MEMORANDUM

TO: Nicholas Hutchinson, Engineering

FROM: Cyrus Naheedy, Transportation

DATE: May 12, 2022

SUBJECT: Analysis of South Main Street 3-lane Configuration

This memorandum has been prepared to provide information regarding the analysis of South Main Street's 3-lane configuration, between Packard Street and Stadium Boulevard.

Background

The Ann Arbor Moving Together Toward Vision Zero Comprehensive Transportation Plan **(Moving Together**), completed in June 2021, set forth a list of strategies and opportunities for improving the safety of Ann Arbor's streets. Staff have recently worked to deploy two of these strategies on South Main Street, between Packard Street and Stadium Boulevard – namely: transportation investments on corridors and intersections with the most serious crashes; and addressing dangerous behaviors.

Reconfiguration for this section of S. Main has been considered in Moving Together, as well as previous planning efforts, though these plans have lacked formality or comprehensiveness for a variety of reasons. The most notable reason is that the Average Daily Traffic (ADT) previously measured on S. Main – 20,900 vehicles per day – was higher than any location where a 4 to 3 lane configuration had been previously installed in the City of Ann Arbor.

In May 2021, City Council passed R-21-0754 for the 2021 Healthy Streets project. Like its predecessor project in 2020, the 2021 Healthy Streets program was designed in response in the COVID-19 pandemic, while also advancing goals from Moving Together and the A2Zero Carbon Neutrality plan. As the pandemic resulted in lower vehicle trip volumes, a 4 to 3-lane configuration of S. Main Street was considered feasible to install on a temporary basis. Staff oversaw the installation of the 3-lane configuration with the intent to collect data and observe the operating conditions of the corridor. This preliminary analysis was summarized in a memo to the Mayor and City Council on January 3, 2022, extending the pilot past Fall 2021 when other elements of the 2021 Healthy Streets project concluded.

This section of South Main Street is identified as a Tier 1 Focus corridor in Moving Together (p. 32-33), and "reducing vehicular speeds throughout Ann Arbor is likely the most effective, singular approach to improving safety on Ann Arbor's streets (p. 34)." Moving Together also describes street reconfigurations as having demonstrated safety benefits, including:

- Reduced travel speeds
- Safer and easier crossings at both uncontrolled and signalized locations, practically eliminating risk of "dual-threat" pedestrian crashes that previously existed in 4-lane configuration
- Addition of bicycle lanes

Analysis

Analysis of the S. Main Street pilot reconfiguration was performed with the guidance from the **Federal Highway Administration Road Diet Information Guide** and the **Michigan Department of Transportation Road Diet Checklist**. Compared to analysis for prior street reconfigurations, or "road diets", the analysis for South Main Street differs in a few respects:

1. Prior analyses were performed before a proposed reconfiguration, with the analysis used to determine a recommendation for whether a reconfiguration should be installed. In this case, the pilot period of S. Main Street's reconfiguration provides additional opportunity for data collection and analysis. Instead of relying only on the analysis of a hypothetical proposed condition, this memo also includes analysis of data collected once the pilot configuration was installed.

2. Prior analyses were performed by following the direction of the City's 2013 Non-Motorized Transportation Plan and were only recommended for implementation if they met criteria from the MDOT and FHWA guidance cited above. Generally speaking, the impact of this policy direction meant that the potential benefits of a road reconfiguration would not always outweigh the tradeoffs of potential vehicle congestion. The City's updated transportation plan, Moving Together, places a greater emphasis on safety for all road users; this analysis keeps that policy direction in mind as these tradeoffs are examined.

The considerations from FHWA's guide used for this analysis were:

- ADT (<20,000)
- Peak Hour (<1,750)
- Peak hour directional volume (<750)
- Speed
- Transit usage
- Pedestrian and bike traffic
- Parking usage
- Effect on parallel routes
- Road width
- Railroad crossings
- Driveway/intersection conflicts
- Crash history

MDOT concerns not being reviewed are:

- Road segment status as a Freeway Emergency Route.
- Road segment status as CMAQ nonattainment or maintenance area status.
- Use of federal funds for road diet implementation.

