

Memo

To: Craig Hupy

From: Raymond Hess, Cynthia Redinger, PE

Date: May 13, 2019

Re: Analysis of Road Diet on Green Road

The City's 2013 update of the Non-Motorized Plan included several recommendations for vehicular lane conversions to create space in the street cross-section for bicycle lanes. Although some of the recommended road diets have been implemented, several of the recommended segments have not been implemented to date. City staff have worked to determine if Green Road between Burbank Drive and Plymouth Road would be viable for conversion.

The following analysis provides the result of an updated analysis for this road segment and suggested next steps from staff. Analysis of the lane reduction was performed with the guidance from the [Federal Highway Administration Road Diet Information Guide](#) and the [Michigan Department of Transportation Road Diet Checklist](#).

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

- ADT (<20,000)
- Peak Hour (<1750)
- Traffic signal density
- 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.

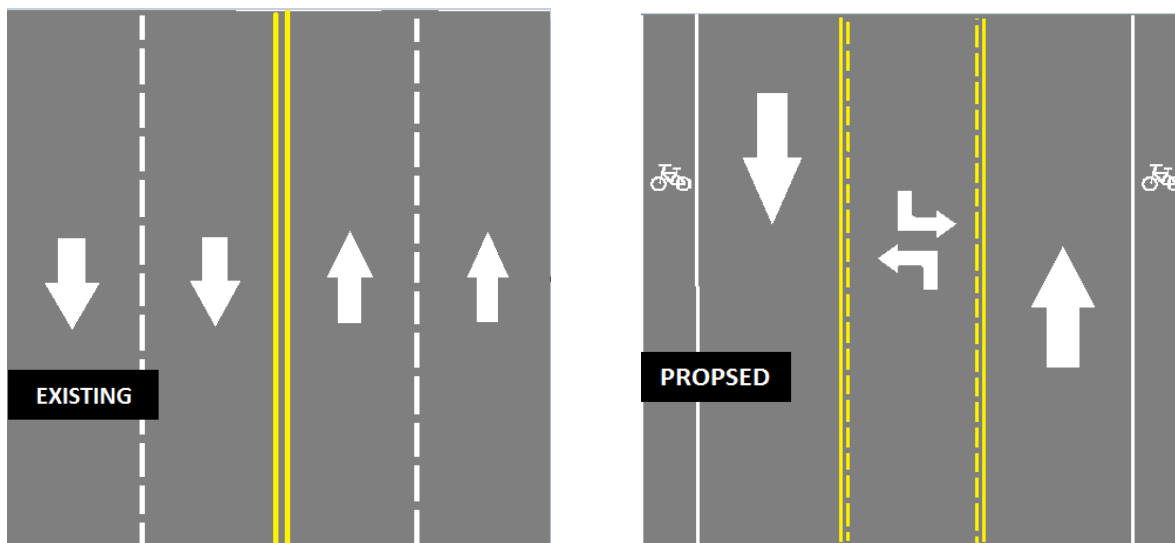
The proposed changes will be implemented with paint and signing. The proposed project is not intended to require extensive redesign of the roadway or intersections.

Green Rd. north of Commonwealth Blvd. currently has a four lane cross-section, two southbound lanes and two northbound lanes. The segment was analyzed to determine if a reconfiguration to one north bound lane, one south bound lane, one two-way left turn lane, and bike lanes would be feasible. Green Rd. south of Commonwealth Blvd. currently has a five lane cross-section, two southbound lanes, two north bound lanes, and one two-way left turn lane. This segment was analyzed for a variety of design options:

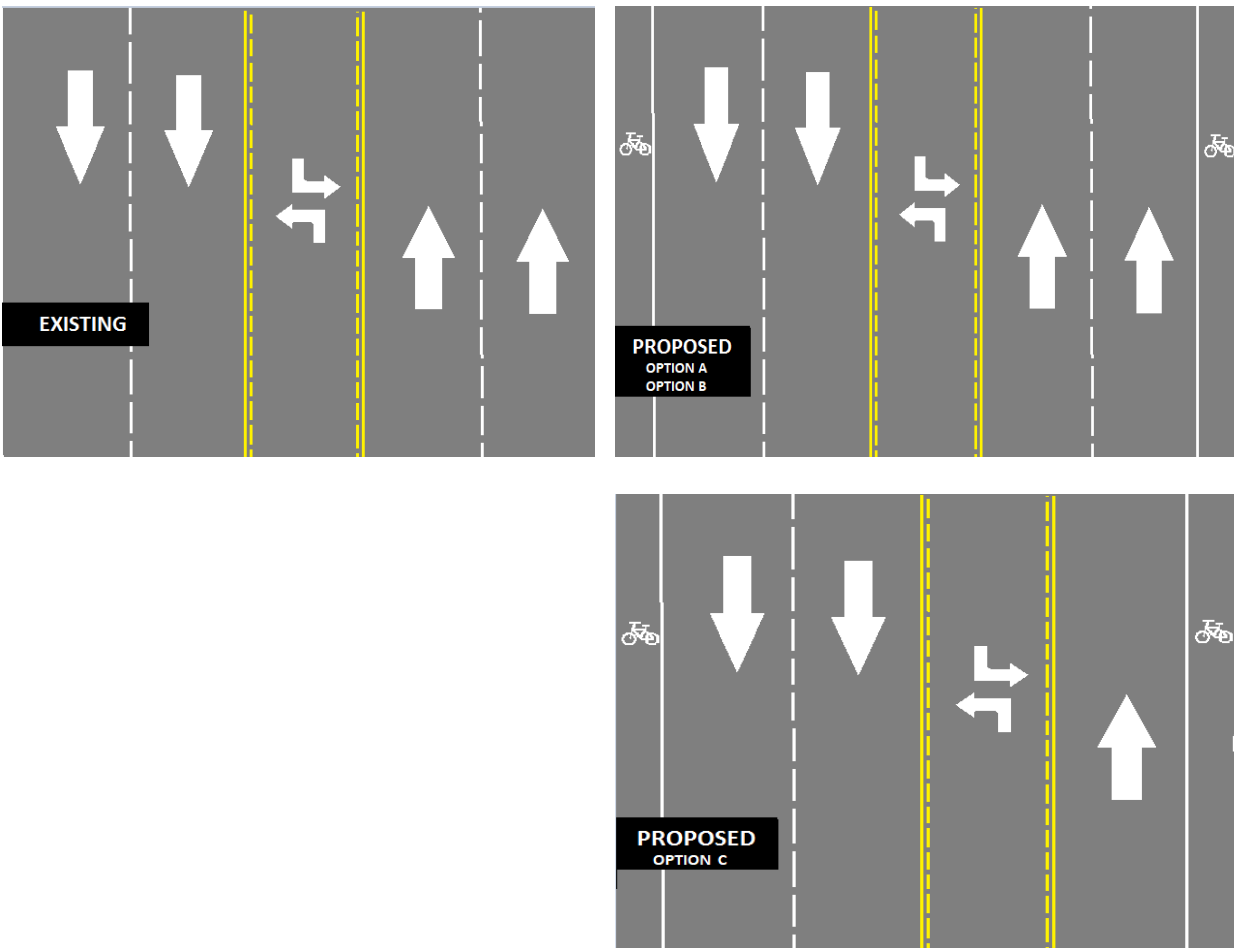
- Narrower lane widths with two bike lanes. Along with eliminating the designated right turn lane at the intersection of Plymouth Rd. and Green Rd. (Option A)
- Narrower lane widths with two bike lanes. (Option B)
- Narrower lanes widths with two bike lanes. Along with the elimination of one northbound lane width. (Option C)

These lane reductions are being implemented in order to increase non-vehicular road user's perceived level of comfort.

North of Commonwealth Blvd:



South of Commonwealth Blvd:



The characteristics of the road segment that support the implementation of a road diet are listed below.

- The daily and peak hour traffic volumes are within the acceptable ranges to maintain a reasonable level of service.
- The peak hour directional for northbound traffic is within the acceptable range to maintain a reasonable level of service. Southbound peak hour directional is within a less ideal range but still acceptable.
- Side street approaches at the intersections of Burbank Dr. and Commonwealth Blvd. maintained or improved level of service of in a Synchro analysis with the proposed lane changes. With no level of services exceeding a C.
- The south bound approach at Green Rd. and Plymouth Rd. maintained the same level of service of E during both peak hours for all options with delay increasing by no more than 11.9% or 7.2 seconds/vehicle in a Synchro analysis with the proposed lane changes for options B and C.
- The elimination of a northbound lane has no operational effect on the intersection of Green Rd. and Plymouth Rd.

- There is no potential for parking conflicts due to the lack of street parking.
- There is no potential for railway conflicts.
- There are no signalized intersections within the road segment that would cause design conflicts.
- The surrounding area consists of retail and office spaces with a residential area on the north end of the road segment. The residents to the north would benefit from the northern lane reduction; while employee, customer, and resident bicyclists would benefit from the installation of bike lanes throughout the road segment.

The characteristics of the road segment that discourage the implementation of a road diet are listed below.

