

3.0 Preliminary Conceptual Alternatives

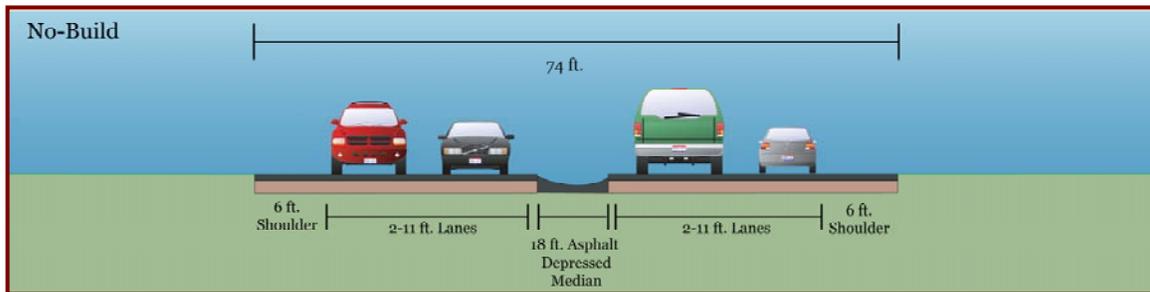
3.1 Access Management (Medina Line Rd to South Hametown Rd)

Existing and Future Conditions

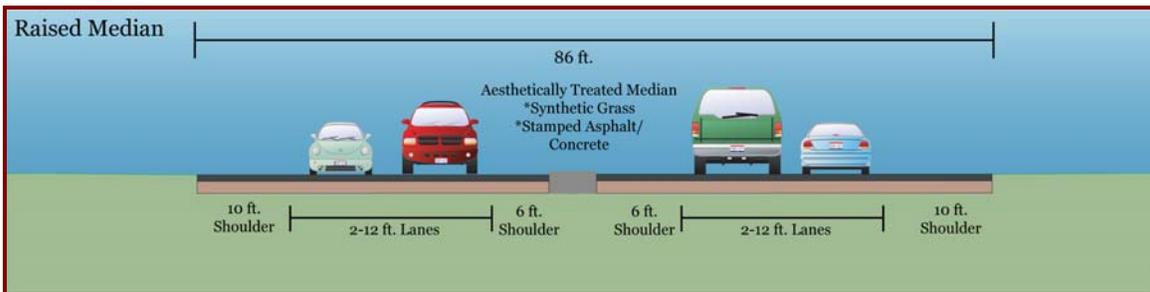
The segment of the SR 18 corridor from South Hametown Rd west to the Summit County line is presently a 4 lane section with an 18 foot paved median with left turn lanes at Medina Line Rd, Harmony Hills Dr, Creekrun Dr and North Hametown Rd. This section of the study area contains large tracts of land that are prime locations for future development.

Preliminary Conceptual Alternatives

No-Build – This concept would maintain the existing 74-foot section with two 11-foot lanes in each direction, 6-foot outside shoulders, and an 18-foot depressed asphalt median.

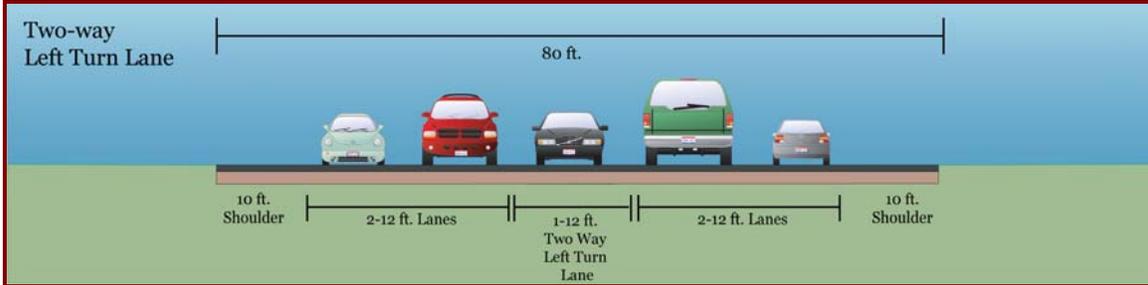


Raised Median – This concept would maintain the existing 2 lanes in both directions along SR 18 with 10-foot outside shoulders and 6-foot inside shoulders. The construction of a raised curb median would implement access management as this corridor is developed in the future by restricting any new drives to right only ingress/egress except where breaks in the median are constructed.



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Two-way Left Turn Lane – This concept proposes a 5-lane section with a two-way left turn lane that would match the current reconstruction of SR 18 to the West in Medina County. This concept would place little restriction on the location and frequency of ingress and egress along the western portion of the corridor.



3.2 Intersection Concepts (Concepts with Independent Utility)

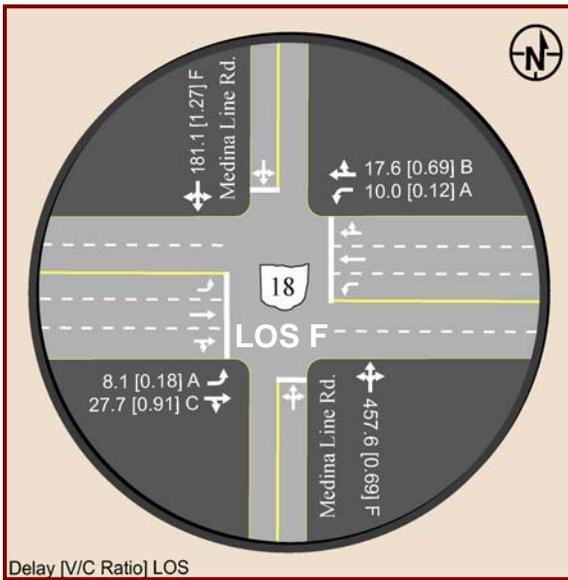
Medina Line Rd and SR 18 Intersection

Existing and Future Conditions

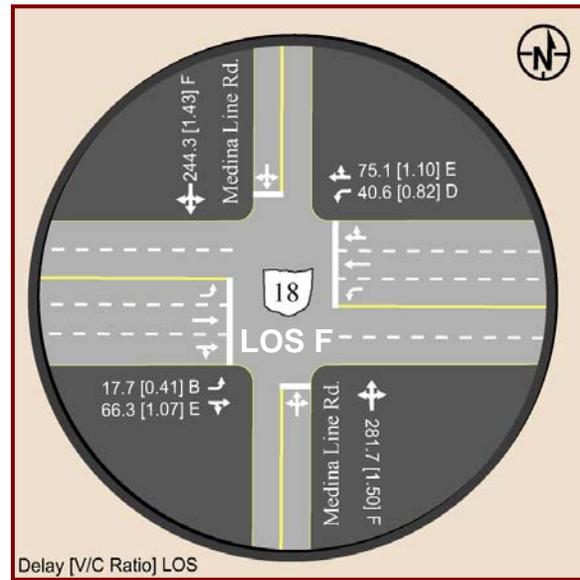
Medina Line Rd runs north-south along the Medina and Summit County lines as a collector feeding the SR 18 east-west arterial at the western boundary of the study area. The existing signalized intersection of Medina Line Rd and SR 18 has two through lanes and single left turn lanes from both the eastbound and westbound SR 18 approaches. Medina Line Rd has a single lane in both the northbound and southbound directions. The existing signalized intersection presently operates at a LOS of B in the AM Peak Hour and a LOS of C in the PM Peak Hour. In the future 2030 condition, both the northbound and southbound Medina Line Rd single lane approaches experience long delays resulting in an operational failure.

Preliminary Conceptual Alternatives

No-Build – A no-build concept at the intersection of Medina Line Rd and SR 18 would maintain the existing single-lane approaches on Medina Line Rd resulting in unacceptable levels of service in both peak hours for the 2030 future condition.



Medina Line Rd & SR 18 – 2030 No-Build AM Peak Hour

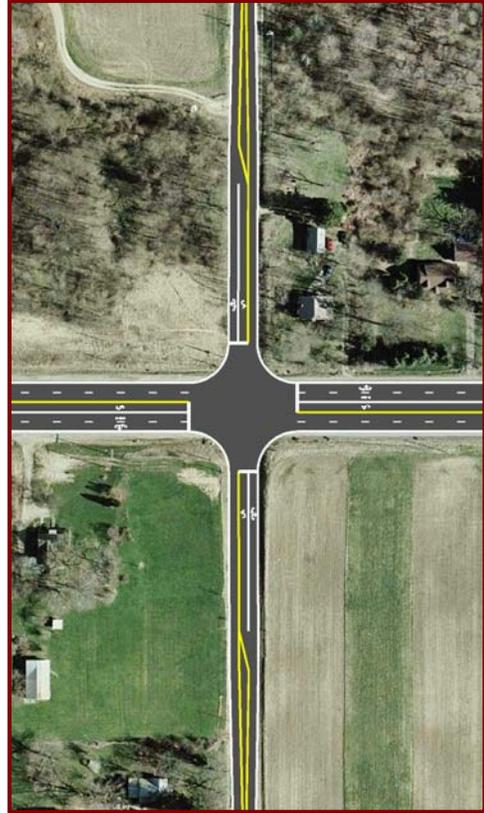


Medina Line Rd & SR 18 – 2030 No-Build PM Peak Hour

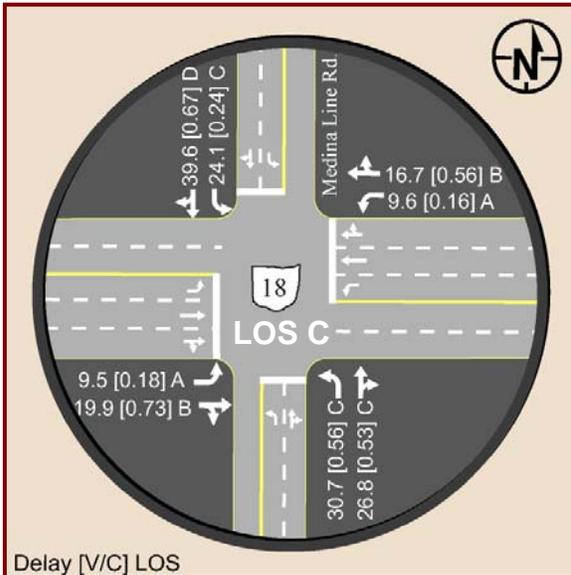
Addition of Left Turn Lanes on Medina Line Rd

– This concept proposes the addition of single left turn lanes on the northbound and southbound approaches of Medina Line Rd to reduce the delays experienced on these approaches in the future 2030 condition. With these proposed improvements the future condition delay is reduced to the point where both the northbound and southbound approaches operate at a LOS D or better.

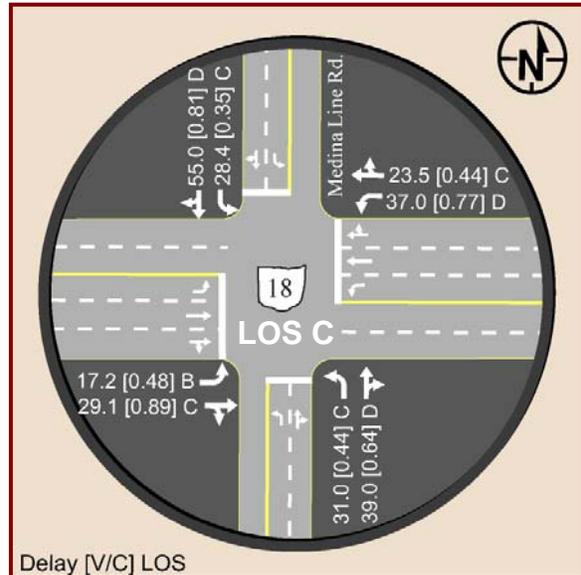
The potential right-of-way impacts of this concept would include partial takes from parcels in Summit County and parcels in Medina County; however, no structures would have to be acquired for the construction of left turn lanes along Medina Lane Rd.



Addition of Left Turn Lanes on Medina Line Rd



Medina Line Rd & SR 18 – 2030 Add Left Turn Lanes AM Peak Hour



Medina Line Rd & SR 18 – 2030 Add Left Turn Lanes PM Peak Hour

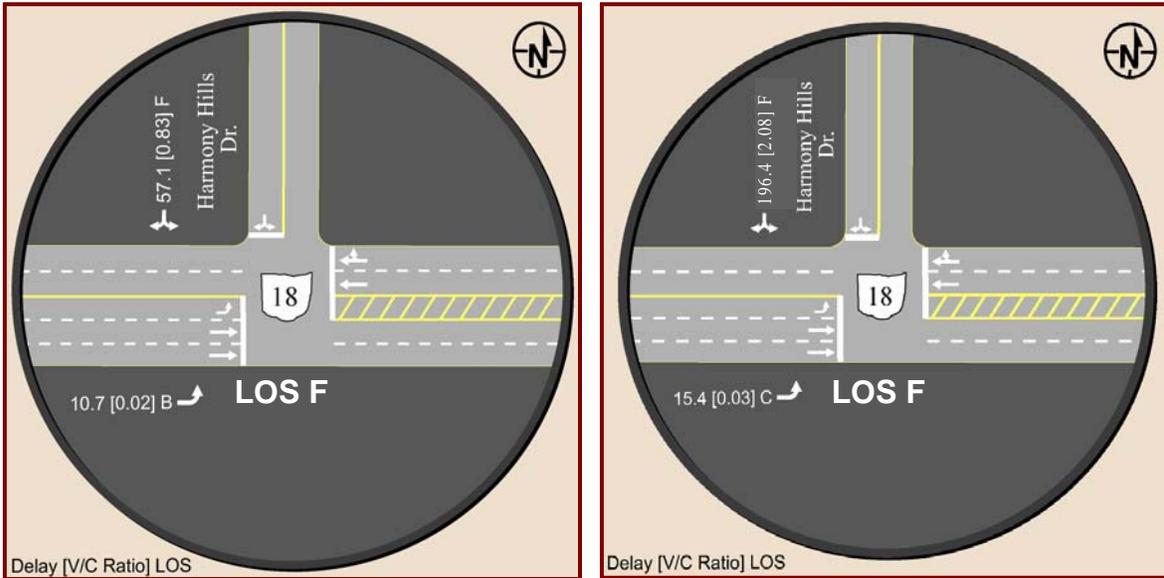
Harmony Hills Dr and SR 18

Existing and Future Conditions

The existing unsignalized intersection at Harmony Hills Dr and SR 18 has a single lane approach in the southbound direction. SR 18 has two through lanes on both the westbound and eastbound approaches, with a single left turn lane on the eastbound approach. The existing condition fails on the southbound approaches in the PM Peak Hour due to a lack of gaps in the SR 18 traffic, resulting in long delays on Harmony Hills Dr. The future 2030 condition results in failures at the intersection in both the AM Peak Hour and PM Peak Hour. Existing or future conditions do not warrant the addition of a westbound right-turn lane into Harmony Hills Dr. Similarly the addition of a left-turn lane on Harmony Hills Dr is not warranted, and it would not benefit vehicles seeking a gap in SR 18 traffic as they make left-turn out of Harmony Hills Dr.

Preliminary Conceptual Alternatives

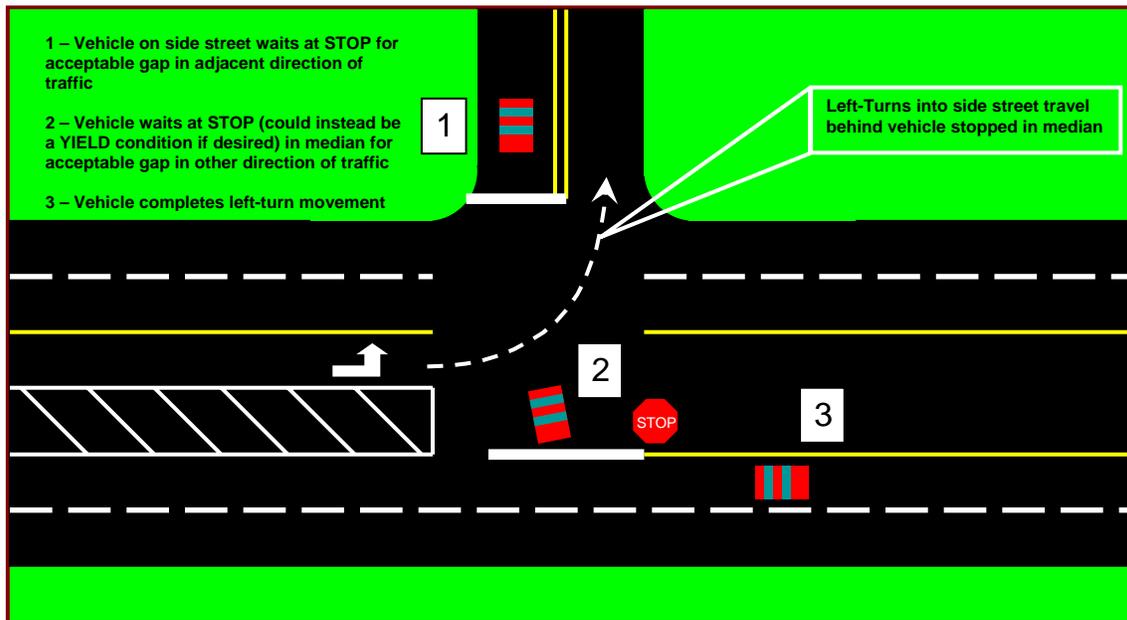
No-Build – A no-build concept at the intersection of Harmony Hills and SR 18 maintains the existing lane configuration resulting in a long delays and a LOS F for vehicles attempting to exit Harmony Hills Dr.



