

INFIRMARY RD

S.R. 14

S.R. 14

PROVIDE 680' WB
TURN LANE STORAGE

PROVIDE QUICK-CURB
OR RECONSTRUCT SPLITTER
ISLAND IN FUTURE TO
ACCOMMODATE 2nd WB LANE

RED/DASHED PAVEMENT MARKINGS
REFLECT THE FUTURE CONDITION

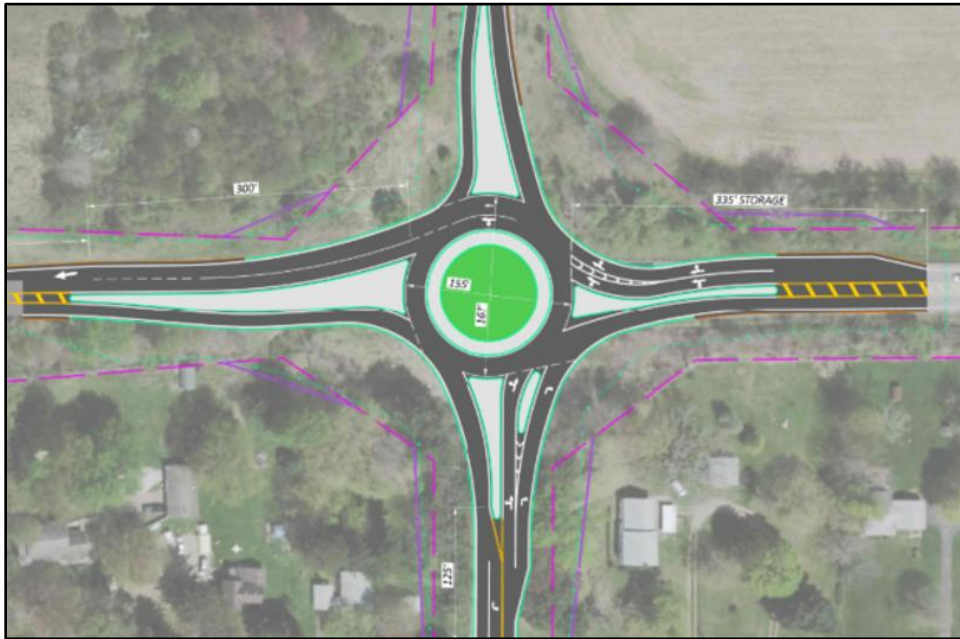
INFIRMARY RD

POR 14 at Infirmary Rd (PID 123828) Refined Roundabout Lane Assignments

Recommended Alternative (Safety Study)

The initial recommended roundabout configuration from the Safety Study included the following lane assignments:

- **EB:** LTR
- **WB:** LT / TR *(with outside lane reduction downstream of the roundabout)*
- **NB:** LT / R
- **SB:** LTR



During the DSRT stakeholder presentation, concerns were raised regarding the two westbound through lanes entering the roundabout and the subsequent lane reduction. ODOT's ECAT cannot account for the lane reduction downstream of the roundabout. Results were thought to be misleading. Stakeholders felt that capacity was being prioritized over safety.

Operational Goals

The Safety Study's recommended alternative met the operational goals outlined in Section 5.9 of ODOT's *Analysis and Traffic Simulation Manual (OATS)*.

POR 14 at Infirmary Rd (PID 123828)
Refined Roundabout Lane Assignments

The operational goals for intersection analyses (AWSC, TWSC, Roundabout, Signalized) is to operate at:

Result	Operational Goal
Intersection LOS	D or better ¹
Approach LOS	E or better
Control LOS	E or better
v/c^2	All movements < 1.0 with ≤ 0.93 preferred.
QSR ³	All movements < 1.0 from HCS analysis, otherwise TransModeler may be needed to determine if queuing impacts upstream intersections.

1: A LOS E may be acceptable at locations where a vulnerable road user project on a low-speed facility is implemented if the Build condition does not have a significant adverse impact on the safety and operations within the study area; 2: v/c = Volume-to-Capacity ratio; 3: QSR = Queue-Storage ratio

Level of Service (LOS) is defined by the *Highway Capacity Manual (HCM)*, which provides LOS thresholds for both **un-signalized** and **signalized** intersections. Roundabouts are typically evaluated under the un-signalized delay category. To meet a minimum acceptable LOS of **E or better**, average delays should remain below:

- **50 seconds per vehicle** for un-signalized conditions, and
- **80 seconds per vehicle** for signalized conditions.

