FUNDING AND OTHER REPAIR CONSIDERATIONS FOR MUNICIPAL SIDEWALK NETWORKS

Prepared for City of Eugene, Summer 2023

Abstract

This report will offer examples of sidewalk repair programs in use by various municipalities, as well as discussions about private versus public repair programs, street tree conflict mitigation, and the importance of sidewalk condition data to overall network health.

LiveMove Summer 2023 Sidewalks Team

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Executive Summary

This report was prepared for the City of Eugene Transportation Planning and Public Works Departments by student researchers at the University of Oregon's LiveMove program. Project coordination was provided by former LiveMove staff. The research and writing presented within represents a mix of original work and synthesis of existing research performed by the Active Transportation Committee (ACT).

Student researchers reviewed existing material from ACT and City of Eugene, identified and synthesized academic literature, and explored and reported municipal sidewalk repair schemes. The research in this report set out to answer the following major questions:

- How are sidewalk improvements funded in other cities?
- In cases (like Eugene) where homeowners are responsible for sidewalk repair, how do cities ensure sidewalks are in good repair?
- How do other cities navigate street tree maintenance where sidewalk quality is at issue? How can cities manage costs associated with street tree maintenance while also repairing sidewalks?

Examples of private and public repair programs are presented, as are examples of funding mechanisms. Reliable cost data for municipal or private sidewalk repair was hard to come by, as many sources were outdated and/or imprecise, especially as COVID-19 disruptions were accounted for. As a result, specific costing information is left out of this report. In addition, the municipalities included in this report varied in climate and traffic pressures, as well as budget and overall size. Furthermore, reliable information about sidewalk network health was not always publicly available. As a result, there is no direct comparison of repair methods (i.e., costs per paver) presented in this report.

The following highlights emerged from the research:

- Public repair schemes have certain advantages over private repair, including generally more equitable cost distribution, but require significant public funding, and staff capacity for administration. They may also create legal challenges and require public approval for implementation.
- Street tree root conflicts are major sources of sidewalk damage and require special attention and creative solutions. Design and materials choices can mitigate root conflicts but require input from forestry professionals, as well as sensitivity to other sidewalk repair priorities.
- Many of the repair schemes surveyed benefited from reliable data collection methods regarding sidewalk conditions. Any significant repair program should incorporate data gathering to ensure effective prioritization.

Introduction

The City of Eugene covers an area of approximately forty-four square miles and is home to some one hundred and seventy-five thousand people. The city has an extensive sidewalk network spanning approximately 760 miles. However, the condition of the sidewalk varies throughout the network, with some stretches in significant disrepair.

At present, sidewalk repair is the responsibility of the private property owner through whose property the sidewalk passes (excluding sidewalks passing through where alleys intersect with streets and city or public property). New sidewalks are built by developers as part of the land use and building permitting processes. However, the city has limited mechanisms for ensuring quality of sidewalks once they are constructed. The Eugene Code holds property owners liable for injuries sustained as a result of a broken sidewalk, creating an incentive for property owners to keep sidewalks in good repair. However, it is unclear what proportion of property owners know of their responsibility, or what proportion has the resources to fix and maintain sidewalks as needed. City staff periodically issue notices of sidewalks in disrepair, but the city has no centralized database of sidewalk conditions. The city also offers a limited repair program, but property owners still bear the cost of repair work.

Ensuring sidewalk repair and condition is a major component of maintaining a connected, effective sidewalk network. Pedestrian Policy #2 of the 2035 Eugene Transportation System Plan, which commits the city to "Ensure that there are safe, accessible, comfortable, and direct sidewalk routes…" throughout the city. A partial inventory of sidewalk conditions found in the city of Eugene performed by students at the University of Oregon's LiveMove program found extensive damage, including a significant proportion of sidewalk pavers within the city being non-compliant with ADA design guidelines in a least one dimension. It is therefore critical that the city determine a strategy for ensuring sidewalk quality and repair.

This report will outline multiple methods in use by other municipalities for the construction and maintenance of urban sidewalks. These include methods of enforcement in cases where sidewalk condition is the responsibility of the property owner, as well as funding sources in use to fund municipal repair programs. A complete list of municipal strategies appears in Appendix A. In addition, this report contains examples of maintaining sidewalks in instances where city-owned street tree. It will also discuss the importance of up-to-date sidewalk condition inventories in prioritizing and carrying out sidewalk repair schemes.

There are three case studies presented in this work: Kansas City, MO, Nashville, TN, and Seattle, WA.

Voters in Kansas City approved a city takeover of sidewalk repair responsibility and accompanying bond issue to clear the repair backlog in 2017. It is the most recent example of a municipality assuming responsibility for sidewalk repair. Public works staff responded to questions about their experience managing the transition, which is ongoing. The full text of their response can be found in Appendix B.

Nashville, TN, recently (2019) imposed an in-lieu fee for developers that would fund sidewalk repairs and network improvements, including in-fill. The fee was incorporated as part of the building permit process. The fee has been challenged in court and is now awaiting appeal. Nashville staff responses to questions can be found in Appendix C.

Student researchers working with LiveMove contacted Seattle, WA public works staff in November 2022 to learn about their process for conducting a sidewalk condition inventory. A brief case study of their methods appears at the end of this report. A more complete write up of the LiveMove sidewalk condition inventory effort can be found in Appendix D.

Sidewalk Repair Programs

Municipalities can ensure that their sidewalk networks meet minimum standards through a variety of ways. In many cities, including Eugene, sidewalk repairs are the responsibility of the adjoining private property owner. Sidewalks are repaired at the owner's expense. Property owners whose sidewalks are deficient can request the city to repair the sidewalk and have the city bill them. The city also repairs sidewalks on public property.

Private Responsibility

Individual property owners or adjacent landowners are responsible for the maintenance and repair of sidewalks on their properties. This can save the municipality money by allowing the municipality to either repair in a limited or as-needed capacity by shifting the primary cost burden to the property owner. However, this does mean that the municipality sacrifices some amount of control over when and to what condition sidewalks must be repaired.

Ensuring sidewalk quality while leaving the repair responsibility to the adjacent property owner can be achieved through a combination of strategies.

Time-of-Sale Systems

Refers to a mandate in which sidewalk repairs or improvements are required when a property is sold or transferred from one owner to the other. Local governments implement this to ensure that the sidewalk is safe for pedestrians and in good condition. It may encourage property owners to maintain sidewalks a little at a time to avoid costly repairs down the line.

