



School Audit Instrument:

Assessing safety and walkability of school environments

Active Living Research
San Diego, CA

February 23, 2011

Chanam Lee, Texas A&M University
Hyung Jin Kim, Texas A&M University
Jun Hyun Kim, California Polytechnic State University
Diane Dowdy, Texas A&M University
Marcia Ory, Texas A&M Health Science Center
Deanna Hoelscher, University of Texas



Presentation Structure

1. Introduction
2. School Audit Instrument Development Process
3. School Audit Instrument Components
4. Training Protocol and Method
5. Validation Study
6. Conclusion

1. Introduction



Measurement Methods

- **Subjective measures** (perceived environment)

- Survey
- Interview
- Cognitive mapping
- Environmental Audit
- Etc.

- **Objective measures** (actual environment)

- Geographic Information System (GIS)
- **Environmental Audit**
- Photography & Video Recording
- Trace Mapping
- Etc.

Density & Land Use ---- Site Layout ---- Architectural Design

Macro ----- Meso ----- Micro

GIS ----- Aerial Photo ----- Audit



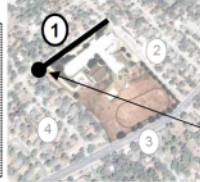


Spatial Data: Line, Point & Polygon

School Name: Highland Park Elementary Date: Time started: ended: Weather: sunny cloudy Auditor ID:

STREET SEGMENT 1: Fairview Dr.

Note:



Audit Street Segment ID ①

Start Here

Land use (check all that is immediately along the street segment)

Residential:

- Single family home
- Multifamily housing (e.g., apartment, condominium, duplex, 4-plex)
- Mobile home

Commercial:

- Fast food restaurant
- Buffet restaurant
- Regular sit-down restaurant / taqueria
- Supermarket / grocery store
- Convenience store with gas station
- Convenience store without gas station
- Gas station with no convenience store
- CD / DVD / video game store or rental
- Mall / strip mall / big box retail (e.g., Wal-mart, Home Depot, IKEA, Toys "R" Us)

Educational, Office & Service:

- Boys & girls club / YMCA
- School / kindergarten / daycare center

Number of lanes (both directions):

If no marked lanes, estimate based on roadway width or driving behaviors.

Number of driveways & street intersections (both sides)

- 0 1-3 4-10 11+

Number of street lights

(both sides of the street, sidewalk, street shoulder and/or bike lane)

- 0 1-3 4-10 11+

Traffic calming devices (check all that apply)

- Reduced speed sign (excluding school zone speed sign)
- Speed bump or hump
- Median island
- Roundabout
- Curb extension / bulb-out
- Pavement change / pavement marking

Maintenance of streets & sidewalks

(free of cracks, holes, overgrown grass/weeds, etc.)

- Poor Fair Good Very Good Excellent

Cleanliness of streets & sidewalks

(free of litter, rubbish, broken glass, discarded items, etc.)

- Poor Fair Good Very Good Excellent

Overall visual quality

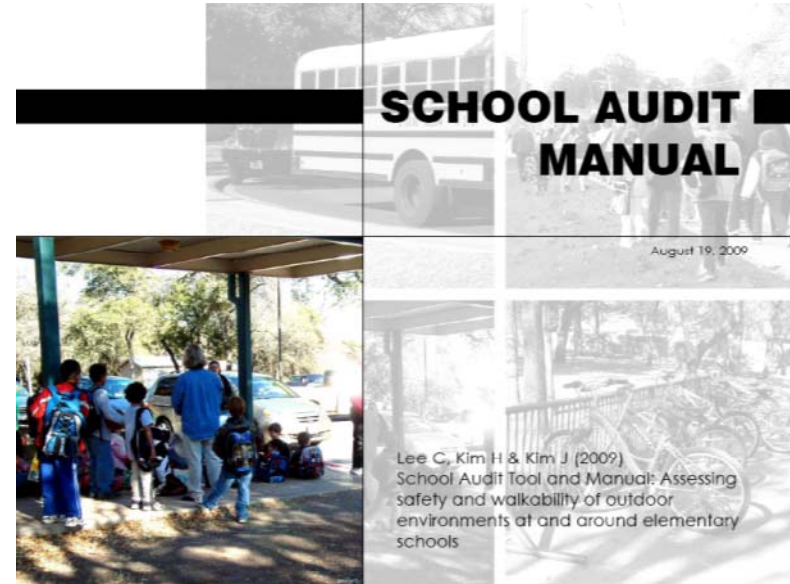
- Poor Fair Good Very Good Excellent

Safety in walking

- Poor Fair Good Very Good Excellent

Safety in bicycling

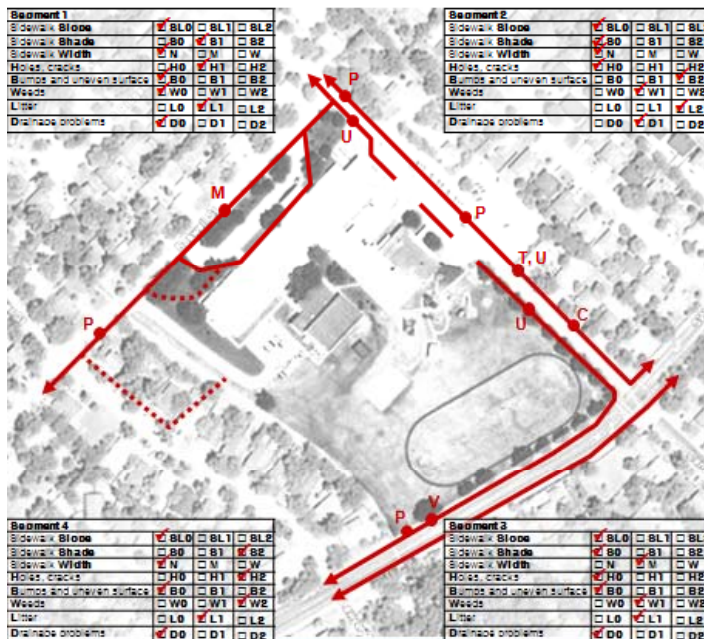
- Poor Fair Good Very Good Excellent



SCHOOL AUDIT MANUAL

August 19, 2009

Lee C, Kim H & Kim J (2009) School Audit Tool and Manual: Assessing safety and walkability of outdoor environments at and around elementary schools



Traffic Calming Devices

[Check all that apply]

- Reduced speed sign (excluding school zone speed sign)



- Speed bump or hump



- Median island



A median island, usually appearing as a landscaped strip, is used to separate the traffic from two directions.



- Round about

A roundabout is a type of road junction at which traffic enters a one-way stream around a central island. It is used to slow traffic.



[1] <http://www.ci.huntsville.al.us/Engineering/TrafficEng/Images/speed30table.jpg>

[2] http://www.celestary.com.au/images/photos/speedbumps_b.jpg

[3] Better Streets, San Francisco

Existing Audit Instrument Examples

Street Segments:

- Systematic Pedestrian and Cycling Environmental Scan by Pikora et al. 2002 & 2003
- Pedestrian Environment Data Scan by Clifton et al. 2007
- The Irvine-Minnesota Inventory by Day et al. 2006

Recreational Facilities:

- Parks (e.g. BRAT-Direct Observation by Bedimo-Rung et al. 2006)
- Trails (e.g. Path Environment Audit Tool by Troped et al. 2006)

Urban Design

- Measurement Instrument for Urban Design Quantities Related to Walkability by Ewing et al. 2006

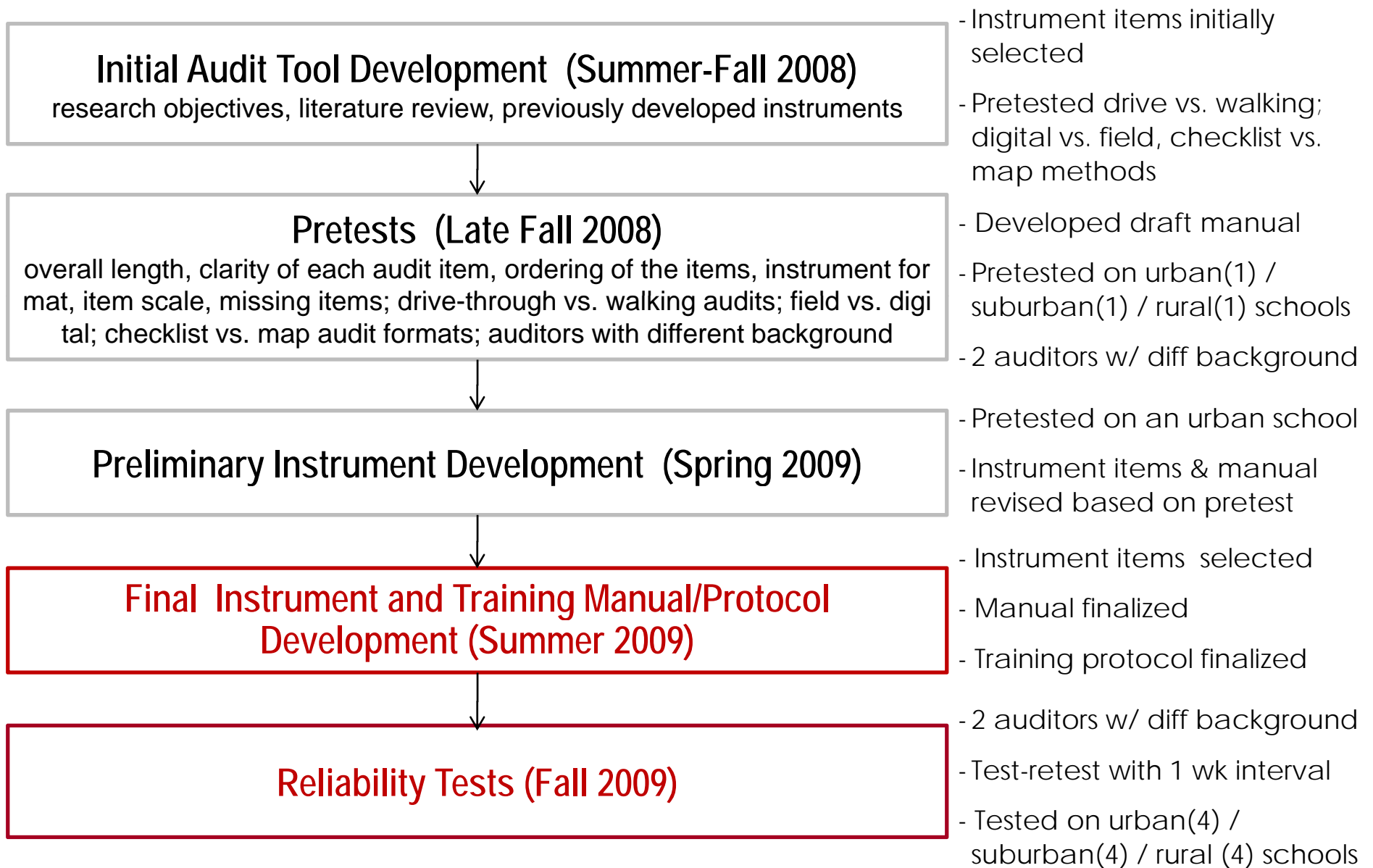
Why School Audits?

