



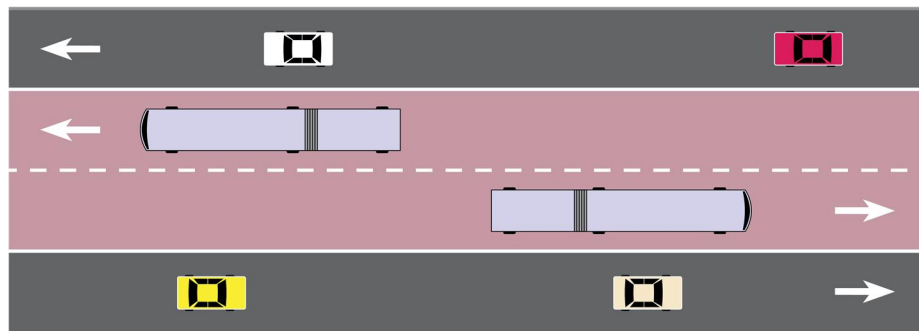
## MEMO

TO: Jane Canada, Justin Stuehrenberg and Ben Smith (IndyGo)  
CC: Will Tolbert (WSP)  
FROM: Ericka Miller, WSP  
SUBJECT: Blue Line BRT Crash Data Evaluation  
DATE: May 31, 2018

---

### Overview

The Blue Line Bus Rapid Transit (BRT), IndyGo's third BRT line in Indianapolis, will likely run from the Indianapolis International Airport, east through downtown along Washington Street, to the Town of Cumberland. Along portions of the corridor, the proposed cross-section may convert one of the existing general-purpose (GP) traffic lanes in each direction to a dedicated BRT lane. To reduce conflict points between GP traffic and BRT vehicles, the BRT lanes in each direction are recommended in the center of the road, with the GP lanes located curbside. To further separate GP traffic and BRT vehicles, and to provide a reliable, safe transit service, midblock, unsignalized left-turns would be prohibited with this configuration. Figure 1 shows the configuration of exclusive center running BRT lanes.



*Figure 1: Exclusive Center Running BRT Lanes*

The purpose of this memo is to assess and summarize potential mitigating impacts that exclusive center running BRT lanes may have on the frequency of certain types of crashes along the corridor. This memo will consider crashes along the portion of Washington Street on the Blue Line corridor within I-465, excluding the segment of the corridor between Schumacher Way and New Jersey Street. Between Schumacher Way and New Jersey Street, the Blue Line will operate along the one-way pair of Maryland Street (eastbound) and Washington Street (westbound). Because the Blue Line will operate on one-way



streets in this portion of the corridor, exclusive center running BRT lanes are not feasible; therefore, crashes in this area were not evaluated as part of this effort.

### Existing Conditions

Within I-465, the existing cross-section of Washington Street varies, though it most commonly consists of two lanes in each direction with a center two-way left-turn lane. Along the corridor, motorists are currently permitted to make left-turn, right-turn, or through movements to and from most unsignalized cross-streets and driveways. At signalized intersections, the majority of left-turns are controlled with protected-permitted phasing, meaning first there is a green arrow for left-turns, and then left-turns are permitted after yielding to oncoming traffic for the remainder of the through green phase.

Crash data for the corridor was extracted from ARIES, the statewide crash database, for years 2015-2017. Crashes that occurred in parking lots or outside of public right-of-way were removed from consideration. Table 1 below summarizes 2015-2017 crash data for Washington Street inside I-465, excluding the segment from Schumacher Way to New Jersey Street, including crashes at both signalized and unsignalized intersections.

*Table 1: Summary of Crash Data (2015-2017)  
Washington Street Inside I-465 excluding Schumacher to New Jersey*

Total Number of Crashes	1,914
Number of Fatal Crashes	10
Number of Incapacitating Injury Crashes	56
Number of Non-Incapacitating Injury Crashes	391
Number of Property Damage Only Crashes	1,457
Number of People Killed	10
Number of People Injured	613

Exclusive center running BRT lanes could have a mitigating impact on several types of crashes along the corridor:

- Left Turn Crashes – throughout the corridor
- Opposite Direction Sideswipe and Head On Crashes – throughout the corridor
- Same Direction Sideswipe Crashes – outside of the influence area of signalized intersections
- Right Angle Crashes – outside of the influence area of signalized intersections

The following sections describe the mitigating impact that exclusive center running BRT lanes might have on each of the crash types listed above.



### **Left Turn Crashes**

With exclusive center running BRT lanes, left-turns to and from unsignalized intersections would be restricted. GP traffic attempting to make a left-turn or through movement from a cross-street or driveway would have to make a right-turn and then a u-turn at the next signalized intersection. GP traffic attempting to make a left-turn onto a cross-street or driveway would have to continue straight on Washington Street and then u-turn at the next signalized intersection. The restriction of these left-turns at unsignalized intersections will reduce conflict points in between signalized intersections along the corridor.

