



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.

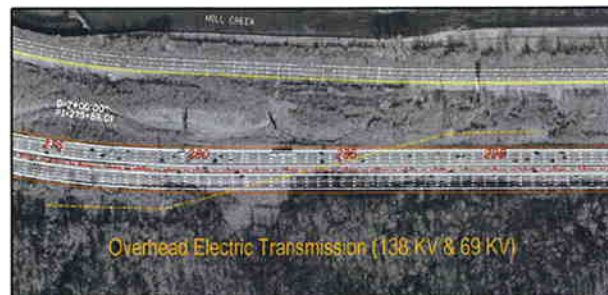


Three existing main railroad tracks owned by CSX and NS are in close proximity to the I-75 mainline on the west side with a future fourth main planned and assumed located between the freeway and tracks. The lateral distance between the tracks and proposed SB outside shoulder is 47'. Although the fourth 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.



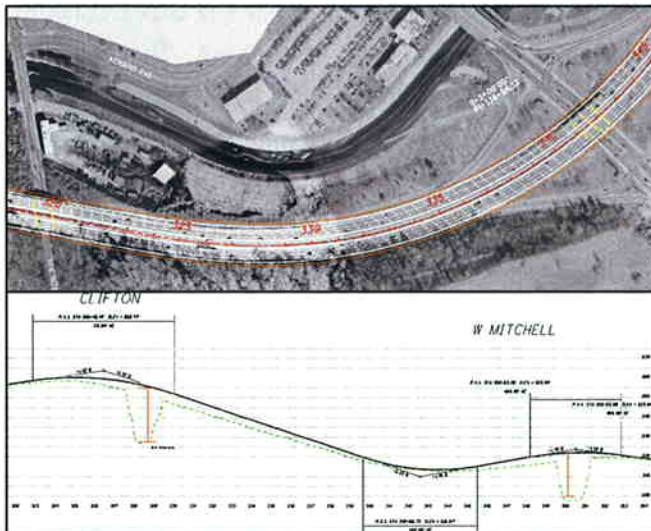
The existing mainline has numerous geometric deficiencies including horizontal SSD, superelevation transition length, and shoulder width. This alternative would correct these deficiencies and improve safety. However, because the railroad limits any westward widening, impacts to hillsides on the east 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



investigation for ODOT on alignment locations within this section of mainline. This evaluation is described in more detail in the Consideration of Design Exceptions discussion on page 27.

Clifton Avenue (Sta 315+00 to Sta 330+00) (See Exhibits A-9 to A-10.)

The existing mainline experiences high crash rates NB due to the crest vertical curve at Clifton Avenue combined with substandard SSD of the horizontal curve beginning at Sta 325+00 and congestion at the Mitchell Avenue exit ramp.



This mainline alternative addresses the geometric deficiencies of the mainline by meeting 60 MPH design speed criteria but a more complete safety solution would also improve operation of ramp intersections at Mitchell Avenue to reduce traffic queuing onto the freeway.

The Clifton Avenue at-grade bridge would require widening for the additional lane and to obtain required shoulder widths. The vertical alignment would need to be adjusted upward in order to

obtain minimum vertical clearance on Clifton Avenue. A review of the structure records indicates this bridge to be a candidate for replacement particularly with respect to the vertical profile correction ($\cong 5'$).

On the west side of the freeway, embankment construction would impact the commercial property between Sta 322+00 and 325+00.

Mitchell Avenue (Sta 330+00 to Sta 355+00) (See Exhibit A-10.)

The existing mainline experiences a high frequency of accidents, ranking it 11th in Ohio Freeway Safety Hot Spots. A contributing factor is traffic congestion that occurs on the Mitchell Avenue ramps. Capacity improvements to the ramp intersections that provide better egress from I-75 is recommended (refer to interchange Alternative MIT-A). The existing at-grade bridge over Mitchell Avenue would require widening to accommodate standard shoulder widths and the





mainline lane addition; however, a review of the structure records indicates that it is a candidate for replacement.

Existing ramp terminals do not meet current high-speed requirements. The I-75 NB entrance terminal is bounded on the east side by a retaining wall that would need to be reconstructed for the mainline widening and additional terminal width.

Mill Creek (Sta 355+00 to Sta 370+00) (See Exhibit A-11.)

This section of I-75 passes through a confined space between a bend in the Mill Creek concrete channel on the west and landfill (currently used as a recreation field) to the east. The proposed widening for this alternative is symmetric about the center line which results in approximately 7' of lateral clearance to the top of concrete channel. Details of the channel should be further investigated to determine the feasibility of constructing a barrier or retaining wall near the channel.