LOS	Un-Signalized Delay	Signalized Delay
A	≤ 10 sec/veh	≤ 10 sec/veh
B	> 10–15 sec/veh	> 10–20 sec/veh
C	> 15–25 sec/veh	> 20–35 sec/veh
D	> 25–35 sec/veh	> 35–55 sec/veh
E	> 35–50 sec/veh	> 55–80 sec/veh
F	> 50 sec/veh	> 80 sec/veh

ODOT District 4 has established a maximum operational delay target of 80 seconds per vehicle to balance safety and traffic performance

Traffic Volumes

Updated turning movement counts (TMCs) were collected in **April 2025**. Compared to 2019 TMC, the intersection experienced a **3% increase** in overall volume. Design Hour Factors and a **0.05% growth rate** along SR 14 were applied to project volumes for:

- **Opening Year: 2029**

POR 14 at Infirmary Rd (PID 123828)
Refined Roundabout Lane Assignments

- **Design Year:** 2049

The Cleveland Road detour was incorporated, redirecting all traffic from Cleveland Road to Infirmary Road for SR 14 access.

Considered Alternatives

The following roundabout alternatives were evaluated:

- **Alt 1**
 - EB: 1 LTR
 - WB: 1 LTR
 - NB: 1 LTR
 - SB: 1 LTR
- **Alt 2**
 - EB: 1 LTR
 - WB: 1 LT / 1 R
 - NB: 1 LT / 1 R
 - SB: 1 LTR
- **Alt 3**
 - EB: 1 LTR
 - WB: 1 L / 1 TR
 - NB: 1 LT / 1 R
 - SB: 1 LTR
- **Alt 4** (*Recommended by Safety Study*)
 - EB: 1 LTR
 - WB: 1 LT / 1 TR (with downstream outside lane reduction)
 - NB: 1 LT / 1 R
 - SB: 1 LTR

Capacity Analysis

Capacity was analyzed using **Highway Capacity Software (HCS) 2025 and 2026**.

Summary tables for both the Opening Year (2029) and Design Year (2049) are attached.

- **2049 Analysis:**

Only **Alternatives 3 and 4** meet the District's 80 sec/veh delay target. Due to safety concerns with Alt 4, **Alternative 3** is selected as the **preferred long-term solution**.
- **2029 Analysis:**

Alternatives 2, 3, and 4 all meet the delay target. **Alternative 2** is expected to

POR 14 at Infirmary Rd (PID 123828)
Refined Roundabout Lane Assignments

provide acceptable performance for approximately **five years**, as shown in the attached sensitivity analysis table for Alt 2.

Conclusion

To balance safety and operational performance:

- **Construct the roundabout footprint for Alternative 3** (long-term solution).
- **Implement lane assignments from Alternative 2** at opening to optimize operations.

HCS Traffic Analysis Results Table_POR 14 at Infirmary Rd (Detour)_Design Year (2049) AM DHV

