

CITY OF CAMBRIDGE
Traffic, Parking, and Transportation
344 Broadway
Cambridge, Massachusetts 02139

www.cambridgema.gov/traffic

Joseph E. Barr, Director
Stephanie McAuliffe, Assistant Director for Parking Management
Brooke McKenna, Assistant Director for Street Management

Phone: 617-349-4700
Fax: 617-349-4747

MEMORANDUM

TO: Louis A. DePasquale, City Manager

FROM: Joseph E. Barr, Director

DATE: April 18, 2018

RE: Awaiting Report 17-77 – Rindge Avenue at Cedar Street and Middlesex Street

Background

This memo is in response to Order 6 from the September 11th, 2017 City Council Meeting (Awaiting Report 17-77) to review existing operations at the Rindge Avenue, Cedar Street, and Middlesex Street intersection and evaluate potential design changes to increase user safety across all modes.

Existing Conditions

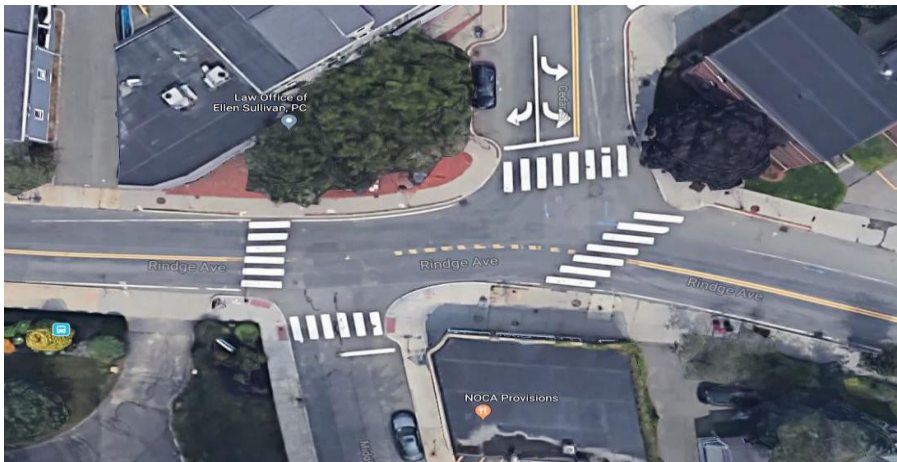


Figure 1

Rindge Ave, Cedar St, and Middlesex St (*Figure 1*) is a four-leg intersection with STOP sign control on the Cedar St and Middlesex St approaches and free-flow along Rindge Ave. The northern leg of the intersection, Cedar St, is slightly offset (approximately 60ft centerline-to-centerline) from the southern leg, Middlesex St. drivers traveling north/south through the intersection must first turn right onto Rindge Ave and then left onto Cedar/Middlesex. Cedar St also has two approach lanes, a left turn and a right turn, which feed into Rindge Ave. There are crosswalks across every leg of the intersection as well as curb extensions at three corners to improve sight distance at crosswalks adjacent to parking lanes.

Crash Data

There was one reported crash in the Cambridge Police Department database within the past three years at this intersection. The collision involved the driver of a box truck who sideswiped the driver of a passenger vehicle while both motorists were queued side by side on the Cedar St approach to Rindge Ave. The driver of the box truck left the scene without waiting for police or exchanging information with the other motorist. This does not represent a significant crash history; therefore any improvements at this intersection would be focused on clarifying right-of-way and reducing confusion.

All-Way STOP Analysis

The Traffic, Parking, and Transportation Department (TP&T) installed Automated Traffic Recorders (ATRs) across each leg of this intersection to collect vehicular volumes over a 48 hour period and conducted Turning Movement Counts (TMCs) during the morning and evening peak-hour for vehicular, pedestrian, and cyclist volumes and directionality. From the data collected, the traffic volumes are too low to be considered for installation of a traffic signal, but meet the thresholds for an all-way STOP, as detailed below.