Literature and field research identifying the boundary of the landfill will also need to be undertaken to determine the extent of available space on the east side if shifting the mainline away from the channel is necessary.

Railroad & City of St. Bernard (Sta 370+00 to Sta 405+00) (See Exhibit A-11 to A-12.)

This section contains railroad tracks on the west side of I-75 that are a minimum of approximately 40' offset from the proposed outside edge of shoulder and 10' lower than the roadway. A retaining wall might potentially be required to reduce embankment onto railroad property.

On the east side, several large buildings are in close proximity to the freeway including the St. Bernard Post Office and Fire Department. The proposed widening is not expected to affect these structures; however, surface parking lots would be impacted. The City of St. Bernard also owns building facilities on the west side between Sta 391+00 to Sta 399+00 to which the single access drive will be eliminated by the widening. Consequently, to avoid impacting the only access to Ross Avenue Park on the east side and provide sufficient curvature and transition lengths to meet the 60 MPH design speed, widening is proposed to be asymmetric toward the west to avoid encroaching on the park.

The at-grade bridge over Vine Street would require widening, however, a review of bridge records indicates that this structure would be a candidate for replacement.



Norwood Lateral & Towne Street (Sta 405+00 to Sta 480+00) (See Exhibit A-12 to A-15.)

Just south of the SR 562 system interchange are two railroad tracks crossing over the mainline. The abutments of this structure are located at the back of the existing outside shoulder thus being impacted by mainline widening and SR 562 ramp terminals.

In the NB direction, the exit ramp to SR 562 currently has no deceleration length and would require approximately 500' of deceleration lane length to conform to current high-speed exit terminal standards. In the SB direction, a high-speed entrance terminal would be constructed.

At Sta 418+00, the at-grade bridge over the I-75 SB to SR 562 EB ramp would require widening; however, review of the bridge records indicates that this structure is a candidate for replacement. The SR 562 EB to I-75 SB ramp bridge over I-75 would require replacement due to the widening of the mainline.



Paddock Road Bridge Over I-75

The SR 562 WB to I-75 NB and I-75 SB to SR 562 EB ramps are proposed to be widened to two lanes due to future traffic demand. Consequently, the ramp terminals on I-75 would be reconstructed to accommodate the additional lane. In the NB direction, a parallel-type entrance terminal is proposed that would conform to LDM Fig 505-1aE. This would result in add lanes extending 2,000' for the outmost lane and 5,440' for the second lane (acting as an add lane for lane balance). In the SB direction, a high-speed two-lane exit terminal is proposed as per LDM Fig 505-2bE for all facilities. The result is to add an auxiliary lane in advance of the divergence point 2,500' of tangent length plus zero degree 40' diverging curve ($\cong 350'$). The effects of constructing the two-lane entrance and exit terminals will be the need to widen the at-grade bridge over Laidlaw Avenue approximately 70'. A review of bridge records indicates that this structure is a candidate for rehabilitation and widening. North of Laidlaw Avenue is a single track railroad bridge over I-75 (Sta 440+00). The existing abutments are located at the back of existing shoulders thus requiring the structure to be replaced due to the mainline widening.



The Towne Street partial interchange serves to provide exit and entry onto I-75 in NB direction only. The service ramps are recommended to be closed since the spacing is less than the minimum 2,000' per the Green Book standard ramp spacing requirement and if the SR 562 interchange entrance ramp is rebuilt with two lanes, the auxiliary lane will extend through the Towne Street interchange.

The at-grade bridge over Towne Street (Sta 452+00) would require widening approximately 70' due to mainline lane additions and shoulders; however, a review of the bridge records indicates that this structure is a candidate for replacement.

Paddock Road (Sta 480+00 to Sta 533+00) (See Exhibit A-16 to A-17.)

At Sta 491+00, the Seymour Avenue overhead bridge would be impacted by the widening and require replacement. The I-75 SB additional lane, shoulder width and Paddock Road entrance terminal combine to extend beyond the pier located at the back of existing shoulder.

The Paddock Road bridge over I-75 was constructed in the late 1990's and is an architectural gateway feature on the corridor. The bridge was constructed with vertical wall abutments offset from the back approximately 7' from the outside edge of shoulder. The abutment has a flat vertical face with protruding corners. Available clearance between unmodified abutment faces under the bridge is approximately 117.75'. With a design exception for shoulder width (4' median and outside shoulders), the minimum amount of space necessary for the four lane mainline alternative is 117.67'. In order to provide a crash barrier in front of the abutment face, a modification of the abutment face would be expected and if so, the bridge should be able to remain. To gain additional shoulder width, modification of the abutment corners should be considered such that the full 125' of clear space between faces is available.

