

Bear Tavern Elementary School Hopewell Twp, NJ



School Travel Plan June 2016

Prepared by Greater Mercer TMA



NEW JERSEY
Safe Routes to School



**GREATER
MERCER**
Discover Greener Paths



Contents

Bear Tavern Elementary School Description:	3
Working Groups and Partnerships:.....	3
School Catchment Area.....	4
School Neighborhood:	5
Baseline Student Travel Data	6
Major Roads and Off Road Access	7
School Zone Measures	8
Access to School Grounds Behind School	9
School Policies.....	9
School Nutrition/Wellness Policy (8505 R)	9
Transportation Policy (8600).....	9
Dismissal Policy (8601).....	10
Plan4Safety Crash History (2003- June 2016, see Appendix A)	11
Walk and Bike Barriers and Opportunities	12
Walking vs Biking Distance.....	12
Child Friendly Bike Facilities.....	12
Sidewalks, along-road paths and off-road trails	13
Existing Sidewalk	13
Existing Intersection at CR546 (Washington Crossing – Pennington Rd)/ CR579 (Bear Tavern Rd).....	14
Safety Countermeasures.....	15
Goal 1 – Improve safety for existing cyclists and walkers	16
Goal 2 – Create New Safe Walking and Biking Areas.....	16
Walking and Bicycling Connections.....	16
Walking and Bicycling Crossings	17
Titusville Bicycling Route.....	17
Education	17
Evaluation- Goals and Action Plan:	18
Appendix A: Pedestrian & Bicyclist Crashes from Plan4Safety Database	22
Appendix B: Use of Rectangular Rapid Flashing Beacons (IA-11)	24
Appendix C: Safe Pedestrian Crossing Examples – Refuges, Roundabouts, etc.	25
Refuge Islands	25
Roundabouts.....	27
Bulb-out	28

Rapid Flashing Beacon	28
Appendix D: Level of Traffic Stress Level Criteria	29

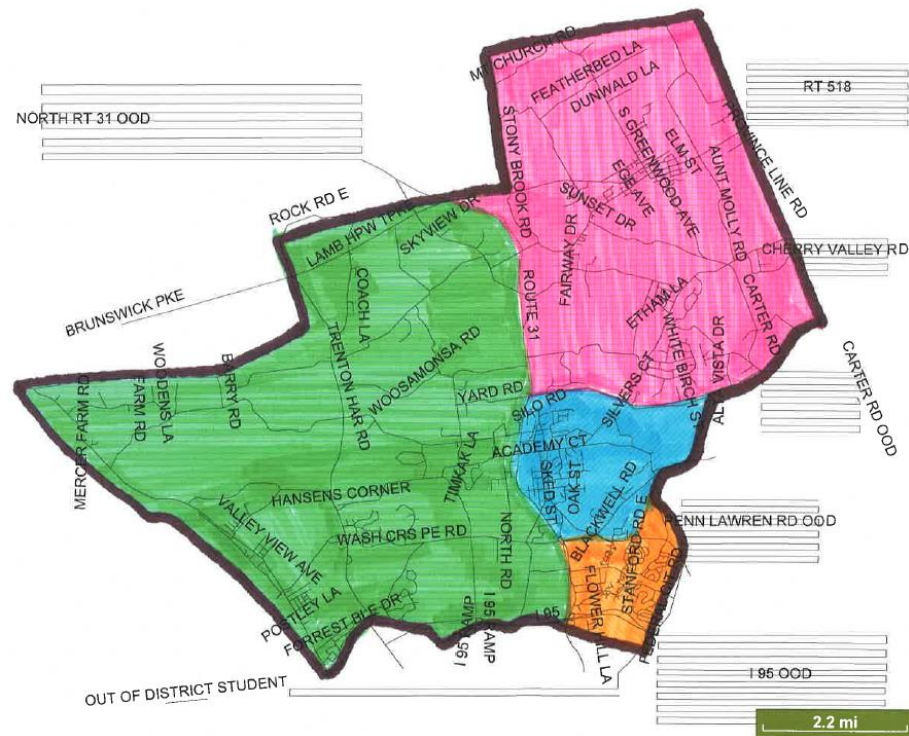
Bear Tavern Elementary School Description:

Bear Tavern Elementary School is located at 1162 Bear Tavern Road, Titusville, NJ 08560. For the 2015-2016 school year, there were 407 students in grades Pre-K-5 (24 Pre-K, 44 Kindergarten, 49 First, 53 Second, 54 Third, 71 Fourth, 93 Fifth, and 19 ungraded). The school day runs from 8:35am to 3:35pm.

Working Groups and Partnerships:

Organization	Role/ Responsibility	Contact
Voorhees Transportation Center	Key Partner	Sean Meehan Project Manager 848.932.2860 smeehan@ejb.rutgers.edu
Bear Tavern Elementary School	Community Partner	Christopher Turnbull Principal 609.737.4005 christopherturnbull@hvrdsd.org
Hopewell Township	Community Partner	Paul Pogorzelski Township Engineer/Administrator 201 Washington Crossing - Pennington Road, Titusville, NJ 08560 609-737-0605 paulpogo@hopewelltwp.org
Bear Tavern PTO	Community Partner	Kim Robinson Parent kbrobinson1@hotmail.com
Greater Mercer Transportation Management Association	Key Partner	Jerry Foster Transportation Safety Educator 609.452.1491 extension 227 jfoster@gmtma.org

