TRAFFIC CALMING EVALUATION
BOROUGH OF SPRING LAKE
MONMOUTH COUNTY, NEW JERSEY

PRELIMINARY REPORT

September 13, 2016

Prepared For:

BOROUGH OF SPRING LAKE
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Introduction

The Borough of Spring Lake, Monmouth County, New Jersey, has identified six locations that are a traffic and pedestrian safety concern. The project locations that have been identified for evaluation are:

1. 3rd Avenue vicinity of Lake Como border and Monroe Avenue
2. 3rd Avenue and Pitney Avenue
3. 3rd Avenue and Ludlow Avenue
4. 5th Avenue and Warren Avenue/West Lake Avenue
5. 5th Avenue and Washington Avenue
6. Ocean Road-from railroad crossing to 4th Avenue

Miskovich Consulting Engineers, LLC (MCE) has been retained to identify the traffic, pedestrian, and safety issues at these locations, evaluate various traffic calming measure that may address these issues, and recommend which measure or measures can be implemented in an attempt to address the identified safety concerns. The following report presents a summary of our data collection efforts, a description of the evaluation and analyses performed, and our findings with respect to potential traffic calming measures.

Scope of Study

MCE has undertaken the following tasks in preparation of this evaluation:

Task 1 - Data Collection

1. Met with Municipal officials to discuss concerns at the subject locations.
2. Conducted an inventory of existing physical roadway conditions and traffic control in the vicinity of the subject locations.
3. Obtained copies of accident reports and discussed travel speed data with the Police Department.
4. Discussed approved or planned developments that may impact traffic at the subject locations with the Borough Engineer.
5. Obtained information on infrastructure improvements proposed at the subject locations.
6. Observed intersection operations at random periods during weekday peak and non-peak hours and during weekend midday periods. The observations were conducted in August.

Task 2 - Data Analysis

1. Review the material obtained for each location to ascertain reported issues.
2. Observations of operating conditions to note vehicular/pedestrian/bicycle activity and identify possible perceived issues.
3. Provide a qualitative assessment of operations at each location.
4. Outline possible traffic calming measures to address the observed and perceived issues.
5. Provide a qualitative evaluation of the positive and negative effects of the various traffic calming measures for each location.
6. Develop short and long-term measures for traffic calming at each location.
7. Prepare a concept sketch for the suggested traffic calming measures with estimated construction costs.

Task 3 –Report

1. Meetings with Municipal officials to discuss the various alternatives for traffic calming.
2. Develop a list of short and long term traffic calming measures for each location.
3. Provide an estimated construction cost for the outlined traffic calming measures for each location.
4. Attend a public meeting with the Borough Council to present and discus the report

Background

While the Borough has identified six locations to be evaluated as part of this study, the evaluation is a continuing effort as stated in the Borough's Master Plan. The Circulation Element of the 2010 Master Plan identified several goals of the plan, four of which are:

1. Improve intersections or roadway segments through the implementation of creative engineering, traffic calming, and design techniques.
2. Preserve, expand, and upgrade pedestrian passageways in the Borough to improve linkages between neighborhoods, community facilities, parks, and open space.
3. Utilize traffic calming measures in areas of high pedestrian activity.
4. Create a more bicycle and pedestrian friendly environment in Spring Lake that provides a safe and viable alternative to driving.

The Master Plan further discussed the need in general terms to improve the circulation for both pedestrians and vehicles within the Borough. Intersection improvements should consider:

1. Pedestrian sidewalks/walking- safety and mobility improvements.

2. Traffic Calming and Congestion Management- slow traffic speeds on the major east/west arterials through the imposition of roundabouts and/or raised/textured paving elements at intersections (similar to Belmar*).*

This study focuses on developing more site specific improvements in consideration of the stated goals on the circulation elements of the Master Plan.

Data Collection

The scope of work did not include traffic count or speed data collections. The Borough has provided all available data from various sources for speed studies/surveys and accident history. Random spot speed recordings were conducted by MCE to ascertain operating speeds of motorists. The data and an analysis of the data is provided in the discussion section of each study location in this report.

Planned Infrastructure Improvements

There are several projects under design or consideration for funding by the Borough within the municipal roadway improvement program. The status, as of this report date, of these projects are summarized below.

3rd Avenue- Brighton Avenue to Pitney Avenue

This project is currently under Phase II of the NJDOT Transportation Trust Fund. Engineering design and plan preparation is underway but funding is dependent on the Trust Fund being financed.

3rd Avenue- Pitney Avenue to Lake Como

This project is currently under the municipal Capital Improvement Program. Field survey and preliminary engineering has not commenced. This is awaiting recommendations from the Traffic Calming Study.

Traffic Calming

RELATIONSHIP TO BOROUGH 2010 MASTER PLAN

The Master Plan recommended several techniques to calm traffic and improve both vehicular and pedestrian safety within the Borough. This is to be accomplished through reviewing the feasibility of utilizing four-way stops at intersections that have experienced a high rate of accidents or where speeding tickets have frequently been issued. In addition, it is desired to enhance pedestrian and biking linkages between Devine Park, Potter Park, and the downtown, and other destinations in the Borough. Observations suggest that the other destinations to be considered are Marucci Memorial Park, the Train Station/Recreation Center, the beach/boardwalk, and Lake Como.

There are a number of traffic calming treatments that have varying effect on reducing speed, reducing traffic volume, reducing accidents, or improving pedestrian safety. Traffic calming efforts may result in various levels of improvement depending on the site specific issues, public acceptance, and are continually monitored to evaluate and measure their performance, and some will provide noticeable changes while others may be more subtle.

TRAFFIC CALMING MEASURES

Traffic calming is a combination of primarily physical measures that are intended to reduce the impact of vehicular traffic in an area and/or alter driver behavior to improve conditions for pedestrians, bicyclists, and other no-motorized users of the roadway and are intended to be self-enforcing. The immediate purpose is to reduce the speed and/or volume of traffic to acceptable levels such that safety is inherently improved.

The various measure to address speeding can be separated into three primary designations:

- vertical control measures; treatments such as speed humps, speed tables, raised crosswalk/intersections.
- horizontal control measures; treatments such to force drivers to shift laterally such as roundabouts, medians, corner bumpouts, curb extensions, realigned intersections, lane shifts, etc.
- Travel way narrowing or lane diets: knockdowns, chokers, chicanes, travel lane width, on-street parking, etc.

These traffic calming measures and their effectiveness in addressing the primary purpose of the measure or device is summarized in Table 1.

Table 1
Effectiveness of Traffic Calming Measures

Purpose	**Traffic Calming Measure/Device**	**Effectiveness**	**Cost**
Speed Reduction	Police enforcement	Short Term	Man-Hours
	Speed humps	Very	$5,000 -$7,500
	Roundabouts	Very	$15,000-$100,000
	Chicanes	Somewhat	$5,000-$15,000
	Entrance treatments	Minimal	$5,000-$20,000
	Pavement treatments	Minimal	$5,000-$15,000
Traffic Volume Reduction	Diverters-diagonal & semi	Very	$15,000-$35,000
	Median barriers	Very	$10,000-$20,000
	Lane narrowing	Somewhat	$2,500-$5,000
	Choke points	Somewhat	$5,000-$10,000
Increase Pedestrian Safety	Curb extensions	Somewhat	$15,000-$20,000
	Raised crosswalks	Very	$2,500-$5,000
	Pedestrian Refuge areas	Somewhat	$8,000-$15,000

Source: Various and MCE estimates

Study Locations

The following is a discussion of each study locations. Potential traffic calming measures have been identified long with an estimated construction cost. The measures have also been summarized into short term projects (three months to one year), mid-term (one year to three years), and long term (greater than three years).

