SMART Curbs: City of San José's Curb Digitization and Management Pilot

Implementation Report
FY22 SMART Stage 1 Award
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01 Executive Summary

In San José's Greater Downtown, the curb has become one of the city's most contested spaces. Over 530,000 daily trips funnel into a limited right-of-way where delivery drivers, transit riders, micromobility users, businesses, and residents all compete for access. Outdated curb rules have not kept pace with this demand, leading to congestion, safety concerns, and inefficiencies. In response, the City launched SMART Curbs: San José's Curb Digitization and Management Pilot (2023–2025) to test new tools and establish an innovative model for modern curb management.

Stage 1 Pilot Goals and Objectives

San José's curb management strategy is guided by three goals:

- *Increase efficiency* by using real-time analytics to reduce congestion and wait times.
- *Enhance economic competitiveness* by improving turnover and delivery reliability, supporting Downtown recovery.
- *Improve safety* by reallocating space to reduce conflicts and advance Vision Zero.

Stage 1 served as a proof-of-concept to build the City's first comprehensive curb inventory, test emerging technologies, and integrate data into a centralized platform.

Partners and Deliverables

The pilot, focused on Greater Downtown, was carried out with support from the Open Mobility Foundation's Curb Collaborative, technology vendors Umojo, Sony, and IPS, the community engagement firm PlaceWorks, and Fresh Lifelines for Youth (FLY), which supported workforce recruitment and training. Together, these partners delivered 140 miles of curb scanned via LiDAR, the deployment of 164 cameras and 23 sensors, and the launch of the NexCity platform with CDS-compliant APIs. Extensive community engagement also identified key priorities of loading, safety, and signage clarity.

Results and Lessons

The pilot confirmed that large-scale curb digitization and management are feasible and that a CDS-compliant platform can serve as a foundation for future operations. Just as importantly, it gave San José a clear understanding of what scaling requires. The City gained hands-on experience with procurement, vendor relationships, interdepartmental coordination, hardware trade-offs, software integration, and data governance. By addressing both technology challenges and institutional hurdles San José is now equipped with the knowledge needed to move Stage 2 forward with confidence.

Next Steps: Stage 2

With the lessons of Stage 1, San José will deliver the nation's first AI-powered, fully connected curb management ecosystem: a replicable digital twin model for cities nationwide. Building on Stage 1, the City will deploy 500+ hardwired streaming cameras, predictive analytics, dynamic pricing and allocation, and public navigation tools integrated with Google Maps, ParkSJ, and multimodal systems. This system will reduce congestion, improve safety, and support local businesses.

02 Introduction and Project Overview

Issues and Challenges Being Addressed

Downtown San José's curbs are under pressure. Delivery drivers, transit vehicles, cyclists, pedestrians, passenger services, and local businesses all compete for limited space, yet curb management has not kept pace with today's demands. With shifting travel patterns and the rise of on-demand delivery and passenger services, this mismatch creates conflict, inefficiency, and unsafe conditions for residents and visitors alike.

The impacts are far-reaching:

- Inefficient use of space, with some blocks oversubscribed while others sit underutilized.
- Limited delivery and customer access for businesses and delayed post-pandemic economic recovery.
- Safety hazards when vehicles block bike lanes, double park, or obstruct sidewalks.
- A degraded experience for people walking, biking, driving, or taking transit.

To address these challenges, San José launched one of the most comprehensive curb management pilots in the nation. The project combined advanced tools and approaches, scanning more than 140 miles of curbs, deploying over 160 cameras and sensors, testing AI-enabled curb management software, and laying the groundwork for long-term asset integration. This broad deployment and deep experimentation generated a uniquely large body of evidence and insights, making San José's experience a valuable resource for cities seeking to modernize curb management at scale.

Communities Impacted

The Greater Downtown area is home to roughly 60,000 residents, 60,000 workers, and 35,000 students, and generating more than 530,000 trip ends per weekday, including an estimated 14,000 daily delivery trips. With this level of activity, the curb plays an outsized role in access, safety, and quality of life.

To ground the pilot in real community needs, Stage 1 featured extensive outreach, delivered in partnership with the community engagement firm PlaceWorks, including focus groups, surveys, workshops, community events, advisory committees, and intercept interviews. Across these diverse formats, stakeholders consistently identified similar priorities:

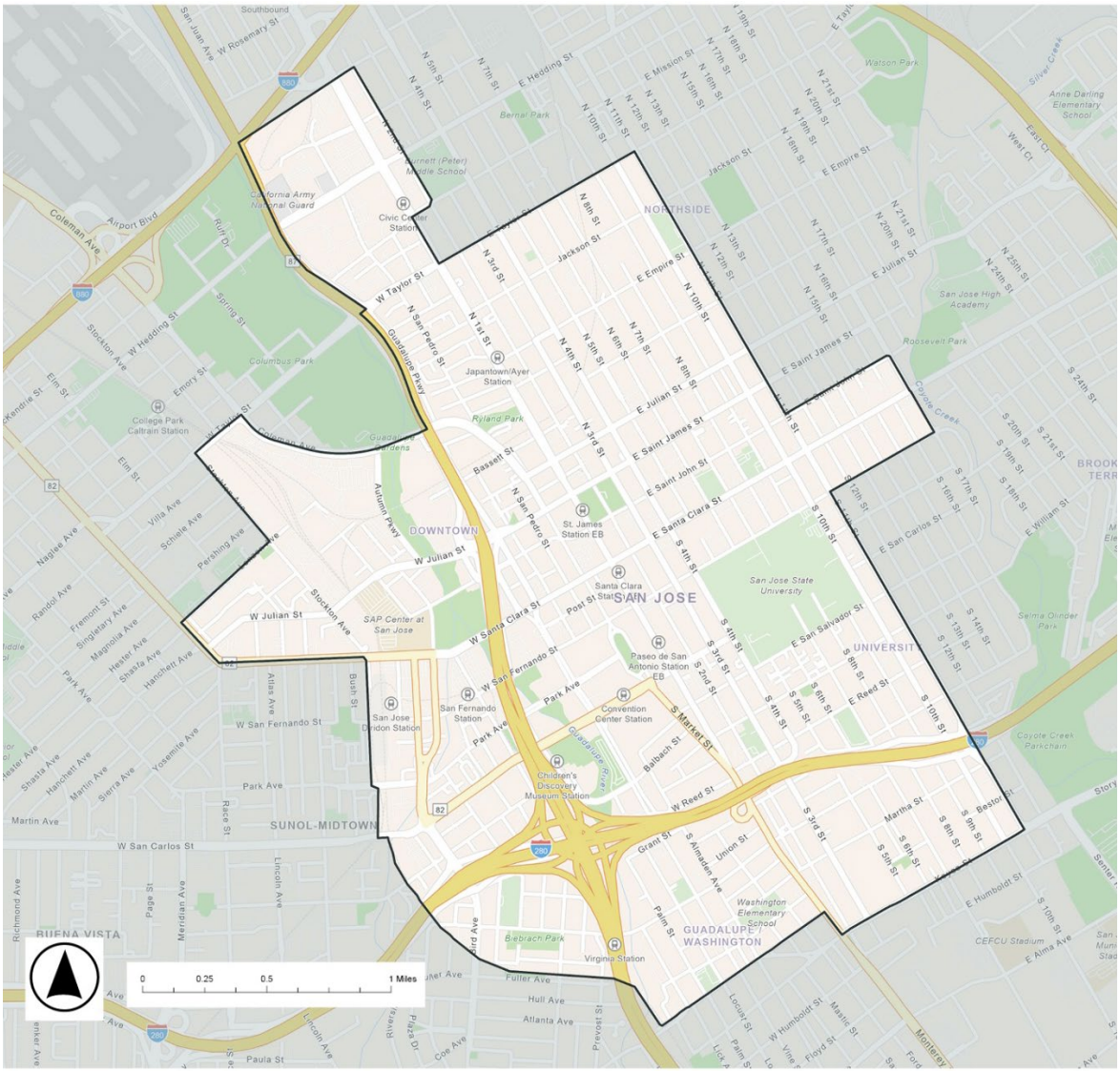
- Access and loading: insufficient space, double-parking from gig drivers, and inconsistent enforcement.
- Safety and mobility: blocked sidewalks and bike lanes, debris in bike lanes, and unsafe loading practices.