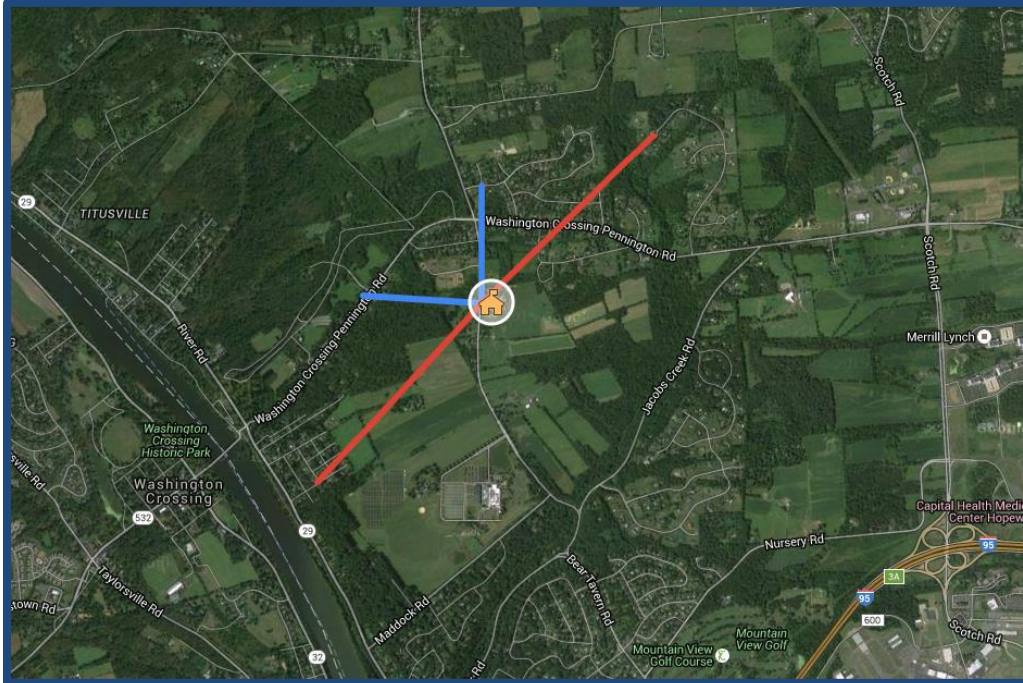
School Catchment Area



The green area of the map of Hopewell Township above shows which parts attend Bear Tavern Elementary School.

School Neighborhood:

Bear Tavern Elementary School (school icon on map) is located on Bear Tavern Road (County Road 579), an urban major collector with traffic volume of 7037/day in 2014 (according to NJDOT's Straight Line Diagrams), near the intersection of Washington Crossing-Pennington Road (County Road 546), an urban minor arterial with traffic volume of 7702/day in 2013. It is surrounded by residential neighborhoods and farm fields, and is near Washington Crossing State Park and Janssen Pharmaceuticals' office campus. For reference, the map below shows blue half mile distances and red mile distances, starting from the school icon.



Bear Tavern Elementary School (school icon) and surrounding neighborhood – blue lines are a half mile, red lines are one mile from the school

Bear Tavern Elementary has only one sidewalk within the walking area, on the opposite side of Bear Tavern Road and without a marked crossing, so all students are bused as part of a hazardous area under school board policy. Nonetheless, GMTMA observed a few children walking with their parent to school from the neighborhood to the north.



Bear Tavern Elementary School: Red line is the morning and afternoon bus drop off/ pick up, yellow line is the morning and afternoon parent drop off / pick up

Baseline Student Travel Data

Travel tallies were provided by the school covering the following Tuesday-Thursday weeks in 2015 – January 27, February 3, February 10 and March 24.

