, which offer cost-effective, mobile-enabled tools for infrastructure management—ideal for small to mid-sized organizations without complex GIS infrastructure.



6. Strengthen Public Engagement through StoryMaps

- Create interactive maps and narratives using ArcGIS StoryMaps and Experience Builder to promote tourism, cultural awareness, and stakeholder input.



7. Use Digital Twin Technology for Planning

- Apply 3D GIS and simulation tools to model future development, test planning scenarios, and improve interagency coordination. Digital twins enhance strategic planning and public engagement.



Key Benefits

- ✓ **Improved Data Accessibility:** Centralized, real-time data improves operational efficiency and decision-making.
- ✓ **Cost-Efficiency:** Scalable solutions reduce the need for specialized infrastructure or training.
- ✓ **Regional Collaboration:** Shared platforms support seamless coordination across jurisdictions.
- ✓ **Inclusive Mobility Planning:** Multimodal data enhances transportation access and equity.
- ✓ **Enhanced Public Engagement:** Interactive tools foster transparency and community participation.
- ✓ **Stronger Funding Potential:** Alignment with state and federal priorities boosts competitiveness for grants.

Next Steps

1. Collect or assimilate authoritative data from internal and external sources.
2. Deploy ArcGIS Hub as the regional open data portal
3. Finalize and implement data governance policies
4. Build priority GIS applications for transportation, utilities, and planning
5. Pilot StoryMap and digital twin projects for community engagement
6. Monitor adoption and refine tools based on feedback and metrics

By advancing these recommendations, LCTC and its partners will strengthen regional data governance, modernize public infrastructure management, and support inclusive, sustainable transportation systems. This strategic GIS investment positions Lassen County as a model for innovation, collaboration, and long-term community resilience.



Introduction

This report outlines GIS solutions, data accessibility policies, and data-sharing infrastructure. It evaluates existing practices and recommends enhancements to:

- ◆ Improve **real-time data access** for informed decision-making.
- ◆ Enable seamless **data exchange** among stakeholders. and
- ◆ Ensure compliance with **regulatory and security standards**.

Building upon the insights gathered during the Phase 1 Needs Assessment, this document outlines recommended solutions to address those findings. The proposed recommendations are designed to align with the objectives outlined in the Regional and Countywide Plans. This report also outlines the practices, policies, and infrastructure related to how data is accessible, shared, and utilized throughout the Lassen County region.

Another key focus is identifying opportunities for *effective data sharing* and recommending robust *methods for facilitating* such exchanges. By enhancing collaboration and communication among stakeholders, these data-sharing strategies aim to foster informed decision-making and improve overall system efficiency.

Special attention is given to *tools and strategies* that support multimodal travel initiatives, travel demand management, and transportation and development planning. These initiatives are critical to advancing sustainable growth and meeting the evolving transportation needs of the County. Furthermore, this report will address the importance of maintaining updated and accurate data to support ongoing planning and operational activities.



Data Accessibility Framework

A data accessibility framework refers to the foundational set of guidelines and policies established within a region to ensure transparency, compliance, and good governance while fostering collaboration and responsible data use. The Lassen County Transportation Commission (LCTC) relies on Geographic Information Systems (GIS) to support informed transportation planning, regional coordination, and public service delivery. A robust GIS Data Accessibility Framework is essential for ensuring that spatial data is accessible, consistent, secure, and usable across internal departments and external partners. This framework defines how data is *stored, accessed/shared, secured, and governed* among different stakeholders, ensuring efficiency and security while maximizing the value of available information. Framework components include:



◆ Data Governance Policies

- ◆ *Data Ownership & Stewardship:* Identifies which department, agency, or GIS coordinator is responsible for managing specific geospatial datasets, such as parcels, roads, or utilities, including ensuring spatial accuracy, routine updates, and documentation.
 - ◆ It is critical for LCTC to identify where and how to obtain authoritative data (internally and externally), as well as who maintains its authoritative datasets for data sharing initiatives. Effective data sharing solutions rely on the availability of accurate, complete, and well-maintained data. Without a strong foundation, it is not best practice to design, implement, or fully leverage data sharing tools and platforms.
- ◆ *Access Policies:* Defines who may view, edit, publish, or distribute GIS layers, based on user roles, system permissions (e.g., ArcGIS roles), and the sensitivity of the data (e.g., infrastructure vs. public-facing maps).
 - ◆ Defining access policies throughout the agency, as well as with external partners, can promote data sharing and collaboration, while also helping to prevent unauthorized editing or misrepresentation of the data. Additionally, they ensure compliance under the frameworks mentioned below, minimizing misuse of the data.
- ◆ *Regulatory Compliance:* Ensures spatial data practices comply with relevant legal and policy frameworks (e.g., FOIA, state-level open data acts, NG911 standards)



while protecting personally identifiable information (PII), utility assets, or emergency response layers.

- ◆ Regulatory compliance in spatial data practices benefits LCTC by providing legal protection, fostering transparency, and necessitating a structured approach to data management. By safeguarding personally identifiable information (PII), counties maintain community trust and enhance decision-making. Compliance also improves interagency collaboration, leading to better service delivery and governance.

