Better On-Street Bus Stops

DETAILS

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TCRP
SYNTHESIS 117

TRANSIT COOPERATIVE RESEARCH PROGRAM

Better On-Street Bus Stops

Sponsored by the Federal Transit Administration

A Synthesis of Transit Practice

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

TRANSIT COOPERATIVE RESEARCH PROGRAM

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Better On-Street Bus Stops

A Synthesis of Transit Practice

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SUBJECT AREAS
Public Transportation • Operations and Traffic Management • Terminals and Facilities

Research Sponsored by the Federal Transit Administration in Cooperation with
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TRANSPORTATION RESEARCH BOARD

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TRANSIT COOPERATIVE RESEARCH PROGRAM

The nation's growth and the need to meet mobility, environ-mental, and energy objectives place demands on public transit systems. Current systems, some of which are old and in need of upgrading, must expand service area, increase service frequency, and improve efficiency to serve these demands. Research is necessary to solve operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the transit industry. The Transit Cooperative Research Program (TCRP) serves as one of the principal means by which the transit industry can develop innovative near-term solutions to meet demands placed on it.

The need for TCRP was originally identified in *TRB Special Report 213—Research for Public Transit: New Directions*, published in 1987 and based on a study sponsored by the Federal Transit Administration (FTA). A report by the American Public Transportation Association (APTA), *Transportation 2000*, also recognized the need for local, problem-solving research. TCRP, modeled after the longstanding and successful National Coopera-tive Highway Research Program, undertakes research and other technical activities in response to the needs of transit service providers. The scope of TCRP includes a variety of transit research fields including planning, service configuration, equipment, fa-cilities, operations, human resources, maintenance, policy, and administrative practices.

TCRP was established under FTA sponsorship in July 1992. Proposed by the U.S. Department of Transportation, TCRP was authorized as part of the Intermodal Surface Transportation Effi-ciency Act of 1991 (ISTEA). On May 13, 1992, a memorandum agreement outlining TCRP operating procedures was executed by the three cooperating organizations: FTA, the National Academy of Sciences, acting through the Transportation Research Board (TRB); and the Transit Development Corporation, Inc. (TDC), a nonprofit educational and research organization established by APTA. TDC is responsible for forming the independent governing board, designated as the TCRP Oversight and Project Selection (TOPS) Committee.

Research problem statements for TCRP are solicited periodi-cally but may be submitted to TRB by anyone at any time. It is the responsibility of the TOPS Committee to formulate the re-search program by identifying the highest priority projects. As part of the evaluation, the TOPS Committee defines funding levels and expected products.

Once selected, each project is assigned to an expert panel, appointed by TRB. The panels prepare project statements (requests for proposals), select contractors, and provide technical guidance and counsel throughout the life of the project. The process for developing research problem statements and selecting research agencies has been used by TRB in managing cooperative re-search programs since 1962. As in other TRB activities, TCRP project panels serve voluntarily without compensation.

Because research cannot have the desired impact if products fail to reach the intended audience, special emphasis is placed on disseminating TCRP results to the intended end users of the research: transit agencies, service providers, and suppliers. TRB provides a series of research reports, syntheses of transit practice, and other supporting material developed by TCRP research. APTA will arrange for workshops, training aids, field visits, and other activities to ensure that results are implemented by urban and rural transit industry practitioners.

The TCRP provides a forum where transit agencies can coop-eratively address common operational problems. The TCRP results support and complement other ongoing transit research and training programs.

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Cover figure: Multiple berths at a single bus stop. Photo courtesy of WMATA.

FOREWORD

Transit administrators, engineers, and researchers often face problems for which information already exists, either in documented form or as undocumented experience and practice. This information may be fragmented, scattered, and unevaluated. As a consequence, full knowledge of what has been learned about a problem may not be brought to bear on its solution. Costly research findings may go unused, valuable experience may be overlooked, and due consideration may not be given to recommended practices for solving or alleviating the problem.

There is information on nearly every subject of concern to the transit industry. Much of it derives from research or from the work of practitioners faced with problems in their day-to-day work. To provide a systematic means for assembling and evaluating such useful information and to make it available to the entire transit community, the Transit Cooperative Research Program Oversight and Project Selection (TOPS) Committee authorized the Transportation Research Board to undertake a continuing study. This study, TCRP Project J-7, "Synthesis of Information Related to Transit Problems," searches out and synthesizes useful knowledge from all available sources and prepares concise, documented reports on specific topics. Reports from this endeavor constitute a TCRP report series, *Synthesis of Transit Practice.*

This synthesis series reports on current knowledge and practice, in a compact format, without the detailed directions usually found in handbooks or design manuals. Each report in the series provides a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems.

PREFACE

By Donna L. Vlasak
Senior Program Officer
Transportation
Research Board

This synthesis reports on major issues and successful approaches that address on-street bus stops from the transit agency's perspective and also includes some customer perspective. It documents the current state of the practice with regard to actions taken to address constraints and improve on-street bus stops. This synthesis is intended for transit operators.

A literature review and detailed survey responses from 48 of 60 transit agencies surveyed, yielding a response rate of 80%, are provided. Also, six case examples offer additional details on challenges, solutions, bus stop design and location, lessons learned, and successful strategies that achieved an agency's goals.

Daniel K. Boyle, Daniel Boyle & Associates, Inc., San Diego, California, collected and synthesized the information and wrote the report, under the guidance of a panel of experts in the subject area. The members of the topic panel are acknowledged on the preceding page. This synthesis is an immediately useful document that records the practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As progress in research and practice continues, new knowledge will be added to that now at hand.

CONTENTS

BETTER ON-STREET BUS STOPS

SUMMARY

One of the unique aspects of bus transit is that the interface with the customer begins at multiple locations scattered throughout the service area. These locations, known as bus stops, are often controlled by local jurisdictions rather than by the transit agency. Local jurisdictions and transit agencies share responsibilities concerning stop location decisions, stop installation, and stop maintenance.

Bus stops were not always accorded high priority by either the transit agency or the local jurisdiction. However, this situation has changed in recent years. The location, size, and design of bus stops have far-reaching impacts on customers and on transit operation in areas such as safety, accessibility, convenience, and attractiveness. Despite these impacts, which vary in urban, suburban, and rural locations, little research exists to offer bus stop guidance for transit agencies. Many research efforts have been written primarily from a traffic engineer's perspective. The purpose of this synthesis is to report on major issues and successful approaches that address on-street bus stops from both the transit agency's and the customer's perspective. The bus stop is where the customer's journey on transit begins.

What makes a good bus stop? Basics include room for the bus to pull in to the curb and to pull out into traffic, pedestrian accessibility, street design, passenger information, customer amenities, access for passengers with disabilities, and roadway/curbside design that takes account of the weight of a transit bus. Figure 1 is a schematic developed by Metropolitan Transportation Authority (MTA)–New York City Transit and the New York City Department of Transportation for the ideal bus stop.

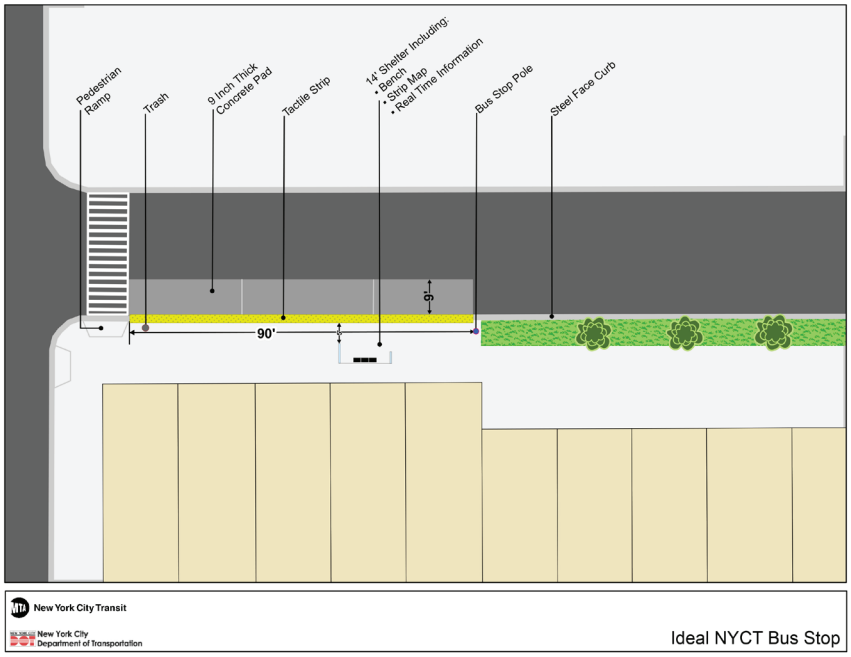


FIGURE 1 Schematic of an ideal bus stop.

Not every bus stop resembles this schematic because the real world imposes constraints. The survey of transit agencies was important in defining the current state of the practice with regard to actions taken to address constraints and improve on-street bus stops. The sampling plan involved a sample of 60 transit agencies. Forty-eight completed surveys were received from the 60 agencies in the sample, a response rate of 80%.

Case examples provide additional details on challenges, solutions, bus stop design and location, and lessons learned. Six agencies were selected as case examples:

- Austin, Texas: Capital Metro
- Columbus, Ohio: Central Ohio Transit Authority
- New York, New York: MTA–New York City Transit
- Portland, Oregon: TriMet
- San Francisco, California: Golden Gate Transit
- Washington, D.C.: Washington Metropolitan Area Transit Authority

Major findings of this synthesis include the following:

- **Absence of sidewalks, conflicting curbside uses, and concerns of property owners are among the major challenges facing transit agencies as they attempt to improve bus stops.** Coordination with local governments, absence of sidewalks, and obtaining sufficient right-of-way were the most common responses to an open-ended survey question asking for the one major challenge facing transit agencies.
- **Cooperation and partnerships with local municipalities, counties, and states are vital to the success of any efforts to improve on-street bus stops.** Survey results indicate that 56% of transit agencies have good or very good relationships with the primary city served, but only 41% have good or very good relationships with other municipalities within their service area. These other municipalities tend to be less urban, with fewer pedestrian amenities and a higher priority for automobile traffic than for transit. The case examples suggest that going beyond cooperation to a partnership arrangement (where each side benefits from the other's actions) has been important in achieving success. For example, the transit agency can place bus stop improvements in the context of pedestrian improvements, streetscape projects, and municipalities' other priorities, but it first needs to understand these priorities. Establishing good relationships builds trust on bus stop issues. These partnerships can create a shared vision of bus service stops and amenities, identify funding opportunities, obtain a seat at the table for the transit agency when streets are redesigned and private development is proposed, and develop expedient permitting approaches, all of which aid the implementation of successful bus stop improvements.
- **Bus stop lengths reported by most agencies are shorter than the guidelines cited in the literature review** of 90 ft farside, 100 ft nearside, and 150 ft midblock. Several agencies agreed with the guidelines in specifying longer lengths (most often 20 ft longer) for nearside stops than for farside. Many agencies report that they make the best of whatever space is available for a bus stop.
- **Farside is mentioned three times as often as nearside as the preferred stop location, but the actual decision making is more nuanced.** Subsequent responses indicated that many agencies that responded "depends on specific location" do have a general preference for either farside or nearside, and agencies reporting a specific preference do make exceptions at specific locations. In older parts of the service area, stop locations have been inherited from the previous operator, sometimes going back to the days of streetcars.
- **Agencies that have developed their own bus stop design guidelines emphasize the importance of this process.** A common theme in case example "lessons learned" is the usefulness of having locally developed guidelines that an agency can give to a municipality or a developer as a model of how projects can be designed to accom-

modate bus stops. The municipality or developer is more receptive to guidelines that are responsive to local conditions and express what the transit agency needs. If a bus stop is 75 ft long but needs to be 100 ft, case example agencies have found that their own guidelines receive a better response than national studies. One agency suggested developing diagrams and templates in computer-aided design (CAD) so designers can easily incorporate the bus stop improvements and proper clearances into their plans. A by-product of the process was the education of agency staff on bus stop issues.

- **A successful effort to improve bus stops brings together various departments within the transit agency.** Each department brings its own perspective to bus stop improvements, and participation by operations, safety, and planning departments builds internal consensus and ultimately strengthens the bus stop improvement plan.
- **Assessments of the success of actions taken are generally positive.** Most respondents (53%) rated their actions as "somewhat successful" and 27% rated their actions as "very successful." Specific successful actions described in chapter four include cost-sharing arrangements, agreements with municipalities and developers to provide bus stop improvements, and pursuit of funding opportunities that benefit all parties. Primary benefits are better customer access to stops, an improved customer experience at stops, and improved customer safety. The major drawbacks are budgetary impacts and required staff time.
- **Streamlined and simplified approval processes, legal authority to establish bus stops where needed, and better coordination with local governments were most frequently mentioned** in response to the question: "If you could change ONE aspect in the process of designing and locating bus stops, what would you change?" Respondents also mentioned standardized procedures across municipalities.
- **The priority agencies place on bus stop improvements affects the success of these efforts.** If the agency does not place a high priority on improving bus stops, neither will anyone else.
- **Customers value information at bus stops.** The most common customer request for additional information at stops is for real-time information about next-bus arrival, followed by schedule information. Most responding agencies have or are in the process of implementing or planning real-time information at bus stops.
- **Lessons learned emphasized ongoing external communications that begin prior to a major bus stop improvement project, partnerships to facilitate a clear understanding of each agency's priorities and requirements, and a multidisciplinary cross-department approach within the agency.**

The case examples support these findings and identify added themes:

- Support from leadership is crucial.
- Invest the time to make sure that agency staff understands the main principles of the bus stop program.
- Communicate to cities that the transit agency can be a great partner. It is important to highlight the benefits that the community as a whole receives from the development of better bus stops. The transit agency can also be a great funding partner.
- Provide sufficient information at bus stops. Electronic information may be the wave of the future, but riders continue to value schedule information and a route map.
- Create your own bus stop policy and follow it.
- If requested to add a stop, do so thoughtfully. If you are not sure whether to put in a bus stop, do not.
- The process of improving bus stops creates a positive, self-sustaining cycle. As the transit agency does more to make bus stops a community asset, the communities become more responsive.

CHAPTER ONE

INTRODUCTION

PROJECT BACKGROUND AND OBJECTIVES

The location and design of bus stops are critically important elements for efficient bus services. Current and past research efforts provide useful information on this subject, but these reports are often written from a traffic engineer's perspective, and some are dated. While the standard dimensions for bus stops have remained largely unchanged for decades, guidelines do not always recognize that front-mounted bike racks increase bus length and maneuvering space needs (side-mounted racks require more sidewalk space), nor do they necessarily reflect operation of 45-ft coaches and 60- to 62-ft articulated buses, current street design, and current operating practices.

Bus stop quality ranges from poor (Figure 2) to excellent (Figure 3). It is fair to say that most stops fall somewhere in the middle. The location, size, and design of bus stops have far-reaching impacts on customers and on bus transit operation in areas such as safety, accessibility, convenience, and attractiveness. The purpose of this synthesis is to describe major issues and successful approaches that address on-street bus stops from both the transit agency's and the customer's perspective. It documents key barriers to providing better bus stops, and how transit agencies have overcome these barriers. The study identifies successful strategies that achieve the agency's goals.

FIGURE 2 Bus stop example at one end of the scale.

FIGURE 3 Bus stop example at the other end of the scale.

This synthesis explores the following topics:

1. Current dimensional needs for bus stops, including maneuvering distances and multiple berths at stops
2. Facilitation of safe pedestrian and bicycle access
3. Americans with Disabilities Act (ADA) requirements and considerations
4. Cooperation between the transit operator and the agency responsible for the bus stop
5. Passenger information needs at bus stops (way-finding, real-time, etc.)
6. Current practice regarding curb cuts (defined as driveways, not pedestrian ramps) and bus stops
7. Funding options
8. Passenger amenities (shelters, street furniture, lighting, etc.)
9. Bus stops in city, suburban, and rural environments.

Results of a web-based survey of a cross-section of transit agencies in North America document current issues and practices concerning bus stop size, location, and design. The sur-

vey includes transit agency assessments of factors contributing to the success or failure of various strategies to improve on-street bus stops. This synthesis also describes lessons learned and presents guidance for transit agencies and communities.

The synthesis includes a review of the relevant literature in the field. The literature review summarizes major studies as well as reports looking at specific aspects of bus stop location and design in specific places. Many transit agencies have prepared bus stop design guidelines. These have not been included in the literature review because (1) there are so many of them and (2) the availability of the guidelines varies by agency. Bus stop design guidelines are referenced, with a few examples, in the survey results in chapter three and in the case examples in chapter five.

Detailed case examples based on interviews with key personnel at selected agencies are an important element of this synthesis. The case examples profile innovative and successful practices. The concluding chapter reports lessons learned, identifies gaps in information and knowledge, and summarizes emerging research needs.

TECHNICAL APPROACH

The approach to this synthesis included

1. A literature review, aided by a TRID (Transportation Research Information Database) search using several different keywords;

2. A survey of 48 transit agencies, described in the following paragraphs; and

3. Telephone interviews with six agencies selected as case examples.

The survey on actions taken to improve on-street bus stops was designed to solicit information on all aspects of stop size, design, and location, including pedestrian access, amenities, and responsibilities and coordination. Respondents reported challenges, evaluated the success of actions taken, and reported lessons learned. Once finalized by the panel, the survey was posted and pretested. The pretest resulted in minor changes to survey structure, logic, and flow.

FIGURE 4 Survey respondents and case examples. *Source*: Survey results and case examples.

Forty-eight completed surveys were received from the 60 agencies in the sample, a response rate of 80%. The 48 agencies range in size from 12 to more than 3,000 buses operating during peak periods.

Table 1 presents the distribution of responding agencies by size of their operation. Almost 60% of all responding agencies operate between 250 and 999 vehicles during peak service.

TABLE 1
TRANSIT AGENCIES BY SIZE

No. Vehicles Operated in Maximum Service	No. Agencies Responding	% Agencies Responding
Fewer than 250	20	42
250 to 999	20	42
1,000 or more	8	17
Total agencies responding	48	100

Sources: National Transit Database 2011 data, survey results.
Note: Percentages do not add to 100% due to rounding.

Figure 4 presents the distribution of survey respondents across the United States and Canada. Case example locations are also indicated in Figure 4.

ORGANIZATION OF THIS REPORT

Subsequent chapters are organized as follows. Chapter two summarizes the findings of the literature review. Chapter three, the first of two chapters to present the survey results, examines bus stop types, design, and location, pedestrian access, passenger information and amenities, curb cuts/driveways, bus pads, ADA considerations, and challenges.

Chapter four discusses the responding agencies' assessment of actions taken. This chapter describes agency assessment of the success of efforts to provide better on-street stops, benefits and drawbacks, potential improvements, and lessons learned.

Chapter five gives detailed findings from each of the six case examples. The selection process for case examples had several criteria: (1) include transit agencies of various sizes in different parts of North America; (2) include agencies that have taken different approaches to bus stop location and design; and (3) include agencies that provided detailed survey responses and interesting observations.

Chapter six summarizes the findings, presents conclusions from this synthesis project, and offers areas for possible future study.

CHAPTER TWO

LITERATURE REVIEW

INTRODUCTION

This chapter summarizes findings from a literature review related to bus stops. A TRID search was conducted using various keywords to aid the literature review. Reports are grouped into two categories: the big picture and bus stop location and design.

THE BIG PICTURE

Texas Transportation Institute (*1*) developed guidelines for locating and designing bus stops in various operating environments. The guidelines include three sections: the "big picture," streetside design, and curbside design:

- The big picture section of the guidelines (chapter two) addresses the need for cooperation and coordination among stakeholders during bus stop design and location. Such efforts result in mutually satisfying outcomes for diverse interests and can preclude many problems that often arise.
- The streetside section (chapter three) discusses matters such as curb radii, when to consider installing the various bus stop configurations (curbside, transit curb extension, bus bay, open bus bay, and queue jumper bus bay), and different bus stop locations (nearside, farside, and midblock). This section of the guidelines addresses possible effects of bus stop location and design on bus operations and traffic flow. Figure 5 shows an example of streetside stop design, with a stop length of 90 ft for farside stops, 100 ft for nearside stops, and 150 ft for midblock stops. A streetside placement checklist is included at the end of the chapter.
- The curbside section addresses community integration; pedestrian access to bus stops; placement of bus stops in the right-of-way; environmental treatments; bus shelter designs; shelter construction materials; and amenities, such as lighting, benches, vending machines, trash receptacles, telephones, bus route and schedule information, and bicycle storage facilities. Figure 6 shows an example of curbside stop design with various amenities. A curbside placement checklist is included at the end of the chapter.

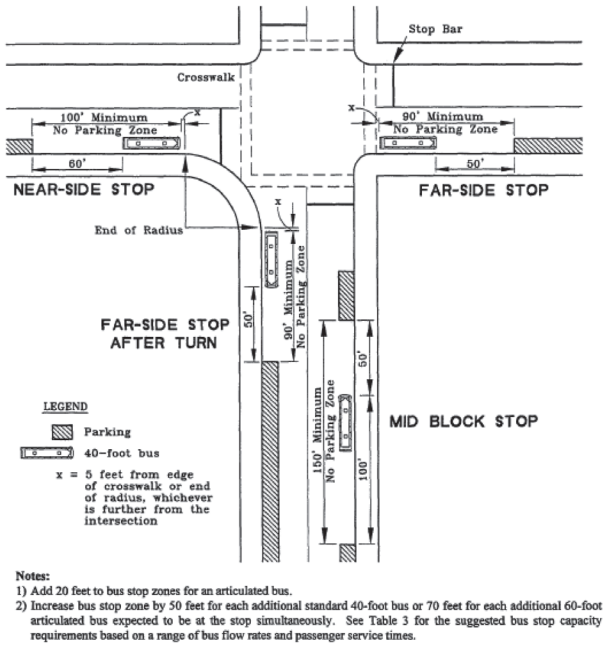


FIGURE 5 Typical dimensions for on-street bus stops. *Source*: Texas Transportation Institute, *TCRP Report 19: Guidelines for the Location and Design of Bus Stops* (*1*, p. 25).

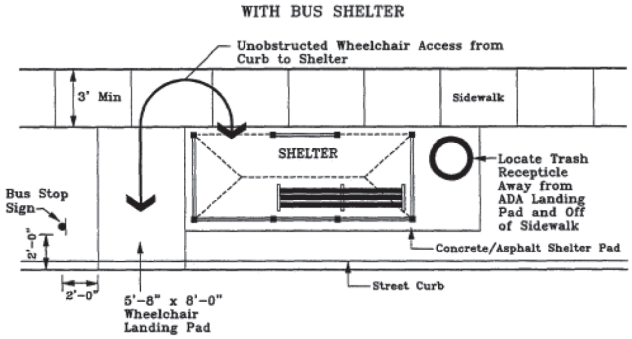


FIGURE 6 Curbside stop design. *Source*: Texas Transportation Institute, *TCRP Report 19: Guidelines for the Location and Design of Bus Stops* (*1*, p. 81).

The study (published as TCRP Report 19) remains the most comprehensive study to date, providing very thorough guidance on the design of all bus stop types.

The Institute of Transportation Engineers (ITE), in conjunction with the Congress for the New Urbanism, pre-

pared a report on the design of walkable urban thoroughfares (*2*) that includes the following minimum dimensions for bus stops:

- Farside: 80 ft plus 5 ft from crosswalk or curb return
- Farside after turn: 90 ft plus 5 ft from crosswalk or curb return
- Nearside: 100 ft
- Midblock: 120 ft.

The Canadian Urban Transit Association (*3*) prepared a handbook addressing bus stops in the context of transit-land use relationships as well as from a transit operations perspective. Recommended bus stop lengths are as follows:

- Farside: 25 m (82 ft)
- Nearside: 30 m (98 ft)
- Midblock: 35 m (115 ft).

The U.S. Department of Justice (*4*) published standards that address ADA accessibility at bus stops. The standards specify minimum areas, slopes, and clearances for bus stop pads (i.e., where passengers in wheelchairs board and alight), shelters, and accessible paths as well as signage standards.

Levinson et al. (*5*) conducted a review of ongoing and completed research reflecting the experience of more than 200 bus priority treatments in the United States and elsewhere. The appendices address bus stop issues.

Levinson et al. (*6*) prepared guidelines for efficient bus use of urban highway facilities based on a review of bus priority treatments in the United States and abroad. This report, which complements an intensive report on the state of the art of bus use of highways, presents the principal findings of 10 study tasks and contains significant bus design parameters, concepts and criteria, planning and design guidelines for principal bus priority measures, and measures of effectiveness associated with bus highway facilities. Bus stops are important in ensuring that bus priority measures work to their maximum capability.

In the past two editions of the *Transportation Planning Handbook* (*7*, 2nd and 3rd editions), ITE included chapters on public transportation. Chapters 14 (Transportation Terminals) and 16 (Transit Planning) of the 3rd edition address bus stops from a transportation engineering perspective. Chapter 13 of the 2nd edition, authored by Thomas F. Larwin, provides a thorough overview of urban transit.

Several TCRP reports have examined bus stops from a variety of perspectives. Fitzpatrick et al. noted two main objectives in their study (*8*): (1) to recommend selected engineering treatments to improve safety for pedestrians crossing high-volume, high-speed roadways at unsignalized intersections, in particular those served by public transportation; and (2) to recommend modifications to the *Manual on Uniform Traffic Control Devices* pedestrian traffic signal warrants. The report noted that the presence of a bus stop is not considered in pedestrian signal warrants, yet the pedestrian environment is a strong factor in transit mode choice. Several agencies address pedestrian issues through bus stop design and location. Along routes with widely spaced signals, transit agencies have no option other than placing stops at unsignalized locations. Worksheet 2 in Appendix A of this report is intended to guide the selection of pedestrian treatments where a major transit stop exists.

In an earlier report, Fitzpatrick et al. (*9*) examined transit curb extensions, which were used in only a limited number of cities at the time of this report. A major advantage of extensions is the creation of additional space at bus stops; this space allows for bus patron amenities such as shelters and benches where the inclusion of such amenities would otherwise be limited. Other advantages of transit curb extensions are reduced crossing distance for pedestrians (which improves safety, especially for pedestrians who are older or have physical disabilities) and reduced bus stop space requirements because no additional room is necessary to maneuver into or out of the bus stop. The study analyzed available space for pedestrians, average pedestrian flow, and impacts on vehicle and bus speeds at the block and corridor level. It found that replacement of a bus stop with a transit curb extension resulted in an increase in bus and vehicle speeds, even though it takes a parking or travel lane away.

The third edition of the *Transit Capacity and Quality of Service Manual* (*10*) explored bus stop issues throughout the document. Chapter 3 of the Manual discusses stop characteristics, including stop spacing, dwell time at stops, and number of bus berths in terms of their effects on capacity, speed, and reliability. Chapter 4 considers stop amenities and the pedestrian environment as important contributors to perceptions of service quality. Chapter 6 analyzes bus transit capacity, with bus stop characteristics as a major determinant. Chapter 10 examines stop and station capacity.

Tyler (*11*) served as editor of a book examining the process of designing an accessible bus system from underlying principles through to practical implementation, monitoring, and evaluation. Bus stop design, interaction with traffic, and urban and rural systems are all examined in some detail. Chapter 4 examines operational impacts of bus stops and Chapter 5 summarizes bus stop infrastructure.

Easter Seals Project ACTION (*12*) released a toolkit addressing bus stop accessibility and safety. Intended for use by agencies responsible for bus stop design and placement, the toolkit was designed to enhance accessibility of specific stops or to serve as a resource in the preparation of a plan to achieve systemwide accessibility. After presenting

principles of bus stop design, the report focused on elements that make bus stops accessible and safe.

Weiner and Singa (*13*) presented an overview of the Project ACTION toolkit and its contents. This paper described how bus stops are a key link in the journey of a bus rider. For people with disabilities, inaccessible bus stops represent the weak link in the system and can effectively prevent the use of fixed-route bus service. Physical, cognitive, and psychological barriers associated with bus stops can severely hamper bus ridership by the disability community, thus limiting their mobility and potentially leading to increased paratransit costs.

APTA prepared a Recommended Practice report about the design of and access to on-street transit stops (*14*). This report provides guidelines in the areas of street connectivity, street design, surrounding land uses, and location and design of stops, and presents good and bad examples in each subject area.

The National Association of City Transportation Officials (*15*) developed the *Urban Street Design Guide*. A blueprint for designing 21st-century streets, the guide unveiled the toolbox and the tactics cities use to make streets safer, more livable, and more economically vibrant. The guide outlined both a clear vision for complete, sustainable streets and a basic road map for how to bring them to fruition. With regard to transit, the guide noted that bus stop planning and design involves thinking about existing and new stops from both the macro framework of system design and the micro level of conditions around the transit stop. Specific guidance for bus stops includes the following:

- Bus stops must have safe access by means of sidewalks and appropriate street crossing locations. Where possible, *pedestrian crossings* will be accommodated behind the departing transit vehicle (e.g., farside stops).
- At major bus stops, cities may enhance the experience of passengers and passersby through the addition of shelters, benches, area maps, plantings, vendors, or artworks.
- *Transit curb extensions* will be applied where *offset bus lanes* are provided, where merging into traffic is difficult, or where passengers need a dedicated waiting area. Where applied, transit curb extensions are to be 40 ft long and at least 6 ft wide with no step to the sidewalk (based on a 40-ft bus). If there is a step to the sidewalk, it is important that the transit curb extension be at least 10 ft in width or be designed to accommodate the length of the wheelchair ramp used on most standard 40-ft buses.
- It is important that information provided to riders at a bus or transit stop include an agency logo or visual marker, station name, route map, and schedule. Bus stops would include a system or route map, or both, and a schedule on the bus shelter or other street furniture.

Among a growing number of studies and reports about complete streets and sustainable urban design, the guide is a current example of incorporating transit needs into the bus stop design process.

BUS STOP LOCATION AND DESIGN

Streetcars usually had nearside stops. When streetcar lines were converted to buses, the nearside stop locations remained (at least initially). In a 1972 report, Kraft and Boardman (*16*) recommended farside bus stops as preferable to a nearside location in terms of travel time savings only when a high volume of right-turning vehicles and cross-street pedestrians are present. Two experiments were conducted in Louisville, Kentucky, to evaluate the effects of moving a bus stop from a nearside to a farside location. Traffic flow and volume measurements taken before and after the stop's relocation are presented.

Several studies have focused on choosing the optimum bus stop location for given situations; however, few have investigated the effects of bus stop design. Fitzpatrick and Nowlin (*17*) analyzed two separate aspects of bus stop design: curbside versus bus bay/open bus bay, and queue jumper versus no queue jumper. The analysis consisted of investigating the relationships between variables such as travel time, speed, and traffic volume for given bus stop designs and locations. The bus stop locations investigated in the curbside bus bay/open bus bay study included midblock and farside.

Levinson et al. (*18*) presented planning and implementation guidelines for bus rapid transit (BRT). The guidelines were based on a literature review and an analysis of 26 case study cities in the United States and abroad. The guidelines covered the main components of BRT—running ways, stations, traffic controls, vehicles, intelligent transportation systems, bus operations, fare collection, marketing, and implementation. The report noted that farside stops are generally desirable for BRT service and are essential when traffic signal priorities for buses are present. Several chapters address traffic engineering issues for BRT and BRT stations and terminals.

In another BRT-related study, Mejia (*19*) developed a new methodology for the design, planning, and assessment of BRT stations based on the review of station design criteria given in literature, using a comparative approach. A proposal for globally applicable levels of service for station design assessment was derived and tested in the context of selected stations from Istanbul's Metrobus BRT system. The results derived from this work are suitable for both the planning process and the ongoing review and improvement of existing BRT systems.

After a critical examination (using a computer-based traffic simulation model) of public transport priority layouts

in the Milan road network, Decio (20) formulated practical micro-design criteria (lane capacity, bus trajectories on curves, bus stop location, terminus design) and made some suggestions about daily highway and traffic operations.

Lin and Demetsky (*21*) identified those elements associated with the location and design of bus stops that affect the efficiency of transit and traffic operations, and developed guidelines to assist transportation engineers and planners in technical and policy decisions concerning bus stops in urban areas. Two nationwide questionnaire surveys, one for city transportation officials and the other for bus transit operators, were conducted to establish a systematic definition of the operational dimensions of a bus stop that could be shown to influence the performance of the traffic and bus transportation systems. Criteria for evaluating bus stop performance were then derived and applied in practical situations in Arlington County, Virginia. The evaluation found that guidelines, not numerical warrants, should be used to determine bus stop location and design. In locating stops, each should be treated individually. Also, right-turn-on-red and on-street parking conflict with bus stop operations.

Bygrave (*22*) developed a tool for assessing bus stop design and accessibility that was originally used for urban bus stops in Bromley, London. After a literature review, an audit framework based on the transport users' viewpoint was developed. It gave scores for information (getting to transport), infrastructure (getting to transport), boarding (ease of use), information (ease of use), environmental (waiting in safety), security measures (waiting in safety), lighting (waiting in safety), quality of environment (waiting in comfort), maintenance and cleanliness (waiting in comfort), and waiting area (waiting in comfort). A questionnaire found that people are most concerned with personal security, availability of information, and finding the bus stop. Recommendations were used to make a successful bid to fund improvements in Bromley. The development of pedestrian environment review software is described.

Silveira (*23*) focused on the development and deployment of user information and wayfinding at bus stops. Matrices summarize the provision of information from site visits at 29 agencies in North America and highlight innovative elements. Recommendations are presented for the conceptualization and development of bus stop signage that integrate many of these innovative elements as well as ADA regulations to improve user information at transit agencies. The appendix pulls together evaluations of all case studies with photographs to illustrate relevant elements.

Brabham et al. (*24*) recognized that the collective intelligence of communities is largely untapped by traditional public participation (P2) methods, which may result in less-than-ideal transit plans that neglect the needs of diverse constituencies. This paper discussed a P2 model using crowdsourcing, drawing from an FTA pilot project focused on the application of crowdsourcing to bus stop design at the neighborhood scale. Next Stop Design was the name coined for this project. The bus stop designs submitted to the Next Stop Design site were imaginative and incorporate many modern technological amenities, although they are not necessarily practical.

Fernandez and Tyler (*25*) discussed the importance of bus stops on bus operations and vice versa, and why bus stops should be included as the central element of bus priority schemes. As a result, the importance of designing bus stops was raised as the most important factor for improving the bus system. A bus spends a large proportion of its time in operation at bus stops, which are the cause of many unnecessary delays because of, for example, interference between buses, difficulties for buses to regain the traffic stream on leaving the stop, and poor coordination of buses at the stops. The importance of bus stop design is then illustrated with examples from simulation models and on-street practice. Results are given that show the types of bus system improvements that can be made with a clear understanding of bus stop operations; for example, which demand pattern will require another berth, when the platform should be extended and by how much, how long the gap should be between berths of a multiple bus stop, and how the bus stop should operate to obtain a given performance.

Taking a slightly different perspective, Lusk (*26*) examined bus stop and bus designs that could lessen the perception of crime based on the aesthetic or architectural features of the bus stop and bus. The study stated: "One of the many reasons people have been unwilling to forgo their cars is they perceive the bus to be unsafe related to crime." The results demonstrate that the participants preferred a bus stop with a shelter that looks like a house, has a pitched roof, and has at least one side fully opened. Other findings addressed the bus design, where clear glass was highly preferred.

Sunderland et al. (*27*) reported on "adopt-a-stop" programs. These programs can alleviate the difficulty that overextended transit agencies face in keeping transit stops clean and safe. A secondary benefit is the development of partnerships between the transit agency and local community groups.

SUMMARY

The literature review summarizes major studies as well as reports looking at specific aspects of bus stop location and design in specific places. Many transit agencies have prepared bus stop design guidelines. These have not been included in the literature review because (1) there are so many of them and (2) the availability of the guidelines varies by agency. The survey results in chapter three and the case examples in chapter five incorporate bus stop design guidelines.

The literature review has been consulted in the development of the survey instrument used to gather input from transit agencies. Results are generally in accord with literature findings but go beyond the literature in the survey's focus on the transit operator's perspective. The conclusions chapter reflects the literature review as well as the survey and case examples. Further research needs have been developed based in part on unclear or conflicting information.

The next two chapters present the results of a transit agency survey about better on-street bus stops. Survey results provide a snapshot of the state of the practice as it exists today.

CHAPTER THREE

SURVEY RESULTS: BUS STOP CHARACTERISTICS

INTRODUCTION

This is the first of two chapters that present the results of a survey of transit agencies concerning better on-street bus stops. The survey solicited information on actions implemented and their effects, challenges, lessons learned, and guidance. The survey asked about the following items:

- Design standards or guidelines for bus stops
- Responsibilities and coordination
- Bus stop design and location
- Stop length
- Stop types
- Pedestrian access to bus stops
- Passenger information
- Amenities
- Bus pads
- Curb cuts
- ADA considerations
- Challenges
- Assessment: lessons learned (addressed in chapter four).

Forty-eight completed surveys were received from the 60 agencies in the sample, a response rate of 80%. The 48 agencies range in size from 12 to more than 3,000 buses operating during peak periods in service areas ranging from 73,000 to more than 8 million in population. Appendix A lists the responding agencies.

This chapter presents survey results about design standards for bus stops, responsibilities and coordination, stop design and location, stop length, types of stops, pedestrian access, passenger information, amenities, bus pads, curb cuts, ADA considerations, and challenges. Chapter four discusses survey results related to the responding agencies' assessment of actions taken.

DESIGN STANDARDS FOR BUS STOPS

Table 2 shows that standards or guidelines for the design of bus stops are common among transit agencies. More than 75% of agencies have developed their own guidelines, and others use guidelines from another transit agency or cited in a TCRP report. Only 38% of agencies make their guidelines available on their website. Most others indicated a point of contact within the agency, and two respondents stated that the guidelines are an internal reference document.

TABLE 2
STANDARDS OR GUIDELINES FOR BUS STOP DESIGN

Standards or Guidelines for Bus Stop Design	No. Agencies Responding	% Agencies Responding
Agency-developed	37	77
Refer to those developed at other agencies or in TCRP reports	7	15
None	4	8
Total agencies responding	48	100

Sources: Survey results.

Bus stop design guidelines address some or all of the following:

- Stop placement (nearside/farside/midblock, installation and safety issues)
- Stop elements (types of stops, length, accessibility, ADA compliance, agency signage, regulatory signage, passenger information, ADA landing pads)
- Stop amenities (shelters, benches, trash receptacles, lighting, bicycle racks, newspaper boxes, landscaping)
- Stop layout and design
- Stop spacing (can also be addressed in service guidelines)
- Roadway design and treatments (lane width, grade, pavement, in-street concrete bus pads, curb height, turning radii, clearance requirements, bicycle lanes)
- Stop access (streetside, sidewalk, and pedestrian issues)
- Transit-friendly design.

Examples from stop design guidelines are shown in Figures 7 through 10. Figure 7 shows a schematic of what happens at a bus stop. Figure 8 presents various configurations of a bus stop with a grass strip between the sidewalk and the street. Figure 9 shows turning radii for transit vehicles. Figure 10 shows elements of a successful transit center at a suburban mall. These examples are typical of what is included in bus stop design guidelines.

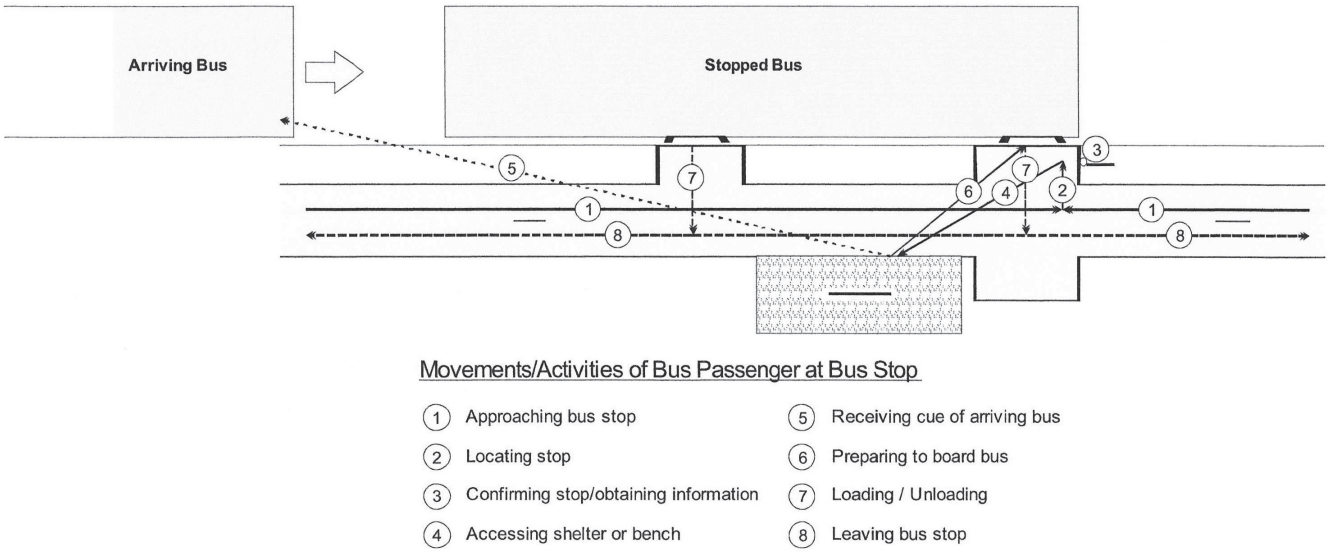


FIGURE 7 Common movements and activities of bus passengers at a bus stop. *Source*: Greater Vancouver Transit Authority, *Universally Accessible Bus Stop Design Guidelines* (*28*).

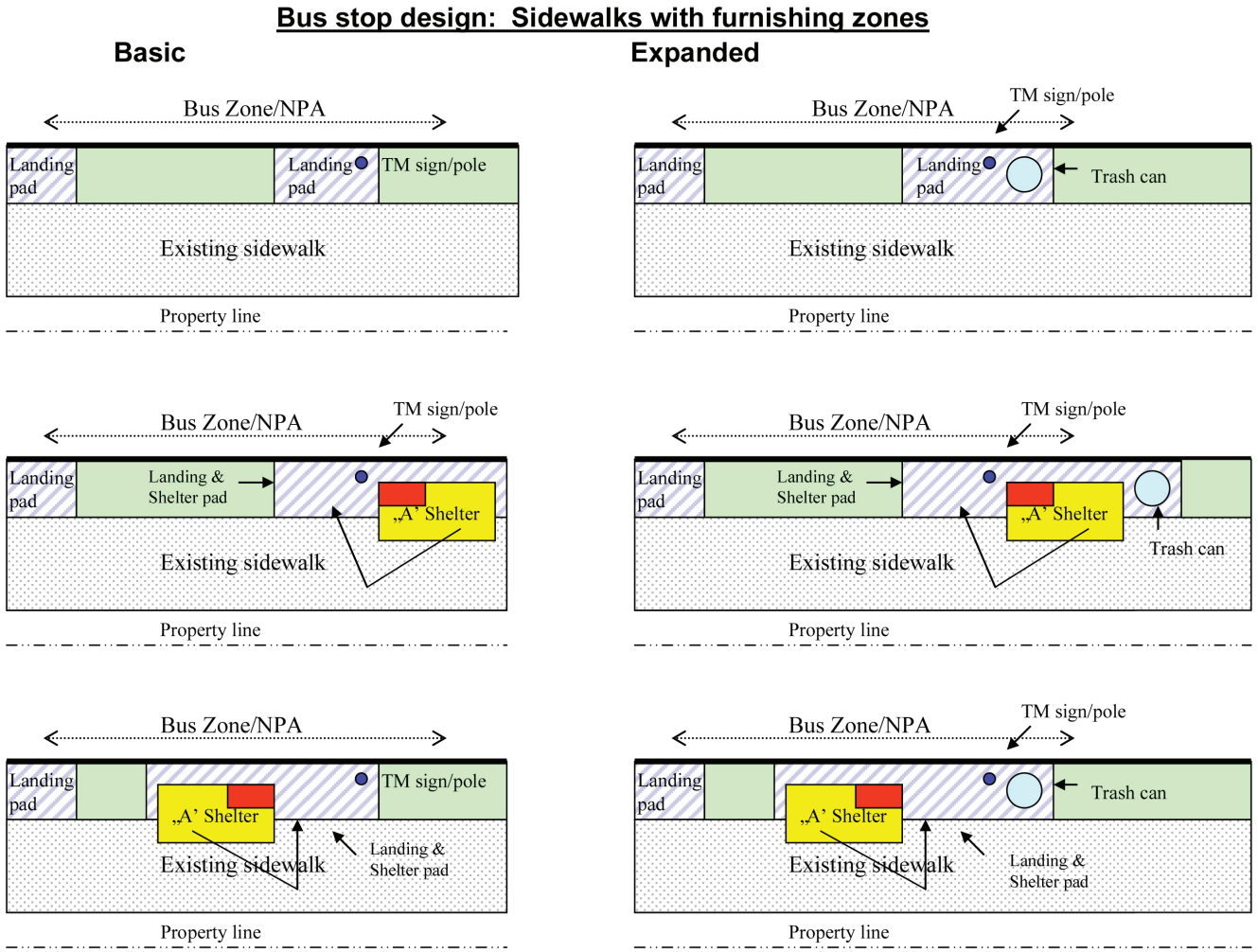


FIGURE 8 Basic and expanded bus stop designs. *Source*: TriMet, *Bus Stop Guidelines* (*29*).

