



MEMO

 DATE **October 28, 2023**

 TO **City of Carlisle, Iowa**
 CC **Carlisle Mayor and City Council
Deven Markley – City Administrator
Tony Rhinehart – Director of Public Works**
 FROM **Alex Schlader, PE - McClure**
 SUBJECT **Intersection Improvement Analysis and Recommendations**

Please inform *AUTHOR* of any additions, corrections, or clarifications to these notes.

In response to the observed concerns on the north leg of the Highway 5 and Scotch Ridge Road intersection, we have identified several pressing issues and potential solutions for improving traffic flow and safety. The following memo outlines the community's concerns, provides potential solutions, and a recommendation for improvement.

IDENTIFIED CONCERNS:

The current traffic movements on the north leg of Highway 5 and Scotch Ridge Road intersection were altered to line up with the new six (6) lane configuration on the south leg. Due to the proximity of Frontage Road and number of vehicles heading west on Highway 5, the following concerns have been raised.

- o If southbound Scotch Ridge Road vehicles are present in the queue, several westbound vehicles are improperly utilizing the granular/earthen shoulder to go around stopped traffic.
- o Since one of the highest movements through this intersection is westbound on Highway 5, the signal timing is not ideal with the Frontage Road configuration.
- o Eastbound Frontage Road travelers are blocked due to added queue on the southbound(straight)/westbound(right-turn) lane of Scotch Ridge Road.
- o Due to heavy traffic on other legs of the intersection during peak hours the north leg wait time is 45-90 seconds (1-2 cycle). With the lack of queue length near Frontage Road, this is causing congestion on Frontage Road.

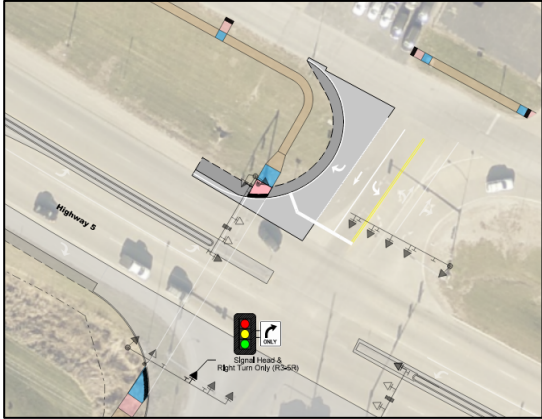
PROPOSED SOLUTIONS:

The City Department Heads have brainstormed five (5) options to be looked at as possible solutions to the identified concerns listed above. The five options are as follows:

1. Add a designed right turn lane including an additional traffic signal head.
2. Add a designed right turn lane without an additional traffic signal head.
3. Add a widened shoulder with crushed asphalt to allow for turning traffic to get by stopped vehicles.
4. Adding a westbound Highway 5 "on ramp" near the intersection of Frontage Road and Market Street.
5. Add a traffic signal at the 8th Street intersection.

OPTION 1 – Paved Turn Lane (Add. Signal Head)

Exhibit



Cost Estimate

Construction Costs*	\$99,000.00
Engineering/Construction Admin. Fee.....	\$20,000.00
Total.....	\$119,000.00

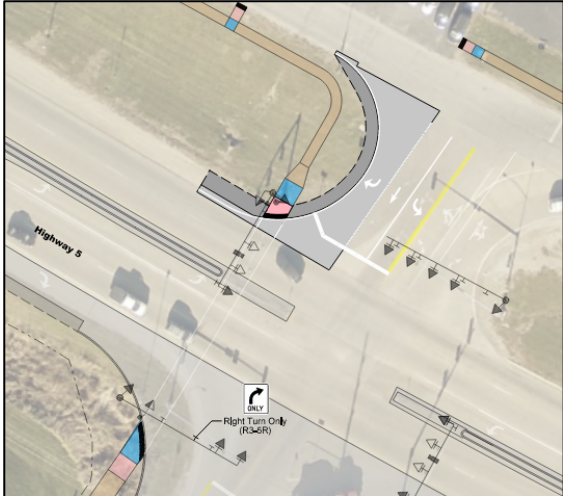
*Refer to attached opinion of cost for breakdown for each construction bid item.

Pros/Cons

This option was originally presented in the 2016 Traffic Study for Scotch Ridge Road. Due to funding limits this was not included in the previous project. However, this does provide the safest option for an additional turning lane. With the added signal on the right turn lane this will provide the best traffic control for driver expectancy. The current traffic signal system also allows for this signal to be added without any major improvements to the system.