◆ Metadata & Data Cataloging

- ◆ *Metadata Standards:* Adopts standardized documentation formats such as FGDC or ISO 19115 to describe GIS datasets, including coordinate systems, data sources, update frequency, and contact information.
 - ◆ Within the Lassen County Strategic Plan, metadata was identified to be missing for existing datasets. Metadata provides essential information about each dataset. This allows internal staff and external agencies to understand the proper use and limitations of the data as well as its suitability for use. Metadata also aids in evaluating the relevance of the data, its currency/accuracy, and credibility, essential for decision-making and public dissemination.
- ◆ *Data Catalogs or Portals:* Implements systems like ArcGIS Hub, Geoportal Server, or custom dashboards to allow users to browse, search, and preview authoritative GIS datasets in a centralized environment.
 - ◆ Enhancing public engagement is essential for growing and improving programs, especially in a multimodal setting. Interactive websites can share data directly with the public, provide transparency for plans and projects, and promote citizen engagement and feedback on future improvements.

◆ Technology Infrastructure

- ◆ *Centralized and/or Federated Platforms:* Leverages platforms such as ArcGIS Enterprise, ArcGIS Online, or open-source stacks (e.g., GeoServer/PostGIS) to manage, store, and serve GIS data internally or across partner agencies.
 - ◆ To provide geospatial services to citizens promoting transparency and engagement, the appropriate infrastructure will need to be in place to support the applications mentioned, but not limited to, the ones above. This could be a partnership with Lassen County, cloud-based/hosted technology, or a combination.



- ◆ *APIs & Interoperability Tools:* Enables data sharing and system integration via Esri REST services, OGC-compliant services (WMS/WFS/WMTS), and APIs for custom web applications and real-time dashboards.
 - ◆ Integration with non-spatial data in county-wide business systems is a critical component of an enterprise GIS. Sharing data between systems geo-enables data and allows location visualization and spatial analysis, such as patterns and trends. As Lassen County's GIS matures, integration with county and regional databases should be a goal.

◆ **User Access & Permissions**

- ◆ *Role-Based Access Control (RBAC):* Assigns user roles (e.g., viewer, editor, administrator) in enterprise GIS environments to ensure proper data access and editing privileges based on job functions.
- ◆ *Authentication & Authorization:* Uses secure login protocols such as SAML, Active Directory integration, or multi-factor authentication (MFA) to validate users and prevent unauthorized access to internal GIS systems.
 - ◆ Data security safeguards digital information and databases against unauthorized access and harmful activities, including cyberattacks and data breaches. Security measures should be applied at all tiers of the GIS system—hardware, applications, ArcGIS Enterprise, Portal, ArcGIS Server, SQL Server, and the central geodatabase according to Esri's ArcGIS security best practices.

◆ **Data Quality & Standards**

- ◆ *Data Validation & Cleansing Protocols:* Implements automated QA/QC checks, topology rules, and validation scripts to ensure the positional accuracy and logical consistency of GIS datasets.
 - ◆ High quality data builds confidence in the GIS system. Geodatabase validation rules should be applied where applicable to assure data quality. In addition, ongoing quality control assessment procedures should be performed on a scheduled basis to analyze the data and identify any inaccurate records, incomplete data or attributes, and non-standard data schemas or spatial projections.
- ◆ *Standardization:* Establishes data schemas, field naming conventions, projection standards, and domain values across layers to support consistent data modeling and interoperability.
- ◆ Database design involves organizing data according to a specific database model. The designer identifies the necessary data to be stored and determines the relationships between data elements. Using this information, the designer aligns the data with the chosen database model. Standardized GIS database naming conventions facilitate



efficient data and database management, integration, interoperability, and data sharing.

Training & Support

- ◆ *Solutions & Data Access Training:* Offers regular training sessions, onboarding guides, and skill development resources for GIS staff, planners, field technicians, and decision-makers to improve GIS proficiency and system usage.
- ◆
 - ◆ Implementing a comprehensive GIS Training Plan is crucial for enhancing the skills of both new and current staff, leading to improved organizational efficiency. A multi-tiered training approach ensures all employees gain necessary GIS competencies and empowers staff to utilize technology effectively. Investing in GIS training is vital for maintaining a knowledgeable workforce capable of leveraging geographic information systems to their full potential.
- ◆ *Documentation:* Provides internal support services and clear documentation (e.g., data dictionaries, workflow manuals, map templates) to assist users in accessing and applying GIS tools effectively.
 - ◆ Documentation of critical processes and procedures is critical to training system and database administrators. Preparing staff for GIS Succession and Continuity of Operations should be an essential initiative.

◆ **Transparency & Public Engagement**

- ◆ *Open Data Portals and Online-based Solutions:* Publish non-sensitive GIS datasets (e.g., zoning maps, trail systems, capital projects) through platforms like ArcGIS Hub and interactive web maps to support transparency and public involvement.
 - ◆ By publishing non-sensitive GIS datasets, Lassen County fosters an environment of openness. This openness allows residents to access important information about local projects and land use, thereby empowering them to stay informed and involved in community planning and development.
- ◆ *Feedback Mechanisms:* Includes tools for user comments, error reporting, or public participation in map-based surveys and collaborative data collection efforts, enhancing two-way engagement with the community.
 - ◆ Open data access encourages citizen feedback, ensuring that diverse perspectives are considered in decision-making. Ultimately, transparency and public engagement foster trust between county officials and residents, leading to collaborative growth and policies that better reflect the community's needs.



