Strand Associates, Inc.®
126 N. Jefferson Street, Suite 350
Milwaukee, WI 53202
(P) 414.271.0771

November 24, 2020

Ms. Magdelene Wager
City of Pewaukee
W240 N3065 Pewaukee Road
Pewaukee, WI 53072

Re: Duplainville Road Reconstruction Alternative Analysis
City of Pewaukee, Wisconsin (City)

Dear Ms. Wager,

The City has hired Strand Associates, Inc.® to complete an alternative analysis for the reconstruction of Duplainville Road from just south of Green Road to Weyer Road. A total of three alternatives were evaluated for the Duplainville Road reconstruction analysis. The proposed typical section for all alternatives is an undivided two-lane roadway with 12-foot lanes, 5-foot paved shoulders, 3-foot aggregate shoulders, 16-foot-wide ditches, and an 8-foot-wide paved path outside of the ditch along the east side of the roadway. The proposed typical section includes 30-inch curb and gutter near the intersection with Green Road and the underpass at Capitol Drive. Additional curb and gutter may be required as determined necessary in the design phase. Right-of-way (ROW) impacts are expected because of the path throughout the project area; those costs have not been quantified. Approximately one acre of fee ROW will be required with the addition of the path, and temporary limited easements (TLE) will be required for grading. Enclosed is a typical section and project overview map demonstrating the conceptual layout.

An opinion of probable construction costs (OPCC) was prepared for the following alternatives:

1. Alternative 1–Asphalt Pavement Throughout the Entire Corridor

The asphalt pavement structure includes 2-inches of 4 LT 58-28 S over 4-inches 3 LT 58-28 S over 5 inches of 3/4-inch base aggregate dense (BAD) over 8 inches of 1 1/4-inch BAD.

2. Alternative 2–Concrete Pavement Throughout the Entire Corridor

The concrete pavement structure includes 7 inches of concrete pavement over 3 inches of 3/4-inch BAD over 5 inches of 1 1/4-inch BAD.

3. Alternative 3–Concrete Pavement from the South Project Limits to Capitol Drive, and Asphalt Pavement From Capitol Drive to the North Limit

The pavement structures listed for Alternatives 1 and 2 were used for Alternative 3.

Pavement structures used for this alternative analysis were based on the findings from the Duplainville Road Bridge Replacement project (Wisconsin Department of Transportation ID: 2370-04-70) pavement design, as well as the City Technical Standards. Further analysis to determine final pavement structure will be completed during final engineering and will be based on the geotechnical report and pavement structure design. This additional analysis will gather soil borings throughout the project corridor and account for the different traffic and truck volumes that are experienced within the

project limits. Additional geotechnical analysis will also provide insight to an anticipated amount of excavation below subgrade, which can have a significant impact on overall project cots. Final design standards may influence the OPCC. A preliminary OPCC for each alternative can be found in Table 1.

	Alternative 1	Alternative 2	Alternative 3
Roadway Items	$ 5,688,500	$ 7,188,500	$ 6,188,500
Trail Items	$ 361,500	$ 361,500	$ 361,500
OPCC	**$ 6,050,00**	**$ 7,550,000**	**$ 6,550,000**

Table 1–OPCC Alternatives

A more detailed OPCC for each alternative is enclosed. A life-cycle cost analysis was not completed as a part of this evaluation. The trail OPCC should only be considered when included with the roadway reconstruction. Should the City construct the path independent of the roadway, the OPCC will increase. The bid items for the trail OPCC include excavation common, 1 1/4-inch BAD, and asphaltic surface needed for the footprint of the 8-foot-wide trail.

Should you have any questions or like to discuss further, please call me at 414-271-0771.

Sincerely,

STRAND ASSOCIATES, INC.®

Ashley L. Pridemore, P.E.

