Pond Road Middle School Robbinsville, NJ

School Travel Plan June 2014

Prepared by Greater Mercer TMA

NEW JERSEY Safe Routes to School

GREATER MERCER TMA Discover Greener Paths

Contents

Pond Road Middle School Description:

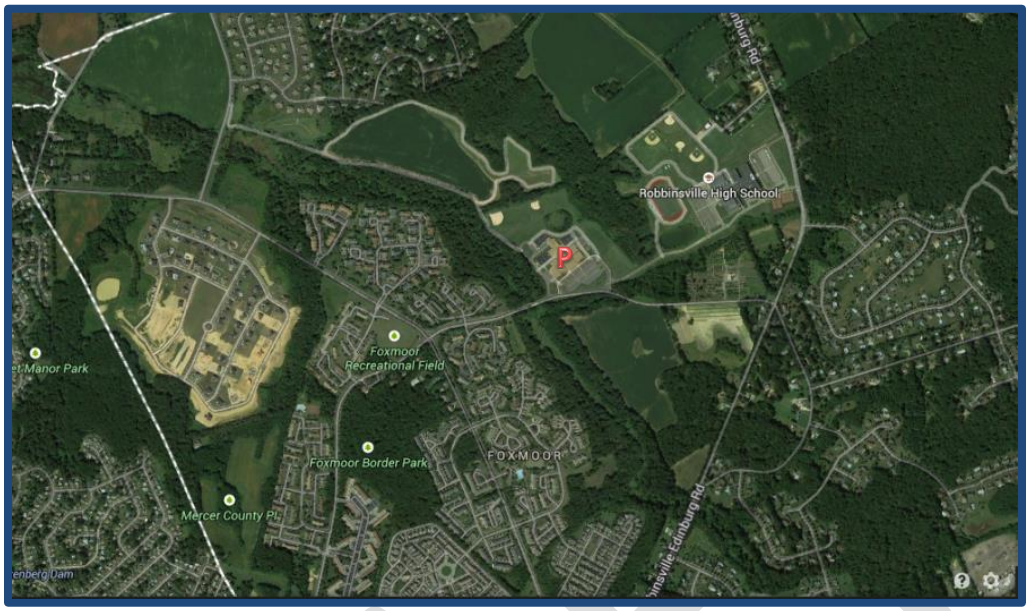
Pond Road Middle School is located at 150 Pond Road Robbinsville, New Jersey. For the 2013-2014 school year it houses approximately 1,100 students from grades 4-8. Pond Road is the only middle school in the Robbinsville School District. The school day lasts from 8:10am to 2:50pm. Many students stay after school for sports or activities. There is also the R.E.D., the Robbinsville Extended Day program which runs from 7am to 6:30pm.

Working Groups and Partnerships:

Organization	Role/ Responsibility	Contact
Voorhees Transportation Center	Key Partner	Sean Meehan Project Manager 848.932.2860 smeehan@ejb.rutgers.edu
Robbinsville Police Department	Community Partner	Patrolman Wayne Haugh Traffic Unit 609.259.3900 WayneH@Robbinsville-twp.org
Robbinsville School District	Community Partner	Superintendent Steven Mayer 155 Robbinsville Edinburg Road Robbinsville, NJ 08691 609-632-0910 smayer@robbinsville.k12.nj.us
Greater Mercer Transportation Management Association	Key Partner	Jerry Foster Transportation Safety Educator 609.452.1491 extension 227 jfoster@gmtma.org

School Neighborhood:

Pond Road Middle School (P on map) is located on Pond Road near the intersection of Pond Road and Robbinsville Edinburgh Road (Route 526). It is surrounded by residential neighborhoods, farm fields and Robbinsville High School.



Pond Road Middle School (P) and surrounding neighborhood

GMTMA observed many students walking and biking to Pond Road School. Nonstudents were also observed (see Appendix D). Those who do take the bus are dropped off and picked up in the front driveway loop of the school; the red arrow on the map below, traffic is one way in the direction of the arrow. Parental drop off and pick up also occurs in this driveway loop. GMTMA also observed some parents drop off and pick up students off of school property and have the students walk the last short distance to/ from the school. One such remote drop off location is located on the map below at the yellow lines. A crosswalk near the remote drop off/ pick up location is highlighted with a white dash.

Pond Road School: Red line is the morning and afternoon bus and parent drop off/ pick up, yellow lines are the remote parent drop off and pick up and the white dash is a crosswalk.

Walk and Bike Barriers and Opportunities:

The following estimates were provided by the school district:

Walk to school - 35 students

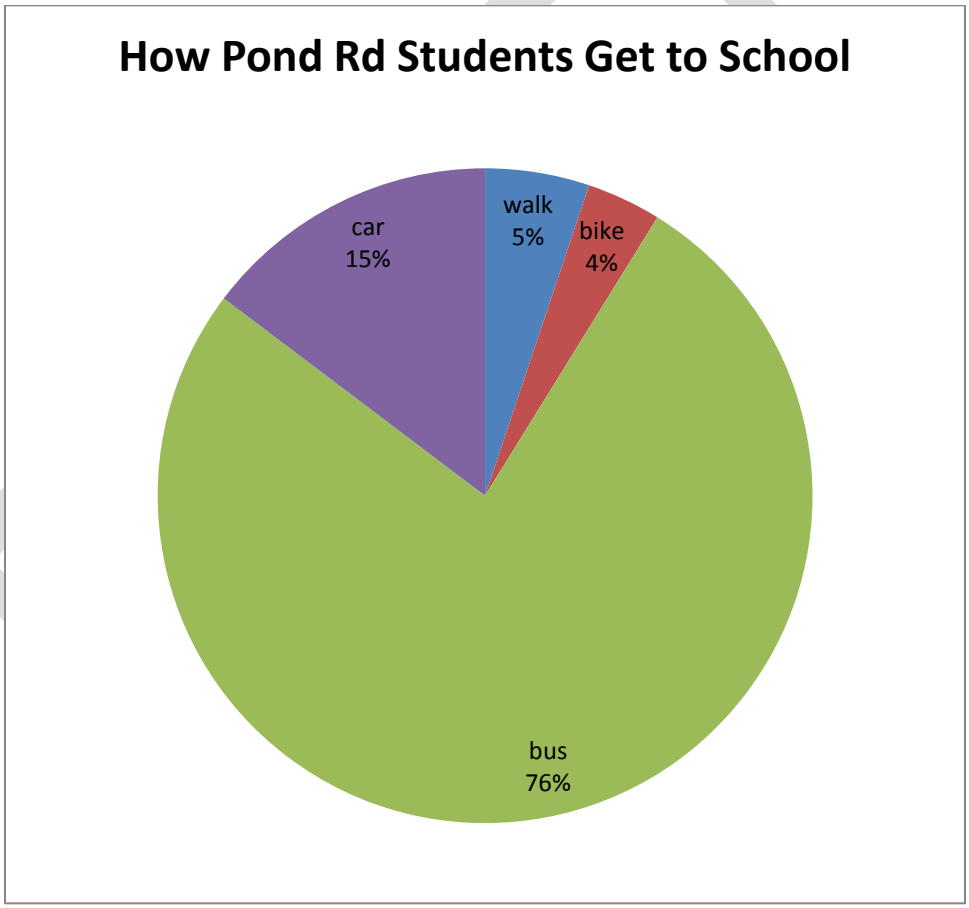
Bike to school - 25 students

Ride the bus - 520 students

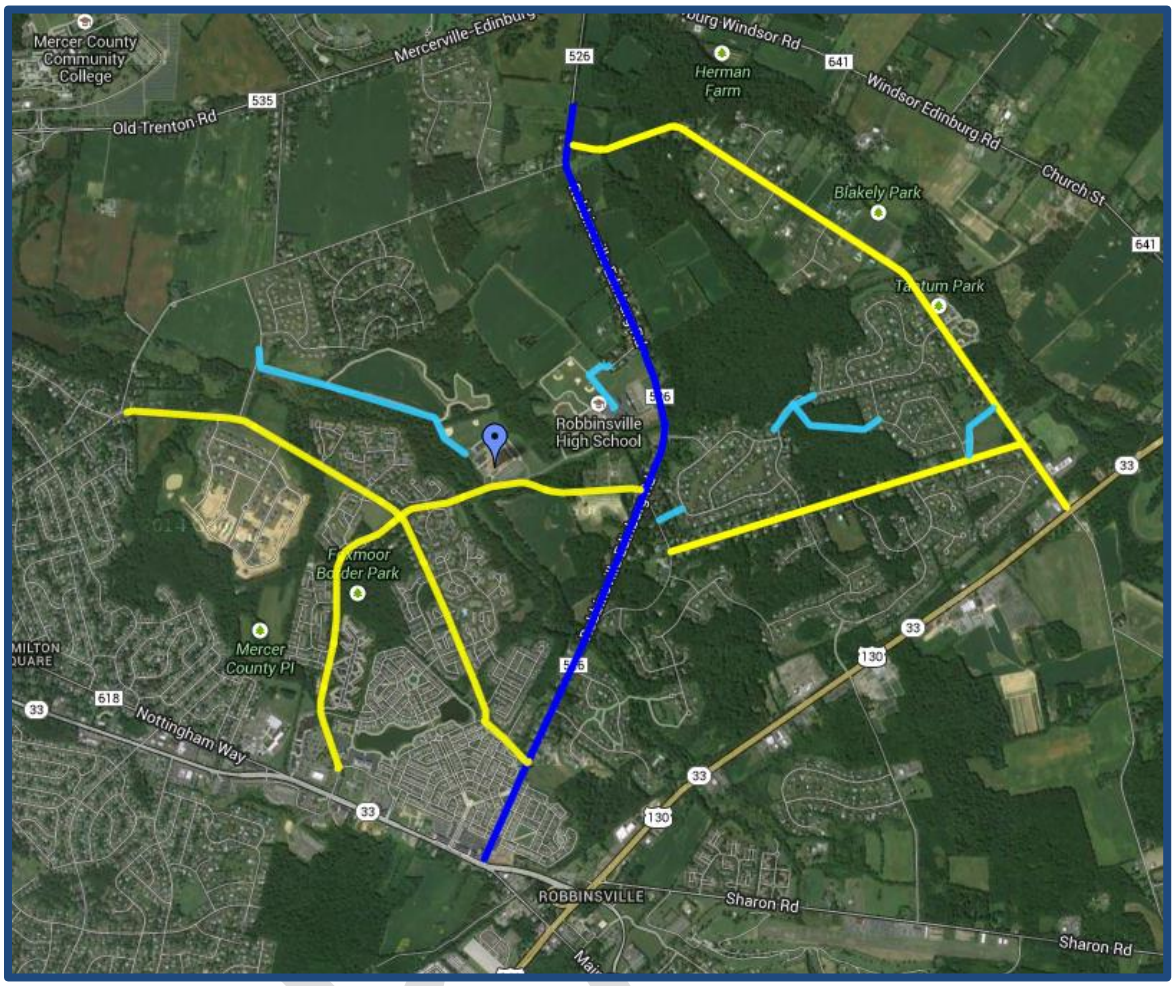
Drop off via car - 100 students

Total population of students is 700

Number of children living within (2) miles - 180



Major Roads and Off Road Access



Robbinsville Township's Circulation Element of the Master Plan names CR526 a Minor Arterial, shown in purple – the yellow lines are Major Collectors - Pond Rd, Washington Blvd, Hutchinson Rd, Tindall Rd and Meadowbrook Rd. Since CR526 is posted at 45mph speed limit until town center, significant walking, biking and/or crossing improvements will be necessary to create a safer route to school. The CR 526 crossing near the high school, which is also staffed by a crossing guard, is a good example of an improved crossing.

School Transportation Policy

The Robbinsville School District Transportation Policy is as follows:

It is the goal of Robbinsville Public Schools to provide safe and efficient transportation to its students. The ***District provides transportation to and from school for the following students:***

1. All K-3 pupils attending public and non-public schools and living within two(2)miles of school (non-remote) or living beyond two(2) miles of school (remote).

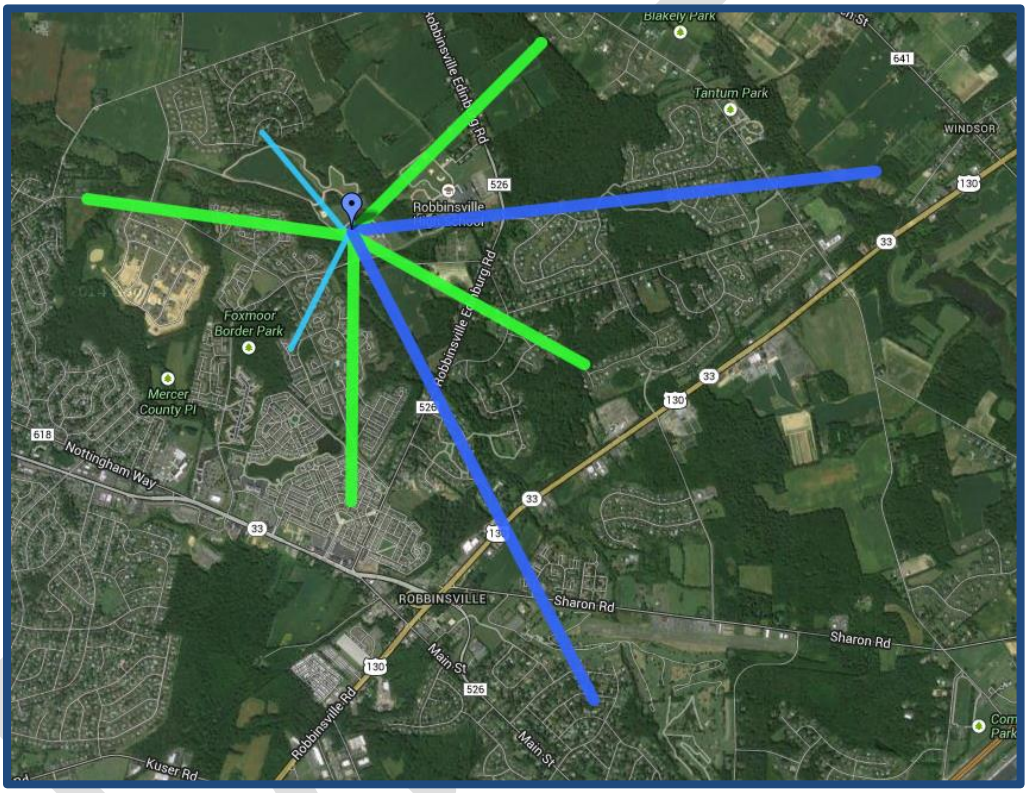
2. All 4-8 pupils attending public and non-public schools living beyond two (2) miles of school (remote).

3. Pupils in grades 9-12 living beyond two and one half (2½) miles of school (remote).

4. Pupils participating in Board approved extra-curricular activities and field trips.

5. Students whose route to school is deemed hazardous by the Board and/or municipal government.

6. Other students as required by law.



The map above shows the school with half-mile light blue, 1 mile green lines and 2 mile purple lines for reference.

