

Alternatives Considered in Step 2

Intersection concepts were evaluated using the criteria outlined in *Appendix A – Evaluation Criteria*, of the [Purpose and Need Report](#). Step 2 criteria include safety, vehicle delay, walkability/bikeability, access, and social, economic, and environmental (SEE) impacts.

The information provided here is a summary of a longer technical report: *Alternatives Evaluation Report (through Step 2)*, which is available upon request.

The following alternatives were considered in Step 2 of the process:

Alt.	Name
At-Grade Alternatives	
1	Restricted Crossing U-Turn (RCUT) Intersection
2	Single Loop Intersection
3	Partial Displaced Left Turn Intersection
Grade-Separated Alternatives	
4-a	Overpass with Eastbound Buttonhook Exit and Slip Ramp Entrances
4-b	Overpass with Eastbound and Westbound Buttonhook Ramps
5-a	Double Roundabout Interchange
5-b	Double Roundabout Interchange with Right Turn Ramps
6	Traditional Diamond Interchange
7	Tight Diamond Interchange
8	Single Point Urban Interchange (SPUI)
9	Diverging Diamond Interchange (DDI)
10	Single Roundabout Interchange
11-a	Folded Diamond Interchange with Ramps on West Side
11-b	Folded Diamond Interchange with Ramps on East Side
12	Michigan Urban Diamond (MUD) Interchange

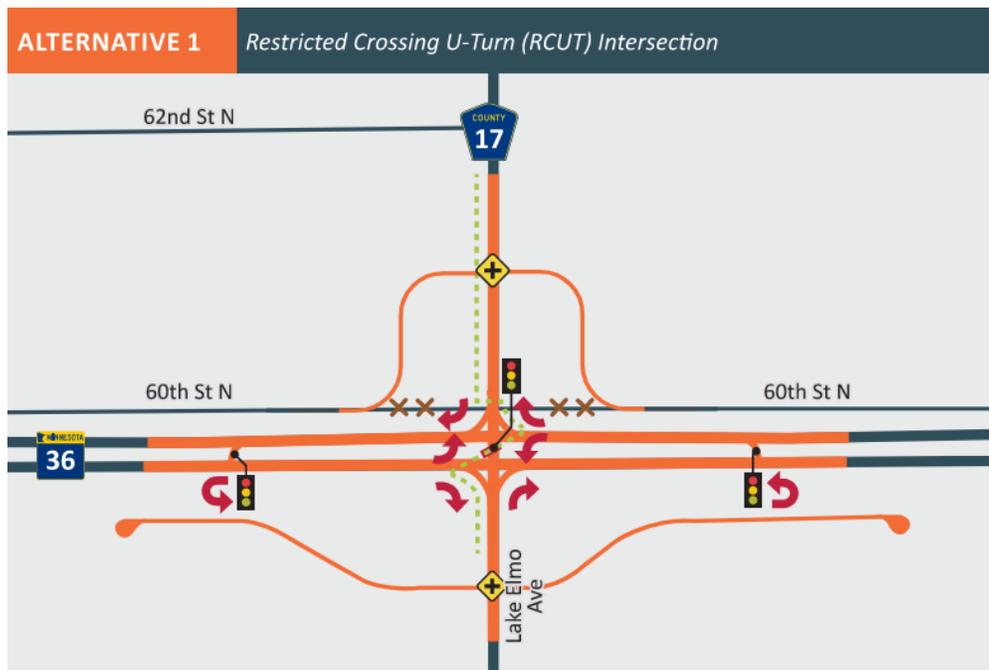
The concepts are illustrated on the following pages. The evaluation process compares each of these alternatives to the No Build Alternative (or “do nothing” alternative”) which leaves the existing at-grade signalized intersection as-is.

At-Grade Alternatives

1. Restricted Crossing U-Turn (RCUT) Intersection

Alternative 1 is a fully signalized restricted crossing U-turn (RCUT), where minor roadway left-turn and through movements are removed from the main intersection. These movements turn right onto the major roadway before making a U-turn at a downstream median opening. The main intersection and U-turn crossover intersections are all signalized.

This alternative also shifts the north frontage road (60th Street N) farther to the north, with the intersection control type to be determined by further analysis if the alternative is advanced into Step 3.



Legend

- Existing Roadway
- Roadway Alternative Concept
- Proposed Bridge
- ⋯ Proposed Trail**
- On/Off Ramp

- Traffic Signal
- Roundabout
- Controlled Intersection*
- Roadway Segment Removal

*Intersection control type (signal, stop, or roundabout) will be determined by further analysis

**The exact location of the proposed trail(s) will be determined by further analysis, assume crossing pattern through median as shown

