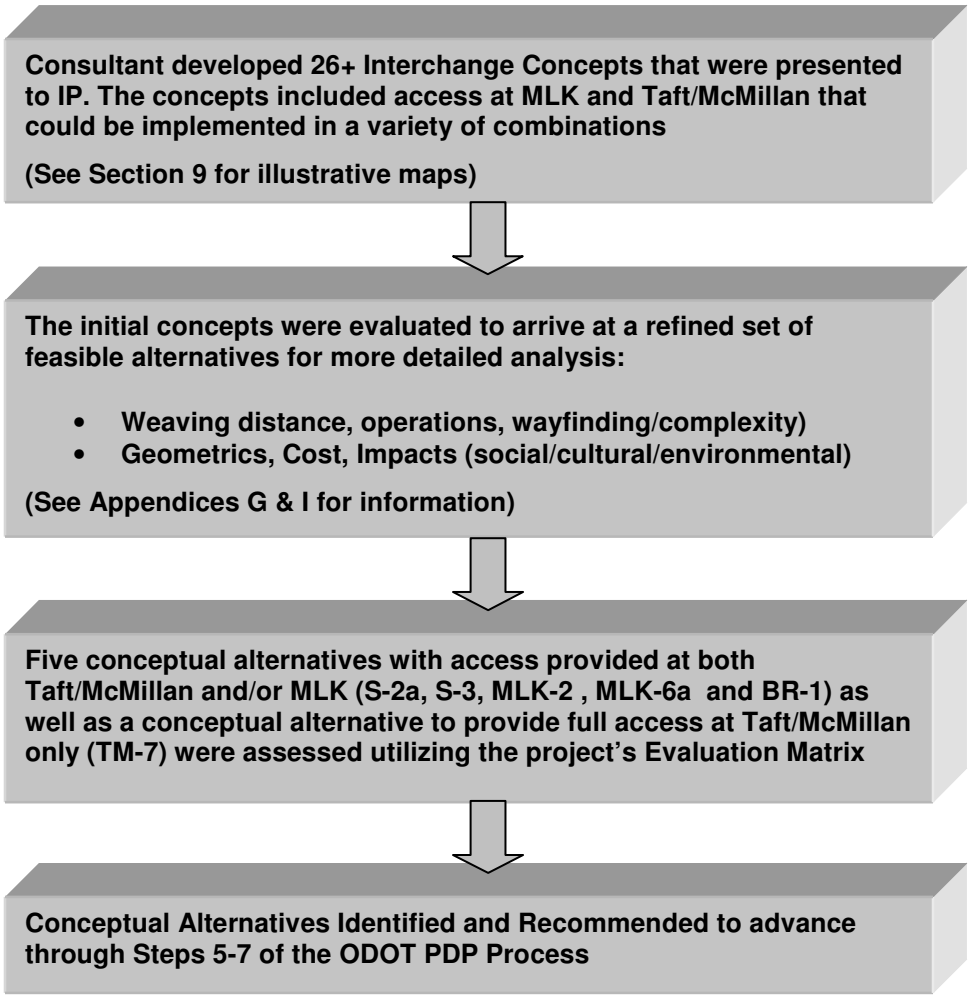
# 6. ALTERNATIVES ANALYSIS

A large number of conceptual alternatives for improving I-71 access were initially considered and presented to the IP. They have been progressively narrowed down to the feasible alternatives recommended for further study. Figure 4 details how this process was conducted and how the conceptual alternatives were identified in this study.