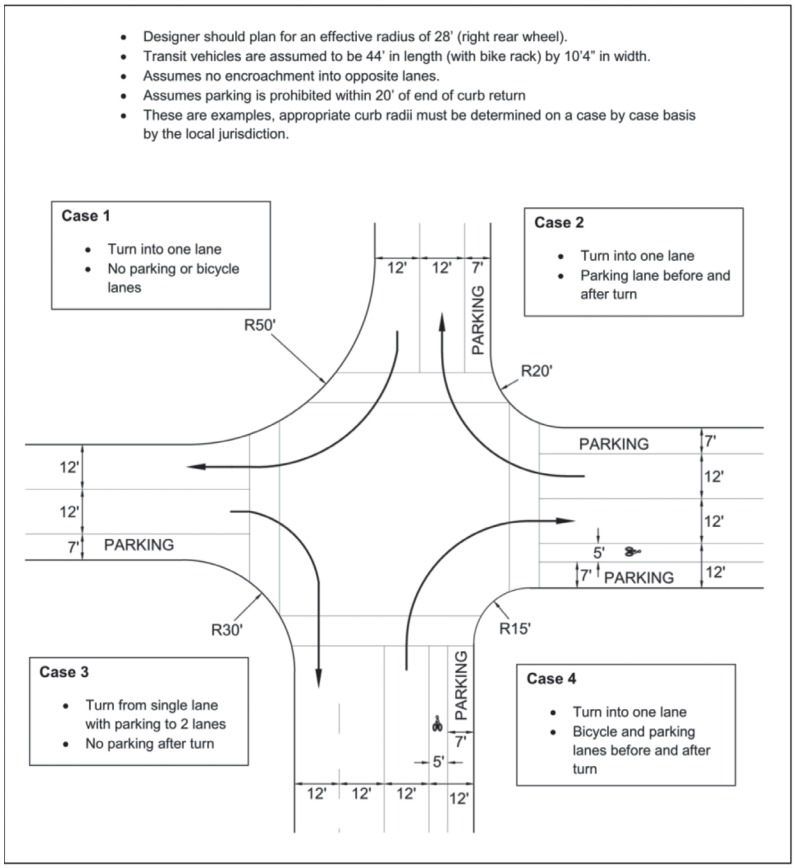


FIGURE 9 Ideal curb radii designs for transit vehicles. *Source*: Central Ohio Transit Authority, *Bus Stop Design Guide* (*30*).

Case Study 3

Elements of a successful transit center at a suburban mall

Suburban malls can be good locations for transit centers or hubs, since they are often served by multiple bus routes and can generate high ridership among both mall customers and employees.

This case study highlights the transit center at King of Prussia Mall, which serves multiple bus routes and includes desirable elements, such as a short bus-only right of way and both indoor and outdoor passenger waiting areas.

Mall transit hubs should be well connected with quality pedestrian paths to mall entrances, and should be placed in visible, well-lit locations. As detailed for case study 2, pavement intended to carry high volumes of buses should be designed to withstand the wear-and-tear that they will generate.

Source: SEPTA 2012. DVRPC 2012

FIGURE 10 Elements of a successful transit center at a suburban mall. *Source*: Delaware Valley Regional Planning Commission, *SEPTA Bus Stop Design Guidelines* (*31*).

RESPONSIBILITIES AND COORDINATION

Responsibility for deciding on the location of bus stops is often shared between the transit agency and the local municipality, as shown in Table 3. Almost one-quarter of respondents indicated that the local municipality has sole responsibility.

TABLE 3
RESPONSIBILITY FOR DECIDING THE LOCATION OF A BUS STOP

Responsible Agency	No. Agencies Responding	% Agencies Responding
Joint decision	17	39
Transit agency	17	39
Local municipality	9	20
Local municipality must approve, transit agency can reject	1	2
Total agencies responding	44	100

Sources: Survey results.

Table 4 presents responsibility for bus stop installation. More than 70% of respondents stated that the transit agency is responsible for installing stops. "Other" responses included: usually the transit agency but not always; transit agency installs bus stop signs and local municipality installs parking regulation signs; responsibility varies by municipality; both are responsible (e.g., agency installs signage and municipality installs shelter; municipality installs signs); and is paid by the transit agency.

TABLE 4
RESPONSIBILITY FOR BUS STOP INSTALLATION

Responsible Agency	No. Agencies Responding	% Agencies Responding
Transit agency	31	72
Local municipality	4	9
Other	8	19
Total agencies responding	43	100

Sources: Survey results.

Table 5 shows that responsibility for bus stop maintenance can be divided in many different ways. Twenty percent of respondents indicated that responsibility is split between the transit agency and local municipality, but the division of specific tasks is different in almost every case.

Respondents indicated that bus stop relocation decisions are made either by the transit agency or jointly between the transit agency and the municipality. Only two respondents in Table 6 reported that the transit agency has no say in stop relocation decisions.

TABLE 5
RESPONSIBILITY FOR BUS STOP MAINTENANCE

Responsible Agency	No. Agencies Responding	% Agencies Responding
Transit agency	18	41
Transit agency and local municipality	9	20
Private contractor	6	14
Local municipality	3	7
Agency, municipality, and private contractor	3	7
Agency, municipality, and property owner	2	5
Agency and private contractor	2	5
Other third party	1	2
Total agencies responding	44	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

TABLE 6
RESPONSIBILITY FOR BUS STOP RELOCATION

Responsible Agency	No. Agencies Responding	% Agencies Responding
Joint decision	21	48
Transit agency	21	48
Local municipality	2	5
Total agencies responding	44	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

The survey asked about the relationship between the transit agency and the primary or largest city in which it operates, with multiple-choice answers permitted. Table 7 shows the results. Fifty-six percent of respondents reported a good or very good relationship.

TABLE 7
RELATIONSHIP BETWEEN TRANSIT AGENCY AND PRIMARY MUNICIPALITY

Relationship	No. Agencies Responding	% Agencies Responding
Very good: meet on a regular basis to discuss issues	9	20
Good: quick response to requests/ open dialogue	16	36
Fair: limited by administrative and funding issues we both deal with	12	27
Could be better: generally unresponsive/requires prodding	3	7
Poor: antagonistic/little communication	0	0
No primary city	2	5
Varies by issue	1	2
Agency is part of the city	1	2
Total agencies responding	44	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

Relationships between the transit agency and other municipalities within its service area are shown in Table 8. Only 41% of respondents reported a good or very good relationship with other municipalities.

TABLE 8
RELATIONSHIP BETWEEN TRANSIT AGENCY AND OTHER MUNICIPALITIES IN SERVICE AREA

Relationship	No. Agencies Responding	% Agencies Responding
Very good: meet on a regular basis to discuss issues	3	7
Good: quick response to requests/ open dialogue	15	34
Fair: limited by administrative and funding issues we both deal with	5	11
Could be better: generally unresponsive/ requires prodding	4	9
Poor: antagonistic/little communication	0	0
Varies by municipality	12	27
Only one city	2	5
No primary city	2	5
Only demand response service in secondary city	1	2
Total agencies responding	44	100

Source: Survey results.

Respondents were then asked if steps had been taken to improve interagency coordination related to bus stops. As Table 9 indicates, the most common responses were outreach to individual agencies as needed and review of site plans for new developments. Many agencies reported a combination of actions.

TABLE 9
ACTIONS TAKEN TO IMPROVE COORDINATION RELATED TO BUS STOPS

Action	No. Agencies Responding	% Agencies Responding
Outreach to individual agencies as needed	15	34
Combination of actions	12	27
Provide comments during review of site plans for new developments	9	20
Attend standing coordination meetings	3	7
Work through the Metropolitan Planning Organization	1	2
Provide comments during review of environmental documents	1	2
Talk daily; meet in field weekly	1	2
Persuade city to exempt agency from building permit fee for shelter	1	2
None of the above	1	2
Total agencies responding	44	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

The actions listed in Table 9 have generally been successful in helping agencies locate bus stops at their preferred location, as shown in Table 10.

TABLE 10
RESULT OF ACTIONS TAKEN TO IMPROVE COORDINATION RELATED TO BUS STOPS

Result	No. Agencies Responding	% Agencies Responding
Very successful	13	30
Moderately successful	25	57
Moderately unsuccessful	2	5
Varies with action	1	2
Not applicable	3	7
Total agencies responding	44	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

The survey asked about financial and institutional barriers to improving bus stops. Table 11 presents the responses about financial barriers. Insufficient capital funding to build or improve bus stops is the major financial barrier.

TABLE 11
BIGGEST FINANCIAL BARRIER RELATED TO BUS STOPS

Financial Barrier	No. Agencies Responding	% Agencies Responding
Lack of capital funds to build or improve stops	21	50
Lack of funds to maintain stops/low priority for municipality	10	24
Lack of local matching funds to build or improve stops	1	2
All of the above	1	2
General lack of funds or funds reduced over time	6	14
No barriers	2	7
Shelter maintenance a low priority for municipalities	1	2
Total agencies responding	42	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

The most frequently mentioned institutional barrier is dealing with multiple municipalities, as shown in Table 12. This was an open-ended question. Internal agency issues also ranked high in terms of institutional barriers. Transit agencies also do not control streets or parking policies. “Other” responses included: required public hearings for stop changes; lack of right-of-way; and unauthorized use of stops by other operators.

BUS STOP DESIGN AND LOCATION

The survey included a series of questions addressing bus stop location and design. Table 13 shows respondents’

stop location preferences. Farside (beyond the intersection) is mentioned four times as often as nearside (before the intersection), but the actual decision making is more nuanced than a multiple-choice question allows. Subsequent responses indicated that many agencies that responded "depends on specific location" do have a general preference for either farside or nearside, and agencies reporting a specific preference do make exceptions at specific locations.

TABLE 12
BIGGEST INSTITUTIONAL BARRIER RELATED TO BUS STOPS

Institutional Barrier	No. Agencies Responding	% Agencies Responding
Multiple municipalities/lack of cooperation and support	9	23
Funding	6	15
Internal agency issues (low priority/ coordination/procedures)	6	15
No transit agency control over street and parking	4	10
Defining responsibilities	3	8
None	3	8
Conflicting interests/lack of interest	2	5
Staff time	2	5
Meeting federal requirements	2	5
Other	3	8
Total agencies responding	40	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

TABLE 13
PREFERRED LOCATION FOR BUS STOPS

Preferred Location	No. Agencies Responding	% Agencies Responding
Farside	21	48
Depends on specific location	15	34
Nearside	5	11
Changing from nearside to farside	1	2
Differs by urban/suburban/rural	1	2
Anyplace but midblock	1	2
Total agencies responding	44	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

The farside/nearside debate has a long history in the transit industry, so it is not surprising that one of the highest response rates (and the longest responses) was to an open-ended question asking agencies to explain the reasoning behind their preferred stop location. Table 14 summarizes responses. The stated reasons match closely with benefits and disadvantages cited in the transit literature.

TABLE 14
REASONING BEHIND PREFERRED LOCATION FOR BUS STOPS

Preferred Location and Reason	No. Agencies Responding	% Agencies Responding
Farside: better for pedestrian safety	16	37
Farside: less delay from traffic signals/ better for traffic signal priority	15	35
Farside: fewer conflicts with turning movements	10	23
Depends on specific location	10	23
Nearside: closer to intersection/operator can see pedestrians	4	9
Nearside: legacy/cultural	4	9
Farside: easier bus access/egress/ requires less space	4	9
Farside: sight distance/visibility	4	9
Nearside: usually a sidewalk/more passenger friendly	3	7
Nearside: avoid pedestrians crossing midblock in front of bus	2	5
Farside at signals, nearside at stop signs	2	5
Farside: no need to stop twice	2	5
Nearside: no need to stop twice	1	2
Farside on wide streets, nearside on narrow streets	1	2
Farside: dwell time savings, bus can depart right away	1	2
Total agencies responding	43	100

Source: Survey results.
Note: Multiple responses allowed; percentages do not add to 100%.

More than 70% of respondents indicated that their agencies always consider safe street crossings in stop location decisions, and almost 90% always consider safe street crossings in urban areas.

The most common additional factors affecting an agency's decisions on stop locations are stop spacing and adjacent land uses or trip generators. Many other responses to this open-ended question are reported in Table 15. "Other" responses included: public comment; parking; ridership; equity; opportunity for dwell time/layover; stops in both directions; and proximity to park-and-ride lot.

STOP LENGTH

Table 16 reports on the length of a standard or typical bus stop. Sixty ft was cited most often in this multiple-choice question (with the choices of 40, 60, 80, or 100 ft), but many agencies indicated other specific lengths. Table 16 suggests that bus stop lengths at most agencies are shorter than the guidelines cited in the literature review in chapter two—90 ft farside, 100 ft nearside, and 150 ft midblock. Several agencies

agreed with the guidelines in specifying longer lengths for nearside stops than for farside. It is also important to note that respondents did not define how bus stop length is measured.

TABLE 15
ADDITIONAL FACTORS AFFECTING BUS STOP LOCATION

Factor	No. Agencies Responding	% Agencies Responding
Stop spacing	14	40
Adjacent land uses/trip generators	12	34
Private property owners	9	26
General accessibility/passenger convenience	7	20
ADA accessibility	6	17
Utility lines/poles/trees	6	17
Personal safety/lighting	6	17
Sightlines	5	14
Turn lanes/turning movements	5	14
Sensitive land uses (senior living centers/medical/schools/social service agencies)	5	14
Transfer opportunities	4	11
Right-of-way availability	4	11
Sidewalks/crosswalks	4	11
Operational safety	4	11
Traffic volume/speed	4	11
Hilly terrain	3	9
Traffic signal priority	3	9
Municipality concurrence	2	6
Political issues	2	6
Driveways/loading zones	2	6
Other	7	20
Total agencies responding	35	100

Source: Survey results.
Note: Multiple responses allowed; percentages do not add to 100%.

Respondents were divided about whether the required length of bus stops has increased, as shown in Table 17. The primary reason is the increased use of longer buses and articulated buses. Other reasons include: multiple agencies at a given stop; greater safety entering and leaving the traffic stream; and greater likelihood of multiple buses at a stop at the same time.

There is no consensus among respondents concerning different stop lengths for nearside and farside stops (Table 18). As noted earlier, agencies with different lengths for farside and nearside stops require longer nearside stops.

Most agencies, particularly smaller agencies, do not have different stop length standards for different bus types (Table 19). Some agencies reported that bus stops are designed to accommodate the longest bus in the fleet, so different standards are not needed. Others add 20, 30, or 50 ft to the stop length if the stop is served by articulated buses.

TABLE 16
LENGTH OF STANDARD OR TYPICAL BUS STOP

Length	No. Agencies Responding	% Agencies Responding
40 ft	2	5
60 ft	12	27
80 ft	10	23
100 ft	5	11
25 ft (long enough to have concrete under both doors)	1	2
25 ft for a landing area/60+ ft for BRT station	1	2
40 ft in urban settings, 60 ft in suburban settings	1	2
60 ft farside/80 ft nearside/ 100 ft midblock	1	2
80 ft minimum for new stops	1	2
80 to 100 ft, at a minimum	1	2
80 ft farside/100 ft nearside	1	2
80 ft farside/120 ft nearside	1	2
85 ft	1	2
85 ft minimum/100 ft preferred/add 20 ft for stops served by articulated buses	1	2
90 ft	1	2
90 ft for standard bus/120 ft for articulated bus	1	2
100 ft at major stops	1	2
110 ft/145 ft midblock	1	2
No standard; depends on length of bus serving stop and frequency	1	2
Total agencies responding	44	100

Source: Survey results.

TABLE 17
LONGER BUS STOPS IN RECENT YEARS?

Longer Stops	No. Agencies Responding	% Agencies Responding
Yes, longer and/or articulated buses	15	37
Yes, for other reasons	5	12
No	21	51
Total agencies responding	41	100

Source: Survey results.

TABLE 18
DIFFERENCES IN DESIRED STOP LENGTHS FOR FARSIDE AND NEARSIDE STOPS?

Difference	No. Agencies Responding	% Agencies Responding
Yes	19	45
No	23	55
Total agencies responding	42	100

Source: Survey results.

TABLE 19
DIFFERENT STANDARDS FOR STOP LENGTHS FOR DIFFERENT TYPES OF BUSES?

Different Standard	No. Agencies Responding	% Agencies Responding
Yes	16	38
No	26	62
Total agencies responding	42	100

Source: Survey results.

Most agencies in the survey do not base stop length standards on the volume of buses serving the stop, as shown in Table 20. Agency comments included the following:

- Add 50 ft for each additional 40-ft bus expected to use the stop at the same time and 70 ft for each additional articulated bus.
- Stops serving more than one route will be longer.
- [Stop length] depends on the available space or footprint; if space allows, we extend platforms to accommodate two or three buses.
- At stops with multiple routes, bus volumes contribute to nearside/farside location and bus zone length.

TABLE 20
STOP LENGTH STANDARDS BASED ON NUMBER OF ROUTES SERVING THE STOP?

Different Standard	No. Agencies Responding	% Agencies Responding
Yes	9	21
No	33	79
Total agencies responding	42	100

Source: Survey results.

An open-ended question asked what agencies do if they cannot obtain sufficient length at a particular bus stop. Table 21 shows that the most common responses were to look for a nearby alternative or to make do with a shorter stop. "Other" responses included: reach agreement with drivers union; reconsider size of the bus; and change routing.

Table 22 indicates use of multiple berths at a single stop based on volume of buses or number of routes serving the stop. The majority of respondents do use multiple berths somewhere in their system. Places where multiple berths are used include the following:

- Transit centers, major transfer points, rail stations, and park-and-ride lots
- Major downtown corridor
- At the end of the line, especially if there is a layover
- Downtown and elsewhere, with separate berths for different service types.

TABLE 21
AGENCY RESPONSE IF SUFFICIENT LENGTH CANNOT BE OBTAINED

Action	No. Agencies Responding	% Agencies Responding
Look for nearby alternative	18	49
Make do with a shorter stop	14	38
Work with municipality to solve	6	16
Eliminate/do not install stop	5	14
Stop in roadway/block traffic/block driveway if demand at stop is great	4	11
Case-by-case evaluation	3	8
Install if stop is critical and safety is not compromised	2	5
Install transit curb extension	2	5
Other	3	8
Total agencies responding	37	100

Source: Survey results.
Note: Multiple responses allowed; percentages do not add to 100%.

TABLE 22
USE OF MULTIPLE BERTHS AT A SINGLE STOP?

Multiple Berths	No. Agencies Responding	% Agencies Responding
Yes	28	67
No	14	33
Total agencies responding	42	100

Source: Survey results.

Figure 11 shows an example of bus berths at a single stop. Figure 12 is a schematic showing how one stop can accommodate multiple buses.

FIGURE 11 Multiple berths at a single bus stop.

STOP TYPES

The survey asked agencies about the use of special types of stops. Table 23 presents the responses. The lone agency

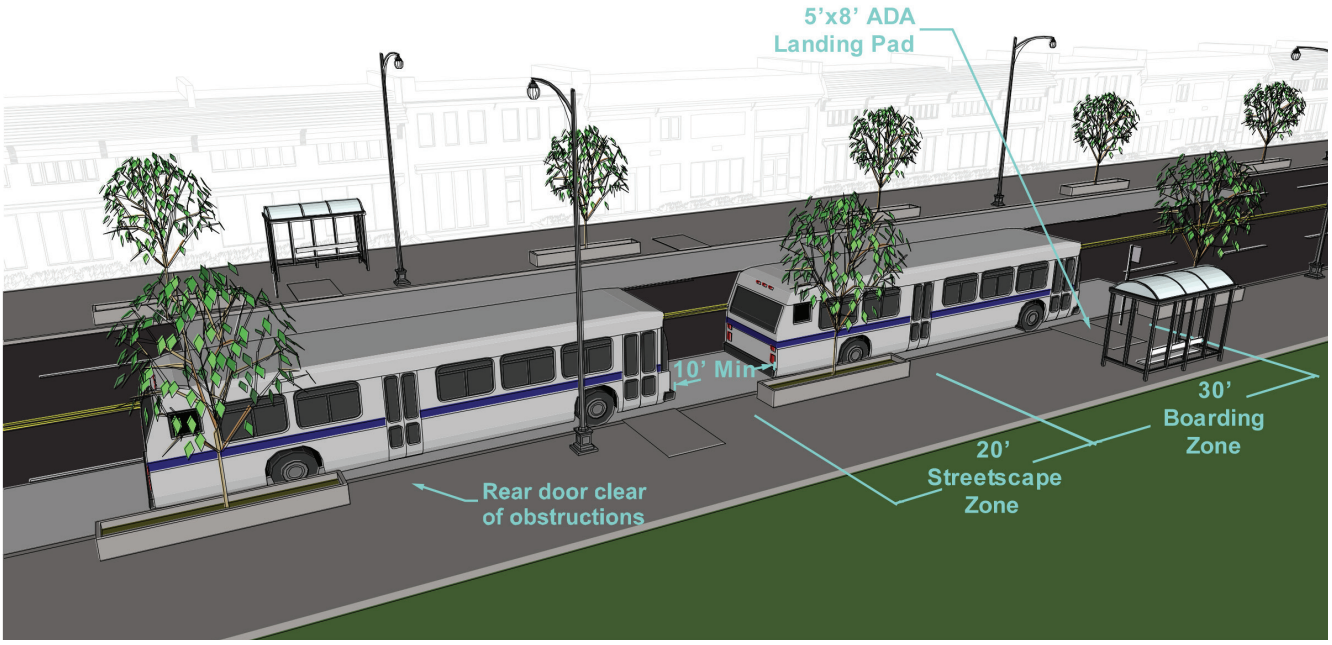


FIGURE 12 Schematic of multiple bus berths. *Source*: Central Ohio Transit Authority, *Bus Stop Design Guide* (*30*).

with stops on the left side of the bus has them only at downtown BRT stations. An example of a left-side stop is shown in Figure 13.

TABLE 23
USE OF VARIOUS STOP TYPES

Stop Type	No. Agencies Responding	% Agencies Responding
Bus bay/cut out	33	75
Transit curb extensions	23	52
Stops in the median of a street	15	34
Stops on left side of the bus	1	2
Total agencies responding	44	100

Source: Survey results.

FIGURE 13 BRT bus station on left side of street in downtown Cleveland.

Agencies were also asked to rate each type of stop according to various criteria. Table 24 shows ratings for passenger safety. Most agencies rated passenger safety as good or very good for bus bays and transit curb extensions, but not for median stops.

TABLE 24
PASSENGER SAFETY RATINGS BY STOP TYPES

Stop Type	% Agencies Responding				
	Very Good	Good	Fair	Poor	Very Poor
Bus bay/cut outs	48	33	15	3	—
Transit curb extensions	45	50	5	—	—
Stops in the median of a street	—	20	60	13	7
Stops on left side of the bus	—	—	100	—	—

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

Table 25 indicates respondent ratings for passenger accessibility. As with passenger safety, most agencies rated passenger accessibility as good or very good for bus bays and transit curb extensions.

Table 26 presents respondent ratings for bus operator safety. Most agencies rated operator safety as good or very good for all stop types.

Table 27 shows respondent ratings for the ability to reenter the traffic flow from the bus stop. A majority of agencies rated the ability to reenter the traffic flow as good or very good for all stop types except bus bays/cut outs.

TABLE 25
PASSENGER ACCESSIBILITY RATINGS BY STOP TYPES

Stop Type	% Agencies Responding				
	Very Good	Good	Fair	Poor	Very Poor
Bus bay/cut outs	45	36	15	3	—
Transit curb extensions	64	36	—	—	—
Stops in the median of a street	7	20	53	13	7
Stops on left side of the bus	—	100	—	—	—

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

TABLE 26
BUS OPERATOR SAFETY RATINGS BY STOP TYPES

Stop Type	% Agencies Responding				
	Very Good	Good	Fair	Poor	Very Poor
Bus bay/cut outs	33	39	24	3	—
Transit curb extensions	45	32	18	5	—
Stops in the median of a street	27	33	33	—	7
Stops on left side of the bus	—	100	—	—	—

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

TABLE 27
ABILITY TO REENTER TRAFFIC FLOW RATINGS BY STOP TYPES

Stop Type	% Agencies Responding				
	Very Good	Good	Fair	Poor	Very Poor
Bus bay/cut outs	3	15	45	24	12
Transit curb extensions	86	9	5	—	—
Stops in the median of a street	27	40	27	—	7
Stops on left side of the bus	—	100	—	—	—

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

Bus bays/cut outs and transit curb extensions are different in degree from standard bus stops in terms of location; that is, the stops are still on the sidewalk even though the sidewalk looks different. Median bus stops are by definition in the middle of the street on a traffic island. The survey asked about ADA considerations at median stops. Table 28 summarizes responses to this open-ended question. A few agencies indicated that their median stops are legacy stops and are no longer being established.

The survey also asked about benefits and challenges associated with median stops. Safety issues, in terms of requiring a crossing to get to the stop and greater exposure to traffic, and capacity constraints are major challenges. Benefits noted by respondents include dedicated waiting area; potentially better environment for passengers (depending on design); and synergies with dedicated lanes or curbside bicycle lanes.

TABLE 28
ADA CONSIDERATIONS AT MEDIAN STOPS

Response	No. Agencies Responding	% Agencies Responding
No different from regular stops	6	46
More challenging	5	38
Need extra attention in design	2	15
Total agencies responding	13	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

PEDESTRIAN ACCESS TO BUS STOPS

Separate open-ended questions on key factors constraining pedestrian access to bus stops were posed for urban, suburban, and rural environments, since the issues vary by area type. Table 29 summarizes constraining factors in urban environments. Street furniture, narrow sidewalks, and safe places to cross the street top the urban list.

TABLE 29
KEY CONSTRAINING FACTORS FOR PEDESTRIAN ACCESS TO BUS STOPS IN URBAN LOCATIONS

Factor	No. Agencies Responding	% Agencies Responding
Presence of street furniture	12	32
Safe places to cross the street	11	29
Narrow sidewalks	11	29
Lack of sidewalks/paving to curb	9	24
ADA compliance issues, often related to limited space	9	24
Parking (including valet parking stands)	7	18
Adjacent land uses/landowners	6	16
Trees/landscaping	6	16
Condition of sidewalks	5	13
Lighting	2	5
Snow	2	5
Total agencies responding	38	100

Source: Survey results.
Note: Multiple responses allowed; percentages do not add to 100%.

Table 30 reports on constraining factors in suburban environments. Lack of sidewalks and safe places to cross the street assume greater importance in the suburbs. “Other” responses included: driveways; inaccessible stops in winter; complaints from homeowners; and topography/hills.

TABLE 30
KEY CONSTRAINING FACTORS FOR PEDESTRIAN ACCESS TO BUS STOPS IN SUBURBAN LOCATIONS

Factor	No. Agencies Responding	% Agencies Responding
Lack of sidewalks/paving to curb	22	65
Safe places to cross the street	15	44
Disconnected street network	7	21
Lengthy walk/difficulty in placing stops	6	18
Lack of signalized intersections	4	12
Width/condition of sidewalks	4	12
Lighting	3	9
ADA access	2	6
Other	4	12
Total agencies responding	34	100

Source: Survey results.
Note: Multiple responses allowed; percentages do not add to 100%.

Table 31 summarizes constraining factors in rural environments. Lack of sidewalks and safe places to cross the street are even more important in rural areas. Safe waiting areas and roadway conditions/drainage ditches appear only on the rural list. "Other" responses included: topography; site distance; ability to see waiting riders; and sprawl. Use of flag stops may be established practice in many locations, but flag stops were not mentioned by any respondent.

TABLE 31
KEY CONSTRAINING FACTORS FOR PEDESTRIAN ACCESS TO BUS STOPS IN RURAL LOCATIONS

Factor	No. Agencies Responding	% Agencies Responding
Lack of sidewalks	26	87
Safe places to cross the street	15	50
Lack of safe waiting area/places to stop	6	20
Lack of signalized intersections	5	17
Roadway conditions/drainage ditches	5	17
ADA compliance	5	17
Lighting	3	10
Other	4	13
Total agencies responding	30	100

Source: Survey results.
Note: Multiple responses allowed; percentages do not add to 100%.

Most agencies do not have to address bollards or other pedestrian barriers at any of their stops, as shown in Table 32. Only 10% of respondents reported that the presence of bollards or other barriers make pedestrian access to bus stops more difficult.

PASSENGER INFORMATION

Respondents summarized the provision of passenger information at bus stops. Table 33 reports the results. A bus stop sign with the route number(s) and a telephone number for information are the most common information elements at bus stops.

TABLE 32
PRESENCE AND EFFECT OF BOLLARDS OR OTHER PEDESTRIAN BARRIERS AT BUS STOPS

Presence/Effect of Bollards or Other Barriers	No. Agencies Responding	% Agencies Responding
Not present	28	64
Present, effects minimized	10	23
Present only at median stops	3	7
Present, access is more difficult	3	7
Total agencies responding	44	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

TABLE 33
PASSENGER INFORMATION AT BUS STOPS

Information Element	% Agencies Responding			
	Every Stop (or almost)	Many Stops	Major Stops	No Stops
Bus stop sign	91	7	2	—
Route number	77	11	7	5
Phone number for information	75	14	7	5
Schedule	11	20	61	7
Route map	7	18	61	14
Stop number	48	16	14	23
System map	—	9	56	35
Real-time information	9	2	41	48
Wayfinding information	2	5	36	57
511 or other traveler aid information	21	13	8	59
Information in languages other than English	7	7	26	60
Quick Response (QR) codes	7	5	12	77

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

Table 34 shows the most common customer request for additional information at stops. Only five of the nine choices were mentioned; no agency reported a request for a phone number for information, route map, wayfinding information, or information in languages other than English. Real-time information about next-bus arrival and schedule were most frequently mentioned. "Other" responses included replacement of missing signs and stop lists by route. Figure 14 shows an example of how some European bus systems include a list of stops by route on bus stop signs. Three agencies in the "other" category had difficulty listing only one request.

Fifty-nine percent of responding agencies have or are in the process of implementing real-time informa-

tion at bus stops. Table 35 summarizes responses to an open-ended question about benefits and disadvantages of real-time information as seen by customers and the operations department. Customers value real-time information because they can make choices at the stop; one agency noted that college students will decide whether to wait for the bus or walk to class. Customers who rely on the system can become frustrated when it does not work correctly. A commitment to system maintenance is required to minimize system downtime. "Other" responses included: expense; unclear format for text messaging; passengers cannot see the exact location of the bus and must trust the time estimate; increased complaints when bus is late; and only limited-stop buses are equipped.

TABLE 34
MOST COMMON REQUEST BY PASSENGERS CONCERNING INFORMATION AT BUS STOPS

Information Element	No. Agencies Responding	% Agencies Responding
Real-time information (next-bus arrival)	17	40
Schedule	16	37
Route number	3	7
System map	1	2
Stop number	1	2
Other	5	12
Total agencies responding	43	100

Source: Survey results.

FIGURE 14 Bus stop sign on Via del Tritone in Rome listing all stops along each route.

The increasing popularity of real-time information at bus stops is evident: 67% of agencies that do not have real-time information are planning to implement next-bus information at stops. Cost is the major reason cited by agencies with no plans to implement. Reliance on mobile device applications, lack of demand, and lack of an automatic vehicle locator system are other reasons mentioned.

TABLE 35
BENEFITS AND DISADVANTAGES OF REAL-TIME INFORMATION AT BUS STOPS

Benefit or Disadvantage	No. Agencies Responding	% Agencies Responding
Customers know when next bus will arrive, can make choices at stop	13	52
Frustrating for customers when system does not work	9	36
Significant IT staff/budget commitment to maintain	5	20
Still new, not much information yet	5	20
Fewer questions/complaints for operator; fewer customer calls	3	12
Not reliable; useless in bad weather (affects traffic) or unusually heavy traffic	3	12
Increased customer confidence	2	11
Perceived wait time is less	2	11
Uses mix of real-time and schedule information; can be confusing	2	11
Other	5	20

Source: Survey results.
Note: Multiple responses allowed; percentages do not add to 100%.

PASSENGER AMENITIES AT BUS STOPS

Respondents summarized the provision of passenger amenities at bus stops. Table 36 reports the results. Shelters, trash receptacles, benches, and traditional lighting are the most common amenities at bus stops. "Other" amenities include additional or expanded waiting areas and fare machinery for BRT prepayment; telephones were not mentioned. Agencies also noted that amenities can be installed as part of streetscape projects and that certain amenities exist at some stops but not necessarily major stops.

TABLE 36
PASSENGER AMENITIES AT BUS STOPS

Amenity	% Agencies Responding			
	Every Stop (or almost)	Many Stops	Major Stops	No Stops
Shelter	—	52	48	—
Trash receptacle	2	59	34	5
Bench	—	66	29	5
Traditional lighting	12	52	21	14
Bicycle rack	—	15	50	35
Solar lighting	—	20	38	43
Newspaper boxes	—	8	41	51
Other	13	25	13	50

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

Table 37 shows the most common customer request for passenger amenities at stops. Shelters were named as the most common request by almost two-thirds of responding agencies.

TABLE 37
MOST COMMON REQUEST BY PASSENGERS CONCERNING PASSENGER AMENITIES AT BUS STOPS

Amenity	No. Agencies Responding	% Agencies Responding
Shelter	28	65
Bench	10	23
Trash receptacle	3	7
Bench plus lighting	1	2
Shelter plus heat and lighting	1	2
Total agencies responding	43	100
Total agencies responding	43	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

An open-ended question asked what amenity was most valued by customers. As shown in Table 38, a shelter was chosen overwhelmingly as the most valued amenity.

TABLE 38
STOP AMENITY MOST VALUED BY CUSTOMERS

Amenity	No. Agencies Responding	% Agencies Responding
Shelter	32	78
Bench	7	17
Lighting	1	2
Real-time information	1	2
Total agencies responding	41	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

How do agencies decide to provide amenities at a given stop? Table 39 indicates that the feasibility of providing amenities at a particular location and guidelines based on stop usage are the most common decision tools. "Other" responses included: decided by others; part of a streetscape project or development approval process; budget; negotiation with private property owner for nonstandard amenities; direct requests; land use attributes; and combination of factors.

IN-STREET BUS PADS

Seventy-two percent of survey respondents have criteria for the design or location of an in-street bus pad at bus stops. Bus pads are installed to support the added weight of buses and to withstand the shear forces applied to pavement surfaces during bus stop and start movements. Bus pads are concrete or reinforced concrete pavement extending the length of the stop to a depth of at least 8 in. Figure 15 shows an in-street bus pad. Figure 16 shows a cross-section of the concrete bus pad.

Table 40 summarizes reported criteria based on open-ended descriptions. "Other" responses included: combination of agency and jurisdiction; rely on another transit agency's guidelines; American Concrete Institute standards; and boardings and alightings at stop. Fifty-four percent of responding agencies reported that they use a single design for all bus stop pads.

TABLE 39
DECISION FACTORS IN PROVISION OF AMENITIES AT BUS STOPS

Factor	No. Agencies Responding	% Agencies Responding
Feasibility of providing amenities at a given location	36	84
Guidelines based on stop usage	34	79
Request by elected officials	19	44
"Squeaky wheel" approach	13	30
Decided by municipality	10	23
Balanced provision of amenities across jurisdictions served	10	23
Decided by street furniture contractor	6	14
Ad-hoc decision	3	7
Other	9	21
Total agencies responding	43	100

Source: Survey results.
Note: Multiple responses allowed; percentages do not add to 100%.

FIGURE 15 In-street bus pad.

Only 13 agencies responded to an open-ended question about which bus stop pad designs are most effective. The response to this question is low probably because municipalities are frequently the ones to make bus pad decisions. Table 41 shows the variety of responses.

CURB CUTS/DRIVEWAYS

The survey included two open-ended questions about bus stop locations at curb cuts/driveways. Response rates were low to these questions because some agencies interpreted curb cuts as referring to curb ramps related to ADA compliance. Figure 17 illustrates issues associated with driveways near bus stops.

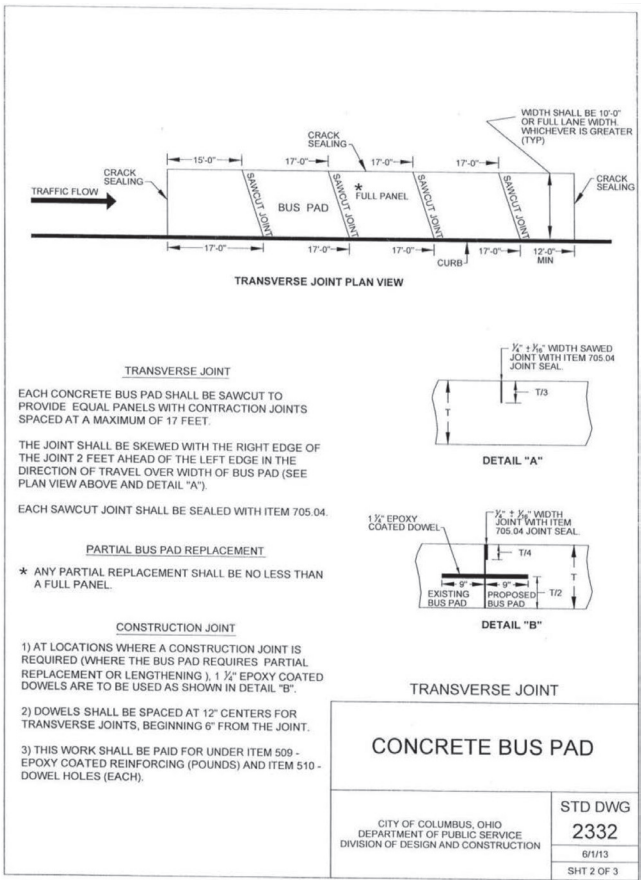


FIGURE 16 Cross-section for concrete bus pad. *Source*: Central Ohio Transit Authority, *Bus Stop Design Guide* (*30*); based on city of Columbus standards.

TABLE 40

CRITERIA FOR DESIGN AND/OR LOCATION OF IN-STREET BUS PADS

Criterion	No. Agencies Responding	% Agencies Responding
Municipalities set criteria	8	30
Agency specifications	7	26
Specific dimensions described	3	11
ADA Accessibility Guidelines (ADAAG)	3	11
Varies by location	2	7
Other	4	15
Total agencies responding	27	100

Source: Survey results.

TABLE 41

BUS PAD DESIGNS THAT HAVE WORKED BEST

Design	No. Agencies Responding	% Agencies Responding
Each location unique	6	46
Concrete	4	31
General dimensions described	2	15
Specific dimensions described	1	8
Total agencies responding	13	100

Source: Survey results.
Note: Multiple responses allowed; percentages do not add to 100%.

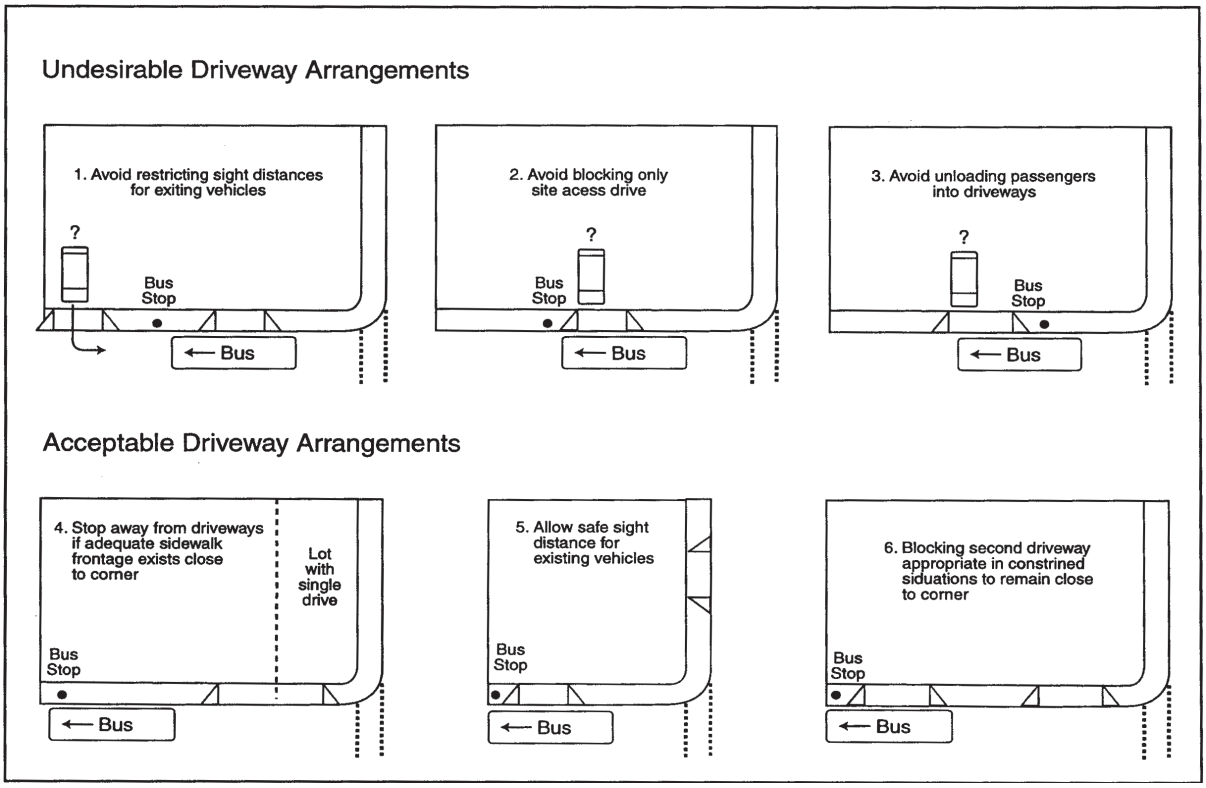


FIGURE 17 Driveway locations near bus stops. *Source*: TriMet, *Bus Stop Guidelines* (*29*).

Table 42 shows agency policies about bus stop location at curb cuts/driveways in commercial areas. Policies can forbid or discourage stops at curb cuts/driveways in commercial areas and may allow a curb cut/driveway at the back door of the bus. Over 30% of responding agencies indicated no official policy.

TABLE 42
AGENCY POLICIES CONCERNING BUS STOPS AT CURB CUTS/DRIVEWAYS IN COMMERCIAL AREAS

Policy	No. Agencies Responding	% Agencies Responding
No official policy	8	32
Try to avoid but locate stops at curb cuts if necessary	6	24
No bus stops at curb cuts	5	20
Front door never in a curb cut; back door acceptable if no alternative	3	12
Avoid interference with businesses or commercial traffic	2	8
Relocate stops at curb cuts	1	4
Municipal decision	1	4
Total agencies responding	25	100

Source: Survey results.
Note: Multiple responses allowed; percentages do not add to 100%.

Table 43 shows agency policies concerning bus stop location at curb cuts/driveways in residential areas. Responses were similar, but some agencies allow stops at curb cuts/driveways in residential areas. Traffic volumes and bus passenger activity are lower in residential areas, and stops at curb cuts/driveways are less of a safety issue in these areas compared with commercial areas.