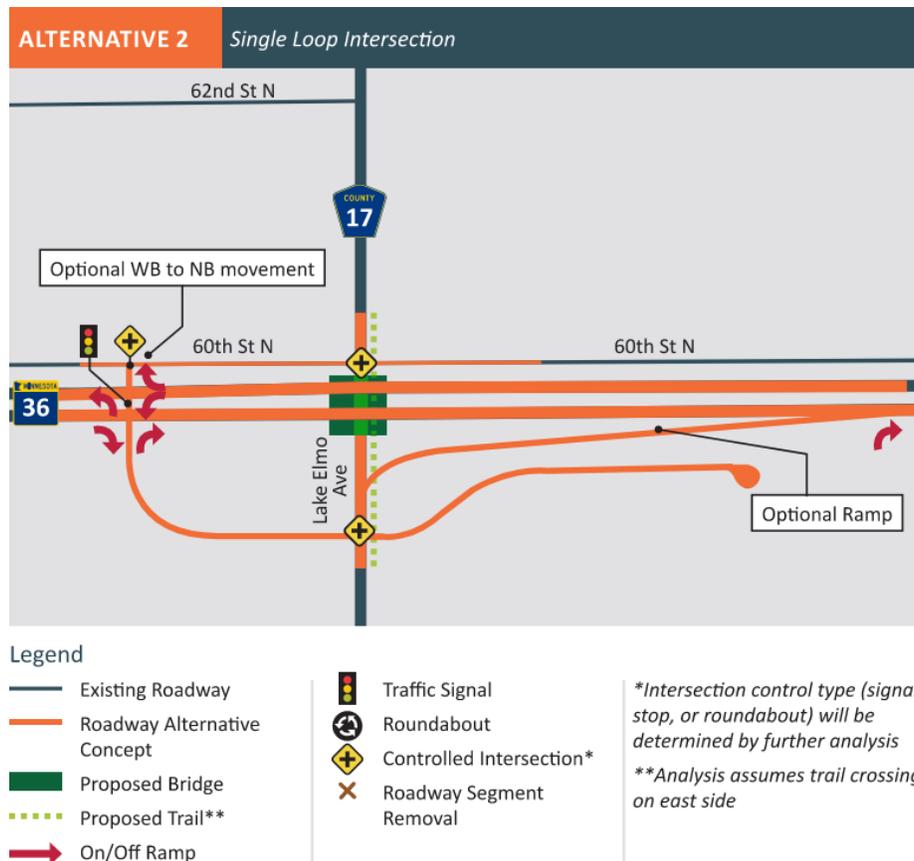
2. Single Loop Intersection

Alternative 2 is a signalized single loop intersection where all four left-turn movements and some right-turn movements are rerouted onto a connector road in the southwest quadrant, while the major and minor roadways are grade-separated. Due to the close proximity of the north frontage road to TH 36, eastbound right turns from TH 36 would occur at the connector road. As an option, a ramp for northbound right-turning traffic from CSAH 17 could be included.

In Step 1 of the Alternatives Evaluation, a planning-level capacity analysis of the Single Loop intersection design evaluated all quadrant options for the loop. The northwest and southeast quadrant options showed over-capacity conditions, and thus did not pass the initial vehicle mobility evaluation. The southwest and northeast quadrant options showed acceptable mobility results.

It was determined that the loop must be located in the southwest quadrant of the intersection based on the frontage road location and the proximity to the Manning Avenue interchange. The northeast quadrant option would require a new signalized intersection on the east side of CSAH 17. This would not meet the 1-mile interchange/intersection spacing requirement on TH 36 and would be problematic due to the shorter distance between the signal and the interchange ramps. Additionally, constructing the loop on the north side of TH 36 would cause complications due to the north frontage road.

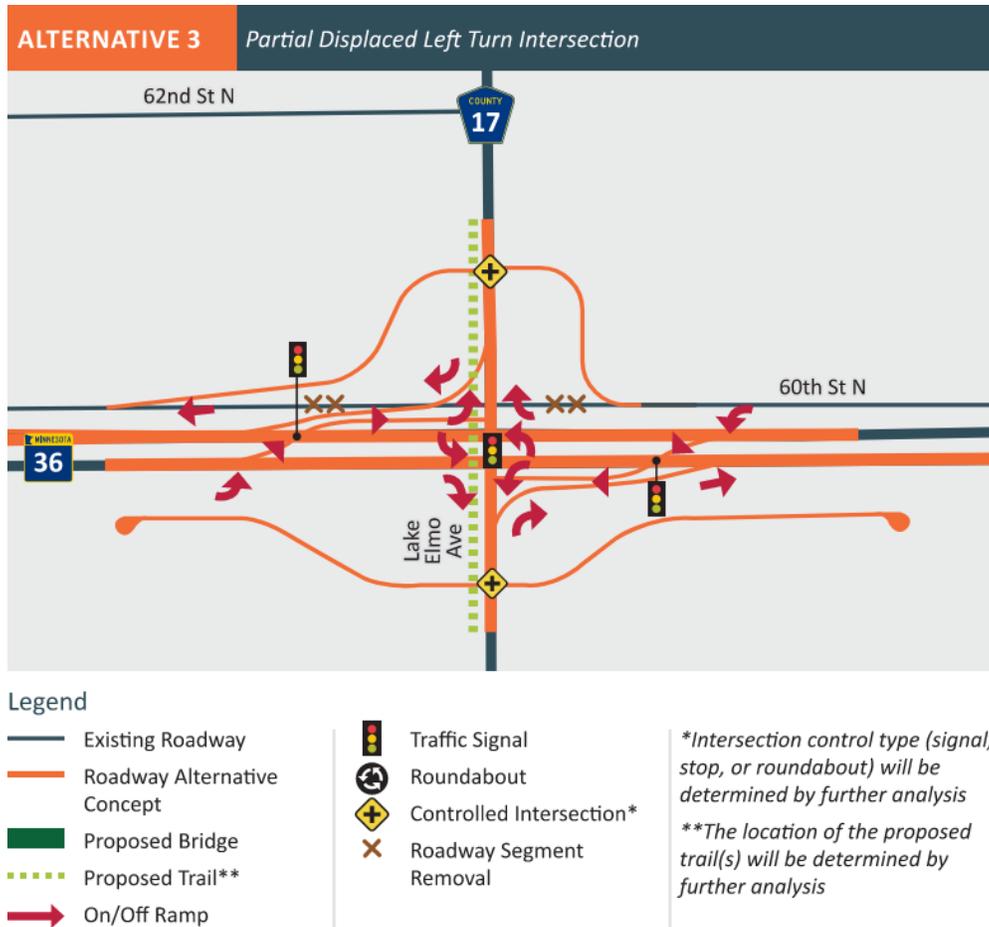
The analysis for Step 2 assumes TH 36 travels over CSAH 17, but if the alternative is advanced into Step 3 the specific grade separation would be determined by further analysis.



3. Partial Displaced Left Turn Intersection

Alternative 3 is a fully signalized intersection, where the TH 36 left-turning vehicles cross over to the other side of the roadway at a signalized intersection several hundred feet in advance of the main intersection. At the signalized main intersection, the protected left turns occur simultaneously with the opposing through movements.

This alternative also shifts the north frontage road (60th Street N) farther to the north, with intersection control type to be determined by further analysis if the alternative is advanced into Step 3.