Data Governance Policies

Effective data sharing and governance require clearly defined policies and processes to ensure compliance, security, and data integrity. Guidelines for both internal and external data sharing, data ownership and stewardship, and quality assurance measures to maintain accuracy and reliability are listed below:

- ◆ **Internal Data Sharing:** Internal data sharing involves established policies that regulate how data is accessed and exchanged within departments. Defined procedures ensure that data requests are managed systematically while maintaining compliance with organizational standards. Privacy considerations play a crucial role in safeguarding sensitive information, restricting access to authorized personnel, and preventing unauthorized exposure. Additionally, compliance measures should be put in place to align internal data-sharing practices with security protocols and industry best practices, ensuring a structured and secure data exchange process.
- ◆ **External Data Sharing:** Sharing data with external entities, such as partners, third-party organizations, or regulatory agencies, requires adherence to legal and regulatory requirements, including compliance with General Data Protection Regulation (GDPR), Health Insurance Portability and Accountability Act (HIPAA), and Archaeological Resources Protection Act (ARPA). Data-sharing agreements (DSAs) and Memoranda of Understanding (MOUs) establish formalized contracts that define the terms of data exchange, including security protocols and permitted uses. To Protect Personally Identifiable Information (PII), anonymization techniques are implemented, ensuring that shared data maintains privacy while still being useful for analytical and collaborative purposes.
- ◆ **Data Ownership & Stewardship:** Clear data ownership and stewardship roles are essential for maintaining data integrity and governance. Data owners are responsible for ensuring the accuracy and reliability of the datasets within their respective departments. Meanwhile, data stewards oversee governance policies, ensuring that best practices are followed for data management, compliance, and security. This structured approach helps maintain accountability and consistency across data repositories.
- ◆ **Data Quality Assurance:** To ensure data accuracy and usability, rigorous quality assurance processes are applied. Validation and cleaning protocols identify inconsistencies and maintain data reliability, reducing errors in analysis and reporting.



Metadata management provides documentation that allows users to interpret datasets accurately, ensuring clarity and proper utilization of available information. Data lineage tracking maintains a record of historical data modifications, ensuring transparency regarding the origin, transformation, and movement of data across systems.

To achieve these results, the Lassen County Transportation Commission should refer to the Lassen County GIS Strategic Plan. Within are discussed the recommendations for Lassen County and, by extension, its partners, such as the City of Susanville and the Susanville Indian Rancheria (SIR), to develop metadata policies, conduct data assessments, and manage and govern data that apply to existing and new data. These should align with GIS best management practices, internal IT policies, and be informative without being cumbersome.

By implementing a structured approach to data sharing, ownership, and quality assurance, Lassen County, the Lassen County Transportation Commission, and its partners/stakeholders can enhance collaboration, maintain compliance, and ensure that data remains a valuable and trustworthy asset for decision-making.

Data Access and Data Security

Ensuring secure and controlled access to data is critical for maintaining data integrity, protecting sensitive information, and complying with regulatory requirements. Below are key components of access control, data sharing platforms, interoperability standards, and security measures that support a robust and secure data environment.

- ◆ **Access Control Systems:** Access to data is managed through authentication methods and role-based permissions to prevent unauthorized access. Authentication methods, such as OAuth and multi-factor authentication (MFA), ensure that only authorized users can access data systems. Additionally, role-based access control (RBAC) assigns different permission levels based on user roles, ensuring that individuals can only access the data necessary for their specific responsibilities. This structured approach minimizes security risks while enhancing data governance.
- ◆ **Data Sharing Platforms:** To facilitate seamless data exchange, various platforms are utilized for internal and external collaboration. The Regional Data Hub (ArcGIS Hub) serves as a centralized portal for sharing GIS data across different entities, enabling real-time access to critical information. Additionally, cloud-based collaboration tools provide a scalable and flexible environment for secure data sharing, supporting interdepartmental and regional coordination.



- ◆ **Interoperability & Standards:** Ensuring that data can be shared and accessed across multiple systems requires adherence to interoperability standards. The use of open data formats, such as JSON, CSV, and GeoJSON, allows for compatibility between different platforms and applications. Additionally, standard protocols, including RESTful APIs and OData, facilitate seamless integration, enabling efficient data exchange while maintaining consistency and reliability.
- ◆ **Security Measures:** Robust security measures are implemented to safeguard data from unauthorized access and cyber threats. Data encryption is applied to protect data both in transit and at rest, ensuring that sensitive information remains secure during storage and transmission. Data masking techniques help protect personally identifiable information (PII) by anonymizing or obfuscating sensitive data when shared externally. Access auditing plays a crucial role in monitoring user interactions with data, providing logs and reports to detect unauthorized access or suspicious activity. Compliance with regulatory frameworks, such as the California Consumer Privacy Act (CCPA) and GDPR, ensures that data-sharing practices align with legal and industry standards, protecting user privacy and data integrity.

By integrating these access control mechanisms, data-sharing platforms, interoperability standards, and security protocols, organizations can maintain a secure, efficient, and compliant data management environment.

Monitoring and Auditing

Effective GIS data management requires continuous monitoring and auditing to ensure security, compliance, and efficiency in data accessibility. Since GIS solutions are widely used for spatial analysis, infrastructure planning, and decision-making, it is essential to track how geographic data is accessed, modified, and shared. Implementing robust monitoring mechanisms helps maintain data integrity, detect unauthorized use, and optimize data accessibility, ensuring that GIS datasets remain reliable and accurate for stakeholders. Monitoring and auditing not only protect sensitive information but also improves operational efficiency by identifying areas for enhancement in data-sharing practices.

- ◆ **Access monitoring** plays a critical role in enforcing data governance policies by tracking real-time data access logs. This verification ensures that only authorized users can retrieve or modify data, reducing the risk of misuse. Continuous monitoring helps organizations detect suspicious activity early, enabling a rapid response to potential



security threats. By maintaining a transparent record of who accessed what data and when, access monitoring supports accountability and compliance with industry regulations.

