

# Far East Freeway FAI/LIC-70-0.00/0.00 Feasibility Study

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## 1.0 Introduction

### 1.1 Executive Summary

The section of IR 70 on the east side of Columbus between Livingston Avenue and SR 310, known as the Far East Freeway, has been plagued by a high number of crashes and daily traffic backups for years, and the problems through the corridor are numerous. This section of IR 70 currently ranks third in central Ohio in both congestion and accident frequency, with an ADT of over 120,000 vehicles per day and over 800 crashes per year. High truck volumes, deficient weave lengths and interchange spacing, combined with heavy growth on the east side has led to LOS F at several ramp locations during the AM and PM peaks. Constructed in the 1960's to meet the travel volumes of the era, many of the interchanges along IR 70 are handling volumes significantly higher than what they were originally designed for; in some cases nearly 70% higher. Because of this, a transportation operations and construction strategy for the Far East Freeway was developed by ODOT in 2007 to identify deficiencies and possible solutions at the following interchanges:

- IR 70 & US 33
- IR 70 & Hamilton Road
- IR 70 & IR 270
- IR 70 & Brice Road
- IR 70 & SR 256
- IR 70 & Taylor Road



**Stopped traffic on IR 70 eastbound from backups on the SR 256 exit ramps are a common occurrence**

The project began to move through the ODOT Project Development Process (PDP) in 2011, and the FRA-70-16.17 Feasibility Study completed by HDR is the foundation for many of the improvements set to be completed along IR 70. The HDR Feasibility Study looked at the entire corridor improvement as a single project, but also broke out each interchange into separate projects to allow each interchange to be reconstructed individually as funding restrictions would likely prevent the entire corridor from being reconstructed under a single contract. The design of the reconstruction of the first phase of the IR 270 and IR 70 interchange is complete, and construction began in July of 2022 and is scheduled to be completed in June of 2025 (FRA-70-22.61, PID 95639, designed by HDR). East of IR 270, the IR 70 and Brice Road interchange is currently being designed (FRA-70-22.85, PID 98232, designed by EMH&T) and construction is set to begin in April of 2024. The section of IR 70 that this Feasibility Study will cover begins at the eastern termini of the FRA-70-22.85 and FRA-70-22.61 projects (the Fairfield County Line) and extends to the east roughly to the two existing structures over Palmer Road. Several different options for the improvement of IR 70 are included in this Feasibility Study and include:

- Widening IR 70 to the inside versus the outside
- The construction of a diamond interchange versus a diverging diamond interchange at Taylor Road
- Taylor Road passing over IR 70 or under IR 70
- Variations to the taper for the eastbound CD road back into IR 70
- Number of lanes for the westbound CD road
- The creating of a CD road east or west of Taylor Road for westbound IR 70

These alternatives are variations of Alternatives B & C developed in the 2014 Feasibility Study completed by HDR. No changes to the existing horizontal or vertical alignment of IR 70 are proposed in this Feasibility Study, but the design of preliminary horizontal and vertical alignments has been completed for the IR 70 & SR 256 exit and entrance ramps, as well as the IR 70 and Taylor Road exit and entrance ramps, and for Taylor Road over and under IR 70. The recommendations for the Alternative Evaluation Report (AER) are as follows:

- Widen IR 70 to the outside and maintain three through lanes in both directions
- Construct a standard diamond interchange at Taylor Road
- Shift the horizontal alignment of Taylor Road to the east
- Construct Taylor Road over IR 70
- Taper the eastbound CD road into IR 70 west of the Taylor Road eastbound entrance ramp
- Construct a two-lane westbound CD road between SR 256 and Taylor Road
- Have westbound traffic on IR 70 exit at Taylor Road and complete the through movement

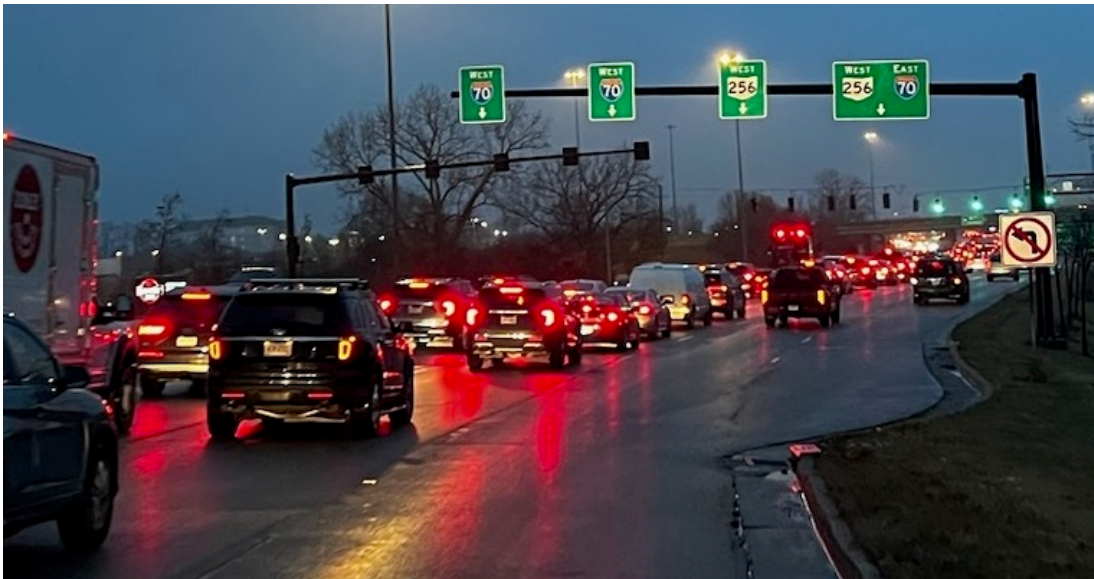
The recommendations are based on a number of factors including: Right of Way impacts, construction cost, crash reduction, congestion reduction, maintenance of traffic effort, environmental impacts, and construction duration, and are included in **Section 6.0**. Refinements to the vertical and horizontal alignments are anticipated during the AER phase when the field survey is complete and the structure type studies are completed.

## 1.2 Previous Studies

Numerous studies relating to congestion and high accident rates along IR 70 and SR 256 have been completed over the years and date back to 2005. These studies include the following:

- 2007 FRA-70-16.17 Far East Freeway Study completed by ODOT Central Office
- 2014 FRA-70-16.17 Feasibility Study Report (PID #76997) completed by HDR
- 2016 FRA-70-16.17 Interchange Modification Study (PID #76997) completed by URS
- 2018 FAI-256-0.23 Abbreviated Safety Study completed by ODOT District 5
- 2020 FAI-70-0.00 Abbreviated TSMO Report completed by ODOT District 5

The previous studies are available upon request from ODOT District 5 and are not included within this Feasibility Study. As noted in **Section 1.1**, modified versions of Alternatives B & C from the 2014 Feasibility Study are the basis for alternatives presented in this Feasibility Study.



**The dual left turn lanes from SR 256 to IR 70 westbound often back up to SR 204**

## 1.3 Summary of Feasibility Study

This Feasibility Study evaluates thirteen “build” alternatives as well as a “no-build” alternative and rates them based on a number of factors including construction cost, environmental impacts, Right of Way impacts, maintenance of traffic effort, as well as its effectiveness of meeting the primary and secondary goals of the Purpose and Need Statement. These thirteen alternatives are not “complete” alternatives, but instead consist of variations of the overall concept identified in the 2014 Feasibility Study completed by HDR. This was done because the number of total alternatives would have exceeded 250 if every possible configuration was looked at as a complete project. The goal is to look at each component of the proposed project individually to identify the best overall configuration while minimizing the number of alternatives being analyzed. Below is a breakdown of the alternatives evaluated in this Feasibility Study (detailed descriptions for each alternative are located in **Section 3.0**):

### **IR 70 Widening alternatives:**

- Alternative 1A: Complete widening of IR 70 to the outside of the existing pavement (2 westbound lanes)
- Alternative 1B: Complete widening of IR 70 to the inside of the existing pavement
- Alternative 1C: Complete widening of IR 70 to the outside of the existing pavement (3 westbound lanes)

### **Taylor Road interchange alternatives:**

- Alternative 2A: Diamond interchange at Taylor Road along existing Taylor Road alignment (under IR 70)
- Alternative 2B: Diamond interchange at Taylor Road shifted to the east (under IR 70)
- Alternative 2C: Diamond interchange at Taylor Road shifted to the east (over IR 70)
- Alternative 2D: Diverging Diamond interchange at Taylor Road shifted to the east (over or under IR 70)

### **Eastbound IR 70 CD road alternatives:**

- Alternative 3A: Dual-lane entrance for eastbound CD road along IR 70
- Alternative 3B: Merging of eastbound CD road prior to Taylor Road entrance

### **Westbound IR 70 CD road alternatives:**

- Alternative 4A: Dual-lane westbound CD road along IR 70
- Alternative 4B: Single-lane westbound CD road along IR 70

### **Westbound Taylor Road exit alternatives:**

- Alternative 5A: Westbound CD lane uses Taylor Road exit ramp and goes through Taylor Road intersection
- Alternative 5B: Westbound CD lane stays parallel to IR 70 and goes under or over Taylor Road

Of those thirteen alternatives, all were identified as both feasible for construction and met the goals of the Purpose and Need. However, preferred options were identified between Alternatives 1A through 1C, 2A through 2D, 3A and 3B, 4A and 4B, and 5A and 5B. A comparison matrix for the alternatives is provided in **Section 5.0** of this document, but the alternatives were not rated on a point scale to identify a “preferred” option. American Structurepoint recommends an AER that looks at the five preferred options under consideration as a complete project in more depth during the AER phase to identify the Preferred Alternative that will be selected for environmental coordination (NEPA), detailed design, and eventually construction. This Feasibility Study considers Taylor Road going over IR 70 as the preferred option, and recommends it be carried to the AER. Geometrically, going over or under IR 70 would utilize similar vertical grades and the same overall work length along Taylor Road, but a preliminary analysis shows going under IR 70 would result in a higher retaining wall cost, require a higher MOT effort, and take longer to construct. The retaining wall costs will be refined with the retaining wall justification study during the AER phase, but no change to the recommendation of Taylor Road going over IR 70 is anticipated. **Section 3.0** of this Feasibility Study describes in detail each alternative, and whether they are recommended for the AER. Roll-plot style plan and profile sheets are provided in **Appendix D** for the alternatives identified for further study. High level construction cost estimates for all thirteen “build” alternatives are provided in **Appendix F**.

## 2.0 Purpose and Need Summary

### 2.1 Purpose and Need Statement

The Purpose and Need Statement for this study was established in the 2006 FRA-70-16.17 Far East Freeway Study, which states the following:

*The current designs of the interchanges on the Far East Freeway are inadequate for current traffic volumes. Traffic volumes are expected to increase by nearly 20 percent by the year 2030. Several locations with failing traffic conditions and high crash rates correspond to overcapacity mainline sections and weave areas at, and between, the interchanges. Solutions to these issues must:*

- *Improve traffic flow and LOS by correcting operational deficiencies, including insufficient capacity in interchange areas.*
- *Improve safety, by addressing problematic roadway geometric deficiencies and weave areas.*

The need to improve traffic operations and decrease crashes along this section of IR 70 is well documented; in the 2040 no-build condition IR 70 westbound would be a LOS F from Brice Road past Taylor Road (including LOS F on the westbound Brice Road exit ramp, westbound SR 256 entrance ramp, and westbound SR 256 exit ramp) in the AM peak. In the PM peak for the 2040 no-build condition IR 70 would be a LOS F from James Road to SR 256 (including LOS F on the SR 256 westbound and eastbound exit ramps, as well as the westbound entrance ramp from SR 256 onto IR 70). By 2030, traffic volumes along IR 70 are expected to increase throughout the corridor to over 190,000 vehicles per day, with over 1000 crashes per year anticipated. The social, economic, and environmental impacts from the congestion and traffic are high, and to offset these impacts ODOT has worked with project stakeholders and the public to identify goals for the improvements of the corridor. Prior to this Feasibility Study, the following goals were established for the Far East Freeway:

- Optimize traffic flow on IR 70 and IR 270 (improvements on IR 270 are not considered as part of this Feasibility Study).
- Improve access to and with the surrounding roadway network.
- Improve current roadway design.
- Support travel purposes, such as access to jobs, services, and location destinations, and coordinate with other modes of travel.
- Consider the impacts on the natural and cultural environment.
- Coordinate with local plans.
- Minimize disruption during construction.
- Balance benefits with infrastructure costs.

The alternatives presented in this Feasibility Study meet the goals of the Purpose and Need with varying levels of effectiveness. These alternatives are detailed below, along with recommendations on what should be evaluated during the AER.



## 3.0 Alternatives Considered and Dismissed

To limit the total number of alternatives developed for this Feasibility Study, the project was broken into sections and each section looked at individually to piece together a complete alternative that will be further refined during the AER phase to establish the Preferred Alternative. The alternatives developed for this Feasibility Study are described below, and schematic representations of each are shown in **Appendix D**. The alternatives selected for further study are detailed in **Section 6.1**.

### 3.1 Alternative 1A – Widening to the Outside on IR 70 (2 WB through lanes)

Key Features of Alternative 1A include:

- At the west end of the project limits (the Fairfield County Line) the project aligns with project FRA-70-22.85, PID 98232, designed by EMH&T. At the tie-in point IR 70 will feature four 12' lanes with 10' paved inside and outside shoulders in the eastbound and westbound directions. The median width measured from inside shoulder to inside shoulder is 40'.
- The majority of the pavement widening will be completed to the outside along IR 70, but limited widening will be required to the inside to increase the inside paved shoulder width to 10' to avoid the need for a design exception for shoulder width. The inside shoulder widening is estimated to be 7' wide in both the eastbound and westbound directions.
- The existing profile on IR 70 will be largely maintained in both the eastbound and westbound directions. Slight changes to the profile may occur due to variable thickness milling and overlays being necessary to shift the locations of the pavement crowns. The existing mainline pavement will be salvaged as much as feasible as both a cost savings measure and to simplify the maintenance of traffic.

IR 70 Eastbound:

- The work on IR 70 eastbound is identical for Alternatives 1A and 1C and details are below.
- From the western project limits to the SR 256 eastbound exit ramp, the pavement widening on the south side of IR 70 will vary in width from 22' at the west end to 105' at the ramp gore. Concrete barrier will be installed from the ramp gore at SR 256 through the proposed Taylor Road interchange area to separate the mainline IR 70 traffic from the proposed CD road.
- The existing mainline structure over Blacklick Creek will require, at a minimum, superstructure replacement and widening, with full replacement of the structure also possible. This will be determined during the structure type study at the AER phase.
- The SR 256 & Taylor Road exit ramp from IR 70 will be three lanes at the ramp gore, and will widen to four lanes 100' east of the gore. Two lanes will exit onto SR 256 eastbound, the inside lane will continue as a CD lane to Taylor Road, and the other lane will run parallel to the CD road and will become the exit ramp onto SR 256 westbound.
- The construction of the CD road at the SR 256 interchange will require the existing structure on IR 70 over SR 256 to be widened from 78' to 109' at the east end of the bridge. Determination if the existing structure will be a superstructure replacement or full replacement will be done during the AER when the structure type study is completed.

- Additional details for the SR 256 westbound and eastbound exit ramps can be found under the description for Alternative 3A.
- From the SR 256 entrance ramp to the Taylor Road exit ramp, IR 70 and the CD road will be divided with concrete barrier. The widening on the south side of IR 70 will vary from 63' to 91', and the use of retaining walls to avoid impacts to the Motorcycle Hall of Fame property is likely.
- Several options for the proposed Taylor Road interchange are explored in this Feasibility Study, and details for them are found in the descriptions for Alternatives 2A through 2D. Depending on whether Taylor Road passes over or under IR 70 will dictate the scope of the bridge work required at the interchange. Estimated lengths and widths for the Taylor Road or IR 70 bridge options are also detailed in the descriptions for Alternatives 2A through 2D.
- At the Taylor Road interchange two options are detailed in Alternatives 3A and 3B for the merging of the CD road and the Taylor Road entrance ramp onto IR 70. Alternative 3A consists of the CD road merging with IR 70 as an add lane east of Taylor Road, and the single lane entrance ramp onto IR 70 from Taylor Road tying into IR 70 as an additional add lane running parallel to the CD road and continuing for approximately 1850' before it is merged into the CD road lane using a 600' taper.
- The CD road lane will continue an additional 2000' before it merges into IR 70 with a 600' taper. At this merge point the outside edge line for IR 70 will match the existing condition. To avoid IR 70 having merges on both the north and south sides of the road simultaneously, widening will be completed on the inside to carry three through lanes to the east beyond the merge of the CD road. This will require the widening or replacement of the existing structure over Palmer Road. For additional details, see sheet 17 of Appendix D.
- The additional through lane on the inside will merge the pavement down to the existing width using an 840' taper, which is the eastern terminus of the project.
- On Alternative 3B, the CD road will continue for 600' beyond the Taylor Road exit ramp gore where it will merge into IR 70 with a 1250' taper that ends 70' west of the gore area for the Taylor Road entrance ramp onto eastbound IR 70. The single lane entrance ramp onto IR 70 from Taylor Road will tie into IR 70 using a 1250' taper. At this merge point the outside edge line for IR 70 will match the existing condition. For additional details, see sheet 18 of Appendix D.

#### IR 70 Westbound:

- From the western project limits to the SR 256 entrance ramp, the pavement widening on the north side of IR 70 will vary in width from 22' at the west end to 73' at the ramp gore. An additional 7' of pavement widening on the south side of IR 70 will be required to increase the inside shoulder width to 10' to avoid a design exception for shoulder width.
- At the west end of the project IR 70 will be four lanes wide and tie into project FRA-70-22.85, PID 98232, designed by EMH&T. The proposed westbound CD road will merge onto IR 70 as an add lane, and east of the CD road merge, IR 70 westbound will be two through lanes to the eastern project limits.
- The existing mainline structure over Blacklick Creek will require several feet of widening to the inside to accommodate the 10' insider shoulder, and nearly 22' to accommodate the additional pavement required for the CD road and ramp modifications. Widening and superstructure replacement is required at a

minimum, with full replacement possible. This will be determined during the structure type study at the AER phase. Although Alternative 1A includes only two through lanes along IR 70 westbound, widening of the structures to accommodate three through lanes in the future is assumed.