Grade-Separated Alternatives

4. Overpass Based on Concept in 2019 Study

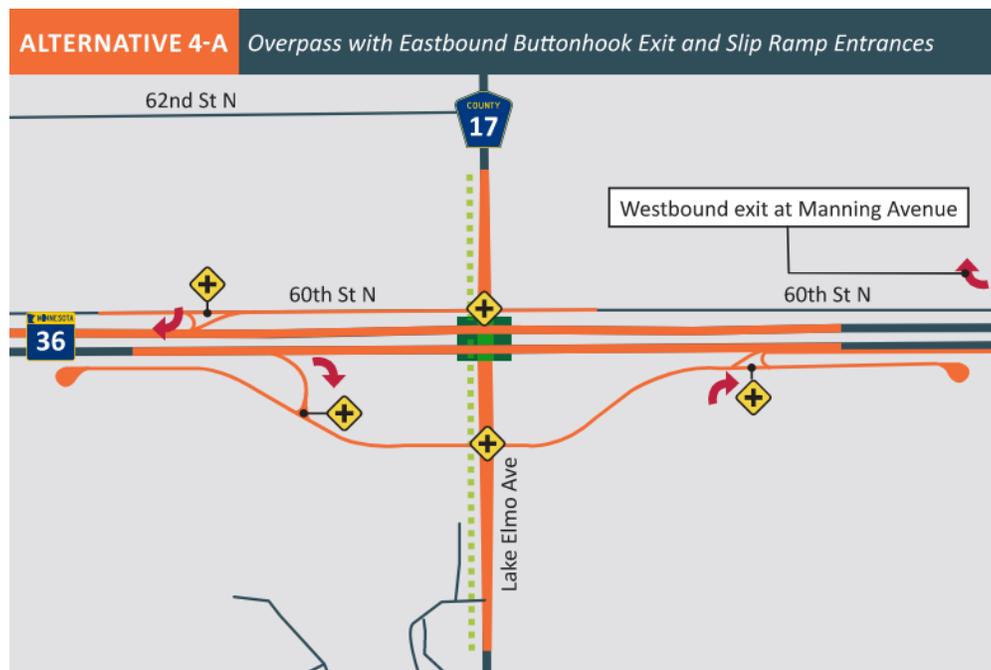
There are two variations for Alternative 4:

- Alternative 4-a: Overpass with Eastbound Buttonhook Exit and Slip Ramp Entrances
- Alternative 4-b: Overpass with Eastbound and Westbound Buttonhook Ramps

Alternative 4-a is a grade-separated interchange and is the base concept developed in the City of Lake Elmo 2019 State Highway 36 South Frontage Road Study. It includes a south frontage road and assumes that westbound exiting traffic exits at Manning Avenue, traveling along the frontage road to get to CSAH 17.

Alternative 4-b is a variation of the 2019 concept. It is shown with the eastbound entrance ramp shifted to the west of CSAH 17 and includes a westbound exit; however, exact ramp locations will be determined by further analysis.

The analysis for Step 2 assumes TH 36 travels over CSAH 17 in Alternatives 4-a and 4-b, but if any alternative is advanced into Step 3, the specific grade separation would be determined by further analysis. Traffic control at the frontage road intersections would also be determined by further analysis if advanced from Step 2.



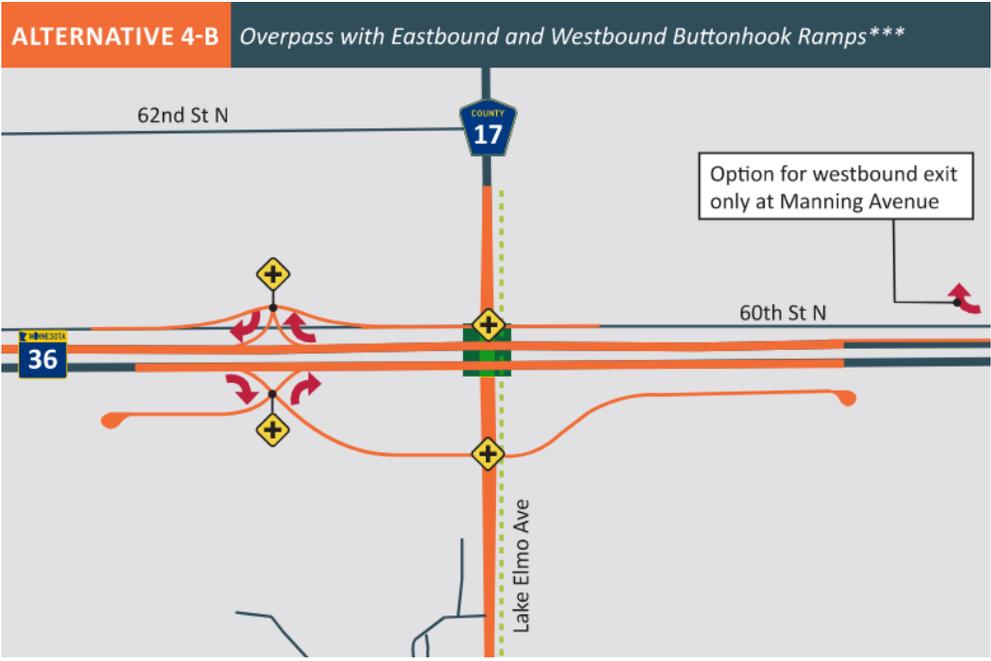
Legend

- Existing Roadway
- Roadway Alternative Concept
- Proposed Bridge
- Proposed Trail**
- On/Off Ramp

- Traffic Signal
- Roundabout
- Controlled Intersection*
- Roadway Segment Removal

*Intersection control type (signal, stop, or roundabout) will be determined by further analysis

**The location of the proposed trail(s) will be determined by further analysis



Legend

- Existing Roadway
- Roadway Alternative Concept
- Proposed Bridge
- Proposed Trail**
- ➔ On/Off Ramp

- Traffic Signal
- Roundabout
- Controlled Intersection*
- Roadway Segment Removal