- **Clarity and design:** confusing signage, unclear sidewalk ownership, curb heights, and misaligned curb cuts.

Community outreach and data collection confirmed these issues are most acute on high-demand blocks, where chronic problems like double parking, insufficient loading, unclear signage, and blocked bike lanes or sidewalks persist. These findings directly shaped the Stage 2 design, which is described in detail in the following section.

Location of Stage 1 Pilot

The Stage 1 Pilot location is San José's Greater Downtown Area



Goals and Desired Outcomes for At-Scale Implementation

Stage 2 will deliver **America's first AI-powered, fully connected curb management ecosystem**—a scalable model for other cities nationwide. The project builds directly on Stage I learnings and will:

- **Increase Efficiency and Reliability**: Use real-time analytics and predictive modeling to optimize curb use, reduce congestion, and shorten delivery and passenger wait times, while connecting curb management tools with the City's existing camera networks and technology systems to reduce redundancy, streamline operations, and maximize efficiency *(Statutory Outcomes I, IV, VII, IX)*.
- **Enhance Economic Competitiveness**: Deploy dynamic curb allocation and integrated payment/permit systems to improve turnover and delivery reliability, supporting Downtown recovery and long-term business vitality *(Statutory Outcomes III, V)*.
- **Improve Safety and Integration**: Dynamically reallocate curb space to reduce conflicts and support Vision Zero strategies *(Statutory Outcomes II, III, VII)*.
- **Boost Flexibility and Emergency Response**: Apply AI-driven analytics and automation to adjust curb use during construction, disruptions, and special events while maintaining access for emergency vehicles *(Statutory Outcomes X, XI)*.

*See **Appendix A** for the full statutory outcomes table, which details how Stage II advances each federal goal area.*

Stage 1 Activities, Outcomes, and Lessons Learned

Stage 1 was a proof-of-concept pilot: to test technologies, evaluate performance in real-world conditions, and build the institutional knowledge required to scale. Between September 2023 through June 2025, San José deployed new tools, adapted when challenges arose, and built the capacity that makes Stage 2 possible.

Technologies Deployed

- **LiDAR scanning** of 140 miles of Downtown created San José's first digital curb inventory.
- **162 Umojo solar-powered cameras**, **2 SONY video streaming cameras**, and **23 above ground IPS sensors** tested real-time curb monitoring.
- **The NexCity platform** centralized these datasets, integrated historical parking and revenue data, and launched with Curb Data Specification (CDS)-compliant Application Programming Interfaces (APIs).

Learning Through Adaptation

Not everything unfolded as planned, and those challenges became some of the most valuable lessons. A defining strength of San José's approach was the ability to adapt in real time: reconfiguring camera

settings, shifting to hardwired equipment, and testing supplemental technologies to fill coverage gaps. Each adjustment required coordination across teams, vendors, and the Open Mobility Foundation's (OMF) Curb Collaborative, reinforcing that flexibility and responsiveness are as critical to innovation as the technologies themselves.

Through the Collaborative, San José also compared approaches, troubleshot common obstacles, and learned alongside peer cities navigating similar pilots. These exchanges helped put local challenges into perspective and identify solutions that can be carried forward into Stage 2 and beyond. By treating setbacks as opportunities to learn, San José advanced its understanding of what reliable scaling requires, laying the foundation for more resilient curb management systems in the future.

Outcomes to Date

Stage 1 delivered tangible results and national visibility:

- Collaborated nationally: Partnered with peer cities through OMF to share strategies, troubleshoot challenges, and align best practices.
- Built the foundation: Completed a digital curb inventory, installation of 162 cameras, and the development of the NexCity platform.
- Tested technologies: Compared multiple camera and sensor types in Downtown's complex environment.
- Validated data: Ground-truthing confirmed accuracy and refined workflows.
- Engaged stakeholders: Input on access, freight, and bike lane obstructions shaped goals and implementation. *(see Appendix B for full list of activities and findings).*
- Raised visibility: Featured in national media, trade press, and conferences, positioning San José as a curb management leader. *(see Appendix C for full list of publicity).*
- Learned how to scale: Gained direct experience with procurement, permitting, and workforce training.

Stage 1 tested technology, while establishing the foundation, lessons, and visibility needed to scale into Stage 2.

Stage 2: From Pilot to Full Deployment

Stage 2 will scale the pilot into a fully connected ecosystem that integrates sensors, AI, and citywide systems. The scope includes:

1. Expand Coverage: Hardwired, high-resolution cameras across most of the Greater Downtown corridors and other select areas in the City; dynamic curb inventory synced to the City's enterprise asset system.
2. Leverage AI: Real-time data, predictive analytics, and automated rules to allocate space for safety, efficiency, and freight management.

3. **Integrate Systems**: A public software application that connects curb data to GPS-based maps and navigation (e.g. Google Maps, in vehicle OEM navigation systems), SPOTSJ, and ParkSJ; merge garage and on-street data; link with freight and micromobility hubs and contactless, virtual payment systems.

Scale of Deployment: Stage 1 vs Stage 2

Stage 1 established the foundation; Stage 2 will deliver America's first fully integrated, AI-driven curb management system. At scale, the curb will be managed dynamically, with real-time data and predictive analytics guiding safety, efficiency, and multimodal access. This transition—from testing to live operations—will not only improve how San José's busiest districts function day to day, but also demonstrate a replicable model that other cities can adopt to modernize their own curb systems.

Component	Stage I (Pilot)	Stage II (At-Scale)
Geographic Coverage	140 miles LiDAR scan; 164 cameras on key corridors	Greater Downtown corridors with 500+ cameras; synced to enterprise system
Curb Utilization	162 snapshot cameras, 2 video streaming cameras, 23 above ground sensors	500+ hardwired cameras, scalable sensors
Curb Inventory	One-time LiDAR scan	Continuous updates via enterprise integration
Data Platform	NexCity: LiDAR + cameras + historical data	AI-powered predictive analytics; multimodal integration
Pricing & Allocation	Static meter pricing, manual adjustments	Dynamic pricing + automated allocation with new signage and curb infrastructure
Systems Integration	Pilot platform + open CDS APIs	Connected public software application, navigation, public/private parking, combined with multimodal transportation options and integrated payment systems
Engagement	Focus groups, workshops, intercepts	Ongoing engagement embedded in allocation decisions

03 Proof-of-Concept or Prototype Evaluation Findings

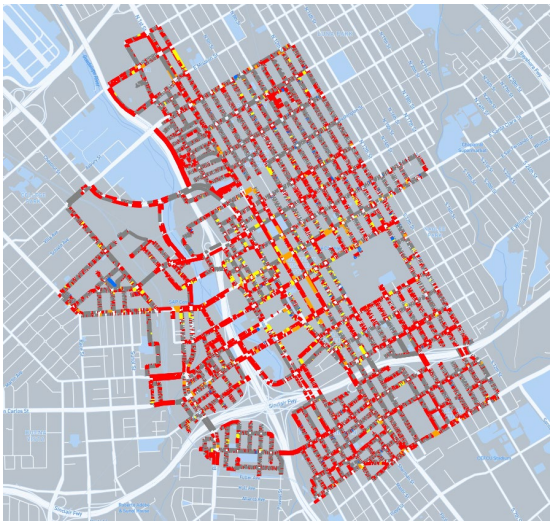
San José's Stage 1 pilot demonstrated the feasibility of using LiDAR, camera detection, and a centralized curb management platform to modernize curb operations. The proof-of-concept met its three core objectives:

1. Building a comprehensive digital curb inventory
2. Collecting real-time utilization data through sensors and cameras, and
3. Developing the NexCity curb management platform to integrate multiple datasets.

