CNST 436—FINAL PROJECT: Dylan Mercier and Ennis Smith: 12-11-21

December 13, 2021

Mr. Pejman Rezakhani
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Eastern Michigan University
120F Sill Hall
Ypsilanti, Michigan 48197

Transmitted Via Email: pejman.rezakhani@emich.edu

RE: **Proposal for Replacement of Old Farmington Rd Bridge**
Mercier & Smith, Incorporated (M&S, Inc.)
Ypsilanti, Michigan 48197
M&S, Inc. Proposal Number: P211211.02

Dear Mr. Rezakhani:

M&S, Inc. is pleased to provide a proposal for the reconstruction of the existing Old Farmington Rd bridge, generally located between Shiawassee St and Twin Valley Ct, in Farmington, Michigan. This letter presents our understanding of the existing conditions and the scope of design services for the project.

Project Description

I. Existing Bridge Attributes

a. Approximately 45 feet (ft) east of 33346 Shiawassee Rd, we encounter an approximate 18ft wide steel single arm swing-gate closing off the existing asphalt path (Old Farmington Rd) to the public. Between the Shiawassee St sidewalk and the gate, the slope of the path is 8%.

i. 

b. The path is approximately 12ft wide and descends from the sidewalk of Shiawassee approximately 256 lineal feet (lf) east (at slopes between 4.6% and 7.3%), before turning northeast for another 234lf, and crossing the Rouge River.

i. 

c. At approximately 384lf northeast of the swing gate, the path forks southeast into a secondary dirt road path leading toward an existing pump station. At this fork, the slope of the path levels out to 1% to 3%.

i.  

d. At approximately 413lf, steel guard-railing converges from the edges of the riverbanks on either side of the asphalt path and are bolted into the approximate 34-inch (in) high masonry block walls of the bridge crossing. The path slope levels out to 1.2% at the guard rails.

i.  

ii.  

e. At 435lf, the mason block walls of the bridge were erected directly on top of the poured concrete retaining walls of the bridge. On the west side, the wall slopes from 22in up to 36in for a length of 30lf. On the east side, the wall slopes from 22in up to 32in for approximately 22lf. The asphalt path slopes adversely at the center of the bridge by -1.0%. Note the standing water in the photo below.

i.  

ii.  

f. As shown in the above photos, the existing block walls are deteriorating beyond patch-repair and were erected short of 36in. in height. These walls are not ADA compliant and lack sufficient safety railing. The makeshift bridge spans approximately 60 feet before the asphalt path abruptly stops at a vegetation and tree-lined slope. The path veers west and drops off the top of the concrete retaining wall, onto a smaller 4 feet wide asphalt foot path descending at a slope of 13.7%. Photo 1 (below) POV is from the bridge, looking down the footpath. Photo 2 POV is from the bottom of the footpath. The measuring wheel sits atop the bridge.

i.  

g. At the end of the bridge (approximately 490lf), there is an overhead electrical line crossing. The lowest-hanging line is approximately 10 feet above the asphalt path.

i.  