This report will treat students living within 2 miles but south or east of SR33 / US130 as ineligible for walking due to the hazardous crossing conditions at US130.[1]

[1] http://tstc.org/reports/danger14/Region-Wide-Fact-Sheet.pdf

Biking and Walking to School Research

Walking Distance

Studies confirm that the percentage of children who walk to school depends on how far away they live, and that a half mile walk is an inflection point, over which the walking percentage declines steeply.[2]

The green area above shows those residences within a half mile walk to school (blue bubble) via streets.

Since the number of residences within a half mile is small compared to the walking area, this report will focus on improving children's bicycling as well as walking safety, to best reduce the number of students traveling by private vehicle from within the walking area, north and west of SR33 / US130.

Child Friendly Bike Facilities

Recent studies define bicycling facilities appropriate for middle school students. Historically, engineers looked at criteria such as lane width to determine "bicycle compatibility," which were refined to include different tolerances that people have for cycling near traffic, resulting in sophisticated "level of service" models. By contrast, social scientists[3] used survey results combined with transparent data, such as posted speed limit, to produce guidelines based on a user's level of traffic-induced stress,[4] where the lowest, Level of Traffic Stress (LTS) 1, is described as child friendly (see Appendix E):

> Presenting little traffic stress and demanding little attention from cyclists, and attractive enough for a relaxing bike ride. Suitable for almost all cyclists, including children trained to safely cross intersections. On links, cyclists are either physically separated from traffic, or are in an exclusive bicycling zone next to a slow traffic stream with no more than one lane per direction, or are on a shared road where they interact with only occasional motor vehicles (as opposed to a stream of traffic) with a low speed differential. Where cyclists ride alongside a parking lane, they have ample operating space outside the zone into which car doors are opened. Intersections are easy to approach and cross.

Robbinsville is fortunate to have roads such as Pond Rd, Washington Blvd and Hutchinson Rd that meet or are close to the child-friendly guidelines, with wide shoulders, sidewalks and/or paths on at least one side. The following pages show the excellent paths, sidewalks, crossings and trails within the safe walking area.

[2] http://travelbehavior.us/Nancy-pdfs/Travel%20to%20School%20in%20LA%20County.pdf
[3] http://web.pdx.edu/~jdill/Dill_VeloCity_Types_of_Cyclists.pdf
[4] http://transweb.sjsu.edu/PDFs/research/1005-low-stress-bicycling-network-connectivity.pdf

As opposed to multi-use paths, sidewalks are not typically considered adult bicycle facilities. GMTMA observed students biking on the sidewalk along Hutchinson Rd and Pond Rd (see pictures). Students were also observed biking on the shoulder on Pond Rd from the school to the Carlyle Ct intersection, to avoid the crowded sidewalk, but then they proceeded to Hutchinson on the sidewalk.

In practice, students cycling on the sidewalk would not appear to have conflicts with walkers except near the school, so this report will treat the sidewalks on Hutchinson and Pond roads as bicycle facilities. Official designation would sanction the practice, while improvements to consider include paving a bicycle lane along the sidewalk, effectively converting it to a multi-use path, or improving the shoulders to create a physically-separated cycle track, e.g. via curbs, raised medians or flexible bollards.

Two existing high-visibility CR526 crossings are critical to providing a safe walking and biking area. The Chambers Farm and Brookshire / Tanager neighborhoods depend on the crossing and guard near the high school, and the Town Center area east of CR526 depend on the Park Ave crossing, with a pedestrian-activated rapid flashing beacon (flashing LED lights, see pictures).

Off road trails may be considered appropriate for safe biking and walking to school, if the trail is accessible and within the public right of way. The Brookshire / Tanager and Combs Farm / Windward Way neighborhoods depend on off road trail access, part of which is not paved (see picture). The Combs Farm / Windward Way neighborhoods north of the school depend on (paved) off-road trail access. Trails may be perceived as undesirable for children biking to school, due to remoteness, lack of snow removal or lighting during winter months. This report will treat the Brookshire/Tanager neighborhood and the Combs Farm / Windward Way neighborhoods as LTS-1. Improvements might include paving with porous asphalt and motion-activated lighting, as well as repairing the damaged railing on the accessible bridge over Miry Run.

Multi-Use Path

Washington Blvd has complete facilities (pictured below), wide bicycle compatible shoulders, a multi-use path on the west side and sidewalk on the east side.

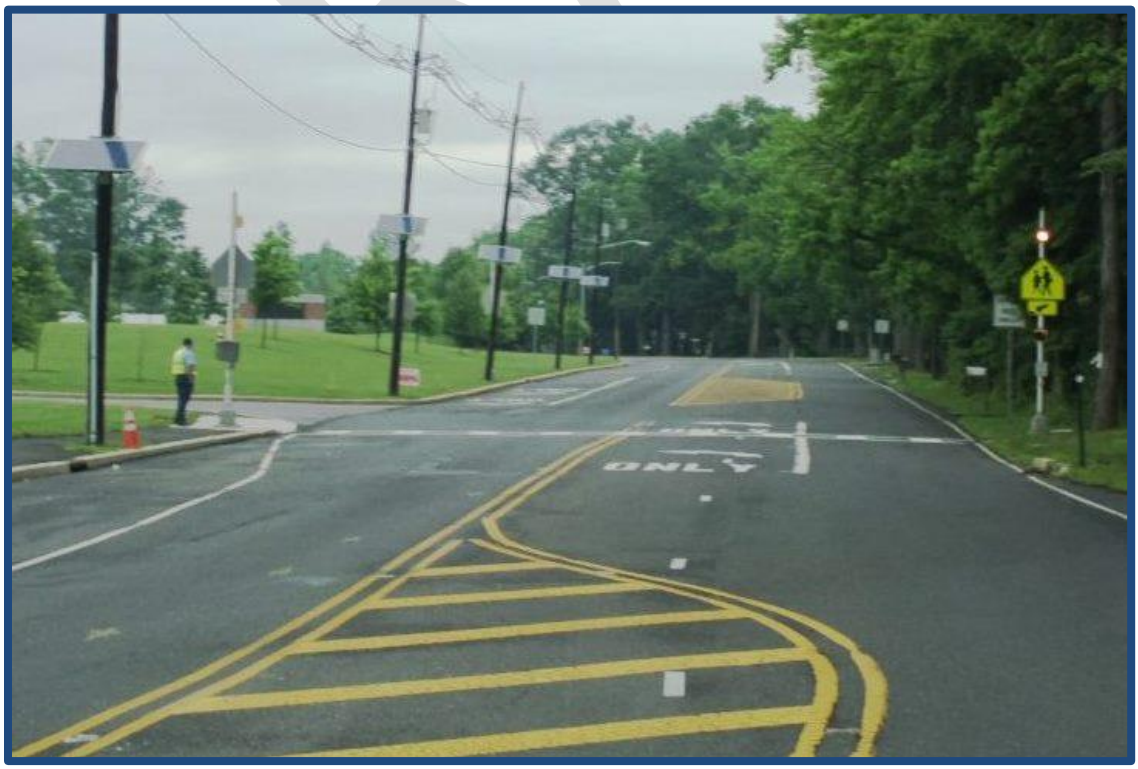
Sidewalk

Hutchinson Rd has a complete sidewalk along the east side from Lake Rd to Walden Circle, and on the west side from Washington Blvd to just south of Wellesley Way.

Crossings

Pond Rd has a sidewalk on the north side from the Hutchinson Rd intersection to the school, and on the south side from the Hutchinson Rd intersection to the midblock crossing west of Miry Run (pictured below).