- ◆ **Audit trails** provide a detailed record of data modifications, ensuring a clear history of changes made to datasets. This record is crucial for maintaining data integrity, as it allows organizations to trace errors, investigate security incidents, and verify that data updates align with governance policies. By logging every action taken—whether accessing, modifying, or sharing data—audit trails create a reliable source of evidence that can be used for compliance reporting and forensic investigations.
- ◆ **Performance metrics** allow operational efficiency beyond security, monitoring, and auditing. By measuring key indicators such as data access times, the number of successful or unsuccessful access attempts, and user feedback, organizations can assess how effectively their data-sharing systems function. Performance metrics help identify bottlenecks in data retrieval processes and provide insights into areas that need optimization, ultimately improving user experience and accessibility.
- ◆ **Risk mitigation** is one of the most significant challenges in data sharing. Unauthorized access, data breaches, corruption, or misuse can have severe consequences, including legal liabilities and reputational damage. Implementing proactive measures, such as encryption, role-based access controls, and continuous monitoring, reduces these risks. Additionally, organizations must regularly review and update their data-sharing policies to adapt to evolving security threats and regulatory requirements.

By prioritizing monitoring and auditing, organizations can enhance data security, ensure compliance, and optimize data-sharing efficiency. These practices provide a structured approach to tracking, analyzing, and improving data governance, ultimately fostering a more transparent and secure data environment.





GIS Solutions & Data Sharing Tools

Geographic Information Systems (GIS) have become essential tools in modern transportation planning and management, offering advanced solutions for improving efficiency, accessibility, and sustainability. By integrating spatial data with analytical capabilities, GIS provides a comprehensive approach to understanding transportation networks, optimizing routes, and enhancing infrastructure. From public transit planning to freight logistics and traffic management, GIS plays a crucial role in helping decision-makers design more efficient and responsive transportation systems.

Multimodal transportation initiatives, which focus on seamlessly integrating different modes of travel, greatly benefit from GIS technology. Some examples include:

- Walking
- Cycling
- Public transit
- Private vehicles

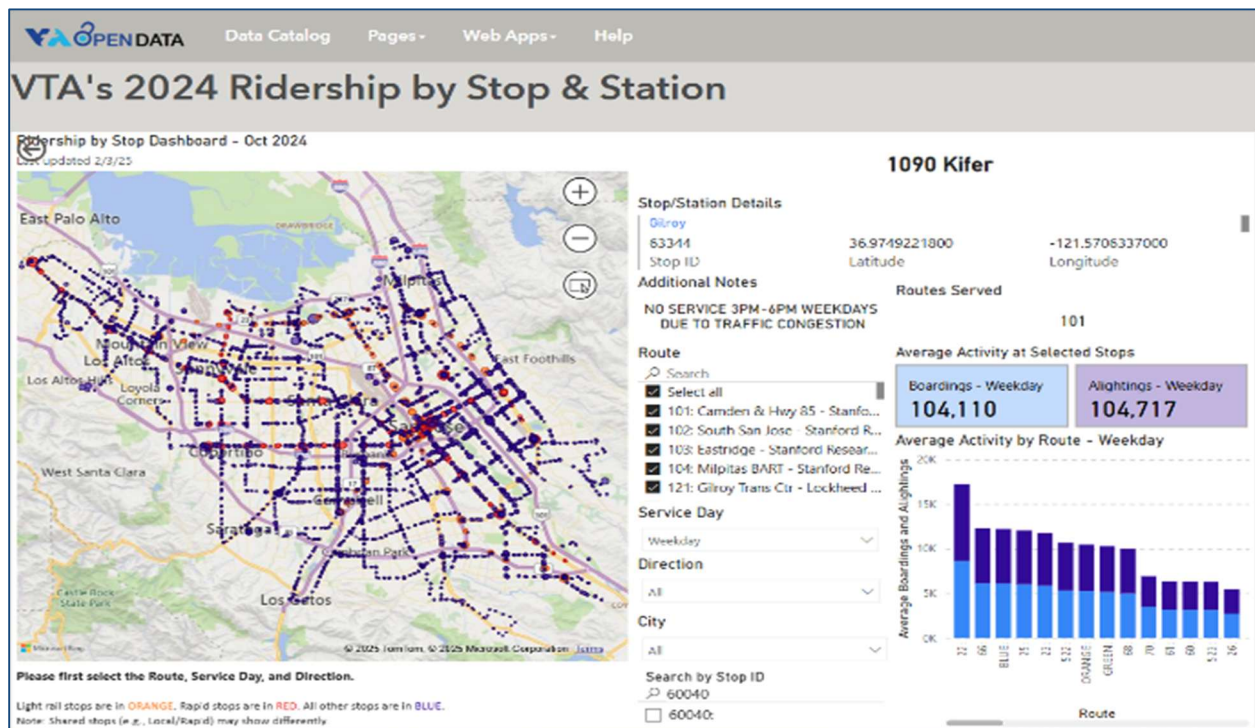


Figure 1: Santa Clara Valley TA Open Data Portal

Source: <https://data.vta.org/pages/ridership-by-stop>



GIS enables planners to visualize and analyze data related to transit connectivity, accessibility, and commuter behavior, ensuring that transportation networks function cohesively. By mapping real-time traffic patterns, identifying mobility gaps, and optimizing transit schedules, GIS-driven solutions contribute to the development of more inclusive and sustainable urban mobility strategies.

Additionally, GIS supports transportation agencies in infrastructure development, safety analysis, and environmental impact assessments. It helps evaluate the effectiveness of new transit projects, monitor road conditions, and enhance emergency response planning. Through spatial analysis and predictive modeling, GIS empowers transportation planners to make data-driven decisions that improve mobility, reduce congestion, and promote sustainable urban growth. As transportation systems continue to evolve, GIS will remain a key tool in shaping smart, resilient, and efficient multimodal transportation solutions.

