PHOTO 7 Condition

Description Span A facing south.

PHOTO 8 Condition, Other

Description Span A Beam 6. 3'x6"x6".

PHOTO 9 Condition

Description Span B facing north.

PHOTO 10 Condition

Description Span C facing north.

PHOTO 11 Condition, Other

Description Span C Beam 3 and Beam 4.

PHOTO 12 Condition

Description South abutment.

PHOTO 13 Condition

Description Pier 2 south side.

PHOTO 14 Condition

Description Pier 3 south side.

PHOTO 15 Condition

Description Pier 3 north side.

PHOTO 16 Condition

Description North abutment.

PHOTO 17 Condition

Description US channel facing west through Span B.

PHOTO 18 Condition, Other, Maintenance - Bridge

Description Sinkhole on northeast shoulder just past north approach.

Miscellaneous Asset Data

Asset Management

Load Rating 2:

Has the dead load or the structural condition of the primary load carrying members changed since the last inspection? No

Extended Frequency: Submittal Date:

Inspector:

INDOT Reviewer:

This bridge has been accepted into the Extended Frequency Program. Approval Date:

Joints: ** Indicate location, type, and rating of lowest rated joint.*

Transverse South/West	A	5 - Fair Condition, minor noising damage, very minor leakage

Comments:

The south joint has been partially covered by bituminous patching. There is minor leaking at both joints.

Terminal Joints: **Rating of lowest rated terminal joint.* N

Comments:

Concrete Slopewall: **Rating of lowest rated slopewall.* N

Comments:

Bearings: ** Indicate type, and rating of lowest rated bearing.*

2 - Elastmeric 7

Comments:

Approach Slabs: ** Indicate if present & condition rating.*

1 - Approach Slabs	5 - Fair condition, no settlement, moderate cracking and spalls, crack spacing > .5'

Comments:

Both approach slabs have longitudinal and transverse cracking. South approach slab has been partially replaced with bituminous material.

Paint: ** Indicate if paint present , year painted & condition rating.*

N - No Paint Not Rated

Comments:

Endangered Species: ** If yes, add one photo to the dropdown field*

Bats: seen or heard under structure? *	N
Birds/swallows/nests seen? Empty nests present? *	Y

BRIDGE Culvert Geometry:

Barrel Length:

Height:

Width:

NBI Data come from National Inventory

NBI 113: Scour Critical Bridges	8	NBI 113a Scour Critical Bridges Comments	Scour at Piers #2 and 3 Spread footings, NO piles, scour, poor channel details.

To Be Completed by Hydraulics

Scour Analysis Status	1-Scour Analysis on file	Scour Analysis Date	10/09/2020	Scour Analysis Determination

Hydraulics Comments

To Be Completed by Bridge Inspection

Scour Critical Safety Status	1-Bridge is NOT scour Critical based on analysis findings	Date of Counter Measure Placed or Field Verified

Bridge Inspectoin Comments "Although the low scour elevation is below the low footing elevation, the bridge will not be scour critical since the existing footings are keyed into rock."

Scour Delineators installed

LOAD RATING - BRADIN

Load Rating Date: 20-OCT-06

National Bridge Inventory (NBI):

(66B) INVENTORY RATING (H):	32	(31) DESIGN LOAD:	6
(65) INVENTORY RATING METHOD:	3	(70) BRIDGE POSTING:	5
(66) INVENTORY RATING:	51	(41) STRUCTURE OPEN/POSTED/CLOSED:	A
(63) OPERATING RATING METHOD:	3	(66C) TONS POSTED:	
(64) OPERATING RATING:	68	(66D) DATE POSTED/CLOSED:	

Posting Configurations:

Emergency Vehicles:

EV2: LEGAL RF:	2.614
EV3: LEGAL RF:	1.745

2-Axles:

H20-44: LEGAL RF:	2.168
ALTERNATE MILITARY: LEGAL RF:	1.744

3-Axles:

HS20: LEGAL RF:	1.916
AASHTO TYPE 3: LEGAL RF:	2.367

4-Axles:

SU4: LEGAL RF:	1.989
TOLL ROAD LOADING NO. 2: ROUTINE PERMIT RF:	

Other Configurations:

H20-44: DESIGN RF:	1.611
NRL: LEGAL RF:	1.627

5-Axles:

AASHTO TYPE 3S2: LEGAL RF:	2.042
SU5: LEGAL RF:	1.882
TOLL ROAD LOADING NO. 1: ROUTINE PERMIT RF:	