Together, these efforts revealed critical lessons for scaling and produced findings that will directly inform Stage 2 implementation. The evaluation confirmed that at-scale deployment is realistic and achievable, while highlighting where technology and processes need refinement.

Objective 1: Develop a Comprehensive Curb Inventory

San José set out to create its first comprehensive digital map of Downtown curb assets and regulations. LiDAR scanning provided the precision needed to capture curb lengths, types, and restrictions, giving staff a baseline dataset to support operational decisions. This effort proved both the feasibility and the value of a digital curb inventory, while also revealing the importance of continuous updates to keep pace with real-world changes.



Images: LiDAR scanning of curb inventory Downtown.

Curb Inventory Validation Process

To ensure the integrity of the curb inventory data presented in the NexCity platform, the project team conducted a targeted field-based validation effort. This process was designed to evaluate whether the platform's curb records accurately reflected real-world conditions observed at the curb.

The initial round of validation began in October 2024 and involved hiring a youth-based workforce, through the local organization Fresh Lifelines for Youth (FLY), to systematically ground-truth the inventory data across a centralized portion of the study area. One major finding from this effort was that curb lengths were consistently inaccurate by about 1-2 feet. The technology vendor, Umojo, identified this as a calibration error and recalibrated the data, bringing the recorded lengths to a reliable state. Similarly, early findings on signage revealed consistent gaps in how rules and regulations were captured. This led to an iterative process with Umojo to refine how signage was coded in the platform. The dataset is now significantly improved, but early validation process revealed that validation itself required greater rigor. Checking curbs proved more complex than expected, and the team recognized the need for a structured approach, separating attributes such as length, color, meters, and signage, so that results could be accurately documented and acted upon.

A second phase of validation, led by City staff, produced more conclusive results. The 140-mile study area was divided into nine zones, and a sample of street blocks with a variety of curb types, uses, and activities from each area was selected for verification. Using a standardized validation template, staff reviewed the following curb attributes:

- Curb lengths
- Curb colors and painted markings
- Meter Location
- Use designation (e.g., commercial loading, ADA, bus zones)
- Signs and regulations

This approach allowed for consistent, repeatable documentation of observed curb features, along with notes on any discrepancies or challenges encountered during fieldwork. This process surfaced specific issues and provided a clear pathway for future improvements in inventory data maintenance and platform reliability. The below table summarizes the findings from the LiDAR validation.

Category	Key Findings
Performance	• **Curb lengths:** 322 zones validated; 208 matched within 8" of manual measurements, 35 were unmeasurable due to construction, updates, or platform issues. • **Curb colors/designations**: 322 curb zones validated; 233 recorded as correct • **Meter Zones**: 172 meters observed, 172 recorded as correct • **Signage**: Validation was iterative, with multiple vendor corrections; qualitatively accurate but quantitative assessment still pending.
Limitations	• Data aged quickly due to roadway and regulatory changes

	• Lack of automated updates during Stage 1 meant the LiDAR snapshot could not reflect special events, construction, or unforeseen changes. • Platform designations need clearer color schemes to reduce user confusion. • Overlapping policies and regulations create confusion when observing specific zones
Scalability	• Provides a strong baseline for Stage 2; while imperfect, LiDAR captures an accurate snapshot for building a digital inventory • Asset management system can be refined in Stage 2 to support continuous, real-time updates • Strong stakeholder interest in leveraging digital curb data for planning and operations.

Key Insight: *LiDAR produced a reliable digital baseline, but without automated updates, its accuracy degrades quickly. Because curbs change often, through construction, wear, and overlapping regulations, a single scan cannot stay current. Establishing real-time sync and routine updates will be essential for scaling.*

Objective 2: Collect Curb Utilization Data

A central aim of Stage 1 was to understand how curb space is used in practice, both historically and in real time. To do this, San José tested multiple sensor and camera technologies across Downtown. The deployment confirmed that large-scale curb management is feasible and produced valuable datasets on occupancy, dwell time, and revenue. At the same time, it revealed important technical limitations, particularly with short-duration events and multimodal detection, that will guide improvements in Stage 2. The following table provides a detailed specification comparison of the technologies piloted.

Specification	Umojo Cameras	Sony Cameras	IPS Sensors
			
Model	SolarCam-4G	GS-500	IPS Stereoscopic Dome Sensor Assembly Model 147 w/Modem
Quantity Installed	162	2	32
Detection	Snapshot-based	Video-based	Sensor-based
Power Source	131 Internal battery (with solar panel)	Light pole NEMA socket	N/A

	31 Light pole NEMA socket		
Battery Life	For Solar powered: Batteries hold consistent at 2 minute snapshot intervals	N/A	N/A
Image Resolution	2560 x 1440	max 4056 x 3040 (captured image), max 640 x 480 (DNN)	N/A

Curb Utilization Validation Process

The validation process was designed to assess whether utilization data presented in the NexCity platform accurately reflected real-world curb activity.

Umojo Cameras

The first phase began in Fall 2024 with a youth-based workforce (through Fresh Lifelines for Youth, or FLY). Early efforts revealed that many Umojo solar-powered cameras were not consistently active due to battery limitations, making the initial data unusable. Umojo addressed the issue by hardwiring cameras in low-light locations and reconfiguring the remaining solar units to two-minute snapshot intervals to preserve battery life.

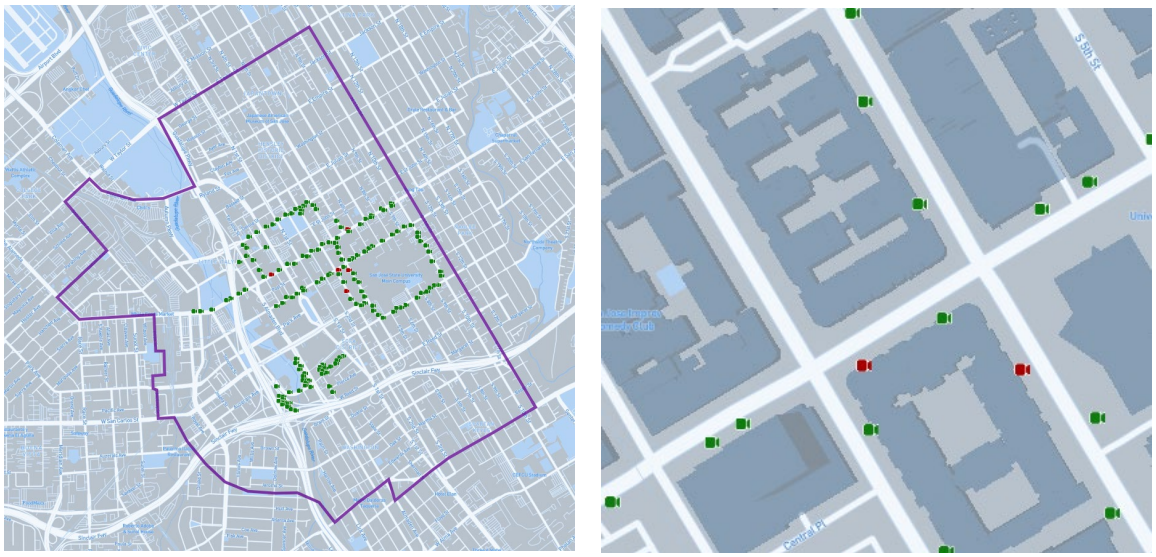
Once the system was stabilized, City staff conducted a second phase of validation by observing blocks directly under cameras for one-hour sessions. Staff recorded vehicles arriving and departing, body type, dwell time, curb activity (e.g., passenger pick-up/drop-off, commercial loading), and contextual notes. Comparing these field observations against platform reports revealed that only events lasting four minutes or longer were consistently captured.

In one validation session, staff observed 18 curb events in an hour. The 9 events longer than four minutes appeared in the platform data, but the 9 shorter events did not. This confirmed that while the system reliably detects longer-duration activity, it systematically misses shorter events.

Moving forward, more frequent image capture and/or streaming capability will be essential to provide the complete, real-time data needed to support dynamic curb management.