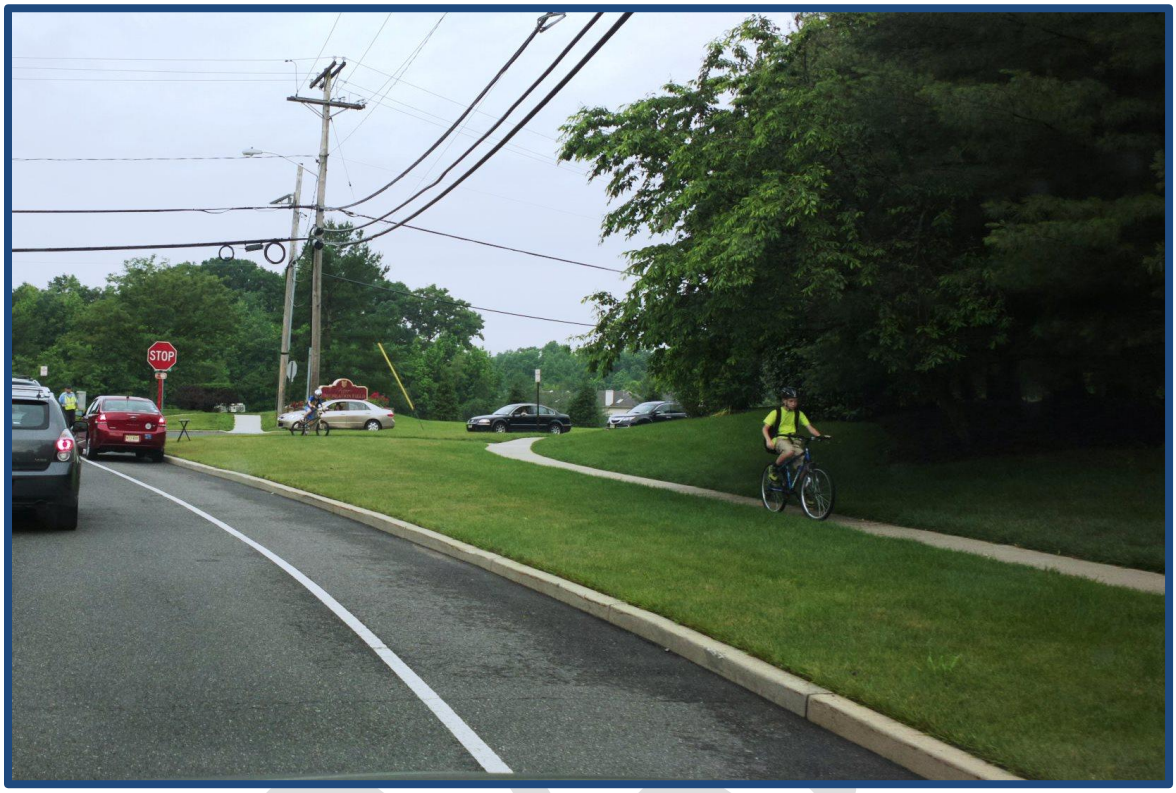
From the school grounds, a paved path proceeds east along the access road to the adjacent high school and to a high visibility crossing of CR 526, where a crossing guard is posted (pictured below).



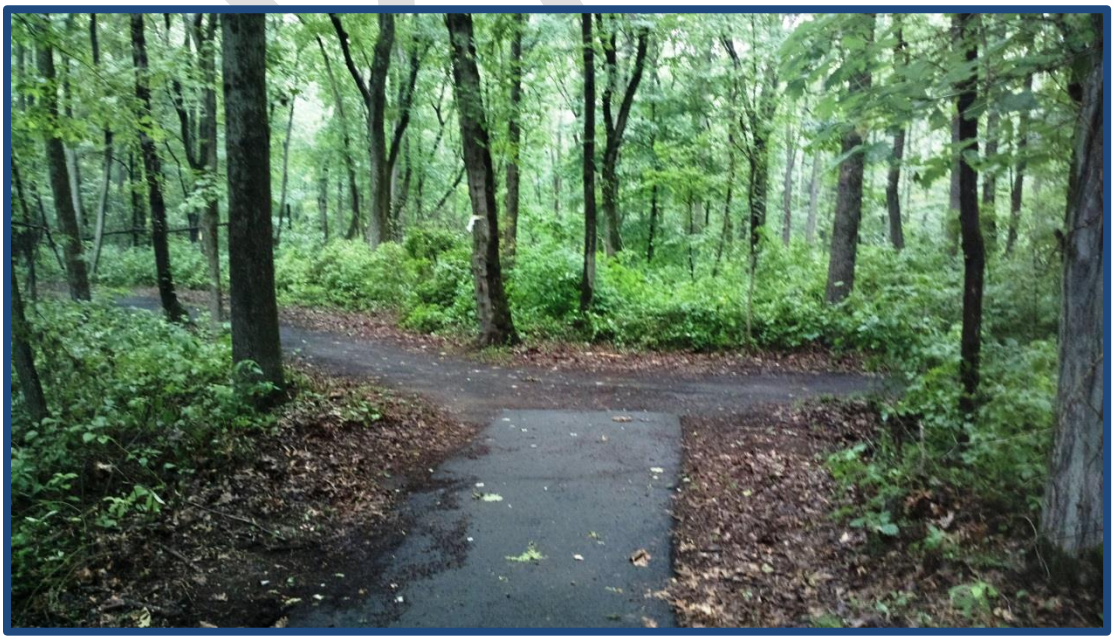
High visibility crossing, including pedestrian-activated rapid flashing beacon, at Park Ave and CR526, below. The posted speed limit in the Town Center area is reduced to 35mph, from 45mph.

Sidewalks and Trails

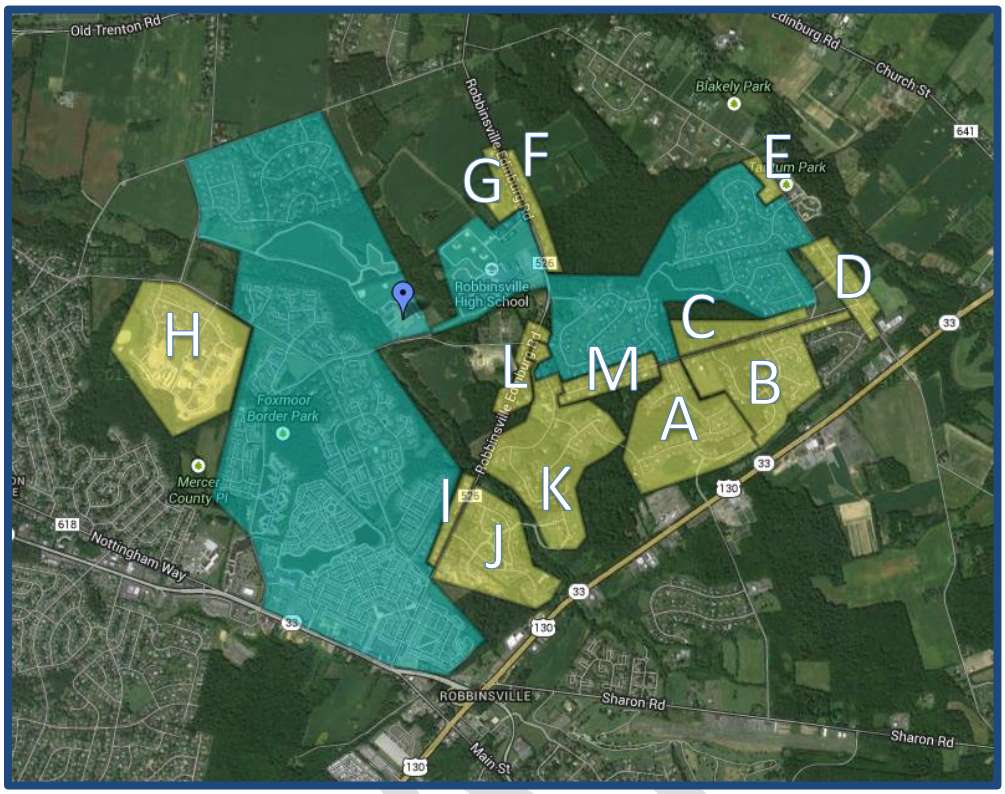
Students riding on the sidewalk on Pond Rd, below.