As the policy direction from Moving Together places a greater emphasis on safety, staff has presented the analysis related to speed and crash data first, followed by other considerations from the FHWA guide.

FHWA Considerations – Safety

Speed Data

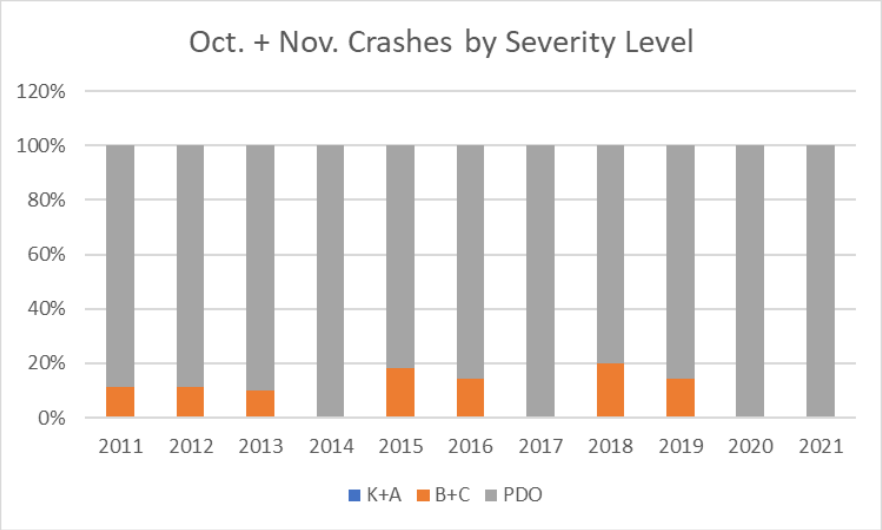
S. Main (Davis to Hill)

	Pre-Pilot			Post-Pilot		
	NB	**SB**	**Total**	**NB**	**SB**	**Total**
Traffic Volume	4,727	7,577	12,304	6,661	7,401	14,062
% at/below 30 mph	29.6%	50.2%	42.2%	65.5%	83.3%	74.9%
# at/below 30 mph	1,398	3,803	5,201	4,365	6,162	10,527
% above 40 mph	3.9%	2.2%	2.8%	0.6%	0.2%	0.4%
# above 40 mph	185	164	349	41	14	55

One of the most notable demonstrable safety data points from the pilot was an observed reduction in number of drivers speeding, as noted in previous communication to City Council and Transportation Commission (1/3/22 memo: South Main Street Reconfiguration Pilot Update). The percentage of vehicles travelling at the posted speed limit (30 mph) increased from 42.4% to 74.9%, while the percentage of vehicles driving 10 mph over the speed limit (40 mph) decreased from 2.8% to 0.4%. This threshold is also notable as it is identified as the speed at which survival of pedestrians involved in a crash with motor vehicles is 10% or less, as identified in Moving Together (p. 31).

Crash Data

The 10 year crash history for this section of S. Main Street includes a number of injury crashes but no severe injury or fatality crashes (K+A category in the following graph). It is identified as a Tier 1 Focus corridor in Moving Together because past crashes have involved vulnerable users, as well as other factors that used in the methodology that identified Focus Corridors/Intersections (including relatively heavier use of the corridor by vulnerable users). Staff provides this background as helpful context for examining crashes before and during the pilot period.



Crashes were only analyzed for October and November of all years – these are the only months for which reliable crash data from the pilot period currently exist, so crashes were limited to the same months for prior years to ensure all years could be compared accurately with each other.

As demonstrated in the chart, no injury crashes have been reported during the pilot period – while this has occurred in 2 previous years, it is an encouraging sign of the pilot's initial success in controlling the severity of crashes. The number of Property Damage Only (PDO) crashes has also been within range of previous years, and staff expects that rate to decrease as users become increasingly familiar with the new street design.

FHWA Considerations – Pedestrian, Bicyclist, Pedestrian

Transit

Ann Arbor Area Transportation Authority (TheRide) is the only transit operator that uses this section of S. Main Street. TheRide operates route numbers 25, 28 and 29. Feedback from TheRide has reported significant queuing for northbound transit vehicles at S. Main/Stadium; staff are working to address this issue, as detailed later in this memo.