II. South-End Asphalt Path Surrounding Terrain

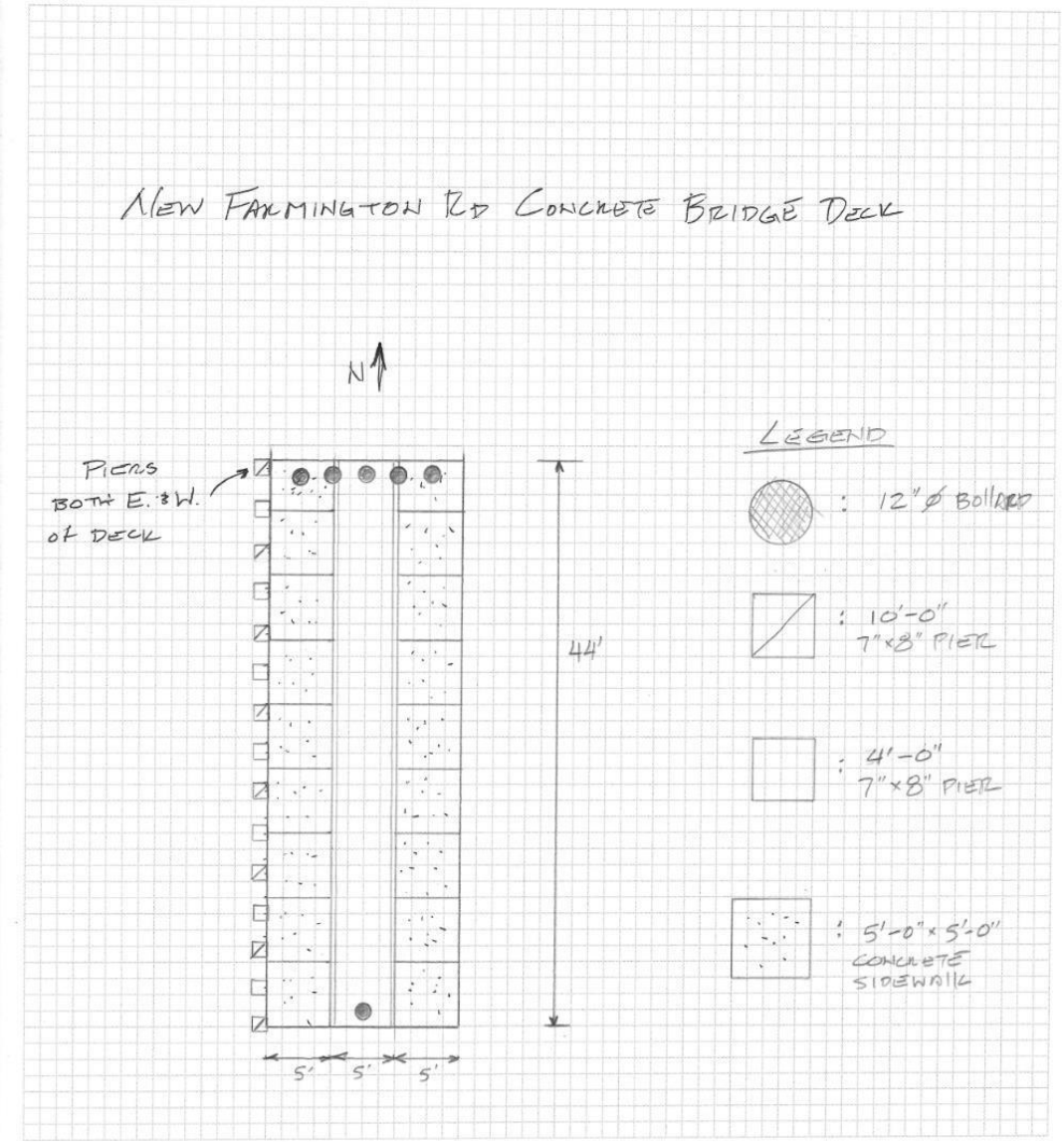
a. The sloped path descending east from the single-arm swing gate consists of deteriorating asphalt draped on either side (of the path) by dense 4-to-7 in. trees. The southern slope adjacent to Shiawassee St descends at a dangerous percentage, making navigation from the Street down to the path nearly impossible.

i.  

Recommendations

I. **Replacing the Existing Bridge**
   a. The existing asphalt bridge paved over concrete and incorporating masonry block walls will need to be demolished and replaced by a newly constructed bridge, consisting of concrete foundations on concrete abutments, steel I-Beam Underframe-work, corrugated steel decking and 8-in. thick concrete cap-deck. On top of the concrete deck, safety railing and an overhead canopy should be installed.
      i. Based on site-field measurements and existing conditions observed, M&S, Inc. proposes pile footings installed on the north and south sides of the existing Rouge River. The 12in. x 12in. concrete piles should be driven 50 feet deep and capped with new concrete abutments.
      ii. Atop the abutments, beams and steel decking should be installed.
      iii. A new 8-in. thick 4500psi, air-entrained concrete mix can then be poured in-place over the decking. The concrete pavement should be installed 44lf long to cover the span over the river, and 15lf wide. At this width, the concrete pavement provides (2) 5lf wide walking paths on either side of the bridge along with a center 5lf wide bike path. The center bike path should be overlaid with 2in-thick asphalt layer, while the walking paths are jointed 5ft x 5ft concrete flags.
      iv. On the northern-most and southern-most ends of the new concrete pavement, 12in. diameter concrete bollards should be installed to prevent motor vehicle traffic over the bridge and deter pedestrians from leaping over the north edge of the bridge; one bollard at the south end and five bollards at the north end.
      v. Wooden railing (consisting of 7in. x 8in. x 48in. piers installed at 36in. on center, on the west and east sides of the concrete deck) should be installed onto the concrete pavement edges. Alternating piers should be installed 10ft tall to accommodate a flat tin canopy overhead. The canopy will be installed to protect pedestrians from the low hanging electrical wire located on the north end of the pathway. See plan view below.

b.