TABLE 43
AGENCY POLICIES CONCERNING BUS STOPS AT CURB CUTS/DRIVEWAYS IN RESIDENTIAL AREAS

Policy	No. Agencies Responding	% Agencies Responding
No official policy	8	32
No bus stops at curb cuts	5	20
Front door never in a curb cut; back door acceptable if no alternative	3	12
Try to avoid but locate stops at curb cuts if necessary	3	12
Generally allow	2	8
Many exist now, but no new stops will be located at curb cuts	1	4
Relocate stops at curb cuts	1	4
Municipal decision	1	4
Avoid blocking residential access; do not stage or wait at these locations	1	4
Total agencies responding	25	100

Source: Survey results.

The decision-making responsibility to approve or deny a request for a curb cut/driveway at an existing bus stop rests with the municipality, according to 73% of survey respondents. Table 44 describes the transit agency's role in this decision. The majority of respondents noted that the agency is consulted but does not have final say.

TABLE 44
AGENCY ROLE IN APPROVING OR DENYING PROPOSED CURB CUTS/DRIVEWAYS AT AN EXISTING BUS STOP

Role	No. Agencies Responding	% Agencies Responding
Agency is consulted but does not have final say	23	62
Decision is made without agency input	13	35
Agency has veto power over proposed curb cuts at existing bus stops	1	3
Total agencies responding	37	100

Source: Survey results.

ADA CONSIDERATIONS

Two survey questions explored how agencies address ADA requirements at existing and new bus stops. Table 45 indicates that, for existing stops, responsibility most often lies with the agency. Several factors affect the ability or decision to improve a stop. "Other" responses included: agency prioritizes stops for improvement, often based on ridership and input from disabled community leadership; an upgrade to the stop requires the entire stop to be in compliance; based on available funds; agency has funds to make all stops ADA-compliant; and occasionally the agency partners with the landowner, depending on cost.

TABLE 45
ADDRESSING ADA REQUIREMENTS AT EXISTING STOPS

Response	No. Agencies Responding	% Agencies Responding
Improvements made based on available funds within jurisdiction	23	53
Improvements made based on customer complaints	22	51
Improvements made based on use and need	21	49
Responsibility lies exclusively with jurisdiction or adjoining property owner	11	26
Other	8	19
Total agencies responding	43	100

Source: Survey results.
Note: Multiple responses allowed; percentages do not add to 100%.

Table 46 addresses new stops. The majority of respondents take a holistic approach to addressing ADA require-

ments at new stops. "Other" responses included: local jurisdiction is responsible; new stops must be 100% ADA-compliant; new stops with shelters must be ADA-compliant; attempt to place new stops at ADA-compliant locations; and new stops only at locations with sidewalks and curb cuts.

TABLE 46
ADDRESSING ADA REQUIREMENTS AT NEW STOPS

Response	No. Agencies Responding	% Agencies Responding
ADA requirements are applied to the immediate bus stop with consideration given to the path of travel to and from the bus stop	27	63
ADA requirements are considered only for the "immediate" area of the bus stop (i.e., excludes crosswalks or pathways to and from the bus stop but includes the shelter, bench, or adjoining sidewalk)	9	21
Other	7	16
Total agencies responding	43	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

CHALLENGES

Respondents described various challenges in the provision of bus stops. Table 47 displays the results. Absence of sidewalks and property owners' concerns were rated as major challenges by over half of the respondents. ADA issues, conflicting curbside uses, and coordination with cities/counties/states were rated as major challenges by at least 40% of respondents. "Other" challenges mentioned by multiple agencies include: different attitudes among municipalities/different levels of community buy-in; snow removal; and physical conditions around stops.

Storm water management was not a major concern in the survey, but several agencies noted that it is an emerging issue. Many municipalities are installing rain gardens (also referred to as bio-swales or planters) as part of streetscape projects to improve aesthetics and reduce storm water runoff. Figure 18 shows an example of a bus stop that restricts the ability to exit via the rear door. As municipalities and transit agencies gain experience with rain gardens, a clearer understanding of potential impacts at bus stops will be gained. At this stage, however, transit agencies may need to be vigilant in reviewing streetscape plans.

TABLE 47
RATINGS OF POTENTIAL CHALLENGES

Potential Challenge	Major Challenge	Minor Challenge	Not a Challenge	No. Agencies Responding
Absence of sidewalks	69%	29%	2%	48
Property owners' concerns	60%	34%	6%	47
ADA issues	52%	48%	0%	48
Conflicting curbside uses; e.g., street furniture or landscaping	47%	51%	2%	47
Coordination with city/county/state	40%	52%	8%	48
Absence of crosswalks	38%	56%	6%	48
Width of sidewalks	35%	65%	0%	48
Funding	33%	54%	13%	48
Driveway issues	29%	63%	8%	48
Right-of-way availability (to locate or improve bus stop and amenities)	27%	69%	4%	48
Restrictions on stop locations on state highways	25%	38%	38%	48
Traffic engineering concerns	21%	79%	0%	48
Developer concerns	21%	75%	4%	48
Balancing customer and operational perspectives	21%	73%	6%	48
Stop maintenance	21%	63%	17%	48
Ability to select shelter sites	17%	56%	27%	48
Roadway grades	13%	73%	15%	48
Sight distance	8%	83%	8%	48
Lack of emphasis within transit agency	8%	33%	58%	48
Conflicts with bicycles (bike lanes and stations)	4%	71%	25%	48
Storm water management	4%	54%	42%	48
Other	59%	24%	18%	17

Source: Survey results.

FIGURE 18 Rain garden blocking exit path from rear door of bus.

TABLE 48
DIFFERENCES IN MAJOR CHALLENGES BY AGENCY SIZE

Agency Size	Greater Challenges	Lesser Challenges
Small (less than 250 peak vehicles)	Absence of sidewalks 90% ADA issues 70% Width of sidewalks 60% Absence of crosswalks 55% Roadway grades 25%	Coordination with city/ county/state 30%
Medium (250–999)	None	Traffic engineering concerns 10% Width of sidewalks 20% Funding 20% Absence of crosswalks 25%
Large (1,000+)	Funding 50% Coordination with city/county/ state 50% Balancing customer and operational perspectives 38%	Right of way availability 0% Ability to select shelter sites 0% Roadway grades 0% Width of sidewalks 13% Restrictions on stop locations on state highways 13% ADA issues 25%

Source: Survey results.
Note: Percent rating element as a major challenge shown next to individual elements.

Table 48 summarizes differences in major challenges by transit agency size. Differences are defined as disparities of at least 10 percentage points from the overall percentage of respondents rating a specific element as a major challenge. For example, 90% of small systems rated absence of sidewalks as a major challenge, compared with 69% of all agencies. Small systems have greater concerns about sidewalks, crosswalks, ADA issues, and roadway grades and lesser concerns about coordination. Medium-sized agencies have lesser concerns about traffic engineering, width of sidewalks, funding, and absence of crosswalks. Larger agencies have greater concerns about funding, coordination, and balancing customer and operational perspectives and lesser concerns about right-of-way availability, ability to select shelter sites, roadway grades, width of sidewalks, and stop location restrictions on state highways.

Respondents also answered an open-ended question to describe the major challenge affecting bus stop provision and improvements. Table 49 summarizes detailed responses. Verbatim examples of specific responses are shown in italics in the following paragraphs.

TABLE 49
ONE MAJOR CHALLENGE FOR BUS STOP IMPROVEMENTS

Challenge	No. Agencies Responding	% Agencies Responding
Coordination with/funding from local/ county/state	12	28
Absence of sidewalks	7	16
Obtaining sufficient right-of-way	6	14
ADA issues	4	9
Balancing concerns/many items to juggle	3	7
Parking conflicts	2	5
Opposition to bus stops from adjacent property owners/residents	2	5
Snow removal	2	5
Land use conflicts	1	2
Bicycle conflicts	1	2
Agency does not own bus stops	1	2
Buried utilities	1	2
Stop maintenance and trash collection	1	2
Total agencies responding	43	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

One major challenge is the ability to provide passenger amenities, such as passenger shelters and ADA landing pads, at locations where ADA accessibility and compliance would be difficult to achieve. Many locations throughout our service area lack sidewalks completely or have existing sidewalks that are not ADA-compliant. This generally means

that we are hesitant to "build" any infrastructure at these bus stop locations in order to avoid installing something that is not ADA-compliant, thus opening ourselves up to the possibility of lawsuits. The transit agency funds and maintains almost all of its passenger shelters and amenities, and thus performing a lot of sidewalk and curb work in order to make a completely accessible and ADA-compliant bus stop area is often a financial burden.

We have a lot, but are picking coordination with city/county/state, as a number of the others we selected as major challenges result from coordination issues. Institutionally, we have seen a lot of turnover and change within both our agency and the local governments. As a result, we do not currently have a lot of long-term relationships with staff—there is not necessarily a "go-to" person at each city/county/etc., and they don't necessarily know that we have staff dedicated to bus stop issues. Related, there are not set policies with each city that dictate or recommend how coordination should be carried out, so there aren't institutional measures to make sure that we are all keeping in touch and working together. When staff changes, often any informal measures that had been taking place fall apart. These issues manifest when it comes to issues that the transit agency does not control—notably sidewalks, crosswalks, and ADA issues where we do not own the property or site, conflicting curbside uses, bike facilities, etc. We have had a number of pedestrian improvement projects that have added landscaping and furniture zones to the curbside environment, eliminating usability for our buses' ADA ramps—we have actually lost ADA compliance at a number of previously compliant stops. We also had a similar issue with our city's first protected cycle track, which eliminated access completely to several bus stops.

Lack of pedestrian infrastructure along important corridors is one of the most frustrating issues to overcome in terms of stop placement, spacing, access, and safety. Stop-specific improvements along underdeveloped corridors are more challenging to build and have reduced impact without suitable connectivity.

Being able to determine the most effective location for a particular stop with numerous issues (challenges) facing the project. Accessibility concerns, customer demand/needs, property owner preferences, road conditions at best option site, etc.

Available right-of-way is a major challenge in our service area. In many cases right-of-way is at the back of sidewalk, which can hinder our ability to place ADA-compliant bus pads, shelters, and other improvements. Where there is public right-of-way it is often taken by parking, signage, fire hydrants, and other curbside items.

The state has a new "complete streets" law, which our department of transportation (DOT) has interpreted to mean that whenever we apply for a simple permit to pour a concrete pad for a bus stop shelter, we (the transit agency) are responsible for improving all aspects of the intersection that impact pedestrians—installing push-button "walk" signals, painting crosswalks, etc.

As intersections are improved or roadways widened, right turn lanes are added to improve vehicular level of service. Bus stops then need to be relocated away from the intersections, passengers must walk further, and in some cases, other conflicts such as driveway entrances, storm water, or adjacent land uses make locating and improving a bus stop location challenging.

Agencies also described strategies or tactics used to overcome any major challenges. Table 50 summarizes the results. Agency strategies focus on building partnerships with localities and property owners and taking a proactive stance to address issues under the agency's control.

TABLE 50
AGENCY STRATEGIES TO OVERCOME MAJOR CHALLENGES FOR BUS STOP IMPROVEMENTS

Strategy	No. Agencies Responding	% Agencies Responding
Work more closely with localities/involve transit agency in planning process	22	54
Use agency funds for maintenance or minor improvements	8	20
Work with property owners	7	17
Ensure that agency's own house is in order (procedures/staff development)	6	15
Prepare agency guidelines and studies	4	10
Work closely with the community	3	7
Develop a regional program with shared costs for stop improvements/shelters	2	5
Minimize actions not in agency's best interests	2	5
Keep union informed	1	3
Relocate stops to farside to minimize conflicts with turning movements	1	3
Focus on sites with the fewest constraints (e.g., where the city owns ROW)	1	3
Construct new Downtown Transit Center and implement "next bus" to minimize weather effects	1	3
Total agencies responding	41	100

Source: Survey results.
Note: Multiple responses allowed; percentages do not add to 100%.

One interesting strategy was the development of regional programs that establish priorities for bus stop improvements and cost-sharing arrangements (50/50 split) with the municipalities within their service areas. The two agencies

that reported this strategy are Canadian, but it is a promising approach to overcome funding issues and could be implemented in the United States.

SUMMARY

This section summarizes the key findings of the agency survey concerning responsibilities and coordination; bus stop design, location, length, and type; pedestrian access; passenger information; amenities; bus pads; curb cuts/driveways; ADA considerations; and challenges.

Responsibilities and Coordination

Responsibility for deciding on the location of bus stops is often shared between the transit agency and the local municipality (typically the DOT or Department of Public Works). More than 70% of respondents stated that the transit agency is responsible for installing stops. Responsibility for stop maintenance can be divided in many different ways. Even when responsibility was split between the agency and local municipality, the division of specific tasks was different in almost every case. Half of the respondents indicated that stop relocation decisions are made jointly between the transit agency and the municipality. Fifty-six percent of transit agencies reported a good or very good relationship with the primary or largest city in which they operate. Only 41% of respondents reported a good or very good relationship with other municipalities.

Steps taken to improve interagency coordination related to bus stops include outreach to individual agencies as needed and review of site plans for new developments. Many agencies reported a combination of steps and also reported that the actions have been successful in helping agencies to locate bus stops at their preferred location. Insufficient capital funding to build or improve bus stops is the major financial barrier. The most frequently mentioned institutional barrier is dealing with multiple municipalities. Internal agency issues also ranked high in terms of institutional barriers.

Bus Stop Design and Location

More than 80% of agencies have developed their own bus stop design guidelines. A preference for farside stops is more common than a preference for nearside, but actual decision making is more nuanced than a multiple-choice question allows. Subsequent responses indicated that many agencies that responded "depends on specific location" do have a general preference for either farside or nearside stops, and agencies reporting a preference do make exceptions at specific locations. In older parts of the service area, stop locations have often been inherited from the previous operator, sometimes going back to the days of streetcars. Agencies provided thorough explanations for their preferred stop location. The stated reasons match closely with benefits and disadvantages cited in the transit literature. More than 70% of respondents indicated that their agencies always consider safe street crossings in stop location decisions, and 90% always consider safe street crossings in urban areas. Among additional factors affecting an agency's decisions on stop locations are stop spacing and adjacent land uses or trip generators.

Stop Length

Sixty or 80 ft was cited most often in the multiple-choice question on stop length (with the choices 40, 60, 80, or 100 ft), but many agencies indicated other specific lengths. The responses suggest that bus stop lengths at most agencies are shorter than the guidelines cited in the literature review in chapter two—90 ft farside, 100 ft nearside, and 150 ft midblock. Several agencies agreed with the guidelines in specifying longer lengths (most often 20 ft longer) for nearside stops than for farside. It is also important to note that respondents did not define how bus stop length is measured.

A majority of respondents stated that the required length of bus stops has increased in recent years owing to increased use of longer buses and articulated buses. Most agencies in the survey do not base stop length standards on the volume of buses serving the stop. If agencies cannot obtain sufficient length at a particular bus stop, the most common responses are to look for a nearby alternative or to make do with a shorter stop. The majority of respondents use multiple berths somewhere in their system, typically at transit centers, along major downtown bus corridors, at the end of the line, and on corridors with different service types.

Stop Types

Most on-street bus stops are located along the curb. However, bus bays/cut outs, transit curb extensions, and stops in the median of the street are fairly common. Most agencies rated passenger safety and accessibility as good or very good for bus bays and transit curb extensions. A majority of responding agencies rated bus operator safety as good or very good for all stop types. Most agencies rated the ability to reenter the traffic flow as good or very good for all stop types except bus bays/cut outs. Safety issues, in terms of requiring a crossing to get to the stop and greater exposure to traffic, and capacity constraints are major challenges associated with median stops. Respondents were split on the issue of whether ADA compliance is more difficult at median stops.

Pedestrian Access to Bus Stops

Street furniture, narrow sidewalks, and safe places to cross the street are major constraining factors to pedestrian access in urban environments. Lack of sidewalks and safe places to cross the street assume greater importance in the suburbs and are even more important in rural areas. Most agencies do not have bollards or other pedestrian barriers at bus stops.

Passenger Information

A bus stop sign with the route number(s) and a telephone number for information are the most common information elements at bus stops. The most common customer request for additional information at stops is for real-time information about next-bus arrival, followed by schedule information. Almost 60% of responding agencies have or are in the process of implementing real-time information at bus stops. Customers value real-time information because they can make choices at the stop. Customers who rely on the system can become frustrated when it does not work correctly. A commitment to system maintenance is required to minimize system downtime. Seventy-five percent of agencies that do not have real-time information are planning to implement next-bus information at stops. Cost is the major reason cited by agencies with no plans to implement.

Passenger Amenities at Bus Stops

Shelters, benches, trash receptacles, and traditional lighting are the most common amenities provided at bus stops. The most common customer request for passenger amenities at stops is shelters, and agencies overwhelmingly rate shelters as the most valued amenity. Guidelines based on stop usage and feasibility are the most common factors in deciding when to provide amenities at a given stop.

In-Street Bus Pads

Seventy-two percent of survey respondents have criteria for the design or location of bus pads, which are concrete or reinforced concrete pavement installed in the street to support the added weight of buses. The municipality often sets the criteria for bus pad design and location. A variety of responses was received about which bus stop pad designs work most effectively.

Curb Cuts/Driveways

Agency policies often forbid or discourage stops at curb cuts/driveways in commercial areas but may allow a curb cut/driveway at the back door of the bus. Responses were similar in residential areas, but some agencies do allow stops at curb cuts/driveways in residential areas where traffic volumes and bus passenger activity are lower and stops at curb cuts/driveways are less of a safety issue. The decision-making responsibility to approve or deny a request for a curb cut/driveway at an existing bus stop rests with the municipality, according to 73% of survey respondents. The majority of respondents noted that the agency is consulted but does not have final say.

ADA Considerations

Two survey questions explored how agencies address ADA requirements at existing and new stops. For existing stops, responsibility most often lies with the agency. Several factors affect the ability or decision to improve a stop. The majority of respondents take a comprehensive approach to addressing ADA requirements at new stops.

Challenges

Absence of sidewalks, property owners' concerns, and ADA issues were rated as major challenges by at least half of the respondents. Conflicting curbside uses and coordination with cities/counties/states were rated as major challenges by more than 40% of respondents. Respondents also answered an open-ended question to describe the major challenge affecting bus stop provision and improvements. Coordination with local governments, absence of sidewalks, and obtaining sufficient right-of-way were each mentioned as the biggest challenge by at least 10% of respondents. Agency strategies to overcome any major challenges focus on building partnerships with localities and property owners and taking a proactive stance to address issues under the agency's control. One interesting strategy was the development of regional programs that establish priorities for bus stop improvements and cost-sharing arrangements (50/50 split) with the municipalities within the service area.

CHAPTER FOUR

SURVEY RESULTS: AGENCY ASSESSMENT OF ACTIONS TO PROVIDE BETTER ON-STREET BUS STOPS

INTRODUCTION

This is the second of two chapters that present the results of a transit agency survey about better on-street bus stops. The previous chapter addressed survey results related to aspects of bus stop design and location, responsibilities, coordination, pedestrian access, and amenities and passenger information at stops. This chapter focuses on agencies' evaluations of their efforts. Specific topics include agency assessment of the success of actions taken, benefits and drawbacks, potential improvements, and lessons learned.

AGENCY ASSESSMENT OF ACTIONS TAKEN TO IMPROVE ON-STREET BUS STOPS

Table 51 shows transit agencies' ratings of actions taken to improve on-street bus stops. Actions include more and improved shelters, better pedestrian connections to and from stops, wider sidewalks, additional amenities, improved and more consistent customer information, lengthened bus stops, and newly designed bus stop signs and flags. Most respondents (80%) rated their actions as either "very successful" or "somewhat successful." One agency noted that planners and community development staff have begun to incorporate transit perspectives into their processes.

TABLE 51
AGENCY RATING OF ACTIONS TAKEN TO IMPROVE ON-STREET BUS STOPS

Agency Rating	No. Agencies Responding	% Agencies Responding
Very successful	12	27
Somewhat successful	24	53
Neutral	5	11
Somewhat unsuccessful	3	7
Very unsuccessful	1	2
Total agencies responding	45	100

Source: Survey results.

Table 52 summarizes the responses to an open-ended question on the primary benefits of these actions. Better customer access to stops, an improved overall customer experience at stops, and improved customer safety are the leading benefits. Other benefits cited by at least 10% of respondents include: better relationships with municipalities; safer bus operation; ridership increases; ensuring ADA compliance; and investments in on-street amenities. One agency commented that ridership increases occurred only at high-ridership stops; improvements to low-ridership stops did not result in added ridership.

TABLE 52
PRIMARY BENEFITS OF ACTIONS TAKEN TO IMPROVE ON-STREET BUS STOPS

Benefit	No. Agencies Responding	% Agencies Responding
Better customer access to stops	10	24
Improved overall customer experience	10	24
Improved customer safety	9	21
Better relationship and clearer understanding with municipalities	7	17
Safer bus operation	5	12
Ridership increases	5	12
Investments in on-street amenities	5	12
Ensuring ADA compliance	5	12
Improved image for transit	3	7
Fewer stops	3	7
Better customer information at stops	3	7
Improved stop visibility	2	5
Easier for visitors to get around	1	2
Reduced number of complaints	1	2
Improved maintenance at shelters	1	2
Consistent stop appearance	1	2
Total agencies responding	42	100

Source: Survey results.
Note: Multiple responses allowed; percentages do not add to 100%.

Table 53 summarizes the responses to an open-ended question on the drawbacks of actions to improve on-street bus stops. Budgetary impacts and staff time were mentioned most frequently as drawbacks. Other drawbacks cited by at least 10% of respondents include: higher expectations for future stop enhancements; procedural or policy issues with local municipalities; pushback from property owners; and loss of parking. Increased complaints occurred as riders' expectations rose and unimproved stops became less acceptable. Lack of flexibility refers to greater diffi-

culty in moving or discontinuing improved stops. Internal issues include clear responsibilities, consistency, and accurate information.

TABLE 53
DRAWBACKS OF ACTIONS TAKEN TO IMPROVE ON-STREET BUS STOPS

Drawback	No. Agencies Responding	% Agencies Responding
Budgetary impacts	11	27
Staff time/slow process	9	22
Higher expectations for further enhancements	5	12
Procedural/priority issues with local municipalities	5	12
Pushback from property owners	4	10
Loss of parking	4	10
Increased complaints due to riders' higher expectations	3	7
Lack of flexibility (e.g., moving bus stops)	3	7
Internal issues	3	7
Community backlash	2	5
Need to be vigilant regarding new construction projects	2	5
Cleaning and maintenance	2	5
Avoiding complacency ("good enough is not the goal")	1	2
Improving the "wrong" stops because of cost or resistance	1	2
Changes made need to be memorialized in policy	1	2
Stalemates where there is no reasonable solution	1	2
Negotiating agreements with property owners to ensure ADA compliance	1	2
Total agencies responding	41	100

Source: Survey results.
Note: Multiple responses allowed; percentages do not add to 100%.

Table 54 reports the most successful (as defined by the respondents) actions taken. Partnerships and improved communication with municipalities and others leads the list, followed by grants and funding for stop improvements and bus shelters.

Specific successful actions within these general categories include the following:

- Development of regional programs that establish priorities for bus stop improvements and cost-sharing arrangements (50/50 split) with the municipalities within their service areas.
- A community grant program for local jurisdictions that allows them to install the amenities they want at bus stops as long as they agree to maintain the stop.

TABLE 54
THE MOST SUCCESSFUL ACTIONS TAKEN

Action	No. Agencies Responding	% Agencies Responding
Partnerships/communication with municipalities and others	11	28
Grants/funding for stop improvements	5	13
Bus shelters	5	13
Transit curb extensions	3	8
Reviewing plans/working with developers	3	8
Bus pads	2	5
Upgraded amenities at BRT stops	2	5
Real-time information at bus stops	1	3
Improved bus speeds due to stop consolidation	1	3
New, highly visible bus stop sign	1	3
Removing unneeded street furniture to improve access to stops	1	3
Locally developed bus stop guidelines	1	3
Comprehensive database of all bus stops	1	3
A "complete" bus stop as an example of what can be done	1	3
New Downtown Transit Center	1	3
Total agencies responding	39	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

- Agreement with the city DOT to install concrete bus pads as part of any arterial resurfacing project at no cost to the transit agency.
- As a formal reviewer on all development plans and right-of-way improvements, the transit agency has successfully encouraged developers to install passenger landing pads at all bus stops within the project area if they are already doing sidewalk work.
- Greater involvement in Complete Streets initiatives that can provide funding for bus stop improvements.
- Partnerships with local business owners and national chains to obtain easements that provide room for added amenities at bus stops.
- A foundation of partnerships and processes to (1) create a shared vision of the importance of bus stops and amenities, (2) be at the table when streets are redesigned and new developments are proposed, (3) identify funding opportunities, and (4) develop expedient permitting procedures.
- Dedicated funding and staff for bus stop improvements.
- Reduction in the number of stops by 15% to improve travel speeds.
- Establishment of a small committee characteristic of the disabled community to provide guidance in prioritizing stops for improved ADA access.
- Face-to-face meetings with city staff at stop locations in the field.

- Addition of a unique five-digit identification number on every bus stop sign that can be used by means of phone, text, or smartphone to obtain real-time bus arrival time at the stop.

Respondents were asked, "If you could change ONE aspect in the process of designing and locating bus stops, what would you change?" Table 55 summarizes the results. Streamlined and simplified approval processes, legal authority to establish bus stops where needed, better coordination with local governments, and standard procedures in all municipalities served were the most frequent answers.

TABLE 55
ONE CHANGE TO THE PROCESS OF DESIGNING AND LOCATING BUS STOPS

Change	No. Agencies Responding	% Agencies Responding
Streamlined/simplified approval process	8	21
Legal authority to establish bus stops where needed	7	18
Better coordination with local governments	6	15
Standard procedures in all municipalities served	4	10
ADA compliance/comprehensive assessment/waivers	3	8
Higher priority on proactively improving bus stops	2	5
Additional funding	2	5
Flexibility in types of amenities installed	1	3
Nearside stops	1	3
Contractor cooperation in installing sidewalks/curb cuts	1	3
Bus stop spacing	1	3
Bus stop design standards elevated to same level as municipal standards re: streets and sidewalks	1	3
Guidance on bus stop design	1	3
Sufficient funding to avoid having to choose shelter locations	1	3
Total agencies responding	39	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

LESSONS LEARNED

Lessons learned that would benefit other agencies are shown in Table 56. Ongoing external communications that begin before a major bus stop improvement project are very helpful. Partnerships strengthen relationships with other agencies and facilitate a clear understanding of each agency's priorities and requirements. Internally, a multidisciplinary, cross-department approach yields many benefits.

TABLE 56
LESSONS LEARNED

Lessons Learned	No. Agencies Responding	% Agencies Responding
Good ongoing communications and partnerships with external agencies	13	35
Multidisciplinary, cross-department agency approach	5	14
Cross-understanding of agency needs and jurisdictional requirements	3	8
Locally developed guidelines and standards	2	5
Funding/budget	2	5
Be proactive in dealing with streetscape/parking conflicts	2	5
Multiple outreach methods to municipalities, landowners, and customers	2	5
Education re: importance of bus stops	2	5
Simple yet flexible shelter designs	2	5
Get to know city staff/meet in the field	2	5
Other	13	35
Total agencies responding	37	100

Source: Survey results.
Note: Multiple responses allowed; percentages do not add to 100%.

Key lessons learned are presented by category in italics. All comments are reported verbatim as expressed by agency respondents except for minor grammatical changes.

Communications with External Agencies

- *Need to create good communication with local political officials and with officials responsible for authorizing/creating the parking regulations required to designate bus stops.*
- *Transit agencies don't have the resources to solve all the issues alone. Build partnerships.*
- *Established partnerships with external agencies (local, state, etc.).*
- *The transit agency is collaborating with neighborhood communities and not-for-profit organizations to reduce costs and speed up the process for constructing a shelter pad and installing shelters. Three successful projects are under way in a neighborhood in an unincorporated part of the county. One new project is just starting with the Boy Scouts. This model is a win-win for the community! (1) Costs are reduced for the transit agency. (2) Projects get under way and are completed more quickly than could be achieved due to lack of funding, right-of-way, or other priority. (3) The community has ownership and pride in the project and takes on a maintenance component. (4) More people learn about transit and the opportunity to ride the system!*
- *Build a rapport with city staff members before you make requests to install, relocate, or remove stops.*
- *Keep an open and honest dialog with all parties involved.*

- *Work with appropriate municipalities and other groups early on in the development of bus stop guidelines in order to get their buy-in. Projects such as this are much more successful and efficient when agencies work together toward a common goal.*
- *It is helpful to have an up-to-date Memorandum of Understanding with cities. This way, responsibilities are clear when a customer complains about a stop being dirty.*
- *Work with all stakeholders and local and state agencies to put all the pieces together. The bus system is within a four-county area, so it takes many stakeholders to make it happen.*
- *Cultivate municipal officials on the transit systems and its needs.*
- *Coordinate with as many groups as possible (departments of transportation, elected officials, private developers) to seek funding for improvements.*
- *Communicate as best you can with those agencies that directly impact your bus stop: city planning department, public works department, utility companies, and other transit operators. Because the region has a multitude of transit operators and organizations, it is best to find and participate in a standing committee so they are aware you (i.e., the bus company!) actually exist.*
- *Establish good relationships with local government to both gain their trust on bus stop issues and to establish a rapport that will yield a climate of customer-sensitive interest in establishing and maintaining bus stops for local residents.*

Internal Agency Approach

- *Utilize a multidisciplinary or cross-departmental approach when possible. By involving the expertise of others when handling problems, you can get a more balanced view of each situation and have a more functional outcome. Examples of this include having Planning, Safety, and Bus Operations work together to assess stop issues (we recently reviewed all stops with layovers using this combination)—it helps get buy-in from key areas when proposing a solution.*
- *Just because you have an internal system of handling the normal level of bus stop changes, don't assume it can handle a major service change or the replacement of an old sign design with a new design (or worse, both at once).*
- *Carefully plan route changes.*
- *It is necessary to have dedicated, expert staff that can establish good relationships with municipalities.*
- *Dedicated staff (actual staff who concentrate on this effort daily).*

Understanding Each Other's Needs

- *We were able to frame the topic of bus stop development so that it fit in with pedestrian improvements, streetscape projects, and improvement of traffic flow. It is important to highlight the benefits that the community gets as a whole from the development of better bus stops.*
- *Work with jurisdictions to understand transit agency needs and the jurisdiction's requirements so that plans are submitted consistent with meeting both agencies' needs.*
- *In some regards persistence has paid off. By constantly working with public and private groups to ensure transit needs are considered, some of those groups have begun to contact our agency at the beginning of their design phases to get our* input and work with us to ensure our needs are met.

Locally Developed Guidelines and Standards

- *Local standards with buy-in from Right-of-Way (ROW) owners is critical. This also helps communicate with developers who aren't looking at some nationwide research report but rather at an adopted or generally accepted guidelines document. In cases where the ROW owner's standard or guideline on bus stops doesn't meet the transit authority's needs, it is incumbent on the transit authority to work with the ROW owner to update their engineering standards.*
- *Develop standards, diagrams, and templates (in CAD if possible) so designers can easily incorporate the bus stop improvements and proper clearances into their plans.*

Funding/Budget

- *Put stop improvements into a budget so the agency is not surprised.*
- *Dedicated funding.*

Proactive Approach

- *Be proactive when it comes to dealing with curbside and ROW issues (streetscape or parking conflicts). With recent trends of stimulus/TIGER [Transportation Investment Generating Economic Recovery] grant streetscapes and complete streets projects, it's critical to make sure that bus stops are properly designed into plans from the beginning rather than an afterthought. This requires coordination with local governments, as well as their consultants and contractors.*
- *In the event a standing committee does not exist, then you need to be proactive and seek them out...and communicate.*

Multiple Outreach Methods

- *Use multiple outreach methods when trying to establish coordination with your member cities/counties. The agency informed their municipal contacts that we wanted to coordinate on bus stop issues and plan*

reviews, and we have been approached proactively by the cities on several occasions as a result.
- *Outreach to adjacent landowners and customers is intense in the areas that are changing. Getting everyone on the same page with the same information up front helps the process move forward.*

Education

- *It takes patience and persistence to see change happen. It also means being willing to educate nontransit planners on how important improvements to bus stops are to how well a transit system can serve its customers.*
- *It is important to educate municipal officials on the importance of considering the transit systems and its needs when considering zoning code. We are currently considering a BRT system, which will require Transit Oriented Design (TOD) code around stations and stops. Without it, forget about getting FTA financial help. Most municipalities here do not have TOD on their radar.*

Shelter Design

- *Simple is better. We originally designed our own unique shelters and paid the price for the "custom" nature of the shelter. When we planned an expanded shelter program and also began replacing older shelters, we selected a commercially available shelter that could meet our needs with minor adaptations, making the shelters more readily available and reducing costs.*
- *The agency has a contract with a shelter manufacturer that allows us to buy several different styles of shelter. We let the local municipality choose which style they want in their town. That helps us get approval to install new shelters.*

Other

- *Learn experience working with and attending meetings with other agencies.*
- *Leadership support (top-down) and dedicated Board support.*
- *Consolidation of bus stops has had a large benefit in improving service reliability, reducing local impacts of bus stops, and increasing our ability to concentrate on fewer problem stop locations. Bus stop maintenance could be a huge budget item (power washing, trash collection, etc.) but having an ability to do that, at least on a case-by-case basis, would be hugely beneficial.*
- *Consider the added maintenance cost of putting bus shelters at bus stops when costing out a bus shelter program.*
- *Identify one point of contact at permitting jurisdiction for the review of proposed improvements.*
- *Safety is priority one even if that means not installing a bus stop.*
- *Make sure you have input into major streetscape projects in your community. You should be a check-off in terms of one of the agencies that has to review these projects.*
- *Collect data on bus stops that are targeted for improvement and prioritize these stops.*
- *Dedicate personnel to review public works projects so that bus stops can be requested and required as part of the project and monitor compliance with having the stops constructed as designed during the initial design process.*
- *Utilities and topography have always been the project-killers. You'd think the service area is flat, but 2 or 3 ft could mean expensive retaining walls and excavation of shallow utilities. Spend ample time on each site taking pictures and poking around. Learn to look for problems. It is better to move the bus stop away from the problems if you can rather than issue change orders after digging has begun.*
- *If your agency has a rule, such as stop placement every two blocks within an urban area, make it a "soft" rule and allow for some flexibility.*
- *You can't always get what you want.*

SUMMARY

This chapter has described agency assessments of actions taken to provide better on-street bus stops. Key findings include the following:

- **Assessments of the success of actions taken are generally positive.** Most respondents (53%) rated their actions as "somewhat successful" and 27% rated their actions as "very successful."
- **The primary benefits of these actions are better customer access to bus stops, an improved customer experience at stops, and improved customer safety,** each cited by at least 20% of all respondents. Other benefits include better relationships with municipalities, safer bus operation, ridership increases, ensured ADA compliance, and investments in on-street amenities.
- **The major drawbacks of these actions are budgetary impacts and staff time.** Other drawbacks include higher expectations for future stop enhancements, procedural/policy issues with local municipalities, pushback from property owners, loss of parking, increased customer complaints, lack of flexibility, and internal issues.
- **Partnerships and improved communication with municipalities and property owners were most frequently mentioned as the most successful actions,** followed by grants and funding for stop improvements and bus shelter installation. Specific successful actions described in this chapter include cost-sharing arrangements with municipalities, agreements with

municipalities and developers to provide bus stop improvements as part of their ongoing work, pursuit of funding opportunities that benefit all parties, real-time information at bus stops, dedicated funding and staff for a bus stop program, and means to involve riders and city staff in prioritizing stop improvements.

- **Streamlined and simplified approval processes, legal authority to establish bus stops where needed, and better coordination with local governments were most frequently mentioned** in response to the question: "If you could change ONE aspect in the process of designing and locating bus stops, what would you change?" Respondents also mentioned standardized procedures across municipalities.
- **Lessons learned emphasized ongoing external communications that begin prior to a major bus stop improvement project, partnerships to facilitate a clear understanding of each agency's priorities and requirements, and a multidisciplinary cross-department approach within the agency.**

CHAPTER FIVE

CASE EXAMPLES

INTRODUCTION

Synthesis survey results provide an overview of actions taken to improve on-street bus stops. Following a review of these results, six agencies were chosen as case example sites. Personnel directly involved with bus stop improvements were interviewed by telephone. The case examples provide additional details on challenges, solutions, stop design and location, and lessons learned.

The selection process for case examples included several criteria: (1) transit agencies of various sizes in different parts of North America; (2) agencies that have taken different approaches; and (3) agencies that reported detailed and interesting observations in the survey. More than 80% of responding agencies offered to serve as a case example. The six agencies chosen provide a sample overview of the current state of strategies to improve bus stops.

Figure 4 in chapter one shows the location of the case example cities. The six case example cities and agencies are

- Austin, Texas: Capital Metro
- Columbus, Ohio: Central Ohio Transit Authority
- New York, New York: MTA–New York City Transit
- Portland, Oregon: TriMet
- San Francisco, California: Golden Gate Transit
- Washington, D.C.: Washington Metropolitan Area Transit Authority.

TABLE 57
CHARACTERISTICS OF CASE EXAMPLE AGENCIES

Agency	Annual Ridership (million)	Service Area Population (million)	Number of Peak Buses
Capital Metro	33.5	1.02	324
Central Ohio Transit Authority	18.4	1.37	257
MTA–New York City Transit	829.2	8.18	3,691
TriMet	59.5	1.49	496
Golden Gate Bridge, Highway, and Transportation District	6.7	0.87	168
Washington Metropolitan Area Transit Authority	137.8	3.72	1,281

Source: FY 2012 National Transit Database reports and agency data.

Table 57 provides a basic description of the transit agencies included in the case examples, including ridership, service area population, and peak bus requirements. Sources are the FY 2012 National Transit Database (NTD) reports or data provided by the agency, or both.

The case examples summarize survey responses and interview observations from each agency. The interviews explored in greater depth the issues raised by the survey responses.

CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY (CAPITAL METRO, AUSTIN, TEXAS)

Capital Metro is the transit provider in Austin, Texas. Capital Metro operates multiple modes, including directly operated and contracted bus service. The service area population is 1.02 million. Capital Metro oversees operation of 273 local buses, 18 MetroRapid (BRT) buses, and 33 express buses during maximum service. Annual bus ridership was 33.5 million in 2012.

Challenges

Key challenges that emerged from the interview were as follows:

- *Financial*. Finances are always an issue, but the situation at Capital Metro has changed, as discussed in the next section.
- *Dealing with adjacent private landowners*. Not everyone wants a bus stop adjacent to their property, although some do. Capital Metro has an interlocal agreement with the city of Austin to place bus stops along the public right-of-way within the city. Survey results indicate that this arrangement is atypical. As a courtesy, Capital Metro contacts any business or residence concerning placement or movement of an adjacent stop to explain its reasoning.
- *ADA compliance*. The Capital Metro Board directed the agency to identify the number of bus stops not compliant with current ADA accessibility regulations and develop a plan to bring them into compliance.

Solutions

- *Dedicated funding and staff.* The Capital Metro Board, recognizing the importance of bus stops for all customers and especially for ADA customers, has committed funds for bus stop improvements. Austin has a very vibrant and active transit community, and advocacy groups have lobbied the Board on the need for all bus stops to be accessible. The Board understands that money ($2.2 million in FY 2013; $2.5 million budgeted for FY 2014) and staff positions are needed to carry out the ambitious goal of making all stops accessible within 4 years. Capital Metro is carrying out an ongoing daily program of updating stops, trying to improve the landing area footprint (defined as a firm, stable surface 8 ft deep and 5 ft wide that is free from obstructions—see Figure 19 as an example), and providing sidewalks to the adjacent intersection. This program is possible only with agency (Board, leadership, and staff) support. The percentage of stops lacking full accessibility was 69% in FY 2008 and has fallen to 29% in FY 2013, with further improvements programmed.

Before

After

FIGURE 19 Before and after bus stop, new landing pad connected to the sidewalk.

- *Personal contact.* Capital Metro exercises its prerogative to locate stops with care. The agency often reaches a compromise with the landowner; for example, not placing a stop directly in front of the door or providing a bench so that waiting passengers are not standing around in front of the business or residence. Personal contact with the landowner makes a difference, and Capital Metro believes that the culture is a little more polite in the South, especially in Austin.
- *Great relationship with the city of Austin.* The relationship begins at the top of the organizational chart and is reinforced by working together on various bus stop issues. If either agency has a team in the field, that team will take care of all transit and city issues. Informal relationships are built on trust, a by-product of working together over the years.

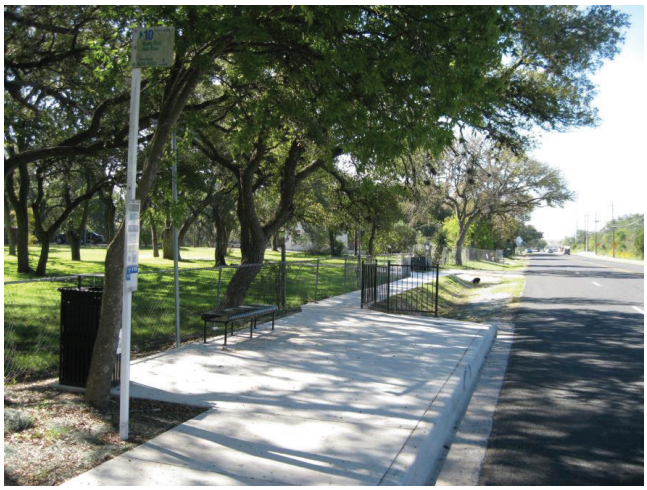
Stop Design and Location

- *Capital Metro's stop design guidelines are the basis for its decisions.* Provision of amenities at a stop is based on current or projected ridership.
- *Consistency in procedures is important.* Capital Metro controls the bus stop process and thus can ensure consistency. Consistency, however, does not prevent testing of new ideas.
- *Equity is another consideration, in two senses.* One involves improving stops in all quadrants of the city. The second involves fairness in how stops are sited: procedures are identical in all neighborhoods.
- *What makes a bus stop better?* Capital Metro looks at several elements:
  - *Full accessibility*, with a level landing pad. Figure 19 earlier in this section shows an example of a stop's new landing pad that is now connected to the sidewalk.
  - *Connectivity*: sidewalks extending to the adjacent intersection with a curb ramp. Capital Metro will build a curb and gutter at the stop and in the vicinity and will fix a broken sidewalk. Figure 20 is a before-and-after example of a stop with an extended sidewalk.
  - *Right-sized pad*, based on ridership at the stop.
  - *Concrete*, always.
  - *An empowered staff* that can field-engineer solutions to unanticipated issues on site. Capital Metro crews are out in the field every day and understand the work and the regulations. The agency seeks out project managers and engineers who are problem solvers with the experience and common sense to make decisions in the field.
  - *Place making*: identifying safe and suitable bus stop locations that work to blend in and enhance the surrounding area.

Advice to Other Agencies

Capital Metro offers the following keys to its success in improving bus stops:

Before



After

FIGURE 20 Before and after bus stop, South 1st Street at Hyde Park in Austin, TX.

- *Good working relationships among internal teams.* The Safety, Operations, Construction, and Planning departments work together on the bus stop program at Capital Metro.
- *Good working relationships with external groups.* The city of Austin is the most important jurisdiction, since most transit service and bus stops are within the city. Capital Metro also has good relationships with the Texas Department of Transportation (some stops are on state highways) and suburban municipalities.
- *Investing the time needed to make sure agency staff understands the main principles of the bus stop program.* While many agency employees are never involved with bus stops in their daily work, this effort goes a long way toward ensuring smooth internal relationships.
- *Support from leadership.* In Capital Metro's case, this support extends to top management and to the Board. The Board clearly understands the importance of improving bus stops, in part by hearing from advocacy groups, and is willing to allocate dollars and staff to achieve the goal of making all stops accessible with good connectivity. The current work program could not happen without this support. The support actually goes beyond the Board to the community as a whole that favors smart investments to create a safe, vibrant place to live and work.

CENTRAL OHIO TRANSIT AUTHORITY (COLUMBUS, OHIO)

Central Ohio Transit Authority (COTA) is the transit provider in Columbus, Ohio. COTA operates 257 buses during maximum service in a service area with 1.37 million residents. Annual bus ridership was 18.4 million in 2012.

