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Alternative Designs for Operation and Safety on Coliseum Boulevard

Group Members: Luis Flores, Vanessa Ray, Afrid Sarker

Abstract

There are nine intersections along Coliseum Boulevard in Fort Wayne, Indiana from Crescent Avenue to Lima Road. Of these nine intersections, three are among the most dangerous intersections in the State of Indiana based on a recent study by INDOT. Coliseum Boulevard has approximately 50,000 vehicles per day and serves as a major arterial to industrial, commercial, and educational zones. Our goals include: improving operation for the nine signalized intersections in the study corridor during peak traffic hours, and increasing traffic safety at the most critical intersection. These goals will be accomplished using short term and long term alternatives that would be unique to the Fort Wayne community and will reduce the congestion/delay and emissions during the AM and PM peak hours along with increasing vehicle travel speeds and safety.



Synchro Model of Diverging Diamond

Traffic Safety

Coldwater Rd. and Coliseum Blvd. was found to be one of the most dangerous intersections. In the collision diagram, the existing intersection with crashes represented from 2011 can be seen. The intersection was analyzed using the Hazard Analysis Tool and using concepts from the Highway Capacity manual. The following table shows the countermeasures that were chosen that would have the greatest impact on the intersection. Each Countermeasure has an individual crash reduction value. This number represents the reduction of crashes that could be seen if the countermeasure was implemented. All crash reduction values were weighted based on the number of collisions that were caused by the deficiency that can be improved by each particular countermeasure. This allowed the group to find an overall crash reduction value of 23% for the Coldwater Intersection on Coliseum Boulevard.

Traffic Operation

The following alternatives were simulated and analyzed on Synchro for short and long term:

Short Term Alternatives

Alternative 0: Current Conditions

Alternative 1: Adding left NB lane on Lima Road and left EB lane on Coliseum Blvd. towards Coldwater Rd.

Alternative 2: T-Intersection at Glenbrook Mall

Alternative 3: Addition of EB and WB thru lanes from Paul Schaffer Dr. to Crescent Ave.

Alternative 4: Combination of Alternative 1 and Alternative 3

Long Term Alternatives

Alternative 0: Current Conditions in 20 Years

Alternative 1: Addition of one EB and WB thru Lane From Lima Rd. to Crescent Ave.

