COUNCIL STAFF REPORT
Blue Line Extension

FROM: **John Sutter, Community Development Director**

TO: **Adam R. Bell, City Manager (for February 9 work session)**

DATE: **February 2, 2023**

SUBJECT: **Review updated Blue Line Extension design options and traffic modeling**

In response to previous discussions and the city's July resolution (attached), the Blue Line Extension has identified six scenarios for evaluation:

1. Existing conditions (No build)

   Baseline required for the environmental review.

2. 4 lanes at grade

   This was the initial concept. Blue Line project staff and city staff agree that it would not work due to the intersection volumes and delays at Bass Lake Road.

3. 4 lanes with Bass Lake Road interchange plus additional southbound lane south of Corvallis ("4/5 + interchange")

   This is the concept currently preferred by the Blue Line Extension project staff.

4. 4 lanes at grade plus additional lanes through Bass Lake Road intersection and an additional southbound lane south of Corvallis ("4-6-4/5 at grade")

   This concept is intended to address the Bass Lake Road intersection capacity issues without constructing an interchange.

5. 6 lanes at grade

   This concept is an alternative requested for evaluation by the city.

6. 6 lanes with interchange at Bass Lake Road

   Blue Line project staff and city staff agree that this concept would be an overdesign and do not recommend it.

The February 9 work session will have two main elements:

- Presentation by the Blue Line Extension project staff including process and timeline, design scenarios and the latest traffic modeling. The slides are attached.

- Interactive discussion among the Council, project staff and city staff. Because the discussion will likely focus on comparing #3 (4/5 +interchange), #4 (4-6-4/5 at grade) and #5 (6 lanes at grade), those roll plots will be laid out on tables for viewing and discussion. Roll plot excerpts of the interchange and at-grade scenarios at Bass Lake Road are attached.

Anticipated next steps:

Feb. 21	Council work session to discuss a proposed resolution commenting on the design scenarios
Mar. 7	Council action on the resolution
Mar. 9	Presentation of resolution to Corridor Management Committee
June 8	CMC recommends design option for Supplemental Draft Environmental Impact Statement
Summer 2023	Federal Transit Administration review of SDEIS
Fall 2023	SDEIS published
Fall 2023	30% plans completed for city and community review and comment
Spring 2024	Municipal Consent process

CITY OF CRYSTAL

RESOLUTION NO. 2022 - 63

REQUEST FOR INCLUSION OF ALTERNATIVES IN THE ENVIRONMENTAL REVIEW FOR THE METRO BLUE LINE EXTENSION

WHEREAS, the City of Crystal ("City") has long been underserved by the regional public transit system, with limited access to jobs and services in adjacent communities; and

WHEREAS, the City desires improved and expanded transportation options and connections for its residents, businesses, institutions and visitors; and

WHEREAS, the City has actively participated in efforts to bring high-frequency transit service to the northwest suburbs, including the proposed Metro Blue Line Extension ("the Project"); and

WHEREAS, the Project has developed conceptual layouts for the Project, specifically, at grade in the median of Bottineau Boulevard, and city staff, the Mayor and City Council, and community members have provided input as requested by Metro Transit and Hennepin County; and

WHEREAS, on December 13, 2021, Metro Transit and Hennepin County released the Draft Route Modification Report; and

WHEREAS, on January 18, 2022, the Crystal City Council adopted Resolution 2022-12 commenting on the draft Route Modification Report, including the planned reduction of the number of traffic lanes in the Crystal segment from six to four and replacement of the intersection of Bottineau Boulevard and Bass Lake Road with a grade-separated interchange; and

WHEREAS, on June 21 and 22, respectively, the Hennepin County Board of Commissioners and the Metropolitan Council approved the Route Modification Report; and

WHEREAS, with this approval, the Project now moves into the Environmental Review and Municipal Consent phases; and

WHEREAS, it is in the best interest of the City to formally request inclusion of certain alternatives in the Environmental Review to inform the City Council's anticipated Municipal Consent vote in 2023.

NOW, THEREFORE, BE IT RESOLVED that, in addition to the alternatives shown in the conceptual layouts previously provided to the City and described in the Route Modification Report, the City Council requests inclusion and analysis of the following alternatives in the Environmental Review for the Project:

1. No Build alternative reflecting maintenance of existing conditions.

2. Six Lanes, At-Grade alternative maintaining three travel lanes in each direction from the Trunk Highway 100 ramps through a reconstructed at-grade Bass Lake Road intersection to the vicinity of Airport Road.

3. Six Lanes, Interchange alternative maintaining three travel lanes in each direction from the Trunk Highway 100 ramps to the southerly ramps of a new interchange at Bass Lake Road.

BE IT FURTHER RESOLVED that inclusion of these alternatives in the Environmental Review is essential for the City Council to consider an affirmative Municipal Consent vote on the Project.

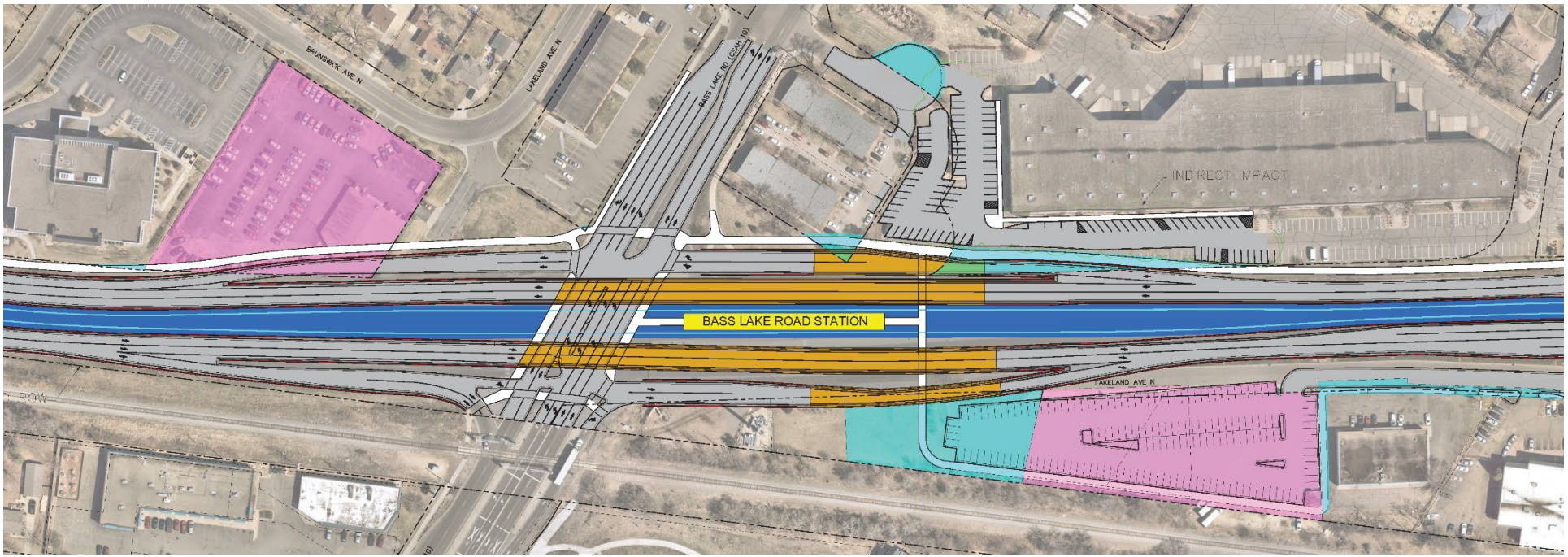
Adopted by the Crystal City Council this 19th day of July, 2022.

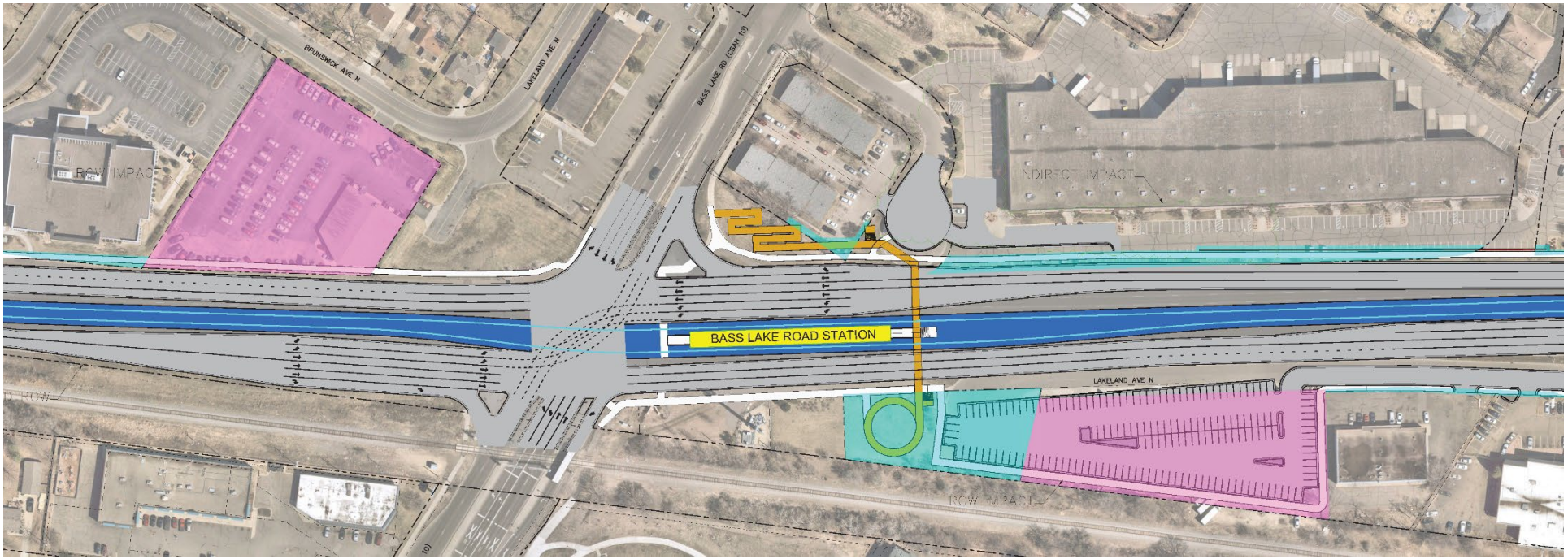
Jim Adams, Mayor

ATTEST:

Christina Serres, City Clerk

Interchange and At-Grade Scenarios at Bass Lake Road





Blue Line LRT Extension Crystal, MN

City Council Work Session
Feb 9, 2023

METRO BLUE LINE EXTENSION

BROOKLYN PARK | CRYSTAL | ROBBINSDALE | MINNEAPOLIS

METROPOLITAN COUNCIL

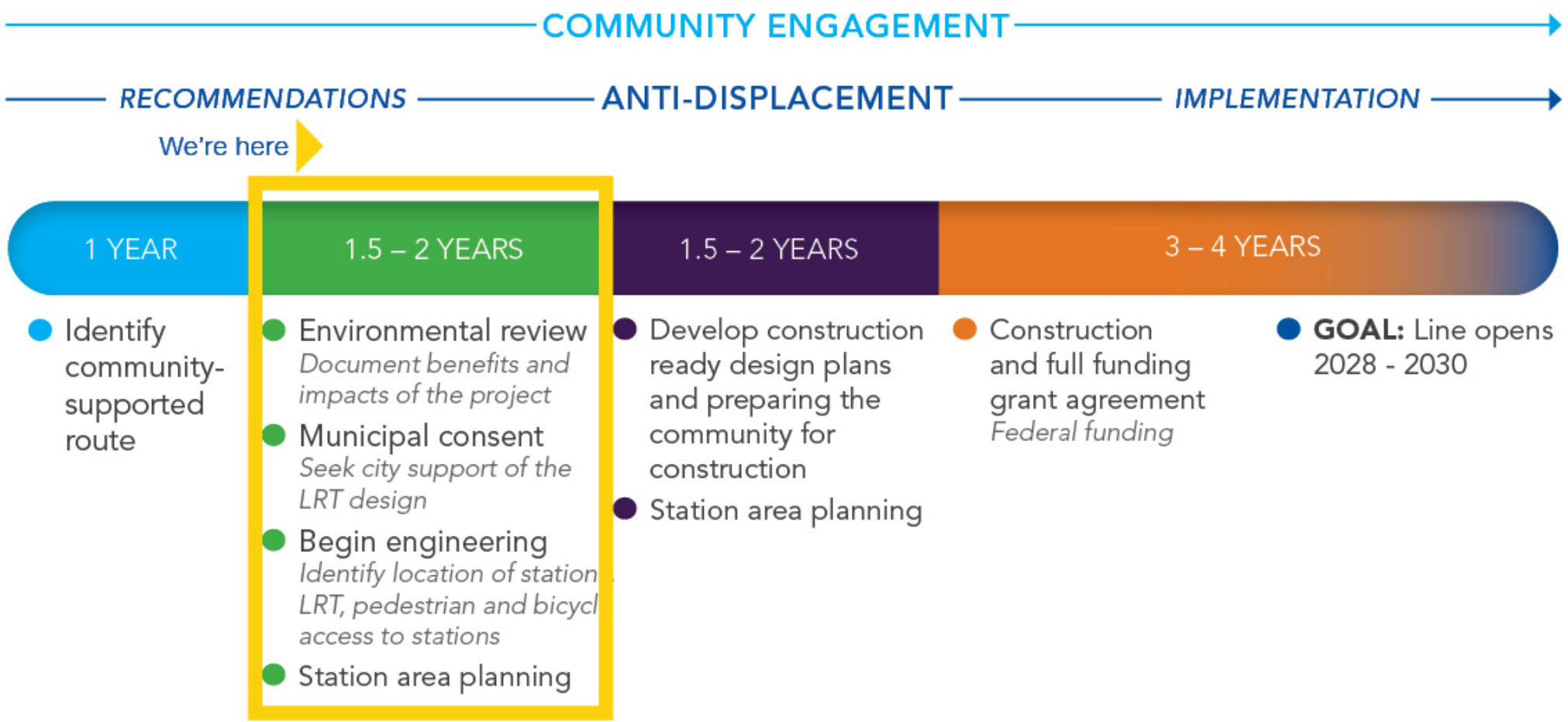
Hennepin

Federal Transit Administration

Blue Line LRT Extension

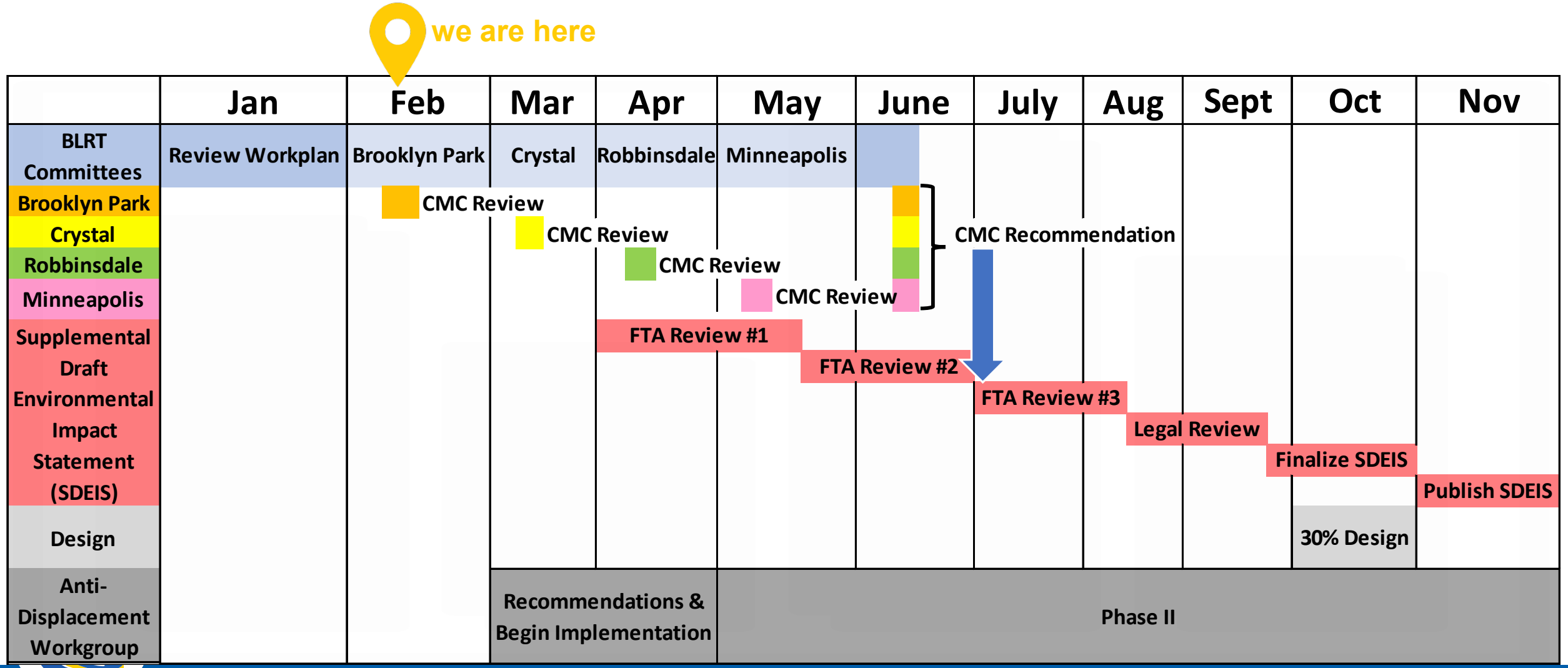
- Located in Hennepin County directly connecting downtown Minneapolis, Robbinsdale, Crystal and Brooklyn Park and communities in the northwest Metro
- New route adopted in June 2022
- Advancing environmental analysis and engineering for Supplemental Draft and Final EIS
- Public engagement underway and ongoing, including an Anti-Displacement Workgroup
- Policy recommendation in June 2023 for preferred route where SDEIS includes more than one option

Project Schedule



LRT projects are complex and unforeseen challenges arise. Schedules and timelines are subject to change.