> **Edmonton, Alberta, Canada** has implemented such a program to ensure sidewalk repair. However, due to the patchwork nature of this program, the city also repairs or reconstructs sidewalks as part of other infrastructure projects, such as Neighborhood Revitalization.

Penalties for Non-Compliance

Cities can impose penalties or fines on property owners who do not make sidewalk repairs after receiving notifications to do so. This functions similarly to parking restrictions or other municipal violations, in that the primary mechanism of repair is the reasonable assurance of financial consequences for property owners who keep sidewalks in deficient condition. These programs require mechanisms for inspectors being made aware of deficient sidewalks, and implementation would likely require a public information campaign to ensure equity.

> **Pasco, Washington** issues citations to property owners for non-compliant sidewalks. Fees can be up to $250. Per the 2021-2022 Biennial Budget, the city leveraged an additional $400k in one-time funding for certain improvements. Pasco also maintains a database of sidewalk conditions for use in citations and transportation planning.

Clear Regulations, Guidelines, and Support

Include clear regulations that outline the responsibilities of the property owners. Ensure that it is easily accessible and understandable, such as an app, website, mailing list, etc. The city can provide property owners with resources and contacts for local contractors who perform sidewalk repairs. This lowers the barrier for residents to access services.

> The city of **Albuquerque, New Mexico** has a resource list of contractors who do sidewalk repairs, which they share with property owners.

New York City has a large staff of foresters as part of its Department of Parks and Recreation. NYC Parks foresters provide free consultation to all building permit requests that involve sidewalk repair and street trees.

Partial City Responsibility

Both the city and property owners share the responsibility for maintaining and repairing sidewalks. Generally, the municipality takes on a portion of the repair and maintenance burden, while property owners also contribute in some capacity (typically financially).

In **Madison, Wisconsin**, property owners are responsible for 50% of project costs, and the remainder of the project cost is paid for out of a 'pot' of money from a local bond issue(s). Sidewalk conditions are typically assessed when crews perform work nearby; there is no formalized inspection system in place.

The City of **Chicago, Illinois** has a mix of private/public responsibilities. All sidewalks (except on public land) are the responsibility of the property owner. However, the city has a first-come, first-served sidewalk repair program, that is funded through a city general operating budget. The average cost to homeowners for the repairs is between $600-$1,500, but there are discounts for seniors and people with disabilities. However, there is no discount available to low-income residents.

Incentives and Rebates

To encourage repairs, the city can offer incentives or rebates to property owners who complete repairs within a specified timeframe. This could include discounts on property taxes or sidewalk repair materials.

In **Boulder, Colorado**, the city assesses residential property owners up to $420 (commercial property owners pay 50% of the total cost) for sidewalk repair/replacement. This helped alleviate some financial burdens on property owners and encouraged them to act promptly.

Flexible Payment Options

Some cities offer flexible payment options or installment plans for repair costs, including low or no interest loans. The responsibility of homeowners to maintain sidewalks may burden low-income residents disproportionately. Cities could also offer programs where low-income property owners can apply for funding.

Developer Programs

Oftentimes, developers are required by the city to install new sidewalks or improve existing ones as part of their projects.

In **Tampa, Florida** (mix of public and private responsibility)**,** the sidewalk repair fund is partially funded by developers, who are required to repair/install sidewalks at time of construction. Developers can also pay in-lieu fees to city services, like a System Benefit Charge.

Public Responsibility

Under a public responsibility scheme, the city or local government takes on the role of maintaining, repairing, and funding sidewalk repairs.

Property Tax or Special District

A city can allocate a portion of property taxes or local sales taxes to a dedicated sidewalk repair fund.

> **Ann Arbor, Michigan** passed a voter-approved sidewalk millage tax (property tax) for sidewalk repairs and replacement. The average household pays $13 per year.

System Development Charges (Impact Fees or Development Impact Fees)

Fees charged to developers by the city to fund the expansion and improvement of the sidewalks. These fees help local governments manage growth while minimizing the burden on taxpayers.

> **Charlotte, North Carolina** imposes a development impact fee program that includes a "Streets and Sidewalks" category, where a portion of the funds are reallocated to transportation and pedestrian infrastructure.

General Funds

A city could allocate a portion of the general budget or sidewalk infill/repair. A general fund is the primary account within a government's budget that holds money for essential services and daily operations. This is likely the easiest funding source, as distribution decisions can be made by administrative departments, as opposed to levying additional taxes, which may require legislative action.

> **Los Angeles, California** has a substantial budget for sidewalk repairs and maintenance. A portion of their general fund is allotted for sidewalk safety and repair. In 2015-16, the General Fund allocated "$10.2 million to the new Sidewalk Repair Fund" and has since seen implemented other pedestrian improvements.

General Obligation or Capital Bonds

This is the primary funding source for Eugene's Street Repair Program. These bonds fund various public projects and infrastructure improvements. GO bonds are municipal bonds that provide a way for a government entity to raise money for projects that may not generate a stream directly.

> **Lee's Summit, Missouri** passed a voter-approved General Obligation bond of just under $12 million, for funding the repairs, improvements, and new construction of sidewalks.

Local Gas Tax

This tax is imposed by a local government on the sale of gasoline within its jurisdiction. This tax is levied on each gallon of gasoline sold and is often used to generate revenue for funding local transportation projects, road maintenance, and other related infrastructure initiatives. Eugene receives about $3 million/year in local gas tax revenue. Currently, this money is used for street repair, maintenance, and operations, but it could be used for sidewalks if the city of Eugene chose to do so.

> **Tampa, Florida** has a mix of public and private responsibility for sidewalk repair. The sidewalk repair fund is funded through a combination of development impact fees, system benefit charges, and a local option gas tax to cover the remaining costs and maintenance.

Transportation Utility Fee

19 Oregon cities have implemented Transportation Utility Fees for various purposes. It can either be a flat fee or a fee derived from a more complicated methodology and is paid as a part of the utility bill.

> In **Corvallis, Oregon**, there is a monthly sidewalk maintenance fee that is part of the City Services bill, which also includes water and sewer charges. The monthly fee is $1 for the typical property owner, which equates to about $12 per year. The city of Corvallis spends approximately $150,000 per year on sidewalk repair.