*Harmony Hills Dr & SR 18 –
2030 No-Build AM Peak Hour*

*Harmony Hills Dr & SR 18 –
2030 No-Build PM Peak Hour*

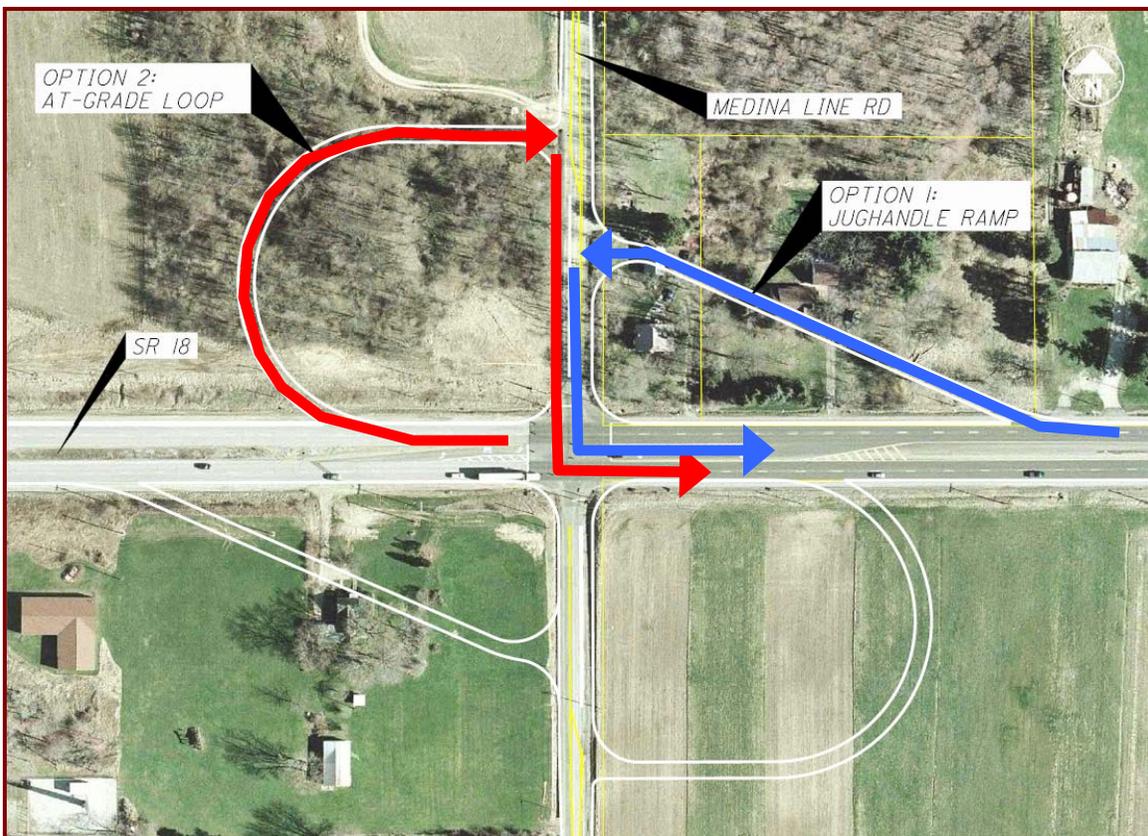
Two-stage Left Turn – This concept proposes the addition of a two-stage unsignalized left turn intersection along SR 18 at Harmony Hills Dr in order to help facilitate the movement of southbound left turns onto SR 18. Analysis of this proposed concept indicates that the intersection at Harmony Hills Dr is improved to a LOS E in the future 2030 condition with delay being decreased from 196 seconds to 50 seconds. Installation of a two-stage left turn would necessitate the widening of the SR 18 median to provide adequate storage space for a vehicle.



Operation of a Two-Stage Left Turn

The widening of the existing 20 foot median to 25 feet would provide enough of a refuge to accommodate cars making a left-turn out of Harmony Hills Dr. Storage for only one vehicle would be provided in the median which could lead to problems if another driver unfamiliar with the intersection were to enter the occupied median and attempt to wait behind or beside the lead vehicle. Left turns from SR 18 would still be allowed and their turn radius would be behind a stopped vehicle in the median. Vehicles completed the second stage of their left-turn could be governed by stop-control or yield-control within median refuge space.

Indirect Left Turns at Medina Line Rd – Another concept to reduce travel times for vehicles turning left out of Harmony Hills Dr is to provide indirect left turns to the West at the signalized intersection with Medina Line Rd. Two different types of indirect left turn ramps are considered at the Medina Line Rd intersection. Option 1, a jughandle-type ramp, is considered to be the preferred option by the AASHTO's *A Policy on the Geometric Design of Highways and Streets*. In this particular scenario the jughandle ramps would be located in the Northeast and Southwest quadrants of the intersection which are home to multiple residential structures. Option 2, an at-grade (surface) loop, is considered for cases just like Medina Line Rd and SR 18 where the right-of-way impacts of the jughandle ramps are too severe. The at-grade loops would be located on the opposite quadrants of the intersection (the Northwest and Southeast) which are presently home to undeveloped farm land.



Options for Implementing Indirect Left Turns at Medina Line Rd

A jug handle ramp would have to be constructed along eastbound SR 18 to eliminate the need for protected left turn phases from SR 18 to Medina Line Rd. Because the right-of-way impacts of the jughandle ramps are cost prohibitive, this concept proposes the construction of at-grade surface loop at the Northwest quadrant of Medina Line Rd and SR 18. For purposes of intersection phasing operation, another at-grade surface loop would be provided at the opposing southeast corner of SR 18 and Medina Line Rd.

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The construction of each at-grade surface loop would require approximately 3 acres of additional right-of-way. The cost-benefit of this improvement is questionable given the low number of vehicles entering SR 18 eastbound from Harmony Hills Dr.

Table 3-1 compares the operation of the different concepts at the Harmony Hills Dr and SR 18 intersection. With the addition of indirect left turns at Medina Line Rd the southbound Harmony Hills Dr delay at the intersection is reduced from 196 seconds to 19 seconds. Despite the significant decrease in delay at Harmony Hills Dr there is 116 seconds of additional travel time for cars and trucks traveling to and from the Medina Line Rd intersection. After intersection delay and additional travel times are summed the indirect left turns at Medina Line Rd the amount of time to reach SR 18 eastbound from Harmony Hills Dr is only decreased by 28 seconds.

Concept	Harmony Hills Dr Approach				
	Delay	Additional Travel Time	Delay & Additional Travel Time	LOS	V/C Ratio
	(Sec)	(Sec)	(Sec)		
No-Build	196.4			F	0.83
Two-Stage Lefts	49.9			E	0.12
Indirect Lefts	18.6	116	135 (Car) 135 (Truck)	C	0.08

Table 3-1 – Operation of Harmony Hills Concepts

The addition of indirect left turns at Medina Line Rd also has an adverse impact on the operation of the Medina Line Rd and SR 18 intersection as detailed in Table 3-2.

Concept	Without Indirect Lefts		With Indirect Lefts	
	No-Build	Add Left Turns on Medina Line	Left-Turn Only on Arrow (i.e. Protect U-Turn)	Jughandle
Intersection Delay (Sec)	*35.3	29.2	**34.6	***34.3

* NB & SB LOS F & V/C > 1.0

** WB Left LOS F & V/C = 0.94

*** WB & SB Thru V/C = 0.96

Table 3-2 – Medina Line and SR 18 Intersection Operation with Indirect Left Turns

Direct left turns from Harmony Hills Dr would be prohibited in this concept. The Indirect Left Turns concept is not recommended for further consideration due to its high cost and poor traffic operation relative to the Two Stage Left Turns concept.

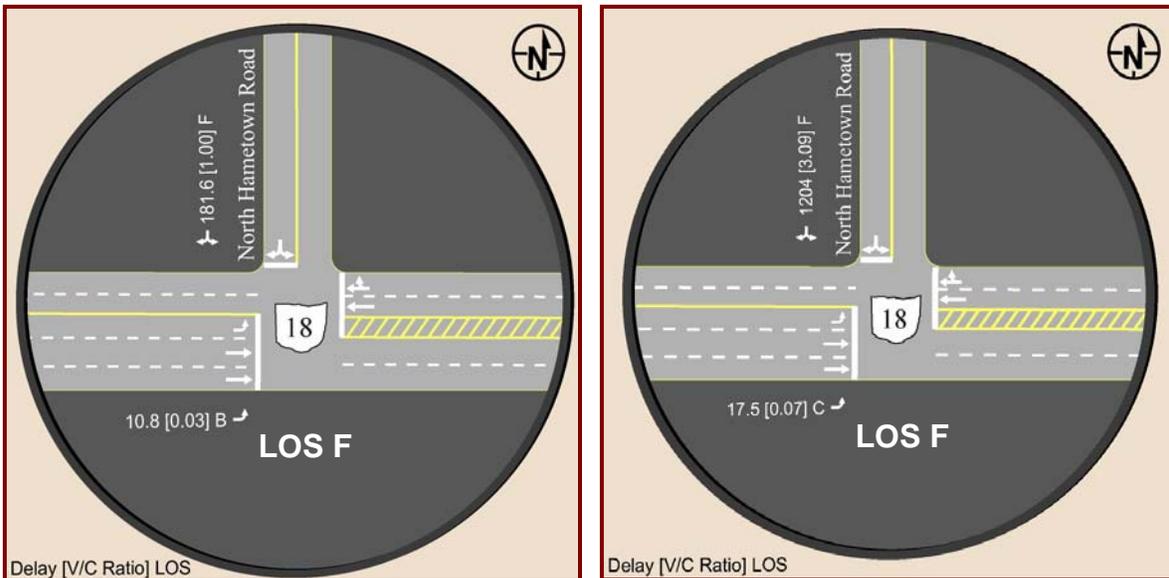
North Hametown Rd and SR 18 Intersection

Existing and Future Conditions

The existing unsignalized intersection at North Hametown Rd and SR 18 has a single lane approach in the southbound direction. SR 18 has two through lanes on both the westbound and eastbound approaches, with a single left turn lane on the eastbound approach. The existing condition fails on the southbound approach in the PM Peak Hour due to a lack of gaps in the SR 18 traffic, resulting in long delays on North Hametown Rd. The future 2030 condition results in failures at the intersection in both the AM Peak Hour and PM Peak Hour, with delays on the southbound North Hametown Rd approach exceeding 1200 seconds in the PM Peak Hour. The addition of a left-turn lane on North Hametown Rd is not warranted, and its installation would not benefit vehicles seeking a gap in SR 18 traffic as they make left-turn out of North Hametown Rd.

Preliminary Conceptual Alternatives

No-Build - A no-build concept at the intersection of North Hametown Rd and SR 18 maintains the existing lane configuration resulting in long delays and a LOS F for vehicles attempting to exit North Hametown Rd. In the 2030 future condition, delays on North Hametown Rd in the PM Peak Hour would exceed 1200 seconds.



North Hametown Rd & SR 18 – 2030 No-Build AM Peak Hour

North Hametown Rd & SR 18 – 2030 No-Build PM Peak Hour

Two-stage Left Turn – This concept proposes the addition of a two-stage unsignalized left turn intersection (see page 14 for a detailed description) along SR 18 at North Hametown Rd in order to help facilitate the movement of

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southbound left turns onto SR 18. Analysis of this proposed concept indicates that the intersection at North Hametown Rd still fails in the future 2030 condition in the PM Peak Hour; however, the delay in the PM Peak Hour is significantly decreased from over 1200 seconds to 84 seconds.

This concept also proposes the addition of a right turn lane on westbound SR 18 at North Hametown Rd, due to 2030 traffic volumes warranting a right turn lane. This proposed concept would improve the flow of traffic on SR 18 westbound, but it would have no effect on the long delays experienced on North Hametown Rd in the future 2030 condition. The addition of a right turn lane on SR 18 could be implemented independently of any other intersection improvements.

Indirect Left Turns at Medina Line Rd – Another concept to reduce travel times for vehicles turning left out of North Hametown Rd is to provide indirect left turns to the West at the signalized intersection with Medina Line Rd (direct left turns would now be prohibited). Cars on southbound North Hametown destined for SR 18 eastbound are able to make a right turn at SR 18 and proceed to make a U-turn at Creek Run Dr; however, trucks are not provided enough space to perform this maneuver. These trucks would be directed west on SR 18 to make an indirect left turn at Medina Line Rd (for a description of the indirect left turn options see *Harmony Hills and SR 18 Intersection – Indirect Left Turns*).

Table 3-3 illustrates the reductions in delay and travel time at the southbound North Hametown approach. With the addition of indirect left turns at Medina Line Rd the North Hametown delay is reduced from over 1200 seconds to 23 seconds; however there are 65 additional seconds of travel times for cars and 204 seconds of additional travel time for trucks. Nevertheless, when intersection delay and additional travel times are summed the indirect left turns at Medina Line significantly reduce the amount of time for trucks to reach SR 18 eastbound from North Hametown Rd.

North Hametown Concepts (2030 PM Peak Hour)					
Concept	SB North Hametown Approach				
	Delay	Additional Travel Time	Delay & Additional Travel Time	LOS	V/C Ratio
	(Sec)		(Sec)		
No-Build	1110			F	3.09
2 Stage Lefts	84.4			F	0.74
Indirect Lefts	23.2	65 (Car) 204 (Truck)	88 (Car) 227 (Truck)	C	0.34

Table 3-3 – Medina Line and SR 18 Intersection Operation with Indirect Left Turns

The construction of each at-grade surface loop would require approximately 3 acres of additional right-of-way. Given these substantial right-of-way impacts, the negative operational impacts to the Medina Line Rd intersection (see Table 3-2), and the low number of trucks entering SR 18 eastbound from North

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Hametown Rd the Indirect Left Turn concept is not recommended for further consideration.

This concept also proposes the addition of a right turn lane on westbound SR 18 at North Hametown Rd, due to 2030 traffic volumes warranting a right turn lane. This proposed concept would improve the flow of traffic on SR 18 westbound, but it would have no effect on the long delays experienced on North Hametown Rd in the future 2030 condition. The addition of a right turn lane on SR 18 could be implemented independently of any other intersection improvements.

Realignment of North Hametown Rd to a Signalized Intersection with South Hametown Rd – This concept proposes the realignment of North Hametown Rd approximately 700 feet to the East to form a single signalized intersection with South Hametown Rd. Because the traffic on the North Hametown Rd approach alone does not warrant a signal, this concept is the most logical way to funnel North Hametown traffic into a signalized intersection.

