

Sidewalk Assessment

Sidewalk planners and designers need an objective method to assess the conditions of sidewalks. With such information, sidewalk professionals can evaluate conditions experienced by pedestrians in the public right-of-way and identify sites requiring accessibility and maintenance improvements. The information can also be used to develop transition plans, verify compliance with design guidelines, provide information to pedestrians, and continue improving sidewalk conditions for all users.



Figure 11-1. Collecting objective information about sidewalk conditions is a critical step towards improving the accessibility of existing pedestrian networks.

11.1 Benefits of assessment

Inventorying the existing pedestrian facilities and assessing the accessibility of the travelway is the first step towards providing access for all pedestrians. Objective data obtained from sidewalk assessments enables managers to create signs and other informational guides that will assist users in selecting the best routes for travel. Conducting sidewalk assessments is also beneficial because they allow managers to inventory sidewalk conditions and plan for projects, in order to:

- Determine if the sidewalk meets intended design specifications and guidelines;
- Prioritize sidewalk maintenance projects;
- Revise and update Americans with Disabilities Act (ADA) transition plans;

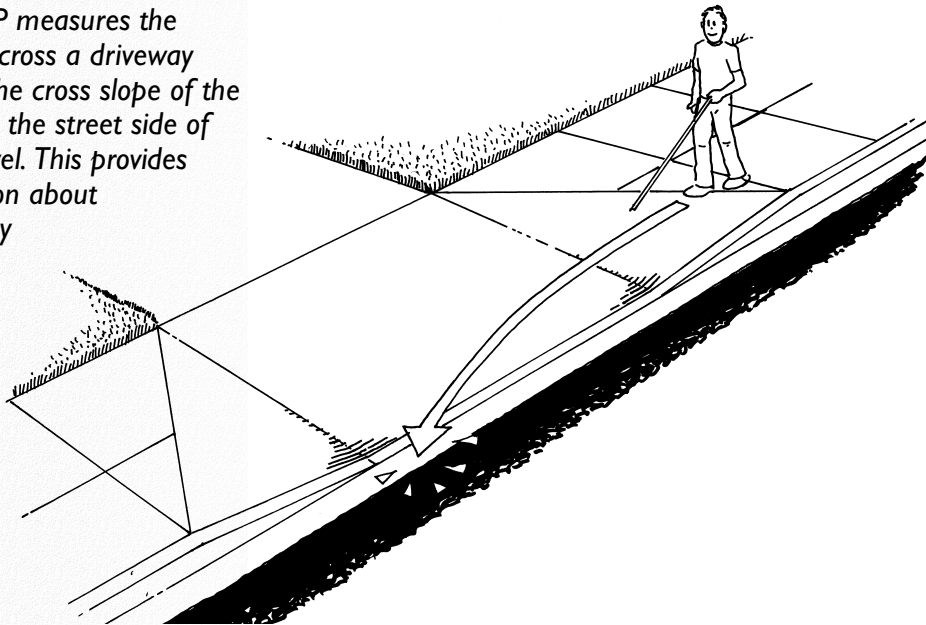
11

SIDEWALK ASSESSMENT

CHAPTER

- Budget for sidewalk projects;
- Identify portions of sidewalks needing accessibility improvements;
- Develop maintenance schedules;
- Quantify the extent of the work required;
- Catalog feature and maintenance information;
- Share data and project plans with disability focus groups;
- Create objective sidewalk information that can be provided to users in various formats such as signage, maps, and Websites;
- Add pedestrian information to Geographic Information Systems (GIS) mapping and inventories; and
- Justify maintenance funding.

Figure 11-2. SWAP measures the best path of travel across a driveway crossing, as well as the cross slope of the driveway crossing on the street side of the best path of travel. This provides important information about whether the driveway crossing has a cross slope that will be detectable by people with vision impairments.



11.2 Sidewalk Assessment Process overview

The Sidewalk Assessment Process (SWAP) is a prototype system developed to inventory the dimensions, locations, and conditions experienced by pedestrians in the public right-of-way in a reliable, consistent, and comprehensive manner. Measurement techniques from the Universal Trail Assessment Process (Chapter 12) were modified and adapted to record sidewalk conditions.