SONY Cameras

For SONY, integration into the Umojo platform proved challenging and took longer than expected. Their team spent much of Stage 1 troubleshooting software and connection issues. By the end of the pilot, however, SONY demonstrated promising multimodal detection on Downtown streets, successfully identifying bicycles, pedestrians, and vehicles in sample events. While City staff have not yet had the opportunity to validate these results directly, the demonstration confirmed the potential of continuous video streaming for capturing short-duration and non-vehicle curb activity. This lays important groundwork for Stage 2, when more robust validation and integration will be possible.



Images: Camera locations Downtown

IPS Sensors

IPS deployed 23 above-ground sensors on a high-traffic corridor, and the devices functioned as expected in the field. However, the required APIs were not delivered during Stage 1, preventing integration with the NexCity platform and halting validation. This experience underscored that successful curb monitoring depends as much on timely vendor data delivery as on hardware performance. With APIs and integration in place, these sensors could contribute valuable data in future phases.

This process underscored the importance of phased validation: each step surfaced different gaps (power reliability, timestamp accuracy, and multimodal detection) that required correction before meaningful validation could take place. By the end of Stage 1, San José had not only produced useful utilization data, but also developed a practical understanding of how to troubleshoot and validate emerging hardware in complex environments.

Evaluation of Curb Utilization Technologies

Category	Key Findings
Performance	• **Umojo Cameras**: Reliably capture long-duration vehicle-based curb events 4 minutes and above; Integrated smoothly into NexCity. • **SONY Cameras**: SONY demonstrated detection of bikes, peds, and vehicles, though City validation not yet completed. • **IPS Sensors:** No validation conducted due to API delays
Limitations	• **Umojo Cameras:** Missed short-duration events below 4 minutes, omitting bus, bike, and pedestrian movements from utilization data; solar power limited continuous streaming, reducing real-time accuracy • **SONY Cameras**: Faced software and integration issues; multimodal outputs remain unvalidated

	by City staff. • **IPS Sensors:** Did not provide APIs in time, preventing integration with NexCity
Scalability	• Hardwired cameras are essential for reliable, continuous data streams • AI and analytics must be enhanced to classify buses, bikes, and pedestrians • Timely vendor API delivery and integration support are as critical as the hardware itself.

Key Insight: *Stage 1 proved that large-scale curb management is possible, but snapshot-based and solar-powered devices cannot deliver the precision needed. Reliable, real-time management will require hardwired, streaming-capable cameras and more advanced AI. Equally important, the validation process itself surfaced critical gaps (power reliability, timestamp accuracy, and multimodal detection) giving San José practical experience in troubleshooting with vendors. These lessons ensure Stage 2 begins with both stronger technology and a tested approach to validation.*

Objective 3: Develop a Curb Management Platform

A core objective of Stage 1 was to create a centralized system capable of integrating multiple datasets, including LiDAR curb inventory, real-time utilization data, and historical records, into a single, user-friendly environment. San José partnered with Umojo to build the NexCity curb management platform, designed for flexibility, interoperability, and compliance with the national Curb Data Specification (CDS). The platform demonstrated strong potential as the backbone of at-scale curb management, while also revealing areas where artificial intelligence, reporting depth, and data maintenance need to advance further.

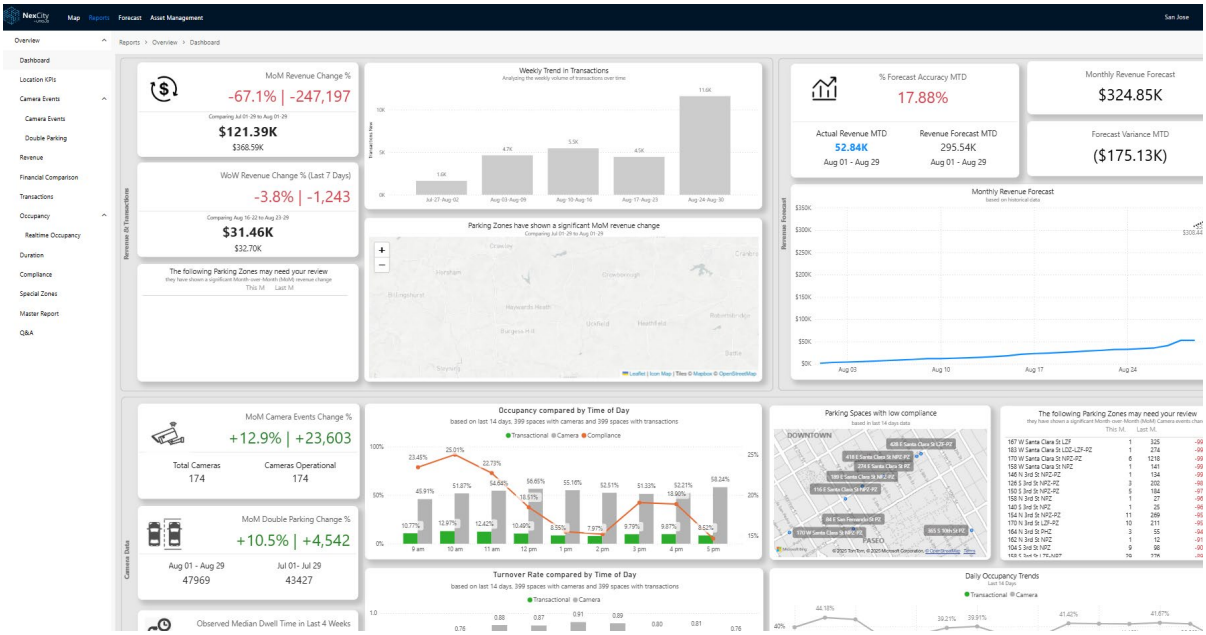


Image: Screenshot of NexCity Platform

Curb Platform Validation Process

Validation of the platform was carried out through structured testing and iterative feedback. City project managers systematically evaluated NexCity features against field conditions and internal benchmarks, documenting observations on usability, responsiveness, and accuracy. Weekly review sessions with the vendor enabled continuous corrections and improvements, such as refining reporting tools and addressing API integration issues. This process showed that the system reliably centralized datasets and supported basic reporting, but it struggled with short-duration events, conflict detection, and keeping pace with regulatory changes. Additional AI training and automated syncing will be required to strengthen performance. Above all, the process underscored that close partnership between City staff and the vendor was essential to making the platform functional and adaptable.

Category	Key Findings
Performance	• Centralized diverse datasets (LiDAR, cameras, historical transactions) into one platform • Integrated historic and real-time third-party vendor data feeds (IPS meters, Passport, T2) • Developed Curbs, Events, and Metrics APIs to CDS v1.0 standard for interoperability • Provided an accessible map-based interface and summary reporting tools that City staff used throughout the pilot. • Reliably captured curb events lasting 4 minutes or longer, producing consistent occupancy and duration data. • Enabled revenue analysis, trend reporting, and occupancy calculations by block, zone, and time of day.
Limitations	• Dependent on snapshot-based camera inputs, reducing accuracy for events under 4 minutes • AI tools need additional training to reliably identify vehicle body or multimodal classification (buses, bikes, pedestrians) • Reporting features functional but limited, system not reporting on curb conflicts, double parking, or stopping violations, vehicle counts • Dataset quickly outdated when regulations or curb changes occurred, due to lack of automated updates. • Reporting timeliness issues led to delays in event verification
Scalability	• Flexible architecture allows multi-vendor integration and avoids lock-in • CDS compliance ensures compatibility with peer cities and federal requirements • To scale, the platform will need expanded data storage for continuous streaming, stronger AI classification, and automated workflows to keep pace with real-world changes.

Key Insight: *The NexCity platform successfully unified curb data and demonstrated the value of a CDS-compliant system as the foundation for at-scale curb management. Stage 1 revealed the specific upgrades needed for scaling, such as streaming data inputs, stronger AI classification, and automated updates,*

which now provide San José with a clear roadmap for evolving the platform into a real-time, multimodal management tool in Stage 2.