Trail junction connecting Tanager Ln and Witmer Ln to Annie Ln, below.



Child-friendly Walking and Biking Areas



The aqua areas on the map show where walking and biking is low stress and within 2 miles of the school via streets or trails (not as the crow flies), improvements are discussed in Goal 1 – Improving Safety for Existing Walkers and Cyclists. The yellow areas on the map show the potential for creating new safe walking and biking areas within 2 miles of the school via streets or trails, see Goal 2 – Creating New Safe Walking and Biking Areas for details.

Safety Countermeasures

Two goals drive improvements to biking and walking to Pond Rd Middle School – (1) improve safety for existing cyclists and walkers and (2) create new safe walking and biking areas by eliminating hazardous conditions.

The Federal Highway Administration's 2012 guidance for improving pedestrian safety include the following proven countermeasures.[5]

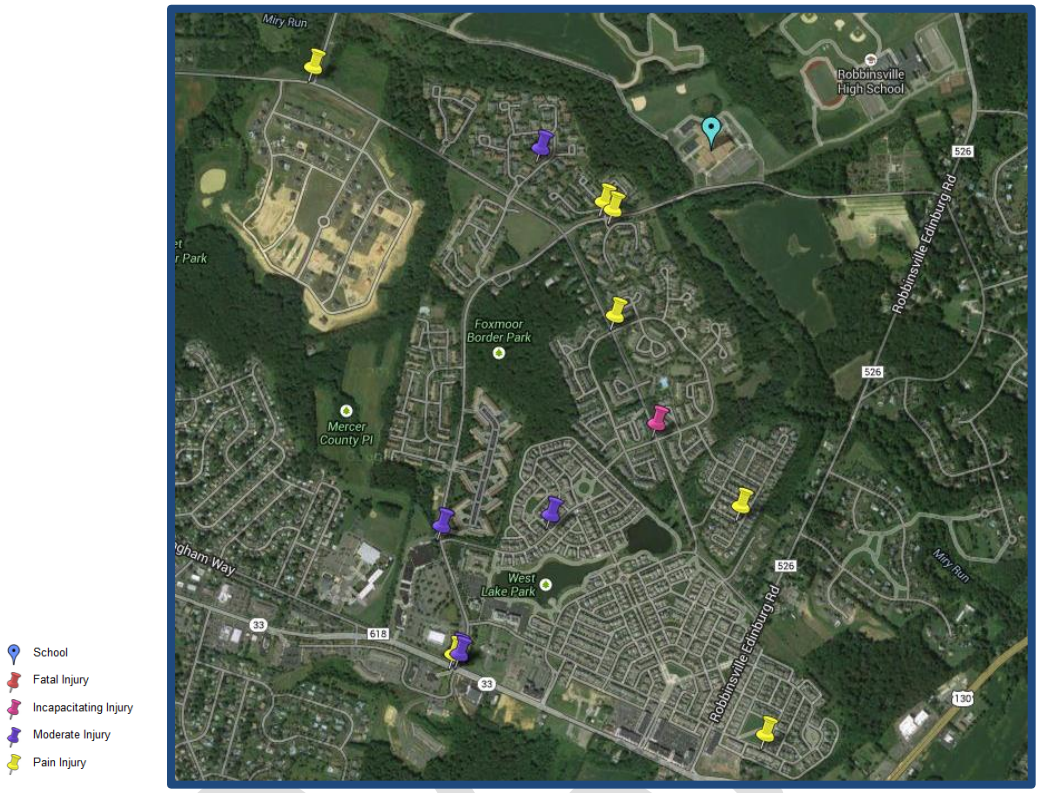
1. Roundabouts – consider for the intersection of Pond Rd, Washington Blvd and Hutchinson Rd
2. Medians and Pedestrian Crossing Islands in Urban and Suburban Areas
3. Pedestrian Hybrid Beacon – the Rapid Flashing Beacon is a lower cost alternative (see Appendix B)[6]

See Appendix C for pictures of regional examples of pedestrian safety improvements.

[5] http://safety.fhwa.dot.gov/provencountermeasures/
[6] http://safety.fhwa.dot.gov/intersection/resources/techsum/fhwasa09009/

Goal 1 – Improve Safety for Existing Walkers and Cyclists

Plan4Safety Crash History



Pedestrian crash history near the school includes two Pain level crashes near the mid-block crosswalk, plus crashes at several places along Hutchinson Rd and Washington Blvd, indicating a need for traffic calming and/or pedestrian safety countermeasures. Traffic safety officers recognize this need, and make good use of a movable variable message board to deliver safety messages to motorists, pictured below.

Additional traffic calming measures might include narrowing the travel lanes to 11 feet and/or installing bicycle lanes instead of bicycle compatible shoulders.

School Driveway Crosswalk

A high visibility crosswalk is recommended at the school driveway, above.

Mid-block Crosswalk on Pond Road

Recommended improvements include pedestrian-activated rapid flashing beacon, pedestrian refuge island (see Appendix C), and/or a crossing guard. Motorists from both directions stopped for students in the crosswalk, below.

Congestion

A roundabout should be considered for the Washington Blvd, Hutchinson Rd and Pond Rd intersection, which would also calm traffic, improve capacity and mitigate or prevent queuing from extending to the school driveway during drop-off and pick-up times (pictured below, see roundabout examples in Appendix C).

GMTMA observed two vehicles making K-turns to avoid the congestion.

The backup creates an unsafe crossing situation, since the students are blocked from view by the stopped motorists – this student stopped behind the bus to make sure there were no approaching motorists, then ran across the road.

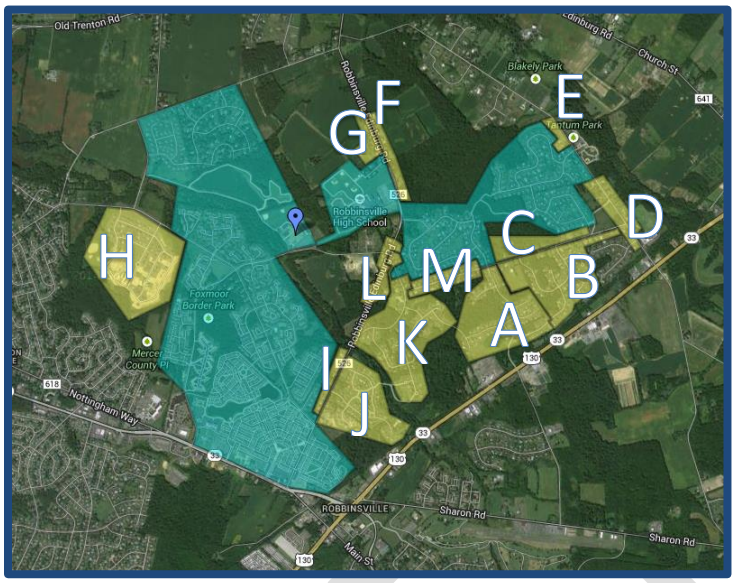
Intersection at Pond Rd/Washington Blvd and Hutchinson Rd

The crossing guard reported daily cases of motorists failing to honor the guard's instructions to stop at all four legs while students are crossing, below. GMTMA suggests a roundabout at this intersection, to improve pedestrian safety as well as traffic flow (see examples in Appendix C).

Additional Crossing Improvements for Goal 1 – Improve the Safety of Existing Walkers and Cyclists

Additional improvements to consider for Goal 1 include pedestrian-activated rapid flashing beacons at Hutchinson Rd intersections with Moorsleigh Way (both) and at Lake Drive, as well as at Washington Blvd and North St.

