



# Intersection Inventory and Walkability Map

January 8, 2009

# Organization



- **Founded:** as a private non-profit corporation in January 2006
- **Current membership:** 327 local residents
  - Majority from West Windsor, but also surrounding communities
- **Board of Trustees:** Nine person board (many former members of the Mayor's Bicycle and Pedestrian Task Force)
- **Advisory Board:** Eight person board, includes a transportation professional and student advisors



- **Mission:** To promote bicycling and walking in West Windsor Township and neighboring communities, emphasizing access, education, mobility, and safety

# Goals



## **Encourage residents to walk and/or bicycle more often**

### **Promote bicycle and pedestrian awareness and education:**

- Bicycle and pedestrian safety
- Health benefits from bicycling and walking
- Share the road strategies

### **Advocate for improvements in bicycle & pedestrian access & mobility:**

- Public policies and programs
- Bicycle and pedestrian infrastructure
- Safe bicycle and pedestrian crossings of major barriers (e.g., Rt. 1)
- Traffic calming
- Enforcement of traffic laws
- Coordination with neighboring communities on regional goals

### **Conduct and support activities to fulfill our mission:**

- Community events and programs
- Community service opportunities for students, residents, and local businesses
- Fundraising (e.g., government, corporations, foundations, individuals)

# Attaining a Goal of Walkability



**Overall goal:** develop safe routes for pedestrians to schools, transit, work, retail centers, parks

## What have we done to get there?

- Conducted educational walks: West Windsor Walks Program
- Identified gaps in infrastructure: sidewalk inventory
- Developed pedestrian map: print and online map
- Lobbied governmental bodies for improvements: sidewalk program

## What's been missing from our approach? **Safe Intersections!**

- Conduct an intersection inventory
- Develop methodology to cope with enormous amount of data
- Develop prioritization method for improvement
- Create online safe routes map
- Lobby for improvements: intersection improvement program

# Intersection Inventory



- In the Spring, we conducted an inventory 193 intersections in town
- Enormous undertaking, helped by:
  - Global Volunteer Day grant from McGraw-Hill
  - The combined effort of over 30 volunteers





# The Methodology: Collecting Data



- 193 intersections based on arterial roads, major/minor collector roads (e.g., Rte 571, Village Rd, Edinburg Rd, Conover Rd, etc.)
- 30 volunteers, 14 teams armed with cell phones, detailed capture logs, guidelines, measuring devices
- Collected data required for ADA compliance
- Documenting gaps with photographs
- Data verified and captured electronically on spreadsheets





# The Methodology: Intersection Evaluation Questions



- Crosswalk road surface damaged?
- Curb cut missing?
- Curb cut slope dysfunctional?
- Curb cut detectable warnings missing?
- Curb cut not flush?
- Sidewalk missing?
- Sidewalk blocked?
- Sidewalk narrow (<3ft)?
- Sidewalk surface damaged?
- Walk signal missing?
- Walk signal non-functional?
- Walk signal inaccessible/obstructed?
- Pedestrian sign missing?
- Pedestrian sign obstructed?

Answer “yes”, “no”, or “NA” to each question



# Key Determination: Incentive to Cross



- If there was any incentive to cross, then the questions were applicable to that crossing
- If there was no incentive to cross, then the questions were not applicable

Incentive to cross = crosswalk, curb cut or walk signal

# Preliminary Findings



- 666 Crossings of 193 Intersections
- 197 Crosswalks Missing or Faded (38%)
- 14 Walk Signals Missing (24%)
- 82 Pedestrian Signs Missing (68%)
- 89 Curb Cuts Missing (27%)
- Photographs of gaps and deficiencies

# What to do with all this Data?



- Capture all data in electronic spreadsheets and verify, verify
- Quantify improvements: convert answers to numbers
- Determine proximity of intersections to pedestrian generators (e.g. schools, train station, retail centers, etc.)
- Develop Walkability scoring methodology based on:
  - Needed improvements
  - Proximity to pedestrian generators
- Prioritize intersection improvements based on overall score
- Add transparency:
  - Publish results
  - Create Walkability map

# Determine Improvement Score



- Assign a score from 1-3 based on perceived importance of each Improvement
- For each crossing of an intersection, add up Improvement Scores
- Generate Total Improvement Score for entire intersection

Question	Assigned Score
Crosswalk missing?	3
Crosswalk faded or low visibility?	2
Crosswalk road surface damaged?	1
Curb cut missing?	3
Curb cut slope dysfunctional?	2
Curb cut detectable warnings missing?	2
Curb cut not flush?	2
Sidewalk missing?	2
Sidewalk blocked?	2
Sidewalk narrow (<3ft)?	1
Sidewalk surface damaged?	1
Walk signal missing?	3
Walk signal non-functional?	3
Walk signal inaccessible/obstructed?	3
Pedestrian sign missing?	3
Pedestrian sign obstructed?	2