- Importance of **daily physical activities** such as walking to school (WTS) to reduce health burdens among children.
 - Importance of targeting **children** to enable the development of life-long active lifestyle habits.
 - Potential for influencing a large number of children at a time by targeting schools (**impact**).
 - Important role of the **built environment** in promoting WTS.
 - Recognition of the many **modifiable barriers** at/around schools.
 - Importance of the **context-specific and detailed environmental features** in changing school travel behaviors
-
- **Lack/shortage of instruments designed to capture school environments systematically and comprehensively**
 - **Need to assess school ground, frontage streets, and nearby streets, considering specific and detailed factors that may influence school transportation**

2. School Audit Instrument: Development Process



Audit Tool Development Process



3. School Audit Instrument: Instrument Components



Environmental Audit: School Audit

T-COPPE

School Name & Address:

School contact information:

Auditor name: (Male/Female)

Reviewer name :

Audit date :

INSTRUCTIONS FOR PHOTO AUDIT

- The first photo should always include the school name (with the school façade or on the signage)
- Do not take photos of people's faces
- For each segment, take a few photos of the overall street view, standing at each end of the segment and looking directly toward the audit segment
- Take photos of any audit items that you are not sure about your rating
- Take photos of the features/things that support your subjective item (5-point scale item) ratings
- Take photos of any additional items that are not included in the audit but could be potentially important for children's walking or bicycling
- Take photos of good and bad examples of walkability and bikeability

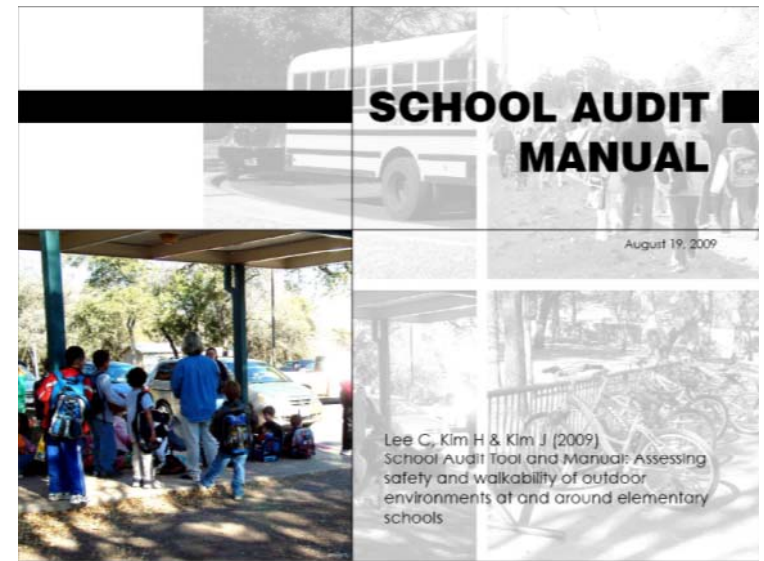
DO NOT FORGET:

- To bring the ISD's approval letter and your ID with you
- To drive around all segments to get yourself familiarized with the area before starting the audit
- Not to enter the school property, unless it is permitted
- Not to talk or discuss about the ratings with your partner while auditing, if you have a partner
- To record the start and end times

A. Street Segment Audit

B. School Site Audit

C. Map Audit



Audit tool cover sheet

Audit manual

Street Segment Audit

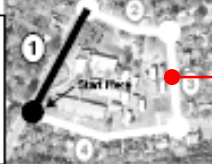
- Audit info.**

- Auditor info.
- Date, weather
- Start/end time
- Street name

School Name: Andrews EL Date: _____ Time started: _____ ended: _____ Weather: sunny cloudy Auditor ID: _____

STREET SEGMENT 1: Northeast Dr.

Note: _____



- Segment Image**

- Indicating each segment
- North up

- Audit Items**

- For objective observations

Land use (check all that are immediately along the street segment)

Residential:

- Single family home
- Multifamily housing (e.g., apartment, condominium, duplex, 4-plex)
- Mobile home

Commercial:

- Fast food restaurant
- Buffet restaurant
- Regular sit-down restaurant / lounge
- Supermarket / grocery store
- Convenience store with gas station
- Convenience store without gas station
- Drug store / pharmacy (e.g., CVS)
- CD / DVD / video game store or rental
- Mail / shipping / big box retail (e.g., Wal-Mart, Home Depot, IKEA, Toys 'R Us); double-code all individual land uses

Educational, Office & Service:

- Boys & girls club / YMCA
- School / kindergarten / daycare center
- Police station
- Bank / post office
- Library
- Church / other religious institution
- Institutional excluding education and religious (e.g., city hall, court, hospital)
- Office (e.g., clinic, dental clinic, law office, insurance office)

Recreational & Others:

- Gym / fitness center / indoor playground
- Lake / river / stream / creek
- Forest / wooded area
- Public plaza / public square
- Park (not part of the school) with: (check all that apply)
 - playground equipment
 - trail / path / jogging track
 - basketball / tennis / volleyball court
 - baseball / football / soccer field
 - outdoor swimming pool
 - open field with no facility / equipment
- Factory / power plant / junk yard
- Warehouse / storage building / self-storage
- Parking lot / garage (stand alone)
- Vacant / abandoned / undeveloped area (land area without buildings)
- Vacant / abandoned building
- Other: _____

School zone

Is the segment designated as school zone?

No Yes, partly Yes, entirely

Poiced speed

None posted

Non-school zone: _____ miles/hr

School zone: _____ miles/hr

- When flashing
- During designated hours / days
- When children are present
- At all times

Street parking

- No Yes, one side Yes, both sides

Number of lanes (both directions): _____

If no marked lanes, estimate based on roadway width or driving behaviors

Number of driveways & street interconnections (both sides):

0 1-3 4-10 11+

One-way street

- No
- Yes → Indicate direction on the map above

Number of street lights (not traffic lights):

0 1-3 4-10 11+

Traffic calming devices (check all that apply)

- None
- Reduced speed sign (excluding school zone speed sign)
- Speed bump or hump
- Median island
- Roundabout
- Curb extension / bulb-out
- Pavement change / pavement marking (e.g., brick-paved roadways)
- Other: _____

Amenities (check all that are immediately along the street, excluding those near school buildings / entries and bus stop)

- None
- Bench / seating Public trash can
- Other (e.g., public art, public telephone): _____

Signs visible (check all that apply)

- None
- Child safety / child crossing sign
- Bike Route / pedestrian or bicyclist friendly sign
- Community / cultural / religious / political message or event / historical mark
- Crime watch / security warning / home security service (e.g., ADT)
- Beware of dog sign / road hazard sign
- Cell phone usage restriction sign
- Other: _____

Unattractive items visible

- None
- Graffiti
- Whole or broken bottles or cans
- Cigarette / cigar butts or packages
- Abandoned cars
- Buildings with broken windows or other vandalism
- Condoms, needles, syringes, or drug-related paraphernalia
- Excessive power lines
- Unattended stray dogs
- Other: _____

Surveillance (how easily observed from the windows, porches, or gardens nearby)

Poor Fair Good Very Good Excellent

Maintenance of gardens & buildings (how clean, well-kept, etc.)

Poor Fair Good Very Good Excellent

Maintenance of streets & sidewalks (how free of cracks, holes, overgrown grass/weeds, etc.)

Poor Fair Good Very Good Excellent

Cleanliness of streets & sidewalks (how free of litter, rubbish, broken glass, discarded items, etc.)

Poor Fair Good Very Good Excellent

Overall visual quality

Poor Fair Good Very Good Excellent

Safety in walking (for upper-year elementary school children)

Poor Fair Good Very Good Excellent

Safety in bicycling (for upper-year elementary school children)

Poor Fair Good Very Good Excellent

Attractiveness in walking

Poor Fair Good Very Good Excellent

Attractiveness in bicycling

Poor Fair Good Very Good Excellent

MAP AUDIT ITEMS

- Sidewalk No Yes → **MAP A**
- Informal footpath (not part of formal sidewalk / trails) No Yes → **MAP B**
- Landscaped buffer No Yes → **MAP C**
- Drainage ditch (along either side of the street) No Yes → **MAP D**
- Bike lane (exclude Bike Routes) No Yes → **MAP E**
- Off-street trails / paths (for walking, jogging, running, biking, etc.) No Yes → **MAP F**
- Bus stop (include school & public bus) No Yes → **MAP G**
- Crosswalk No Yes → **MAP H**
- Use **MAP E** for photo log / notes

Reviewer Initial: _____

- Perceptions**

- Map Audit Indicators**


- If related items present, go to Map Audit(s)

School Site Audit

School Name: Andrews EL Date: _____ Time started: _____ ended: _____ Weather: Sunny Cloudy Auditor ID: _____