- Additional details for the SR 256 entrance and exit ramps can be found under the description for Alternatives 4A and 4B.
- Two alternatives are detailed for the CD road between the SR 256 and Taylor Road interchanges; a dual-lane westbound CD road (Alternative 4A) and a single-lane westbound CD road (Alternative 4B). Both options will require the construction of concrete barrier between the CD road and IR 70, but the single lane option requires 8' less pavement widening. The single lane option will require a higher level of weaving traffic between the Taylor Road and SR 256 ramps.
- The inside shoulder widening on IR 70 westbound, combined with the construction of the westbound CD road will require, at a minimum, widening and replacement of the superstructure of the existing bridge over SR 256. Full replacement of the structure is possible and a determination would be made during the structure type study at the AER phase. Although Alternative 1A includes only two through lanes along IR 70 westbound, widening of the structures to accommodate three through lanes in the future is assumed.
- Alternatives 4A and 4B show westbound traffic on IR 70 wishing to exit at SR 256 being required to exit at the Taylor Road interchange, and completing the through movement at the intersection of the ramp and Taylor Road. While this reduces the pavement widening required on IR 70 within the Taylor Road interchange area, it does force additional traffic through the proposed signal at Taylor Road. However, Alternative 5B is a two lane exit ramp option for Taylor Road that begins the CD road east of the proposed Taylor Road overpass/underpass and eliminates the need for SR 256 traffic to exit at Taylor Road. The traffic benefits of the CD road are mixed; it does reduce the amount of traffic at the ramp intersection, but requires all traffic from both the CD road and the Taylor Road entrance ramp to complete the weave movement in a distance of 1660'. It also results in a longer bridge on Taylor Road in the overpass condition, or a wider bridge on IR 70 in the underpass condition. It also requires roughly 1500' of extra pavement widening work on the north side of IR 70.
- Details for the required bridge work at the Taylor Road interchange are found in Alternatives 2A through 2D.
- **The construction cost for Alternative 1A is \$55.77 million in 2022 dollars.**

### 3.2 Alternative 1B - Widening to the Inside on IR 70

Key Features of Alternative 1B include:

- At the west end of the project limits (the Fairfield County Line) the project aligns with project FRA-70-22.85, PID 98232, designed by EMH&T. At the tie-in point IR 70 will feature four 12' lanes with 10' paved inside and outside shoulders in the eastbound and westbound directions. The median width measured from inside shoulder to inside shoulder is 40'
- At the western project limits the eastbound and westbound lanes of IR 70 will begin a 1450' shift toward the inside that eliminates the 40' median. Eastbound and westbound traffic will be divided with a concrete median barrier. Because of the existing superelevation along IR 70, some sections of the barrier will need to be "As Per Plan" and have a designed footer because the elevation difference between the



eastbound and westbound lanes exceeds the maximum allowed for standard barrier. Inside shoulder widths will be maintained at 10' from the edge of traveled way to the face of the concrete barrier. The edge of traveled way will be a 12' offset from the centerline in both the eastbound and westbound direction.

- Elimination of the grass median between the eastbound and westbound lanes will require the installation of median barrier inlets and a trunk sewer installed for the entire length of the project which adds significant cost compared to the outside widening only.
- While widening the pavement to the inside will limit the amount of widening required to the outside in both the eastbound and westbound directions, a substantial amount of widening to the outside will be required for the construction of the CD roads, SR 256 ramps, and Taylor Road ramps. Details on the widths of widening required are provided in subsequent sections.
- The existing profile on IR 70 will be largely maintained in both the eastbound and westbound directions. Slight changes to the profile may occur due to variable thickness milling and overlays being necessary to shift the locations of the pavement crowns. The existing mainline pavement will be salvaged as much as feasible as both a cost savings measure, and to simplify the maintenance of traffic.
- Variable thickness milling and overlay work will need to be completed in both the eastbound and westbound directions to shift the pavement crown to the inside. While this work is feasible, it adds a significant level of complexity in both construction and maintenance of traffic effort.

#### IR 70 Eastbound:

- From the western project limits to the SR 256 eastbound exit ramp, the pavement widening on the south side of IR 70 will vary in width from 22' at the west end to 125' at the ramp gore. Concrete barrier will be installed from the ramp gore at SR 256 through the proposed Taylor Road interchange area to separate the mainline IR 70 traffic from the proposed CD road.
- The existing mainline structure over Blacklick Creek may require full replacement. The amount of widening required on both sides of the structure could make widening unfeasible or cost prohibitive. This will be determined during the structure type study at the AER phase.
- The SR 256 & Taylor Road exit ramp from IR 70 will be three lanes at the ramp gore, and will widen to four lanes 100' east of the gore. Two lanes will exit onto SR 256 southbound, the inside lane will continue as a CD lane to Taylor Road, and the other lane will run parallel to the CD road and will become the exit ramp onto SR 256 westbound.
- The construction of the CD road at the SR 256 interchange will require the existing structure on IR 70 over SR 256 to be reconstructed and widened from 78' to 116' at the east end of the bridge. Determination if the existing structure will be a superstructure replacement or full replacement will be done during the AER when the structure type study is completed.
- Additional details for the SR 256 westbound and eastbound exit ramps can be found under the description for Alternative 3A.
- From the SR 256 entrance ramp to the Taylor Road exit ramp, IR 70 and the CD road will be divided with concrete barrier. The widening on the south side of IR 70 will vary from 39' to 78', and the use of retaining walls to avoid impacts to the Motorcycle Hall of Fame property is likely.

- Several options for the proposed Taylor Road interchange are explored in this Feasibility Study, and details for them are found in the descriptions for Alternatives 2A through 2D. Depending on whether Taylor Road passes over or under IR 70 will dictate the scope of the bridge work required at the interchange. Estimated lengths and widths for the Taylor Road or IR 70 bridge options are also detailed in the descriptions for Alternatives 2A through 2D.
- At the Taylor Road interchange two options are detailed in Alternatives 3A and 3B for the merging of the CD road and the Taylor Road entrance ramp onto IR 70. Alternative 3A consists of the CD road merging with IR 70 as an add lane east of Taylor Road, and the single lane entrance ramp onto IR 70 from Taylor Road tying into IR 70 as a second add lane running parallel to the CD road and continuing for approximately 1850' before it is merged into the CD road lane using a 600' taper.
- The CD road lane will continue an additional 2000' before it merges into IR 70 with a 600' taper. At this merge point the outside edge line for IR 70 will match the existing condition. To avoid IR 70 having merges on both the north and south sides of the road simultaneously, widening will be completed on the inside to carry three through lanes to the east beyond the merge of the CD road. This will require the widening or replacement of the existing structure over Palmer Road. For additional details, see sheet 17 of Appendix D.
- The additional through lane on the inside will merge the pavement down to the existing width using an 840' taper, which is the eastern terminus of the project.
- On Alternative 3B, the CD road will continue for 600' beyond the Taylor Road exit ramp gore where it will merge into IR 70 with a 1250' taper that ends 70' west of the gore area for the Taylor Road entrance ramp onto eastbound IR 70. The single lane entrance ramp onto IR 70 from Taylor Road will tie into IR 70 using a 1250' taper. At this merge point the outside edge line for IR 70 will match the existing condition. For additional details, see sheet 18 of Appendix D.

#### IR 70 Westbound:

- From the western project limits to the SR 256 entrance ramp, the pavement widening on the north side of IR 70 will vary in width from 22' at the west end to 70' at the ramp gore.
- The existing mainline structure over Blacklick Creek will require several feet of widening to the inside to accommodate the 10' insider shoulder, and nearly 22' on the outside to accommodate the additional pavement required for the CD road and ramp modifications. Widening and superstructure replacement, or full replacement will be determined during the structure type study at the AER phase.
- Additional details for the SR 256 entrance and exit ramps can be found under the description for Alternatives 4A and 4B.
- The construction of the CD road and pavement widening to the inside on IR 70 will require the existing structure on IR 70 over SR 256 to be reconstructed and widened. Determination if the existing structure will be a superstructure replacement or full replacement will be done during the AER when the structure type study is completed.
- Two alternatives are detailed for the CD road between the SR 256 and Taylor Road interchanges; a dual-lane westbound CD road (Alternative 4A) and a single-lane westbound CD road (Alternative 4B). Both options will require the construction of concrete barrier between the CD road and IR 70, but the single

lane option requires 8' fewer of pavement widening. The single lane option will require a higher level of weaving traffic between the Taylor Road and SR 256 ramps.

- Alternatives 4A and 4B show westbound traffic on IR 70 wishing to exit at SR 256 being required to exit at the Taylor Road interchange, and completing the through movement at intersection of the ramp and Taylor Road. While this reduces the pavement widening required on IR 70 within the Taylor Road interchange area, it does force additional traffic through the proposed signal at Taylor Road. However, Alternative 5B is a two lane exit ramp option for Taylor Road that begins the CD road east of the proposed Taylor Road overpass/underpass and eliminates the need for SR 256 traffic to exit at Taylor Road. The traffic benefits of the CD road are mixed; it does reduce the amount of traffic at the ramp intersection, but requires all traffic from both the CD road and the Taylor Road entrance ramp to complete the weave movement in a distance of 1660'. It also results in a longer bridge on Taylor Road in the overpass condition, or a wider bridge on IR 70 in the underpass condition. It also requires roughly 1500' of extra pavement widening work on the north side of IR 70.
- Details for the required bridge work at the Taylor Road interchange are found in Alternatives 2A through 2D.
- **The construction cost for Alternative 1B is \$67.71 million in 2022 dollars.**

### 3.3 Alternative 1C – Widening to the Outside on IR 70 (3 WB through lanes)

Key Features of Alternative 1C include:

- At the west end of the project limits (the Fairfield County Line) the project aligns with project FRA-70-22.85, PID 98232, designed by EMH&T. At the tie-in point IR 70 will feature four 12' lanes with 10' paved inside and outside shoulders in the eastbound and westbound directions. The median width measured from inside shoulder to inside shoulder is 40'.
- The majority of the pavement widening will be completed to the outside along IR 70, but limited widening will be required to the inside to increase the inside paved shoulder width to 10' to avoid the need for a design exception for shoulder width. In the eastbound direction, the inside shoulder widening is estimated to be 7' wide. In the westbound direction, the widening is estimated to be 7' from the western project limits to the SR 256 overpass, and then increase to 22' for the remainder of the project.
- The existing profile on IR 70 will be largely maintained in both the eastbound and westbound directions. Slight changes to the profile may occur due to variable thickness milling and overlays being necessary to shift the locations of the pavement crowns. The existing mainline pavement will be salvaged as much as feasible as both a cost savings measure and to simplify the maintenance of traffic.

IR 70 Eastbound:

- The work on IR 70 eastbound is identical for Alternatives 1A and 1C and details are below.
- From the western project limits to the SR 256 eastbound exit ramp, the pavement widening on the south side of IR 70 will vary in width from 22' at the west end to 105' at the ramp gore. Concrete barrier will be installed from the ramp gore at SR 256 through the proposed Taylor Road interchange area to separate the mainline IR 70 traffic from the proposed CD road.



- The existing mainline structure over Blacklick Creek will require, at a minimum, superstructure replacement and widening, with full replacement of the structure also possible. This will be determined during the structure type study at the AER phase.
- The SR 256 & Taylor Road exit ramp from IR 70 will be three lanes at the ramp gore, and will widen to four lanes 100' east of the gore. Two lanes will exit onto SR 256 eastbound, the inside lane will continue as a CD lane to Taylor Road, and the other lane will run parallel to the CD road and will become the exit ramp onto SR 256 westbound.
- The construction of the CD road at the SR 256 interchange will require the existing structure on IR 70 over SR 256 to be widened from 78' to 109' at the east end of the bridge. Determination if the existing structure will be a superstructure replacement or full replacement will be done during the AER when the structure type study is completed.
- Additional details for the SR 256 westbound and eastbound exit ramps can be found under the description for Alternative 3A.
- From the SR 256 entrance ramp to the Taylor Road exit ramp, IR 70 and the CD road will be divided with concrete barrier. The widening on the south side of IR 70 will vary from 63' to 91', and the use of retaining walls to avoid impacts to the Motorcycle Hall of Fame property is likely.
- Several options for the proposed Taylor Road interchange are explored in this Feasibility Study, and details for them are found in the descriptions for Alternatives 2A through 2D. Depending on whether Taylor Road passes over or under IR 70 will dictate the scope of the bridge work required at the interchange. Estimated lengths and widths for the Taylor Road or IR 70 bridge options are also detailed in the descriptions for Alternatives 2A through 2D.
- At the Taylor Road interchange two options are detailed in Alternatives 3A and 3B for the merging of the CD road and the Taylor Road entrance ramp onto IR 70. Alternative 3A consists of the CD road merging with IR 70 as an add lane east of Taylor Road, and the single lane entrance ramp onto IR 70 from Taylor Road tying into IR 70 as an additional add lane running parallel to the CD road and continuing for approximately 1850' before it is merged into the CD road lane using a 600' taper.
- The CD road lane will continue an additional 2000' before it merges into IR 70 with a 600' taper. At this merge point the outside edge line for IR 70 will match the existing condition. To avoid IR 70 having merges on both the north and south sides of the road simultaneously, widening will be completed on the inside to carry three through lanes to the east beyond the merge of the CD road. This will require the widening or replacement of the existing structure over Palmer Road. For additional details, see sheet 17 of Appendix D.
- The additional through lane on the inside will merge the pavement down to the existing width using an 840' taper, which is the eastern terminus of the project.
- On Alternative 3B, the CD road will continue for 600' beyond the Taylor Road exit ramp gore where it will merge into IR 70 with a 1250' taper that ends 70' west of the gore area for the Taylor Road entrance ramp onto eastbound IR 70. The single lane entrance ramp onto IR 70 from Taylor Road will tie into IR 70 using a 1250' taper. At this merge point the outside edge line for IR 70 will match the existing condition. For additional details, see sheet 18 of Appendix D.

#### IR 70 Westbound:

- The widening work on the outside of the pavement is identical for Alternative 1A and 1C. However, on Alternative 1A, the westbound CD road becomes an add lane on IR 70 westbound, and from that point to the west IR 70 is three through lanes. To the east of that point, IR 70 westbound is two through lanes to the eastern project limits. On Alternative 1C, the westbound CD road merges with the outside lane of IR 70 westbound, but to the east IR 70 remains three through lanes to the eastern project limits. All other details are below.
- From the western project limits to the SR 256 entrance ramp, the pavement widening on the north side of IR 70 will vary in width from 22' at the west end to 73' at the ramp gore. From the western project limits to 900' west of the SR 256 bridge, an additional 7' of pavement widening on the south side of IR 70 will be required to increase the inside shoulder width to 10' to avoid a design exception for shoulder width. From the above-mentioned point to the eastern project limits, 22' of pavement widening on the south side of IR 70 will be required to maintain three through lanes along IR 70 and a 10' inside shoulder.
- At the west end of the project IR 70 will be four lanes wide and tie into project FRA-70-22.85, PID 98232, designed by EMH&T. The proposed westbound CD road will merge into the outside lane of IR 70, and east of the CD road merge, IR 70 westbound will be three through lanes to the eastern project limits.
- The existing mainline structure over Blacklick Creek will require several feet of widening to the inside to accommodate the 10' insider shoulder, and nearly 22' to the outside to accommodate the additional pavement required for the CD road and ramp modifications. Widening and superstructure replacement is required at a minimum, with full replacement possible. This will be determined during the structure type study at the AER phase.
- Additional details for the SR 256 entrance and exit ramps can be found under the description for Alternatives 4A and 4B.
- Two alternatives are detailed for the CD road between the SR 256 and Taylor Road interchanges; a dual-lane westbound CD road (Alternative 4A) and a single-lane westbound CD road (Alternative 4B). Both options will require the construction of concrete barrier between the CD road and IR 70, but the single lane option requires 8' less pavement widening. The single lane option will require a higher level of weaving traffic between the Taylor Road and SR 256 ramps.
- The additional through lane on IR 70 and inside shoulder widening on IR 70 westbound, combined with the construction of the westbound CD road will require, at a minimum, widening and replacement of the superstructure of the existing bridge over SR 256. Full replacement of the structure is possible and a determination would be made during the structure type study at the AER phase.
- Alternatives 4A and 4B show westbound traffic on IR 70 wishing to exit at SR 256 being required to exit at the Taylor Road interchange, and completing the through movement at the intersection of the ramp and Taylor Road. While this reduces the pavement widening required on IR 70 within the Taylor Road interchange area, it does force additional traffic through the proposed signal at Taylor Road. However,





Alternative 5B is a two lane exit ramp option for Taylor Road that begins the CD road east of the proposed Taylor Road overpass/underpass and eliminates the need for SR 256 traffic to exit at Taylor Road. The traffic benefits of the CD road are mixed; it does reduce the amount of traffic at the ramp intersection, but requires all traffic from both the CD road and the Taylor Road entrance ramp to complete the weave movement in a distance of 1660'. It also results in a longer bridge on Taylor Road in the overpass condition, or a wider bridge on IR 70 in the underpass condition. It also requires roughly 1500' of extra pavement widening work on the north side of IR 70.

- Details for the required bridge work at the Taylor Road interchange are found in Alternatives 2A through 2D.
- **The construction cost for Alternative 1C is \$56.77 million in 2022 dollars.**

### **3.4 Alternative 2A – Diamond Interchange at Taylor Road along existing alignment (under IR 70)**

Key Features of Alternative 2A include:

- The existing horizontal alignment along Taylor Road north and south of IR 70 will be maintained and a tangent section between the two sections established. The intersection angle between the proposed section of Taylor Road and IR 70 will be 68°38'10".
- Two new IR 70 structures will be constructed over the proposed Taylor Road with a vertical clearance of 16.5' required. Preliminary estimates for the proposed IR 70 bridges show a span of approximately 125' in both the eastbound and westbound directions. The westbound structure width is estimated to be 60', and the eastbound structure will likely vary in width from 85' to 88'. Structure type studies for the proposed bridges will be completed during the AER phase.
- Taylor Road will widen from a single lane in each direction at the north and south work limits to two through lanes throughout the interchange area. Detailed descriptions for the required turn lanes are below.
- At the Taylor Road & SR 204 intersection, a 100' northbound left turn lane onto westbound SR 204 will be added, and a single combined through-right lane will carry northbound traffic on Taylor Road.
- The west leg of SR 204 will feature a 405' taper that widens the roadway from two lanes to three lanes to construct an eastbound left turn lane onto northbound Taylor Road. The left turn lane will have a total length of 225' including taper.
- The east leg of SR 204 will also feature a 405' taper that widens the roadway from two to three lanes, in addition, a 50' taper for westbound traffic will widen the roadway to four lanes to provide dedicated left, through, and right turn lanes at the Taylor Road intersection. The left and right turn lanes will have a length of 225' including taper.
- The north leg of the Taylor Road & SR 204 intersection will go from one through lane to two in the northbound direction immediately north of the intersection. In the southbound direction the inside through lane will become a drop left onto SR 204, and a single through lane will carry through the intersection. Additionally, a 615' right turn lane (including 50' taper) onto SR 204 westbound will be present.