II. Reconstructing the Southern Path

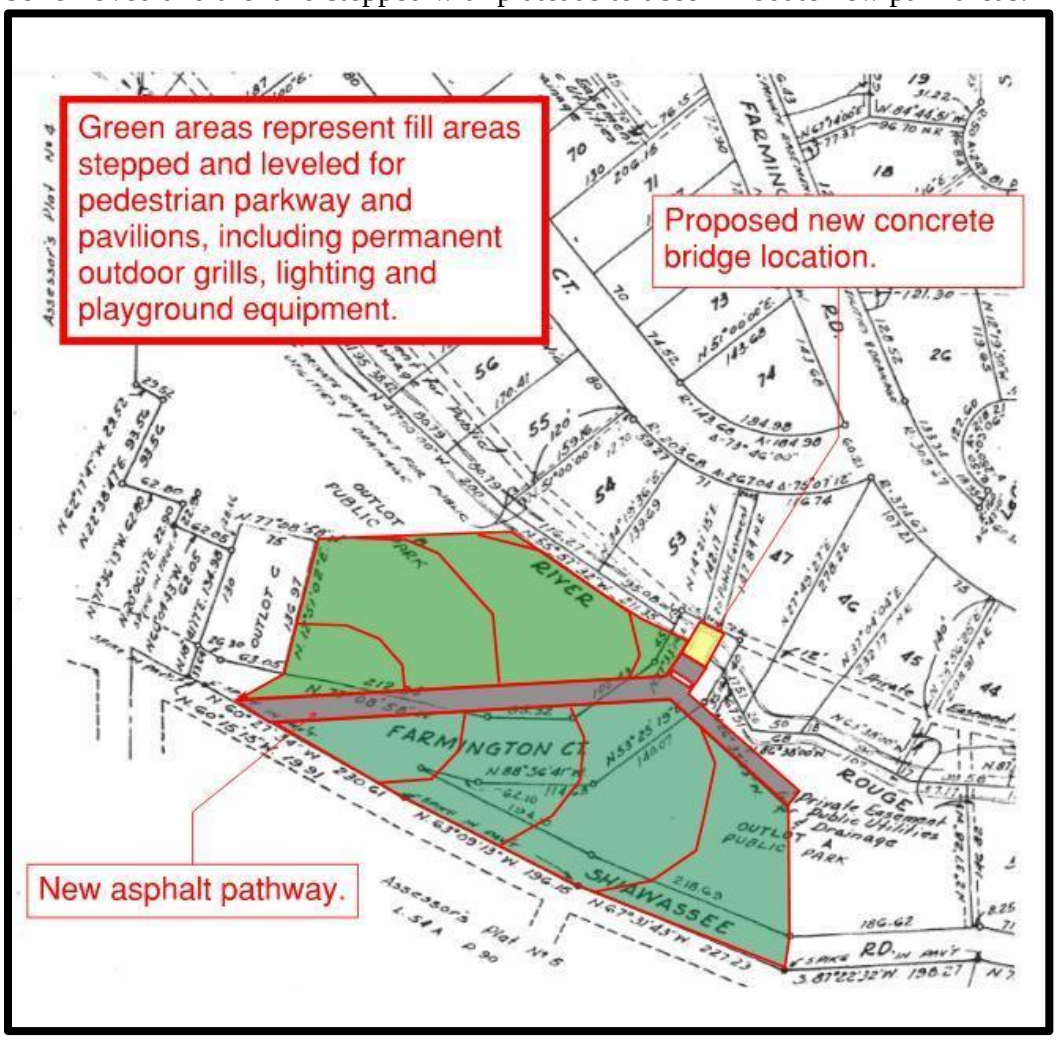
a. The existing southern asphalt path should be demolished. Because of the steep grade changes, the grade of the proposed replacement road should be regraded (filled) for the 384lf distance from the Shiawassee sidewalk, to the pumpstation access road below. The existing conditions of the narrow path vary between 3% and 8%. The new road should be graded to accommodate a straight path with an approximate 5% constant slope, to allow for a conservative descent.

   i. Grading the proposed path will call for the removal of existing trees on the north and south sides of the existing path, and filling these areas with earth to build up the grade to accommodate a new 18ft wide asphalt pathway.

ii. The new asphalt path should be wide enough to accommodate a full-sized pickup truck, while maintaining 3ft wide pedestrian/bicycle access on either side of the road.

iii. Concrete jersey barriers should be installed across the new asphalt path, north of the pump station access road, to deter vehicular traffic beyond the pumpstation road. In the event of an emergency, the barriers can be lifted out of the road using heavy equipment.

b. Along the north and south sides of the proposed roadway, the vegetation should be removed and the land stepped with plateaus to accommodate new park areas.