OPTION 2 - Paved Turn Lane (No Signal Head)

Exhibit



Cost Estimate

Construction Costs*	\$80,000.00
Engineering/Construction Admin. Fee.....	\$20,000.00
Total.....	\$100,000.00

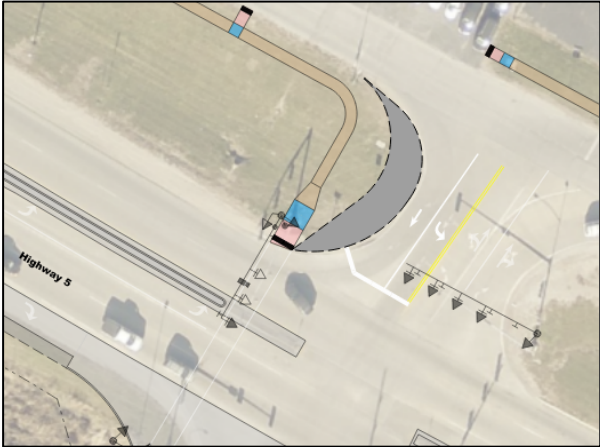
*Refer to attached opinion of cost for breakdown for each construction bid item.

Pros/Cons

Option 2 provides the same traffic movements and widened road for a right turn lane as Option 1. However, to reduce cost, the additional signal head was removed. According to MUTCD it is allowed to use the existing signal head orientation. However, the right turn arrow sign must be placed in line with the right turn lane. Additionally, a through arrow sign will be placed by the middle signal head.

OPTION 3 – Granular Turn Lane

Exhibit



Cost Estimate

Construction Costs*	\$18,000.00
Engineering/Construction Admin. Fee.....	\$0.00
Total.....	\$18,000.00

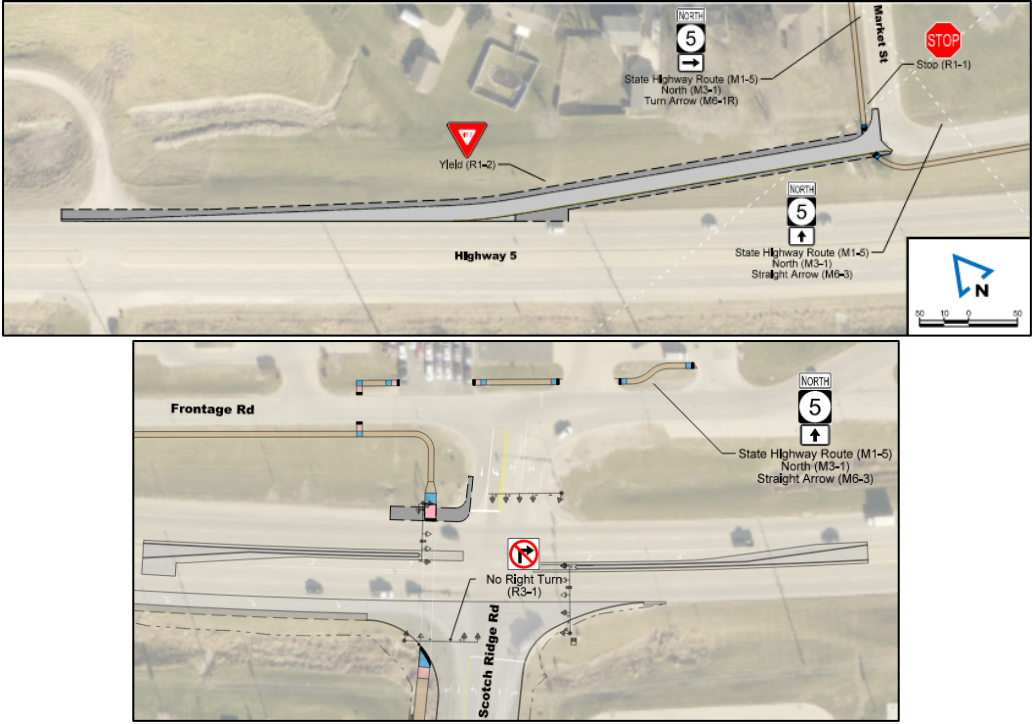
*Refer to attached opinion of cost for breakdown for each construction bid item.

Pros/Cons

Overall, the extended crushed asphalt extended shoulder would be the cheapest option. However, this option would produce much more maintenance costs and would not provide the safest solution. Even though the crushed asphalt will hold up better than a traditional granular or earthen shoulder, over each season some maintenance would be required by City staff. Also, this option would promote vehicles to perform illegal traffic movements by passing traffic in the designated through/right turn lane. This would increase the chance of accidents and damages.