- The drive for the former Wigwam Event Center (now owned by Violet Township) will be reconstructed, and the existing right-in intersection at Taylor Road & Haaf Farm Drive will be replaced with a right-in, right-out intersection. Full access is not being provided to limit cut-through traffic on Haaf Farm Drive. From discussions with ODOT District 5, there is potential for private development to be constructed on the Violet Township parcel in the future. Considerations for additional access to this property will be made during the detailed design of the project.
- From the Haaf Farm Drive intersection to the eastbound IR 70 exit and entrance ramps, Taylor Road will be two lanes in each direction, and a variable width (10' minimum to 30' maximum) raised concrete median will be constructed dividing the northbound and southbound lanes. The median is required because of turn lanes within the interchange area.
- At the Taylor Road and IR 70 eastbound ramp intersection, a 600' right turn lane onto eastbound IR 70 will be constructed along northbound Taylor Road. The entrance ramp onto IR 70 eastbound will be a single 16' lane.
- The exit ramp to Taylor Road from eastbound IR 70 will be a two-lane ramp, with an additional lane developed approximately 450' west of the intersection. The exit ramp will feature a single left turn lane onto northbound Taylor Road, a through-right, and a dedicated right turn lane onto southbound Taylor Road.
- North of the eastbound IR 70 ramps a 425' (including 50' taper) single left turn lane from southbound Taylor Road onto eastbound IR 70 will be used. A 4' concrete median will divide northbound and southbound traffic, and the northbound left turn lane for westbound IR 70 will begin immediately north of the intersection.
- The total pavement width along Taylor Road between the eastbound and westbound IR 70 ramps is 78'.
- At the Taylor Road and IR 70 westbound ramp intersection, dual left-turn lanes will be present on Taylor Road for the westbound IR 70 entrance ramp. A 4' median will divide northbound and southbound traffic on Taylor Road.
- The entrance ramp onto westbound IR 70 will be two lanes; in Alternative 4A the ramp will remain two lanes with the outside lane becoming an exit only onto SR 256, and the inside lane continuing as the CD road to IR 70. In Alternative 4B, the two lane ramp from Taylor Road will taper down to one lane and then split back to two lanes east of the SR 256 exit ramp.
- In Alternative 5A, the exit ramp from IR 70 westbound onto Taylor Road will be a single 16' lane, but will widen to two lanes approximately 500' east of the intersection. The ramp will utilize a dedicated left turn lane onto southbound Taylor Road and a combined through-right. Alternative 5B would have the exit ramp be two lanes with the outside lane exiting onto Taylor Road and the inside lane continuing as a CD road to SR 256.
- North of the IR 70 westbound ramps, Taylor Road will continue with two through lanes in the northbound direction. The inside through lane will become a dedicated left turn lane at the realigned intersection with Taylor Road SW.
- Southbound traffic on Taylor Road will go from one lane to two 300' south of the realigned intersection with Taylor Road SW. The inside lane will be a through, and the outside lane a through-right for traffic entering IR 70 westbound.

- Between the IR 70 westbound ramps and the realigned Taylor Road SW intersection, northbound and southbound traffic on Taylor Road will be divided by a concrete median. This median varies in width from 30' at the IR 70 westbound ramps to 4' at the Taylor Road SW intersection.
- Taylor Road SW will be realigned with a curve (150' radius) to intersect Taylor Road at a 90° angle. The realigned intersection will be signalized and have dedicated left and right turn lanes onto Taylor Road.
- North of the Taylor Road SW intersection, Taylor Road will be a three lane section with a dedicated left turn lane into Slate Ridge Elementary School. North of the school entrance the project terminates and will match the existing three-lane pavement section.
- A 10' shared use path will be constructed on the east side of Taylor Road along the entire work limits.
- New traffic signals will be installed at the Taylor Road & SR 204 intersection, the Taylor Road & eastbound IR 70 ramp intersection, the Taylor Road & westbound IR 70 ramp intersection, and the realigned Taylor Road & Taylor Road SW intersection.
- Information regarding the required retaining walls for Alternative 2A can be found in **Section 4.8**.
- The vertical profile of Taylor Road will match existing from the work limits at the south end of the project to where the horizontal shift to the east begins. A 350' crest vertical curve, followed by a -2.06% grade for 990' will get the proposed profile under IR 70 and establish a minimum 16.5' vertical clearance between the roadway surface and the proposed twin structures on IR 70.
- The maximum cut depth immediately south of IR 70 is approximately 29.5'.
- A 510' sag vertical curve under IR 70 will be followed by a +4.60% vertical grade for 672' bringing Taylor Road back up to the existing grade, which is 100' south of the realigned intersection with Taylor Road SW. The profile of Taylor Road will then match the existing grade to the end of the northern work limits.
- **The construction cost for Alternative 2A is \$40.74 million in 2022 dollars.**

### 3.5 Alternative 2B – Diamond Interchange at Taylor Road shifted to the east (under IR 70)

Key Features of Alternative 2B include:

- Horizontal alignment of Taylor Road shifted 110' east through the use of reverse curves with a degree of curvature of 5°30' (maximum degree of curvature permitted without the use of superelevation). Proposed horizontal alignment is tangent over IR 70 with an intersection angle of 68°43'42".
- Two new IR 70 structures will be constructed over the proposed Taylor Road with a vertical clearance of 16.5' required. Preliminary estimates for the proposed IR 70 bridges show a span of approximately 125' in both the eastbound and westbound directions. The westbound structure width is estimated to be 60', and the eastbound structure will likely vary in width from 85' to 88'. Structure type studies for the proposed bridges will be completed during the AER phase.
- Taylor Road will widen from a single lane in each direction at the north and south work limits to two through lanes throughout the interchange area. Detailed descriptions for the required turn lanes are below.
- At the Taylor Road & SR 204 intersection, a 100' northbound left turn lane onto westbound SR 204 will be added, and a single combined through-right lane will carry northbound traffic on Taylor Road.



- The west leg of SR 204 will feature a 405' taper that widens the roadway from two lanes to three lanes to construct an eastbound left turn lane onto northbound Taylor Road. The left turn lane will have a total length of 225' including 50' taper.
- The east leg of SR 204 will also feature a 405' taper that widens the roadway from two to three lanes, but in addition a 50' taper for westbound traffic will widen the roadway to four lanes to provide dedicated left, through, and right turn lanes at the Taylor Road intersection. The left and right turn lanes will have a length of 225' including 50' taper.
- The north leg of the Taylor Road & SR 204 intersection will go from one through lane to two in the northbound direction immediately north of the intersection. In the southbound direction the inside through lane will become a drop left onto SR 204, and a single through lane will carry through the intersection. Additionally, a 615' right turn lane (including 50' taper) onto SR 204 westbound will be utilized.
- The drive for the former Wigwam Event Center (now owned by Violet Township) will be reconstructed, and the existing right-in intersection at Taylor Road & Haaf Farm Drive will be replaced with a right-in, right-out intersection. Full access is not being provided to limit cut-through traffic on Haaf Farm Drive. From discussions with ODOT District 5, there is potential for private development to be constructed on the Violet Township parcel in the future. Considerations for additional access to this property will be made during the detailed design of the project.
- From the Haaf Farm Drive intersection to the eastbound IR 70 exit and entrance ramps, Taylor Road will be two lanes in each direction, and a 30' raised concrete median will be constructed dividing the northbound and southbound lanes. The median is required because of turn lanes within the interchange area.
- At the Taylor Road and IR 70 eastbound ramp intersection, a 600' right turn lane onto eastbound IR 70 will be constructed along northbound Taylor Road. The entrance ramp onto IR 70 eastbound will be a single 16' lane.
- The exit ramp to Taylor Road from eastbound IR 70 will be a two-lane ramp, with an additional lane developed approximately 450' west of the intersection. The exit ramp will feature a single left turn lane onto northbound Taylor Road, a through-right, and a dedicated right turn lane onto southbound Taylor Road.
- North of the eastbound IR 70 ramps a 425' (including 50' taper) single left turn lane from southbound Taylor Road onto eastbound IR 70 will be used. A 4' concrete median will divide northbound and southbound traffic, and the northbound left turn lane for westbound IR 70 will begin immediately north of the intersection.
- The total pavement width along Taylor Road between the eastbound and westbound IR 70 ramps is 78'.
- At the Taylor Road and IR 70 westbound ramp intersection, dual left-turn lanes will be present on Taylor Road for the westbound IR 70 entrance ramp. A 4' median will divide northbound and southbound traffic on Taylor Road.
- The entrance ramp onto westbound IR 70 will be two lanes; in Alternative 4A the ramp will remain two lanes with the outside lane becoming an exit only onto SR 256, and the inside lane continuing as the CD



road to IR 70. In Alternative 4B, the two lane ramp from Taylor Road will taper down to one lane and then split back to two lanes east of the SR 256 exit ramp.

- In Alternative 5A, the exit ramp from IR 70 westbound onto Taylor Road will be a single 16' lane, but will widen to two lanes approximately 500' east of the intersection. The ramp will utilize a dedicated left turn lane onto southbound Taylor Road and a combined through-right. Alternative 5B would have the exit ramp be two lanes with the outside lane exiting onto Taylor Road and the inside lane continuing as a CD road to SR 256.
- North of the IR 70 westbound ramps, Taylor Road will continue with two through lanes in the northbound direction. The inside through lane will become a dedicated left turn lane at the realigned intersection with Taylor Road SW.
- Southbound traffic on Taylor Road will go from one lane to two 300' south of the realigned intersection with Taylor Road SW. The inside lane will be a through, and the outside lane a through-right for traffic wishing to enter IR 70 westbound.
- Between the IR 70 westbound ramps and the realigned Taylor Road SW intersection, northbound and southbound traffic on Taylor Road will be divided by a concrete median. This median varies in width from 30' at the IR 70 westbound ramps to 4' at the Taylor Road SW intersection.
- Taylor Road SW will be realigned with a curve (150' radius) to intersect Taylor Road at a 90° angle. The realigned intersection will be signalized and have dedicated left and right turn lanes onto Taylor Road.
- North of the Taylor Road SW intersection, Taylor Road will be a three lane section with a dedicated left turn lane into Slate Ridge Elementary School. North of the school entrance the project terminates and will match the existing three-lane pavement section.
- A 10' shared use path will be constructed on the east side of Taylor Road along the entire work limits.
- New traffic signals will be installed at the Taylor Road & SR 204 intersection, the Taylor Road & eastbound IR 70 ramp intersection, the Taylor Road & westbound IR 70 ramp intersection, and the realigned Taylor Road & Taylor Road SW intersection.
- The vertical profile of Taylor Road will match existing from the work limits at the south end of the project to where the horizontal shift to the east begins. A 250' crest vertical curve, followed by a -1.80% grade for 1100' will get the proposed profile under IR 70 and establish a minimum 16.5' vertical clearance between the roadway surface and the proposed twin structures on IR 70.
- The maximum cut depth immediately south of IR 70 is approximately 27'.
- A 510' sag vertical curve under IR 70 will be followed by a +4.50% vertical grade for 615' bringing Taylor Road back up to the existing grade, which is approximately 100' south of the realigned intersection with Taylor Road SW. The profile of Taylor Road will then match the existing grade to the end of the northern work limits.
- **The construction cost for Alternative 2B is \$45.16 million in 2022 dollars.**

### **3.6 Alternative 2C – Diamond Interchange at Taylor Road shifted to the east (over IR 70)**

Key Features of Alternative 2C include:



- Horizontal alignment of Taylor Road shifted 110' east through the use of reverse curves with a degree of curvature of  $5^{\circ}30'$  (maximum degree of curvature permitted without the use of superelevation). Proposed horizontal alignment is tangent over IR 70 with an intersection angle of  $68^{\circ}43'42''$ .
- A single new structure on Taylor Road will be constructed over IR 70. The proposed structure is estimated to have a span length of 245' and a total bridge width of 101'. A minimum of 16.5' of vertical clearance will be required over IR 70, and a structure type study for the proposed bridge will be completed during the AER phase.
- Taylor Road will widen from a single lane in each direction at the north and south work limits to two through lanes throughout the interchange area. Detailed descriptions for the required turn lanes are below.
- At the Taylor Road & SR 204 intersection, a 100' northbound left turn lane onto westbound SR 204 will be added, and a single combined through-right lane will carry northbound traffic on Taylor Road.
- The west leg of SR 204 will feature a 405' taper that widens the roadway from two lanes to three lanes to construct an eastbound left turn lane onto northbound Taylor Road. The left turn lane will have a total length of 225' including 50' taper.
- The east leg of SR 204 will also feature a 405' taper that widens the roadway from two to three lanes, but in addition, a 50' taper for westbound traffic will widen the roadway to four lanes to provide dedicated left, through, and dual right turn lanes at the Taylor Road intersection. The left and right turn lanes will have a length of 225' including 50' taper.
- The north leg of the Taylor Road & SR 204 intersection will go from one through lane to two in the northbound direction immediately north of the intersection. In the southbound direction the inside through lane will become a drop left onto SR 204, and a single through lane will carry through the intersection. Additionally, a 615' right turn lane (including 50' taper) onto SR 204 westbound will be present.
- The drive for the former Wigwam Event Center (now owned by Violet Township) will be reconstructed, and the existing right-in intersection at Taylor Road & Haaf Farm Drive will be replaced with a right-in, right-out intersection. Full access is not being provided to limit cut-through traffic on Haaf Farm Drive. From discussions with ODOT District 5, there is potential for private development to be constructed on the Violet Township parcel in the future. Considerations for additional access to this property will be made during the detailed design of the project.
- From the Haaf Farm Drive intersection to the eastbound IR 70 exit and entrance ramps, Taylor Road will be two lanes in each direction, and a 30' raised concrete median will be constructed dividing the northbound and southbound lanes. The median is required because of turn lanes within the interchange area.
- At the Taylor Road and IR 70 eastbound ramp intersection, a 600' right turn lane onto eastbound IR 70 will be constructed along northbound Taylor Road. The entrance ramp onto IR 70 eastbound will be a single 16' lane.
- The exit ramp to Taylor Road from eastbound IR 70 will be a two-lane ramp, with an additional lane developed approximately 450' west of the intersection. The exit ramp will feature a single left turn lane



onto northbound Taylor Road, a through-right, and a dedicated right turn lane onto southbound Taylor Road.

- North of the eastbound IR 70 ramps a 425' (including taper) single left turn lane from Taylor Road southbound onto eastbound IR 70 will be used. A 4' concrete median will divide northbound and southbound traffic, and the northbound left turn lane for westbound IR 70 will begin immediately north of the intersection.
- The total pavement width along Taylor Road between the eastbound and westbound IR 70 ramps is 78'.
- At the Taylor Road and IR 70 westbound ramp intersection, dual left-turn lanes will be present on Taylor Road for the westbound IR 70 entrance ramp. A 4' median will divide northbound and southbound traffic on Taylor Road.
- The entrance ramp onto westbound IR 70 will be two lanes; in Alternative 4A the ramp will remain two lanes with the outside lane becoming an exit only onto SR 256, and the inside lane continuing as the CD road to IR 70. In Alternative 4B, the two lane ramp from Taylor Road will taper down to one lane and then split back to two lanes east of the SR 256 exit ramp.
- In Alternative 5A, the exit ramp from IR 70 westbound onto Taylor Road will be a single 16' lane, but will widen to two lanes approximately 500' east of the intersection. The ramp will utilize a dedicated left turn lane onto southbound Taylor Road and a combined through-right. Alternative 5B would have the exit ramp be two lanes with the outside lane exiting onto Taylor Road and the inside lane continuing as a CD road to SR 256.
- North of the IR 70 westbound ramps, Taylor Road will continue with two through lanes in the northbound direction. The inside through lane will become a dedicated left turn lane at the realigned intersection with Taylor Road SW.
- Southbound traffic on Taylor Road will go from one lane to two lanes 300' south of the realigned intersection with Taylor Road SW. The inside lane will be a through, and the outside lane a through-right for traffic wishing to enter IR 70 westbound.
- Between the IR 70 westbound ramps and the realigned Taylor Road SW intersection, northbound and southbound traffic on Taylor Road will be divided by a concrete median. This median varies in width from 30' at the IR 70 westbound ramps to 4' at the Taylor Road SW intersection.
- Taylor Road SW will be realigned with a curve (150' radius) to intersect Taylor Road at a 90° angle. The realigned intersection will be signalized and have dedicated left and right turn lanes onto Taylor Road.
- North of the Taylor Road SW intersection, Taylor Road will be a three lane section with a dedicated left turn lane into Slate Ridge Elementary School. North of the school entrance the project terminates and will match the existing three-lane pavement section.
- A 10' shared use path will be constructed on the east side of Taylor Road along the entire work limits.
- New traffic signals will be installed at the Taylor Road & SR 204 intersection, the Taylor Road & eastbound IR 70 ramp intersection, the Taylor Road & westbound IR 70 ramp intersection, and the realigned Taylor Road & Taylor Road SW intersection.
- The vertical profile of Taylor Road will match existing from the work limits at the south end of the project to where the horizontal shift to the east begins. The existing grade on Taylor Road (+1.95%) will continue to a 400' crest vertical curve over IR 70.

- The maximum fill depth immediately south of IR 70 is approximately 20’.
- The crest vertical curve over IR 70 will be followed by a -4.00% grade for 105’, followed by a 450’ sag vertical curve. Maximum fill heights along the sag vertical curve will exceed 45’, and will be dependent on the structure type selected for the crossing over the Blacklick Creek Tributary.
- North of the sag vertical curve, the grade along Taylor Road will match existing to the northern work limits.
- **The construction cost for Alternative 2C is \$30.36 million in 2022 dollars.**

### 3.7 Alternative 2D – Diverging Diamond Interchange at Taylor Road shifted to the east (over or under IR 70)

Key Features of Alternative 2D include:

- Horizontal alignment of Taylor Road shifted 110’ east through the use of reverse curves with a degree of curvature of 5°30’ (maximum degree of curvature permitted without the use of superelevation). Proposed horizontal alignment is tangent over IR 70 with an intersection angle of 68°43’42”.
- Taylor Road will widen from a single lane in each direction at the north and south work limits to two through lanes throughout the interchange area. Detailed descriptions for the required turn lanes are below.
- At the Taylor Road & SR 204 intersection, a 100’ northbound left turn lane onto westbound SR 204 will be added, and a single combined through-right lane will carry northbound traffic on Taylor Road.
- The west leg of SR 204 will feature a 405’ taper that widens the roadway from two lanes to three lanes to construct an eastbound left turn lane onto northbound Taylor Road. The left turn lane will have a total length of 225’ including taper.
- The east leg of SR 204 will also feature a 405’ taper that widens the roadway from two to three lanes. In addition, a 50’ taper for westbound traffic will widen the roadway to four lanes to provide dedicated left, through, and right turn lanes at the Taylor Road intersection. The left and right turn lanes will have a length of 225’ including taper.
- The north leg of the Taylor Road & SR 204 intersection will go from one through lane to two in the northbound direction immediately north of the intersection. In the southbound direction the inside through lane will become a drop left onto SR 204, and a single through lane will carry through the intersection. A 615’ right turn lane (including 50’ taper) onto SR 204 westbound will be utilized.
- The drive for the former Wigwam Event Center (now owned by Violet Township) will be reconstructed, and the existing right-in intersection at Taylor Road & Haaf Farm Drive will be replaced with a right-in, right-out intersection. Full access is not being provided to limit cut-through traffic on Haaf Farm Drive. From discussions with ODOT District 5, there is potential for private development to be constructed on the Violet Township parcel in the future. Considerations for additional access to this property will be made during the detailed design of the project.
- From the Haaf Farm Drive intersection to the eastbound IR 70 exit and entrance ramps, Taylor Road will be two lanes in each direction, and an 18’ raised concrete median will be constructed dividing the northbound and southbound lanes. The 18’ median is required to establish the horizontal curvature required for the DDI.