Goal 2 – Create New Safe Walking and Biking Areas



The table describes improvements necessary to create new safe areas according to LTS-1 Walking and Biking Areas map.

Area	Improvement	Potential New Area
A	Pedestrian –activated rapid flashing beacon at Tindall Rd and Reagan Ln (50-60 students)	Reagan Ln, Wilson Ct, Truman Ct, Roosevelt Way, Eisenhower Dr, Cornflower Dr (partial)
B	Sidewalk on south side of Tindall Rd between Wildflower Trail and Reagan Ln, plus Area A improvement	Wildflower Trail, Cornflower Dr (partial), Violet Ln, Sundew Way, Thistle Pl
C	Sidewalk on north side Tindall Rd between Witmer Way and Annie Lane	North side Tindall Rd between Witmer Way and Annie Lane
D	Sidewalks from school along north side Pond Rd, west side Beechwood Dr and north side Tindall Rd	Meadowbrook residences from US130 to Tantum Park – note the improvements bring the residences within 2 miles, as they are more direct than via the trails
E	Path or sidewalk on west side of Meadowbrook from Tanager Ln to existing path	Six residences
F	Sidewalk west side CR526 opposite the high school, connecting with the existing high visibility crossing	Thirteen residences
G	Sidewalk east side CR526 north of the high school, connecting with Buckley Ln	Ten residences
H	Sidewalk south side of Hutchinson connecting Sapphire Ln to Washington Blvd crossing guard	Cubberly Meadows Estates neighborhood
I	Sidewalk west side CR526 connecting Lake Dr to Miry Run	Ten residences
J	High visibility crossing and pedestrian –activated rapid flashing beacon at CR526 and Lake Dr, plus sidewalk sections east side of CR526 between Lake Dr and Miry Run	Anderson Ln, Branford Dr, Compton Cir, Kyle Ln
K	Sidewalk both sides Beechwood Dr to connect with off-road sidewalk to Sara Dr	Beechwood Dr, Donna St, Arnold Ln, Gerson Rd, Sven Dr, Herman Ct, Silvia Way
L	Sidewalks both sides CR526 between Chambers Farm Rd and southern intersection with Beechwood Dr	Sixteen residences

Education

Robbinsville is well-positioned for more biking and walking, with apparent community and municipal support, crossing guards, bike racks, and a good sidewalk and path network.

Learning to bike and walk safely is a critical life skill – ideally, children would learn skills and safe practices in most grades, so by the time they learn to drive a car they can already navigate town using the relevant rules of the road. GMTMA offers age-appropriate learn-to-bike sessions, basic bicycling skills classes ("rodeos") and bike/walk safety education.

Improving safe biking and walking involves coordinated efforts in the "6 E's" – Evaluation, Engineering, Education, Encouragement, Enforcement and Equality. The federally-funded Safe Routes to School (SRTS) program provides coordinators through GMTMA, and infrastructure funding to address these areas.

Encouragement ideas include walking school buses, Walk to School Day, Bike to School Day and frequent walker programs or competitions like the Golden Sneaker Award. GMTMA hopes Robbinsville will participate in our annual bike/walk bookmark design contest, for example, which is open to 3rd-5th graders.

Meeting with the parent/teacher organization to discuss these education and encouragement programs is an excellent way to kick off an SRTS program in Robbinsville.

Evaluation- Goals and Action Plan:

This plan of action is intended to increase safety for students on their walk to and from school and when appropriate, encourage more students to walk. The table below identifies those actions, a responsible party for implementing them, a time frame, and a level of cost. Many actions identified as "short-term" and "low cost" can make a big difference in a short time and can be accomplished with the help of local partners.

Cost estimates are for planning purposes only – a professional engineer should prepare the actual estimates used for a grant application. These estimates were prepared using the SRTS Implementation Cost sheet prepared in 2014 to support the grant application process.[7]

Engineering			
Action	**Responsibility**	**Time Frame**	**Cost**
Roundabout at intersection of Pond Rd, Hutchinson and Washington Blvd. Neighborhood roundabout ($75K) plus 4 raised splitter islands ($30K ea)	Robbinsville Township	Long Term	est. $195K
Rapid Flashing Beacon ($40K) at the mid-block crosswalk on Pond Rd between the school and the 2 adjacent Foxmoor townhouse developments. Consider a pedestrian refuge island ($30K) and/or a crossing guard.	Robbinsville Township	Medium Term	est. $70K
Consider bicycle lanes instead of bicycle compatible shoulders on Hutchinson Rd (1.1 mi), Pond Rd (2200 ft) and Washington Blvd (4800 ft) * 33K/mi, plus bike lane symbols ($200 ea) every 200 ft (64 symbols) = $12,800.	Robbinsville Township	Medium Term	est. $93K
New Walking Area A - Pedestrian –activated rapid flashing beacon at Tindall Rd and Annie Ln / Reagan Ln, $40K	Robbinsville Township	Medium Term	est. $40K
New Walking Area B - Sidewalk on south side of Tindall Rd between Wildflower Trail and Reagan Ln, 5 ft wide @ $60/ft * 900 ft = $54K, plus Area A improvement ($40K)	Robbinsville Township	Medium Term	est. $94K
New Walking Area C - Sidewalk on north side Tindall Rd between Witmer Way and Annie Lane, 5 ft wide @ $60/ft * 2900 ft = $174K	Robbinsville Township	Medium Term	est. $174K
New Walking Area D - Sidewalks from school along north side Pond Rd, west side Beechwood Dr and north side Tindall Rd, 5 ft wide @ $60/ft * 8200 ft = $492K	Robbinsville Township	Medium Term	est. $492K

[7] http://www.saferoutesnj.org/wp-content/uploads/2013/07/srts_costs_NEW-FORMAT_FINAL.pdf

New Walking Area E - Path or sidewalk on west side of Meadowbrook from Tanager Ln to existing path, 5 ft wide @ $60/ft * 1100 ft = $66K	Robbinsville Township	Medium Term	est. $66K
New Walking Area F - Sidewalk west side CR526 opposite the high school, connecting with the existing high visibility crossing, 5 ft wide @ $60/ft * 2500 ft = $150K	Robbinsville Township	Medium Term	est. $150K
New Walking Area G - Sidewalk east side CR526 north of the high school, connecting with Buckley Ln, 5 ft wide @ $60/ft * 1500 ft = $90K	Robbinsville Township	Medium Term	est. $90K
New Walking Area H - Sidewalk south side of Hutchinson connecting Sapphire Ln to Washington Blvd crossing guard, 5 ft wide @ $60/ft * 2800 ft = $168K	Robbinsville Township	Medium Term	est. $168K
New Walking Area I - Sidewalk west side CR526 connecting Lake Dr to Miry Run, 5 ft wide @ $60/ft * 2200 ft = $132K	Robbinsville Township	Medium Term	est. $132K
New Walking Area J - High visibility crossing and pedestrian –activated rapid flashing beacon at CR526 and Lake Dr ($40K), plus sidewalk sections east side of CR526 between Lake Dr and Miry Run, 5 ft wide @ $60/ft * 1400 ft = $84K	Robbinsville Township	Medium Term	est. $124K
New Walking Area K - Sidewalk both sides Beechwood Dr to connect with off-road sidewalk to Sara Dr, 5 ft wide @ $60/ft * 6400 ft = $384K	Robbinsville Township	Medium Term	est. $384K
New Walking Area L - Sidewalks both sides CR526 between Chambers Farm Rd and southern intersection with Beechwood Dr, 5 ft wide @ $60/ft * 5200 ft = $312K	Robbinsville Township	Medium Term	est. $312K