Traffic Violations

It would be possible to use revenue from traffic violations to fund sidewalk repair.

> Many cities across the west coast, including **Seattle, San Francisco, and Los Angeles**, have explored the idea of using a portion of traffic violation revenue for sidewalk repairs, improvements, and other transportation related projects.

Parking Revenue

It would be possible to use the revenue from parking to fund sidewalk repairs.

> **Portland, Oregon** has recently implemented an additional $.20 fee on metered parking transactions, called the "Climate and Equitable Mobility Fee". The Portland Bureau of Transportation (PBOT) hopes this will encourage drivers to switch to more sustainable modes of transportation. This new program is estimated to generate $2 million per year and these funds will go towards bike and pedestrian safety. This parking revenue "accounts for 35% of PBOT's annual discretionary revenue".

Vehicle Impact Mitigation Fees

These charges are imposed on new development projects to offset the impacts of increased congestion caused by the development. These fees are collected by local governments and are used to fund roads, sidewalks, and other transportation infrastructure.

> Cities like **Los Angeles, Portland, Seattle, and Austin** collect transportation impact fees from developers. These funds are then used for road improvements, pedestrian and sidewalk improvements, and public transit enhancement.

Gross Receipts Tax

A Gross Receipts Tax is a special kind of sales tax levied on specific businesses, potentially falling within a specific industry or specific geographic area.

> The city of **Burlington, Vermont** refers to its Gross Receipts tax as the "Restaurant, Hotel, Amusements and Admissions Tax". Any entities doing business in Burlington must pay the monthly tax. It is unclear how impactful this implementation has been. The tax funds various projects city-wide as a means of capturing value from its lucrative tourism industry.

Methods for Tracking Sidewalk Condition

No matter the repair program in place to repair sidewalks, cities must have mechanisms for assessing and documenting sidewalk condition. The importance of a sidewalk inventory appears in much of the literature, and many of the examples provided in this report. More on Inventories can be found in a later section of this report.

Below are other mechanisms for cities receiving and documenting sidewalk condition which may be used in conjunction with any of the repair and funding methods outlined above.

Online Reporting and Tracking

Implementing an online platform where residents can report damaged sidewalks can help identify areas in need of repair more efficiently. Additionally, property owners can track the status of their repair requests.

> **Toronto, Ontario, Canada** has a "311" system that enables residents to report sidewalk issues online. The city's Transportation Services uses this platform to manage repair requests and track repairs.

Citizen Reporting and Feedback

The implementation of an online platform or mobile app that allows residents to report damaged sidewalks, empowers residents as well as quickly identifies areas in need of repairs.

> **Eugene, Oregon** relies on citizen reports to make note of sidewalk deficiencies.
>
> **Seattle, Washington** augments their regularly updated sidewalk inventory with a mobile app allowing residents to make reports of sidewalk conditions.
>
> **Atlanta, Georgia** relies on citizens to report sidewalk damage and other pedestrian hazards through an online reporting system that was created by an Atlanta based advocacy group, PEDS.
>
> **Hoboken, New Jersey** relies on citizens to report sidewalk damage through Hoboken311, which has a phone, website, and app reporting system. Residents can upload a photo with the submission and can receive status updates through the app.

Regular Inspections

The city can conduct regular inspections of sidewalks to identify any in need of repair. Inspections should be scheduled periodically. This could be part of a sidewalk master plan.

> **Austin, Texas** performs regular sidewalk inspections as part of a regularly approved bond issue. The inspections and bond issue make up part of the Sidewalk Master Plan, by which the city prioritizes sidewalks for repair.
>
> **Boulder, Colorado** and **Minneapolis, Minnesota** now conduct zone inspections by partitioning the city into more manageable zones. Boulder, Colorado conducted a one-time citywide inspection of the sidewalks by taking video from a van. The city of Minneapolis conducts zone inspections of their ten zones, which results in each zone getting inspected every ten years.

Additional Considerations

Besides funding for sidewalk repair and construction projects, municipalities must consider additional factors when making repairs or upgrades to their sidewalk networks. Two of the most notable from companion municipalities and preeminent literature on the subject include inventories and data collection, and street tree-related conflicts.

Sidewalk Condition Data

Comprehensive sidewalk condition data indicates locations of greater need of repair or replacement. Inventorying sidewalk conditions before repairs begin aids in remediating a backlog of repair requests by allowing for prioritization. Many municipalities have conducted inventories or other comprehensive assessment work as part of a limited repair program (such as a bond issue) or maintained an ongoing inventory as a complement to public repair schemes.

Inventories can be designed to weigh criteria to meet different priorities. For instance, inventories can be used to prioritize instances of damage that may present ADA non-compliance issues as opposed to cosmetic or other damage. The inventory collects critical information on public sidewalks, ramps, pedestrian crossings, and other infrastructure of concern. The critical information includes hazardous sidewalks, street tree roots in need of maintenance, and locations without sidewalks at all. An inventory of damage to pedestrian sidewalks also presents an opportunity to assess ADA compliance throughout the city. Establishing a criterion for what constitutes damaged sidewalks can also define what constitutes a safe sidewalk.

Contractor repair crews that perform repairs have reportedly expressed hesitation for conducting sidewalk repairs that involve few panels as the cost to mobilize equipment and crews is greater than the payout. In Las Vegas, Nevada the crews are not incentivized to take on small scale repair jobs while the luxury of larger scale higher paying jobs is present. This can leave property owners with the dilemma of either not conducting a repair or paying inflated amounts.

Cities without public repair programs can benefit from inventories as well. Even in cases where private property owners are responsible for adjoining sidewalks, municipalities can better ensure minimum repair standards are maintained throughout the sidewalk network. Cities without comprehensive inventories must rely on field inspectors or notifications from residents of defective sidewalks.

Street Tree Conflicts

Balancing sidewalks or other hardscape repairs in cases of damage caused by city-owned street trees is a major concern. Cities plant trees for aesthetic and ecological reasons and maintaining city trees is a major undertaking for most municipalities. However, city-owned trees can also be sources of damage for sidewalks and other infrastructure. Municipalities must therefore find ways of balancing street tree care and maintenance and sidewalk condition. These may include system-wide strategies (such as planting trees elsewhere in the city when removing a tree), design-based (such as curving or sloping sidewalks around root conflicts), or materials-based (such as directing root growth or implementing non-standard paving materials). Selected examples are presented below.