Under the exclusive center running BRT lanes scenario, left-turn movements from Washington Street at signalized intersections will be controlled under protected only operations rather than protected-permitted phasing. A protected only left-turn movement means that the movement can only be made when a green arrow is illuminated, and that no other directions of traffic will move through the intersection simultaneously. The transition from protected-permitted phasing to protected only phasing has been proven to reduce the frequency and severity of left-turn crashes at signalized intersections<sup>1</sup>.

There were 211 (11% of total crashes) left-turn crashes throughout Washington Street inside I-465 (excluding the segment from Schumacher to New Jersey) from 2015 to 2017; 49 of these crashes resulted in injury, and one of these crashes resulted in death. Exclusive center running BRT lanes should have a mitigating impact on this subset of crashes.

### **Opposite Direction Sideswipe and Head On Crashes**

Opposite direction sideswipe crashes are the result of one vehicle striking the side of another vehicle that is traveling in the opposite direction. Head on crashes are similar, except that the crash results in vehicles striking front ends, and these crashes are typically more dangerous/severe. Allocating the two center lanes of the roadway as dedicated BRT lanes will create a buffer between GP vehicles traveling in opposite directions.

There were 28 (1% of total crashes) opposite direction sideswipe crashes and 101 (5% of total crashes) head-on crashes throughout Washington Street inside I-465 (excluding the segment from Schumacher to New Jersey) from 2015 to 2017; 54 of these crashes resulted in injury, and two of these crashes resulted in death. Exclusive center running BRT lanes should have a mitigating impact on crashes like these.

### **Same Direction Sideswipe Crashes**

Same direction sideswipe crashes are not necessarily expected to be mitigated at signalized intersections by the exclusive center running BRT lanes alternative; however, many same direction sideswipe crashes outside of the influence area of signalized intersections (midblock) should be mitigated as a result of this configuration. Same direction sideswipe crashes are often the result of motorists changing lanes to avoid turning vehicles. As GP traffic will generally be accommodated by one lane in each direction under the exclusive center running BRT lanes alternative, lane changes will not be as common, and the frequency of same direction sideswipe crashes should be reduced.

There were 98 (5% of total crashes) same direction sideswipe crashes that likely occurred outside the influence area of signalized intersections along Washington Street inside I-465 (excluding the segment from Schumacher to New Jersey) from 2015 to 2017; eight of these crashes resulted in injury. Exclusive center running BRT lanes could have a mitigating impact on this subset of crashes.

---

<sup>1</sup> [http://www.cmfclearinghouse.org/study\\_detail.cfm?stid=140](http://www.cmfclearinghouse.org/study_detail.cfm?stid=140)



## Right Angle Crashes

Right angle crashes are the result of a motorist perpendicularly crossing the path of another motorist; they are often referred to as “T-Bone” crashes. The exclusive center running BRT lanes alternative may not reduce the frequency of right angle crashes at signalized intersections, but similar to the left turn crash type, right angle crashes at mid-block cross-streets and driveways may be reduced due to the implementation of this alternative. Motorists will only be permitted to make right-turns to and from the cross-streets, eliminating left-turns and through movements to and from the cross-streets. Restricting these movements reduces the likelihood of right angle crashes.

There were 138 (7% of total crashes) right angle crashes that likely occurred outside the influence area of signalized intersections along Washington Street inside I-465 (excluding the segment from Schumacher to New Jersey) from 2015 to 2017; 49 of these crashes resulted in injury. Exclusive center running BRT lanes could have a mitigating impact on crashes like these.

## Summary

The implementation of the exclusive center running BRT lanes alternative could have a mitigating effect on the following crash types along Washington Street inside I-465 (excluding the segment from Schumacher to New Jersey): all left-turn, opposite direction sideswipe and head on crashes, both midblock and at signalized intersections; and same direction sideswipe and right angle crashes outside the influence area of signalized intersections. The exclusive center running BRT lanes alternative prohibits certain movements that sometimes lead to these crash types, and therefore, the frequency of these crash types should be reduced with implementation. Table 2 summarizes the frequency of all the crash types listed above along Washington Street inside I-465 (excluding the segment from Schumacher to New Jersey) from 2015-2017; exclusive center running BRT lanes could have a mitigating impact on crashes like these.

*Table 2: Summary of Potentially Mitigated Crash Types  
Washington Street Inside I-465 (excluding Schumacher to New Jersey)  
Based on 2015-2017 ARIES Data*

Crash Type	Number of Potentially Mitigated Crashes	Percentage of Total Crashes Along Segment	Number of Crashes Involving Injury	Number of Crashes Involving Death
Left Turn	211	11%	49	1
Opposite Direction Sideswipe	28	1%	5	0
Head On	101	5%	49	2
Same Direction Sideswipe*	98	5%	8	0
Right Angle*	138	7%	49	0
<b>Total</b>	<b>576</b>	<b>30%</b>	<b>160</b>	<b>3</b>

\* Outside influence area of signalized intersections