3rd AVENUE AND MONROE AVENUE-LAKE COMO BORDER

Description

3rd Avenue is a two-lane roadway under the jurisdiction of the Borough of Spring Lake. The posted speed limit is 25 mph and is striped for passing. The roadway is approximately 50 feet wide. Parking is permitted on either side of the roadway. The horizontal alignment is basically straight and the vertical alignment is basically level. Land use consists of Marucci Memorial Park on the westerly side of 3rd Avenue with Borough owned property at Monroe Avenue and 3rd Avenue and single-family residences on the easterly side.

The roadway Is signed "*No Parking any Street 3 a.m. To 6 a.m*." There are painted rumble strips on the southbound approach for traffic coming from Lake Como. There is also a Radar Speed limit sign in the southbound direction just south of the park entrance. The roadway has curbs and sidewalks along both sides of 3rd Avenue.

Observations

Speeding along 3rd Avenue seems to be a concern. This is supported by the fact that there are rumble strips coming in from Lake Como, and the Radar Speed sign near Marucci Park Access. The roadway in Lake Como is a mix of residential and commercial with heavy on-street parking. This has the effect of raising motorist attention and visually reduces the street width. The landscape changes coming in from Lake Como to a wide open area with virtually no parking. This physical and visual change results in motorist having a tendency to increase speed. A motorist will travel the roadway at a speed that feels reasonable for the roadway environment. Random speed measurements were made midday on a weekday and found that the average speed was approximately 35 mph in the southbound direction and 30 mph in the northbound direction. Observations also noted a rather high bicycle usage along 3rd Avenue. While there are sidewalks along all streets, cyclists were using the roadway as the bike lane.

Figure 1- Study Location - 3rd Avenue

Potential Traffic Calming Measures

The landscape changes entering Spring Lake from Lake Como from dense residential /commercial uses with heavy on-street parking, to a wide open area on Spring Lake with virtually no parking. This physical and visual change results in motorist having a tendency to increase speed. 3rd Avenue is also very wide (50'±) which also encourages higher travel speeds. There are several traffic calming measures that have the potential to address speeding. These range from increased enforcement, speed humps, or physical constraints to narrow the roadway such as lane diets, corner bump outs, etc.

Since it does not appear that on-street parking would increase substantially to the point that provides a physical and visual reduction in the width of 3rd Avenue, other measures or techniques are necessary to provide this reduction. Furthermore, because the landscape changes from Lake Como and 3rd Avenue is very wide, there are opportunities to enhance the entrance into Spring Lake with streetscape improvements. The primary issues to address is the wide open streetscape. There are a number of ways and variations of the concepts that can be introduced to accomplish this and some are discussed below.

Striping

1. The roadway is currently striped for passing. This could encourage motorists to pass slower moving vehicles. Consideration should be given to changing this to No Passing in each direction, which could be extended from the length of 3rd Avenue.
2. Since observations noted a high bicycle usage, and consistent with the Borough's Master Plan, consideration should be given to striping 3rd Avenue with Bike Lane markings and signage. This will delineate the travel areas for bicyclists and enhance the visual identity of bicyclists.
3. Stripe the roadway for No Passing with striped bicycle lanes and parking along each side.
4. Provide a striped median with striped bicycle lanes and parking along each side.

Physical Changes

1. Narrow the roadway from its current 48'-50' width to 36'-40' by reconstructing the curbline on each side. This width would still allow on-street parking.

2. With a narrowing of the roadway, the existing sidewalk could then be widened to permit both pedestrian and bicycle usage or construct a separate bicycle path in the widened area to separate bicyclists from pedestrians.
3. Construct bumpouts, knockdowns, chockers, etc., at ransom locations along 3rd Avenue to enhance a motorist's perception of a narrow roadway.
4. A landscaped median could be constructed with striped bicycle lanes and parking along each side. The landscaped median would allow for an enhanced visual identification on entering Spring Lake from Lake Como.
5. Construct landscaped island or roundabout on 3rd Avenue entering from Lake Como. Not only would these force vehicles to slow down to traverse the island or roundabout but also provide the opportunity for some form of enhanced Borough identification.
6. Realign Monroe Avenue to enter the roundabout. It may also be reasonable to also relocate the park entrance so that the roundabout serves both Monroe Avenue and the park entrance.

3rd Avenue maintains this wide pavement with minimal parking from Lake Como to the vicinity of Brighton Avenue. Treatments considered for the northerly segment could be extended to Brighton Avenue. This provides a continuity of the streetscape and not just spot improvements. Some of the concepts mentioned above are illustrated in the following figures. There are also a number of variations of these concepts that can be implemented, or phased in over time. The roadway provides a clean slate for the Borough to consider and implement their vision of what to portray to motorists entering Spring Lake from Lake Como.