Movements	Roundabout - Detour (ALT 1) EB: LTR / WB: LTR / NB: LTR / SB: LTR				Roundabout - Detour (ALT 2) EB: LTR / WB: LT-R / NB: LT-R / SB: LTR				Roundabout - Detour (ALT 3) EB: LTR / WB: L-TR / NB: LT-R / SB: LTR				Roundabout - Detour (ALT 4-80/20 Lnu) EB: LTR / WB: LT-TR (80/20) / NB: LT-R / SB: LTR				Roundabout - Detour (ALT 4-70/30 Lnu) EB: LTR / WB: LT-TR (70/30) / NB: LT-R / SB: LTR				Movements
	LOS	Delay (sec/veh)	95th Queue	QSR	LOS	Delay (sec/veh)	95th Queue	QSR	LOS	Delay (sec/veh)	95th Queue	QSR	LOS	Delay (sec/veh)	95th Queue	QSR	LOS	Delay (sec/veh)	95th Queue	QSR	
EBL																					EBL
EBT	C	22.6	222	-	C	22.6	222	-	C	22.6	222	-	C	22.6	222	-	C	22.6	222	-	EBT
EBR																					EBR
EB Approach	C	22.6	-	-	C	22.6	-	-	C	22.6	-	-	C	22.6	-	-	C	22.6	-	-	EB Approach
WBL									A	6.9	26	-	E	49.8	457	-	D	28.8	290	-	WBL
WBT	F	177.8	1132	-	F	114.1	846	-	E	48.5	450	-									WBT
WBR					A	4.7	5	-					A	6.9	27	-	A	8.6	46	-	WBR
WB Approach	F	177.8	-	-	F	109.7	-	-	E	40.0	-	-	E	41.2	-	-	C	22.7	-	-	WB Approach
NBL					C	16.3	113	0.45	C	16.3	113	0.45	C	16.3	113	0.45	C	16.3	113	0.45	NBL
NBT	E*	50.5	341	1.36	A	8.0	24	0.10	A	8.0	24	0.10	A	8.0	24	0.10	A	8.0	24	0.10	NBT
NBR																					NBR
NB Approach	E*	50.5	-	-	B	14.0	-	-	B	14.0	-	-	B	14.0	-	-	B	14.0	-	-	NB Approach
SBL																					SBL
SBT	D	30.4	95	-	D	30.4	95	-	C	18.4	61	-	C	18.4	61	-	C	18.4	61	-	SBT
SBR																					SBR
SB Approach	D	30.4	-	-	D	30.4	-	-	C	18.4	-	-	C	18.4	-	-	C	18.4	-	-	SB Approach
Intersection	F	95.8	-	-	E*	58.2	-	-	D	27.6	-	-	D	28.2	-	-	C	20.3	-	-	Intersection
Comments	Does NOT satisfy D4's operational goals - WB T movement LOS F - WB approach LOS F - NB QSR > 1.0				Does NOT satisfy D4's operational goals - WB T movement LOS F - WB approach LOS F				Satisfies operational goals in OATS				Satisfies operational goals in OATS *WB Lane Utilization (80% inside / 20% outside) WB Lane reduction downstream of roundabout **(Recommended in Safety Study)**				Satisfies operational goals in OATS *WB Lane Utilization (70% inside / 30% outside) WB Lane reduction downstream of roundabout **(Recommended in Safety Study)**				Comments
	Predicted Crash Rates - Injury: 0.64 - Property Damage: 3.13 - Total Crashes: 3.77 (4.34 reduction)				Predicted Crash Rates - Injury: 0.4 - Property Damage: 3.13 - Total Crashes: 3.53 (4.58 reduction)				Predicted Crash Rates - Injury: 0.65 - Property Damage: 3.73 - Total Crashes: 4.38 (3.73 reduction)				Predicted Crash Rates - Injury: 0.65 - Property Damage: 3.73 - Total Crashes: 4.38 (3.73 Reduction)				Predicted Crash Rates - Injury: 0.65 - Property Damage: 3.73 - Total Crashes: 4.38 (3.73 Reduction)				

The operational goals for intersection analyses (AWSC, TWSC, Roundabout, Signalized) is to operate at:

Result	Operational Goal
Intersection LOS	D or better ¹
Approach LOS	E or better
Control LOS	E or better
v/c ²	All movements < 1.0 with ≤ 0.93 preferred.
QSR ³	All movements < 1.0 from HCS analysis, otherwise TransModeler may be needed to determine if queuing impacts upstream intersections.

Un-Signalized Delay LOS

LOS A: ≤ 10 sec/veh	LOS D: > 25–35 sec/veh
LOS B: > 10–15 sec/veh	LOS E: > 35–50 sec/veh
LOS C: > 15–25 sec/veh	LOS F: > 50 sec/veh

* D4 has set a target of 80 sec/veh as our operational goal

Signalized Delay LOS

LOS A: ≤ 10 sec/veh	LOS D: > 35–55 sec/veh
LOS B: > 10–20 sec/veh	LOS E: > 55–80 sec/veh
LOS C: > 20–35 sec/veh	LOS F: > 80 sec/veh

HCS Traffic Analysis Results Table_POR 14 at Infirmary Rd (Detour)_Opening Year (2029) AM DHV

