The WABSA Project

Assessing and Improving Your Community's Walkability & Bikeability

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OUR VISION CAN BECOME REALITY

Many of us have visited neighborhoods that stand out in our memory because they are walkable. We can easily imagine living there and leading an active life. Some of those neighborhoods are in large cities like Portland, San Francisco, or New York City. Some are in ancient villages in Europe. Others are in older American towns where neighborhoods were built to foster community, healthy living, and social interaction.

With an epidemic of heart disease, obesity and diabetes threatening our nation's health, it is important that we provide people with every opportunity to weave physical activity into their daily routines. In many small ways throughout our day we can choose active forms of work, fun, and travel. However, we can't be truly active unless we live, work, and play in safe and appealing environments.

WHAT TO CHANGE?

Many communities lack adequate and well-maintained sidewalks that connect people's homes to their worksites, schools, shopping districts, and recreation areas. In many communities, the roads are designed primarily to move automobiles. Even the most experienced cyclists may be discouraged by high speed traffic, oversized vehicles, poor pavement conditions, or paved shoulders that are simply not wide enough to be used for cycling. People are more likely to walk and bicycle if well-designed opportunities exist. One way we can improve our community environment for physical activity is by improving our sidewalks and roads.

WHAT CAN WE DO?

This guidebook will help community groups, organizations, and concerned individuals learn how to take an active part in helping improve local conditions for walking and bicycling. Step-by-step instructions guide you to assess the suitability of your sidewalks for walking and roads for bicycling, and then develop a plan for improvements. By using this guidebook, you will become familiar with the concepts and language that planners and transportation engineers use, and that will help you discuss the problems and possible solutions with fellow citizens and professionals alike.

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Introduction

Our nation is making an effort to improve the health of its citizens by increasing their physical activity levels, providing healthy food options, and reducing tobacco use. What is unique about these current efforts is that they focus on changing the physical and social environments in which we live. Physical activity is difficult to initiate or sustain when the environment neither promotes nor supports physical activity. If people have many opportunities and reminders to be physically active, they may choose to walk or bicycle when making a short trip. More people will take the stairs if there are signs posted at elevators directing them to the stairs and reminding them that walking is "good for their heart." If our communities have sidewalks, bicycle lanes, and if our park trails and greenways are clearly marked and maintained, more people will use them to be physically active. If the physical environment offers safe opportunities to be physically active and provides connectivity to destinations, more people will have the opportunity to become healthier.

Two forms of physical activity that most people can enjoy are walking and bicycling. However, if roads and streets are not conducive and safe for bicycling or walking, people will not become more active. In many communities people are currently walking and bicycling on roads that are unsafe and even dangerous. We need to make our communities safer and healthier by improving the suitability of our roads for walking and bicycling. This guidebook can help you be a part of these improvements in your own community.

Assessment: We show you two simple methods for assessing the suitability of roads for walking and bicycling[1]. The assessment methods let you quickly study the roads that people could use for non-automobile travel to work, school, or shopping. Assessing a road can take as little as fifteen minutes. Assessment is important because it helps to identify problems with each road's suitability for walking and bicycling. The assessment results can be mapped to pinpoint the needed improvements to your community's roads. The guidebook walks you through the entire assessment process.

Improvement: You can directly improve your community environment by working as an assessment team to gather information about the suitability of your roads for walking and bicycling, and collaborating with local planning staff and other officials to design a town or county "plan" to develop a network of suitable roads and sidewalks. Your collaboration can change the physical environment so that all community members can choose to be more physically active and ultimately enhance their quality of life.

We provide suggestions for working with planning staff and other officials to design a "network" of roads in your community that provide real connectivity between where people are and where they want to go. Your community can improve that road network to enhance the safety of walkers and bicyclists. Suggestions are provided to address potential barriers to improvement projects such as funding and "right of way" issues.

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[1] The bicycle suitability assessment method presented in this Guidebook was identified by analyzing several methods used across the country. Randomly selected road segments in one county were independently assessed by two data collectors. Bicycle suitability scores were computed for each method studied. The method developed by Nils Eddy and presented here attained the highest reliability correlation with all other methods for each road segment.

After reviewing the small number of publicly available walking suitability methods, James Emery, MPH developed the method presented in this Guidebook. To read about the reliability and validity of these methods see: Emery, J., Crump, C., & Bors, P. Reliability and validity of two instruments designed to assess the walking and bicycling suitability of sidewalks and roads. *American Journal of Health Promotion*, September/October 2003; 18(1); pp. 38-46.

Starting Out

What is it about the place you live, work or play that makes it easy for walking? How about bicycling? What makes it challenging or even impossible?

You are an expert. You may not realize it, but you are already an "expert" in using your environment to be physically active. Every time you take a walk or ride your bike, you are monitoring the quality of your environment. You probably travel along routes that you enjoy. You probably also quickly recall and avoid places that are unfriendly for walking or bicycling. Keep that in mind as you read this guidebook. You are an expert user of your environment.

Find your allies. Talk with other people who walk and bicycle (or want to) – your family, friends, neighbors, and co-workers. Find others who are concerned about safety and health. Find people who are also interested in promoting a "liveable" town or city.

Work as a team. Citizens can have a powerful voice, especially if they are organized and bring "data" to document environmental conditions. This guidebook will help you gather some simple data. You can begin by finding other people who want to work on this type of assessment project. The Walking and Bicycling Suitability Assessment Project is being used in various communities in the country. Concerned citizens in any neighborhood, town, or city can quickly begin working as a team to influence improvements to the physical environment.

Learn the system. Much of the environment in which we live, work or play is maintained by governmental or organizational systems. It is important that you begin learning how sidewalks are planned and improved in your community. There is a process – what is it? Make it a point to visit your local planning staff and ask for a brief orientation to how improvements happen to sidewalks, roads, and other physical activity opportunities – like greenways and trails. Also get to know any elected officials who have an interest in health. If any politicians talk about making your town or city more "liveable" that is a good opening for you to explore their support for your team's interest in walking and bicycling as ways to promote health. A liveable city is walkable!

Talk about your WABSA Project. As you meet people and build rapport, talk about your team's interest in assessing the walkability and bikeability of your neighborhood. Show them the assessment tools. Point them to the WABSA website (www.unc.edu/~jemery/WABSA) for more information. The goal is to develop relationships with these professionals because you may work closely with them as you influence how improvements are made in your community.

IDENTIFY A LOCATION

Now that you have introduced yourself to other physical activity enthusiasts, the planning department and elected officials, and you have learned what is happening in your local area regarding improvements for walking and bicycling, it is time to start assessing the environment.

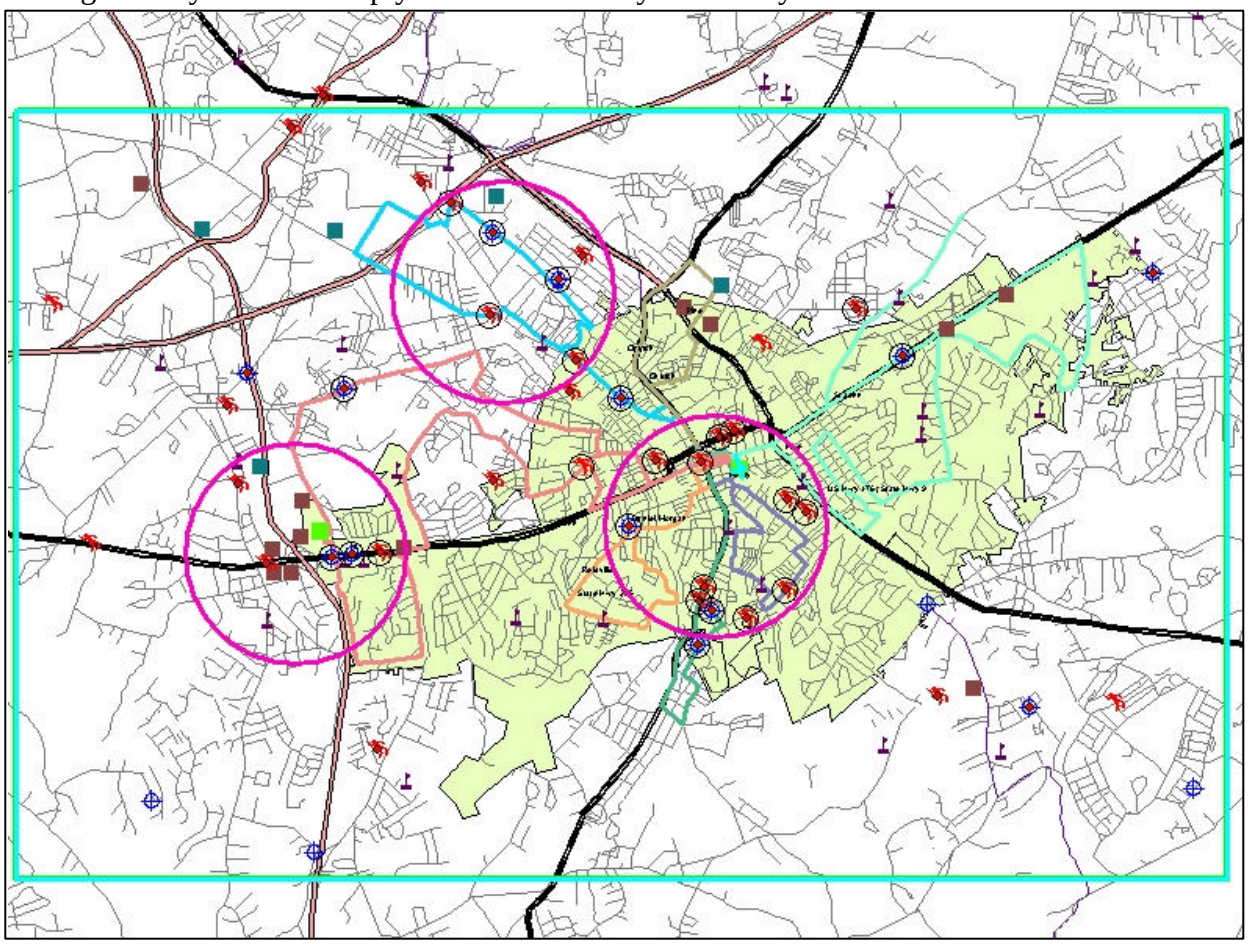
1. **Identify your project area(s).**
   You will need information to help you decide on project area(s). Those data will probably be available from your local planning department. To foster a sense of collaboration with them, describe the project you hope to coordinate, get their feedback, and detail some of the data that you will need. Learn if they have computer mapping programs (called GIS, an acronym for Geographic Information Systems) and if you could have 1-3 maps created that show the locations you are considering as possible project areas. If they cannot offer you GIS maps, request the relevant data and map it yourself on a photocopier-enlarged street map. If you can't seem to get assistance from any local staff, visit your local library and start building your own map of the information. Ask for help from the reference librarians.