6+-Axles:

AASHTO TYPE 3-3: LEGAL RF:	2.481
LANE TYPE: LEGAL RF:	2.877
SU6: LEGAL RF:	1.744
SPECIAL TOLL ROAD TRUCK: ROUTINE PERMIT RF:	
SU7: LEGAL RF:	1.657
MICHIGAN TRAIN TRUCK NO. 5: ROUTINE PERMIT RF:	
MICHIGAN TRAIN TRUCK NO. 8: ROUTINE PERMIT RF:	
SUPERLOAD-11 AXLES: SPECIAL PERMIT RF:	1.635
SUPERLOAD-13 AXLES: SPECIAL PERMIT RF:	1.619
SUPERLOAD-14 AXLES: SPECIAL PERMIT RF:	1.1
SUPERLOAD-19 AXLES (152.5T): SPECIAL PERMIT RF:	1.466
SUPERLOAD-19 AXLES (240.045T): SPECIAL PERMIT RF:	1.211

Bridge Inspection Report

Date Reported: 05/03/2021

Priority: Green - 3

Work Code: Erosion Control / Rip Rap

Deficiency Description:
There is a sinkhole on the east shoulder at the north end of the north approach slab.

Work Description:

Date Repairs Completed:

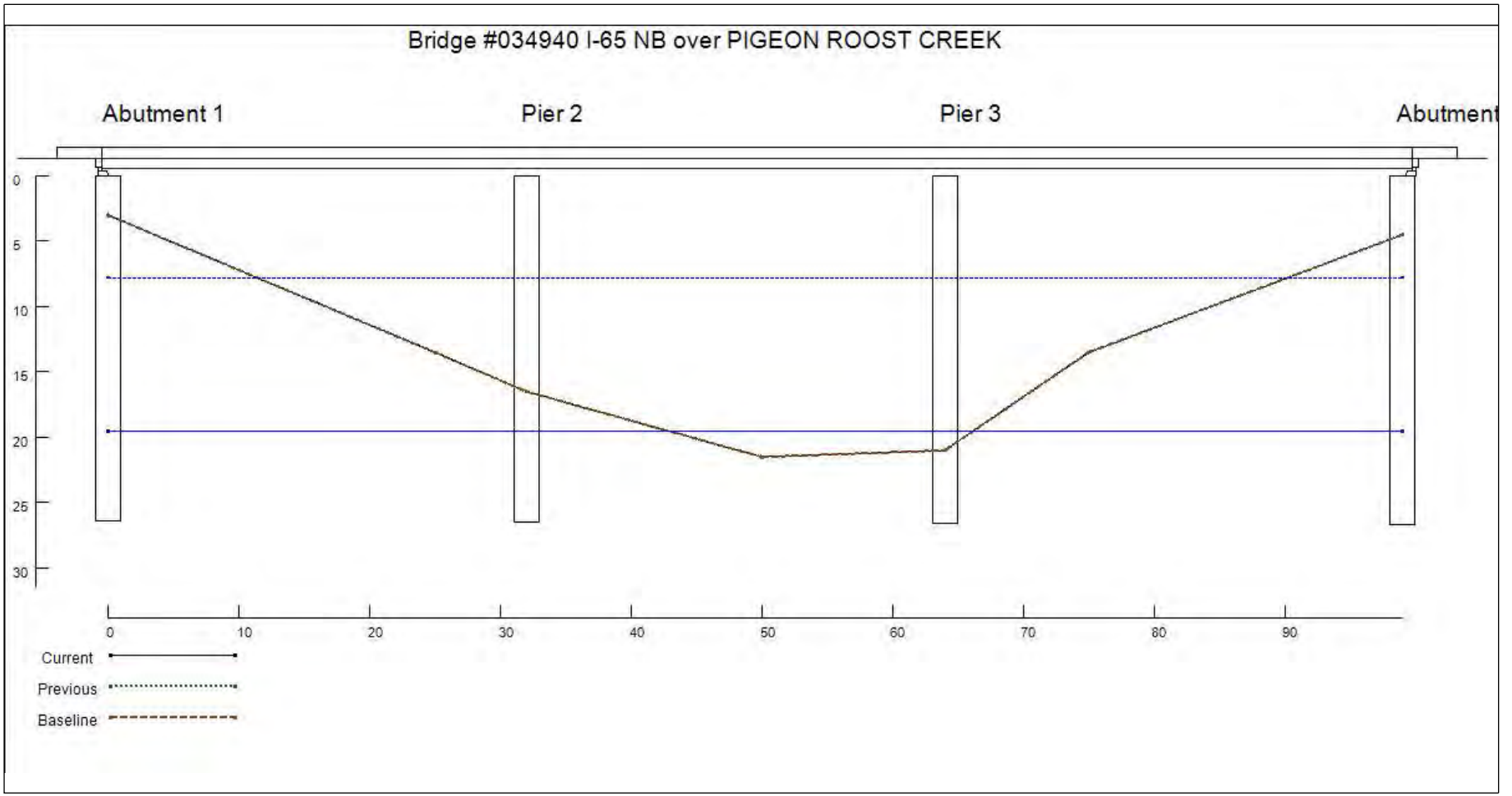
Maintenance Comments:

Stage: Open

PHOTO 1 Description Sinkhole on northeast shoulder just past north approach.

Channel Measurement

Date of Channel Measurements:	06/02/2017	Number of Fixed Objects in Channel:	4
Distance Measured From:	0	Water Level:	19.50
Depth Measured From:	0	High Water Mark:	7.77
Number of Measurement Points Taken:	7	Measurement Type:	Depth from Reference Point



INDOT BRIDGE INSPECTION DIVISION

SCOUR PLAN OF ACTION

GENERAL INFORMATION

District: 05

NBI Number: 034940 **Facility Carried :** I-65 NB

Feature Intersected: PIGEON ROOST CREEK **Location:** 04.58 S SR 56

SCOUR STATUS SUMMARY

Scour Critical Rating: 8 **Substructure Rating:** 7 **Channel and Channel Protection Rating:** 7

Culvert Rating: N **Waterway Adequacy Appraisal:** 7

Scour/Flood History:

INITIAL SCOUR INSPECTION

Bridge Scour Critical Components:

Trigger:

Initial Scour Inspection following Trigger(Date/Findings):

MONITORING PLAN

Monitoring Required after Initial Scour Inspection (Y/N):

Reason for Bridge Monitoring:

If monitoring is required after initial inspection, the Bridge Scour Monitoring Log shall be used.

Person or Agency that will monitor the bridge:

Monitoring Methodology:

Monitoring History/Comments:

Monitoring Termination Criteria:

Bridge Owner Contact Information (Primary):

COUNTERMEASURE INFORMATION AND RECOMMENDATIONS

Existence/Type of Countermeasures Present:

Countermeasures Observations:

Countermeasures Recommendations:

EMERGENCY TRAFFIC INFORMATION AND RECOMMENDATIONS

Closure Plan:

Suggested Detour Route:

Re-opening Procedures:

Provide recommendations as needed, such as reduced routine inspection frequency, need for future underwater inspections, countermeasure recommendations, and other comments.

Scour POA Author (Name/Title) **Date**

Scour POA Approved (Name/Title) **Date**

Scour POA Updated (Name/Title) **Date**

NBI 008: Structure Number	034940	**NBI 007: Facility Carried by Structure**	I-65 NB
NBI 006: Feature Intersected	PIGEON ROOST CREEK	**NBI 009: Location**	04.58 S SR 56

Date/Time | Inspectors Name | Type of Monitoring

Bridge Condition Due to Scour

Actions Taken

Comments/Conclusions

File Description	South joint and approach slab.
File Type Category	Condition

File Description	North joint and approach slab.
File Type Category	Condition

File Description	Roadway north.
File Type Category	Condition

File Description	Pier 2 south side.
File Type Category	Condition

File Description	Span A Beam 6. 3’x6”x6”.
File Type Category	Condition, Other

File Description	Pier 3 south side.
File Type Category	Condition

File Description	Span A facing south.
File Type Category	Condition

File Description	Roadway south.
File Type Category	Condition

File Description	South abutment.
File Type Category	Condition

File Description	East side.
File Type Category	Condition

File Description	Span C facing north.
File Type Category	Condition

File Description	West side.
File Type Category	Condition, Elevation

File Description	Span B facing north.
File Type Category	Condition

File Description	US channel facing west through Span B.
File Type Category	Condition

File Description	Sinkhole on northeast shoulder just past north approach.
File Type Category	Condition, Maintenance - Bridge, Other