# Determine Proximity Score



- Follow same methodology used for sidewalk improvement priorities
- Identify Pedestrian Generators (schools, train station, parks, retail centers)
- Identify Distance from crossing to each generator (maps made by Brian)
- Assign Proximity Score for each crossing based on Distance (peak-hour generators are weighted)
- Determine overall Proximity Score for Crossings and Intersection

Distance from Generator	Non Peak-Hour Generator	Peak-Hour Generator
< 0.5 mile	2	4
0.5 to 1.0 mile	1	2

Example:

Generator	Distance	Proximity Score by Crossing			Intersection Proximity Score			
		Crossing 1	Crossing 2	Crossing 3				
A - WW-P South*	0.5	4	4	4	<b>12</b>			
B - Acme	1	1	1	1	<b>3</b>			
C - Train Station*	1	2	2	2	<b>6</b>			
* Peak-Hour Generator		7	+	7	+	7	=	<b>21</b>

# Pedestrian Generators



## Peak-Hour Generators

Schools
Mercer County Community College
West Windsor Plainsboro High School North
West Windsor Plainsboro High School South
Grover Middle School
Village Upper Elementary School
Maurice Hawk Elementary School
Dutch Neck Elementary School
Transit Facilities
Princeton Junction Train Station

Retail Centers
Acme Shopping Center
McCaffery's Shopping Center
Village Shoppes
Princeton Arms
Ellsworth Shopping Center
Market Fair
Windsor Green
Parks
Mercer County Park
Arboretum
Community Park
Van Nest Park
Conover Park
Zaitz Park
Duck Pond Park
D&R Canal Park @ Alexander Road
D&R Canal Park @ Washington Road
Misc
Arts Council
Municipal Center



# Determine Overall Intersection Score



- Improvement Score x Proximity Score = Crossing Score
- Total of Crossing Scores = **Overall Intersection Score**

## Example: Princeton-Hightstown and Cranbury-Wallace Roads

Multiple deficiencies: missing crosswalks, walk signals, curb cuts, detectable warning and sidewalks; non-functional walk signals

Crossing	Improvement Score																		Proximity Score	Overall Intersection Score
	Crosswalk Missing?	Crosswalk Faded or Low Visibility?	Crosswalk Road Surface Damaged?	Curb Cut Missing?	Curb Cut Slope Dysfunctional?	Curb Cut Detectable Warnings Missing?	Curb Cut NOT Flush?	Sidewalk Missing?	Sidewalk Blocked?	Sidewalk Narrow (<3 ft)?	Sidewalk Surface Damaged?	Walk Signal Missing?	Walk Signal Non-Functional?	Walk Signal Inaccessible or Obstructed?	Walk Signal Length (in seconds)?	Pedestrian Sign Missing?	Pedestrian Sign Obstructed?	Total		
A	3	0	0	3	0	0	2	0	0	0	1	3	0	0	0	0	0	12	27	324
B	3	0	0	0	0	2	0	0	0	0	0	3	0	0	0	0	0	8	27	216
C	3	0	0	3	0	0	0	2	0	0	0	3	0	0	0	0	0	11	27	297
D	0	0	0	3	0	0	0	2	0	0	0	0	3	0	0	0	0	8	27	216
<b>Intersection</b>	<b>9</b>	<b>0</b>	<b>0</b>	<b>9</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>9</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>39</b>	<b>108</b>	<b>1053</b>

# Top 20 Intersection Improvements



From WWBPA  
Intersection Inventory  
And Prioritization  
11-20-2008 Analysis  
(199 Intersections Analyzed)