Pedestrian coordinators, sidewalk designers, and ADA experts were enlisted to ensure that the Sidewalk Assessment Process accurately recorded information in a usable format about all sidewalk features and dimensions affecting pedestrian access. Conditions identified in accessibility guidelines, pedestrian facility guidelines, and municipal transportation planning documents were also used. The terminology and measurement procedures for the SWAP were developed to ensure consistency in assessments.

Quick measurements of sidewalk components that impact access are recorded on a *Stroll Sheet*, which contains *Station*, *Features*, and *Curb Ramp* forms. Intersections are evaluated using the Intersection Checklist. Complex sidewalk elements such as curb ramps, driveway crossings, and medians identified on the *Stroll Sheet* are measured in more detail and recorded on the *Sidewalk Element Analysis* form. A complete set of the Sidewalk Assessment Process forms is contained in Appendix A.

The Sidewalk Assessment Process is intended to be a modular system. Transportation agencies should identify the components that are most appropriate to their assessment needs. For example, if an agency wanted to determine where access improvements are needed, they would use the basic evaluation recorded on the *Stroll Sheet*. However, if an agency has already determined that a driveway crossing is problematic, they would conduct a complete evaluation using the *Sidewalk Element Analysis* form for driveway crossings.

11.3 Sidewalk access characteristics

During the development of the Sidewalk Assessment Process, the following characteristics were identified to be most critical to sidewalk access:

- Grade;
- Cross slope;
- Changes in grade and cross slope;

11

SIDEWALK ASSESSMENT

CHAPTER

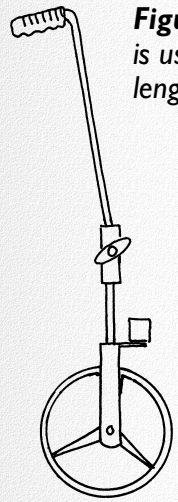


Figure 11-3. A rolatape is used to measure the length of the sidewalk.

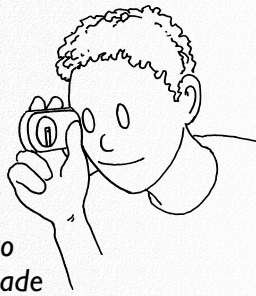


Figure 11-4. A clinometer is used to measure running grade between stations.

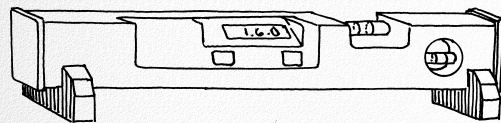


Figure 11-5. A digital inclinometer (level) is used to measure maximum grades, cross slopes, and changes in grade and cross slopes.

- Sidewalk design width;
- Minimum clear width;
- Vertical clearance;
- Location of protruding objects;
- Detectable warnings; and
- Changes in level.

General information about these characteristics including type, dimensions, and location with respect to other sidewalk elements are recorded on the *Stroll Sheet*.

The following complex elements are measured in more detail on the *Element Analysis* forms:

- Curb Ramps;
- Medians;
- Refuge Islands; and
- Driveway Crossings.

11.4 Data collection

Inexpensive and easy-to-use tools have been selected to simplify the process of measuring sidewalk access characteristics. The tool kit should include a rolatape, tape measure, clinometer, inclinometer, and profile gauge. It is recommended that the assessment team wear safety vests to increase their visibility to motorists. A brief description of each tool follows:

1. A **rolatape**, which is a wheeled measurement device, is used to roll down the center of the sidewalk for measuring the length of the sidewalk.
2. A hand-held **clinometer** is used to measure running grade between stations (the measurement reference points).
3. A **digital inclinometer** (level) is used to measure cross slope, maximum cross slope, maximum grade, and changes in grade and

11

SIDEWALK ASSESSMENT

CHAPTER

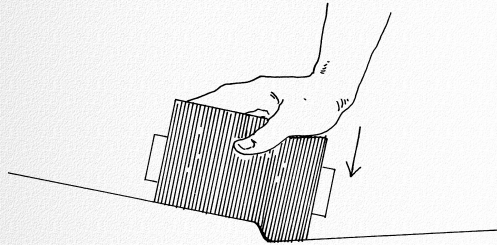


Figure 11-6. A profile gauge is used to measure small changes in level, such as shifts in sidewalk cracks and the lip of driveway and crosswalk crossings.