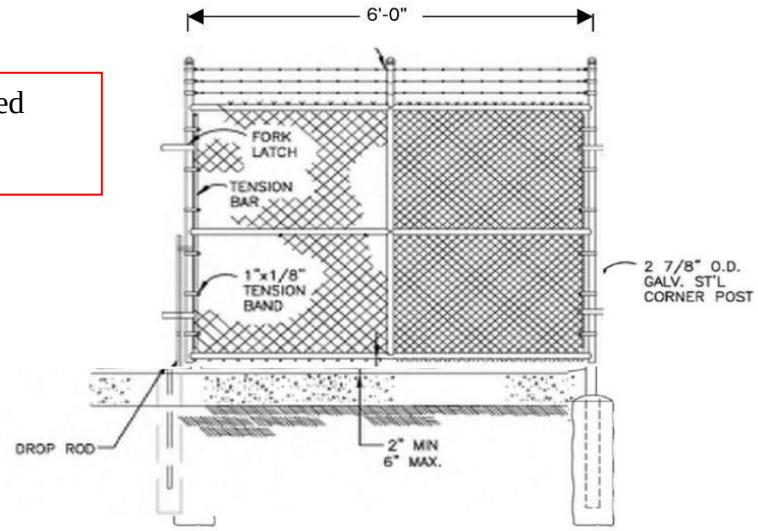
c. 

Note: the small white strip north of the pump station access road, represents removable barriers.

III. Existing Single Arm Swing Gate Replacement

a. The existing single-arm swing gate should be demolished and replaced with a double swing arm galvanized fence.
   i. The permanent mounting posts should be installed 3 feet off the edges of the new asphalt pavement and bored directly through the asphalt and aggregate base layer.
   ii. The swing gates should be 6 feet wide by 8 feet tall. The center drop posts shall meet in the center line of the new asphalt road pathway.
   iii. This gate will be installed to restrict unauthorized vehicle traffic onto the asphalt pathway. However, the outer edges of the path will remain free for pedestrians to use.
   iv. Along Shiawassee St, new signage shall be installed notifying the public of the new pedestrian pathway, the new bridge and the new public parkways.
   v.

Note: One half of the proposed new gate shown here.



IV. Materials Estimates

a. All take off quantities include demo of existing conditions as well as labor to complete the construction project to owner's specifications. Estimated project duration is 90 days.

M&S, INC. PROPOSAL FOR REPLACEMENT OF OLD FARMINGTON RD BRIDGE/WALKWAY

ITEM	DESCRIPTION	MATERIAL SPECS	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
Foundation & Columns	12" x 12" Driven Precast Concrete Piles (50' depth minimum)	Prestressed 1,000 psi - 5,000 psi Max	8	Piles	$6,000.00	$48,000.00
Foundation & Columns	15' x 5' Precast Concrete Semi Retaining Abutment	5,000 psi	2	N/A	$8,250.00	$16,500.00
Beams & Steel Decking	W16 x 50 x 44' A36 Wide Flange Beam	50 lb/ft	4	I-Beams	$3,600.00	$14,400.00
Beams & Steel Decking	3W x HF-36 Hi Form Composite Decking	3" Deep - 15' x 36" Optimal Span Range	15	Decking	$1,983.94	$29,759.10
Concrete	8" Air-Entrained Concrete Mix	4,500 psi	17	Cubic Yds	$175.00	$2,975.00
Concrete	12" Diameter Concrete Bollards at 30" Tall	290 lbs	9	Bollards	$374.00	$3,366.00
Lumber	7" x 8" x 48" Pressure Treated Piers at 36" O.C.	Pressure Treated Lumber	14	Piers	$532.68	$7,457.52
Lumber	7" X 8" X 10' Pressure Treated Piers	Pressure Treated Lumber	16	Piers	$832.49	$13,319.84
Canopy	4' x 8' Sheets of Aluminum Tin Roofing	Wind and Weather Resistant	21	Sheets	$86.45	$1,815.45
Asphalt	18' x 384' x 3" Asphalt Walkway	3" Dense Grade Mix	64	Cubic Yds	$228.65	$14,633.60
Fencing	Double Swing Galvanized Fence	2" Galvanized Aluminum Pipe	1	N/A	$2,256.00	$2,256.00
Infastructure	Pedestrain Parkways & Pavilions	N/A	1	N/A	$23,345.00	$23,345.00
				Estimated Project Total		$154,482.51

Authorization

We have assumed (2) site visits per week will be required and the services performed will occur during weekdays and will not exceed 12 hours at this site. If additional visits, contractor/weather delays, or holiday work is required, additional fees will be required. We estimate $2,000 per day, or $150 per hour in excess of a 12-hour day. We request a minimum of 48 hours of notification for scheduling our on-site personnel.

Our services will be provided from our Ypsilanti office. Mr. Ennis Smith, PE will serve as the M & S, Inc. project manager for the duration of the project. Our estimated fees do not include fees for our project manager to attend construction progress meetings. If attendance at such meetings is required, additional fees would be required.

We understand that M & S, Inc. services will be provided in accordance with this proposal. Please provide a purchase order at your convenience as our notice to proceed. If you have questions, please contact us.

Very truly yours,

M & S, Inc.

Dylan Mercier

Dylan Mercier, PE
Senior Project Engineer

Ennis Smith

Ennis Smith, PE
Senior Project Manager

P211211.02