The bridge received a design exception for 15' vertical clearance (15.5' minimum allowable) and the combination of adding a lane with the deepening haunched exterior plate girders may result in less vertical clearance over the outside shoulder. A profile adjustment of the mainline may be necessary to achieve the required minimum clearance.

The HAM-75-10.10 project team has recommended the use of an auxiliary lane between the Paddock Road and SR 126 interchanges in each direction. The lane addition results in five lanes for this alternative with potential impacts to a parallel industrial drive on the west side and extensive length (\cong 1600') of retaining wall along Summit Avenue on the east side.

I75-B: 5-Lane Continuity – The impacts of this alternative are the same as Alternative I75-A unless noted below. The basic difference is the addition on one more 12' mainline lane for the length of the project thus causing the footprint to be 24' wider. Exhibits of this alternative are not



provided, as this option was dismissed from further consideration early in Step 5. A technical memorandum is included in Appendix 4 explaining the rationale behind this decision.

The following is a discussion of the main design differences from Alternative I75-A by section:

WHV (Sta 126+00 to Sta 155+00)

The fifth lane is proposed to be started at the WHV with the WHV EB to I-75 NB entrance ramp as the add lane. There is approximately 86' between piers of the I-75 NB to WHV WB exit ramp over I-75 bridge. To meet standard lane and shoulder widths, a total width of 88' is required for five lanes. Therefore, a design exception for shoulder width is likely at this location of the existing structure would require replacement.

As with Alternative I75-A, WHV interchange ramp terminals would require reconstruction to meet current high-speed standards.

Marshall Avenue (Sta 155+00 to Sta 168+00)

In the SB direction, the fifth lane is proposed to end just south of the I-75 over Marshall Avenue bridge (\cong SLM 3.10). The existing bridge would require being widened 48', however, the bridge is recommended for replacement.

At approximately SLM 3.16, there is limited lateral space for widening due to an industrial complex on the west side of the mainline and Central Parkway on the east side. There is approximately 180' of space available before impacting either the buildings or requiring relocation of Central Parkway. The five lane section is 185' (from outside of barrier to outside of barrier) without shoulder width reductions.

Hopple Street (Sta 168+00 to Sta 210+00)

The existing interchange ramp terminals would require reconstruction to upgrade to current high-speed standards which could affect overhead bridges. In addition, the fifth lane mainline widening in the SB direction would result in reconstruction of the Hopple Street overhead ramp bridges to achieve adequate lateral clearance. With piers at the back of shoulders, the Bates Avenue and Monmouth Street overhead bridges would require reconstruction or demolition due to the additional lane.

In the NB direction, the Bates Avenue entrance ramp would enter the freeway as an auxiliary lane forming a six lane segment to I-74.



I-74 (Sta 210+00 to Sta 255+00)

In the SB direction, the I-74 EB to I-75 SB exit ramp is two lanes that would combine with the five mainline lanes to form a seven lane segment to Hopple Street. The outside most lane is proposed to be an exit-only lane to Hopple Street with six lanes passing under the Hopple Street overhead bridges. Several industrial buildings on the west side of the freeway would likely require relocation.

All overhead bridges in the I-74 interchange would require replacement due to the widening.

The Ludlow Viaduct overhead bridge would also be impacted by this alternative. Unlike Alternative I75-A, the additional lane width is expected to extend into the existing south abutment. Two or three spans at the south end of the bridge would require replacing.

Hillside (Sta 255+00 to Sta 315+00)

The alignment developed for this segment would result in similar impacts to the hillsides as with the Alternative I75-A, but with the retaining walls set nearly one lane width further into the hillside (allowing for some differences in alignment geometry). Additional retaining wall length is expected.

Clifton Avenue (Sta 315+00 to Sta 330+00)

This alternative results in similar impacts (to the 4-lane continuity) through the Clifton Avenue segment with corresponding additional width.

Mitchell Avenue (Sta 330+00 to Sta 355+00)

This alternative results in similar impacts (to the 4-lane continuity) through the Mitchell Avenue segment with corresponding additional width.

Mill Creek (Sta 355+00 to Sta 370+00)

This section of mainline is constrained as described for Alternative I75-A; however, the conditions are more exaggerated with the additional 24' for this alternative. Holding the Mill Creek as a fixed unalterable boundary results in the widening occurring further into the existing landfill. Risk presented by the landfill is unknown as this time.