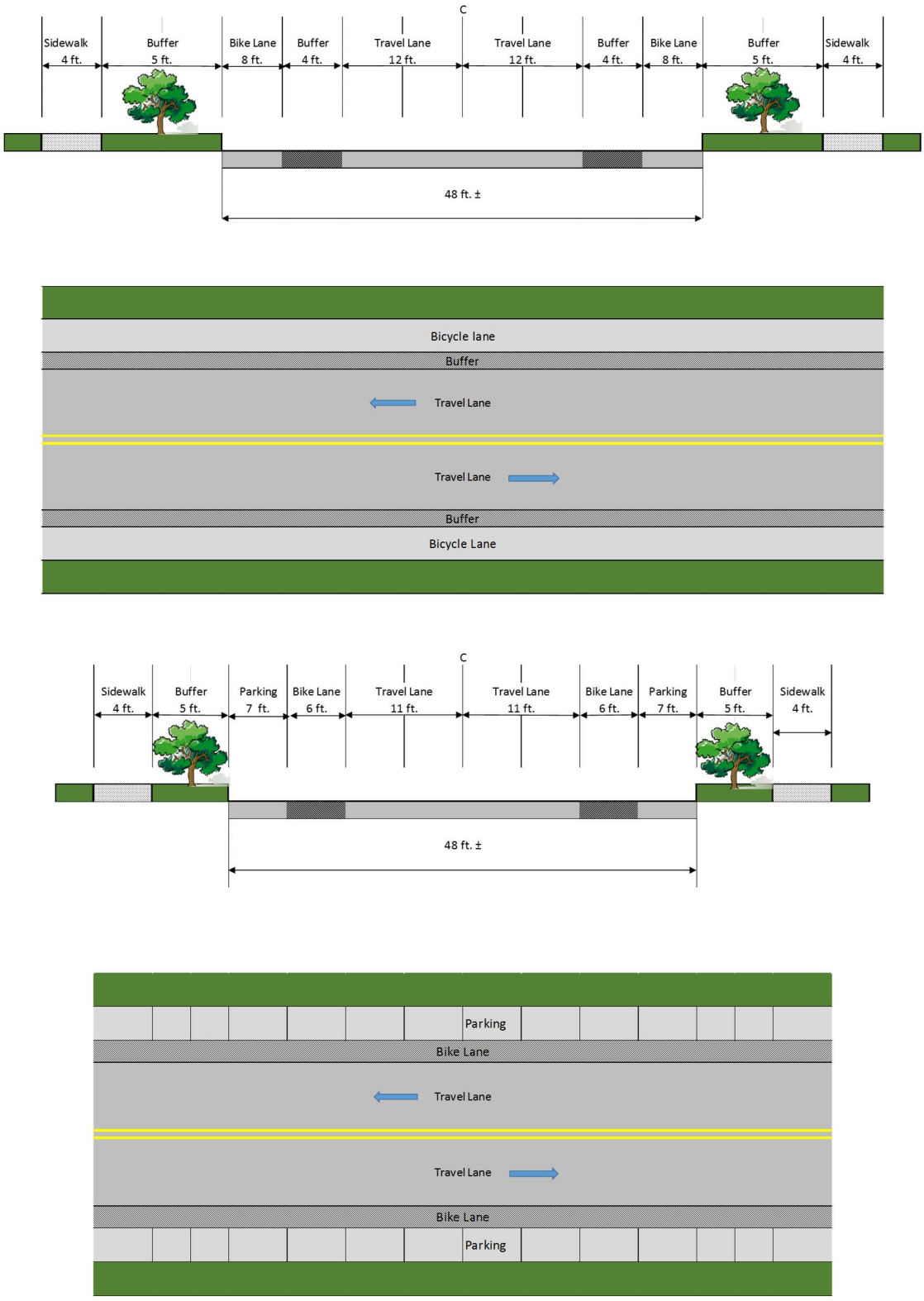

Figure 2- 3rd Avenue Bicycle Lane Concepts

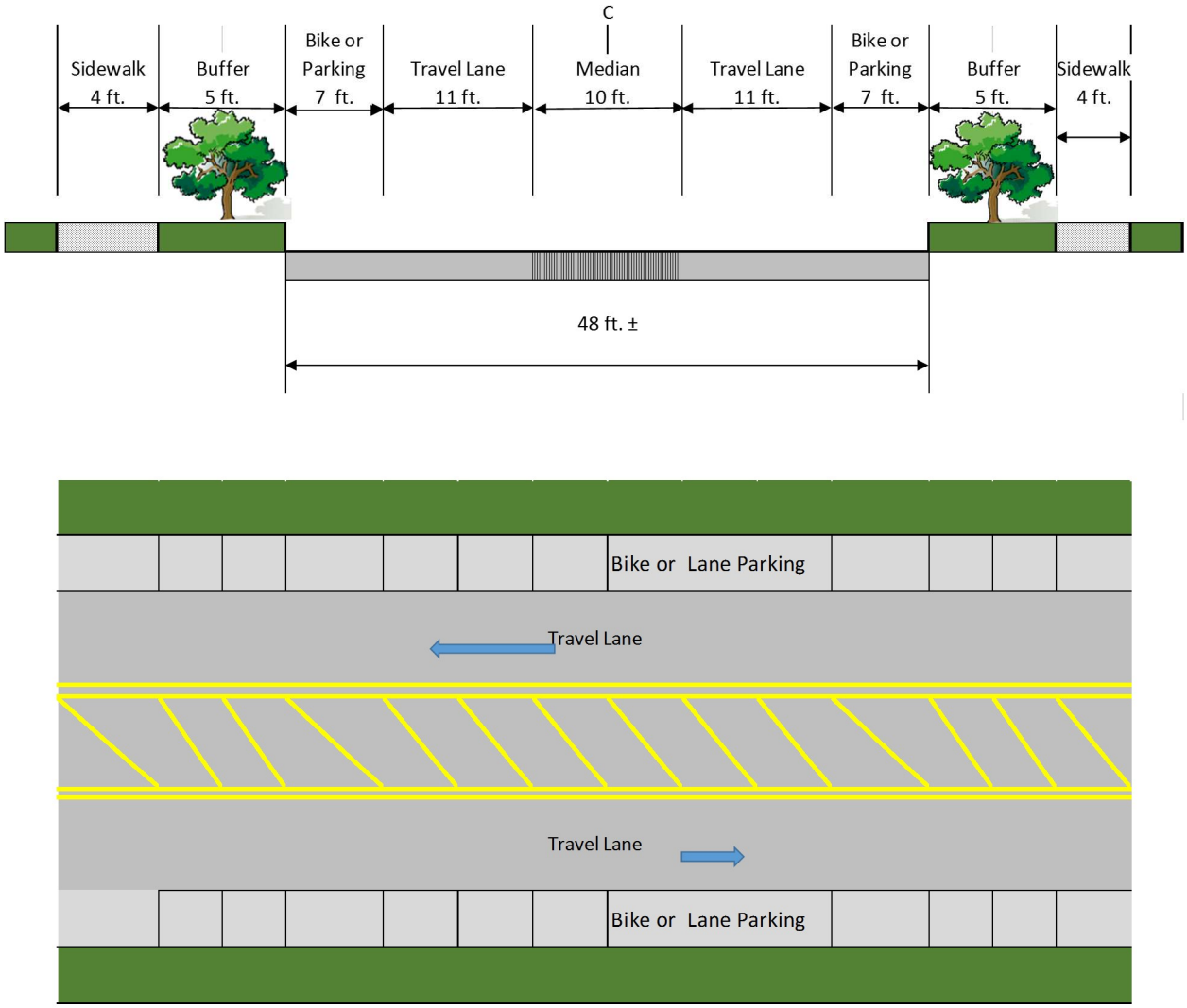

Figure 3 – 3rd Avenue Striped Center Median Concept

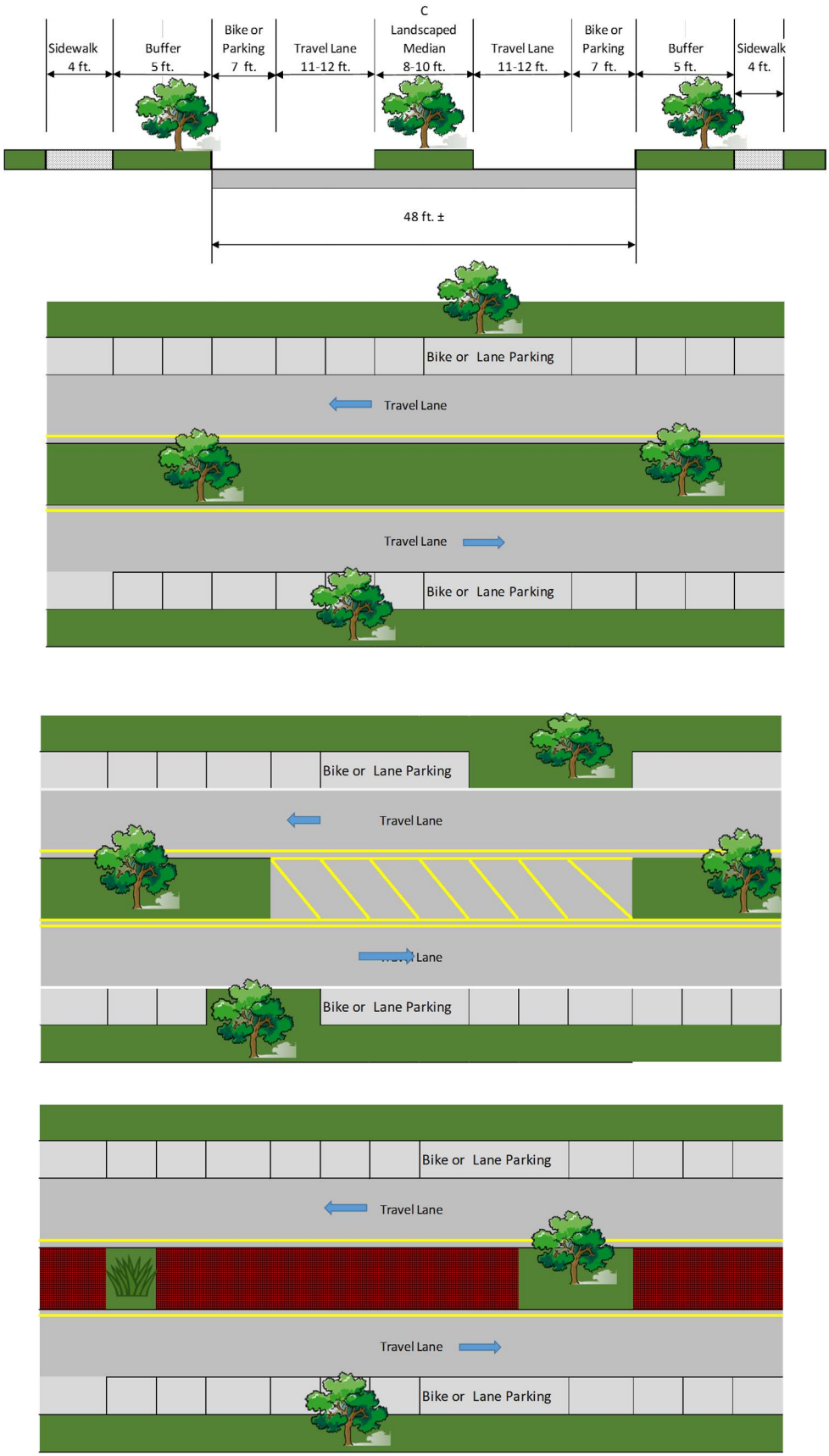

Figure 4 – 3rd A venue Landscaped Median Concepts

Table 2
3rd Avenue Traffic Calming Measures

Traffic Calming Measure	**Time Frame**	**Estimated Cost**
Change striping to No Passing, stripe bicycle lanes, parking lanes	Short Term	$3,000 - $5,000
Median striping, bicycle lanes, parking lanes	Short Term	$8,000 - $10,000
Construct random bump outs	Mid Term	$15,000 - $30,000
Extend curbline Monroe Avenue to South Boulevard	Long Term	$55,000 - $65,000
Landscaped Median-Monroe Avenue to South Boulevard	Long Term	$50,000 - $60,000
Landscaped Median-random locations	Long Term	$15,000 - $30,000
Roundabout	Long Term	$30,000 - $100,000

3rd AVENUE AND PITNEY AVENUE

Description

The intersection of 3rd Avenue and Pitney Avenue is a four-way skewed intersection under the jurisdiction of the Borough of Spring Lake. 3rd Avenue is on a slight angle to the left through the intersection in the southbound direction. The alignment of Pitney Avenue is basically straight and level. The posted speed limit is 25 miles per hour. There is curbing and sidewalk along both sides of the roadway. Land use consists of single family homes on all four quadrants. Pitney Avenue is not striped except for a double yellow line and stop line at its intersection with 3rd Avenue. The Pitney Avenue approaches are Stop controlled with the sign posts having reflectorized insert. A Stop sign is also mounted on a flexible post placed in the center line. Each approach also has advanced Stop Ahead warning signs. All four quadrants are striped with pedestrian crosswalks. The eastbound approach of Pitney Avenue has a Stop sign on each side of the roadway. Parking is permitted on either side of Pitney Avenue.

Figure 5 - 3rd Avenue and Pitney Avenue

Observations

The skewed angle of 3rd Avenue through the intersection creates some difficulty with sight distance especially on the Pitney Avenue westbound approach. The approach is on the inside of the "curve" which inherently restricts sight line in either direction. The sight distance is compounded by vegetation along the two corner properties and further restricted when there are parked vehicles. Observations of motorists found that they had to encroach beyond the curb line of 3rd Avenue to get unobstructed sight lines. The eastbound approach is on the outside of the curve as such does not present the same sight distance issue. Eastbound Pitney Avenue also has sight lines restricted to the right due to mature landscaping in the southwest corner and a hedge row along this property on 3rd Avenue.

