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March 19, 2017

Mr. Jay Volk
President
J. VOLK consulting
830 Central Parkway East, Suite 300
Plano, TX 75074

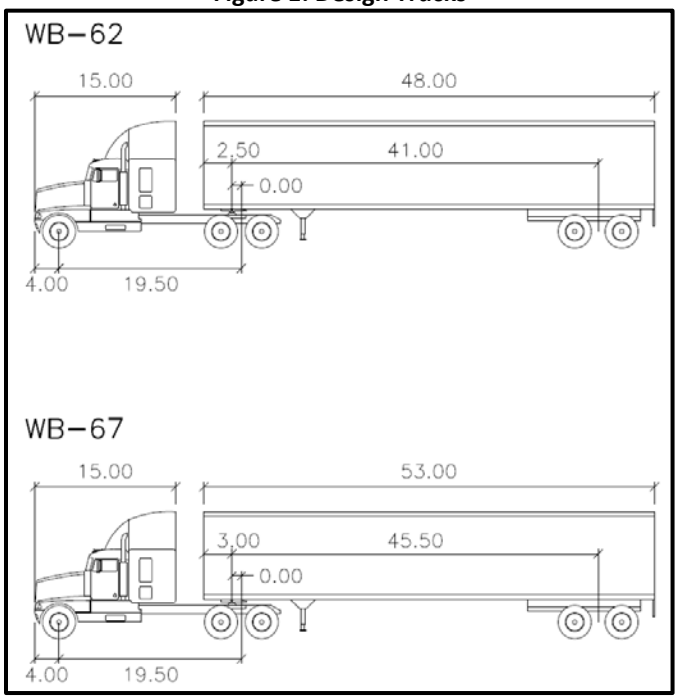
RE: *Freeport Parkway Autoturn Analysis*

Dear Mr. Volk:

Lee Engineering has completed a review of the Freeport Parkway traffic control plan with respect to truck operations in the vicinity of the horizontal curve located near STA 25+00 – STA 27+00. In the study area, the roadway is a two lane undivided roadway during construction, with a variable pavement and lane width.

Our review was focused on whether semi-tractor trailer vehicles could maintain two way operations through the temporary traffic control, and at what likely speeds. Our review included two design vehicles, the WB-62 and WB-67. Both vehicles are AASHTO semi-tractor trailer combination vehicles. Both vehicles are relatively common, with the WB-62 being the TxDOT typical design truck and the WB-67 being a similar tractor with a 53' trailer which is common on the roadways today. Both vehicles are shown in Figure 1 below.

Figure 1: Design Trucks



Using traffic control plan sheets prepared by J. Volk Consulting, Lee Engineering overlaid the driving paths of the WB-62 and WB-67 vehicles using AutoTurn swept path simulation software in the horizontal curve area in question. Paths were evaluated to determine if the design vehicle was predicted to track outside the assigned travel lane or off the pavement. Phase 1A and 1B were the phases of traffic control evaluated because these are the phases that have the traffic on the existing bridge with the smaller horizontal radius in use along Freeport Parkway.

The WB-62 and WB-67 vehicles were placed on the curves, at speeds ranging from 25 mph to 10 mph. In Figure 2 below, the southbound travel path for a WB-67 vehicle is depicted. The vehicle was simulated at a speed of 10 mph and there were no offsets included for the front/rear tires or vehicle body. The swept path of the vehicle body is shown with the light blue hatching. This turn simulation indicates there is less than 1.5 feet of available clearance within the travel lane for this vehicle at this speed.