Challenges

- *Adjacent property owners.* Everyone wants service, but they do not want a bus stop directly in front of their home or business.
- *Lack of sufficient right-of-way.* In many locations, the available right-of-way is not wide enough to make desired improvements. This limits the agency's ability to provide amenities.
- *No dedicated source of funding for bus stops.* COTA has funding for shelters but not for right-of-way, sidewalks, or ADA landing pads. The agency funds and maintains almost all of its passenger shelters and amenities, and performing the sidewalk and curb work necessary to make a completely accessible and ADA-compliant bus stop area is often financially burdensome.
- *Lack of clarity in ADA regulations concerning where a bus stop ends and right-of-way begins.* Many locations throughout the service area either lack sidewalks completely or have sidewalks that are not ADA-compliant. This generally means that COTA is hesitant to "build" any infrastructure at these bus stop locations to avoid ADA noncompliance. If COTA installs a stop or shelter that involves construction, then it will ensure full ADA compliance. If the city of Columbus is adding sidewalks, COTA asks that it also upgrade the stop, passenger loading pad, and shelter pad to be in full compliance. The city has been willing to do so in most cases.
- *Land use and transit.* As areas such as the High Street corridor and Short North attract development, requests to relocate bus stops have increased. Relocation can be difficult given the desirability of on-street parking spaces. Additionally, interior roads at major malls are often not designed for buses, resulting in a walkability issue from the bus stop across a 10-lane roadway and through a large parking lot.

Solutions

- *Bus Stop Design Guide*. This internally developed guide was completed in April 2014 and has been reviewed and vetted by the city of Columbus as well as surrounding municipalities and builder/developer groups. This document is intended to educate officials and developers about how to build streets and streetscapes that are more amenable to the establishment of bus stops and passenger amenities. Furthermore, the document lays out specific guidelines and best practices for COTA staff to follow, to guide where COTA will and will not consider installing passenger amenities. Preparation of the guide has been a good educational process for COTA and city staff, bringing important issues to the forefront and encouraging reflection about bus stops and transit in general. Key values guiding the development of the guide include
  - Clearly defining responsibilities concerning bus stops and surrounding areas specific to COTA's service area;
  - Focusing on provision of the most accessible and safest bus stops possible given available resources;
  - Providing guidance for current and future COTA staff that will result in uniform bus stop placement and development practices; and
  - Engaging the larger planning and development community in developing better bus stops and bus stop areas.

COTA is now regularly contacted by consultants and project managers seeking input on how their projects should be designed and constructed to accommodate bus stops. Figure 21 from the *Bus Stop Design Guide* shows a bus stop prototype. Other examples are included in the discussion in chapter three.

- *Cooperation with the city*. Columbus and other cities that COTA serves must be willing to require developers and their own staffs to submit initial plans and final designs to the transit agency for review. Streetscape elements are often not addressed until later stages. COTA is now a part of the plan review process in Columbus. COTA has been less successful with other cities and private developers. COTA has requested minor changes such as installation of a bus pad or modifications to improve access to and from the bus stop, and these have usually been approved.
- *Working relationships with developers*. A primary impetus for developers is the need for a letter of support from the transit agency in a grant application. This need for support can start the dialogue between developer and transit agency. From the agency's perspective, the goal of this dialogue is for developers to gain a better understanding of transit's needs at a particular location. COTA has persuaded several developers to build concrete passenger landing pads at all bus stop locations within their project area if they are already doing sidewalk work.
- *Bus stop inventory*. COTA has a stop database in its scheduling software, but few attributes are included and it is not always accurate. COTA is preparing a bus stop inventory with detailed stop attributes such as the slope of the landing area, clear floor space for wheelchairs within the shelter, and accurate GPS coordinates. This inventory will provide a clear indication of where problems exist, and can be combined with ridership information to prioritize stop improvements.
- *Downtown bus stops*. For a long time, the city did not allow bus stop signs in the downtown area. Once downtown bus stop signs were approved, COTA prepared CAD drawings for every bus stop location in the

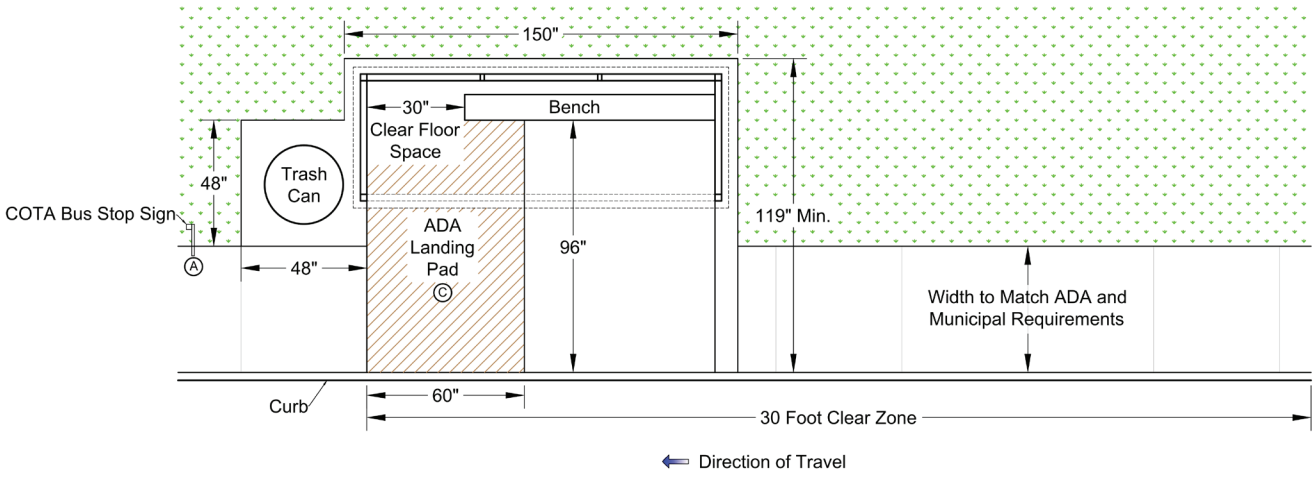


FIGURE 21 Bus stop prototype from *Bus Stop Design Guide*.

process of adding signage, at the city's request. The city now requests CAD drawings for any new bus stop to ensure that no infrastructure (e.g., pipes, snow-melting devices) is at risk. Figure 22 shows an example of a CAD drawing for a COTA bus stop. A student intern well versed in CAD prepares the drawings with all physical characteristics.

- *Public involvement*. Public outreach can create support among stakeholders and the city by inviting residents into the process as partners in identifying solutions. COTA has undertaken extensive public involvement in its Bus Stop Service Improvement Project, which consolidated bus stops across the service area. In a recent dispute over an existing bus stop that a new restaurant wanted replaced with parking spaces, the city of Columbus supported COTA and resolved the issue by offering an additional valet parking space nearby. A current transportation study by The Ohio State University could result in improved stops and amenities at major transfer locations on or adjacent to campus.
- *Request form for new stops and stop relocations*. COTA is developing a more transparent process that solicits specific reasons for a new stop or stop relocation. It plans to place the request form on its website. COTA will evaluate each submitted request and report its decision to the requestor.

Stop Design and Location

- *COTA prefers farside stops for pedestrian safety, but decisions are made on a site-specific basis.*
- *COTA has established guidelines for provision of trash cans and shelters*. The standard is at least 35 boardings at the bus stop on an average weekday. The agency recognizes special needs populations at a senior center or health care facility and will place a shelter at these locations even if passenger activity is lower. Placement of trash cans is more flexible, because adjacent land uses such as fast-food restaurants can generate more trash. COTA tracks trash complaints and uses this information in deciding whether a trash can is needed.

Advice to Other Agencies

COTA offers the following advice to other transit agencies desiring to improve their bus stops:

- *Work with appropriate municipalities and other groups early on in the development of bus stop guidelines in order to get their buy-in.* Projects such as this are much more successful and efficient when agencies work together toward a common goal.

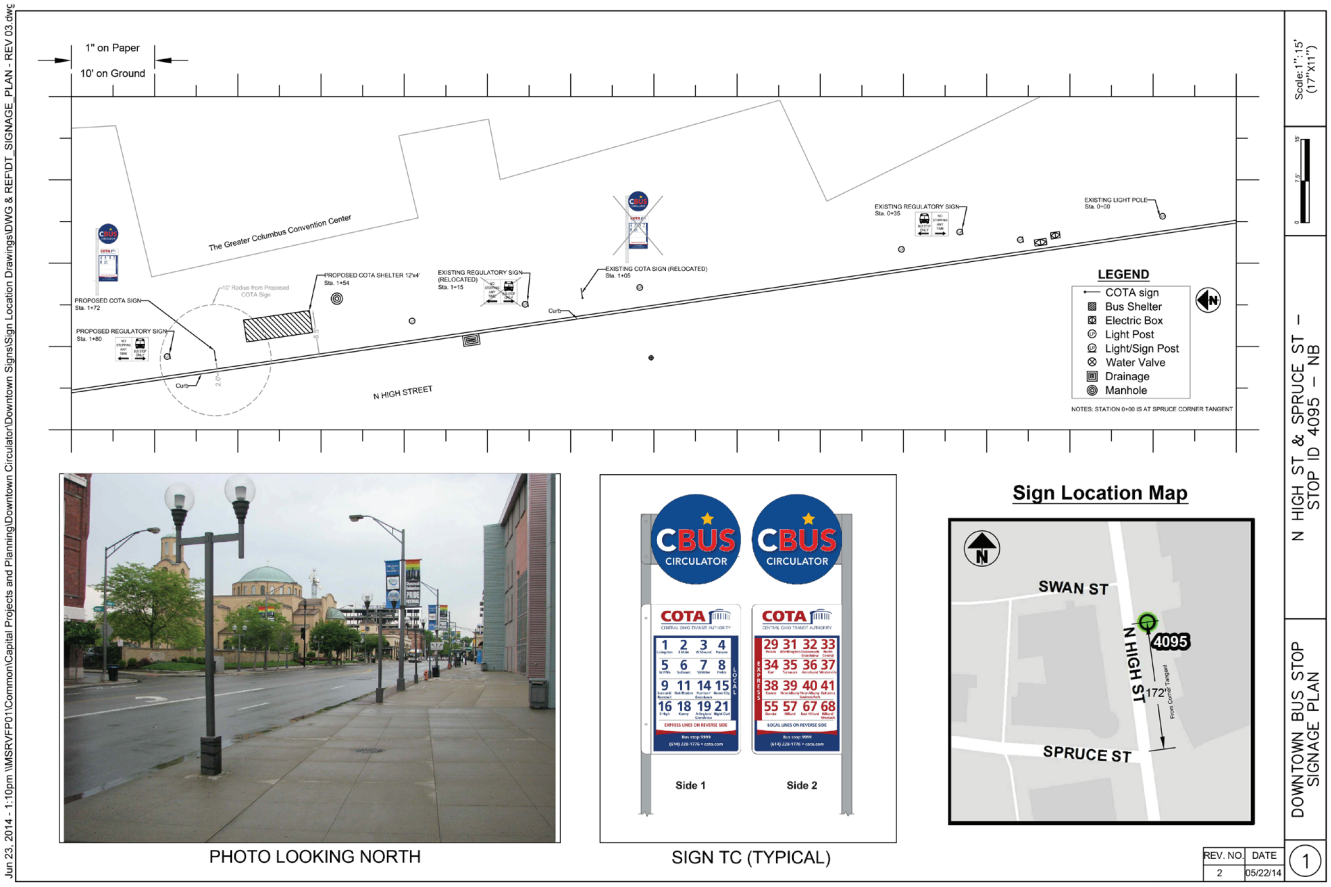


FIGURE 22 CAD drawing of COTA bus stop. *Source*: Central Ohio Transit Authority.

- *Prepare bus stop design guidelines specific to your agency.* COTA performed all work on its *Bus Stop Design Guide* internally. This lengthened the process, but the agency cannot stress enough the usefulness of the process and the final document. COTA can now hand this document to cities, developers, consultants, and others to provide a complete picture of what a bus stop should be. One immediate impact is that Columbus is retrofitting "rain gardens" at bus stops to ensure that they do not interfere with passenger boarding and alighting flows. The process of preparing the guide also served to educate COTA staff.
- *Communicate to cities that the transit agency can be a great partner.* COTA worked with the city of Columbus to prepare successful grant applications to fund sidewalk improvements, and both partners noticed that funding agencies like partnerships. COTA was able to frame the topic of bus stop development so that it fit in with pedestrian improvements, streetscape projects, traffic flow improvement, and other city priorities. It is important to highlight how the community as a whole benefits from the development of better bus stops.

An emerging issue in the COTA service area is rain gardens and planters. Every community is looking to reduce infrastructure costs by installing rain gardens to reduce storm water construction costs and planters to improve streetscape aesthetics. As shown in Figure 23, incorrect installation either causes safety concerns for someone alighting from the rear door or simply restricts the location where a bus stop can be created. Although it has taken a couple years, the rain garden in Figure 23 is being redesigned to make it more pedestrian-friendly for transit users, and the *Bus Stop Design Guide* includes a section identifying how rain gardens or planters can be incorporated in the bus stop area so as not to impede the loading zone.

FIGURE 23 Rain garden improperly installed at bus stop.

MTA–NEW YORK CITY TRANSIT (NEW YORK, NEW YORK)

MTA–New York City Transit (NYCT), the primary transit agency in New York City, operates multiple modes, including an extensive bus network. Service area population is 8.18 million. MTA–NYCT operates 3,691 buses during maximum service. Annual bus ridership was 829.2 million in 2012.

Challenges

- *Length of bus stop.* Buses sometimes cannot get to the curb or stops are not adequate to serve multiple routes. The bus stop can take 140 ft in a 230-ft block. Objections from the community are not so much about parking as concerns over multiple demands for curb space (for example, delivery vehicles). Length is also a challenge because of the increased use of articulated buses.
- *Pavement conditions in the bus stop.* Bucking, rutting, and sliding of blacktop create a very rough roadway and pedestrian hazards.
- *Coordination with the city.* MTA–NYCT is fortunate to work with only one jurisdiction (New York City, through the New York City Department of Transportation or NYCDOT) and cooperation has improved in the past several years, but the fact remains that the city has final say.
- *ADA compliance.* Even in New York City, some stops in outlying areas are basically a pole in the dirt, with no sidewalks. These conditions are an ADA issue as well as an accessibility issue.
- *Bollards.* Post-9/11, many buildings are surrounded by bollards, and the bus stop in front of the building is no longer ADA-compliant as a result (see Figure 24).
- *Trees in a bus stop* can be an ADA violation. The issue is similar to bollards. This is not an issue with existing stops that are grandfathered, but the presence of trees limit the ability to lengthen a stop. In such a case, the lengthened stop will end before the tree.
- *A neighborhood bus stop becomes part of the culture of the neighborhood.* Attempts to relocate can engender strong neighborhood opposition. Also, property owners assume significant responsibility (trash clearance, insurance issues) with a stop on their property.

Solutions

- *Cooperation.* One factor encouraging closer cooperation is that MTA–NYCT now pays NYCDOT for each bus stop action. Years ago, when relations between the two agencies were very different, relocating a bus

stop could take 6 months. Now, the stop is installed or changed within 45 days or NYCDOT will explain why it cannot be done, and it is not uncommon for stops to be installed within a week if needed.

- *Adaptation*. MTA–NYCT adapts as best it can to bus stops with less-than-optimal lengths, recognizing that stops of this nature will always be present in New York City.
- *Transit curb extensions*. New York City has built, or is building, transit curb extensions at approximately 40 locations. They have generally been built on Select Bus Service routes (New York's name for BRT) where they are paired with offset bus lanes one lane away from the curb lane, but not exclusively so. NYCDOT designs and owns the asset when it is built. In an excellent example of interagency cooperation, approximately 25 of the transit curb extensions were actually built by NYCT using city funds. Typically the transit curb extensions are a 9-ft-wide extension of the sidewalk (or the width of the parking lane). They are as long as required by the frequency and characteristics of the bus service. If space permits, they are built to approximately 140 ft to accommodate two articulated buses. While extending the sidewalk would appear to be straightforward, drainage issues are critical. In addition, particularly in midtown Manhattan, utility relocation requirements add enormously to the time and cost required to construct the transit curb extensions. Where slopes and drainage and local conditions permit, a 10-in.-high curb is built. This permits almost level boarding. If the bus operator kneels the bus, then front-door boarding is essentially level.

FIGURE 24 Bus bollards at a bus stop in Manhattan.

Figure 25 presents a before and after example of a transit curb extension for Select Bus Service in Manhattan.

Bus Stop Design and Location

- *MTA–NYCT works closely with NYCDOT on bus stops*. When articulated buses are introduced on a route, agency staff drive the route with NYCDOT staff, discuss options at each stop, and reach agreement on how to restructure the stops along the route.
- *MTA–NYCT does not solicit the public for approval on individual bus stops* owing to the sheer number of bus stops in New York City. Changes to bus layover locations, however, do require consultation with local residents.
- *Stop locations adjacent to gas stations and supermarkets are avoided*. Driveways are the issue at gas stations, because these are not safe places for passengers to wait for a bus. Curbside deliveries are the issue at supermarkets, since very few stores in New York City have loading docks.
- *Intermodal bus stops are a challenge*. Many stops at a subway entrance are a half-block away, not an insurmountable distance but not a seamless transfer either. Because of curb space limitations, the city has no kiss-and-ride locations.

FIGURE 25 Bus stop with and without transit curb extension in Manhattan.

Advice to Other Agencies

MTA–NYCT offers the following advice to other transit agencies:

- *Farside stops are generally preferred*. The overwhelming majority of stops in the city are farside. There are specific cases where a nearside stop is required.

- If the agency does not control the bus stops, *make sure that it has a good relationship* with the agency that does. Even with a good relationship, the transit agency will not get everything that it wants.
- *Provision of information at bus stops is critical*. The current "lollipop" bus stop sign works well as urban design, is highly visible, and provides good static information (see Figure 26). Each stop is now numbered and the sign includes a telephone number to call for next-bus information. Each stop also has a unique "box number" for texting and a scannable Quick Response (QR) Code. Electronic information may be the wave of the future, but riders continue to value schedule information and a route map, posted at every NYCT stop.
- *If the agency is unsure whether to put in a bus stop, don't*. It is much easier to put the stop in later if it is needed than to remove an existing stop. For the same reason, err on the side of fewer bus stops along a route. MTA–NYCT removed crosstown bus stops 10 years ago at Park Avenue in Manhattan, which has no bus services, and still receives complaints.
- *Identifying stop locations for Select Bus Service* (or BRT) *is not especially difficult*. Major intersections with connecting routes are obvious choices for stop locations. As with local routes, it is wiser to err on the side of fewer stops.

FIGURE 26 Lollipop bus stop sign and transit curb extension on Broadway.

TRI-COUNTY METROPOLITAN TRANSPORTATION DISTRICT OF OREGON (PORTLAND, OREGON)

Tri-County Metropolitan Transportation District of Oregon (TriMet) is the multimodal public transportation operator in the Portland, Oregon, metropolitan area. Service area population is 1.49 million. TriMet operates 496 buses during maximum service. Annual bus ridership was 59.5 million in 2012.

Challenges

TriMet reports that various challenges have evolved over the years. Development of *Bus Stop Design Guidelines* aided the response to many challenges and established a focus on pedestrian safety, accessibility of stops, and operational safety and efficiency. One of the biggest current challenges is dealing with changing infrastructure and infrastructure needs, including the following:

- *Bicycle facilities*. TriMet has found that the incorporation of separated in-roadway bikeways (cycle tracks, buffered lanes, etc.) needs to be carefully assessed by the transit agency during the design phase to ensure harmonious sharing of the roadway. Right turns across bicycle lanes are a concern, but more so with general traffic than with TriMet buses. Figure 27 shows an interesting example of bicycle lanes within the sidewalk area along Moody Avenue.

FIGURE 27 Bike lanes and storm water street planter along Moody Avenue, Portland.

- "*Green*" *storm water management features on transit corridors*. While very important, storm water street planters and curb extension planters compete for space with bus stops. As with bicycle facility improvements, transit agency involvement is key to reaching creative solutions that maintain stop viability and safety. Figure 27 also shows a storm water street planter along Moody Avenue.
- *Proliferation of "safe crossings."* In the region, the city of Portland is leading an effort to install crossing infrastructure (pavement marking, islands, extensions, hawk signals, rectangular rapid flash beacons or RRFBs, etc.) at locations where pedestrian access and safety is important. Figure 28 shows a hawk signal and Figure 29 shows an RRFB. While these greatly

enhance pedestrian safety, and are often intended to support access to transit, their specific location (mid-block, at T-intersections) does not always fit with stop spacing or preferred stop position. TriMet relies on public partners to stay apprised of projects and "hot spot" applications in order to arrive at positive outcomes for pedestrians and transit riders.

- *Stop accessibility.* The sidewalk infrastructure is generally good, but exceptions exist in the service area. Extension of the sidewalk network is a priority for the city of Portland and many local jurisdictions.

FIGURE 28 Hawk Signal, Sandy and NE 18th Avenue, Portland.

FIGURE 29 Street crossing with rectangular rapid flash beacons (RRFBs).

Solutions

- *Bus Stop Design Guidelines.* TriMet revised this document extensively in 2001 and has since made minor changes. The document continues to provide guidance on stop location, amenities, and stop design. Figure 30 shows a TriMet bus stop with a transit curb extension and amenities. Benefits accruing from the development and use of this document include the following:

FIGURE 30 TriMet bus stop with transit curb extension and amenities, Pearl District.

  - A basis for discussing right-of-way and stop design with local jurisdictions and the Oregon Department of Transportation.
  - A basis for discussing these same issues with private property owners and developers.
  - Consistency in stop appearance.
  - A clear understanding within the agency of the importance of bus stops.
- *Pedestrian Network Analysis Project.* TriMet partnered with local municipalities to identify areas where sidewalks are missing, traffic volumes and speeds are high, and pedestrian crashes have occurred. The project developed a composite bus stop score to grade all TriMet bus stops. The study includes specific recommendations in 10 key areas for pedestrian access improvements as well as principles for pedestrian design. Pedestrians are the top priority for the city of Portland, which has undertaken a process to map sidewalks and other pedestrian facilities.
- *Integrating bus stop and bicycle facilities on transit streets.* TriMet and city transportation planners and engineers spend considerable time together creating solutions to minimize bicycle-bus conflicts on an intersection-by-intersection basis. Green Bike Boxes (see Figure 31) at intersections (where cyclists can queue in front of the bus or vehicle traffic), a low-cost solution to right-turn accidents, were introduced with some success about 6 years ago.

Stop Design and Location

- *Farside stops are preferred*, but each intersection is analyzed to identify the most logical spot.
- *Quantitative, ridership-based criteria are established for provision of stop amenities.*
- *Stop design guidelines emphasize what the space at the bus stop should look like*, including shelters and square footage.

FIGURE 31 Green bike box at an intersection.

Advice to Other Agencies

TriMet offers the following advice to other agencies in terms of improving bus stops:

- *Create your own design standards.*
- *Create your own bus stop policy and follow it.* Make sure it is sufficiently flexible to accommodate site-specific characteristics.
- *Make bus stops an agency priority.* In the past, bus stops were not always a high priority at TriMet. The agency came to realize that no one else would treat bus stops as important unless TriMet did.
- *Aggressively pursue grant opportunities.* Real opportunities to secure federal and other funding for bus stop improvements are available.
- *Commit to strong partnerships with local jurisdictions and the state.* These partnerships can create a shared vision of bus service stops and amenities, identify funding opportunities, obtain a seat at the table for the transit agency when streets are redesigned and private development is proposed, and develop expedient permitting approaches, all of which aid the implementation of successful bus stop improvements.
- *Engage private developers.* The Transportation Planning Rule adopted in 1991 encourages developers to work with TriMet to design stops that fit into the context of the building. Developers receive lower parking ratio requirements (in some cases, no parking is required) and higher floor-area ratios in exchange for transit improvements adjacent to the development. TriMet will add its own amenities to an adjacent stop if existing or projected ridership meets its guidelines.
- *Understand that staff and funding are critical elements of a stop improvement program.* Ongoing partnerships with local jurisdictions and developers require resources, as does stop maintenance.

GOLDEN GATE BRIDGE, HIGHWAY AND TRANSPORTATION DISTRICT (SAN FRANCISCO, CALIFORNIA)

Golden Gate Bridge, Highway and Transportation District (GGBHTD) is a regional transit provider in the San Francisco, California, metropolitan area. GGBHTD operates the Golden Gate Bridge, Golden Gate Transit (GGT), and Golden Gate Ferry. The GGT service area, centered in Marin County and extending to San Francisco, Sonoma, and Contra Costa Counties, has a population of 869,000. GGT operates 168 buses during maximum service. Annual bus ridership was 6.70 million in 2012.

Challenges

- *Multiple jurisdictions.* GGT serves four counties and 22 jurisdictions and also has bus stops within the state ROW. The agency must obtain approvals by multiple agencies, each with its own procedures, standards, and attitude toward transit, to establish and maintain bus stops. Many stops are left over from the days of Greyhound operation and have not been upgraded. Figure 32 shows one example; problems with this stop include no sidewalk, poor surface conditions (dirt and asphalt combination), a very old shelter, insufficient length (the bus blocks access to the road on the right), and no delineated pedestrian access to and from the bus stop.

FIGURE 32 Golden Gate Transit legacy stop in Marin County.

- *Different vehicle configurations.* Wheelchair lifts are located in different places, and bicycle racks are either in front of the bus (three-position) or internal on the 45-ft over-the-road coaches used on commuter routes (two-position). Bus stops must be configured with these differences in mind.

- *Local jurisdictions*. Only 10 of the 850 bus stops within the service area are located on property owned by GGT. Local jurisdictions vary in their interest in transit and willingness to cooperate on bus stop issues. GGT is either given very short notification or not contacted at all on some construction projects affecting its stops and routes.
- *Emerging issues*. These include bicycle tracks, either on the street or on sidewalks, and how they interface with bus stop locations, as well as safety issues, such as whether a yellow line is needed at the curb or the edge of the bus stop to indicate where passengers must wait.
- *Freeway stops*. GGT has about 15 stops per direction on Highway 101 itself or on ramps leading to and from the freeway. Figure 33 shows the difficulty of locating these stops safely and ensuring good pedestrian access in a freeway setting.

FIGURE 33 Golden Gate Transit freeway stop, Northbound US-101 and Tiburon Boulevard, Marin County.

Solutions

- *GGT outreach efforts with the multiple jurisdictions it serves include* (*for example*) *presentations* at the monthly meeting of the Marin County Department of Public Works (DPW). These meetings afford the opportunity to meet face to face with DPW personnel and to encourage contact and cooperation.
- *GGT has developed a PowerPoint presentation to raise the awareness of its needs at bus stops*, including
  - Various coach lengths,
  - Various locations of wheelchair lifts,
  - Various locations of bike racks,
  - Hours of operation,
  - Bus stop accessibility,
  - ADA requirements,
  - Conflicts with street furniture,
  - Various turning requirements,
  - Conflicts with driveways,
  - Design of roundabouts, and
  - Maintenance.

The agency plans to reach out to all jurisdictions served and to post the PowerPoint presentation on its website. Figure 34 shows a well-designed stop in a residential neighborhood. Good design elements include a farside stop, pullout area on a narrow street, shelter that is well maintained by the adjoining property owner, shelter configuration partially facing on-coming traffic versus centerline of the street, clear landing area for wheelchair lift operation, and separate pedestrian path to the adjoining building.

FIGURE 34 Golden Gate transit stop in residential neighborhood, Sausalito.

Stop Design and Location

- *Farside stops are preferred, with some exceptions.*
- *Adjacent land use and changes in land use affect stop location decisions*. One example is the opening of a very popular supermarket with a parking lot that exits into the right-turn lane where the bus stop was located. Another was a video store that was converted to a dry cleaning store with steady pedestrian traffic throughout the day; this led to complaints that the bus blocked access to the store. New or restored business buildings often do not want a bus stop outside their doors.
- *Shelters and passenger amenities are more likely to be provided at inbound locations*, especially on commuter routes.
- *Shelter maintenance* can be performed by the agency, the municipality, or the company that leases advertising on the shelters. The quality of maintenance varies. Even when another agency is responsible for maintenance at a given stop, GGT often sends a crew to clean up litter, garbage, and shattered glass in response to complaints because the appearance of the stop affects the perception of transit and because riders view GGT as responsible for all aspects of the bus stops.
- *Informational elements at bus stops include description of the route, a QR Code, and a unique stop identification number* that feeds into the Bay Area 511 system and will provide scheduled bus arrival times.
- *GGT is planning for real-time next-bus information, but topography and complexity have delayed implementation.*

Advice to Other Agencies

GGT offers the following advice to other transit agencies:

- *Outreach and communication are critical.* Communicate as effectively as you can with agencies whose work directly affects your bus stop: the city planning department, the public works department, utility companies, and other transit operators. If your service area has a multitude of transit operators and organizations, it is best to find and participate in a standing committee to increase awareness of your agency and its needs regarding bus stops. If no standing committee exists, then you need to be proactive and seek out the relevant agencies. Communication can address issues before they turn into problems.

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY (WASHINGTON, D.C.)

Washington Metropolitan Area Transit Authority (WMATA) is the regional transit provider in the Washington, D.C., metropolitan area. WMATA operates multiple modes, including an extensive bus network. Service area population is 3.72 million. WMATA operates 1,281 buses during maximum service. Annual bus ridership was 137.8 million in 2012.

Challenges

- *Proliferation of bus stops*. For decades, residents asked for stops and the transit agency complied. Existing bus stops become part of the neighborhood culture and are very difficult to move or consolidate.
- *Community outreach*. WMATA has embarked on a stop consolidation program. The first step is reaching out to local elected officials, often through the Advisory Neighborhood Commissions that have been established throughout the District of Columbia. WMATA performs its analysis as a precursor to outreach to identify candidates for elimination based on proximity to another stop and stop usage (automatic passenger counter, or APC, data are a real blessing in this data-driven effort), and discusses the benefits of stop elimination for bus riders. The outreach with community leaders has been successful. Outreach to riders occurs in the form of notices posted at stops proposed for elimination that include a phone number to call. If WMATA receives a high number of calls about a specific stop, the decision will be reconsidered.
- *Local jurisdictions*. WMATA, like most agencies, does not own any of its bus stops and so works with bus stop coordinators at local jurisdictions. The position of "bus stop coordinator" exists at local jurisdictions to oversee stops used by the local bus systems and is an excellent local contact for WMATA because the coordinator understands bus stop issues. WMATA typically co-locates its bus stops with those of the local agency except in extenuating circumstances. WMATA also participates in the Regional Bus Stop Task Force. Despite these efforts, WMATA is not always notified of ongoing improvement projects that may include sidewalk, roadway resurfacing, or ADA components.
- *Developers*. The District of Columbia has a development review process that includes bus stops as a check-off box. Developers need to work with WMATA in a satisfactory way before the box can be checked. Developers vary in their willingness to do so and in their propensity to put up a fight. There is less of a defined process outside the District, and in these locations WMATA is more likely to work with the jurisdictions rather than directly with developers.
- *ADA compliance*. The Washington Metro area includes many jurisdictions and ROW owners, all with different contexts and their own standards on bus stops and sidewalks. Improving stops to ADA compliance regionally has been a priority only when streets are undergoing major capital improvements, and more than half of the region's 19,000 bus stops remain inaccessible. As noted previously, jurisdictions may not notify WMATA of improvement projects; at times, a project has made a bus stop ADA-accessible without WMATA's knowledge.
- *Right-of-way constraints*. In many locations where the ROW behind the curb is constrained, additional passenger waiting space, room for shelters, and the opportunity to speed up boarding and deboarding can be provided by a transit curb extension. However, municipalities have been reluctant to allow transit curb extensions, possibly because the bus will stop in a travel lane.

Solutions

- WMATA has developed *bus stop design guidelines*. The agency had previously relied on TCRP reports, including those referenced in the literature review in chapter two, as the basis for improvement requests. Use of its own guidelines tailored for its operating environment has been helpful in negotiating and in having jurisdictions and ROW owners understand the issues.
- WMATA received an FTA New Freedom grant to *improve stops to ADA compliance*, but at just over $1.2 million it is expected to improve only about 75 stops. Its Board of Directors has placed renewed emphasis on the impact of inaccessible stops on paratransit eligibility, leading to more attention to this issue regionally. Every bus stop improved to ADA compliance has the potential to create great savings by providing access to

the bus network in place of expensive paratransit trips for those who can access the fixed-route system. Better data on ridership and paratransit destinations are also helping to prioritize investments.

- WMATA has *updated its bus stop signs* for a modern look, ADA compliance, and clear indication of different service brands (Figure 35). The "information case" at each stop has been standardized (Figure 36), although some legacy cases remain. Information at each stop is customized to indicate major destinations along the route, estimated travel times, and bus arrival times for that stop. This customized information replaced a full bus schedule that riders said was not always especially useful. The goal was to replace extensive schedule data with more useful information. The signage also indicates Metro Extra service that operates in limited-stop mode at least every 15 minutes with a different-colored bus (Figure 35 shows stop signage; Figure 37 is a photograph of the Metro Extra bus). WMATA has posted new bus stop signage at approximately two-thirds of its 12,000 stops.

FIGURE 35 WMATA updated bus stop sign showing Metro Extra Route.

- APCs provide a wealth of *current, up-to-date information* at the bus stop level. WMATA summarizes average daily boardings by stop every quarter. This information is useful for analyzing stop usage.

FIGURE 36 WMATA bus stop information case.

FIGURE 37 WMATA Metro Extra Bus.

- WMATA is working with the District Department of Transportation (DDOT) to develop a *toolkit for the deployment of transit curb extensions* in parking lanes, along with assistance on engineering standards for these facilities. As part of its green initiative, DDOT is now designing transit curb extensions into street reconstruction projects that include a place for storm water to gather, but bus stops are not necessarily incorporated into the design.

Stop Design and Location

- *Adjacent land uses* tend to drive most stop location decisions. Regardless of farside or nearside, WMATA

would rather have a bus stop next to a park or shopping center than next to someone's residence or a day care.
- The location should be somewhere that is *less likely to see people illegally parking or stopping in the bus zone.*
- *ROW for a bus shelter* can also drive decisions; a shelter may be located on one side of the street but not on the opposite side.
- Recently, the agency *moved stops in several corridors to farside* to facilitate transit signal priority systems, which work most effectively with farside stops.

Advice to Other Agencies

WMATA offers the following advice to other transit agencies:

- *Develop your own local bus stop design guidelines.* These have been more effective for WMATA in communicating with local jurisdictions, because the jurisdictions understand that the guidelines are responsive to local conditions and express what WMATA needs. If a bus stop is 75 ft long and needs but be 100 ft, citing the agency's guidelines receives a better response than citing a national study.
- *Coordinate with the ROW owners in your service area* to understand their needs and to make your agency's needs clear. WMATA's monthly meetings with DDOT are extremely helpful in terms of sharing technical knowledge and concerns as well as in terms of interaction with the people who ultimately make decisions regarding bus stops.
- In outlying portions of the service area, *begin with the people you know* to establish contact with local jurisdictions. WMATA has a few bus stops in Charles County, Maryland, outside the Metro Compact Area. Because the stops are on a state highway, WMATA reached out to the state DOT to establish a liaison.
- *The process of improving bus stops creates a positive, self-sustaining cycle.* As WMATA does more to make bus stops a community asset, the communities become more responsive.
- *Maintaining accurate customer information at bus stops will likely increase staffing needs.* An agency needs a dedicated team to keep up with periodic service changes and fix broken stops. New responsibilities tend to be secondary, but they are important to keep customer information up to date.

CHAPTER SIX

CONCLUSIONS

INTRODUCTION

The purpose of this synthesis is to report on major issues and successful approaches that address on-street bus stops from the transit agency's perspective. This approach also includes the customer's perspective, because the bus stop is where the customer's journey on transit begins.

The survey of transit agencies was important in defining the current state of the practice with regard to actions taken to improve on-street bus stops. The sampling plan involved a sample of 60 transit agencies. Forty-eight completed surveys were received from the 60 agencies in the sample, a response rate of 80%. Survey results address design guidelines for bus stops, responsibilities and coordination, stop design and location, stop length, types of stops, pedestrian access, passenger information, amenities, bus pads, curb cuts, ADA considerations, challenges, agency assessment of the success of actions taken, benefits and drawbacks, potential improvements, and lessons learned.

Case examples provide additional details on challenges, solutions, bus stop design and location, and lessons learned. Six agencies were selected as case examples:

- Austin, Texas: Capital Metro
- Columbus, Ohio: Central Ohio Transit Authority
- New York, New York: MTA–New York City Transit
- Portland, Oregon: TriMet
- San Francisco, California: Golden Gate Transit
- Washington, D.C.: Washington Metropolitan Area Transit Authority.

This chapter summarizes key findings, presents conclusions from this synthesis project, and offers areas for future study. Findings from the literature review, survey responses, and particularly the case examples identify and assess the factors contributing to the success of actions to improve bus stops. The chapter is organized into five sections:

- Findings concerning better on-street bus stops
- Agency assessments
- Lessons learned—survey respondents
- Lessons learned—case examples
- Conclusions and areas for future study.

The further research needs offered here would address a greater detail of analysis about impacts on ridership, extent of agency–municipality partnerships, unanticipated impacts of ADA compliance at stops, the role of real-time bus arrival information at stops, and transferability of findings across cities and transit agencies.

FINDINGS CONCERNING BETTER ON-STREET BUS STOPS

- *Responsibilities and coordination*. Responsibility for deciding bus stop location and relocation is often shared between the transit agency and the local municipality (typically the Department of Transportation or Department of Public Works), while the transit agency is generally responsible for installing stops. Responsibility for stop maintenance can be divided in many different ways. Even when responsibility was split between the agency and local municipality, the division of specific tasks was different in almost every case. Most respondents reported a good or very good relationship with the primary or largest city in which they operate, but fewer reported a good or very good relationship with other municipalities.
- *Improved coordination*. Steps taken to improve interagency coordination related to bus stops include outreach to individual agencies as needed and review of site plans for new developments. Many agencies reported a combination of steps and also reported that the actions have been successful in helping agencies to place bus stops at their preferred location. Insufficient capital funding to build or improve bus stops is the major financial barrier. The most frequently mentioned institutional barrier is dealing with multiple municipalities. Internal agency issues also ranked high in terms of institutional barriers.
- *Bus stop design and location*. More than 80% of agencies have developed their own bus stop design guidelines. A preference for farside stops is more common than a preference for nearside, but actual decision making is more nuanced than a multiple-choice question allows. Subsequent responses indicated that many agencies that responded "depends on specific location" do have a general preference for either farside or nearside stops, and agencies reporting a specific prefer-

ence do make exceptions at specific locations. In older parts of the service area, stop locations have often been inherited from the previous operator, sometimes dating back to the days of streetcars. Agencies provided thorough explanations for their preferred stop location. Additional factors affecting an agency's decisions on stop locations include stop spacing and adjacent land uses or trip generators.

- *Stop length*. Survey responses suggest that bus stop lengths at most agencies are shorter than the guidelines cited in the literature review in chapter two—90 ft farside, 100 ft nearside, and 150 ft midblock. Several agencies agreed with the guidelines in specifying longer lengths (most often 20 ft longer) for nearside stops than for farside. It is also important to note that respondents did not define how bus stop length is measured. Most respondents stated that the required length of bus stops has increased in recent years to accommodate the use of longer buses and articulated buses. Most agencies in the survey do not base stop length standards on the volume of buses serving the stop. If agencies cannot obtain sufficient length at a particular bus stop, the most common responses are to look for a nearby alternative or to make do with a shorter stop. Most respondents use multiple berths at bus stops somewhere in their system, typically at transit centers, major downtown bus corridors, at the end of the line, and on corridors with different service types.
- *Stop types*. A majority of agencies rated passenger safety and accessibility as good or very good for bus bays and transit curb extensions. The major problem with bus bays is the difficulty of reentering the traffic flow. Safety issues and capacity constraints are major challenges associated with median stops.
- *Pedestrian access to bus stops*. Provision of good pedestrian access to bus stops is a key design objective. Street furniture, narrow sidewalks, and safe places to cross the street are major constraining factors to pedestrian access in urban environments. Lack of sidewalks and safe places to cross the street assume greater importance in the suburbs and are even more important in rural areas. Many transit agencies are concerned about liability regarding access to bus stops.
- *Passenger information*. A bus stop sign with the route number(s) and a telephone number for information are the most common information elements at bus stops. The most common customer request for additional information at stops is for real-time information about next-bus arrival, followed by schedule information. Almost 60% of responding agencies have or are in the process of implementing real-time information at bus stops. Seventy-five percent of agencies that do not have real-time information are planning to implement next-bus information at stops. Cost is the major reason cited by agencies with no plans to implement.
- *Passenger amenities at bus stops*. Shelters, benches, trash receptacles, and traditional lighting are the most common amenities provided at bus stops. The most common customer request for passenger amenities at stops is shelters, and agencies overwhelmingly rate shelters as the most valued amenity. Guidelines based on stop usage and feasibility are the most common factors in deciding when to provide amenities at a given stop.
- *In-street bus pads*. Most survey respondents have criteria for the design or location of bus pads, which are concrete or reinforced concrete pavement installed in the street to support the added weight of buses. The municipality often sets the criteria for bus pad design and location.
- *Curb cuts/driveways*. Agency policies often forbid or discourage stops at curb cuts/driveways in commercial areas but may allow a curb cut/driveway at the back door of the bus. Some agencies do allow stops at curb cuts/driveways in residential areas where traffic volumes and bus passenger activity are lower and stops at curb cuts/driveways are less of a safety issue. The decision-making responsibility to approve or deny a request for a curb cut/driveway at an existing bus stop rests with the municipality, according to 73% of survey respondents.
- *ADA considerations*. For existing stops, responsibility for addressing ADA requirements most often lies with the transit agency. Several factors affect the ability or decision to improve a stop. Most respondents take a comprehensive approach to addressing ADA requirements at new stops.
- *Challenges*. Absence of sidewalks, property owners' concerns, and ADA issues were rated as major challenges by at least half of the respondents. Conflicting curbside uses and coordination with cities/counties/states were rated as major challenges by more than 40% of respondents. Respondents also answered an open-ended question to describe the major challenge affecting bus stop provision and improvements. Coordination with local governments, absence of sidewalks, and obtaining sufficient right-of-way were each mentioned as the biggest challenge by at least 10% of respondents. Agency strategies to overcome any major challenges focus on building partnerships with localities and property owners and taking a proactive stance to address issues under the agency's control.

AGENCY ASSESSMENTS

- **Assessments of the success of actions taken are generally positive.** Most respondents (53%) rated their actions as "somewhat successful" and 27% rated their actions as "very successful." Actions include more and improved shelters, better pedestrian connections to

and from stops, wider sidewalks, additional amenities, improved and more consistent customer information, lengthened bus stops, and newly designed bus stop signs and flags. One agency noted that planners and community development staff have begun to incorporate transit perspectives into their processes.

- **The primary benefits of these actions are better customer access to bus stops, an improved customer experience at stops, and improved customer safety,** each cited by at least 20% of all respondents. Other benefits include better relationships with municipalities, safer bus operation, ridership increases, ensured ADA compliance, and investments in on-street amenities.
- **The major drawbacks of these actions are budgetary impacts and inefficient use of staff time.** Other drawbacks include higher expectations for future stop enhancements, procedural/policy issues with local municipalities, pushback from property owners, loss of parking, increased customer complaints, lack of flexibility, and internal issues.
- **Partnerships and improved communication with municipalities and property owners were most frequently mentioned as the most successful actions,** followed by grants and funding for stop improvements and bus shelter installation. Specific successful actions described in chapter four include cost-sharing arrangements with municipalities, agreements with municipalities and developers to provide bus stop improvements as part of their ongoing work, pursuit of funding opportunities that benefit all parties, real-time information at bus stops, dedicated funding and staff for a bus stop program, and ways to involve riders and city staff in prioritizing stop improvements.
- **Streamlined and simplified approval processes, legal authority to establish bus stops where needed, and better coordination with local governments were most frequently mentioned** in response to the question: "If you could change ONE aspect in the process of designing and locating bus stops, what would you change?" Respondents also mentioned standardized procedures across municipalities.