Station Measurements:

Distance	Design Width	Cross Slope	Running Grade
m	cm	%	%

Figure 11-7. Station measurements are recorded on this form that is contained within the *Stroll Sheet* form.

cross slope. The inclinometer is 610 mm (24 in) long, and it provides measurements over the same distance covered by the length and width of an average wheelchair, walker, crutch span, or pedestrian stance.

4. A **tape measure** is used to record:
 - Sidewalk width at each station;
 - Width and length of segments narrower than specified for the sidewalk (minimum clear width); and
 - Dimensions of features, obstacles, and protruding objects that might obstruct passage or require maintenance or repair.
5. A **profile gauge** is used to measure small changes in level, such as sidewalk cracks, and to record the shape and spacing of truncated domes (i.e., detectable warnings).

11.4.1 Stroll Sheet station measurements

Stations are established as reference points along the block for taking sidewalk measurements. The rolatape measures the length of the sidewalk between stations. The distance of each station is recorded on the *Station Measurements* form that is contained within the *Stroll Sheet*. Stations are established frequently to increase the number of data points and ensure a higher degree of accuracy.

The first station along each block is established 2.030 m (80 in) from the curb edge of the intersection at an area not considered part of a curb ramp (such as flares and landing). Establishing a station directly at the corner is avoided to prevent atypical measurements created by the presence of a curb ramp and to exclude the corner from the average grade measurement and calculation because the corner is generally more level than the rest of the sidewalk. Subsequent stations are established at regular intervals no greater than 50 m (164 ft) apart. The last station along a block is established approximately

11

SIDEWALK ASSESSMENT

CHAPTER

2.030 m (80 in) from the edge of the intersection at a point not considered part of a curb ramp. Stations should not be established at a point considered part of a driveway crossing; instead, the station is set up before or after the driveway crossing. This is also done to exclude the generally level section of the driveway crossing from decreasing the average grade calculation of the sidewalk. It also prevents poorly designed driveway crossings with steep cross

slopes from impacting the average cross slope calculations.

Sidewalk design width, cross slope, and running grade between stations are measured at each station and recorded in the *Station Measurements* form. Only the portions of the sidewalk that are available for travel are included in width measurements; elements such as grass planting strips should not be measured.

11.4.2 Stroll Sheet feature measurements

The measurements for features encountered between stations are recorded on the *Feature Measurements* form, which is part of the *Stroll Sheet*. A standard set of abbreviations is used to identify the type of feature. The distance to each feature, its dimensions, and any comments are recorded.

- The cross slopes of **driveway crossings (DC)** are measured within the best path of travel as well as adjacent to the roadway and the property line. The best path of travel is the space that has the least cross slope and is therefore the area that most people will use for walking. However, it is also important to measure the cross slope of the driveway crossing on the street side of the best path of travel. This will provide information about whether the driveway crossing has a cross slope that will be identifiable by individuals with vision impairments.

Feature Measurements:

Feature Distance m	Feature	Dimension	Units	Comments

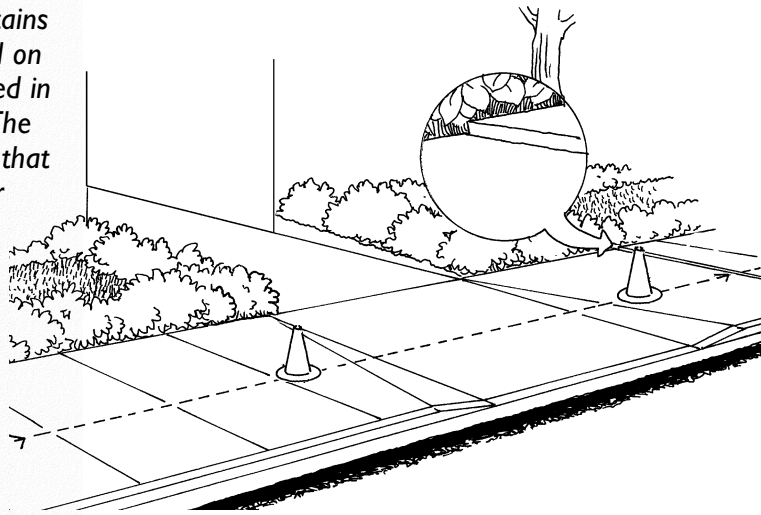
Figure 11-8. Feature measurements are recorded in this form which is contained within the *Stroll Sheet* form.