Figure 2: Southbound WB-67 @ 10 MPH

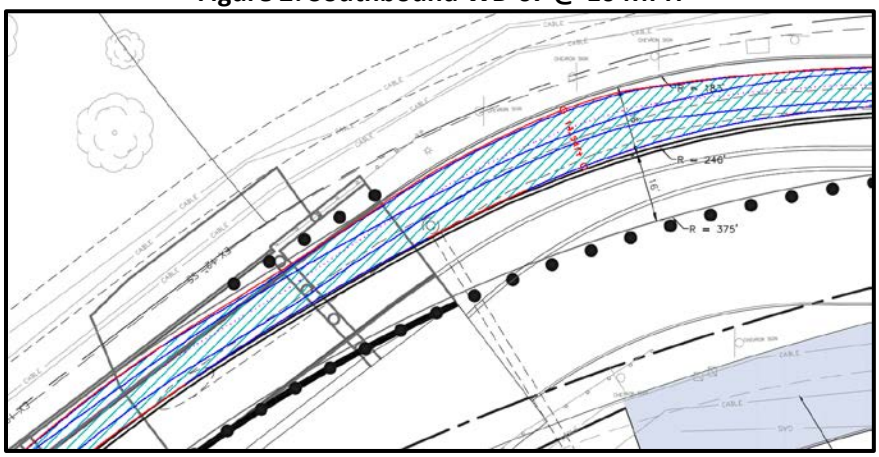
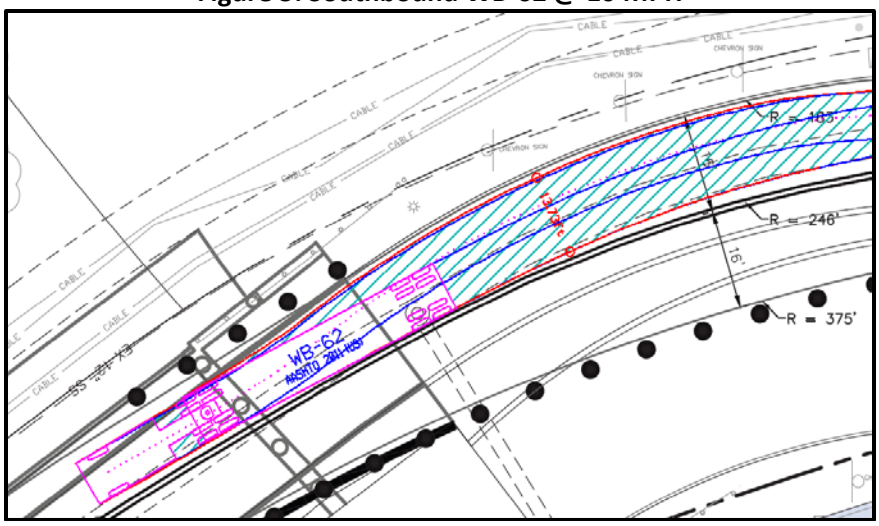


Figure 3 illustrates the southbound travel path for a WB-62 vehicle. The vehicle was simulated at a speed of 10 mph and there were no offsets included for the front/rear tires or vehicle body. The swept path of the vehicle body is shown with the light blue hatching. This turn simulation indicates there a maximum of 2.3 feet of clearance within the travel lane for this vehicle. There is more clearance for this vehicle on the departure side of the curve due to the shorter wheelbase.

Figure 3: Southbound WB-62 @ 10 MPH



The swept path of the vehicle is variable based on the steering inputs of the driver. Below, in Figure 4, is the swept path for a 20 mph WB-62 vehicle. At higher speeds the swept path width is reduced because the truck will not turn at as steep an angle at the lower speeds. As a result, the requisite turn radius increases as speed increases. The vehicle appears able to negotiate this curve while maintaining lane discipline at this speed, however, there appears to be little room for error or variation on the part of the truck drive.