OPTION 4 – Westbound Highway 5 “On-Ramp”

Exhibit



Cost Estimate

Construction Costs*	\$301,000.00
Engineering/Construction Admin. Fee	\$75,250.00
Total	\$376,250.00

*Refer to attached opinion of cost for breakdown for each construction bid item.

Pros/Cons

Option 4 presents the most expensive option for improvements due to the amount of pavement and grading required for the “on-ramp”. To keep traffic from using the old turning movements at the Scotch Ridge Rd. intersection, the radius would also need to be altered to promote only through (southbound) movement. This option would overall help the congestion of vehicles entering westbound Highway 5. However, it will be much more costly than Option 1 or 2.

OPTION 5

Pros/Cons

The purpose of this option is to divert traffic entering Highway 5 from the north to the 8th Street intersection. However, to warrant a traffic signal at 8th Street the vehicle counts turning off Highway 5 must be much more substantial. If the north leg of the Scotch Ridge Road and Highway 5 intersection is taken away and forces traffic to use 8th Street, there still would not be enough volume to warrant a

signal. This makes this option not viable and would most likely not be allowed by the Iowa DOT at this time.

RECOMMENDATIONS

Based on the proposed options, most would provide some relief of congestion at the intersection of Frontage Road and Scotch Ridge Road from traffic entering Highway 5. However, the most economical and safest solution would be Option 1 or 2. If funding allows, Option 1 would provide the best driver expectancy with the additional signal head above the new right turn lane.

With the additional turn lane, more vehicles will be able to come off Frontage Road and reduce the queue length at the current yield sign. Current signage does request that vehicles should not block the intersection, so more enforcement may need to be considered to reduce backing up eastbound Frontage Rd. traffic.

In summary, we believe that Option 1 or 2 will take care of many of the identified concerns at the most economical price for the City of Carlisle. We look forward to hearing your feedback on all options and hope we can work with you to fix the current issues.