SCHOOL SITE

Note: _____



FRONTAGE	MAIN ENTRY (indicated in the map)	ON-SITE FACILITIES
<ul style="list-style-type: none"> Number of frontage streets (streets directly adjacent to the school property): _____ Number of all vehicular entries and exits from all frontage streets (exclude drop-off bays and include service vehicular entries): _____ Number of school bus only entries and exits (exclude drop-off bays): _____ Number of pedestrian-only entries and exits (with direct walkway access from the street to school building entrance): _____ School property adjacent/ abutting to (without streets separating) <ul style="list-style-type: none"> <input type="checkbox"/> None (surrounded by streets on all sides) <input type="checkbox"/> Park → Direct pedestrian access from the school to the park: <input type="checkbox"/> No <input type="checkbox"/> Yes Park has: (check all that apply) <ul style="list-style-type: none"> <input type="checkbox"/> playground equipment <input type="checkbox"/> trail / path / jogging track <input type="checkbox"/> basketball / tennis / volleyball court <input type="checkbox"/> baseball / football / soccer field <input type="checkbox"/> outdoor swimming pool <input type="checkbox"/> open field with no facility / equipment <input type="checkbox"/> Vacant / abandoned / undeveloped area <input type="checkbox"/> Residential area <input type="checkbox"/> Industrial area <input type="checkbox"/> Commercial area <input type="checkbox"/> Other: _____ <input type="checkbox"/> Other: _____ 	<ul style="list-style-type: none"> Bike rack <input type="checkbox"/> No <input type="checkbox"/> Yes Sidewalk / walkway connection (all the way to school building entrance) <input type="checkbox"/> No <input type="checkbox"/> Yes Outdoor amenities nearby (check all that apply) <ul style="list-style-type: none"> <input type="checkbox"/> None <input type="checkbox"/> Bench / seating <input type="checkbox"/> Public trash can <input type="checkbox"/> Separated covered structure (e.g., gazebo) <input type="checkbox"/> Sculpture / art display <input type="checkbox"/> Vending machine <input type="checkbox"/> Water feature (e.g., pond, fountain) <input type="checkbox"/> Tall trees providing shade <input type="checkbox"/> Other: _____ 	<p>Do NOT include Main Entry items that are already marked.</p> <ul style="list-style-type: none"> Recreational facilities (check all that apply) <ul style="list-style-type: none"> <input type="checkbox"/> Playground equipment (e.g., seesaw) <input type="checkbox"/> Trail / path / jogging track <input type="checkbox"/> Basketball / tennis / volleyball court <input type="checkbox"/> Baseball / football / soccer field <input type="checkbox"/> Open field with no facility / equipment <input type="checkbox"/> Outdoor swimming pool <input type="checkbox"/> Other: _____ Covered structure (check all that apply) <ul style="list-style-type: none"> <input type="checkbox"/> Basketball or other sports court <input type="checkbox"/> Covered walkway <input type="checkbox"/> Gazebo / pavilion <input type="checkbox"/> Other: _____ Vegetation <ul style="list-style-type: none"> Tall deciduous trees <input type="checkbox"/> None <input type="checkbox"/> A few / some <input type="checkbox"/> Many Tall evergreen trees <input type="checkbox"/> None <input type="checkbox"/> A few / some <input type="checkbox"/> Many Shrubs <input type="checkbox"/> None <input type="checkbox"/> A few / some <input type="checkbox"/> Many Others excluding grass (e.g., potted plants, flowers): _____ Outdoor amenities on-site (check all that apply) <ul style="list-style-type: none"> <input type="checkbox"/> None <input type="checkbox"/> Bike rack <input type="checkbox"/> Bench / seating <input type="checkbox"/> Public trash can <input type="checkbox"/> Picnic table <input type="checkbox"/> School garden (e.g., vegetable / flower garden) <input type="checkbox"/> Bird sanctuary <input type="checkbox"/> Sculpture / art display <input type="checkbox"/> Vending machine <input type="checkbox"/> Water feature (e.g., pond, fountain) <input type="checkbox"/> Drinking water fountain <input type="checkbox"/> Other: _____ Fence transparency (school fence visible from streets) <ul style="list-style-type: none"> <input type="checkbox"/> No fence <input type="checkbox"/> Not transparent at all <input type="checkbox"/> Partly transparent <input type="checkbox"/> Fully transparent
	<h3>DROP-OFF / PICK-UP AREA</h3> <ul style="list-style-type: none"> Location of private car area <ul style="list-style-type: none"> <input type="checkbox"/> No <input type="checkbox"/> Yes, on-site <input type="checkbox"/> Yes, off-site (along streets) Type of private car area (if present) <ul style="list-style-type: none"> <input type="checkbox"/> Fully separated area with buffer <input type="checkbox"/> Additional designated lane along streets <input type="checkbox"/> Existing lane dedicated for drop-off / pick-up during designated hours <input type="checkbox"/> Temporary street closure during designated hours Capacity of private car area (if present) (car length, excluding driveways) <ul style="list-style-type: none"> <input type="checkbox"/> 1-2 cars <input type="checkbox"/> 3-5 cars <input type="checkbox"/> 6-10 cars <input type="checkbox"/> 11+ cars Location of school bus only area <ul style="list-style-type: none"> <input type="checkbox"/> No <input type="checkbox"/> Yes, on-site <input type="checkbox"/> Yes, off-site (along streets) 	

Reviewer Initial: _____

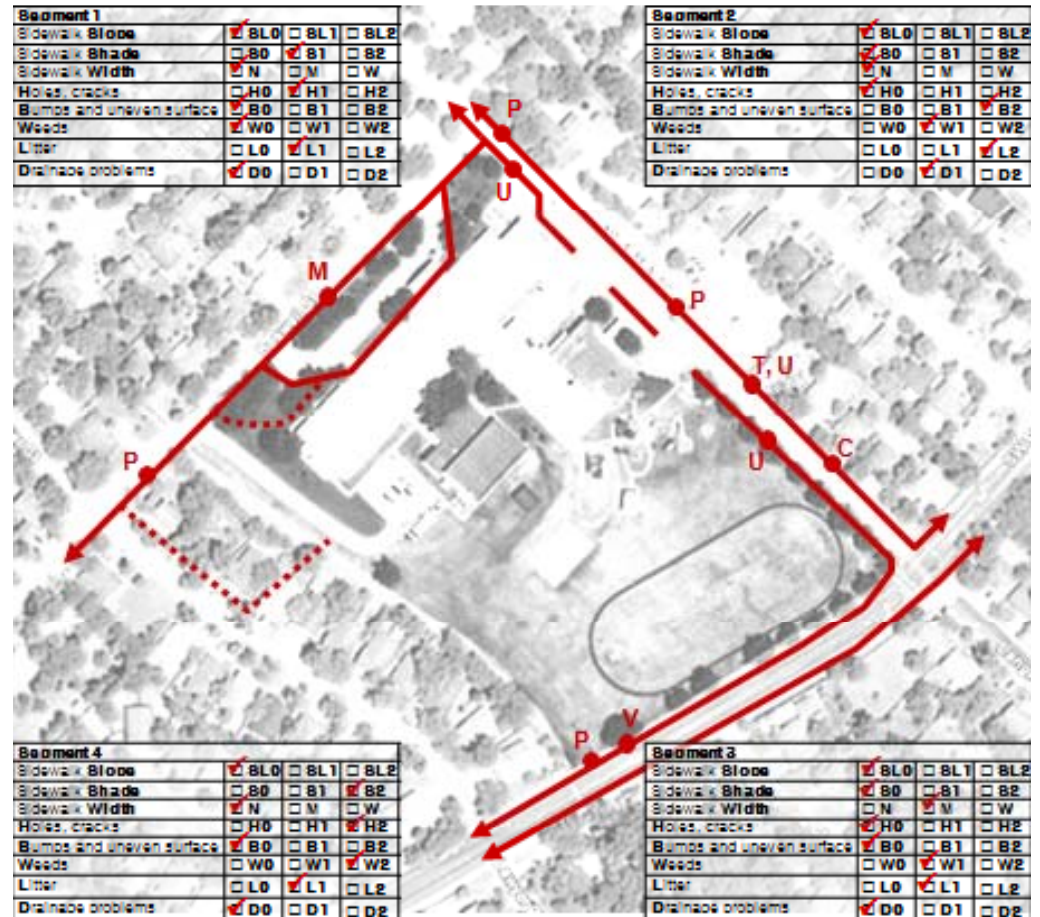
- **Frontage**
 - Street facing
 - Vehicular and pedestrian entries
- **Main entry**
 - Amenities around main entry

- **School Site Image**
 - Indicating School site and property line
 - Main entry
- **On-site facilities**
 - Physical features
 - Amenities, etc.
- **D/P Area**
 - Location, types, and capacity

Map Audit Example

Map audit A : sidewalk & informal path

- **Exact locations**
- **Detailed conditions**
slope, shade, width, holes & cracks, bumps & uneven surface, weeds, litter, drainage problems, etc.
- **Obstructions**
poles, parked cars, mail boxes, etc.
- **Connections**



Color Aerial Photo



4. School Audit Instrument: Training Protocol & Manual



SCHOOL AUDIT MANUAL

December 22, 2009

Lee C, Kim H & Kim J (2009)
School Audit Tool and Manual: Assessing
safety and walkability of outdoor
environments at and around elementary
schools

