Trans ASSOCIATES

Via email

May 10, 2021

Mr. Don Franson, P.E., P.L.S.
College Township
Township Engineer
1481 E. College Avenue
State College, PA 16801

Subject: Centre Hills Traffic Calming
Memo #1 – Available Traffic Calming Measures
College Township, Centre County, PA

Dear Mr. Franson:

As the initial steps to determining what Traffic Calming Measures are appropriate for Oak Ridge Avenue and Shamrock Avenue, Automatic Traffic Recorders (ATRs) were installed on the aforementioned streets to collect daily traffic volumes as well as speeds.

TRAFFIC CALMING STUDY AREA INVESTIGATIONS

ATRS were installed on Oak Ridge Avenue, Shamrock Avenue and Dublin Street from April 5, 2021 – April 8, 2021. The table below presents the Average Daily Traffic (ADT) and 85th Percentile speed for each roadway.

Roadway	ADT	85th Percentile Speed *
Oak Ridge Avenue	3,390	Eastbound – 34 MPH/Westbound – 33 MPH
Shamrock Avenue	384	Eastbound – 27 MPH/Westbound – 25 MPH
Dublin Street	70	Not collected

*The maximum speed which 85% of drivers are travelling.

In further review of the speeds on Oak Ridge Avenue, 50% (~1700 vehicles/day) of the motorists travelled at 28 MPH and above. Approximately 5-10% of all vehicles travelled at or above 35 MPH. The speeds collected on Shamrock are much closer to the posted speed limit.

In review of the traffic volumes collected, there is a significant traffic volume disparity on Oak Ridge Avenue and Shamrock Avenue. This is likely a direct relationship to the design of the roadway and connection to Country Club Road. The table on the following page presents how the roadways differ. The volumes on Dublin Street are very low and would not warrant a multi-way stop.

Design Element	Roadway	
	Oak Ridge Avenue	Shamrock Avenue
Center line striping	Present	Not Present
On Street Parking	*Not Present*	*Present*
Edge Striping	Present	Not Present
Multi-Way Stop	*Present*	*Not Present*
Residential Driveways	Present	Present
Shoulders	Present	Not Present
Width of roadway	24'	24'

The two most impactful differences are the presence of on-street parking and the stop signs on Shamrock Avenue. The on-street parking often stops traffic in one direction to allow the other vehicle to pass and the multi-way stop causes additional delay.

Adding longitudinal striping to a roadway (Oak Ridge Avenue) is often for safety once volumes get high enough, but can sometimes be a traffic calming technique to potentially reduce speeding. The striping gives a visual appearance of tighter lanes and often slows speeds. However, it is possible over time the commuting traffic becomes accustomed to the striping and begins to disregard it as a reason to slow down.

In further review of the volumes, the previous Origin-Destination Study completed by Wooster in October 2020 presented results that show a large percentage of 'pass-through' traffic within the Centre Hills neighborhood during the AM and PM time periods:

- AM Time Period (6:00 a.m. to 9:00 a.m.)
  - 79% Pass-through (414 out of 525 vehicles during the 3-hour period)
- PM Time Period (3:00 p.m. to 6:00 p.m.)
  - 66% Pass-through (591 out of 889 vehicles during the 3-hour period)

As the data presents, there is a considerable amount of pass-through traffic through the neighborhood based on the license plate survey performed. The College Township Traffic Calming Policy states that pass-through greater than 40% is subject to qualification for traffic calming mitigation. Even though the majority of the cut-through traffic is likely travelling on Oak Ridge Avenue, adding mitigation elements to only Oak Ridge Avenue will likely divert more traffic to Shamrock Avenue; thereby, making the mitigation much less impactful and will cause disruption to residents on Shamrock Avenue. Therefore, traffic calming measures should be explored for the entirety of the Centre Hills neighborhood to ensure all residents foresee the same benefits from the removal or reduction of the pass-through traffic.

TRAFFIC CALMING ELEMENTS RELATIVE TO CENTRE HILLS NEIGHBORHOOD

In order to properly propose and choose the correct measures for Centre Hills, the investigation needs to review which measures are most applicable for the concern. The selection of Traffic Calming Measures should be based on:

- The effectiveness of the potential measure
- The type of roadway
- Actual site conditions

Specific measures have been grouped into four categories based upon the means by which they reduce volumes or speeds. The following is a description of the categories:

- Horizontal Deflection – creating a horizontal shift in roadway to force vehicles to slow down to safely navigate the measure or a narrowing of the travel lane which causes drivers to slow their vehicles to maintain a comfortable driving speed. Primary use is speed reduction.
- Vertical Deflection – creating a change in the height of the roadway to force vehicles to slow down to traverse comfortably. Primary use is speed reduction.
- Physical obstruction – creating a measure that prevents particular vehicle movements, thereby discouraging or eliminating cut-through traffic. Primary use is volume reduction.
- Signs and Pavement markings – creating a measure to regulate traffic movements in lieu of physical changes. Could be used for both speed and volume reduction. Typically striping and signage will need police enforcement to maintain effectiveness.