> **New York City** Parks Foresters approach sidewalk repair where tree roots are at fault differently depending on what repair measures are permissible based on the location. The city does not permit root pruning except where necessary because root pruning can compromise a tree's stability and health. To avoid this, the city employs non-standard designs. For instance, sidewalks can be curved around an existing tree to allow for continued root growth. A disadvantage to not permitting root pruning is the continued and

undirected growth of tree roots. The city does not discuss measures for root containment and redirection despite the existence of certain methods.

Sunnyvale, California utilizes tree root redirection measures to mitigate sidewalk disruption. Steel plates are bolted to opposing sides of a tree root which flattens future root growth and disables the root's ability to penetrate the steel plates and the above concrete. An advantage to this method is the improved tree stability compared to the stability of a tree following root pruning. Sunnyvale reports that after more than 15 years the concrete sidewalk has not required further maintenance following the steel plate installation. A disadvantage to steel plates for root redirection is that the installation can be costly compared to root pruning.

Kansas City, Missouri employs different methods for street tree caused sidewalk repair. A local university created a rubberized sidewalk alternative to allow continued tree and root growth that is designed to resist uplift, and cracking. The rubberized alternative has a gray appearance. The city also has a 'replacement rate' for projects on streets and sidewalks: when a tree is removed during normal repairs, the entity performing the work must plant trees, or else pay into a dedicated fund for tree replacement.

Logan, Utah manages tree root conflict by utilizing interlocking panels made from 100% recycled plastic. The panels are called TERREWALKS. The plastic panels are a replacement for traditional concrete sidewalks. The Terrewalks panels are replaceable and come with a 20-year warranty. A disadvantage to the Terrewalks is that replacement of one or more panels comes with the recommendation of tree root pruning, as well as increased cost for initial installation. The panels are not as durable which can lead to more frequent replacement.

Case Study: Kansas City, Missouri

Kansas City, Missouri transitioned from private property owners holding responsibility for sidewalk repair to public ownership. KCMO took over ownership for sidewalks in 2017 in conjunction with a voter-approved general obligation bond issue for sidewalk repair.

A main obstacle for KCMO was underestimating the magnitude of backlog repairs and conducting a full inventory. Uday Manepalli, the Kansas City, MO sidewalk repair program manager, remarked on the undertaking that was conducting a full inventory once commencing the sidewalk repair program. Manepalli discussed the challenge of attending to the backlog of service requests, which was made more difficult by not having a complete inventory prior. Manepalli and his office utilized a prioritization list generated as part of a comprehensive inventory during the undertaking of municipal sidewalk repair by KCMO.

Manepalli also remarked that there is a balance to conducting repairs and replacements for sidewalks. The city prefers to shave down sidewalks rather than grinding, as grinding leaves grooves that are not ADA compliant. The cost of shaving down high spots in the sidewalk is four times less than spot repairs. However, if a block face has significant damage, it is often more economical to replace the entire block than perform spot repairs. The citywide balance between repair and replacement lies at 60-40 according to Manepalli. The overall condition of the sidewalks since the beginning of KCMO's ownership could not be quantified by Manepalli as he was not comfortable speaking on the topic since there was no data before the transition.

Case Study: Nashville, Tennessee

The city of Nashville is responsible for all sidewalks in the city. In 2017 Nashville began utilizing "in-lieu of" fees for sidewalk funding. The fees were assessed to developers, who either built sidewalks or paid the fees in lieu of doing so. In 2023 it was ruled unconstitutional to assess these in-lieu of fees. This happened recently so Nashville does not have a response yet, beyond ceasing to assess these fees. The city does not know if they will be responsible for paying back the fees.

Sidewalk damage or grievances can be reported to hubNashville, an online tool like 311. The city is currently working to update their inventory of sidewalks to continue their ADA transition plan. The prioritization process used by the city to determine locations in greater need of repair follows four factors: safety, transit access, connectivity, and social vulnerability. The city did remark that there is an element of unpredictability to the construction and repair process which lends to a first come first serve element. Since the reversal of the in lieu of fees there has been a negative impact on the state of sidewalks within Nashville. A representative from the city stated there is a general support for sidewalk funding in Nashville, and that the city is lacking sidewalks in many parts. The increasing costs for repairs and construction are still viewed as worthwhile to the city organization and community.

Case Study: Seattle, Washington

The city of Seattle undertook a city-wide sidewalk condition assessment to accompany a large influx of repair funding from the City Council in 2019. City staff had noticed that citizen reports of defective sidewalks were primarily in "whiter and wealthier" neighborhoods, and as a result decided that more objective and complete data would be necessary for equitable prioritization.

In order to adequately map the entire city, public works staff created a grid overlay, and assigned data collection zones to interns. Approximately 14 interns were employed full-time over the course of a summer and were able to complete an inventory of sidewalk conditions. Interns were provided with cards to be handed out to the public for any questions and were given high-visibility vests and city-owned handheld devices for data collection. City staff described an iterative process by which interns were routinely engaged to determine which strategies worked in the field and which required revision.

Among the concerns for the city in initiating the inventory was from Legal. The argument was generally that once the city was made aware of certain sidewalk defects, such as ADA non-compliance, there may be a higher urgency to act and/or liability for inaction. Although homeowners are responsible for maintaining 'passage' along public rights of way, utilities and the city share responsibility for repair in instances of damage involving city trees and/or utility infrastructure. As a result, the city has to carefully design criteria for collection to provide actionable information without creating infeasible repair burdens.

Conclusions and Next Steps

Maintaining sidewalks in good condition is a major challenge that is critical to promoting pedestrian safety and urban walkability. There are no strategies that are free from tradeoffs, and there are no strategies that do not involve some amount of staff capacity investment by the city. There are, however, many options that can provide flexibility to municipalities to tailor-make solutions for their conditions.

The variations among cities in repair program, climate, overall budget, and extensiveness of sidewalk network made direct comparisons difficult. Sidewalk repair must be tailored to local context and build off staff capacity. The

same is true of mitigating street trees and root conflicts. Public repair programs were discussed in the literature to have generally lower costs per resident and provide greater overall equity, but they require extensive administrative build out. It is worth noting that no comprehensive strategy for ensuring sidewalks are maintained in good repair will come without cost to the city. In private schemes, this takes the form of inspection, enforcement, and/or outreach and collaboration with property owners. In public schemes it requires contracting or hosting concrete crews in-house, retaining project management staff, and managing outreach and mitigation.