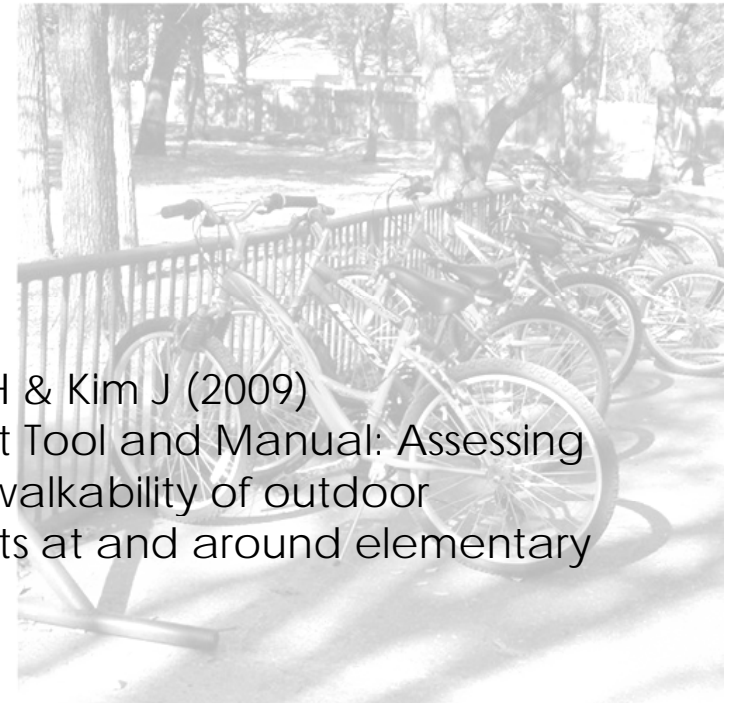
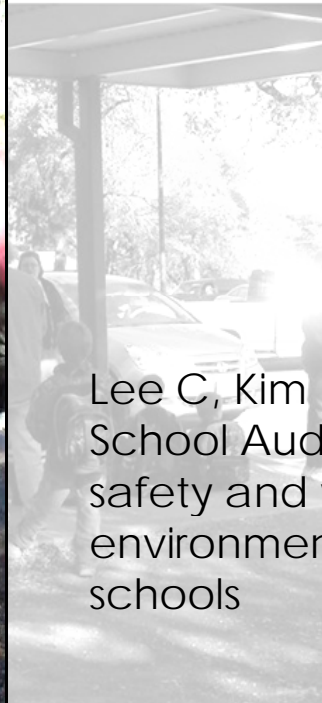




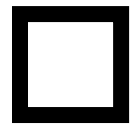
Table of Contents

Introduction

1. Street Segment Audit

2. School Site Audit

3. Map Audit



INTRODUCTION

1. **What** to bring with you

2. **What** training you should receive

3. **How** to observe

4. **Where** to observe



■ What to bring with you

In addition to this Manual, you will need

- Audit Instrument (extra copies)
- Measuring tape
- Digital camera
- Color pens
- Clip board
- Sound meter [optional]

Others:

- Driver's License and University ID
- Map or driving directions to the audit schools
- Information about the contact person for each of the audit schools



What training you should receive

1. **Review Instrument and Manual** (2 hours):

Request a copy of the Instrument and Manual to Chanam Lee (chanam@tamu.edu) and review before attending the training session

Prepare a list of questions to ask during the Training session

2. **Attend Training Session** (2 hours):

Attend a pre-scheduled group training session that includes a PowerPoint presentation by a trainer, followed by a Q&A session

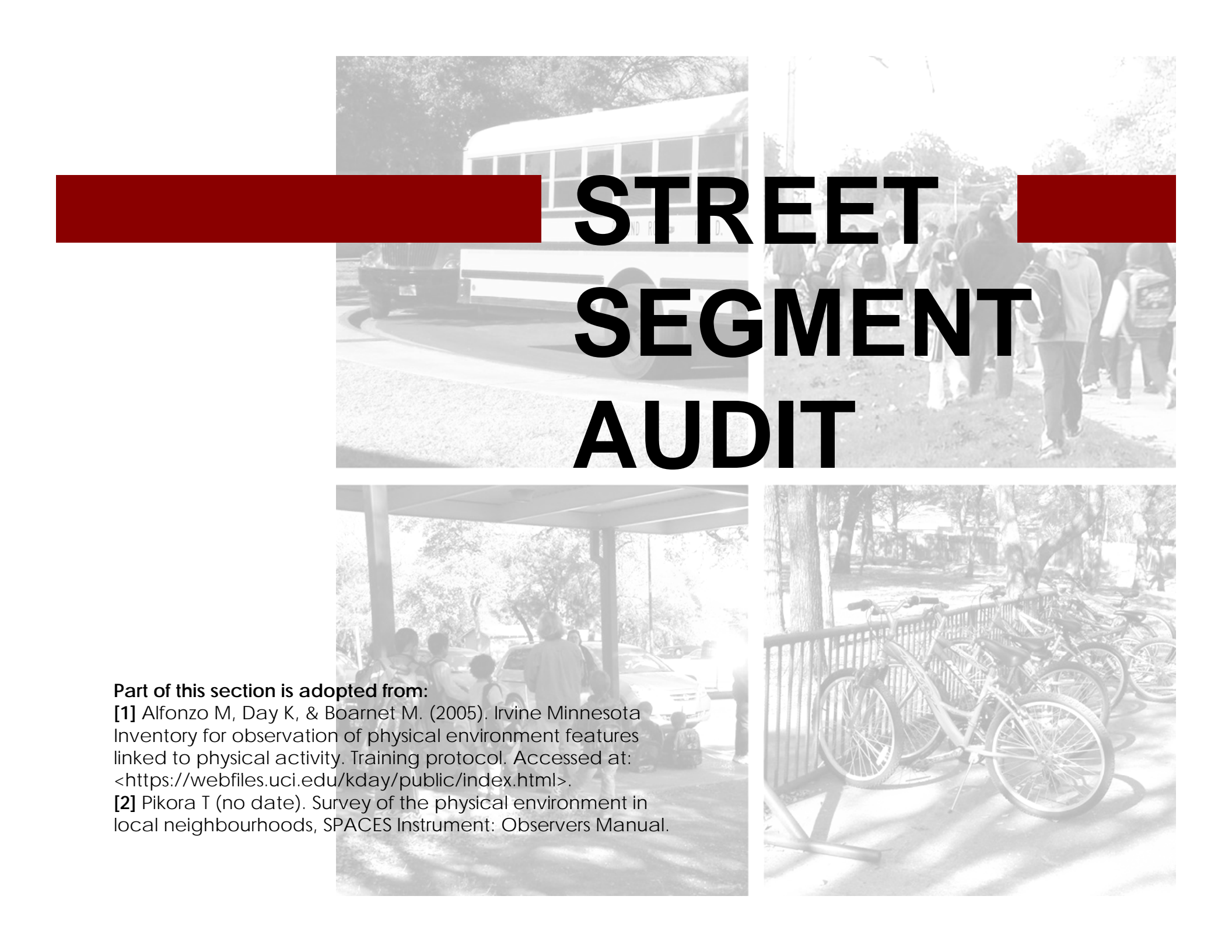
Make sure that all your questions are answered

3. **Attend Field Practice** (2 hours):

Test out the Instrument as a small group activity led by the trainer, immediately following the training session

4. **Get Certification** (2 hours):

Independently perform the audit on an assigned site and submit the results to the trainer who will review your audit results and inform you about your certification status (you may be asked to re-take this certification activity until your audit results are satisfactory)



STREET SEGMENT AUDIT

Part of this section is adopted from:

[1] Alfonzo M, Day K, & Boarnet M. (2005). Irvine Minnesota Inventory for observation of physical environment features linked to physical activity. Training protocol. Accessed at: <<https://webfiles.uci.edu/kday/public/index.html>>.

[2] Pikora T (no date). Survey of the physical environment in local neighbourhoods, SPACES Instrument: Observers Manual.

Land Use

Residential:

[check all that are immediately along the street segment]

- Single family home



Single family detached

Single family attached

This may appear similar to duplex or other multi-family units, check the addresses (mail boxes) to confirm if needed

- Multi-family housing



Apartment

High-rising apartment

Duplex

Condominium

- Mobile home



Land Use

Commercial:

[check all that are immediately along the street segment]

- Regular sit-down restaurant / taqueria

Provides food services to patrons who order and are served while seated and pay after eating.ⁱ Taquerias are usually found in areas with large Hispanic populations, serving authentic Mexican cuisine such as tacos, enchiladas, and burritos.

Examples: Casual dining chain restaurants such as TGI Friday's, Texas Roadhouse, Applebee's, Cheddar's, Cheese cake Factory, Chili's, Denny's, IHOP, Olive Garden, On the Border, Outback Steakhouse, P.F. Chang's China Bistro, Red Lobster, etc.; and local restaurants



- Supermarket / grocery store

Sells a general line of food, such as canned and frozen foods; fresh fruits and vegetables; and fresh and prepared meats, fish, and poultry.ⁱ

Examples: HEB, Albertsons, Kroger, Whole Foods Market, Randall's, Safeway, Fiesta Mart, Tom Thumb Food & Pharmacy, Save-A-Lot



http://en.wikipedia.org/wiki/List_of_casual_dining_restaurant_chains

ⁱ North American Industry Classification System (NAICS) 2007 Definition. 722211 Limited-Service Restaurants. <http://www.census.gov/eos/www/naics/index.html>

Traffic Calming Devices

[Check all that apply]

- Reduced speed sign (excluding school zone speed sign)



- Speed bump or hump



- Median island



A median island, usually appearing as a landscaped strip, is used to separate the traffic from two directions.



- Round about

A roundabout is a type of road junction at which traffic enters a one-way stream around a central island. It is used to slow traffic.



[1]<http://www.ci.huntsville.al.us/Engineering/TrafficEng/images/speed%20table.jpg>.

[2]http://www.ceekay.com.au/images/photo_speedhumps_b.jpg.

[3] Better Streets, San Francisco

Traffic Calming Devices (Cont.)

[Check all that apply]

- Curb extension / bulb-out

A curb extension is a horizontal intrusion of the curb into the roadway resulting in a narrower section of roadway.

A bulb-out extends out the sidewalk, usually where there are crosswalks so that the crossing distance is shorter.

Sometimes offer seating, transit stop, landscaping, or other pedestrian amenities.