Following an engineering study, all-way STOP control for an intersection is considered when traffic volumes entering the intersecting streets are roughly equal and the following criteria are met:

C. Minimum volumes:

- 1. The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day, and*
- 2. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour.*

These data support the addition of STOP control on Rindge Ave to make this intersection an all-way STOP. In order to convert this intersection to all-way STOP control TP&T would need to remove the existing Pedestrian Warning Signs—which indicate uncontrolled crosswalks—along the Rindge Ave approaches and install STOP signs and STOP bar pavement markings on Rindge Ave eastbound at Middlesex Street and on Rindge Ave westbound at Cedar Street.

Level of Service (LOS)

Figure 2 below shows the Level of Service (LOS) by approach under existing conditions versus (proposed) all-way STOP control. LOS is a measure of delay for vehicular traffic, describing the time a driver must wait at a STOP sign or traffic signal prior to proceeding through the intersection. LOS is rated on a scale of A through F, with A representing very low delay and F representing a high level of delay. Typical peak period LOS in Cambridge at major intersections ranges from LOS D to LOS F.

Existing traffic flow along Rindge Ave operates at LOS A with little delay and the side streets (Middlesex St and Cedar St) operate at LOS E and F for the morning and evening peak, respectively. With the addition of STOP signs for Rindge Ave, the eastbound and westbound LOS drops to B and D, respectively, in the morning and C for both directions in the evening. All-way STOP control is a substantial benefit to the side streets, Middlesex St and Cedar St, increasing their LOS from E & F in the morning and evening to B & C.

Existing Operation								
Time of Day	Morning Peak				Evening Peak			
Approach	Rindge (EB)	Rindge (WB)	Middlesex (NB)	Cedar (SB)	Rindge (EB)	Rindge (WB)	Middlesex (NB)	Cedar (SB)
Delay (s)	2.1	0.9	46	50	5.7	0.1	341.8	∞
LOS	A	A	E	E	A	A	F	F
Int Delay (s)	18.8				∞			
Int LOS	C				F			
All-Way STOP								
Time of Day	Morning Peak				Evening Peak			
Approach	Rindge (EB)	Rindge (WB)	Middlesex (NB)	Cedar (SB)	Rindge (EB)	Rindge (WB)	Middlesex (NB)	Cedar (SB)
Delay (s)	14.8	25.1	11.3	16.2	22.2	22.8	17	11.8
LOS	B	D	B	C	C	C	C	B
Int Delay (s)	19.2				19.8			
Int LOS	C				C			

Figure 2

It should be noted that reducing the delay for users of the side street may result in a higher volume of traffic using Middlesex Street as a cut-through route during the peak hours.

Conclusion

Based on the data collected and the analysis of the intersection with and without all-way STOP control, TP&T proposes implementation of STOP signs and the appropriate pavement markings on the Rindge Ave approach to convert this intersection to an all-way STOP. This will provide clear right-of-way between vehicles on all four approaches and improve driver yielding for pedestrians at crosswalks. Prior to moving forward, we plan on scheduling an open house for members of the local community so they can understand the potential impacts of the proposed changes prior to implementation.

- WHEREAS: The junction of Cedar Street and Rindge Avenue in North Cambridge is a confusing intersection with a number of other streets going in various directions; and
- WHEREAS: This junction is a large plaza where cars, bicycles, and pedestrians are forced to navigate various turning movements and other potential traffic conflicts without a clear understanding of who has priority and who is going where; and
- WHEREAS: The increased reliance of drivers and cyclists on automated route finding programs such as WAZE can send people through intersections such as this one in a manner and in numbers the intersections and relevant streets for which they were not designed; and
- WHEREAS: Especially at rush hour, but at other times as well, this intersection has a horribly dangerous feel for people who travel through it, including during non-rush hour periods, cyclists coming off of Cedar Street and making a left onto Rindge Avenue who wind up in the middle of the junction with cars turning past them; now therefore be it
- ORDERED: That the City Manager be and hereby is requested to confer with relevant City staff to study this intersection with the goal of clarifying traffic patterns through the intersection; identifying possible methods of regulating traffic flow and turning movements; and budgeting for, planning, and implementing any appropriate traffic control measures to make this intersection work better and to keep ‘cut through’ traffic off of smaller local streets; and be it further
- ORDERED: That the City Manager be and hereby is requested to report back to the City Council on this issue.