LESSONS LEARNED: SURVEY RESPONDENTS

Survey respondents shared lessons learned from efforts to improve on-street bus stops. Lessons learned emphasized ongoing external communications that begin before a major bus stop improvement project, partnerships to facilitate a clear understanding of each agency's priorities and requirements, and a multidisciplinary, cross-department approach within the agency:

- **Outreach to external stakeholders,** including municipalities and other groups, **early in the development of bus stop guidelines or improvement programs invites them into the process as partners in identifying solutions.** Projects are much more successful and efficient when agencies work together toward a common goal. Providing the context for future stop-related requests is more likely to succeed than making requests "out of the blue." Establishing good relationships builds trust on bus stop issues and creates a rapport that will yield a climate of customer-sensitive interest in establishing and maintaining bus stops for local residents.
- **Working with jurisdictions to explain the transit agency's needs and understand the jurisdiction's requirements helps the transit agency to craft plans that are consistent with meeting the needs of all parties.** One agency was able to frame the topic of bus stop development so that it fit in with pedestrian improvements, streetscape projects, and traffic flow improvement. It is important to highlight how the community as a whole benefits from the development of better bus stops.
- Using a **multidisciplinary or cross-departmental approach within the transit agency** can achieve a more balanced view of each situation and produce a more functional outcome. For example, having planning, safety, bus operations, real estate, and construction departments work together to assess stop issues can create internal consensus for the proposed solution.
- **Locally developed bus stop design and location standards and guidelines are extremely effective** in communicating with municipalities and developers. The municipality or developer is more receptive to guidelines that are responsive to local conditions and express what the transit agency needs. If a bus stop is 75 ft long but needs to be 100 ft, case example agencies have found that their own guidelines receive a better response than national studies. One agency suggested developing diagrams and templates in CAD (if possible) so designers can easily incorporate the bus stop improvements and proper clearances into their plans. A by-product of the process was the education of agency staff on bus stop issues.

LESSONS LEARNED: CASE EXAMPLES

Several themes ran through the case examples in terms of lessons learned, including the following:

- **Develop your own local bus stop design guidelines.** Customized guidelines are more effective in communicating with local jurisdictions and developers, because they understand that the guidelines are responsive to local conditions and express what the transit agency needs.
- **Outreach and communication are critical.** Communicate as effectively as possible with agencies whose work directly affects your bus stop: the city planning department, the public works or transporta-

tion department, utility companies, and others. The transit agency needs to be proactive and seek out the relevant agencies. Communication helps the transit agency to understand others' needs and to clarify its needs.

- **Commit to strong partnerships with local jurisdictions and the state.** These partnerships can create a shared vision of bus service stops and amenities, identify funding opportunities, obtain a seat at the table for the transit agency when streets are redesigned and private development is proposed, and develop expedient permitting approaches, all of which aid the implementation of successful bus stop improvements.
- **Make bus stops an agency priority.** No one else will treat bus stops as important unless the transit agency does. Invest the time to ensure that transit agency staff understands the importance of bus stops. Maintaining accurate customer information at bus stops will likely increase staffing needs.
- **Demonstrate to cities that the transit agency can be a great partner.** Work with cities to prepare grant applications to fund sidewalk improvements. The transit agency can frame the topic of bus stop development so that it fits in with pedestrian improvements, streetscape projects, traffic flow improvement, and other municipal priorities. It is important to highlight how the community as a whole benefits from the development of better bus stops.

Other lessons learned include the following:

- Support from transit agency leadership is very important for the success of any bus stop improvement program.
- Farside stops are generally preferred.
- Provision of information at bus stops is critical. Electronic information may be the wave of the future, but riders continue to value schedule information and route maps at the bus stop.
- Identifying BRT stop locations is not especially difficult. Major intersections with connecting routes are obvious stop location choices. As with local routes, it is wiser to err on the side of fewer stops.
- The process of improving bus stops creates a positive, self-sustaining cycle. As the transit agency does more to make bus stops a community asset, the communities become more responsive.

CONCLUSIONS AND AREAS OF FUTURE STUDY

- **Absence of sidewalks, concerns of property owners, and ADA compliance are among the major challenges facing transit agencies as they attempt to improve bus stops.** These issues were mentioned by at least half of all survey respondents. Coordination with local governments and obtaining sufficient right-of-way were the most common responses to an open-ended survey question on the one major challenge facing transit agencies.
- **Cooperation and partnerships with local municipalities, counties, and states are vital to the success of any efforts to improve on-street bus stops.** The transit agency does not own the streets on which its service operates. Survey results indicate that 56% of transit agencies have good or very good relationships with the primary city served, but only 41% have good or very good relationships with other municipalities within their service area. These other municipalities tend to be less urban, with fewer pedestrian amenities and a higher priority for automobile traffic than for transit. The case examples suggest that going beyond cooperation to a partnership arrangement (where each side benefits from the other's actions) has been important in achieving success. For example, the transit agency can place bus stop improvements in the context of pedestrian improvements, streetscape projects, and municipalities' other priorities, but it first needs to understand these priorities. Establishing good relationships builds trust on bus stop issues. These partnerships can create a shared vision of bus service stops and amenities, identify funding opportunities, obtain a seat at the table for the transit agency when streets are redesigned and private development is proposed, and develop expedient permitting approaches, all of which aid the implementation of successful bus stop improvements.
- **Agencies that have developed their own bus stop design guidelines emphasize the importance of this process.** A common theme in case example "lessons learned" is the usefulness of having locally developed guidelines that an agency can hand to a municipality or a developer as a model of how projects can be designed to accommodate bus stops. The municipality or developer is more receptive to guidelines that are responsive to local conditions and express what the transit agency needs. If a bus stop is 75 ft long but needs to be 100 ft, case example agencies have found that their own guidelines receive a better response than national studies. A by-product of the process is the education of agency staff on bus stop issues.
- **A successful effort to improve bus stops brings together various departments within the transit agency.** Each department brings its own perspective to bus stop improvements, and participation by operations, safety, and planning departments builds internal consensus and ultimately strengthens the bus stop improvement plan.
- **Assessments of the success of actions taken are generally positive.** Most respondents (52%) rated their actions as "somewhat successful" and 26% rated their actions as "very successful." Primary benefits are improved customer safety and better customer access

to bus stops. The major drawbacks are financial needs and staff time required.
- **The priority agencies place on bus stop improvements affects the success of these efforts.** If the agency does not place a high priority on improving bus stops, neither will anyone else.

Findings from this synthesis suggest seven areas of future study:

- *Ridership impacts of and customer satisfaction with improved bus stops.* Several agencies mentioned ridership increases as a benefit of bus stop improvements. One agency mentioned that ridership increases occur only at high-ridership stops; bus stop improvements at low-ridership stops have no effect on ridership. Another agency cited retaining choice riders and encouraging new ridership as a benefit of improved bus stops. Conventional wisdom suggests that the more inviting and safely designed a bus stop is for pedestrians, the more likely that people will use transit. A study of ridership impacts would provide very useful information.
- *The role of real-time bus arrival information at stops.* Only three agencies in the survey indicated no plans to implement real-time information, and all gave cost as the reason. Real-time information, either at stops or by means of text messages, improves customer satisfaction as well as the image of the transit agency. Do some real-time systems yield better predictions under these situations than others? Is the technology evolving to include factors such as these in the time prediction methodology? With rapid changes in the pace of adoption of this technology as well as in the technology itself, it may be difficult to answer all these questions. These are, however, important questions.
- *More detailed information on transit agency-municipality bus stop partnerships.* Several interesting approaches were revealed in the survey responses and the case examples. While communication with external agencies remains an issue, the relationship between transit agencies and cities appears to have improved. Are there other examples of partnerships? The ongoing TCRP Project A-39 is identifying how to establish good working relationships with external stakeholders, particularly roadway agencies, when implementing transit preferential treatments.
- *Safe pedestrian access to bus stops.* How do the "complete streets" movement and increased attention to pedestrian safety tie in with efforts to improve bus stops? To what extent are pedestrian injuries and fatalities related to patrons crossing to and from bus stops? Can warrants for pedestrian signals at or adjacent to bus stops be developed? Can guidelines be developed for stop placement and design that specifically address the proximity and quality of street crossings? Would transit agencies bear increased liability for stops with no or poor adjacent street crossings, and if so, what impacts would this have on transit accessibility within a reasonable walking distance?
- *Research on the unanticipated impacts of ADA compliance on bus service.* The overall impact of ADA requirements at bus stops has been positive for all riders, especially riders with disabilities. Some agencies noted a reluctance both to expand service to areas requiring a significant effort to establish ADA-compliant stops and to make minor improvements to a bus stop if it would trigger the need to bring the stop into full compliance. This issue has not been explored in the literature.
- *Conflicts between bus stops and bicycle facilities.* Bicycle racks on buses have become ubiquitous as transit agencies realize the benefits of attracting bicycle riders to transit. In-street bicycle lanes are often between the parking lane (or the sidewalk) and the travel lane used by buses, and the conflict is heightened at bus stops. Cycle tracks on sidewalks may have impacts on pedestrian access to bus stops. How can these conflicts best be managed?
- *Storm water management issues.* Municipalities throughout North America are increasingly incorporating rain gardens and planters in their streetscapes. The improved streetscapes can enhance the attractiveness of bus stops, but several transit agencies noted that they have not been included in streetscape planning. As a result, some stops are no longer ADA-compliant because opportunities to enhance both the bus stop environment and the safe operation of buses, such as the placement of rain gardens, are being missed. What must be done to incorporate transit needs into "green" streetscape design?

ACRONYMS

ADA	Americans with Disabilities Act
APC	Automatic passenger counter
BRT	Bus rapid transit
CAD	Computer-aided design
COTA	Central Ohio Transit Authority
DDOT	District Department of Transportation
DOT	Department of transportation
DPW	Department of Public Works
GGBHTD	Golden Gate Bridge, Highway and Transportation District
GGT	Golden Gate Transit
MTA	Metropolitan Transportation Authority
NTD	National Transit Database
NYCDOT	New York City Department of Transportation
NYCT	New York City Transit
P2	Public Participation
QR	Quick Response
ROW	Right-of-way
RRFB	Rectangular rapid flash beacon
TIGER	Transportation Investment Generating Economic Recovery
TOD	Transit Oriented Design or Transit Oriented Development
TRID	Transportation Research Information Database
TriMet	Tri-County Metropolitan Transportation District of Oregon
WMATA	Washington Metropolitan Area Transit Authority

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APPENDIX A

List of Participating Transit Agencies

1.	Albany, NY	Capital District Transit Authority
2.	Alexandria, VA	City of Alexandria
3.	Ann Arbor, MI	Ann Arbor Transit Authority/TheRide
4.	Antioch, CA	Eastern Contra Costa Transit Authority
5.	Arlington Heights, IL	PACE Suburban Bus
6.	Austin, TX	Capital Metro
7.	Baltimore, MD	Maryland Transit Administration
8.	Charlotte, NC	Charlotte Area Transit System
9.	Chicago, IL	Chicago Transit Authority
10.	Cleveland, OH	Greater Cleveland Regional Transit Authority
11.	Columbus, OH	Central Ohio Transit Authority
12.	Concord, CA	Central Contra Costa Transit Authority/County Connection
13.	Dallas, TX	Dallas Area Rapid Transit
14.	Davis, CA	Unitrans
15.	Dayton, OH	Greater Dayton Regional Transit Authority
16.	Denver, CO	Regional Transportation District
17.	Fort Worth, TX	Fort Worth Transportation Authority
18.	Hartford, CT	Connecticut Transit
19.	Houston, TX	Houston METRO
20.	Lansing, MI	Capital Area Transit Authority
21.	Largo, MD	Prince George's County
22.	Las Cruces, NM	City of Las Cruces RoadRUNNER
23.	Las Vegas, NV	Regional Transit Commission of Southern Nevada
24.	Minneapolis, MN	Metro Transit
25.	Montreal, QU	Société de transport de Montréal

26.	Newark, NJ	New Jersey Transit
27.	New York, NY	MTA–New York City Transit
28.	Oakland, CA	AC Transit
29.	Oceanside, CA	North County Transit District
30.	Olympia, WA	Intercity Transit
31.	Orange, CA	Orange County Transportation Authority
32.	Portland, OR	Tri-County Metropolitan Transit District of Oregon
33.	Rockville, MD	Ride-On
34.	Salem, OR	Salem–Keizer Transit
35.	San Carlos, CA	Caltrain
36.	San Diego, CA	Metropolitan Transit System
37.	San Francisco, CA	San Francisco Municipal Transit Agency (Muni)
38.	San Francisco, CA	Golden Gate Bridge and Highway Transportation District
39.	Santa Cruz, CA	Santa Cruz Metro
40.	Sarasota, FL	Sarasota County Area Transit
41.	Seattle, WA	King County Metro Transit
42.	Spokane, WA	Spokane Transit Authority
43.	Syracuse, NY	Central New York Regional Transit Authority
44.	Toronto, ON	Toronto Transit Commission
45.	Vancouver, BC	TransLink
46.	Victoria, BC	BC Transit
47.	Washington, DC	Washington Metropolitan Area Transit Authority
48.	Wenatchee, WA	Link Transit

APPENDIX B

TCRP Synthesis Survey

Better On-Street Bus Stops

1. WELCOME

This TCRP synthesis will report on major issues and successful approaches that address on-street bus stops from the transit agency's perspective, which necessarily includes the customer's perspective. What are the components of "good" bus stops? What are the key barriers to providing better bus stops, and how have transit agencies overcome these barriers? The study will answer these questions by identifying successful strategies and best-practice solutions.

The survey questions try to address as many situations as possible, but given the variety of circumstances and transit systems, not all questions may be appropriate for all agencies. We encourage you to obtain input from others in your agency as needed. If any question does not apply to your system, simply answer "N/A."

We also ask for recommendations for other agencies to be included in our sample and for your willingness to participate in a telephone interview if your agency is selected for a more detailed case example.

The final report, to be published by the Transportation Research Board, will summarize best practices in improving on-street bus stops. This report will be extremely useful to all transit agencies in assessing current policies and identifying actions that have been successful elsewhere. All survey responses will be confidential.

Thank you for taking the time to participate.

2. Default Section

1. Today's date

MM DD YYYY

MM/DD/YYYY ☐ / ☐ / ☐

2. Please list your name, agency, and contact information

Name:

Title:

Company:

City/Town:

State/Province:

Email Address:

Phone Number:

3. System size

◯ Small (<250 peak buses)

◯ Medium (250-999)

◯ Large (1000+)

3. DESIGN STANDARDS FOR BUS STOPS

4. Does your agency have standards or guidelines for bus stop design?

- ◯ Yes, we have developed standards or guidelines
- ◯ No, but we refer to standards/guidelines developed by others
- ◯ No, we do not typically use published standards/guidelines

4. DESIGN STANDARDS 2

5. Are the design standards available on your agency's website?

- ◯ Yes
- ◯ No

5. DESIGN STANDARDS 3

6. What is the best way to obtain the stop design standards?

6. DESIGN STANDARDS 4

7. Who developed these other standards/guidelines?

7. CHALLENGES

8. Please characterize the following elements as major challenges, minor challenges, or not an issue in provision of bus stops.

	Major Challenge	Minor Challenge	Not an Issue
Right-of-way availability	◯	◯	◯
Sight distance	◯	◯	◯
Roadway grades	◯	◯	◯
Conflicting curbside uses, e.g. street furniture or landscaping	◯	◯	◯
Absence of sidewalks	◯	◯	◯
Width of sidewalks	◯	◯	◯
Absence of crosswalks	◯	◯	◯
Coordination with City/county/state	◯	◯	◯
Lack of emphasis within transit agency	◯	◯	◯
Ability to select shelter sites	◯	◯	◯
Traffic engineering concerns	◯	◯	◯
Conflicts with bicycles (bike lanes/stations)	◯	◯	◯
Funding	◯	◯	◯
Balancing customer and operational perspectives	◯	◯	◯
Restrictions on stop locations on state highways	◯	◯	◯
ADA issues	◯	◯	◯
Developer concerns	◯	◯	◯
Property owners' concerns	◯	◯	◯
Driveway issues	◯	◯	◯
Storm water management	◯	◯	◯
Stop maintenance	◯	◯	◯
Other	◯	◯	◯

Other (please specify)

8. BARRIERS, OBSTACLES, AND CHALLENGES

9. Please describe the nature of the one major challenge.

10. Please describe strategies or tactics used to overcome any major challenges.

9. ASSESSMENT

11. How would your agency rate its efforts to provide better on-street bus stops?

- ◯ Very successful
- ◯ Somewhat successful
- ◯ Neutral
- ◯ Somewhat unsuccessful
- ◯ Very unsuccessful

12. What have been the primary benefits of these efforts?

13. What have been the primary drawbacks of these efforts?

14. What was the most successful action taken, and why?

15. If you could change ONE aspect in the process of designing and locating bus stops, what would you change?

16. Please describe any "lessons learned" that would benefit other transit agencies.

10. RESPONSIBILITIES AND COORDINATION

17. Who is ultimately responsible for deciding the location of a bus stop?

- ◯ Transit agency
- ◯ Municipality/county/state DOT
- ◯ Joint decision
- ◯ Other (please specify)

18. Who is responsible for stop installation?

- ◯ Transit agency
- ◯ Municipality/county/state DOT
- ◯ Other (please specify)

19. Who is responsible for stop maintenance?

- ◯ Transit agency staff
- ◯ Transit agency contractor
- ◯ Municipality/county/state DOT
- ◯ Private sector or other third party
- ◯ Other (please specify)

20. Who is responsible for stop relocation decisions?

- ◯ Transit agency
- ◯ Municipality/county
- ◯ Joint decision
- ◯ Other (please specify)

21. Describe the relationship between your transit agency and the primary or largest municipality served with regard to bus stops?.

- ◯ Very good – meet on a regular basis to discuss issues
- ◯ Good – quick response to requests/open dialogue
- ◯ Fair – limited by administrative and funding issues we both deal with
- ◯ Could be better – generally unresponsive/requires prodding
- ◯ Poor – antagonistic/little communication
- ◯ Other (please specify)

22. Describe the relationship between your transit agency and municipalities other than the primary municipality served with regard to bus stops.

- ◯ Very good – meet on a regular basis to discuss issues
- ◯ Good – quick response to requests/open dialogue
- ◯ Fair – limited by administrative and funding issues we both deal with
- ◯ Could be better – generally unresponsive/requires prodding
- ◯ Poor – antagonistic/little communication
- ◯ Varies by municipality
- ◯ Only one municipality served by our agency
- ◯ Other (please specify)

23. Have any steps been taken to improve coordination related to bus stops?

- ◯ Attend standing coordination meetings
- ◯ Outreach to individual agencies – as needed
- ◯ Provide comments during review of site plans for new developments
- ◯ Provide comments during review of environmental documents
- ◯ Work through our MPO or similar regional entity
- ◯ Other (please specify)

11. RESPONSIBILITIES 2

24. Have these steps been successful in helping your agency locate stops where you want them to be?

- ◯ Yes, very successful
- ◯ Yes, moderately successful
- ◯ No, moderately unsuccessful
- ◯ No, not successful at all
- ◯ Other (please specify)

12. RESPONSIBILITIES 3

25. What is the biggest financial barrier faced by your agency with regard to bus stops?

- ◯ General lack of capital funds to build new bus stops or improve existing stops
- ◯ Lack of local matching funds to build new bus stops or improve existing stops
- ◯ Lack of funds to maintain bus stops
- ◯ Other (please specify)

26. What is the biggest institutional barrier faced by your agency with regard to bus stops?

13. STOP DESIGN AND LOCATION

27. What is your agency's preferred location for bus stops?

- ◯ Far side
- ◯ Near side
- ◯ Mid-block
- ◯ Differs by urban/rural/suburban area
- ◯ Depends on specific location
- ◯ Other (please specify)

28. Please explain the reasons behind your agency's preferred stop location.

29. Does your agency consider safe street crossings in stop location decisions?

- ◯ Yes, always
- ◯ Yes, especially in urban areas
- ◯ Yes, especially in suburban areas
- ◯ Yes, especially in rural areas
- ◯ No
- ◯ Other (please specify)

30. Are there any additional factors affecting your agency's decisions regarding stop locations?

14. STOP LENGTH

31. How long is your standard or typical bus stop?

- ◯ 40 feet
- ◯ 60 feet
- ◯ 80 feet
- ◯ 100 feet
- ◯ Other (please specify)

32. Has the required length of stops increased in recent years?

- ◯ Yes, longer and/or articulated buses have been placed into service
- ◯ Yes, for other reasons (specify below)
- ◯ No

Please specify other reasons

33. Does the desired length of stops different for near-side and far-side stops?

- ◯ Yes
- ◯ No

34. Does your agency have standards for length of stops based on the number of buses per hour at the stop?

◯ Yes (please describe below)

◯ No

Please describe standards

35. Does your agency have standards for length of stops based on the types of buses serving the stop?

◯ Yes (please describe below)

◯ No

Please describe standards

36. What does your agency do when it cannot obtain sufficient length at a given bus stop?

37. Does your agency have multiple berths at a single stop location based on volume of buses or number of routes serving a stop?

◯ Yes (please describe below)

◯ No

Please describe basis for multiple berths

15. STOP TYPES

38. Does your agency use bus bays/cut-outs to stop, i.e., curbside stops out of the right-hand traffic lane?

- ◯ Yes
- ◯ No

16. STOP TYPES 2

39. Please rate bus bay stops on the following criteria.

	Very poor	Poor	Fair	Good	Very good
Passenger safety	◯	◯	◯	◯	◯
Passenger accessibility	◯	◯	◯	◯	◯
Operator safety	◯	◯	◯	◯	◯
Ability to re-enter traffic flow	◯	◯	◯	◯	◯

17. STOP TYPES 3

40. Does your agency use bus bulb stops, i.e., curb extensions into a parking or traffic lane?

- ◯ Yes
- ◯ No

18. STOP TYPES 4

41. Please rate bus bulb stops on the following criteria.

	Very poor	Poor	Fair	Good	Very good
Passenger safety	◯	◯	◯	◯	◯
Passenger accessibility	◯	◯	◯	◯	◯
Operator safety	◯	◯	◯	◯	◯
Ability to re-enter traffic flow	◯	◯	◯	◯	◯

19. STOP TYPES 5

42. Does your agency locate any stops in the median of a street, i.e., on a traffic island?

- ◯ Yes
- ◯ No

20. STOP TYPES 6

43. Please rate median stops on the following criteria.

	Very poor	Poor	Fair	Good	Very good
Passenger safety	◯	◯	◯	◯	◯
Passenger accessibility	◯	◯	◯	◯	◯
Operator safety	◯	◯	◯	◯	◯
Ability to re-enter traffic flow	◯	◯	◯	◯	◯

44. Describe ADA considerations at median stops. Do they differ from other types of stops?

45. Please describe any specific benefits and challenges associated with median stops.

21. STOP TYPES 7

46. Does your agency have stops on the left side of the bus, either in a median or on a one-way street?

◯ Yes

◯ No

22. STOP TYPES 8

47. Please describe the conditions that led you to implement a bus stop on the left-side of the bus.

48. Please rate stops on the left side of the bus according to the following criteria.

	Very poor	Poor	Fair	Good	Very good
Passenger safety	◯	◯	◯	◯	◯
Passenger accessibility	◯	◯	◯	◯	◯
Operator safety	◯	◯	◯	◯	◯
Ability to re-enter traffic flow	◯	◯	◯	◯	◯

23. PEDESTRIAN/CUSTOMER ACCESS TO BUS STOPS

49. What are the key constraining factors for pedestrian access in urban locations?

50. Are there other key constraining factors for pedestrian access in suburban locations?

51. Are there other key constraining factors for pedestrian access in rural locations?

52. Does your agency incorporate bollards or other pedestrian barriers at any stops?

- ◯ Yes
- ◯ No

24. ACCESS 2

53. How do these barriers affect access to the bus stop itself?

- ◯ Access is much more difficult
- ◯ Access is more difficult
- ◯ Effects on access are minimized because the barriers are far enough away from the stop
- ◯ Barriers are only used on bus stops located in the median to protect customers from adjoining traffic
- ◯ Other (please specify)

25. PASSENGER INFORMATION

54. Please summarize provision of various elements of passenger information at bus stops.

	Every stop (or almost)	Many stops	Major stops	No stop
Bus stop sign	◯	◯	◯	◯
Route number	◯	◯	◯	◯
Phone number for info	◯	◯	◯	◯
511 or other traveler aid info	◯	◯	◯	◯
Stop number	◯	◯	◯	◯
Schedule	◯	◯	◯	◯
Route map	◯	◯	◯	◯
System map	◯	◯	◯	◯
Real-time information	◯	◯	◯	◯
QR codes	◯	◯	◯	◯
Wayfinding information	◯	◯	◯	◯
Information in languages other than English	◯	◯	◯	◯

55. What is the most common request from passengers regarding information at stops?

- ◯ Route number
- ◯ Phone number for info
- ◯ Stop number
- ◯ Schedule
- ◯ Route map
- ◯ System map
- ◯ Real-time information (next-bus arrival)
- ◯ Wayfinding information
- ◯ Information in languages other than English
- ◯ Other (please specify)

56. Has your agency implemented real-time next bus information at bus stops?

- ◯ Yes
- ◯ No

26. PASSENGER INFO 2

57. Please describe the benefits and disadvantages of real-time information as seen by the operations department and by customers.

27. PASSENGER INFO 3

58. Is your agency planning to implement real-time next bus information at bus stops?

- ◯ Yes
- ◯ No

28. PASSENGER INFO 4

59. Why is your agency not planning to implement real-time information at bus stops? (Check all that apply.)

- ☐ Cost
- ☐ Lack of demand
- ☐ Lack of infrastructure, e.g., no AVL system
- ☐ Other (please specify)

29. PASSENGER AMENITIES

60. Please summarize provision of various passenger amenities at bus stops.

	Every stop (or almost)	Many stops	Only major stops	No stop
Bench	◯	◯	◯	◯
Traditional lighting	◯	◯	◯	◯
Solar lighting	◯	◯	◯	◯
Trash receptacle	◯	◯	◯	◯
Shelter	◯	◯	◯	◯
Bicycle rack	◯	◯	◯	◯
Newspaper boxes	◯	◯	◯	◯
Other	◯	◯	◯	◯

Other (please specify)

61. What is the most common amenity requested by passengers at stops?

- ◯ Bench
- ◯ Lighting
- ◯ Trash receptacle
- ◯ Shelter
- ◯ Bicycle rack
- ◯ Other (please specify)

62. In your agency's experience, what is the stop amenity most valued by customers?

63. How does your agency decide which amenities are provided at a given stop? (Check all that apply.)

- ☐ Guidelines based on stop usage
- ☐ Feasibility of providing amenities at a given location
- ☐ Ad-hoc decisions
- ☐ "Squeaky wheel" approach
- ☐ Request by elected officials
- ☐ Balanced provision of amenities across jurisdictions served
- ☐ Decided by street furniture contractor
- ☐ Decided by municipality
- ☐ Other (please specify)

30. BUS PADS

64. Does your agency have criteria for the design and/or location of bus stop pads?

- ◯ Yes (please describe below)
- ◯ No

Other (please specify)

65. Does your agency use different types of bus stop pad designs?

- ◯ Yes
- ◯ No

31. BUS PADS 2

66. What bus stop pad designs have worked best?

32. CURB CUTS

67. Please describe your agency's policy regarding bus stop location at curb cuts in commercial areas.

68. Please describe your agency's policy regarding bus stop location at curb cuts in residential areas.

69. Who makes the decision to approve or deny a request for a curb cut at an existing stop?

- ◯ Municipality/county/state DOT
- ◯ Transit agency
- ◯ Other (please specify)

33. CURB CUTS 2

70. Does your agency have a role in approving/denying a proposed curb cut at an existing stop?

- ◯ Yes, we have a veto at an existing bus stop
- ◯ Yes, we have a role but not final say
- ◯ No, the decision is made without our input

34. ADA CONSIDERATIONS

71. How does your agency address ADA requirements at existing stops? (Check all that apply.)

- [ ] Improvements made based on available funds within jurisdiction
- [ ] Improvements made based on utilization and need
- [ ] Improvements made based on customer complaints
- [ ] Responsibility lies exclusively with local jurisdiction or adjoining property owner
- [ ] Other (please specify)

72. How does your agency address ADA requirements at new stops?

- ◯ ADA requirements are only considered for the "immediate" area of the bus stop (i.e., excludes crosswalks or pathways to/from the bus stop but includes the shelter, bench, or adjoining sidewalk)
- ◯ ADA requirements are applied to the immediate bus stop with consideration given to the path of travel to/from the bus stop
- ◯ Other (please specify)

35. CASE STUDY

73. Would you be willing to participate further as a case study, involving a telephone interview going into further detail on your agency's experience, if selected by the TCRP panel for this project?

- ◯ Yes
- ◯ No

36. OTHER AGENCIES

74. Is there another transit system that you suggest we include in this synthesis project? Please provide the agency name and a contact.

37. THANK YOU!

APPENDIX C

Summary of Survey Results

Better On-Street Bus Stops

RESPONDENT INFORMATION

1. Date

2. Contact information

   Name of respondent: _____

   Agency name: _____

   Title of respondent: _____

   Agency address: _____

   Agency size (note: this was entered after survey responses were received, based on FY 2012 NTD data): _____

   Respondent e-mail address: _____

   Respondent telephone number: _____

3. System size

Small (<250 peak buses)	41.7%	20
Medium (250–999 peak buses)	41.7%	20
Large (1,000+ peak buses)	16.7%	8

DESIGN STANDARDS FOR BUS STOPS

4. Does your agency have standards or guidelines for bus stop design?

Yes, we have developed standards or guidelines	77.1%	37
No, but we refer to standards developed by others	14.6%	7
No, we do not typically use published standards/guidelines	8.3%	4

5. Are the design standards available on your agency's website?

Yes	37.8%	14
No	62.2%	23

6. What is the best way to obtain the stop design standards?

   Typically invited to request via email or phone

7. Who developed these other standards/guidelines?

   AC Transit

   Orange County Transportation Authority

   The Federal Transit Administration—TCRP Report 19———Guidelines for the Location and Design of Bus Stops.

Our transit agency only has a formal spacing standard and amenity placement policy. We primarily refer to TCRP Report 19 and the Easter Seals Project Action Toolkit for the Assessment of Bus Stop Accessibility and Safety.

We are in the process of developing our own standards. In the meantime we rely on TCRP and information developed by other agencies.

TCRP

We follow ADA guidelines and standards. We also adhere to local and municipal guidelines when feasible.

TCRP Report 19, AASHTO Draft Transit Facility Design Guide, COTA Bus Stop Design Guide, OCTA Bus Stop Design Guide, SEPTA Bus Stop Design Guide

BARRIERS, OBSTACLES, AND CHALLENGES

8. Please characterize the following elements as major challenges, minor challenges, or not an issue in provision of bus stops.

	Major challenge	Minor challenge	Not a challenge
Right-of-way availability	27%	69%	4%
Sight distance	8%	83%	8%
Roadway grades	13%	73%	15%
Conflicting curbside uses (e.g., street furniture or landscaping)	47%	51%	2%
Absence of sidewalks	69%	29%	2%
Width of sidewalks	35%	65%	0%
Absence of crosswalks	38%	56%	6%
Coordination with city/county/state	40%	52%	8%
Lack of emphasis within transit agency	8%	33%	58%
Ability to select shelter sites	17%	56%	27%
Traffic engineering concerns	21%	79%	0%
Conflicts with bicycles (bike lanes/stations)	4%	71%	25%
Funding	33%	54%	13%
Balancing customer and operational perspectives	21%	73%	6%
Restrictions on stop locations on state highways	25%	38%	38%
ADA issues	52%	48%	0%
Developer concerns	25%	71%	4%
Property owners' concerns	60%	34%	6%
Driveway issues	29%	63%	8%
Storm water management	4%	54%	42%
Stop maintenance	21%	63%	17%
Other	59%	24%	18%

Other includes: (1) Political involvement precluding certain projects from being developed or coming to fruition. (2) Establishing partnerships with property owners and planners is necessary for transit agencies to overcome the above obstacles. Teaching transit awareness to non-transit professionals is part of the role that I play at the transit agency. Public transit agencies rarely have the resources to act alone, so we establish partnerships mainly through our Adopt-A-Stop program. Meeting with planners at other municipalities regularly, to include public transit accessibility in the planning stages. Public transit needs to be considered in the pedestrian side when talking with planners and engineers. Too often bus stops are put in a separate category than pedestrians. Public transit riders are pedestrians twice during their journey, planners need to know this. Well-designed complete streets are good for everyone, including public transit passengers. (3) Continuous right turn lanes on state highway system and, primarily, extensive right turn lanes on all roadways, state highway, arterial and collector, and local roadways. (4) Utilities. (5) Weather is a major issue as we get more snow than any other metropolitan area in the nation. Snow affects bus stop & shelter placement, maintenance costs, ADA paratransit costs due to conditional eligibility & a host of other elements. (6) Stop requirements vary by local jurisdictions. (7) Roadside

drainage ditches; lack of shoulders and curbs; lack of ADA accessible landing pads. (8) Our transit agency does not have the legal authority to set up bus stops; this is a local responsibility under state law. (9) Covered most issues. (10) a. Political concerns—related to developer and property owners' concerns above, sometimes a small issue will carry a lot of political weight and complicate our efforts to treat each situation fairly—political pressures on management and Board members (who are appointed by local elected officials). We have also had instances where different municipalities want different treatment of their stops (like a desire to put all stops in turn lanes within their boundaries, or to simply have no stops at all). b. Coordination within transit agency—when bus stop management functions are not centralized in a consolidate group, it can result in coordination challenges within the transit agency as components of the bus stop management system are scattered to different departments with different managers and processes. c. Lack of formal transit agency policies/ guidelines for stop placement/design—the lack of formal transit agency guidelines can make it challenging to ensure consistent treatment of our stops and resolution of issues when they arise (referencing TCRP Report 19; Easter Seals tends not to carry as much weight as it might if it were an transit agency-approved document). (11) We have dedicated funding and a dedicated staff (directly employed and under contract to construct). We also have working relationships with local authorities. We are working towards 100% ADA improvements on all existing bus stops. We have a timeline and support (from all levels). We face these issues and have the ability to often work through these items. Nothing is impossible, but often we do have to take several items into consideration to get the best project completed. (12) Community buy-in and process to make changes happen. (13) Snow removal! (14) Some of the items I checked as "Minor" could be "Major," depending upon which of the 34 cities we are referring to and vice-versa. (15) Snow removal on public right of way; public safety concerns around some bus stops. (16) Conflicts with land uses such as supermarkets, gas stations, etc. Another big concern is bucking / rutting / sliding of blacktop at bus stops creating a very rough roadway. (17) Lighting, wayfinding (for freeway bus stops), sharing stops w/ other transit operators (e.g., school buses or private buses).

9. Please describe the nature of the one major challenge.

Responses summarized in Table 49, Chapter 3 of report. Verbatim responses are provided here.

Adding bus stops to areas with no pedestrian access to businesses or sidewalks.

Stops along roadways administered by the state. The state DOR requires any major or minor modification to a bus stop along a state highway to have extensive construction performed to bring it to their standard. Example: Rural or Urban stops that are in need of benches or shelters cannot be performed unless project includes roadway static pad to be part of the project. This adds thousands of dollars to a project that otherwise would enhance customer usability and improve stops to updated ADA requirements.

Lack of sidewalks, what we refer to as a rural bus stop. The challenge here is that transit stops need to tie into a sidewalk network. These stops are the biggest challenge because we're not dealing with just the bus stop anymore. Today we need to focus on accessibility to and from the stop.

As intersections are improved or roadways widened, right turn lanes are added to improve vehicular LOS. Bus stops then need to be relocated away from the intersections, passengers must walk further, and in some cases, other conflicts such as drive entrances, stormwater, or adjacent land uses make locating and improving a bus stop location challenging.

The nature of one major challenge is the overall lack of local governments including the function of public transportation in their planning efforts. The allowance of on-street parking at bus stops, landscaping requirements that create barriers between the curb and sidewalk, and the lack of a complete sidewalk network are all evidences of a planning process that is void of any other perspective than driving to your destination.

I was trying to build a ramp from a bus stop at street grade up to a shopping center parking lot about 4 feet higher, which required excavation. The survey company missed a buried telephone cable that was barely six inches under the ground. I had to have my engineer re-design the entire site to work around the buried cable. Seems like everywhere I try to pour concrete, there's some sort of buried utility, whether phone, cable TV or conduit for the traffic signals. If it's not buried, it's a telephone pole or fire hydrant.

Being able to determine the best location for a particular stop with numerous considerations (challenges) facing the project, such as accessibility concerns, customer demand/needs, property owner preferences, road conditions at best option site etc...

We have a lot of sight constraints in the placement of bus shelters but the biggest is acquiring right of way to build ADA-compliant bus shelters. Many of our bus stops are just a pole in the ground or a street light pole with a sign on it; we are not as concerned about right of way with the placement of these. Many parts of town have no sidewalks, or only have sidewalks that are less than 5' wide. The City will not condemn any portion of private property in order to build bus shelter locations; it is politically non-tenable to do that here.

Lack of sidewalks in much of our service area limits what we can do as far as providing for safety regarding access to our stops, as well as the obvious ADA issues pertaining to accessibility and wheelchair access.

Sidewalk and intersection limitations

The single greatest challenge here is snow. We do not have the resources to keep our 130 bus shelters clear of snow, let alone the 5,000 bus stops. The best we can do is try to keep shelters in the CBD clear of snow.

There's a complexity to enhancing stops that is multi-layered. First, we rely on grant funding for stop improvements (no $, no project). Second, we have to identify a minimum number of stop locations (typically 20+), otherwise we can't get interest from engineers or contractors to bid on the work. And third, even though we initially identify a preliminary list of stops, locating a stop on private property can be a hurdle and knock a stop location off the list.

Stop maintenance/cleaning and trash collection. The District has multiple MOU's with jurisdictions for bus stop cleaning that are all over 10 years old. The MOU's have not been updated with current stop list, and our staff has not been performing quality-control checks on these stops. Trash collection is a major issue at stops both with and without trash cans. Many cities do not want to pay for trash collection at these locations, even though it is their ROW.

One major challenge that we face with bus stop requests is the lack of sidewalks or ADA compliance. Currently, the transit agency's Office of Service Development does not have direct funding for installation of new sidewalk or ADA improvements.

All of our stops need local government approval and state approval if they are on a state highway. Our main local north–south corridor is a major arterial street that is also a state highway. There are 20 cities in our county and we also run service in cities outside our county. Each city has a different process to establish new bus stops. Some involve approval by the City Council; some are at a staff level. Some of the cities charge an encroachment fee for each stop. Some require surveys of property owners while others don't. Internally we also have up to six departments responsible for bus stops depending on the task. PLUS the most significant challenge associated with stops in our County is property-owner resistance to bus stops and terminal locations. Some residents are very vocal and view buses as a detriment to their property values and/or a hazard for children, pedestrians, and other vehicles. Strong resident opposition to a stop can derail service planning efforts and force staff to scramble to look for alternative options as many jurisdictions will not approve a stopover community opposition.

Something that has recently occurred: we have restructured a route to take over a branch. When we extended the route, it operated on 6 blocks that required bus stops; however the locations are not ADA accessible. There is no sidewalk or curb, some have loose asphalt on the side of the road. Current ADA restrictions prevent adding a bus stop that is non-ADA accessible.

As a strong "home rule" state, the transit agency does not have the legal authority to establish bus stops. That legal responsibility rests with local municipalities. On County roads, County formal concurrence is also required. On State highways, each stop proposal requires a detailed, on-site review by state DOT staff before ultimate approval can be granted.

Parking is a major challenge. Parking is at a premium in the city, and bus stops, loading, ADA access are all desired at intersections.

Lack of investment in bus stop accessibility and amenities by local government agencies

Obtaining sufficient ROW to keep the shelter a safe distance from the adjacent roadway and maintain PROWAG access clearance on sidewalk.

Rural Areas—limited sidewalk, curb cuts.

The state has a new "complete streets" law, which our DOT has interpreted to mean that whenever we apply for a simple permit to pour a concrete pad for a bus stop shelter, we (the transit agency) are responsible for improving all aspects of the intersection that impact pedestrians--installing push-button 'walk' signals, painting crosswalks, etc.

We have a lot, but are picking coordination with city/county/state, as a number of the others we selected as major challenges result from coordination issues. Institutionally, we have seen a lot of turnover and change within both our transit agency and the local governments. As a result, we don't currently have a lot of long-term relationships with staff—there isn't necessarily a "go-to" person at each city/county/etc., and they don't necessarily know that we have staff dedicated to bus stop issues. Related, there aren't set policies with each city that dictate or recommend how coordination should be carried out, so there aren't institutional measures to make sure that we are all keeping in touch and working together. When staff changes, often any informal measures that had been taking place fall apart. These issues manifest when it comes to issues that the transit agency doesn't control—notably sidewalks, crosswalks, ADA issues where we don't own the property or site, conflicting curbside uses, bike facilities, etc. We have had a number of pedestrian improvement

projects that have added landscaping and furniture zones to the curbside environment, eliminating usability for our buses' ADA ramps—we've actually lost ADA compliance at a number of previously compliant stops. We also had a similar issue with our city's first protected cycle track, which eliminated access completely to several bus stops.

Difficult to get municipalities to post regulatory signage. Also, reluctance of officials to remove parking meters to create sufficient space for stops.

As I stated, we have dedicated funding and a dedicated staff (directly employed and under contract to construct). We also have working relationships with local authorities. We are working toward 100% ADA improvements on all existing bus stops. We have a timeline and support (from all levels). We face these issues and have the ability to often work through these items. Nothing is impossible, but often we do have to take several items into consideration to get the best project completed.

On few occasions, we encounter a need to place a shelter where right-of-way is not adequate for the installation. This issue does not occur frequently but it can be significant when it occurs.

Adjacent and nearby property owners and tenants strongly object to bus stops. We field daily complaints and requests to remove or relocate stops to mitigate impacts. Bus stop complaints include passengers waiting for long periods of time, large numbers of riders blocking the sidewalk and waiting on adjacent private property, riders smoking while waiting, homeless issues, trash, loss of parking, perceived security threats, etc. Our ability to regularly clean and patrol nearly 5,000 stops is limited.

Cycling infrastructure does not always consider the nature of bus operation. Some cycling paths are designed without taking into account the high amounts of buses and the amount of users using the bus stops. Also, this can lead to strong opposition from the union.

Available right of way is a major challenge in our service area. In many cases right of way is at the back of the sidewalk, which can hinder our ability to place ADA-compliant bus pads, shelters and other improvements. Where there is public right of way it is often taken by parking, signage, fire hydrants and other curbside items.

There are really two major challenges. Right of way availability is a constant issue. In order to install the level of amenities we would like and ADA pads, we need to have it or we are at the mercy of property owners. This makes pushing a uniform plan forward difficult. The 2nd issue is stop maintenance. There are multiple parties involved; it is often unclear who has the ultimate responsibility to maintain the stop.

Trying to remove parking from in front of bus stops is a major challenge as parking is seen as a needed amenity to some as compared to providing safe and accessible transit. In our city, the removal of parking is done before a Traffic and Parking board, which is made up of citizens. Getting all to understand the importance of having safe and accessible transit is a challenge and may go against the political will of the board and community.

1) ADA compliance is the biggest area where we are deficient from our standards. In the metropolitan area, there are many jurisdictions and right-of-way owners, all with different contexts and their own standards on bus stops/sidewalks. It has not been a priority to improve stops to ADA compliance regionally except when streets are undergoing major capital improvements, and more than half of our region's 19,000 bus stops remain inaccessible. 2) In many locations where the ROW behind the curb is constrained, additional passenger waiting room and room for shelters (and other operational advantages due to faster boarding and deboarding) can be provided by provision of a curb bulb-out. However, ROW owners and traffic engineers have been reluctant to allow these installations despite the fact that they do not occupy a travel lane.

Sufficient public right of way is occasionally an issue in siting facilities, where insufficient space might not be available to accommodate all desired passenger amenities within the public right of way.

Funding provided by the municipalities to improve them.