Walk or Bike to school - 0 students

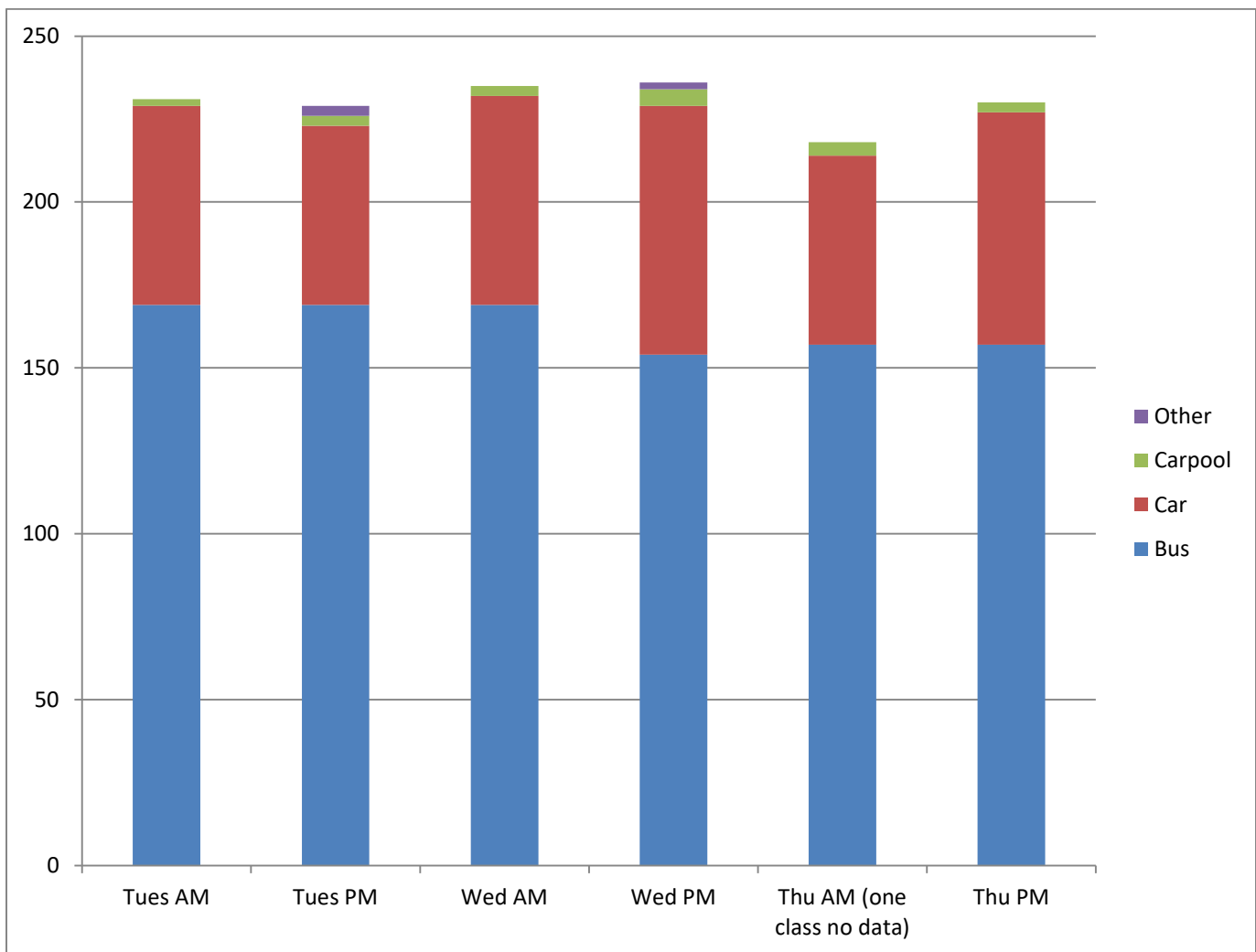
Ride the bus - 154-169 students

Drop off via car – 54-75 students

Car pool – 2-5 students

Other – 0-3 students

Total population of students reporting travel tallies is 242 out of total school population of 407



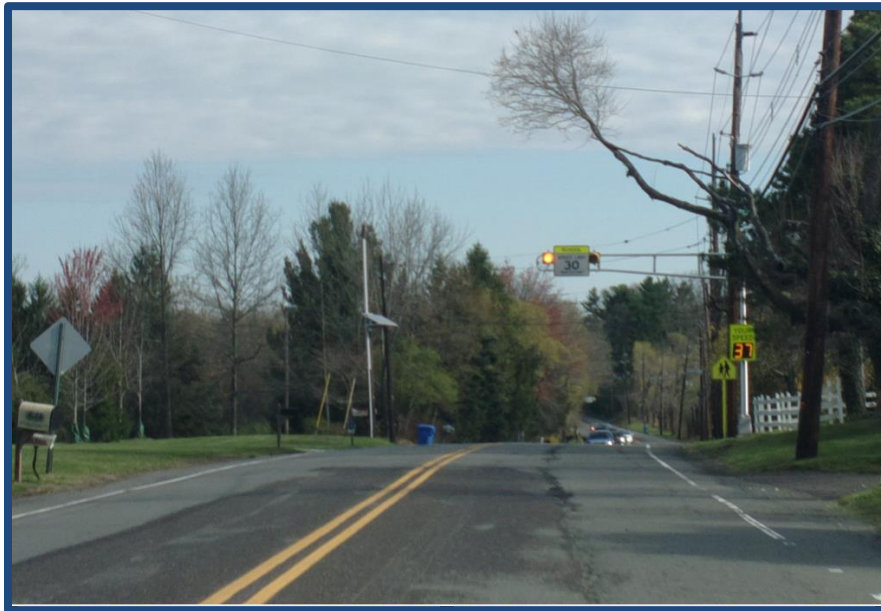
Major Roads and Off Road Access



Hopewell Township's Circulation Element of the Master Plan names CR546 (Washington Crossing-Pennington Rd), CR579 (Bear Tavern Rd) and CR637 (Jacob's Creek Rd) Minor Arterials, shown in yellow – the orange lines are Major Arterials – I-95, SR29 and SR31. Since CR579 is posted at 45mph speed limit (according to NJDOT's Straight Line Diagrams, although Google Streetview shows 50mph), significant walking, biking and/or crossing improvements will be necessary to create a safer route to school. The red line next to CR579 shows the one existing sidewalk segment that extends along the south side of Winding Brook Way, the red line to the right of the school indicates a path connecting to a driveway behind the school, see pic below.

School Zone Measures

Significant School Zone improvements have been implemented, such as overhead flashing beacons and speed display signs, see the pictures below – top is northbound on CR579, below is southbound on CR579.



Access to School Grounds Behind School

Behind the school, a grassy path connects to a residential driveway and then to Old Washington Crossing Road - see the short red line in the map above and the pic below.



School Policies

School wellness/nutrition (8505 R), transportation (8600) and dismissal (8601) policies support walking to school - excerpts are cut/pasted below:

School Nutrition/Wellness Policy (8505 R)

Walking and biking to school is encouraged, according to the school district Nutrition/Wellness policy 8505R, section C.3.c: “The district will encourage walking/biking to school.”

Transportation Policy (8600)

“The Hopewell Valley Regional Board of Education, while cognizant of the fact that bus transportation of pupils is necessary when safety and/or distance preclude them from walking to school, also expresses its belief that walking is desirable and healthy and pupils should be encouraged to walk to school whenever possible.

Eligibility for Transportation

The school district shall provide transportation in accordance with law for:

1. Pupils who live remote from the schoolhouse as defined by New Jersey law;

...

Remote from the Schoolhouse: Defined in New Jersey Administrative Code 6A: 27 1.2 defines "remote from school" as elementary (preschool through grade eight) pupils who live more than two miles from their school and secondary pupils (grades nine-twelve) who live more than two and one-half miles from their school. Measurements shall be made along public roads or public walkways from the entrance of the pupil's residence nearest the entrance to the school.

Non-mandated, Hazardous Routes: The Board of Education will publish on the district website a list of streets or parts of streets that are deemed to be hazardous based upon consideration of the following factors:

1. Population density;
2. Traffic volume;
3. Vehicle velocity;
4. Absence of adequate shoulder and/or off-road walking space;
5. Roads and highways that are winding or have blind curves;
6. Topographical conditions of drop off sites;
7. Bridges or overpasses that must be crossed to reach the school;
8. Train tracks or trestles that must be crossed to reach the school; and
9. Busy roads or highways that must be crossed to reach the school.

The hazardous route factors for a particular route will be evaluated independently by the Director of Transportation and the School Business Administrator with the assistance of representatives from the local police departments as needed.