Enclosures

Duplainville Road

Alternative 1: Asphalt from Green Road to Weyer Road

Preliminary Opinion of Probable Construction Cost

November 23, 2020

	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
	EARTHWORK				
	Excavation Common	CY	68,100	$15.00	$ 1,021,500
1				**Earthwork Subtotal Cost**	$ 1,021,500
	PAVING ITEMS				
	Base Aggregate Dense 1 1/4-Inch	TON	29,700	$20.00	$ 594,000
	Base Aggregate Dense 3/4-Inch	TON	22,800	$17.00	$ 387,600
	Concrete Pavement 7-Inch	SY		$55.00	$ -
	Concrete Driveway 6-Inch	SY	25	$53.00	$ 1,300
	HMA Pavement 3 LT 58-28 S	TON	11,900	$70.00	$ 833,000
	HMA Pavement 4 LT 58-28 S	TON	5,700	$80.00	$ 456,000
	Concrete Curb & Gutter 30-Inch Type A	LF		$30.00	$ -
	Concrete Curb & Gutter 30-Inch Type D	LF	800	$30.00	$ 24,000
2				**Paving Items Subtotal Cost**	$ 2,295,900
	TRAIL ITEMS				
	Excavation Common	CY	2,700	$15.00	$ 40,500
	Base Aggregate Dense 1 1/4-Inch	TON	4,500	$20.00	$ 90,000
	Asphaltic Surface (Bike Path)	TON	2,200	$105.00	$ 231,000
3				**Trail Items Subtotal Cost**	$ 361,500
4				**Major Roadway Items Subtotal Cost (Lines 1 - 3)**	$ 3,679,000
5	**ALLOWANCE FOR UNMEASURED ITEMS IN 1-2 ABOVE**	LS	25 % of Line 4	N/A	$ 920,000
6				**Major Roadway Items Subtotal Cost (Lines 4 - 5)**	$ 4,599,000
	OTHER ITEMS				
7	EROSION CONTROL/FINISHING	LS	5 % of Line 6	N/A	$ 230,000
8	DRAINAGE/STORM SEWER/DITCH GRADING	LS	7 % of Line 6	N/A	$ 321,900
9	SIGNING	LS	2 % of Line 6	N/A	$ 92,000
10	MISCELLANEOUS ITEMS	LS	15 % of Line 6	N/A	$ 689,900
11	PAVEMENT MARKING	LS	2 % of Line 6	N/A	$ 92,000
12				**Other Items Subtotal Cost (Lines 7 - 11)**	$ 1,426,000
				Total Cost (Lines 6 and 12)	$ 6,025,000
OPINION OF PROBABLE CONSTRUCTION COST					**$ 6,050,000**

Assumptions/Notes

1. Quantities are based on preliminary layout and 2020 prices.
2. Unit costs were taken from BidX using WisDOT projects in and around Waukesha county, as well as WisDOT average bid item prices.
3. Costs for items not measureable at the pre-30 percent design stage were determined by reviewing similar projects and what percentage these unmeasurable items typically comprised of the total removals, earthwork and paving items.
4. A pavement structure of 7-Inches of Concrete Pavement over 3-Inches B.A.D. 3/4-inch over 5-Inches B.A.D. 1 1/4-inch was used base on WisPave analysis. A pavement strucure of 6-Inches HMA pavement over 5-Inches B.A.D. 3/4-inch over 8-Inches B.A.D. 1 1/4-inch was used
5. Anticipated FEE and TLE costs not included.
6. Earthwork was approximated using the pavement structure depth multiplied by the length of the project.