Railroad & City of St. Bernard (Sta 370+00 to Sta 405+00)

The minimum offset to existing railroad tracks on the west side of the mainline is approximately 25'. Crashworthy retaining walls for much of this segment is recommended with some length potentially



required. Other impacts would be similar to Alternative I75-A; however, the work would generally be closer to existing buildings located on the east side of the freeway.

Norwood Lateral (SR 562) & Towne Street (Sta 405+00 to Sta 480+00)

This alternative would result in similar impacts as Alternative I75-A; however, due to geometric requirements for curvature, the mainline would pass under the existing railroad tracks at Sta 407+00 on a more exaggerated skew resulting in a longer span railroad bridge over I-75.

Paddock Road (Sta 480+00 to Sta 533+00)

The impacts in this section of mainline improvement would be substantially more than for Alternative I75-A. The Paddock Road overhead bridge would not be avoidable even with lateral width design exceptions. The additional two lanes in each direction would require that the overhead bridge be replaced.

Additionally, in combination with the auxiliary lane each way between Paddock Road and SR 126, the industrial drive adjacent to the freeway on the west side would require relocation. Summit Avenue adjacent and parallel to the mainline on the east side might also require relocation if there is inadequate space for retaining walls to be constructed.

I75-C: 4-Lane Continuity with Elevated Express Lanes – With respect to the mainline, this alternative is very similar to I75-A. For purposes of discussion, the elevated express lanes would be assumed to be supported by pier columns located in the median or at the back of outside shoulder. The elevated express lanes are also assumed to be continued from the Thru the Valley and Brent Spence Bridge projects. Directional ramps would be provided at the SR 562 and I-74 system interchanges.

In general, the elevated structure would be supported in the median resulting in an additional 4' of median width (for piers). In limited locations, there may be an advantage to locate the elevated structure on the outside or circumstances might permit one direction of express lanes to be at-grade.

The additional median width would not necessarily result in additional impacts over Alternative I75-A; however, the elevated express lane structure would be required to span over most overhead bridges such as at Western Hills Viaduct, Hopple Street, I-74, Ludlow Viaduct, and Paddock Road, etc. This is primarily a function of how feasible spanning the arterial over the elevated express lanes. In nearly all cases, the arterial over express lanes would not be practical.



Providing directional ramp connections to I-74 and SR 562 poses substantial constructability challenges. Since ramp spacing between terminals would be approximately 2000' between the I-75 ramp terminals and expressway ramp terminals, remaining space to service interchange ramps becomes very difficult to obtain.

At I-74, the expressway ramps would likely be required to remain physically separated from the I-74 mainline beyond the Colerain Avenue interchange. An elevated structure (essentially the same cross section as the mainline) would extend approximately one mile west to then form ramp terminals on the outside of the I-74 mainline.

In the I-75 NB direction, ramp fly-overs would be necessary carrying traffic over the I-74 interchange. The I-74 EB to I-75 NB elevated expressway ramp would be required to span over the Ludlow Viaduct in addition to the I-75 elevated expressway mainline. The entrance ramp would then extend approximately one mile north to achieve adequate spacing between the I-74 EB to I-75 NB entrance terminal.

At SR 562, the elevated expressway would span over the overhead railroad bridges and SR 562 interchange. Directional ramps connecting the elevated expressway to SR 562 would be required to span over the overhead railroad bridge on SR 562 extending to a point beyond the Paddock Road / SR 562 interchange either braided with the Paddock Road service ramps or combined in a Collector-Distributor (CD) arrangement.

Exhibits are not provided for this option as it was dismissed early in Step 5 of the Project Development Process. This option was not desirable due to costs associated with elevated roadways and was dropped from further consideration when eliminated from further consideration by the Thru the Valley project located to the north.

I75-D: 5/4-Lane – This alternative was added during PDP Step 5 as a separate alternative to address the additional traffic generated by I-74, to allow for one additional through lane throughout the project limits. This alternative entirely matches Alternative I75-A in the SB direction and from I-74 to the end in the NB direction, shown on Exhibits A-5 to A-18. From the project beginning to I-74, this alternative matches Alternative I75-B and can be found on Exhibits A-18 to A-21. Please refer to those sections for discussion of design issues.