**Figure 4: Conceptual Alternatives Development**




Part "B" of the Uptown Transportation Study was focused on improving access to Interstate 71 from Uptown area of the City of Cincinnati. The primary needs for interstate access improvements approved by the project Implementation Partners are as follows:

- Reduce Travel Times
- Reduce Complexity of Wayfinding
- Promote Economic Vitality

In addition to these primary needs, several secondary needs were also documented as follows:

- Reduce Interstate & Arterial Congestion
- Reduce Accidents
- Reduction in Design Deficiencies
- Substantially Reduce Weave at Reading Road (US-42) Interchange
- Increase Travel Time Reliability

Several conceptual alternatives had been developed with the goal of meeting these needs. In conjunction with the IP and advisory Committee, a comprehensive evaluation matrix was developed to compare alternatives. The components of the evaluation matrix are as follows:

**Table 21: Evaluation Matrix**

| GOAL | CRITERIA | SOURCE |
|---|---|---|
| Travel Time Reduction | Regional Vehicle Miles of Travel<br>Regional Vehicle Hours of Travel<br>AM, PM and Midday Travel Times to/from selected Uptown locations | OKI Regional Travel Demand Model |
| Reduce Complexity of Wayfinding | Vehicle miles of travel by roadway functional class<br>Number of turns to/from selected Uptown locations | OKI Regional Travel Demand Model<br>Manual count of turns on least travel time path |
| Promote Economic Vitality | Subjective assessment of potential for increased economic vitality | Subjective assessment |
| Reduce Congestion | Level of Service for Basic Freeway Segments and Ramp Merge/Diverge Movements | HCS Analysis of forecasted 2030 Design Hourly Volumes |
| Potential Environmental Impacts | Hazardous materials sites<br>Churches, Schools<br>4f Resources (cultural, historic and public recreational)<br>Residential displacements<br>Commercial displacements<br>Number of impacted parcels<br>Assessed value of impacted parcels | Comparison of anticipated right of way requirements to aerial photos and resource inventories completed for the Red Flag Summary Report |
| Cost of Roadway Improvements | Capital cost of I-71 access<br>Capital cost of local streets | Estimated based on concept designs and unit costs |
| Construction and Design Issues | Utilities<br>Geotechnical<br>Railroads<br>Consistency with regional and local plans | Review of concept designs relative to existing resources. |

The complete evaluation matrix is included in Section 9

While geometric studies were conducted to determine the design constraints on new access a concurrent effort was undertaken to forecast future travel demand changes due to potential access improvements.

To ascertain the potential reduction in travel time and to gage the impact of future traffic volumes on the roadway network, several access scenarios were modeled with OKI's regional Travel Demand Forecasting Model (RTDM). The modeled alternatives included full access at Taft/McMillan only, as well as adding a full service interchange at ML King Drive combined with or without the Taft/McMillan interchange. The results of these forecasts were compared with the 2030 no build scenario to determine the change in regional travel time attributable to each scenario. The resulting peak period volumes from the RTDM were used to determine the design hourly volumes for the I-71 basic freeway segments and access ramps.

The model scenario which included full service access at both Taft/McMillan and ML King Drive served as the basis for the plan year traffic analysis of the Uptown area's arterial network for the Uptown Part A long range street improvements. The specific geometry of the alternatives recommended to be advanced for further evaluation were not coded into the RTDM roadway network as part of the analysis done to date. The nature of the RTDM is such that the specific geometry of specific access alternatives will not significantly alter the forecast future volumes.

The results of the travel demand forecasting indicate that there will be slight reduction in travel time from for each of the alternatives but the relative difference between them is small on a regional basis. A more refined microsimulation of the study area will be needed in future PDP steps to ascertain potential travel time savings on specific corridors within the Uptown area.

All alternatives result in higher volumes on the I-71 mainline, particularly between the Liberty Street interchange and Taft/McMillan as some of the volume that currently uses the Reading Road/Burnet Corridor is redirected to I-71 and new access to and from the south located at Taft/McMillan or ML King Drive To the north of Taft/McMillan or ML King Drive Interchange, volumes increase slightly as the nature of the access to and from the north is not significantly altered in any of the scenarios under consideration. The forecasted 2030 level of service for the I-71 basic freeway segments are not degraded as a result of the proposed improvements. However the basic freeway segments between Taft/McMillan or ML King Drive and the adjacent interchanges to the north is forecast to operate at a LOS of E potentially requiring additional capacity (five lanes in each direction) in the 2030 plan year.