- At the approach for the eastbound IR 70 ramps, northbound and southbound traffic will be crossed to the opposite side of the roadway via a two-phase signal at the Taylor Road and IR 70 ramp intersection. The eastbound IR 70 entrance ramp from northbound and southbound Taylor Road will be a continuous flow movement, and the two lanes will merge down to one before the ramp hits mainline IR 70.
- The eastbound exit ramp will be two lanes in the southbound direction and a single lane in the northbound direction. The turn lane lengths will be approximately 325'.
- Two through lanes on Taylor Road will be present between the eastbound and westbound IR 70 ramp intersections. The 10' shared use path will be between the northbound and southbound travel lanes of Taylor Road, which will be approximately 72' apart (measured from edge of traveled way).
- At the Taylor Road and IR 70 westbound intersection, the entrance ramp onto IR 70 westbound will be a continuous flow movement from northbound and southbound traffic on Taylor Road. The two lanes will merge down to one before the ramp hits mainline IR 70.
- The westbound exit ramp from IR 70 onto Taylor Road will be a single lane in both the northbound and southbound directions. Turn lane lengths will be approximately 310', and the movements controlled with the two-phase signal in sync with the crossing movement for Taylor Road.
- North of the westbound IR 70 ramps, the northbound and southbound Taylor Road through lanes will be divided by a variable width (72' maximum, 4' minimum) concrete median that terminates at the realigned Taylor Road SW intersection.
- Taylor Road SW will be realigned with a curve (150' radius) to intersect Taylor Road at a 90° angle. The realigned intersection will be signalized and have dedicated left and right turn lanes onto Taylor Road.
- North of the Taylor Road SW intersection, Taylor Road will be a three lane section with a dedicated left turn lane into Slate Ridge Elementary School. North of the school entrance the project terminates and will match the existing three-lane pavement section.
- Vertical profiles for the over and under options for the DDI were not established. The north and south work limits on Taylor Road are identical to the standard diamond options detailed above, so the same vertical profiles established for the over and under options of the standard diamond would be used.
- If the vertical profile of Taylor Road passes over IR 70, the bridge span length would be similar to what is detailed in Alternative 2B, but two separate bridges over IR 70 would be constructed, with the western bridge having a width of 68' and the eastern bridge having a width of 56'. If the vertical profile of Taylor Road passes under IR 70 the proposed IR 70 bridge width would match what is detailed in Alternative 2A, but the span lengths would increase to approximately 245'. It is unlikely the DDI alternative will be studied further at the AER phase, but if it does a structure type study would be completed for the proposed structures along Taylor Road or IR 70.
- **The construction cost for Alternative 2D is \$35.24 million in 2022 dollars and is based off of the DDI passing over IR 70.**

### 3.8 Alternative 3A - Dual-lane entrance for eastbound CD road along IR 70

Key Features of Alternative 3A include:

- The SR 256 eastbound ramp from IR 70 eastbound will consist of a three-lane exit ramp that utilizes a 50' taper immediately after the ramp gore to widen out to four total lanes. The two inside lanes will continue



as a CD road for the SR 256 westbound exit ramp as well as the Taylor Road interchange. The two outside lanes widen with a 50' taper to three lanes onto SR 256 eastbound and will be signalized at the intersection with SR 256.

- On the CD road over SR 256 the outside lane will be a single lane exit onto SR 256 westbound and will maintain the same horizontal geometry as the existing ramp. The ramp will utilize a 50' taper to go from one to two lanes similar to the existing condition, and will feature two dedicated right turn lanes onto SR 256 westbound.
- The construction of the CD road over SR 256 will require the widening or replacement of the existing structure on eastbound IR 70 over SR 256. The structure work will be required regardless of whether IR 70 is widened to the inside or outside.
- The inside lane of the CD road will continue to the Taylor Road interchange, and the IR 70 eastbound entrance ramp from SR 256 will be an add lane running parallel to the CD road. Traffic on the CD road exiting onto Taylor Road will not be required to change lanes; the exit onto Taylor Road will utilize both lanes. However, traffic entering from SR 256 will need to complete the weave movement in order to continue on IR 70 eastbound. The total weave distance between the two ramps is 1050'. Additional information relating to the weave movement can be found in **Section 5.4**.
- The exit ramp onto Taylor Road will be a two lane ramp and will widen to three lanes with a 50' taper approximately 500' beyond the ramp gore. At the Taylor Road intersection, the ramp will consist of a dedicated left turn lane, a through-right lane, and a dedicated right turn lane.
- The CD road will continue either over or under Taylor Road depending on whether or not Taylor Road is an underpass or overpass, and will tie into IR 70 as an add lane approximately 500' west of the ramp gore for the IR 70 eastbound entrance ramp from Taylor Road.
- The single lane entrance ramp onto IR 70 from Taylor Road will tie into IR 70 as a second add lane running parallel to the CD road and will continue for approximately 1850' before it is merged into the CD road lane using a 600' taper.
- The CD road lane will continue an additional 2000' before it merges into IR 70 with a 600' taper. At this merge point the outside edge line for IR 70 will match the existing condition.
- **The construction cost for Alternative 3A is \$9.81 million in 2022 dollars.**

### **3.9 Alternative 3B – Merging of eastbound CD road prior to Taylor Road entrance**

Key Features of Alternative 3B include:

- The SR 256 eastbound ramp from IR 70 eastbound will consist of a three-lane exit ramp that utilizes a 50' taper immediately after the ramp gore to widen out to four total lanes. The two inside lanes will continue as a CD road for the SR 256 westbound exit ramp as well as the Taylor Road interchange. The two outside lanes widen with a 50' taper to three lanes onto SR 256 eastbound and will be signalized at the intersection with SR 256.
- On the CD road over SR 256 the outside lane will be a single lane exit onto SR 256 westbound and will maintain the same horizontal geometry as the existing ramp. The ramp will utilize a 50' taper to go from

one to two lanes similar to the existing condition, and will feature two dedicated right turn lanes onto SR 256 westbound.

- The construction of the CD road over SR 256 will require the widening or replacement of the existing structure on eastbound IR 70 over SR 256. The structure work will be required regardless of whether IR 70 is widened to the inside or outside.
- The inside lane of the CD road will continue to the Taylor Road interchange, and the IR 70 eastbound entrance ramp from SR 256 will be an add lane running parallel to the CD road. Traffic on the CD road exiting onto Taylor Road will not be required to change lanes; the exit onto Taylor Road will utilize both lanes. However, traffic entering from SR 256 will need to complete the weave movement in order to continue on IR 70 eastbound. The total weave distance between the two ramps is 1050’.
- The exit ramp onto Taylor Road will be a two lane ramp and will widen to three lanes with a 50’ taper approximately 500’ beyond the ramp gore. At the Taylor Road intersection, the ramp will consist of a dedicated left turn lane, a through-right lane, and a dedicated right turn lane.
- The CD road will continue for 600’ beyond the Taylor Road exit ramp gore where it will merge into IR 70 with a 1250’ taper that ends 70’ west of the gore area for the Taylor Road entrance ramp onto eastbound IR 70.
- The single lane entrance ramp onto IR 70 from Taylor Road will tie into IR 70 using a 1250’ taper. At this merge point the outside edge line for IR 70 will match the existing condition.
- **The construction cost for Alternative 3B is \$2.88 million in 2022 dollars.**

### 3.10 Alternative 4A - Dual-lane westbound CD road along IR 70

Key Features of Alternative 4A include:

- All traffic exiting IR 70 westbound for both Taylor Road and SR 256 will exit at Taylor Road. The exit ramp will be a single lane exit ramp that widens to two lanes 450’ east of the Taylor Road intersection. The right lane will be a through-right (the right turn for northbound Taylor Road and the through for SR 256 traffic), and the left will be a dedicated left turn lane for southbound Taylor Road.
- The IR 70 westbound entrance ramp from Taylor Road will be a two-lane ramp, with the inside lane continuing to IR 70 as a CD road, and the outside lane as the single-lane SR 256 exit ramp. Turning traffic from Taylor Road onto the outside ramp lane will need to complete the weave movement to continue onto IR 70 westbound (the weaving distance is 2350’).
- Traffic exiting from IR 70 westbound at Taylor Road and completing the through movement to continue to SR 256 will be in the correct (outside) lane and will not need to complete any weaving. The SR 256 exit ramp will be a single lane exit that widens to two lanes 360’ east of the SR 256 intersection. The ramp will consist of a dedicated right turn lane for SR 256 westbound and a through-left lane for SR 256 eastbound. The through movement should only be used for motorists who incorrectly exited at SR 256 but wish to continue onto IR 70 westbound.
- The westbound CD road will tie into IR 70 as an add lane 565’ east of the gore area for the SR 256 entrance ramp onto IR 70 westbound. The SR 256 entrance ramp onto IR 70 westbound is two lanes, and IR 70 is five lanes wide at the ramp tie in. The five-lane section continues for 2000’ feet where it then merges down to four lanes using a 600’ taper. The four lane section continues to the western project limits.

- The construction of the CD lane merge onto IR 70 over SR 256 will require the widening or replacement of the existing IR 70 westbound bridge over SR 256. The structure work will be required regardless of whether IR 70 is widened to the inside or outside.
- **The construction cost for Alternative 4A is \$3.99 million in 2022 dollars.**

### 3.11 Alternative 4B - Single-lane westbound CD road along IR 70

Key Features of Alternative 4B include:

- All traffic exiting IR 70 westbound for both Taylor Road and SR 256 will exit at Taylor Road. The exit ramp will be a single lane exit ramp that widens to two lanes 450' east of the Taylor Road intersection. The right lane will be a through-right (the right turn for northbound Taylor Road and the through for SR 256 traffic), and the left will be a dedicated left turn lane for southbound Taylor Road.
- The IR 70 westbound entrance ramp from Taylor Road will be a two-lane ramp, but will merge down to a single 16' lane with a 720' taper approximately 425' west of the Taylor Road intersection. The single lane ramp will continue as a CD road between Taylor Road and the SR 256 exit ramp. A 50' taper will widen the CD lane back out to two lanes 650' east of the SR 256 exit ramp gore. Traffic exiting onto SR 256 will make the lane change, and traffic continuing onto IR 70 will continue on the CD road.
- The westbound CD road will tie into IR 70 as an add lane 565' east of the gore area for the SR 256 entrance ramp onto IR 70. The SR 256 entrance ramp onto IR 70 westbound is two lanes, and IR 70 is five lanes wide at the ramp tie in. The five-lane section continues for 2000' feet where it then merges down to four lanes using a 600' taper. The four lane section continues to the western project limits.
- The construction of the CD lane merge onto IR 70 over SR 256 will require the widening or replacement of the existing IR 70 westbound bridge over SR 256. The structure work will be required regardless of whether IR 70 is widened to the inside or outside.
- **The construction cost for Alternative 4B is \$3.77 million in 2022 dollars.**

### 3.12 Alternative 5A - Westbound CD lane uses Taylor Road exit ramp and goes through Taylor Road intersection

Key Features of Alternative 5A:

- All traffic exiting IR 70 westbound for both Taylor Road and SR 256 will exit at Taylor Road. The exit ramp will be a single lane exit ramp that widens to two lanes 450' east of the Taylor Road intersection. The right lane will be a through-right (the right turn for northbound Taylor Road and the through for SR 256 traffic), and the left will be a dedicated left turn lane for southbound Taylor Road.
- The IR 70 westbound entrance ramp from Taylor Road will be a two-lane ramp, with the inside lane continuing to IR 70 as a CD road, and the outside lane as the single-lane SR 256 exit ramp. Turning traffic from Taylor Road onto the outside ramp lane will need to complete the weave movement to continue onto IR 70 westbound (the weaving distance is 2350').
- Traffic exiting from IR 70 westbound at Taylor Road and completing the through movement to continue to SR 256 will be in the correct (outside) lane and will not need to complete any weaving. The SR 256 exit ramp will be a single lane exit that widens to two lanes 360' east of the SR 256 intersection. The ramp will

consist of a dedicated right turn lane for SR 256 westbound and a through-left lane for SR 256 eastbound. The through movement should only be used for motorists who incorrectly exited at SR 256 but wish to continue onto IR 70 westbound.

- **The construction cost for Alternative 5A is \$4.10 million in 2022 dollars.**

### **3.13 Alternative 5B - Westbound CD lane stays parallel to IR 70 and goes under or over Taylor Road**

Key Features of Alternative 5B:

- All traffic exiting IR 70 westbound for both Taylor Road and SR 256 will exit at Taylor Road. The exit ramp will be a two lane exit ramp with the inside lane serving as a CD road for SR 256 that passes either over or under Taylor Road depending on the selected alternative for the Taylor Road profile. The outside lane of the ramp will be a single lane exit ramp that widens to two lanes with a 50' taper approximately 100' west of the ramp gore.
- At the Taylor Road intersection, the exit ramp will feature a dedicated left turn lane for southbound Taylor Road traffic, and a through-right for northbound Taylor Road. Because of the CD lane passing over or under Taylor Road, the only through movements made at the intersection would be motorists who accidentally exited at Taylor Road instead of SR 256.
- The entrance ramp onto IR 70 westbound from Taylor Road will be a two-lane ramp that merges down to one with a 600' taper approximately 530' west of the Taylor Road intersection. The single lane will then meet the CD road running parallel to IR 70 westbound. Traffic on the CD road exiting onto SR 256 and westbound IR 70 traffic entering from Taylor Road will need to complete the weaving movement between the two interchanges. The total weave length provided between the ramps is 1660'.
- If the profile for Taylor Road passes over IR 70, the span of the proposed bridge on Taylor Road will need to be increased by approximately 32' to accommodate for the CD road along IR 70 westbound. If the profile for Taylor Road passes under IR 70, the proposed IR 70 westbound structure will need to be approximately 32' wider to accommodate the CD road. Structure type studies for the proposed bridges will be completed during the AER phase.
- **The construction cost for Alternative 5B is \$6.38 million in 2022 dollars.**

### **3.14 No-Build Alternative**

For comparison sake, a "no-build" alternative was included for evaluation. While the no-build alternative would free up available funds for ODOT to use on other pressing issues, the Far East Freeway ranks near the very top in both congestion and crash rate. Severe backups occur daily along IR 70 and SR 256, and over 800 crashes occur along the Far East Freeway annually; with this number expected to exceed 1000 annual crashes if no improvements are made. Improvements along the entire Far East Freeway corridor are critical for public safety, continued growth on the east side of Columbus, and to eliminate major traffic issues which have plagued the area for years.

While the no-build alternative does not meet the goals of the Purpose and Need, the NEPA process requires that the no-build option to be analyzed during the AER.

## 4.0 Key Issues

### 4.1 Traffic Analysis

Capacity analyses were performed for the proposed Taylor Road interchange for a standard diamond configuration (Alternatives 2A, 2B, and 2C) and for a diverging diamond interchange (Alternative 2D). Additionally, a weaving analysis was performed for the eastbound collector-distributor (CD) roadway between the SR 256 interchange and the proposed Taylor Road interchange. These capacity analyses were performed using the 2040 AM and PM ODOT Certified Traffic Volumes that were provided as part of the Feasibility Study Report (FRA-70-16.17, PID 76997). The proposed interchange configurations were used in the Highway Capacity Software (HCS2022) which utilizes the methodology outlined in the *Highway Capacity Manual* (HCM) to determine the anticipated operating conditions that would be experienced in 2040.

A diamond interchange is one of the most common types of interchanges for the intersection of a major roadway with a minor facility. This type of interchange is most familiar to drivers as it provides typical signalized intersections and driving patterns through the interchange.

A diverging diamond interchange (DDI) is a form of interchange in which opposing directions of travel on the non-freeway road cross each other on either side of the interchange so that traffic crossing over or under the freeway is driving on the opposite side from what is normal. This is advantageous to the flow through the interchange as the traffic signals operate with a two-phase cycle and eliminates the need for left turning vehicles having to cross opposing traffic. However, drivers may not be familiar with this configuration and the maneuvers needed to safely navigate through the interchange.

The standard parameter used to evaluate traffic operating conditions is referred to as Level of Service (LOS). There are six LOS (A through F) which relate to driving conditions. LOS for signalized intersections is defined in terms of control delay per vehicle, which is a direct correlation to driver discomfort, frustration, fuel consumption, and lost travel time. LOS for weaving segments on CD roadways is defined by the computed density of the segment. This is used to characterize the total flow in the weaving segment and how the computed conditions relate to the capacity of the CD roadway. As the computed density of the CD roadway increases, weaving conditions become less safe as gaps to perform lane changes become smaller and fewer in number. **Table 4.1** provides the LOS criteria as defined in the HCM.

**Table 4.1: LOS Thresholds**

LOS	Signalized Intersection Control Delay per Vehicle (seconds)	Weaving on CD Roadways Density Range (veh/mi/ln)
A	≤ 10	≤ 12
B	> 10 and ≤ 20	> 12 and ≤ 24
C	> 20 and ≤ 35	> 24 and ≤ 32
D	> 35 and ≤ 55	> 32 and ≤ 36
E	> 55 and ≤ 80	> 36
F	> 80	Demand Exceeds Capacity

Operating conditions are generally considered to be acceptable if found to operate at LOS D or better for the overall intersection, with no approach operating worse than LOS E. The capacity analysis results for the Taylor Road diamond interchange and diverging diamond interchange can be found in **Table 4.2** for the Certified Traffic Volumes for the 2040 AM and PM peak hours. The full capacity analysis output is provided in **Appendix G**.