File Description	North abutment.
File Type Category	Condition

File Description	Pier 3 north side.
File Type Category	Condition

File Description	Span C Beam 3 and Beam 4.
File Type Category	Condition, Other

Bridge Inspection Report

I65-024-04229 BSBL
I-65 SB
over
PIGEON ROOST CREEK

Inspection Date: 04/14/2021

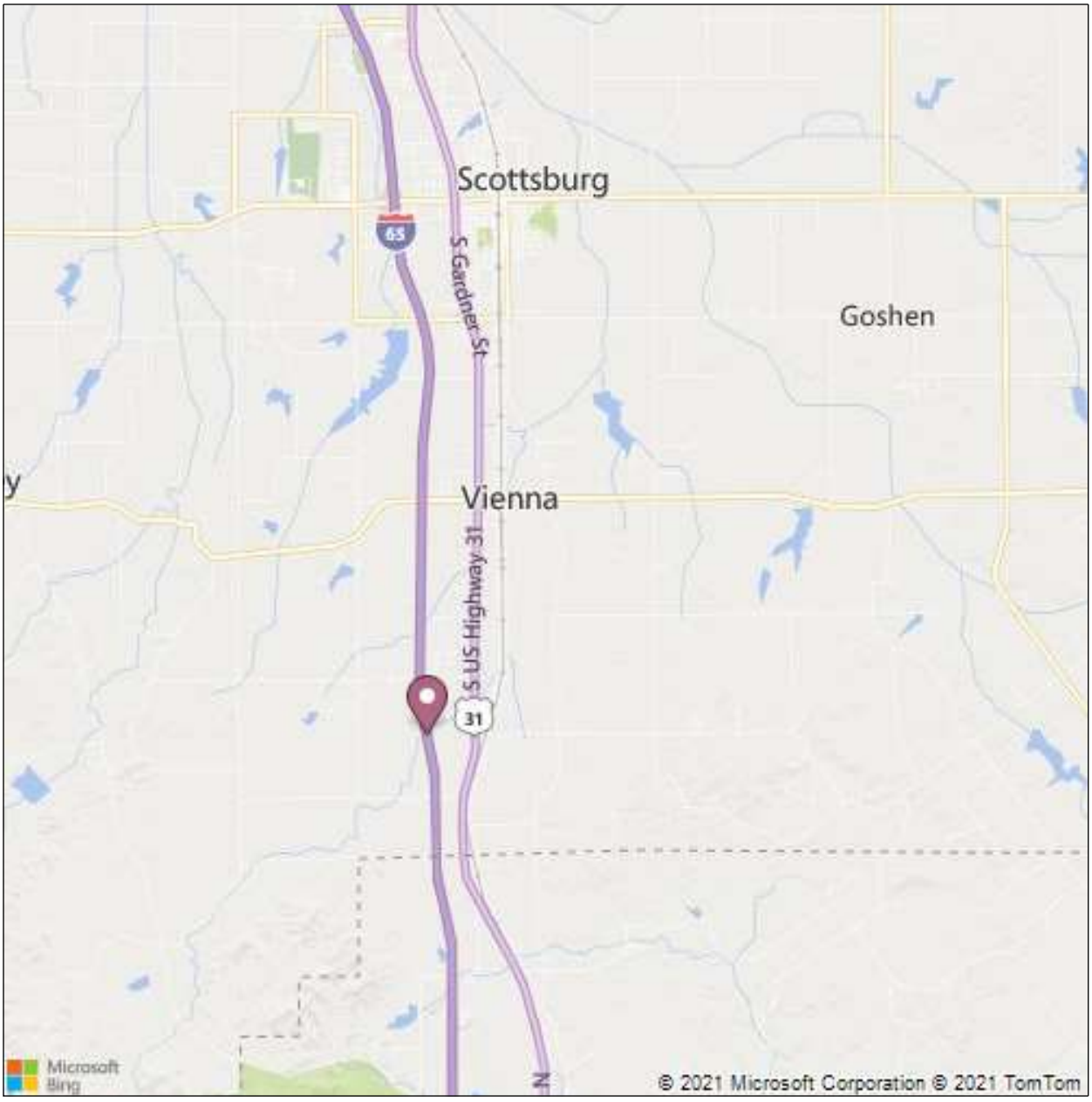
Inspected By: Stephen F. Hurst

Inspection Type(s): Routine

TABLE OF CONTENTS

Latitude: 38.61991

Longitude: -85.78310



Latitude: 38.61991

Longitude: -85.78310

General Inspection Notes: Overall the structure is in fair to good condition. Superstructure is in fair condition: Span A at abutment 1 (south): Cracking on both sides beam 4. 4" spall on west side beam 5. Span C at abutment 4 (north): Spall 2' long on east side beam 1. Cracking on both sides beam 2. Cracking on west side beam 6.