**Intersection control type (signal, stop, or roundabout) will be determined by further analysis*

***Analysis assumes trail crossing on east side*

****Ramp locations will be determined by further analysis*

5. Double Roundabout Interchange

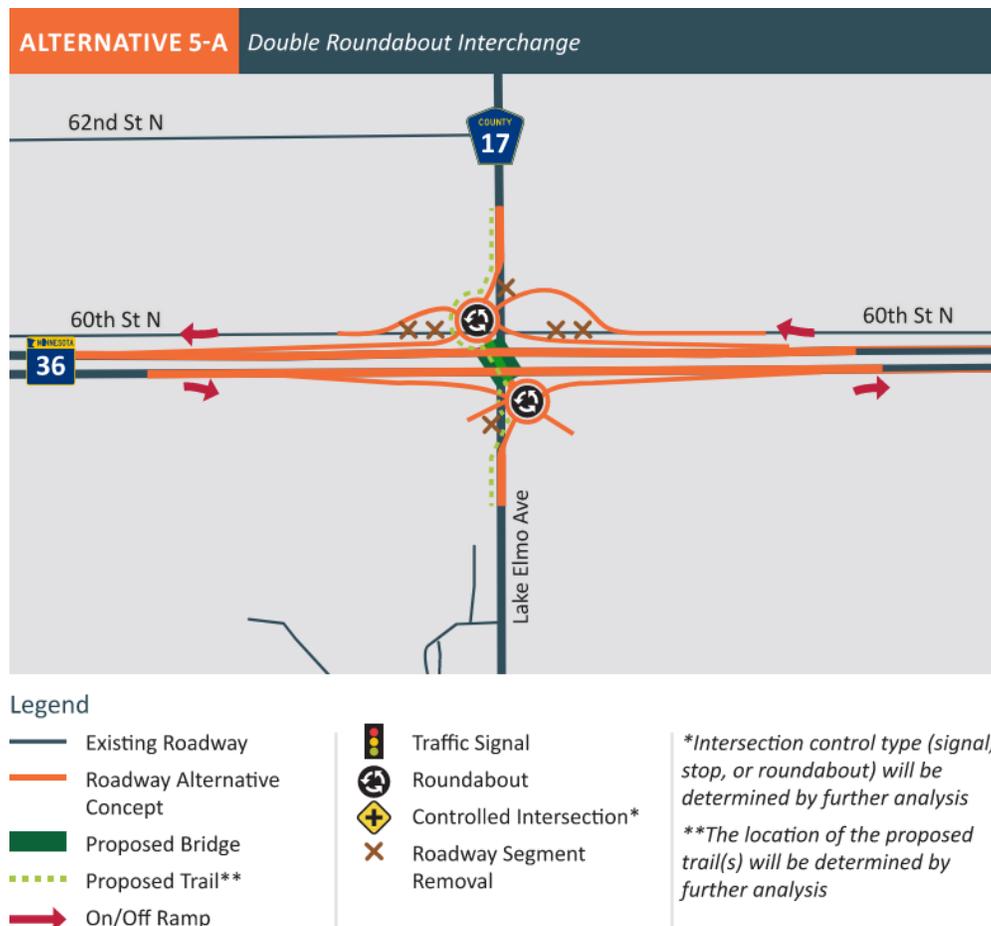
There are two variations for Alternative 5:

- Alternative 5-a: Double Roundabout Interchange
- Alternative 5-b: Double Roundabout Interchange with Right Turn Ramps

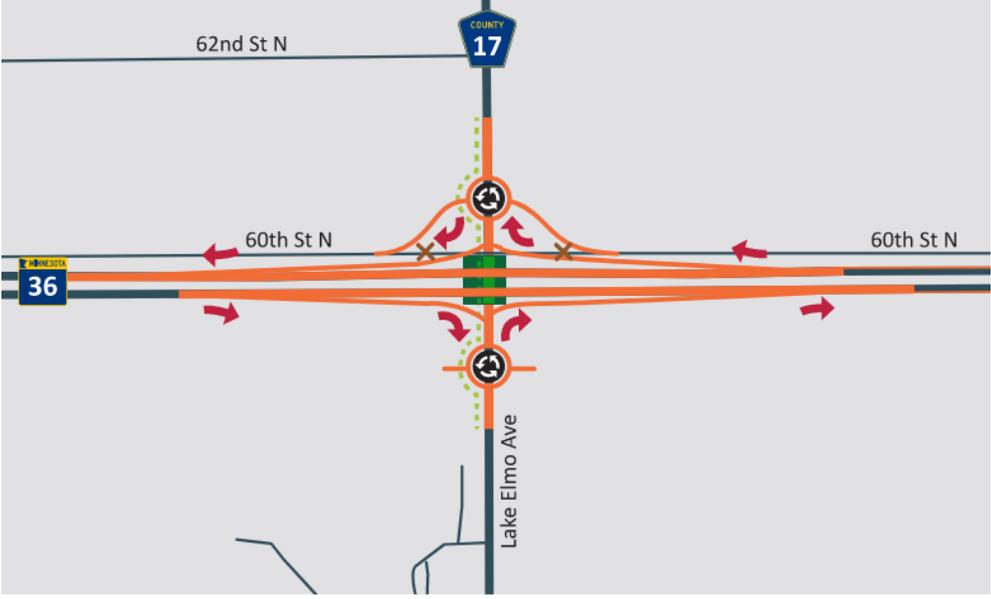
Alternative 5-a is a grade-separated interchange with roundabouts at each of the ramp terminals. The north frontage road ties into the north intersection as a six-leg roundabout.

Alternative 5-b is a variation of 5-a, where the ramps come into CSAH 17 at right-in/right-out intersections and the roundabouts are shifted farther to the north or south. The north frontage road intersection would be a roundabout. The roundabout to the south allows for eastbound exiting traffic to head north on CSAH 17, or traffic entering eastbound TH 36 from southbound CSAH 17 to access the right-only entrance. It is assumed that any future frontage road or driveway connections could tie into this roundabout.

The analysis for Step 2 assumes TH 36 travels over CSAH 17 in Alternatives 5-a and 5-b, but if either alternative is advanced into Step 3 the specific grade separation would be determined by further analysis.