11

SIDEWALK ASSESSMENT

CHAPTER

Figure 11-9. This illustration contains two features that might be located on the sidewalk and would be recorded in the Feature Measurement Form. The first feature is a driveway crossing that creates a significant cross slope for pedestrians; both the cross slope and change of cross slope would be recorded. The second feature is a sidewalk crack which would be recorded as a change in level and would be measured using the profile gauge.



In addition, if the driveway crossing leads into a parking lot or some other open area, the cross slope should also be recorded on the property line side of the best path of travel. Gradual cross slopes at driveway crossings make it difficult for people with vision impairments to realize when they accidentally drift into the street or parking lot. However, if the cross slope at the best path of travel is greater than 2.0 percent, driveway crossings may cause people who use wheelchairs

to lose control, veer into the street, and/or tip over.

- **Maximum grades (MG)** are recorded if they exceed the running grade by more than 5 percent. The distance over which the maximum grade occurs is also recorded.
- **Maximum cross slopes (MCS)** are recorded if they exceed the station cross slope by more than 2 percent. The distance over which the maximum cross slope occurs is also recorded.
- **Changes in cross slope (CCS)** are recorded in conjunction with maximum cross slope. Changes in cross slopes are calculated by recording the measurements of cross slope 610 mm (24 in) in front of and behind the maximum cross slope. This is done at steep driveway crossings and sidewalk segments with cross slopes greater than 5 percent.

11

SIDEWALK ASSESSMENT

CHAPTER

- **Minimum clear width (MCW)** is measured with the tape measure when the clear space is narrower than 915 mm (36 in).
- **Minimum vertical clearance (MVC)** is measured with a tape measure when the vertical clear space is less than 2.030 m (80 in).
- The distance **protruding objects (PO)** intrude into the pathway is recorded if the object protrudes more than 101 mm (4 in) into the sidewalk between a height interval

are recorded anywhere a pedestrian could potentially walk because pedestrians with vision impairments often do not travel along the intended path of travel.

- **Changes in level (CL)** greater than 13 mm (0.5 in) are recorded with a profile gauge. The profile is traced from the profile gauge to paper and then measured to record the height transition and any surface beveling.

11.4.3 Stroll Sheet curb ramp measurements

Curb Ramp Measurements:

CR Distance m	Number of Ramps #	Type (L I D C B)	Approach Slope %	Ramp Slope %	Ramp Length cm	Landing Length cm	Detectable Warning y/n

Figure 11-10. Curb ramp measurements are recorded in this form, which is contained within the Stroll Sheet form.

of 685 mm to 2.030 m (27 in to 80 in). Protruding objects are things such as tree branches and hedges, low street and business signs, and telephones mounted on posts and walls. Protruding objects

Aspects of curb ramps critical for determining whether or not a ramp is accessible are recorded on the *Curb Ramp Measurements* form, which is part of the *Stroll Sheet*. If information is recorded during the stroll that identifies a major element of a curb ramp should be replaced, the curb ramp is reevaluated using the *Curb Ramp Element Analysis* form. Both the *Stroll Sheet* and the *Element Analysis* forms capture information to

11

SIDEWALK ASSESSMENT

CHAPTER

determine how the curb ramp can be retrofitted. The following curb ramp characteristics are recorded on the *Stroll Sheet* between stations:

- Distance to the curb ramp (CR);
- Number of curb ramps (0, 1, 2) at every corner. When there are no curb ramps at an intersection, a zero is recorded and no additional information is included on that line of the data form. If there are two curb ramps at the corner, each curb ramp is evaluated and two separate lines are completed on the data form;
- Type of curb ramp (parallel, perpendicular, diagonal, combination, built-up);
- Street approach slope (generally the gutter and part of the street) over a

610 mm (24 in) distance and the slope of the ramp in the upward direction;

- Ramp slope parallel to the ramp path;
- Ramp length if the ramp slope exceeds 8.3 percent.
- Landing length; and
- The presence or absence of a detectable warning as defined in ADAAG 4.29.2. Other attempts at providing tactile information on the surface are noted and identified for replacement as they provide limited benefits to people with vision impairments.