Proposed GIS Solutions

ArcGIS Hub

To enhance GIS capabilities, the implementation of a Regional Data Hub, using ArcGIS Hub or ArcGIS Enterprise, is recommended to centralize GIS data and improve accessibility. Strengthening both public-facing and internal GIS applications will provide better tools for planning and analysis. Additionally, adopting automated workflows for real-time data updates will ensure that transportation and infrastructure data remain current, reducing manual processing efforts and improving overall efficiency.



Implementing a Regional Data Hub will significantly enhance data collaboration between Lassen County, the City of Susanville, and the Susanville Indian Rancheria by improving data sharing, coordination, and decision-making. The hub will serve as a centralized platform, providing a single point of access for spatial and non-spatial data across jurisdictions. Whether through ArcGIS Hub's cloud-based capabilities or ArcGIS Enterprise's on-premises infrastructure, all stakeholders will be able to view, share, and analyze real-time data in a unified environment. For example, the [California State Geoportal](#) shown below allows access to explore, visualize, and download its services, data and applications, providing easy to find, reliable, authoritative data. To facilitate data sharing, many diverse state and local government organizations contribute to the geoportal.

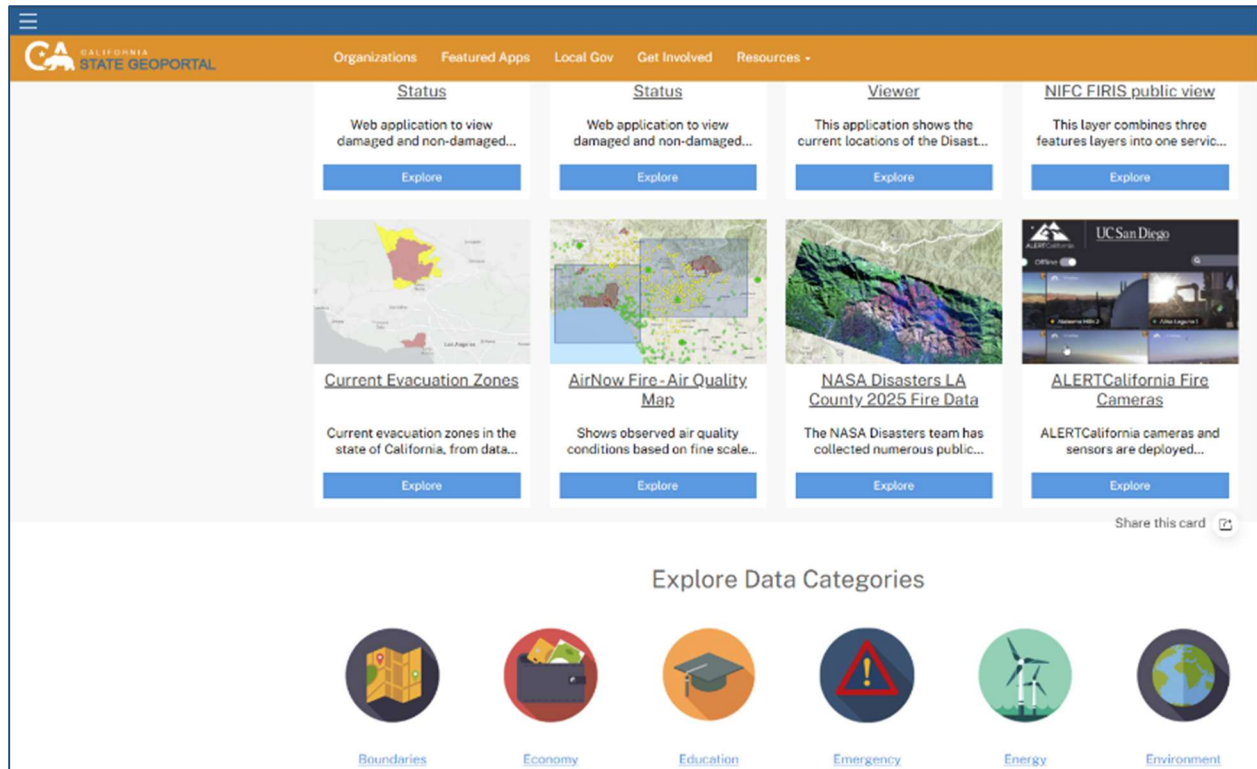


Figure 2: California State Geoportal
(Source: <https://gis.data.ca.gov/>)

Although several data needs were identified through the Needs Assessment process, LCTC, the City of Susanville, and SIR all named the following in common:

- ◆ Updated Parcel Layer/Land Ownership
- ◆ Active Transportation Facilities (bike/pedestrian facilities)
- ◆ Bus Stops/Bus Routes
- ◆ Development Projects/Land that can be Developed
- ◆ Updated Zoning and General Plan Layers

Implementation of a regional data hub will facilitate seamless cross-jurisdictional access, enabling each entity to contribute and retrieve accurate, up-to-date information, including those layers listed above. By fostering improved data-sharing practices, these agencies can work more efficiently, reducing redundancies and ensuring everyone operates with the most current datasets available. Additionally, the hub will support enhanced collaboration on regional transportation projects, emergency response coordination, infrastructure planning,

and accessibility (e.g., transportation access to the new Lassen Indian Health Center), and resource management by providing a shared digital workspace.