Specific economic modeling of the potential impacts of the conceptual access alternatives was not performed during the study. The subjective assessment of the support of economic activity is based primarily on input from the IP and advisory committees and the potential redevelopment of residual parcels in the vicinity of the conceptual alternatives balanced with the potential displacements of existing commercial establishments. An economic impact analysis is recommended to quantify the potential costs and benefits associated with conceptual interchange alternatives with significant input from key uptown stakeholders.

A use of the approved evaluation matrix to compare of the six alternatives advanced for review indicates that, while there are differences in potential environmental impacts and costs, all are comparable and feasible. Elimination of any of the alternatives from further evaluation at this time would be pre-mature without additional analysis therefore all six alternatives are recommended for further evaluation, see Section 7 for additional information.

## 6.1. Alternatives Considered But Dismissed

As noted above, many conceptual interchange alternatives had been considered in this study, and many have been dropped from further study upon confirming one or more major design deficiencies from a geometric or operational standpoint. Table 22 specifies which alternatives were advanced or eliminated through this process and the justification for these decisions. For additional information concerning alternatives considered but dismissed see Appendices F and H. Illustrations for these initial alternatives are found in Section 9.

## Table 22: Interchange Options Comments and Recommendations

**OKI UPTOWN INTERCHANGE OPTIONS**

| Option | Recommend To Continue | Design Comment |
|---|---|---|
| MLK-1 | No | Insufficient southbound distance MLK - TM-7 |
| **MLK-2** | **YES** | **All ramps are on north side of MLK. Use w/ TM-7** |
| **MLK-3** | **YES** | **All ramps are on north side of MLK. Use w/ TM-7** |
| MLK-4 | No | Insufficient southbound distance MLK - TM-7 |
| MLK-5 | No | Insufficient southbound distance MLK - TM-7 |
| MLK-6 | No | Superseded by similar MLK-6a |
| **MLK-6a** | **YES** | **All ramps are on north side of MLK. Use w/ TM-7** |
| TM-0 | No | Missing ramps to/from TM corridor |
| TM-1 | No | Insufficient southbound distance TM – Reading/Gilbert |
| TM-2 | No | Missing ramps to/from South |
| TM-3 | No | Insufficient northbound distance TM – MLK |
| TM-4 | No | Missing ramp to South |
| TM-5 | No | Poor connection to TM |
| TM-6 | No | Insufficient northbound weaving distance TM – MLK, potential stand alone option |
| TM-EX | No | Missing ramps to/from South precludes access at MLK, need additional capacity for southbound ramp. |
| TM-R | No | Insufficient southbound distance TM – Reading/Gilbert |
| **TM-7** | **YES** | **Southbound ramps centered at Taft, northbound south side McM. Use w/ MLK-2, 3, or 6a** |
| S-1 | No | Insufficient southbound distance TM – Reading/Gilbert |
| S-2 | No | Insufficient southbound distance TM – Reading/Gilbert |
| **S-2a** | **YES** | **Southbound entrance ramp connects at Taft will impact CHMC Oak Campus** |
| **S-3** | **YES** | **Southbound entrance ramp connects near Taft will impact 660 Lincoln Building and Oak Campus** |
| CD-1 | No | Insufficient spacing between MLK -TM |
| L-1 | No | Poor safety/operation due to left-hand ramps |
| L-2 | No | Poor safety/operation due to left-hand ramps |
| L-3 | No | Poor safety/operation due to left-hand ramps |
| RG-1 | No | Poor connection to MLK & TM, arterial connections require modifications. |
| **BR-1** | **YES** | **Taft/McMillan ramps connect at/near Taft will impact 660 Lincoln Building and CHMC Oak Campus** |
| General comments: | | |
| | | All options having a southbound entrance ramp from Taft or McMillan will necessitate modification to the Reading-Gilbert Interchange.<br>All options having a southbound exit ramp to MLK should include the shortening of the Montgomery-Dana southbound entrance ramp.<br><br>TM-7 is representative of alternatives for a full service interchange at Taft/McMillan. The specific alignment and configuration of this interchange including local connections will be determined during future planning activities. This may include evaluation of alternatives which were eliminated primarily due to lack of weaving distance to potential access at MLK> |