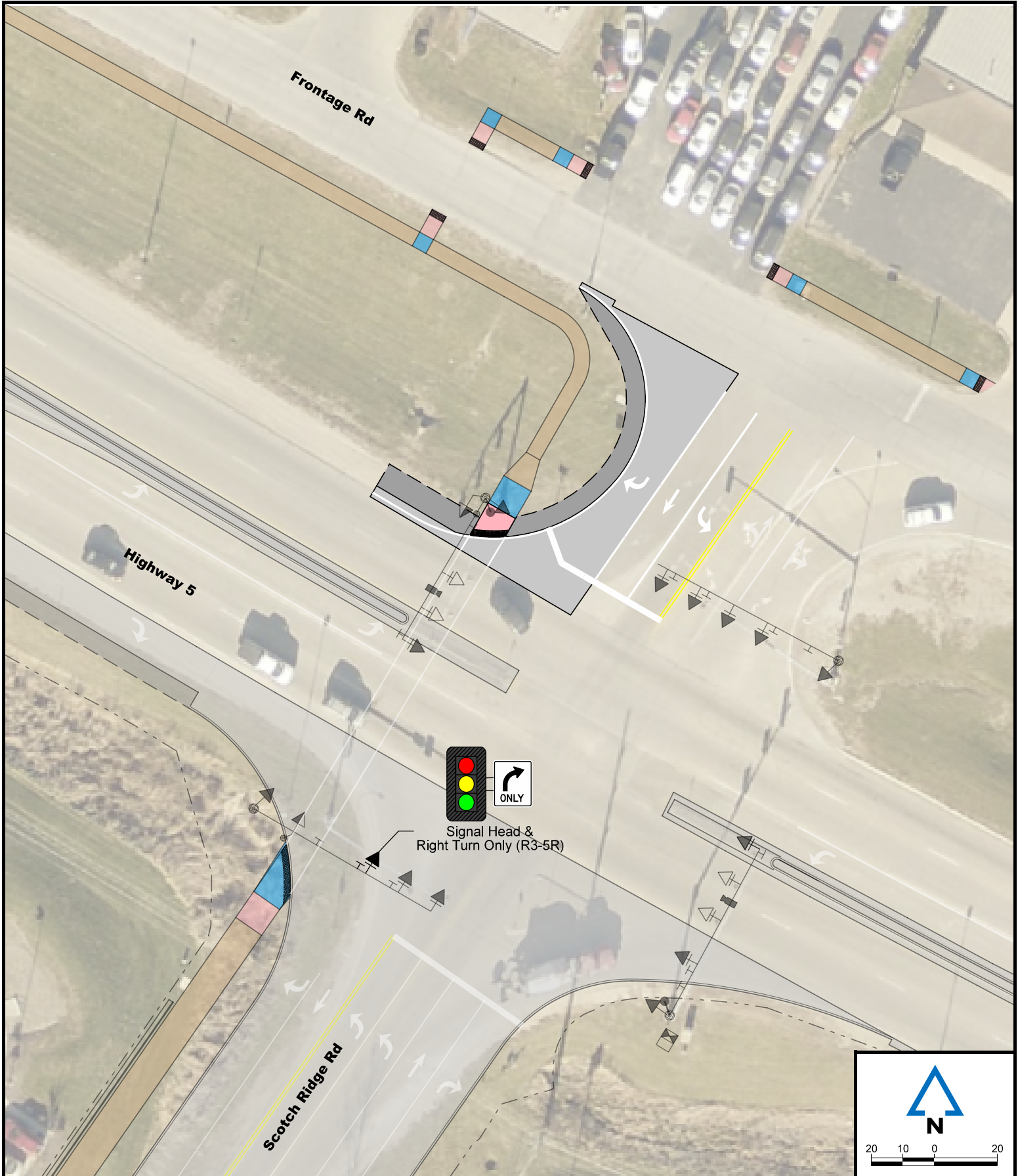
Sincerely,



Alex Schlader, PE
Project Manager
McClure


Attachments:


Exhibit - Intersection Improvement Options
Engineer's Opinion of Probable Costs (Construction)