Digital Twin Technology

Digital Twin Technology is a virtual model that replicates real-world assets, buildings, or infrastructure, using live and historical data to analyze and predict changes. It combines information from various GIS systems and 3D mapping to create an interactive and realistic simulation of physical spaces.

For cities, Digital Twins help planners and decision-makers visualize developments, test scenarios, and improve urban planning. By integrating real-time data, such as traffic flow or environmental conditions, they provide valuable insights for making informed decisions. Tools like 3D mapping, simulation software, and GIS enhance planning by showing the impact of new projects before they are built.



Figure 3: Historic Utah Downtown Revitalization Using Digital Twin Technology

By leveraging Digital Twin Technology, the City of Susanville can visualize and analyze both existing and proposed developments while integrating tourism opportunities and senior/retiree interests to support the revitalization of the historic Uptown business district and attract developers. Utilizing *3D mapping*, *ArcGIS Experience Builder*, and *StoryMaps*, the City can create a comprehensive, interactive plan that enhances community engagement and fosters informed decision-making.

Through interactive dashboards, mapping tools, and analytics, decision-makers will gain valuable insights that help drive data-informed policies and initiatives. The implementation of Digital Twin technology will ultimately strengthen interagency communication, improve public engagement, and create a more transparent and efficient approach to regional planning and governance.

ArcGIS Solution for Utilities

Transportation and utility projects are deeply interconnected, as both rely on shared infrastructure, planning coordination, and efficient resource management. Roads, highways, and transit systems often run alongside or above underground utilities such as water, sewer, gas, electricity, and telecommunications, requiring careful coordination to prevent conflicts, minimize service disruptions, and optimize infrastructure investments.



ArcGIS Solutions

GIS technology, such as ArcGIS Utility Solutions, plays a crucial role in facilitating collaboration between transportation and utility agencies. By mapping infrastructure layers, analyzing spatial relationships, and integrating real-time data, GIS allows for better decision-making and improved project and work order coordination. This ensures that both transportation and utility projects are executed efficiently, reducing delays, minimizing costs, and improving overall infrastructure resilience.

ArcGIS Solutions for Water and Sewer Utilities provide industry-specific advanced GIS tools designed to help efficiently manage infrastructure, monitor system performance, and enhance decision-making. These solutions enable agencies to map, analyze, and optimize their networks using real-time data, improving operational efficiency and asset management.



Figure 4: ArcGIS Solution for Water Distribution (Source: Esri ArcGIS Blog)

Both the ArcGIS Water Solution and Esri's Utility Network provide powerful GIS tools for managing water and sewer infrastructure. However, ArcGIS Solutions for Water and Sewer



Utilities offers a more focused and practical approach, particularly for organizations that may not require the full complexity of the Utility Network.

Utilities within Lassen County are managed by the Lassen Municipal Utility District (LMUD). However, for the City of Susanville and the Susanville Indian Rancheria, adopting Esri's ArcGIS Solution for Utilities would bring significant benefits. Both agencies have very little data collected for the water and sewer utilities. Therefore, they are at an initiation/planning phase and can begin building a solution from the ground up. These tools would allow them to create a centralized, digital infrastructure map specific to their maintenance areas, improve coordination between agencies and departments, and reduce response times for maintenance and emergency repairs. Knowing the infrastructure and having real-time data will help the city and SIR evaluate needs as economic development and population growth occur. GIS-driven analysis could support future expansion projects, ensuring that water and sewer services meet the growing needs of the community.

Benefits of using the ArcGIS Solution over the Utility Network are:

Criteria	ArcGIS Solutions for Water/Sewer	Utility Network
Ease of Implementation	Designed for rapid deployment with minimal configuration. User-friendly and ideal for utilities needing an out-of-the-box solution with minimal customization.	Requires significant configuration, data migration, and technical expertise. Best suited for teams with technical expertise.
Cost-Effectiveness	More affordable for small organizations. Works with ArcGIS Online or Portal, with lower licensing and infrastructure needs.	Higher costs due to requirements for ArcGIS Enterprise, ArcGIS Pro, and specific licensing.
Cloud & Mobile Readiness	Fully cloud-enabled and mobile-ready, allowing field data collection via Field Maps and Survey123.	Heavily reliant on ArcGIS Pro and Enterprise, making mobile use more complex.
Prebuilt Tools & Templates	Comes with prebuilt templates, dashboards, and reporting tools	Requires custom schema development and configuration



Criteria	ArcGIS Solutions for Water/Sewer	Utility Network
	tailored for water/sewer utilities.	to take full advantage of its asset-tracking features.
Scalability for Small to Mid Utilities	Optimized for smaller systems needing efficient water and sewer asset management.	Better for large-scale, multi-utility organizations requiring advanced connectivity modeling and topological integrity.
Technical Expertise Required	Lower – Suitable for users with basic GIS skills.	Higher – Demands expertise in GIS, data modeling, and system architecture.
Best Use Case	Small to medium-sized utilities starting or modernizing their GIS infrastructure.	Large, complex utility networks needing advanced asset tracking, tracing, and connectivity modeling.

For the City of Susanville and SIR, the ArcGIS Solutions for Water and Sewer would provide an effective, cost-efficient, and easy-to-implement GIS solution for managing water and sewer infrastructure. It offers the necessary tools for mapping assets, improving maintenance workflows, and enhancing field operations without the technical and financial burden of adopting a Utility Network.

ArcGIS Experience Builder and StoryMaps

Transportation Planning

GIS solutions can support several key transportation and infrastructure applications. In transportation and development planning, GIS can be used for traffic flow analysis and transit system optimization, aiding in more effective urban planning and road network improvements. Asset management can benefit from GIS through roadway maintenance tracking and public infrastructure management, ensuring that maintenance efforts are well-coordinated and data-driven.