- Pavement change / pavement marking (e.g., brick-paved roadways)



Amenities

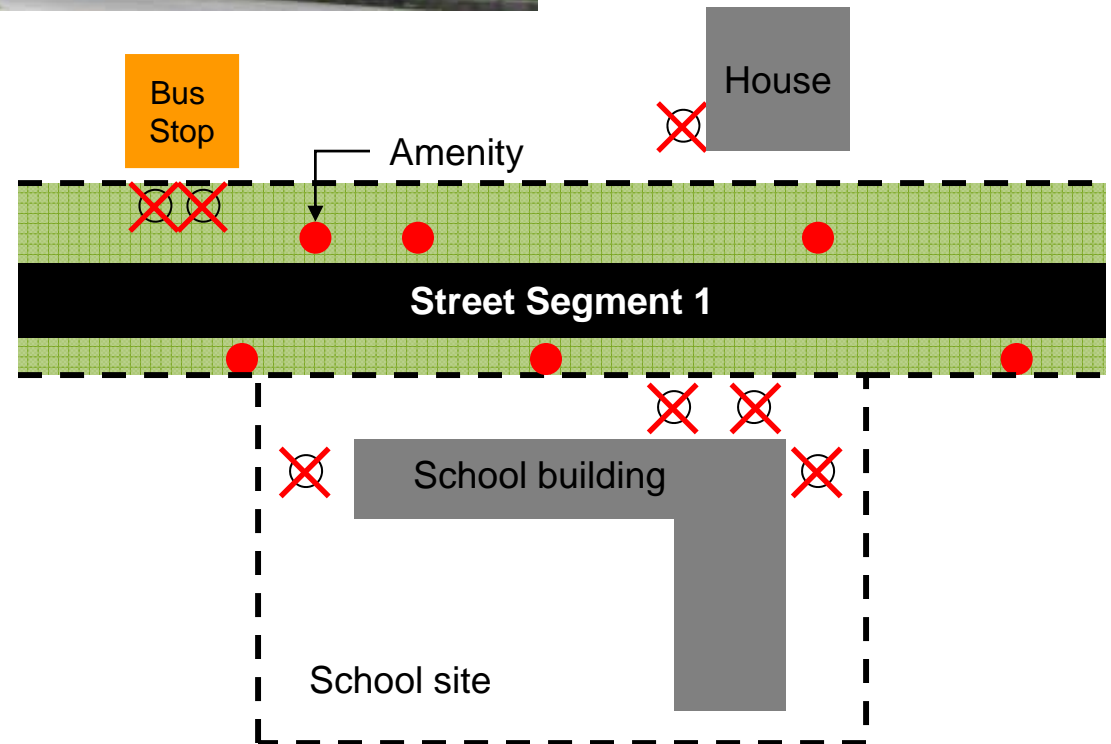
[check all that is immediately along the street, excluding those near school buildings / entries and bus stops]

- Bench / seating
- Public trash can
- Other (e.g., public art, public telephone):

Public Art



Seating



Surveillance

[easily observed from the windows, porches, or gardens nearby]

Poor	Fair	Good	Very Good	Excellent
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Poor



Good



Excellent

Surveillance is whether people can see you from their windows, porches or gardens when you are walking / bicycling on the street. In area with higher degree of surveillance, you are more likely to get help on-time from other people when you are attacked or injured. Set-back distance is also considerable.

Maintenance of Streets & Sidewalks

(free of cracks, holes, overgrown grass/weeds, etc.)

Poor	Fair	Good	Very Good	Excellent
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Poor

Paved surfaces have many cracks, holes, weeds, etc.; lawns / trees are not maintained.

Good

Paved surface have few cracks, holes, weeds, etc.; lawns / trees are somewhat maintained; some work is needed to improve.

Excellent

Paved surfaces are free of cracks, holes, weeds, etc.; lawns / trees are healthy and well-kept.

Cleanliness of Streets & Sidewalks

(free of litter, rubbish, broken glass, discarded items, etc.)

Poor	Fair	Good	Very Good	Excellent
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Poor

Good

Excellent

Lots of litter, rubbish, broken glass, discarded items, etc.

Some litter, rubbish, broken glass, discarded items, etc.

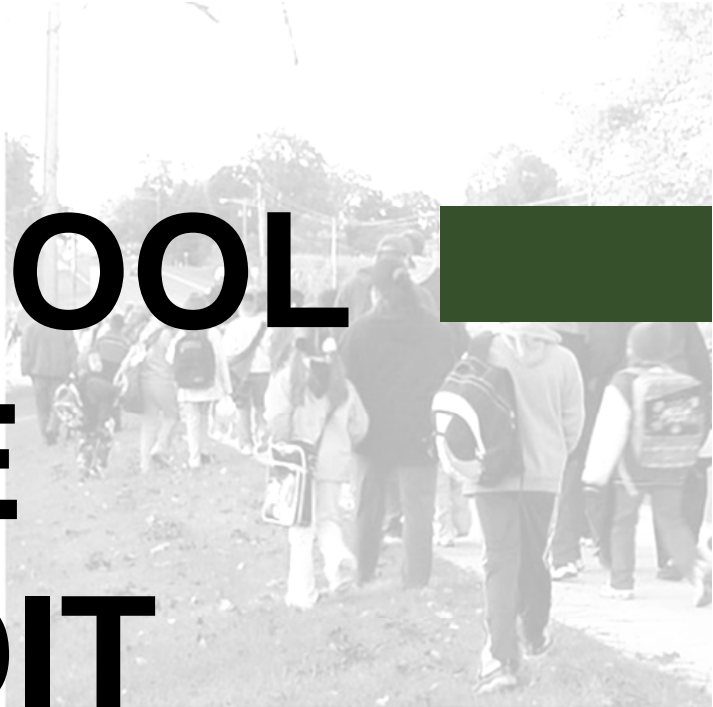
Free of litter, rubbish, broken glass, discarded items, etc.



SCHOOL

SITE

AUDIT



Number of **Frontage Streets**

- Number of **frontage streets**

(streets directly adjacent to the school site): 3



Frontage entries of vehicular and school bus

- Number of **all vehicular entries and exits** from all frontage streets (excluding drop-off bay with NO buffer and including service vehicular entries): **2**



- Number of **school bus only entries and exits** (excluding drop-off bay) : _____

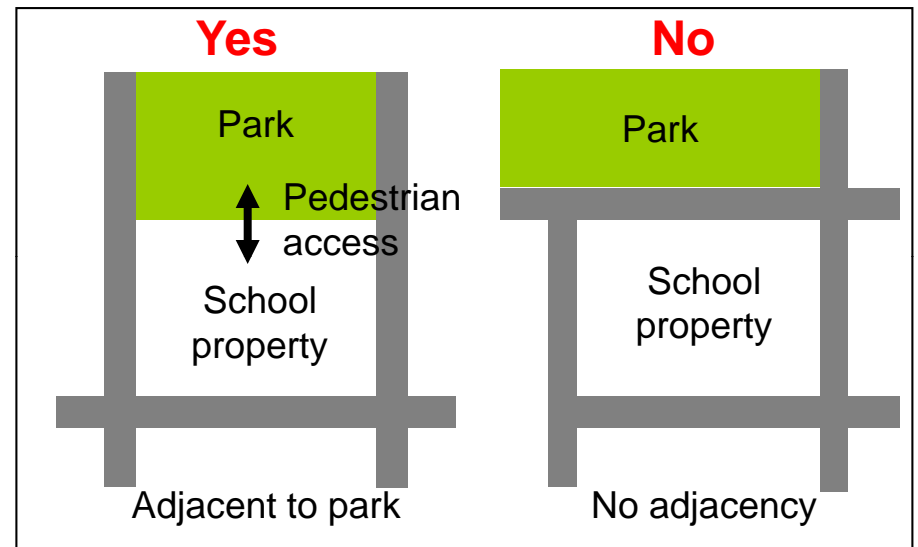
Drop-off bay is small pocket space on the street side that allow vehicles to stop for a short while for loading or drop-off people

School property adjacent / abutting to (without streets separating the area from the school property)

- None** (surrounded by streets on all sides)
- Park** → Direct pedestrian access from the school to the park
 - No Yes

Park has:

- playground equipment
- trail / path / jogging track
- basketball / tennis / volleyball court
- baseball / football / soccer field
- outdoor swimming pool
- open field with no facility / equipment



- Vacant / abandoned / undeveloped area**
- Residential area**
- Industrial area**
- Commercial area**
- Other:** _____

Main Entry (indicated in the map)

Main entry items should **ONLY** include those near the main entrance to the school building (**exclude** those in other areas within the school site)



Main entry

- Bike rack
- No
- Yes

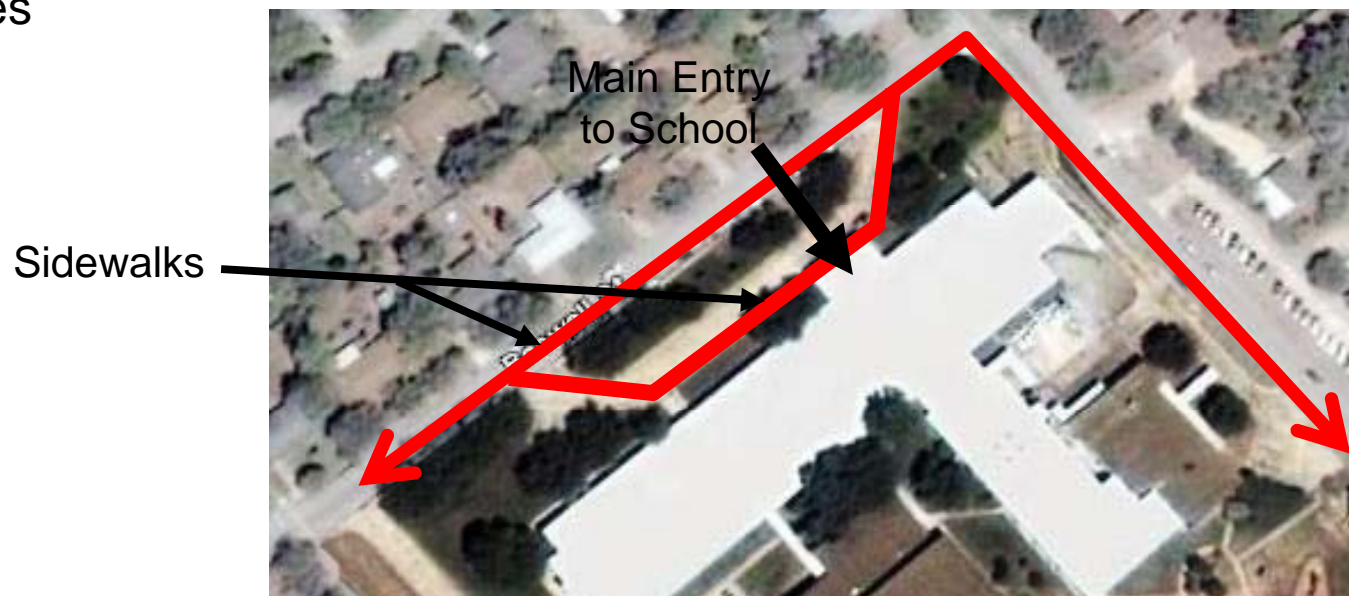


NOTE: This is a boot/shoe scraper, NOT a bike rack



- Sidewalk / walkway connection (all the way to school building entrance)

- No
- Yes



Location of Private Car D/P Area

Drop-off / pick-up Area

Drop-off / Pick-up areas may be fenced off/locked and open only during the pick-up and drop-off hours

No

On-site

Drop-off and pick-up areas inside school site.