Interchange Alternatives

HOP-NB: No-Build Plus Minor Improvements – The existing interchange of Hopple Street at I-75 contains several undesirable geometric elements. As noted in the mainline alternatives discussion, the existing mainline shoulders do not meet standard shoulder width. A design exception would be necessary to avoid impacting the overhead bridge piers within the



interchange. Ramp terminals could be upgraded to meet current high-speed requirements. Signal coordination and timing could also be investigated for efficient operation at the Colerain Avenue, Central Parkway and ramp intersections. (See Exhibit A-3.)

The no-build alternative is compatible with mainline alternative I75-A and I75-C in that there are four existing lanes at this interchange. For I75-B and I75-D, the additional mainline lane would impact existing overhead bridges to the extent that HOP-NB would not be desirable.

Advantages of Alternative HOP-NB are:

- Low cost, short-term improvements that do not preclude other alternatives in the future.
- Improves safety at the freeway ramp terminals.
- No property impacts.

Disadvantages of Alternative HOP-NB are:

- Does not address capacity deficiencies on Hopple Street.
- Does not correct left hand exit ramp from I-75 NB.
- Does not add missing I-75 NB entrance movement.
- Is not compatible with mainline alternative I75-B or I75-D.

HOP-A: Tight Urban Diamond – This alternative would involve reconstructing the Hopple Street interchange as a tight urban diamond (TUDI). The completed interchange would provide for full movements at Hopple Street (Bates Avenue ramp would be closed) with straight ramps. The ramp intersections would be closely spaced and signals coordinated. Due to the close proximity of the Central Parkway / MLK Drive intersection to the east ramp intersection, the Central Parkway / MLK Drive intersection is proposed to be grade-separated. A connecting roadway from Central Parkway to MLK Drive would be constructed to maintain access between the roadways. (See Exhibit A-3a.)

Advantages of Alternative HOP-A are:

- Low speed ramp curves are eliminated.
- Eliminates existing weave segment on the I-75 exit ramps.
- Left hand exit from I-75 NB is relocated to the right side.
- More distance between the Colerain Avenue and ramp intersections.
- All routes from / to I-75 are supported. Currently, the I-75 NB entrance is not allowed.
- Provides greater distance between the Hopple Street I-75 NB entrance ramp and I-74. This allows for access to both I-75 NB and I-74 from Hopple Street.



- Grade-separation of Central Parkway and MLK Drive eliminates nearby major intersection.
- Improves capacity of Hopple Street to permit traffic to exit the freeway more freely.

Disadvantages of Alternative HOP-A are:

- High cost improvement.
- Property impacts on east side of I-75 with several relocations.
- Additional signal installed for ramp intersection.
- Requires existing bifurcated median to be replaced with narrow median. This alternative would therefore not be compatible with alternative I75-NB or I75-A (without closing the median).

HOP-B: Offset Roundabout Diamond Interchange – This alternative essentially the same as illustrated by HOP-B1 but contained a roundabout at the ramp intersection and one less through lane on Hopple Street each way. After further analysis was performed for the Central Parkway / MLK Drive intersection future condition, an additional through lane each way on Hopple Street was determined necessary to achieve an acceptable level of service. The added lane would then result in the roundabout containing at least three lanes. Presently, the Department will not consider a three plus lane modern roundabout at opening day due to driver unfamiliarity, therefore this alternative with modern roundabout has been dismissed and replaced with Alternative HOP-B1 discussed below.

HOP-B1: Offset Diamond Interchange – This interchange alternative provides for a single signalized ramp intersection located on the west side of I-75. As with HOP-A, all movements are supported by this arrangement; however, the I-75 NB direction ramps would fly over the mainline with overhead bridges such that all ramp roadways meet at the single intersection. By doing so, the intersection of Central Parkway / MLK Drive would remain at-grade. (See Exhibit A-3b.)

Advantages of Alternative HOP-B1 are:

- Left hand exit from I-75 NB is relocated to the right side.
- Eliminates existing weave segment on the I-75 exit ramps.
- Provides more distance between the Colerain Avenue and the ramp intersection.
- All routes from / to I-75 are supported. Currently, the I-75 NB entrance is not allowed.
- More distance would result between the Hopple Street I-75 NB entrance ramp and I-74. This allows for access to both I-75 NB and I-74 from Hopple Street.
- Improves capacity of Hopple Street to permit traffic to exit the freeway more freely.
- Fewer impacts to properties on east side of I-75.



- Does not require elimination of mainline open median and is therefore compatible with all mainline alternatives.

Disadvantages of Alternative HOP-B1 are:

- High cost improvement but less than Alternative HOP-A.
- I-75 NB ramps contain lower speed curves.
- Requires more space for ramps thus shortening distance between Hopple Street ramp terminals and adjacent interchanges at I-74 and Western Hills Viaduct.