## 6.2. Conceptual Alternatives To Advance

The following alternatives have been recommended by the IP to advance through subsequent steps of the ODOT PDP in order to arrive at a preferred alternative.

### 6.2.1. No Build

This alternative would not make any significant capacity revisions to the existing interstate 71 access points within the study area. Traffic signal optimization, parking restrictions, and other roadway, wayfinding, travel demand management, transit and parking recommendations incorporated into the PART "A" recommendations of the Uptown Study would be implemented. Improvements to interstate guide signs and potential revision to the pavement markings of the I-71 southbound ramp to WH Taft Road to provide two lanes or one standard with lane so that lane positioning is less confusing to divers approaching the Taft/Essex intersection. Additionally consideration of eliminating of pedestrian walk, bus stop at Taft/Essex along with revised signal phasing. These improvements will provide some benefit to improve travel time on the arterial network as well as reduce the complexity of wayfinding and marginally reduce congestion in the vicinity of the I-71 southbound ramp to WH Taft Road.

### 6.2.2. TSM Option

This alternative would include all items included in the "no build" alternative with additional improvements as follows:

- The potential closing of Essex Place and the elimination of the signal at WH Taft Road.
- Modification of Ramp ME (ramp from Montgomery Road to southbound I-71) to eliminate circuitous alignment and merge on mainline curve to improve safety and return of excess rights of way to alternative uses.
- Potential widening of I-71 southbound ramp to WH Taft Road to provide two lanes.
- Modification to Dana Avenue Interchange to provide access to southbound I-71 from eastbound Dana Avenue.

### 6.2.3. Build Alternatives

Improvements include modification of the existing interchange at Taft/McMillan to provide partial access to and from the south and additional new access at ML King Drive. Representative design options include S-2a, S-3, and BR-1. The service road options (S-2a and S-3) would provide partial access at Taft/McMillan and ML King Drive with a limited access service road directly linking these two east-west arterials.

The build alternatives will require modification to Ramp RA (southbound I-71 to Reading Road/Gilbert Avenue) to eliminate the current two lane exit configuration in order to meet minimum weaving distances between McMillan Street and the exit.

Five conceptual alternatives described more fully below appear to be feasible at this time based on current design criteria. A minimum weaving distance was established between ML King Drive and WH Taft Road /McMillan Street as well as between WH Taft Road/McMillan St and the adjacent interchange ramps to the south at the Reading Road/Gilbert Avenue interchange. This minimum distance was established by utilizing the forecast 2030 design hourly volumes for the interstate mainline and ramp merge/diverge movement as input for HCS Weaving analysis "Type A" with a resultant LOS of "D". The resulting weaving distances were then used as a geometric constraint in the development of the following. The minimum spacing proposed between cross streets is less than 1 mile but from an operational standpoint would appear to be feasible at this stage of analysis. Signing and marking have not been evaluated in detail pending review and comments before further evaluation of the respective alternatives.

There is one alternative that functions as two independent interchanges and two that make use of a service road facility linking ML King Drive with Taft/McMillan. Some general design comments that pertain to all of the alternatives follow:

- The I-71 southbound exit ramp to Gilbert/Reading would require modification if a new entrance ramp is constructed southbound from Taft/McMillan.
- The I-71 northbound climbing lane between Gilbert/Reading and Taft may need modification.
- Access to a crossroad (WH Taft, McMillan, & ML King) should be prohibited within 600 feet of a ramp intersection and within 1,000 feet of a ramp diverge.
- McGregor and Gilbert-Blair over I-71 would be open.
- The abandoned railroad bridge over I-71 north of ML King Drive would be removed.
- A Whittier-Fredonia connection would be made.