2023 Workplan



Workplan- continued

June 2023

CMC Recommendation on Preferred Design Options in SDEIS

Summer 2023

Federal Transit Administration (FTA) Final Review of Draft SDEIS

Fall 2023

SDEIS Published & Public Comment Period

Fall 2023

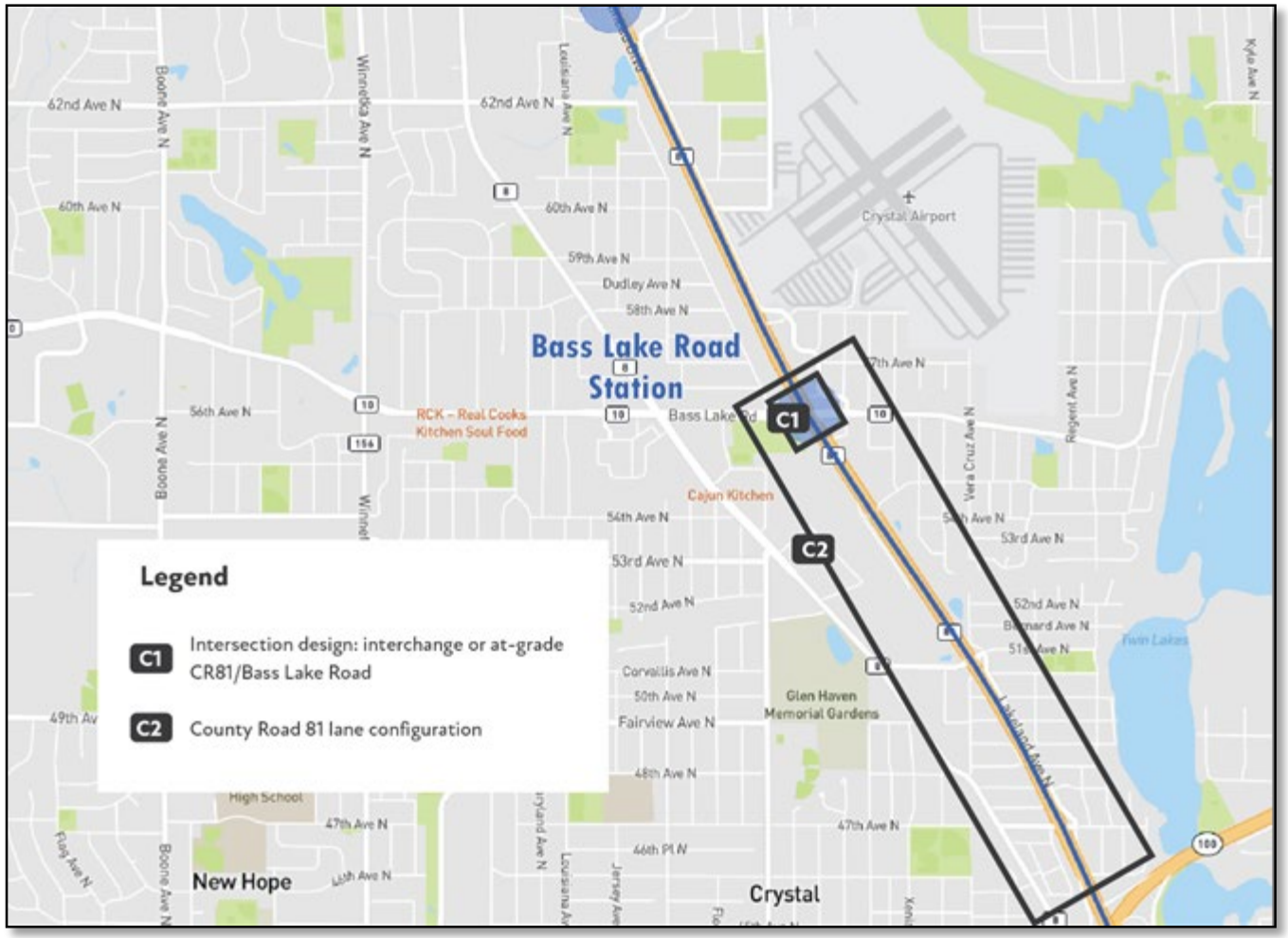
30% Design Complete

Spring 2024

Municipal Consent Process

SDEIS = Supplemental Draft Environmental Impact Statement

Crystal Design Decisions



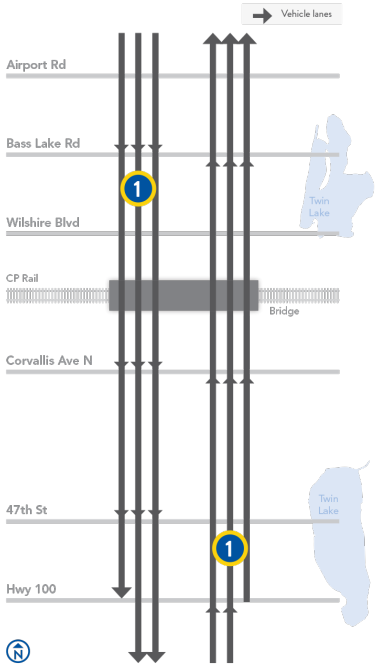
Traffic Study Scenarios

1

Existing Condition
No Build

CROSS SECTION
Airport Road to Hwy 100

3 lanes of vehicular traffic in each direction, separated by a median

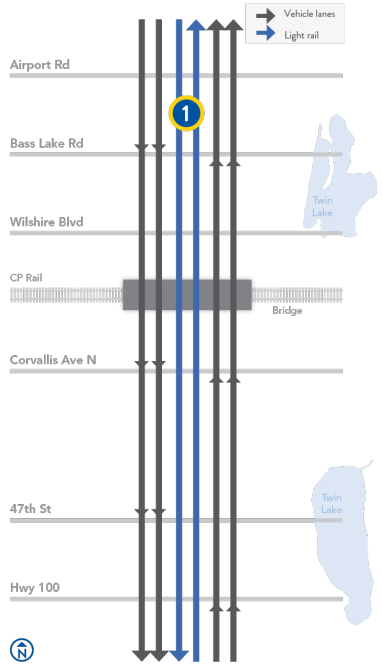


2

4 Lanes At-Grade with LRT

CROSS SECTION
Airport Road to Hwy 100

2 lanes of vehicular traffic in each direction, center running LRT in median



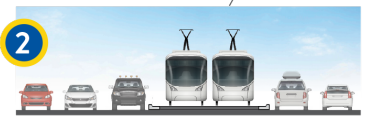
3

4/5 Lanes with Grade Separated Interchange with LRT

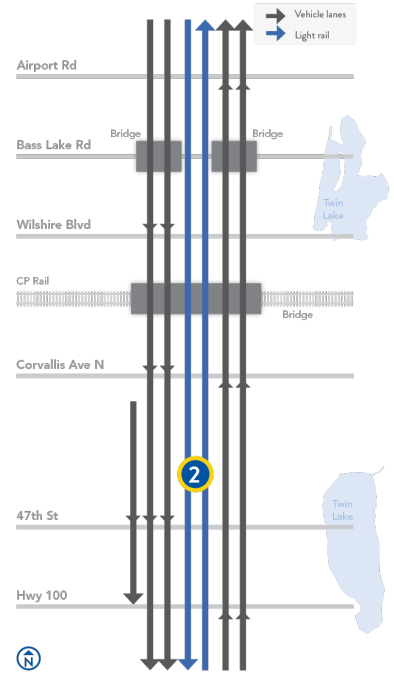
CROSS SECTION
Airport Rd to Corvallis Ave N

2 lanes of vehicular traffic in each direction,center running LRT in median grade separated interchange at Bass Lake Road

Corvallis Ave N to Hwy 100



3 lanes of vehicular traffic between Corvallis Ave and HWY 100 to accommodate HWY 100 traffic volume



METRO BLUE LINE EXTENSION

Traffic Study Scenarios

4

4/6 Lanes at Grade with LRT

CROSS SECTION

Airport Rd to Wilshire Blvd

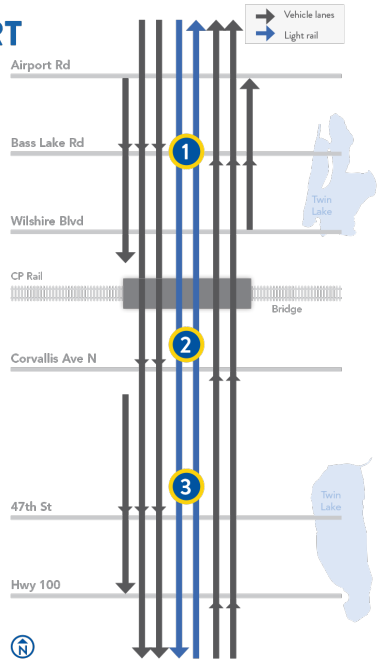
3 lanes of vehicular traffic in each direction, center running LRT in median

CP Rail to Corvallis Ave N

2 lanes of vehicular traffic in each direction, center running LRT in median

Corvallis Ave N to Hwy 100

3 lanes of vehicular traffic between Corvallis Ave and HWY 100 to accommodate HWY 100 traffic volume

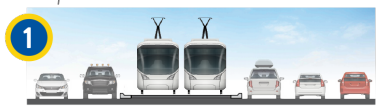


5

6 Lanes at Grade with LRT

CROSS SECTION

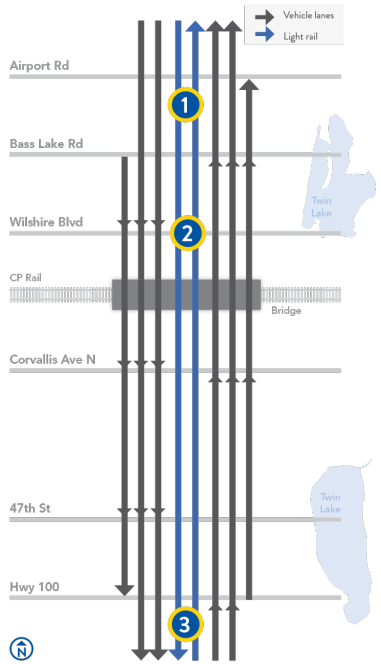
Airport Rd to Bass Lake Rd



Bass Lake Rd to Hwy 100

3 lanes of vehicular traffic in each direction, center running LRT in median

South of Hwy 100



6

6 Lanes at Grade Separated Interchange with LRT

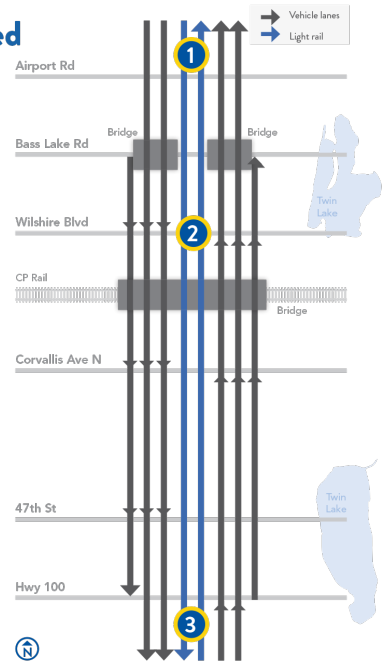
CROSS SECTION

Airport Rd to Bass Lake Rd

Bass Lake Rd to Hwy 100

3 lanes of vehicular traffic in each direction, center running LRT in median, grade separated interchange at Bass Lake Rd