<http://www.st-bernadettelem.com/>

Off-site (along streets)

Drop-off and pick-up areas outside school, along adjacent streets.



Type of Private Car D/P Area (if present)

Drop-off / pick-up Area

- Fully separated area with buffer



- Additional designated lane along streets



- Existing lane dedicated for drop-off / pick-up during designated hours



- Temporary street closure during designated hours



Outdoor Amenities On-site

On-site Facilities

[check all that apply]

- Bike rack
- Bench / seating
- Trash can
- Picnic table
- School garden (e.g., vegetable / flower garden)



- Bird sanctuary



- Sculpture / art display
- Water feature (e.g., pond, fountain)
- Other: _____
- Vending machine
- Drinking water fountain

Fence Transparency

[school fence visible from streets]

- No fence Not transparent at all Partly transparent Fully transparent



Not transparent at all



Partly transparent

A combination of solid and transparent fence.



Fully transparent

MAP

MAP

AUDIT

MAP



MAP A Sidewalk

DRAW

- Sidewalk locations —
- Sidewalk connectivity →

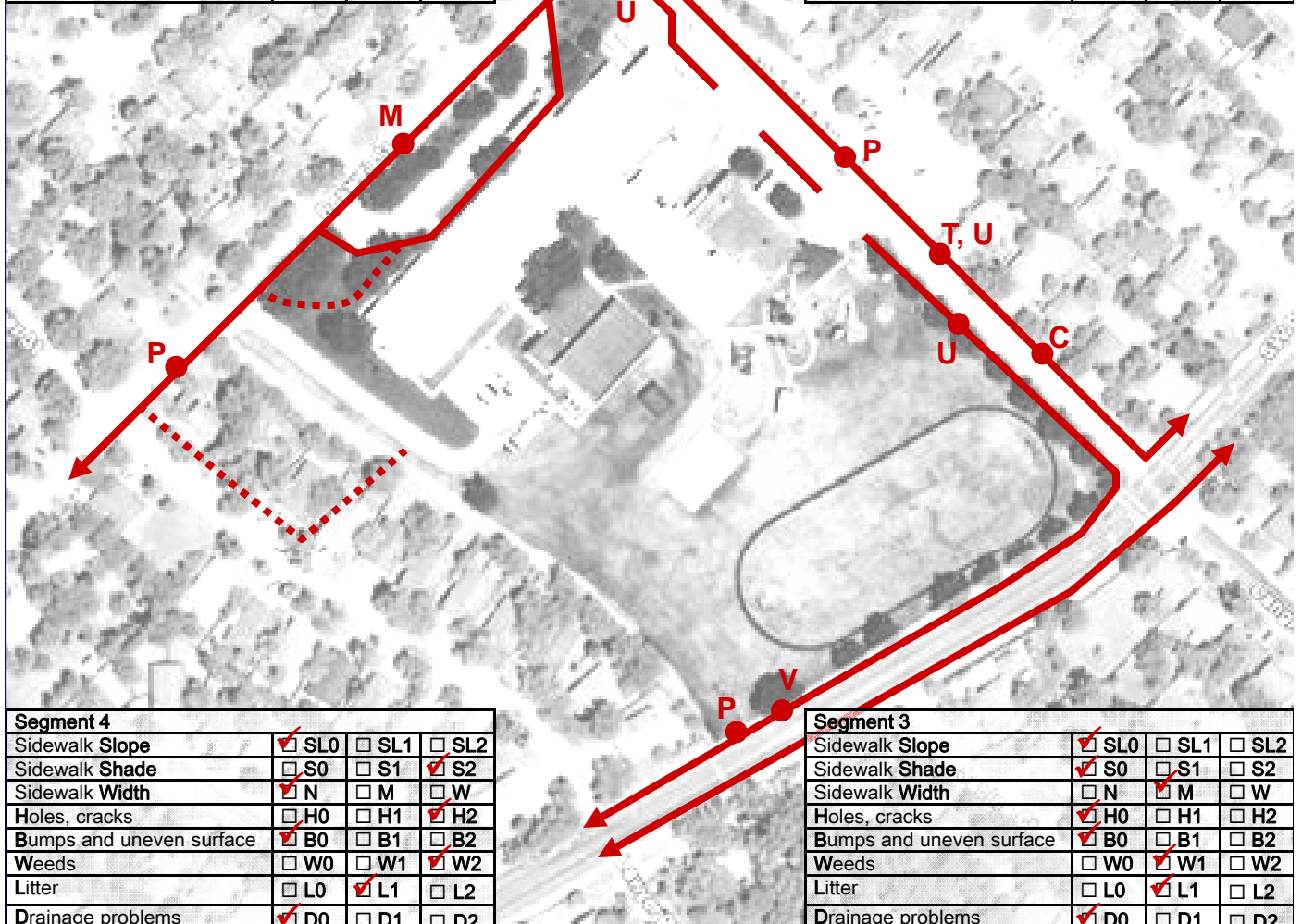
INDICATE / LOCATE

- Sidewalk Slope (Mark on tables)
SL0 SL1 SL2
- Sidewalk Shade (Mark on tables)
S0 S1 S2
- Sidewalk Width (Mark on tables)
N: <4 feet M: 4-6 feet W: >6 feet
- Sidewalk Condition (Mark on tables)
H0 H1 H2
B0 B1 B2
W0 W1 W2
L0 L1 L2
D0 D1 D2
- Sidewalk Obstructions ●
P V C T U M O1 O2
- Informal footpaths - - - - -



Segment 1			
Sidewalk Slope	<input checked="" type="checkbox"/> SL0	<input type="checkbox"/> SL1	<input type="checkbox"/> SL2
Sidewalk Shade	<input type="checkbox"/> S0	<input checked="" type="checkbox"/> S1	<input type="checkbox"/> S2
Sidewalk Width	<input checked="" type="checkbox"/> N	<input type="checkbox"/> M	<input type="checkbox"/> W
Holes, cracks	<input type="checkbox"/> H0	<input checked="" type="checkbox"/> H1	<input type="checkbox"/> H2
Bumps and uneven surface	<input checked="" type="checkbox"/> B0	<input type="checkbox"/> B1	<input type="checkbox"/> B2
Weeds	<input checked="" type="checkbox"/> W0	<input type="checkbox"/> W1	<input type="checkbox"/> W2
Litter	<input type="checkbox"/> L0	<input checked="" type="checkbox"/> L1	<input type="checkbox"/> L2
Drainage problems	<input checked="" type="checkbox"/> D0	<input type="checkbox"/> D1	<input type="checkbox"/> D2

Segment 2			
Sidewalk Slope	<input checked="" type="checkbox"/> SL0	<input type="checkbox"/> SL1	<input type="checkbox"/> SL2
Sidewalk Shade	<input checked="" type="checkbox"/> S0	<input type="checkbox"/> S1	<input type="checkbox"/> S2
Sidewalk Width	<input type="checkbox"/> N	<input type="checkbox"/> M	<input type="checkbox"/> W
Holes, cracks	<input checked="" type="checkbox"/> H0	<input type="checkbox"/> H1	<input type="checkbox"/> H2
Bumps and uneven surface	<input type="checkbox"/> B0	<input type="checkbox"/> B1	<input checked="" type="checkbox"/> B2
Weeds	<input type="checkbox"/> W0	<input checked="" type="checkbox"/> W1	<input type="checkbox"/> W2
Litter	<input type="checkbox"/> L0	<input type="checkbox"/> L1	<input checked="" type="checkbox"/> L2
Drainage problems	<input type="checkbox"/> D0	<input checked="" type="checkbox"/> D1	<input type="checkbox"/> D2



Segment 4			
Sidewalk Slope	<input checked="" type="checkbox"/> SL0	<input type="checkbox"/> SL1	<input type="checkbox"/> SL2
Sidewalk Shade	<input type="checkbox"/> S0	<input type="checkbox"/> S1	<input checked="" type="checkbox"/> S2
Sidewalk Width	<input checked="" type="checkbox"/> N	<input type="checkbox"/> M	<input type="checkbox"/> W
Holes, cracks	<input type="checkbox"/> H0	<input type="checkbox"/> H1	<input checked="" type="checkbox"/> H2
Bumps and uneven surface	<input checked="" type="checkbox"/> B0	<input type="checkbox"/> B1	<input type="checkbox"/> B2
Weeds	<input type="checkbox"/> W0	<input type="checkbox"/> W1	<input checked="" type="checkbox"/> W2
Litter	<input type="checkbox"/> L0	<input checked="" type="checkbox"/> L1	<input type="checkbox"/> L2
Drainage problems	<input checked="" type="checkbox"/> D0	<input type="checkbox"/> D1	<input type="checkbox"/> D2

Segment 3			
Sidewalk Slope	<input checked="" type="checkbox"/> SL0	<input type="checkbox"/> SL1	<input type="checkbox"/> SL2
Sidewalk Shade	<input checked="" type="checkbox"/> S0	<input type="checkbox"/> S1	<input type="checkbox"/> S2
Sidewalk Width	<input type="checkbox"/> N	<input checked="" type="checkbox"/> M	<input type="checkbox"/> W
Holes, cracks	<input checked="" type="checkbox"/> H0	<input type="checkbox"/> H1	<input type="checkbox"/> H2
Bumps and uneven surface	<input checked="" type="checkbox"/> B0	<input type="checkbox"/> B1	<input type="checkbox"/> B2
Weeds	<input type="checkbox"/> W0	<input checked="" type="checkbox"/> W1	<input type="checkbox"/> W2
Litter	<input type="checkbox"/> L0	<input checked="" type="checkbox"/> L1	<input type="checkbox"/> L2
Drainage problems	<input checked="" type="checkbox"/> D0	<input type="checkbox"/> D1	<input type="checkbox"/> D2