Movements	Roundabout - Detour (ALT 1) EB: LTR / WB: LTR / NB: LTR / SB: LTR				Roundabout - Detour (ALT 2) EB: LTR / WB: LT-R / NB: LT-R / SB: LTR				Roundabout - Detour (ALT 3) EB: LTR / WB: LT-R / NB: LT-R / SB: LTR				Roundabout - Detour (ALT 4-80/20 Lnu) EB: LTR / WB: LT-TR (80/20) / NB: LT-R / SB: LTR				Roundabout - Detour (ALT 4-70/30 Lnu) EB: LTR / WB: LT-TR (70/30) / NB: LT-R / SB: LTR				Movements
	LOS	Delay (sec/veh)	95th Queue	QSR	LOS	Delay (sec/veh)	95th Queue	QSR	LOS	Delay (sec/veh)	95th Queue	QSR	LOS	Delay (sec/veh)	95th Queue	QSR	LOS	Delay (sec/veh)	95th Queue	QSR	
EBL																					EBL
EBT	C	16.9	156	-	C	16.9	156	-	C	16.9	156	-	C	16.9	156	-	C	16.9	156	-	EBT
EBR																					EBR
EB Approach	C	16.9	-	-	C	16.9	-	-	C	16.9	-	-	C	16.9	-	-	C	16.9	-	-	EB Approach
WBL									A	6.6	24	-	D	32.5	325	-	C	21.6	215	-	WBL
WBT	F	125.9	850	-	E*	72.2	602	-	D	32.1	323	-									WBT
WBR					A	4.7	5	-					A	6.6	24	-	A	8.1	40	-	WBR
WB Approach	F	125.9	-	-	E*	69.3	-	-	D	26.9	-	-	D	27.3	-	-	C	17.5	-	-	WB Approach
NBL					B	14.5	100	0.40	B	14.5	100	0.40	B	14.5	100	0.40	B	14.5	100	0.40	NBL
NBT	E	38.5	291	1.16	A	7.5	24	0.10	A	7.5	24	0.10	A	7.5	24	0.10	A	7.5	24	0.10	NBT
NBR																					NBR
NB Approach	E	38.5	-	-	B	12.6	-	-	B	12.6	-	-	B	12.6	-	-	B	12.6	-	-	NB Approach
SBL																					SBL
SBT	C	24.4	79	-	C	24.4	79	-	C	15.9	53	-	C	15.9	53	-	C	15.9	53	-	SBT
SBR																					SBR
SB Approach	C	24.4	-	-	C	24.4	-	-	C	15.9	-	-	C	15.9	-	-	C	15.9	-	-	SB Approach
Intersection	E*	68.0	-	-	E	38.0	-	-	C	19.9	-	-	C	20.0	-	-	C	16.0	-	-	Intersection
Comments	Does NOT satisfy D4's operational goals - WB T movement LOS F - WB approach LOS F - Intersection LOS F - NB QSR > 1.0				Does NOT satisfy D4's operational goals - WB T movement LOS F - WB approach LOS F				Satisfies operational goals in OATS				Satisfies operational goals in OATS *WB Lane Utilization (80% inside / 20% outside) WB Lane reduction downstream of roundabout **(Recommended in Safety Study)**				Satisfies operational goals in OATS *WB Lane Utilization (70% inside / 30% outside) WB Lane reduction downstream of roundabout **(Recommended in Safety Study)**				Comments
	Predicted Crash Rates - Injury: 0.64 - Property Damage: 3.13 - Total Crashes: 3.77 (4.34 reduction)				Predicted Crash Rates - Injury: 0.4 - Property Damage: 3.13 - Total Crashes: 3.53 (4.58 reduction)				Predicted Crash Rates - Injury: 0.65 - Property Damage: 3.73 - Total Crashes: 4.38 (3.73 reduction)				Predicted Crash Rates - Injury: 0.65 - Property Damage: 3.73 - Total Crashes: 4.38 (3.73 Reduction)				Predicted Crash Rates - Injury: 0.65 - Property Damage: 3.73 - Total Crashes: 4.38 (3.73 Reduction)				

The operational goals for intersection analyses (AWSC, TWSC, Roundabout, Signalized) is to operate at:

Result	Operational Goal
Intersection LOS	D or better ¹
Approach LOS	E or better
Control LOS	E or better
v/c ²	All movements < 1.0 with ≤ 0.93 preferred.
QSR ³	All movements < 1.0 from HCS analysis, otherwise TransModeler may be needed to determine if queuing impacts upstream intersections.