Education			
Action	**Responsibility**	**Time Frame**	**Cost**

Educate students, family members, bus drivers and school employees about drop-off/ pick up zones. Make sure everyone knows the best way to keep students safe and to quickly dismiss students from school.	School, School District	Short Term / Ongoing	Low
Increase community outreach about the health benefits of walking and biking to school.	School, PTO	Short Term	Low
Conduct community wide outreach about Safe Routes to School actions such as walking and biking safety.	School, GMTMA	Short Term/ Ongoing	Low
Establish a program to encourage students to walk and/or bike to school. Examples: Golden Sneaker Award, Walking Wednesday, Walking School Bus	School, GMTMA	Short Term/ Ongoing	Low
Educate community and responsible parties about snow removal on sidewalks near schools.	Public Works	Short Term/ Ongoing	Low

Encouragement			
Action	**Responsibility**	**Time Frame**	**Cost**
Establish main walking routes, safety corridors, walking school buses – safety in numbers.	School, PTO, GMTMA, Community Groups	Ongoing	Low
Conduct Student and Parent survey to see what actions and rewards could encourage them to walk to school more – and feel safer walking to school.	School, PTO, GMTMA	Short Term	Low

Enforcement			
Action	**Responsibility**	**Time Frame**	**Cost**
Enforce speed limits (in general and specifically in school zones), pedestrians walking safely, drivers watching for pedestrians especially at times when students are going to/ from school.	Police	Ongoing	Low / Medium
Enforce motorist compliance with crossing guard instructions.	Police	Ongoing	Low/ Medium
Enforce parking laws.	Police	Ongoing	Low / Medium
Conduct structured crosswalk enforcement campaign.	Police	Ongoing	Low / Medium
Increase law enforcement presence seen in the vicinity of Pond Road Middle School.	Police	Ongoing	Low / Medium

Evaluation			
Action	**Responsibility**	**Time Frame**	**Cost**
Conduct periodic travel mode choice surveys (teacher tallies)	School	Annual	Low
Conduct bikeability audit of walking area	School, Township, GMTMA	Short Term	Low
Tour the areas with school, township and TMA personnel to identify areas for improvement	School, Township, GMTMA	Short Term	Low

*Explanation of funding- Greater Mercer TMA is funded through the New Jersey department of Transportation to offer advice and assistance in starting safe Routes to School programs and projects. Greater Mercer TMA can help with walk and bike to school events, walking school bus programs, youth bicycle and pedestrian education, school travel plans, and surveys that provide evaluation and feedback on local programs.

Appendix A: Pedestrian Crashes from Plan4Safety Database

12/29/2006	US 130	Pedestrian	WINDSOR ROAD	Fatal
1/9/2009	I-95 N.J. TURNPIKE	Pedestrian		Fatal
1/27/2013	RTE 526	Pedestrian	VAHLSING WAY	Fatal
11/6/2003	US 130	Other	CR 526	Incapacitating Injury
4/25/2004	I-95 N.J. TURNPIKE	Other		Incapacitating Injury
11/5/2005	US 130	Other	ROBBINSVILLE-ALLENTOWN ROAD (RT526)	Incapacitating Injury
8/19/2006	11 APPLEGATE DR PARKING LOT	Pedestrian		Incapacitating Injury
4/23/2010	MOORSLEIGH WAY	Pedestrian	HUTCHINSON RD	Incapacitating Injury
4/4/2013	I95 N J TPKE	Pedestrian		Incapacitating Injury
6/12/2003	US 130	Other		Moderate Injury
4/19/2006	IFO BLDG #38 ANDOVER PLACE	Pedestrian		Moderate Injury
1/3/2007	HULSE ST	Pedestrian	NORTH STREET	Moderate Injury
2/9/2007	WASHINGTON BLVD	Pedestrian	NORTH STREET	Moderate Injury
10/5/2009	WASHINGTON BOULEVARD	Pedestrian		Moderate Injury
3/26/2010	US 130	Pedestrian	CR 526	Moderate Injury
8/31/2011	US HIGHWAY 130	Struck Parked Vehicle		Moderate Injury
10/9/2013	NJ HIGHWAY 33	Pedestrian	WASHINGTON BLVD	Moderate Injury
3/19/2003	ELDRIDGE DRIVE	Struck Parked Vehicle	ABBINGTON LANE	Pain
11/6/2003	MERCER COUNTY 641	Other	SOUTH MAIN STREET	Pain
5/12/2005	273 MEADOWBROOK ROAD DRIVEWAY	Unknown		Pain
4/18/2006	NJ 33	Pedestrian	RT 130	Pain
10/19/2007	WASHINGTON BLVD	Pedestrian	NJ 33	Pain
11/2/2007	HUTCHINSON ROAD	Pedestrian	AMBLESIDE DR.	Pain
12/24/2009	N MAIN ST	Pedestrian	CHURCH STREET	Pain
6/14/2010	POND ROAD	Pedestrian	CARLYLE COURT	Pain
10/16/2011	HUTCHINSON RD	Pedestrian	COOMBS RD	Pain
12/23/2011	UNION ST	Pedestrian	MCCABE ST	Pain
2/8/2012	BEACON CT	Pedestrian		Pain
10/25/2013	169 WINDSOR EDINBURG RD	Pedestrian		Pain

Appendix B: Use of Rectangular Rapid Flashing Beacons (IA-11)

Interim approval and guidance for use of the beacons referenced in the report was issued in 2008.[8]

Please refer to the pictures to confirm that the intersections at Lawrence Ave, Roxboro Rd and at Notre Dame High School conform to the Allowable Uses, cut/pasted here:

Allowable Uses:

a. An RRFB shall only be installed to function as a Warning Beacon (see 2003 MUTCD Section 4K.03).

b. An RRFB shall only be used to supplement a W11-2 (Pedestrian) or S1-1 (School) crossing warning sign with a diagonal downward arrow (W16-7p) plaque, located at or immediately adjacent to a marked crosswalk.

c. An RRFB shall not be used for crosswalks across approaches controlled by YIELD signs, STOP signs, or traffic control signals. This prohibition is not applicable to a crosswalk across the approach to and/or egress from a roundabout.

d. In the event sight distance approaching the crosswalk at which RRFBs are used is less than deemed necessary by the engineer, an additional RRFB may be installed on that approach in advance of the crosswalk, as a Warning Beacon to supplement a W11-2 (Pedestrian) or S1-1 (School) crossing warning sign with an AHEAD: (W16-9p) plaque. This additional RRFB shall be supplemental to and not a replacement for RRFBs at the crosswalk itself.

[8] http://mutcd.fhwa.dot.gov/resources/interim_approval/ia11/fhwamemo.htm

Appendix C: Safe Pedestrian Crossing Examples – Refuges, Roundabouts, etc.

Refuge Islands

Above from Washington Blvd, Robbinsville.

Above from Clarksville Rd, CR638, West Windsor - the flashing beacon has incandescent lights and a regular, up and down blinking pattern in one direction.

This midblock crossing island example, from Eggerts Crossing Road in Lawrence, is near Lawrence Intermediate School.

Roundabouts

The splitter islands are raised to form a pedestrian refuge, above from Lake Dr and Newtown Blvd, Robbinsville, below from Alexander St and University Place, Princeton.