Rank	Cross Road	Major Road	Total Score (w/Proximity as Multiplier)	School Zone?	Jurisdiction (State, County, Town)	Crosswalk Missing?	Crosswalk Faded or Low Visibility?	Crosswalk Road Surface Damaged?	Curb Cut Missing?	Curb Cut Slope Dysfunctional?	Curb Cut Detectable Warnings Missing?	Curb Cut NOT Flush?	Sidewalk Missing?	Sidewalk Blocked?	Sidewalk Narrow (<3 ft)?	Sidewalk Surface Damaged?	Walk Signal Missing?	Walk Signal Non-Functional?	Walk Signal Inaccessible/Obstructed?	Pedestrian Sign Missing?	Pedestrian Sign Obstructed?
1	Princeton Hightstown Rd	Cranbury Rd	1053	Y	S/C	Y	N	N	Y	N	Y	Y	Y	N	N	Y	Y	Y	N	A	A
2	North Post Rd	Clarksville Rd	621	Y	C/T	N	N	Y	Y	Y	Y	N	N	N	N	Y	N	N	Y	A	Y
3	Princeton Hightstown Rd	Clarksville Rd	600	Y	C	N	N	N	Y	N	Y	N	N	N	N	N	N	N	Y	A	A
4	Scott Ave	Alexander Rd	570	Y	T	N	N	N	Y	N	Y	N	Y	N	N	N	A	A	A	N	N
5	Penn Lyle Rd/Harris	Clarksville Rd	480	Y	C/T	N	N	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N
6	Village Rd	New Edinburg Rd	470	Y	T	Y	N	N	N	Y	Y	Y	Y	N	N	N	Y	Y	Y	A	A
7	Arnold Dr	Penn Lyle Rd	336	Y	T	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	A	A	A	Y	N
8	Sherbrooke Dr	Princeton Hightstown Rd	336	Y	C	N	Y	Y	Y	N	Y	N	N	Y	N	N	A	A	A	N	N
9	Princeton Hightstown Rd	Alexander Rd	308	Y	C	N	N	N	N	Y	Y	Y	Y	A	A	A	N	A	Y	A	A
10	Carillon Blvd/Carnegie Blvd	Canal Pointe Blvd	276	N	T	Y	A	A	Y	Y	Y	Y	Y	Y	N	N	A	A	A	Y	Y
11	Village Rd	South Mill Rd	270	Y	T	Y	A	A	Y	N	Y	Y	Y	Y	Y	Y	A	A	A	Y	A
12	South Mill Rd	Princeton Hightstown Rd	270	Y	C	N	Y	N	Y	N	Y	Y	Y	N	N	Y	N	N	Y	A	A
13	Akron Ln	New Village Rd	270	Y	T	N	Y	N	N	Y	Y	Y	N	N	N	N	A	A	A	Y	A
14	Princeton Hightstown Rd	Lanwin Blvd	264	N	C/T	N	Y	N	Y	N	Y	Y	Y	Y	N	N	N	N	Y	A	A
15	Greenfield Dr	New Village Rd	234	Y	T	N	Y	N	N	N	Y	Y	N	N	N	N	A	A	A	Y	A
16	Stockton Ln	New Village Rd	234	Y	T	N	Y	Y	N	Y	Y	N	N	N	N	N	A	A	A	Y	A
17	Wallace Rd	Scott Ave	232	Y	T	N	N	Y	N	Y	Y	Y	N	N	N	Y	A	A	A	N	N
18	Village Rd	Old Trenton Rd	232	Y	T	Y	N	N	N	N	Y	N	N	N	N	N	N	N	Y	A	A
19*	Village Rd	Southfield Rd	110	Y	T	Y	Y	N	N	N	Y	Y	Y	N	N	N	A	A	A	N	N
20**	Crosswalk near Mayfair Dr	Canal Pointe Blvd	-	N	T				Y												

\* Special case- Missing xwalk at school entrance

\*\* Special case- Missing curb cut on sole xwalk on road

S=State C=County T=Township

Y=Yes N=No A=Not applicable

# Mapping, Prioritization, Funding



- Mapping results
  - Latitude and longitude of each crossing
  - Load detail onto walkability map (ongoing)
- Prioritization (ongoing)
  - Develop method for prioritization (based on pedestrian generators, road type, improvements needed)
  - Present findings to township, county and state
  - Funding:
    - Township has agreed to Intersection Improvement Budget
- Publish process and use as a model to be repeated in other communities
- Applied for Google Geo Challenge Grant to automate methodology

# Safe Routes Map



The map accomplishes the following:

- Capture of all data elements collected in our inventory, including:
  - Latitude and longitude of each crossing and intersection
  - Final scores and rankings assigned to each crossing and intersection
  - Photographs identifying missing infrastructure
- Identification of safe pedestrian routes to school, transit and work
- Prioritization of needed infrastructure improvements for local authorities
- Search functionality based on missing/available infrastructure and score

<http://maps.gismap.us/wwbpa/>



# Safe Routes Map (cont)



**West Windsor Bicycle and Pedestrian Alliance: Safe Routes Inventory - Interactive Map - Microsoft Internet**

File Edit View Favorites Tools Help

Address: <http://maps.gismap.us/wwwba/#>

West Windsor Bicycle and Pedestrian Alliance: Safe Routes Inventory  
Promoting bicycling and walking in West Windsor Township

About the Project

**Search**

Address:   
e.g., Village Rd & Eastern Dr, 08550  
OR Village Rd & Eastern Dr, West Windsor, NJ