South of Hwy 100



METRO BLUE LINE EXTENSION

Scenario 4 – 6 Lanes at Grade with LRT

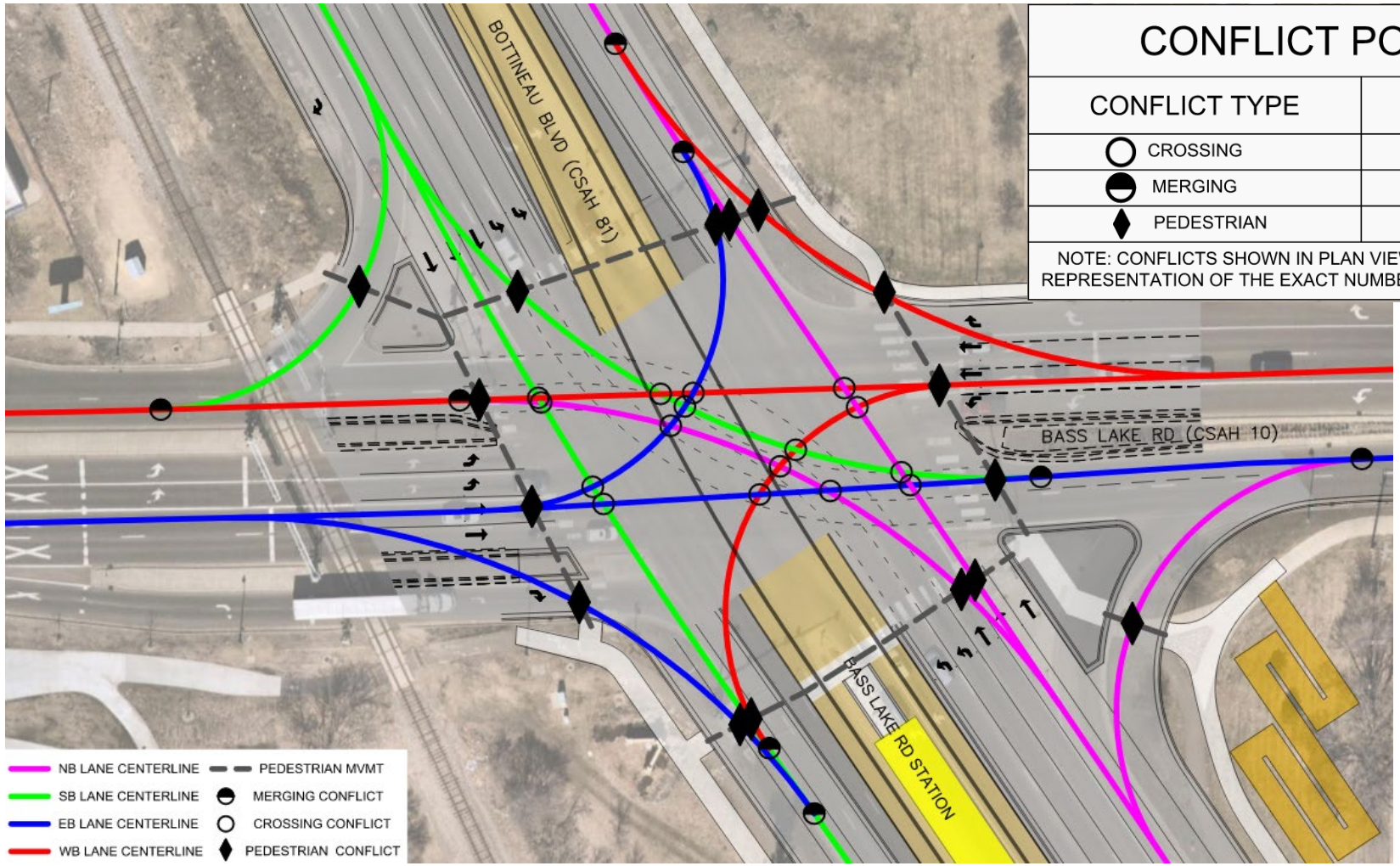
Scenario 3 – 4/5 Lanes with Interchange

Crash History at Bass Lake Road (2018-2022)

Crash Severity	# of Crashes (2018-2022)
Fatal	0
Serious Injury	0
Minor Injury	8
Possible Injury	19
Property Damage Only	70
TOTAL	**97**

- > 50% of crashes were rear end crashes
- Intersection Critical Index = 1.47
  - >1.0 = above statewide average for similar intersections

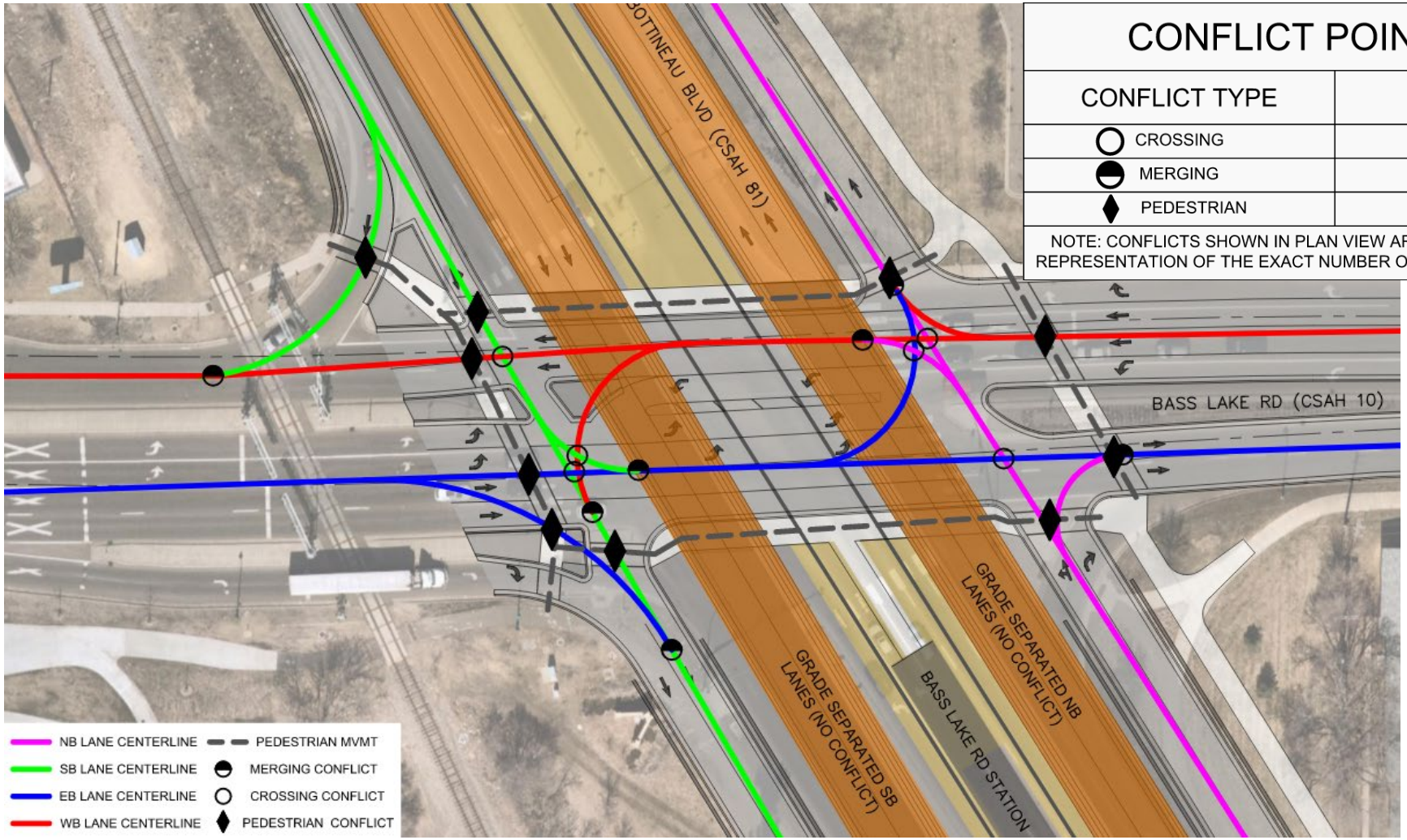
Safety Considerations: At-Grade Intersection



CONFLICT POINT SUMMARY	
CONFLICT TYPE	NUMBER
CROSSING	68
MERGING	11
PEDESTRIAN	31

NOTE: CONFLICTS SHOWN IN PLAN VIEW ARE SCHEMATIC AND ARE A SIMPLIFIED REPRESENTATION OF THE EXACT NUMBER OF CONFLICTS AS SHOWN IN THIS TABLE