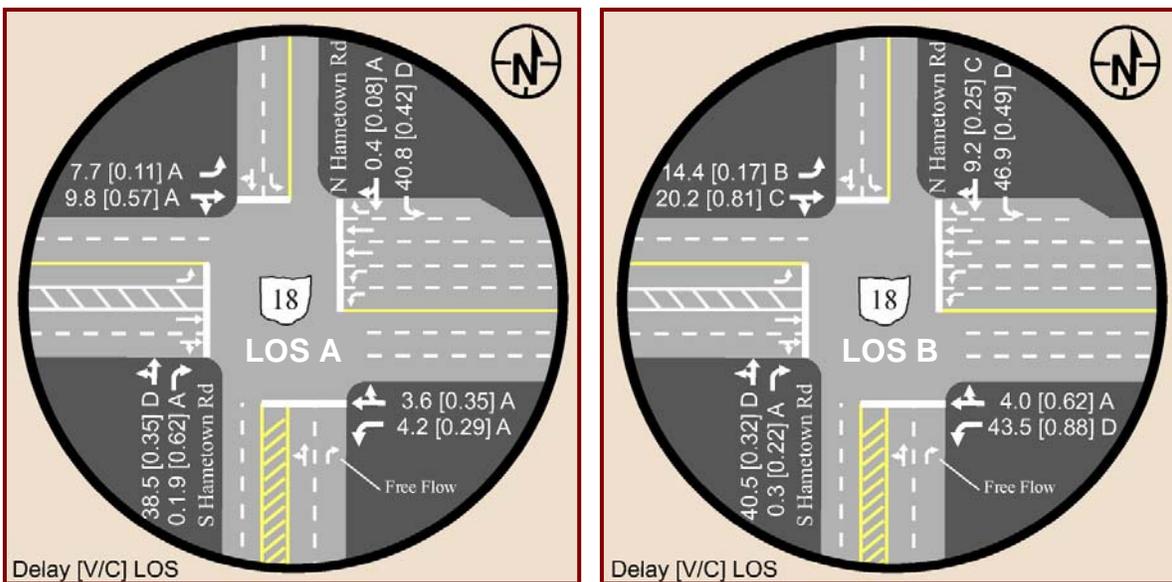


Realignment of North Hametown Rd to South Hametown Rd

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Environmental and economic ramifications must be considered when performing a cost-benefit analysis of a realigned North Hametown Rd given the small volume of traffic at North Hametown Rd. A realignment of North Hametown Rd would require the partial acquisition of the Bath Township School property (SUM-116-6) listed in the National Historic Register as part of the Bath Township Multiple Resource Area; however, no structures on the parcel would be impacted. Also, directly north of South Hametown Rd there is an office building whose parking lot ingress and egress is served by the north approach of the existing signal. A realignment of North Hametown Rd would also have a negative impact on the local neighborhood quality of life because the proposed relocation would run adjacent to residential parcels along the Fryman Dr cul-de-sac.

This concept also proposes the addition of a right turn lane on westbound SR 18 at North Hametown Rd, due to 2030 traffic volumes warranting a right turn lane. This proposed concept would improve the flow of traffic on SR 18 westbound, but it would have no effect on the long delays experienced on North Hametown Rd in the future 2030 condition. The addition of a right turn lane on SR 18 could be implemented independently of any other intersection improvements.



Hametown Rd & SR 18 –
2030 N Hametown Realignment AM Peak Hour

Hametown Rd & SR 18 –
2030 N Hametown Realignment PM Peak Hour

The realignment of North Hametown Rd would substantially decrease the future condition delays on the southbound approach with minimal impacts on the operation of the northbound approach to the intersection. While the realignment of North Hametown Rd is logical from a traffic engineering standpoint, the high cost implications of this concept coupled with the relatively low volume of traffic serviced by North Hametown Rd make this approach less feasible.

Springside Drive and SR 18 Intersection

Existing and Future Conditions

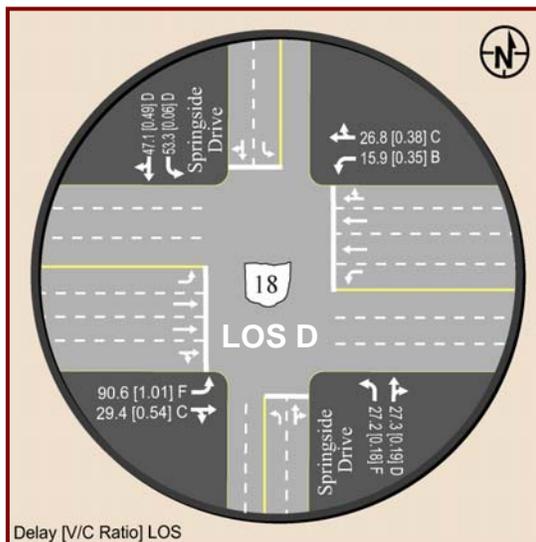
The existing signalized intersection at Springside Dr and SR 18 consists of three through lanes in both directions on SR 18, with the outside westbound lane dropping as a right turn to I-77 northbound just west of Springside Dr. Both the northbound and southbound approaches of Springside Dr have single through lanes and single left turn lanes. To the north of SR 18, Springside Dr provides access to a business park, multiple hotels and a recreational facility; south of SR 18 there is dense commercial and retail development, as well as access to residential subdivisions via Rothrock Rd.

The existing and future conditions experience failures in the PM Peak Hour on the Springside Dr approaches and the westbound SR 18 left turn movement. In the future 2030 condition the westbound left turn into Springside Dr also fails.

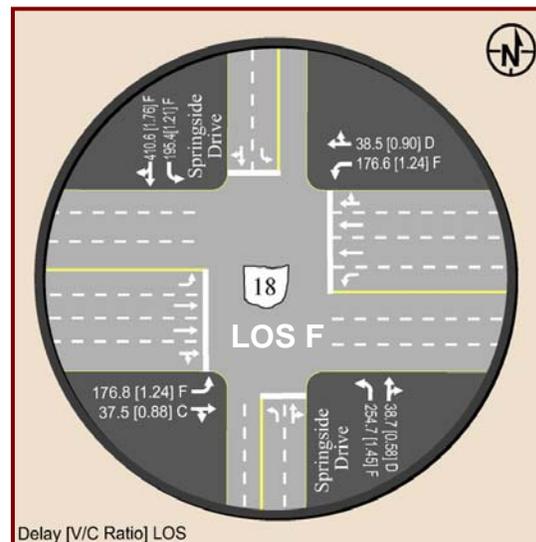
The frequency of rear-end (40.0%) and left crashes (20.7%) at the intersection are both well above the statewide averages (26.2% and 12.0%, respectively – See page 70 of the Existing & Future Conditions Report.) The high number of rear-end crashes can be attributed to congestion. The high number of left turn crashes result from a lack of gaps in opposing traffic during the left turn permissive phase.

Preliminary Conceptual Alternatives

No-Build – Maintaining the existing intersection configuration at Springside Dr and SR 18 yields an intersection LOS D in the 2030 future condition in the AM Peak Hour with failures on the northbound left and westbound left approaches. In the PM Peak Hour for the 2030 condition, overall intersection operation drops to a LOS F with failures on the southbound through and all left turn movements.



*Springside Dr & SR 18 –
2030 No-Build AM Peak Hour*



*Springside Dr & SR 18 –
2030 No-Build PM Peak Hour*

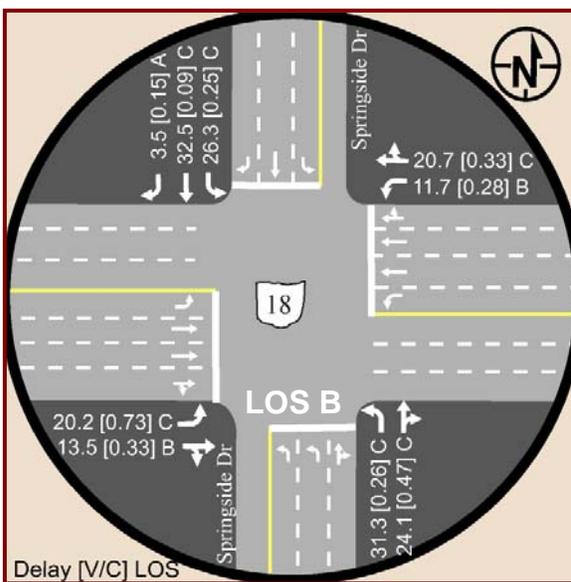
Addition of Turn Lanes on Springside Dr – This concept proposes the addition of a second left turn lane on the northbound Springside Dr approach to alleviate delays on the heavy left turn movement. This proposed improvement will be funded by a developer planning to build on property to the southwest on Rothrock Rd. This improvement yields an improvement to a LOS E on the northbound left turn movement in the PM Peak Hour.

This concept also proposes the addition of a right turn lane on the southbound Springside Dr approach, as the heavy volume of vehicles turning westbound onto SR 18 warrants a right turn lane. This improvement improves the southbound right turn movement to a LOS B in the PM Peak Hour.

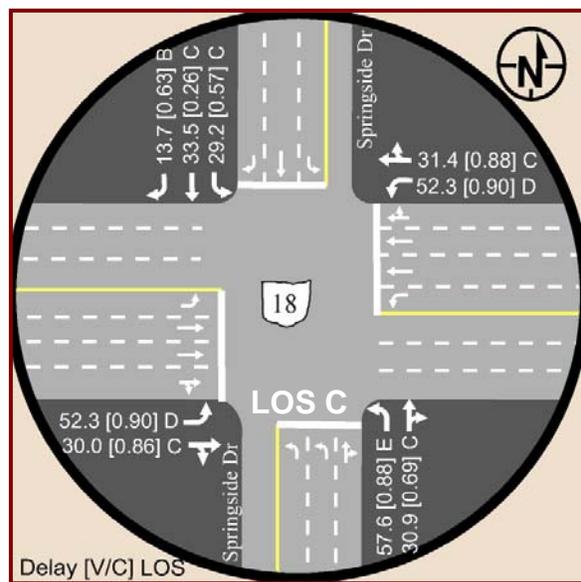
No improvements are proposed on the SR 18 approaches as this intersection represents the eastern edge of the study limits; therefore, SR 18 will be matching the existing 7-lane section of roadway that continues east into Fairlawn.



The addition of turn lanes at Springside Dr & SR 18



Springside Dr & SR 18 – 2030 Add Turn Lanes AM Peak Hour



Springside Dr & SR 18 – 2030 Add Turn Lanes PM Peak Hour

3.3 SR 18 Capacity Additions (South Hametown to Montrose West)

Existing and Future Conditions

This section of SR 18 experiences currently experiences the most congestion in the corridor primarily because the intersection of SR 18 and Crystal Lake Rd/Montrose West Ave creates a bottleneck in close proximity to poorly coordinated signals at the intersections of Heritage Woods Dr and SR 18 to the West and Embassy Parkway and Crystal Lake Rd to the North. The existing configuration of SR 18 has two through lanes in both the eastbound and westbound directions, with single left turn lanes at signalized intersections with South Hametown Rd, Heritage Woods Dr and Montrose West Ave/Crystal Lake Rd. The unsignalized intersection with Scenic View Dr is also serviced by a single left turn lane on SR 18 westbound. Vehicles traveling northbound on Scenic View are provided minimal gaps in the traffic at SR 18, which is mitigated by local street access to South Hametown Rd where traffic destined for westbound SR 18 is able to make a left turn at a signalized intersection. The signal at Montrose West Ave/Crystal Lake Rd currently operates as a split phase in the northbound and southbound directions to service high demands for the conflicting southbound left turn and northbound right turn movements.

In the existing condition AM Peak Hour, eastbound traffic operation on SR 18 fails between Heritage Woods Dr and Montrose West Ave/Crystal Lake Rd as traffic destined for the I-77 ramps is forced to the outside lane creating backups that spill into the signalized Heritage Woods Dr intersection. In the existing condition PM peak hour, westbound traffic operation on SR 18 fails between Heritage Woods Dr and Montrose West Ave/Crystal Lake Rd as green time for the westbound SR 18 through movement must contend with a heavy volume of left turns from Crystal Lake Rd southbound primarily originating in the adjacent Embassy Parkway corporate park. In the future 2030 condition, the failures along SR 18 extend west past North Hametown Rd in the AM Peak Hour and west to South Hametown Rd in the PM Peak Hour (*For 2030 Future Condition LOS diagram see Appendix A – 2030 No-Build, AM Peak LOS & 2030 No-Build, PM Peak LOS.*)

In the existing condition, the southbound Crystal Lake Rd approach operates at a LOS E in both Peak Hours, while the northbound Montrose West Ave approach operates at a LOS E in the AM Peak Hour and a LOS F in PM Peak Hour. In the future 2030 condition, the southbound Crystal Lake Rd approach experiences failures in both Peak Hours.

In addition to congestion problems, safety is another major concern in the section of the corridor between Heritage Woods Dr and Montrose West Ave. The corridor has a percentage of rear-end crashes (65.3%) almost three times higher than the statewide average (23.1%) which is a strong indication of a congestion problem (*See page 51 of the Existing & Future Conditions Report.*)

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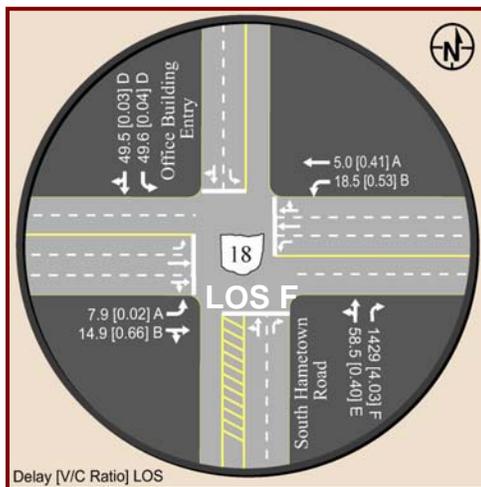
At South Hametown Rd the existing signalized intersection configuration has two through lanes and single left turn lanes in both directions on SR 18. The southbound approach from the Office Park has a thru-right lane and a left turn lane. The northbound approach from South Hametown Rd has a thru-left lane and a right turn lane. South Hametown Rd provides access to the northern region of Copley containing a growing number of residential subdivisions that generate a significant volume of commuter trips to and from I-77 through the SR 18 corridor.

In the future 2030 condition the SR 18 westbound approach fails in the PM Peak Hour for the left turn movement to southbound South Hametown Rd with a delay exceeding 800 seconds and a volume to capacity ratio of 2.90.

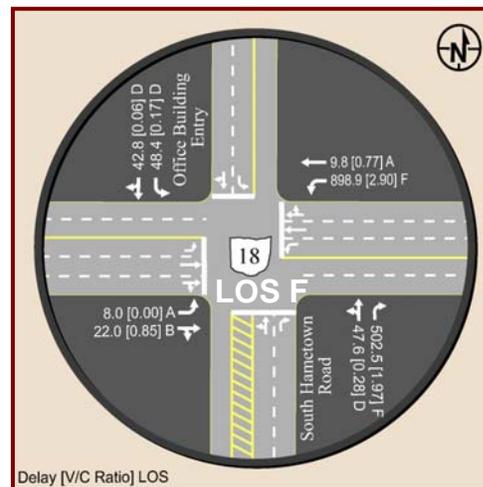
On the South Hametown Rd approach the existing condition fails for the northbound right turn to SR 18 eastbound in the AM Peak Hour with a movement delay of 80 seconds. In the future condition this delay increases to over 1400 seconds as right-turn-on-red vehicles struggle to find gaps in the morning rush of eastbound SR 18 traffic destined for I-77 favoring the outside lane. The intersection of South Hametown Rd and SR 18 experienced 20 crashes over a three year period between 2002 and 2004, but this data was collected prior to the installation of a traffic signal at the intersection.

Preliminary Conceptual Alternatives

No-Build – A no build concept would maintain the existing 5-lane section of SR 18 between South Hametown and Montrose West. All side street approaches would also maintain their existing lane configurations. The bottleneck at the split-phase signalized intersection of Crystal Lake Rd/Montrose West Ave and SR 18 would degrade mainline operation to a LOS F in both directions in both 2030 Peak Hours. For a No-Build concept in the future 2030 condition the signalized intersections at South Hametown Rd, Heritage Woods Dr, and Montrose West Ave/Crystal Lake Rd would all fail in both the AM and PM Peak Hours.