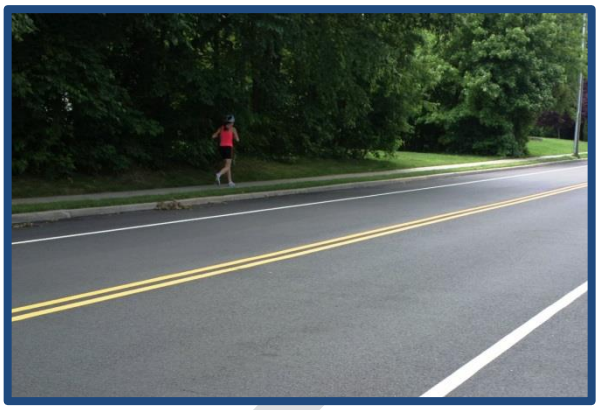
Bulb-out

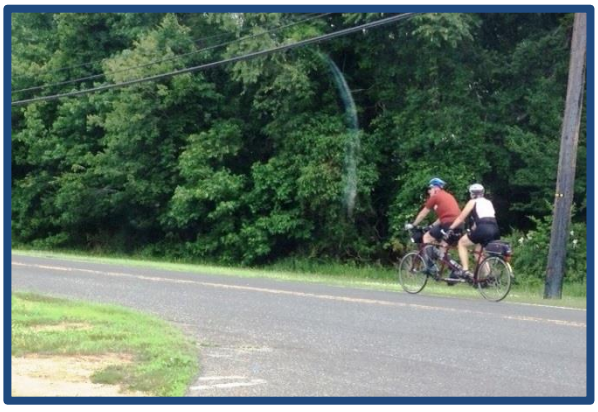
Bulb-out (right) improves visibility and shortens crossing distance, Washington Blvd at Union St, Robbinsville.

Rapid Flashing Beacon

Rapid flashing LED lights on pedestrian crossing sign are brighter than incandescent and have an irregular flashing pattern to alert motorists, Robbinsville-Edinburg Rd (CR526), Robbinsville

Appendix D: Nonstudent Cyclists, Pedestrians and Wheelchair Roadway Users





Appendix E: Level of Traffic Stress Level Criteria

The following criteria is from: Low-Stress Bicycling and Network Connectivity, by Maaza C. Mekuria, Ph.D., P.E., PTOE, Peter G. Furth, Ph.D., Hilary Nixon, Ph.D. May 2012

Table 1. Levels of Traffic Stress (LTS)

LTS 1	Presenting little traffic stress and demanding little attention from cyclists, and attractive enough for a relaxing bike ride. Suitable for almost all cyclists, including children trained to safely cross intersections. On links, cyclists are either physically separated from traffic, or are in an exclusive bicycling zone next to a slow traffic stream with no more than one lane per direction, or are on a shared road where they interact with only occasional motor vehicles (as opposed to a stream of traffic) with a low speed differential. Where cyclists ride alongside a parking lane, they have ample operating space outside the zone into which car doors are opened. Intersections are easy to approach and cross.
LTS 2	Presenting little traffic stress and therefore suitable to most adult cyclists but demanding more attention than might be expected from children. On links, cyclists are either physically separated from traffic, or are in an exclusive bicycling zone next to a well-confined traffic stream with adequate clearance from a parking lane, or are on a shared road where they interact with only occasional motor vehicles (as opposed to a stream of traffic) with a low speed differential. Where a bike lane lies between a through lane and a right-turn lane, it is configured to give cyclists unambiguous priority where cars cross the bike lane and to keep car speed in the right-turn lane comparable to bicycling speeds. Crossings are not difficult for most adults.
LTS 3	More traffic stress than LTS 2, yet markedly less than the stress of integrating with multilane traffic, and therefore welcome to many people currently riding bikes in American cities. Offering cyclists either an exclusive riding zone (lane) next to moderate-speed traffic or shared lanes on streets that are not multilane and have moderately low speed. Crossings may be longer or across higher-speed roads than allowed by LTS 2, but are still considered acceptably safe to most adult pedestrians.
LTS 4	A level of stress beyond LTS3.

Table 2. Criteria for Bike Lanes Alongside a Parking Lane

	LTS ≥ 1	LTS ≥ 2	LTS ≥ 3	LTS ≥ 4
Street width (through lanes per direction)	1	(no effect)	2 or more	(no effect)
Sum of bike lane and parking lane width (includes marked buffer and paved gutter)	15 ft. or more	14 or 14.5 ft.[a]	13.5 ft. or less	(no effect)
Speed limit or prevailing speed	25 mph or less	30 mph	35 mph	40 mph or more
Bike lane blockage (typically applies in commercial areas)	rare	(no effect)	frequent	(no effect)

Note: (no effect) = factor does not trigger an increase to this level of traffic stress.

[a] *If speed limit < 25 mph or Class = residential, then any width is acceptable for LTS 2.*

Table 3. Criteria for Bike Lanes Not Alongside a Parking Lane

	LTS ≥ 1	LTS ≥ 2	LTS ≥ 3	LTS ≥ 4
Street width (through lanes per direction)	1	2, if directions are separated by a raised median	more than 2, or 2 without a separating median	(no effect)
Bike lane width (includes marked buffer and paved gutter)	6 ft. or more	5.5 ft. or less	(no effect)	(no effect)
Speed limit or prevailing speed	30 mph or less	(no effect)	35 mph	40 mph or more
Bike lane blockage (may apply in commercial areas)	rare	(no effect)	frequent	(no effect)

Note: (no effect) = factor does not trigger an increase to this level of traffic stress.

Table 4. Criteria for Level of Traffic Stress in Mixed Traffic

	Street Width		
Speed Limit	2-3 lanes	4-5 lanes	6+ lanes
Up to 25 mph	LTS 1[a] or 2[a]	LTS 3	LTS 4
30 mph	LTS 2[a] or 3[a]	LTS 4	LTS 4
35+ mph	LTS 4	LTS 4	LTS 4

Note: [a] Use lower value for streets without marked centerlines or classified as residential and with fewer than 3 lanes; use higher value otherwise.

Table 5. Level of Traffic Stress Criteria for Pocket Bike Lanes

Configuration	Level of Traffic Stress
Single right-turn lane up to 150 ft. long, starting abruptly while the bike lane continues straight, and having an intersection angle and curb radius such that turning speed is ≤ 15 mph.	LTS ≥ 2
Single right-turn lane longer than 150 ft. starting abruptly while the bike lane continues straight, and having an intersection angle and curb radius such that turning speed is ≤ 20 mph.	LTS ≥ 3
Single right-turn lane in which the bike lane shifts to the left but the intersection angle and curb radius are such that turning speed is ≤ 15 mph.	LTS ≥ 3
Single right-turn lane with any other configuration; dual right-turn lanes; or right-turn lane along with an option (through-right) lane.	LTS = 4

Table 6. Level of Traffic Stress Criteria for Mixed Traffic in the Presence of a Right-turn Lane

Configuration	Level of Traffic Stress
Single right-turn lane with length ≤ 75 ft. and intersection angle and curb radius limit turning speed to 15 mph.	(no effect on LTS)
Single right-turn lane with length between 75 and 150 ft., and intersection angle and curb radius limit turning speed to 15 mph.	LTS ≥ 3
Otherwise.	LTS = 4

Table 7. Level of Traffic Stress Criteria for Unsignalized Crossings Without a Median Refuge

Speed Limit of Street Being Crossed	Width of Street Being Crossed		
	Up to 3 lanes	4 - 5 lanes	6+ lanes
Up to 25 mph	LTS 1	LTS 2	LTS 4
30 mph	LTS 1	LTS 2	LTS 4
35 mph	LTS 2	LTS 3	LTS 4
40+	LTS 3	LTS 4	LTS 4

Table 8. Level of Traffic Stress Criteria for Unsignalized Crossings With a Median Refuge at Least Six Feet Wide

Speed Limit of Street Being Crossed	Width of Street Being Crossed		
	Up to 3 lanes	4 - 5 lanes	6+ lanes
Up to 25 mph	LTS 1	LTS 1	LTS 2
30 mph	LTS 1	LTS 2	LTS 3
35 mph	LTS 2	LTS 3	LTS 4
40+	LTS 3	LTS 4	LTS 4