Figure 5: Traffic Flow Analysis



The Lassen County Transportation Commission (LCTC) currently utilizes GIS technology to enhance the planning and operation of the Lassen Rural Bus (LRB) system, the County's primary public transit service.

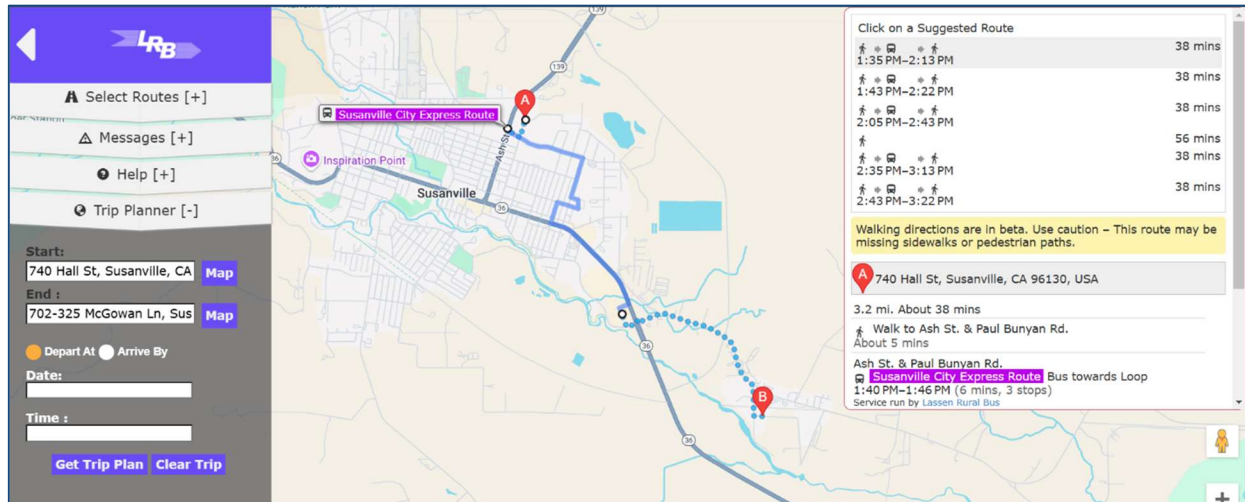


Figure 6: Lassen Rural Bus (LRB) Live Bus Tracking Application
(Powered by SPOT® from ETA Transit Systems Inc. Source: <https://lrpublic.etaspot.net/>)⁵

By integrating GIS into their transportation planning efforts, LCTC can more effectively analyze spatial data to optimize bus routes, improve service coverage, and ensure efficient allocation of resources. As the County and region grow through their revitalization process, the benefits of increasing the LRB data to include multimodal methods will be substantial, supporting all communities. Benefits include:

- ◆ **Improved Accessibility & Mobility** – Supports all users—walkers, cyclists, transit riders—especially those without cars and the elderly and handicapped. It also enhances first-mile/last-mile connectivity by linking bus routes with walking paths, bike infrastructure, and ride-hailing zones.
- ◆ **Better Access & Equity** – Improves scheduling, fare policies, and access to services, education, and employment areas with underserved or unmet transportation needs.
- ◆ **More Innovative Route Planning** – Identifies mobility gaps and guides infrastructure investments.
- ◆ **Economic Growth** – Enhances tourism and local business by improving access to key areas.
- ◆ **Environmental Gains** – Encourages low-emission travel, supporting climate goals.



- ◆ **Emergency Preparedness** – Aids in evacuation and resilient transportation planning.
- ◆ **Stronger Funding Potential** – Aligns with federal/state goals, improving grant eligibility.

Regional Tourism

Additionally, GIS can boost public engagement by providing tools for tourism promotion and economic development, helping to visualize data in ways that support business growth and community initiatives. For example, SIR anticipates creating a StoryMap for visitors, similar to Figures 5 and 6 below, that depicts indigenous plants and how they were historically used, providing an educational experience about the tribes and their history. As one walks around the community center, they can follow their location on the StoryMap and click on a plant or other feature, providing the user with a rich, historical context.