SCOTCH RIDGE ROAD & HIGHWAY 5 INTERSECTION
 RIGHT TURN OPTIONS
 CITY OF CARLISLE, IOWA

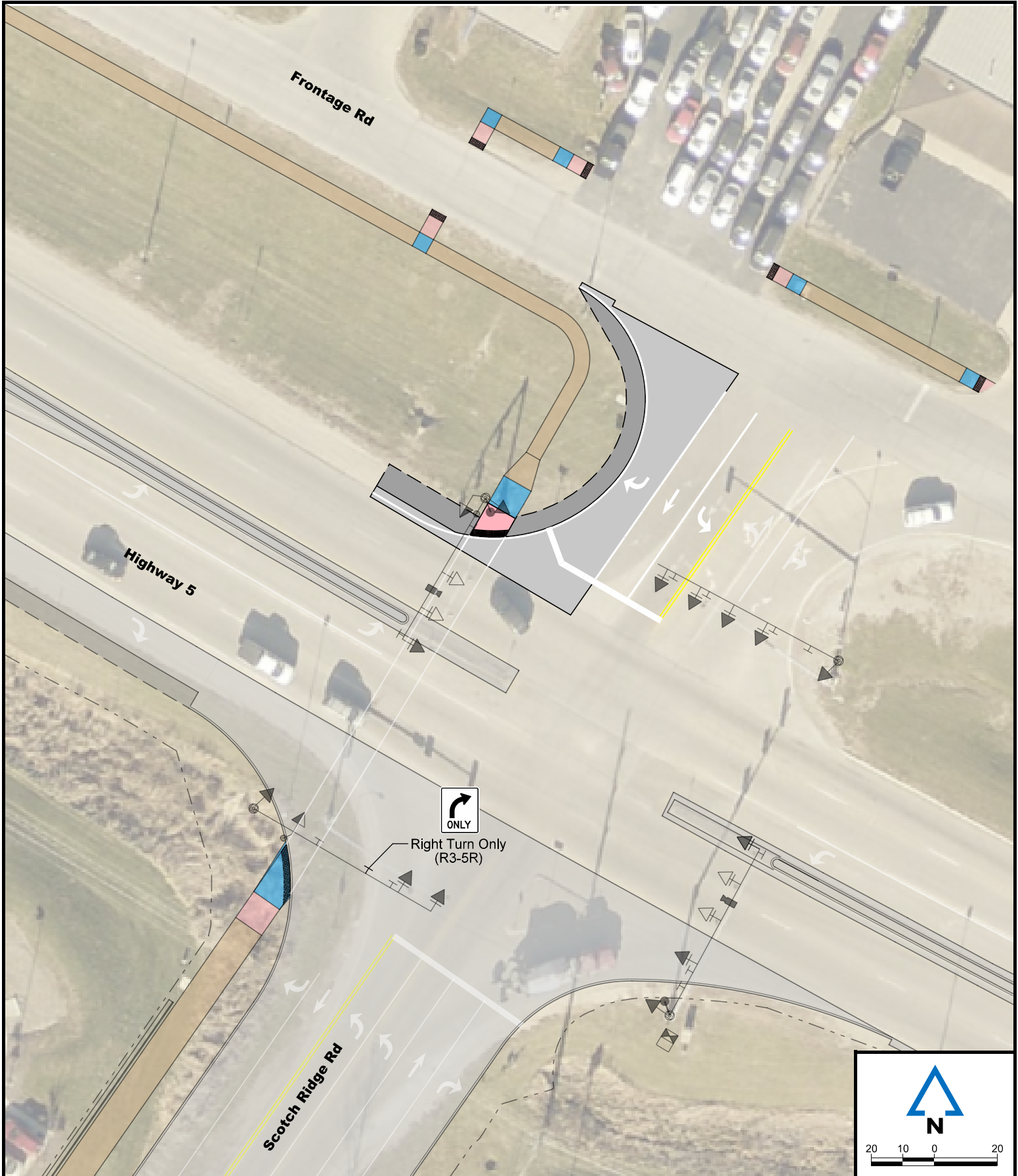
OPTION 1: PAVED RIGHT TURN LANE WITH TRAFFIC SIGNAL HEAD


 N




McCLURE™

DRAWING NO.
1 / 4

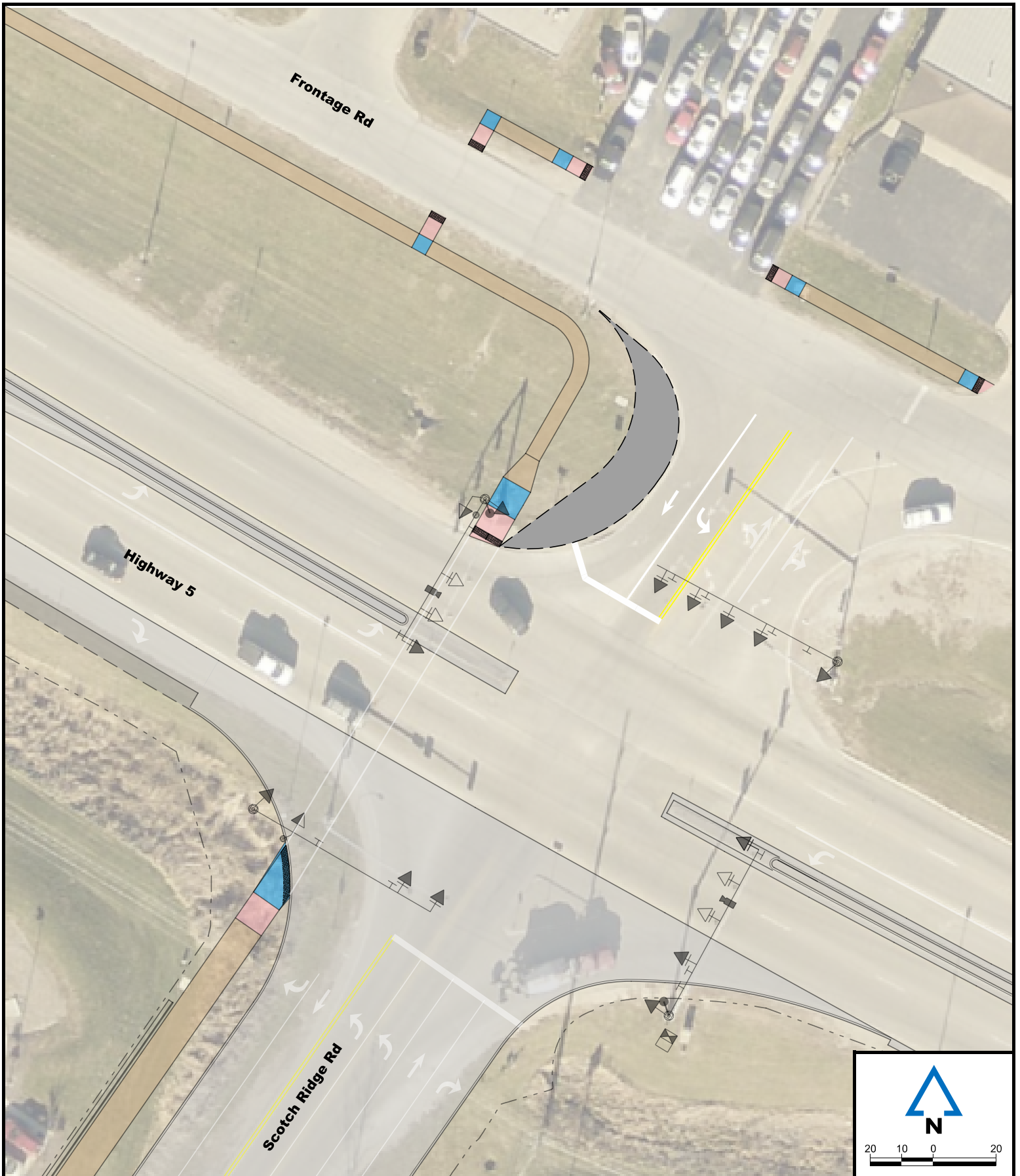