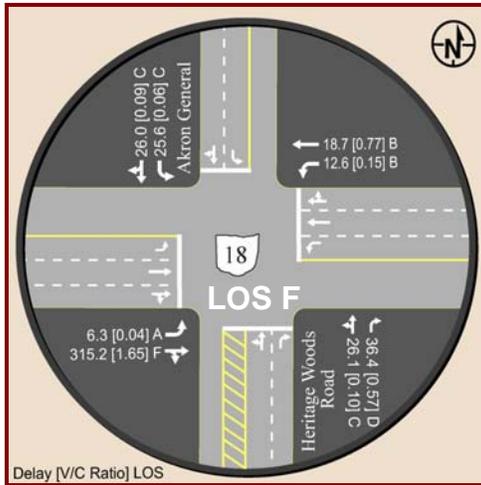


South Hametown Rd & SR 18 –
2030 No-Build AM Peak Hour

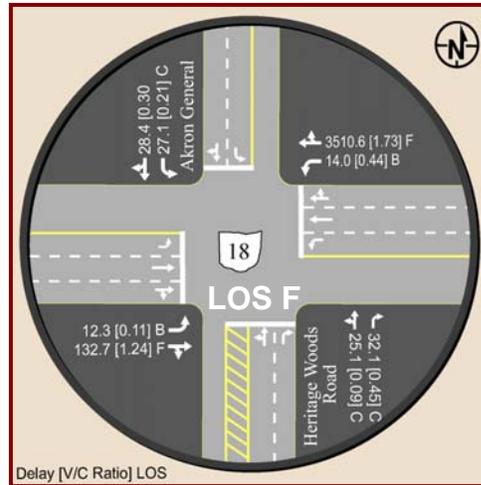


South Hametown Rd & SR 18 –
2030 No-Build PM Peak Hour

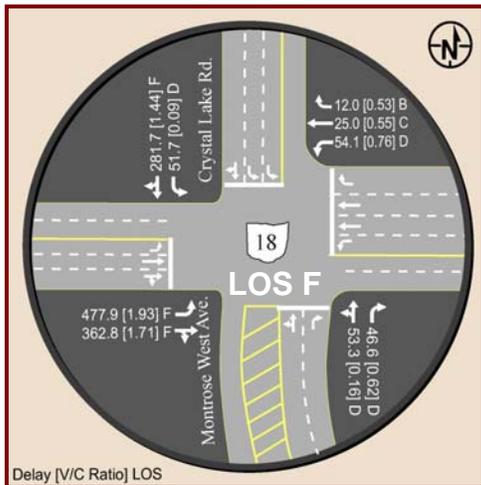
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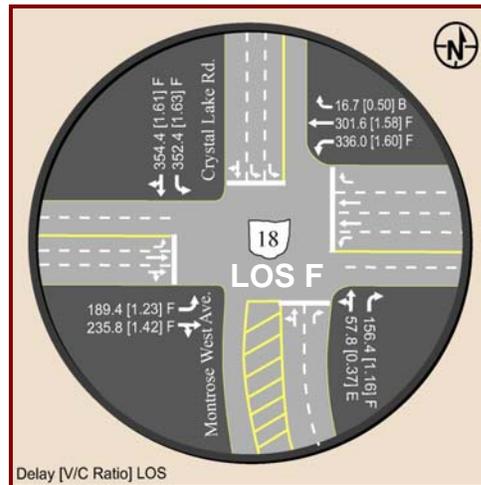
Heritage Woods Dr & SR 18 – 2030 No-Build AM Peak Hour



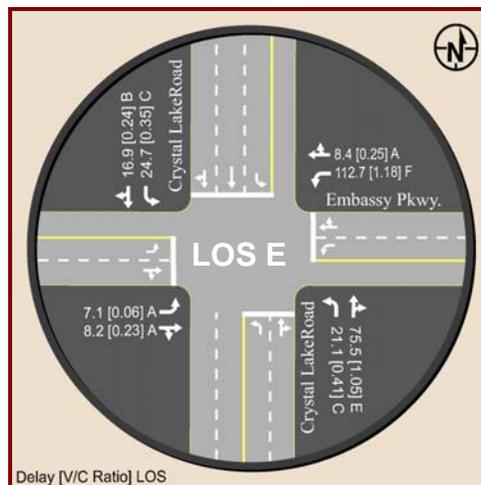
Heritage Woods Dr & SR 18 – 2030 No-Build PM Peak Hour



Crystal Lake Rd & SR 18 – 2030 No-Build AM Peak Hour



Crystal Lake Rd & SR 18 – 2030 No-Build PM Peak Hour



Embassy Parkway & Crystal Lake Rd – 2030 No-Build PM Peak Hour

Basic Lane Addition – This concept proposes adding two through lanes on SR 18 in both the eastbound and westbound directions. In the eastbound direction single lanes would be added as free-flow right turns at the South Hametown Rd and Heritage Woods Dr intersections. The additional eastbound lanes would be signed in advance for I-77/SR 21 southbound traffic as both lanes would drop at the interchange. The addition of these two lanes would prevent the eastbound traffic queue at the Montrose West Ave signal from extending upstream into the intersection at Heritage Woods Dr. This concept improves the eastbound movement to a LOS C in the AM Peak Hour.

In the westbound direction the two additional lanes would provide enough capacity to eliminate the bottleneck at Crystal Lake Rd /Montrose West Ave during the PM peak hour, improving the through movement to a LOS C. Both additional lanes would extend west where they would drop before South Hametown Rd. A single left turn lane into South Hametown Rd would be striped, although SR 18 would be widened to accommodate the projected future need for a double left turn to serve the heavy volume of commuter traffic destined for the adjacent Copley subdivisions. A short-range or medium-range reconstruction project would not widen South Hametown Rd to accept a second left turn lane from SR 18; however, if deemed necessary, a long-range improvement could be implemented to widen South Hametown Rd to accommodate a dual left turn from SR 18 if traffic demand grows as projected by the year 2030.

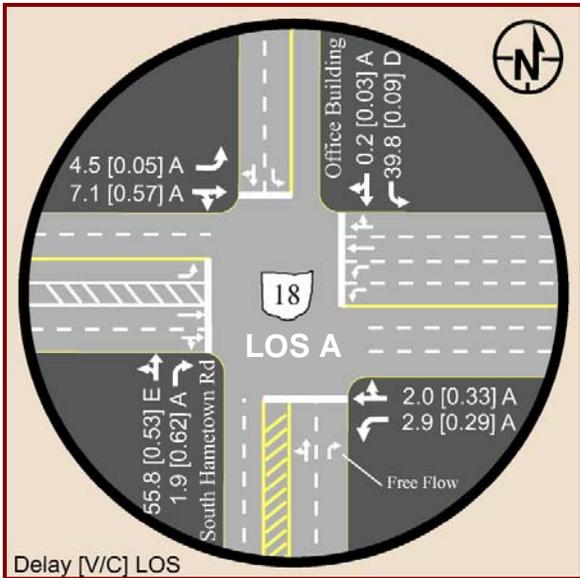
At South Hametown Rd the potential addition of dual left from westbound SR 18 would eliminate the failure (LOS F) condition in the 2030 PM Peak Hour and improve the westbound left movement to a LOS D. An additional southbound through lane would be added to South Hametown Rd to accommodate the dual left turn movement dropping as right turn only at Hillside Dr about a quarter mile south of SR 18. The addition of a free flow right turn lane from northbound South Hametown Rd to eastbound SR 18 remedies the failure projected due to long delays in the 2030 AM Peak Hour.



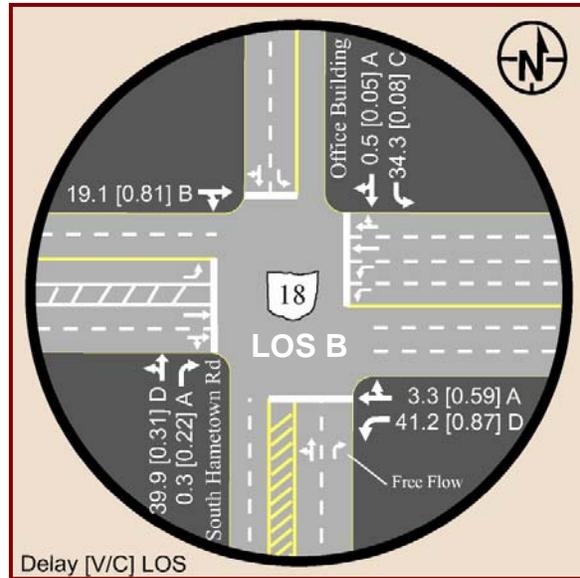
Potential Long-Term Improvements to the South Hametown Rd & SR 18 Intersection

The potential long-range future capacity enhancements on South Hametown Rd would require the acquisition of multiple strip takes from residential parcels. Because South Hametown Rd was already widened in a recent reconstruction, another widening of the street would be a long-term project with purpose and need to be reevaluated at a later date.

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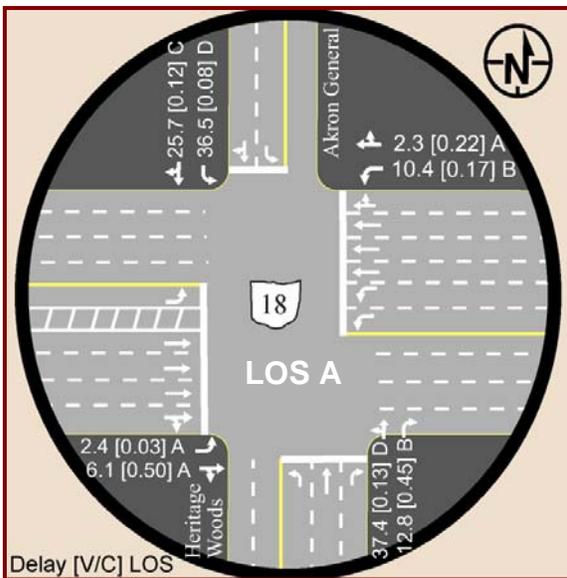


South Hametown Rd & SR 18 –
2030 Basic Lane Addition AM Peak Hour

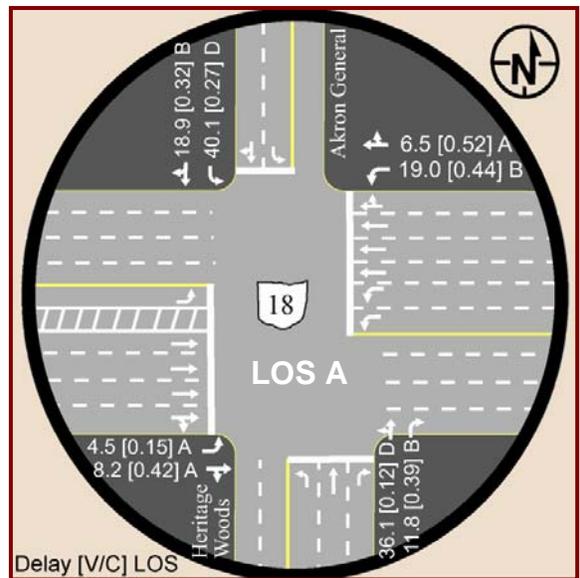


South Hametown Rd & SR 18 –
2030 Basic Lane Addition PM Peak Hour

The intersection of Heritage Woods Dr and SR 18 is enhanced by the addition of thru lanes on SR 18, a second westbound left turn lane into Heritage Woods Dr, and a northbound left turn lane out of Heritage Woods Dr. At the intersection of Crystal Lake Rd and Embassy Parkway a second left turn lane would be added to the westbound movement and a right turn lane would be added to the northbound movement.

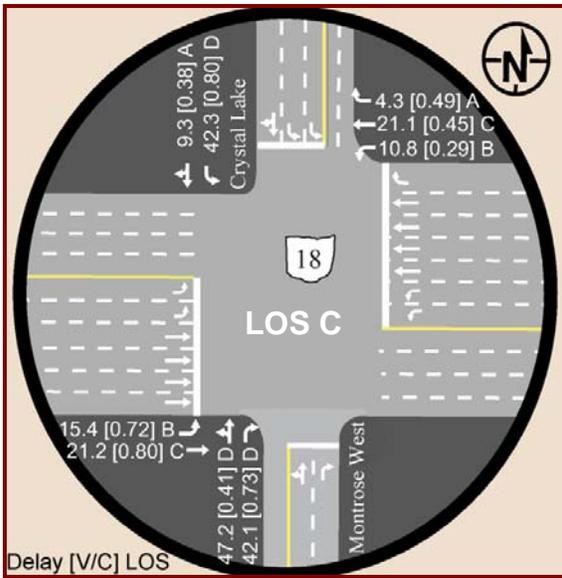


Heritage Woods Dr & SR 18 –
2030 Basic Lane Addition AM Peak Hour

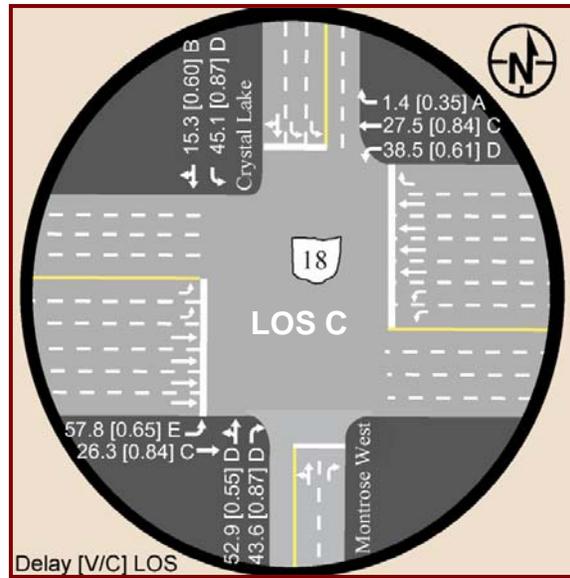


Heritage Woods Dr & SR 18 –
2030 Basic Lane Addition PM Peak Hour

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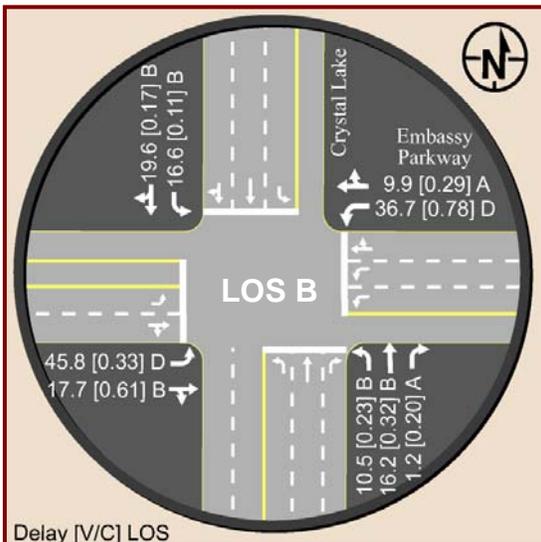


Montrose West Ave & SR 18 –
2030 Basic Lane Addition AM Peak Hour

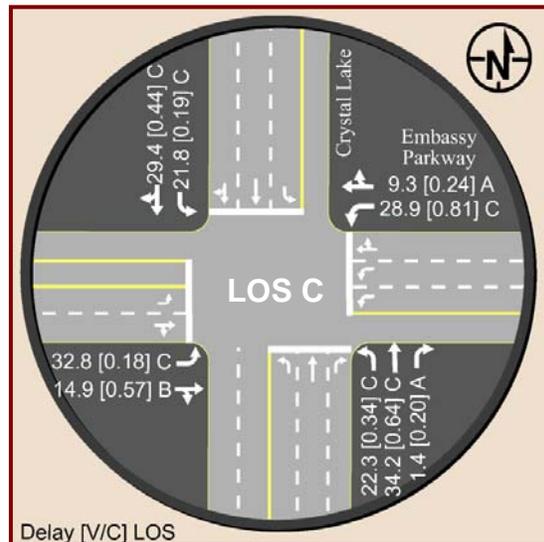


Montrose West Ave & SR 18 –
2030 Basic Lane Addition PM Peak Hour

This basic lane addition concept maintains the split phase signal and existing lane configuration on the northbound and southbound approaches of the Montrose West Ave/Crystal Lake Rd and SR 18 intersection. In both Peak Hours the southbound left turn movement from Crystal Lake Rd to SR 18 operates at a LOS D. In the PM Peak Hour the northbound right turn movement from Montrose West Ave to SR 18 East operates at a LOS D. Additional left turn lanes would be added to SR 18 on both the eastbound and westbound approaches to form dual lefts into Crystal Lake Rd and Montrose West Ave. With dual left turns the westbound movement into Montrose West Ave operates at a LOS D in the PM Peak Hour. The eastbound left into Crystal Lake Rd has about half the volume of the westbound left in the PM Peak Hour, but actually operates worse at a LOS E because it has a shorter green time in order to accommodate the heavy demand for the conflicting westbound through movement.