Summary of Stage 1 Proof-of-Concept Findings

Stage 1 confirmed that San José can digitize, monitor, and manage the curb using advanced technologies while also surfacing clear lessons for scaling. Together, the three objectives of curb inventory collection, utilization monitoring, and platform development produced a robust proof-of-concept and highlighted critical refinements for Stage 2:

- **Curb Inventory (Objective 1):** LiDAR scanning delivered a highly accurate digital baseline of Downtown's curbs. The challenge lies in keeping this inventory current, underscoring the need for automated syncing with enterprise asset systems.
- **Curb Utilization (Objective 2):** Large-scale monitoring proved feasible, with cameras and sensors capturing occupancy, dwell time, and revenue. Limitations with short-duration events and multimodal detection showed the importance of hardwired, streaming-capable devices and improved AI.
- **Curb Management Platform (Objective 3):** The NexCity platform successfully centralized multiple datasets, provided CDS-compliant APIs, and offered a foundation for integration with peer cities and private partners. Moving forward, deeper analytics, stronger multimodal classification, and automated updates will be essential for scalability.
- **Vendor and Data Partnerships:** Devices generally performed as intended, but integration took longer than anticipated due to API timing, platform adjustments, and software refinements. This highlighted that successful curb management depends as much on close collaboration, clear timelines, and reliable data delivery as it does on hardware performance.

Collectively, these findings demonstrate that the technologies tested in Stage 1 are not only feasible but also capable of delivering the kinds of improvements envisioned in the SMART program. By addressing the limitations identified, including automated updates, real-time streaming, and advanced AI, San José is well positioned to scale its system into America's first AI-powered, fully connected curb management ecosystem.

Meeting Original Expectations

Stage 1 was designed as a proof-of-concept to test whether San José could digitize, monitor, and manage the curb in ways envisioned in the original grant proposal. The pilot successfully met those expectations, delivering the foundational capabilities needed for at-scale deployment.

Original Proposal Goal	Stage 1 Achievement
Develop a comprehensive curb inventory	• Completed LiDAR scanning of 140 miles of Downtown • Built digital map of curb assets and regulations • Integrated curb inventory into the NexCity platform

Collect curb utilization data	• Installed 162 solar-powered Umojo cameras and 2 video streaming SONY cameras to capture occupancy and dwell time • Deployed 23 IPS above-ground sensors on a high-traffic corridor (integration challenges noted) • Integrated curb utilization data into NexCity platform and observed activity patterns • Identified hotspots of double parking, bike-lane obstructions, and dwell-time violations
Develop an integrated curb management platform	• Launched NexCity platform centralizing LiDAR, utilization, and historical transaction data • Real-time data feeds from IPS, Passport, and T2 integrated • Developed CDS-compliant Curbs, Events, and Metrics APIs for interoperability • Provided map-based interface and reporting tools
Engage stakeholders and validate findings	• Conducted extensive outreach: business focus groups, community events, neighborhood meetings, accessibility workshops, and intercept surveys • Ground-truthing workforce validated LiDAR and camera data accuracy

Statutory Contributions of Stage 1

While designed as a proof-of-concept, Stage 1 delivered measurable contributions toward federal statutory outcomes. Key impacts included:

- **Reducing congestion and delays (I, IV, IX):** LiDAR inventory and utilization monitoring established a baseline of curb demand, dwell times, and turnover, laying the groundwork for efficiency and congestion reduction.
- **Improving safety and integration (II, VII):** Camera observations will allow identification of recurring conflicts, such as double-parking, sidewalk obstructions, and bike lane blockages, that now inform Vision Zero priorities and multimodal planning.
- **Enhancing economic competitiveness (III, V):** Turnover and delivery data will be able to highlight access gaps and reliability issues for local businesses, informing strategies for Downtown recovery.
- **Promoting connectivity and partnerships (VII, VIII):** The CDS-compliant NexCity platform integrated data from multiple vendors (IPS, Passport, T2) and demonstrated readiness to connect with peer cities and private platforms.

See Appendix D for the full statutory outcomes table, which details how Stage 1 aligns with federal goals.

04 Anticipated Costs and Benefits of At-Scale Implementation

Anticipated Impacts of At-Scale Implementation

Stage 1 established baselines for curb inventory and utilization and tested multiple technologies under real conditions. With these lessons, San José enters Stage 2 prepared to deliver measurable improvements across all federal goal areas. *Each anticipated impact is tied to the statutory outcomes (referenced in parentheses and detailed further in Appendix A).*

- **Reduced congestion and delay:** Real-time curb availability, predictive analytics, and dynamic pricing will cut circling and idling, shortening passenger and freight trips *(I, IV, IX).*
- **Improved safety and integration:** Dynamic reallocation will reduce bike lane blockages and sidewalk obstructions, aligned with Vision Zero safety priorities *(II, III).*
- **Expanded access and lower costs:** Reliable turnover improves access to jobs, schools, and essential services while reducing wasted time and fuel for residents, gig workers, and businesses *(III, IV).*
- **Economic competitiveness:** Improved delivery reliability and customer access support Downtown recovery and small business vitality, while positioning San José as a national leader *(V).*
- **Connectivity and partnerships:** Integration with Google Maps, SPOTSJ, ParkSJ, micromobility, and freight hubs expands traveler options and attracts private investment through open APIs *(VII, VIII).*
- **Environmental benefits:** Reduced circling and double-parking improve air quality *(IX).*
- **Flexibility, resiliency, and emergency response:** Automated rules allow rapid adjustments during construction or events, while preserving access for emergency vehicles *(X, XI).*

Anticipated Costs of At-Scale Implementation

San José anticipates that Stage 2 will require an investment of **$13–15 million**, reflecting full deployment of a connected, AI-powered curb management ecosystem across Downtown and integration into citywide systems.

Category	Description	Estimated Cost
1. Direct Technology & Infrastructure	500+ hardwired cameras and sensors; server and cloud infrastructure for real-time processing; LiDAR integration and	$6.0–6.5M

	dynamic curb inventory; networking, power, and communications upgrades.	
2. Data Platform, Software & Integration	Enhancements to NexCity with AI and predictive analytics; development of open-source, curb and parking navigation application; integration with external platforms (Google Maps, SPOTSJ, ParkSJ).	$5–5.5M
3. Community Engagement & Workforce Development	Ongoing engagement with residents, businesses, operators, and accessibility advocates; workforce training and expanded ground-truthing model.	$1.0–1.5M
4. Project Management, Evaluation & Contingency	Staff support for procurement, planning, oversight, and reporting; evaluation and performance measurement; 5–10% contingency reserve.	$1.0–1.5M

Total Estimated Cost: $13–15M

Cost–Benefit Balance

Stage 2 requires significant upfront investment, but the expected benefits are measurable and long-term.

- **Reduced congestion and delay:** Even a 2–3 minute reduction in parking search time across 530,000 daily Downtown trip ends represents $80 million annually in saved time and fuel for residents, workers, and visitors.
- **Improved delivery efficiency:** Faster, more reliable curb access reduces wasted labor and fuel costs for delivery operators, directly benefiting local businesses.
- **Safety gains:** With more than 3,000 reported crashes in Downtown between 2020 and 2024, the potential safety benefit is significant. Fewer blocked bike lanes and sidewalks reduce crash risk and liability, while improving customer access to storefronts.
- **Revenue generation:** Dynamic pricing and space reallocation increase turnover and align supply with demand, producing new revenue streams that can offset system costs. Space reallocation may also include the creation of new meter districts, extending management and revenue collection to areas that are currently unmetered.
- **Business growth:** Reliable curb access translates into higher sales and competitiveness for Downtown businesses, supporting long-term recovery.
- **Operational savings:** Automated inventories and real-time analytics reduces the need for costly manual studies, saving an estimated $50-$100K annually. More importantly, this shifts City staff time from data collection to active management.
- **Environmental benefits:** Reduced idling and circling reduce pollution, improving air quality.
- **Flexibility and emergency response:** Dynamic curb rules keep access clear during disruptions and ensure emergency vehicles reach their destinations without delay.

- **Connectivity gains:** Integrating with existing City cameras and mobility platforms extends coverage, maximizes prior investments, and reduces the need for new hardware deployments.