I74-NB: No-Build Plus Minor Improvements – Minor modifications to the I-74 interchange that would improve traffic flow could consist of closing existing service ramps to Central Parkway, Spring Grove Avenue and Colerain Avenue. This modification would substantially reduce weaving between ramp terminals. However, improvements would be necessary to interchanges receiving diverted traffic. (See Exhibit A-5.)

Advantages of Alternative I74-NB are:

- Low cost, short-term improvements that do not preclude other alternatives in the future.
- Improves traffic flow and safety.
- No property impacts.

Disadvantages of Alternative I74-NB are:

- Does not address deficiencies on existing low speed ramps connecting I-75 north of I-74.
- Requires improvements to adjacent interchanges to accommodate diverted traffic.
- Not compatible with mainline build alternatives. There are three existing mainline lanes passing under interchange overhead bridges. Adding one or two lanes would require replacing overhead bridges, thus consideration should be given to the build alternatives.

I74-A: Fully Directional Interchange with Local Access – This alternative would involve reconstructing the existing low speed north ramps of the I-74 interchange as directional ramps and providing eliminating some service ramps while adding others. The purpose of this alternative is to achieve a balance between system-level operation and local access. (See Exhibit A-5a.)

For directional movements, the existing low speed ramp from I-75 SB to I-74 WB would be closed and replaced by a 45 MPH ramp that spans over the railroad tracks. The I-74 EB to I-75 NB ramp would be retained (but modified) to maintain access to Central Parkway and a new 45 MPH



directional ramp constructed. The existing directional two-lane ramps serving I-75 south of I-74 would essentially remain unaffected.

Local access to Central Parkway from I-74 and to I-75 NB would be maintained but the existing ramps are proposed to be reconstructed such that a conventional signalized intersection at Central Parkway would result. This arrangement would support a left turn from the I-74 ramp onto Central Parkway which is not allowed currently.

The Spring Grove Avenue entrance ramp would be closed for safety since the divergence point for the I-74 to I-75 ramps would be too short a distance from the entrance terminal. New exit service ramps would be constructed from I-75 SB and NB to connect to Colerain Avenue at the Spring Grove Avenue / William P. Dooley Bypass while the existing ramp would be closed due to the physical construction of the I-75 SB to I-74 directional ramp. The existing Colerain Avenue segment between Elmore Street and William P Dooley Bypass is one-way to William P Dooley Bypass and would require an investigation to convert to two-way or not allow a through movement from the ramps.

Advantages of Alternative I74-A are:

- Corrects low speed curves on existing I-74 north ramps serving I-75.
- Maintains local access to Central Parkway (from I-74 and to I-75 NB) and Colerain Avenue (from I-75 SB and NB).
- Reduced need to improve adjacent intersections.

Disadvantages of Alternative I74-A are:

- High cost improvement.
- Retains partial interchanges.
- Requires relocation of Cumminsville #64 electric substation located at the Colerain Avenue / William P Dooley Bypass intersection.
- Reduced level of service for a system interchange due to presence of service ramps with increased turbulence caused by weaving and speed change maneuvers.
- Potential impact to Ludlow Viaduct overhead bridge due to additional width at ramp terminals where service ramps must converge or diverge.

I74-B: Fully Directional Interchange with No Local Access – As with Alternative I75-A, 45 MPH directional ramps would replace the low speed ramps currently connecting I-74 to I-75 north of the interchange. However, all local access service ramps would be closed which would include the Central Parkway ramps, Colerain Avenue exit ramp and Spring Grove Avenue entrance ramp. (See Exhibit A-5b.)



Advantages of Alternative I74-B:

- Substantially lower cost than Alternative I74-A, but higher than I74-NB.
- Avoids relocation of Cumminsville #64 electric substation.
- High probability of avoiding impacts to the Ludlow Viaduct overhead bridge.
- Improved traffic flow and higher level of service.
- Elimination of partial interchanges.
- Meets driver expectation for a system interchange with higher speed ramp connections and no service ramps.

Disadvantages of Alternative I74-B:

- Reduces local access to the freeway. Improvements to adjacent interchanges for diverted traffic are recommended.

COL-NB: No-Build Plus Minor Improvements – This alternative would retain the existing partial system interchange and require upgrading ramp terminals to current high-speed standards. Operationally, the interchange is expected to function at an acceptable level of service in the future with the possible exception being diverted traffic from one of the build conditions. Missing movements include Beekman Street NB to I-74 EB, Beekman Street SB to I-74 WB and I-74 WB to Beekman Street SB. The interchange appears to have no significant safety problems.