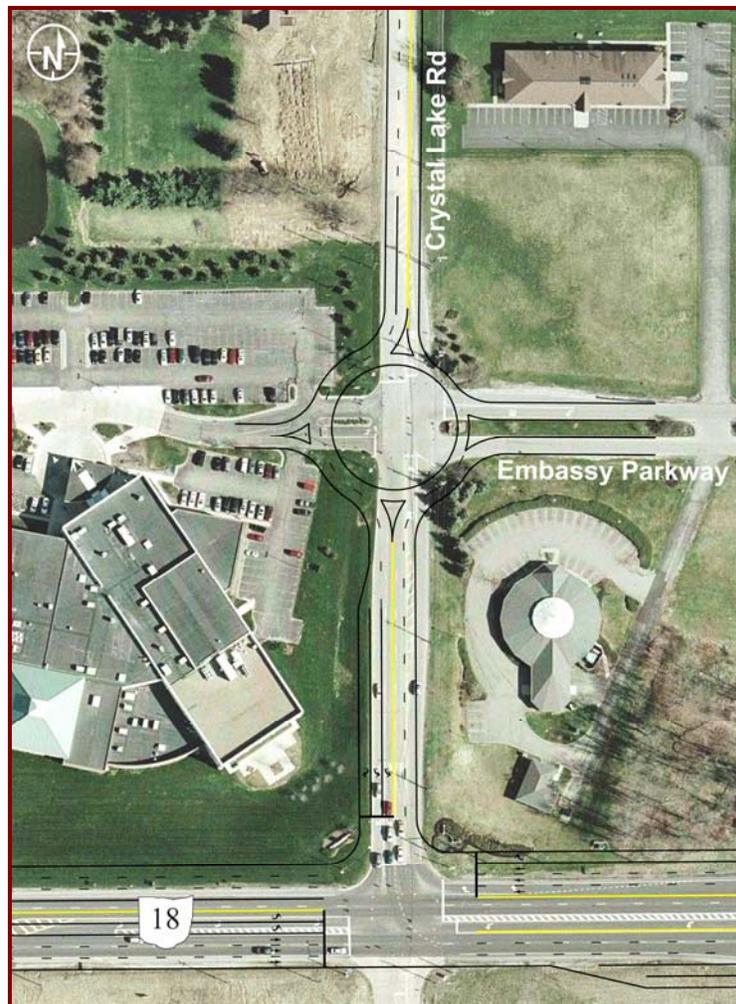
Crystal Lake Rd & Embassy Parkway –
2030 Basic Lane Addition AM Peak Hour



Crystal Lake Rd & Embassy Parkway –
2030 Basic Lane Addition PM Peak Hour

Summit 18 Corridor: Planning Study including Strategic Plan

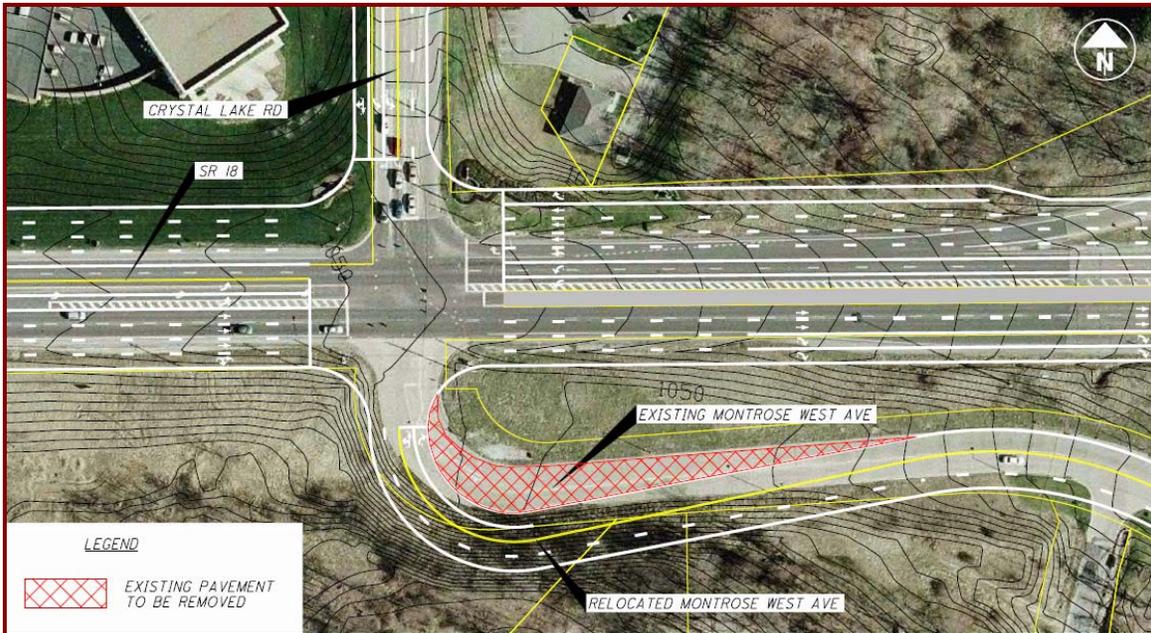
Adding a second left-turn lane out of Embassy Parkway at the signalized intersection with Crystal Lake Rd would improve the operation of the westbound left-turn movement in the 2030 PM Peak Hour from a LOS F in the No-Build to a LOS C. Furthermore, the 2030 PM Peak Hour No-Build delay (112.7 sec) and V/C ratio (1.18) would be reduced significantly to 28.9 sec and 0.81, respectively. Another potential concept would be to replace the current signalized intersection at Crystal Lake Rd and Embassy Parkway with a two-lane roundabout intersection to improve the flow of traffic to and from SR 18. One concern with a roundabout intersection being placed so closely (approximately 500 feet) to a signalized intersection at SR 18 would be the potential for the southbound traffic queue from the signal to back into the roundabout intersection. An advantage of a roundabout intersection is that traffic within the intersection is constantly moving; however, any adjacent backups spilling into the roundabout would quickly lead to a failure of the intersection. It is imperative that a roundabout configuration be analyzed in detail in conjunction with the coordinated signal timings along the SR 18/Heritage Woods Dr and SR 18/Crystal Lake Rd intersections to ensure that adequate storage exists for the southbound queue at the SR 18/Crystal Lake Rd signal.



Conceptual Roundabout Intersection at Crystal Lake Rd & Embassy Parkway

Summit 18 Corridor: Planning Study including Strategic Plan

Montrose West Ave would have to be realigned at SR 18 because the additional lanes on SR 18 would push the curve on Montrose West Ave adjacent to the intersection further to the south. This reconfiguration would require extensive excavation into a rock layer.



Basic Lane Addition – Realignment of Montrose West at intersection with SR 18

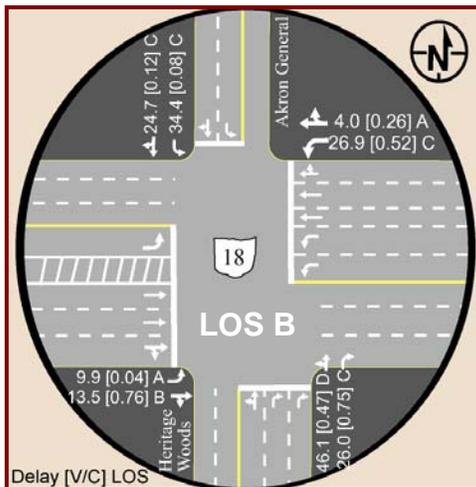
The capacity enhancements of this concept are controlled by the PM Peak Hour demand resulting in an overdesign with respect to the AM Peak Hour traffic.

The capacity enhancements and advance signing of I-77 priority lanes included in this concept should reduce the high number of rear-end crashes that presently occur as a result of heavy congestion.

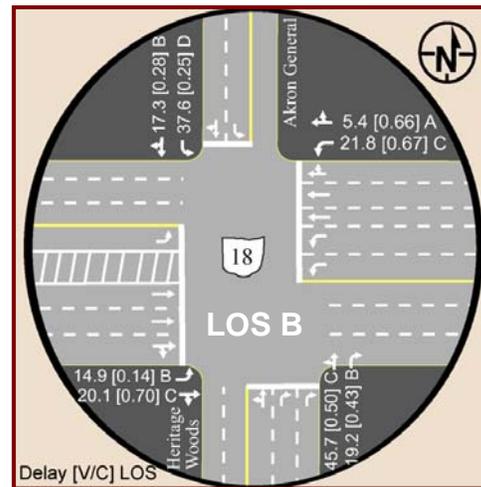
Summit 18 Corridor: Planning Study including Strategic Plan

Montrose West Relocation – This concept proposes the realignment of Montrose West Ave to a new northern terminus at an improved intersection with Heritage Woods Dr, thus eliminating the southbound leg of the Crystal Lake Rd and SR 18 intersection and relocating Montrose West Ave access via the Heritage Woods Dr and SR 18 intersection. This concept also proposes an additional through lane in both directions along SR 18.

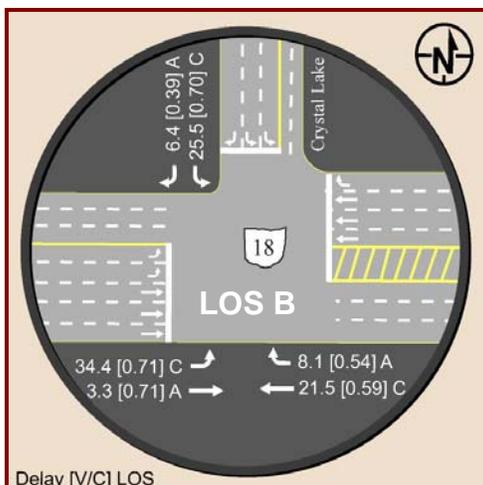
This concept eliminates the split phase signal intersection at Crystal Lake Rd/Montrose West Ave and SR 18. The following three closely spaced signals would operate in a coordinated network: Crystal Lake Rd/SR 18; Heritage Woods Dr/SR 18; Embassy Parkway/Crystal Lake Rd. Montrose West Ave traffic destined for eastbound SR 18 and I-77 would enter SR 18 upstream of the existing intersection at Heritage Woods Dr. A dual right turn is added to the northbound approach of the Heritage Woods Dr and SR 18 intersection resulting in a LOS B for this movement in the PM Peak Hour. The southbound dual left at Crystal Lake Rd and SR 18 operates at a LOS D in the PM Peak Hour.



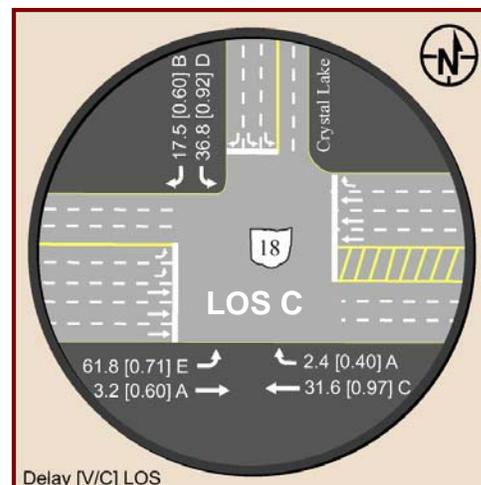
Heritage Woods Dr & SR 18 –
2030 Montrose West Relocation AM Peak Hour



Heritage Woods Dr & SR 18 –
2030 Montrose West Relocation PM Peak Hour

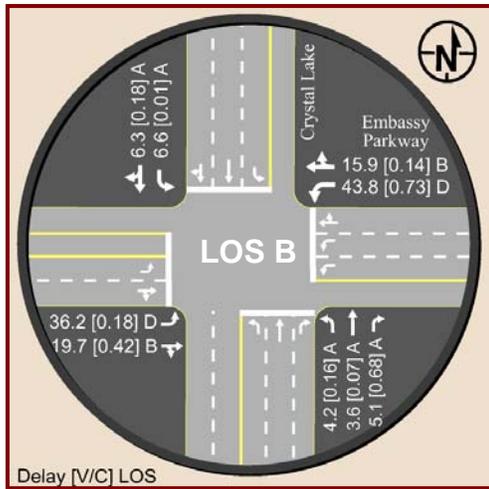


Crystal Lake Rd & SR 18 –
2030 Montrose West Relocation AM Peak Hour

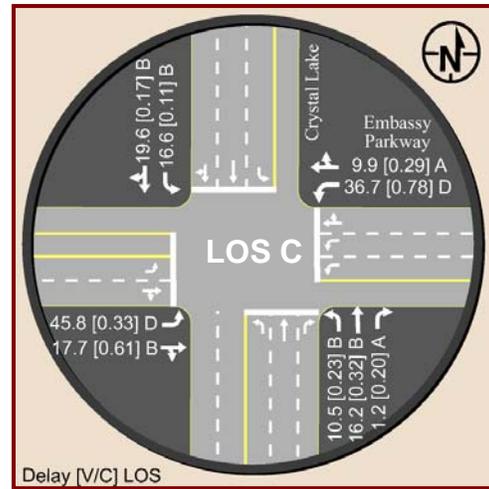


Crystal Lake Rd & SR 18 –
2030 Montrose West Relocation PM Peak Hour

Summit 18 Corridor: Planning Study including Strategic Plan



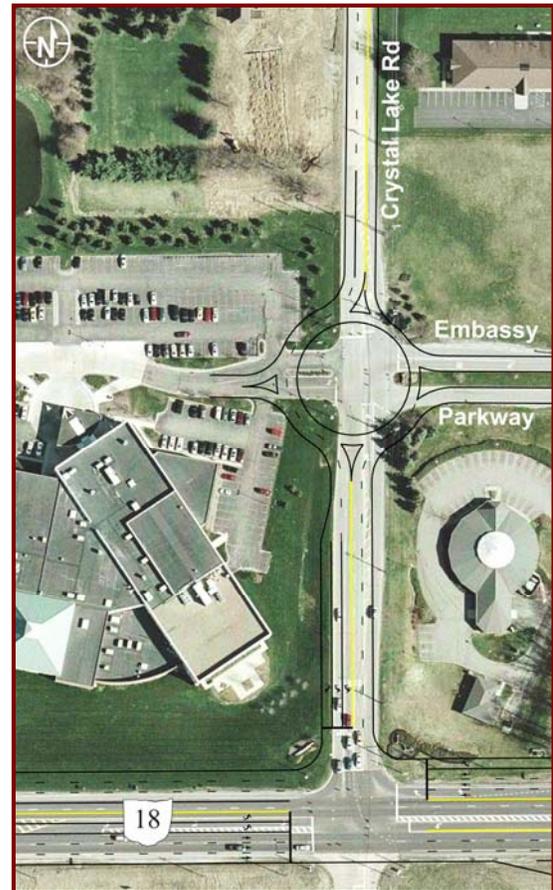
Crystal Lake Rd & Embassy Parkway –
2030 Montrose West Relocation AM Peak Hour



Crystal Lake Rd & Embassy Parkway –
2030 Montrose West Relocation PM Peak Hour

Adding a second left-turn lane out of Embassy Parkway at the signalized intersection with Crystal Lake Rd would improve the operation of the westbound left-turn movement in the 2030 PM Peak Hour from a LOS F in the No-Build to a LOS C. Furthermore, the 2030 PM Peak Hour No-Build delay (112.7 sec) and V/C ratio (1.18) would be reduced significantly to 28.9 sec and 0.81, respectively.

Another potential concept would be to replace the current signalized intersection at Crystal Lake Rd and Embassy Parkway with a two-lane roundabout intersection to improve the flow of traffic to and from SR 18. One concern with a roundabout intersection being placed so closely (approximately 500 feet) to a signalized intersection at SR 18 would be the potential for the southbound traffic queue from the signal to back into the roundabout intersection. An advantage of a roundabout intersection is that traffic within the intersection is constantly moving; however, any adjacent backups spilling into the roundabout would quickly lead to a failure of the intersection. It is imperative that a roundabout configuration be analyzed in detail in conjunction with the coordinated signal timings along the SR 18/Heritage Woods Dr and SR 18/Crystal Lake Rd intersections to ensure that adequate storage exists for the southbound queue at the SR 18/Crystal Lake Rd intersection.