**Table 4.2: Capacity Analysis Diamond Interchange vs DDI Interchange at Taylor Road**

Intersection	Approach		Diamond Interchange				Approach		DDI Interchange			
			2040 AM		2040 PM				2040 AM		2040 PM	
			LOS	Delay (sec)	LOS	Delay (sec)			LOS	Delay (sec)	LOS	Delay (sec)
Taylor Rd & Eastbound Ramps	EB	L	C	21.7	D	38.5	EB	L	B	18.8	C	29.1
		R						B	11.3	C	22.5	
	NB	T	C	20.3	C	29.0	NB	T	B	14.3	D	35.3
		R										
	SB	L	A	7.7	B	10.9	SB	L	B	10.5	C	21.0
T												
<b>Overall</b>		<b>B</b>	<b>17.1</b>	<b>C</b>	<b>27.4</b>	<b>Overall</b>		<b>B</b>	<b>14.4</b>	<b>C</b>	<b>27.5</b>	
Taylor Rd & Westbound Ramps	WB	L	C	25.7	C	32.2	WB	L	B	12.2	B	15.7
		T/R						B	12.9	B	14.7	
	NB	L	A	10.0	B	13.2	NB	L	A	5.2	C	20.7
		T										
	SB	T	B	15.4	C	28.2	SB	T	A	4.0	B	10.2
R												
<b>Overall</b>		<b>B</b>	<b>16.5</b>	<b>C</b>	<b>21.2</b>	<b>Overall</b>		<b>A</b>	<b>6.7</b>	<b>B</b>	<b>17.5</b>	

As shown in the table above, for the diamond interchange and the diverging diamond interchange, both the eastbound and westbound ramps operate at similar LOS and delays for both the AM and PM peak hour analysis periods. There are no overall or approach LOS or delays that fall below the acceptable thresholds discussed prior.

The westbound CD Road SR 256 and Taylor Road is anticipated to have 10,120 ADT, 1,040 vehicles in the AM peak hour, and 1,020 vehicles in the PM peak hour according to the 2040 Certified Traffic Volumes. The westbound CD Road was analyzed as a single lane facility for the 2040 AM and PM peak hours. Each peak hour operates with LOS E and a vehicle densities of 16.8 and 16.4 vehicles/mile/lane for the AM and PM peak hours which indicates that the single lane westbound CD Road traffic volumes are approaching the capacity of the roadway. The results of the capacity analysis are shown below in **Table 4.3**. As the CD Road demand approaches capacity the roadway becomes congested and increases the delay and probability of crashes. The CD Road was then analyzed as 2 lane roadway which decreases the vehicle densities to 10.3 and 10.1 vehicles/mile/lane and improves the roadway to LOS A for 2040. Therefore, it is recommended that the CD Road is constructed as 2 lane roadway.

**Table 4.3: Capacity Analysis for WB CD Road**

Analysis Period	Roadway Configuration	LOS	Density
2040 AM	1 Lane	E	16.8
2040 PM		E	16.4
2040 PM	2 Lane	A	10.3
2040 PM		A	10.1

The results of the weaving analysis for the eastbound CD road between the SR 256 interchange and the proposed Taylor Road interchange can be found in **Table 4.4**. The weaving flow rate and the maximum weaving length were also calculated for the eastbound CD road. The weaving flow rate is a measure of passenger cars per hour and a flow rate that exceeds 2,400 passenger cars per hour is considered failing for a 2 lane segment. The segment length of weave area cannot exceed the Maximum Weaving Length ( $L_{MAX}$ ) calculated by HCS. If either of these measures fail, then further modeling via TransModeler is to be used as a supplemental analysis, however for this analysis both of these measures are acceptable for utilizing HCS. The full weaving analysis for the eastbound CD road can be found in **Appendix G**.

**Table 4.4: Weaving Analysis for Eastbound CD Road**

Analysis Period	LOS	Density (vec/mi/n)	Weaving Flow Rate (pc/h)	Maximum Weaving Length (ft)	Segment Length (ft)
2040 AM	A	10.2	832	12,918	1,350
2040 PM	C	30.7	2,191	12,770	1,350

As shown in **Table 4.4**, the CD road operates acceptably for both the AM and PM peak hours in regards to providing adequate roadway to safely perform weaving maneuvers between the two interchanges.

## 4.2 Right of Way Impacts

Right of Way acquisition costs will be a major cost driver for the project regardless of what alternatives are ultimately selected for detailed design. The use of retaining walls to limit Right of Way impacts to high value areas such as commercial parking lots & single family homes will be more closely analyzed when the retaining wall justification study is completed during the AER phase. Below is a table with estimated Right of Way take areas and costs:



Alternative	Proposed R/W Areas					
	Prop LA R/W	Prop R/W	Temp R/W	Total	Estimated R/W Cost 2022 Dollars	Total Take Parcel
Alternatives 1A & 1C	2.48 Acres			2.48 Acres	\$154,750	
Alternative 1B	1.38 Acres			1.38 Acres	\$86,100	
Alternative 2A	21.77 Acres	1.32 Acres	1.40 Acres	24.49 Acres	\$1,882,700	1
Alternative 2B	18.67 Acres	1.32 Acres	0.97 Acres	20.96 Acres	\$1,622,600	1
Alternative 2C	17.45 Acres	1.32 Acres	0.83 Acres	19.60 Acres	\$1,520,400	1
Alternative 2D	18.67 Acres	1.32 Acres	0.97 Acres	20.96 Acres	\$1,622,600	1
Alternative 3A #			1.03 Acres	1.03 Acres	\$5,150	
Alternative 3B #			0.15 Acres	0.15 Acres	\$750	
Alternative 4A #	0.39 Acres		0.19 Acres	0.58 Acres	\$84,600	
Alternative 4B #	1.18 Acres			1.18 Acres	\$253,110	
Alternative 5A #	7.27 Acres			7.27 Acres	\$604,900	1
Alternative 5B #	5.58 Acres			5.58 Acres	\$464,300	1
Preferred Alternative	19.93 Acres	1.32 Acres	0.83 Acres	22.08 Acres	\$1,675,150	1
<p>#Areas are included in Alternatives 2A through 2D and are shown for reference only. Costs are based off of Auditor's appraised values plus an additional 30%, and were assumed as the following: HOA property in southeast corner of Taylor Road interchange valued at \$10,000 per acre, Blacklick Woods Metro Park land valued at \$62,400 per acre, Creekside at Taylor Square Apartments land valued at \$214,500 per acre, Violet Township property valued at \$31,200 per acre, residential property valued at \$83,200 per acre, and the value of the Total Take Parcel is \$304,200. All values are in 2022 dollars.</p>						

The majority of the Right of Way take areas required for the project are within the proposed Taylor Road interchange areas, and the required areas are largely based on the required ramp geometry, and the widening to the inside or outside on IR 70 has very little impact. Widening IR 70 to the outside in lieu of the inside results in a total of 1.10 acres of additional Right of Way being required, which was less than what anticipated at the start of the Feasibility Study. While the additional Right of Way will be costlier for the outside widening, the additional pavement, median barrier, and storm sewer related to the inside widening greatly exceeds the additional Right of Way cost associated with the outside widening. The outside widening does result in the need to acquire Limited Access Right of Way from Blacklick Woods Metro Park, which is a designated 4(f) property.

The tangent alignment alternative for Taylor Road (Alternative 2A) would require the removal of a minimum of two the buildings of the Creekside at Taylor Square apartment complex, which is financially unfeasible. Shifting the alignment of Taylor Road to the east minimizes impacts to the apartment property, but the construction of the IR 70 westbound exit ramp onto Taylor Road will require a total take of the single family home at 13920 Taylor Road NW (APN 0360078900). Limited Access Right of Way takes will be required from the HOA owned property on the east side of Taylor Road (APN 0360596300) and 8 of the single family homes in the Haaf Farms subdivision for the construction of the eastbound IR 70 entrance ramp from Taylor Road. In the southwest quadrant, Limited Access Right of Way will be required from the Violet Township Parcel (APN 0360073400) for the construction of the eastbound exit ramp to Taylor Road.



**Shifting Taylor Road to the east will avoid impacts to the Creekside at Taylor Square Apartments**

## 4.3 Roadway Geometrics

### IR 70 Eastbound and Westbound

IR 70 is classified as a Principal Arterial Interstate with a design speed of 70 mph. 12' travel lanes, with 10' paved shoulders on the inside and outside are required per Figure 301-4 in the ODOT L&D, Volume 1. The existing horizontal and vertical alignments of IR 70 are being maintained in both the eastbound and westbound directions. The existing centerline of IR 70 has two horizontal curves within the project limits, the first has a Dc of 1°28'00" and the second has a Dc of 1°00'00", which meet the criteria for the 70 mph design speed (maximum allowable Dc is 2°45'00" per Figure 202-2 in the ODOT L&D, Volume 1). It should be noted that the maximum existing superelevation rate of IR 70 is 0.0617 which exceeds the maximum 0.06 currently shown in the L&D for an urban interstate. **A Design Exception is NOT required for exceeding the maximum superelevation rate**, and using variable thickness milling and pavement overlays to reduce the proposed superelevation rate down to 0.06 is not recommended. The existing vertical profile of IR 70 has three crest and two sag vertical curves in succession, and the K Value and stopping sight distance criteria are met for all five vertical curves. All pavement shifts and lane tapers shown for Alternatives 1A (outside widening) and 1B (inside widening) meet the criteria for the 70 mph

design speed. If Taylor Road passes over IR 70, a minimum of 16.5' vertical clearance will be required for the proposed bridge. **No Design Exceptions are anticipated for the work on IR 70.**

## Taylor Road

The extension of Taylor Road over or under IR 70 will be classified as an Urban Minor Arterial with a design speed of 45 mph per the IMS. The proposed alternatives as shown utilize 12' lanes, but lane widths could be reduced to 11' per Figure 301-4 in the ODOT L&D, Volume 1 to reduce construction costs. Type 2 Combination Curb and Gutter is shown on both sides of the roadway, and 6" concrete median separates the northbound and southbound lanes along the majority of the work limits. A 10' asphalt shared use path with a 5' tree lawn is shown on the east side of Taylor Road to add pedestrian access from the residential areas south of IR 70 to the commercial area north of IR 70.

Alternative 2A (the tangent alignment of Taylor Road) is being dismissed because of the impacts to the Creekside at Taylor Square Apartments. Additionally, Alternative 2B (the shifted diamond interchange going under IR 70) is being dismissed because the retaining walls costs associated with going under IR 70 make it costlier than going over. For the two remaining alternatives under consideration, the shifted horizontal alignment of Taylor Road features reverse curves at the north and south ends of the project with a Dc of 5°30'00" to avoid the need for superelevation (maximum allowable Dc of 5°40'00" per Figure 202-3 in the L&D, Volume 1). The reverse curves at the north and south ends of the project push the tangent section crossing over or under IR 70 to the east 110' to avoid impacts to the apartments mentioned above. The plan view layout and limits for Alternatives 2B and 2C are identical and feature the same tapers, shifts, lane configurations, and turn lane lengths. Turn lane lengths were generated based off Figures 401-9 and 401-10 in the ODOT L&D, Volume 1, and all horizontal shifts and tapers meet the design criteria for 45 mph.

The design criteria for the vertical profile of Taylor Road requires a minimum stopping sight distance of 360', and K values of 61 for crest vertical curves and 79 for sag vertical curves. The proposed profile for Alternative 2B utilizes a 250' crest vertical curve beginning at the Haaf Farm Drive (SSD = 408.9', K = 65.8), with approach grades of +2.00% and -1.80%. The crest vertical curve is followed by a 510' sag vertical curve under IR 70 (SSD = 370.7', K = 81.0) with approach grades of -1.80% and +4.50%. At the realigned intersection of Taylor Road SW, a 210' crest vertical curve is present (SSD = 421.4', K = 61.6) with approach grades of +4.50% and +1.09%.

The proposed profile for Alternative 2C utilizes a 400' crest vertical curve over IR 70 (SSD = 380.8', K = 67.2), with approach grades of +1.95% and -4.00%. The crest vertical curve is then followed by a 450' sag vertical curve (SSD = 377.2', K = 82.7) with approach grades of -4.00% and +1.44%. Generally, grades under 5.00% are desirable for overpass and underpass approaches, so the vertical geometry for Alternatives 2B and 2C is acceptable. Revisions to the profiles are anticipated during the AER phase when the field survey is complete, and superstructure depths are determined from the structure type study. In both the overpass and underpass alternatives, 16.5' vertical clearance will be required. For both Alternatives 2B and 2C, **no Design Exceptions are anticipated for the work on Taylor Road.**

## Taylor Road and SR 256 Interchange Ramps

The existing horizontal and vertical geometry of the SR 256 ramps will be kept largely the same with a few exceptions. Listed below are the modifications being proposed for the ramp horizontal geometry:

- For the eastbound exit onto SR 256 eastbound (Ramp E), the ramp is being pushed south to accommodate the construction of the CD road running along IR 70. At the ramp gore, the baseline of the ramp is approximately 42' south of its current location. Beyond the ramp gore the ramp widens on the north side from two to three lanes to avoid impacts to the Cracker Barrel property. This inside widening places the edge of paved shoulder in roughly the same location as the existing condition. The horizontal curvature of Ramp E is being improved; the existing ramp has a curve radius of 229', and the proposed ramp has a curve radius of 260'. Even with the increased radius, the ramp does not meet the minimum radius required for the 35 mph design speed, and **a design exception for Degree of Curve will be required.**
- The eastbound exit onto SR 256 westbound (Ramp D) will require a decrease in the radius of the curve coming off the ramp gore from 249' to 229'. This is necessary because the construction of the CD road on the south side of IR 70 and the required barrier separation pushes the ramp baseline to the south approximately 24' at the ramp gore. The proposed horizontal curvature exceeds the minimum 150' radius required for a loop ramp, therefore **no design exceptions are required for Ramp D.**
- Ramps B (westbound exit ramp onto SR 256) and C (eastbound IR 70 entrance ramp from SR 256) will match the existing horizontal and vertical geometry at the intersection points at SR 256 and throughout the majority of the ramp. The construction of the CD roads on the north and south sides of IR 70 will push the ramp baselines at the gore areas to the north and south. The degree of curvature for the westbound and eastbound ramps will be 1°30'00" and 3°00'00", respectively, which exceeds the requirements for the ramp design criteria shown on Figure 503-1 in the ODOT L&D, Volume 1.
- Ramp A (westbound IR 70 entrance ramp from SR 256) will have the most significant changes to the roadway geometry of any of the ramps at the SR 256 interchange. The intersection skew angle between SR 256 and Ramp A will be improved to 80°00'00", and the radius of the horizontal curve coming off of SR 256 increased to 440.74' (Dc of 13°00'00"). The existing ramp merges from two lanes to one immediately west of the SR 256 intersection. The proposed Ramp A will carry two lanes for 1970' beyond the merge point with IR 70 (the ramp hits IR 70 as two add lanes) before merging down to one with a 600' merge taper. The improvements to the Ramp A geometry pushes the pavement to the northwest as much as 57' along the Target parking lot, and retaining walls will be required to prevent impacts to the parking lot. **No design exceptions will be required for the modifications to Ramp A.**
- Proposed profiles for Ramps A through E can be found on the roll plots in **Appendix D.**

As stated in the Taylor Road details in Section 4.3, Alternatives 2A and 2D were eliminated from consideration, so the roadway geometrics will not be detailed. The proposed horizontal geometry for Ramps G, H, I, and J will be identical for Alternatives 2B and 2C. Listed below are details for the horizontal geometry for each of those ramps:

- Ramp G (eastbound IR 70 exit ramp) will exit the eastbound CD road via a horizontal curve with a Dc of 0°40'00", which exceeds the criteria for 70 mph. The exit curve will be a compound curve with a Dc of 4°00'00", good for 60 mph. A 259' tangent section follows the compound curve and intersections the centerline of Taylor Road at an 85° angle.

- Ramp H (westbound IR 70 entrance ramp) intersects Taylor Road at a 95° angle, and has a 261' tangent section before its first horizontal curve. The ramp curves to the left with a horizontal curve with a Dc of 10°15'00", good for 42 mph. A 130' tangent section separates the first curve from a second horizontal curve to the right with a Dc of 4°00'00" which meets the design criteria for 60 mph. The ramp runs parallel to IR 70 as the westbound CD road between the two interchanges.
- Ramp I (westbound IR 70 exit ramp) will exit IR 70 westbound via a horizontal curve with a Dc of 1°30'00", which exceeds the criteria for 70 mph. The exit curve is followed by a 522' tangent section and a second horizontal curve to the left with a Dc of 4°00'00". This horizontal curve extends to the centerline of Taylor Road and intersects Taylor Road at an 84° angle.
- Ramp J (eastbound IR 70 entrance ramp) intersects Taylor Road at a 90° angle, and has a 51' tangent section before its first horizontal curve. The ramp curves to the left with a horizontal curve with a Dc of 14°00'00", good for 37 mph. A 516' tangent section separates the first curve from a second horizontal curve to the right with a Dc of 5°30'00" which meets the design criteria for 57 mph. The ramp then merges into IR 70 eastbound with a 1260' merge taper.
- All proposed ramp geometry exceeds the minimum requirements in Table 503-1 in the ODOT L&D, Vol. 1.
- Proposed profiles for Ramps G through J for the over and under condition for Taylor Road can be found on the roll plots in **Appendix D**.
- **No design exceptions are required for the horizontal or vertical geometry in the under or over condition for the proposed Taylor Road interchange.**

#### 4.4 Construction Cost

High level construction cost estimates for the 13 alternatives detailed in this report are listed below (detailed construction cost estimates for each alternative can be found in **Appendix F** and are based on 2022 dollars). For comparison sake, the estimates for each alternative are for that specific portion of the project and are **not** combined with other portions for an overall project cost. To make the cost comparisons for 3A, 3B, 4A, 4B, 5A and 5B consistent, it is assumed they would be based off outside widening on IR 70 (Alternative 1A or 1C).

**ODOT Estimator was used to generate all construction costs with the following exceptions: proposed structure costs were generated from \$325/SF of deck area, retaining wall costs as detailed in Section 4.8, and Right of Way costs as detailed in Section 4.2. Costs in 2022 dollars.**

##### IR 70 Widening Alternatives

- |   |                                      |
|---|--------------------------------------|
| • Alternative 1A (outside widening, 2 westbound lanes): | <b>Construction Cost = \$55.77 M</b> |
| • Alternative 1B (inside widening):                     | <b>Construction Cost = \$67.71 M</b> |
| • Alternative 1C (outside widening, 3 westbound lanes)  | <b>Construction Cost = \$56.77 M</b> |

##### Proposed Taylor Road Interchange Alternatives

- |  |                                      |
|--|--------------------------------------|
| • Alternative 2A (diamond, existing alignment, under IR 70): | <b>Construction Cost = \$40.74 M</b> |
| • Alternative 2B (diamond, shifted alignment, under IR 70):  | <b>Construction Cost = \$45.16 M</b> |
| • Alternative 2C (diamond, shifted alignment, over IR 70):   | <b>Construction Cost = \$30.36 M</b> |
| • Alternative 2D (DDI, shifted alignment, over IR 70):       | <b>Construction Cost = \$35.24 M</b> |

### Eastbound IR 70 CD Road Alternatives

- Alternative 3A (dual-lane entrance of eastbound CD Road): **Construction Cost = \$9.81 M**
- Alternative 3B (merging of eastbound CD road): **Construction Cost = \$2.88 M**

### Westbound IR 70 CD Road Alternatives

- Alternative 4A (dual-lane westbound CD road along IR 70): **Construction Cost = \$3.99 M**
- Alternative 4B (single-lane westbound CD road along IR 70): **Construction Cost = \$3.77 M**

### Westbound Taylor Road Exit Ramp Alternatives

- Alternative 5A (westbound CD road exits at Taylor Road): **Construction Cost = \$4.10 M**
- Alternative 5B (WB CD road goes over/under Taylor Road): **Construction Cost = \$6.38 M**

**The alternative recommended for further study has a total estimated Construction Cost of \$84.31 M**

Of the 5 major components being evaluated in this Feasibility Study, there is only one situation where the highest rated alternative has a higher construction cost. Alternative 4A (the dual-lane westbound CD road) has a higher construction cost than Alternative 4B because of the additional 8' of pavement width, additional embankment, and increase in proposed Right of Way required. However, the increased construction cost for Alternative 4A accounts for only a 0.26% increase in the total construction cost compared to Alternative 4B. Carrying two lanes along the CD road improves the decision distance between the two interchanges, will increase traffic flow on the entrance ramp from Taylor Road, and will decrease the density and congestion and the likelihood of rear-end and sideswipe crashes created from reducing the CD road from two lanes to one between the Taylor Road and SR 256 interchanges. The higher initial investment will be more than compensated for with the increased capacity and safety for the westbound entrance ramp from Taylor Road.

