



## EVALUATION OF CONCEPTUAL ALTERNATIVES

The following sections summarize the engineering and environmental issues associated with the proposed project, including where applicable an explanation of additional studies that will be completed in future steps of the PDP. Where the impacts vary by alternative, the impact of each option is discussed independently.

Several mainline alternatives are discussed in detail under the Design Issues section and the Traffic Operations discussion. Only those mainline options that were found to meet design and operations standards, as discussed in those sections, are discussed in detail for the remaining impact categories. Two mainline alternatives are analyzed in detail – the 4-Lane Continuity Alternative and the 5/4-Lane Alternative. Drawings of these alternatives may be found in the Exhibits section of this report.

### **Design Issues**

The following discussion focuses on evaluation of alternatives on a design-related basis. Where multiple alternatives exist, a comparative evaluation is also included.

The narrative notes the locations of impacted bridges for information. Please note that all impacted bridges within the corridor, with the exception of the Ludlow Viaduct and the Paddock Road bridge, are assumed to be full replacement due to age and condition. These structures are anticipated to require major rehabilitation, or more likely replacement, regardless of the I-75 widening project. At the Ludlow Viaduct and Paddock Road bridges, consideration is given for options to avoid or reduce impacts to these structures.

### ***Mainline Alternatives***

**I75-A: 4-Lane Continuity with Auxiliary Lanes** – This alternative begins approximately 0.1 miles south (SLM 2.30) of the Western Hills Viaduct (WHV) and terminates approximately 0.2 miles south (SLM 10.10) of SR 126. The only identified design exception at this time is for the mainline shoulder width and vertical clearance at the Paddock Road overhead bridge.

This alternative is illustrated on Exhibits A1-A17. The following is a discussion of relevant design features of this alternative by section:

#### **WHV (Sta 126+00 to Sta 155+00) (See Exhibits A-1 to A-2.)**

The existing mainline section is four lanes and bifurcated to accommodate the I-75 NB left hand exit ramp at the WHV interchange. With this alternative, the section would largely remain



unchanged and the existing pavement potentially suitable for concrete overlay. Existing shoulder widths are substandard ( $\cong$  13' outside /  $\cong$  6' median) and obtaining standard widths would impact the Harrison Avenue at-grade bridge, WHV overhead bridge (SB direction) piers, and I-75 NB to WHV ramp overhead bridge piers. The existing profile can be retained through this section.

Upgrading the WHV ramp terminals to current high-speed standards poses potential impacts to properties and bridges. In the NB direction, the terminals may be sufficient or require little modification, but in the SB direction both WHV ramps have low speed (30 MPH exit and 35 MPH entrance) ramps requiring deceleration and acceleration lengths. For the SB exit, approximately 400 feet of deceleration lane would be necessary (potentially impacting the west side property at Sta 139+00). With the SB entrance ramp, approximately 500 feet of additional acceleration taper length would be necessary requiring widening of the Harrison Avenue at-grade bridge.

The existing transit tubes are located on the east side near the freeway between Sta 144+00 and Sta 149+00. Widening at this location may require a low retaining wall.

**Marshall Avenue (Sta 155+00 to Sta 168+00)** (See Exhibit A-2.)

The WHV bifurcated median is closed in by Sta 155+00. At this point, additional width is required for shoulder widening. The existing Marshall Avenue bridge would require approximately 24' of widening to achieve standard shoulder widths. However, review of structure records indicates it to be a candidate for replacement.

**Hopple Street (Sta 168+00 to Sta 210+00)** (See Exhibits A-2 to A-4.)

Like the WHV interchange, the Hopple Street interchange contains a left hand exit ramp from I-75 NB. Consequently, the median is also bifurcated between Sta 168+00 to Sta 200+00. Although the 4-Lane Continuity Alternative exhibits indicate a closed median, this would only be necessary if the interchange is improved as described by the interchange alternatives. If the interchange alternatives are not constructed and the left hand exit ramp retained, the bifurcated median could remain and the overhead bridges unaffected. However, as with the WHV interchange section, shoulder widths are substandard and may not be able to be widened under overhead bridges without affecting piers.