Overall, a key perquisite for most major repair programs surveyed, private or public, is good data pertaining to sidewalk conditions and network health. This can come from extensive citizen reporting networks, but generally relied on some form of public inspection or collection. Therefore, the only recommendation offered by this report is to investigate strategies for collecting and maintaining comprehensive condition data.

Appendices

Appendix A – Summary of Municipal Repair Programs

Sidewalk Funding/Repair Scheme Examples from Other Communities

Cities are presented in alphabetical order. Population figures are last available. Areas are total urban area, and are intended as proxies for sidewalk network size.

Albuquerque, NM

- Private Population: 562,599 189 sq. mi.
- Citizens can report broken sidewalk pavers to city inspectors. The city issues violations to property owners, who are responsible for repairing the sidewalk. The city maintains a list of contractors who perform sidewalk repairs.

Ann Arbor, Michigan

- Public Population: 121,536 29.09 sq. mi
- Voter-approved sidewalk millage tax (property tax) for sidewalk repair/replacement. Average household pays $13/year. In FY 2023, Ann Arbor spent $2,432,466 on sidewalk repairs.

Austin, TX

- Public Population: 974,444 297 sq. mi.
- City works off of Sidewalk Master Plan to allocate funding. Developers can pay in-lieu fees instead of constructing sidewalks, which contributes to sidewalk repair 'pool.' Austin voters approved $80 million in sidewalk repair and rehabilitation (out of $460 million total infrastructure bond).

Boulder, CO

- Mix Population: 104,175 27.37 sq. mi.
- Assesses residential property owners up to $420 (commercial property owners 50% of total cost) for sidewalk repair/replacement. Also has voter-approved bond measure for maintenance/renovation of existing infrastructure, which includes sidewalks.

Charlotte, NC

- Public Population: 879,709 312 sq. mi.
- Voter-approved bond measures in 2014, 2016, 2018, 2020 fund sidewalk repair program. Bonds totaled $75 million to date. Charlotte DOT staff receive notice of broken sidewalks via online portal.

Cheney, WA

- Public Population: 13,087 4.37 sq. mi.
- Voter-approved tax on electric and natural gas services to fund maintenance of residential streets and sidewalks. 4% tax generates $380,000 annually.

Chicago, IL

- Mix Population: 2.7 million 231.7 sq. mi.
- All sidewalks (except on public land) are the responsibility of property-owner, but city has a first-come, first-served program for sidewalk repair. Program funded through city general operating budget. Average

cost to property owners between $600-$1500, discounts available for Seniors and Persons with Disabilities (no discount for low income).

Corvallis, OR

- Public Population: 59,864 14.59 sq. mi.
- Sidewalk maintenance fee is part of monthly City Services bill, which also includes water and sewer charges. $.80 monthly fee ($10/year). City spends approx. $150,000 per year on sidewalk repair.

Davidson, NC

- Private Population: 15,132 6.59 sq. mi.
- Informal program—when a developer has equipment and crews doing street-related work and there is a sidewalk maintenance need nearby, City asks developer to address maintenance need.

Durham, NC

- Public Population: 285,527 116.20 sq. mi.
- Voter-approved bonds fund 86% of sidewalk program (including ADA repairs) - provided $8.45 million for sidewalk repair, replacement, and ADA improvements. Other funding comes from state and federal sources, and local sources (such as engineering inspection fees for certain services).

Fort Collins, CO

- Public Population: 168,538 58.47 sq. mi.
- Uses 33% of sales tax revenue for street maintenance/repair, and additional 17% for other street and transportation needs.

Fort Worth, TX

- Public Population: 935,508 355.60 sq. mi.
- Red Light cameras fund pedestrian maintenance activities. 75% of revenue generated toward new sidewalks, 25% toward repair of existing sidewalks. Fort Worth uses Tax-Increment Financing districts to address pedestrian facility maintenance needs in commercial areas.

Ironton, MO

- Public Population: 1,456 1.39 sq. Mi.
- City had to replace numerous water and sewer lines, and wrapped cost of sidewalk replacement into total project costs.

Ithaca, NY

- Public Population: 31,710 30.29 sq. Mi.
- Created sidewalk assessment districts covering most properties in the city. All properties pay a yearly assessment (ranges from $70-$140 annually) for sidewalk replacement/construction, including corner curb cuts.

Kansas City, MO

- Public Population: 508,384 319 sq. Mi.

- City voters passed bond issue in 2017 that transferred responsibility for sidewalk repair from private property owners to the city. The Bond Issue covered $7.5 million/year for 20 years to address the city's backlog. For more information see Kansas City case study in the body of the report.

Lee's Summit, Missouri

- Public Population: 102,781 65.91 sq. Mi
- Voter-approved general obligation bond earmarks just under $12 million for building new sidewalks, rehab of existing sidewalks and replacing curbs/ramps.

Madison, Wisconsin

- Mix Population: 269,196 101.50 sq, mi.
- Property owners are responsible for 50% of project costs, sidewalks are typically assessed when crews perform work nearby. City also has a sidewalk repair program. Remainder of project cost is paid for out of 'pot' of money from bond issue.

Nashville, TN

- Mix Population: 683,622 475.78 sq. Mi.
- Sidewalk repair and/or installation is required on issuance of a building permit. Recent (2022) 'WalknBike' plan accompanied a $200 million bond issue. This bond issue will cover 50% of the costs of a priority 71 miles of sidewalk repair and installation.

Pasco, WA

- Private Population: 78,871 37.50 sq. Mi.
- City issues citations to property owners for non-compliant sidewalks. Fees can be up to $250.

Seattle, Washington

- Public Population: 733,919 83.78 sq. mi
- Voter-approved 'Bridging the Gap' property tax levy funds infrastructure repairs. Most recent approval was a 9-year, $930 million package, at least 18% of which must be used for sidewalks specifically. Partial funding for ADA-curb ramps comes from vehicle licenscing fees. The city also has an extensive inventory (prepared in part for 'Bridging the Gap') of sidewalk condition and has an app for citizens to report sidewalk condition.