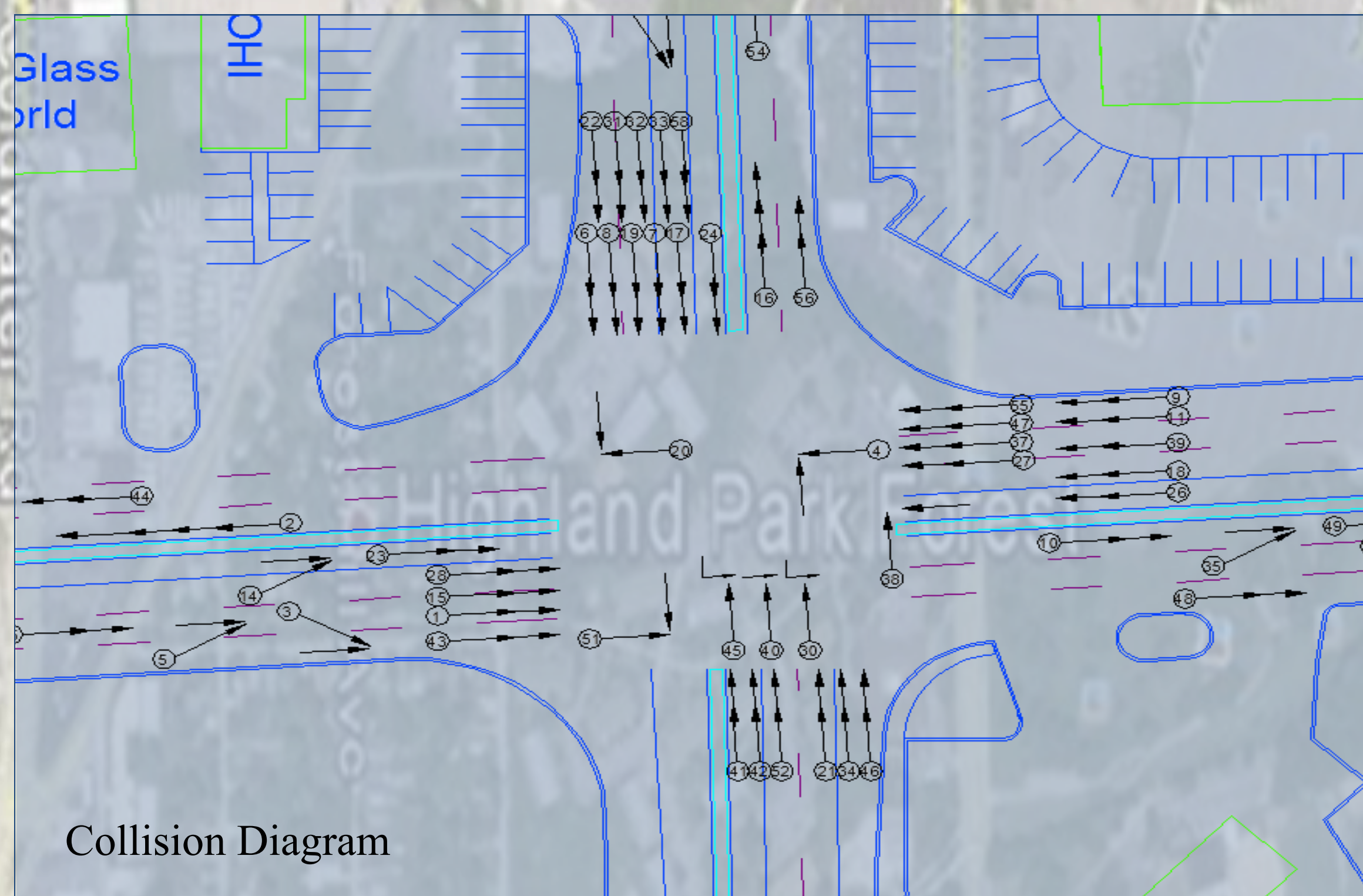
Alternative 2: Diverging Diamond in front of IPFW

Alternative 3: Flyover Coliseum Boulevard

Alternative 4: Combination of Alternatives 1 and 2

After evaluating the above-mentioned alternatives for short term and long term based on Total delay/vehicle, travel time/vehicle, fuel economy and vehicle emissions the best alternative was chosen for both-short and long term. In short term, addition of one NB left turn lane on Lima, one EB left turn lane from Coliseum to Coldwater and addition of one EB and WB thru lane from Paul Shaffer to Crescent Ave. would improve the operation to a significant extent. In long run, addition of one EB and WB thru lane from Lima to Paul Shaffer and constructing a *diverging diamond* between Anthony and Crescent Ave. (shown in the following picture) would reduce the total delay/vehicle, travel time/vehicle, emissions and improve the fuel economy significantly. The improvements are shown in the following table.

Performance Measure	Percent Improvement	
	Short Term	Long Term
Total Delay/Veh (s/v)	7%	60.4%
Travel Time/Veh (s/v)	11.2%	35.1%
Fuel Economy (mpg)	7.7%	43.4%
CO Emissions (kg)	7.3%	32.4%
NOx Emissions (kg)	7.3%	32.5%
VOC Emissions (kg)	7.3%	32.5%



Collision Diagram

Countermeasures	Service Life	Crash Reduction Factor
Remove sight obstructions	10 years	40%
Overlay pavement (friction course)	10 years	34%
Provide adequate drainage and/or crown	20 years	8%
Increase curb radii	20 years	13%
Combine/consolidate adjacent driveways	10 years	14%
Channelize intersections	10 years	23%
Install/improve markings	10 years	4%

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