Safety Considerations: Interchange

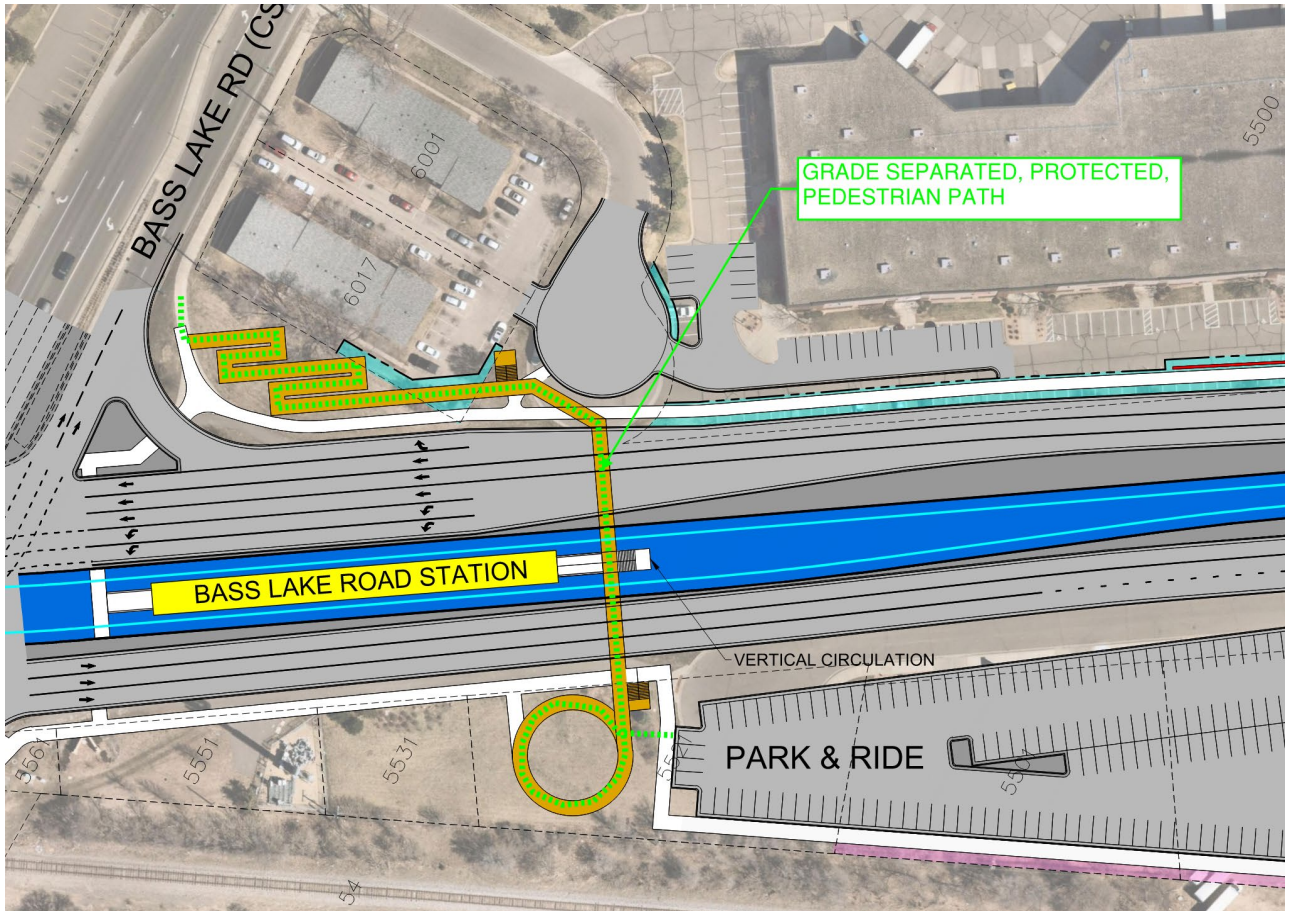


CONFLICT POINT SUMMARY	
CONFLICT TYPE	NUMBER
CROSSING	20
MERGING	8
PEDESTRIAN	20

NOTE: CONFLICTS SHOWN IN PLAN VIEW ARE SCHEMATIC AND ARE A SIMPLIFIED REPRESENTATION OF THE EXACT NUMBER OF CONFLICTS AS SHOWN IN THIS TABLE

METRO BLUE LINE EXTENSION

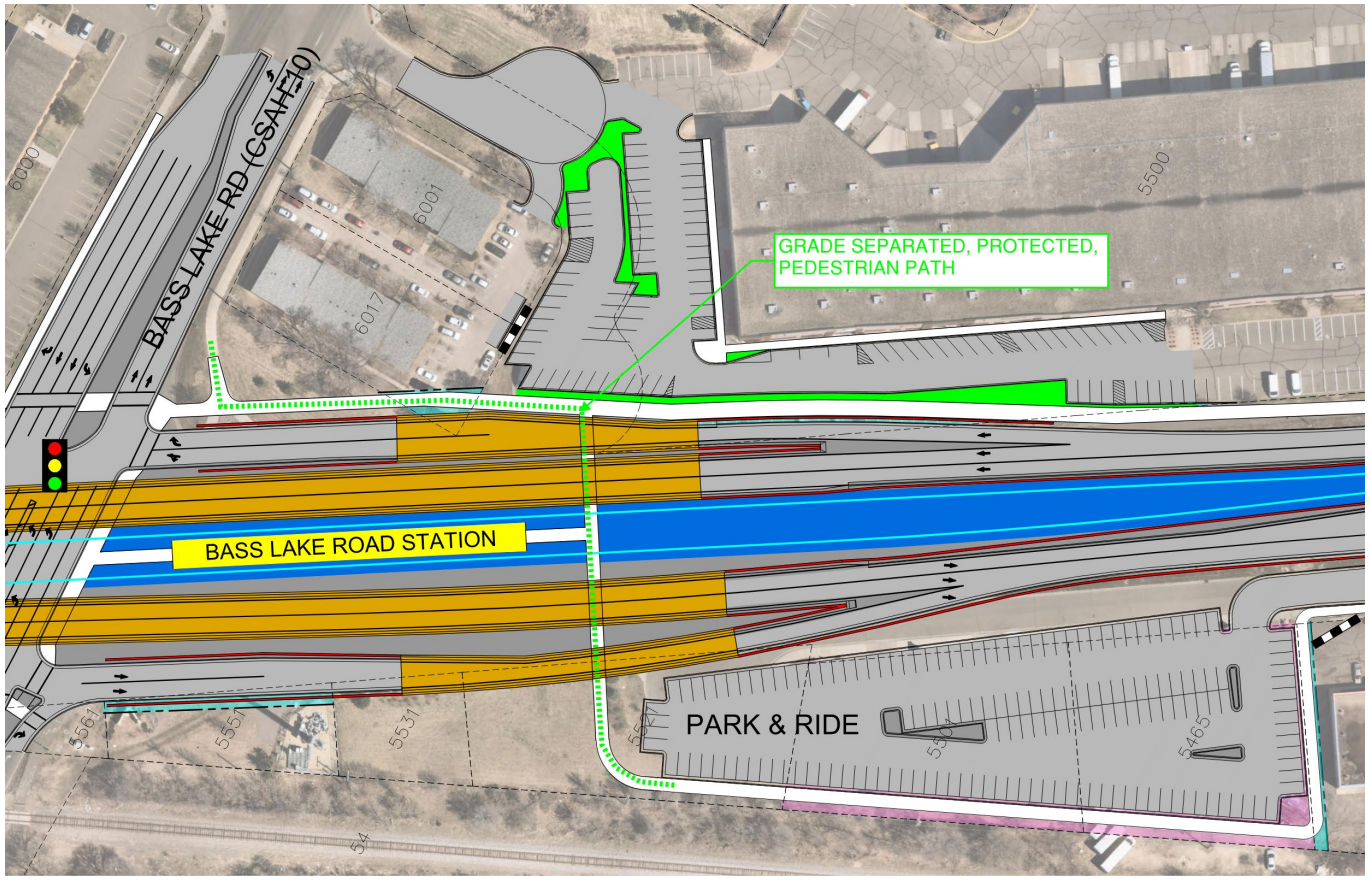
Protected Pedestrian Paths: At-Grade Int.



- ~1/4 mile to safely cross CSAH 81 on grade separated pathway
- Significant vertical variance to overcome moving route ~25’ vertical
- ~ 8 minutes to cross

*Assumed walking speed of 3.5 ft/sec with variation based on grade of path (i.e. incline/decline)

Protected Pedestrian Paths: Interchange



- ~1/8 mile to safely cross CSAH 81 on grade separated pathway
- Flat terrain with minimal elevation change
- ~3 minutes to cross

*Assumed walking speed of 3.5 ft/sec with variation based on grade of path (i.e. incline/decline)

2040 Conditions: CSAH 81 Travel Time
(TH 100 to Crystal Airport Road)

Scenario	Travel Time (sec) (TH 100 to Crystal Airport Road)			
	AM Peak Hour		PM Peak Hour	
	NB	SB	NB	SB
1: No-Build	2 min 56 sec	3 min 19 sec	2 min 58 sec	3 min 50 sec
2: 4 Lanes, at Grade	+15 sec	+48 sec	+167 sec	+79 sec
3: 4/5 Lanes, Grade Separated Interchange	-15 sec	-24 sec	-5 sec	-34 sec
4: 4/6 Lanes, at Grade ("4-6-4 Option")	+10 sec	+17 sec	+18 sec	-10 sec
5: 6-Lane BLR at Grade Intersection	-1 sec	-1 sec	+7 sec	-1 sec
6: 6 Lanes Grade Separated Interchange	-17 sec	-27 sec	-16 sec	-66 sec

Legend:

0 to ±5 sec	
+5.1 to +10 sec	-5.1 to -10 sec
+10.1 to +15 sec	-10.1 to -15 sec
> +15 sec	< -15 sec

2040 Conditions: Cross Street Approach Delay

Legend:

0 to ±5 sec	
+5.1 to +10 sec	-5.1 to -10 sec
+10.1 to +15 sec	-10.1 to -15 sec
> +15 sec	< -15 sec

AM Peak Hour									
Intersection	CSAH 81 & Bass Lake Rd		CSAH 81 & Wilshire Blvd		CSAH 81 & Corvallis Ave N		CSAH 81 & 47th Ave N		CSAH 81 & TH 100 SB Ramp
Approach	Eastbound	Westbound	Eastbound	Westbound	Eastbound	Westbound	Eastbound	Westbound	Westbound
1: No-Build	27 sec	37 sec	14 sec	30 sec	18 sec	26 sec	58 sec	42 sec	37 sec
2: 4 Lanes, at Grade	+11 sec	+3 sec	+10 sec	+1 sec	+3 sec	-1 sec	0 sec	-2 sec	0 sec
3: 4/5 Lanes, Grade Separated Interchange	+10 sec	+2 sec	+9 sec	+1 sec	+3 sec	-1 sec	0 sec	0 sec	0 sec
4: 4/6 Lanes, at Grade ("4-6-4" Option)	+1 sec	-4 sec	+10 sec	0 sec	+4 sec	-1 sec	-2 sec	-2 sec	0 sec
5: 6-Lane BLR at Grade Intersection	+6 sec	-4 sec	+5 sec	0 sec	-1 sec	0 sec	+4 sec	0 sec	0 sec
6: 6 Lanes Grade Separated Interchange	+9 sec	+2 sec	+9 sec	+1 sec	-3 sec	-1 sec	0 sec	0 sec	0 sec
Build Approach Volume (vehicles per hour)	**712**	**341**	**33**	**221**	**190**	**80**	**79**	**65**	**186**