Tampa, FL

- Mix Population: 387,050 175.80 sq. Mi.
- Local Option Gas Tax partially pays for street and sidewalk repair/maintenance. Sidewalk repair fund also partially funded by developers: developers either must repair/install sidewalks at time of construction or can pay in-lieu fees. Sidewalks are generally the responsibility of the property owner, and city staff will issue citations for repair. Conditions of public repair/city contractors are unclear.

Appendix B – Responses from Kansas City Sidewalk Repair Program Manager Uday Manepalli

Sidewalk Manager in KCMO

Can you describe the process and experience of city staff taking over responsibility for sidewalk repairs? What were the major stumbling blocks? What were some of your successes?

> When the City passed the Bond, one of the directives was to repair the backlog (i.e., service request submitted via 311 between 2008-2016). We didn't have inventory of these locations and the magnitude of repair costs. The plan was to complete them by 2025, but with improved processes we are able to get this done by end of 2023. Stumbling blocks would be not understanding the magnitude of the problem we inherited.

How do you track/prioritize sidewalks for repair? How is the city made aware of sidewalk conditions that require repair?

> Our initial list came from the backlog. We are working parallel on Sidewalk Comprehensive plan (includes sidewalk condition, equity, access and connectivity, public support, ped demand and safety)which adopted by City Council will focus on Network Prioritization, tripping hazards. We are currently inspecting sidewalks throughout the City and update them in our Asset Management System. https://www.kcmo.gov/city-hall/departments/public-works/sidewalks/sidewalk-design-inspections

What are the standards used by the city to measure the condition of the sidewalks? How were the point values decided when creating the "systematic inspection prioritization point system"?

> We classified out of repair into 10 categories vertical deflection (trips) less than ½ inch, ½ to 1 inch, over 1 inch; horizontal cracks less than ¼ inch, ¼ to ½ inch, more than ½ inch; surface condition – obstruction, overgrowth, ponding, and spalling. Each panel is categorized based on these defects. Priority being vertical deflection. We also capture the trees which cause the vertical deflection of the sidewalks. A prioritized score is then used.

Do you feel sidewalks are in general in better condition now than when they were private responsibility? If the condition has improved, do you feel that it has been worth the cost to the city?

> I cannot quantitatively make a statement that they were better as we didn't have data. However, we have significant areas in the City who wouldn't be able to afford the repairs. There has been significant difference, but, it'll get better over time.

What is the cost of repair for different sidewalk repairs? Ex grinding down high spots, full replacement, etc.

> We prefer shaving instead of grinding due to grooves left by grinding and thus making it not ADA compliant. The cost of shaving is 4 times less than spot repairs. If a block is over 60% of spot repairs, it is economical to perform full replacement. An average cost of 4" sidewalk sq. ft is $15.00.

How does the city manage street tree maintenance when it may be the cause of sidewalk degradation?

We worked on a pilot program with partnering with university UMKC and Rubberway and this seems the way to move forward regarding trees. Please find the details and report here:

https://www.kcmo.gov/city-hall/departments/public-works/sidewalks/sidewalks-special-initiatives

Our previous process is a City Forester reviews the trees and determines if the tree needs to be taken out. For every tree taken out we have to plant 'X' number of trees based on the diameter of the tree (this was previously 2 per tree). We plan to save trees and provide safer walking path.

Since the start of the 2017 pilot program, what would you improve on either in the beginning stages or now a few years later?

Having the inventory and understanding the magnitude of the problem would be something I'd go back to in the beginning stages.

We will be using a variety of tools to address the issue and one size won't fit all – like shaving, spot repairs, network connections, replacement etc. This will be seen in the next 4-5 years.

Appendix C – City of Nashville Public Works Responses on Sidewalk Program

You reached out at a very interesting time for sidewalks in Nashville. A lot of laws have been passed here since 2015 that may have significantly changed the situation compared to what you found in the report. We recently had a federal appeals court rule against some of our sidewalk requirements in new construction, so I think we're still trying to figure out how this will affect how we move forward. It might be hard to get concrete answers to your questions that fit in neatly with other cities (assuming you're reaching out to everyone in the report) since procedures around sidewalks in residential permits are likely in flux right now, and we're approaching a mayoral election next month that will bring a new administration following a campaign cycle that has focused heavily on infrastructure, transportation, and affordable housing in areas throughout the city that have access to neighborhood amenities i.e. sidewalks.

I'll be straightforward and note that I'm far from an expert on our sidewalk ordinances and have only been working for the Metro Nashville Planning Department for around 9 months so far, meaning I wasn't involved with the passing of any historic sidewalk legislation, but I'd be happy to try and fill you in with anything I can provide. I know a bit about the urban forestry ordinances and how we use the Capital Improvements Budget to identify infrastructure that needs improvement or repair, but not much on how they interact with sidewalks specifically as of yet. I will say that I commute and do almost all of my errands on foot since I don't have a car, so I do have a lot of experience navigating our very car-dependent city using the sidewalks.

If you're interested, I could take a little time to fill in some of my info gaps and see what I can figure out. I have a lot of ideas for starting points to try and get to the bottom of your questions, but don't have a lot of answers ready to go at the moment. I'm also happy to try and identify somebody else to connect you with who may be more experienced/knowledgeable, but I don't know how available or responsive they'll be.

Let me know what you're thinking and I'll see what I can do to help!

Best,

Austin Fernandez
Research Planner 1
Advanced Planning and Research
Metro Nashville Planning Department

Other Nashville City Staff Responses:

What were your major stumbling blocks and successes?

> As Austin referenced, passing our now-on hold sidewalk ordinance was a major success, and the appeals court ruling is a major stumbling block. In 2017, our council passed a sidewalk ordinance requiring developers on major roadways to either construct sidewalk or pay an in-lieu fee (for sidewalk to be constructed nearby) as a condition of receiving a building permit. The ordinance was challenged, upheld, appealed, and now ruled unconstitutional, at least in that case. We stopped requiring sidewalk/in lieu fees immediately after the decision earlier this summer. Unclear whether we'll have to refund fees/costs since the ordinance went into effect—or if the ordinance will be upheld/reestablished in future.

How is the city made aware of sidewalk conditions that require repair?