Snow removal is a chronic issue with the bus stops and shelters. We got a lot of snow, so snow removal is a big issue. The snow plows throw additional snow directly in front of most bus stops and shelters. Most bus stops are within the ROW of municipalities and there is little effort to remove the snow at bus stops. The transit agency has limited resources for snow removal. If a shelter is installed within a private location we do have the property owner sign a license agreement stating that they are responsible for snow removal, but more often than not they do not take care of the snow removal, leaving it for the transit agency to take care of.

Most of our service area is suburban in nature, and buses on the streets, bus stops with accompanying street furniture, and pedestrians standing/sitting around bus stop locations is difficult for non-riders to understand. They would prefer those items to be elsewhere.

One major challenge is the ability to provide passenger amenities, such as passenger shelters and ADA landing pads, at locations where ADA accessibility and compliance would be difficult to achieve. Many locations throughout our service area lack sidewalks completely or have existing sidewalks that are not ADA compliant. This generally means that we are hesitant to "build" any infrastructure at these bus stop locations in order to avoid installing something that is not ADA compliant, thus opening ourselves up to the possibility of lawsuits. The transit agency funds and maintains almost all of its passenger shelters and amenities, and thus performing a lot of sidewalk and curb work in order to make a completely accessible and ADA-compliant bus stop area is often a financial burden.

Bus shelters in the City are provided through a contract with an advertising firm, which also maintains the shelters. Shelter installations require the provision of electrical power and reinforced concrete sidewalks. The ability to relocate shelters is constrained by funding to provide the infrastructure needed for the shelters.

ADA concerns, and general access, are major concerns. Many of our streets where buses run do not have sidewalks, or have other issues that impede accessibility.

We do not own or maintain bus stops. The numerous towns in which we operate bus service technically control the siting of bus stops, although the public perceives bus stops as the portal into our system. Snow removal from bus stops is a major challenge.

Lack of pedestrian infrastructure along important corridors is one of the most frustrating issues to overcome in terms of stop placement, spacing, access and safety. Stop-specific improvements along underdeveloped corridors are more challenging to build and have reduced impact without suitable connectivity.

Land use conflicts, roadway condition

Coordination with City/County/State: the transit agency serves 22 jurisdictions + has bus stops in the State right-of-way. Of 850 bus stops, only 10 are on property owned by the transit agency. Hence we must obtain approvals by multiple agencies; each has its own procedures and "sympathy" to establish and/or maintain bus stops.

10. Please describe strategies or tactics used to overcome any major challenges.

Responses summarized in Table 50, Chapter 3 of report. Verbatim responses are provided here.

Try to work with jurisdictions to get sidewalks and/or crosswalks added and with businesses to improve access. Worked with MPO to get Complete streets policy, and stress to jurisdiction importance of connectivity.

Public with concerns regarding the lack of improvement to bus stops in areas mentioned will be asked to contact their state representative.

Meeting with the planners during the planning stages. This allows a transit agency an opportunity to point out something they may have overlooked regarding an adjacent bus stop. The transit agency has made a lot of progress in this area; bus stop improvements are now included in the drawings/plans with the City, County and Townships on several projects each year.

Relocating stops to the farside where acceptable.

Working with local planners and developers to help them understand how the built environment and parking policies impact the ability to provide efficient and accessible public transportation. It is an education effort that takes persistence and creativity.

I can't afford to move utilities so I often have to relocate a planned bus stop to an inferior location if I want it to be ADA accessible. I've had some success in getting the city to work with me on traffic signals, like burying their conduits deeper and putting in pedestrian signal buttons on separate bollards in locations where I couldn't pour concrete within reach of the existing signal poles. The city has been cooperative to work with as it relates to ADA access. Other utilities won't budge unless we pay to move them.

Bringing all major players involved in a stop placement to the table and coming to the best solution for the given circumstances.

We research the property owners and request permission to obtain ROW or easement to place a bus shelter. More than 95% of the time, property owners will not respond to our requests. The tactic we use is to select sites that offer the fewest constraints (for example ones where the City already had ROW) and focus on those.

As funding is available, we make as many improvements as we can. Working with local jurisdictions at least makes them aware of our issues, but most times does not address the problems in a timely manner.

We've recently constructed a downtown transit Hub consolidating the main downtown stop in a weather-protected facility in the CBD. We have a heated "head house" as well as a pavement snow melting system. We are also implementing a "next

bus" system for all routes in all our entire system that will allow customers to track their bus before they leave weather protection to go to their bus stop.

We have developed an internal review and scoring process that identifies stops that need to be enhanced and/or to improvements made for pedestrian and ADA access. We review this on an annual basis since boardings, a prime variable for scoring stops, changes over time or between stop enhancement projects.

The transit agency has offered to share the cost of cleaning and trash collection at stops.

We work with the City, County, and State to identify bus stops that need sidewalk repairs or ADA improvements. Repairs to existing sidewalks are usually made by the City, County, or State Highway Administration. Improvements usually are made in coordination with planned revitalization projects.

We recently implemented a major route restructuring and replaced all of our bus stops as part of the process. This exposed process problems that weren't an issue when we were only making changes to 10 to 50 stops at one time but became major problems when we needed to replace about 2,000 signs at once. We have formed a working group and will fix the process problems and create clear lines of responsibility. PLUS: We do not have solid tactics for overcoming this issue. Many residents will not listen to reason and often use concerns about pedestrian safety as a proxy for keeping unsightly buses or low-income persons out of their neighborhood.

In this case, since the road is asphalt, an asphalt landing pad could be constructed at a minimal costs. Informing customers that they may have to walk an extra 4—6 blocks to the nearest bus stop is also an option, though not well received. Adapt a stop would be another strategy, where a landowner or group would pay for curbside improvements. The regulations could have significant funding impacts if we were required to install 20 concrete pads on a route extension, so one of the tactics would be to plan extensions/ route changes only to accessible streets, and to minimize extensions to non-ADA areas.

Our staff works extensively with local government and the state DOT to ensure that local and county bus stop proposals are designed to meet established State safety and traffic engineering requirements. In this light, the transit agency has been granted the approval to "self certify" bus stops for local and county roads, without the need for a State staff inspection. We also strive to set up state highway proposals in the exact format that the state wants and requires, to streamline the approval process as much as possible.

Reallocating street space to better meet all needs and working closely with community

Developed a regional program with funding for bus shelter installations

Ask property owners for easements; coordinate with local jurisdictions for condemnation/purchase of rights of way.

Working with Developers—when new homes are constructed in the County.

Installing new bus stop shelters is never mandated by any entity, so if we encounter a proposed site that is deemed unfeasible for whatever reason, we just abandon the proposed installation. In other instances, we adjust our proposed installation location to accommodate the combined wishes of DOT, local property owners, riders—all while incorporating traffic engineering standards. Sometimes, political influence can help overcome resistance by a permitting authority.

We are still struggling with this. We are trying to get the word out that the transit agency is interested in working collaboratively on bus stop issues. We are also trying to insert ourselves into the planning and design phases of roadway and streetscape projects so that we can make sure our stops are designed appropriately into the plans early on. However, we are still working to establish solid relationships so that we're capturing all of the projects and not just those we hear about. We have seen some success with this, and we are increasingly being approached by consultants, municipalities, and developers as they begin designing projects. Formal policies for this kind of coordination still have to be developed.

We have been meeting with the appropriate officials but have not yet resolved the issue.

Every situation is unique. However, with a dedicated staff (construction, engineering and planning) that have worked together for years, we can typically overcome most all challenges. It is a process and the relationships we have developed (internally and externally) help us. Dealing with private adjacent landowners is usually the only major challenge, but often we can come up with a compromise.

We generally address the right-of-way issue by obtaining either a formal easement for the shelter placement or we negotiate an agreement with the property owner for the encroachment onto private property. In the instance of a significant ADA accessibility issue—the absence of sidewalks—we actually budget funds to construct sidewalks to the bus stop.

Stops are relocated when and where practical, provided that riders are not negatively impacted. In most cases, the stop is located where it is for a reason, and relocating or removing it is not feasible. In these cases, we work with our Transit Enforcement to increase patrols of the stop and area, and with our operations department if there is any one-time or spot cleaning that is possible.

Regular meetings with city officials with regards to the planning of cycling infrastructures. Being involved in plan validations in order to avoid bus/users/bike conflicts. Keep our union partner informed.

We have worked to become more involved in the planning process both publicly and privately for projects related to sidewalks, streets and the like to ensure the needs of bus stops are taken into account.

For the 1st issue, there is an ongoing effort to engage property owners to attempt to mitigate issues. For the 2nd issue, we have a list of stops we have prioritized and have taken control of all maintenance. This allows us to deal with our most sensitive stops.

Outreach and have board members, community, and businesses understand the need for safe and accessible transit services.

1) The transit agency received an FTA New Freedom grant to improve stops to ADA compliance, but at just over $1.2 million it is expected to only improve approximately 75 stops. There is a renewed emphasis from our Board of Directors on the impact of inaccessible stops on Paratransit eligibility, which is leading to more attention paid to this issue regionally. Every bus stop improved to ADA compliance means the potential of great savings on providing expensive paratransit trips to those who can access the fixed route system otherwise. Better data on ridership and paratransit destinations is also helping prioritize investments. 2) The transit agency is working with the local Department of Transportation to develop a toolkit for the deployment of curb bulbs in parking lanes, along with assistance on engineering standards for these facilities.

Work with the adjacent private property owner to obtain agreement to site facilities on their property; work with jurisdictions to relocate conflicting street furniture; modify pedestrian route of travel in ways that are not necessarily ideal in order to get around the desired passenger amenities; develop new designs for passenger amenities (e.g., shelters) that achieve both shelter cover and accommodate pedestrian travel.

1. We improve low-cost bus stops first. 2. Ask the municipalities to cost share 50%/50% for the improvements. 3. Set up priorities.

The transit agency is adding resources to our street amenities including bus stops. We also reach out regularly to municipalities, businesses, schools, and property owners for their help and support regarding street amenities.

We have been able to work through our Technical Advisory Committee to help “pave the way” with the Traffic Engineering and Public Works Departments who are focused much more on autos. This took much education of our highway and engineering sections, first.

The transit agency is currently in the final stages of writing a “Bus Stop Design Guide” that has been reviewed and vetted by the City as well as surrounding municipalities and builder/developer groups. The intent of this document is to educate officials and developers about how to build streets and streetscapes that are more amenable to the establishment of bus stops and passenger amenities. Furthermore, the document lays out specific guidelines and best practices that should be followed by transit agency staff so that there are “policies” to guide where we will and will not consider installation of passenger amenities.

Through coordination with the vendor and the city Department of Transportation, the transit agency has prioritized the shelters to be relocated, based on ridership and other data. As opportunities arise, such as a new development or a streetscape project, the transit agency pursues the shelter relocations.

We surveyed all of our bus stops, and refresh the survey for 20% of the bus stops each year. We are attempting to have better coordination with the towns surrounding the central city on streetscape projects. We have pretty good coordination with the city DOT. We review rezoning requests and ask for bus stop improvements where applicable, typically paid for by the developer as a condition to get their rezoning approved. There is give and take. We also have a limited budget to make our own improvements to bus stops, which usually does not require coordination on any significant level.

Initiate a pedestrian network study highlighting deficient corridors, intersections and gaps in network. Partner with jurisdictions seeking multiple grants to fund specific roadway improvements. If funded, create streamlined approach to design/engineer and construct (in a supporting role). Smaller targeted pedestrian and bus stop improvements can be addressed by transit agency.

We try not to site bus stops at supermarkets and gas stations, but sometimes we must. As regards asphalt condition at bus stops, the city standard is a 12” reinforced concrete pad at bus stops, with steel-face curbs.

Coordination with City/County/State: the transit agency has developed a PowerPoint to raise the awareness of our needs at bus stops, such as--various coach lengths, various locations of wheelchair lifts, various locations of bike racks, hours of operation, bus stop accessibility, ADA requirements, conflicts w/ street furniture, various turning requirements, conflicts

w/ driveways, design of roundabouts, maintenance. We will reach out to all jurisdictions we serve and post the PowerPoint on our web site.

ASSESSMENT

11. How would your agency rate its efforts to provide better on-street bus stops?

Very successful	26.7%	12
Somewhat successful	56.3%	24
Neutral	11.1%	5
Somewhat unsuccessful	6.7%	3
Very unsuccessful	2.2%	1

12. What has been the primary benefit of these efforts?

Responses summarized in Table 52, Chapter 4 of report. Verbatim responses are provided here.

Better amenities for customers and jurisdictions.

Bus stops that have bus cut-outs, improved shelters, improved accessibility to bus stops by ambulatory and disabled persons.

Overall improved waiting experience for customers. Reduction in bus stop complaints. Improved accessibility at bus stops overall. More amenities at bus stops. Improved bus stop spacing by consolidating stops in some corridors. Improved maintenance program for shelter cleaning resulting in cleaner stops. Consistency; stops are more uniform with signs installed by following standards and guidelines.

Our bus stop and shelter program has made improvements that are being noticed. In FY 2013, 51 shelters were installed. The transit agency is on target to meet its goal of 25 shelters installed in FY 2014 and will continue to seek funding and collaborative opportunities to increase the number of ADA bus stops and shelters in future years.

Some of the planners and community development staff begin to incorporate public transportation perspectives into their processes. This often will result in policy changes that help memorialize the change and encourage consistency in the future.

A well-designed, comfortable and accessible bus stop is very visible and appreciated by more than just the few passengers that use it but is also appreciated by the neighborhood. As long as we can keep the costs reasonable, we see it as a very large bang for our buck.

Having parties involved in the process have a stake in the success and promotion of the stop/facility.

More accessible stops.

In the last decade we have moved from having only 4 bus shelters (out of about 300 bus stops) to having over 100 bus stops with bus shelters.

ADA accessibility.

Stops at locations passengers like

“A trip begins before you get on the bus.” Providing amenities (shelter, bench, and where possible, solar lighting) has improved customer’s experience. Customers have recognized and appreciate the stop improvements. Given our local climate (lots or rain), shelters and lighting make using our transit system easier to use.

A more informed public resulting in greater ridership.

Customers are able to have a safe, clean place to wait for the bus.

We have a clear process for ADA evaluations.

Where passenger boardings are high, improvements to bus stops can result in even higher ridership. Where passenger boardings are low, improvement to bus stops often do not result in increased ridership.

We have been able to transform bus stops into “real-time” schedule informational sites, through implementation of our “My Bus Now” program with each of our 16,000 signed bus stops displaying a unique 5-digit ID number that can be used via text message, phone call, or via computer or smart phone access to obtain real-time predictive bus arrival data.

Easier operations for transit vehicles and better access for customers

Investments in on-street amenities

Improved safety, improved image for transit.

Overall good, when new construction is completed.

A very limited evaluation of the effect on ridership shows no impact. However, the Board has been very focused on adding new shelters, so they are pleased with the efforts to install many more. There is certainly an impact on the ability of pedestrians to easily access bus stops in all weather.

We have not completed any large-scale systematic attempts to improve stops in recent years. We feel that we do a good job of handling issues case-by-case, but we have not been affecting large-scale improvements yet. We also have a shelter program that puts out a small number of shelters and benches annually. We are planning several major projects for the next few years that should significantly improve things—this includes a new comprehensive bus stop inventory, which will provide the key data required to do a route-by-route bus stop evaluation project. This will assess each stop to identify and resolve issues with spacing, safety, and access. We are hoping to coordinate with the local municipalities to resolve issues outside of the transit agency’s control such as curbside conflicts, ADA issues, parking conflicts, etc.

Fewer stops with more concern for safety

Improved customer experience.

We believe we retain choice riders and attract new riders by having safe, convenient well-maintained bus stops. Properly located bus stops make the service accessible to riders while promoting reasonable travel times by consolidating boarding and alighting activity.

Our focus has been on bringing stops and access to stops into ADA compliance. All users benefit from the enhancements, but seniors and the disabled are the primary beneficiaries. Future efforts will include new shelters and amenities that are not only functional but are also attractive, which benefits our users as well as the communities they are located in.

Able to keep a coherent approach with our partners. We can justify easily why we can or cannot move a bus stop. Better safety for users and bus drivers.

We do a better job of creating bus stops to meet customers’ needs. We have also done a better job ensuring stops are ADA compliant.

We have been able to improve some locations in conjunction with municipal and private projects. Stops that may have been obstructed by parking or other issues have become more accessible as a result of our efforts.

Safe and accessible bus stops, enhanced passenger amenities such as bus shelters and bus stop benches, increased ridership at some improved stops, visitors know where to get on and where to get off a bus.

Vastly improved visibility of bus stops due to the design of a new bus stop flag, and vastly improved customer information by the use of customized (by location) and simpler, customer-focused information at bus stops. Each jurisdiction in our service area has a bus stop coordinator, who is instrumental in making changes and improvements in rights-of-way that we operate within but don’t own (most stops). We have also increased the transit agency’s staff commitment to construction/development project design review and coordinating bus stop changes due to construction project phasing.

Greater passenger satisfaction with wait and security, leading to increased patronage; placement of amenities at locations that benefit the most passengers; lower dwell time at stops, which improves operational efficiency.

Improved bus stops and better customer service.

The primary benefit to the transit agency is added ridership to our system. The primary benefit for our customers is safer and easier access to bus stops and places they need to go throughout the area.

We are able to provide more conveniently located bus stops (primarily in relation to closeness of stops to potential passengers).

At this point, the primary benefit of our efforts to create a “Bus Stop Design Guide” has been the education of internal staff as well as government and private partners. Since the beginning of this process, the transit agency has developed a couple of new bus stop locations with improved passenger amenities, and they have been held to a very high standard. Our hope

is that this standard will be followed at all future locations, and perhaps we will even be able to upgrade existing bus stop locations that need refurbishment.

Bus stop improvements include lengthening the stops so that buses can properly curb. This helps keep buses out of the flow of traffic to reduce rear-end collisions (cars striking buses). Getting the bus closer to the curb also helps load and unload passengers safely and efficiently. Adding full-width sidewalks helps establish the bus stop, improves customer boarding and alighting, and allows the agency to mount signage to the sidewalk. In-street concrete pads help to give buses a smooth surface for approaching the stop and also help buses to align with the curb. ADA curb ramps and crosswalks have also benefited the safety of our customers.

It improves safety for pedestrians in addition to accessibility. It also improves the visual aspect of the stops and improves the overall impression of the transit system in the community.

Improved safety and accessibility for patrons boarding and alighting buses and waiting at stops. Improved patron comfort/convenience when amenities including shelter, seating, and lighting are included. Access to safer crossings. Improved bus/patron interface contributes to operational consistency.

Generally we have a small number of truly problematic bus stops. When necessary we work with community groups and Elected Officials to reach a solution. Over time we have lengthened bus stops where necessary, have eliminated some bus stops where they are too close together (moving from 600' spacing to 750' in the CBD). The overall effect of these actions has been bus stops that function better operationally, and from a traffic management standpoint and which function better for customers.

Raising awareness of staff and local jurisdictions of ADA requirements, design issues, operational issues.

13. What have been the primary drawbacks of these efforts?

Responses summarized in Table 53, Chapter 4 of report. Verbatim responses are provided here.

Being able to keep up with cleaning and maintenance. Jurisdictional approval and right-of-way issues installing amenities.

Excessive staff time in pursuing these changes; costs associated with delays in obtaining permissions to improve; improving stops that are not as widely used in place of stops that are not as frequently used, but offer less resistance and cost to having them improved.

Expectations; transit riders seem to request shelters, benches, concrete walks at more stops than can be provided. The guidelines are important to help understand the threshold. Budgeting constrictions can be a significant drawback and can limit how many bus stop improvements can be completed each year.

The cost of a bus stop project is considerable especially when stormwater is impacted. More improvements are needed than can be funded or accomplished. In the County and municipalities, minimal bus stop/transit facility land development regulations transfers most of the responsibility for bus stop improvements to the transit agency.

If the change does not become memorialized in policy, then a change in staffing can quickly reverse many years of work to make the changes needed to support public transportation services.

The time involved is staggering. A small bus stop that costs $5,000 sometimes has to go through almost as many steps, reviews, reports, sign-offs, permits, inspections and fees as any multi-million dollar capital project.

Coming to stalemates where no reasonable resolution can be found.

Reduced on-street parking

The process is very SLOW. In addition to the difficulty of finding sites, we have funding issues preventing us from quickly adding shelters. Funding issues affect not only procurement and installation but also ongoing maintenance.

Negotiating private property agreements in order to provide compliance with the ADA

The time needed to get stop locations

The only downside is somewhat general. Given the cost of stop improvements we have to rely on the general use pattern of a stop and prioritize the need. Basically, that means we cannot afford to make improvements to every stop we have even though a customers might request an improvement and/or amenity.

Expense. Many small- to mid-sized properties would struggle to find the funding for a next-bus system.

There have been issues with trash collection, cleaning and maintenance.

Nearby property owners can be a drawback. Especially in residential neighborhoods. We often receive requests to relocate bus stops even when the stops themselves are ADA accessible and/or equipped with amenities such as trashcans, benches, or shelters.

We do not have clear areas of responsibility for bus stops. It is shared by up to 6 departments. The bus stop data is in at least three databases and there is some resistance to consolidate into one. PLUS: It has become much more difficult to site new stops, particularly in some communities that lack proper infrastructure to maintain ADA eligibility. Also, getting improvements made to stops in some communities is difficult because some cities do not want to ease the use of bus service in their jurisdictions. This means there are sometimes areas where bus stops are too far apart.

Without careful monitoring and cost/benefit analysis, stop improvements can seriously eat into a capital improvement budget, with little ridership to show. Even when improvements are made to high-ridership stops, they are expensive.

No real drawback other than the constant limitation of establishing bus stops in municipalities that, for one reason or another, are not motivated to establish a sufficient network of bus stops by formal ordinance or resolution.

Community backlash and parking loss

The transit agency is not the road authority

We are getting political pressure to put new shelters in areas where we lack right of way to safely install the shelters.

Not being aware when construction starts.

Lots of staff time spent negotiating with the various permitting authorities.

N/A

Customer complaints

While very important, our charge is to make our system 100% ADA compliant. This means we are retrofitting all old existing stops (previous programs / previous compliance rules, etc.). So this takes time and dedication. We have a staff that is reviewing and building/rebuilding bus stops every single day. We have an expected completion date to achieve this. Meanwhile, our system continues to grow and change.

The better we perform at providing desirable bus stops and other passenger amenities, the higher the expectation becomes for further enhancements.

The cost of improvements at some locations is prohibitive, and at times requires a great deal of work beyond our boundaries, such as ADA ped ramps that could require storm drain or signaling changes, etc.

Lack of flexibility in some cases.

Ensuring that these efforts are done consistently.

We must remain vigilant for new projects coming on the horizon to ensure they have taken into account transit; if not, we must ensure we comment accordingly. In most cases if we do not ensure the needs of transit passengers are addressed no one else will.

Parking in highly dense areas must be removed, which causes political and business conflicts.

Maintaining accurate customer information that is customized to each stop is expensive for a large system that undergoes service changes up to four times per year. Increased visibility of improved bus stops makes the deficient ones even more obvious, but we are ticking away at the problem. When people see the new flag and customer information they might think the stop is “good enough” but we need to continue focusing on ADA improvements which benefit all customers.

Increased staff time and capital costs.

None

A couple of the biggest drawbacks are increased expectation and push back from property owners. While customers appreciate the added street amenities and convenient stop locations there are constant requests for more and more. Many business owners complain that a bus stop or shelter is located near or in front of their business due to some loitering and trash.

Likely, we receive more customer comments about negative issues than we would otherwise.

There really have not been any drawbacks so far, other than the expectation from some parties that all bus stops everywhere should be equipped with sidewalks, ADA landing pads, and passenger shelters.

Adding permanent infrastructure makes it more difficult to move or eliminate a bus stop because of sunk costs.

It takes a lot of effort among staff, and the cost is significant when we upgrade our stops on our own dime.

Increased cleaning and maintenance responsibilities. More pressure on adjacent property owners. Less flexibility when considering stop and service changes.

When we lengthen stops we often encounter complaints from merchants and homeowners, and there are parking concerns as well. Sometimes a bus stop moving away from a business becomes controversial.

(1) Much preparation to assemble and explain ADA requirements, design requirements, and operational requirements. (2) Lack of having transit agency standards and guidelines for bus stops. (3) Keeping current w/ new research and studies.

14. What was the most successful action taken, and why?

Responses summarized in Table 54, Chapter 4 of report. Verbatim responses are provided here.

Started a community grant program for jurisdictions. It allows the jurisdiction to install what they want in amenities, and they are responsible for maintenance

A stop that resulted in a design that allowed for a bus turn-out, complete sidewalk improvement resulting in full accessibility, full-sized shelter, with adequate space for mobility impaired, solar lighting, and elegant landscaping.

The Adopt-A-Stop program has given us the opportunity to have more amenities out in the system, and also allows us to make better use of our resources in terms of maintenance. In the winter time when clearing snow, the more partners you have the better!

The transit agency continues to seek opportunities to reduce the cost of ADA bus stops and shelter installation. The County approved contracts for shelter installs in May 2013.

Working with local planners to work on formally adopting elements of our stop design into their administrative rules for design.

We had grant money to improve ADA access. To choose which bus stops to apply the money to, I put together a small committee representative of the disabled community. Some were disabled themselves but all worked for various local government or social service agencies. While I have anecdotal information about bus stops for which we'd received complaints over the years, they were in positions to know about where their clients lived and traveled and therefore how much impact any particular bus stop would have.

Establishing ourselves as the lead determining force behind the ultimate decision and keeping an open dialog about the process with all involved parties. Paying particularly close attention to those who may have not gotten their ideal outcome in the process.

Identifying sites where the City already has ROW to place the majority of the shelters.

Through 20+ years of persistence, local jurisdictions are now including us in their sidewalk and streetscape design efforts.

Face-to-face meetings at the stop locations with city staff

Building a series of 'bulb-outs' in a central downtown district. It provided additional room to install shelters/amenities, improved ADA accessibility, provided safer operating conditions for coach operators (didn't require pulling all the way out of travel lane, which also makes it easier for them to get back into traffic), and a new shelter's design is noticeably more attractive (improved "branding" of our service).

Probably the construction of our downtown Transit Hub. We have a timed-transfer system in downtown in off-peak & weekend periods. 60% of our riders transfer. The physical situation for the transferring customer prior to construction of the Transit Hub was dismal: a four-corner operation fully exposed to the elements with little information and no bathroom facility. Many customers had to negotiate up to 6 lanes of traffic to transfer from one bus line to another.

We have approached all the cities in our service area and are working to update MOU's for cleaning and trash collection.

Bus shelters. We have 400+ bus shelters installed throughout the system. We are currently working on developing a new shelter installation and maintenance project to increase the number of new shelters, replace old ones, and to increase management efforts.

The formation of a bus stop implementation committee. This group was initially formed to complete the installation of the 2000 new bus stops needed for the January 2014 service change. The bus stops are mostly installed correctly but it was completed about 60 days late. PLUS: The most successful approach is to start early or to ask cities for "temporary" or "conditional" approval of a stop to get a stop placed somewhere, thus getting our foot in the door and easing permanent approval. It also helps to have customer reports requesting service to a particular area.

As stated in the answer to Q. 10, the My Bus Now project has been our most successful action taken in years because it significantly upgraded the level of key information now available to our customers.

Installation of bulb outs—They require less parking removal than bus zones, allow us to stay in traffic, and provide a larger, more accessible space for customers.

Partnering with local business owners and national chain retailers to obtain easements for transit amenities. Public-private partnership to improve bus stop safety.

Working as a team and Installing Bus Pads for Shelters, and providing ADA for wheel chair patrons.

In 2008, we secured a congressional earmark of $800,000 to pour concrete pads along a notoriously pedestrian-unfriendly corridor. The pedestrian access has vastly improved.

N/A

Reduction of 15% of stops to improve travel speeds

A dedicated funding cycle (Board approved) and support from leadership to have dedicated staff.

We were able to secure specific grant funding dedicated to the provision of shelters, benches and bus stop area improvements. This action allows us to be very proactive in responding to passenger needs and to provide attractive, durable, comfortable passenger facilities at bus stops. We are able to include solar lighting where appropriate and to construct sidewalks and/or landing pads in addition to maintaining a relatively aggressive program of both adding facilities and replacing older, high-maintenance and high-cost shelters.

Most successful has been our attempts to improve access at the bus stop location itself, largely by removing news racks and other impediments. We worked closely with the local jurisdiction in crafting their new news rack ordinance to make sure that bus stops are called out for special treatment, due to bus door opening locations and our riders' needs for circulation.

This is another twofold answer. Part of our efforts has dealt with communication. We have done a much better job informing cities and property owners of the need for new stops. We have also created an annual review of all our stops with the aim to install new ADA pads at high-boarding stops and also at low-boarding stops upon customer request.

Through our efforts we have been able to install multiple bus bulbs in the largest jurisdiction we serve and have shown that they can be useful not only from a transit perspective but from a design and traffic perspective as well.

Developing stop guidelines and standards as it provides a rule-book on what would be the ideal bus stop.

Creating a comprehensive database of regional bus stops. You have to know the location and condition of your stops in order to know what information to provide and what improvements to make. Keeping up with the data is a challenge as we have over 11,000 stops.

Upgraded passenger amenities at bus rapid transit stops, including real-time bus arrival signs and off-board fare validation; these increase passenger satisfaction and reduce operating costs.

Cost sharing the expenses to improve bus stops

The transit agency has a BRT style of service along one major corridor. This is a limited stop service with specialized buses and large shelters or transit stations. These stations are brightly lit, and have audio and a digital display for next-time bus arrivals. There was significant infrastructure work done at each site ensuring ADA and pedestrian access. The customers are very happy with these stations because they feel safer, are more comfortable, and are more confidant with knowing when the next bus will arrive.

Convincing the City to include the transit agency as a "reviewer" on all development plans for both buildings and right-of-way work. Transit agency staff are now able to review project proposals to determine their effects on our transit routes and stops, and we provide feedback regarding streetscape schemes, bus stop locations, and possible bus stop amenities. Notably, we have been able to get developers to build concrete passenger landing pads at all bus stop locations within their project area if they are already doing sidewalk work. This means that the developers have (so far) been willing to absorb the cost of these "wheelchair" loading pads into their large projects, which provides ADA-accessible bus stops at more and more locations.

In-street bus pads are now included in city Department of Transportation arterial resurfacing projects at no cost to us. The concrete pads help preserve the street pavement and make it easier for buses to enter and exit the bus stop. The transit agency is also involved in other street improvements and complete street initiatives, such as bike lanes and streetscape projects. These projects provide some funding for bus stop improvements.

Reviewing rezonings and working with developers, because we get improvements without cost to us

We struggled for years just to get towns to accept uniform bus stop signage. Now we are working with those towns that are willing (mainly a central city) to establish new passenger waiting shelters with advertising. Advertising revenue will help defray the cost of shelter maintenance.

Building a foundation of partnerships and processes to: create a shared a vision of bus service stops and amenities; identify funding opportunities to be at the table when streets are redesigned and private development is proposed; develop expedient permitting approaches etc. to aid the implementation of successful bus stop improvements.

Our current “lollypop” bus stop design is very good urban design, and offers good static information for the customer. The sign is high enough to see from across the street when there is a bus in the stop.

Preparing a PowerPoint w/ an overview of transit agency operations and operating requirements. Why? Public Works officials are not usually in tune w/ bus operations and our needs. Also, there is a frequent turn-over of staff so I believe performing occasional outreach w/ public works staff and having our PowerPoint available on-line will be a tremendous benefit to establishing new and maintaining existing bus stops in our service area.

15. If you could change ONE aspect in the process of designing and locating bus stops, what would you change?

Responses summarized in Table 55, Chapter 4 of report. Verbatim responses are provided here.

Having full authority and jurisdiction in determining where bus stops are to be placed.

Give more authority to transit agency or MPO on placement and design.

Bus stop spacing; most agencies have stops that have been at locations for years, agencies have added stops over the years, and rarely do we take them away. We are getting better at consolidating stops. It would be great to remove all the stops on a route and start over from scratch. It’s always easier to add a stop than to take one away.

Reducing the cost and time to design, construct, purchase and install shelters. In 2014, the transit agency is developing an RFP for Construction Manager at Risk to design, construct, purchase and install shelters and is being evaluated for FY 2015.

Not having to choose what stops were able to have shelters and what ones had to go without.

I believe bus stop design standards should be no different that standards for sidewalks, driveways, streets, etc. It will only be when it is considered just another part of developing the overall transportation infrastructure that it will no longer be considered an option or an afterthought.

When I first started doing this, I didn’t know anything about it. I wish I could have taken a class on designing bus stops. It involves only about 10% planning, 15% landscape architecture, 30% engineering and 45% administration of red tape.

It is a very labor-intensive process from selecting sites, acquiring shelters and procuring installation, and maintenance. Our administrative staff is very small, so, in my opinion, it takes an inordinate amount of staff time to move a bus shelter program forward in an acceptably prompt period of time.

ADA compliance

Encroachment permits that are not needed

It starts at local land use provisions, which are multifaceted. But within that frame work, improving local jurisdictional process for locating and permitting stops for both existing stops and new stops associated with new land use developments.

Due to topography, weather, lack of sidewalks &/or ADA compliant sidewalks, many of our stops are not ADA accessible; yet all stops are signed as ADA compliant. Due to lack of manpower & financial resources, the Authority has no ability to do a real assessment of all bus stops based on ADAAG standards. Given the ability to do a comprehensive assessment; that’s the one action I’d choose.

Having to determine who will pay for ongoing cleaning and trash collection.

The power and funds to make ADA improvements.

A standard procedure that would apply to all 22 cities we serve would reduce staff time and rely less on individual memories of how each city operates.

I would give the transit agency more legal authority to establish bus stops, as long as we follow stated policy and guidelines for safety and traffic engineering, as established by the state DOT.

Approval and change process. Very labor intensive.

Operating funding to influence bus stop investments, improvements or better locations

Eliminate local building/zoning department review of transit amenities installation.

Like to work with contractors towards installing sidewalks and curb cuts before the stops are installed.

A streamlined approval process for construction permit applications--or better yet, no approval process at all.

We're not clear as to whether this question is asking about the overall multi-agency/multidisciplinary process of adding a stop or the existing internal transit agency process, so we're providing two answers—pick whichever suits the question's intent. Overall, better coordination between us and our local governments so that the design and placement of the stop effectively includes measures/improvements to make sure the ROW and curbside environment are adequate for waiting and safe boarding (as opposed to the put-it-wherever-you-can approach of the past). Internally, better coordination (or consolidation of functions to one bus stop group) so that we have a simplified management structure. This could help us improve when coordinating stop locations with passenger amenities, having clearly defined roles and responsibilities, communicating bus stop practices out to other departments (ex: Bus Operations), working on problems with a multi-disciplinary approach, etc.

Give the transit agency the ability to create stops where needed and impose the proper parking regulations.

Have flexibility in the type of amenities that can be installed. This sometimes leads to challenges in being able to accomplish the ideal vs. the acceptable.

Our service area includes thirteen municipalities, each of whom has somewhat differing requirements for the placement of the facilities at bus stops. The simple location of a bus stop placement of appropriate signage is not the issue, but the requirements for design, approval and installation of shelters is a particular challenge to manage. A uniform approach among the jurisdictions would be helpful.

Standardize jurisdictional street, sidewalk, and landscape design guidelines in a way that is compatible with bus stop placement.

Have decision-making autonomy in issues of stop location and pad/shelter placement.

Despite our best efforts public and private entities still must often be reminded of the presence of bus stops and bus routes and that they are an important piece that must be considered from the beginning during design phases of projects. Having the design and locating process better codified in local development codes would help, especially if it applied consistently across jurisdictions.

Have policy dictated by the implementing agency and not via an outside board/group that does not understand transit.

We do not have good knowledge of when our stops are changed by others. DOTs and other ROW owners may do resurfacing projects that normally they would not coordinate with us, but they install bus stop amenities and improvements at the same time. We need better and more up-to-date information on the condition and attributes of our stops.

Streamlined jurisdictional review and approval.

Additional funding availability

More cooperation from municipalities and DOT regarding pedestrian access to bus stops. Cooperation among local and state agency has become much better through the years but there is need for much more. More cooperation from local and state agency regarding maintenance and snow removal is needed.

The one aspect of this process that the transit agency would like to change is actually the environment surrounding the entire process. To be more specific, it feels like we are the only entity that ever considers the location and design of bus stops, whereas this is an afterthought (at best) within the development community and even among municipal officials. The transit agency would like for bus stop locations and amenities to be a consideration in every single project that ever occurs in the region from the very early planning stages. However, there is nothing in our local codes or laws that dictates for this to happen. Additionally, there are really no incentives or penalties offered in this region in order to encourage developers to consider transit in their projects.

I would like to see a higher priority placed on proactively improving bus stops. They are typically addressed when a property owner or elected official has a specific complaint, or when a project (public or private) is implemented that affects a bus stop.

Better coordination with the towns surrounding the major city we serve. Many people on town councils are not educated on ADA, and some representatives want to remove the stop instead of dealing with the issue in a positive manner.

Most of our stops are nearside. The jury is out on the relative advantages of nearside vs. farside stop locations. Nearside stops are generally more passenger-friendly if they are at a signalized intersection, but they are prone to safety issues when traffic is trying to turn.

ADA requirements that prohibit us from placing a new bus stop where the surface is unpaved, or where there are trees in a potential bus stop zone. More waivers would help.

16. Please describe any "lessons learned" that would benefit other transit agencies.

Responses summarized in Table 56, Chapter 4 of report. Verbatim responses are provided here.

Dedicate personnel to review public works projects so that bus stops can be requested and required as part of the project, and monitor compliance with having the stops constructed as designed during the initial design process.

Transit agencies don't have the resources to solve all the issues alone. Build partnerships.

The transit agency is collaborating with neighborhood communities and not-for-profit organizations to reduce costs and speed up the process for constructing a shelter pad and installing shelters. Three successful projects are underway in a neighborhood in the unincorporated portion of the County. One new project is just starting with the Boy Scouts. This model is a win-win for the community! 1) Costs are reduced for the transit agency. 2) Projects get underway and are completed more quickly than could be achieved due to lack of funding, right of way, or other priority. 3) The community has ownership and pride in the project and takes on a maintenance component. 4) More people learn about transit and the opportunity to ride the system!

It takes patience and persistence to see change happen. It also means being willing to educate non-transit planners on how important improvements to bus stops are to how well a transit system can serve its customers.

Utilities and topography have always been the project-killers for me. You'd think our city is flat but two or three feet could mean expensive retaining walls and excavation of shallow utilities. Spend ample time on each site taking pictures and poking around. Learn to look for problems. It's better to move the bus stop away from the problems if you can rather than issue change orders after digging has begun.

Keep an open and honest dialog with all parties involved.

Consider the added maintenance cost of putting bus shelters at bus stops when costing out a bus shelter program.

If your transit agency has a rule, such as stop placement every 2 blocks within an urban area, make it a "soft" rule and allow for some flexibility.

Talk with city staff and meet out at the location

Get to know your local jurisdiction staffs responsible for street design, land use and traffic so that stop locations are more fully understood (and hopefully supported).

As a State Authority, the transit agency has the ability to put bus stops wherever necessary in the public domain. However, the state is a Home Rule state, meaning municipalities control their own land use. It's important to cultivate & educate municipal officials on the importance of considering the transit systems & its needs when considering zoning code. We are currently considering a BRT system, which will require Transit Oriented Design code around stations & stops. Without it, forget about getting FTA financial help. Most municipalities here do not have TOD on their radar.

It is helpful to have up-to-date MOU's with cities. This way responsibilities are clear when a customer complains about a stop being dirty.

Just because you have an internal system of handling the normal level of bus stop changes don't assume it can handle a major service change or the replacement of an old sign design with a new design (or worse, both at once). PLUS: Cultivate good relationships with city staff and start early in the process.

Carefully plan route changes. Put stop improvements into a budget so the transit agency is not surprised.

It is necessary to have dedicated, expert staff that can establish good relationships with local government to both gain their trust on bus stop issues and to establish a rapport that will yield a climate of customer-sensitive interest in establishing and maintaining bus stops for local residents.

Outreach—intense in the areas that are changing to adjacent landowners and customers. Getting everyone on the same page with the same information up front helps the process move forward.

Learn experience working with the transit agency and attending transit agency FORCE meetings.

The transit agency has a contract with a shelter manufacturer that allows us to buy several different styles of shelter. We let the local municipality choose which style they want in their town. That helps us get approval to install new shelters.

1. Be proactive when it comes to dealing with curbside and ROW issues (streetscape or parking conflicts). With recent trends of stimulus/TIGER grant streetscapes and complete streets projects, it's critical to make sure that bus stops are properly designed into plans from the beginning rather than as an afterthought. This requires coordination with local governments, as well as with their consultants and contractors. 2. Use multiple outreach methods when trying to establish coordination with your member cities/counties. The transit agency's Real Estate & TOD office informed their municipal contacts that we wanted to coordinate on bus stop issues and plan reviews, and we have been approached proactively by the cities on several occasions as a result. 3. Utilize a multi-disciplinary or cross-departmental approach when possible. By involving the expertise of others when handling problems, you can get a more balanced view of each situation and have a more functional outcome. Examples of this include having Planning, Safety, and Bus Operations work together to assess stop issues (we recently reviewed all stops with layovers using this combination)—it helps get buy-in from key areas when proposing a solution. We also have partnered with transportation planning and traffic engineering from local municipalities to resolve tough stop issues.

Need to create good communication with local political officials and with officials responsible for authorizing/creating the parking regulations required to designate bus stops

1. Leadership support (top-down) 2. Dedicated Board support 3. Dedicated funding 4. Dedicated staff (actual staff who concentrate on this effort daily) 5. Established partnerships with external agencies (local, state, etc.)

Simple is better. We originally designed our own unique shelters and paid the price for the "custom" nature of the shelter. When we planned an expanded shelter program and also began replacing older shelters, we selected a commercially available shelter that could meet our needs with minor adaptations making the shelters more readily available and reducing costs.

Consolidation of bus stops has had a large benefit in improving service reliability, reducing local impacts of bus stops, and increasing our ability to concentrate on fewer problem stop locations. Bus stop maintenance could be a huge budget item (power washing, trash collection, etc.) but having an ability to do that, at least on a case-by-case basis, would be hugely beneficial.

In some regards persistence has paid off. By constantly working with public and private groups to ensure transit needs are considered, some of those groups have begun to contact our transit agency at the beginning of their design phases to get our input and work with us to ensure our needs are met.

N/A

Local standards with buy-in from ROW owners are critical. This also helps communicate with developers who aren't looking at some nationwide research report but rather at an adopted or generally accepted guidelines document. In cases where the ROW owner's standard or guideline on bus stops doesn't meet the transit authority's needs, it is incumbent on the transit authority to work with the ROW owner to update their engineering standards.

Identifying one point of contact at permitting jurisdiction for the review of proposed improvements; working with that individual to understand transit agency needs and the jurisdiction's requirements so that plans are submitted consistent with meeting both agencies' needs.

None

Safety is priority one even if that means not installing a bus stop. Work with all stake holders and local and state agencies to put all the pieces together. The bus system is within a four-county area so it takes many stake holders to make it happen.

Build a rapport with city staff members before you make requests to install, relocate, or remove stops.

Work with appropriate municipalities and other groups early on in the development of bus stop guidelines in order to get their buy-in. Projects like this are much more successful and efficient when agencies work together towards a common goal. We were able to frame the topic of bus stop development so that it fit in with pedestrian improvements, streetscape projects, and improvement of traffic flow. It is important to highlight the benefits that the community gets as a whole from the development of better bus stops.

Collect data on bus stops that are targeted for improvement and prioritize these stops. Coordinate with as many groups as possible (departments of transportation, elected officials, private developers) to seek funding for improvements. Develop standards, diagrams and templates (in CAD if possible) so designers can easily incorporate the bus stop improvements and proper clearances into their plans.

Make sure you have input into major streetscape projects in your community. You should be a check-off in terms of one of the agencies that have to review these projects.

You can't always get when you want.

Communicate as best you can w/ those agencies that directly impact your bus stop: city planning dept., public works dept., utility companies, and other transit operators. Since our region has a multitude of transit operators and organizations, it is best to find and participate in a standing committee so they are aware you (i.e., the bus company!) actually exist. In the event a standing committee does not exist, then you need to be pro-active and seek them out...and communicate.