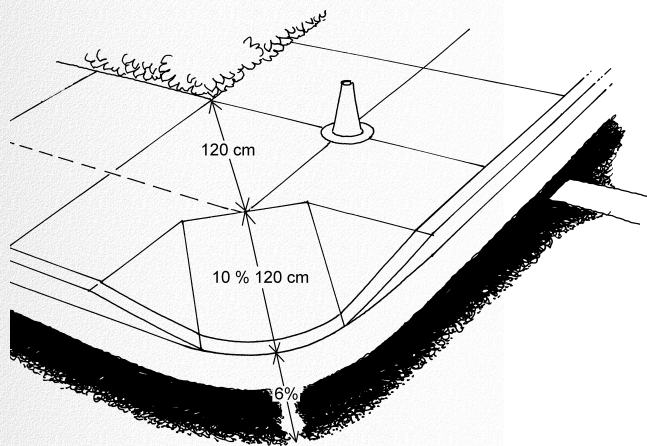


Figure 11-11. Some curb ramp measurements are recorded as part of the *Stroll Sheet*. More detailed measurements for curb ramps are recorded using the *Element Analysis Form*. As part of the stroll, the slope of the ramp, the slope of the roadway approach, the length of the ramp, and the length of the landing are all recorded. If the ramp slope is less than 8.3 percent, the length of the ramp should not be measured.

11.4.4 Intersection Checklist

The conditions at an intersection are a key factor in determining how usable the pedestrian network is for people with disabilities. If renovations are planned for

11

SIDEWALK ASSESSMENT

CHAPTER

Intersection Checklist:

Name of primary street:	
Name of cross street:	
Total number of lanes on primary street:	
Total distance across primary street (measure with rolatape):	
Total number of lanes on cross street:	
Total distance across street (measure with rolatape):	
Are there any left turn only lanes?	yes--no
Are there any right turn only lanes?	yes--no
Is a right turn on red permitted?	yes--no
Is there a right turn island?	yes--no
Is parking permitted on the primary street?	yes--no
Is parking permitted on the cross street?	yes--no
How many corners have curb extensions (bulbouts)?	
Is there a median?	yes--no
If so, is it designed as a pedestrian refuge?	yes--no
Is it identifiable to people with vision impairments?	yes--no
Is it accessible to people with mobility impairments?	yes--no
Does the intersection have four way stop signs?	yes--no
Does the intersection have two way stop signs?	yes--no
Is the intersection signalized?	yes--no
Is there a pedestrian actuated control signal?	yes--no
Location of control:	
Information emitted: audible vibrotactile infrared	
Is there a high contrast between the button and post color?	yes--no
Is there a tactile arrow indicating the street crossing direction?	yes--no
Height of control:	
Dimension of pedestrian button?	
Is 5 lbs of force or less required to operate the signal?	yes--no
Is the crosswalk marked?	yes--no
If so, what are the conditions of the markings?	
Duration of WALK interval:	
Comments:	

Figure 11-12. The Intersection Checklist allows an assessment team to quickly evaluate an intersection based on the availability of accessible information and the probability of a safe crossing for people with disabilities.

an intersection, engineers should use the *Intersection Checklist* that is available as part of the SWAP to identify areas that need improvement. The *Intersection Checklist* consists of a brief series of questions that focus on the availability of information to assist in safe crossings. Most of the questions on the checklist are recorded as “yes” or “no” to allow the assessment team to quickly evaluate the intersection. Evaluators are also encouraged to sketch a map of the intersection at the bottom of the checklist to facilitate future evaluations of the same site.

The primary street is defined on the checklist as the street from which the assessment team approached the intersection; the cross street is defined as the street perpendicular to the primary street. The total number of lanes and the crossing distance are recorded for both the primary street and the cross street. The presence of traffic

signals, stop signs, parked cars, medians, and marked crosswalks are recorded to gain a better understanding of how difficult the intersection would be to cross for people with slower walking speeds. The length of the walk interval is also recorded if a pedestrian signal is located at the corner. The accessibility of pedestrian actuated control signals and the patterns of right and left turning automobiles are recorded to evaluate the information available to people with vision impairments. The sound of automobile traffic is another important cue used by people with vision impairments at intersections; however, the presence of traffic is not recorded because it often fluctuates based on a variety of factors including the time of day and the weather conditions at the intersection. Additional intersection observations should be recorded as comments at the bottom of the checklist. Signal types, timing, and crosswalk configuration all affect usability of a pedestrian route. TEA-21 requires consideration of accessible (audible and vibrotactile) pedestrian signals.