Bus Stop Locations on South Main Street	
Northbound ○ Michigan Stadium (Berkley) ○ Keech ○ Hoover ○ Hill	Southbound ○ Madison ○ Mosley ○ Davis ○ Keech ○ Berkley

Pedestrian and Bicyclist Information

Pedestrian and bicyclist count data were collected before and after the installation of the pilot. While there has not been a significant change as of yet, the pilot does show a marginal increase in pedestrian and bicyclist activity. Staff expect a further increase in bicyclist activity as users become more familiar with S. Main Street increases, and as the City's bicycle network expands.

Pedestrian and Bicyclist Counts (PM Peak Hour)					
Main/Madison	**Pedestrians**	**Bicyclists**	***Main/Pauline***	**Pedestrians**	**Bicyclists**
Pre-Pilot	48	18	*Post-Pilot*	31	4
Post-Pilot	93	24	*Post-Pilot*	39	18

FHWA Considerations – Operational

Guidelines	Site Information	Comments
Average Daily Traffic (ADT) < 20,000	Pre-pilot: 12,304 Post-pilot: 14,062	Historic ADT (pre-COVID): 20,900
Peak Hour < 1,750	Pre-pilot: 948 (5:00 PM) Post-pilot: 967 (2:00 PM)	
Peak Hour Directional Volume <750	Pre-pilot NB: 346 (8:00 AM) SB: 646 (5:00 PM) Post-pilot NB: 544 (8:00 AM) SB: 679 (2:00 PM)	
Level Of Service	Main & Stadium: LOS E (68 sec/veh) Main & Pauline: LOS D (37 sec/veh) Main & Hill: LOS A (10 sec/veh) Main & Madison: LOS C (21 sec/veh) Main & Packard: LOS B (19 sec/veh)	
Delay	Northbound • Average delay: 14 seconds • Peak delay: 23 seconds Southbound • Average delay: 32 seconds • Peak delay: 135 seconds	
Volume/Capacity (highest)	0.9 - 1.03 at Main & Stadium	
Intersection/Driveway Conflicts	5 signalized intersections – Packard, Madison, Hill, Pauline, Stadium. At intersections, the TWLTL becomes a dedicated left turn lane for approaches on S. Main Street. Number/density of driveways is similar to that of other 4-to-3 reconfigurations that have been installed.	

Travel times obtained from INRIX, for entire corridor (Packard-Stadium). Delay calculated as difference between pre-pilot and post-pilot travel times. For additional context:

- NB pre-construction travel time typically varied between 95-120 seconds, with low of 67 seconds
- SB pre-construction travel time typically varied between 130-160 seconds, with low of 101 seconds.
    - The worst-case, PM peak hour SB, increased from 148 to 283 seconds (pre to post pilot)

FHWA Considerations – Additional Factors

Guidelines	Site Information	Comments
Freight Info		Illegal parking activity was observed along sections of the corridor, including between Madison-Mosley
Parallel routes that might be effected	Major/complete routes: Seventh, State Local/incomplete routes: Fifth, First, Ashley	
Road Width	Most of corridor: ~45' At Stadium: 61'	
Railroad info	A diagonal (NW-SE) railroad crossing exists ~190 feet north of the centerline for Madison Street.	

Engagement

Engagement for the full 2021 Healthy Streets project was completed in early 2021. Of the 3 major (non-local) streets that were included in the project scope, S. Main Street was the only one that was planned as a temporary pilot. After the project's installation, initial data and feedback were collected and staff determined that the project could potentially be considered on a permanent basis.

As the initial Healthy Streets engagement was performed when S. Main Street was still a temporary pilot, staff performed further engagement, updated to explain the project's origin as well as the potential for permanent installation. An online survey was created and distributed via typical communication methods used for similar projects by the City of Ann Arbor (ex: NextDoor, local media). The survey was open from March 1 to March 19, 2022, with 1,146 responses completed in that time period.