Conceptual Roundabout Intersection at
Crystal Lake Rd & Embassy Parkway

The proposed realignment of Montrose West Ave would require the partial acquisition of four parcels slated for commercial development. Due to the existing topography and adjacent residential development the construction of the relocated Montrose West Ave would require substantial excavation and the possibility of retaining walls (See *Appendix C – Plan and Profile, Montrose West Relocation.*) The intersection of the relocated Montrose West Ave and Heritage Woods Dr could be constructed using a several configurations (*for a graphical depiction see Montrose West Relocation Concepts on Page 34*):

- (1) **Montrose West Ave Relocated to a Stop-Control Intersection at Heritage Woods Dr** – This concept would relocate Montrose West Ave access from the south leg of the split-phase signal at Crystal Lake Rd and SR 18 and realign Montrose West Ave southwest to the existing Heritage Center Dr intersection with Heritage Woods Dr. The Montrose West approach to the intersection would be stop-controlled.
- (2) **Montrose West Ave Relocated to a Roundabout Intersection at Heritage Woods Dr** - This concept would relocate Montrose West Ave access from the south leg of the split-phase signal at Crystal Lake Rd and SR 18 and realign Montrose West Ave southwest to a new roundabout intersection in the vicinity of the existing Heritage Center Dr intersection with Heritage Woods Dr.
- (3) **Heritage Woods Dr Relocated to a Stop-Control Intersection at Relocated Montrose West Ave** – This concept would relocate Montrose West Ave access from the south leg of the split-phase signal at Crystal Lake Rd and SR 18 and realign Montrose West Ave to the south leg of the existing signalized intersection at Heritage Woods Dr/Akron General entrance and SR 18. Heritage Woods Dr would be realigned to a new stop-control intersection along Relocated Montrose West Ave approximately 600 feet south of SR 18.



Montrose West Relocation Concepts

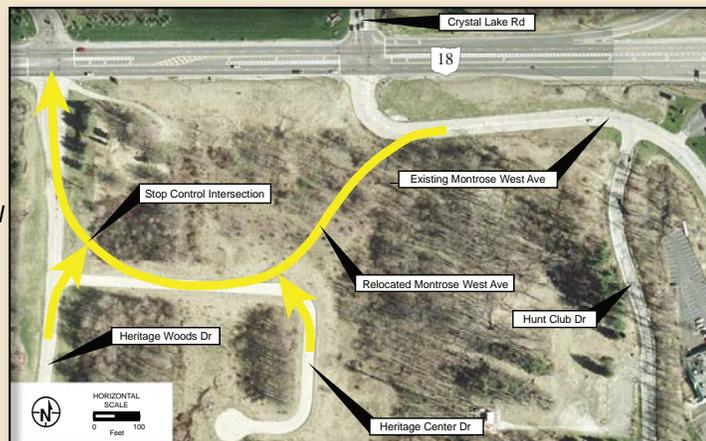
Montrose West Relocated to Stop-Control Intersection at Heritage Woods Dr



Montrose West Relocated to Roundabout Intersection at Heritage Woods Dr

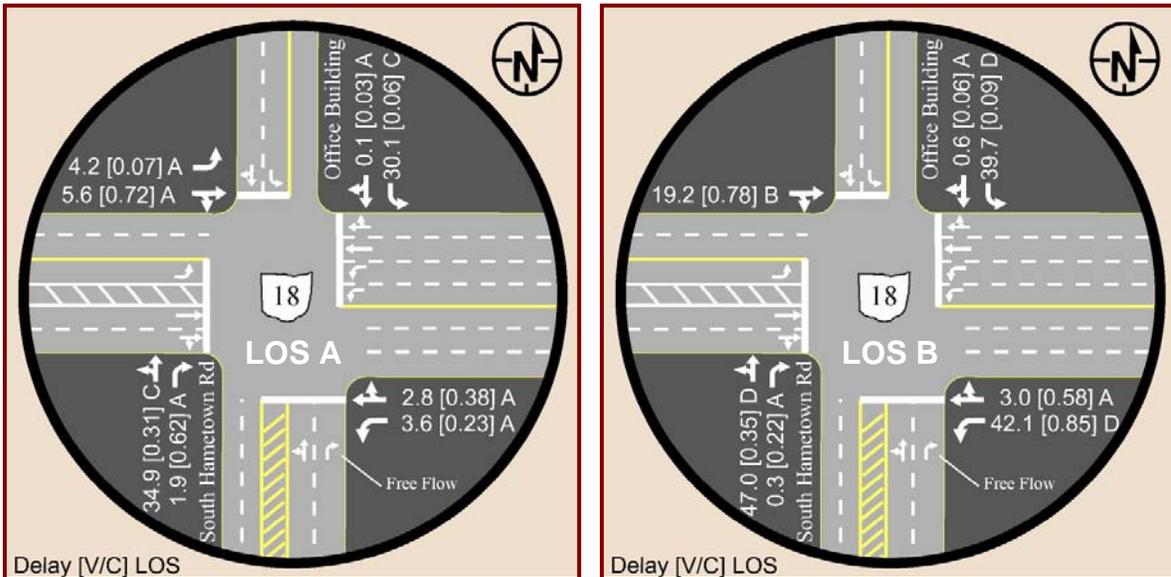


Heritage Woods Dr Relocated to Stop-Control Intersection at Relocated Montrose West



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At South Hametown Rd the potential addition of dual left from westbound SR 18 would eliminate the failure condition (LOS F) in the 2030 PM Peak Hour and improve the westbound left movement to a LOS D. An additional southbound through lane would be added to South Hametown Rd to accommodate the dual left turn movement dropping as right turn only at Hillside Dr about a quarter mile south of SR 18. The addition of a free flow right turn lane from northbound South Hametown Rd to eastbound SR 18 remedies the failure projected due to long delays in the AM Peak Hour.



South Hametown Rd & SR 18 –
2030 Montrose West Relocation AM Peak Hour

South Hametown Rd & SR 18 –
2030 Montrose West Relocation PM Peak Hour

The potential long-range future capacity enhancements on South Hametown Rd would require the acquisition of multiple strip takes from residential parcels. Because South Hametown Rd was already widened in a recent reconstruction, another widening of the street would be a long-term project with purpose and need to be reevaluated at a later date.

3.4 I-77 Mainline

The existing I-77 mainline between the SR 18 and SR 21 interchanges currently has conflicting weave movements in the northbound and southbound directions. Northbound SR 21 traffic entering northbound I-77 favors the inside lane of a two-lane ramp as the outside lane drops as an exit only to SR 18 east. This dominant northbound SR 21 to northbound I-77 movement conflicts with the northbound I-77 traffic exiting at SR 18 resulting in a weave movement LOS D in AM Peak Hour for the 2030 future condition.

In the southbound direction vehicles entering the SR 18 eastbound to I-77 southbound ramp must travel across two lanes in order to reach I-77 southbound before the SR 21 split. This movement conflicts with the I-77 southbound to SR 21 southbound movement. The I-77 add-lane project presently under construction to the South will help correct this problem by adding a third through lane on I-77, thus SR 18 to I-77 southbound traffic will only have to move over one lane. The existing southbound mainline weave condition is minimized by the SR 18 bottleneck at Crystal Lake Rd/Montrose West Ave which meters traffic onto the SR 18 eastbound to I-77 southbound ramp. If mainline capacity improvements to SR 18 were to release the bottleneck the influx of vehicles on the eastbound SR 18 to southbound I-77 ramp would increase the severity of the southbound weave and degrade the mainline operation to a LOS D. (See *Appendix E for Comprehensive Weave Analysis.*)

Three mainline concepts (one in the northbound direction, two in the southbound direction) have been developed to eliminate the existing mainline weave conditions that are projected to worsen with the implementation of SR 18 capacity enhancements. The northbound and southbound concepts are independent of one another and their compatibility with the proposed interchange concepts (see *Section 3.5*) are summarized by the matrix below.

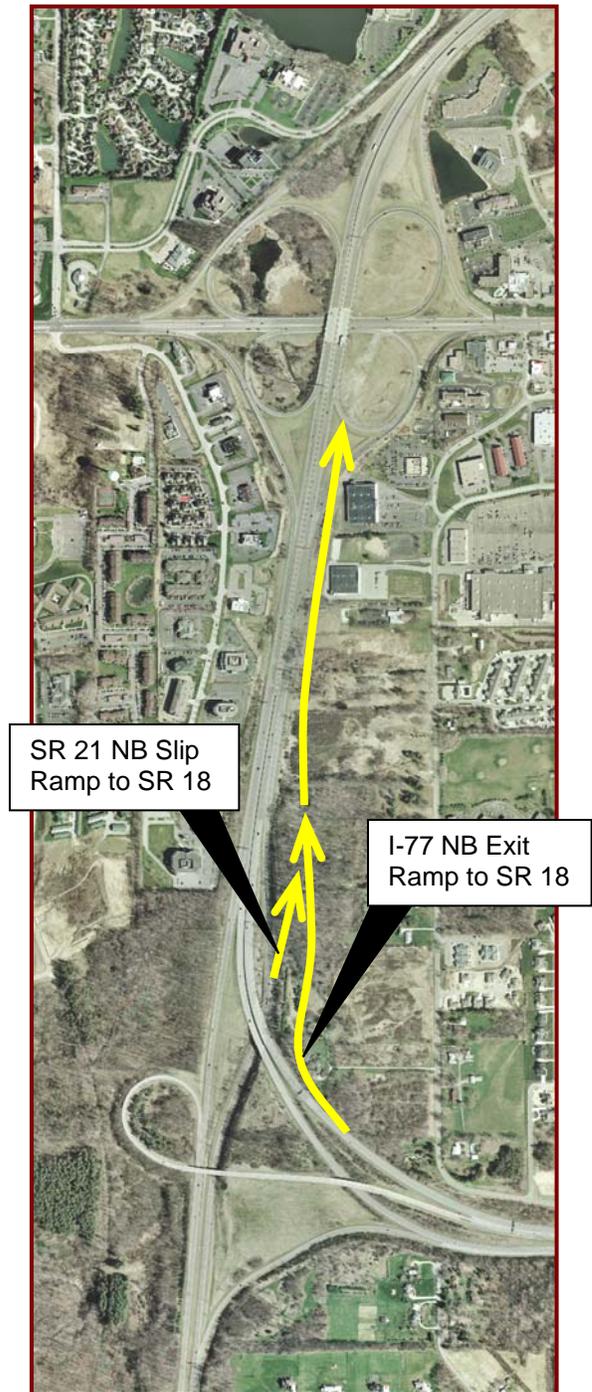
Compatibility of Mainline & Interchange Concepts Matrix

	No-Build Interchange	Tight Diamond	SPUI	Offset SPUI	Modified Cloverleaf
Early SR 18 Split (NB)		✓	✓	✓	✓
Early SR 21 Split (SB)				✓	✓
Southbound C-D System		✓	✓	✓	✓

Preliminary Conceptual Alternatives

Early SR 18 Split – This concept would sort out the I-77 northbound traffic exiting at SR 18 south of the I-77/SR 21 northbound merge. This reconfiguration of the ramps would eliminate the weave condition just north of the interchange between northbound SR 21 traffic merging onto I-77 northbound and I-77 northbound traffic exiting at SR 18 by exiting SR 18 traffic separately on each freeway prior to the SR 21/I-77 merge. I-77 northbound traffic would exit as a single drop lane upstream of the SUM-77-2230R structure. This single lane ramp would combine with a single lane slip ramp originating from the existing SR 21 northbound to I-77 northbound ramp just north of the SUM-77-2230R structure. If coupled with the Early SR 21 Split this concept would completely eliminate the mainline weaves on I-77 between the SR 21 and SR 18 interchanges; however, the Early 18 Split can be implemented independent of any southbound mainline improvements.

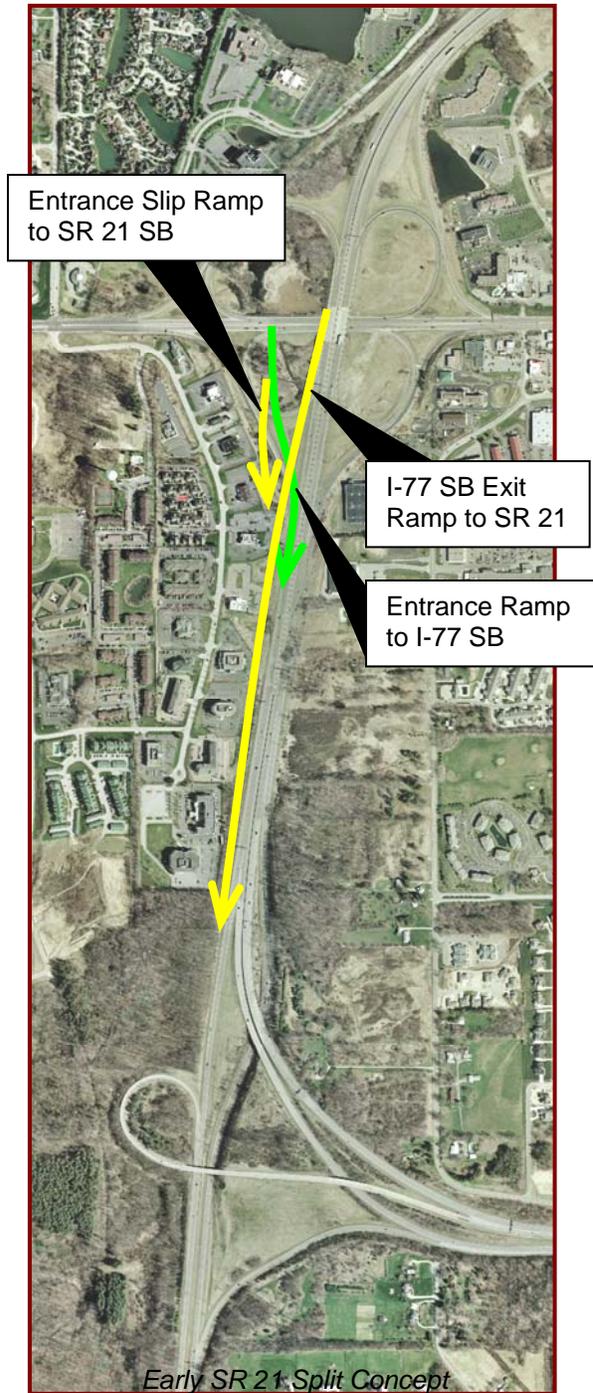
This improvement presents the unique opportunity to eliminate a mainline weave condition without the construction any additional structures. Multiple partial right-of-way takes would be required on parcels along the Westside of Rothrock Rd.



Early SR 18 Split Concept

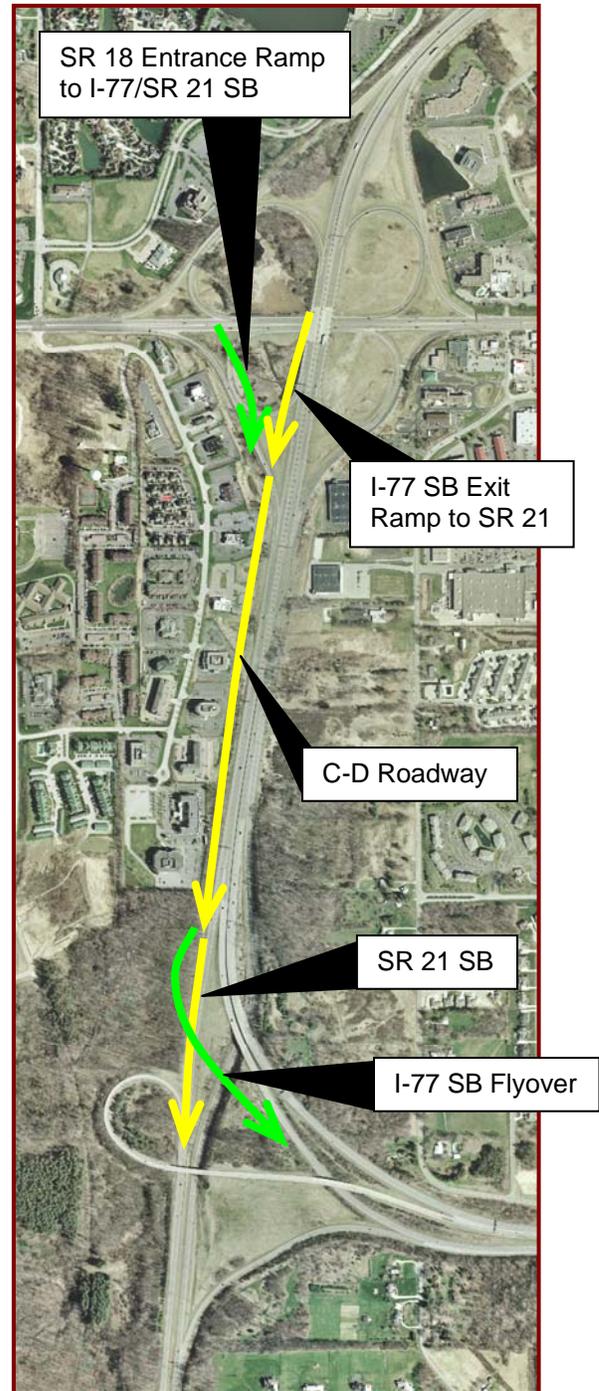
Early SR 21 Split – This concept would exit I-77 southbound to SR 21 southbound traffic north of the SR 18 to I-77 southbound entrance ramp. The I-77 southbound to SR 21 southbound exit ramp would be braided over the SR 18 to I-77 southbound entrance ramp. A slip ramp on the outer west edge of the interchange would accommodate SR 18 traffic destined for SR 21 southbound. The Early SR 21 Split eliminates any weave movements on the southbound lanes of the mainline throughout the study area. This concept is compatible with the Offset SPUI and Modified Cloverleaf interchange concepts, and it is completely independent of the Early SR 18 Split.