See Section 9 for illustrative maps.

#### 6.2.3.1. Alternative S-2a

This alternative consists of one single interchange serving both Taft/McMillan and ML King Drive corridors. The ramp configuration would be more or less a modified split diamond. Both ramps to/from the south would connect with Taft Road on the west side of I-71, and both ramps to/from the north would connect with M.L. King Drive also on the west side of I-71. Between the two ramp intersections, traffic would use a one two-way service road on the west side of the freeway.

The only weaving issues due to closely spaced interchanges would be southward from Taft Road and northward from M.L. King Drive. Ramps northward from M.L. King likely would be two-lane ramps to accommodate forecast 2030 design hour volumes in excess of 1,500.

The ramps connecting to the Taft/McMillan corridor would be placed as far north as possible for two reasons. One reason is the proximity of the existing ramps to/from Reading Road

and Gilbert Avenue, especially on the southbound side. New or improved connector roads would be needed for passage between Taft Road and McMillan Street. The other reason is to shorten the service road as much as possible.

Most of the existing cross road bridges could be lengthened or reconstructed to permit mobility within the neighborhood. The service road will pass under Oak Street and Lincoln Avenue without intersections, such that connection between corridors will be quick and attractive for through traffic between corridors only. If the service road were to intersect with the cross roads, then it would be shared by more local traffic and likely would operate slower.

Additional design features include:

- The service road connection from McMillan to Taft and from Taft to McMillan each would be 1-way.
- The Taft-McMillan interchange would require one 2-phase and one 3-phase signal at ramps.
- The service road between Taft and ML King Drive would have no local access and would be separated from Oak and Lincoln.
- Oak and Lincoln over I-71 would be open.
- The ML King Drive interchange would require one 4-phase signal at ramps.
- The ML King Drive ramps to/from the north would be 2-lane ramps.
- Stanton under ML King Drive and Fredonia over I-71 would be open.
- The I-71 southbound entrance ramp from Montgomery would require modification.

#### 6.2.3.2. Alternative S-3

This alternative is similar to Alternative S-2a, except that this alternative would have two service roads.

This alternative consists of one single interchange serving both east-west corridors and possibly the cross streets between. The ramp configuration would be more or less a split diamond. Both ramps to/from the south would connect with Taft Road, and both ramps to/from the north would connect with M.L. King Drive. Between Taft Road and M.L. King Drive, traffic would use two one-way service roads, each on its own side of the freeway.

Additional design features include:

- The Taft overpass would be two-way, with one-way connections from/to McMillan.
- The Taft-McMillan interchange would require two 3-phase signals at ramps.
- The service road between Taft and ML King Drive would have no local access and would be separated from Oak and Lincoln.
- Oak and Lincoln over I-71 would be open.
- The ML King Drive interchange would require two 3-phase signals at ramps.
- The ML King Drive ramps to/from the north would be 2-lane ramps.

- Stanton under ML King Drive would be closed and Fredonia over I-71 would be open.
- The I-71 southbound entrance ramp from Montgomery would require modification.

#### 6.2.3.3. Alternative MLK-2

This alternative consists of a stand-alone interchange serving the M.L. King corridor. The existing access at Taft/McMillan would be eliminated.

North of M.L. King Drive, the ramps to/from the north could be configured more or less as diamond ramps.

Most existing cross road bridges could be lengthened or reconstructed to permit the same amount of mobility within the neighborhood as currently exists.

Additional design features include:

- Oak and Lincoln over I-71 would be open.
- The ML King Drive interchange would require two 3-phase signals at ramps.
- Fredonia over I-71 would be removed and Stanton under ML King Drive would be open.
- There would be no impacts south of ML King Drive.