Bridge History:
1959 : New Bridge : DES # Unknown - Contract # B-4597
1975 : Rehab A : Bridge Deck Overlay Prior : DES # Unknown - Contract # B-9858
1991 : Rehab B : Replace Superstructure : DES # 8715965 - Contract # B-18469
2024 : Bridge Deck Overlay 1 : DES # 2001605 - Contract # R-41529 - Letting Date 7/12/2023

Maintenance/Deficiencies:
There are no open maintenance items.

IDENTIFICATION

(1) STATE CODE:	185 - Indiana
(8) STRUCTURE:	034950
(5 A-B-C-D-E) INV. ROUTE:	1 - 1 - 1 - 00065 - 0
(2) HIGHWAY AGENCY DISTRICT:	05 - Seymour
(3) COUNTY CODE:	072 - SCOTT
(4) PLACE CODE:	00000 - N/A
(6) FEATURES INTERSECTED:	PIGEON ROOST CREEK
(7) FACILITY CARRIED:	I-65 SB
(9) LOCATION:	04.58 S SR 56
(11) MILEPOINT:	0024.740
(12) BASE HIGHWAY NETWORK:	1
(13A) INVENTORY ROUTE:	0000000001
(13B) SUBROUTE NUMBER:	01
(16) LATITUDE:	38.61991
(17) LONGITUDE:	-85.78310
(98) BORDER	
A) STATE NAME:	
B) PERCENT	%
(99) BORDER BRIDGE STRUCT. NO:	

STRUCTURE TYPE AND MATERIAL

(43) STRUCTURE TYPE, MAIN:	
A) KIND OF MATERIAL/DESIGN:	6 - Prestressed concrete continuous
B) TYPE OF DESIGN/CONSTR:	06 - Box Beam or Girders - Single or Spread
(44) STRUCTURE TYPE, APPROACH SPANS:	
A) KIND OF MATERIAL/DESIGN:	0 - Other
B) TYPE OF DESIGN/CONSTR:	00 - Other
(45) NUMBER OF SPANS IN MAIN UNIT:	003
(46) NUMBER OF APPROACH SPANS:	0000
(107) DECK STRUCTURE TYPE:	1 - Concrete Cast-in-Place
(108) WEARING SURFACE/PROT SYS:	
A) WEARING SURFACE:	1 - Monolithic Concrete (concurrently placed with structural deck)
B) DECK MEMBRANE:	0 - None
C) DECK PROTECTION:	1 - Epoxy Coated Reinforcing

AGE OF SERVICE

(27) YEAR BUILT:	1959
(106) YEAR RECONSTRUCTED:	1991
(42) TYPE OF SERVICE:	
A) ON BRIDGE:	1 - Highway
B) UNDER BRIDGE:	5 - Waterway
(28) LANES:	
A) ON BRIDGE:	02
B) UNDER BRIDGE:	00
(29) AVERAGE DAILY TRAFFIC:	021299
(30) YEAR OF AVERAGE DAILY TRAFFIC:	2004
(109) AVERAGE DAILY TRUCK TRAFFIC:	10 %
(19) BYPASS DETOUR LENGTH:	001 MI

GEOMETRIC DATA

(48) LENGTH OF MAX SPAN:	0032.0	FT	(35) STRUCTURE FLARED:	0 - No flare	
(49) STRUCTURE LENGTH:	00099.0	FT	(10) INV RTE, MIN VERT CLEARANCE:	99.99	FT
(50) CURB/SIDEWALK WIDTHS:			(47) TOT HORIZ CLEARANCE:	039.7	FT
A) LEFT	00.0	FT	(53) VERT CLEAR OVER BR RDWY:	99.99	FT
B) RIGHT:	00.0	FT	(54) MIN VERTICAL UNDERCLEARANCE:		
(51) BRDG RDWY WIDTH CURB-TO-CURB:	039.7	FT	A) REFERENCE FEATURE:	N	
(52) DECK WIDTH, OUT-TO-OUT:	042.6	FT	B) MIN VERT UNDERCLEAR:	0	FT
(32) APPROACH ROADWAY	040.0	FT	(55) LATERAL UNDERCLEARANCE RIGHT:		
(33) BRIDGE MEDIAN:	0 - No median		A) REFERENCE FEATURE:	N	
			B) MIN LATERAL UNDERCLEAR:	000.0	FT
(34) SKEW:	00	DEG	(56) MIN LATERAL UNDERCLEAR ON LEFT:	00.0	FT