> Nashville has a great complaint/reporting tool (our 311) called hubNashville where community members can report sidewalk damage and request repair. NDOT staff, consultants, and crews/contractors respond to these requests. We're also in the process of updating our sidewalk inventory as an update to our ADA transition plan, prioritizing that inventory—and repairs—using the same factors as our 3-year work plan projects from the 2022 WalknBike plan: 1) safety (crash history), 2) transit access (proximity to transit stops), 3) connectivity (filling gaps), and 4) social vulnerability (array of demographic factors using our MPO's index)

How do you prioritize sidewalks for repair?

> Using the same 4 factors as construction (see above)—though the pipeline for repairs is less predictable, so there is somewhat of a first come first serve element.

Do you feel sidewalks are in general in better condition now than when they were private responsibility? If the condition has improved, do you feel that it has been worth the cost to the city?

> This wasn't a recent transition for us, so I can't speak to this—however, I would say that we have already seen a negative impact now that we are unable to require sidewalk construction/in lieu fee, in that development applications are moving through our land use review process while we are unable to require sidewalk. Echoing Austin's point, I will say that in general there is broad support for sidewalk funding in Nashville—as it's widely acknowledged that we're lacking sidewalk. This tells me that 1) sidewalks are still seen as underfunded and 2) existing and even increased costs are worth it to the city organization and community.

Appendix D – LiveMove Sidewalk Condition Inventory Write Up

LiveMove Sidewalk Condition Inventory Write-Up

1. Project Overview

   The Eugene Sidewalk Inventory was undertaken to document instances of damage along public sidewalks in the City of Eugene. The main animating theory was that while the city possessed knowledge of the location of sidewalks and had an understanding of the severity of damage along the city's sidewalks, city staff desired data as to the specific locations and features of the damage. Similarly, it was communicated to the LiveMove team that the city desired information about the type and placement of crossing treatments.

   A student team was assembled in Fall 2022 to design a survey and research best practices for data collection. The team researched municipalities which had undergone similar inventories, as well as relevant statutes from federal sources, including Americans with Disabilities Act (ADA) design guidelines. These best practices were used to inform the design of an in-field survey tool which could be used to record data. Student data collectors were trained in early February 2023 and began collecting data. Data collection ran through the end of May 2023, at which time the project transitioned into its next phase, which included preparation of materials for public display and hand off to city staff.

2. Methodology
   - Fall – Survey Creation

     Throughout Fall 2022, student researchers worked to design a data collection tool to assess and document the condition of sidewalks and the types and locations of crossing treatments.

     Sidewalks

     The sidewalk data collection survey was designed to be accessible and comprehensive. Criteria for measurement were identified in other municipalities' sidewalk inventory processes, as well as ADA design guidelines and certain other national transportation policy sources (including Federal Highway Administration and NACTO). The following municipalities' design guidelines and sidewalk inventory practices were consulted: City of San Diego, City of Seattle, New York City, as well as others.

     Drawing on best practices and availability of technology, the student team elected to create a survey in the ArcGIS Survey 123 smartphone app. This would allow for instantaneous creation of a GIS feature layer of sidewalk observations. Survey questions related to criteria of interest. The decision was made to limit available responses to survey questions in order to ensure fidelity of data for hand-off. This required parsing measurement criteria into 'buckets' that would be narrow enough to be of value without overwhelming the data collector. A catch-all survey question was appended to the survey to allow for students to record additional notable features of the sidewalk or crossing record.

Note: The data collection tool was designed to record percent grade for running slope and cross slope. However, the actual measurements recorded by student data collectors were in degrees. This is because the level tool on smart phones measures degrees, not percent grade. This was not discovered until late in the data collection process. However, it is likely that this will not significantly impact the major use of this data. Because the degrees as measured are consistently lower than the equivalent percent grade, no running slope or cross slope measurements were recorded in error. The slope measurements using degrees likely under-counted instances of measurable slope.

Conversions for degrees and percent grade are presented below:

1 degree	=	1.70%
2 degrees	=	3.49%
3 degrees	=	5.24%
4 degrees	=	6.99%
5 degrees	=	8.74%

Crossing Treatments

Crossing treatments were identified from transportation policy documents, as well as from City of Eugene documents. Ultimately, the decision was made not to include traffic calming devices or infrastructure as independent criteria, since while they were related to pedestrian safety, they were not always present at curb cuts or intended crossing areas. However, an 'Other Treatments' category was appended to the survey to allow data collectors to record such improvements where they felt it necessary, as well as other types of pedestrian-friendly improvements not captured by the rest of the survey.

- Winter/Spring – Data Collection

  Trial Runs and Training

  Data collection began in January 2023. The student team responsible for the creation of the survey began collecting data collection trial runs to inform best practices for other student data collectors and identify any issues with the collector app. During trials, student data collectors identified that the size categories did not match observed paver sizes. Paver size options were changed to "5ft x 5ft", "2.5ft x 2.5ft", and "Other" after consultation with city staff about the standard dimensions of pavers found throughout the city.

  Following these trial runs, a training presentation was developed to standardize data collection methods and ensure data fidelity throughout. Students were introduced to sidewalk condition measurement and identification of crossing treatments.

Of importance is that students were instructed to record each 'instance of damage,' which was defined as any contiguous damage and/or damage from the same source, such as a tree root, impacting several pavers. An 'instance of damage' might be restricted to a single crack in a single paver or might refer several broken pavers along a contiguous stretch, or even to a whole block length (i.e., an instance of an entire block face having all pavers at the same gradient of cross-slope was noted as one record). Students were instructed to record each criterion at their most significant point within a given instance of damage.

Students were also instructed to treat each 'arm' or 'branch' of an intersection as an independent point for the purposes of collecting crossing treatment data. A given intersection could therefore have one or no data points, or four or more depending on the intersection. ArcGIS geo-location built into the survey app helped to distinguish crossing records along different sections of an intersection.

3. Data Collection and Cleaning

Student data collectors assigned themselves to zones using this map. Each data collector completed a one-hour trial run after which the coordinator would make notes and suggestions and authorize further collection. In-field data collectors worked up to eight hours per week within their assigned zone through May 14th. Regular email updates were sent to student data collectors, including reminders about data collection best practices. A student coordinator ensured data quality via regular checks and "cleaning" of data using an ArcGIS online dashboard. Notable issues or common data entry mistakes were communicated to student data collectors by the coordinator.