Preliminary Baseline Data from Stage 1

Stage 1 focused on establishing the foundation for future measurement by deploying new technologies and beginning to collect curb activity data. While detailed analysis has not yet been completed, early observations highlight both existing challenges and the potential for improvement:

- **Congestion and turnover:** Occupancy appeared to peak on core Downtown blocks while adjacent blocks remained underused. Average dwell times were often above posted limits, limiting turnover.
- **Safety conflicts:** Cameras observed frequent double-parking events and recurring bike-lane and sidewalk blockages, especially during peak periods.
- **Economic baseline:** Parking transaction data showed substantial annual revenues, but also revealed wide variation in performance across block faces.
- **Enforcement and compliance:** Compliance rates were mixed; many observed violations went unaddressed due to enforcement gaps.
- **Emergency access:** Instances of blocked fire lanes and access points were observed during peak demand.

These baselines give San José a starting point. Stage 2 will deepen this measurement by deploying hardwired streaming cameras, integrating real-time curb data with City systems, and tracking outcomes against defined metrics. Rather than relying on one-time scans or partial datasets, the City will be able to monitor turnover, compliance, safety conflicts, and revenue continuously, providing a rigorous way to evaluate benefits at scale.

Departmental Applications of a Scaled Platform

The curb management platform already provides value and benefits across multiple City departments, several of which have identified specific ways the data and tools can strengthen operations, planning, and policy decisions.

Parking Department

The Parking Department is currently leveraging the platform to improve efficiency and the modernization of parking operations. Key applications include:

- Maximizing the effectiveness of the Oversized Lived in Vehicles (OLIV) initiative through camera observations of abated areas.
- Collecting and analyzing data to guide meter hours expansion.
- Evaluating opportunities for new meter zones increasing sustainability of the system.

- Supporting the transition to virtual meter deployment.

Planning and Policy Department

For the Planning and Policy Department, the platform is viewed as a critical tool for aligning curb management with broader mobility and land use goals. Key applications include:

- Re-allocating curb space for more effective and efficient use.
- Activating downtown spaces to support local businesses.
- Identifying bike lane obstructions and analyzing collision patterns.
- Advancing complete streets and shared micromobility initiatives.
- Exploring strategies for demand-based parking pricing.

Other Departments

Additional City departments also anticipate important benefits:

- Information Technology (IT): Using inventory data to assess curb assets remotely, reducing the need for field visits and avoiding redundancy.
- Office of Economic Development (OED): Leveraging camera data to understand pedestrian counts, food truck locations, blocked bike lanes, freight loading zones, and illegal parking rates.
- Public Works (PW): Using platform data to understand existing curb inventory before implementing curb changes.

Across all departments, the platform reduces redundancy, improves efficiency, and aligns operations with San José's long-term mobility and policy goals. Together, these applications demonstrate the platform's ability to serve multiple City priorities, creating a shared foundation for more coordinated and effective curb management.

05 Challenges and Lessons Learned

Stage 1 was a true pilot: it gave San José room to test unproven tools, adapt in real time, and learn through iteration. The pilot surfaced challenges that could not have been fully anticipated — from data quality issues to technology limitations and staffing constraints — and each became a lesson for how to contract with vendors, coordinate internally, share lessons collaboratively, respond to first-of-its-kind technology development and plan for scalability.

What began as trial and error is now practical guidance. These lessons are already shaping Stage 2, ensuring the City enters the next phase with greater clarity, stronger tools, and the experience needed to scale curb management on a sustainable footing.

1. City Procurement and Permitting

Procurement and permitting proved less about technical barriers and more about process delays. Even when San José's internal procurement moved smoothly, collaborative-level approvals and interdepartmental sign-offs created ripple effects.

Challenge	Lesson Learned
OMF membership and sole-source procurement delays	Multi-city procurement can slow progress even when local processes are efficient; clear shared timelines and flexible contracting tools are needed.
Public Works approval delays	Approvals for streetlight pole installations took longer than expected, highlighting the need for early inter-departmental engagement.

Takeaway: *Stage 1 revealed that approvals, not procurement rules, are the bottleneck. Stage 2 will succeed by engaging approvers early and using standardized documents to cut time.*

2. Data Access and Integration

Data access was one of the most persistent barriers. Delays in obtaining vendor data, coupled with inconsistencies and gaps, slowed platform development. LiDAR became a source of friction.

Challenge	Lesson Learned
Delays in receiving historical vendor data	Data delivery schedules must be contractual and actively monitored to keep projects on track.
Inconsistencies and gaps in City's historical data	Data cannot be assumed reliable; validation and quality checks are prerequisites before integration.

LiDAR extraction challenges	Scanning and extraction took far longer than expected; future deployments must include generous buffer time.
LiDAR matching challenges	Aligning LiDAR data with curb objects proved resource-intensive and error-prone; workflows must be resourced accordingly.
Location-based discrepancies in compliance data	Manual reconciliation was required, underscoring the need for consistent, standardized location data.
CDS limitations	National standards are evolving; pilots must anticipate iteration and design for flexibility.

Takeaway: *Stage 1 showed that data integration is the slowest link in the chain. Future deployments must treat governance, validation, and realistic timelines as core design elements.*

3. Data Availability

Critical baseline datasets were missing or fragmented, requiring the team to build from scratch. What was assumed to exist — like parking zones and pole ownership records — often didn't.

Challenge	Lesson Learned
Lack of existing parking zone data	Where datasets don't exist, creating them manually adds workload and delay; baselines must be inventoried up front.
Scattered meter and parking spot data	Reconciling fragmented sources is labor-intensive; consolidating and validating data should precede deployment.
Lack of clear streetlight pole ownership data	Without an accurate inventory, installation was slowed by manual verification; future work must begin with asset audits.

Takeaway: *Stage 1 revealed that missing datasets create cascading delays, making comprehensive inventories a prerequisite. Reliable baseline datasets for parking, meters, and poles are prerequisites for efficient project delivery.*

4. Technology and Equipment

Camera deployment surfaced trade-offs between snapshot vs. streaming, solar vs. hardwired power, and pole types. Some outcomes, like the failure of solar in a sunny city, were unexpected, reshaping future design.

Challenge	Lesson Learned

Snapshot vs. video stream	Snapshot-based collection misses short curb events; streaming is more comprehensive but requires higher storage capacity.
Solar-powered camera battery limitations	Even in San José with its mostly sunny clear skies, solar power proved unreliable; stable operations require hardwired or hybrid power solutions.
Hardwired camera considerations	Power socket differences, City permitting processes, installation costs, and data storage needs; multiple factors require careful consideration when transitioning to hardwired camera hardware.
Pole type complications	Decorative and banner poles required costly retrofits; pole standards and inventories must be addressed in advance.
Camera height and security issues	Cameras mounted too low were vulnerable to tampering and theft; secure, elevated placements are critical.

Takeaway: *Stage 1 clarified the technical trade-offs of camera deployment and underscored the importance of hardwired power, secure placement, and adequate storage capacity.*

5. Platform and Reporting

The curb platform struggled with accuracy and timeliness, as hardware and software dependencies cascaded. From AI limitations to validation delays, each gap reinforced that reliable reporting requires seamless integration.

Challenge	Lesson Learned
AI object detection limitations	Current AI missed common curb objects (busses, bikes, dumpsters, pedestrians, cones); accuracy depends on training models to local conditions.
Incorrect curb length measurements	LiDAR extraction errors forced recalibration; validation must occur early and often.
Zone count and type confusion	Overlapping policies complicated analysis; zoning must be clarified and simplified in advance.
Delayed start to data validation	Dependencies between LiDAR and camera data created bottlenecks; parallel workflows are needed.
Delays in accessing utilization data	Platform bottlenecks limited timely analysis; performance testing should be part of vendor requirements.
Camera battery and programming complications	Failures caused early data loss; resiliency plans must account for equipment error.

Takeaway: Reliable curb reporting depends on early validation, robust detection methods, and seamless integration between hardware and software systems.