Figure 4: Southbound WB-62 @ 20 MPH

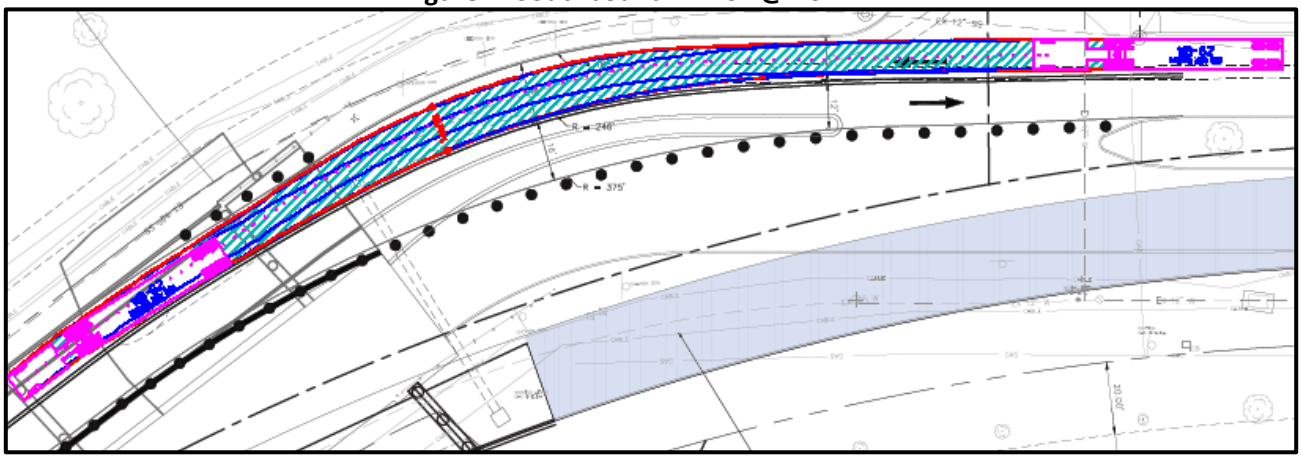
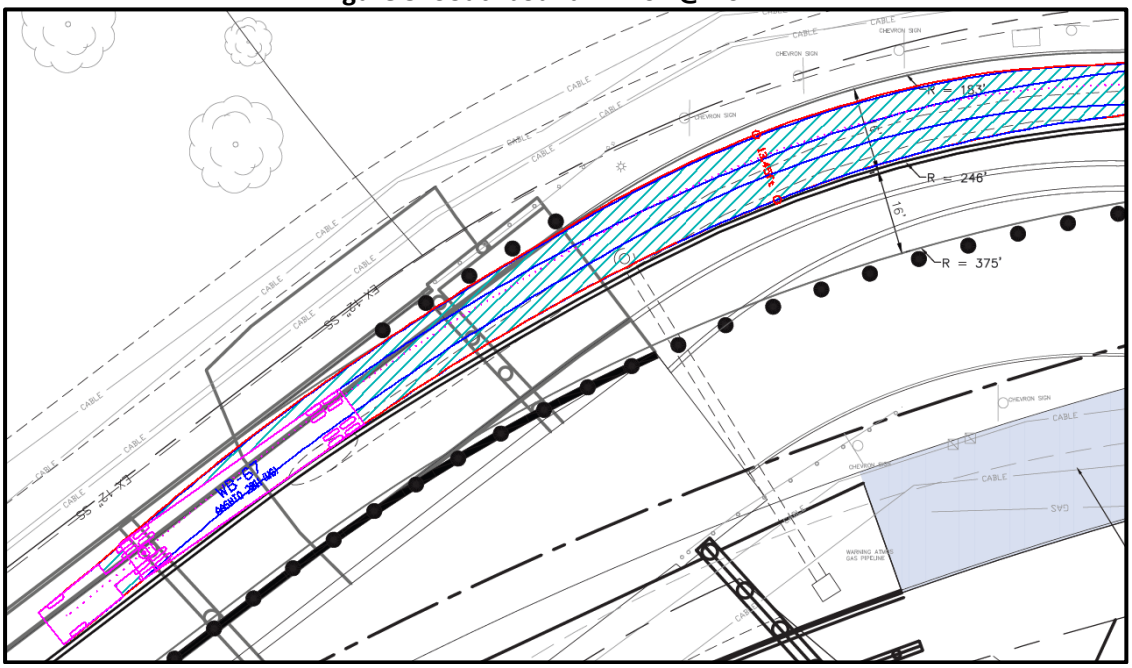


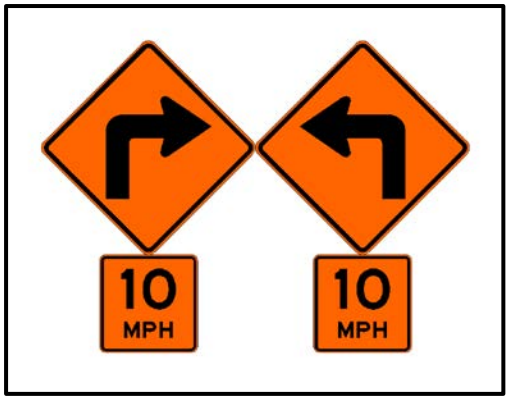
Figure 5 depicts the WB-67 vehicle traveling through the curve at 20 mph. At this speed, the vehicle appears to encroach on both the outside curb on the bridge, as well as slightly crossing the centerline.

Figure 5: Southbound WB-67 @ 20 MPH



Based on our review of the truck maneuvers at this location Lee Engineering makes the following recommendations:

1. A CURVE WARNING sign with an advisory speed plaque of 10 MPH should be placed in advance of the curve in both directions.



2. During Phase 1, a REGULATORY 20 MPH speed zone should be enacted with speed limit signage approximately 200' to 300' feet upstream and downstream of the curve. Care should be taken such that the curve warning signs are placed inside of the regulatory speed zone.

If you have any questions, please contact me at (972) 248-3006. We appreciate the opportunity to provide traffic engineering services to J. Volk Consulting.

Sincerely,

Digitally signed by
John Denholm III, P.E.
Date: 2017.03.19
18:20:41 -05'00'

John Denholm III, P.E., PTOE
Project Manager
Lee Engineering
TBPE F-450