Pupil Pedestrian Safety

The safety of pupils on the streets of our community is the responsibility of the local governing bodies, including during those times that pupils are on their way to and from regular bus stops and at times during which school transportation is not provided. The school district will work cooperatively with each local governing body in seeking a safe and efficient solution to safety related demands for non mandatory transportation.

Parental Responsibility

Parent(s) or legal guardian(s) are responsible for providing transportation to and from classes and events conducted at the schools for which transportation is not furnished by the school district. ..."

Dismissal Policy (8601)

"A recent New Jersey Supreme Court decision (Jerkins v. Anderson (A-49-06) has established new and higher standards regarding pupil safety at dismissal from school, specifically related to walking (non-bused) pupils. In response to this decision, the Hopewell Valley Regional School District has instituted age appropriate regulations to ensure that pupils are released consistent with parent(s) or legal guardian(s) expectations and agreements.

It is the position of the Hopewell Valley Regional School District that parent(s) or legal guardian(s) are responsible for the safety of their child(ren) (1) to and from bus stops for transported pupils and (2) upon dismissal from school for pupils commonly known as "walkers," e.g. those pupils who are not eligible for busing. ...

Elementary School - Grades Pre-Kindergarten-Five (Opt Out Provision)

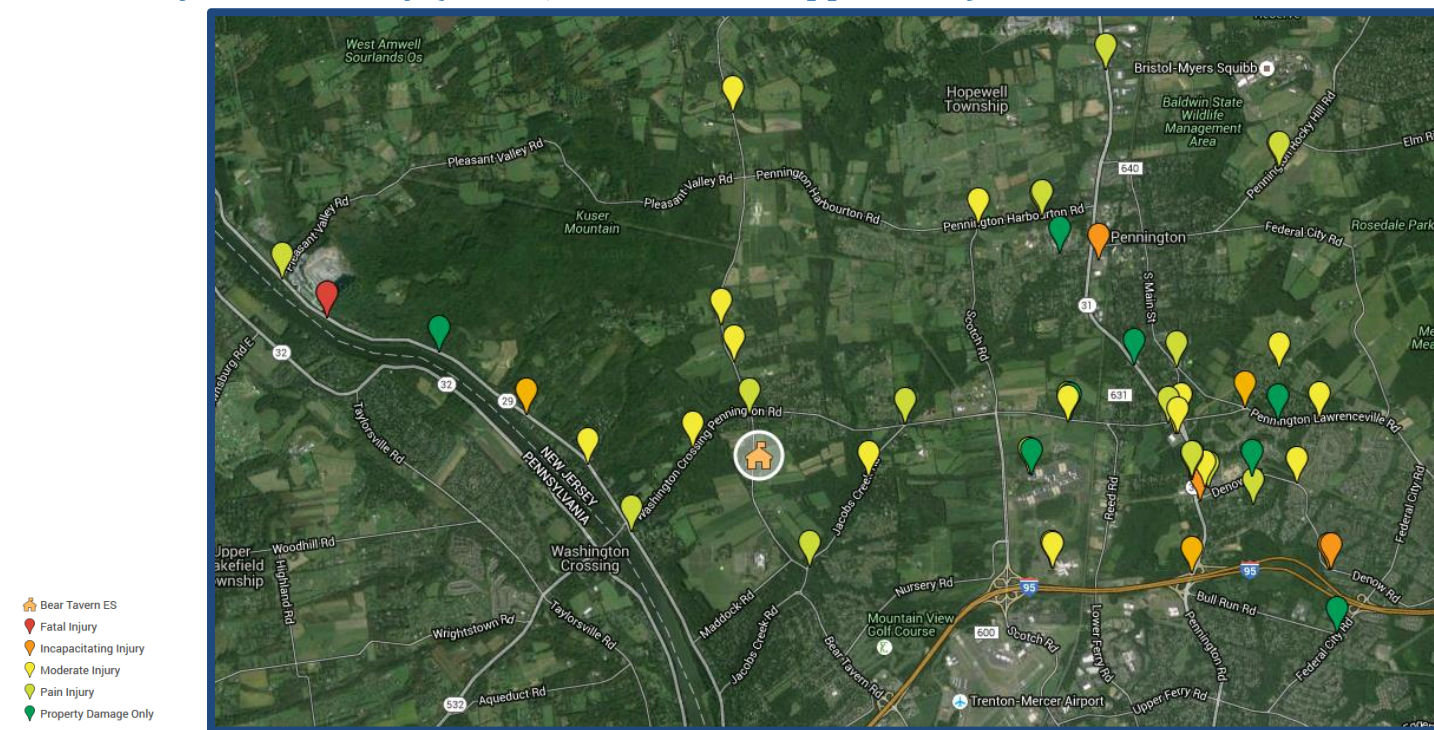
...

Pupils who do not receive bus transportation in grades Pre-Kindergarten-Five (walkers) will be released only to parent(s) or legal guardian(s) unless said parent or legal guardian has provided written permission for other designated adult(s) or sibling(s) to assume this responsibility.

Parent(s) or legal guardian(s) may sign a waiver to allow their child(ren) to be dismissed from school without identification of and/or hand-off to an individual assigned to receive their child(ren). In so doing, the parent(s) or legal guardian(s) assumes responsibility for meeting the child(ren), having someone of choice meet the child(ren), or allowing the child(ren) to walk or bicycle home on his or her own.

...

Plan4Safety Crash History (2003- June 2016, see Appendix A)



Pedestrian and cyclist crash history near the school includes two Pain level crashes near the school along CR546.

Walk and Bike Barriers and Opportunities

Walking vs Biking 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.¹ This report will consider houses within a half mile as most likely to walk, while those between a half mile and two miles from school as most likely to bicycle.



The yellow lines show those residences within a half mile walk to school (school icon) via streets or the back trail access.

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.