ALTERNATIVE 5-B Double Roundabout Interchange with Right Turn Ramps



Legend

- Existing Roadway
- Roadway Alternative Concept
- Proposed Bridge
- ⋯ Proposed Trail**
- ➔ On/Off Ramp

- 🚦 Traffic Signal
- 🔄 Roundabout
- ⚠️ Controlled Intersection*
- ✂️ Roadway Segment Removal

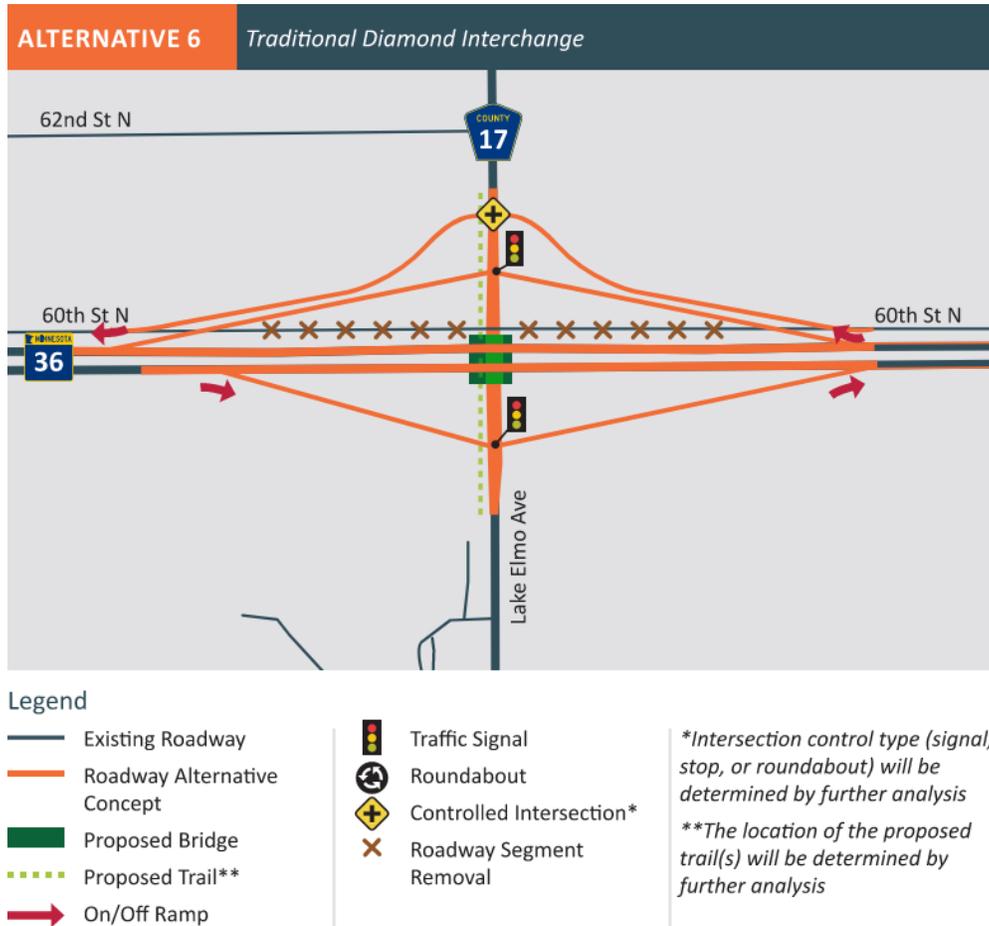
*Intersection control type (signal, stop, or roundabout) will be determined by further analysis

**The location of the proposed trail(s) will be determined by further analysis

6. Traditional Diamond Interchange

Alternative 6 is a grade-separated traditional diamond interchange, with eastbound and westbound entrance and exit ramps. This alternative shifts the north frontage road (60th Street N) farther to the north, with control type to be determined by further analysis if the alternative is advanced into Step 3.

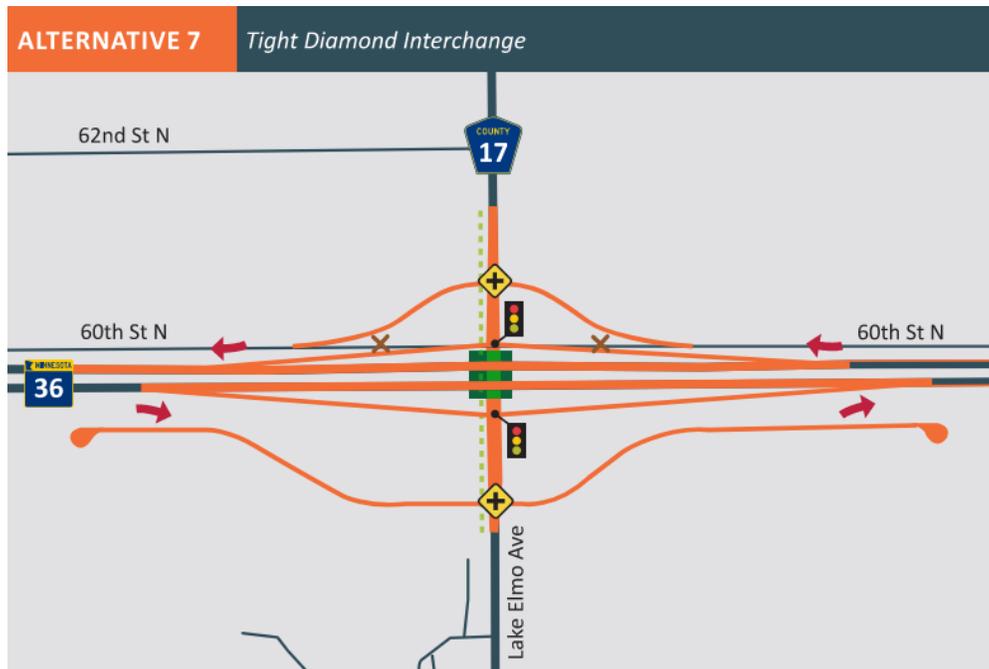
The analysis for Step 2 assumes TH 36 travels over CSAH 17, but if the alternative is advanced into Step 3 the specific grade separation would be determined by further analysis.