RESPONSIBILITIES AND COORDINATION

17. Who is ultimately responsible for deciding the location of a bus stop?

Transit agency	38.6%	17
Municipality/county/state DOT	20.5%	9
Joint decision	38.6%	17
Other (please specify)	2.2%	1

Other includes: Municipality/County must approve the bus stop location. Transit Agency can reject bus stop location if not in agreement with Municipality/County

18. Who is responsible for stop installation?

Transit agency	72.1%	31
Municipality/county/state DOT	9.3%	4
Other (please specify)	18.6%	8

Other includes: (1) Both. (2) For the most part it is the Transit Agency, but when a project is in its initial stages of design, can become part of the overall project, in which case it can be Transit Agency, Municipality, County or State DOT. (3) The transit agency determines where the stop should be and installs bus stop ID signs. Municipalities install parking regulatory signs. (4) It depends on the area. Some cities require their own workers to install stops. Some want Transit to do the work. Others are ok with a contractor doing the work. (5) Depends on the jurisdiction; some allow the transit agency to install the facilities; others maintain control of certain aspects of the stop (namely, curb paint and signage). (6) The transit agency installs the bus stop signage; city DOT installs regulatory signage, such as No Parking signs. (7) Transit agency is responsible for signage. Currently, towns are responsible for shelters. (8) The city installs the bus stops, but the transit agency pays the city for every bus stop action.

19. Who is responsible for stop maintenance?

Transit agency staff	40.9%	18
Transit agency contractor	13.6%	6
Municipality/county/state DOT	6.8%	3
Private sector or other third party	2.3%	1
Other (please specify)	36.4%	16

Other includes: (1) All of above. (2) Generally it's the transit agency, but we rely on a contractor for the benches. (3) Municipality is responsible for stop unless it is a shelter (which is transit agency staff responsibility). (4) The Transit agency (or its contractor) is responsible for maintaining our agency-brand shelter/bench style. If a city chooses a different type of bench or shelter, the city is responsible for maintaining it because the transit agency does not have the spare parts to do so. (5) The transit agency is responsible for maintaining agency-owned shelters, signage and infoboxes. Benches and trashcans are usually installed and maintained by the City/County/State who also maintains the sidewalks. (6) Transit agency maintains bus stop pole and sign and transit agency benches. Trash, other benches, shelters maintained by Municipality/third-party vendor. (7) Transit agency staff maintains signs and shelters (where installed). Municipalities and private parties must maintain paving, deal with trash, etc. at all locations. (8) Adjacent property owner is responsible for the condition of the sidewalk. Municipality is responsible for the street and, sometimes, trash collection. We (the transit agency) are responsible for maintaining our amenities (poles, shelters, benches, displays, etc.). (9) All are involved. (10) For issues related to installation of signs and poles the jurisdiction has responsibility. The transit agency is responsible for clean-up of litter, erection of shelters and snow removal at sheltered locations. (11) City is responsible for the infrastructure maintenance and transit agencies responsible for pole/flag maintenance. (12) The pole and flag (and attached information) are the transit agency. All other elements in public ROW are the municipality/county/state DOT. Most shelters are owned

by a franchisee under an advertising supported contract with the DOT. (13) Combination of transit agency staff and contractors. (14) Transit agency staff maintain bus stop signage and submit requests to city DOT if regulatory signage is damaged or missing. The shelter vendor maintains the areas around the shelter (e.g., cleaning, shelter repairs, snow removal). (15) The city does all maintenance, but the transit agency installs and maintains static bus schedule canisters at every stop. (16) Another case-by-case situation. Land owner (city/county/state/private) is usually responsible for sidewalk area. Shelters: depends on owner (could be us, land owner, or shelter provider like CBS Outdoor or Clear Channel). Signs: usually transit provider. Garbage can: ourselves or land owner.

20. Who is responsible for stop relocation decisions?

Transit agency	47.7%	21
Municipality/county	4.6%	2
Joint decision	47.7%	21

Comments include:

Usually the transit agency decides on stop relocations. However, we have been requested to add/relocate/remove stops by the City/County/or State for a variety of reasons.

Municipality/County must approve the bus stop relocation. The transit agency can reject bus stop relocation if not in agreement with Municipality/County. Bus stop can be removed by Municipality/County.

Primarily, the transit agency is responsible for these decisions, but we try to coordinate and work jointly with local governments when they have a concern or we are asking for something.

Transit decision in a cooperative way, as much as possible, with municipality.

Usually led by the transit agency, but occasionally impacted by unrelated jurisdictional public works projects that impact existing bus stops.

Elected officials have input in stop location decisions.

21. Describe the relationship between your transit agency and the primary or largest municipality served with regard to bus stops.

Very good – meet on a regular basis to discuss issues	18.2%	8
Good – quick response to requests/open dialogue	36.4%	16
Fair – limited by administrative and funding issues we both deal with	47.7%	12
Could be better – generally unresponsive/requires prodding	6.8%	3
Poor – antagonistic/little communication	0.0%	0
Other (please specify)	11.4%	5

Other includes: (1) I would say that our relationship with our central City is very good. We do not meet on a regular basis to discuss bus stop additions/relocations/removals. But they are quick to respond to our requests for information. We meet with City DOT on a regular basis for planned construction projects and events that will impact our service and bus stops for temporary, long term or permanent basis. (2) One and the same – the transit agency is part of the City and only serves one city. (3) Our service area = 19 boroughs and 13 smaller city. This is quite complex to manage even though relations are from good to very good. (4) There are three transit agencies which provide service in the City; in some cases the relationships among all three is very good, while on some controversial and coordination issues, the relationships could be better. (5) We serve 22 jurisdictions and our service is regional, so we don't have a 'primary jurisdiction.' The relationship varies tremendously. The central City: generally receptive to our needs but "could be better." State DOT: very unaware of our needs and at times antagonistic, so "poor." The County: always antagonistic/little communication/pathetic, so VERY "poor."

22. Describe the relationship between your transit agency and municipalities other than the primary municipality served with regard to bus stops.

Very good – meet on a regular basis to discuss issues	6.8%	3
Good – quick response to requests/open dialogue	34.1%	15
Fair – limited by administrative and funding issues we both deal with	11.4%	5
Could be better – generally unresponsive/requires prodding	9.1%	4
Poor – antagonistic/little communication	0.0%	0
Varies by municipality	27.3%	12
N/A – only one municipality served by our agency	4.6%	2
Other (please specify)	6.8%	3

Other includes: (1) We only have demand-response door-to-door service in our secondary municipality. (2) Our service area = 19 boroughs and 13 smaller city. This is quite complex to manage even though relations are from good to very good. (3) See answer to previous question.

23. Have any steps been taken to improve coordination related to bus stops?

Attend standing coordination meetings	6.8%	3
Outreach to individual agencies – as needed	34.1%	15
Provide comments during review of site plans for new development	20.5%	9
Provide comments during review of environmental documents	2.3%	1
Work through MPO or similar regional agency	2.3%	1
None of the above	0.0%	0
Other (please specify)	34.1%	15

Other includes: (1) Meet with jurisdictions and MPO. Provide comments to plans. (2) All of the above. (3) None of these apply. (4) We're trying to talk them into either exempting us from building permit fees or doing some sort of blanket fee. Right now the permit for each bus shelter costs the same as a house. (5) We provide comments to developers and environmental documents and outreach to other agencies and jurisdictions. (6) Both outreach and comments on development. (7) Our transit agency does not serve one major municipality. Answers above represent an 'average' of our interactions with 100+ municipalities. (8) We have done a combination of the above: Outreach to individual agencies—as needed. Provide comments during review of site plans for new developments. Work through our MPO or similar regional entity. (9) We do portions of each of the above. (10) All of the above. (11) Several: coordination meetings, outreach, comments during both review periods. (12) Several of the above apply, including standing meetings, outreach to agencies, review of public and private development plans, review of environmental documents for larger public works projects. (13) All of the above. (14) We talk daily and meet in the field regularly. Sometimes we don't agree, we will still have coffee together. (15) The survey does not allow me to choose more than one. This should be corrected.

24. Have these steps been successful in helping your agency locate stops where you want them to be?

Yes, very successful	29.6%	13
Yes, moderately successful	56.8%	25
No, moderately unsuccessful	4.6%	2
No, not successful at all	0.0%	0
Other (please specify)	9.1%	4

Other includes: (1) The city has never objected to any location during my tenure. What little steps we've taken have simply been to streamline the red tape and reduce our costs. (2) N/A, haven't been able to take any of these steps. (3) Comments on new development plans, not always received plans or after initial comments not always updated on future plan changes. (4) N/A.

25. What is the biggest financial barrier faced by your agency with regard to bus stops?

General lack of capital funds to build new bus stops or improve existing stops	50.0%	21
Lack of local matching funds to build new bus stops or improve existing stops	2.4%	1
Lack of funds to maintain a bus stop	23.8%	10
Other	23.8%	10

Other responses include: (1) All of the above. (2) Shelters in high demand. Our resources are limited so not all requests can be fulfilled. (3) Funding is available in grant line items, but lacking funding for staff to develop specs, etc. (4) The transit agency's Office of Service Development does not have an allotted budget for new bus stops or bus stop improvements. We ultimately ensure that our new or relocated stops are in a safe location where the passengers are visible by the operators, there are no major obstructions or hazards, and there are at least sidewalks and curb cuts. (5) We have the dedicated funding for capital and staff. Often, people focus on "Capital" funding, when in reality, you really need to also be mindful of having "Operating" to design/build and maintain. We are fortunate. We could always use more funding to do more and better. (6) Issue is related to general lack of capital. No links to specific bus stop issues. (7) Currently, funding is satisfactory for our needs. (8) We have funds to maintain stops (using contractors), but funds have been reduced gradually over time such that we are receiving more complaints about unkempt stops related to trash because the intervals between maintenance visits gets further apart. (9) Until we implement shelters with advertising, all shelters are installed and maintained by towns for whom shelter maintenance is a low priority. (10) We allocate adequate funding to keep buss tops in proper condition. When stops are moved for construction, costs are borne by the developer / contractor.

26. What is the biggest institutional barrier faced by your agency with regard to bus stops?

Responses summarized in Table 12, Chapter 3 of report. Verbatim responses are provided here.

Jurisdictional approval of bus stops.

Improvements to Grandfathered stops would require significant dollar outlays in order to comply with changes in accessibility and other jurisdictional requirements such as static pads.

This would be funding. Although the stop is recognized as being an integral part of the agency, funding for buses, software and new transit centers is always a higher priority to the agency. The bus stop often falls to the bottom of the priority list.

Lack of right of way

Currently it is the frequently changing and unclear direction received from our FTA region office on addressing NEPA requirements.

Where bus stops are located on state right-of-way, the red-tape is considerably more than for those on City right-of-way.

Funding

Staff time to lay out bus stop, assess ADA compliance, and work with surrounding property owner.

Lack of enough staff time to implement a good bus shelter program.

N/A

The success of this has varied over time, but on-going coordination efforts between different departments—in particular Planning, Facilities and Operations staff—who have different priorities can either make or break stop location improvements. We are fortunate though, in that our internal process has worked well and we rarely have upper management or transit authority board members getting down into the weeds.

Funding

Lack of funding, municipal mindset in suburban towns to construct sidewalks.

Trash collection at bus stops. We do not have a contractor who can collect trash.

Dealing with 22 cities and the state on bus stop issues, each with a different procedure for approval. The main point of contact with the cities is the bus field supervisors. We have up to 6 departments internally that control parts of the internal process. PLUS no clear owner of the process and no clear representative to individual cities.

Since a bus stop is often the first thing the customer sees (hopefully not the back of the bumper as a bus pulls away), more attention should be given to bus stops from the agency. They are looked at as low-maintenance, low-cost items ("just stick a pole in the ground"), but good bus stops require planning, good construction practices, and ongoing maintenance.

Legal limitations that do not permit us to establish bus stops or to self-certify for stops along state highways.

Public process. Stop changes must go to public hearing which can lead to no progress.

Not the road authority

Historic underfunding of shelter maintenance staff.

It's a tie between coordination issues as described in prior questions and a lack of internal agency-wide focus on bus stops (thereby contributing to that lack of capital funds from the last questions).

Lack of cooperation by Municipalities

I can't think of one at the moment.

Our bus stop process involves coordination across multiple departments with varying priorities and skill sets. Maintaining the degree of coordination and cooperation to deliver a successful program in the face of limited staffing levels is the biggest institutional barrier.

Virtually zero community support and varying levels of political support for bus service infrastructure, including bus stops and terminals. Community support and demand for service is very high; support for the necessary infrastructure is very low.

Lack of uniformity in installation policy between municipalities

With over 1,600 bus stops we have to prioritize projects and funds to maximize our efforts

Traffic and Parking Board controls parking at bus stops / not having an internal policy to control parking at bus stops.

Our region is a mélange of different municipalities, some of them own their own ROW and in other cases it is owned by the State government. Interjurisdictional coordination is the biggest barrier. Some jurisdictions prioritize and staff work on bus stops, and others less so.

Cumbersome/lengthy internal process for design and construction of facilities.

Conflicting interests

Not enough internal resources and need for better understanding of what's going on at the bus stop level on the street.

Who has versus who wants the responsibility for maintaining the area around bus stops?

Probably trying to define the boundary of the "bus stop" that the transit agency is responsible for versus what the municipality or property owner is responsible for (i.e., pedestrian access to the bus stop)

We depend on the City Department of Transportation and local elected officials to fund bus stop improvements in the public right-of-way. When there is no project planned or desire to make improvements, the improvements are difficult to implement.

Funding

See previous comments

Most institutional barriers have been addressed.

Other bus operators who use our stops wither with, or more often without, authority. The tour bus operators and on-street intercity operators are a very big challenge.

We do not own the bus stops and must ALWAYS deal w/ the owner of the lands within the bus stop. Often the land owner is not on-board w/ our objectives to serve the public, so we end up w/ driveways thru our stops, bus stops that are too short, sidewalks that haven't been maintained or upgraded to current standards.

STOP DESIGN AND LOCATION

27. What is your agency's preferred location for bus stops?

Farside	45.5%	20
Nearside	9.1%	4
Midblock	0.0%	0
Differs by urban/rural/suburban area	2.3%	1
Depends on specific location	34.1%	15
Other	9.1%	4

Other responses include: (1) Nearside, with a change to farside. (2) There has been some debate on the preferred location for bus stops. We prefer nearside or farside stops. City DOT has expressed preference to farside stops when possible as they have less of an impact on traffic but still place passengers close to the intersection to discourage midblock crossing. We now avoid placing new stops at midblock locations unless it is located at a crosswalk. (3) See earlier comment. We mostly use nearside but acknowledge the drawbacks. (4) We have a farside preference, especially along corridors with TSP, but make decisions on an individual stop basis.

28. Please explain the reasons behind your agency's preferred stop location.

Responses summarized in Table 14, Chapter 3 of report. Verbatim responses are provided here.

Not always able to place in same position

Allows for passengers to alight and proceed to the rear of the bus in order to access crosswalks or controlled intersection. Bus is free to proceed without possible pedestrian interference.

Farside is typically endorsed by TCRP and other publications as having fewer safety issues surrounding them than nearside and midblock. Bus drivers prefer them as well because they have cleared the traffic signal. Sight lines and pedestrian movements are improved with farside.

Right turn lanes impact locating a bus stop nearest the intersection. More and more stops are being located farside. Farside locations are being preferred as more intersections are being converted to roundabouts and bus pullouts are being considered for operational improvements.

This has proven to be the best for customer safety (fewer cases of crossing in front of the bus when exiting) and to maintain traffic flow.

Does not block site distance as much for vehicles entering from a side street or driveway. Forces passengers to cross the street at the intersection behind the bus rather than stepping out in front of the bus where they can't see oncoming traffic and won't be seen until it's too late. Sometimes allows the bus to pass through the intersection and stop only once rather than stopping at the red light and then again at the bus stop. This is particularly helpful on corridors and at signals where we have transit signal priority activated as stopping before passing through the detector confuses the signal controller and it resets to another cycle.

Situations change and different areas call for different considerations.

So that passengers cross street behind the bus and so that right-turns are not blocked at traffic signals.

We prefer farside, but realistically we are ultimately limited by site constraints: can ROW or easement can be acquired, existing structures, presence or lack of ADA access, etc.

Not blocking visibility of intersections. Farside works really well with traffic signals, allowing us opportunities to merge in to traffic.

Preferred "farside" isn't always possible since it really depends on the location, but our interest is to get a bus past the intersection, especially if there's a traffic control signal there. We find it safer than nearside, which runs the risk of vehicles turning in front of a bus, and it typically means we don't have additional delay time that a red light might create at an intersection.

Get the bus through the intersection; force passenger to go behind the bus to cross the street.

Because that's the way we've always done it. Seriously. The stop system was established as the trolley system evolved in the early 1900s. Most transit corridors still have the same stop patterns. When pressed, Operations Dept. personnel think nearside stops are safer. Personally, I'd like to move towards a farside system, for the very same reason.

The bus is able to get through the intersection before stopping. There are typically crosswalks available for safe pedestrian crossing.

For the safety of our riders in order to minimize midblock crossing where there is not a traffic signal or crosswalk.

Fewer conflicts with car turning movements. Less delay caused by traffic signals. Easier to align with the curb line to load/unload passengers. PLUS farside allows our buses to clear an intersection prior to making the stop.

Farside is preferred so passengers go behind the bus to the crosswalk

The bus driver can see passengers crossing the street in front of the bus. Fewer passengers go around the back of the bus, as the front of the bus is closer to the crosswalk.

Farside stops are preferred because: * enables better on-time performance since stop occurs after passing thru traffic signal; * improves safety as customers are less likely to cross in front of the bus after alighting past the intersection; * easier access/egress for buses due to improved angle approaching farside stop after a traffic signal, using the intersection itself as a buffer to get over to the stop.

Farside at stop lights, nearside at stop signs

Will work better for Transit Priority and past crosswalks

Better for pedestrian safety and farside stop doesn't block right turns on red—better for air quality and congestion.

We take advantage of transit signal priority, so we want the bus to get through the (sometimes extended) green light, and then make its stop, and then proceed.

We have a legacy of nearside stops, but are looking at it case-by-case until we develop our own placement policies.

Based on curb space, turning movements, traffic signals.

We attempt to be sensitive to the access needs of passengers, the traffic conditions in which we operate, the nature of adjoining land use, the degree to which stops accommodate on-street transfers and the safety of the location. We probably have more nearside stops because of long-standing tradition but we continue to work toward the best possible solution for our riders and the environment in which we operate.

The standard answer is "farside," but the reality is that there are too many variables to choose one preference. Aside from that, a policy or procedure that favors one location type over another provides bus stop opponents a built-in argument against a facility that you've determined is in the best location.

Cultural, to avoid pedestrian crossing midblock. Farside stop can exist mainly where there are major transfer between two lines.

People attempt to cross the street in front of the bus. Nearside stops ensure customers will be crossing at the controlled intersection. At farside stops, people still attempt to cross in front of the bus which leads to unsafe conditions.

Jurisdictions have final authority on stop locations. The majority are placed nearside but some prefer a farside stop. Stops are often considered on a case-by-case basis.

It depends on each location, both nearside and farside are preferred as compared to midblock—nearside closer to intersection/crosswalks but can get caught at a signal. Farside is good for getting buses through the signal and to get people to cross behind the bus.

The adjacent land use tends to drive many stop location decisions. Regardless of far or nearside, we would rather have a bus stop next to a park or shopping center than next to someone's residence or a day care. The location should be somewhere that is less likely to see people illegally parking or stopping in the bus zone.

Safety, sight distance and traffic operational patterns, transit signal priority.

Lesser traffic conflicts

Most urban bus stops are located nearside where there is a traffic light and crosswalk; rural areas may have safer bus stop locations midblock or farside depending on each location and whether it has a sidewalk or not. A few of our more rural streets have bus cut outs off of each side of the lanes for the bus stop. The bus cut outs work well depending on traffic and road speed.

Farside—In cases where streets have wide shoulders and multiple lanes. Nearside—in cases of two-lane streets where autos are less likely to pass buses.

There are many factors that go into the decision as to where to place the bus stop. However, if there are no other limiting factors, we prefer farside locations because they tend to be safer for pedestrians and encourage pedestrians to use the crosswalks appropriately.

We prefer farside stops at signalized intersections, and nearside at stop-controlled intersections. The farside stops help buses to cross the intersection without stopping and minimizes conflicts with right-turning traffic. Nearside stops; stop signs prevents the buses from having to stop twice, once at the stop sign and again at the bus stop. If there is no stop sign at the corner, nearside is still preferred in case a stop sign is added in the future, and typically there is a full-width sidewalk to facilitate passenger boarding.

We generally go for farside, but the individual geography of each stop means that we quite often are not able to get what we want. Each location is different.

See earlier comment.

Improved visibility/safety when peds cross behind the bus. No right hook conflicts. Operational efficiency improved.

It is better to be past the light and avoid conflicts with right-turning vehicles. Farside stops require less space. When the bus is done boarding, it can depart; big dwell time savings.

Prefer nearside but ultimate location depends on: (1) safety: ped access (2) safety: presence or lack of crosswalk (marked or signalized) (3) safety: vehicular maneuverability or sight distance (4) willingness of local jurisdiction to provide on-street space (5) heavy right- or left-turn movements (6) facilitate transfers between routes (7) adjoining land use (8) ADA issues (9) ability to accommodate a shelter (10) adjoining land use or land owner

29. Does your agency consider safe street crossings in stop location decisions?

Yes, always	70.5%	31
Yes, especially in urban areas	18.2%	8
Yes, especially in suburban areas	2.3%	1
Yes, especially in rural areas	2.3%	1
No	0.0%	0
Other	6.8%	3

Other responses include: (1) Yes, in all areas. (2) Given that the City has sidewalks and traffic signals almost everywhere, this is seldom an issue. There are some locations, particularly in outlying areas, where we must take pedestrian access into account. (3) Yes, in any case: urban, suburban, rural.

30. Are there any additional factors affecting your agency's decisions regarding stop locations?

Responses summarized in Table 15, Chapter 3 of report. Verbatim responses are provided here.

Traffic safety. Turns of vehicles. Driveway locations. Property owner in front. Jurisdictional approval. Lighting.

Stops servicing medical, social and governmental locations.

Midblock stops have become the biggest challenge because they encourage midblock crossing or jay walking. Still, midblock stops make up most of the transit agency's stops.

Land uses, especially commercial, office and institutional

Spacing between stops, operational safety, and proximity to major trip generators.

My favorite quote: "Nobody wants a bus stop in front of their home or business who doesn't ride the bus" as stated by our COO. We try to be sensitive to the neighbors.

Public comment.

Walking distance, distance between stops based on traffic and speed limits, and the ability to run the routes on time!

:: In-lane traffic controls that narrow down lane widths and/or create potential traffic safety issues. :: Outside lane widths (curb-side) and bicycle lanes. We try to get local jurisdictions to keep lane widths at least 11' wide. But that's not always possible. :: Trees planted at or near stops. Trees can scrape a bus or a bus breaks a tree limb. In addition, leaves on the ground can create other issues for riders getting on and off buses. :: Pedestrian cross-walk locations (too close and departing riders will walk in front a bus, creating further delay and a safety issue for not seeing on-coming traffic). :: Shelter or stop pole set-back from curb or traffic lane, which can sometimes create ADA accessibility issues. :: Sidewalk widths vary by jurisdiction and location. Making a stop ADA accessible can be a challenge. :: Location requirements of maintenance/facilities equipment (trucks) when stopped for cleaning a stop. :: Line of sight for getting in and out of a stop. :: Speed limits or sometimes an individual jurisdiction's requirement for when a bus pull-out is needed for a stop. :: Creating "stand alone" stop designs for locations that don't have sidewalks or adequate pedestrian pathways yet have resident or commercial developments close by.

Whether there is a turnout or enough space for the bus to pull partially or fully out of traffic, especially on high-speed corridors (higher than 35 mph).

We consider the ADA accessibility of the stop. We also try to anticipate the property owner reaction by avoiding placing the stop directly in front of the front of a house or business.

We refer to our Municipality/County Traffic Engineering Departments as we do not have Traffic Engineering staff at the transit agency

Sightlines, private property owners, access to developments, usable curb areas, stop spacing

Adjacent land uses, trees, parking, transfer options

Municipal authority concerns

Trip generators

We look at: Pedestrian facilities—sidewalks, crosswalks, signalization. Accessibility—clear access to front and back doors from curb, ADA factors (compliance preferred, but we try to make it functional if compliance is not possible), slope. Roadway—curves, sight distance, avoiding turn lanes. Developments—we try to coordinate with land use. Sensitive land uses—we will break spacing standard for senior homes, medical, key social agencies, etc. Spacing—we try to avoid placing new stops close together (800–1200 feet in most areas, depending on the street network—we don't have consistent block lengths in most of our service area). Personal safety—lighting, woods/hiding places, known crime history at location, etc.

Transferring opportunities, stop spacing, political factors.

A. SPACING B. LOCATION: NEARSIDE STOP, FARSIDE STOP, MIDBLOCK STOP, BUS STOP SITE SELECTION, CRITERIA, AND CONSIDERATIONS: 1. Ridership 2. Right-of-Way (R-O-W) 3. Safety • visibility • ensure adequate bus turning at intersection. • drainage • flat terrain • conflicts in the traffic flow.• pedestrian movements of transferring passengers • adequate lighting • avoid isolated locations. 4. Equity 5. Accessibility/ADA 6. Impact on Adjacent Properties 7. Location of Sidewalks 8. Road Surface Condition and Street Grade 9. Traffic-related 10. Transit-related—facilitate movements of passage between intersecting routes 11. Location of Driveways and Loading Zones 12. Passenger Comfort and Convenience 13. Proximity of Utilities Lines, Poles, and Trees

Of course, there are always those decisions that are made for the sake of maintaining positive relationships with elected officials, adjoining property owners, stakeholders and for other "sensitive" issues.

Quite a few: ADA accessibility, waiting space available, street lighting, adjacent property use, shade/weather protection, traffic volume and speed, bus driver sightlines, nearby trip generators, etc.

Our bus stop spacing protocols, business interests, property owner interests and customer interests.

We consider proximity to other stops, accessibility to safe crossings and locations surrounding stops such as schools and medical centers.

ADA

Recently, we have needed to move stops in several corridors to farside in order to facilitate transit signal priority systems, which don't work very well with nearside stops. Right of way for a bus shelter can also drive decisions—we might have it on one side but not the other.

Yes, many. Adjacent land uses, transit signal priority, lighting, quality of waiting environment, pedestrian routes of travel, topography, conflicts with other public infrastructure, availability of right-of-way, support by adjacent property owners...

Spacing, grades, developments in the neighborhood

Safety is number one, but bus stop distance, destinations, surrounding infrastructure, land owners, and sidewalk/pedestrian access is always considered regarding stop locations.

No

Existence of turn lanes, nearby land uses, objects in the right-of-way, bus stop spacing

Existing uses in the curb lane heavily influence bus stop locations, for example, loading zones, pay to park locations, sidewalk cafes, and driveways. Land uses can also play a role, such as locating stops away from day care centers.

Spacing

Transfer locations, trip generators, appropriate spacing, land uses, existing infrastructure, planned infrastructure, available ROW, signal treatment types, bus turning movements, opportunity to dwell for timepoints and layovers, etc.

If the bus is turning in a block or two that must be considered. Sometimes special land uses--Police Stations, Fire Stations, Houses of Worship, Schools, etc.--necessitate placing bus stops in suboptimal locations

Bus stop spacing, complementary bus stop across the street, proximity to a park-and-ride

STOP LENGTH

31. How long is your standard or typical bus stop?

40 feet	4.6%	2
60 feet	27.3%	12
80 feet	22.8%	10
100 feet	11.4%	5
Other	34.1%	15

Other responses include: (1) Major stops are 100 feet, with a bus bay or pull off. (2) For transit shelter pads and amenities, 20 foot with 10 foot (by 8 foot deep) ADA wheel chair deployment area. The transit agency uses a 40 foot as the standard and 80 foot—100 foot for a bus stop is a minimum target. (3) 25 feet, just long enough to have concrete under the two doors. (4) In urban settings, 40'. In suburban settings, 60'. (5) Bus stop length can vary depending on level of service, if it is used as a layover, location, age of stop etc. The City has a standard bus pad length of 90 feet (concrete pad in road surface to minimize wear). Our stops usually take up the entire pad length at bus stops with pads. (6) 110 feet, generally (except for midblock stops, requiring 145 feet). (7) Depends on frequency of service and street location. Generally 80 feet for farside stops and 120 feet for nearside stops. (8) We don't have a specified standard yet. Our driver training manual specifies that 85 feet are needed to pull parallel to the curb, so we've been using that length when doing plan reviews. (9) 80' nearside, 60' farside, 100' midblock. (10) Depends. We have standards for Regular (up to 25 feet in length for the landing area) and Rapid (60+ feet for a station). (11) 80' for farside, 100' for nearside. (12) 90 feet for standard buses 120 feet for articulated buses. (13) Existing stops often do not have a typical length. Many require the bus to "angle in" to access the stop. For new stops, and relocated stops when possible, we seek to have a minimum of 80' for stops served by 40' buses. (14) Minimum 85 feet for stops served by standard 40' buses, 100 feet is preferred. Add 20 feet for stops served by 60' articulated buses. (15) No standard. We request length based on anticipated coach stop length or frequency

32. Has the required length of stops increased in recent years?

Yes, longer and/or articulated buses have been placed into service	36.6%	15
Yes, for other reasons (specify below)	12.2%	5
No	51.2%	21

Comments include: (1) We don't have any standards. Most of our legacy stops are just a pole in the dirt. If I have money to build something new and nice, I just make it fit in the space available but try to at least have concrete to step out onto from either door. (2) See above answer. (3) Many stops serve multiple operators—at times there are two buses stopping. Also provides a safer way for operators to merge back into traffic. (4) There has been more attention paid to a combination of traffic safety and the need for a bus to be able to safely leave and reenter the traffic stream. Longer bus stop zones allow this weave to happen more safely and efficiently for the bus. (5) Longer coaches, but also changes in the service structure requiring need to accommodate additional coaches in the bus stop simultaneously. (6) Our newly-developed Bus Stop Design Guide defines longer bus stop zones than requested in the past. However, the municipality ultimately decides how long they will allow the bus stop zones to be, and in places where on-street parking is at a premium, the transit agency will usually not be granted the amount of space that we desire. (7) More articulated (60-ft) and 45-ft coaches in our fleet.

33. Does the desired length of stops differ for nearside and farside stops?

Yes	45.2%	19
No	54.8%	23

34. Does your agency have standards for length of stops based on the number of buses per hour at the stop?

Yes (please describe below)	21.4%	9
No	78.6%	33

Comments include: (1) Stops servicing more than one route will be larger in order to accommodate the number of buses that may arrive within a scheduled period. These analyses are made taking into consideration delayed boarding or alighting due to disabled, and frequency of disabled riders. (2) This depends on the available space or footprint. We do extend platforms to allow for two, three connecting buses if the foot print allows. We have bus bays ranging from 60-100 ft. (3) We do not have formal adopted standards. (4) Depends on frequency of service, location, and length of buses used by

stop. Generally 80 feet for farside stops and 120 feet for nearside stops. Zones may be longer based on frequency. (5) Based on the number of routes serving the stop and the likelihood that more than one bus will arrive at the same time. (6) Add 50' for each additional standard bus expected to use a stop at the same time (70' for artic). (7) There are general guidelines that are used, in addition to strict standards. (8) If the stop has multiple buses schedule for the stop at once or a close running time then the bus stop needs to accommodate the highest amount of potential buses at that stop. (9) At stops with multiple routes, bus volumes contribute to nearside/farside orientation decision and bus zone length. This isn't reflected in standards. (10) It is not a formula, but stops where more than approximately 20 buses per hour stop need to be longer. (11) No standards but a few stops in the central city have multiple berths so a very long bus stop could accommodate (say) 4 berths serving multiple routes.

35. Does your agency have standards for length of stops based on the types of buses serving the stop?

Yes (please describe below)	38.1%	16
No	61.9%	26

Comments include: (1) We have some articulated buses with three doors. Those stops are longer. (2) Stops must be able to accommodate the 40' and 60' vehicles in our fleet. (3) We have some local neighborhood routes that only a 30' bus can operate on (limited street width and corner turning radius). So those routes typically have a smaller stop-length footprint. (4) We have 40' and 60' buses in our fleet. We strive to make sure that all newly established bus stops or relocated bus stops can accommodate a 60' bus. We try not to take up more space than what is needed, especially in residential or other areas with street parking. (5) Stops along routes that typically require 60-foot buses are longer. Stops that could have multiple buses at that stop simultaneously are longer. (6) We will have longer stops at locations served by multiple routes. Shorter stops for routes served exclusively by 40' coaches. (7) We currently operate 30-, 35-, and 40-foot buses. The 85-foot length in our training manual accommodates the longest buses. (8) Stops for routes utilizing articulated buses must be longer. (9) Depends. We have standards for Regular (up to 25 feet in length for the landing area) and Rapid (60+ feet for a station). (10) Add 20' at the stop for each bus if articulated. (11) 90 feet for standard buses, 120 feet for articulated buses. (12) A route with 60' buses will need longer stop zones. (13) We have articulated bus length standards that are longer than those for regular coaches. (14) At this point the transit agency does not have articulated buses and we do not differentiate the bus stop length for the different sized buses we currently have. (15) Minimum 85 feet for stops served by standard 40' buses, 100 feet is preferred. Add 20 feet for stops served by 60' articulated buses. (16) Bus stop lengths were not specifically changed when we introduced articulated buses. However, stop lengths for the BRT, both along the guideway and downtown, are designed to accommodate 60' buses. (17) Standards are based on 40' bus. We don't have any artics in fleet. (18) Standard 80; artic 130. (19) No standard but we generally assume a new bus stop SHOULD be able to accommodate an articulated coach.

36. What does your agency do when it cannot obtain sufficient length at a given bus stop?

Responses summarized in Table 21, Chapter 3 of report. Verbatim responses are provided here.

If the demand by the public is great, the bus will stop in the roadway board and alight from that location.

Great question, in these cases we may need to block an exit driveway or encroach on a driveway.

If sufficient length cannot be obtained the transit agency would relocate the stop. In some cases, the transit agency will reduce the minimum 80 foot—100 foot standard if this reduction is operationally feasible and safe.

Relocate the stop.

Given no other alternatives, we do a minimum 5-foot-by-8-foot landing, enough for a wheelchair to maneuver, otherwise we do without.

Move the stop to a location that is both accessible and safe.

Depends on the location. If it's an existing stop that has been in place for years we leave it where it is for the time being but also add it to our list as a future improvement. This means finding another location that can accommodate the size of bus we're using on the route. We typically don't want a bus that's serving a stop to have its tail blocking an intersection or pedestrian cross walk (if it's painted on the street). Or if there's only limited space along a small neighborhood street we try and make the stop at or near an intersection. But we also work with the local jurisdiction and the property owner(s) to try and figure something out. And depending on where it is and traffic conditions, the stop will stay the way it is.

Try to work with local jurisdictions to acquire on-street parking spaces.

N/A

Install the stop anyway & block traffic, when necessary, if it's in a slower traffic, i.e., safer, setting.

Relocate the bus stop.

We will not install a bus stop if there is not enough space to deploy the ADA ramp

We look for alternative locations. If there aren't any good alternatives and the stop isn't a layover spot we will establish the stop without any red curb/no parking zone.

When parking encroaches on bus stops, and because our bus lifts are at the front of the bus, if necessary, the driver can get his front door to the curb and hang the back of the bus out onto the travel lanes

Generally, we will look for the nearest location that can satisfy the length requirements. In rare instances, we will try to make the shorter stop work, if local government requests it and cooperates with us.

If stop is critical, may implement sub-standard stop permitting safety conditions

In some cases make do.

Evaluate on case-by-case basis. May select new location for stop.

We either try to adjust the location or perhaps compromise on the 'ideal' length and settle on a location that has an acceptable length.

Typically, we will relocate the stop (often a nearside to farside relocation). In a few cases, we've successfully worked with a municipality to eliminate obstacles such as on-street parking.

We look at the entire circumstance. What standards do we violate? Stopping in front of a residential driveway might not be a problem. Blocking a commercial drive needs more analysis. What would be the distance between stops if no stop is allowed? What are the safety concerns if we stop in the travel lane?

Ensure we have the minimum allowable of at least 25 feet (for both front and back door). If not, then at minimum 5x8 landing pad.

We search for a reasonable alternative location.

Find another spot or make an agreement with the drivers union.

Install bus stop bulbs of either 15' or 30'

Evaluate other options. We likely can shrink stops if necessary. We can also review the type of bus needed for service.

Our standards are an ideal, but in many locations, especially in the urban area, they are not possible. Each is evaluated on a case-by-case basis to determine if a shorter stop is serviceable in that location or if it needs to be located elsewhere.

We will look at alternative locations and/or work with the local jurisdictions for solutions.

Ask the ROW owner for additional length first. If it cannot be provided we make a determination of if it is physically possible and safe for the bus to enter and leave the stop location given the characteristics of the site. If it simply will not work, we won't install the stop at that location and look elsewhere.

In dense areas, additional coaches must wait to enter the bus stop

Relocate the bus stop.

We try to work something out with the municipality if the insufficient length is due to a parking spot or something within the control of the agency. If we have no options to increase the bus stop length to our standard we will not install a bus stop.

Look elsewhere in the area. Might also consider rerouting the bus.

In some existing stop locations, the length of the bus stop "no-parking" zone is a little too tight. Operators are just forced to drive very slowly and carefully, and sometimes they are unable to fully pull out of the travel lane and into the bus stop. For new bus stop locations, the siting decision may be changed based on how much space is available.

One option is to eliminate the stop if another location will not work (e.g., nearside or farside). We do have stops that are shorter than standard. In these cases, bus operators must pull up to the stop as safely as possible.

Put up the bus stop anyway, and make do

Live with it, or move the stop.

We have many stops that do not have bus zones, or no parking areas. At low-ridership locations, improvements are considered upon request. At moderate- to high-ridership stops, or stops with lift ridership we consider the following options: parking removal, stop relocation or removal, bus bulb outs, other construction options.

We make do, though in some cases, we may have to move or eliminate a bus stop.

Create another bus stop and assign routes to a specific stop.

37. Does your agency have multiple berths at a single stop location based on volume of buses or number of routes serving a stop?

Yes (please describe below)	66.7%	28
No	33.3%	14

Comments include: (1) Some stops must accommodate more than one vehicle at a time. The transit agency is developing a conceptual standard for a "Super Stop." (2) Only at limited transit centers and transfer points. (3) We've got three stops with multiple berths, one with three another with two. (4) At hold-over points multiple vehicles may pull out simultaneously or depending on departure time, independently. (5) Only three locations where we have nodes for rider transfers. (6) Volume of buses serving the stop. Timed transfer locations typically need to have sufficient space for a number of buses that serve it. Currently, the only locations that have bus bays are large off-street stations where there is room to accommodate it. On-street stations utilize a longer stop zone to accommodate more than one bus (first in goes to the front). (7) Yes at transit hubs, of which we have four. Otherwise, no. (8) Yes, only at transit centers. (9) We have a number of facilities/on-street stops that have several bus bays or long bus lanes for a number of routes. These are usually located within transit centers, rail stations, and park and rides. (10) We have an extra-long no parking zone at some route terminals or stops that are shared between routes especially if the stop is used as a terminal for one of the routes. (11) Transit Centers and regional rail stations we have multiple berths. (12) Yes, but very rarely. We do have an instance where we have two stops back-to-back with route restrictions so that one route can get over to make an upcoming left turn. (13) Provided space is available, we mark berths at terminal stops and at off-street locations. We have separated stops along busy corridors to minimize the number of buses arriving at stops during peak times. Also, along our most congested downtown pickup corridor, we designate "first bus" and "second bus" areas so that 2 buses load at the same time. Operators are instructed not to stop twice at the same stop. (14) In Downtown, we have just instituted multiple berths within the same block based on types of services (Local vs. Express vs. Rapid). At our newest transit centers and Park & Rides we use dedicated bays. (15) Within the Central Business District and at a few locations outside the CBD where there is a high concentration of service. (16) Streetside bus stops are almost all first-in, first out. Standard stop length is increased if multiple buses are anticipated to be at a stop simultaneously. (17) We have stops that can hold multiple buses due to high volume of service in area. (18) Not usually, because where there are many buses converging, these are usually at rail stations or we have built a transit center to handle the volume of buses. (19) Occasionally, typically at larger transit centers only. (20) In places such as the downtown area, bus stop lengths are significantly increased due to the expected volume of buses. We have no rigid criteria for determining this extra length. For bus pullouts, however, we have standards for how long the pullout should be in order to accommodate the number of buses expected to arrive and/or layover there at any one time. (21) This is typically implemented at the end of a route at a layover location. Buses in live service must bypass the staged buses to access the bus stop. This usually requires provision of a bypass lane. (22) See comment above re BRT. (23) Buses going to the same general destination may share a berth, but generally we have different berths for different services. (24) Yes in some pick-up stops in the central city (stops are assigned stops by routes) and transit centers we serve.

STOP TYPES

38. Does your agency use bus bays/cut-outs to stop (i.e., curbside stops out of the right-hand traffic lane)?

Yes	75.0%	33
No	25.0%	11

39. Please rate bus bay stops on the following criteria.

	Very Poor	Poor	Fair	Good	Very Good
Passenger safety	0.0%	3.0%	15.2%	33.3%	48.5%
Passenger accessibility	0.0%	3.0%	15.2%	36.4%	45.5%
Operator safety	0.0%	3.0%	24.2%	39.4%	33.3%
Ability to re-enter traffic flow	12.1%	24.2%	45.5%	15.2%	3.0%

40. Does your agency use bus bulb stops (i.e., curb extensions into a parking or traffic lane)?

Yes	52.3%	23
No	47.7%	21

41. Please rate bus bulb stops on the following criteria.

	Very Poor	Poor	Fair	Good	Very Good
Passenger safety	0.0%	0.0%	4.6%	50.0%	45.5%
Passenger accessibility	0.0%	0.0%	0.0%	36.4%	63.6%
Operator safety	0.0%	4.6%	18.2%	31.8%	45.5%
Ability to re-enter traffic flow	0.0%	0.0%	4.6%	9.1%	86.4%

42. Does your agency locate any stops in the median of a street (i.e., on a traffic island)?

Yes	34.1%	15
No	65.9%	29

43. Please rate median stops on the following criteria.

	Very Poor	Poor	Fair	Good	Very Good
Passenger safety	6.7%	13.3%	60.0%	20.0%	0.0%
Passenger accessibility	6.7%	13.3%	53.3%	20.0%	6.7%
Operator safety	6.7%	0.0%	33.3%	33.3%	26.7%
Ability to re-enter traffic flow	6.7%	0.0%	26.7%	40.0%	26.7%

44. Describe ADA considerations at median stops—do they differ from other types of stops?

Responses summarized in Table 28, Chapter 3 of report. Verbatim responses are provided here.

Space enough in the island for chair users to access, safely wait and safely board vehicles.

In some cases, these locations are more difficult from an ADA consideration due to limited access for pedestrians to reach these locations.

Same regulations apply

Wide enough to be universally accessible

Highly recommend marked and signalized crosswalks.

No. We try to make sure that they have an accessible boarding/alighting area at the front of the bus. We also try to avoid these whenever possible, but have a few at intersections with large islands due to channelized turns. Please disregard if we misunderstood the question.

We only utilize median stops on our BRT service

Yes, an extra emphasis is placed on how a customer safely exits the pad and provisions are made for safe crossings.

Does not differ—requires curb ramp from the sidewalk to the median stop location—median stop platforms are 10’ x 75’

Greater challenge in maintaining accessible route of travel to the bus stop; greater need for positive barriers to increase pedestrian safety.

These stops are mainly legacy stops; however, any new median stops must meet ADA standards.

We currently avoid median stops, as most (in our service area) are not designed specifically for transit, and therefore do not have optimum dimensions or locations for bus interface.

