

Travel Time Based Performance Measures

Class Problem

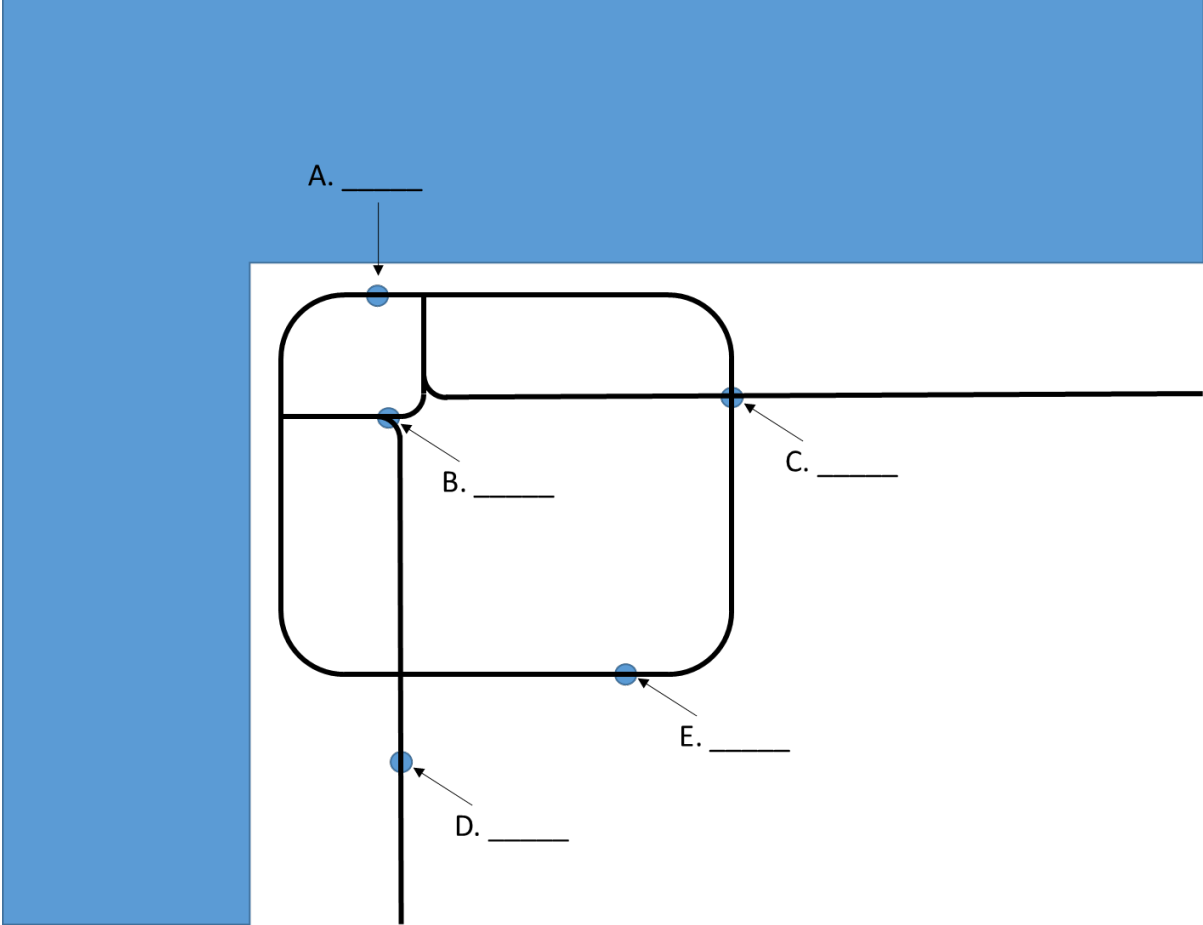
Overview

The Transportation Secretary of Factiousville has given you the responsibility to create an ordered list of bottlenecks in Factiousville that should be invested in order to mitigate congestion. You will be provided a map of the city with the eligible bottlenecks and more detailed information about each bottleneck including its histogram and volume.

