



A diverging diamond interchange (DDI) is unique from a standard diamond interchange in that the side road traffic Route 851 crosses to the left side of the road at a signalized intersection prior to the bridge. This allows direct left turns from the off-ramps to Route 851 and allows for a direct left turn on to the on-ramps to I-83. The side road (Route 851) traffic crosses back to the right side of the road at a signal beyond the bridge.

The DDI configuration has an operational advantage over the standard diamond in that it has only 2 phases per signal cycle versus 3 phases. This allows the DDI to provide more green time to traffic, alleviating congestion. Additionally, because of the direct left turns, there are fewer conflict points than a standard diamond, which reduces the crash rate and crash severity.

As of December 2015, 64 diverging diamond interchanges (DDIs) have been opened to traffic in the United States. Pennsylvania is currently constructing a DDI on I-70 near Washington, PA in the western side of the state.

### PROJECT TIMELINE



Please note that the dates shown are subject to change based on funding availability and receiving design and permitting approvals.

### For Further Information:

#### PennDOT Project Manager:

Mark Malhenzie  
Senior Project Manager

PA Department of Transportation, District 8  
Highway Design Unit  
2140 Herr Street  
Harrisburg PA 17103-1699  
717-783-5080  
mmalhenzie@pa.gov

#### Design Project Manager

David Hamlet, P.E.  
Project Manager  
Gannett Fleming, Inc.  
P.O. Box 67100  
Harrisburg, PA 17106-7100  
717-763-7211 x2329  
dhamlet@gfnet.com

## EXIT 4 I-83 IMPROVEMENTS

On behalf of the Pennsylvania Department of Transportation (PennDOT),

we would like to welcome you to this meeting to share the proposed improvements at the Exit 4 Interchange of Interstate 83 (I-83) and Route 851 in Shrewsbury Township.

The area surrounding the interchange has seen extensive growth that the existing interchange can no longer accommodate. There are high levels of congestion, traffic backs up onto I-83 and the bridge carrying I-83 traffic over Route 851 is structurally deficient.

The purpose of the meeting is to present a project timeline and options for easing congestion and increasing safety for motorists and pedestrians, including PennDOT's recommendation to implement a diverging diamond interchange (DDI).



### PROJECT OBJECTIVES

- A** Eliminate traffic back-ups on the ramps from I-83 to improve safety
- B** Increase capacity and reduce congestion though the project area on Route 851
- C** Replace structurally deficient bridge on I-83
- D** Improve roadway to allow trucks to negotiate interchange safely and efficiently
- E** Lengthen acceleration and deceleration lanes on I-83 ramps to improve safety
- F** Improve roadway signage to reduce driver confusion



# PROJECT OPTIONS

The result of a mini study conducted in 2015, with input from municipal, county, and state stakeholders during the public involvement process, was a decision to study further a 4-lane diverging diamond interchange beneath a new two-span bridge and a 4-lane tight diamond interchange beneath a new two-span bridge. These two options were taken into preliminary engineering for further analysis and comparison. The result is the recommendation below.

## RECOMMENDATION

### Construct Diverging Diamond Interchange

#### The Diverging Diamond (DDI):

- Significantly increases the capacity of left and right turning movements to and from the ramps.
- Requires only two phase traffic signals with short cycle lengths, reducing delay.
- Significantly better at handling left turn movements under the bridge.
- Has better performance and offers lower delays, fewer stops, lower stop time and shorter queue lengths when compared to the performance of the conventional diamond design.
- Can handle steady growth of traffic volumes with acceptable traffic operations through year 2060, 10 years beyond the tight diamond interchange.
- Is easier to expand with additional turn lanes in the future than the tight diamond interchange option if growth exceeds projections.
- Substantially reduces the number of conflicts compared to the tight diamond interchange points, improving safety.

Vehicle-Vehicle Conflict Points	Tight Diamond Interchange	Diverging Diamond Interchange
● Crossing		
○ Merging		
○ Diverging		
<b>Crossing</b>	<b>10</b>	<b>2</b>
<b>Merging</b>	<b>8</b>	<b>6</b>
<b>Diverging</b>	<b>8</b>	<b>6</b>
<b>TOTAL</b>	<b>28</b>	<b>14</b>