Child Friendly Bike Facilities

Because CR579/Bear Tavern and CR546/Washington Crossing – Pennington roads are both high speed, a bikeway separated from traffic will be required to make a child friendly route (Level of Traffic Stress 1 or LTS-1). Recent studies define bicycling facilities appropriate for elementary school students who have had bicycling safety education. Social scientists² 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,³ where the lowest, Level of Traffic Stress (LTS) 1, is described as child friendly (see Appendix D):

¹ <http://travelbehavior.us/Nancy-pdfs/Travel%20to%20School%20in%20LA%20County.pdf>

² http://web.pdx.edu/~jdill/Dill_VeloCity_Types_of_Cyclists.pdf

³ <http://transweb.sjsu.edu/PDFs/research/1005-low-stress-bicycling-network-connectivity.pdf>

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... Intersections are easy to approach and cross.



The map above shows green lines that are currently suitable for children bicycling, the yellow lines show LTS-2 roads, while the red lines show LTS-4, due to the high speed limit.

Sidewalks, along-road paths and off-road trails

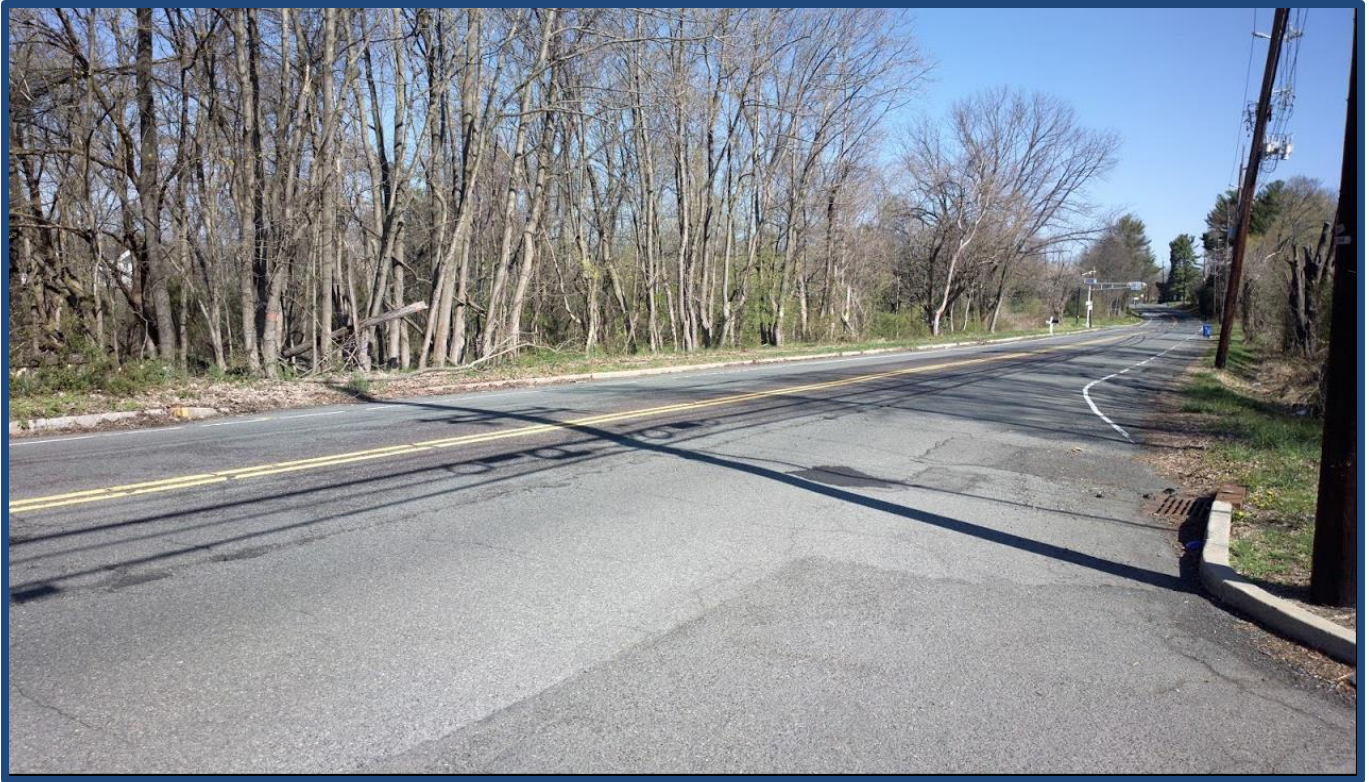
As opposed to multi-use paths, sidewalks are not typically considered adult bicycle facilities, but are more acceptable for children.

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 sidewalk on Bear Tavern Road as a bicycle facility. Official designation would sanction the practice, while improvements to consider include implementing a multi-use path instead of a sidewalk along Bear Tavern Road, perhaps on the side opposite the current sidewalk.

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, and if the trail access is maintained year around, such as after a snowfall.

Existing Sidewalk

Bear Tavern Rd has a sidewalk on the opposite side from the school extending north along the west side from the school to and along the south side of Winding Brook Way – the picture below shows sidewalk covered with brush and leaves.



View of sidewalk across Bear Tavern Rd from the school driveway - school is behind photographer

Existing Intersection at CR546 (Washington Crossing – Pennington Rd)/ CR579 (Bear Tavern Rd)





The crossings at the CR579/CR546 and in front of the school should be examined for child friendliness, and should conform to NJDOT guidelines for safe crossing.

Crossing distance of CR579 at CR546 is approximately 75 ft (see picture above), and crossing CR546 is approximately 60 ft. Under NJDOT guidelines for pedestrian facilities, pedestrian refuge islands in the median should be provided for each crossing since the distance is 60 feet or greater. In addition, pedestrian signal heads with countdown timers should be provided.

Safety Countermeasures

Two Safe Routes to School goals drive improvements to walking and biking areas – (1) improve safety for existing cyclists and walkers and (2) create new safe walking and biking areas by eliminating hazardous conditions. For Bear Tavern Elementary School, only creating new walking and biking areas will be addressed, since there are no existing safe walking and biking areas.