Tasks

1. For each bottleneck:
 - a. Create a cumulative distribution function (CDF) graph with 5% resolution
 - b. Calculate the:
 - i. Travel Time Index (TTI)
 - ii. Planning Time Index (PTI)
2. Rank the bottlenecks from 1 (bottleneck that justifies immediate investment) to 5 (bottleneck that can wait for improvements) based on the performance measures you calculated and for other reasons (volume not high enough, do not want to cause urban sprawl, etc.)
3. Write a narrative at least 1 page (double space) in length justifying your rankings. Feel free to mention other projects around the US as examples.

Map

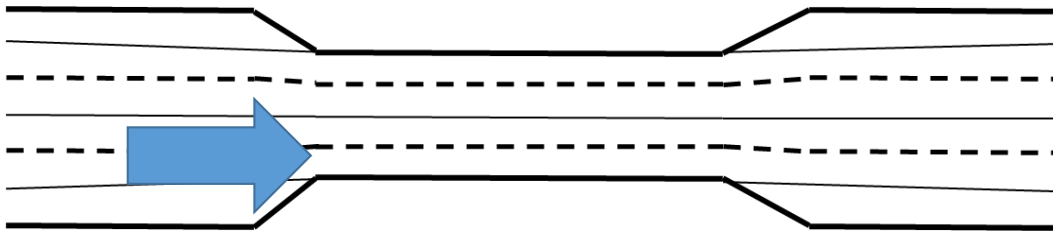


A. Lakefront Freeway



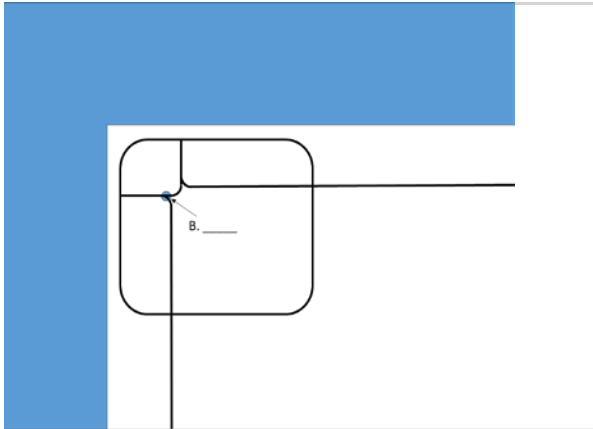
Description: The Lakefront Freeway provides access to Factionsville's Central Business District. Historically, this specific segment of the freeway was a troubling bottleneck with a bridge with narrow ten foot lanes and no shoulder. The probe data shows traffic flow just before the bridge.

AADT = 33,500 (uni-directional) Number of Through Lanes = 2 Freeflow Speed = 44 MPH



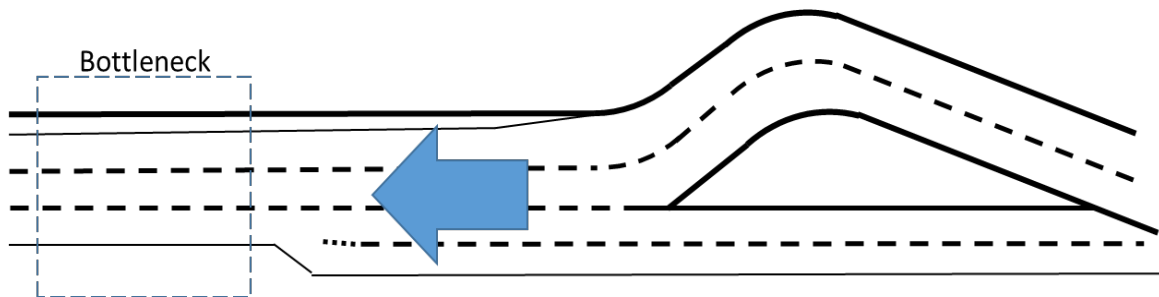
Picture Source: the University of Wisconsin System

B. Central Y Interchange



Description: This particular bottleneck occurs on one of the central y interchanges. Where the two branch segments merge, there is inadequate space for vehicles to converge onto the root segment causing congestion and many crashes. The probe data represents the root segment.