## 4.5 Maintenance of Traffic

Maintenance of traffic was investigated at a preliminary level to understand if there are significant benefits or impacts to the MOT between widening IR 70 to the inside or outside and similarly for an overpass or underpass at the proposed Taylor Road interchange. A summary of the MOT alternatives is below.

### IR 70 Mainline Widening to the Inside versus Outside

The project team has identified MOT alternatives that could be developed to leverage the median or outside widening to facilitate upfront offline construction while traffic is maintained on the existing roadway. The MOT alternatives would utilize construction types including part-width, contraflow, and/or crossover techniques. A three-phase MOT sequencing is likely unless design criteria is relaxed (lane width/shy distance), ramp closures are permitted, and/or bridges are overbuilt/constructed to the median for a temporary or permanent condition that could enable a two-phase MOT solution. Each alternative would require a pre-phase to reconstruct/widen existing shoulders.

While the below MOT alternatives were evaluated for impacts for the Feasibility Study of the two options, once the preferred roadway/bridge alternatives are chosen, a formal MOTAA will be performed during the AER phase which may change the below phasing.

### Inside Widening

It is anticipated that for the inside widening option that the median work would be completed in Phase 1, along with the bridge work and Taylor Road Interchange that would have minimal impact to existing traffic. Phase 2 would shift the eastbound traffic to the median to construct the eastbound travel lanes and associated work. Westbound traffic would be minimally impacted during Phase 2. Phase 3 would shift westbound traffic to the median to construct the westbound travel lanes and associated work. Eastbound traffic would be on the newly constructed eastbound lanes. Typical sections of the MOT phasing are included in **Appendix C**.

### Outside Widening

For the outside widening option, it is anticipated that the outside widening of the eastbound lanes would be constructed first with the associated offline work of the bridges and Taylor Road interchange. During Phase 1, temporary pavement would be required to widen between SR 256 ramps and to the new Taylor Road interchange to utilize the widened pavement for Phase 2 or temporary pavement/bridge widening would be required in the median to minimize the outside temporary widening. Westbound traffic would not be impacted during Phase 1. Phase 2 would shift eastbound traffic onto the widened pavement and would construct the eastbound inside shoulder and bridge work at Blacklick Creek and SR 256. Westbound traffic would still be on existing pavement. Phase 3 would construct the westbound lanes and shift westbound traffic to the eastbound side. Eastbound traffic would remain as in Phase 2. Typical sections of the MOT phasing are included in Appendix C.

### IR 70 MOT Impact Analysis

The above MOT phasing for the widening to the inside and outside identified several constraints as shown in Table A. An impact rating for each constraint was assigned based on a relative comparison between alternatives. A description of each rating is as follows: none - no impact or able to meet/maintain existing; low - minimal impact such as lane shift or narrowing; moderate - medium impact such as lane closure; and high - high negative impact such as facility closure. A thorough explanation and quantification of impacts will be included in the MOTAA.

**Table A**

MOT Constraints	Work Zone Impacts	
	Inside Widening	Outside Widening
1. Meet Work Zone Policy	None	None
2. Bridge Widths	None	None
3. Ramp Access	Moderate	High
4. Safety	Low	Moderate
5. Duration	Low	Moderate
6. Cost	Low	Moderate

### Work Zone Policy

The Permitted Lane Closure Chart (PLCC) requires two lanes to be maintained in each direction east of SR 256 and three lanes west of SR 256 during the daytime hours. An MOT plan can be developed for both the inside and outside widening alternatives that meets the PLCC. A MOTEC exception is not anticipated for either widening alternative, however the temporary configuration of existing lane #3 (which drops east of SR 256) and eastbound exits has the potential of impacting the maintenance of three eastbound lanes west of SR 256.

## Bridge Widths

At this time, bridge overbuilding (existing or proposed) is not anticipated for either widening alternative for the Blacklick Creek and SR 256 bridges.

## Ramp Access

Ramp access at SR 256 is a critical component for the success of the project. Part-width reconstruction of SR 256 ramps appears mostly achievable with both alternatives with varying amounts of temporary pavement. It is also anticipated that the existing eastbound exit ramp to Taylor Road would be closed for both alternatives. For both widening alternatives the westbound ramps would only have a major impact during one of the three phases.

**Inside Widening Eastbound Ramps** – During Phase 1 the ramps would be minimally impacted with traffic shifted to the outside shoulder. Phase 2 would construct all of the ramps part-width with the exception of the eastbound exit loop ramp due to the outside bridge construction not providing adequate deceleration resulting in an unsafe diverge. This ramp would most likely close in lieu of a complete temporary ramp or modifying the intersection of the eastbound diamond exit. There is an option to utilize the new Taylor Road Interchange to maintain ramp traffic while the Taylor Road interchange would remain closed except for facilitating detoured traffic. The IR 70 eastbound to SR 256 west loop ramp could be detoured to the Taylor Road interchange and rerouted through a continuous flow Texas U-turn operation back west to the IR 70 westbound to SR 256 exit. Similarly, the SR 256 to IR 70 eastbound ramp could be rerouted on the local network (Blacklick Eastern Road and Taylor Road SW) and then enter IR 70 eastbound at the Taylor Road interchange to minimize impact to MOT operations. Redistributed traffic volumes will need to be analyzed during the development of the MOTAA. Phase 3 would maintain eastbound ramps on the newly constructed ramps. Phase 3 would construct the westbound ramps part-width.

**Outside Widening Eastbound Ramps** – Phase 1 would construct all the eastbound ramps part-width with the exception of the eastbound exit loop ramp due to the outside bridge construction not providing adequate deceleration resulting in an unsafe diverge. This ramp would most likely close or would require a temporary ramp or modifying the intersection of the eastbound diamond exit. With this alternative the new Taylor Road Interchange is unlikely to be available to utilize during this phase. Phases 2 & 3 would maintain eastbound ramps on the newly constructed ramps. Phase 3 would construct the westbound ramps part-width.

## Safety

As described in the sections above, widening to the inside seems to create more offline construction and a more natural fit with using the new Taylor Road interchange for ramp maintenance that results in less impact to work zone traffic and therefore potentially having a safety benefit. Another benefit to inside widening is this option provides an opportunity to gain greater separation between work zone traffic and the contractor, which will improve work zone safety and contractor production rates.



## Duration

Construction duration is likely going to be around three construction seasons depending on when the project is sold for widening to the inside or outside. Widening to the inside may be slightly faster due to more offline construction, less retaining walls, less temporary widening, and per the Safety section above, increased production rates. Inside widening would include a median barrier wall and drainage work that would increase time, but it is located within the offline construction area.

## Cost

The relatively short length of this project will lead to similar traditional MOT costs related to portable barrier and temporary pavement. Production rates may be higher for widening to the inside that could translate to more competitive pavement bids. The main difference between inside and outside widening is the additional temporary widening that would be required during the outside widening option as detailed above and the crossover to place the westbound traffic on the eastbound side in lieu of just shifting traffic to the median.

## IR 70 MOT Conclusion

Overall, widening to the inside presents some advantages for MOT compared to widening to the outside, but a reasonable MOT plan can be achieved for either roadway alternative.

## Taylor Road Overpass versus Underpass

The project team has identified MOT phasing and impacts that could be identified for the construction of the Taylor Road Interchange whether the construction is an overpass or underpass. Since Taylor Road currently ends on either side of the IR 70, no discussion will be provided to maintain traffic along Taylor Road through the interchange. The evaluation of the overpass versus underpass were focused on the impacts to the overall construction of IR 70 improvements. The MOT phasing of the overpass and underpass was evaluated utilizing the three-phase MOT sequencing as discussed in the inside vs. outside phasing section.

### Overpass

The overpass for the Taylor Road interchange and associated ramps is anticipated to be constructed during IR 70 Phase 1 including the offline portion of the mainline with potential for only tie-in work in the subsequent phases. For the outside widening option, the overpass may require some additional protection for mainline traffic during construction of the median pier. IR 70 mainline traffic primarily would only be impacted during short-term temporary total closure (rolling road block) for beam erection.

### Underpass

The mainline MOT impacts for an underpass option are substantially different depending on widening to the inside or outside.

**Inside Widening** – As stated in the “Inside Widening” information, the median would be constructed first in Phase 1. The width of construction is approximately 63’. Assuming additional width for shoring the remaining minimum width to the edge of the EB outside shoulder is approximately 40’ which would be adequate to maintain two mainline lanes and the SR 256 Entrance ramp acceleration lane. There may be minor mainline lane shifts to construct the underpass. During Phases 2 & 3, the remaining underpass could

be constructed with the phasing as described in the “Inside Widening” section. There is a potential to construct the underpass in two phases, with shifting both eastbound and westbound traffic to the median to construct both ends of the underpass concurrently. Shifting of both directions would be required to and from the underpass but all will be on existing pavement or previously built pavement.

**Outside Widening** – Phase 1 would construct all the eastbound widening as described in the “Outside Widening” section. To construct Phase 2, during Phase 1 it would be required for the proposed eastbound bridge to be widened by approximately 6 feet or temporary widening to the median to provide enough width to maintain two mainline lanes and the SR 256 Entrance ramp acceleration lane. No bridge or temporary road widening would be required if the entrance ramp was closed or utilized the Taylor Road entrance ramp. This would also require an eastbound mainline lane shift of approximately 8 feet. The proposed EB bridge toe/toe width of approximately 82’ is sufficient width to maintain EB and WB traffic in Phase 3. There will be minor mainline lane shifts to complete the construction of the underpass for Phases 2 & 3. There is a potential to construct the underpass in two phases, with shifting both eastbound and westbound traffic to the eastbound side. Shifting of westbound traffic would require a crossover at the bridge and mainline shifts of the eastbound traffic. Additional subphases would be required to complete the mainline pavement around the underpass structures.

### Taylor Road MOT Impact Analysis

The above MOT phasing for the construction of the Taylor Road interchange identified several constraints as shown in Table B. This will summarize the notable impacts that appear at this stage of development and provide a severity of each impact or constraint.

**Table B**

MOT Constraints	Work Zone Impacts	
	Overpass	Underpass
1. Bridge Widths	None	None
2. IR 70 EB Entrance Ramp Access	Minimal	High
3. Impacts to Mainline Phasing	Minimal	Moderate
4. Duration	Low	High
5. Cost	Low	Moderate/high

### Bridge Widths

At this time, bridge overbuilding or lengthening is not anticipated for the overpass or underpass option for the Taylor Road bridge.

### IR 70 Eastbound Entrance Ramp Access

As stated previously, ramp access at SR 256 is a critical component for the success of the project. To maintain the eastbound entrance ramp from SR 256, the ramp would require a decision sight distance of 1,445 feet and a ramp merge of a minimum of 600 feet. This distance will place the ramp within the limits of the Taylor Road Bridge area. As stated above, the entrance ramp can be easily accommodated with either option for the inside widening as well as the overpass can utilize the new Taylor Road interchange as discussed in the “Ramp Access” section under

the IR 70 Impact Analysis. The underpass gets more complicated with the outside widening due to phasing limitations, widths available and the interchange not being open during the early phases which could result in an extended closure for the entrance ramp.

### **Duration**

Construction duration for an overpass is estimated to be 9-12 months. Construction of an underpass would take an additional 6-9 months due to the work type, temporary shoring, and additional widening required for the underpass option.

### **Cost**

The costs of the additional shoring, temporary widening, and potential additional bridge width required will result in the MOT for the underpass to be more expensive than the overpass option.

### **Taylor Road Conclusion**

Overall, the overpass would be simpler and faster to construct, would not impact the phasing of the mainline at all, and would be cheaper making the advantages of this option stand out above the underpass.

## **4.6 Drainage Design**

The extent and complexity of the drainage design required varies significantly between the alternatives developed as part of this Feasibility Study. For Alternatives 1A and 1C (widening IR 70 to the outside), the majority of the drainage design will consist of open ditch analysis on the outside of the proposed pavement, and confirmation that the existing median ditch, median batch basins, and longitudinal storm sewer are all adequate to handle the additional drainage generated from the increased pavement area. Median inlets and storm sewer design will be required for the concrete barrier installed along the outside of IR 70 separating the mainline pavement from the proposed CD roads. Inlet spacing and proper sewer sizing will be critical to ensure that no ponding occurs along the IR 70 or CD road pavement during heavy storm events.

For Alternative 1B (widening IR 70 to the inside), a similar scope of inlet spacing and storm sewer sizing would be required for the median barrier separating IR 70 from the proposed CD roads. The elimination of the grass median separating the eastbound and westbound lanes of IR 70 will require the installation of median inlets along the entire project length. The increased impervious area draining towards the center, combined with the reduction in concentration time (i.e. increased intensity), will require full replacement of the longitudinal storm sewer running between the eastbound and westbound lanes of IR 70. Additionally, the as per plan median barrier that will be required because of the elevation difference between the eastbound and westbound lanes will make the use of as per plan median inlets highly likely.

The existing profile of IR 70 within the project area consists of a series of crest and sag vertical curves, with two low points present within the construction limits: Sta. 45+00 (where Blacklick Creek crosses under IR 70), and Sta. 87+00 (the western property line of Big Sandy Superstore). On the north side of IR 70 westbound, the ditch at the sag point at Sta. 45+00 flows east approximately 600' where it outlets into the tributary of Blacklick Creek. Cattails are present along the ditch in this area, so additional environmental analysis will need to be completed to verify if this area is considered a wetland. While Blacklick Creek and the tributary to Blacklick Creek are suitable

outlet locations for all storm water within the project limits, meeting the Ohio EPA requirements for Post Construction Best Management Practices for water quality and quantity may require rerouting storm water to a detention/retention basin prior to it being outletted.



**The existing ditch on the north side of IR 70 may be considered a wetland**

Because Taylor Road will be a low-speed facility with pedestrian facilities likely included, curb and gutter with a closed storm sewer system is anticipated. Whether Taylor Road crosses over or under IR 70 will significantly impact the inlet spacing and storm sewer size required at the outlet location. Passing over IR 70 creates a crest condition for Taylor Road, with the bridge span over IR 70 short enough that scuppers are likely not required. Catch basins immediately off the bridge to capture the deck drainage would be adequate, with additional basins located on both sides of Taylor Road spaced as necessary to meet the spread requirements. On the south side of IR 70, as much storm water as feasible will be outletted into the Ramp J infield area (likely location for a retention/detention pond, see below), and all storm water to the south would be carried into the existing storm sewer system along Taylor Road. Verification that the existing system along Taylor Road will be required to ensure it can handle the additional volume. North of IR 70, the proposed Taylor Road overpass would have a sag point at the existing tributary of Blacklick Creek structure, so all storm water from the high point of the IR 70 overpass to the northern project limits would outlet into the tributary.

If the Taylor Road underpass option is selected, all storm water south of Sta. 20+00 will flow south and outlet into the existing storm sewer along Taylor Road, and the existing system analyzed to ensure it is adequately sized to accommodate the additional flow. From Sta. 20+00 to the northern project limits on Taylor Road, all storm water will flow towards the profile sag point at Sta. 40+00.00. As much storm water as feasible will be directed into the proposed detention/retention basin located in the Ramp J infield. From the north end of the project, all storm water would flow south, and all storm water north of the tributary to Blacklick Creek would outlet directly into the tributary. All storm water south of the tributary would flow towards the profile sag point, where it would enter the closed system and outletted into the tributary. Confirmation that the storm water can be outletted above the 100-year flood elevation of the tributary has been completed.

Post construction BMPs will be required on the project regardless of what alternative is ultimately selected for detailed design. In both the tangent and shifted alignment alternatives for the Taylor Road interchange, the construction of the additional Taylor Road pavement and ramps will create pavement areas outside of the existing Right of Way that exceed one acre in size. The installation of a retention/detention basin either in the Ramp J (eastbound IR 70 entrance ramp from Taylor Road) infield, or in the grassed area immediately south of Ramp J is feasible to meet the T% for both water quality and quantity. Additional treatment can be provided throughout the project area through the use of vegetated slopes and/or vegetated biofilters.

#### **4.7 Structure (Bridge) Impacts**

The project includes complete replacement or superstructure replacement and widening of three sets of mainline bridges on IR 70 over Blacklick Creek, SR 256, and Palmer Road (only widening or replacement of the eastbound bridge on Palmer Road will be required). Taylor Road will be extended across IR 70 and over vs under alternatives are evaluated within this study. Finally, the existing structure carrying Taylor Road over a tributary of Blacklick Creek will be modified or replaced. Structure type studies for all the bridges will evaluate proposed structure type alternatives once the Feasibility Study is complete. The studies will evaluate MOT and phased construction as well as initial and life-cycle costs.



#### **Superstructure or complete replacement of the SR 256 overpass bridges will be required**

All structure alternatives will be designed for the HL-93 loading, in accordance with the current ODOT Bridge Design Manual and AASHTO LRFD Bridge Design Specifications. For the Feasibility Study, all existing mainline bridges are assumed to be fully removed and replaced with structures of similar length. The proposed structure span length of IR 70 either over or under Taylor Road was determined based on the clear zone offset from travel lanes.