Criteria Measured

- Sidewalks

  Sidewalk condition records contain the following criteria measured for overall passage and specific instances of damage as noted in ADA guidelines and/or found in other municipalities' inventories. An 'instance' of sidewalk damage was any area affected by a similar or the same condition, such as tree roots or other continuous breakage. Certain 'instances of damage' recorded were limited to a single paver (i.e., a crack in a standard 5x5 paver), while others encompassed entire block faces (i.e., instances where all pavers on a given block face had the same notable cross-slope).

  A visual guide to sidewalk conditions as recorded can be found here. This field guide was made available to data collectors for reference in the field, particularly for measurements of Surface Condition, which required a high degree of subjectivity.

  Sidewalk criteria recorded included:

  Passage is a measurement of the passable width of a sidewalk. Narrow sidewalks can impede mobility. ADA design guidelines specify no less than 48 inches of passable width. Passage was measured at its narrowest point for a given instance of damage.

Passage was recorded as: “Less than 48 inches,” “48 inches or wider.”

Obstructions are the objects impacting passage. Obstructions observed included post or pole, fire hydrant, vegetation, and other types.

Uplift is the difference between two sidewalk slabs. Uplift was measured at its highest point for a given instance of damage. Uplift was measured as the distance between the lower paver and the higher paver, not from the ground to the higher paver.

Uplift was recorded as: “1/4 inch or less,” “1/4 to 1/2 inch,” “1/2 inch or greater.”

Cross-slope is the grade of the sidewalk perpendicular to the direction of travel. It is common for sidewalks to have some grade to manage stormwater and runoff. ADA guidelines specify a maximum allowable cross-slope of 2%.

Cross-slope was recorded as: “<2%,” “2% or greater.”

Running slope is the grade in the direction of travel. Running slope can be difficult to measure on hills. Data collectors were instructed to note if the instance of damage being recorded was taken on a hill.

Running slope was recorded as: “5% or less,” “5% to 8%,” “8% or greater.”

Surface condition is a measurement of the overall quality of the sidewalk paver(s) being recorded. Surface condition was assessed on a five-point scale with a high degree of subjectivity:

Perfect/Very Good – No defects or nearly no defects and no surface conditions that would impact mobility; for instance, freshly laid concrete.

Good – Sidewalks have some cracks or other imperfections, but not to the degree that they present immediate significant mobility concerns. This included sidewalks which had hairline cracks.

Moderate – Sidewalk has some deterioration which may currently or immediately present mobility challenges. ‘Moderate’ sidewalks often had significant chipping along edges and/or cracking but were mostly intact.

Poor – Sidewalk presented immediate mobility concerns and/or risk near term deterioration. Includes sidewalks with a gap between pavers of ¾ inch or greater. ‘Poor’ sidewalks were often significantly broken, including missing sections, holes, or deep and/or wide cracking.

Critical – Sidewalk has significant damage or other conditions which make it nearly completely impassable for individuals on mobility-assistance devices. Includes sidewalks with a gap between pavers of ¾ inch or greater.

- Crossing Treatments

Crossing treatments were measured at each 'arm' of an intersection where curb cuts were present. Crossings were not recorded where curb cuts were not present, or in instances where curb cuts were present, but no treatment was. A visual guide to crossings as recorded can be found here. This field guide was made available to data collectors for reference as needed.

Raised Crosswalks – Elevated crossing space to improve visibility for both pedestrians and drivers, these also slow down drivers. The crosswalks may be paired with paints or off-color materials to improve visibility.

Bump Outs – A reshaped curb or sidewalk that protrudes into the space of the road to reduce distance to cross a street and improve visibility. Also known as 'Curb Extensions.'

Parking Restrictions on Crosswalk Approach – Reduces the number of visual barriers for pedestrians wanting to cross and oncoming traffic.

Advanced Signage – Signage in advance of a crossing which gives drivers more advanced notice of changing conditions, providing them with enough time to slow down.

In-Street Signage – Signage, often brightly colored, to denote the location of pedestrian crossings. This signage is placed at the site of the crossing.

Pedestrian Hybrid Beacon – A combination of lighting and signage that is designed to get drivers' attention in high traffic, low visibility, or otherwise treacherous crossing locations. Also known as 'Stutter Flash.'

Pedestrian Refuge Island – infrastructure that allows pedestrians to wait safely midway through the intersection. Also known as 'Crossing Islands.' Present at 'Angular Crossings' (as denoted by the city) but not marked as such.

Painted or Marked Crosswalk – These crosswalks denote where pedestrians are crossing and give drivers visual cues on where to stop while arriving at an intersection. No distinction was made between differing patterns of crossing paint.

Pedestrian Crossing Signal - Lights that specifically indicate to pedestrians the appropriate time to cross.

Stop Lines – Lines that denote where vehicles must stop at an intersection when pedestrians are present.

Other – Treatments not listed above. This included traffic calming devices such as 'Chicanes' and 'Traffic Circles.' Other observations included bollards and temporary protections.

4. How to Use this Data

The LiveMove Sidewalk Condition Inventory is not a complete inventory of existing sidewalks or sidewalk conditions to be found throughout the City of Eugene. Time and staffing issues limited the amount of area able to be covered. However, the data collected can be used to aid in prioritization of sidewalk repairs within the area where data was collected.

The data that was collected falls primarily between Jefferson Street and Fairmount Blvd west-east, and Fifth Avenue to 24th Avenue north-south. Additional data was collected in the Whittaker, College Hill, and South Eugene neighborhoods. These areas are among if not definitely the most densely and heavily populated areas of the city, and certainly among the highest trafficked by pedestrians. Certain projects of interest to the City of Eugene may take place primarily within a neighborhood or block where data is present, allowing the city to assess sidewalk conditions along the project area in addition to other considerations.

The sidewalk condition data was saved to an ArcGIS-compatible map layer. This layer is searchable and 'filter-able,' in that certain data values can be selected for. This allows for highlighting sidewalk panels which were observed to be ADA non-compliant within the survey zone. This may allow for limited prioritization of projects, or for independent verification in cases in which sidewalk quality may be at issue. It is also useful to be able to highlight the severity of damage noted by LiveMove data collectors. Even in a partial survey, it is clear that sidewalk quality varies, and indeed damage to sidewalk pavers is quite severe in cases.

Lastly, the data also includes information on crossing treatments within the survey area. While the data is not a complete survey of all curb cuts or intended crossings within the city, it provides useful information about existing pedestrian crossing infrastructure along many of the high traffic streets and roads within the downtown core and University area.