DATA TO REQUEST:

- Roads (e.g., arterials, collectors, and local streets)
- Sidewalks (if your planning department has a sidewalk inventory)
- Public transit routes (e.g., bus, lightrail)
- Parks and greenways
- Major destinations for walking/bicycling (e.g., schools, colleges, libraries, downtown commercial districts, offices complexes, malls and shopping centers)
- Pedestrian crashes with motor vehicles in last 5 years (including date, time of day, weather, number injured, number of fatalities, address, and nearest intersection)
- Bicycle crashes with motor vehicles in last 5 years (including date, time of day, weather, number injured, number of fatalities, address, and nearest intersection)

The next step is to study the map and look for <u>significant overlap</u> of crashes, public transit and destinations. The overlapping of uses and injuries may make this a good location to begin assessments. However, also consider the population you want to serve (e.g., where do they mainly reside in relation to the majority of crashes and destinations?). Draw a circle around each location (approximately ½ to 1 mile in diameter). With your group prioritize the areas according to what seems most important to your community.

2. **Identify roads to assess for walking and bicycling.**
   Here is an example of a GIS map for a walking and bicycling suitability assessment project. The circles identify three project areas where crashes, public transit, and destinations (e.g., schools and office complexes) are geographically close together. The image is only meant to help you see how data symbols may cluster.



   If your team looks at the mapped information, but you just can't make sense of it – find some people in your community who walk or bicycle a lot. Ask them to study the maps with you. Let their experience and knowledge help you select areas with problematic roads, intersections, or schools that are "unsafe" for walking.

3. **Identify road segments to be assessed.**
   Identify the roads you want to assess. One way to do this is to assess all the roads within the project circle they drew on the map. Divide each road into segments that are between one block and 2 miles in length. Don't create any road segments longer than 2 miles – try to keep them short (a few city blocks). **Important: Be sure to divide roads into segments whenever the road changes travel direction, number of through lanes, posted speed limit, width, or where there is a dramatic change in conditions** (e.g., a physical median appears between traffic lanes, the curb and gutter ends and becomes paved shoulders, the pavement condition is dramatically different in quality). Identify the crossing streets at the two ends of the segment.

4. **Assign an ID number to each road segment.**

To help you keep track of the road segments, identify each road segment by giving it a unique identification number. We suggest that you keep a list of all the road segments you will be assessing along with their unique identification (ID) number.

GIS: If your local planning department has the ability to map road information using GIS programs, request a paper map of your project areas along with a spreadsheet table of the road data (for example, an Excel spreadsheet). Be sure the road dataset includes both the name and an ID number for each road. Use those ID numbers for your assessment forms. The ID number will be very important to be able to link the assessment results back to their GIS program, so that they can color-highlight the road segments according to their suitability (that is covered in the next chapter). As you subdivide road segments, simply add a suffix to the end of the ID number (for example, 13754a and 13754b).

No GIS: If you are using only paper maps of your own creation, then simply assign each road segment a unique ID number (for example, you could start with #101). If during the assessment you notice that major road characteristics (e.g., speed limit, width) change dramatically within a road segment, simply subdivide that segment and assign each piece an alpha suffix (for example, 101a, 101b, etc.).

5. Obtain traffic counts (AADT) from the planning department.

To assess suitability you will need traffic counts (also called Annual Average Daily Traffic, or AADT) for each road segment. This can be the most challenging piece of information to collect. Our first suggestion is to see if your planning department or traffic engineering department have the data on computer file (sometimes it is kept in paper files or notebooks). They may not have the traffic counts for every road segment you want to assess, but they may be able to help you determine what road segments are similar to ones for which they do have counts. With their professional guidance you may be able to substitute counts.

What if you cannot find any traffic counts? You can estimate by counting the passing automobiles. It just takes time and a good stopwatch. See **Appendix 1** for our suggested method to estimate traffic counts.

6. Create a map of the area – one you can color highlight the roads.

You will need a map to display the results of your assessments. One map for walking. A different map for bicycling. Each road will be color highlighted (using GIS, markers or color pencils) to show how suitable it is for walking or bicycling. That map will become quite useful for studying the patterns of walkability or bikeability. You will quickly see the "hot spots" where improvements are needed.

GIS. If the planning staff have GIS computer mapping software, see if they can use your data to make maps of the project findings. They may request an Excel file of the final assessment scores for each road.

No GIS. If you don't have access to GIS mapping, you can use a paper road map and color each road segment based on the final suitability score.

7. **Identify greenways and other walking/bicycling trails on your map**
   If you learned of any non-road/non-sidewalk paths for walking and bicycling, mark these alternative paths and greenways on your working map. You will not be assessing these off-road paths, but you are including them on the maps for later reference when planning a potential network of routes for walking and bicycling.

8. **Identify key destinations or obvious landmarks on your map**
   GIS. If the planning staff is creating GIS maps, ask them to plot some local landmarks. These landmarks might include churches and other faith centers, libraries, museums, parks, post offices, historic areas, recreation facilities (e.g., pools, tennis clubs), schools, colleges, shopping centers, and major businesses.
   No GIS. If you are developing your own working map, use your knowledge of the area to map these landmarks by drawing symbols on your working map. Be sure to develop a separate "key" or "legend" that shows what the symbols represent.

9. **Get out there and assess!**
   Depending on the length of the segment and what mode of travel each person chooses (walking or bicycling) each segment may take between 10 and 30 minutes to assess. We do not encourage driving the segments in a car, because it is not safe to assess the road segment while also driving a motor vehicle. It is also difficult to "feel" the suitability of certain characteristics when inside a motor vehicle.

   Get your assessment team mobilized and identify a timeframe for completing assessments. Start small and make it a fun event (for example, collect information on a Saturday morning and follow-up with a potluck lunch or pizza). Over a series of weekend mornings, you'll be surprised how much a team can assess! Be sure to have celebrations as you meet your assessment goals.

What You'll Need to Bring

- Clipboard
- Blank assessment forms
- Pencil or pen
- Steel tape measure
- Bright orange safety vest (contact your Dept. of Transportation to borrow some)
- This Guidebook in case you have questions

Assessing the Walking Environment

DESIRABLE ATTRIBUTES FOR WALKING

Walking is the oldest form of human transportation. People walk to reach specific destinations. Many people also walk for recreation, including enjoyment and exercise. Walking contributes to the creation of more "livable communities," because people who walk are more likely to know their neighbors. Neighborly interactions, encouraged by walking, make neighborhoods enjoyable and safer places to live. However, many homes are located on roads where walking is dangerous because they lack adequate sidewalks. Improving the physical walking environment is an important part of building a livable community.

General Design Principles for Sidewalks

1. Interconnected destinations
2. Safe to use (e.g., signals, crosswalks, lighting)
3. Accessible to everyone (e.g., curb ramps)
4. Easy to use
5. Useful
6. Beautiful (e.g., landscaping)
7. Economical to build and maintain

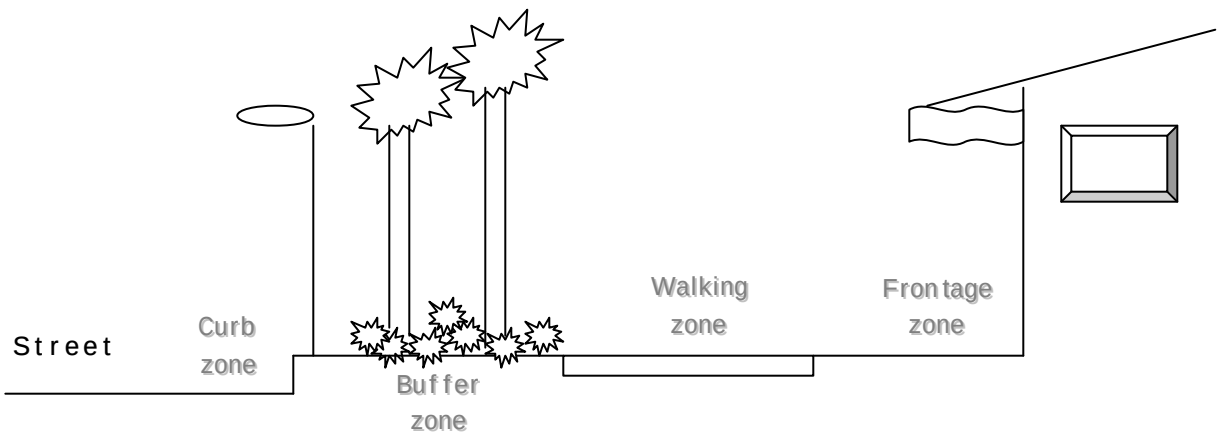
Adapted from City of Portland Office of Transportation, *Portland Walking Design Guide*. June, 1998.

Research shows that almost 80% of people are willing to walk up to ½ mile to reach their destinations. Twenty percent of people are even willing to walk up to two miles to reach their destinations (www.smartraq.net/survey.htm; US DOT, 1994). However, it is not just distance that affects a person's choice to actually walk to a destination. Characteristics of the walking environment also affect this choice. Some characteristics are beyond the control of people designing the walking environment, like the weather and the surrounding landscape. Other characteristics can be incorporated into the design of the walking environment. These characteristics are incorporated into seven general design principles which can guide the design and improvement of sidewalks for walking and wheelchair use.