11

SIDEWALK ASSESSMENT

CHAPTER

Figure 11-13. Segment of the Element Analysis Form for driveway crossings used to measure slope in the plus/minus direction (see Appendix A).

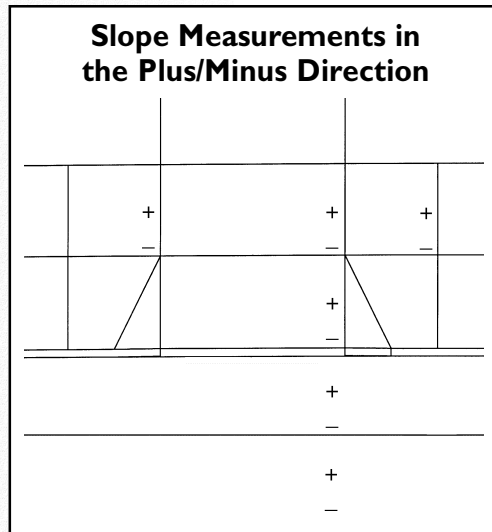
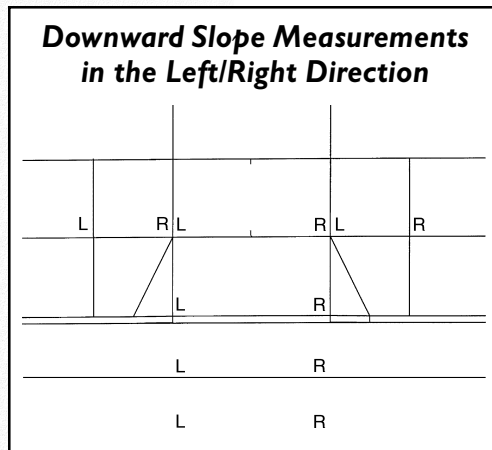


Figure 11-14. Segment of the Element Analysis Form for driveway crossings used to measure slope in the left/right direction (see Appendix A).



11.4.5 Sidewalk Element Analysis Forms

Sidewalk Element Analysis Forms are used to record information about complex sidewalk elements, such as medians and curb ramps, that are identified by the *Stroll Sheet* measurements as warranting further evaluation. Depending on the element being evaluated, dimensions are recorded on forms depicting schematic diagrams of:

- Curb ramps;
- Driveway crossings;
- Medians; and
- Islands.

A complete set of Sidewalk Element Analysis forms is included in Appendix A. The following example reviews the Driveway Crossing Sidewalk Element Analysis form. To completely analyze a driveway crossing, each of the following measurements are recorded. Some of the measurements explained below may not be applicable to every complex element. Furthermore, some additional measurements that are not applicable to driveway crossings may be recorded for some of the other complex elements. For example, the location of a detectable warning would be recorded for a curb ramp but is not recorded for driveway crossings.

- **Slope measurements parallel to ramp path** — The slope parallel to the driveway ramp path is recorded with an inclinometer for the street, gutter, ramp, landing, and approaches. The surface is considered to have a positive slope when it slopes up from the street. (These measurements are recorded

11

SIDEWALK ASSESSMENT

CHAPTER

Figure 11-15.
Segment of the
Element Analysis
Form for driveway
crossings used to
measure dimension
in the X direction
(see Appendix A).