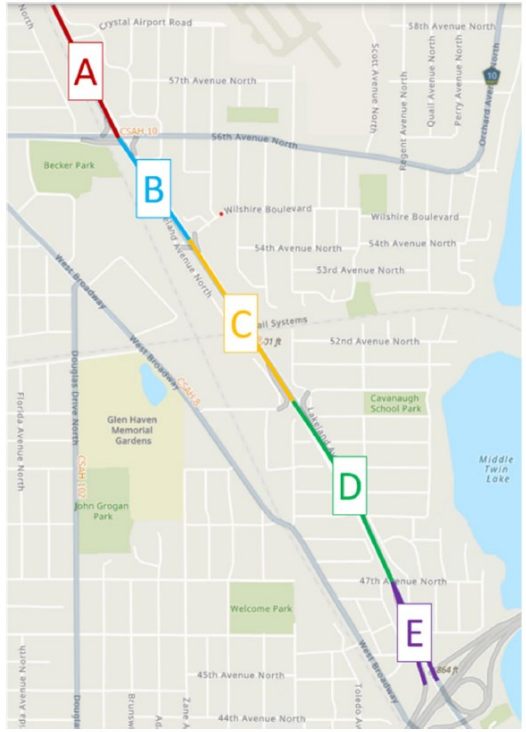
PM Peak Hour									
Intersection	CSAH 81 & Bass Lake Rd		CSAH 81 & Wilshire Blvd		CSAH 81 & Corvallis Ave N		CSAH 81 & 47th Ave N		CSAH 81 & TH 100 SB Ramp
Approach	Eastbound	Westbound	Eastbound	Westbound	Eastbound	Westbound	Eastbound	Westbound	Westbound
1: No-Build	34 sec	42 sec	13 sec	18 sec	24 sec	30 sec	89 sec	55 sec	25 sec
2: 4 Lanes, at Grade	-5 sec	+12 sec	+11 sec	+14 sec	+3 sec	+3 sec	-1 sec	+1 sec	-3 sec
3: 4/5 Lanes, Grade Separated Interchange	+11 sec	+25 sec	+5 sec	+6 sec	+5 sec	+4 sec	-1 sec	-4 sec	-3 sec
4: 4/6 Lanes, at Grade ("4-6-4" Option)	-6 sec	+13 sec	+6 sec	+1 sec	+1 sec	+2 sec	-1 sec	+1 sec	-3 sec
5: 6-Lane BLR at Grade Intersection	+3 sec	+13 sec	+7 sec	+1 sec	+1 sec	+1 sec	-1 sec	+3 sec	+1 sec
6: 6 Lanes Grade Separated Interchange	+11 sec	+24 sec	+5 sec	+4 sec	-1 sec	0 sec	-1 sec	+1 sec	0 sec
Build Approach Volume (vehicles per hour)	**1282**	**500**	**125**	**195**	**157**	**76**	**48**	**45**	**361**

CR 81 Traffic Volumes

Annual average daily traffic (AADT) is the estimated average daily traffic volume experienced in both directions of a roadway segment considering the seasonal variation in traffic in a one-year period.

	Segment	2005 AADT[1] (vehicles/ day)	2015 AADT[2] (vehicles/ day)	2019 AADT[3] (vehicles/ day)	2021 AADT[4] (vehicles/ day)	Spring 2022 AADT[5] (vehicles/ day)	Fall 2022 AADT[6] (vehicles/ day)	2040 Forecast[7] (vehicles/ day)
A	CR 81, 63rd Ave to Bass Lake Rd	23,900	26,500	28,500	26,500	26,900	26,600	34,000
B	CR 81, Bass Lake Rd to Wilshire Blvd	23,900	27,000	31,000	26,700	29,000	28,200	32,000
C	CR 81, Wilshire Blvd to Corvallis Ave				28,100	30,800	29,500	
D	CR 81, Corvallis Ave to 47th Ave				29,900	32,600	31,500	
E	CR 81, 47th Ave to TH 100 ramps	28,500	32,500	38,000	33,100	34,900	33,500	39,000

1. Existing volumes during the design phase for the CR 81 reconstruction.
2. Volumes after the CR 81 reconstruction but before the restriping to 6 lanes between 47th Ave and Wilshire Blvd.
3. Volumes after the CR 81 restriping to 6 lanes between 47th Ave and Wilshire Blvd.
4. Volumes collected in October 2021.
5. Intersection turning movement count data collected in April 2022.
6. Intersection turning movement count data collected in September 2022.
7. Forecasts in the current Hennepin County Transportation Plan.



2040 Conditions: AM Peak Hour

Intersection	Direction	Movement	1: No-Build				2: 4 Lanes, at Grade				3: 4/5 Lanes, Grade Separated Interchange				4: 4/6 Lanes, at Grade ("4-6-4" Option)				5: 6-Lane BLR at Grade Intersection				6: 6 Lanes Grade Separated Interchange			
			Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)
CSAH 81 & Bass Lake Rd	Eastbound	Left	51.5	D	25	100	63.1	E	30	115	56.3	E	20	100	58.3	E	25	100	43.7	D	25	125	55.6	E	20	95
		Through	33.3	C	25	135	38.5	D	30	135	55.6	E	40	140	28.2	C	20	120	36.2	D	25	180	55.6	E	40	145
		Right	15.2	B	20	175	30.7	C	60	320	22.1	C	50	280	19.9	B	40	280	27.6	C	65	420	21.8	C	50	280
	Westbound	Left	47.8	D	20	90	58.6	E	25	105	47.7	D	0	10	48.2	D	20	95	38.7	D	15	125	47.6	D	0	10
		Through	44.0	D	35	135	34.9	C	25	130	47.7	D	40	135	31.1	C	25	115	31.3	C	25	150	47.7	D	40	135
		Right	5.1	A	0	50	38.7	D	15	90	4.9	A	0	50	28.1	C	10	90	33.8	C	15	135	4.8	A	0	50
	Northbound	Left	58.8	E	60	180	53.1	D	55	200	71.8	E	140	445	44.7	D	45	170	36.0	D	35	195	69.5	E	130	425
		Through	26.0	C	40	195	31.5	C	70	315	0.8	A	0	0	30.8	C	50	200	19.7	B	30	265	1.6	A	0	0
		Right	2.7	A	0	5	4.5	A	0	65	16.8	B	0	50	4.5	A	0	55	16.4	B	5	75	18.1	B	0	50
	Southbound	Left	49.9	D	20	90	102.9	F	30	85	54.4	D	30	135	69.7	E	25	80	50.9	D	20	120	54.8	D	30	130
		Through	26.2	C	70	335	64.7	E	345	900	3.4	A	0	0	41.2	D	115	475	29.6	C	75	510	3.2	A	0	0
		Right	5.1	A	0	65	28.5	C	5	60	6.9	A	0	50	9.0	A	0	65	7.7	A	0	115	6.8	A	0	55
	Intersection		29.3	C	-	-	47.7	D	-	-	20.5	C	-	-	34.7	C	-	-	28.5	C	-	-	20.4	C	-	-
CSAH 81 & Wilshire Blvd	Eastbound	Left	19.4	B	0	25	39.4	D	5	45	38.3	D	5	45	38.6	D	5	45	35.8	D	5	60	38.4	D	5	45
		Through	45.1	D	0	35	44.1	D	5	50	39.1	D	5	50	43.6	D	5	50	30.9	C	5	60	38.1	D	5	50
		Right	2.3	A	0	10	1.5	A	0	10	1.5	A	0	5	1.2	A	0	5	1.4	A	0	55	2.4	A	0	15
	Westbound	Left	39.4	D	40	180	40.0	D	40	185	40.1	D	40	185	39.4	D	40	190	39.7	D	40	225	40.3	D	40	185
		Through	43.7	D	40	180	42.9	D	40	190	40.2	D	40	190	43.7	D	40	195	34.6	C	40	225	42.9	D	40	190
		Right	5.3	A	0	60	6.4	A	0	60	6.9	A	0	65	5.8	A	0	60	5.5	A	0	80	5.5	A	0	60
	Northbound	Left	64.8	E	5	45	38.8	D	5	40	38.6	D	5	40	38.6	D	5	45	46.1	D	5	85	39.9	D	5	40
		Through	4.6	A	10	105	4.5	A	10	165	4.6	A	10	145	3.8	A	5	115	4.2	A	5	165	4.5	A	5	140
		Right	2.5	A	0	15	2.6	A	0	10	2.5	A	0	15	2.6	A	0	5	3.2	A	0	10	3.0	A	0	10
	Southbound	Left	47.6	D	20	95	44.5	D	20	100	46.7	D	20	105	47.7	D	20	115	47.0	D	20	140	47.4	D	20	115
		Through	8.7	A	25	300	11.5	B	65	615	11.7	B	50	470	9.9	A	30	400	9.1	A	30	420	8.9	A	30	300
		Right	8.4	A	0	25	5.8	A	0	80	11.4	B	0	30	4.1	A	0	75	4.9	A	0	45	3.7	A	0	60
	Intersection		10.1	B	-	-	11.2	B	-	-	11.6	B	-	-	10.2	B	-	-	9.9	A	-	-	9.9	A	-	-