THE WALKING ENVIRONMENT HAS FOUR "ZONES"

Regardless of the type of street, the walking environment generally consists of four zones (Figure 1). The zones map out the walking environment from the edge of the pavement where there may be a curb and parked cars, through the buffer zone where trees, streetlights and benches may be located, through the walking zone of the sidewalk, to the frontage zone where there may be business displays, vendors tables, café seating, a residence, or a parking lot. The walking suitability assessment method assesses from the curb through the walking zone. However, a community can influence all four zones to enhance the complete walking experience (e.g., promoting residential frontage beautification and business/restaurant frontage that overflows onto extra-wide sidewalks to encourage walker patronage). For more information, request a copy of "A Walkable Community," an illustrated publication by USDOT (#FHWA-SA-00-010). Also visit the following internet website: http://safety.fhwa.dot.gov/programs/ped_bike.htm.

Figure 1. Walking Environment (Sidewalk) Zones



A CLOSER LOOK AT SOME WALKING FACILITIES

This photograph illustrates the four sidewalk zones on a downtown sidewalk. From the right to the left side of the photograph are the curb zone at the edge of the street; the buffer zone with signs, trash receptacles and a bicycle (notice the brick pavers used to visually differentiate the zone); the through walking zone where the woman is walking; and the frontage zone where the storefronts meet the sidewalk.

What recommended width for sidewalks? The Institute of Transportation Engineers recommends **5 feet** to allow two people to walk side by side comfortably. Visit this website for details: www.walkinginfo.org. Go to the "Pedestrian Facility Design" page for design suggestions.

This photograph illustrates the same four sidewalk zones in a residential setting. The curb zone is at the edge of the street, the buffer zone has a wide strip of grass and shrubbery, the through walking zone is where the man is jogging, and the frontage zone is the landscaped stone wall at the edge of a residential yard.

This photograph illustrates one form of curb ramp that allows a wheelchair to leave the sidewalk zone from either direction of travel and enter the road within the crosswalk. Notice the gentle slope of the ramp and the patterned texture that helps visually and texturally distinguish the ramp area. Curb ramps differ markedly in their design and effectiveness for gently guiding wheelchairs to the street level.

In this photograph the clearly marked crosswalk stretches from one curb ramp to the other curb ramp. The markings are in good condition and the curb ramp safely guides a wheelchair directly into the crosswalk boundaries.

WALKING ASSESSMENT METHOD

For a community to be "walkable" there should be sidewalks, greenways, and walking paths that provide a safe and accessible route for walking that is separated from motor vehicle travel. The walking assessment method examines information about the presence or absence of sidewalks, the material used for the surface of the walkway, the sidewalk width, the buffer width, and the presence or absence of curb ramps and streetlights. This assessment tool is only designed to assess actual sidewalks. Do not use it to assess unplanned trails or "desire trails" that walkers have made along the side of a road; those paths would not be considered a developed dirt sidewalk (Sidewalk/Path = None).

Supplies You Will Need

1. List of your road segments
2. Map of road segments
3. Walking Suitability Assessment Forms
4. 20' retractable tape measure
5. Clipboard & pencils
6. Guidebook for reference
7. Safety equipment (e.g., orange vests, caution signs).

1. **Become familiar with the Walking Suitability Assessment Form.**
   Encourage each member of the data collection team to carefully examine the Walking Suitability Assessment Form (Appendix 2) and become familiar with the information they will be collecting. Before heading out to assess the roads, each person or team should gather the supplies needed for the assessment. Be sure assessors take a copy of the guidebook into the field in case there are questions about the procedure.

2. **Travel the road segment and observe the characteristics.**
   Only assess segments in daylight when you will be clearly visible to motor vehicles. Study both sides of the road segment for an "overall" score for each characteristic. It may help to travel the road once to view the entire walkway segment before writing anything down. Then begin filling out the data collection worksheet. For each characteristic, record the score in the space provided. Record your overall or average impression for the entire segment. If it is difficult to find an average impression, be more conservative in your scoring (e.g., imagine yourself in a wheelchair or pushing a baby stroller on that sidewalk). If there are specific spots where conditions are worse than the average, note that under "Isolated Problem Spots" and complete the table at the bottom of the form. Do not record temporary conditions from construction. Try to capture the permanent characteristics of the road after construction is completed. For each characteristic, record the score in the space provided.

   What Characteristics Are Being Assessed?

   1. AADT
   2. Speed
   3. Number of through lanes
   4. Presence of a sidewalk
   5. Sidewalk material
   6. Sidewalk surface condition
   7. Sidewalk width
   8. Buffer width
   9. Curb ramps
   10. Street lights
   11. Isolated problem spots
   12. Intersections

3. **Record information on the Walking Suitability Assessment Form (Appendix 3).**

   AADT. Record the score for the annual average daily traffic.
   Posted speed limit. Record the score for the posted speed limit.
   Number of through lanes. Record the score for the number of through lanes (for both directions of travel).
   Presence of Sidewalk. If there is no actual sidewalk or planned path (or only a very tiny patch of sidewalk for the entire segment) record "99" and do not answer any other questions. Just total the score up to that point and record in the final column "Total Score." Do not assess the rest of the information for this segment, since there is no sidewalk. (The scores 99 and higher will draw attention to areas where sidewalks may need to be constructed, especially on busy streets.) However, if there is a sidewalk, record the presence of sidewalk that exists on both sides of the street. To be continuous, the sidewalk must run the full length of the segment. For example, if there is only sidewalk present on one side of the street and it alternates from side to side, record that as "both sides partial." The safety concern is that a walker must keep crossing the street to use the sidewalk.
   Sidewalk Material. "Dirt" should only be designated when it is obviously a constructed walking pathway (not just a "desire trail" that formed from repetitive pedestrian use). If the material changes in alternation down the length of the segment, choose the predominant material. If it is difficult to choose one main material, then be conservative

and choose the material that causes the most problem for walking or wheelchair use. If the segment has a couple of different materials, each used for about half of the segment, you might want to subdivide that segment to record it more accurately.

Surface Condition. This is your opinion on the permanent condition of the sidewalk. Do not record any temporary conditions due to construction or debris (e.g., scattered gravel or dirt on the sidewalk).

Sidewalk Width. Measure the full width of the constructed sidewalk's walking zone at a location that best represents the average width you've observed. Don't let temporary barriers, such as vegetation, prevent you from measuring the width (i.e., push aside the grass or vegetation to measure between the edges of the sidewalk). However, do note any permanent barriers that reduce the sidewalk width in isolated locations (e.g., streetlights and trashcans). Where Sidewalk and Buffer are constructed of the same material and it is hard to identify the boundary, be sure to check for objects that would designate the buffer area, such as newspaper boxes, benches, landscaping, streetlights, etc. If you can't discern a buffer zone, it probably does not exist - many sidewalks don't have buffers.

Buffer Width. Measure from the edge of the curb farthest from the street to the edge of the sidewalk itself. Observe the changing width and measure where it seems about average in width. If a significant portion of the segment has no buffer at all, be conservative and use that as the score. Where Sidewalk and Buffer are constructed of the same material and it is hard to identify the boundary, be sure to check for objects that would designate the buffer area, such as newspaper boxes, benches, landscaping, streetlights, etc. If you can't discern a buffer zone, it probably does not exist - many sidewalks don't have buffers.

Curb Ramps. If every sidewalk has a curb ramp to lower it to street level at intersections, record "Yes." If some are missing, record "Some." Otherwise, if none are present, record "None."

Adequate Lighting. This is your opinion on the adequacy of street lighting for evening walking. Is there enough to adequately illuminate the walking area of the sidewalk?

Isolated Problem Spots. Record "Yes" if there are isolated spots where a certain characteristic does not maintain the average score you selected. For example, a sidewalk where most of the ½ mile length is concrete except for one 20' section of gravel.

Intersections. For each road intersection in the segment (including intersections at the beginning and ending of the segment) use your judgement to determine if any of the intersection problems apply. If you check a "Yes" box for <u>any</u> of the intersection problems, complete the table at the bottom of the form. Give a brief reason why you believe the design improvement is needed.

4. **Proceed to the next road segment.**
   Proceed to the next road segment and continue your assessments. If two road segments include the same intersection, assess the intersection problems for each segment. It will not affect the suitability scores, and will ensure the problems are adequately noted.

5. **Calculate the final walking suitability scores.**
   Use a calculator or computer spreadsheet program (e.g., MS Excel) to sum the various columns and determine the final walking suitability score for each road segment.

6. Color highlight the road segments on your map.

When the final scores are determined, color highlight each assessed road segment on a large map. Use the colors listed below. Attach to the map a photocopy of the suitability score color description. Note: *the "cooler" the color - the better the street for walking*.

Walking Suitability Assessment (Emery Method, V.040802) **Scores and Colors:**

Very Good (less than 3.0) – color **blue**.
These sidewalks are generally good for walking and wheelchair use.

Good (3.0 – 5.9) – color **green**.
These sidewalks provide basic walking access, but could be upgraded to improve the walking and wheelchair environments. Improvements might include enhancing the surface material or condition, and installing more lighting.

Fair (6.0 – 8.9) – color **yellow**.
These sidewalks need improvements to ensure an adequate walking environment. Improvements might include lowering the posted speed limit, improving the surface material or condition, installing or widening buffers.

Poor (9.0 – 26.0) – color **orange**.
These sidewalks need major improvements to enable safe use. These types of improvements include replacing unfirm surfaces (e.g., gravel or dirt), repairing broken sidewalk sections, constructing curb ramps for wheelchair access, or constructing a continuous sidewalk on at least one side of the street.

No Sidewalk on quiet street – (99.0) – color **pink.**
No Sidewalk on busy street – (more than 99.0) – color **red**.
When there are no sidewalks, travel beside the road on foot or wheelchair is not safe or comfortable (especially if the street has frequent, high-speed traffic). If these roads provide links between residential areas and frequent destinations, the need for sidewalks is greater.