The Federal Highway Administration’s 2012 guidance for improving pedestrian safety include the following proven countermeasures.⁴

1. Roundabouts – consider for the intersection of CR579 and CR546
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)⁵

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

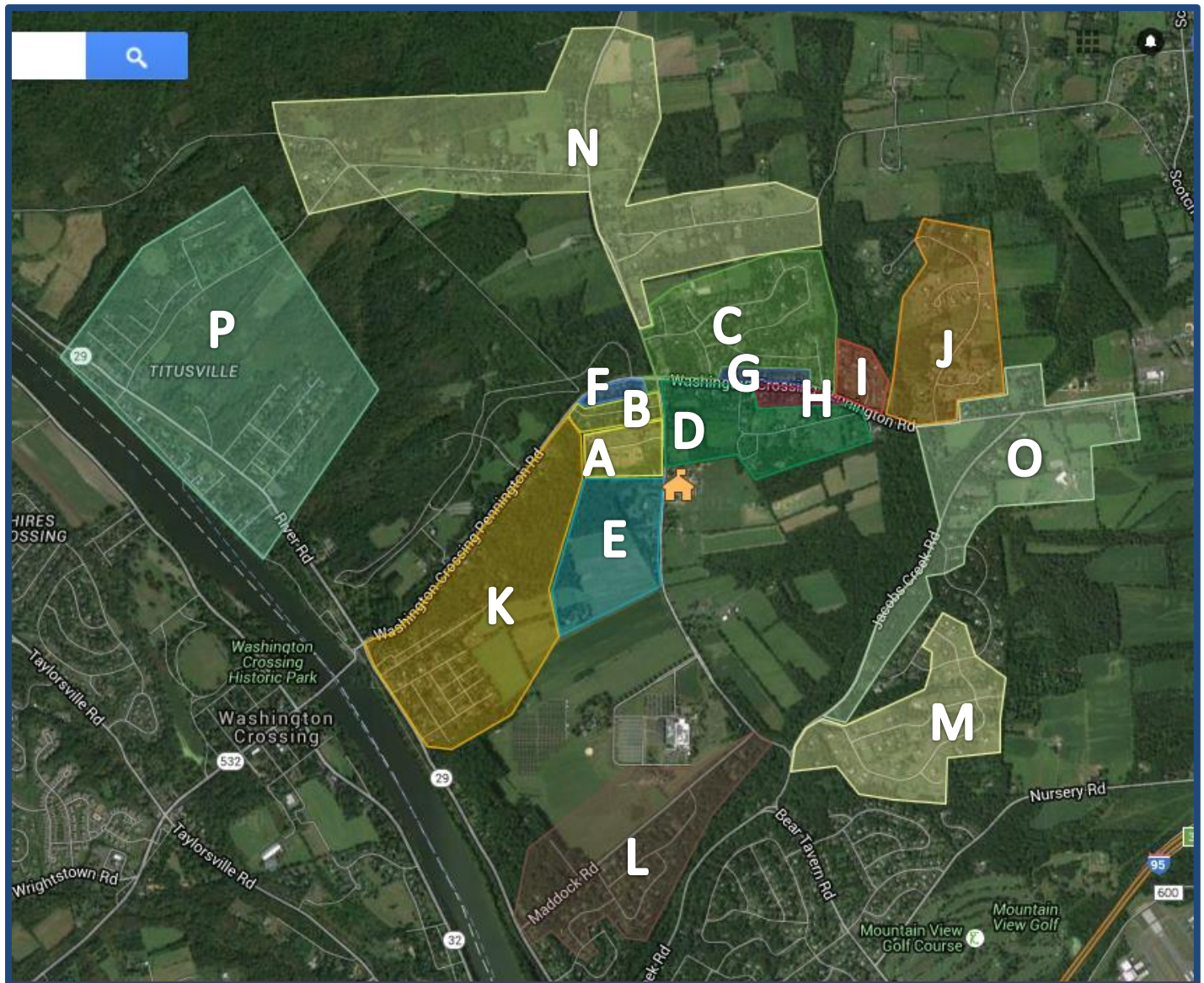
⁴ <http://safety.fhwa.dot.gov/provencountermeasures/>

⁵ <http://safety.fhwa.dot.gov/intersection/resources/techsum/fhwasa09009/>

Goal 1 – Improve safety for existing cyclists and walkers

There is no existing walking area, but a parent was observed walking with her children to Bear Tavern Elementary.

Goal 2 – Create New Safe Walking and Biking Areas



The shaded areas in the map above correspond to potential new safe walking areas within 2 miles of Bear Tavern Elementary, except for Area P, Titusville, which lies outside the 2 mile distance by public roads (and therefore outside the scope of this school travel plan, since busing must be provided by law). Titusville is included because of teacher and parent interest, since it is the densest residential area near the school, and because an attractive bicycling route might be created through Washington Crossing State Park to the school, possibly including using the bicycle and pedestrian overpass of SR29 near CR546.

Walking and Bicycling Connections

Multi-use paths along roads but separated from traffic should be considered, to maintain the rural character as well as to promote children cycling to school.

Several off-road trail connections are possible, including:

1. From the back of school property to Old Washington Crossing Road and Areas D and H – this currently connects to a driveway for which legal right of way is unknown.
2. Along stream right of way from the neighborhood in Area K north toward the school.
3. Through Washington Crossing State Park to connect to Titusville (Area P) or the neighborhood in Area K.
4. Through Janssen Pharmaceutical property to connect the neighborhoods in Areas K and/or L.
5. From the back of the school toward Areas O and/or M

Since the likelihood of these potential trails is unknown, the rest of the travel plan will not address them and will concentrate on routes along roadways. If a trail is implemented, it will have to be maintained year around to be counted as a safe route to school.