## 4.8 Retaining Walls

This Feasibility Study compares wall costs for the following alternatives:

- Alternative 1A: Complete widening of IR 70 to the outside of the existing pavement (2 WB through lanes)
- Alternative 1B: Complete widening of IR 70 to the inside of the existing pavement
- Alternative 1C: Complete widening of IR 70 to the outside of the existing pavement (3 WB through lanes)
- Alternative 2A: Diamond interchange at Taylor Road along existing Taylor Road alignment (under IR 70)
- Alternative 2B: Diamond interchange at Taylor Road shifted to the east (under IR 70)
- Alternative 2C: Diamond interchange at Taylor Road shifted to the east (over IR 70)

Assumptions:

- If a residential property is affected, a wall is used. Otherwise, grading is assumed to be the preferred alternative.
- If sidewalk is present, the proposed face of wall is located at the edge of sidewalk. This is typical along Taylor Road on the east side.
- For the ramps, the wall is located either at the edge of graded shoulder or outside the proposed ditch.
- Due to limited space between Ramp I and IR 70, the wall along Ramp I is located at the edge of pavement when the wall is on fill (Alternative 2A) or behind Type D Barrier, when wall is in cut (Alternatives 2B & 2C).
- All wall locations are approximate, and limits will be refined when a preferred alternative is selected.
- Cost of walls along Ramps G, H, I, and J are included in the Taylor Road Alternative Estimates, (Alternative 2A, 2B, & 2C)
- Wall locations for the Taylor Road Alternatives assume IR 70 is widened to the outside (Alternative 1A) as this configuration will require more walls along the ramps and Taylor Road than widening IR 70 to the inside.
- The area of wall is calculated is based on the exposed height of wall. Unit costs used for estimates account for the buried portion of the wall and foundation costs.
- Unit cost of Mechanically Stabilized Earth Retaining Wall (MSE) is \$100/SF.
- Unit cost of Cast-in-Place Reinforced Concrete Retaining Wall (CIP) is \$150/SF.
- Soldier pile and lagging walls (SPL) that have exposed heights of less than 16' are assumed to not require tiebacks or anchors. The unit cost of unanchored SPL is \$250/SF.
- SPL walls that have exposed heights of greater than 16' are assumed to require tiebacks or anchors. The unit cost of anchored SPL is \$350/SF. The cost could be greater depending on soil conditions.

### Alternatives 1A and 1C – Complete widening of IR 70 to the outside of the existing pavement

#### Retaining Walls along IR 70:

IR 70 is widened to the outside in this alternative, Wall 1 retains the existing soil located just beyond the ditch that runs along the north side of IR 70. This wall is CIP and will be located 10' inside the existing Right of Way line. This wall prevents grading outside the existing Right of Way into the business's property located on the northwest side of the IR 70 and SR 256 interchange.

Wall 2 retains the existing soil located just beyond the ditch that runs along the north side of IR 70. This wall is CIP and is located 10' inside the existing Right of Way line. This wall prevents grading outside the existing Right of Way into the business's property located on the north side of IR 70.

Wall 3 retains the existing soil located just beyond the ditch that runs along the north side of IR 70. This wall is CIP and is located 8' inside the existing Right of Way line, so that it does not conflict with the proposed channel location for the Tributary to Blacklick Creek. This wall reduces the amount of right of way that will need to be acquired and reduces impacts to the existing apartment complex on the north side of IR 70.

Table 1 presents the estimated costs for each of the walls as well as the estimated wall limits. The total wall cost for Alternatives 1A and 1C is approximately \$1.1 million.

**Table 1**

Alternative 1A								
Wall Location	Type	Begin Sta.	End Sta.	Length (ft)	Avg Ht. (ft)	Area (sf)	\$/SF	Total Cost
Wall 1 - IR 70	CIP	50+50	54+50	400	3.2	1281	\$150	\$193,000
Wall 2 - IR 70	CIP	78+25	85+00	675	3.8	2541	\$150	\$382,000
Wall 3 - IR 70	CIP	93+50	99+00	550	6.5	3548	\$150	\$533,000
Total Cost for Option 1A								\$1,108,000

### **Alternative 1B – Complete widening of IR 70 to the inside of the existing pavement**

#### **Retaining Wall along IR 70:**

IR 70 is widened to the inside in this alternative. In addition, Ramp A is shifted to the northwest, which will move it closer to the businesses on the northwest corner of IR 70 and SR 256. Due to this, the grading limits will extend beyond the existing right of way in some locations and a wall will be required. Wall 1 is a CIP wall that retains the existing soil located 2' beyond the proposed ditch that runs along the north side of Ramp A. This wall reduces the amount of Right of Way needed, however, it will not prevent a Right of Way take, since a portion of the ramp will be outside the existing Right of Way limits.

Wall 2 retains the existing soil located just beyond the ditch that runs along the north side of IR 70. This wall is CIP and is located 10' inside the existing Right of Way line. This wall reduces the amount of Right of Way that will need to be acquired and reduces impacts to the existing apartment complex on the north side of IR 70.

Table 2 presents the estimated costs for each of the walls as well as the estimated wall limits. The total wall cost for Alternative 1B is approximately \$421,000.

**Table 2**

Alternative 1B								
Wall Location	Type	Begin Sta.	End Sta.	Length (ft)	Avg Ht. (ft)	Area (sf)	\$/SF	Total Cost
Wall 1 - Ramp A	CIP	58+00	62+75	475	4.8	2281	\$150	\$343,000
Wall 2 - IR 70	CIP	93+50	95+00	150	3.4	514	\$150	\$78,000
Total Cost for Option 1B								\$421,000

**Alternative 2A – Diamond interchange at Taylor Road along existing Taylor Road alignment  
(under IR 70)**

**Retaining Wall along Taylor Road:**

For this alternative, Taylor Road is lowered to pass underneath IR 70. Wall 1 retains the existing soil located at the east edge of sidewalk, with horizontal offsets varying from 45.5 to 72.5’ right of the centerline of Taylor Road. A SPL wall is used to reduce the amount of excavation required for construction. This wall will reduce the amount of right of way that will need to be acquired and limits the amount of grading in the subdivision homeowner’s backyards. Wall 1 should be further evaluated during detailed design as it may be able to be eliminated, or reduced, because it will not remove the need to acquire right of way in this area and grading may be preferred.

Wall 4 is located along the west side of Taylor Road, 10’ inside the existing right of way line to the north of the proposed interchange. This wall retains the fill that is required to construct Taylor Road and is a MSE wall. This wall is required to avoid right of way taken from the apartment complex at the northwest corner of the interchange. Wall 4 will tie into the wingwalls of the existing box culvert over the Tributary to Blacklick Creek. See the Taylor Road Existing Structure Impacts section for further discussion of this alternative.

**Retaining Wall along Ramp J:**

Wall 2 is a continuation of Wall 1 and wraps around from the east edge of the sidewalk along Taylor Road to the south side of Ramp J. Wall 2 will retain the existing soil on the east side of the Ramp, just beyond the ditch limits along Ramp J, with a horizontal offset of 30’ right of the baseline of Ramp J. A SPL wall is used to reduce the amount of excavation required for construction. This wall reduces the amount of right of way that will be needed to be acquired and limits the amount of grading in the subdivision homeowner’s backyards. The beginning portions of Wall 2 should be further evaluated during detailed design as it may be able to be eliminated because it will not remove the need to acquire right of way in this area and grading may be preferred.

**Retaining Wall along Ramp I:**

To build Ramp I, the existing ground will be excavated. Wall 3 retains the existing soil located on the south side of Ramp I between Ramp I and mainline IR 70. Due to limited space, the face of wall is located at the back face of the Type D barrier, which varies from 29.66’ to 20.66’ right of the baseline of Ramp I. A SPL wall is used to reduce the amount of excavation required for construction. This wall is required so that the grading from Ramp I does not interfere with mainline IR 70. Wall 3 will continue to the east side of Taylor Road to tie into the wingwalls for the bridge on IR 70 over Taylor Road.



### Retaining Walls along Ramp H:

The proposed profile of Ramp H begins on fill and ends in a cut. Two different wall types are required on the north side of the ramp to reduce impacts to the existing apartment complex and to preserve the existing channel of the Tributary to Blacklick Creek. Wall 5 is located in the fill portion of the ramp at the edge of the shoulder, 27' left of the baseline of Ramp H and is assumed to be a MSE wall. Wall 6 is located in the cut portion of the ramp at the edge of shoulder and is assumed to be a CIP wall. This wall type may be further refined in future phases, if needed, to reduce waterway impacts.

### Retaining Wall along Ramp G:

No retaining walls are required along Ramp G; however, this section is in a large cut on the south side. A wall could be used to reduce the amount of Right of Way that needs to be acquired, but it will not eliminate the need for Right of Way in this area, therefore, grading is preferred over a wall at this location.

Table 3 presents the estimated costs for each of the walls as well as the estimated wall limits. The total wall cost for Alternative 2A is approximately \$14.6 million.

**Table 3**

Alternative 2A								
Wall Location	Type	Begin Sta.	End Sta.	Length (ft)	Avg. Ht. (ft)	Area (sf)	\$/SF	Total Cost
Wall 1 - Taylor Rd.	SPL	26+00	35+75	975	10.5	10204	\$250	\$2,552,000
Wall 2a - Ramp J	SPL	110+50	114+50	400	22.5	9017	\$350	\$3,157,000
Wall 2b - Ramp J	SPL	114+50	121+00	650	7.6	4938	\$250	\$1,235,000
Wall 3a - Ramp I	SPL	113+50	120+00	650	23.7	15437	\$350	\$5,403,000
Wall 3b - Ramp I	SPL	120+00	123+00	300	6.6	1979	\$250	\$495,000
Wall 4 - Taylor Rd.	MSE	45+25	47+50	225	13.7	3089	\$100	\$309,000
Wall 5 - Ramp H	MSE	103+00	109+00	600	17.6	10535	\$100	\$1,054,000
Wall 6 - Ramp H	CIP	109+00	112+25	325	7.4	2413	\$150	\$363,000
Total Cost for Option 2A								\$14,568,000

### Alternative 2B – Diamond interchange at Taylor Road shifted to the east (under IR 70)

#### Retaining Wall along Taylor Road:

For this alternative, Taylor Road will be lowered to pass underneath IR 70. Wall 1 retains the existing soil located at the east edge of sidewalk, with a horizontal offset of 59.5' right of the centerline of Taylor Road. A SPL wall is used to reduce the amount of excavation required for construction. This wall will reduce the amount of right of way that will need to be acquired and limit grading in the subdivision homeowner's backyards. Wall 1 should be further evaluated during detailed design as it may be able to be eliminated, or reduced, because it will not remove the need to acquire right of way in this area and grading may be preferred.

### **Retaining Wall along Ramp J:**

Wall 2 is a continuation of Wall 1 and wraps around from the east edge of the sidewalk along Taylor Road to the south side of Ramp J. Wall 2 retains the existing soil on the east side of the Ramp, just beyond the ditch limits along Ramp J, with a horizontal offset of 30' right of the baseline of Ramp J. A SPL wall is used to reduce the amount of excavation required behind the wall for construction. This wall will reduce the amount of right of way that will need to be acquired from the subdivision homeowner's backyards. The beginning portions of Wall 2 should be further evaluated during detailed design as it may be able to be eliminated because it will not remove the need to acquire right of way in this area and grading may be preferred.

### **Retaining Wall along Ramp I:**

To build Ramp I, the existing ground will be excavated. Wall 3 retains the existing soil located on the south side of Ramp I between Ramp I and mainline IR 70. Due to limited space, the face of wall is located at the back face of Type D barrier, which varies from 29.16' to 20.16' right of the baseline of Ramp I. A SPL wall is used to reduce the amount of excavation required for construction. This wall is required so that the grading from the ramp will not interfere with mainline IR 70. Wall 3 will continue to the east side of Taylor Road to tie into the wingwalls for the bridge on IR 70 over Taylor Road.

### **Retaining Wall along Ramp H:**

The proposed profile of Ramp H begins on fill and ends in a cut. Two different wall types are required on the north side of the ramp to reduce impacts to the existing apartment complex and to preserve the existing channel of the Tributary to Blacklick Creek. Wall 4 is located in the fill portion of the ramp at the edge of the shoulder, 27' left of the baseline of Ramp H and is assumed to be a MSE wall. Wall 5 is located in the cut portion of the ramp at the edge of shoulder and is assumed to be a CIP wall. This wall type may be further refined in future phases, if needed, to reduce waterway impacts.

### **Retaining Wall along Ramp G:**

No retaining walls are required along Ramp G; however, this section is in a large cut on the south side. A wall could be used to reduce the amount of Right of Way that needs to be acquired, but it will not eliminate the need for Right of Way in this area, therefore, grading is preferred over a wall at this location.

Table 4 presents the estimated costs for each of the walls as well as the station limits. The total wall cost for Alternative 2B is approximately \$15.3 million.

**Table 4**

Alternative 2B								
Wall Location	Type	Begin Sta.	End Sta.	Length (ft)	Avg. Ht. (ft)	Area (sf)	\$/SF	Total Cost
Wall 1 - Taylor Rd.	SPL	26+00	36+00	1000	9.3	9261	\$250	\$2,316,000
Wall 2a - Ramp J	SPL	110+50	117+00	650	22.0	14315	\$350	\$5,011,000
Wall 2b - Ramp J	SPL	117+00	122+00	500	8.6	4318	\$250	\$1,080,000
Wall 3a - Ramp I	SPL	114+50	120+00	550	24.8	13613	\$350	\$4,765,000
Wall 3b - Ramp I	SPL	120+00	123+00	300	8.0	2399	\$250	\$600,000
Wall 4 - Ramp H	MSE	102+00	108+50	650	18.1	11765	\$100	\$1,177,000
Wall 5 - Ramp H	CIP	110+00	113+00	300	7.9	2358	\$150	\$354,000
Total Cost for Option 2B								\$15,303,000

**Alternative 2C and 2D – Diamond interchange or DDI at Taylor Road shifted to the east (over IR 70)**

**Retaining Wall along Taylor Road:**

Wall 1 will retain the fill that is required to raise Taylor Road. It is assumed to be a MSE wall and will be located at the east edge of sidewalk along Taylor Road with a horizontal offset varying from 59.5' right to 71.5' right of the centerline of Taylor Road. This wall will reduce the amount of right of way that will need to be acquired from the subdivision homeowner's backyards. Wall 1 should be further evaluated during detailed design as it may be able to be eliminated, or reduced, as it will not remove the need to acquire right of way in this area and grading may be preferred.

**Retaining Wall along Ramp J:**

Wall 2 is a continuation of Wall 1 and wraps around from the east edge of the sidewalk along Taylor Road to the south side of Ramp J. Wall 2 will retain the fill that is required to build up Ramp J to connect Taylor Road and IR 70. It is assumed to be a MSE wall. It is located at the right edge of graded shoulder along Ramp J, with a horizontal offset of 14' right of the baseline of Ramp J. This wall will reduce the amount of right of way that will need to be acquired from the subdivision homeowner's backyards. The beginning portions of Wall 2 should be further evaluated during detailed design as it may be able to be eliminated because it will not remove the need to acquire right of way in this area and grading may be preferred.

**Retaining Wall along Ramp I:**

Wall 3 is located on the south side of Ramp I between Ramp I and IR 70. Due to limited space, the face of wall will be located at the edge of pavement, which varies from 28' to 18' right of the baseline of Ramp I. This wall is mostly a fill wall, however, there are some cut areas. It is assumed that this wall will be a Cast-In-Place Reinforced Concrete (CIP) Wall. This wall is required so that the grading from the ramp will not interfere with mainline IR 70.

### Retaining Wall along Ramp H:

Wall 4 is located along the north side of Ramp H at the edge of shoulder, 30' left of the baseline of Ramp H. This wall retains the fill that is required to build up Ramp H to connect Taylor Road and IR 70. It is assumed to be a MSE wall. This wall is required to reduce the amount of right of way taken from the apartment complex at the northwest corner of the interchange and to preserve the existing channel of the Tributary to Blacklick Creek. This wall type may be further refined in future phases, if needed, to reduce waterway impacts.

### Retaining Wall along Ramp G:

No retaining walls are required along Ramp G; however, this section is in a large cut on the south side. A wall could be used to reduce the amount of Right of Way that needs to be acquired, but it will not eliminate the need for Right of Way in this area, therefore, grading is preferred over a wall at this location.

Table 5 presents the estimated costs for each of the walls as well as the station limits. The total wall cost for Alternatives 2C and 2D is approximately \$4.6 million.

**Table 5**

Alternative 2C								
Wall Location	Type	Begin Sta.	End Sta.	Length	Avg Ht.	SF	\$/SF	Total Cost
Wall 1 - Taylor Rd	MSE	29+00	36+00	700	10.5	7319	\$100	\$732,000
Wall 2 - Ramp J	MSE	110+50	116+50	600	11.2	6690	\$100	\$669,000
Wall 3 - Ramp I	CIP	114+50	128+00	1350	5.0	6788	\$150	\$1,019,000
Wall 4 - Ramp H	MSE	102+00	113+25	1125	19.5	21922	\$100	\$2,193,000
Total Cost for Option 2C								\$4,613,000

## 4.9 Environmental Analysis

The following environmental studies, documents, and agency coordination are available in the EnviroNet project file. Additional documents and agency coordination pertaining to the project are also available in the project file. Environmental studies will be re-assessed once a preferred alternative is determined and additional studies and coordination may commence at this time.

- A Mobile Source Air Toxic (MSAT) Qualitative Analysis was prepared by HDR and approved by the Ohio Environmental Protection Agency (OEPA) on January 20, 2015. The OEPA determined this project meets the criteria to be categorized as “Low MSAT effect’ project.
- A Noise Analysis Report titled *Far East Freeway/I-70 Brice Road to Palmer Road (FRA-70-16.17)*, completed by URS in December 2014, is available in the project file.
- A Regulated Materials Review (RMR), formerly referred to as an Environmental Site Assessment (ESA) Screening, was completed for the project by HDR in 2012. A Phase I ESA was recommended for eight (8) sites. In 2014, URS

completed a Phase I ESA for two (2) sites. A Phase I ESA was conducted for the project by URS and ODOT-Office of Environmental Services recommended no further ESA or special material management for this project (July 29, 2014).

- A Section 106 Request for Review (URS, 2013), a Phase I Archaeology report (URS, 2014), and a Phase I History/Architecture report (Kramb Consulting 2012) were completed for the project. In 2014, ODOT-OES issued an Inter-Office Communication determined that “no history/architecture properties listed in or determined eligible in the National Register of Historic Places were identified within the area of potential effects”.
- A Level 2 Ecological Survey Report was completed by URS in 2014 for the project. The Jurisdictional Determination for the streams and wetlands was received on February 27, 2015.

Permanent and temporary impacts to Blacklick Woods Metro Park (designated 4(f)) are likely, but exact impact areas will be determined during the AER phase when the field survey and wall justification study are completed. The Blacklick Trail crossing under IR 70 adjacent to Blacklick Creek will require closure when the mainline IR 70 bridges are reconstructed. Areas of cattails on the north side of IR 70 between SR 256 and Taylor Road have been identified, and a wetland determination will need to be made. The environmental impacts of the project will be studied in greater detail during the AER phase when the Preferred Alternative is identified and the construction limits are more accurately depicted.