Advantages of Alternative COL-NB:

- Low cost long-term alternative.
- No property impacts.

Disadvantages of Alternative COL-NB:

- Retains partial interchange.
- Incompatible with I-74 interchange build alternatives.

COL-A: Low Impact Improvement with Full Movements – The objective of this alternative is to provide the missing movements at minimal cost. The proposed interchange would provide for an exit ramp from I-74 WB to Beekman Street such that a left turn is conducted under signal control. This arrangement allows for I-74 WB to Beekman Street NB and SB movements. From I-74 EB, an exit ramp would intersect Beekman Street with a signalized intersection for access to Beekman Street in the NB and SB directions. Left turns would also be permitted from Beekman Street SB onto the I-74 EB entrance ramp. (See Exhibit A-7a.)



Existing I-74 bridges over Beekman Street would not be affected and the ramp bridges on the south side of the interchange would be removed.

Advantages of Alternative COL-A:

- Provides full interchange movements.

Disadvantages of Alternative COL-A:

- Potential conflict with I-74 build alternatives in WB direction. The distance between the I-75 ramp convergence point and Beekman Street exit ramp is 1500'. The Green Book (pg 844) preferred distance between system interchange ramp and service road exit ramp is 2000'. This condition must be analyzed further to determine feasibility (refer to Alternative COL-A1).
- Impact to floodplain.
- Impact to wetland (less than 0.1 acre)
- Some property relocations.
- Adds two additional signals to Beekman Street between Elmore Street and Colerain Avenue.

COL-A1: Low Impact Improvement with Full Movements & COL-B1: Double Roundabout Diamond Interchange (DRDI) – These alternatives are very similar to the corresponding build alternatives above; however, the I-74 WB exit ramp is proposed to be relocated to the west of Beekman Street and be constructed with a low speed loop to intersect with Beekman Street.

These alternatives have been investigated and are considered feasible.

Land impacts are expected to be the same or less than the other COL build alternatives; however, the cost would be higher due to additional bridge construction either by widening the existing I-74 bridges over Beekman Street or constructing new ramp bridges over Beekman Street.

These alternatives are recommended for further evaluation if spacing between the I-75 and Colerain Avenue interchanges are determined to be too close in the next PDP Step.

COL-B: Double Roundabout Diamond Interchange (DRDI) – Like Alternative COL-A, the objective of this alternative is to provide for full movements at the interchange. The principal difference is for modern roundabouts to be constructed at the ramp intersections in lieu of signals. The use of roundabouts is particularly effective in reducing speeds and thus providing for safer merging and weaving maneuvers. Since Beekman Street through the interchange was constructed



to freeway standards, traveling speeds through intersections of 50 MPH or greater are possible. As a safety measure, the use of roundabouts is proposed for speed control. (See Exhibit A-7b.)

Aside from using the roundabout intersection type, the other material difference between this alternative and COL-A is for the Beekman Street NB to I-74 WB ramp bridge over Beekman Street SB to be removed. Left turning traffic would pass through the north roundabout intersection.

Advantages of Alternative COL-B:

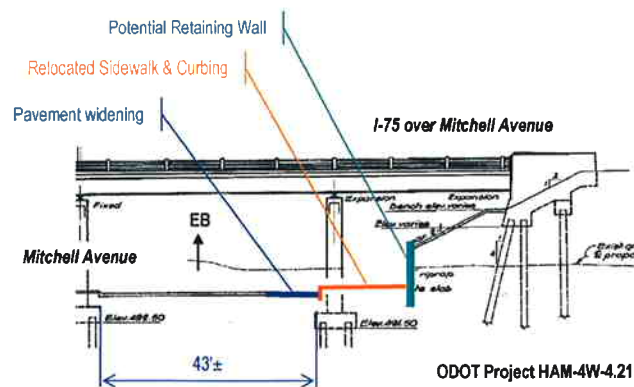
- Provides full interchange movements.
- Improve safety using modern roundabout intersections to control excessive speeds.
- Impacts less floodplain than Alternative COL-A.

Disadvantages of Alternative COL-B:

- Same potential spacing conflict with the I-75 to I-74 WB ramps as described in Alternative COL-A.
- Some property relocations.
- Impact to wetland (less than 0.1 acre)
- Potential driver confusion due to unfamiliarity with modern roundabouts.