Construction of an additional structure would be required to carry the I-77 southbound to SR 21 southbound exit ramp over the SR 18 to I-77 southbound entrance ramp. Multiple partial takes would be required along the eastside of Montrose West Ave; however these takes would be minimal and would not impact any commercial structures or parking lots.



Southbound C-D System – This concept proposes the construction of a southbound collector-distributor (C-D) roadway adjacent to the I-77 mainline from SR 18 to SR 21. A southbound I-77 to southbound SR 21 exit would drop near the SUM-77-2321 structure similar to the Early 21 Split as a 2-lane C-D roadway. The SR 18 to I-77 southbound ramp would enter the C-D roadway on the outside as an add-lane. Traffic would split at the existing I-77/SR 21 interchange with the I-77 southbound traffic exiting on the right and crossing the southbound SR 21 lanes as a flyover ramp. This concept would move any southbound weaves from the mainline, and it would prevent the dominant traffic movements (southbound I-77 to SR 21 southbound on the inside; SR 18 to I-77 southbound on the outside) from weaving on the C-D roadway. Only SR 18 to southbound SR 21 traffic would have to move over a lane from its point of entry on the C-D system.

This concept would fall almost entirely within the existing right-of-way, and would require the construction of a single additional structure.



Southbound C-D System Concept

3.5 SR 18 & I-77 Interchange

Existing and Future Conditions

The existing SR 18 and I-77 interchange is a cloverleaf configuration. The interchange was recently modified to provide a stop intersection for the I-77 southbound to SR 18 westbound ramp to eliminate a dangerous movement for I-77 southbound traffic destined for Montrose West Ave which requires vehicles to cross two lanes of westbound traffic. The I-77 northbound to SR 18 eastbound ramp enters SR 18 as an add lane. All four interior loop ramps have the standard short auxiliary lanes and weave patterns traditionally associated with cloverleaf interchanges. Just over a half-mile to the South is a full directional interchange with SR 21, a limited access freeway that runs south to the City of Massillon.

Crash frequency data indicates that the I-77 northbound to SR 18 westbound loop merge at SR 18 is the location with highest number of crashes (11) from 2002 to 2004. Recent grading improvements to the ramp merge at SR 18 may have remedied the sight distance problems that were partially responsible for the high number of crashes. The following three locations also exhibited 10 crashes over the three-year period: SR 18 west of the I-77 interchange; SR 18 east of the SR 18 interchange; I-77 southbound to SR 21 southbound weave with traffic entering I-77 from SR 18.

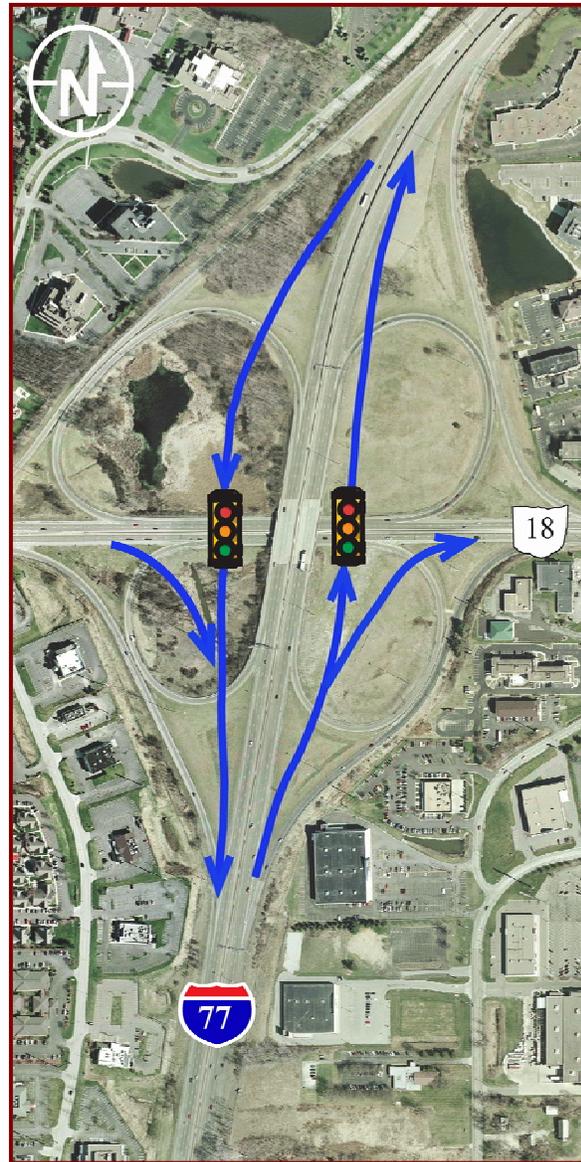
Preliminary Conceptual Alternatives

No-Build Interchange – Maintaining the existing cloverleaf configuration in conjunction with the Basic Lane Addition or Montrose West Relocation improvements to SR 18 would enable eastbound traffic to arrive at the interchange more efficiently. This would result in a reduced LOS for the southbound mainline due to the influx of vehicles entering the eastbound SR 18 to southbound I-77 ramp that were previously metered by the upstream congestion. In the future 2030 condition, the northbound I-77 to westbound SR 18 loop ramp would operate at a LOS E in AM Peak Hour and LOS F in the PM Peak Hour. In the 2030 PM Peak Hour the weave on SR 18 between the northbound to westbound ramp and the westbound to southbound ramp would operate at LOS E. On the mainline the northbound weave between westbound exit ramp and eastbound entrance ramp would operate at a LOS D in the AM Peak Hour in the 2030 condition. Two through lanes would remain in each direction along SR 18. (*See Appendix E for Comprehensive Weave Analysis.*)

Maintaining the existing cloverleaf condition would mean that the four weave movements currently present within the interchange would still exist. In addition, the existing interchange configuration prohibits the inclusion of the Early SR 18 Exit and Early SR 21 Exit concepts to remove the mainline weave condition on I-77 between SR 18 and SR 21.

Tight Diamond – This concept proposes replacing the existing cloverleaf interchange with a tight diamond configuration where the ramp termini at SR 18 would have two coordinated signals located approximately 400 feet apart. A slip ramp from eastbound SR 18 to I-77 southbound would allow this heavy movement to avoid the western signal and yield to westbound left turns upon entering the ramp. On the eastern side of the diamond, northbound I-77 to eastbound SR 18 traffic would enter SR 18 in a free flow condition as an add-lane. The following two dominant movements traveling through the signals would be provided with dual left turn lanes: northbound I-77 to SR 18 westbound and westbound SR 18 to southbound I-77.

The proposed tight diamond configuration would require minimal right-of-way acquisition as its footprint is substantially narrower than that of the existing cloverleaf interchange.



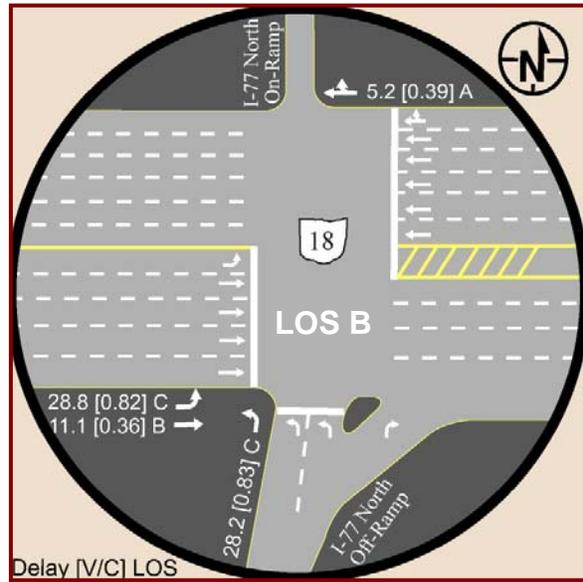
Tight Diamond Interchange Configuration

In the future 2030 condition, the southbound I-77 entrance ramp operates at a LOS E and F in the AM Peak Hour and PM Peak Hour, respectively. The left turn movement on the northbound exit ramp also fails in the PM Peak Hour for the future 2030 condition. The I-77 mainline experiences a LOS D in the southbound lanes downstream of the SR 18 interchange as the vehicles once metered by the Crystal Lake bottleneck arrive at the interchange less impeded (*See Appendix A – State Route 18 2030 Tight Diamond, AM Peak LOS & State Route 18 2030 Tight Diamond, PM Peak LOS for ramp and mainline LOS diagrams.*) The tight diamond configuration would require the construction of 4 through lanes in each direction along SR 18.

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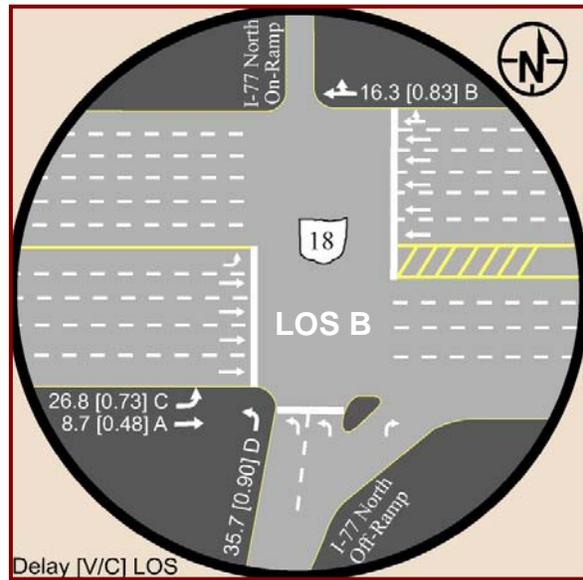
I-77 SB Exit Ramp & SR 18 –
2030 Tight Diamond AM Peak Hour



I-77 NB Exit Ramp & SR 18 –
2030 Tight Diamond AM Peak Hour



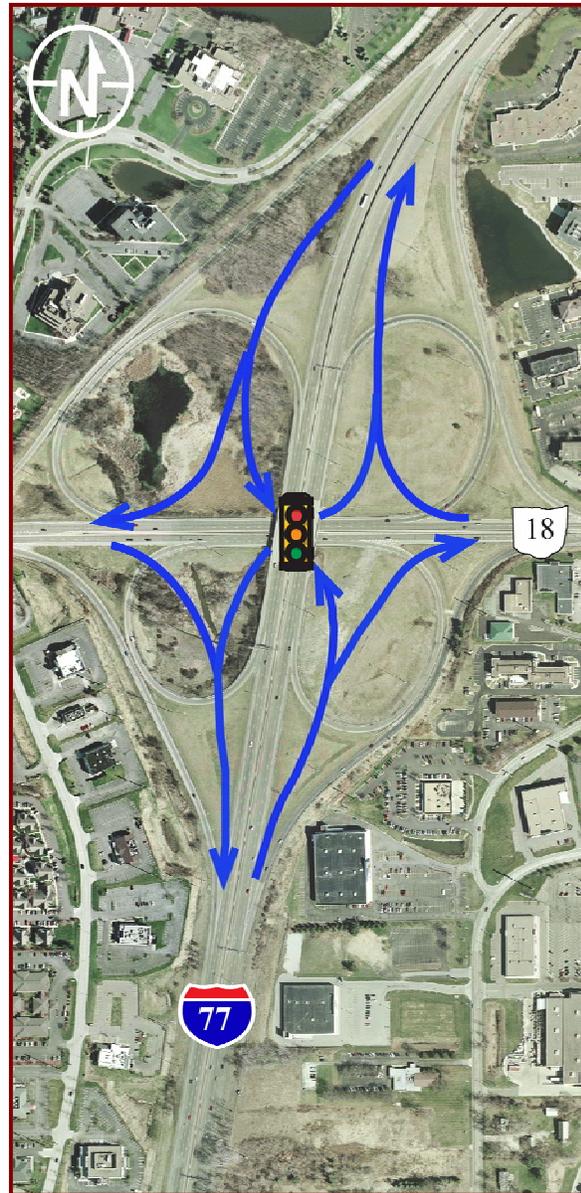
I-77 SB Exit Ramp & SR 18 –
2030 Tight Diamond PM Peak Hour



I-77 NB Exit Ramp & SR 18 –
2030 Tight Diamond PM Peak Hour

Because the Tight Diamond configuration fails to operate at an acceptable level (LOS C or better) for all movements in the 2030 future condition peak hours it is dismissed from further consideration.

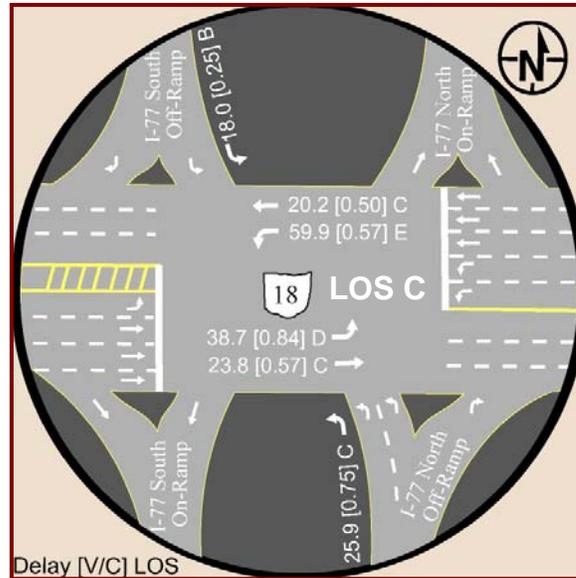
Single Point Urban Interchange (SPUI) - This concept proposes replacing the existing cloverleaf interchange with a SPUI configuration with a single three-phase signal under the I-77 overpass. A slip ramp from eastbound SR 18 to I-77 southbound would allow this heavy movement to avoid the western signal and yield to westbound left turns upon entering the ramp. Southbound I-77 to westbound SR 18 traffic would enter SR 18 in a free flow condition as an add-lane that would drop as a right turn only at Crystal Lake Rd. On the eastern side of the diamond, northbound I-77 to eastbound SR 18 traffic would enter SR 18 in a free flow condition as an add-lane. Westbound SR 18 to northbound I-77 would enter the ramp in a free flow condition as a drop lane beginning at Springside Dr. The following two dominant movements traveling through the signals would be provided with dual left turn lanes: northbound I-77 to westbound SR 18 and westbound SR 18 to southbound I-77.



SPUI Interchange Configuration

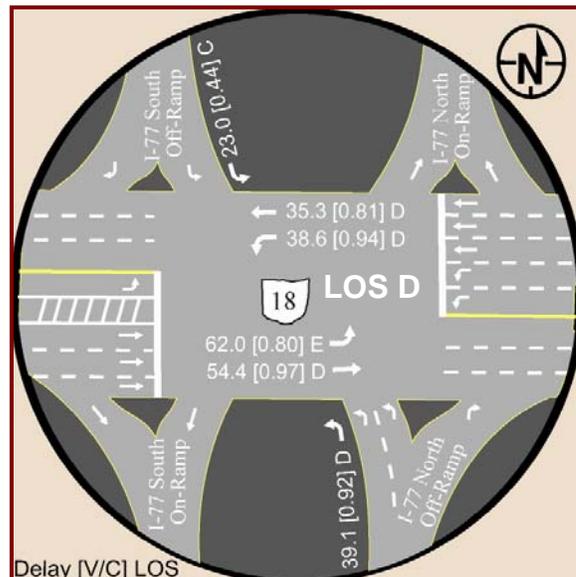
The proposed SPUI configuration, like the tight diamond, would require minimal right-of-way acquisition as its footprint is substantially narrower than that of the existing cloverleaf interchange.