**Temporary impacts to the Blacklick Trail running under IR 70 are likely during construction**

## 5.0 Comparison of Alternatives

### 5.1 Alternative Evaluation Matrix

Below is an evaluation matrix that rates each of the alternatives on a number of factors including: Right of Way impacts, crash reduction, congestion reduction, construction duration, maintenance of traffic effort, construction cost, environmental impacts, and an overall rating. Further refinement of the evaluation matrix is recommended during the AER when more design details are available and construction costs are more accurately calculated.

Alternative	Evaluation Matrix								
	Criteria								
	ROW Impacts	Crash Reduction	Congestion Reduction	Construction Duration	Maintenance of Traffic Effort	Construction Cost	Environmental Impacts	Overall	Cost (\$Million)
No Build	●	○	○	○	●	●	●	◐	\$0
<b>IR 70 Widening Options</b>									
Alternative 1A	◐	◐	◐	◐	◐	◐	◐	◐	\$55.77 M
Alternative 1B	◐	◐	◐	◐	◐	○	◐	◐	\$67.71 M
Alternative 1C	◐	◐	◐	◐	◐	◐	◐	◐ PRFD	\$56.77 M
<b>Proposed Taylor Road Interchange Options</b>									
Alternative 2A	○	◐	◐	◐	◐	○	◐	◐	\$40.74 M
Alternative 2B	◐	◐	◐	◐	◐	○	◐	◐	\$45.16 M
Alternative 2C	◐	◐	◐	◐	◐	◐	◐	◐ PRFD	\$30.36 M
Alternative 2D	◐	◐	◐	◐	◐	◐	◐	◐	\$35.24 M
<b>Eastbound IR 70 CD Road Options</b>									
Alternative 3A	◐	◐	◐	◐	◐	◐	◐	◐	\$9.81 M
Alternative 3B	◐	◐	◐	◐	◐	◐	●	◐ PRFD	\$2.88 M
<b>Westbound IR 70 CD Road Options</b>									
Alternative 4A	○	◐	◐	◐	◐	◐	◐	◐ PRFD	\$3.99 M
Alternative 4B	◐	◐	◐	◐	◐	◐	◐	◐	\$3.77 M
<b>Westbound Taylor Road Exit Ramp Options</b>									
Alternative 5A	◐	◐	◐	◐	◐	◐	◐	◐ PRFD	\$4.10 M
Alternative 5B	◐	◐	◐	○	◐	◐	◐	◐	\$6.38 M



● Excellent    ◐ Very Good    ◐ Good    ◐ Fair    ○ Poor

## 5.2 Comparison of Alternatives 1A, 1B & 1C

**Alternative 1C** was selected over Alternatives 1A and 1B for the following reasons:

- Alternative 1C aligns with the project currently under design by EMH&T. This will prevent the need for lane shift within the SR 256 interchange area and would maintain a consistent section throughout the corridor.
- While Alternative 1A is slightly cheaper to construct than Alternative 1C, the additional cost to construct the third through lane in the westbound direction is minor compared to the overall project cost. Additionally, traffic projections show the additional third through lane will be needed for capacity by 2030. If Alternative 1A is constructed, in the westbound direction on IR 70 a LOS F would occur in the PM peak on the opening day of the project.
- Alternative 1B would require a significantly more challenging modification of the existing pavement to shift the pavement crown for the inside widening. This would require removal of more of the existing pavement, higher cost, more complex milling and overlay work, and a more expensive maintenance of traffic effort.
- The existing superelevation along IR 70 is problematic for the widening to the inside. The superelevation creates a significant elevation difference between the eastbound and westbound lanes on IR 70, which would require an as per plan median barrier with a designed footer throughout much of the project length. The additional median barrier for Alternative 1B increases the construction cost by \$1.69 million compared to Alternatives 1A and 1C.
- Alternative 1B requires a higher overall pavement area than Alternatives 1A and 1C; this is due to the third through lane starting west for Alternative 1B, and longer tapers at the east end of the project. The pavement cost of Alternative 1B is estimated to be \$2.60 million higher than Alternative 1C.
- The required Right of Way take area for Alternative 1C is only 1.10 acres more than Alternative 1B. The majority of the Right of Way take areas are for the construction of the Taylor Road interchange, and widening IR 70 to the inside has almost no impact to the take areas in relation to the interchange. Even with the higher Right of Way acquisition cost for Alternative 1C, the higher pavement, concrete barrier, and drainage costs makes Alternative 1B substantially more expensive than Alternative 1C.
- Alternative 1C leaves open the possibility for the construction of an additional through lane towards the inside in the future if traffic volumes warrant it. Maintaining the existing median width would allow an additional through lane to be constructed without any modifications to the SR 256 or Taylor Road interchange ramps. Alternative 1B would eliminate this possibility; any additional through lanes on IR 70 would require reconstruction of the ramps and CD roads. With the construction of the Intel plant and the expected growth on the east side of Columbus related to this, the need to further expand capacity on IR 70 in the future is feasible.
- Alternative 1B will require the complete replacement of the trunk storm sewer along IR 70, and the installation of median inlets along the entire corridor. The increased drainage cost for Alternative 1B compared to 1C is estimated to be \$4.80 million.
- Maintaining the existing grassed median reduces the likelihood of flooding to the inside through lanes during heavy storm events. Two sag points along IR 70 are present within the project limits, and these could be subject to ponding if the median inlets become clogged. This does occur at the sag point at the

IR 270 and US 23 interchange frequently and results in accidents, traffic delays, and stormwater spray coming over the top of the median barrier into opposing traffic.

- The elimination of the grassed median on Alternative 1B eliminates the turnaround points for emergency services and would force police and fire to use the SR 256 and Taylor Road interchanges in lieu of the median turnarounds. The removal of the grassed median also makes speed enforcement more difficult.
- Alternative 1C has a substantially lower overall construction cost than Alternative 1B, which is estimated to be \$56.77 million for Alternative 1C compared to \$67.71 million for Alternative 1B. Alternative 1C is more expensive than Alternative 1A, but the cost difference is only 1.79% higher
- All three alternatives will meet the goals of the purpose and need and provide a reduction in both accidents and congestion. Alternative 1C completes these goals at a lower cost than Alternative 1B. While Alternative 1C is slightly more expensive than Alternative 1A, the additional through lane on IR 70 provides a satisfactory level of service through 2050; while Alternative 1A would have a LOS F during the PM peak on opening day.

### 5.3 Comparison of Alternatives 2A, 2B, 2C & 2D

Alternative 2C was selected over Alternatives 2A, 2B and 2D for the following reasons:

- Alternative 2A was eliminated from consideration because of the impacts to the apartment buildings in the northwest quadrant of the interchange. Even with the use of retaining walls, removal of a minimum of two apartment buildings would be required, and this made Alternative 2A cost-prohibitive compared to Alternatives 2C and 2D.
- While Alternative 2C does have a higher structure cost than 2B (\$10.12 M vs. \$6.61 M), the retaining wall cost related to going under IR 70 is nearly \$13 million higher than constructing the overpass. This creates a nearly 50% increase in construction cost between Alternatives 2B and 2C.
- The roadway geometrics for Alternative 2B and 2C both meet all required design criteria, but the vertical grade on the north side IR 70 for Taylor Road is slightly better for Alternative 2B (4.00%) than it is for Alternative 2C (4.50%). These grades are subject to change when the field survey and structure type studies are completed. The slight improvement in vertical grade does not offset the increased construction cost.
- The scoring comparison of Alternatives 2C and 2D is very close; the DDI does function at a slightly better level of service than the standard diamond, but has a construction cost of nearly \$5 million more. The eastbound ramps for both the standard diamond and DDI both function at a LOS B during the AM peak and a LOS C during the PM peak using the 2040 volumes, and the overall intersection delays are nearly identical. The westbound ramps do have some differences in the LOS and delay however. The westbound ramps of the standard diamond function at a LOS B and C during the AM and PM peaks, respectively. The westbound ramps of the DDI function at a LOS A and B during the AM and PM peaks, respectively. However, the standard diamond is only 1.2 seconds beyond the threshold of a LOS B for the PM peak, and **the overall difference in delay between the DDI and standard diamond during the PM peak is only 3.7 seconds.** The difference in the overall delay during the AM peak is a little larger, 9.8 seconds, but because the standard diamond operates at a LOS B, the ramps would still operate at a very high efficiency level. **Because the difference in delay of the westbound ramps during the highest peak hour (PM) is only 3.7**





**seconds, and Alternative 2D has a construction cost of nearly \$5 million more, Alternative 2C is recommended over Alternative 2D.**

- While the cut condition of Alternative 2B could potentially balance the earthwork, a geotechnical analysis has not been completed to determine if this soil would be suitable to use for embankment. Additionally, the groundwater elevation is currently unknown, so there are additional risks involved with going under IR 70.
- As stated in the Maintenance of Traffic section in the Key Issues, the MOT effort involved with Alternative 2B would be more expensive and construction of the underpass would take 6-9 months longer than Alternative 2C.
- Alternative 2C has a smaller project footprint than Alternative 2B and requires less proposed Right of Way. This will reduce the associated Right of Way costs, and results in a less impactful project to the residential properties in the southeast quadrant of the interchange.
- Alternative 2C has a lowest overall construction cost, which is estimated to be \$30.36 million for Alternative 2C compared to \$40.74 million for Alternative 2A, \$45.16 million for Alternative 2B, and \$35.24 million for Alternative 2D.

## 5.4 Comparison of Alternatives 3A & 3B

**Alternative 3B** was selected over Alternative 3A for the following reasons:

- Alternative 3B shortens the work limits on eastbound IR 70 by 2490'. Along with the cost savings related to the reduced earthwork, pavement, and traffic control; the shortened work limits on eastbound IR 70 will prevent any work being required on the Palmer Road bridge. The estimated replacement cost of the Palmer Road bridge in the eastbound direction is \$6.27 million.
- Alternative 3B reduces the amount of widening and the width of the proposed structure on IR 70 over Taylor Road by approximately 6', which will reduce the overall bridge cost by approximately \$376,350 in the underpass condition. If Taylor Road passes over IR 70 Alternative 3B will reduce the span length by 6', with a similar cost savings to the under condition.
- Merging the CD road west of the eastbound IR 70 entrance ramp from Taylor Road allows for improved distances between the merges on both the inside and outside lanes on IR 70. In Alternative 3B, there is 1675' between the end of the merge point for the Taylor Road entrance ramp and the start of the lane reduction merge for the inside lane of IR 70. On Alternative 3A, the lane reduction merge for the inside lane of IR 70 begins at the merge end point for the CD road/Taylor Road entrance ramp. The additional distance between the merge points with Alternative 3B will reduce bottlenecking (see below) and driver confusion. It is feasible to shift the inside lane reduction merge for IR 70 to the east, but this will come with additional pavement cost.
- Alternative 3A creates a bottleneck at the east end of the project limits, and will create a situation where the backups on IR 70 have just been "kicked down the road" from its current location. Alternative 3A will reduce IR 70 eastbound from four lanes to two over a distance of 1680'. High amounts of sideswipe and rear-end crashes are likely, along with traffic backups during peak times. Pushing the inside lane merge to the east is feasible, but will make the construction cost difference between Alternatives 3A and 3B even higher.

- As stated above, Alternative 3B shortens the work limits along eastbound IR 70 by 2490'. This reduces the overall work zone length which provides a reduction in maintenance of traffic cost and effort.
- The reduction in pavement area for Alternative 3B compared to Alternative 3A reduces the pavement cost of the project by an estimate \$1.15 million.
- The additional 2490' of work length required for Alternative 3A results in an additional 0.88 acres of proposed Temporary Right of Way to be purchased on the south side of IR 70.
- Alternative 3B has a lower overall construction cost than Alternative 3A, which is estimated to be \$2.88 million for Alternative 3B compared to \$9.81 million for Alternative 3A.

## 5.5 Comparison of Alternatives 4A & 4B

**Alternative 4A** was selected over Alternative 4B for the following reasons:

- While Alternative 4B would have some cost savings compared to Alternative 4A because of the reduced pavement area, embankment required, and proposed Right of Way, Alternative 4A would merge the two lane entrance ramp down to a single lane for only a distance of 1850' (roughly 22 seconds at 55 mph) before it would immediately open back up to two lanes at the SR 256 exit ramp. The increased cost associated with Alternative 4A should be considered against the potential increased accident rate and reduced traffic flow from the two-lane ramp merging down to one.
- The cost savings associated with Alternative 4B compared to 4A would be minor in relation to the overall project cost, with an estimated difference of \$0.22 million. This would account for less than a 0.26% increase in the total construction cost of the project.
- Lane-use signage along the dual left turn lanes on Taylor Road northbound and at the entrance of the ramp for traffic turning onto the ramp from Taylor Road southbound would not completely eliminate any lane changes or merging on the ramp for Alternative 4A, but would significantly reduce it. This would provide improved capacity and a reduced accident rate compared to Alternative 4B. Alternative 4B would have the majority of traffic from the inner (longer) left turn lane on Taylor Road be forced to merge into the other lane before the ramp gore. Alternative 4A would have all southbound traffic from Taylor Road in the correct when they turn onto the ramp, and only northbound traffic from the inner left turn lane that wishes to continue along IR 70 being forced to make a lane change. This lane change would not have to occur until the ramp gore at the SR 256 exit ramp, which is an additional 35-40 seconds of decision time compared to Alternative 4B.

## 5.6 Comparison of Alternatives 5A & 5B

**Alternative 5A** was selected over Alternative 5B for the following reasons:

- The development of the CD road east of the Taylor Road interchange does eliminate the need for traffic exiting at SR 256 to complete the through movement at the Taylor Road intersection. However, the number of vehicles exiting at SR 256 during the peak hour in the design year is estimated to be 410, which would be roughly 14 vehicles per cycle on a 120 second signal cycle length.
- The creation of the CD road east of the Taylor Road requires nearly all traffic between the Taylor Road and SR 256 ramps to complete a lane change resulting in an unnecessary weave movement. For the CD road developed east of Taylor Road, all traffic on the CD road would be exiting onto SR 256 would be

forced to change lanes into the outside lane in order to exit onto SR 256. For traffic entering the CD road from Taylor Road, only traffic exiting at SR 256 would not be required to weave. The amount of traffic exiting at SR 256 is likely to be low, as they would use Taylor Road SW or SR 204 in lieu of the Taylor Road interchange. All traffic heading westbound on IR 70 from Taylor Road would be required to complete the lane change/weave movement. The weave distance between the ramps is only 1660', so the addition of the CD road is likely to result in sideswipes and rear-end crashes.

- The creation of the CD road east of Taylor Road would require either a longer span bridge on Taylor Road in the over condition, or a wider bridge on IR 70 westbound in the under condition. This additional work increases the construction cost by \$1.04 million compared to creating the CD road west of Taylor Road.
- The two-lane exit and creation of the CD road east of Taylor Road increases the work limits on IR 70 westbound by 1480'.
- The current volumes of westbound traffic exiting at SR 256 do not warrant the construction of a CD road east of the Taylor Road interchange. If the construction of the Intel plant, or some other factor is anticipated that will result in substantially higher volumes exiting at SR 256 than what is currently projected, then the CD road should be revisited. But with the volumes that are anticipated in the design year, adding the weaving movement between the SR 256 and Taylor Road interchange is likely to increase crashes while providing little improvement to traffic flow.
- Alternative 5A has a lower overall construction cost than Alternative 5B, which is estimated to be \$4.10 million for Alternative 5A compared to \$6.38 million for Alternative 5B.

## 6.0 Conclusion

### 6.1 Summary of Alternatives Recommended for Additional Study

Each of the individual project components detailed in **Section 3** and rated in the Evaluation Matrix have been compared, and a preferred option selected to establish a complete alternative that is recommended for further study during the AER phase. Of the components selected for further study in the AER phase, the lowest cost alternative was also the highest rated, with exception to Alternative 4A. The selection of Alternative 4A over 4B will increase the overall construction cost by 1.10%, but will provide additional capacity, reduced weaving, and a lower crash rate compared to Alternative 4B. The recommendations for the Alternative Evaluation Report (AER) are as follows:

- Widen IR 70 to the outside, construct three through lanes in the eastbound and westbound directions
- Construct a standard diamond interchange at Taylor Road
- Shift the horizontal alignment of Taylor Road to the east
- Construct Taylor Road over IR 70
- Taper the eastbound CD road into IR 70 west of the Taylor Road eastbound entrance ramp
- Construct a two-lane westbound CD road between SR 256 and Taylor Road
- Have westbound traffic on IR 70 exit at Taylor Road and complete the through movement

As stated in **Section 1.1**, refinements to the vertical and horizontal alignments of the ramps and Taylor Road are anticipated during the AER phase when the field survey is complete and the structure type studies are finalized. If any of these refinements warrant revisiting any of the alternatives developed in this feasibility study, it can be accommodated for during the AER phase.

## 7.0 Next Steps

### 7.1 Completion of the Alternatives Evaluation Report

The next phase in the ODOT PDP is the completion of the Alternatives Evaluation Report (AER), which is currently scheduled for a 5/12/2023 submission to the ODOT District 5 office. Included with the submission of the AER will be the MOTAA, Retaining Wall Justification Study, Structure Type Studies for all mainline IR 70 bridges, Structure Type Study for the replacement of the existing Taylor Road structure over the tributary of Blacklick Creek, final survey deliverables, and updated plan sheets of the following:

- Typical Sections
- Mainline IR 70 Plan and Profile Sheets
- Taylor Road Plan and Profile Sheets
- SR 256 Plan and Profile Sheets
- Interchange Ramp Plan and Profile Sheets
- Cross Section Sheets for all roadways listed above
- Retaining Wall Plan and Profile Sheets

The AER will identify the Preferred Alternative that will be carried onto environmental coordination (NEPA) and detailed design. ASI anticipates the AER will consist of a single alternative that will be a refined version of what is recommended in this Feasibility Study.

### 7.2 Determination of the Preferred Alternative

As stated in **Section 7.1**, the goal of the AER will be to identify the Preferred Alternative that will be carried on to the detailed design. A refined geometric layout based on the finalized field survey with updated geometry will be created during the AER phase, with proposed cross sections, updated profiles for Taylor Road and all interchange ramps, preliminary drainage, etc. that will more accurately depict construction limits and Right of Way impacts. Structure type studies for all mainline IR 70 bridges and the structure over the tributary of Blacklick Creek will be completed to make a determination of the proposed structure types and superstructure depths. The revised superstructure depths will impact the Taylor Road profile and changes will likely be required compared to what is shown on this Feasibility Study. Additionally, a full MOTAA and retaining wall justification will be completed during the AER phase and the results of each will be carried onto detailed design.



## Appendix A – Project Area Map



## Appendix B – Typical Section Sheets

## Appendix C – Maintenance of Traffic Typical Sections

## Appendix D – 1" = 50' Scale Roll Plot Plan and Profile Sheets





## Appendix E – Cross Section Sheets



## Appendix F – Construction Cost Estimates

## Appendix G – HCS2022 Capacity and Weaving Analysis

## Appendix H – Ramp Name Schematic Diagram



## Appendix I – Geotechnical Red Flag Summary Report