6. Workforce Capacity

The pilot relied on existing staff who managed the project alongside regular responsibilities. Although a full-time position was originally scoped, constrained timelines prevented the hire. While the team adapted and delivered results, the approach strained capacity and slowed progress, making it clear that innovation cannot be an add-on.

Challenge	Lesson Learned
Limited dedicated staffing	Pilots require dedicated staff ownership; splitting attention undermines both day-to-day work and innovation progress.

Takeaway: Stage 1 showed the cost of overloading existing staff. Stage 2 will build dedicated capacity from the outset.

7. Timelines

Compressed timelines shaped every deliverable. The FY24 Stage 2 grant deadline in particular created cascading delays in LiDAR extraction and validation.

Challenge	Lesson Learned
Stage II deadline pressure	Tight timelines limited quality checks and created cascading delays, especially in LiDAR extraction; realistic timelines and buffers are essential.

Takeaway: Stage 1 showed that innovation under deadline pressure sacrifices quality. Stage 2 must balance speed with time for iteration.

Overall Learnings

Across all areas of the pilot, several overarching lessons emerged that will be critical to the success of future curb management efforts.

- **Inventory must stay current**: The dynamic nature of San José's Downtown means curb data becomes outdated quickly. Stage 2 will prioritize processes for routine updates to ensure accuracy and reliability.
- **Advanced camera technology is essential**: Solar-powered cameras and snapshot-based collection limited visibility into real curb activity. Stage 2 will transition to hardwired cameras with continuous streaming to capture short-term events.

- AI capabilities must evolve: Current limitations in object detection reduced the accuracy of reporting. More advanced AI will be critical to support predictive analytics and proactive curb management.
- Vendor relationships are critical: Strong communication, clear timelines, and shared accountability with vendors are essential to successfully manage first-of-its-kind technology deployments.
- Comprehensive base data is foundational: Missing or inconsistent datasets, such as streetlight pole ownership or meter locations, created avoidable delays. Future phases will begin with consolidated and validated baseline data.
- Collaboration strengthens outcomes: Working alongside peer cities across the nation provided opportunities to share strategies, troubleshoot challenges, and accelerate learning. The Open Mobility Foundation (OMF) made this collaboration possible, creating a forum for collective problem solving and standard-setting that will continue to shape curb management nationwide.

First-of-its-kind technology is inherently iterative. Stage 1 demonstrated the need for resilient processes, strong partnerships, and realistic timelines. These are lessons that San José will employ for scaling in Stage 2.

06 Deployment Readiness

For San José, deployment readiness means more than having technology in hand. It requires aligning departments, technical systems, and governance structures for implementation at scale. Stage 1 provided that foundation by testing first-of-its-kind tools under real conditions, revealing where systems were reliable and where they fell short, and clarifying how internal teams and vendors must coordinate. It also surfaced key uncertainties, from hardware lifespans to the ongoing effort required to keep inventories current, that will be addressed directly in Stage 2.

Stage 1 showed us how to anticipate challenges, respond quickly, and adapt as conditions changed. It stress-tested every part of implementation, turning trial-and-error into practical guidance for scaling citywide. The sections that follow outline the areas most critical to readiness, San José's current status, the risks ahead, and the strategies we will use to move forward.

Institutional Readiness

Stage 1 strengthened the City's internal systems and partnerships, laying the groundwork for at-scale deployment.

Area	Current Status	Key Risk	Strategy
Legal & Policy	Authority clear; privacy review complete.	Public misperceptions of cameras as surveillance.	Transparent policies, FAQs, strict data protections.
Procurement & Budget	Vendors competitively procured; contracts extendable.	Rising hardware/supply chain costs.	Maintain vendor pool; phased procurement.
Internal Coordination	Interdepartmental team active in Stage 1.	Cross-departmental delays.	Standing working group; reporting cadence.
Workforce Capacity	Existing staff + vendor support.	Scaling may strain resources.	Add dedicated staff; surge consultants.

Takeaway: *Institutional systems are in place; Stage 2 hinges on expanding staff capacity to sustain operations.*

Technical Readiness

Stage 1 proved that the technology is workable and interoperable, while also clarifying where reliability must be strengthened.

Area	Current Status	Key Risk	Strategy
Technology & Integration	Cameras and analytics tested; interoperable.	Power/connectivity reliability.	Mix of solar + hardwired; backup connectivity.

Data Governance	CDS API standards adopted; aligned with City IT.	Storage costs and access management at scale.	Industry-standard security policies; IT cost planning.
Cybersecurity	Systems vetted by City IT.	Evolving threats.	Encryption, penetration testing, monitoring.

Takeaway: *Systems are proven; Stage 2 will focus on reliability and scaling storage securely.*

Learning Needs & Risk Mitigation

Stage 1 clarified what remains uncertain; these are the areas we are actively refining to ensure sustainability and avoid future operational burdens.

- **Hardware lifecycle:** Testing real-world lifespan of solar vs. hardwired units; replacement schedules will be built into operation and maintenance budgets.
- **Software updates:** Understanding frequency/cost of upgrades; mitigated by open standards and contract terms.
- **Data storage:** Long-term costs of streaming data; refining projections with City IT.
- **Staffing model:** Number of full-time employees (FTEs) required for daily monitoring and analytics; using Stage 1 workload data to refine.
- **Vendor capacity:** Ability to sustain citywide service levels; service level agreements tested during pilot.
- **Future-proofing:** Guarding against future operational burdens; modular hardware and open APIs allow phased upgrades.

Takeaway: *These are known uncertainties, and Stage 2 strategies ensure they are managed before they become barriers.*

Community Readiness

Stage 1 demonstrated that community acceptance depends on transparency and clear benefits.

Area	Current Status	Key Risk	Strategy
Community Impact & Acceptance	Engagement showed support when privacy and access were addressed.	Skepticism about surveillance.	Messaging focused on safety, efficiency, and business benefits.

Takeaway: *Public trust was strong in Stage 1. Maintaining transparency and emphasizing the system's role in safety, efficiency, and business access will be key to sustaining that support.*

Workforce and Jobs Impacts at Scale

Scaling curb management will create permanent City staff roles and ongoing demand for vendor support. The City anticipates a net positive impact on employment, with safeguards to ensure high-quality, union-friendly jobs.

Category	Beneficial Impacts	Job Quality Strategies
City staff roles	Permanent union positions for oversight, analytics, and program management.	Training, career ladders, reduced reliance on consultants.
Field operations	Demand for technicians in electrical, communications, and construction trades.	Prevailing wages and PLAs ensure fair pay and union participation.
Vendor workforce	Growth in vendor staff for software, analytics, integration.	Contracts favor local, small businesses.
Job quality	Automation shifts repetitive tasks into higher-value roles.	Automation enhances productivity without reducing headcount.

Takeaway: *In Stage 1, a local workforce supported validation. In Stage 2, the City will expand this by hiring dedicated staff. The system will support high-quality jobs across City staff, vendors, and field operations, with strong labor standards to ensure fair pay and union participation.*

Overall Readiness

Stage 2 revealed what it takes to scale curb management: reliable procurement pathways and workforce capacity to system integration and interdepartmental coordination. It also underscored the importance of keeping inventories current, deploying hardwired streaming cameras, and building clear data governance. These lessons give San José a tested playbook for deployment.

The remaining risks, such as long-term data storage costs, hardware lifespans, and vendor responsiveness, are real but understood, with mitigation strategies already built into a developing Stage 2 plan. With proven systems and strong leadership, San José is ready to implement at-scale curb management in a way that is sustainable, scalable, and supported by both the public and partner institutions.

07 Wrap-Up

The Stage 1 pilot gave San José the chance to test unproven tools, push systems to their limits, and learn what it takes to scale. We confirmed that AI-powered curb management can work in a complex urban setting, and we identified exactly where technology, data, and processes need to improve. Some parts worked better than expected, including streamlined procurement, a robust platform, and strong community support. Others did not, such as solar cameras, LiDAR integration, and limited staff capacity. Taken together, these lessons give us the clarity needed to plan and execute Stage 2 at scale.