SCOTCH RIDGE ROAD & HIGHWAY 5 INTERSECTION
 RIGHT TURN OPTIONS
 CITY OF CARLISLE, IOWA

OPTION 2: PAVED RIGHT TURN LANE




McCLURE™

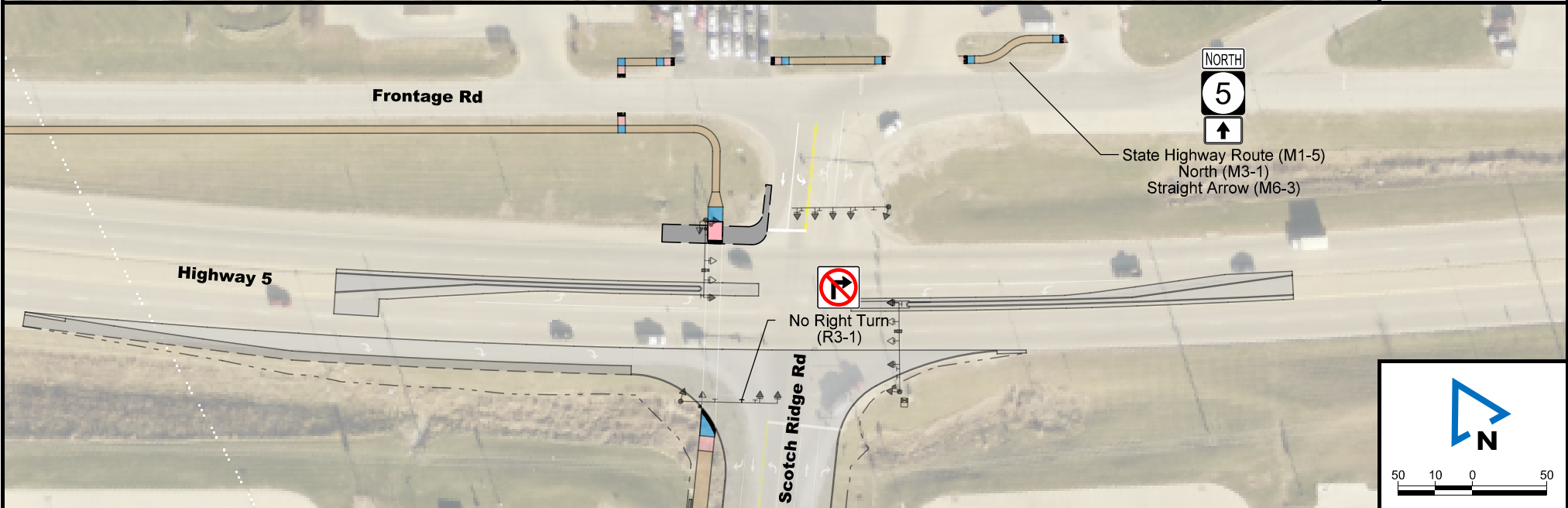
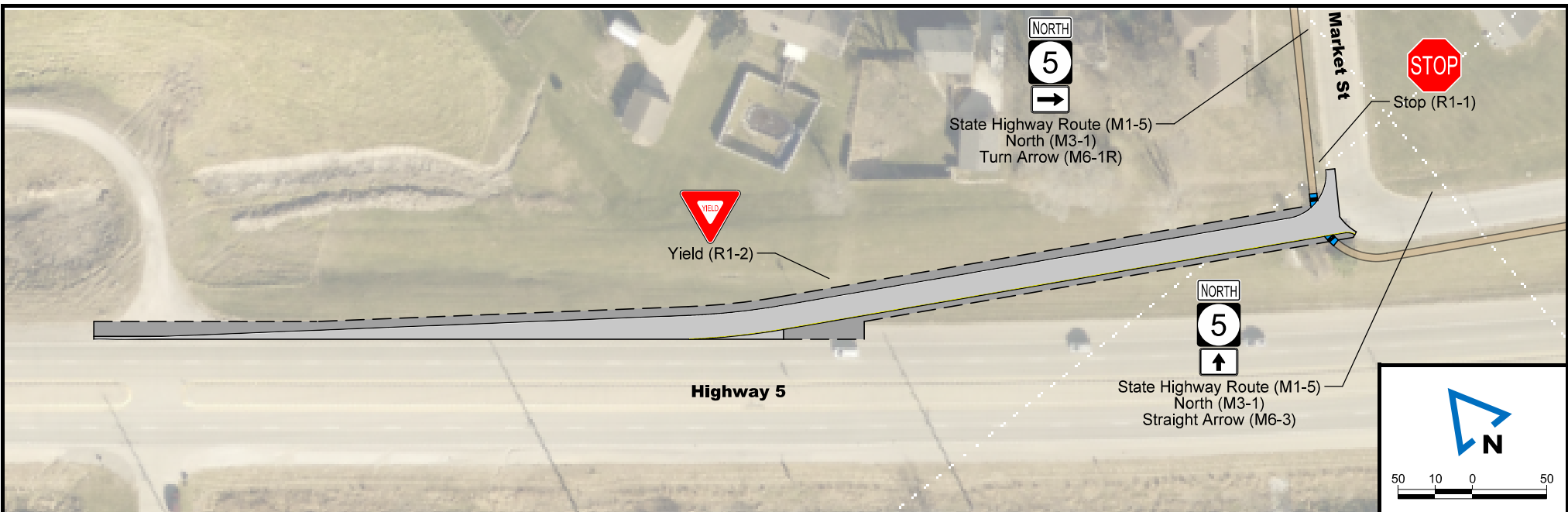
DRAWING NO.
2 / 4



