

MEMO

To: Lonny Boring, Great Rivers Greenway
From: Cheryl Sharp, PE, PTOE
Date: June 7, 2021
Subject: Brickline Greenway RAISE Grant Traffic Assessment

Introduction

Lochmueller Group has completed a traffic assessment to support Great Rivers Greenway in their application for a RAISE Grant to extend their Brickline Greenway project in St. Louis, Missouri. The proposed greenway would extend along the North Grand Boulevard corridor, from Natural Bridge Avenue to the north, south to Cass Avenue. The greenway would then cut over west along Cass Avenue to North Spring Avenue, where it would extend south to Forest Park Avenue.

As part of the RAISE Grant application, a benefit-cost-analysis (BCA) is required to estimate future benefits of the project or improvements and compares them to the capital and maintenance costs which are expected over the life of the project. A benefit is accrued anytime users of a transportation system experience changes to the characteristics of the trips they make, such as travel time. In order to estimate travel time benefits, a traffic assessment was performed along the corridor.

Alignment Characteristics

N GRAND BOULEVARD

North Grand Boulevard is classified as a principle arterial traveling in the north-south directions with a posted speed limit of 35 miles per hour (mph). MoDOT cites AADT values for N Grand Boulevard at approximately 13,000 vehicles per day. The current cross section provides two travel lanes in each direction with on street parking provided along certain segments of the corridor. Crash data obtained from Missouri Department of Transportation (MoDOT's) crash database concluded that 563 crashes occurred along the North Grand Boulevard corridor between 2015 and 2019. Additionally, a significantly high number of fatal and injury crashes were observed, with four vehicle-pedestrian fatalities occurring at North Grand Boulevard's intersection with Montgomery Street.

During field observations, vehicles were observed to be traveling in well excess of the posted speed limit along the corridor. Traffic signals are pre-timed along the corridor and call the side-street phases without any vehicles present. As a result, lack of driver compliance to stop at a red indication on a traffic signal is a major issue along the corridor.

There are existing Shared Lane Markings for bicycles along Grand for bicyclists. Sidewalks run along both sides of the road. There are some pedestrian crosswalks at signalized locations but most ramps at these intersections are not ADA compliant.

This section of N Grand Boulevard is one of the most heavily traveled routes in Bi-State's Metrobus system, with over 400 boardings and 400 alightings on an average day according to 2018 data. Bi-State

Development is currently planning a project to upgrade the buses along the corridor to electric buses along with charging stations along the route.

CASS AVENUE

Spring Avenue is classified as a minor arterial traveling in the east-west direction and has a posted speed limit of 30 miles per hour (mph). On this one-block stretch of Brickline Greenway corridor from Grand to Spring, the current roadway provides two travel lanes in each direction with Shared Lane Markings for bicycles. One westbound lane drops as a right turn bay at Spring. West of Spring, Cass is a two lane road with bicycle lanes. East of Grand, the four-lane section continues towards the future National Geospatial Agency site.

SPRING AVENUE

Spring Avenue is classified as a major collector between Page Boulevard and Lindell Boulevard; the remaining sections of Spring Avenue along the subject alignment are classified as local roads. It travels in the north-south directions and has a posted speed limit of 30 miles per hour (mph). MoDOT Datazone cites AADT values for Spring Avenue at approximately 2,000 vehicles per day. For most of the corridor, the current roadway provides two travel lanes in each direction with on street parking provided along most segments of the corridor. In general, ADA compliance is lacking at intersections along the corridor.

FUTURE IMPROVEMENTS

As part of the Brickline Greenway project, the corridor would be subject to a road diet with upgraded traffic signals and ADA compliance at signalized intersections. The road diet would reduce N Grand Boulevard and Cass Avenue's four-lane cross sections to three lanes (one each direction plus a two-way-left-turn lane). On Spring Avenue, the road diet would be from four lanes to two lanes. On-street parking may remain in certain locations.

The narrower cross-sections would be significantly more pedestrian- and bicycle-friendly as the smaller cross-section reduces these more vulnerable modes' exposures to vehicle traffic. Typically, road diets reduce speeds and are a countermeasure against crashes as vehicles can no longer pass each other. Per CMFClearinghouse.com, a 4-to-3 road diet like that to be implemented on Grand Boulevard and Cass Avenue has a Crash Modification Factor (CMF) of 0.53 for all types and severities of crashes. This means that with an implementation of a road diet, it is expected to reduce crashes along the corridor by 47% (1 minus 0.53).

Traffic signals will need modification and will be upgraded with fiber interconnect and Intelligent Transportation Systems (ITS) hardware following City of St. Louis standards. This will connect these signals to the City's Transportation Management Center and the city may run coordinated timing plans as they see fit to improve traffic flow along the corridor.