- Option A increases the southbound delay by 19.3% or 11.7 seconds/vehicle in a Synchro analysis for the intersection Green Rd. and Plymouth Rd.
- The retail and office spaces have multiple driveways leading to the road segment causing less consistency with vehicle speeds. This could become a source of friction if a lane reduction were implemented.
- The abundance of retail stores surrounding the road segment ensure a high volume of freight traffic. If lanes are reduced a passenger car driver's perceived level of comfort may be decreased.
- There are seven bus stops within the road segment. Their frequent stopping could be another source of friction.
- There is a high concentration of southbound rear-end crashes at the Plymouth Rd. intersection and CVS parking lot, which may worsen with a lane reduction.
- Nixon Road could be effected by vehicles avoiding the new lane configuration.

Other characteristics that were noted during the study are listed below.

- The left turning traffic from Green Rd. at the intersection of Green Rd. and Plymouth Rd. requires two left turn lanes per guidance from the Federal Highway Administration.

Based on the analysis of the road segment it is recommended to implement the two part lane reduction with Option C. North of Commonwealth Blvd., the lane reduction would increase the quality of life of citizens surrounding the road segment, while the potential negative results are minor. South of Commonwealth Blvd., the elimination of one northbound lane has no operational difference while simply narrowing southbound lanes to mitigate the negative effects of a lane reduction will allow implementation of aspects that would benefit citizens that utilize this road segment .

The following project plan was implemented to ensure the lane reduction plan is successful:

- An open house was held on May 9th 2019.
- An online survey was available through May 24th 2019.
- The Transportation Commission reviewed the solution in spring 2019.
- Implementation of the lane reduction will be in summer 2019.
- An evaluation of the lane reduction will be conducted in fall 2020

Attachment B

Guidelines	Site information *Collected by Grace Crowe (2018)	Comments
ADT <20000	8702	<p>Calculated with peak hour volumes and a “K factor “obtained from the ITE Traffic Engineering Handbook 7th Edition Pg. 213.</p> <p>This count is for the area closer to the intersection of Green and Plymouth but it can be assumed, based on road type, that further north the count will be lower.</p> <p>Counts obtained from the Plymouth Mixed Use Redevelopment Traffic Study (2018).</p>
Peak Hour <1750	1314	<p>This count is for the area closer to the intersection of Green and Plymouth but it can be assumed, based on road type, that further north the count will be lower.</p> <p>Based on turning movement counts obtained from the Plymouth Mixed Use Redevelopment Traffic Study (2018).</p>
Peak Hour Directional <750	D1:554 D2:754	<p>Directional peak hour volumes between 750 and 875 are not ideal but still within the range of reasonable implementation¹. Due to the higher volume being for southbound traffic and no lanes are being reduced in that direction the higher value is of less concern.</p> <p>This count is for the area closer to the intersection of Green and Plymouth but it can be assumed, based on road type, that further north the count will be lower.</p>

¹ https://safety.fhwa.dot.gov/road_diets/guidance/info_guide/ch3.cfm#s336

Analysis Guide: Green Road, between Plymouth Road and Burbank Drive

		Based on turning movement counts obtained from the Plymouth Mixed Use Redevelopment Traffic Study (2018).
LOS	<p>Intersection: Burbank (NB)</p> <p>AM:</p> <ul style="list-style-type: none"> • Current: A • After: A <p>PM:</p> <ul style="list-style-type: none"> • Current: A • After: A <p>Intersection: Commonwealth (NB)</p> <p>AM:</p> <ul style="list-style-type: none"> • Current: A • After: A <p>PM:</p> <ul style="list-style-type: none"> • Current: A • After: A <p>Intersection: Plymouth (SB)</p> <p>AM:</p> <ul style="list-style-type: none"> • Current: E • Option A-After: E • Option B-After: E • Option C-After: E <p>PM:</p> <ul style="list-style-type: none"> • Current: E • Option A-After: E • Option B-After: E • Option C-After: E 	<p>Southbound at Burbank and Commonwealth is uninterrupted so has no delay.</p> <p>WB/ EB at Burbank and Commonwealth have improved delay/LOS due to the reduced lanes that need to be crossed.</p> <p>Turning movement counts obtained from the Flagstar Bank Traffic Analysis (2014).</p> <p>The different design options for the southbound approach can be referenced</p> <p>The removal of a northbound lane, north of Plymouth has no operational effect on the intersection.</p>
Delay (s/v)	<p>Intersection: Burbank (NB)</p> <p>AM:</p> <ul style="list-style-type: none"> • Current: 0.9 • After: 0.9 <p>PM:</p> <ul style="list-style-type: none"> • Current: 1.0 • After: 1.0 <p>Intersection: Commonwealth (NB)</p> <p>AM:</p> <ul style="list-style-type: none"> • Current: 2.0 • After: 2.0 <p>PM:</p> <ul style="list-style-type: none"> • Current: 0.2 • After: 0.2 	<p>Southbound at Burbank and Commonwealth has uninterrupted flow so delay is negligible.</p> <p>WB/ EB at Burbank and Commonwealth have improved delay/LOS due to the reduced lanes that need to be crossed.</p> <p>Turning movement counts obtained from the Flagstar Bank Traffic Analysis (2014).</p> <p>The different design options for the southbound approach can be referenced</p>