The survey asked 7 questions related to the project, followed by demographic questions unrelated to the project. The first 3 project questions asked each respondent about their residence (City resident, near/far from project area) as well if/how respondents used the corridor before and after the pilot. The last 4 project questions asked whether the pilot improved their transportation options and perception of safety on S. Main Street. For these 4 questions, between 52% and 59% answered "No", and between 31% and 43% answered "Yes" with all others answering "Don't Know".

Splitting the survey responses based on how questions 1-3 were answered shows a divergence in how questions 4-7 were answered regarding project benefits. Those who answered that they'd only driven or not used the corridor (503 responses) were more likely to answer "No" to the 4 questions regarding their transportation options and safety on the corridor. Among all other survey responses (640 responses) – including those who included driving but with at least one other mode use also identified – the answer to questions 4-7 was more likely to be "Yes". Similar findings when survey results were split between those who identified as a City resident (whether adjacent to project area or not) and those who did not, though fewer non-City residents took survey (180 responses).

Survey Summary			
Did the pilot increase transportation options & safety?	*Yes*	*No*	*Don't Know*
All responses	31-43%	52-59%	3-12%
Drivers Only/Not Used	15-26%	65-74%	4-16%
All other (multi-modal) responses	43-57%	40-47%	2-10%

Engagement results are available in further detail on the South Main Street Reconfiguration website, available in the Additional Resources section at the end of this memo.

Related projects

Staff are also coordinating the installation of safety improvements at 4 uncontrolled crosswalks in this section of S. Main Street, located at the following intersections:

- Mosley
- Davis
- Hoover
- Keech

At each location, positive contrast lighting and Rectangular Rapid Flashing Beacons (RRFBs) will be installed. Staff are coordinating with the University of Michigan regarding improvements at the Keech crosswalk, since construction work would impact University property outside the City's right-of-way. Staff intend to finish crosswalk improvements in the 2022 construction season, though the additional coordination required for the Main/Keech crosswalk could potentially delay work at this location.

While this effort is relatively independent of the pilot, the final design of improvements at each crosswalk would differ slightly depending on whether the configuration remains 3 lanes or reverts back to 4 lanes. In the 3-lane configuration, the City's crosswalk design guidelines call for side-mounted RRFBs; in the 4-lane configuration, the recommended design would include overhead-mounted RRFBs.

Next Steps

Based on collected data, staff observations and public feedback, staff are in the process of making the following adjustments:

- *Change merge condition at Main/Stadium:* The current pilot design includes one northbound vehicle through lane at this section, with vehicles merging south of the intersection. Further analysis and discussion among staff resulted in a proposed redesign that allows for two vehicle lanes and a bicycle lane with no buffer. Initial traffic modeling results (from the Synchro software program) indicate that this design would significantly reduce queuing for northbound vehicles that is occurring during peak times, while maintaining sufficient facilities for bicyclists. This queuing is especially notable in that transit vehicles will also benefit; this was a concern raised by TheRide.
- *Signal adjustments at Main/Stadium:* This includes several components, several of which have already been completed as of April 2022:
    - Introduction of permissive left-turn, or "flashing-yellow" (when cycle length allows it)
    - Change from leading to lagging left-turn phase
    - Removal of right-turn signal for WB Stadium

    - Add camera for better detection of SB Main left turn
- *Signal adjustments at Main/Pauline*: These changes are still being evaluated for potential implementation by Signs & Signals staff
    - Add camera for bicycle and vehicle detection
    - Add APS pedestrian actuation

As part of 2021 Healthy Streets installation, vertical delineators were placed to physically separate bicycle lanes from vehicle lanes. These were installed for a relatively short time in Fall 2021, prior to their removal for winter maintenance. Staff learned several lessons regarding the placement and spacing of delineators needed to minimize illegal standing/parking by drivers in the bicycle lanes. However, staff's recommendation is that delineators should not be re-installed until larger questions regarding maintenance of these bicycle lanes are answered, in collaboration with Public Works.

Additional Resources

- South Main Street Reconfiguration Website
- South Main Street Reconfiguration Pilot Update (1/3/22 memo to Council)
- 2020 Healthy Streets memo
- Ann Arbor Moving Together Towards Vision Zero
- MDOT Road Diet Checklist
- FHWA Road Diet Information Guide

cc: R Hess
C Redinger
L Liu
S Flowers