Traffic Assessment

Road diets work quite well on roadways with average daily traffic of less than 15,000 vehicles per day (vpd). Studies have shown that one lane in each direction with a left turn bay can typically accommodate as much traffic as a four-lane road with no left turn bay. They can also apply to roads with vehicular traffic of up to 20,000 vpd, but a traffic study is suggested that a study be performed when daily traffic exceeds

15,000 vpd. Based on this industry standard and the low traffic volumes on Cass Avenue and Spring Avenue, no further analysis was performed and a road diet was deemed acceptable.

In order to assess the impacts of implementing a road diet along the North Grand Boulevard corridor, a traffic assessment was conducted utilizing Synchro 10 traffic modeling software, which is based upon the methodologies outlined in the Highway Capacity Manual (HCM) 6th Edition, last updated in 2016 by the Transportation Research Board. The performance of a transportation system is quantified by Levels of Service (LOS), which are measures of traffic flow that consider factors such as speed, delay, interruptions, safety, and driver comfort.

Traffic signal timings along the corridor were provided by the City of St. Louis and MODOT. Traffic counts were collected from previous projects at the following intersections:

- North Grand Boulevard & St. Louis Avenue
- North Grand Boulevard & Cass Avenue

Additionally, fifteen-minute manual spot counts were conducted on May 19, 2021 at all other signalized intersections along the corridor. The spot counts were scaled by a factor of four to extrapolate to hour-long afternoon peak commuter volumes. The resulting afternoon peak hour traffic volumes used in the analysis are presented in **Figure 1**.

The existing signal timings, traffic volumes, and existing lane configurations were coded in the Synchro 10 traffic model. The performance of a transportation system is quantified by Levels of Service (LOS), which are measures of traffic flow that consider factors such as speed, delay, interruptions, safety, and driver comfort. There are six levels of service ranging from LOS A (“free flow”) to LOS F (“oversaturated”). LOS C is commonly used for design purposes and represents a roadway with volumes utilizing 70 to 80 percent of its capacity. LOS D is typically considered acceptable for peak period conditions in urban and suburban areas. However, LOS F is not unusual for side street stop-controlled approaches during peak period conditions, especially along major arterials.

The N Grand Boulevard lane configurations were then modified under forecasted conditions to reflect a four-to-three road diet. Traffic signal timings along the corridor were optimized for commuter travel patterns in order to minimize delays, queues, and ensure efficient progression along the corridor.

Similarly, as stated previously, this section of N Grand Boulevard is one of the most heavily traveled routes in Bi-State’s Metrobus system. The Metrobus system’s effective schedule was referenced to determine the number of buses frequenting each stop along the corridor during the peak hour and modeled as “Bus Blockages” for northbound and southbound through and right turn traffic within Synchro at each signalized intersection.

The traffic performance metrics of the corridor under existing and forecasted road diet conditions are summarized in **Table 1**, and are presented in terms of Level of Service, delay (seconds per vehicle), and 95th percentile queue (feet). As a result of the implemented road diet with optimized signal timings, travel times are reduced by 9 percent as compared to existing conditions. Similarly, delays and queues remain acceptable despite the implementation of the road diet.

Please contact our office at (314) 446-3793 if you have any questions or comments concerning this report.

Completed by Lochmueller Group, Inc.