MAP A. Sidewalk

Sidewalk Obstructions

Poles (e.g., lighting or signage poles)

Vegetations (e.g., trees, shrubs)

Cars (e.g., abandoned or parked on sidewalks)

Trash can

Utility facility/equipment

Mailbox



MAP B. Landscaped Buffer / Drainage Ditch

Landscaped Buffer Type

Trees



Grass



No buffer



Drainage Ditch along the segment streets



MAP C. Bike Lane / Off-street Path

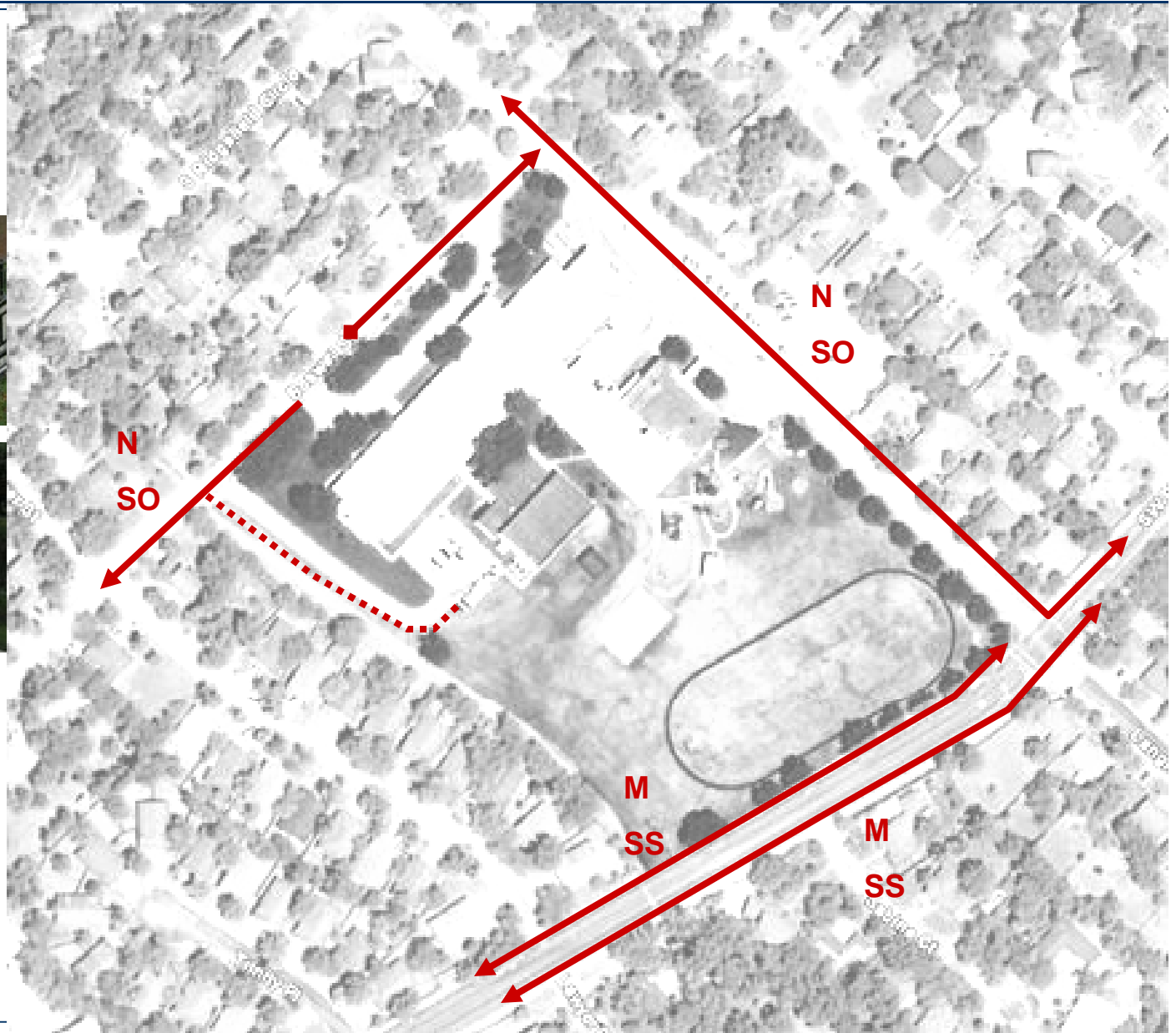
DRAW

- Bike lane locations ———
- Bike lane connectivity ———>
- Off-street trails / paths ·····



INDICATE / LOCATE

- Bike lane width
 - N:** < 4 feet
 - M:** about 4 feet
 - W:** 4+ feet
- Bike lane type
 - SO:** Separated Off-road
 - SS:** Signed and Striped bike lane on road



MAP D. Crosswalk / Bus Stop

DRAW

- Crosswalk locations —
- Bus stop locations ●

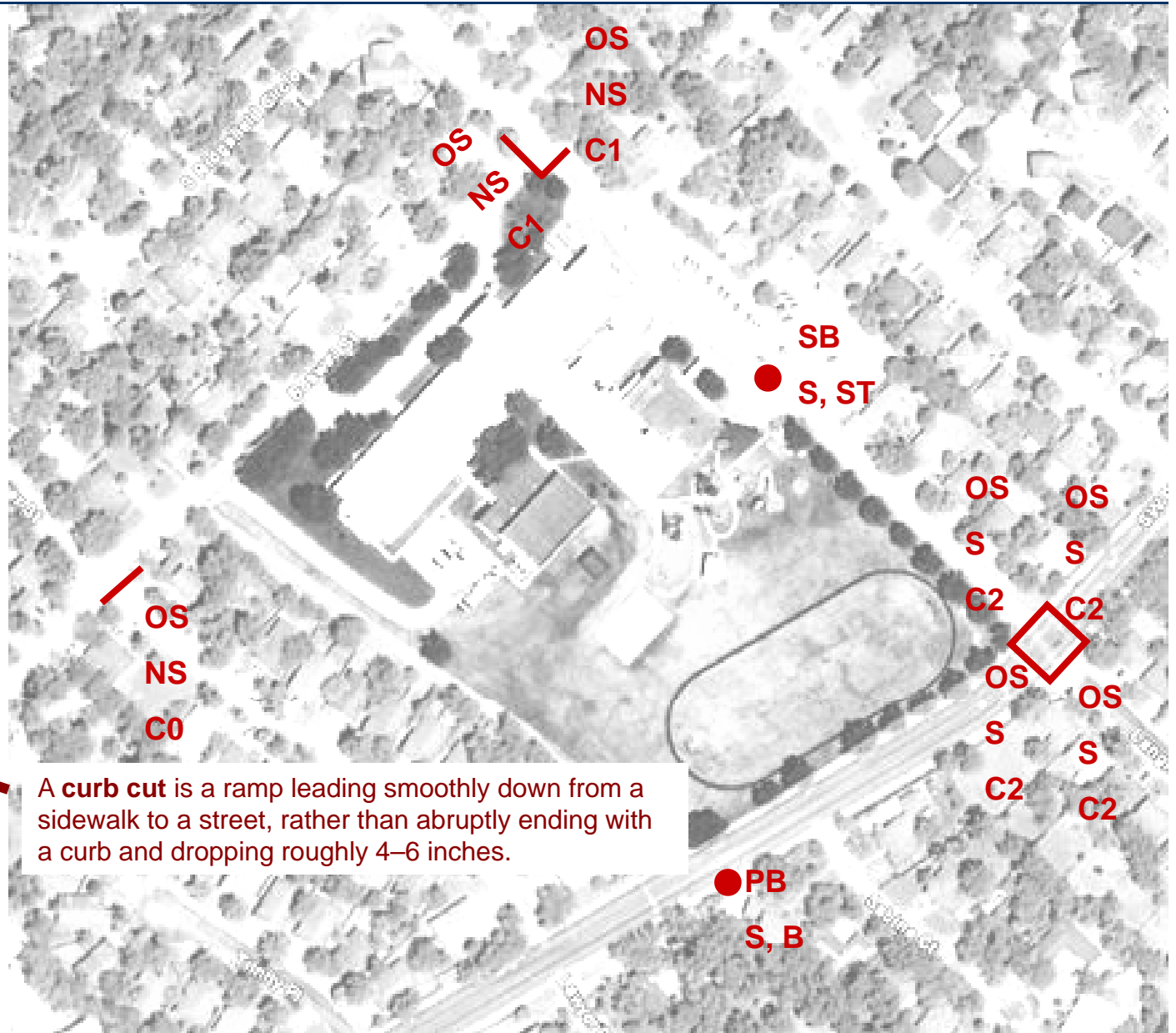
INDICATE / LOCATE

- Crosswalk type
 - OS:** On Street
 - WB:** Overhead Walking Bridge
 - UP:** Under Pass
- Crosswalk traffic signals
 - S:** Ped. Signal
 - NS:** No Signal
- Curb cuts
 - C0:** None
 - C1:** On One Side
 - C2:** On Both Sides



A **curb cut** is a ramp leading smoothly down from a sidewalk to a street, rather than abruptly ending with a curb and dropping roughly 4–6 inches.