2040 Conditions: AM Peak Hour

Intersection	Direction	Movement	1: No-Build				2: 4 Lanes, at Grade				3: 4/5 Lanes, Grade Separated Interchange				4: 4/6 Lanes, at Grade ("4-6-4" Option)				5: 6-Lane BLR at Grade Intersection				6: 6 Lanes Grade Separated Interchange			
			Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)
CSAH 81 & Corvallis Ave N	Eastbound	Left	32.2	C	10	75	31.2	C	10	75	30.6	C	10	70	32.4	C	10	80	31.7	C	10	105	32.5	C	10	80
		Through	41.1	D	0	25	40.5	D	0	25	42.7	D	0	25	42.6	D	0	25	41.7	D	0	45	41.6	D	0	25
		Right	10.9	B	5	85	16.2	B	10	100	16.1	B	10	110	16.8	B	10	110	10.2	B	5	110	7.0	A	5	80
	Westbound	Left	34.4	C	5	55	33.8	C	5	55	33.8	C	5	55	33.0	C	5	55	34.1	C	5	65	34.4	C	5	55
		Through	39.6	D	5	55	39.3	D	5	55	39.1	D	5	55	39.5	D	5	55	38.9	D	5	65	39.2	D	5	55
		Right	4.1	A	0	35	5.1	A	0	40	5.2	A	0	40	5.3	A	0	40	4.6	A	0	75	4.3	A	0	40
	Northbound	Left	44.5	D	15	75	53.5	D	15	80	53.8	D	15	80	53.3	D	15	80	54.5	D	20	140	54.9	D	15	90
		Through	6.5	A	15	165	11.0	B	35	400	10.5	B	35	395	10.9	B	35	390	10.2	B	25	365	8.8	A	20	250
		Right	0.8	A	0	0	5.6	A	0	5	4.2	A	0	5	5.5	A	0	0	3.2	A	0	15	1.8	A	0	5
	Southbound	Left	70.3	E	5	40	77.2	E	5	40	72.1	E	5	35	69.5	E	5	35	60.4	E	5	55	66.6	E	5	40
		Through	15.4	B	55	395	24.6	C	170	780	22.1	C	140	675	25.5	C	160	765	17.9	B	65	520	18.6	B	70	415
		Right	4.0	A	0	0	12.0	B	0	5	8.1	A	0	5	14.0	B	0	5	5.0	A	0	15	3.5	A	0	5
	Intersection		13.3	B	-	-	20.2	C	-	-	18.7	B	-	-	20.7	C	-	-	15.9	B	-	-	15.8	B	-	-
CSAH 81 & 47th Ave N	Eastbound	Left	36.5	D	0	35	52.4	D	5	50	42.2	D	5	50	46.6	D	5	50	45.9	D	5	100	42.2	D	5	50
		Through	0.0	A	0	0	0.0	A	0	0	0.0	A	0	0	0.0	A	0	0	0.0	A	5	100	0.0	A	0	0
		Right	60.2	E	25	110	58.0	E	25	110	59.2	E	25	110	56.9	E	25	110	63.6	E	30	165	59.2	E	25	115
	Westbound	Left	44.5	D	15	90	42.3	D	15	95	44.0	D	15	95	42.6	D	15	95	43.3	D	15	120	44.1	D	15	95
		Through	33.2	C	10	65	37.6	D	10	70	38.2	D	10	70	37.6	D	10	70	51.2	D	15	120	38.9	D	10	70
		Right	8.7	A	0	15	7.9	A	0	15	7.8	A	0	15	7.9	A	0	15	6.7	A	0	25	8.0	A	0	15
	Northbound	Left	33.1	C	5	60	37.2	D	5	65	36.4	D	5	60	36.3	D	5	60	41.4	D	5	100	37.0	D	5	65
		Through	2.9	A	5	120	4.9	A	15	290	4.7	A	15	290	4.8	A	15	285	3.6	A	10	280	3.8	A	10	195
		Right	2.4	A	0	15	3.9	A	0	15	4.0	A	0	20	3.7	A	0	15	2.9	A	0	25	2.6	A	0	20
	Southbound	Left	81.2	F	0	20	44.8	D	0	20	53.6	D	0	20	49.2	D	0	20	42.1	D	0	35	54.8	D	0	20
		Through	7.0	A	20	345	5.5	A	15	295	3.7	A	10	205	3.6	A	10	245	6.6	A	15	565	5.9	A	15	270
		Right	7.0	A	0	0	3.7	A	0	5	4.9	A	0	5	2.7	A	0	0	8.9	A	0	5	10.0	B	0	0
	Intersection		8.1	A	-	-	7.9	A	-	-	6.8	A	-	-	6.7	A	-	-	8.2	A	-	-	7.7	A	-	-
CSAH 81 & TH 100 SB Ramp	Westbound	Left	51.7	D	30	105	52.4	D	30	110	52.4	D	30	110	52.4	D	30	110	52.2	D	30	135	52.1	D	30	110
		Right	5.5	A	0	55	4.4	A	0	55	4.4	A	0	55	4.4	A	0	55	5.7	A	0	80	5.3	A	0	55
	Northbound	Through	1.5	A	5	60	1.7	A	5	90	1.7	A	5	90	1.7	A	5	90	1.5	A	5	90	1.4	A	5	65
	Southbound	Through	3.9	A	5	155	5.0	A	10	175	4.0	A	10	190	4.0	A	10	195	4.5	A	10	290	4.5	A	10	175
		Right	3.0	A	0	0	1.9	A	0	0	1.6	A	0	0	1.5	A	0	0	3.0	A	0	0	2.8	A	0	0
	Intersection		4.7	A	-	-	4.8	A	-	-	4.4	A	-	-	4.4	A	-	-	4.9	A	-	-	4.8	A	-	-