The pedestrian crosswalks were the standard crosswalk with edge lines defining the crosswalk and were faded. Also, the Stop signs and Stop Ahead signs were faded and did not meet current retro-reflectivity standards. Also, the Stop Ahead signs are an older version and not compliant with current standards.

Observations also noted a number of bicyclists using the roadway along both sides of 3rd Avenue. Some turned down Pitney Avenue and some continued along 3rd Avenue. Parking along either roadway was light during the weekday and increased somewhat during a Saturday with parking on 3rd Avenue south of Pitney Avenue being used more than the northerly side. Random speed measurements were made midday on a weekday and found that the average speed was approximately 30 mph in either direction.

Accident History

There were only six (6) reported accidents over the past 3-1/2 years. Four of these (67%) involved sight line issues from westbound Pitney Avenue. One involved a vehicle striking a bicyclist just north of Pitney Avenue. This may be the result of sight lines northbound thru the intersection, lack of a striped bicycle lane, or both.

Potential Traffic Calming Measures

The apparent issue is the available sight distance from both the eastbound and westbound Pitney Avenue approaches. Also the sharp alignment shift of 3rd Avenue through the intersection presents some issues with safe travel through the intersection.

There are several traffic calming measures that have the potential to address the issue of sight distance

from westbound Pitney Avenue and the 3rd Avenue alignment. These range from physical changes to narrow the roadway, corner bump outs, or a combination of both. Several traffic calming measures or alternatives are summarized below.

Table 3
3rd Avenue and Pitney Avenue Traffic Calming Measures

Traffic Calming Measure	**Time Frame**	**Estimated Cost**
Replace the Stop and Stop Ahead signs with new signs meeting the current retro-reflectivity criteria	Short Term	$200 - $400
Stripe the crosswalks with transverse markings to increase visibility	Short Term	$3,500
Stripe 3rd Avenue to realign the roadway travel lanes with striping to serve as "bumpouts" to further delineate travel through the intersection	Short Term	$4,500
Construct corner bumpouts at the intersection. This will permit vehicles to extend further into the roadway to increase sight distance to the south and north. This will also reduce pedestrian crossing distance of 3rd Avenue.	Mid Term	$20,000 - $30,000 with landscaping $35,000 - $45,000 with concrete or pavers
Construct mini-roundabout with striping/concrete splitter islands	Long Term	$60,000 - $75,000
Reconstruct the 3rd Avenue alignment thru the intersections to reduce the effect of the angle and increase sight lines.	Long Term	Requires right-way acquisition on the east side of intersection.