AADT = 65,000 (unidirectional) Number of Through Lanes = 3 Freeflow Speed = 59 MPH



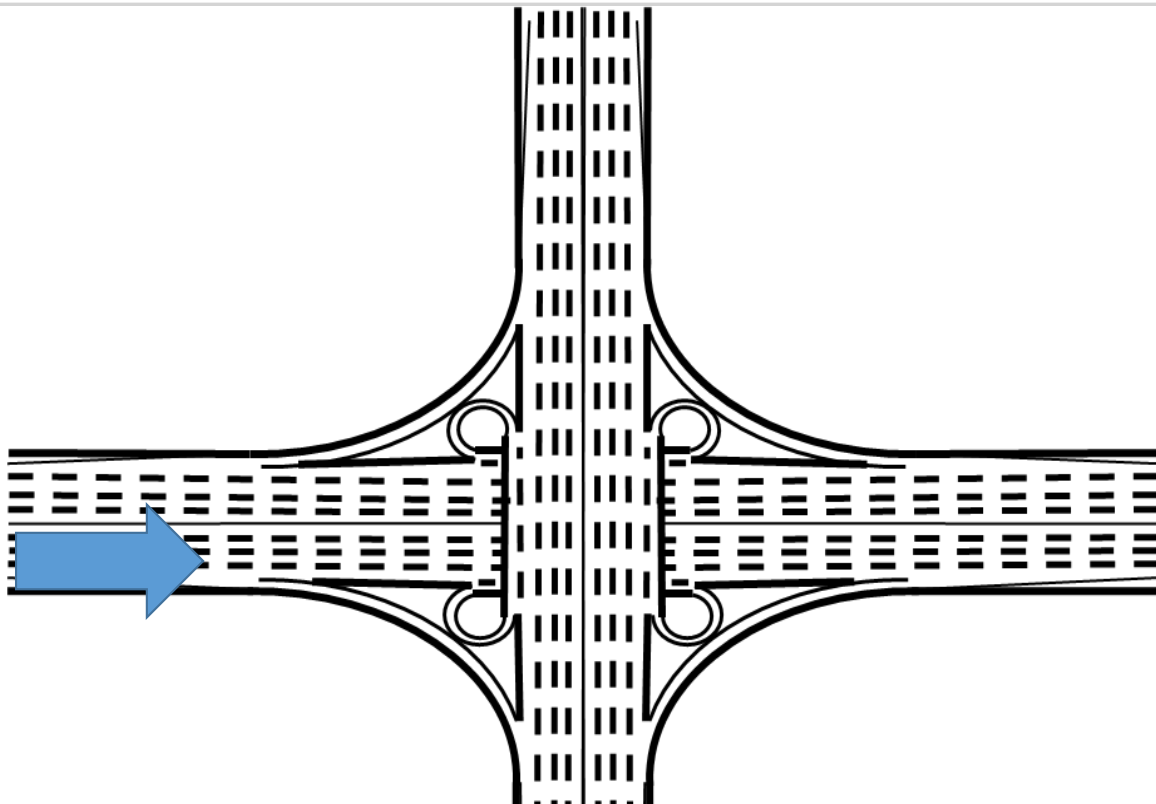
Picture Source: Google Maps

C. Cloverleaf Interchange



Description: The interchange between the Factiousville Beltway and the freeway that goes towards the eastern suburbs and exurbs is currently configured as a cloverleaf interchange. Due to the growth in the immediate vicinity of the interchange, traffic can get heavy at the low capacity interchange. The probe data shown is representative of a freeway segment just before the interchange.