7. Tight Diamond Interchange

Alternative 7 is a grade-separated tight diamond interchange, with eastbound and westbound entrance and exit ramps. This alternative also shifts the north frontage road (60th Street N) farther to the north, with intersection control type to be determined by further analysis if the alternative is advanced into Step 3.

The analysis for Step 2 assumes TH 36 travels over CSAH 17, but if the alternative is advanced into Step 3 the specific grade separation would be determined by further analysis.



Legend

- Existing Roadway
- Roadway Alternative Concept
- Proposed Bridge
- - - Proposed Trail**
- ➔ On/Off Ramp

-  Traffic Signal
-  Roundabout
-  Controlled Intersection*
-  Roadway Segment Removal

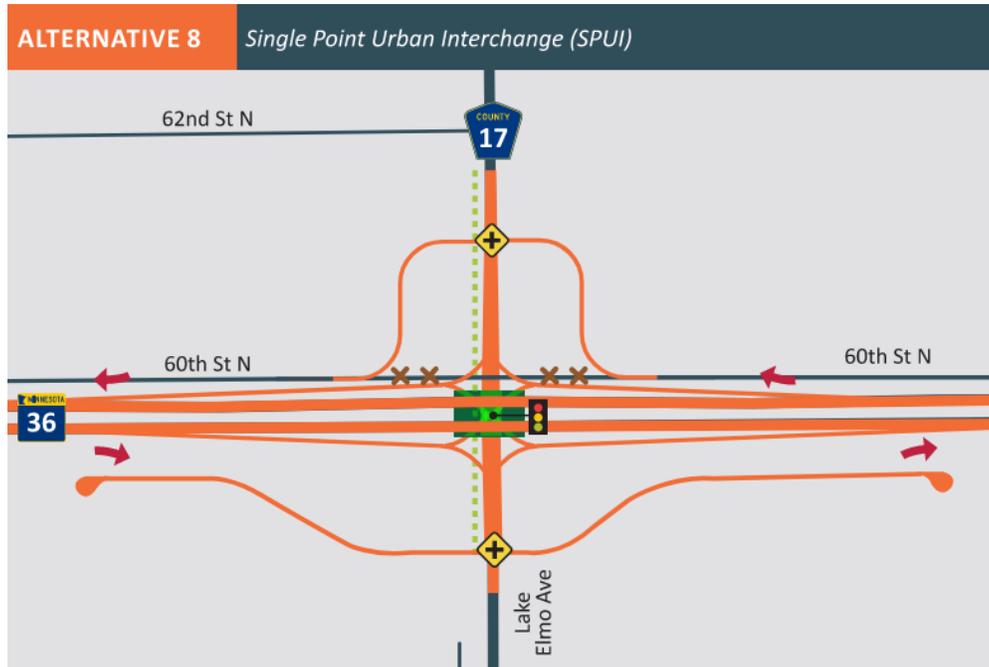
*Intersection control type (signal, stop, or roundabout) will be determined by further analysis

**The location of the proposed trail(s) will be determined by further analysis

8. Single Point Urban Interchange (SPUI)

Alternative 8 is a single point urban interchange, an alternative to the traditional diamond interchange in which all ramps begin or end at a single intersection on CSAH 17. This alternative also shifts the north frontage road (60th Street N) farther to the north, with intersection control type to be determined by further analysis if the alternative is advanced into Step 3.

The analysis for Step 2 assumes TH 36 travels over CSAH 17, but if the alternative is advanced into Step 3 the specific grade separation would be determined by further analysis.



Legend

- Existing Roadway
- Roadway Alternative Concept
- Proposed Bridge
- Proposed Trail**
- ➔ On/Off Ramp

-  Traffic Signal
-  Roundabout
-  Controlled Intersection*
-  Roadway Segment Removal

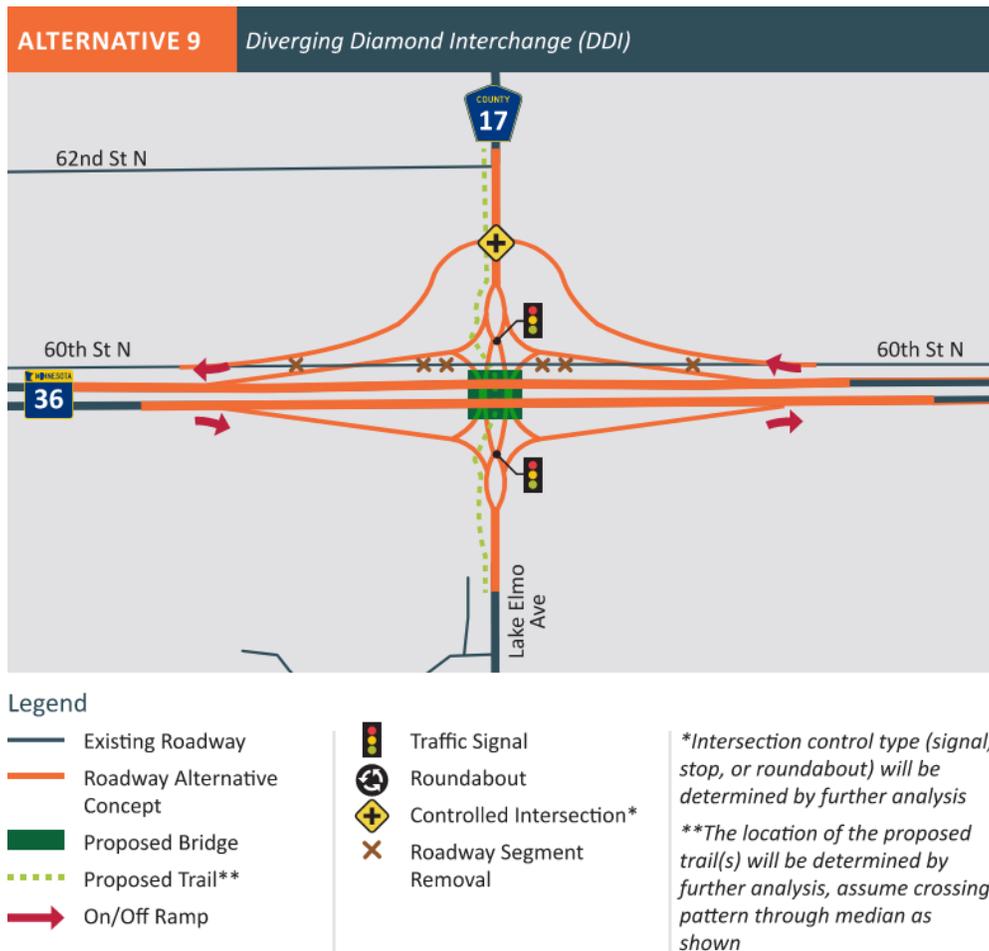
*Intersection control type (signal, stop, or roundabout) will be determined by further analysis