**SCOTCH RIDGE ROAD & HIGHWAY 5 INTERSECTION
 RIGHT TURN OPTIONS
 CITY OF CARLISLE, IOWA**

OPTION 3: GRANULAR RIGHT TURN LANE


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McCLURE™
DRAWING NO.
3 / 4



SCOTCH RIDGE ROAD & HIGHWAY 5 INTERSECTION
 RIGHT TURN OPTIONS
 CITY OF CARLISLE, IOWA

OPTION 4: PAVED ON-RAMP

McCLURE™

DRAWING NO.
4 / 4



ENGINEER'S OPINION OF PROBABLE COST
 HWY 5 & SCOTCH RIDGE RD RIGHT TURN LANE
 OPTION 1: PAVED RIGHT TURN LANE WITH TRAFFIC SIGNAL HEAD
 CITY OF CARLISLE, IOWA
 OCTOBER 18, 2023

Item No.	Item Code	Item Description	Quantity	Unit	Unit Price	Extended Price
1	2102-2710070	EXCAVATION, CLASS 10, ROADWAY AND BORROW	180	CY	\$ 20.00	\$ 3,600.00
2	2115-0100000	MODIFIED SUBBASE	50	CY	\$ 75.00	\$ 3,750.00
3	2121-7425010	GRANULAR SHOULDERS	30	TON	\$ 65.00	\$ 1,950.00
4	2301-1033100	PORTLAND CEMENT CONCRETE PAVEMENT, 10 IN.	260	SY	\$ 110.00	\$ 28,600.00
5	2510-6745850	REMOVAL OF PAVEMENT	150	SY	\$ 15.00	\$ 2,250.00
6	2511-6745900	REMOVAL OF SIDEWALK	12	SY	\$ 15.00	\$ 180.00
7	2511-7526006	SIDEWALK, P.C. CONCRETE, 6 IN.	11	SY	\$ 90.00	\$ 990.00
8	2511-7528101	DETECTABLE WARNINGS	25	SF	\$ 60.00	\$ 1,500.00
9	2524-9325001	TYPE A SIGNS, SHEET ALUMINUM	1	EA	\$ 500.00	\$ 500.00
10	2525-0000100	TRAFFIC SIGNALIZATION	1	LS	\$ 15,000.00	\$ 15,000.00
11	2527-9263109	PAINTED PAVEMENT MARKINGS	1	LS	\$ 7,000.00	\$ 7,000.00
12	2528-8445110	TRAFFIC CONTROL	1	LS	\$ 4,000.00	\$ 4,000.00
13	2533-4980005	MOBILIZATION	1	LS	\$ 10,000.00	\$ 10,000.00
					Subtotal (ROUNDED):	\$ 79,000.00
					Contingency (25%):	\$ 20,000.00
					Construction Total:	\$ 99,000.00



ENGINEER'S OPINION OF PROBABLE COST
 HWY 5 & SCOTCH RIDGE RD RIGHT TURN LANE
 OPTION 2: PAVED RIGHT TURN LANE
 CITY OF CARLISLE, IOWA
 OCTOBER 18, 2023