Duplainville Road

Alternative 2: Concrete from Green Road to Weyer Road

Preliminary Opinion of Probable Construction Cost

November 23, 2020

	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
	EARTHWORK				
	Excavation Common	CY	56,200	$15.00	$ 843,000
1				**Earthwork Subtotal Cost**	$ 843,000
	PAVING ITEMS				
	Base Aggregate Dense 1 1/4-Inch	TON	18,700	$20.00	$ 374,000
	Base Aggregate Dense 3/4-Inch	TON	16,300	$17.00	$ 277,100
	Concrete Pavement 7-Inch	SY	48,800	$55.00	$ 2,684,000
	Concrete Driveway 6-Inch	SY	25	$53.00	$ 1,300
	HMA Pavement 3 LT 58-28 S (for driveways)	TON	516	$70.00	$ 36,100
	HMA Pavement 4 LT 58-28 S	TON		$80.00	$ -
	Concrete Curb & Gutter 30-Inch Type A	LF	800	$30.00	$ 24,000
	Concrete Curb & Gutter 30-Inch Type D	LF		$30.00	$ -
2				**Paving Items Subtotal Cost**	$ 3,396,500
	TRAIL ITEMS				
	Excavation Common	CY	2,700	$15.00	$ 40,500
	Base Aggregate Dense 1 1/4-Inch	TON	4,500	$20.00	$ 90,000
	Asphaltic Surface (Bike Path)	TON	2,200	$105.00	$ 231,000
3				**Trail Items Subtotal Cost**	$ 361,500
4				**Major Roadway Items Subtotal Cost (Lines 1 - 3)**	$ 4,601,000
5	**ALLOWANCE FOR UNMEASURED ITEMS IN 1-2 ABOVE**	LS	25 % of Line 4	N/A	$ 1,150,000
6				**Major Roadway Items Subtotal Cost (Lines 4 - 5)**	$ 5,751,000
	OTHER ITEMS				
7	EROSION CONTROL/FINISHING	LS	5 % of Line 5	N/A	$ 287,600
8	DRAINAGE/STORM SEWER/GRADING	LS	7 % of Line 5	N/A	$ 402,600
9	SIGNING	LS	2 % of Line 5	N/A	$ 115,000
10	MISCELLANEOUS ITEMS	LS	15 % of Line 5	N/A	$ 862,700
11	PAVEMENT MARKING	LS	2 % of Line 5	N/A	$ 115,000
12				**Other Items Subtotal Cost (Lines 7 - 11)**	$ 1,783,000
				Total Cost (Lines 6 and 12)	$ 7,534,000
OPINION OF PROBABLE CONSTRUCTION COST					**$ 7,550,000**

Assumptions/Notes

1. Quantities are based on preliminary layout and 2020 prices.
2. Unit costs were taken from BidX using WisDOT projects in and around Waukesha county, as well as WisDOT average bid item prices.
3. Costs for items not measureable at the pre-30 percent design stage were determined by reviewing similar projects and what percentage these unmeasurable items typically comprised of the total removals, earthwork and paving items.
4. A pavement structure of 7-Inches of Concrete Pavement over 3-Inches B.A.D. 3/4-inch over 5-Inches B.A.D. 1 1/4-inch was used base on WisPave analysis. A pavement strucure of 6-Inches HMA pavement over 5-Inches B.A.D. 3/4-inch over 8-Inches B.A.D. 1 1/4-inch was used
5. Anticipated FEE and TLE costs not included.
6. Earthwork was approximated using the pavement structure depth multiplied by the length of the project.

Duplainville Road

Alternative 3: Concrete from Green Road to Capitol Drive and Asphalt from Capitol Drive to Weyer Road

Preliminary Opinion of Probable Construction Cost

November 23, 2020

	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE		TOTAL
	EARTHWORK					
	Excavation Common	CY	65,000	$15.00	$	975,000
1				**Earthwork Subtotal Cost**	$	975,000
	PAVING ITEMS					
	Base Aggregate Dense 1 1/4-Inch	TON	26,500	$20.00	$	530,000
	Base Aggregate Dense 3/4-Inch	TON	22,000	$17.00	$	374,000
	Concrete Pavement 7-Inch	SY	14,900	$55.00	$	819,500
	Concrete Driveway 6-Inch	SY	25	$53.00	$	1,300
	HMA Pavement 3 LT 58-28 S	TON	8,500	$70.00	$	595,000
	HMA Pavement 4 LT 58-28 S	TON	4,000	$80.00	$	320,000
	Concrete Curb & Gutter 30-Inch Type A	LF	700	$30.00	$	21,000
	Concrete Curb & Gutter 30-Inch Type D	LF	150	$30.00	$	4,500
2				**Paving Items Subtotal Cost**	$	2,665,300
	TRAIL ITEMS					
	Excavation Common	CY	2,700	$15.00	$	40,500
	Base Aggregate Dense 1 1/4-Inch	TON	4,500	$20.00	$	90,000
	Asphaltic Surface (Bike Path)	TON	2,200	$105.00	$	231,000
3				**Trail Items Subtotal Cost**	$	361,500
4				**Major Roadway Items Subtotal Cost (Lines 1 - 3)**	$	4,002,000
5	**ALLOWANCE FOR UNMEASURED ITEMS IN 1-2 ABOVE**	LS	25 % of Line 3	N/A	$	1,001,000
6				**Major Roadway Items Subtotal Cost (Lines 4 - 5)**	$	5,003,000
	OTHER ITEMS					
7	EROSION CONTROL/FINISHING	LS	5 % of Line 5	N/A	$	250,200
8	DRAINAGE/STORM SEWER/GRADING	LS	7 % of Line 5	N/A	$	350,200
9	SIGNING	LS	2 % of Line 5	N/A	$	100,100
10	MISCELLANEOUS ITEMS	LS	15 % of Line 5	N/A	$	750,500
11	PAVEMENT MARKING	LS	2 % of Line 5	N/A	$	100,100
12				**Other Items Subtotal Cost (Lines 7 - 11)**	$	1,551,000
				Total Cost (Lines 6 and 12)	$	6,554,000
OPINION OF PROBABLE CONSTRUCTION COST					**$**	**6,550,000**