GIS: If you received GIS maps from your planning department, ask them to colorize the road segments by adding a new "field (column)" called Walking Suitability Score. To make this easier for them, your team can data enter the walking suitability scores into a Microsoft Excel spreadsheet that has just two columns: Road ID# and Walking Suitability Score. They can merge your spreadsheet with their original data table and then colorize the road segments using their GIS program.

No GIS: If you do not have computerized maps, simply use a large road map and color each road segment by hand using color highlighters or color pencils.

Assessing the Bicycling Environment

DESIRABLE ATTRIBUTES FOR BICYCLING

General Design Principles For Bike Lanes

1. Well marked
2. Safe from vehicles
3. Clear of debris
4. Free of potholes and cracking
5. Safe turn lanes

Adapted from City of Portland Office of Transportation, *Bicycling Master Plan*. 1996.

The most suitable bikeways are well-designed, clearly marked, well-maintained, and keep bicyclists safe from vehicles. Preferred bikeway surfaces are free of potholes, cracking, and other rough spots. In addition, the bikeway is safer when there is no turning or merging traffic crossing in front of the bicyclist. Many people presume that "bike lanes" are the best solution for all circumstances. However, some transportation engineers suggest that striped bike lanes can provide a false sense of security to bicyclists who then pay less attention to motor vehicle traffic. Some design professionals suggest that striped bike lanes are appropriate only on streets with reduced traffic access from sidestreets and driveways. And on many roads without curb and gutter, wider paved shoulders could allow bicyclists to more safely share the road with motor vehicles. There is no single solution for the design issues of your community's roads. Each road must be considered independently to determine the best design for bicycling facilities. This assessment method will help you gather important information to help plan bicycling improvements for your roads.

ROAD ASSESSMENT METHOD

1. **Become familiar with the Bicycle Suitability Assessment Form before going into the field.**
   Encourage each member of the data collection team to carefully examine the Bicycle Suitability Assessment Form (Appendix 4) and become familiar with the information they will be collecting. Before heading out to assess the roads, each person or team should gather the supplies needed for the assessment. Be sure that assessors take a copy of the guidebook with them in case there are questions about the procedure.

2. **Travel the road segment and observe the characteristics.**
   Only assess segments in daylight when you will be clearly visible to motor vehicles. We encourage you to travel the segment by bicycle because if you are in an automobile you may not be able to "feel" the surface of the road or stop as often as you need to record information. You will probably benefit by traveling the road more than once. Please do not rely on memory, but take the time to travel the road as many times as needed to record all the information.

   Study both sides of the road segment to determine an "overall" score for each characteristic. If it is difficult to find an average impression, be more conservative in your scoring. For example, if the curb only exists for less than half the road, mark it

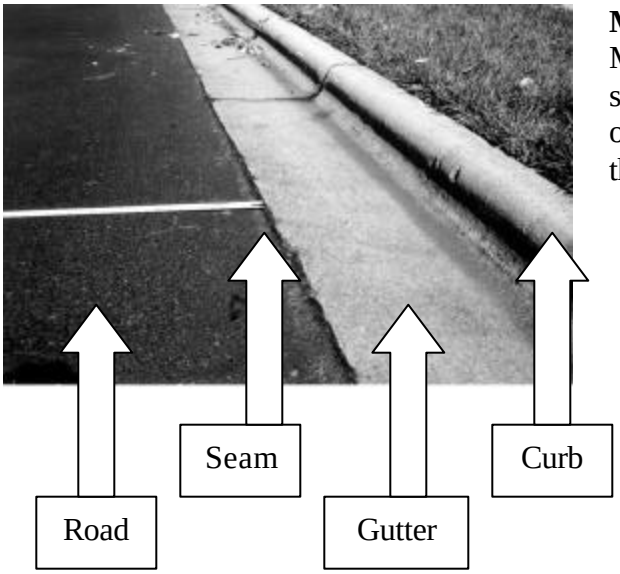
"No." Do not record temporary conditions due to construction or bad weather. Try to capture the permanent characteristics of the road after construction is completed. For each characteristic, record the score in the space provided.

3. **Record information on the Bicycling Suitability Assessment Form (Appendix 5).**
For each road segment, fill in the date, your name, the segment ID number and the boundary roads on the Bicycle Suitability Assessment Form. Record any comments or notes that seem immediately useful for the assessment process, such as "no bike lane, but gravel path parallel to the roadway".

4. **Record General Road Factors.**
Record the Annual Average Daily Traffic (A1) provided by the planning department or regional DOT. While assessing the road segment, record the total number of through lanes (A2). Through lanes do not include turn-only lanes, but do include combined through/turn lanes. Record the posted speed limit (A3). Do not record school zone speed limits that are in effect only during certain times of day. The next step is to measure the outside lane width (A4) and convert your measurement to decimal format for recording on the sheet (e.g., 4'6" converts to 4.5' and 4'9" converts to 4.75'). See the special instructions and photograph below. Note that any dramatic change in these general road factors might necessitate dividing the road segment into sub-segments (and numbering them with an alpha suffix, e.g., 101a and 101b).

What Characteristics Are Being Assessed?

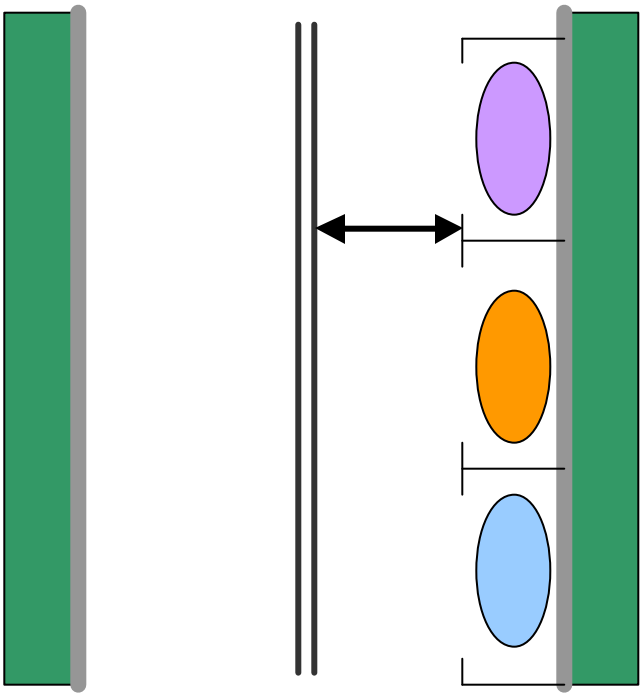
1. Annual Average Daily Traffic (A1)
2. Number of through lanes (A2)
3. Speed (A3)
4. Outside lane width (A4)
5. Bike lane width (A5)
6. Pavement factors (B)
7. Location factors (C1-C18)



Measuring the outside lane (A4):
Measure from the edge of the driver's side painted stripe of the outer-most motor vehicle lane to the outer edge of that travel lane. Be sure to convert the measurement to decimal form for recording.

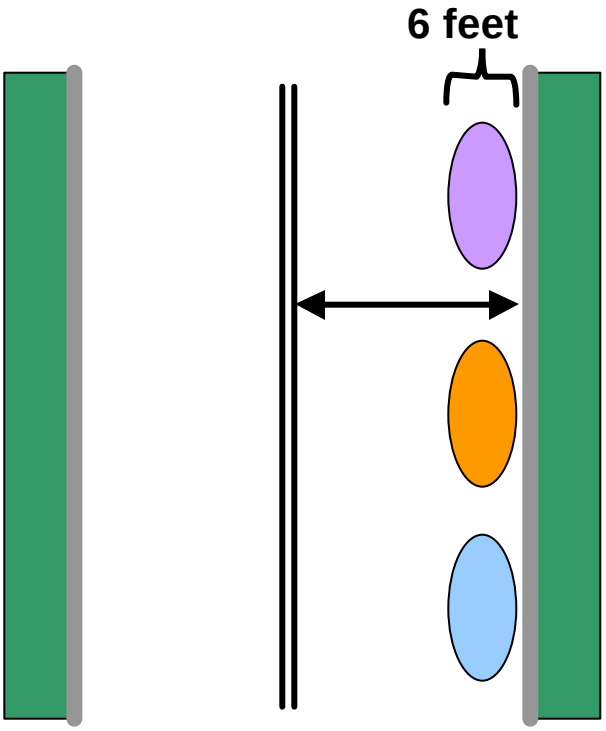
1) For roads with a striped shoulder, measure up to the stripe marking the shoulder.
2) For roads with a curb and gutter, measure to the gutter seam (see photo).
3) For roads with curb only (no gutter), measure right up to the curb.
4) If there are no painted lanes on the two-way road, measure the entire road surface and divide by two.

When measuring outside lanes that include vehicle parking, follow the instructions illustrated below.



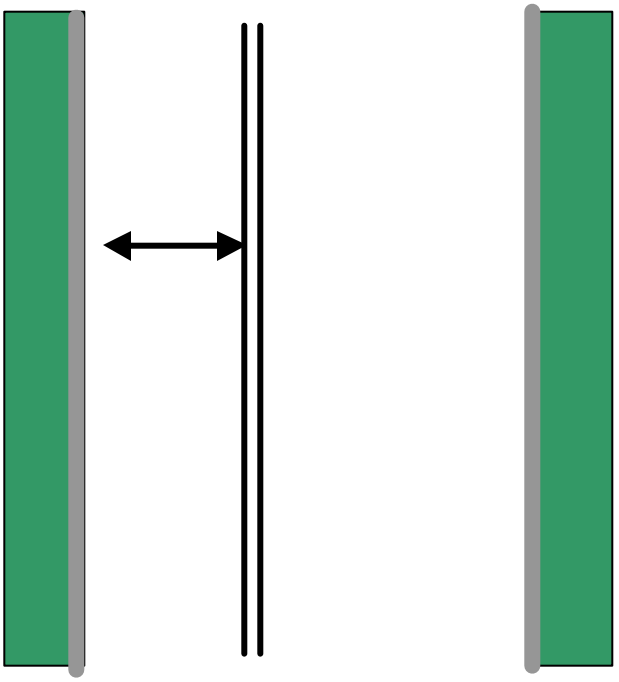
Special measurement instructions for roads with painted parking spaces:

Measure from the edge of the driver's side painted stripe of the outer-most motor vehicle lane up to the beginning of the parking space. The logic is that a bicyclist would not be riding in the marked parking spaces because of parked cars or even the visual markings. The bicyclist would share the outside lane with motor vehicles.