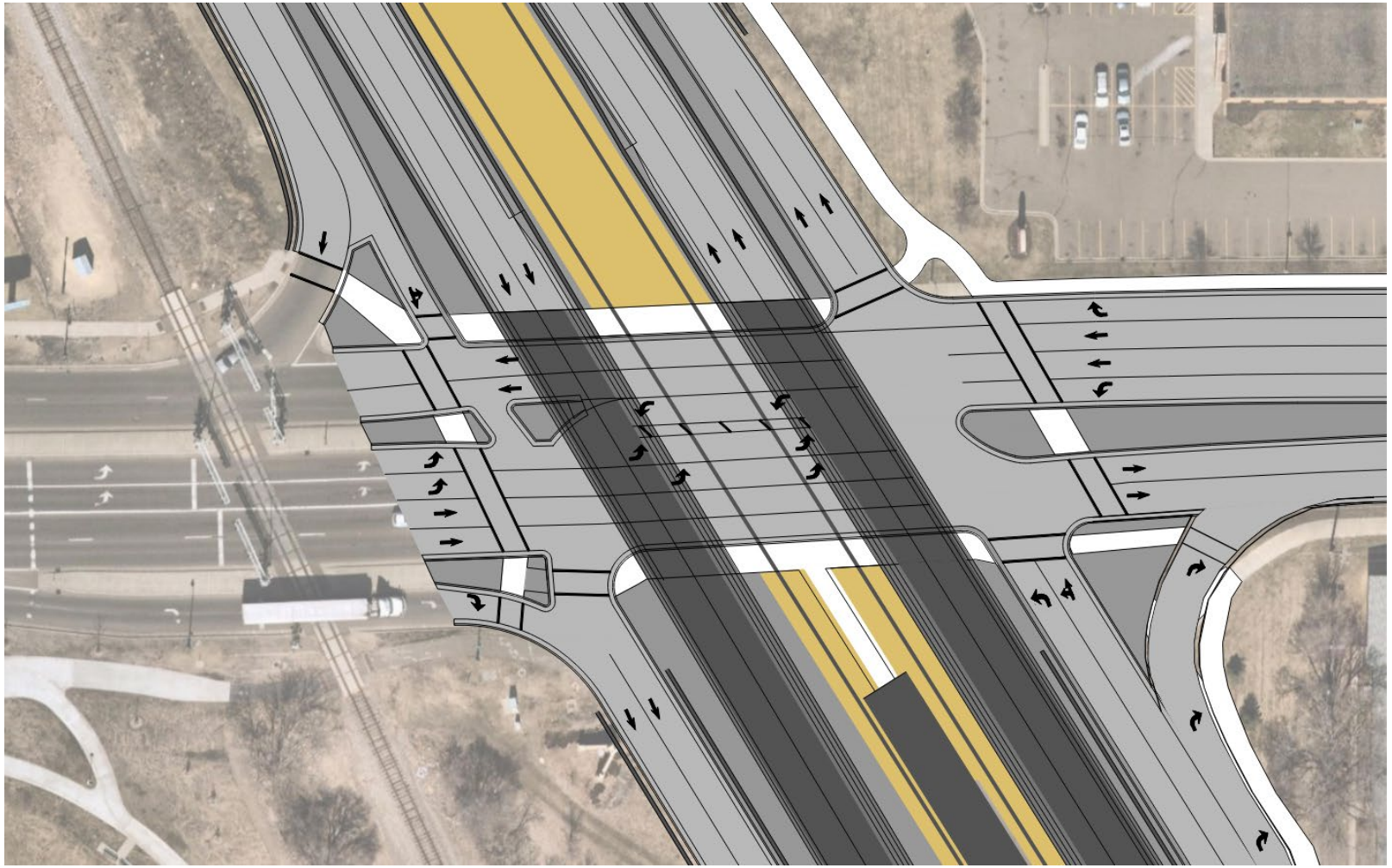
2040 Conditions: PM Peak Hour

Intersection	Direction	Movement	1: No-Build				2: 4 Lanes, at Grade				3: 4/5 Lanes, Grade Separated Interchange				4: 4/6 Lanes, at Grade ("4-6-4" Option)				5: 6-Lane BLR at Grade Intersection				6: 6 Lanes Grade Separated Interchange			
			Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)
CSAH 81 & Bass Lake Rd	Eastbound	Left	51.6	D	75	290	41.7	D	65	255	61.2	E	85	295	42.6	D	65	255	54.7	D	85	385	62.2	E	90	310
		Through	35.5	D	60	235	29.3	C	50	215	57.4	E	95	290	29.5	C	50	215	36.6	D	60	270	56.7	E	95	285
		Right	15.1	B	35	235	16.4	B	30	240	16.5	B	40	250	13.4	B	25	225	19.4	B	40	360	15.3	B	35	245
	Westbound	Left	60.7	E	25	120	62.5	E	30	125	76.3	E	5	70	62.6	E	30	125	61.8	E	30	160	77.0	E	5	70
		Through	50.6	D	55	190	50.3	D	55	180	89.3	F	105	270	52.5	D	55	180	52.4	D	55	210	86.9	F	105	250
		Right	9.6	A	5	65	59.3	E	45	175	8.4	A	5	65	58.5	E	45	175	55.7	E	40	205	7.8	A	5	65
	Northbound	Left	37.3	D	45	195	99.8	F	95	395	41.3	D	140	575	45.8	D	65	315	51.3	D	70	430	40.5	D	125	550
		Through	20.7	C	65	390	84.9	F	750	1295	1.0	A	0	0	27.5	C	105	540	27.4	C	105	785	1.1	A	0	0
		Right	5.7	A	0	5	55.4	E	5	90	15.3	B	5	80	7.7	A	5	90	27.5	C	15	145	14.9	B	5	70
	Southbound	Left	60.3	E	35	130	197.6	F	45	125	94.0	F	55	190	85.8	F	40	125	71.2	E	40	145	105.6	F	65	215
		Through	45.0	D	110	355	184.4	F	1180	1695	2.9	A	0	0	53.6	D	110	420	50.5	D	135	650	3.4	A	0	0
		Right	11.3	B	25	160	129.3	F	365	670	8.3	A	5	85	28.4	C	50	270	24.4	C	60	550	8.3	A	0	90
	Intersection		32.2	C	-	-	90.3	F	-	-	26.2	C	-	-	37.3	D	-	-	39.7	D	-	-	26.3	C	-	-
CSAH 81 & Wilshire Blvd	Eastbound	Left	28.8	C	5	40	33.2	C	15	135	23.6	C	10	85	23.8	C	15	120	24.6	C	15	120	23.8	C	10	75
		Through	25.1	C	5	40	15.0	B	20	135	18.8	B	10	85	25.4	C	15	120	29.8	C	15	120	19.8	B	10	80
		Right	0.3	A	0	0	2.0	A	0	40	1.3	A	0	30	2.2	A	0	35	1.6	A	0	45	1.8	A	0	25
	Westbound	Left	25.5	C	15	115	33.1	C	20	115	32.4	C	20	115	25.9	C	15	110	26.5	C	20	140	30.9	C	20	115
		Through	18.4	B	15	90	28.0	C	15	95	22.8	C	15	90	21.0	C	15	85	29.9	C	20	140	26.9	C	15	95
		Right	7.4	A	5	65	31.9	C	10	100	12.7	B	5	75	8.8	A	5	70	8.5	A	5	95	9.9	A	5	75
	Northbound	Left	40.2	D	5	35	108.7	F	5	40	46.3	D	5	35	35.0	C	5	35	41.9	D	5	60	35.4	D	5	40
		Through	8.7	A	30	310	114.3	F	1335	1985	19.0	B	150	845	10.7	B	50	380	10.6	B	45	525	11.3	B	45	400
		Right	3.6	A	0	10	83.5	F	0	10	8.6	A	0	25	4.0	A	0	20	4.8	A	0	10	6.2	A	0	10
	Southbound	Left	34.7	C	15	100	46.7	D	20	95	45.9	D	15	100	41.3	D	15	95	38.3	D	15	145	42.5	D	15	85
		Through	8.7	A	25	320	11.3	B	45	460	8.9	A	30	340	10.7	B	30	300	9.9	A	30	400	7.1	A	20	225
		Right	9.4	A	0	20	6.1	A	0	65	4.9	A	0	30	4.9	A	0	70	5.4	A	0	30	2.3	A	0	50
	Intersection		9.7	A	-	-	66.5	E	-	-	15.8	B	-	-	11.7	B	-	-	11.5	B	-	-	11.0	B	-	-

2040 Conditions: PM Peak Hour

Intersection	Direction	Movement	1: No-Build				2: 4 Lanes, at Grade				3: 4/5 Lanes, Grade Separated Interchange				4: 4/6 Lanes, at Grade ("4-6-4" Option)				5: 6-Lane BLR at Grade Intersection				6: 6 Lanes Grade Separated Interchange			
			Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)	Average Delay (sec/veh)	LOS	Average Queue (ft)	Max Queue (ft)
CSAH 81 & Corvallis Ave N	Eastbound	Left	44.7	D	10	70	48.4	D	10	75	48.7	D	10	70	45.0	D	10	75	45.1	D	10	100	45.5	D	10	70
		Through	52.0	D	5	55	52.1	D	5	55	57.8	E	5	55	52.1	D	5	55	51.9	D	5	65	52.1	D	5	55
		Right	6.6	A	5	50	10.1	B	5	70	11.3	B	5	70	8.7	A	5	70	7.9	A	5	75	4.3	A	0	45
	Westbound	Left	40.4	D	5	50	41.5	D	5	50	43.2	D	5	55	40.4	D	5	50	42.0	D	5	80	41.5	D	5	50
		Through	58.8	E	5	50	61.0	E	5	45	58.1	E	5	45	58.8	E	5	40	53.0	D	5	80	59.8	E	5	50
		Right	5.9	A	0	40	12.5	B	0	45	12.9	B	5	60	10.8	B	0	55	8.3	A	0	75	6.8	A	0	40
	Northbound	Left	69.9	E	35	135	93.0	F	35	130	30.6	C	15	120	69.5	E	35	125	69.8	E	35	190	71.2	E	35	135
		Through	6.6	A	25	240	44.6	D	470	1255	6.8	A	40	480	8.4	A	55	520	6.9	A	30	270	6.6	A	25	220
		Right	1.8	A	0	0	28.3	C	0	0	3.3	A	0	0	4.6	A	0	0	2.3	A	0	0	2.1	A	0	0
	Southbound	Left	60.4	E	15	75	57.5	E	15	80	63.5	E	15	80	59.0	E	10	85	67.1	E	15	105	54.9	D	15	85
		Through	15.1	B	50	370	12.5	B	60	525	30.1	C	150	635	14.2	B	55	470	14.8	B	50	430	10.5	B	30	245
		Right	3.8	A	0	5	6.0	A	0	0	7.7	A	0	5	5.7	A	0	5	4.4	A	0	15	1.9	A	0	0
	Intersection		12.7	B	-	-	32.5	C	-	-	17.5	B	-	-	13.4	B	-	-	12.8	B	-	-	10.9	B	-	-
CSAH 81 & 47th Ave N	Eastbound	Left	65.7	E	5	30	63.3	E	5	25	57.9	E	5	35	63.3	E	5	25	71.7	E	5	100	63.3	E	5	25
		Through	17.9	B	0	10	17.9	B	0	10	16.7	B	0	10	17.9	B	0	10	55.9	E	5	100	17.9	B	0	10
		Right	96.1	F	25	115	94.9	F	25	120	95.8	F	25	120	95.0	F	25	120	92.6	F	25	140	95.0	F	25	120
	Westbound	Left	61.0	E	15	100	61.0	E	15	105	55.7	E	15	95	61.1	E	15	105	60.3	E	15	120	61.0	E	15	100
		Through	0.0	A	0	0	0.0	A	0	0	0.0	A	0	0	0.0	A	0	0	71.8	E	15	120	0.0	A	0	0
		Right	8.0	A	0	0	16.9	B	0	10	10.8	B	0	10	18.0	B	0	10	17.7	B	0	45	13.7	B	0	10
	Northbound	Left	33.3	C	10	85	33.6	C	10	95	36.3	D	10	80	35.8	D	10	95	39.2	D	15	135	33.2	C	10	80
		Through	1.3	A	5	125	3.2	A	10	240	3.3	A	10	170	2.4	A	5	185	1.4	A	5	190	1.3	A	5	95
		Right	1.9	A	0	15	3.1	A	0	20	3.5	A	0	25	3.0	A	0	20	2.3	A	0	25	2.0	A	0	20
	Southbound	Left	75.5	E	5	35	87.1	F	5	30	94.8	F	5	25	62.7	E	5	35	80.6	F	5	60	86.3	F	5	30
		Through	14.7	B	75	575	12.9	B	80	655	21.3	C	110	660	9.2	A	40	470	14.7	B	70	705	10.7	B	45	505
		Right	11.5	B	0	10	7.6	A	0	15	9.4	A	0	20	4.8	A	0	15	14.7	B	0	25	8.9	A	0	15
	Intersection		8.9	A	-	-	9.1	A	-	-	12.3	B	-	-	7.3	A	-	-	9.1	A	-	-	7.2	A	-	-
CSAH 81 & TH 100 SB Ramp	Westbound	Left	55.3	E	25	80	54.6	D	25	85	55.1	E	25	80	54.8	D	25	85	55.9	E	25	100	55.6	E	25	80
		Right	12.5	B	20	150	8.0	A	15	125	7.8	A	15	115	8.1	A	15	125	12.9	B	25	185	12.2	B	20	135
	Northbound	Through	1.8	A	5	115	2.4	A	10	160	2.5	A	10	155	2.4	A	10	155	1.9	A	10	145	1.8	A	5	120
	Southbound	Through	1.1	A	0	30	1.1	A	0	40	1.1	A	0	50	0.7	A	0	35	1.1	A	0	80	0.8	A	0	30
		Right	1.8	A	0	0	1.2	A	0	0	1.3	A	0	0	1.1	A	0	0	1.7	A	0	0	1.3	A	0	0
	Intersection		3.8	A	-	-	3.8	A	-	-	3.8	A	-	-	3.7	A	-	-	3.9	A	-	-	3.7	A	-	-

Interchange: Dual NB Left Concept



Note: this is a preliminary sketch and design will be further refined.