3rd AVENUE AND LUDLOW AVENUE

Description

3rd Avenue and Ludlow Avenue is a four-way 90-degree intersection under the jurisdiction of the Borough of Spring Lake. Both 3rd Avenue and Ludlow Avenue are basically straight and level. Curbing and sidewalk are present along both sides of the street. There are pedestrian crosswalks across each street at the intersection. Land use consists of single-family residences and a Church in the northwest quadrant. 3rd Avenue in striped for passing while Ludlow Avenue is not striped except for a double yellow line and stop Line near the intersection with 3rd Avenue. The Ludlow Avenue approaches have advanced Stop Ahead signs with Stop signs on both the left and right hand sides of the street at its intersection with 3rd Avenue. The curbing is painted the yellow at the corners but only the northbound approach of 3rd Avenue has a sign that says "*No Parking Here to Corner* "at the limit of the curb painting.

Figure 6 – 3rd Avenue and Ludlow Avenue

Observations

The sight distance is slightly impeded by vegetation along the property to the south on the Ludlow westbound approach. While there is a masonry wall on the northwest corner at the Church, it is does not appear to substantially restrict sight distance to the north. Observations of motorists note that many motorists on eastbound Ludlow Avenue did not come to a complete stop, but rather slowed and "rolled" through the stop. It was also observed that many motorists on Ludlow Avenue, while seeing approaching vehicles, waited until approaching vehicle got closer before deciding to cross 3rd Avenue. The *Stop* signs and *Stop Ahead* signs do not appear to meet the current retro-reflectivity standards and the pavement markings were worn with the pedestrian crosswalks not very visible.

On-street parking was observed to be random during the weekday and Saturday, but this is not the case during a service. The street width of 3rd Avenue was about 38 feet which is about 10 feet less than further to the north. The Stop signs and Stop Ahead signs were somewhat faded and not up to current retro-reflectivity criteria. The pedestrian crosswalks were the standard crosswalk with edge lines defining the crosswalk and were faded. Also the Stop signs and Stop Ahead signs were faded and did not meet current retro-reflectivity standards. Observations also noted a number of bicyclists using 3rd Avenue as well as crossing 3rd Avenue at the intersection.

Accident History

There was a total of eleven (11) reported accidents over the past 3 years. All of the crashes were right angle accident. The right angle crashes were basically spread among the southbound, northbound, and eastbound approaches. Six crashes were due to eastbound vehicles and four crashes due to westbound traffic on Ludlow Avenue. More telling was the fact that 10 of the 11 crashes (90%) were due to a vehicle failing to stop. This is quite alarming since there are three *Stop* signs on both Ludlow Avenue approaches.

Potential Traffic Calming Measures

The failure of vehicles to stop with all of the *Stop* signs raises a question of whether there is a disregard by motorists or they observe vehicles on 3rd Avenue moving slowly and think they can quickly cross the intersection before the vehicle arrives. Also vehicles not using turn signals tended to contribute to this feeling. The Stop signs are also back from the intersection and sight lines may be restricted to the south from Ludlow Avenue.

The traffic calming measures that were considered were aimed at providing greater visibility and enhancement of the stop control. A four-way Stop may address the accident situation, but observed volumes on 3rd Avenue appeared to be lower than along Ludlow Avenue. Additional study to evaluate the warrants for a 4-way stop intersection is required.

Several measures or alternatives were identified to providing greater visibility and enhancement of the stop control are summarized below.

Table 4
3rd Avenue and Ludlow Avenue Traffic Calming Measures

Traffic Calming Measure	**Time Frame**	**Estimated Cost**
Replace the Stop and Stop Ahead signs with new signs meeting the current retro-reflectivity criteria. Increase the size of the Stop sign to 36" x 36"	Short Term	$400 - $600
Paint “Stop Ahead” pavement markings on the Ludlow Avenue approaches.	Short Term	$400 - $600
Install LED Illuminated Stop Signs	Short Term	$5,000 - $8,000
Convert intersection to a 4-way Stop	Short Term	$1,500 - $2,000
Stripe the crosswalks with transverse markings to increase visibility	Short Term	$1,500 - $2,000
Stripe the corners with diagonal striping to serve as “bumpouts” to further delineate travel through the intersection	Short Term	$7,500 - $9,000
Construct corner bumpouts. This may not be feasible in front of the church because of possible funeral parking. Further review is necessary.	Mid Term	$40,000 - $50,000
Construct mini-roundabout with striping for splitter islands	Long Term	$60,000

5th AVENUE, WARREN AVENUE, AND WEST LAKE AVENUE

Description

The intersection of 5th Avenue, Warren Avenue, and West Lake Avenue is a four-way 90-degree intersection under the jurisdiction of the Borough of Spring Lake. The Warren Avenue/ West Lake approaches are under Stop control. One lane is provided on each approach to the intersection except for eastbound Warren Avenue which is striped with a shared left/thru lane and a dedicated right-turn-only lane. Curbing and sidewalk are present on each side of the street. 5th Avenue north of the intersection has been widened to provide a separate parking lane and striped with a thru and right turn lane as it approaches Passaic Avenue. Land use consists of residential uses in the northwest quadrant, the municipal building and single-family residences in the southeast quadrant, and a municipal park in the northeast and southwest quadrants. The Spring Lake train station and commuter parking lot is located about 500 feet west of the intersection.

Figure 7 – 5th Avenue-Warren Avenue-West Lake Avenue

Standard crosswalks are painted across each street at the intersection. The southerly leg of 5th Avenue Is not striped, while the northerly leg is striped for no passing. Warren Avenue Is also striped for no passing

on each approach to the intersection. The southerly leg of 5th Avenue Is posted for No Parking along the westerly side. North of Warren Avenue, the southbound approach a signed for "*No Parking Any Time*." Parking is permitted on either side of Warren Avenue. The eastbound approach of Warren Avenue has painted rumble strips, and advance *Stop Ahead* warning signs. A Stop sign is mounted on a flexible post in the center line on the eastbound approach to the intersection. The advance *Stop Ahead* warning signs on the westbound approach are the older design while those on the eastbound approach use the current design. Eastbound approach is signed for "*No Parking in the Street 3 am to 6 am".*

Observations

Observations of traffic suggest that the eastbound Warren Avenue approach is the more heavily trafficked approach to the intersection. The majority of the traffic also appeared to turn left onto 5th Avenue. The majority of southbound traffic on 5th Avenue appeared to turn right onto Warren Avenue. A number of bicyclists were observed to use the intersection to cross between the parks. Bicycle traffic may actually be higher because of the bike rental shop on Warren Avenue between the railroad tracks and 5th Avenue.

While parking was prohibited in front of The Chateau on the southbound 5th Avenue approach, several vehicles always seemed to be parked obstructing sight distance to the north from Warren Avenue. Motorists using the eastbound right turn lane often had their sight lines obstructed by vehicles in the shared left/thru lane requiring them to extend further into the intersection to see. Pavement markings were worn and the pedestrian crosswalks not very visible. Also the *Stop* signs and *Stop Ahead* signs do not appear to meet the current retro-reflectivity standards.

Many motorists were observed to roll into the intersection to either see or because of the sense of being pressured to cross due to the volume behind. Observations noted that when the first vehicle in the queue began to enter the intersection, the second vehicle in the queue often rolled thru following the first vehicle. This creates a potentially dangerous situation. In addition, a number of southbound vehicles on 5th Avenue did not use turn signals to turn right onto Warren Avenue but slowed down. Some of the thru vehicles also slowed down because of this or to pass the turning vehicles. This creates a potentially dangerous situation.

Accident History

There were only five (5) reported accidents over the past 3-1/2 years. Three of these (60%) involved right angle accidents. One involved a vehicle turning right from the left/thru lane. This number of accidents is very low. Review of the accident reports does not suggest any specific pattern of accidents that could be addressed by traffic calming measures.