Walking and Bicycling Crossings

Since CR579, CR546 and CR637 are all high-speed arterials, recommended improvements to pedestrian crossings include high visibility crosswalks, pedestrian countdown signal heads, pedestrian-activated hybrid beacons or rapid-flashing beacons, pedestrian refuge islands (see Appendix C), and/or crossing guards.

GMTMA suggests consideration of a improved crossings including high visibility crosswalks, pedestrian countdown signal heads, pedestrian refuge islands, and/or a roundabout at this intersection, to improve pedestrian safety as well as traffic flow, in the case of the roundabout (see examples in Appendix C).

Titusville Bicycling Route

Although Titusville is beyond the 2 mile walking area along public right of way, an attractive bicycling route can be created using the D&R Canal Path, the bicycle and pedestrian bridge across SR29 River Road near CR546 Washington Crossing-Pennington Rd and the roads internal to Washington Crossing State Park. Proposed improvements enable a safe crossing of SR29 at Grant St and a multi-use path connection from the old entrance onto CR546 north to CR579.

Education

Hopewell Township is well-positioned for more biking and walking, with apparent community and municipal support, crossing guards, bike racks, and a growing 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 Hopewell Township 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 at Bear Tavern Elementary.

Evaluation- Goals and Action Plan:

This plan of action is intended to create new safe walking and bicycling areas to encourage more students to walk. The table below identifies those actions, a responsible party for implementing them and an estimate or level of cost.

Engineering improvements are in suggested order of priority, based on lowest cost for the highest return in terms of number of houses in the new walking area. 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 2016 to support the grant application process.⁶

Hopewell Township has already estimated the cost of A-C for a 2016 grant application, but these engineering estimates are not reflected here in order to maintain methodological integrity between areas within the report.

Engineering					
Area	Improvement(s)	Depends On	Responsibility	Estimated Cost	New Area
A	CR579 crossing at school	n/a	County, Township, School	\$42K	9 houses
B	Sidewalk west side CR579 from Fabrow to Winding Brook Way	A	County, Township	\$30K	23 houses
C	Sidewalk east side CR579 from Continental Lane to CR546, then west side CR579 to Fabrow. High visibility crosswalks, pedestrian countdown signals, consider pedestrian refuge island, consider roundabout	A and B Alternative – if sidewalk on east side of CR579 as in Area D, improved CR546 pedestrian crossing on east side instead of north CR579 and west CR546	County, State Parks, Township	\$109K	114 houses
D	Sidewalk west side CR579 to CR546, then east on south side of CR546 to Old Washington Crossing Rd	n/a	County, Township	\$185K	46 houses
E	Sidewalk west side CR579 south from school 2K ft	A	County, Township	\$120K	12 houses
F	Sidewalk south side CR546 from CR579 to Fabrow	A and B	County, Township	\$109K	10 houses
G	Sidewalk north side CR546 from Grenloch to George Washington Dr, high visibility crossing of CR546 at Old Washington Crossing Rd	Right of Way to back entrance of school grounds, Or D	County, Township	\$172K	15 houses
H	Sidewalk south side CR546 from Old Washington Crossing Rd west intersection to George Washington Dr	Right of Way to back entrance of school grounds, Or D	County, Township	\$92K	9 houses
I	High visibility pedestrian crossing of CR546 between Hopkinson Ct and Old	Right of Way to back entrance of school grounds,	County, Township	\$42K	7 houses

⁶ http://www.saferoutesnj.org/wp-content/uploads/2013/07/srts_costs_NEW-FORMAT_FINAL.pdf

	Washington Crossing Rd	Or D and H and sidewalk extended 720 ft on CR546 to Hopkinson Ct			
J	Sidewalk on CR546 between Hopkins Ct and Independence Way	I	County, Township	\$94K	36 houses
K	Sidewalk on west side CR546 from Fabrow to SR29, on west side SR29 from CR546 to Patterson Ave	A and B	NJDOT, State Park, County, Township	\$594K	128 houses
L	Sidewalk west side CR579 south to Maddock, on south side Maddock west to SR29	E	County, Township	\$562K	75 houses
M	Sidewalk west side CR579 south to Jacobs Creek Rd, then across to east side Jacobs Creek to Todd Ridge	E	County, Township	\$360K	44 houses
N	Sidewalk east side CR579 from Continental Lane north, on Pennington-Titusville both sides, on Church and Fiddlers Creek both sides	A and B and C	State Park, County, Township	\$1.218K	83 houses
O	Sidewalk on north side CR546 from Hopkinson Ct to Alliger Park, on south side of CR546 from farm across from Skate park to Jacobs Creek Rd, on east side Jacobs Creek Rd to Todd Ridge Rd	D and H and I	County, Township	\$618K	32 houses
P	Beyond 2 mile walking area – sidewalk west side SR29 from Blue Ridge to Grant, high visibility crossing with HAWK on SR29 at Grant. Multi-use path north side of CR546 in Washington Crossing State Park from old entrance to CR579	A and B and D	NJDOT, State Park, County, Township	\$334K	200 houses

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 Bear Tavern Elementary 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 & Bicyclist Crashes from Plan4Safety Database