Besides their primary function of reducing speeds or volumes, the large majority of measures also have the ability to reduce conflicts between vehicles and pedestrians, bicyclists, and other vehicles. In addition, well designed and landscaped traffic calming measures can enhance a neighborhood's appearance and the quality of life of its residents. During our field observations at Centre Hills, there is a substantial amount of walkers and bicyclists which share the roadway with motorists. Any measure implemented should take into consideration pedestrians and bicyclists.

The following information provides a description of potential measures if applicable with the volumes of traffic on Oak Ridge Avenue, its usage, and its anticipated effect on speeds and traffic volumes.

<u>Curb Extensions/Bulb Outs</u>

- Area of expanded curbing which narrows roadway
- Appropriate for roadways with <15000 ADT and speeds lower than 40 MPH
- Used at intersections or midblock to decrease roadway width and slow traffic.
    - Speed reduction of up to 5 MPH
    - Minimal effect on volume reduction

<u>Chicanes</u>

- A series of three curb extensions staggered on alternating sides of the street, at a mid-block location, which forces vehicles to negotiate the narrowed roadway in a snake-like fashion.
- Appropriate for roadways with <3500 ADT
- Slow vehicles by forcing motorists to weave through the extensions.
    - Speed reduction of up to 13 MPH
    - A 20% volume reduction could be expected

Speed Humps

- A raised surface on the roadway that is typically 3 to 4 inches in height, and 12 to 20 feet in length.
- Appropriate for roadways with <3500 ADT
- Slows vehicles to approach and traverse humps at a comfortable speed
    - Humps are deigned to slow vehicles to 15- 20 MPH
    - An 18% volume reduction could be expected

Raised Intersections

- Raising an entire intersection 3 to 6 inches to create a tabletop effect
- Appropriate for roadways with < 10,000 ADT
- Slows vehicles to comfortably traverse intersection
    - Typically built with long ramps, so speed reduction is not very dramatic or impactful.
    - Primarily used where there is a high volume of pedestrian traffic to bring awareness to drivers.

Semi-Diverters

- Sometimes referred to as half closures or partial diverters, semi-diverters prevent travel in one direction on a street by blocking half the street with a physical barrier. Can be used in a system to create preferred travel characteristics. Creates a one-way pattern at an intersection while still maintaining two-way on the remaining section of the street.
- Appropriate for roadways with <3500 ADT
- Eliminates movements to reduce traffic
    - Minimal effect on speeds
    - Volume reductions of up to 60% could be expected, but are site specific and vary greatly.

Diagonal Diverters

- A physical barrier placed diagonally across a four-way intersection to create two unconnected intersections. Can be used in a system to create preferred travel characteristics.
- Appropriate for roadways with <3500 ADT
- Eliminates unwanted through traffic
    - Minimal effect on speeds
    - Volume reductions of up to 70% could be expected, but are site specific and vary greatly.

Striping and Signage

- An inexpensive alternative to physical changes to the roadway
- Signage - additional speed limit signs, multi-way stops, turn prohibitions, one-way streets
    - Must be enforced to be effective
    - Variable speed and volume reductions
- Striping – Rumble Strips, various edge line treatments
    - Minimal speed and volume reduction

Additionally, any of the aforementioned measures can be used together to create a custom plan for the Centre Hills neighborhood. Also, the aforementioned measures all have advantages, disadvantages and other factors should be considered when choosing which to choose.

OTHER CONSIDERATIONS

It is important to recognize and consider other factors besides the volume of pass-through traffic when evaluating possible mitigations to cut-through traffic. Such considerations include the vehicle types along the route, user safety, impacts of diverted traffic, user approval, and right-of-way. These considerations are described below.

In addition to passenger cars, mail and parcel delivery trucks (UPS, USPS, etc.) utilize Shamrock Avenue and Oak Ridge Avenue to drop off packages to residents and continue on their way. School buses have routes in Centre Hills. If movement restrictions are imposed, provisions should be made to accommodate new stop locations, routing, or turn-around movements for school buses and delivery vehicles.

While emergency responders were not observed along Oak Ridge Avenue or Shamrock Avenue, access to the neighborhood is important so that they may quickly and safely address any calls in the neighborhood.

Vehicles which are restricted from using Centre Hills as a pass-through, or are restricted from accessing one of the intersections will need to be diverted to another intersection (most likely to the Elmwood Street at E. College Avenue signal or University Drive at E. College Avenue). This means that intersection volumes and delays may increase. Trip lengths and travel time may increase as a result of the added distance. This will likely affect residents as well.

Another factor to consider is user approval of any recommended mitigations. While some residents may strongly desire a mitigation, other residents may find it as a major inconvenience to their commute. Residents should be made aware of the potential impacts and unforeseen consequences of any mitigation to cut-through traffic.

Property boundaries would also need to be considered for any reconstruction along Oak Ridge Avenue or Shamrock Avenue.

Regards,
TRANS ASSOCIATES ENGINEERING CONSULTANTS, INC.

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https://transassociates.sharepoint.com/Shared Documents/State College/Active Projects/Colle00 - College Township/20139-OakRidgeAvenue/Correspondence/Report/2021.04.12-VolumesMemo.docx