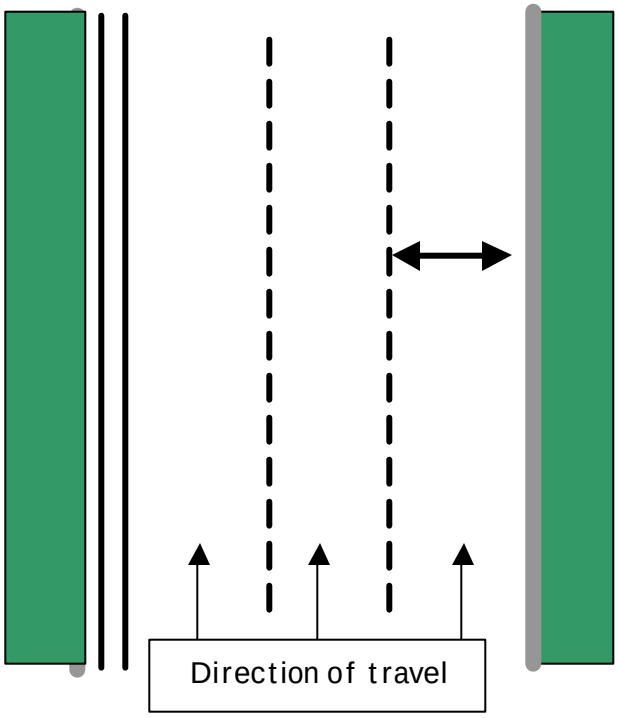
Special measurement instructions for roads with unpainted parking:

If roadside parking is permitted and used (may not necessarily be signed), and there are no painted parking spaces, measure the width of the outer-most lane according to the general instructions and subtract six feet (6') from the width. The logic is that when cars are parked there, a bicyclist must share the remaining width with motor vehicles.



Special measurement instructions for roads with unequal outside lanes:

If the outside lanes on each side of the road are significantly different widths (perhaps parked vehicles are permitted on side and not the other) measure the outside lane that is narrower. For example, a road may have a very wide outside lane traveling in one direction and a narrow lane in the other direction. The narrower outside lane is the lane to measure for the road segment. The logic is that a bicyclist should be able to travel in both directions – therefore, measure the narrower lane the bicyclist must share with motor vehicles. In the Comments/Suggested Improvement box at the top of the form write, "Unequal Outside Lanes."



Special measurement instructions for one way streets:

One way streets present unique challenges to bicyclists. Most of the time, the bicyclists will be riding on the far right side of the street sharing the outermost lane. It is only when making a left turn that the bicyclist would cross the lanes of traffic and ride in the left lane. Therefore, measure the far right side lane as the "outer lane".

BikeLane. A bicycle lane is a clearly marked/striped lane for bicycle travel that is constructed as part of the paved roadway. It is not a separate path, therefore motor vehicles could illegally drive or park on the marked bikelane. Generally the bicycle lane is clearly striped on the road and may include signs designating it for "Bicycle Use Only." The photograph below is of a marked bicycle lane.

Paved Shoulder. A paved shoulder is frequently observed on roads that do not have curb and gutter. The paved shoulder may be used by cyclists to provide more separation from motor vehicle traffic. However, it is NOT a bicycle lane unless marked and signed as such.

Measuring a bicycle lane or paved shoulder (A5):
To measure the bike lane or paved shoulder, you must measure from the edge of the inside painted line to the outside painted line. If there is no outside painted line, measure to the edge of the paved road surface. Convert the measurement to decimal format for the assessment formula.

The photograph to the left illustrates a bicycle lane near the curb. Measurement is from the painted line to the edge of the curb.

5. **Identify Pavement Factors (B).**
Record the condition of the road according to the FHWA Highway Performance Monitoring System (HPMS) Pavement Condition Factors (US DOT, 1987) listed below. Note that these descriptions are for motor vehicle travel, so you may need to think as a car driver when assessing pavement condition. Decide which one describes the overall condition of the pavement.

Very good: only new or nearly new pavements are likely to be smooth enough and free of cracks and patches to qualify for this category.

Good: pavement, although not as smooth as those described above, gives a first class ride and exhibits signs of surface deterioration.

Fair: riding qualities are noticeably inferior to those above, may be barely tolerable for high-speed traffic. Defects may include rutting, map cracking (the surface has thin cracklines covering sections of it, as if it were a roadmap), and extensive patching.

Poor: pavements have deteriorated to such an extent that they affect the speed of free-flow traffic. Flexible pavement has distress over 50% or more of the surface. Rigid pavement distress includes join "spalling" (where sections of joined pavement are chipping and breaking apart at the join), patching, etc.

Very poor: pavements that are in an extremely deteriorated condition. Distress occurs over 75% or more of the surface.

Other pavement factors include the presence of a curb (B2), the presence of rough railroad crossings (B3), and the presence of storm drain grates (B4). A storm drain grate is in the road or gutter surface and frequently has a cover that allows the rainwater to flow through into the storm sewer below. The concern is that a bicyclist might ride across this surface and compromise their tire traction. A storm drain grate is not the vertical opening cut into the curb along the side of the street which allows water in the gutter to discharge from the street surface.

6. Record Location Factors (C).

Record the presence of the 18 location factors by circling "yes" or "no" as appropriate. At the end of measurement, you will total only the scores for every factor that is answered "yes." Consider each location factor as independent characteristics. For example, a road segment could have both severe and moderate grades.

Some location factors require your opinion (for example: severe grade (C8), moderate grade (C9), frequent curves (C10), restricted sight distance (either horizontal or vertical) (C11), numerous residential or commercial driveways (C12), numerous signed/signaled stops (C13), and difficult intersection crossing (C14)). Use your best judgement as a bicyclist when recording these location factors.

Below are descriptions and sample photographs of some of the location factors.

Physical median (C5):
A strip of land that physically separates the two directions of traffic. Note this is not a limited traffic island near a signalized intersection. Medians are generally used for significant distances of roadway.

Paved shoulder (C6):
The area from the outer most painted line to the end of the pavement or to the curb and gutter.

When are paved shoulders useful for bikes?
Best practices from several bicycle-friendly cities present widths ranging from **4 to 5+ feet** depending on guardrails and speed of traffic. Visit this website for details: www.bicyclinginfo.org. Go to the "On-Street Facilities" page for design suggestions.

Bike lane (C7): A separate lane on the road that is for bicycle use only. It is identified for bicycle-use-only with painted road markings and/or posted signs.

What recommended width for bikelanes? Best practices from several bicycle-friendly cities present widths ranging from **4 to 5 feet** depending on curbing and parked cars. Visit this website for details: www.bicyclinginfo.org. Go to the "On-Street Facilities" page for design suggestions.

Industrial Land Use (C15): Property alongside the road that is occupied by a manufacturing plant, factory, warehouse, or other large industrial facility that has a driveway or road accessed from the segment you are measuring. The safety risk is from the high volume of large trucks crossing in front of bicyclists to enter or exit the industrial property.

Commercial Land Use (C16): Property that is used for business, such as a grocery store, movie theatre, university or school, church, office building, fast food restaurant, or shopping center that has a parking lot or driveway accessed from the segment you are measuring. The safety risk is from the high volume of vehicles crossing in front of bicyclists to enter or exit the property.

One Sidewalk Only (C17) and No Sidewalks (C18): The presence of sidewalks can help reduce the speed of traffic on a road simply because there is a visual "cue" to the driver that other forms of transporation occur on that road, so caution must be used. Visual interest and complexity along the road, such as sidewalks, can help increase driver attention by alerting them to people moving along the road on foot or on bicycle. Therefore, these limited sidewalk assessments contribute to the bicycling score for the segment. Assessing the sidewalk presence is not meant to imply that bicyclists should use the sidewalk for riding bicycles. We strongly discourage bicyclists from riding on sidewalks since that creates an unsafe walking environment.

7. **Complete the bicycle suitability formula.**
   Add up the various suitability subtotal scores. Complete the formula on the Bicycle Suitability Assessment Form by filling in the General Road Factors measures (A), the Pavement Factors total score (B), and the Location Factors total score (C). Use a calculator or a computer spreadsheet program (e.g., MS Excel) to calculate the bicycle suitability score and record in the box provided at the end of the formula.

8. Color highlight the segments on the map.

When the final scores are determined, color highlight each assessed road segment on a large map. Use the colors listed below. Attach to the map a photocopy of the suitability score color description. Note: *the "cooler" the color - the better the road for bicycling*.

Bicycle Suitability Scores and Colors: Adapted from: Eddy, N. (1996)

Very Good (less than 3.00) – color **blue**.
A road that is bicycle friendly and usable by all levels of bicyclists. There are few improvements needed.

Good (3.00 - 3.99) – color **green**.
A road that can be used safely by most bicyclists. Minimal improvements may be needed.

Fair (4.00 - 4.99) – color **yellow**.
A road that has some hazards, but can be still be used by adults for bicycling. Not recommended for children. Specific improvements are needed.

Poor (5.00 - 6.99) – color **orange**.
This road has many hazards and would require adult bicyclists to be very careful. Not safe for children. Many improvements are needed.

Very Poor (higher than 6.99) – color **red**.
This road has many hazards, heavy traffic and bad road conditions. Not safe for any bicyclists. Improvements are greatly needed.