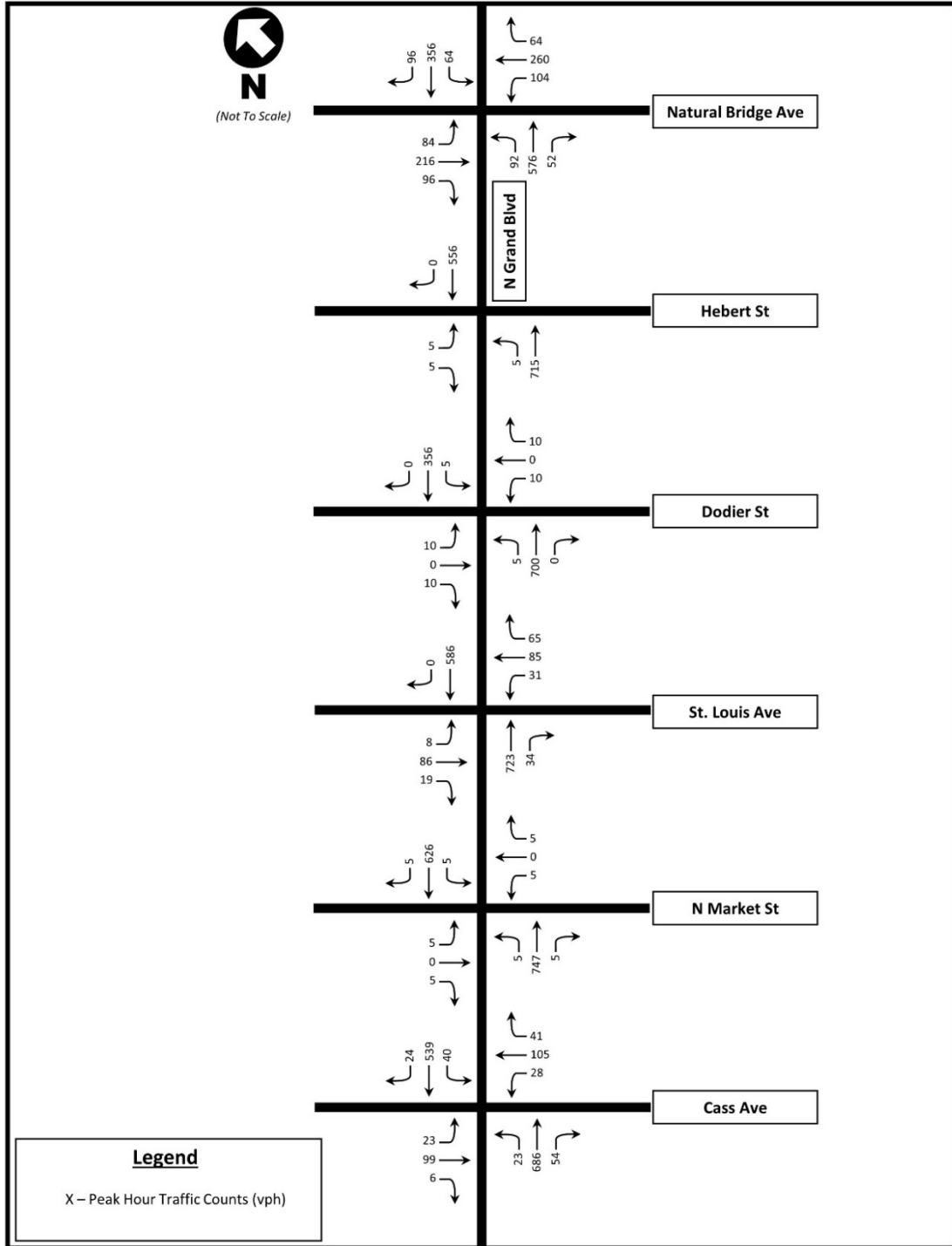


FIGURE 1. N GRAND BOULEVARD TRAFFIC VOLUMES

TABLE 1. AFTERNOON COMMUTER PEAK HOUR TRAFFIC OPERATING CONDITIONS

Intersection/Approach	Existing Configuration		Future with Road Diet	
	Vehicle LOS (Delay)	95 th Percentile Queue (ft)	Vehicle LOS (Delay)	95 th Percentile Queue (ft)
N Grand Boulevard & Hebert Street (signalized)				
Eastbound Approach	D (35.9)	<25	C (34.8)	<25
Northbound Approach	A (8.6)	161	A (1.9)	169
Southbound Approach	A (5.5)	97	A (1.4)	119
N Grand Boulevard & Dodier Street (signalized)				
Eastbound Approach	B (16.4)	25	B (12.2)	<25
Westbound Approach	B (16.4)	25	B (12.2)	<25
Northbound Approach	A (1.0)	<25	A (1.0)	27
Southbound Approach	A (2.0)	<25	A (1.9)	100
N Grand Boulevard & St. Louis Avenue (signalized)				
Eastbound Approach	C (22.0)	82	D (48.7)	126
Westbound Approach	B (9.8)	50	C (23.3)	85
Northbound Approach	B (15.0)	255	B (14.3)	430
Southbound Approach	C (25.9)	243	A (10.2)	197
N Grand Boulevard & Market Street (signalized)				
Eastbound Approach	A (6.6)	<25	A (1.6)	<25
Westbound Approach	A (6.6)	<25	A (1.6)	<25
Northbound Approach	A (5.7)	118	A (1.0)	55
Southbound Approach	A (6.6)	108	A (0.9)	50
N Grand Boulevard & Cass Avenue (signalized)				
Eastbound Approach	D (50.8)	91	D (44.3)	71
Westbound Approach	D (46.0)	108	D (39.8)	82
Northbound Approach	A (6.6)	147	A (6.7)	291
Southbound Approach	A (1.2)	<25	A (9.6)	433