Analysis Guide: Green Road, between Plymouth Road and Burbank Drive

	<p>Intersection: Plymouth (SB)</p> <p>AM:</p> <ul style="list-style-type: none"> • Current: 55.0 • Option A-After: 56.7 • Option B-After: 59.4 • Option C-After: 59.4 <p>PM:</p> <ul style="list-style-type: none"> • Current: 60.6 • Option A-After: 72.3 • Option B-After: 67.2 • Option C-After: 67.2 	<p>The removal of a northbound lane, north of Plymouth has no operational effect on the intersection.</p>
Volume/Capacity (highest)	<p>Approach: Green at Burbank</p> <p>AM:</p> <ul style="list-style-type: none"> • Current: 0.15 • After: 0.08 <p>PM:</p> <ul style="list-style-type: none"> • Current: 0.17 • After: 0.31 <p>Approach: Green at Commonwealth</p> <p>AM:</p> <ul style="list-style-type: none"> • Current: 0.20 • After: 0.32 <p>PM:</p> <ul style="list-style-type: none"> • Current: 0.22 • After: 0.35 <p>Approach: Green at Plymouth (SB)</p> <p>AM:</p> <ul style="list-style-type: none"> • Current: 0.83 • Option A-After: 0.86 • Option B-After: 0.87 • Option C-After: 0.87 <p>PM:</p> <ul style="list-style-type: none"> • Current: 0.93 • Option A-After: 0.99 • Option B-After: 0.96 • Option C-After: 0.96 	<p>Turning movement counts obtained from the Flagstar Bank Traffic Analysis (2014).</p> <p>The different design options for the southbound approach can be referenced</p> <p>The removal of a northbound lane, north of Plymouth has no operational effect on the intersection.</p>
Minimum Signals	None in road segment	
Transit Info	<p>7 bus stops</p> <ul style="list-style-type: none"> • 4 on east side • 3 on west side <p>1 location where they are across each other</p>	<p>Having bus routes across each other has the potential to cause collisions when traffic goes around them in TWLTL.</p> <p>Stopping traffic can effect traffic flow.</p>

Analysis Guide: Green Road, between Plymouth Road and Burbank Drive

Freight Info	All locations that would need freight drop off/pick up have designated loading areas. Multiple locations that would increase freight traffic. USPS office located on road segment.	
Pedestrian and Bike traffic	Road segment is largely industrial/retail orientated. Neighborhood on north end.	Residents to the north, consumers, and employees will benefit from the improved level of comfort for pedestrian and bicyclist.
Parking Info	None	
Parallel Routes that might be effected	Nixon Rd traffic volume has the potential to be effected.	
Road Width	<p>Current: ~45ft Plan: 42ft</p> <ul style="list-style-type: none"> • 11ft lanes (x2) • 10ft TWLTL • 5ft bike lanes (x2) <p>And</p> <p>Current: ~60ft & ~72ft Plan: 55ft</p> <ul style="list-style-type: none"> • 10^{ft} lanes(x4) • 9ft TWLTL • 5ft bike lanes (x2) 	<p>All lane widths are not finalized.</p> <p>Lane configuration is to be maintained south of Commonwealth, but lane width is going to be decreased to accommodate a bike lane. Designated right turn lane at the intersection of Plymouth and Green will be removed. A 4 to 3 lane reduction is to be implemented north of Commonwealth.</p>
Railroad Info	None	
Intersection/Driveway Conflicts	Multiple driveways from offices and retail centers.	Could cause irregular flow patterns
Crashes	<p>Highest concentration of crashes are rear-ends at Plymouth intersection.</p> <p>Second to that is turning crashes 400ft north at the CVS parking lot. Crashes are sparse past that point.</p>	<p>Reducing lanes at the intersection with Plymouth is not suggested. The CVS parking lot driveway is located where TWLTL is present so a road diet wouldn't alleviate this situation.</p>
Other	Left turning traffic at the intersection of Plymouth and Green is >300.	Turning traffic >300 requires dual left turn lanes.