Many median stops do not meet ADA standards for accessibility or width. We have such stops on various streets. We also have stops under elevated train tracks. These are median stops of a different type, but they are 100% non-ADA compliant with no curb whatsoever. At a few locations we have extended the sidewalk out to the pillars to create a huge bus bulb, which is ADA compliant.

These bus stops: (1) must be 8-ft deep in order to meet ADA requirements to deploy a wheelchair lift, (2) are generally accessible via a crosswalk--some crosswalks are midblock (bad), some coincide with crosswalk at an intersection (better)

45. Please describe any specific benefits and challenges associated with median stops.

Making sure there is sufficient space for people to wait and keep them out of traffic.

We do have stops that are located at medians. However, it is now written in our guidelines that median stop locations should be avoided.

On some major state highways, these are the only locations that may be available for bus stops, despite the obstacles associated with them. In the absence of these stops (especially for "legacy" locations where the stops were established decades ago), it would be extremely difficult to serve these key commuter corridors at all.

Our islands are narrow and pose some challenge due to capacity constraints. Islands allow for quick boardings but can encourage delinquent behavior when customers are accessing.

All our median stops are associated with BRT routes and dedicated transit lanes.

Requires a crossing to get to the stop location, and passengers are more exposed to traffic. It also may require passengers to exit through the front door only.

Space is limited. It is a less than ideal waiting area for customers. Safety is a major concern.

Provides a dedicated area for passengers to wait, but requires passengers to cross traffic to get to the stop

May accommodate more coaches or may provide more space for passenger amenities and queuing.

These are best used in combination with dedicated lanes or in a bus terminal. The number of lanes that pedestrians must cross to access the stop should be minimized. These may work well with curbside bike lanes.

See above.

See above.

Sometimes it's a transit oasis, can be a good environment for transferring pax—depending on how it is configured.

46. Does your agency have stops on the left side of the bus, either in a median or on a one-way street?

Yes	2.4%	1
No	97.6%	41

47. Please describe the conditions that led you to implement a bus stop on the left side of the bus.

Detour only/construction

Downtown BRT stations

Left side of the STREET. These situations are a result of: (1) coincide w/ a streetcar stop, (2) traffic on right side is too heavy (bus can't pull in or out), (3) not enough curb space on right side, or (4) nearside stop on left side to allow bus to make left turn at intersection.

48. Please rate stops on the left side of the bus according to the following criteria.

	Very Poor	Poor	Fair	Good	Very Good
Passenger safety	0.0%	0.0%	100.0%	0.0%	0.0%
Passenger accessibility	0.0%	100.0%	0.0%	0.0%	0.0%
Operator safety	0.0%	100.0%	0.0%	0.0%	0.0%
Ability to re-enter traffic flow	0.0%	100.0%	0.0%	0.0%	0.0%

PEDESTRIAN/CUSTOMER ACCESS TO BUS STOPS

49. What are the key constraining factors for pedestrian access in urban locations?

Responses summarized in Table 29, Chapter 3 of report. Verbatim responses are provided here.

Missing concrete wheelchair pad in right of way

Extremely narrow sidewalks.

Lack of curb ramps, street lighting and sidewalks.

Distance between traffic signals.

The availability of signalized pedestrian crosswalks or other enhanced pedestrian crossings.

Overzealous streetscaping, furniture, trees, shrubs, etc.

On street parking, lane width, curb cuts...

Sidewalk width. ADA ramps to and from a sidewalk. Clear space/width around sidewalk obstructions: street lights, trees or tree wells. Jurisdiction permitting codes for passenger amenities on sidewalks. Conflicts with businesses (especially around entrance doors) where a stop is located. Limitations by jurisdiction to build a stop pad with 6" curb height.

Presence of ADA-accessible paths to the bus stops

Accessibility

Sidewalks and crosswalks

*Lack of adequate sidewalks. *Snow &, by extension, people/municipalities who don't shovel their sidewalks.

ADA compliance

Our level of pedestrian access is probably at its highest in urban locations. Access is more challenging in urban or rural areas.

Safe places to cross the street; enough sidewalk width to accommodate waiting passengers; enough clear sidewalk space for wheelchair boardings/alightings; PLUS many urban streets in the County are too wide, making crossing the street needlessly difficult/dangerous.

Resistance to removal of parking and loading/unloading zones in business districts

Generally, in urban locations, pedestrian access is good, with the exception of narrow sidewalks and presence of street furniture, vendors, etc.

Sidewalk width, trees, adjacent land uses, safe crossing

None

Lack of sidewalks in some areas. Lack of marked crosswalks. Inability to place stops in close proximity to intersection.

Street furniture

We have a significant lack of sidewalks in our urbanized area, mostly from mid-century suburban-style developments in town that did not regard pedestrians highly. Sidewalk conditions are also a problem; many sidewalks are damaged and have not been repaired in recent years. We also have a highly disconnected street network, even in many parts of the central city—much of the city does not follow much of a grid, so our passengers may have a significant walk to reach our service. Lastly, we've seen a fair amount of access issues due to street furniture and landscaping in streetscape projects that did not consider the presence of our stops.

Lack of paving to curb (tree lawns).

Sidewalks and signalized crossing (we are working with the city to continue building more signalized midblock crossings). We are also mindful of existing crossing signals to assist with ped crossing

Other on-sidewalk objects including sign/utility poles, newspaper boxes, signal equipment cabinets, and, in some cases narrow sidewalks. Of a more recent vintage, there have been bus stop access issues because of valet parking stands.

1) Sidewalk width, especially in older areas 2) Obstructions (light posts, news racks, sign posts, telephone poles, trash cans, fire hydrants, etc.).

Lack of space between street and building in high-density areas.

Location of crosswalks. Also, maintained sidewalks is an issue for customer access to bus stops.

Accessible paths. Many locations lack cohesive sidewalk networks, ADA ramps

Sidewalk width, parking, other street furniture, trees, traffic, lighting, stop distance

Existence of a sidewalk is primary—wish we had one in every bus corridor but we don't due to various factors, especially community opposition or environmental impact.

Insufficient sidewalk width, due to volume of users and presence of other conflicting infrastructure in public right of way; meeting ADA requirements (i.e., space for properly designed ramps that don't conflict with signal poles or other obstructions).

None

Parking and snow

Width of streets, traffic volumes and speed limits

Street furniture and signage in the right-of-way as well as non-ADA-compliant sidewalks and curb ramps. Most urban areas have sidewalks, but many of them are in poor condition.

Sidewalk condition; street crossing in some locations

Private property issues

In urban locations the biggest conflict to pedestrian access is the competition for space. Crossings are both better and more frequent, but busses compete for curb space with on-street parking, passengers compete with street furniture, bio features, cafe seating, A boards, newspaper boxes etc.

In highly urban locations we have no real pedestrian issues. The city has sidewalks almost everywhere, curb cuts almost everywhere and traffic signals at all major intersections

Sidewalk width, sidewalk condition, placement of street furniture, trees and other landscaping along curb, space allocated to on-street parking, adjoining space allocated to bike stations

50. Are there other key constraining factors for pedestrian access in suburban locations?

Responses summarized in Table 30, Chapter 3 of report. Verbatim responses are provided here.

Missing sidewalks. Poor development patterns.

Extremely narrow sidewalks or lack of sidewalks

Complaints from homeowners. Some just don't want a bus stop in front of their home.

Traffic volumes

Curb cuts, sidewalks, sprawl...

Poor street network design that creates significant out-of-direction travel to reach the bus stop. Also frequent incomplete sidewalk network.

The winding sidewalk in the wide right-of-way. Looks pretty, but it never seems to come close enough to the curb.

Lack of sidewalks. Lack of safe pedestrian pathways along or near roads that a transit route uses. Lack of ADA-accessible sidewalks. Limited area/locations where a bus stop can be placed. Limitations by jurisdiction to build a stop pad with 6" curb height.

We don't serve suburban areas

No

Sidewalks and crosswalks

Topography (hills), ADA access, not a large population living within 1/4 mile of a stop.

Lack of sidewalks

Lack of sidewalks; landscaped planter strips between the sidewalk and curb; PLUS the suburban street grid limits routing options, meaning many pedestrians have to walk farther to access stops.

Ability to place bus stops in residential areas in front of homes

Sometimes, sidewalks are not consistent, creating pedestrian access obstacles. Roadways often have higher speed operations, making street crossing more difficult.

Only urban operations

None

Lack of crosswalks

Lack of sidewalks to/from bus stop locations.

Suburban roadway design has been unfriendly for pedestrians and transit riders. Arterial roads are wide and fast, and crossing opportunities are limited. Signalized intersections may be far apart, and crosswalks are often not installed. We see issues with existing pedestrian crossing signalization—both timing and maintenance are issues in some areas. Our suburban areas have a highly disconnected street network as well, so passengers may have a significant walk to reach our service on the major roads.

Lack of traffic signals along high-volume streets and lack of crosswalks.

Lack of continuous sidewalks. We often build to the bus stop but cannot create a continuous system (too expensive and challenging)

Primarily, the absence of sidewalks both in residential communities and, in particular, in office parks. Walled communities limit access to bus stops.

Lack of sidewalks, lack of signalized and/or safe pedestrian crossings.

Lack of sidewalks

Lack of sidewalk and traffic considerations. Also, as stops are often not on sidewalks, they can be inaccessible during winter and force customers into traffic to wait.

Speed of traffic, lighting, stop distance

The walk required from the bus stop to the nearest safe crosswalk location can sometimes be lengthy. Wide roadways that are hard to cross in a single cycle length.

Driveway access points; width and condition of existing sidewalks (depending on when the suburban area was developed); roadway speeds; infrequency of intersecting roadways and clearly-defined pedestrian crossings of major arterials.

None

Lack of sidewalks and crosswalks and ped lights.

Cannot think of any

Lack of sidewalks is the biggest issue in suburban locations, but also the building setbacks from the street can impose walking distance hardships

Provision of sidewalks and sidewalk width

Lack of sidewalks at times

Lack of sidewalks and marked crossings

Street crossings are a greater concern in suburban areas, as are accessibility issues. Sidewalk infrastructure is less consistent, and there is often landscaping separating sidewalk and street.

Yes, in low-density areas we must consider safe crossings and pedestrian access paths to/from the bus stop. We also must consider lighting

Lack of: marked crosswalks, signalized crosswalks, adequate lighting, posted speed limits, adequate sidewalk width

51. Are there other key constraining factors for pedestrian access in rural locations?

Responses summarized in Table 31, Chapter 3 of report. Verbatim responses are provided here.

High-speed roads. No sidewalks.

No sidewalks, no improvements allowed to existing stops that have not had improvements made prior to ADA.

Site distance for motorists, difficulty for bus drivers to see waiting riders

Lack of sidewalks and persistence of open drainage roadway sections

Lack of sidewalks, higher speed limits, and a lack of lighting.

Bar-ditches and soft shoulders.

Sprawl! Accessibility.

Lack of safe pedestrian pathways along or near roads that a transit route uses. Open storm water catchment along roads that limit where a stop can be placed. Lack of ADA accessible sidewalks with curb height. Limited area/locations where a bus stop can be placed. Limitations by jurisdiction to build a stop pad with 6” curb height.

N/A

Distance between stops

Sidewalks

No sidewalks, ADA compliance, no shelter from heat/rain, no crosswalks.

Lack of sidewalks, lighting, and safe street crossing.

Lack of sidewalks, lack of safe waiting areas unsignalized pedestrian crossings on high-speed rural roads, lack of street lights

Lack of sidewalks

The main rural constraints are the absence of sidewalks, crosswalks, and traffic signals, making access/egress from bus stops far more difficult for pedestrians.

Only urban operations

Lack of sidewalks

No sidewalks

Lack of sidewalks to/from bus stop locations.

We have very little service in any area that could be considered rural—our example is a state road with no pedestrian facilities and few crossings (except in small downtown areas along the route).

No rural service

Typically, streets do not have curb/gutter. We can build and accessible bus stop, but connectivity to activity generators can be a challenge.

We do not serve rural locations

Lack of sidewalks, lack of signalized and/or safe pedestrian crossings.

N/A

N/A

Rural areas typically lack sidewalks, curb ramps and safe crossings and in some cases along highways, lack room for the bus to pull out of the lane of travel.

N/A

Having no sidewalks makes it hard to get to the stop and wait for the bus.

Incomplete or non-existent sidewalk network; impediments to travel paths; roadway speeds; infrequency of intersecting roadways and clearly-defined pedestrian crossings of major arterials.

No

Lack of sidewalks and crosswalks and ped lights.

Same as 41 plus topography

Lack of sidewalks, high-speed roadways

The transit agency does not serve rural areas

Lack of sidewalks

No

No pedestrian infrastructure, drainage ditches, no street lighting, infrequent cross streets and access points, high traffic speeds etc.

N/A

Lack of sidewalk, lack of adequate sidewalk width, lack of marked and signed crosswalks, lack of traffic signals adjoining bus stops, general lack of capital facilities that support bus stops including roadway surface, poor maintenance of roadway and sidewalks at bus stops, high posted speed limits, general lack of shelters

52. Does your agency incorporate bollards or other pedestrian barriers at any stops?

Yes	34.9%	15
No	65.1%	28

53. How do these barriers affect access to the bus stop itself?

Access is much more difficult	0.0%	0
Access is more difficult	18.8%	3
Effects on access are minimized because the barriers are far enough away from the stops	18.8%	3
Barriers are only used on bus stops located in the median to protect customers from adjoining traffic	18.8%	3
Other (Please specify)	43.8%	7

Other responses include: (1) Used at transit centers to keep pedestrians from walking in drive lanes. Must use walkways. (2) This is only at stops designed by others mostly at community colleges. (3) Bollards are only used to protect a shelter from a parking lot. (4) Only in specific locations but they do not affect passengers or boarding/deboarding. They are for safety. (5) Uses at stops in the median and at stops where there were prior accidents. (6) Barriers are only used at a few shelter locations and do not interfere with pedestrian access. (7) ADA access is always considered when barriers are incorporated. One or more direct accessible pathways are incorporated into the design.

PASSENGER INFORMATION

54. Please summarize provision of various elements of passenger information at bus stops.

	Every stop (or almost)	Many Stops	Major Stops	No Stops
Bus stop sign	90.9%	6.8%	2.3%	0.0%
Route number	77.3%	11.4%	6.8%	4.6%
Phone number for info	75.0%	13.6%	6.8%	4.6%
511 or other traveler aid info	20.5%	12.8%	7.7%	59.0%
Stop number	47.7%	15.9%	13.6%	22.7%
Schedule	11.4%	20.5%	61.4%	6.8%
Route map	6.8%	18.2%	61.4%	13.6%
System map	0.0%	9.3%	55.8%	34.9%
Real-time information	9.1%	2.3%	40.9%	47.7%
QR codes	7.0%	4.7%	11.6%	76.7%
Wayfinding information	2.4%	4.8%	35.7%	57.1%
Information in languages other than English	7.0%	7.0%	25.6%	60.5%

55. What is the most common request from passengers regarding information at stops?

Route number	7.0%	3
Phone number for info	0.0%	0
Stop number	2.3%	1
Schedule	37.2%	16
Route map	0.0%	0
System map	2.3%	1
Real-time information (next-bus arrival)	39.5%	17
Wayfinding information	0.0%	0
Information in languages other than English	0.0%	0
Other	11.6%	5

Other responses include: (1) Most of the requests that we receive are to replace missing bus stop signs due to weather events, recent car accidents, theft. We are currently working on a new bus stop sign design to include more information such as stop name, route destinations, stop ID for real time, phone numbers, route maps. (2) We receive requests for stop lists by route. Something that we don't provide. (3) Tie between route number and schedule. (4) Combination of schedule, route map, and real-time information. I just completed a large regionwide survey of what improvements customers want at bus stops. (5) Schedule, "direction" info (i.e., where does this bus go?) and fare. Non-English info requested at bus stops in communities w/ recent immigrants—not throughout service area.

56. Has your agency implemented real-time next-bus information at bus stops?

Yes	59.1%	26
No	40.9%	18

57. Please describe the benefits and disadvantages of real-time information as seen by the operations department and by customers.

Responses summarized in Table 35, Chapter 3 of report. Verbatim responses are provided here.

Only have at transit centers. Can be confusing to customers if issues with GPS accuracy. Helps passengers know when to be at stop.

Technology is expensive and requires trouble shooting. If the information is not accurate, now you've created a different problem by putting out inaccurate information. When the technology works the customer will benefit from this type of signage.

The benefit of real-time information is that passengers know when the bus will arrive. The disadvantage of real-time information is that it requires IT and sufficient staff to update and maintain.

We've only got it on one route. It's been difficult to maintain the LED signs at the stops and we've had some issues with the equipment on buses. We'll do it all over the system eventually because people like it but it's not without its own issues.

Benefits—Ability to predict exactly when you will be picked up at the stop you are at. Disadvantages—Unclear format for using the text for next-bus feature. (StopNumber_RouteNumber, i.e., 1234_01)

Can't help you much here. We're implementing it in stages & hope to have it up in all four of our counties in the next year or so. The one major advantage we've seen to date is we've used the project to replace our aging radio communication system with a VOIP system. "Next bus" info, numerically indexed bus stops, AVL, APCs & a host of other benefits are coming.

Passengers know when the next bus is arriving. Passenger cannot see where the bus is located.

The accuracy is good at most stops except the first stop of a route. PLUS any additional information for our customers is a big benefit to the Operations group. Customer Service has indicated there was a 50 percent drop in customers' calls once Stop IDs and the 511 number were placed on stops.

Customer may know when the next bus arrives. However this is on a limited-stop route. The overlay bus does not have this real-time information, so the information does not tell the customer when the next bus is coming, only the next limited-stop bus.

Benefits are obvious...customers know when the bus will actually show up! Operators get fewer complaints because more customers know what is going on. Only real disadvantage is when the system doesn't work, reverting back to scheduled times, which can confuse customers and cause problems where customers think that a bus is coming when it is not.

Great for customers when it works. Operational issues can lead to poor prediction quality which is frustrating to customers.

Customers can make choices, particularly where they could take more than one route.

We just began with our BRT system (first phase). The challenge is that this system is operated on a frequency base schedule and we have new technology. So we are still tweaking/streamlining. We are only 2 months into actual activation but our plans are to move forward with the entire system.

Our real-time information is currently based upon the use of mobile phone technology to text the stop number and receive the next-bus information. Individual bus operators are likely to see the information as positive, giving the customer a realistic expectation of the bus's arrival. Operations management sees some negative from the possibility of increased complaints when customers perceive that buses are late. Customers view the information positively -- so long as it is reliable and reliably accurate. If the information is not correct/accurate, customers are frustrated.

Impact to customers is undetermined. Besides the obvious benefit, the drawbacks are if the prediction is inaccurate and the bus passes earlier than displayed, or takes significantly longer than displayed. Only half of our fleet is equipped to provide real-time arrival status, so the other half shows scheduled. This inconsistency is a drawback for riders. On the agency side, it is a major I.T. staff and financial commitment to keep the hardware and back-end service all working, at multiple locations spread throughout a large service area.

Real-time signage not only helps our customers shorten their wait time for buses, but it also shortens their perceived wait time, which enhances their overall experience. The main drawback is the fact the information is useless in times of bad weather/traffic. We put up messages but customers still are often upset by the fact that the real-time sign may have said 10 minutes but the bus didn't arrive for 30 minutes.

When it is running well and providing accurate information, the signs are only positive. But that's not the sign, it is the back-end systems that provide the arrival prediction along with the on-board bus equipment. It is a major challenge to get it all working properly so that the arrival predictions customers see are accurate. Someone has to be watching the system for the entire operating day and making sure it's working. When it is not working correctly, it is a huge billboard displaying how your system doesn't work right, and generates a ton of customer complaints.

Decreases perception of wait time; increase confidence in speed and reliability of service.

This item is new to the system and there is not much info available

We have real-time information along one route and the benefits have been embraced by both the customers and the operations department. This keeps the drivers from getting many questions about when the next bus will be arriving and gives the customer confidence on when the next bus will be arriving. As anything on the street there is a maintenance aspect but there have not been any disadvantages that I am aware of.

We actually cannot fully answer this question yet. We are in the process of testing and implementing real-time information access at bus stops, but it is not live yet. Once implemented, people with smartphones will be able to locate real-time information at their bus stop using our main website and either activating GPS on their phone or entering in the stop's unique ID number. At some point customers will also be able to get real-time information via SMS text messaging using the stop ID number. Roll-out of real-time information access is expected for mid-April of this year.

Bus Tracker information is posted on each bus stop sign. Customers can access arrival information by sending a text message with the stop ID. In addition, many shelters have digital screens with bus arrival information. The benefit is that customers have better information on the arrival times, especially when frequencies are lower. A disadvantage is that the system needs to be maintained and can sometimes provide inaccurate information.

The system reports erroneous information too often. Not reliable. University students like it a lot because they can make a decision whether to walk to their next class or catch the shuttle based on the real-time system. But this is offered on phones, and not at the stop.

We developed our own real-time information displays at bus stops over a decade ago. The cost associated with maintaining wireless routers was prohibitive and reliability was suspect. We chose to focus real-time displays at rail platforms where hard-wired option was available. For many years now real-time information has been available for all bus stops via our transit tracker, accessible by computer or mobile device. Bus stop ID numbers are available at many bus stops and soon will be at all stops. The main benefit is it gives customers a realistic expectation of when the bus will arrive. Its biggest

disadvantage is that it assumes perfect conditions, and is therefore suspect when conditions (like recent snow storms) impact operations.

We are just beginning to put real-time displays at stops (3 to date). But by spring, every stop will have a QR code and real-time information will be available by phone/text, etc. Obviously customers crave real-time information; there are no disadvantages. Operations has some concerns about showing bad service, i.e., next bus is 30 stops away. In reality though, information that the next bus is very far away is critical for the customer.

58. Is your agency planning to implement real-time next-bus information at bus stops?

Yes	66.7%	12
No	33.3%	6

59. Why is your agency not planning to implement real-time information at bus stops? (Check all that apply.)

Cost	83.3%	5
Lack of demand	16.7%	1
Lack of infrastructure (e.g., no AVL system)	16.7%	1
Other (please specify)	50.0%	3

Other responses include: (1) Mobile device applications that show this information. We did have it at a couple of major transit centers but the system died and is currently too expensive to replace. We do anticipate adding it back when funding is available and the cost becomes reasonable. (2) Using web-based and text-based systems to provide real-time information to passengers with mobile phones or smart phones. (3) We are not aware of any plans to do so at this time at bus stops, though we have real-time information at our rail stations. We have had discussions about it. It aligns with the agency's strategic initiatives, so it may be coming at some point soon.

PASSENGER AMENITIES

60. Please summarize provision of various passenger amenities at bus stops.

	Every stop (or almost)	Many Stops	Major Stops	No Stops
Bench	0.0%	65.9%	29.3%	4.9%
Traditional lighting	11.9%	52.4%	21.4%	14.3%
Solar lighting	0.0%	20.0%	37.5%	42.5%
Trash receptacle	2.4%	58.5%	34.2%	4.9%
Shelter	0.0%	52.4%	47.6%	0.0%
Bicycle rack	0.0%	15.0%	50.0%	35.0%
Newspaper boxes	0.0%	7.7%	41.0%	51.3%
Other	12.5%	25.0%	12.5%	50.0%

Other responses include: (1) I would note you need another column that has "some stops," since I would have been able to use that one. For some I've indicated 'no' when in fact it's a few. (2) The only amenities that the transit agency provides at on-street stops are bus shelters. Other amenities are usually installed by the city/county/state or community effort. (3) We have tried solar lighting before (first-generation I-Stops, by Carmanah Technologies—they have been discontinued). We have also installed Simme Seats, a seating amenity that can meet the need for benches with a smaller footprint. A number of non-transit-agency owned amenities, particularly benches and trash cans. Bike racks are installed as part of streetscape projects, and do not seem to be placed in coordination with bus stops. (4) Additional/expanded waiting areas. (5) Need a category for "some stops" that aren't necessarily "major stops." For instance bike racks and solar lighting may be present at some stops, but these might not be the "major" or "most important" stops. Newspaper boxes are provided by others, and appear at some stops, not just "major." (6) The transit agency does not currently install any "free-standing" benches at bus stops. They are only provided inside passenger shelters. There are advertising benches in some locations, but the transit agency has no control over these. Additionally, the transit agency doesn't install very many bicycle racks, largely because the major city and other entities have provided many of those, and they often happen to be located near bus stops. (7) The transit agency does not provide these amenities; they are typically provided by the city or a neighborhood group. (8) Fare

machinery at BRT stops. (9) Nearly all of the above are installed at "some" stops. Their installation depends on many factors and so they don't have to be a "major" stop to have a trash receptacle or bus shelter.

61. What is the most common amenity requested by passengers at stops?

Bench	23.3%	10
Lighting	0.0%	0
Trash receptacle	7.0%	3
Shelter	65.1%	28
Bicycle rack	0.0%	0
Other (please specify)	4.7%	2

Other responses include: (1) Bench and lighting are probably pretty equal in requests. (2) Shelter with heat and lighting.

62. In your agency's experience, what is the stop amenity most valued by customers?

Responses summarized in Table 38, Chapter 3 of report. Verbatim responses are provided here.

Shelters

A full service Shelter—Shelter, bench, trash receptacle, bicycle rack, lighting.

Shelters go hand in hand with accessible bus stops. So we focus on improving accessibility and then adding a shelter.

Bench and clean bus stop

Shelter

Shelter

Shelter

Shelter (we always include a bench) and trash receptacle.

A bus shelter to provide shade and wind protection.

Shelters and benches.

Bus stop shelters

Bench

Bench

Lighting. Lighting is the one thing in my experience that customers have expressed that makes them feel safer and more comfortable in their surroundings. Benches are nice but lighting is a must.

Shelters

In many cases benches are preferable to shelters, as they provide a rest area without the greenhouse effect of the shelter. Benches also show permanence of a route in the community.

Bus shelters that provide shelter from heat/rain, etc.

Shelters and real-time information

Bus shelters, schedules and accessibility

Shelter. Protection from sun/wind and lighting at night.

Shelter

It seems to be shelters. Shelter installations have garnered political weight in some cases (pressure on the transit agency to place a shelter, or a placement lauded by local elected officials, etc). We have also had several municipalities partner with us on stop improvement projects that are usually primarily focused on shelters, as that's what they feel their riding residents want. I do not know that we get thorough feedback on this topic though. We get lots of requests but far fewer thank-you notes.

Shelter

Bench

Shelters. Our shelters include seating.

A bench for waiting

Bus shelters

Shelter with heat and lighting

Benches are certainly desired by customers. Benches are under contract with private vendors and the local jurisdictions, however customers often complain about the lack of benches or removal of them, or request an install to the transit agency, which has no authority to place or remove them.

Bus shelters with lighting (solar or electric) and bench

Shelters for sure. In my Love Your Bus Stop survey, I didn't even ask about shelters because I did not want people to focus on something I don't have the ability to provide. The jurisdictions have to provide shelters. My survey asked about other amenities.

Shelter

Bus shelters

Shelters with lighting

Passenger shelters and/or benches. As stated above, the transit agency does not currently install free-standing benches. However, this has been requested by customers, and the transit agency is considering benches for the future, as they would be less expensive than passenger shelters while still providing a nice amenity for passengers.

At the right location, I believe a shelter is the most-valued amenity.

Shelter

Real time next-bus info

Bus shelters

Shelters

Shelter since also provides bench, lighting and weather protection. In near future will also include real-time signing.

63. How does your agency decide which amenities are provided at a given stop? (Check all that apply.)

Guidelines based on stop usage	79.1%	34
Feasibility of providing amenities at a given location	83.7%	36
Ad hoc decisions	7.0%	3
"Squeaky wheel" approach	30.2%	13
Request by elected officials	44.2%	19
Balanced provision of amenities across jurisdictions served	23.3%	10
Decided by street furniture contractor	14.0%	6
Decided by municipality	23.3%	10
Other (please specify)	20.9%	9

Other includes: (1) All of the above. (2) Many of the factors. Should allow more than one check. (3) Often shelters are provided as part of new development approval process. (4) Guidelines based on land use attributes and/or individual request (especially ADA needs). (5) We have a list of "top 200" bus stops that do not currently have shelters and have the highest APC ridership statistics, or that we received direct requests about from the public. These are the locations that would be the most ideal based on ridership and demand. However, they have yet to be investigated for installation feasibility. This will be done in coordination with the contractor once a contract is awarded. Other requests are forwarded to the city/county/state. (6) The transit agency partners with municipalities and developers who want shelters through our "non-standard shelter agreement." The transit agency is occasionally approached by someone who wants to install a shelter, typically of their own design. We review the design and provide feedback or approval. If approved, the transit agency and the interested party sign a non-standard shelter agreement allowing the install and delegating the maintenance (including emergency maintenance) to the installer. (7) Budget. (8) The transit agency does not provide these amenities; they are typically provided by the city or a neighborhood group; the transit agency works to ensure the placement of street furniture will not interfere with passenger access. (9) Streetscape projects will include well-planned transit improvements

that include stop consolidation, ADA, safety and amenity upgrades. We often require stop improvements as part of private developments, depending on scope and scale.

BUS PADS

64. Does your agency have criteria for the design and/or location of bus stop pads?

Yes (please describe below)	71.8%	28
No	28.1%	11

Comments include:

Specifications regarding design and amenities for varied locations that a stop may be considered. From sheltered to non-sheltered. New design, existing remodel.

We are currently addressing bus stops with 20+ riders on/off combined daily

Transit agency bus stop design standards and spacing criteria (every 800 foot—1200 foot between stops)

Standard that meets ADAAG for pads and shelter locations.

We have design guidelines based on ADA requirements. The attributes of a stop location is influenced by required 8' depth and a 5' wide 'landing pad,' sidewalk or pedestrian pathway depth and whether or not a planter area exists between curb and sidewalk. In addition, we' have designs for areas that require stand-alone stops that provide 6 curb height.

We have design only for the basic bus shelter pads, but not on a site-by-site basis

Pads must follow ADA guidelines.

What's a bus stop pad? You mean for a shelter, or a concrete pad in the street where the bus stops? If the former, yes. If the latter, no. For the latter, we have a few, but they were built by others in all cases.

Criteria are set by city/county/state.

We refer to the Orange County Transportation Authority's guidelines, but the decision is the municipality/county's

8' deep by 5' wide is the new minimum pad

We have detailed specifications for required space and quality of pavement to install bus stop poles and signs.

Not our agency, but Department of Public Works does

We do not have criteria or a design for a bus stop pad (interpreting this as an ADA-compliant concrete pad that provides a stable surface for boarding and alighting). We do not construct these and typically try to have them built by the local governments when we have accessibility issues. We've also been successful at getting some installed through our plan reviews with the municipalities, though we have only provided the ADA regulations for reference.

Each location is unique given the environment to build/place

There are standard design drawings for both bus stop pads and pads to accommodate shelters. These differ in size depending on use.

Criteria are a general guideline; the local jurisdiction is responsible for pavement maintenance and ultimately provides the specifications for any concrete or asphalt enhancements at bus stop locations. Our concrete bus pad guideline is 9" PCC (8" if reinforced) on 6' concrete treated base.

Standardized format and route information

Sized to include shelters and poles

New stop locations, or locations being revised as part of a capital project, may receive a bus pad if necessary.

These are in jurisdictional ROW and up to them to provide or not.

To meet minimum accessibility requirements.

The transit agency uses the American Concrete Institute Standards for bus stop and shelter pads. We make sure any stop pad is at least 5' x 5' and shelter pads are at least 5' from street curb.

The design of bus stop pads (in the street) is governed by the City or other appropriate municipality. Historically, the City has funded and installed these pads, and thus the transit agency was not responsible for designing them or deciding the location.

Criteria were developed by the City Department of Transportation

We have our own criteria and design for shelter pads, ADA landing pads, carriage walks, transit curb extensions, in-street bus pad design etc.—I am assuming this refers to an in-street pad.

Bus stop pads are constructed whenever a street is reconstructed. In very bad cases pads may be built on a case-by-case basis by DOT. The pads are 12” thick and the length of the stop.

Location: see Q25

65. Does your agency use different types of bus stop pad designs?

Yes	46.3%	19
No	53.7%	22

66. What bus stop pad designs have worked best?

Responses summarized in Table 41, Chapter 3 of report. Verbatim responses are provided here.

Ones that connect curb and sidewalk and are large enough for front and back boarding.

Pads designed to encompass both ambulatory and mobility impaired that allow for both to traverse unobstructed.

We prefer to have the shelter positioned behind the sidewalk with a pad in front leading to the curb stop. We have photos of these configurations.

Shelter pad that accommodates bike racks and trash receptacles. The narrow cantilevered shelter has allowed the transit agency to construct shelter pads and install shelters in approximately 8 foot of right of way.

Standard concrete that meet ADA standards.

Almost every one is different to fit in the space available.

Simple, streamlined. Pad connected to the curb with an access sidewalk from traditional sidewalk. Bench/shelter located mid to rear of pad.

We design a pad based on the requirements at each individual stop.

NA

Concrete pad

Concrete is best at high-volume locations. Less maintenance but more expensive to build. Asphalt sinks around pad though. Moving towards replacing all pads with concrete at all stops.

Ideal design is a pad that stretches between a sidewalk (behind the bus stop) and the curb, with a shelter located at one side of the pad to allow pedestrian/wheelchair clearance from the sidewalk to the shelter to the curb.

Again, each location is unique. There is no one particular design.

Generally similar to sidewalks extending from the back of the curb to a distance equivalent to what would be present if there were a sidewalk.

Depends on situation.

We strive for 5’ width and 9’ depth

If in street—60’ x 10’ concrete pad—10” 4000 psi concrete pad with #4x18 deformed steel tie bars @30” centers over 12” compacted 11/2” -0” aggregate base. If referencing boarding area—we design stop improvements to fit the need.

We don’t have a “one size fits all” bus pad design. They are all concrete. The only variances in their design are length (depending on the stop in question) and specific soil conditions at the specific stop. We have one design that, if asked, will provide to geotech to structural engineers w/ the understanding that “local conditions” and frequency of bus service may alter the design of the bus pad.

CURB CUTS

67. Please describe your agency's policy regarding bus stop location at curb cuts in commercial areas.

Responses summarized in Table 42, Chapter 3 of report. Verbatim responses are provided here.

Try to place near for accessibility.

Must meet all accessibility and ADA requirements.

We do have curb-cut bus bays on high-speed corridors throughout our system. These vary in length and sometimes in width depending on the available right of way.

N/A

Only in areas with speed limits over 40 mph.

Avoid interfering with business/commercial traffic as much as we can. Adapt to meet concerns of business owners and the community at large.

Not sure I understand the question. We rarely place any stop at a curb cut. We prefer having a 6" curb for ease of getting on or off a bus and bus ramp deployment. Our current fleet is all low-floor vehicles and a curb stop location is by far the preference.

None

No policy

Can't say it's an official policy but, in general, we try to avoid blocking curb cuts when possible. However, if it's a stop we really want/need, we'll put the stop in anyway.

We have no policy

N/A

New bus stops should be installed at locations that have sidewalks and curb cuts.

We don't have a policy for this

No official policy.

Try to avoid it but do it when needed.

N/A

We meet ADA guidelines when pouring a connecting sidewalk to a curb that leads to a crosswalk

We don't have a formal policy, but do have a practice of attempting to avoid placing stops at locations where they would block entrances/exits to businesses. We're usually able to do this without too much trouble. We do have some locations where this is a legacy issue that we plan to work on with our upcoming bus stop evaluation project.

Make every attempt not to block curb cut

No Issue if you mean accessible to this. We don't place exactly at the curb ramp, but build a level landing pad with access to it.

The bus must be able to stop with both doors clear of any driveways or inlets.

Low floor buses ideally have a 6"–8" landing surface for the wheelchair ramp, so our front door is never placed in a curb cut. If no other location is available, we may accept the rear door opening into a curb cut, depending on condition, traffic volume, etc.

No policy. It is integrated in city road work design.

No policy.

We have stops at curb cuts but it is our intent to relocate such stops when practical, typically as part of a larger project.

Bus stops must be installed with an 8'x8' unobstructed passenger loading pad area or larger. Curb cuts should not be installed directly at bus stops. All bus stops should provide access to a sidewalk and a curb ramp/cut which leads to another curb ramp/cut and sidewalk.

We will never block a curb cut with a bus stop.

The head of the bus stop cannot be within a “curb cut” (or “driveway”), however rear doors may open into a driveway, and a stopped bus may momentarily block driveway access.

N/A

The transit agency tries to locate bus stops as close to curb cuts as possible, but direct access to bus stop, parking driveways, lighting, and sight line my play a role in the location.

The transit agency does not install bus stops at curb cuts (neither driveways nor pedestrian curb cuts)

The transit agency generally attempts to avoid placing bus stops where there are curb cuts. If the stop can be placed in between driveways, the stop can be accommodated. At minimum the front door needs to be positioned at a sidewalk with a level surface, and the rear of the bus needs to be out of the crosswalk when making the stop.

I don’t understand these questions

Decision is entirely in the hands of municipalities.

Please better define curb cut. Curb ramp for pedestrian crossing or a driveway? If we are discussing curb ramps for ADA access to street crossings we pursue them at any stop we plan improvements at that has a curb but no ramp. We may also provide curb ramps on the other side of the street if they are so there is at least one pathway connection. We avoid ramps to nowhere. It is also worth noting that since 1992, our major city and other regional partners have aggressively retrofitted old sidewalks with ramps. This isn’t much of an issue anymore.

We try not to have curb cuts in commercial areas. In rare instances we have to live with a curb cut.

We don’t like them and request the local jurisdiction to not install new driveways at existing bus stops. The decision to include a driveway ultimately depends on the local jurisdiction. If problematic and an alternative site is available, we would abandon the bus stop.

68. Please describe your agency’s policy regarding bus stop location at curb cuts in residential areas.

Responses summarized in Table 43, Chapter 3 of report. Verbatim responses are provided here.

Try to place near for accessibility.

Must meet minimal ADA requirements

We have no such policy at this time.

N/A

This is not one of our practices.

Try and avoid blocking residential access and be sure not to stage or wait at residential stop locations.

Not sure I understand the question. We rarely place any stop at a curb cut. We prefer having a 6” curb for ease of getting on or off a bus and bus ramp deployment. We do have stops in newer residential developments that incorporate pedestrian bulb-outs so we don’t take away on-street parking. These bulbouts have curb cuts but the stop utilizes the 6” curb area with an 8’ depth and 5’ wide landing pad.

None

No policy

Same as above

We have no policy

N/A

New bus stops should be installed at locations that have sidewalks and curb cuts.

We don’t have a policy for this.

No official policy

Try to avoid it but do it when needed.

N/A

We meet ADA guidelines when pouring a connecting sidewalk to a curb that leads to a crosswalk

Same practice as #57 but with respect to driveways. We attempt to avoid placing stops at locations where they would block driveways. We're usually able to do this without too much trouble. We do have some locations where this is a legacy issue that we plan to work on with our upcoming bus stop evaluation project.

Generally will allow

No Issue if you mean accessible to this. We don't place exactly at the curb ramp, but build a level landing pad with access to it.

The bus must be able to stop with both doors clear of any driveways or inlets.

Low-floor buses ideally have a 6"–8" landing surface for the wheelchair ramp, so our front door is never placed in a curb cut. If no other location is available, we may accept the rear door opening into a curb cut, depending on condition, traffic volume, etc.

No policy. It is integrated in city road work design.

No policy

See previous question.

Bus stops must be installed 8' x 8' unobstructed passenger loading pad area or larger. Curb cuts should not be installed directly at bus stops. All bus stops should provide access to a sidewalk and a curb ramp/cut which leads to another curb ramp/cut and sidewalk.

We will never block a curb cut with a bus stop.

The head of the bus stop cannot be within a "curb cut" (or "driveway"), however rear doors may open into a driveway, and a stopped bus may momentarily block driveway access.

N/A

The transit agency tries to locate bus stops as close to curb cuts as possible, but direct access to bus stop, parking, driveways, lighting, and sight line my play a role in the location.

Residential driveways do not have the same access concerns as commercial properties, but the similar considerations apply. The transit agency generally attempts to avoid placing bus stops where there are curb cuts. If the stop can be placed in between driveways, the stop can be accommodated. At minimum the front door needs to be positioned at a sidewalk with a level surface, and the rear of the bus needs to be out of the crosswalk when making the stop.

See above

See above

We have residential curb cuts at many locations, but we will not add a new stop with residential curb cut. We find it helpful not to put the pole in the driveway

69. Who makes the decision to approve or deny a request for a curb cut at an existing stop?

Municipality/county/state DOT	73.2%	30
Transit agency	9.8%	4
Other	17.1%	7

Other responses include: (1) We work with county, state regarding planning of these. (2) N/A (3) Both depending on the scenario. (4) Cut outs are put in by the developer. We ask they put them in at the design stage. (5) Both. What is a curb cut? Do you mean curb ramp or driveway cut? (6) Ultimately the municipality decides whether to approve or not approve a proposed bus stop location. However, the transit agency does not request bus stop locations at curb cuts. (7) This is the City's role (Department of Buildings) but in reality, nobody does it.

70. Does your agency have a role in approving/denying a proposed curb cut at an existing stop?

Yes, we have a veto at an existing bus stop	2.7%	1
Yes, we have a role but not final say	62.2%	23
No, the decision is made without our input	36.1%	13

ADA CONSIDERATIONS

71. How does your agency address ADA requirements at existing stops? (Check all that apply.)

Improvements made based on available funds within jurisdiction	53.5%	23
Improvements made based on utilization and need	48.8%	21
Improvements made based on customer complaints	51.2%	22
Responsibility lies exclusively with local jurisdiction or adjoining property owner	25.6%	11
Other (please specify below)	18.6%	8

Other responses include: (1) Due to funding constraints, review of stop requests will establish priority of bus stops to be improved. (2) We established a bus stop accessibility improvement program several years ago, this criteria is strongly based on daily boarding data as well as demand requests from riders. (3) We've done a bunch with grant money. Tapped into local disabled community leadership for help in deciding and prioritizing projects. (4) Improvements made based on available funds with the transit system. (5) We only make ADA improvements at all that are improved by placing a shelter at the stop. All of our bus shelters meet ADA accessibility requirements. (6) When we upgrade a stop with a transit-agency-installed bench or shelter, the entire stop area must be made compliant (triggers ADA requirements for "improvement" that require us to take responsibility at that location). When we receive complaints or requests, we forward them to the local jurisdiction. (7) We are funded to improve and make the entire system 100% fully ADA compliant. (8) Occasionally we partner w/ the land owner. This decision depends on cost and use of the bus stop.

72. How does your agency address ADA requirements at new stops? (Check all that apply.)

ADA requirements are only considered for the "immediate" area of the bus stop (i.e., excludes crosswalks or pathways to/from the bus stop but includes the shelter, bench, or adjoining sidewalk)	20.9%	9
ADA requirements are applied to the immediate bus stop with consideration given to the path of travel to/from the bus stop	62.8%	27
Other (please specify below)	16.3%	7

Other responses include: (1) It can be both items stated above. But the ADA "requirement" is for stops with shelters. (2) We install stops at locations that at least have sidewalks and curb cuts. Other requests for ADA improvements are sent to the city/county/state. (3) As we are not responsible for making ADA improvements in the ROW, we do not make new stops compliant (this complies with ADA regulations and Access Board clarifications). However, we make all attempts to locate new stops at ADA-compliant locations if the infrastructure is there. (4) We attempt to place stops in areas that conform to ADA requirements. We will not place a shelter in a manner that does not meet ADA. Sidewalks, crosswalks, curb ramps, and paths to the curb are the responsibility of the local municipality. (5) No ADA jurisdiction in Canada. (6) Improvements to the public right of way are the responsibility of the municipality or the property owner. The transit agency is responsible for meeting ADA requirements on our facilities (e.g., terminals). (7) New stops must be 100% ADA compliant.

CASE STUDY

73. Would you be willing to participate further as a case study, involving a telephone interview going into further detail on your agency's experience, if selected by the TCRP panel for this project?

Yes	83.7%	36
No	16.3%	7

OTHER AGENCIES

74. Is there another transit system that you suggest we contact for this synthesis project? If you know of a contact at that system, please also list the name.

Various responses.

Abbreviations used without definitions in TRB publications:

A4A	Airlines for America
AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
MAP-21	Moving Ahead for Progress in the 21st Century Act (2012)
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation

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