MIT-NB: No-Build Plus Minor Improvements – The existing Mitchell Avenue interchange operates at a failing level of service under existing traffic due largely to short single lane left turn lanes at the ramp intersections. The existing I-75 bridge over Mitchell Avenue is a four span structure with center pier in the middle of Mitchell Avenue protected by a raised traffic divider. Available width between existing curbs is approximately 30 feet. An existing sidewalk is between the outside curb line and first pier beyond the abutment. The total span between first and second pier is approximately 46 feet.

A potential minor improvement to provide better overall operation and level of service at the ramp intersections is to relocate the sidewalk between the abutment and first pier providing approximately 43 feet of total space for roadway lanes including curb and gutter in each direction of travel. The supplementary width might permit additional lanes to be constructed without





replacing the existing bridge. However, relocating the sidewalk behind the first pier would require new retaining walls to maintain the bridge abutment slope protection. The existing I-75 bridge over Mitchell Avenue can therefore be evaluated for widening rather than complete replacement under this treatment.

Upgrading ramp terminals to current high-speed standards and providing more storage and speed change length would increase safety at the ramp terminals particularly in the I-75 NB direction. Signal timing could also be evaluated for better operation.

Heavy truck volumes are present at this interchange and exaggerate operational problems. The existing left turn lanes are approximately 170' in length, allowing for only two WB-67 tractor trailers to occupy the lane during a single phase of the signal.

Advantages of Alternative MIT-NB:

- Low cost short-term improvement.
- Improve safety and efficiency of traffic entering / exiting the freeway.
- Provide additional storage on exit ramps to reduce queuing on mainline through lanes.
- Low property impacts.
- Potential to provide adequate level of service if lanes can be added on Mitchell Avenue (with relocated sidewalk option)

Disadvantages of Alternative MIT-NB:

- No capacity improvements (without sidewalk relocation and lane additions). Ramp intersections would operate at failing level of service during peak periods.

MIT-A: Tight Urban Diamond Interchange (TUDI) – This alternative would convert the existing operationally deficient spread diamond with a compact TUDI. The footprint would largely remain unchanged; however, additional turn lanes and operational efficiencies of the TUDI will provide satisfactory levels of service at peak periods. (See Exhibit A-10a.)

As discussed above, the TUDI provides more efficient operation by closely spacing ramp intersections and coordinating the timing such that left turn storage between intersections is minimized. Left turn storage is provided on the outside approaches to the intersections. Since there are no nearby intersections, there is substantial left turn storage available. The primary concern raised during this PDP Step is how well the TUDI can provide adequate turning space for large trucks (assumed to be WB-67). Paths of side-by-side turning of large trucks have been reviewed and should prove feasible, providing careful design, with the proper TUDI layout.



In the event the TUDI should be determined later to not feasibly permit desired truck turning movements, the Single Point Urban Diamond (SPUI) can be reconsidered. In a previous PDP Step, the SPUI alternative was determined to be feasible for this location but at higher cost than the TUDI alternative and thus not developed further.

Advantages of Alternative MIT-A:

- Provides sufficient future capacity to achieve a satisfactory level of service at the ramp intersections.
- Improves safety by reducing congestion at the interchange and correcting existing geometric deficiencies.
- Provides for better traffic progression and reduced delay on Mitchell Avenue by eliminating left turn queuing into through lanes.
- Compatible with all mainline alternatives.

Disadvantages of Alternative MIT-A:

- High cost.
- Impact to adjoining land on the east side of the mainline. Existing retaining walls would be removed and new walls constructed further into the hillsides.

NOR-NB: No-Build Plus Minor Improvements – The SR 562 (Norwood Lateral) interchange is a T-type system freeway-to-freeway connection with I-75 from the east. The future traffic demand indicates the need for the ramps serving I-75 to the north should be two lanes for a satisfactory level of service.

For purposes of this discussion, the No-Build alternative assumes an I-75 mainline build condition since any beneficial change other than superficial improvements to signage and pavement markings would result in high cost impacts to nearby overhead railroad bridges in an I-75 no-build scenario. This would be the case, for instance, if the ramp terminals were upgraded to high-speed standards. As such, this No-Build alternative would involve upgrading the ramp terminals to high-speed standards. (See Exhibit A-13 to A-14.) The essential difference between the No-Build alternative and NOR-A is retaining the SR 562 on the north side of the interchange as single lane.

Advantages of Alternative NOR-NB:

- Improves safety by upgrading ramp terminals to high-speed standards.

Disadvantages of Alternative NOR-NB:

- No additional capacity.