Several themes stand out: inventories must stay current, hardwired streaming cameras are essential, AI needs to evolve, vendor relationships are as important as the technology, and strong base data is foundational. These lessons translate directly into Stage 2 design.

Key Advice for Other Communities

- **Engage other departments early.** Camera installations were slowed by pole approvals; future deployments should bring infrastructure departments in at the outset.
- **Demand vendor transparency.** LiDAR was pitched as simple but proved complex; ask for step-by-step clarity upfront.
- **Build buffers into your schedule.** Dependencies between LiDAR, cameras, and the platform meant a single delay cascaded across the project; pad timelines to absorb the unexpected.
- **Leverage peer networks.** The Curb Collaborative saved us from repeating mistakes, from procurement strategies to technical integration.
- **Treat pilots like the first phase of a system.** Even small-scale tests require staff, vendor coordination, and community engagement.

Why San José Is Ready for Stage 2

Stage 1 set the foundation for San José to deliver America's first AI-powered, fully connected curb management ecosystem in Stage 2, designed as a scalable model for communities nationwide. We now know what works, what doesn't, and what must change. Procurement pathways, the curb management platform, and community trust are in place. Hardwired cameras, routine inventory updates, and dedicated staffing will close the gaps identified in the pilot. With these adjustments, San José is ready to implement a citywide curb management system and provide a roadmap for other cities.

08 Appendix

A: Stage 2 Alignment with Statutory Outcomes

Statutory Criterion	Anticipated Impact at Scale
(I) Reduce congestion and delays	Public access to a navigation application with real-time curb availability, predicted availability, and pricing will reduce circling and idling; dynamic pricing increases turnover; freight loading zones become more reliable, shortening delivery times.
(II) Improve safety and integration	Dynamic reallocation will reduce bike lane blockages and sidewalk obstructions; integration with Vision Zero corridors lowers conflict rates for pedestrians, cyclists, and buses.
(III) Improve access to jobs, education, and essential services	Reliable curb turnover improves customer and employee access to Downtown jobs, schools, and civic institutions; reduced congestion benefits essential trips.
(IV) Expand access for underserved populations and reduce transportation costs	Streamlined curb operations reduce wasted time and fuel for residents and businesses; lower circling and idling ease costs for gig workers, delivery drivers, and households with limited resources.
(V) Contribute to medium- and long-term economic competitiveness	Improved delivery reliability supports Downtown recovery; increased turnover grows sales for small businesses; San José establishes itself as a national leader in modern curb management.
(VII) Promote connectivity	Unified parking platform merges on- and off-street supply; integration with Google Maps, SPOTSJ and ParkSJ provides travelers real-time curb information; system links with freight and micromobility hubs.
(VIII) Incentivize private sector partnerships	CDS-compliant APIs enable integration with mapping and payment platforms; vendor partnerships demonstrated in Stage 1 will expand, attracting private investment in hardware and analytics.
(IX) Improve energy efficiency / reduce pollution	Reduced circling and idling lower fuel use and emissions; cleaner curb operations support air quality improvements in Downtown and surrounding neighborhoods.
(X) Increase resiliency	Dynamic curb allocation ensures continuity during events, construction, or disruptions, allowing staff to proactively manage surges.
(XI) Improve emergency response	Curb rules preserve access for emergency vehicles and integrate with public safety protocols to support rapid response.

B: Community Engagement Summary

San José partnered with **PlaceWorks** to design and deliver a comprehensive community engagement program for Stage 1. Outreach included focus groups, surveys, workshops, community events, advisory committees, intercept interviews, and targeted stakeholder meetings.

Outreach Type	Stakeholders	Key Feedback
Community Advisory Committee	Business representatives, transportation leaders, City staff, Disability Community Representatives	Access issues often overlooked; curbs need repainting; sidewalk obstructions from food vendors
Community Events	Bicyclists, pedestrians, residents, visitors	Bike lane debris; congestion from deliveries; strong support for protected bike lanes
Neighborhood Associations	Residents	Confusion about sidewalk ownership; desire for clean, safe streets; sightline issues at driveways
Focus Groups	Businesses	Insufficient loading; double-parking from gig drivers; inconsistent enforcement
Stakeholder Interviews	Public agencies, operators, law enforcement	Residential parking pressure; bus stops not optimized; limited outreach on bike projects
Intercept Interviews	Mixed user groups	Difficulty finding safe parking; obstructions common; unclear curb signage
Accessibility Workshop	Disability advocates	Excessive curb heights; limited ADA parking; misaligned curb cuts
Survey	Broad public	Top modes: personal vehicle, walking, biking; concerns: blocked sidewalks, obstructions, fast traffic

C: Project Publicity

Project Phase	Activity Description
Local and Regional Media	• City of San José press release: "DOT wins grant to study better use of curb space" (April 2023). • San José Spotlight: "San Jose studies how to best use curb space" (August 2023). • San José ribbon-cutting ceremony at the first round of camera installations covered by local outlets (July 2024).
National Media and Trade Press	• Government Technology: "Digital Curb Data Deepens Understanding of Urban Activity" (August 2024). • Parking Today Magazine (web and print): "Kicking Inefficiency to the Curb" (September 2024) and cover story on Umojo highlighting the San José pilot (September 2024). • Parking Network (parking.net): Announcement of San José–Umojo partnership (June 2024).
Conference Presentations and Professional Forums	• Redefining Mobility Summit (Contra Costa Transportation Authority, San Ramon, CA) – San José presentation (May 2024). • International Parking & Mobility Institute (IPMI) Expo (Columbus, OH) – Umojo highlighted San José's pilot (June 2024). • National Parking Association Annual Convention – Umojo session (September 2024). • Urbanism Next Europe (Amsterdam, Netherlands) – San José presentation (October 2024). • Open Mobility Foundation (OMF) – San José featured in the SMART Curb Collaborative webinar (September 2024) and the OMF Summit panel (Los Angeles, November 2024). • USDOT SMART Collaborative Cities program – San José featured in Mid-Grant Summary Report (September 2024). • South Bay Transportation Officials Association (SBTOA) – San José presentation (San José, May 2025).

D: Stage 1 Alignment with Statutory Outcomes

Statutory Goal Area	Stage 1 Demonstrated Contribution
(I) Reduce congestion and delays	• Identified double-parking hotspots and dwell-time violations through camera monitoring. • Set groundwork to analyze mismatched supply/demand between over-capacity and underutilized blocks, showing potential for reallocation and dynamic pricing.
(II) Improve safety and integration	• Documented frequent bike-lane blockages and sidewalk obstructions. • Established baseline for reallocating curb space to improve pedestrian and bicycle safety.
(III) Improve access to jobs, education, and essential services	• Mapped curb turnover near job centers, schools, and civic institutions. • Identified barriers to reliable access such as overtime stays.
(IV) Expand access and reduce transportation costs	• Set the stage to analyze mismatched supply/demand (next step). • Established baseline for reallocating space to reduce unnecessary circling and improve affordable access.
(V) Contribute to medium- and long-term economic competitiveness	• Analyzed annual parking transactions to reveal opportunities for revenue growth (e.g., expanded metering). • Business outreach confirmed that inefficient loading reduces sales; Stage 1 data now provides evidence to target improvements.
(VII) Promote connectivity	• Built NexCity platform integrating LiDAR, transactions, and curb event data. • Developed CDS-compliant Curbs, Events, and Metrics APIs for interoperability with peer cities and mobility providers.
(VIII) Incentivize private sector partnerships	• Engaged vendors (Umojo, SONY), including in-kind camera contributions. • Integrated data from IPS, Passport, and T2 systems, confirming multi-vendor compatibility.
(IX) Improve energy efficiency / reduce pollution	• Not directly addressed; baseline data created foundation for emissions analytics in Stage 2.
(X) Increase resiliency	• Demonstrated system flexibility by integrating multiple vendor feeds. • Validated modular hardware/software approach to avoid lock-in and adapt as needs evolve.
(XI) Improve emergency response	• Not addressed in Stage 1.