Ramp terminals at the Hopple Street interchange appear to meet current standards and should only require minor modifications if any.

The existing condition in the NB direction is for the outside lane to become an exit-only lane to I-74 with the Bates Avenue entrance ramp merging onto this lane. This mainline alternative would



require adding an auxiliary lane from the Bates Avenue / Hopple Street entrance ramp to form a five lane segment.

The Bates Avenue overhead bridge has median piers located at the back of shoulder which would be affected by median shoulder widening. Similarly, the Monmouth Street overhead structure is supported by piers at the back of outside shoulders that will be impacted by shoulder widening and extended I-74 ramp lanes in the SB direction. The additional SB lane extending through the Hopple Street interchange would impact existing overhead bridge piers located at the outside edge of shoulder.

**I-74 (Sta 210+00 to Sta 255+00)** (See Exhibits A-4 to A-5.)

In the NB direction, the existing number of lanes transitions at the I-74 exit terminal from four approach lanes to three through lanes and two ramp lanes. At this point, one lane widening in the NB direction would commence. However, in order to achieve required lane balance per the Green Book, an auxiliary lane would be constructed on the outside between Hopple Street and the I-74 exit ramp. This would result in five lanes approaching the I-74 interchange with four through and two exiting lanes.



A large commercial building is located on the east side of the freeway between Sta 217+00 and 219+00. With the construction of an auxiliary lane, the need for a low retaining wall would be probable. An overhead pedestrian bridge located at Sta 219+00 would also be impacted by the auxiliary lane widening and need to be replaced.

In the SB direction south of I-74, the two-lane entrance ramp would merge with the four-lane mainline as a parallel-type entrance terminal. As a result, the outside lane would be an exit-only lane to Hopple Street while the other add lane must continue through the Hopple Street interchange and merge onto the mainline south of Hopple Street. The parallel ramp terminal would correct the existing tapered inside merge. Existing commercial buildings located on the west side of the freeway would require a retaining wall to avoid relocation.

The at-grade bridge over the I-75 NB to I-74 WB ramp would require shoulder and lane widening. The I-74 EB to I-75 NB / Central Parkway overhead bridge would be impacted by the lane addition and shoulder widening since the structure's piers are located at the back of existing outside shoulder.

In the event that the I-74 interchange alternatives are not implemented and the existing I-74 EB to I-75 NB ramp remains, a retaining wall would need to be constructed on the east side of the mainline due to the mainline widening.

In the SB direction, the I-74 exit ramp is low speed (20 MPH) with no deceleration length. In addition to the additional SB travel lane, a deceleration lane approximately 480' in length would also be required (beginning just south of the Ludlow Viaduct).

The Ludlow Viaduct was reconstructed in the early 1990's with future widening of I-75 taken into account. As a result, the existing structure should not be impacted by this alternative.



Three existing main railroad tracks owned by CSX and NS are in close proximity to the I-75 mainline on the west side with a future fourth main planned and assumed located between the freeway and tracks. The lateral distance between the tracks and proposed SB outside shoulder is 47'. Although the fourth main can still be accommodated, a retaining wall will be necessary. Although the wall would be outside the required 25' minimum crash design limit, a crashworthy retaining wall is recommended.

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**Hillside (Sta 255+00 to Sta 315+00) (See Exhibits A-8 to A-9.)**

The section of freeway north of the Ludlow Viaduct is constrained on both sides. On the east side are hill sides, park lands (Mt. Storm) and cemetery. On the west side are CSX tracks, the Mill Creek and numerous billboards. Crossing the mainline are overhead electric transmission lines (138 KV and 69 KV) at Sta 284+00 with towers located near the freeway. The entire area is geologically unstable and will require special designs for earthwork and retaining walls.



The existing mainline has numerous geometric deficiencies including horizontal SSD, superelevation transition length, and shoulder width. This alternative would correct these deficiencies and improve safety. However, because the railroad limits any westward widening, impacts to hillsides on the east side of the freeway will result in extensive use of retaining walls extending the length of this section with 32' maximum height. TranSystems performed a detailed