**The location of the proposed trail(s) will be determined by further analysis

9. Diverging Diamond Interchange (DDI)

Alternative 9 is a diverging diamond interchange (DDI), which is similar to a traditional diamond interchange except that CSAH 17 traffic crosses over to the other side of the roadway and then crosses back in between the two ramps. This allows vehicles to turn left onto the on-ramps without crossing over opposing lanes of traffic. The crossover intersections are all signalized. This alternative includes shifting the north frontage road (60th Street N) farther to the north, with intersection control type to be determined by further analysis if the alternative is advanced into Step 3.

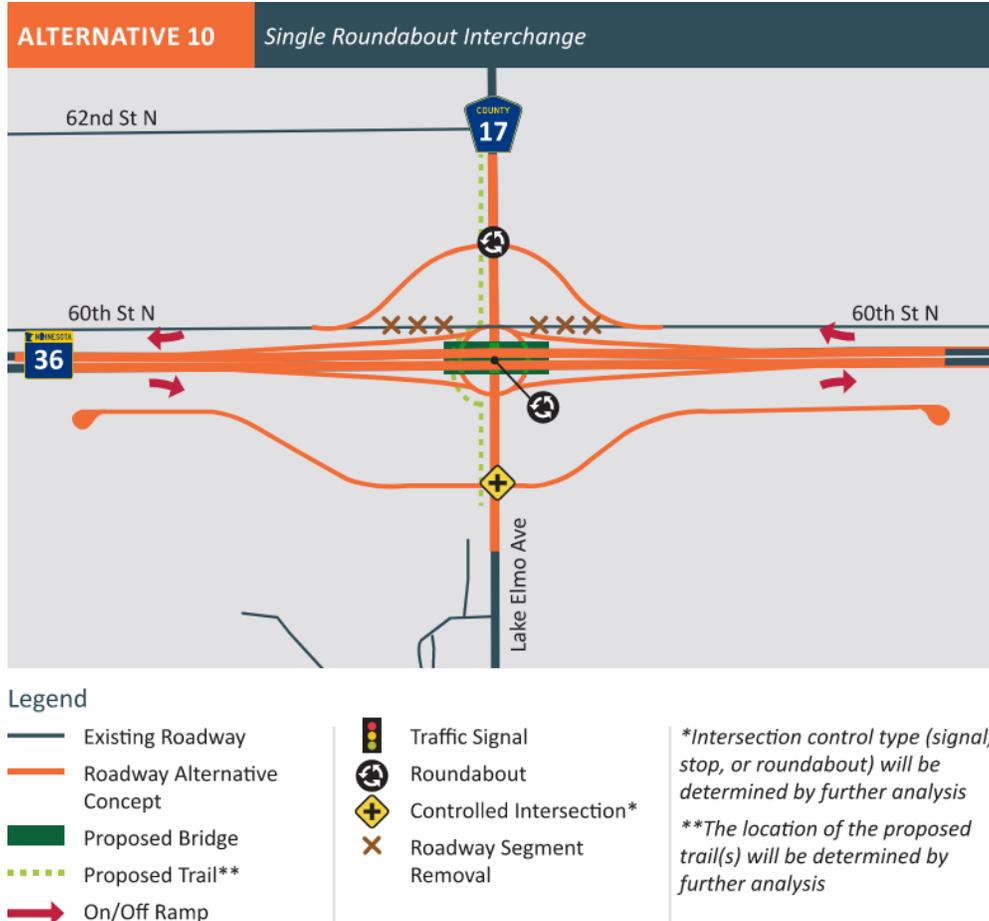
The analysis for Step 2 assumes TH 36 travels over CSAH 17, but if the alternative is advanced into Step 3 the specific grade separation would be determined by further analysis.



10. Single Roundabout Interchange

Alternative 10 is a single roundabout interchange, an alternative similar to the SPUI but configured as a large single roundabout in which all ramps begin or end at a single intersection on CSAH 17. This alternative includes shifting the north frontage road (60th Street N) farther to the north, with a roundabout intersection at CSAH 17.

The analysis for Step 2 assumes TH 36 travels over CSAH 17, but if the alternative is advanced into Step 3 the specific grade separation would be determined by further analysis.