Potential Traffic Calming Measures

The apparent issue seems to be a capacity issue. The Stop control is located on the heavy volume street which is contrary to established usage. While the standard is to place the Stop control on the 5th Avenue approaches, and make Warren Avenue/West Lake Avenue the through street, this may result in increased speeds thru the intersection. This could present issues with sight distance and pedestrian crossings to/from the parks and municipal building, as well as bicyclists trying to cross the intersections. Thus, it is reasonable that the Stop signs remain on the Warren Avenue/West Lake Avenue approaches, but replaced with signs that comply with the current retro-reflectivity standards.

Observations noted a sight distance issues to the north from eastbound Warren Avenue. Diagonal striping can be painted in the northwest corner to enforce no parking and move any parked vehicles further away from the intersection. The limits of the striping would comply with the NJ statutory parking prohibition limits. The costlier alternative is to construct a corner bump out at this location similar to what was done in the northeast corner.

Observations suggest that eastbound traffic experiences unexpected delay due to the slower vehicles speeds on southbound 5th Avenue and motorists not using turn signals. A four-way stop would eliminate some of the observed situations and quite possibly reduce vehicle delay for eastbound traffic. This could also provide a safer environment for pedestrians and cyclists to cross the intersection since all traffic will have to come to a complete stop.

Several measures or alternatives were identified to providing greater visibility and to address the issue the observed issues, and are summarized below.

Table 5
5th Avenue, Warren Avenue, and West Lake Avenue
Traffic Calming Measures

Traffic Calming Measure	**Time Frame**	**Estimated Cost**
Replace the Stop and Stop Ahead signs with new signs meeting the current retro-reflectivity criteria	Short Term	$400 - $600
Convert intersection to 4-way Stop	Short Term	$1,500 - $2,000
Convert intersection to 4-way Stop with transverse markings of crosswalks to increase visibility	Short Term	$3,500 - $4,000
Stripe the crosswalks with transverse markings to increase visibility	Short Term	$2,000 - $3,000
Stripe the corners with diagonal striping to serve as “bumpouts” to further delineate travel through the intersection	Short Term	$7,500 - $9,000
Construct corner bumpouts on northwest and northeast corners.	Mid Term	$15,000 - $30,000

5th AVENUE AND WASHINGTON AVENUE

Description

The intersection of 5th Avenue and Washington Avenue is a four-way under the jurisdiction of the Borough of Spring Lake. Washington Avenue is basically straight and level. 5th Avenue is basically level but the alignment is skewed between Washington Avenue to Brighton Avenue. Land use in the vicinity of the intersection is single-family residences. The posted speed limit is 25 mph.

5th Avenue is approximately 30 feet wide south of Washington Avenue and 40 feet wide north of Brighton Avenue. Between Washington Avenue and Brighton Avenue it widens to approximately 60 feet. There is diagonal striping on the easterly side of 5TH Avenue between Washington Avenue and Brighton Avenue in an attempt to define and reduce the travel path along northbound 5th Avenue. 5th Avenue in striped with No Passing striping beginning about 60 feet south of Washington Avenue, and ending about 65 feet north of Brighton Avenue. Before and after this, there is no centerline striping along 5th Avenue. There are pedestrian crosswalks along the westerly side of 5TH Avenue but are faded. The Washington Avenue approaches are *Stop* controlled. The stop line on the westbound approach extends about 30 feet ± beyond the physical curb line on to the north. However, the stop line is about 20 feet ± from the easterly curbline to the south on 5th Avenue.

Figure 8 - 5th Avenue and Washington Avenue

Observations

There was minimal traffic along 5th Avenue and Washington Avenue during the hours observed. Brighton Avenue had the higher volume of traffic during these periods. Observations noted that the stop line on westbound Washington Avenue looking to the south is set back from 5th Avenue as indicated in the preceding section. This makes it difficult to see approaching vehicles from the south. The sight line is also impeded by the presence a large mature tree and another large tree and mature hedges about 80 feet to the south. This requires a motorist to extend into the intersection to see northbound approaching vehicles. From the stop line, sight distance is about 70 to 80 feet which equates to a safe stopping sight distance (SSD) of about 10 to 15 mph. With the vehicle extending into the intersection such that the driver is in line with the sidewalk, sight distance is increased to about a 25 mph design.

Accident History

There was only one reported accident over the past 3 years. This involved a right angle accident between an eastbound vehicle on Washington Avenue and a northbound vehicle on 5th Avenue. The statement indicates that the eastbound vehicle did not stop. The lack of reported accidents may suggest that volumes are relatively low, or that motorists use extra precaution due to the limited sight distance from westbound Washington Avenue.

Potential Traffic Calming Measures

The lack of reported accidents suggests that there are minimal extenuating circumstances causing the accidents. However, it is noted that the sight line from westbound Washington Avenue looking to the south is extremely reduced due to the alignment of 5th Avenue thru the intersection, and the presence of large mature trees on the easterly side of 5th Avenue. From the stop line, the safe stopping sight distance is about 10 to 15 mph. Moving the stop line closer to the intersection could increase safe stopping sight distance to about 20 mph. However, this would eliminate being able to have a crosswalk on the easterly side of 5th Avenue across Washington Avenue. Also a motorist would still encroach into the intersection. This is also awkward due to the widened pavement on their right (to the north). To increase sight distance to at least the posted speed limit from the stop line would require removing the large tree on the southeast corner.

Table 6
5th Avenue and Washington Avenue
Traffic Calming Measures

Traffic Calming Measure	**Time Frame**	**Estimated Cost**
Remove the tree at the southeast corner	Short Term	$1,500 - $2,000
Provide striping through the intersection to delineate the travel lane	Short Term	$1,500 - $2,000
Install textured/colored pavement between Washington and Brighton Avenue to narrow the roadway width.	Short Term	$5,000 - $7,500
Reconstruct the curbline between Washington and Brighton Avenue to narrow the roadway width.	Mid Term	$12,000 - $20,000

OCEAN ROAD-RAILROAD TO 4th AVENUE

Description

Ocean Road Is a two-lane roadway under the jurisdiction of the Borough of Spring Lake having a general east-west orientation. It is striped for no passing and has a posted speed limit of 25 mph. Curbing and sidewalks are present on either side of the street. Land use consists of single-family homes along both sides of the street.

From the railroad tracks to a point just east of 2nd Avenue, parking is permitted on either side of the roadway except restricted from 3 a.m. to 6 a.m. Parking is not permitted along the southerly side of the street. The roadway is approximately 32 feet wide from the railroad tracks to a point just west of Shore Road where it transitions to about 25 feet wide at Shore Road. Beginning at Shore Road, the roadway narrows to about 22 feet across the culvert on the east side of Shore Road before widening at the approach to 4th Avenue. There is a crosswalk provided across Ocean Road on the westerly side of Shore Road.

Observations

This roadway is a narrow roadway with no striping. Parking is permitted on the northerly side which provides some measure of reducing the street width, but parking was random. Parking was more prevalent on a Saturday compared to midday on a weekday. There was minimal bicycle activity observed but use was split between in the street and on the sidewalk.