Un-Signalized Delay LOS	
LOS A: ≤ 10 sec/veh	LOS D: > 25–35 sec/veh
LOS B: > 10–15 sec/veh	LOS E: > 35–50 sec/veh
LOS C: > 15–25 sec/veh	LOS F: > 50 sec/veh

* D4 has set a target of 80 sec/veh as our operational goal

Signalized Delay LOS	
LOS A: ≤ 10 sec/veh	LOS D: > 35–55 sec/veh
LOS B: > 10–20 sec/veh	LOS E: > 55–80 sec/veh
LOS C: > 20–35 sec/veh	LOS F: > 80 sec/veh

HCS Traffic Analysis Results Table_POR 14 at Infirmary Rd (Detour)_Build 2 Sensitivv_AM DHV

SR 14 at Infirmary Rd	(Option 2) - 2029 EB: LTR / WB: LT-R / NB: LT-R / SB: LTR				(Option 2) - 2034 EB: LTR / WB: LT-R / NB: LT-R / SB: LTR				(Option 2) - 2039 EB: LTR / WB: LT-R / NB: LT-R / SB: LTR				(Option 2) - 2049 EB: LTR / WB: LT-R / NB: LT-R / SB: LTR				SR 14 at Infirmary Rd
	LOS	Delay (sec/veh)	95th Queue	QSR	LOS	Delay (sec/veh)	95th Queue	QSR	LOS	Delay (sec/veh)	95th Queue	QSR	LOS	Delay (sec/veh)	95th Queue	QSR	
EBL																	EBL
EBT	C	16.9	156	-	C	18.6	175	-	C	19.3	186	-	C	22.6	222	-	EBT
EBR																	EBR
EB Approach	C	16.9	-	-	C	18.6	-	-	C	19.3	-	-	C	22.6	-	-	EB Approach
WBL																	WBL
WBT	E*	72.2	602	-	F	85.2	677	-	F	94.5	734	-	F	114.1	846	-	WBT
WBR	A	4.7	5	-	A	4.7	5	-	A	4.7	5	-	A	4.7	5	-	WBR
WB Approach	E*	69.3	-	-	F	81.8	-	-	F	90.8	-	-	F	109.7	-	-	WB Approach
NBL	B	14.5	100	0.40	B	14.8	102	0.41	B	15.2	105	0.42	C	16.3	113	0.45	NBL
NBT	A	7.5	24	0.10	A	7.6	24	0.10	A	7.7	24	0.10	A	8.0	24	0.10	NBT
NBR																	NBR
NB Approach	B	12.6	-	-	B	12.8	-	-	B	13.1	-	-	B	14.0	-	-	NB Approach
SBL																	SBL
SBT	C	24.4	79	-	C	26.2	84	-	C	27.5	87	-	D	30.4	95	-	SBT
SBR																	SBR
SB Approach	C	24.4	-	-	C	26.2	-	-	C	27.5	-	-	D	30.4	-	-	SB Approach
Intersection	E	38.0	-	-	E	44.1	-	-	E	48.4	-	-	F	58.2	-	-	Intersection
Comments	Satisfies D4's operational goals				Does NOT satisfy D4's operational goals - WB T movement LOS F - WB approach LOS F				Does NOT satisfy D4's operational goals - WB T movement LOS F - WB approach LOS F				Does NOT satisfy D4's operational goals - WB T movement LOS F - WB approach LOS F - Intersection LOS F				Comments

The operational goals for intersection analyses (AWSC, TWSC, Roundabout, Signalized) is to operate at:

Result	Operational Goal
Intersection LOS	D or better ¹
Approach LOS	E or better
Control LOS	E or better
v/c^2	All movements < 1.0 with ≤ 0.93 preferred.
QSR ³	All movements < 1.0 from HCS analysis, otherwise TransModeler may be needed to determine if queuing impacts upstream intersections.

Un-Signalized Delay LOS

LOS A: ≤ 10 sec/veh	LOS D: $> 25\text{--}35$ sec/veh
LOS B: $> 10\text{--}15$ sec/veh	LOS E: $> 35\text{--}50$ sec/veh
LOS C: $> 15\text{--}25$ sec/veh	LOS F: > 50 sec/veh

Signalized Delay LOS

LOS A: ≤ 10 sec/veh	LOS D: $> 35\text{--}55$ sec/veh
LOS B: $> 10\text{--}20$ sec/veh	LOS E: $> 55\text{--}80$ sec/veh
LOS C: $> 20\text{--}35$ sec/veh	LOS F: > 80 sec/veh

* D4 has set a target of 80 sec/veh as our operational goal