IOWA DEPARTMENT OF TRANSPORTATION

TO OFFICE: District 5 **DATE:** December 18th, 2018

ATTENTION: James V. Armstrong **PROJECT:** Decatur County

STPN-069-1(54)--2J-27

FROM: Anthony J. Klein PIN: 19-27-069-010

OFFICE: District 5 Design

SUBJECT: FY 2021 – Culvert Replacement Project Concept

PROJECT LOCATION MAP: Page 2 or Click Here

BACKGROUND: Decatur County, US 69, MM 9.05

Separation of three joints of a 5' x 5' reinforced concrete box (RCB) culvert at station 517+40 along U.S. Highway 69 has occurred. The joint separation was initially suspected due to pavement settlement\cracking above the culvert. An onsite inspection of the culvert revealed joint separation of several inches at three joints of the culvert barrel. Soil has fallen through the separated joints into the culvert. If left unchecked the soil will continue to migrate through the joints into the culvert. The loss of soil above the culvert appears to have caused some loss of subgrade support under the highway pavement. Continued loss of subgrade support will be detrimental to the pavement. Also, a significant amount of silt\soil has accumulated in the culvert which is affecting the hydraulic capacity of the structure. Continued build-up of soil\silt will lead to more loss of hydraulic capacity.

RECOMMENDATIONS:

The total estimated cost of the project is \$390,000 as described below. The existing 5' x 5' RCB culvert does not meet the DOT hydraulic capacity guidelines for a 50 year event. Lining the existing RCB is therefore not an option and it should be replaced with a 66 inch RCP culvert. The proposed method to install the RCP is by jacking the pipe in place under the highway embankment. The proposed RCP flowline inverts will match the flowline inverts of the existing RCB. The length of the 66 inch RCP was determined assuming a foreslope grade of 2.5:1. The pavement and shoulders will remain as is and will not be altered. The 66 inch RCP meets the DOT hydraulic guidelines for a 50 year event.

The existing RCB culvert will be abandoned in place by filling the culvert barrels with flowable mortar. Based on field inspection there are voids above the open joints of the box. The extent of these voids is unknown and they may not be filled via the process used to fill the culvert barrel with flowable mortar. In order to fill these voids a bore hole shall be installed above each joint and the hole and void shall be filled with flowable mortar. This will involve some pavement removal and replacement for the bore cores. Temporary traffic control to reduce traffic through the work area to one lane will also be needed.

The existing box outlets to a 36 inch CMP that is located under an old railroad embankment. The railroad embankment is no longer owned by a railroad and this land is now owned by a private individual. The condition of the CMP is not fully known due to standing water and it is a maintenance issue. During the field exam the property owner of the old railroad embankment was on site and stated the CMP could be removed and the embankment could be removed permanently with an open channel in its place. The property owner did ask that a fence be installed for livestock containment. Also, any erosion control in the channel should be such that livestock could walk over it. The concept includes cutting a channel through the railroad embankment with 2.5:1 side slopes and using articulating concrete block erosion control along the channel bottom and side slopes. This type of erosion control is made up of concrete blocks connected to each other with steel cables. The voids between the blocks are filled with a granular material so livestock can walk across the blocks.

Link to: Concept Drawing

Decatur County

STPN-069-1(54)--2J-27 PIN: 19-27-069-010

Page 2

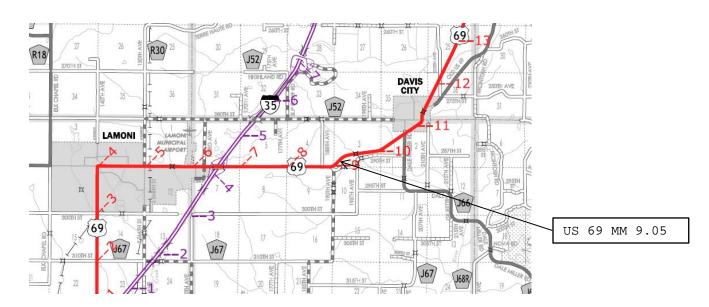
ESTIMATED COST:

Excavation	\$28,400
66 inch RCP, Jacked in Place	\$137,750
Aprons, 66 inch RCP	\$8,000
Flowable Mortar	\$45,600
Fill voids above joints with Flowable Mortar	\$5,000
Erosion Control, Articulating Concrete Block	\$57,600
Surface Restoration	\$500
Traffic Control	\$10,000
Mobilization (10%)	\$29,300
Contingencies (20%)	\$64,430
Total Cost	\$386.580

FUNDS PROGRAMMED:

It has been identified by the District 5 office for construction in FY 2021. A schedule of events for plan development will be determined following approval of the Project Concept.

LOCATION MAP:



Decatur County STPN-069-1(54)--2J-27 PIN: 19-27-069-010

Page 3

cc:

C. Purcell	M. J. Kennerly	K. D. Nicholson
D. L. Maifield	C. B. Brakke	S. J. Megivern
F. W. Todey	A. A. Welch	N. M. Miller
C. C. Poole	S. Anderson	G. A. Novey
M. A. Swenson	M. J. Sankey	R. A. Younie
D. R. Tebben	B. D. Hofer	K. Brink
D. L. Newell	B. E. Azeltine	D.R. Claman
T. D. Hanson	S. J. Gent	W.A. Sorenson
T. D. Crouch	J.W. Laaser-Webb	M. Van Dyke
D. E. Sprengeler	E. C. Wright	H. Torres-Cacho
J. R. Webb	A.J. Klein	J. R. Phillips
B. M. Clancy	T. Quam	FHWA
M. E. Ross	J. Selmer	P.C. Keen
J. Garton	J. Woodcock	