GIS: If you received GIS maps from your planning department, ask them to colorize the road segments by adding a new "field (column)" called Bicycling Suitability Score. To make this easier for them, your team can data enter the bicycling suitability scores into a Microsoft Excel spreadsheet that has just two columns: Road ID# and Bicycling Suitability Score. They can merge your spreadsheet with their original data table and then colorize the road segments using their GIS program.

No GIS: If you do not have computerized maps, use a large road map and color each road segment by hand using color highlighters or color pencils.

Improving the Environment

1. Study the network of color-coded roads.

Take some time as a team to study the maps you've created. Look for patterns in the colors that help you understand the patterns of barriers to walking and bicycling.

Imagine yourself walking from residential neighborhoods toward key destinations such as town centers, universities, commercial areas, grocery stores, libraries, retail shops, schools, places of worship, and recreation areas.

Are blue and green segments connected to provide a safe network of travel for walkers and bicyclists to most of the popular destinations within your community? Do red or orange segments interfere with bicyclists or walkers ability to safely reach their destinations? Are there road segments which are hazardous to both walkers and bicyclists? Consider the road segment intersections which the assessment identified as needing improvements for suitable walking and bicycling. How could those improvements become part of the bigger picture of an improved road network? If hazardous road segments or intersections are barriers to having safe links between important destination points (e.g., from schools to parks), they may be high priority for improvements.

Improve Your Travel Network

This is the time to improve the network of sidewalks and roads that connect travel origins to travel destinations. It is the time to enhance the connectivity from neighborhoods to commercial districts, schools, cultural centers, parks, etc. Use your mapped data, and the experiences and ideas of your team, to study and improve the suitability and connectivity of the road networks in your community. Remember that the maps also include alternative pathways. Build a travel network that connects walking and bicycling routes and that integrates the alternative pathways.

2. Are any improvements already planned?

This is the time to ask planning staff about any future planned development or sidewalk/road construction that may impact the "poor" condition areas on the map in the next few years. Depending on your municipality's resources, this type of information may be available via their website. If not, try to obtain photocopies of the relevant ordinances, and copies of technical reports (even just Executive Summaries with maps will help) outlining the planned development or construction.

3. Improve the "connectivity" between where people live and where they want to go.

Your town or county may already be planning improvements to some roads. Your data can help by identifying specific walking or bicycling challenges. Your team may be able to suggest a series of improvement projects for officials to consider and vote upon. For instance, Project 1 may be to improve the unsuitable roads around schools. Project 2 may be to improve the unsuitable roads around governmental service institutions (e.g., post office, library, health department, museum, centers of worship). Project 3 may be to improve the unsuitable roads around major worksites or centers of worship. Prepare a list of recommendations for improving the roads in each project.

Be creative when presented with design problems. For example, in areas where road width improvements are not possible because the town has no funding to purchase private property "right of way," you could try planning the road network to link with public transit. This solution would also provide transit support for bicyclists when the weather turns bad, if they have to ride at night, or if personal safety is an issue.

4. Plan for supportive amenities like benches, water fountains, and shade trees.

Developing a road and sidewalk network is only one part of enhancing the physical activity environment. Another important design consideration is to provide supportive facilities at major destination points and along busy walking and bicycling routes. Design lockable parking facilities for bicyclists. Consider lighting along the routes and at destination points. Is there adequate street lighting or should supplemental lighting be considered? Consider installing public restrooms, water fountains and benches at appropriate locations. These final design issues should be developed within the larger, more comprehensive "master" plan for improved walking and bicycling in your community.

5. Determine the best methods for contacting appropriate policy makers.

Work with your team and the planning staff to prioritize the key officials and other decision-makers who must be contacted regarding your ideas for walking and bicycling improvements. It is important to prepare for these meetings, since support of these officials will be vital to making policy and environmental change happen. There are many ways to build support for change:

- directly contacting policy makers
- using the media to build public support and "political pressure" for change
- coordinating local citizens' advocacy efforts (like rallies or petitions)

Different policy makers may respond to different techniques or methods. Therefore, talk with your team and the planning department and use an appropriate combination of these methods. Rely on local experience and knowledge – but keep in mind that sometimes change happens when you "shake things up a bit." You may be lucky and have complete support from planning staff and local officials. That is happening more and more. If you don't have that kind of support, don't be afraid to use your maps to begin educating officials and the general public.

6. Explore funding sources.

One of the first barriers you may hear about is the lack of funding. If policy makers suggest that the only way to improve the environment for walking is to bill each resident for the linear feet of sidewalk constructed on their property, then research may be needed by your team and the local planning staff to identify federal and state funding opportunities. Funding is available to municipalities and counties seeking to improve their alternative transportation facilities (e.g., bike lanes, bike paths, and sidewalks). Communities with a plan for bicycle and walking improvement projects will be better prepared to develop competitive applications for these sources of funding.

Here are some funding sources to consider. Your local planning staff will probably be quite familiar with sources.

Transportation Enhancement Funding

One approach for obtaining federal funding for bicycle and walking improvement projects is through transportation enhancement funding. Originally, the federal highway bill of 1991, the Intermodal Surface Transportation Efficiency Act (ISTEA), broadened the federal government's transportation focus to include transportation enhancement activities like beautification projects, the construction of bicycle and walking facilities, and the rehabilitation of historic transportation facilities. The ISTEA funding was continued through a second bill, the Transportation Equity Act for the 21st Century (TEA-21) signed by the President in June 1998. The transportation enhancement activities were structured to continue receiving funds from a 10% mandatory "set-aside" from Surface Transportation Program (STP) Funds. The third iteration of the program, called TEA-3, may become legislation by the time this guidebook is released. For more information on the future of enhancement funding, see www.tea3.org.

Eligible walking and bicycle projects for enhancement funding include the construction of walking or bicycle facilities; safety and educational activities for walkers and bicyclists; walking streetscape improvements; and bicycle racks or maps for designated signed routes. If an enhancement project is proposed for an area with a metropolitan planning organization (MPO) the plan must first be developed in collaboration with the MPO staff. Remember, most enhancement projects funded by the Department of Transportation funds (administered by your state DOT) must be matched with 20% funding from a local source.

Local Municipality and State Funding

Many states and cities that maintain their own roads receive a yearly allotment of highway funds that can be used for sidewalks and other road enhancements that support walking and bicycling. In some states, revenue for these funds is authorized by the state legislature and is generated from taxes. State legislatures determine how these funds can be spent, and in many cases they can be used for the traditional road projects such as maintaining, repairing, constructing, reconstructing or widening of any street including bridges, drainage, curb and gutter, and other necessary equipment. State legislatures also have it in their power to determine that these funds may also be used to plan, build, and maintain sidewalks and bikeways located within the rights-of-way of public roads and highways. Traffic control devices and signage, such as walking crossings could also be considered acceptable projects.

Local elected officials within each municipality may have responsibility for choosing the specific projects to be funded. These types of local funds are frequently excellent sources of matching funds when applying for transportation enhancement fundings.

State DOT Highway Division "set-aside" for pedestrian/bicycling improvements
Some state Departments of Transportation (DOT) budget's include funds that are "set-aside" for pedestrian and bicycling improvements. Projects are generally chosen by the Highway Division Engineer and the Transportation Board (professional and citizen members). To learn if this funding can be used to make improvements identified by your assessments, contact your local transportation department or planning department staff. If they cannot answer your questions, contact the Highway Division Engineer's office to learn about the funds and how they are currently allocated. Request information about the members of your Transportation Board, and contact the appropriate members to discuss your project and your ideas for improving walking and bicycling facilities in the local area.

State DOT (Pedestrian and Bicycling) Transportation Improvement Programs
Some state Departments of Transportation (DOT) administer transportation improvement programs (TIPs) that emphasize walking and bicycling improvements. Your assessment results may yield excellent information for preparing a short proposal for this type of improvement funding. Smaller improvement projects may be easily included within existing road improvements that are still in the planning stages. Larger improvement projects may need to be separately funded and planned. This type of larger project can take time, but can be well worth the wait. If your community is within a Metropolitan Planning Organization (MPO), that staff will have to approve your project prior to submitting an application to the state DOT. Contact your local transportation department or planning department staff to learn about this program. If they cannot help you, contact your state DOT for information about the program and application guidelines.

Improving Policies for the Future

1. Develop new policies for changing existing roadways and new road construction.

Work with local planning or engineering staff to learn how to impact current and future policies that regulate the design and planning processes. As government employees they work within current regulations and procedures. Just remember, that your role as an agent of change is to learn how to influence the process and make it more supportive of healthy community design. Therefore, listen "between the lines" for procedural barriers that may become barriers to making improvements. Do a little digging and figure out whether some procedural guidelines need to be changed to facilitate making environmental improvements. Gain insight into what regulations prohibit them from creating design options such as those you seek. Advocacy is about changing the regulations and political barriers that are working against your vision.

Policies exist at the local level, such as guidelines for subdivision development, zoning ordinances passed by county commissioners or town boards, and policies that guide local governmental agency actions or enforcement of regulations. Policies exist at the state level, such as DOT policies on bicycle and walking improvement "projects." And policies exist at the federal level, such as the Americans with Disabilities Act (ADA) signed into law on July 26, 1990, which guides new sidewalk construction and reconstruction.

Americans with Disabilities Act

ADA requires all public facilities, and private facilities which provide goods or services to the public, to provide access to people with disabilities (e.g., sidewalk curb ramps, street level or ramped entrances, and accessible restrooms). This powerful policy enhances the ease of use for everyone. When consulting with officials to improve sidewalks in a community, consider discussing this law that requires sidewalks to be accessible. Detailed guidelines are available on the internet:
www.access-board.gov

Local policies. Review your municipality's and state DOT's current road construction policies. Are there minimum standards that include facilities for walking and bicycling in all new road local proposals? If your state DOT road construction standards include the development of walking and bicycling facilities, this will ensure that your local environment will continue to improve into the future.

Examples of policies that support walking and bicycling are: 1) building extra wide outside lanes (or wide paved shoulders), sidewalks, and bicycle lanes for every new road; 2) building all new sidewalks at a width of 5 feet with buffer between the sidewalk and road; 3) requiring new development projects to pay a sidewalk development fee into a municipal trust that is used to construct sidewalks in developed urban areas that don't currently have them.