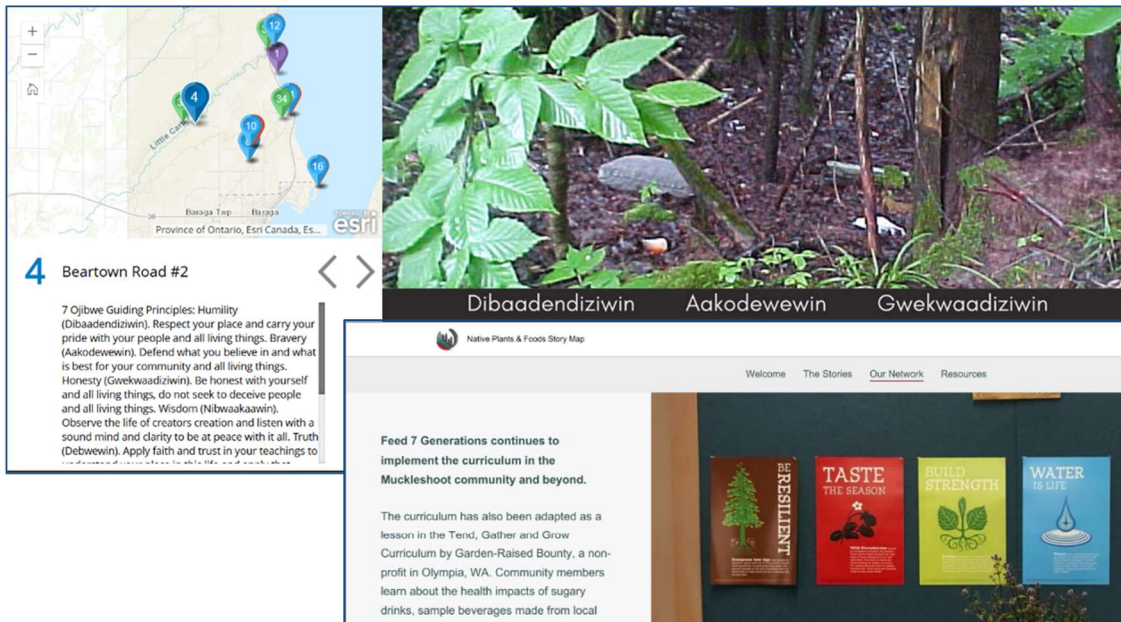
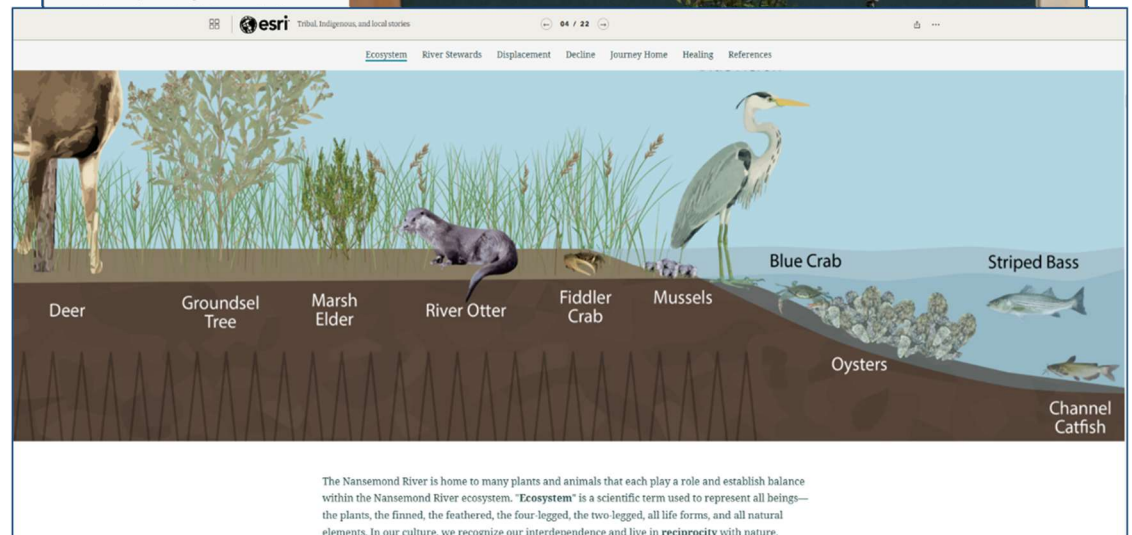


Figure 7: Plants and Foods Native to the Indigenous Lands StoryMap

Figure 8: Tribal, Indigenous, and Local Stories StoryMap - Ecosystem





Conclusion

GIS plays a transformative role in designing and implementing effective multimodal transportation systems that support sustainable growth and improved accessibility. By leveraging data visualization, spatial analysis, and scenario modeling, transportation planners are empowered to make more informed, efficient, and equitable decisions that enhance mobility within communities. The recommended solutions are designed to:

- ◆ Streamline data accessibility through a centralized hub.
- ◆ Enhance data security and regulatory compliance to protect sensitive data.
- ◆ Empower informed planning through the use of robust GIS tools, analytics, and visualization.

To effectively move forward with improvements and address identified issues, Lassen County Transportation Commission (LCTC), in conjunction with Lassen County, should implement the following key Action Items:

1. Collect GIS Data

- ◆ Collect or assimilate data from authoritative sources (internally and externally) to support the GIS solutions and tools, such as the Lassen County GIS Zoning dataset currently in progress.

2. Standardize Data Governance

- ◆ Adopt and implement clear policies on data ownership, stewardship, sharing permissions, and regulatory compliance.

3. Deploy ArcGIS Hub

- ◆ Launch a Regional Data Hub to centralize GIS data and streamline access for internal and external stakeholders.

4. Develop Targeted GIS Applications

- ◆ Build and configure applications to support transportation planning, infrastructure management, and public engagement.

5. Enable Multi-Modal Transit Data Integration

- ◆ Expand public transit datasets to include biking, walking, and ride-share connectivity for better mobility planning.

6. Train Staff and Stakeholders



- ◆ Provide regular training and support to build GIS proficiency across departments and partner agencies.

7. Implement Continuous Monitoring and Auditing

- ◆ Establish performance metrics and audit protocols to maintain data accuracy, security, and system effectiveness.

8. Promote Transparency and Community Engagement

- ◆ Use tools like StoryMaps and Experience Builder to share information with the public and collect feedback.

9. Leverage Digital Twin Technology

- ◆ Begin modeling infrastructure projects virtually to test scenarios and improve planning outcomes.

By adopting these solutions, Lassen County and the LCTC will enhance collaboration, improve efficiency, and better serve its residents through innovative GIS-driven data sharing and accessibility practices. LCTC can foster a more efficient, transparent, and data-driven planning environment that supports sustainable growth and equitable transportation access.





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