Assumptions/Notes

1. Quantities are based on preliminary layout and 2020 prices.
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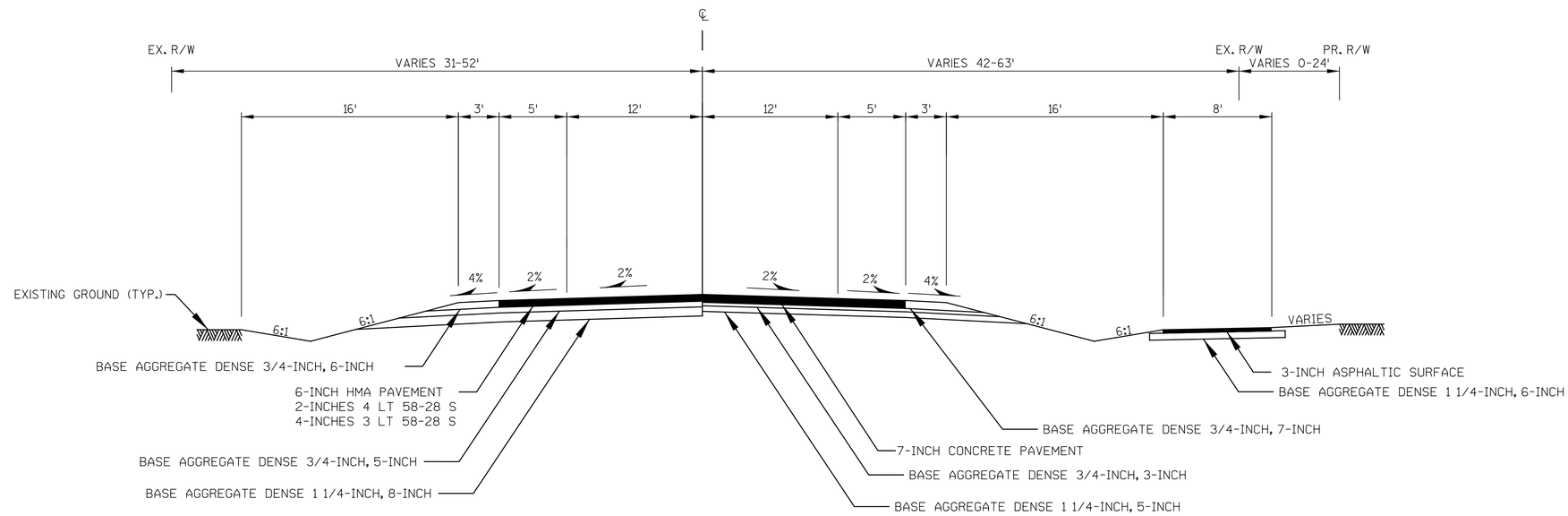
4. A pavement structure of 7-Inches of Concrete Pavement over 3-Inches B.A.D. 3/4-inch over 5-Inches B.A.D. 1 1/4-inch was used base on WisPave analysis. A pavement strucure of 6-Inches HMA pavement over 5-Inches B.A.D. 3/4-inch over 8-Inches B.A.D. 1 1/4-inch was used
5. Anticipated FEE and TLE costs not included.
6. Earthwork was approximated using the pavement structure depth multiplied by the length of the project.



TYPICAL FINISHED SECTION

TYPICAL ASPHALT PAVEMENT SECTION, LT.
TYPICAL CONCRETE PAVEMENT SECTION, RT.

NOTES:

1. PAVEMENT STRUCTURE SUBJECT TO CHANGE FOLLOWING GEOTECHNICAL ANALYSIS AND PAVEMENT DESIGN.

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SHERMAN ROAD
METER ROAD
LINDSAY ROAD
VICTORIA STREET
SHERMAN ROAD
CHERWELL LANE
CAPITOL DRIVE
SHERMAN ROAD
GREEN ROAD
SHERMAN ROAD