AADT = 80,000 (unidirectional) Number of Through Lanes (per direction) = 4
Freeflow Speed = 65 MPH



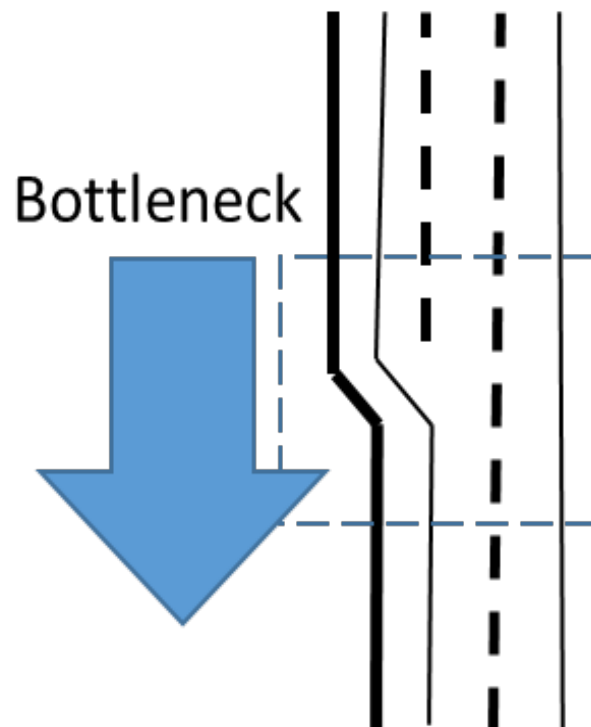
Picture Source: dfwfreeways.com

D. Exurb to City Freeway



Description: As the exurbs (low density residential area on the edge of the suburbs) push out into the periphery of Factiousville, the freeways linking the exurbs to the city become more crowded since most of the jobs are still in the Factiousville Beltway. The freeway that connects the southern exurbs to the city has slowly been widened to three lanes in each direction. The probe data represents the freeway just downstream of where the 3 lane section ends.

AAAT = 45,000 (unidirectional) Number of Through Lanes = 2 Freeflow Speed = 65 MPH



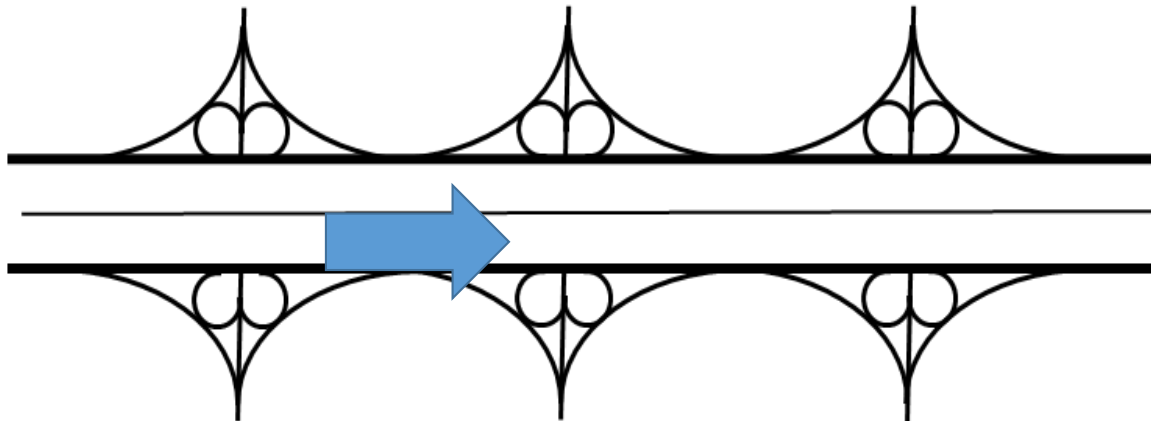
Picture Source: Google Maps

E. Facticiousville Beltway



Description: This portion of the Facticiousville Beltway has 4 lanes in each direction and closely spaced cloverleaf interchanges with local arterials. The high density of interchanges can negatively impact operations with vehicles weaving to enter and exit the freeway. The probe data reflects a segment between a set of the cloverleaves.

AADT = 112,500 (uni-directional) Number of Through Lanes = 4 Freeflow Speed = 57 MPH



Picture Source: fixoahu.blogspot.com