- Bus stop type
 - SB:** School Bus stop
 - PB:** Public Bus stop
- Bus stop facilities
 - S:** Shelter
 - B:** Bench
 - T:** Trash Can
 - ST:** Shade Tree
 - O:** Other



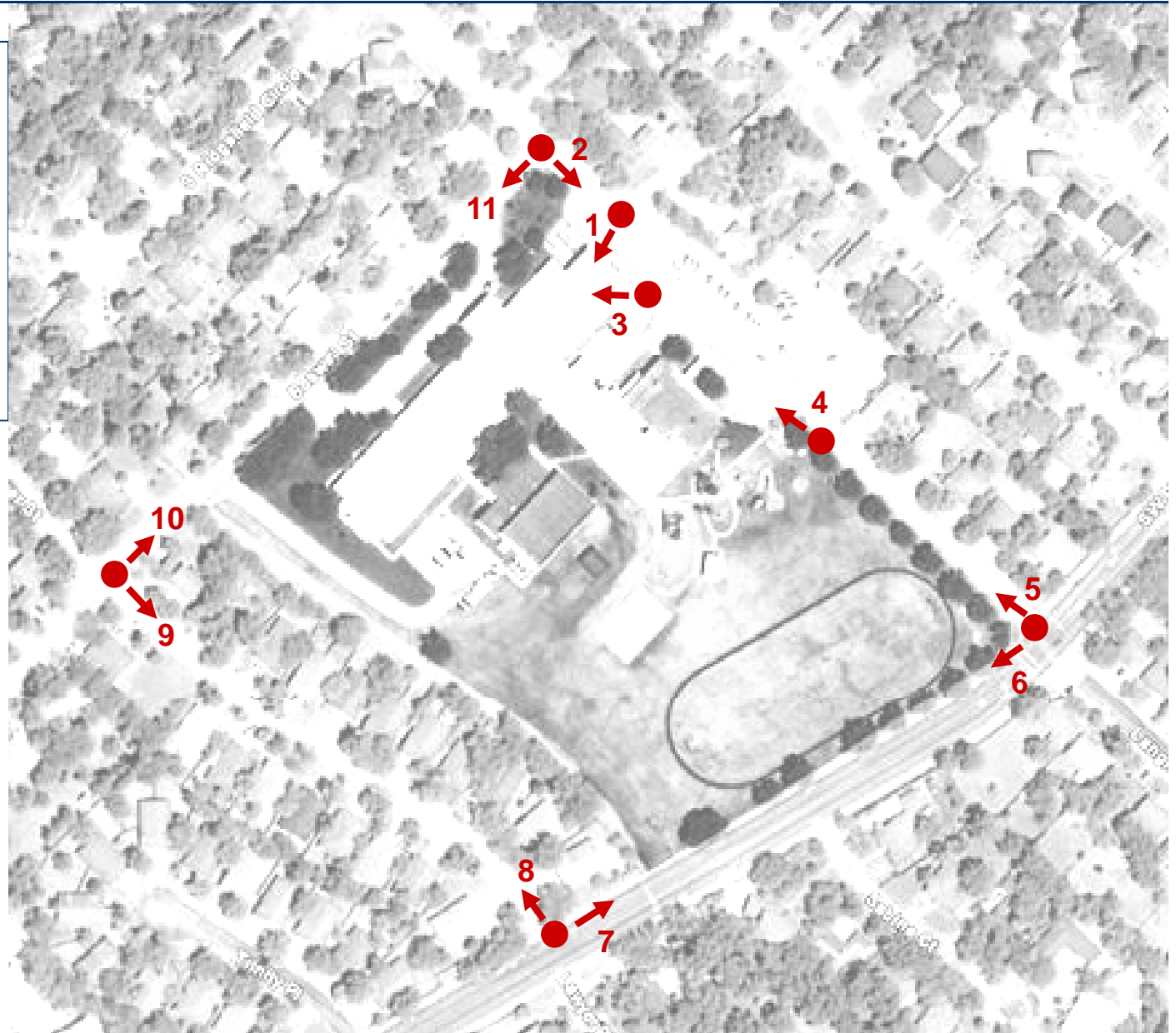
MAP E. Photo Log / Other Notes

DRAW

- Photo** locations ●
- Photo view** direction (→)
- Photo** number

COMPLETE the photo log:

Photo #
Time taken
Description



5. School Audit Instrument: Validation Study



Audit Tool Reliability Assessments

Assessment Types:

1. **Inter-rater reliability:** agreement between the two raters
2. **Test-retest reliability:** agreement between the two audits by the same rater (1-2 weeks interval)
3. **Peak vs. Off-peak Hour Reliability:** agreement between peak vs. off peak hour measurements by the same auditor

Test Auditors: 1 with and 1 without a background in environmental study

Testing school samples: stratified random sampling

	Urban	Suburban	Rural
Higher income	2 schools (8 times)	2 schools (8 times)	2 schools (8 times)
Lower income	2 schools (8 times)	2 schools (8 times)	2 schools (8 times)

* Income level of school determined by % of economic disadvantaged student

Audit Tool Reliability Assessments

Setting	Income	City/County	Density (pp/sq.m)	ISD	EL School	Enroll.	Grade Span	% Black	% Hispanic	% White	% Eco. Disadv.
<i>Statewide Mean</i>								14.3	47.2	34.8	55.3
Urban	Lower	Austin	2,610.4	Austin	Andrews	610	EE-05	28.0	69.7	2.0	93.1
		Houston	3,371.7	Houston	Kelso	528	PK-05	43.4	56.6	0.0	98.7
	Higher	Austin	2,610.4	Austin	Casis	777	EE-05	3.1	9.9	83.9	4.1
		Houston	3,371.7	Houston	Barbara Bush	627	PK-05	10.4	17.5	46.4	13.7
Sub-urban	Lower	Bryan	1,515.0	Bryan	Anson Jones	595	KG-05	27.6	69.7	2.5	93.9
		Bryan	1,515.0	Bryan	Navarro	542	KG-05	23.6	54.4	21.6	78.6
	Higher	Bryan	1,515.0	Bryan	Alton Bowen	411	KG-05	21.4	18.0	57.9	32.1
		College Sta.	1,686.3	College Sta.	Pebble Creek	605	PK-04	12.7	6.8	68.4	22.0
Rural	Lower	Walker Co.	78.5	Huntsville	Huntsville	458	PK-04	28.6	14.8	56.1	71.8
		Anderson Co.	51.5	Palestine	Story	707	03-05	29.0	33.5	36.5	70.6
	Higher	Leon Co.	14.3	Centerville	Centerville	388	PK-06	9.5	10.8	77.8	42.0
		Lee Co.	24.9	Lexington	Lexington	449	EE-05	11.6	10.2	77.7	43.4

School Audit Tool Reliability Study Results

Reliability Test Type	Test Statistics	Urban school			Suburban school			Rural school			Total		
		Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
Inter-rater	Kappa	0.886	0.769	0.831	0.846	0.746	0.800	0.943	0.843	0.885	0.943	0.746	0.839
	ICC	0.847	0.298	0.632	0.884	0.392	0.613	0.645	0.425	0.551	0.884	0.298	0.602
Test-retest	Kappa	0.956	0.855	0.918	0.902	0.789	0.855	0.976	0.883	0.936	0.976	0.789	0.903
	ICC	0.933	0.478	0.772	0.926	0.402	0.719	0.980	0.682	0.838	0.980	0.402	0.774
Peak-offpeak	ICC	1.000	0.373	0.778	0.991	0.321	0.749	0.975	0.670	0.888	1.000	0.321	0.801

School Audit Tool Reliability Study Results

Objective items (categorical) *Kappa*

- Inter-rater reliability: **0.839**
- Test-retest reliability: **0.903**

Subjective items (ordinal) *Intra-Class Correlation*

- Inter-rater reliability: **0.602**
- Test-retest reliability: **0.774**
- Peak vs. off-peak reliability: **0.801**

- Rural schools showed most consistent results in the peak-off peak and test-retest assessments.
- Inter-rater tests showed somewhat different results with urban schools showing the highest ICC and rural schools showing the highest Kappa values

Conclusion

- This School Audit Instrument is a tool that can provide effective and efficient assessments of street and school site environments, focusing on those attributes related to children's **active transportation to school**.
- The instrument's three components of Street Audit, School Site Audit and Map Audit cover multi-faceted environmental factors comprehensively and with sufficient spatial and observational **details**.
- Most items achieved moderate to high levels of reliabilities from the testing that involved schools with different income levels and community settings. Therefore with proper **training**, this audit can be used to provide reliable and accurate information about the existing built environmental conditions around schools, for **education, research, intervention, and policy-support** purposes

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chanam@tamu.edu
http://faculty.arch.tamu.edu/clee



W014 Williams Administration Building
College Station, TX 77843-3137
TEL 979. 845. 7056 FAX 979. 862.1784
Texas A&M University

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WELCOME TO DESIGN RESEARCH FOR ACTIVE LIVING AT TEXAS A&M!

The Design Research for Active Living group is devoted to interdisciplinary research aimed at linking elements of the built environment with human health behaviors and outcomes. We believe that the homes, neighborhoods, cities and regions in which we live, work, study and play form an important health infrastructure that can promote or hinder good health. Made up of faculty members and students from Texas A&M University, our teams focus on identifying the specific and modifiable attributes of the built environment that can contribute to active and healthy living for all, especially vulnerable populations such as children, minorities and older adults. Toward this end, we conduct research projects examining people-environment relationships from the smaller architectural scale to the larger neighborhood and regional scales. Our work also is focused on multiple perspectives, from practitioners to policy-makers perspective, and from a people-oriented view to an environment-oriented view. Finally, we are committed to advancing theoretical and methodological approaches to better characterize the built environment for research, practice, and intervention purposes.



RESEARCH HIGHLIGHT

[The "Whys" and "Why Nots" of Active Living: Barriers and Motivators among HighRisk Children.](#)

This research examines multi-level natural and virtual experiments to identify specific interventions effective in promoting walking and physical activity and reducing obesity ... [more](#)



[Safety, Health, and Equity for Active School Transportation: Interactions among Multi- Level Factors and Specific Needs of Low-Income Hispanic Children.](#)

This research aims: 1) to examine the mediating and moderating factors in the relationship between objective physical environment and active school transportation; ... [more](#)



[Institute for Obesity Research and Program Evaluation, Texas A&M University; and College Research and Interdisciplinary Council, College of Architecture, Texas A&M University.](#)

This pilot study is to explore the impact of food and physical activity environments where students live, work and study on energy expenditure. It will also compare diet and physical... [more](#)