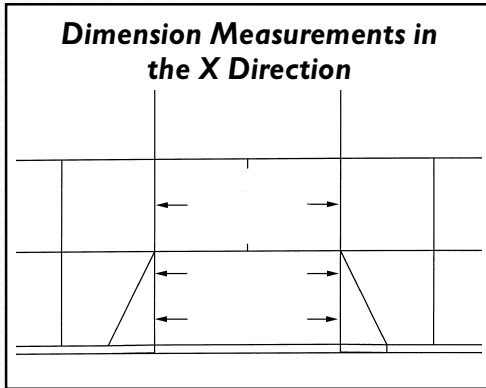
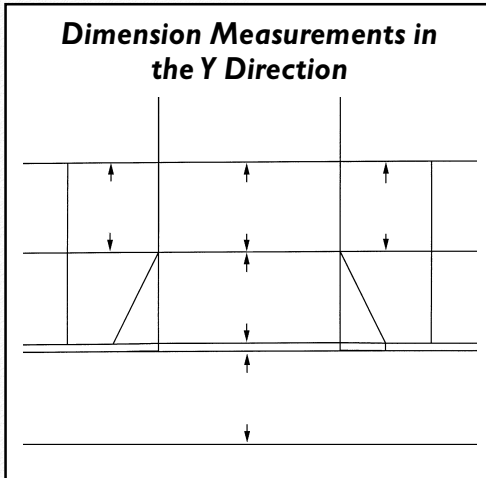


Figure 11-16.
Segment of the
Element Analysis
Form for driveway
crossings used to
measure dimension
in the Y direction
(see Appendix A).



on the Slope
Measurements in the
Plus/Minus Direction
segment.)

- **Slope measurements perpendicular to ramp path** — the slope perpendicular to the driveway ramp path is recorded with an inclinometer for the street, gutter, ramp, landing, and approaches. The measurements are taken facing the driveway from the street, and slope direction is recorded as left or right to correspond with the surface sloping down to the left or down to the right. (These measurements are recorded in the Downward Slope Measurements in the Left/Right Direction segment.)

- **Dimension measurements in the X direction** — The dimensions of the top of the driveway ramp, bottom of the driveway ramp, and landing are recorded with a tape measure. The “X” direction is typically measured as the width with respect to a person facing the driveway.
- **Dimension measurements in the Y direction** — Dimensions of the gutter, driveway ramp, landing, and approach parallel to the ramp length are recorded with a tape measure. The “Y” direction is typically measured as the length with respect to a person facing the driveway.
- **Height of transition points** — The transition points between street and gutter, gutter and ramp, ramp and landing, and landing and approaches are measured with a profile gauge. The transition is quickly traced from the edge of the profile gauge onto the back of the data form.

11

SIDEWALK ASSESSMENT

CHAPTER



Figure 11-17. The curb ramp slope is being measured for positive slope with a digital inclinometer.

- **Flare slopes** — The flare slope is measured along the steepest part of the flare and parallel to the sidewalk path of travel.
- **Change of cross slope** — When the slope of the driveway crossing exceeds 5 percent and a level landing is not provided, or the width of the level landing is less than 915 mm (36 in), users will be forced to travel over a significant cross slope. Furthermore, as the user transitions from the level sidewalk to the cross slope, they will encounter a rapid change in cross slope. The change in cross slope is measured at the flare when the landing is less than 915 mm (36 in) wide and the cross slope exceeds 5 percent. Change in cross slope is measured with an inclinometer by recording the cross slope 610 mm (24 in) in front of and behind the maximum cross slope.
- **Curb height** — The height of the curb is measured with a tape measure.

11.5 Presentation of sidewalk assessment information

The SWAP is a tool that produces valuable data and may assist designers and planners to make targeted access improvements to bring their communities into compliance with the ADA. Sidewalk assessment data can also be used to create useful information for pedestrians. The following ideas are based on Universal Trail Assessment Process products, such as the Trail Access Information strip, and have not yet been developed for sidewalks. Additional information about Universal Trail Assessment Products is contained in Section 12.5. The following information formats should be considered for future development because they would benefit many sidewalk users:

- **Geographic Information Systems (GIS) maps** — Maps that integrate sidewalk assessment data into existing GIS systems. GIS maps could serve as a valuable planning tool for evaluating accessibility

11

SIDEWALK ASSESSMENT

CHAPTER

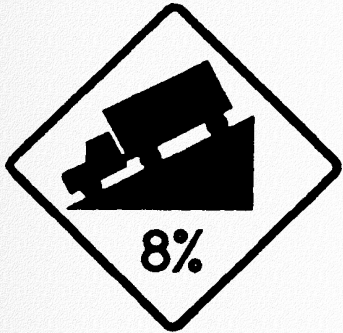


Figure 11-18. Grade information that is provided to motorists would also be beneficial to pedestrians.