Borough representatives indicated that reports of speeding along Ocean Road have been received in the past. At a meeting with the Police Department on August 24, 2016, it was reported that recorded speeds from a prior investigation were approximately 28 to 30 mph in either direction. On Tuesday August 16, 2016, MCE conducted random speed measurements and found similar results. While there may be some excessive speeds and there is a perception of speeding, the observed speeds are fairly consistent with the 25 mph speed limit.

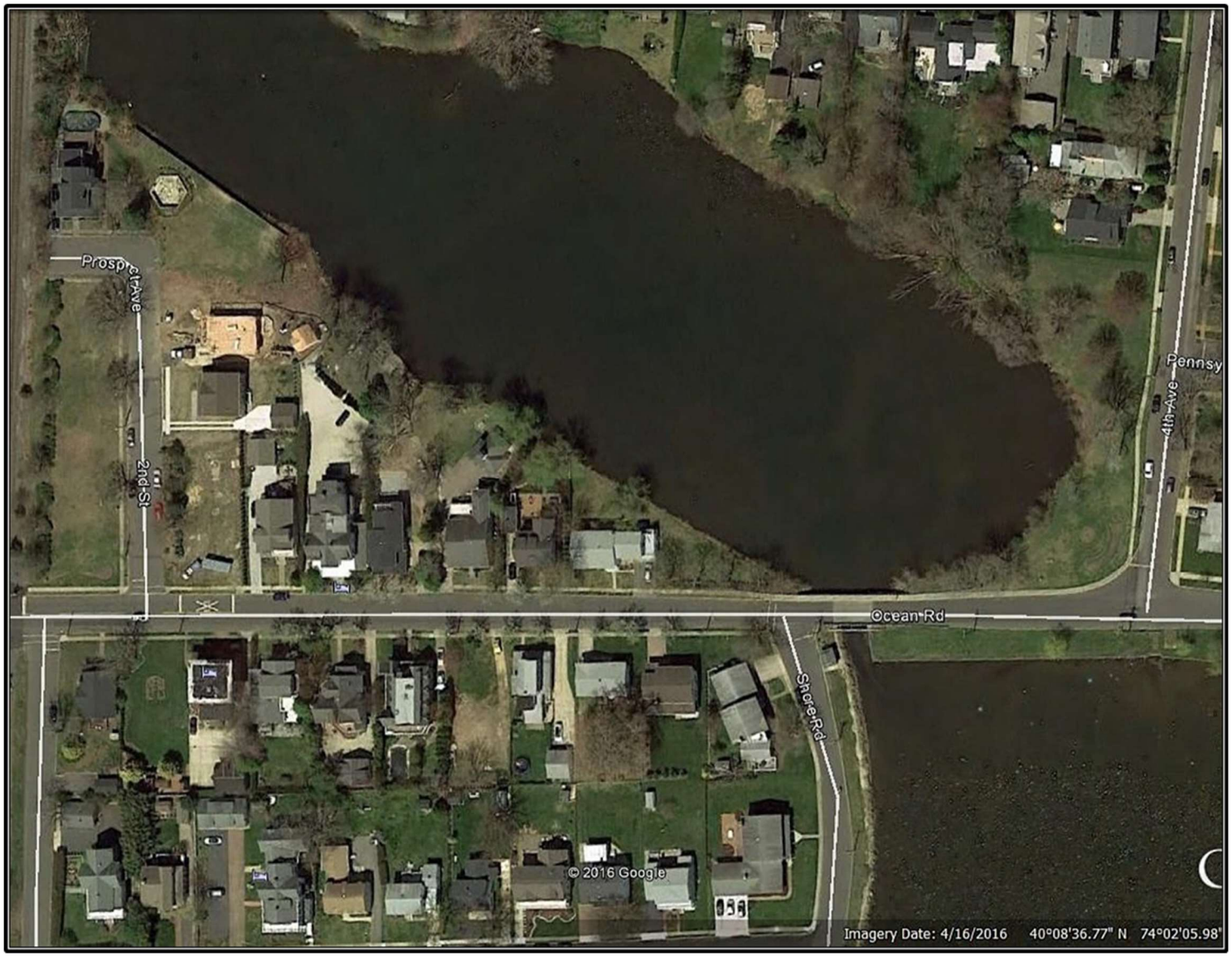

Figure 9 – Ocean Road Study Location

Potential Traffic Calming Measures

While the street is tree lined and straight and level, the roadway is not striped. With on-street parking only along one side of the street and minimal usage during certain times of the day, the visual perception is that it is wide open. There is nothing to physically reduce the street width, or provide visually indicators to a motorist to subconsciously reduce speed or raise their attention to the roadway. Also there were no reported accidents that would suggest certain traffic calming measures.

To address the perceived speeding concerns, there are several traffic calming measures that can be implemented from quick low cost measures to costlier physical measures. Short term measures such as additional speed limit signs and radar speed limit signs will provide more feedback to motorists with the intent of providing more awareness of their vehicle speed. Since the street is straight and level and visually "open", one technique which is a relatively short term low cost measure, is to stripe the roadway to introduce a visual "reduction" of the street width. The northerly side of the street has been widened to provide for on-street parking. A white edge line can be painted to visually define the parking lane and provide a small buffer between parked vehicles and the travel lane. In conjunction with this, a centerline could be striped to delineate the two travel lanes. This will physically reduce the travel lane width and provide a narrower travel lane width of 11 or 12 feet.

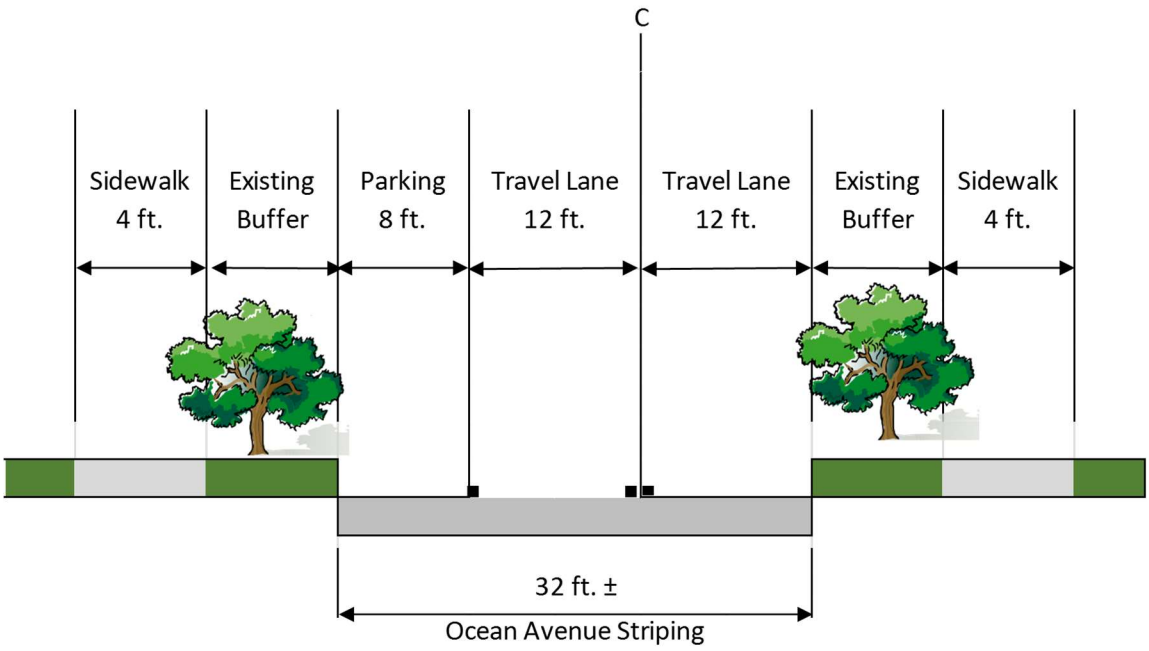

Figure 10 – Striping Concept

Because of its narrowness and straight level alignment, Ocean Road is also a good candidate for speed humps. This is a physical measure that effectively reduces speed. To be effective, at least two speed humps across the entire roadway should be considered.