CRASH_DATE	CRASH_TYPE	CRASH_LOCATION	CROSS_STREET_NAME	EPDO
1/16/2003	Pedestrian	2555 PENNINGTON ROAD		Moderate Injury
5/13/2003	Pedestrian	PENNINGTON-TITUSVILLE RD	DUBLIN ROAD	PDO
5/19/2003	Pedestrian	ROUTE 579	CR 546	Pain
4/29/2004	Pedestrian	NJ 29		Fatal Injury
5/18/2004	Pedestrian	PENNINGTON-TITUSVILLE RD		Moderate Injury
6/2/2004	Pedalcyclist	ROUTE 546		Moderate Injury Incapacitating Injury
6/2/2005	Pedalcyclist	ROUTE 546	CR 632	
10/29/2005	Pedalcyclist	NJ 29	GRANT STREET	Moderate Injury
11/25/2005	Pedestrian	DUBLIN RD	PENNINGTON-TITUSVILLE RD.	Moderate Injury
12/27/2005	Pedestrian	1200 MERRILL LYNCH DR		Pain
5/21/2007	Pedestrian	NJ 31	RT 57	Pain
5/25/2007	Pedalcyclist	MERCER COUNTY 623	SCOTCH RD	Moderate Injury
6/1/2007	Pedestrian	800 DENOW RD		Moderate Injury
6/18/2007	Pedalcyclist	STONY BROOK ROAD	MINE ROAD	PDO
9/12/2007	Pedalcyclist	PENNINGTON-TITUSVILLE RD	DUBLIN RD	PDO
10/10/2007	Pedestrian	800 DENOW RD		Pain
10/22/2007	Pedalcyclist	NJ 31	WASHINGTON CROSSING PENN	Pain Incapacitating Injury
11/11/2007	Pedestrian	SHREWSBURY COURT	DENOW ROAD	
4/20/2008	Pedalcyclist	ROUTE 579	CHURCH RD	Moderate Injury
4/23/2008	Pedestrian	S TIMBERLANE DR	PENNINGTON HARBOURTON RD	Pain
10/5/2008	Pedestrian	NJ 31	CR518	Pain
10/9/2008	Pedestrian	VANBRUNT RD	DENOW ROAD	Moderate Injury Incapacitating Injury
10/11/2008	Pedestrian	RIVER DR	CHURCH ROAD	
10/13/2008	Pedalcyclist	MERCER COUNTY 624	OLD MILL ROAD	Pain
4/1/2009	Pedestrian	408 SCOTCH ROAD		Moderate Injury
4/20/2009	Pedalcyclist	MERCER COUNTY 624	OLD MILL RD	Moderate Injury
4/27/2009	Pedalcyclist	MERCER COUNTY 640	PENNINGTON ROAD	Pain Incapacitating Injury
5/22/2009	Pedestrian	SHREWSBURY CT	DENOW RD	
6/30/2009	Pedalcyclist	ROUTE 579	WOOSAMONSA RD	Moderate Injury
10/6/2009	Pedestrian	1350 MERRILL LYNCH DR		Pain
11/18/2009	Pedestrian	NJ 29	PLEASANT VALLEY RD	Pain
5/25/2010	Pedestrian	S TIMBERLANE DR	PENNINGTON-HARBOURTON ROAD	Moderate Injury
7/11/2010	Pedalcyclist	HOPEWELL WERTSVILLE RD	FEATHERBED LANE	PDO
8/21/2010	Pedalcyclist	DENOW RD	WELLINGTON DR	PDO Incapacitating Injury
9/15/2010	Pedalcyclist	NJ 31	I- 95	
11/13/2010	Pedalcyclist	ROUTE 518	NEW RD	Moderate Injury
12/15/2010	Pedestrian	NJ 31	ROUTE 546/BLACKWELL RD/CR 640/S MAI	Moderate Injury
5/8/2011	Pedalcyclist	ROUTE 546	CR 637 / JACOBS CREEK RD	Pain
5/22/2011	Pedestrian	NJ 31	DIVERTY RD	Moderate Injury
12/12/2011	Pedalcyclist	PENNINGTON-TITUSVILLE	DUBLIN ROAD	Pain

		RD		
12/20/2011	Pedestrian	25 S RT 31		Incapacitating Injury
1/9/2012	Pedestrian	NJ 31	DIVERTY RD	Pain
3/5/2012	Pedestrian	DENOW RD	PENNINGTON RD	Incapacitating Injury
5/29/2012	Pedestrian	VAN DYKE RD	COVENTRY LANE	Moderate Injury
5/30/2012	Pedalcyclist	NJ 29	COLEMAN LANE	Pain
8/24/2012	Pedalcyclist	NJ 31	DIVERTY RD	Pain
10/25/2012	Pedestrian	ROUTE 518	NEW RD	Incapacitating Injury
11/17/2012	Pedalcyclist	ROUTE 518	N GREENWOOD AV	Moderate Injury
12/18/2012	Pedestrian	ROUTE 569	CHERRY VALLEY RD	Moderate Injury
2/13/2013	Pedalcyclist	ROUTE 518	PRINCETON AV	Moderate Injury
2/14/2013	Pedestrian	ROUTE 579	LAMBERTVILLE HOPEWELL RD	PDO
2/25/2013	Pedestrian	NJ 31	CR 631 / INGLESIDE AVE	PDO
3/13/2013	Pedalcyclist	ROUTE 546	SIOUX RD	PDO
4/13/2013	Pedalcyclist	PRINCETON AVE	E BROAD ST	Moderate Injury
7/30/2013	Pedestrian	1 CAPITAL WAY		Moderate Injury
8/28/2013	Pedalcyclist	NJ 31	WOOSAMONSA RD	Pain
12/12/2013	Pedestrian	MERCER COUNTY 632	BENJAMIN TR	Moderate Injury
5/9/2014	Pedestrian	FEDERAL CITY RD	BULL RUN RD	PDO
5/28/2014	Pedalcyclist	ROUTE 569	CLEVELAND RD	Moderate Injury
10/24/2014	Pedestrian	2555 PENNINGTON RD		Pain
5/29/2015	Pedalcyclist	MERCER COUNTY 632	VAN BRUNT RD	Moderate Injury
10/27/2015	Pedalcyclist	ROUTE 579	CR 637 / JACOBS CREEK RD	Pain
11/26/2015	Pedestrian	ROUTE 579	TANGLEWOOD DR	Moderate Injury
12/30/2015	Pedestrian	NJ 29	FIDDLERS CREEK RD	PDO
1/29/2016	Pedestrian	ORCHARD AV	PLYMOUTH STREET	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 2008.⁷

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.

⁷ 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: 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 \geq 1	LTS \geq 2	LTS \geq 3	LTS \geq 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		
	2-3 lanes	4-5 lanes	6+ lanes
Speed Limit 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