In the future 2030 condition AM Peak Hour, the SPUI concept yields a LOS E on the eastbound leg of the southbound entrance ramp because eastbound traffic must yield to the westbound lefts entering the ramp with a green arrow. The left turn movement on the northbound exit ramp also fails in the future condition AM Peak Hour based on the vehicular density of that approach. The SPUI configuration would require the construction of three through lanes in each direction along SR 18.



2030 SPUI AM Peak Hour

The future 2030 condition in the PM Peak Hour yields multiple deficiencies within the SPUI configuration. Both the eastbound and westbound approaches to the signal operate at a LOS D on the SR 18 arterial. The southbound entrance ramp fails and the mainline experiences a LOS D downstream of the merge prior to the SR 21 split (See Appendix A, State Route 18 2030 SPUI Configuration, PM Peak LOS). The left turn movement on the northbound exit ramp operates at a LOS D in the future condition PM Peak Hour based on the vehicular density of that approach.



2030 SPUI PM Peak Hour

Because the SPUI configuration fails to operate at an acceptable level (LOS C or better) at the SR 18 intersection it is dismissed from further consideration.

Modified Cloverleaf – This concept eliminates two of the interior loop ramps in the existing cloverleaf interchange: I-77 northbound to SR 18 westbound loop and I-77 southbound to SR 18 eastbound. I-77 traffic exiting at SR 18 is rerouted to single ramps in the northbound and southbound directions that terminate at signalized intersections with SR 18. SR 18 traffic destined for I-77 would enter the existing directional ramps in free-flow conditions after the conflicting exit loop ramps that presently impose weave conditions are removed.

The modified cloverleaf would still allow for the removal of the northbound mainline weave condition by exiting SR 18 traffic south of the I-77/SR 21 northbound merge. The southbound mainline weave condition could be eliminated through construction of either the Southbound C-D System or the Early SR 21 Split.



Modified Cloverleaf Interchange Configuration

The modified cloverleaf concept requires minimal right-of-way acquisitions as the proposed ramps either follow the existing alignment or fall within the existing limited access right-of-way. Minor partial takes would be required at the periphery of the interchange to provide additional capacity at the entrances to the SR 18 eastbound to I-77 southbound ramp. The modified cloverleaf configuration would require the construction of three through lanes in each direction along SR 18.

Comparison of Modified Cloverleaf Combinations

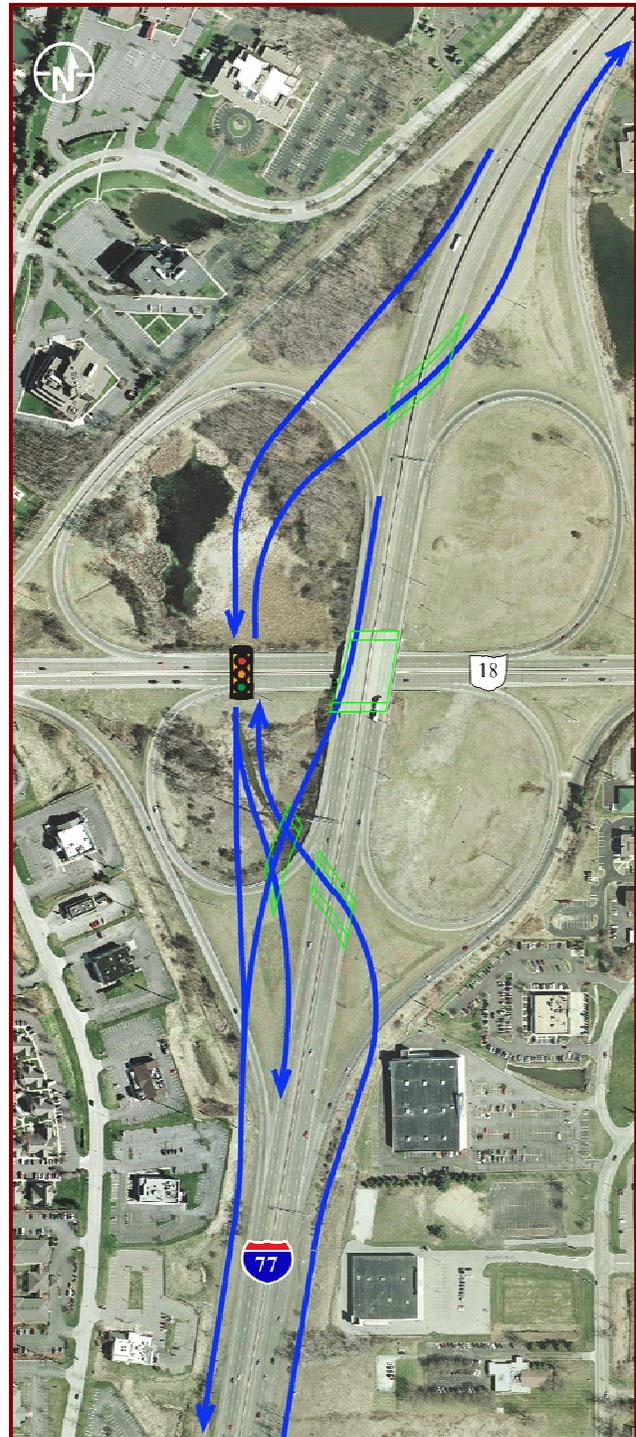


Combination of Loops	# SR 18 Lanes		2030 AM Peak				2030 PM Peak Hour			
			Intersection 1		Intersection 2		Intersection 1		Intersection 2	
	EB	WB	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
A+B	3	4	A	4.8	B	16.6	A	9	C	26.4
A+D (Modified Cloverleaf)	3	3	A	4.3	B	10.6	B	11.8	B	16.7
D (Modified Cloverleaf w/ Early SR 21 Exit or SB C-D System)	3	3	B	17.1	B	15.5	B	17.1	B	15.5

NOTE: Combination B+C was not analyzed because exit loop ramps are undesirable on the mainline. Similarly combination C+D was not analyzed because it creates a weave condition on SR 18 eastbound.

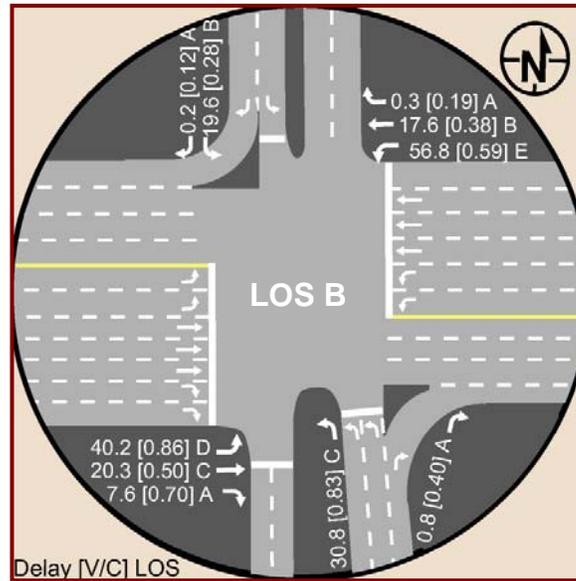
Offset Single Point Urban Interchange (Offset SPUI) – This concept proposes aligning the interchange ramps to a single signalized intersection west of the I-77 overpass. This concept also eliminates the I-77 mainline weave conditions that result from the conflicting paths of I-77 southbound to SR 21 southbound and SR 18 to I-77 southbound. The I-77 southbound to SR 21 southbound ramp exits south of its existing location and is braided over the SR 18 to I-77 southbound ramp. On SR 18 traffic destined for SR 21 south is sorted from traffic destined for I-77 south through advance signing and dual turn lanes. Traffic entering the I-77/SR 21 southbound ramp quickly splits as it enters the ramp in order to eliminate any driver decisions on the mainline.

The Offset SPUI operates significantly better than either the traditional SPUI or tight diamond concepts. In the future 2030 condition, all legs of the Offset SPUI perform at a LOS C or better with the exception of the southbound I-77 entrance ramp which operates at a LOS D in both Peak Hours. This occurs because one of the two lanes that enter the ramp must drop on the ramp prior to entering the mainline as a single add-lane. The southbound mainline operation downstream of the SR 18 entrance ramp merge is improved due to the removal of the SR 21 weave.

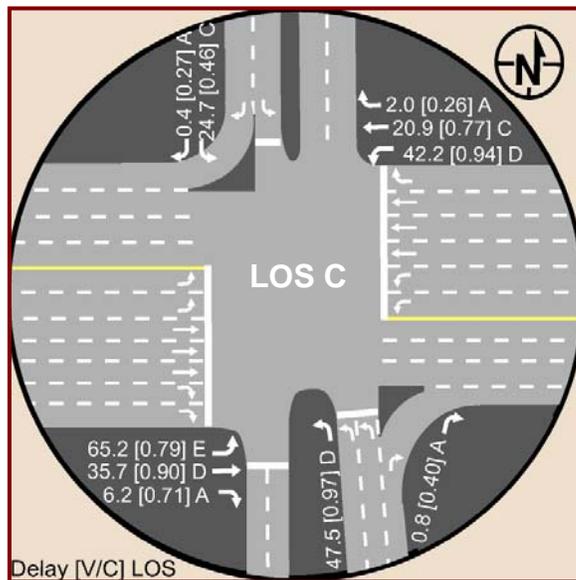


Offset SPUI Interchange Configuration

The alignment of the offset SPUI is advantageous in traffic operation when compared to the traditional SPUI's skewed approaches which require longer yellow and all red times. The offset SPUI configuration would require the construction of three through lanes in each direction along SR 18.



2030 Offset SPUI AM Peak Hour



2030 Offset SPUI PM Peak Hour

The offset SPUI is the least economical concept considered due to the construction cost of three new structures; however, the proposed alignment does clear virtually all of the eastern two quadrants of the existing cloverleaf for a prime commercial development opportunity. If the land is held by ODOT through warranty deed the excess land could potentially be sold to a private developer in order to finance a portion of the project. The excess land could also remain in ODOT's possession as a potential location for future capacity enhancements or storm water detention.

3.6 I-77 and SR 21 Interchange

Existing and Future Conditions

The existing interchange provides full directional connections between I-77 and SR 21. SR 21 is a limited access freeway that runs south to the City of Massillon. It also provides an important link to the Copley Township which is experiencing rapid residential growth.

All legs of the interchange presently operate at a LOS C or higher in both the AM and PM Peak Hours.

In the future 2030 condition the northbound SR 21 approach to interchange operates at a LOS E in AM Peak Hour. The SR 21 northbound to I-77 northbound ramp operates at a LOS D in the AM Peak Hour (*See Appendix A – 2030 No-Build, AM Peak LOS*). All legs of the interchange operate at a LOS C or higher in PM Peak Hour for the future 2030 condition (*See Appendix A – 2030 No-Build, PM Peak LOS.*)

The existing interchange has multiple geometric deficiencies including five substandard curves; however, crash data does not indicate any safety issues exist within the interchange as a result of these geometric deficiencies.

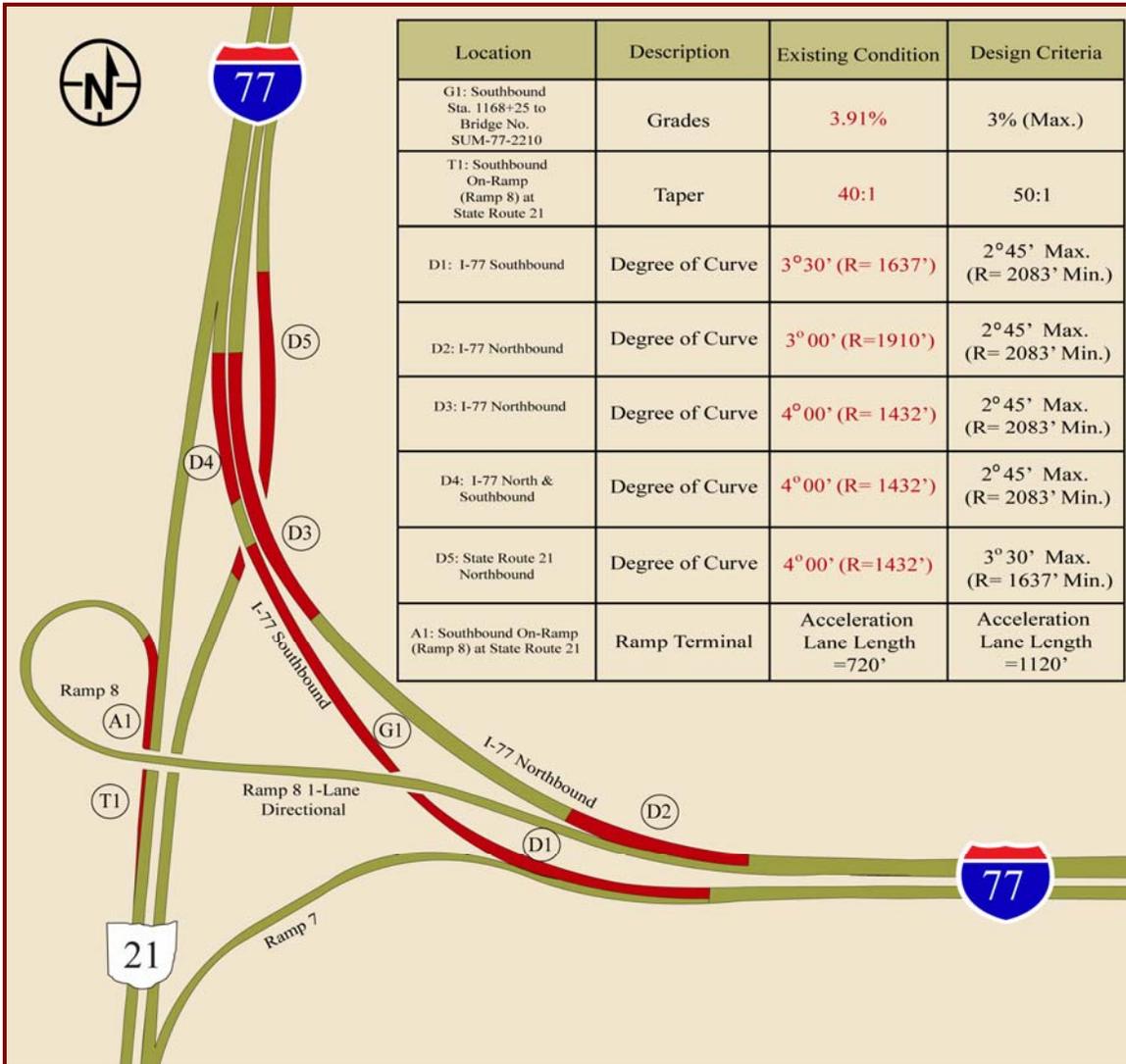
Preliminary Conceptual Alternatives

No-Build – This concept would maintain the existing interchange configuration with all of its geometric deficiencies. Since there are no safety or capacity problems identified at the current interchange it could be argued that no geometric improvements are economically justified.

Upgrade Geometrics – This concept would improve the existing interchange to eliminate all existing geometric deficiencies including substandard horizontal degrees of curvature, vertical grades, taper rates, and acceleration lengths. Five I-77 mainline curves would be improved from substandard degrees of curvature (ranging from 3°00' to 4°00') to an acceptable 2°45.'. The substandard 4°00' curve on the northbound SR 21 to northbound I-77 ramp would be upgraded to an acceptable 3°00.'. The substandard 3.91% grade of southbound I-77 south of structure SUM-77-2210 would be flattened to an acceptable maximum grade of 3%. At the terminal of the northbound I-77 to southbound SR 21 ramp the existing deficient acceleration length (720') would be lengthened 400' to an acceptable acceleration length of 1120'; likewise, the deficient taper rate (40:1) would be improved to an acceptable 50:1.

Summit 18 Corridor: Planning Study including Strategic Plan

The geometric upgrades are relatively minor and would be constructed entirely within the existing right-of-way. The geometrics could be upgraded in conjunction with a future reconstruction project or as a stand alone project if future safety issues or capacity issues are attributed to the interchange's geometric deficiencies.



Summary of Geometric Deficiencies at the I-77 and SR-21 Interchange