The possible traffic calming measures considered for Ocean Road are summarized below.

Table 7
Ocean Road Traffic Calming Measures

Traffic Calming Measure	**Time Frame**	**Estimated Cost**
Install additional Speed Limit signs	Short Term	$200 - $400
Install Radar Speed Limit signs (2)	Short Term	$10,000 - $14,000
Install traffic stripes	Short Term	$1,500
Install speed humps	Short Term	$6,000

The police can also employ temporary portable radar speed Limit signs at random times to reinforce the posted speed limit. This could be an alternative to installing permanent radar speed limit signs.

Implementation Program

Potential traffic calming measures have been identified for each of the study locations in the preceding sections of the report. Some of the measures can be implemented relatively quick such as striping and sign replacement. Measures that can be implanted in a short time frame, three months to one year, have been categorized as short term. Measures than may take slightly longer because of design time. Costs, etc., have been categorized as mid-term, one year to three years. Those that are more expensive and required greater design time and public input have been categorized as long term (greater than three years).

The potential traffic calming measures and cost for each study location have been summarized in the following table. The estimate costa re for construction only based on the 2015 NJDOT Bid Price Report. Engineering design, field survey, right-of-way acquisition (if any) are in additional to the range of costs identified.

Table 8
Short Term Traffic Calming Measures

Traffic Calming Measure	3rd Avenue-Lake Como to South Blvd.	3rd Avenue and Pitney Avenue	3rd Avenue and Ludlow Avenue	5th Avenue and Warren Avenue and West Lake Avenue	5th Avenue and Washington Avenue	Ocean Road	Total Estimated Cost
Change striping to No Passing, stripe bicycle lanes, parking lanes	$3,000 - $5,000						$3,000 - $5,000
Median striping, bicycle lanes, parking lanes	$8,000 - $10,000						$8,000 - $10,000
Replace the Stop and Stop Ahead signs with new signs meeting the current retro-reflectivity criteria.		$200 - $400	$400 - $600	$400 - $600			$1,000 - $1,600
Stripe the crosswalks with transverse markings to increase visibility		$3,500	$1,500 - $2,000	$2,000 - $3,000			$7,000 - $8,500
Provide a striping through intersection for delineation		$4,500			$1,500 - $2,000		$6,000 - $6,500
Install LED Illuminated Stop Signs			$5,000 - $8,000				$5,000 - $8,000
Convert intersection to a 4-way Stop			$1,500 - $2,000	$1,500 - $2,000			$3,000 - $4,000
Paint “Stop Ahead” pavement marking on side street approaches			$400 - $600				$400 - $600
Stripe the corners with diagonal striping to serve as “bumpouts”			$7,500 - $9,000	$7,500 - $9,000			$15,000 - $18,000
Install textured/colored pavement					$7,500 - $9,500		$7,500 - $9,500
Install additional Speed Limit signs						$200 - $400	$200 - $400
Install Radar Speed Limit signs (2)						$10,000 - $14,000	$10,000 - $14,000
Install traffic stripes					$1,500 - $2,000	$1,500	$3,000 - $3,500
Install speed humps						$6,000	$6,000
Remove the tree at the southeast corner					$1,500 - $2,000		$1,500 - $2,000

Table 9
Mid Term Traffic Calming Measures

Traffic Calming Measure	3rd Avenue-Lake Como to South Blvd.	3rd Avenue and Pitney Avenue	3rd Avenue and Ludlow Avenue	5th Avenue and Warren Avenue and West Lake Avenue	5th Avenue and Washington Avenue	Ocean Road	Total Estimated Cost
Reconstruct the curbline between Washington and Brighton Avenue to narrow the roadway width.					$12,000 - $20,000		$12,000 - $20,000
Construct random bump outs	$15,000 - $30,000						$15,000 - $30,000
Construct corner bumpouts. on east side of 3rd Avenue. This will permit		$15,000 - $20,000 with landscaping $35,000 - $45,000 with concrete or pavers	$40,000 - $50,000	$15,000 - $30,000			$70,000 – $125,000
Construct mini-roundabout with striping for splitter islands		$60,000					$60,000
Construct mini-roundabout with concrete or pavers for splitter islands		$75,000					$75,000

Table 10
Long Term Traffic Calming Measures

Traffic Calming Measure	3rd Avenue-Lake Como to South Blvd.	3rd Avenue and Pitney Avenue	3rd Avenue and Ludlow Avenue	5th Avenue and Warren Avenue and West Lake Avenue	5th Avenue and Washington Avenue	Ocean Road	Total Estimated Cost
Extend curbline Monroe Avenue to South Boulevard	$55,000 - $65,000						$55,000 - $65,000
Landscaped Median-Monroe Avenue to South Boulevard	$50,000 - $60,000						$50,000 - $60,000
Landscaped Median-random locations	$15,000 - $30,000						$15,000 - $30,000
Roundabout	$30,000 - $100,000	$60,000 - $75,000	$60,000				$150,000- $235,000

Project Summary

At the study locations, the accident data suggests that the intersection of 3rd Avenue and Ludlow Avenue, and the intersection of 5th Avenue, Warren Avenue, and West Lake Avenue experience accidents that may be corrected by implementing traffic calming measures. While the perception is that speeding is an issue at the locations, discussion with the police and review of spot speed recordings suggest that 3rd Avenue entering Spring Lake from Lake Como experiences travel speed higher than what may be expected.

Striping along the roadways at the study locations is faded or non-existent. Traffic control signs do not comply with the retro-reflectivity criteria as required under the Manual on Uniform Traffic Control Devises. Upgrading of the signs will bring them into compliance and the increased reflectivity may bring more attention to the stop conditions.

The Borough Master Plan has identified to enhance pedestrian and biking linkages between Devine Park, Potter Park, and the downtown, and other destinations in the Borough. Observations have noted a rather high bicycle usage along 3rd Avenue. While there are sidewalks along all streets, cyclists were using the roadway as the bike lane. Therefore, the Borough should consider striping 3rd Avenue to include bicycle lanes.

Other than 3rd Avenue between Lake Como and South Boulevard, many of the traffic calming measures as noted in Tables 8, 9 and 10 are short term and related to enhancing the pavement marking at the intersections. The introduction of traffic calming measures should consider a phased approach with the easier less costly measures implemented to evaluate their effectiveness in addressing the observed issues at beach location. If changes are necessary, more intensive measures can be considered.

The width of 3rd Avenue coupled with little or no on-street parking contributes to vehicle speeding. Providing physical constraints and/or visual clues to reduce the pavement width should be considered. Since the landscape changes from Lake Como and 3rd Avenue, and 3rd is very wide, there are opportunities to enhance the entrance into Spring Lake with streetscape improvements to address the wide open streetscape.

APPENDIX B

CONCEPT SKETCHES