Recommendations for existing road improvements: Locally elected officials can have a major impact on the availability of funds for spending on walking and bicycle improvements. These road improvement expenditure policies will be influenced by some of the following design options for the existing roads. When the road is not wide enough

to create a designated bicycle lane, it may be possible to remark the pavement to widen the outside lane (consult the Pedestrian and Bicycling Information Center for more information: www.walkinginfo.org or www.bicyclinginfo.org). Some municipalities are currently experimenting with nonstandard lane markings on streets in various communities. Other options include looking for ways to create parallel alternatives (a separate bicycle path away from the road), moving parking to side streets to reclaim the major street's parking spaces for a bicycle lane, and designing traffic calming measures to promote safer bicycling. In areas where there are extra wide sidewalks, consider reclaiming part of the sidewalk to develop a landscaped buffer zone that will ensure walking safety and promote a more pleasant walking experience. When right of way is not available, work with neighborhood associations to explore the donation of right of way for sidewalk development

What is "Right of Way"?

Right of way is an important consideration when planning walking and bicycle enhancements. Existing roads cannot be widened and sidewalks cannot be added without having the necessary right of way within the public domain. Right of way is defined as the total width of property owned by the state or local government. For example, if one proposed solution to a segment of road is to construct a bike lane, the property for that proposed bike lane must be within the right of way for the road.

State and regional DOT offices have right of way information for all state-maintained roads. Municipal governments maintain right-of-way records for locally maintained roads. The information may not be maintained in computerized database format, so be prepared to research through paper records. If neither office will help you, consider contacting the local deed registry office (e.g., county clerk) for right-of-way information.

2. Consider policies that promote safety in design.

Safety is a priority when considering planning and design issues. There are many factors that contribute to a safe environment, including the number and width of lanes, the type of vehicular turning patterns, the speed of vehicular traffic, the number and design of street intersections, the number and type of driveway intersections, the amount of on-street parking, and the quality of street lighting. Another safety concern is the presence of unleashed animals or wildlife. All of these factors must be considered when planning and designing a road network that "feels" safe to walkers and bicyclists. Review any design policies regarding safety factors, and work with the planning staff to recommend enforcement of existing policies or recommend policy changes.

3. Consider maintenance policies and enforcement.

After creating or enhancing the walking and bicycling environment, the surfaces must be maintained to keep them clear of debris and to prevent crashes and injuries. Work with your team and the planning department to examine maintenance policies and suggest recommendations when appropriate.

Definitions

Americans With Disabilities Act (ADA) was signed into law on July 26, 1990. ADA requires all public facilities, and private facilities which provide goods or services to the public, to provide access to people with disabilities (e.g., a few examples include sidewalk curb ramps, street level or ramped entrances, and accessible restrooms). This powerful policy enhances the ease of use for everyone. When consulting with officials to improve sidewalks in a community, consider discussing this law that requires sidewalks to be accessible. Detailed guidelines are provided on the internet at www.access-board.gov.

Angle Parking is defined as parking in which the vehicles are parked parallel to one another with front bumpers at an angle toward the curb.

Annual Average Daily Traffic (AADT) is the average volume of vehicles that travel the road segment each day. This is measured by state and local Departments of Transportation.

Bicycle Lane is a clearly marked lane on the road that is designated for bicycle use by striping, signing and pavement marking.

Bicycle Path is a separate or parallel alternative path that is generally developed for multi-use by bicyclists, walkers, in-line skaters, and skate boarders. It is not part of the paved road used by vehicles, however it may be in a highway right-of-way. Some greenways are also designed as bicycle or multi-use paths.

Bicycle Suitability is the extent to which a road or path supports safe biking for recreation and transportation. Different methods exist for assessing bicycle suitability. The method used in this guidebook provides descriptions relating the road segment's suitability to varying bicyclist age groups and experience.

Buffer (Berm) Width is the measured width from the back of the curb (or end of paved shoulder) to the paved sidewalk (see buffer zone).

Buffer (Berm) Zone is the area between vehicular traffic and the sidewalk's walking zone. This zone may have trees, streetlights and benches. Sometimes the buffer zone becomes cluttered with newspaper boxes, trash cans, and election advertisements.

Center Turn Lane is a separate lane in the center of the road that allows turning vehicles to leave the mainstream traffic to prepare to turn across traffic. This allows the flow of traffic to continue in one direction without having to stop every time a vehicle wants to make a left turn.

City Walkways provide walking access to commercial districts and transit along major streets, and also connect neighborhoods. Generally city walkways are in commercially zoned areas and connect major activity centers.

Commercial Land is land that is used for a business, such as a grocery store, movie theatre, office building or fast food, and has a driveway or road that intersects with the segment you are measuring.

Crosswalk is a specifically marked and signed area on the street for the safe crossing of walkers. Many crosswalks also include separate signal lights that tell the walker when it is safe to walk across traffic.

Curb is the concrete form that rises from the end of the gutter (or pavement, if there is no gutter) to the height of the buffer zone and sidewalk adjacent to the road. When parking a car, the tires may bump against the "curb."

Curb Cuts may be Curb Ramps or designed driveway access points in the sidewalk.

Curb Ramps are engineered slopes in the sidewalk structure at intersections that allow wheelchairs to leave the sidewalk environment and smoothly access the street surface.

Curb Zone is the area where the street environment and the pedestrian environment adjoin. Usually a curb exists.

Extra Wide Curb Lane (Wide Outside Lane) is a travel lane that is wider than normal (usually about 14 feet wide) to allow bicyclists to more safely share the same lane with motor vehicles. This has been traditionally used when the roadway is not suitable for a regulation-width bike lane.

Frontage Zone is the area of the sidewalk where there may be business displays, vendor tables, cafe seating or the beginning of people's yards.

Gutter is the flat (usually cement) surface between the driveable pavement and the cement curb. The gutter collects water runoff from the pavement and conducts the runoff toward storm drains.

Industrial Land is land alongside the road that is occupied by a manufacturing plant, a factory or warehouse and has a driveway or road that intersects with the segment you are measuring.

Local Service Walkways provide access to local destinations, such as residential neighborhoods. Most roads that are not walking districts or city walkways are classified as local service walkways. These roads are located in commercial, residential and industrial areas. Good design features include sidewalks on both sides of the street, possible landscaping with trees, and on-street parking.

Off Street Path is a path in which walkers and cyclists have their own space in which to ride or walk that is separated from vehicular travel. This separation is either through the use of barriers or open space.

Parallel Parking is defined as when cars are parked in a horizontal fashion in front of one another and not beside each other.

Paved Shoulder is the area from the outer most painted line to the end of the pavement or to the curb and gutter.

Physical Median is a strip of land or raised concrete island that physically separates the two directions of traffic.

Right Turn Lane is a lane that is designed for traffic turning right at all times.

Shoulder Bikeway is a portion of the street that can be used by bicycles alongside vehicles. There are no markings designating this a bicycle area, but there is a four inch stripe that separates bicycles from vehicles.

Walking Suitability is the extent in which a sidewalk or path supports or prohibits safe walking for recreation and transportation.

Walking District is an area with dense, mixed-use development, generally zoned both commercial and residential, and is serviced by mass-transit.

Walking Zone is the area of the sidewalk or walkway where walkers have unobstructed movement to transit through the area. It is ideally a minimum of 5' wide.

Walkway - Continuous is described as a walkway surface that continues down a street from the beginning to the end of the street without disruption. This can be identified as being on either one side or both sides of the street.

Walkway - Partial is described as a walkway surface that starts at one point on a street, but then is interrupted and does not continue all the way to the other end of the street. Interruptions can occur on one side of the street or on both sides of the street.

Wide Outside Lane (Extra Wide Curb Lane) is a travel lane that is wider than normal (usually about 14 feet wide) to allow bicyclists to more safely share the same lane with motor vehicles. This has been traditionally used when the roadway is not suitable for a regulation-width bike lane.

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Appendix 1: Estimating Traffic Counts (AADT)

Estimating the Annual Average Daily Traffic (AADT) for the WABSA Project

1) Doug Robertson, PhD (UNC Highway Safety Research Center) has written guidelines for estimating traffic counts by logging traffic time intervals (e.g., 15 minutes or longer). You could try estimating traffic counts by a similar method. Depending on the time of day you are assessing, choose either Commute Hours (#4) or Non-Commute Hours (#5).

2) Be clear in your data collection records as to time of day you are assessing each road segment (this will impact the formula for estimating the daily traffic count).

3) **Equipment.**

   - A hand-held device that you can click and it records the count of objects or people. It could be digital or manual. Counting up into the hundreds is too difficult to do without a device.
   - Stopwatch or watch with an audible alarm. Set it for the time period, and then just click away as you count the vehicles. The alarm will tell you when to stop.

4) **Commute Hours.** If you are assessing during the commute hours (generally somewhere between 7:00-9:00am or 4:00-6:00pm) you could stand beside the road away from an intersection (choose somewhere in the middle of a block) and count the number of motor vehicles passing in front of you. Count for both sides of the street. The best way is to count for 15 minutes. However, if this is too long, 5 minutes might work.

   - **For 15 minutes:** Multiply the # of vehicles by 4 (to get an hourly count). Peak hour counts generally represent between 6-10% of the daily traffic on most urban and suburban roads. Since you can't be certain you are hitting the real peak hour, you could take the midpoint (8%). Therefore, multiply your hourly count by 12.5 to estimate 100% of the daily traffic.

     (# of vehicles) x (4) x (12.5) = # of vehicles in a 24 hour period

   - **For 5 minutes:** Multiply the # of vehicles by 12 (to get an hourly count). Peak hour counts generally represent between 6-10% of the daily traffic on most urban and suburban roads. Since you can't be certain you are hitting the real peak hour, you could take the midpoint (8%). Therefore, multiply your hourly count by 12.5 to estimate 100% of the daily traffic.