Item No.	Item Code	Item Description	Quantity	Unit	Unit Price	Extended Price
1	2102-2710070	EXCAVATION, CLASS 10, ROADWAY AND BORROW	180	CY	\$ 20.00	\$ 3,600.00
2	2115-0100000	MODIFIED SUBBASE	50	CY	\$ 75.00	\$ 3,750.00
3	2121-7425010	GRANULAR SHOULDERS	30	TON	\$ 65.00	\$ 1,950.00
4	2301-1033100	PORTLAND CEMENT CONCRETE PAVEMENT, 10 IN.	260	SY	\$ 110.00	\$ 28,600.00
5	2510-6745850	REMOVAL OF PAVEMENT	150	SY	\$ 15.00	\$ 2,250.00
6	2511-6745900	REMOVAL OF SIDEWALK	12	SY	\$ 15.00	\$ 180.00
7	2511-7526006	SIDEWALK, P.C. CONCRETE, 6 IN.	11	SY	\$ 90.00	\$ 990.00
8	2511-7528101	DETECTABLE WARNINGS	25	SF	\$ 60.00	\$ 1,500.00
9	2524-9325001	TYPE A SIGNS, SHEET ALUMINUM	1	EA	\$ 500.00	\$ 500.00
10	2527-9263109	PAINTED PAVEMENT MARKINGS	1	LS	\$ 7,000.00	\$ 7,000.00
11	2528-8445110	TRAFFIC CONTROL	1	LS	\$ 4,000.00	\$ 4,000.00
12	2533-4980005	MOBILIZATION	1	LS	\$ 10,000.00	\$ 10,000.00
					Subtotal (ROUNDED):	\$ 64,000.00
					Contingency (25%):	\$ 16,000.00
					Construction Total:	\$ 80,000.00



ENGINEER'S OPINION OF PROBABLE COST
 HWY 5 & SCOTCH RIDGE RD RIGHT TURN LANE
 OPTION 3: GRANULAR RIGHT TURN LANE
 CITY OF CARLISLE, IOWA
 OCTOBER 18, 2023

Item No.	Item Code	Item Description	Quantity	Unit	Unit Price	Extended Price
1	2102-2710070	EXCAVATION, CLASS 10, ROADWAY AND BORROW	50	CY	\$ 20.00	\$ 1,000.00
2	2121-7425010	GRANULAR SHOULDERS	45	TON	\$ 65.00	\$ 2,925.00
3	2527-9263109	PAINTED PAVEMENT MARKINGS	1	LS	\$ 3,500.00	\$ 3,500.00
4	2528-8445110	TRAFFIC CONTROL	1	LS	\$ 2,000.00	\$ 2,000.00
5	2533-4980005	MOBILIZATION	1	LS	\$ 5,000.00	\$ 5,000.00
					Subtotal (ROUNDED):	\$ 14,000.00
					Contingency (25%):	\$ 4,000.00
					Construction Total:	\$ 18,000.00



ENGINEER'S OPINION OF PROBABLE COST
 HWY 5 & SCOTCH RIDGE RD RIGHT TURN LANE
 OPTION 4: PAVED ON-RAMP
 CITY OF CARLISLE, IOWA
 OCTOBER 18, 2023

Item No.	Item Code	Item Description	Quantity	Unit	Unit Price	Extended Price
1	2101-0850001	CLEARING AND GRUBBING	1	LS	\$ 5,000.00	\$ 5,000.00
2	2102-2710070	EXCAVATION, CLASS 10, ROADWAY AND BORROW	800	CY	\$ 20.00	\$ 16,000.00
3	2115-0100000	MODIFIED SUBBASE	250	CY	\$ 75.00	\$ 18,750.00
4	2121-7425010	GRANULAR SHOULDERS	290	TON	\$ 65.00	\$ 18,850.00
5	2301-1033100	PORTLAND CEMENT CONCRETE PAVEMENT, 10 IN.	1200	SY	\$ 110.00	\$ 132,000.00
6	2510-6745850	REMOVAL OF PAVEMENT	35	SY	\$ 15.00	\$ 525.00
7	2511-6745900	REMOVAL OF SIDEWALK	21	SY	\$ 15.00	\$ 315.00
8	2511-7526006	SIDEWALK, P.C. CONCRETE, 6 IN.	8	SY	\$ 90.00	\$ 720.00
9	2511-7528101	DETECTABLE WARNINGS	25	SF	\$ 60.00	\$ 1,500.00
10	2524-9325001	TYPE A SIGNS, SHEET ALUMINUM	12	EA	\$ 500.00	\$ 6,000.00
11	2527-9263109	PAINTED PAVEMENT MARKINGS	1	LS	\$ 11,000.00	\$ 11,000.00
12	2528-8445110	TRAFFIC CONTROL	1	LS	\$ 10,000.00	\$ 10,000.00
13	2533-4980005	MOBILIZATION	1	LS	\$ 20,000.00	\$ 20,000.00
					Subtotal (ROUNDED):	\$ 241,000.00
					Contingency (25%):	\$ 60,000.00
					Construction Total:	\$ 301,000.00