11. Folded Diamond Interchange

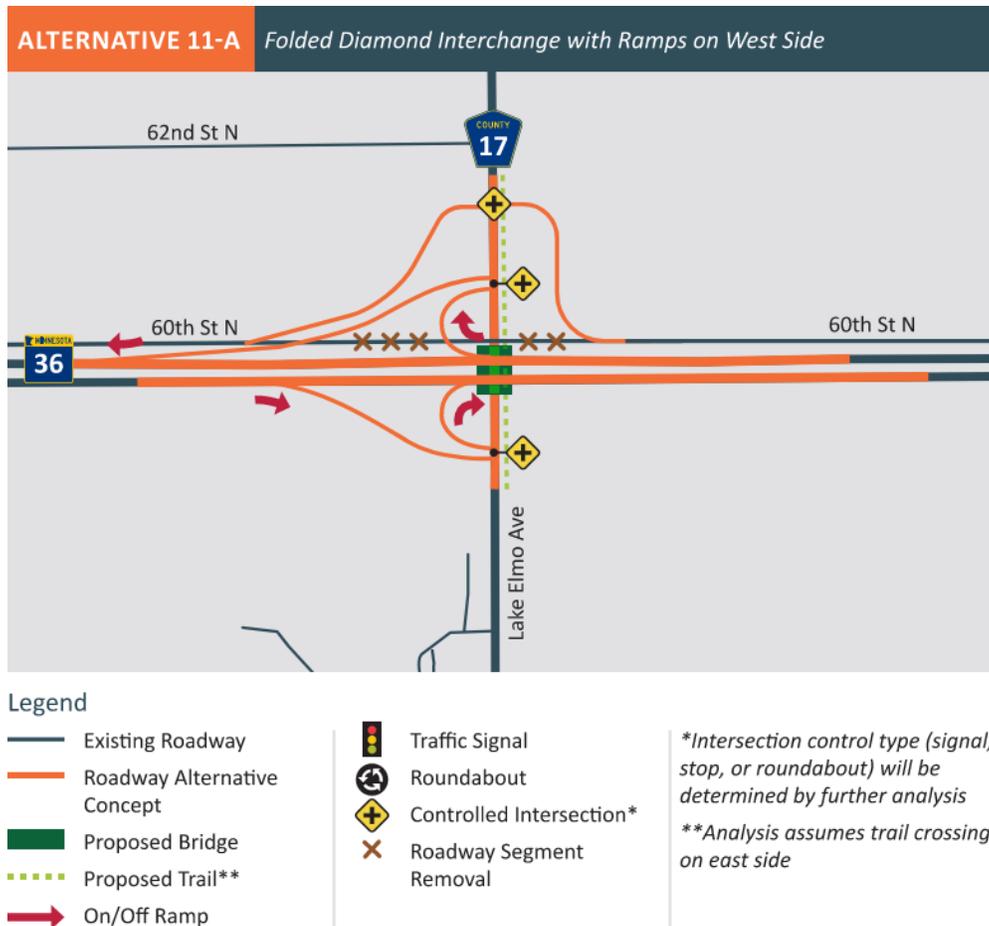
There are two variations for Alternative 11:

- Alternative 11-a: Folded Diamond Interchange with Ramps on West Side
- Alternative 11-b: Folded Diamond Interchange with Ramps on East Side

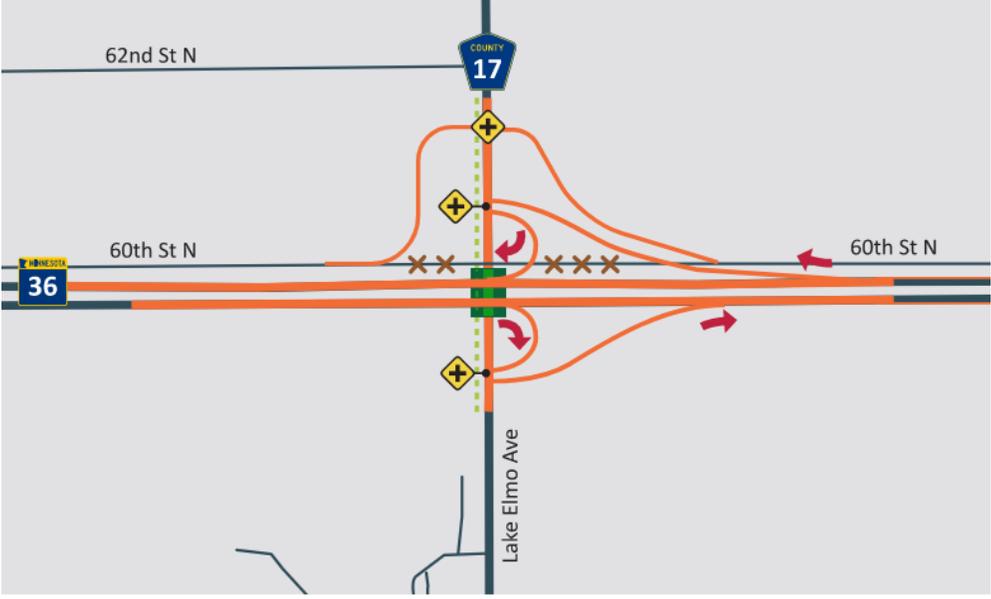
Alternative 11-a is a partial cloverleaf variation on the traditional intersection, where all ramps are on the west side of CSAH 17. This alternative includes shifting the north frontage road (60th Street N) farther to the north, with control type to be determined by further analysis if the alternative is advanced into Step 3.

Alternative 11-b is similar to Alternative 11-a, but with ramps on the east side of CSAH 17.

The analysis for Step 2 assumes TH 36 travels over CSAH 17, but if the alternative is advanced into Step 3 the specific grade separation would be determined by further analysis.



ALTERNATIVE 11-B *Folded Diamond Interchange with Ramps on East Side*



Legend

- Existing Roadway
- Roadway Alternative Concept
- Proposed Bridge
- - - Proposed Trail**
- ➔ On/Off Ramp

-  Traffic Signal
-  Roundabout
-  Controlled Intersection*
-  Roadway Segment Removal

**Intersection control type (signal, stop, or roundabout) will be determined by further analysis*

***Analysis assumes trail crossing on west side*

12. Michigan Urban Diamond (MUD) Interchange

Alternative 12 is a Michigan urban diamond (MUD), which is similar to a traditional diamond interchange except left-turn movements are removed from the arterial intersections. Left-turning vehicles instead make U-turns at directional crossovers on frontage roads, which can be signalized or stop-controlled. This alternative includes shifting the north frontage road (60th Street N) farther to the north, with intersection control type to be determined by further analysis if the alternative is advanced into Step 3.

The analysis for Step 2 assumes TH 36 travels over CSAH 17, but if the alternative is advanced into Step 3 the specific grade separation would be determined by further analysis.