     (# of vehicles) x (12) x (12.5) = # of vehicles in a 24 hour period

5) **Non-Commute Hours.** If you are assessing during non-commute hours use the formulas below to estimate daily traffic counts.

- **For 15 minutes:** Multiply the # of vehicles by 4 (to get an hourly count). Since you are estimating during non-commute hours, each hour is $1/24^{th}$ of the estimate for the day. Therefore, multiple your hourly count by 24 to estimate the daily traffic.

  (# of vehicles) x (4) x (24) = # of vehicles in a 24 hour period

- **For 5 minutes:** Multiply the # of vehicles by 12 (to get an hourly count). Since you are estimating during non-commute hours, each hour is $1/24^{th}$ of the estimate for the day. Therefore, multiple your hourly count by 24 to estimate the daily traffic.

  (# of vehicles) x (12) x (24) = # of vehicles in a 24 hour period

Data Collector Name: Jim **Date:** April 4, 2002

Road Segment ID#: 101 **Road Name:** Sample St. **Boundary Streets:** Walnut / Tulip **AADT:** 16,500

Annual Average Daily Traffic (AADT) <8,000 = 0 8,000-14,999 = 1 15,000-24,999 = 2 25,000 or more = 3	Posted Speed (mph) <30 = 0 30-44 = 1 45 or more = 2	# of Thru Lanes <3 = 0 3-4= 1 5-8= 2	Sidewalk/Path Both sides continuous = 0 One side continuous and one side partial = 1 One side continuous = 2 Both sides partial = 3 One side partial = 4 None = 99 (STOP HERE)	Material Asphalt = 0 Concrete = 0 Brick = 1 Sand/Dirt = 2 Gravel = 3 Woodchip = 3	Surface Condition Good = 0 Fair = 1 Poor = 4	Sidewalk Width 8' or more = -1 5' – 7' 11" = 0 4' – 4' 11" = 1 <4' = 2	Buffer Width 4' or more = 0 <4' = 0.25 None = 0.50	Curb Ramps All = 0 Some = 2 None = 4	Adequate Lighting Plenty = 0 Some = 0.50 None = 1	Isolated Problem Spots? Y = Yes N = No	Total Score
2	1	0	2	0	1	1	0.50	2	1	N	10.5

Do any busy intersections need marked crosswalks?	Do any busy intersections need traffic signals lights?	Do any busy intersections need pedestrian "Walk" signals?	Do any wide intersections need a refuge island for safer crossing?
(Y) N	(Y) N	Y (N)	Y (N)
(if Yes, record below)	*(if Yes, record below)*	*(if Yes, record below)*	*(if Yes, record below)*

Use this table to record Intersection Details, Isolated Problem Spots, and General Comments about needed design improvements:

Nearest Intersecting Street	Describe Intersection Details	Describe Isolated Problem Spots	General Comments (For example: How are transit stops? Is the walk pleasant? Etc.)
Walnut	Crosswalk faded. Need signal light		The transit stop at Walnut needs a bench for waiting.
Pine	Need crosswalk for Pine walkers		

APPENDIX 3: WABSA Project Walking Suitability Assessment Form

Data Collector Name: _____ Date: _____

Road Segment ID#: _____ Road Name: _____ Boundary Streets: _____ AADT: _____

Annual Average Daily Traffic (AADT) <8,000 = 0 8,000-14,999 = 1 15,000-24,999 = 2 25,000 or more = 3	**Posted Speed (mph)** <30 = 0 30-44 = 1 45 or more = 2	**# of Thru Lanes** <3 = 0 3-4= 1 5-8= 2	**Sidewalk/Path** Both sides continuous = 0 One side continuous and one side partial = 1 One side continuous = 2 Both sides partial = 3 One side partial = 4 None = 99 (STOP HERE)	**Material** Asphalt = 0 Concrete = 0 Brick = 1 Sand/Dirt = 2 Gravel = 3 Woodchip = 3	**Surface Condition** Good = 0 Fair = 1 Poor = 4	**Sidewalk Width** 8' or more = -1 5' – 7' 11" = 0 4' – 4' 11" = 1 <4' = 2	**Buffer Width** 4' or more = 0 <4' = 0.25 None = 0.50	**Curb Ramps** All = 0 Some = 2 None = 4	**Adequate Lighting** Plenty = 0 Some = 0.50 None = 1	**Isolated Problem Spots?** Y = Yes N = No	**Total Score**

Do any busy intersections need marked crosswalks?	Do any busy intersections need traffic signals lights?	Do any busy intersections need pedestrian "Walk" signals?	Do any wide intersections need a refuge island for safer crossing?
Y N	Y N	Y N	Y N
(if Yes, record below)	*(if Yes, record below)*	*(if Yes, record below)*	*(if Yes, record below)*

Use this table to record Intersection Details, Isolated Problem Spots, and General Comments about needed design improvements:

Nearest Intersecting Street	**Describe Intersection Details** (from "Yes" checkboxes above)	**Describe Isolated Problem Spots**	**General Comments** (For example: How are transit stops? Is the walk pleasant? Etc.)

Appendix 4: Bicycling Suitability Assessment

(adapted from N. Eddy -form completed)

Date: April 4, 2002	Comments/Suggested Improvements:
Data Collector Name: Jim	
Segment ID Number/Name: 101 - Sample	
Boundary streets: Walnut / Tulip	

A) General Road Factors	Measures
1) Annual Avg. Daily Traffic (AADT)	16,500
2) Total number of through lanes	2
3) Speed (mph)	35
4) Outside lane width (e.g., 11.5')	12.5
5) Bike lane or paved shoulder width (e.g., 4.5') (Note - a **marked** bike lane.)	Ø

Record these measures in the formula below

B) Pavement Factors	Score
1) (*circle one pavement description*)	(*record score*)
Very Good = 0.25	
Good = 0.75	0.75
Fair = 1.50	
Poor = 2.25	
Very Poor = 3.75	
2) Presence of a Curb (Y) N	Yes = 0.25
3) Rough RR Crossing Y (N)	Yes = 0.50
4) Storm Drain Grate (Y) N	Yes = 0.75
TOTAL Scores *Record score in formula below*	1.75

C) Location Factors	Yes/No (*circle*)	Score for "Yes"
1) Angle Parking	Y (N)	0.75
2) Parallel Parking	(Y) N	0.50
3) Right-Only Turn Lanes	(Y) N	0.25
4) Center (Both)Turn Lane	Y (N)	-0.25
5) Physical Median	Y (N)	-0.50
6) Paved Shoulder	Y (N)	-0.75
7) Marked Bike Lane	Y (N)	-1.00
8) Severe Grades	Y (N)	0.50
9) Moderate Grades	(Y) N	0.25
10) Frequent Curves	(Y) N	0.25
11) Restricted Sight Distance	(Y) N	0.50
12) Numerous Driveways	(Y) N	0.50
13) Numerous Intersections	Y (N)	0.75
14) Difficult Intersections	Y (N)	1.00
15) Industrial Land Use	Y (N)	0.50
16) Commercial Land Use	(Y) N	0.25
17) Sidewalk Only One Side	(Y) N	0.25
18) Sidewalks do not exist	Y (N)	0.50
TOTAL all "YES" points *Record score in formula below*		2.75

$$\frac{\text{AADT}}{\text{\# of thru Lanes} * 2500} + \frac{\text{Speed (mph)}}{35} + \frac{14 - \text{Outside Lane Width} - \text{Bike Lane or Paved Shoulder Width}}{2} + \text{Pavement Factors} + \text{Location Factors} = \text{Bicycle Suitability Score}$$

$$\frac{16,500}{2 * 2500} + \frac{35}{35} + \frac{14 - 12.5 - \text{Ø}}{2} + 1.75 + 2.75 = 9.6$$

Appendix 5: Bicycling Suitability Assessment Form (adapted from N. Eddy)

Date:	Comments/Suggested Improvements:
Data Collector Name:	
Segment ID Number/Name:	
Boundary streets:	

A) General Road Factors	Measures
1) Annual Avg. Daily Traffic (AADT)	
2) Total number of through lanes	
3) Speed (mph)	
4) Outside lane width (e.g., 11.5')	
5) Bike lane or paved shoulder width (e.g., 4.5') (Note - a **marked** bike lane.)	

Record all measures in the formula below

B) Pavement Factors	Score
1) (*circle one pavement description*) Very Good = 0.25 Good = 0.75 Fair = 1.50 Poor = 2.25 Very Poor = 3.75	(*record score*) _____
2) Presence of a Curb Y N	Yes = 0.25
3) Rough RR Crossing Y N	Yes = 0.50
4) Storm Drain Grate Y N	Yes = 0.75
TOTAL Scores *Record score in formula below*	

C) Location Factors	Yes/No (*circle*)	Score for "Yes"
1) Angle Parking	Y N	0.75
2) Parallel Parking	Y N	0.50
3) Right-Only Turn Lane	Y N	0.25
4) Center (Both) Turn Lane	Y N	*-0.25*
5) Physical Median	Y N	*-0.50*
6) Paved Shoulder	Y N	*-0.75*
7) Marked Bike Lane	Y N	*-1.00*
8) Severe Grades	Y N	0.50
9) Moderate Grades	Y N	0.25
10) Frequent Curves	Y N	0.25
11) Restricted Sight Distance	Y N	0.50
12) Numerous Driveways	Y N	0.50
13) Numerous Intersections	Y N	0.75
14) Difficult Intersections	Y N	1.00
15) Industrial Land Use	Y N	0.50
16) Commercial Land Use	Y N	0.25
17) Sidewalk Only One Side	Y N	0.25
18) Sidewalks do not exist	Y N	0.50
TOTAL all "YES" points *Record score in formula below*		

$$\frac{\text{AADT}}{\text{\# of thru Lanes} * 2500} + \frac{\text{Speed (mph)}}{35} + \frac{14 - \text{Outside Lane Width} + \text{Bike Lane or Paved Shoulder Width}}{2} + \text{Pavement Factors} + \text{Location Factors} = \text{Bicycle Suitability Score}$$

Contact Information

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