Figure 11-19. Potential sidewalk signage indicating upcoming steep grades. This sign is not currently included in the Manual on Uniform Traffic Control Devices (MUTCD).

improvements through public involvement. GIS maps could also serve transportation agencies with internal planning for the improvement of sidewalk facilities;

- **Sidewalk signage** — Signs (similar to those for motorists) directed at pedestrians to communicate audible and visual information of sidewalk construction and closures providing alternative routes;
- **Universally designed street maps** — Street maps that integrate grade information into standard maps to improve route planning for people with disabilities;
- **District accessibility directory** — A directory sign similar to those found in shopping malls containing a top view map of the district highlighting potential barriers and identifying commercial services. Information that is

Main Street ↑
300bk
East **1200 ft**

Skateboards Bikes

Grade
Average 2%
 200 ft is over 5%

Cross Slope
Average 3%
 Max. 11% for 15 ft
 30 ft is over 5%

Path Width
Minimum 45"
 Average 60"

2" Change in level

WARNING: Conditions may have changed since this sidewalk was assessed. Temporary barriers were not mapped.

Sidewalk Access Information

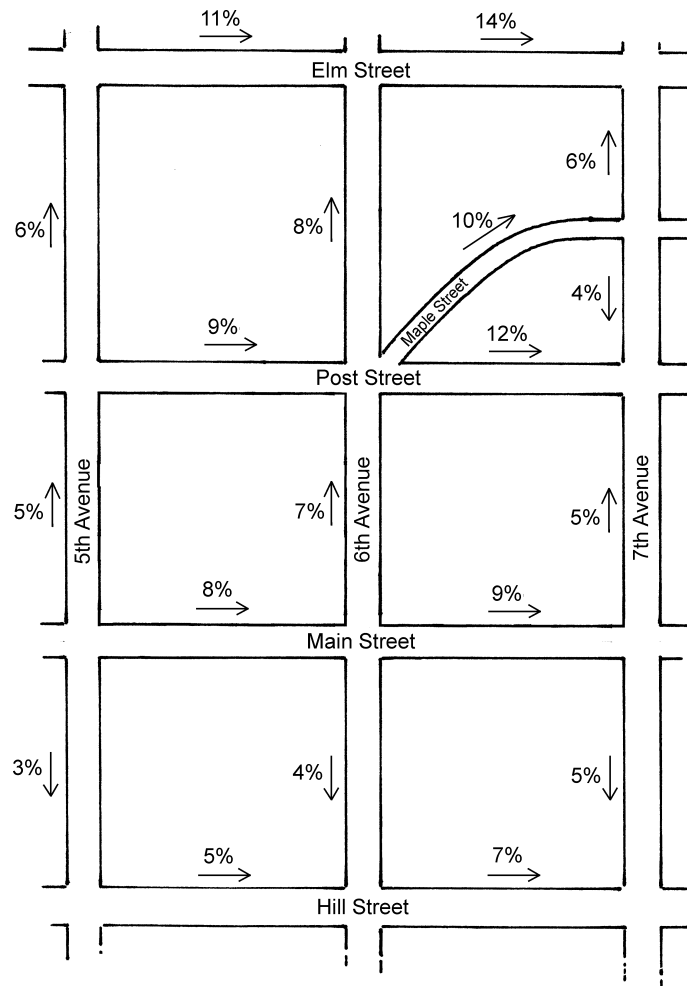
Figure 11-20. This type of sign has been used in trail settings. Pedestrians could benefit from objective information about sidewalk conditions, such as steep grades and cross slopes.

11

SIDEWALK ASSESSMENT

CHAPTER

Figure 11-21. Street maps that include grade information would improve route planning for people with mobility impairments.



provided in text format should also be provided in an audible format;

- **Computer kiosks** — Information on the accessibility of specific routes could be integrated into existing computer kiosks that are currently installed in many locations such as transit stations. Standards for making kiosks accessible to people with vision impairments are available from the U.S. Access Board; and
- **Website** — A site where Internet users could obtain accessibility information about a given municipality. Websites should be designed to accommodate speech access.