Question:   
 Yes  No

OR

Priority/Score:   to

**Map** **Satellite** **Terrain** **Opacity**

**Highest priority intersection (2-10 shown as well)**

**Link to highest priority intersection**

Major Road	Intersection	Point	Score	Priority
Cranbury Rd	Princeton Hightstown Rd	c	1053	1
Cranbury Rd	<u>Princeton Hightstown Rd</u>	b	1053	1
Cranbury Rd	Princeton Hightstown Rd	a	1053	1
Cranbury Rd	Princeton Hightstown Rd	d	1053	1
Clarksville Rd	North Post Rd	a	621	2
Clarksville Rd	North Post Rd	c	621	2
Clarksville Rd	North Post Rd	d	621	2
Clarksville Rd	Princeton Hightstown Rd	a	600	3
Clarksville Rd	Princeton Hightstown Rd	b	600	3

**Listing of top 10 intersections**

Map data ©2008 Tele Atlas - Terrain





# Safe Routes Map (cont)



West Windsor Bicycle and Pedestrian Alliance: Safe Routes Inventory - Interactive Map - Microsoft Internet

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites

Address <http://maps.gismap.us/wwbpa/#>

alO Search Search eMusic Free Music Free Radio Backstage Pass Music Alerts

### West Windsor Bicycle and Pedestrian Alliance: Safe Routes Inventory

Promoting bicycling and walking in West Windsor Township

[About the Project](#)

#### Search

#### Information

**Cranbury Rd & Princeton Hightstown Rd (a)**

Speed Limit:	25
Score:	1053
Priority:	1
- Crosswalk Missing?:	Y
- Crosswalk Faded or Low Visibility?:	N/A
- Crosswalk Road Surface Damaged?:	N/A
- Curb Cut Missing?:	Y
- Curb Cut Slope Dysfunctional?:	N/A
- Curb Cut Detectable Warnings Missing?:	N/A
- Curb Cut NOT Flush?:	Y
- Sidewalk Missing?:	N
- Sidewalk Blocked?:	N
- Sidewalk Narrow (<3 ft)?:	N
- Sidewalk Surface Damaged?:	Y
- Walk Signal Missing?:	Y
- Walk Signal Non-Functional?:	N/A
- Walk Signal Inaccessible or Obstructed?:	N/A
- Walk Signal Length (in seconds)?:	0
- Pedestrian Sign Missing?:	N/A
- Pedestrian Sign Obstructed?:	N/A
- Traffic Light?:	Y

#### Layers

<http://maps.gismap.us/wwbpa/photo.aspx?src=img/A-07-a-01.jpg> - Mic

Missing Walk Signal

Missing Curb Cut

Missing Crosswalk

Missing Detectable Warnings

# Resources Used in Project



Step	Responsible	# People	Hours/Person	Total Hours
<b>Planning</b>				
Business Requirements	WWBPA Trustees	5	10	50
Design: Inventory Approach	WWBPA Trustee	1	100	100
Design: Evaluation and Scoring	WWBPA Trustees	2	10	20
Build: Methodology	WWBPA Trustee	1	40	40
Training and Testing	Global Volunteer Day Team	30	1	<u>30</u> 240
<b>Inventory</b>				
Sidewalk Inventory	Task Force Team	10	10	100
Intersection Identification	WWBPA Trustee	1	10	10
Intersection Inventory	Global Volunteer Day Team	30	6	<u>180</u> 290
<b>Assessment</b>				
Sidewalk Audit	Task Force Team	5	20	100
Sidewalk Review	Township Engineer	1	20	20
Intersection Audit	WWBPA Trustees	5	20	100
Intersection Review	Project Lead	1	100	<u>100</u> 320
<b>GIS Coordinates</b>				
Plotting: Sidewalks	Township Engineer	1	20	20
Plotting: Intersections and Crossings	WWBPA Trustees	4	25	100
Plotting: Generators	Township Engineer	1	10	<u>10</u> 130
<b>Map Application</b>				
Map Development	Vertices	2	100	<u>200</u> 200
<b>Evaluation and Scoring</b>				
Generator Identification	Task Force Team	1	20	20
Generator Proximity Assignment	WWBPA Trustee	1	20	20
Scoring of Crossings	WWBPA Trustees	2	15	30
Rationalization and Prioritization of Findings	WWBPA Trustees	2	5	<u>10</u> 80
<b>Total</b>				<u><u>1260</u></u>

# Contact Us



## How to Contact Us:

- Web site: [www.wwbpa.org](http://www.wwbpa.org)
- Blog: <http://wwbpa.blogspot.com>
- Google Group: [www.groups.google.com/group/wwbpa](http://www.groups.google.com/group/wwbpa)
- E-mail: [wwbikeped@gmail.com](mailto:wwbikeped@gmail.com)
- Address: P.O. Box 625, Princeton Junction, NJ 08550
- Meetings: 2<sup>nd</sup> Thursday of every month, 7:30 PM, West Windsor Municipal Building (Clarksville and North Post Roads)
- Next Meeting: January 8<sup>th</sup> 7:30PM