#### 6.2.3.4. Alternative MLK-6a

Similar to MLK-2 above, this alternative also consists of a stand-alone interchange serving the ML King Drive corridor.

There are a few notable differences between MLK-2 and MLK-6a. MLK-6a has the ramps tighter together over the freeway. Its freeway exit ramps merge into one ramp and intersect with M.L. King Drive with only one traffic signal. All its entrance ramps leave M.L. King Drive via ramp terminals. MLK-2 requires fewer structures, would have less construction & maintenance costs, and would allow better maintenance of traffic during construction. MLK-6a would require only one 2-phase signal between Reading Road and Gilbert Avenue and would provide better operation (MLK-2 would require two 3-phase signals). MLK-6a would have a smaller footprint and would have less real estate costs.

As with the above alternative, most existing cross road bridges could be lengthened or reconstructed to permit the same amount of mobility within the neighborhood as currently exists.

Additional design features include:

- Oak and Lincoln over I-71 would be open.
- The ML King Drive interchange would require one 2-phase signal at ramps.
- Fredonia over I-71 would be removed and Stanton under ML King Drive would be open.

#### 6.2.3.5. Alternative BR-1

This alternative consists of two separate interchanges used in tandem, each serving its own corridor. The ramp configuration of both interchanges is more or less a diamond. To virtually eliminate the weaving issues between closely spaced interchanges, the ramps northward from Taft/McMillan are braided using a grade separation with the ramps southward from M.L. King.

Similar to Alternatives S-2a and S-3, the ramps connecting to the Taft/McMillan corridor are placed as far north as possible because of the proximity of the existing ramps to/from Reading Road & Gilbert Avenue and to shorten the braided ramps as much as possible. From M.L. King Drive northward, the ramps could be configured more or less as diamond ramps.

Some of the existing cross road bridges could be lengthened or reconstructed to permit mobility within the neighborhood, but because of the braided ramp grade separations, the Oak Street and Lincoln Avenue bridges would be removed. Possibly one single bridge could be constructed midway between Taft Road and M.L. King Drive.

This alternative would require right of way along each side of I-71 that would benefit the interchanges but provide little benefit for local mobility.

Additional design features include:

- The Taft overpass would be two-way, with one-way connections from/to McMillan.
- The Taft-McMillan interchange would require two 3-phase signals at ramps.
- Oak and Lincoln over I-71 would be removed and replaced by Tuxedo over I-71.
- The ML King Drive interchange would require two 3-phase signals at ramps.
- Stanton under ML King Drive would be closed and Fredonia over I-71 would be open.

#### 6.2.3.6. Alternative TM-7

This alternative includes modifications to the existing interchange at Taft/McMillan to provide a full service interchange without a new interchange at Martin Luther King. Representative design option is TM-7. TM-3 and TM-6 were rejected earlier in the project primarily because they would not have adequate spacing with a new interchange at ML King Drive. The IP originally expressed a preference for providing access at both Taft/McMillan and ML King Drive. Since that time, the IP has indicated that access at either Taft/McMillan or ML King Drive would be acceptable. Therefore TM-3 and TM-6 could also be deemed feasible and warrant further analysis in subsequent steps of this project.

The ramp configurations of the interchange are controlled by the proximity of the existing ramps to/from Reading Road and Gilbert Avenue in the vicinity of Dorchester Street. In order to have the required weaving distance between these existing ramps and new Taft/McMillan ramps, the southbound entrance ramp intersection from the Taft/McMillan corridor would be placed near Taft Road, and on the northbound side, the ramp could intersect directly with McMillan Street. New or improved connector roads would be needed

for passage between Taft Road and McMillan Street. Essex Place and May Street serve in this capacity currently but do not carry significant volumes of traffic and are residential in nature.

See Section 7 for implementation of these recommended alternatives.