INSPECTIONS

(90) INSPECTION DATE:	04/14/2021	(91) DESIGNATED INSPECTION FREQUENCY:	24 MONTHS
(92) CRITICAL FEATURE INSPECTION:		(93) CRITICAL FEATURE INSPECTION DATE:	
A) FRACTURE CRITICAL REQUIRED/FREQUENCY:	N	A) FRACTURE CRITICAL DATE:	
B) UNDERWATER INSPECTION REQUIRED/FREQUENCY:	N	B) UNDERWATER INSP DATE:	
C) OTHER SPECIAL INSPECTION REQUIRED/FREQUENCY:	N	C) OTHER SPECIAL INSP DATE:	

CONDITION

(58) DECK:	7 - Good Condition (some minor problems)	(60) SUBSTRUCTURE:	7 - Good Condition (some minor problems)
(58.01) WEARING SURFACE:	7 - Good Condition	(61) CHANNEL/CHANNEL PROTECTION:	7 - Bank protection needs minor repairs
(59) SUPERSTRUCTURE:	5 - Fair Condition (minor section loss)	(62) CULVERTS:	N - Not Applicable

CONDITION COMMENTS

(58) DECK: 7 - Good Condition (some minor problems)

Comments:
The underside of the deck is concealed by metal SIP forms. The copings are protected from runoff by concrete barrier walls.

(58.01) WEARING SURFACE: 7 - Good Condition

Comments:
The wearing surface is monolithic with the deck. There is hairline longitudinal cracking in top of the deck.

(59) SUPERSTRUCTURE: 5 - Fair Condition (minor section loss)

Comments:
Span A at Abutment 1 (south): Cracking on both sides Beam 4. 4" spall on west side Beam 5.
Span C at Abutment 4 (north): Spall 2' long on east side Beam 1. Cracking on both sides Beam 2. Cracking on west side Beam 6.
General: Staining at the ends of the beams due to the leaking joints. A few curtain walls have minor cracks and delamination.

(60) SUBSTRUCTURE: 7 - Good Condition (some minor problems)

Comments:
General: Minor cracks in both abutment back walls and bent caps.
Pier 2: Minor spalling with exposed rebar on the north side.
Pier 3: Minor spalling with exposed rebar on both sides.

(61) CHANNEL/CHANNEL PROTECTION 7 - Bank protection needs minor repairs

Comments:
The channel flows from west to east through Span B and against Pier 2. The banks are well vegetated.

(62) CULVERTS: N - Not Applicable

Comments:

LOAD RATING AND POSTING

(31) DESIGN LOAD:	6 - HS 20+Mod	(66) INVENTORY RATING:	51
(70) BRIDGE POSTING	5 - Equal to or above legal loads	(65) INVENTORY RATING METHOD:	3 - Load and Resistance Factor (LRFR)
(41) STRUCTURE OPEN/POSTED/CLOSED:	A - Open	(66B) INVENTORY RATING (H):	32
(64) OPERATING RATING:	68	(66C) TONS POSTED :	
(63) OPERATING RATING METHOD:	3 - Load and Resistance Factor (LRFR)	(66D) DATE POSTED/CLOSED:	

APPRAISAL

SUFFICIENCY RATING:	84.7	(36) TRAFFIC SAFETY FEATURE:	
STATUS:	0	36A) BRIDGE RAILINGS:	1
(67) STRUCTURAL EVALUATION:	5	36B) TRANSITIONS:	1
(68) DECK GEOMETRY:	6	36C) APPROACH GUARDRAIL:	1
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL:	N	36D) APPROACH GUARDRAIL ENDS:	1

(71) WATERWAY ADEQUACY: 7 - Slight Chance of Overtopping Bridge
Comments:

(72) APPROACH ROADWAY ALIGNMENT: 8 - Equal to present desirable criteria
Comments:

(113) SCOUR CRITICAL BRIDGES: 8 - Stable for scour conditions
Comments:
Scour @ P.#2,#3
Spread footings, NO piles, scour, poor channel details

CLASSIFICATION

(20) TOLL:	3 - On Free Road	(21) MAINT. RESPONSIBILITY:	01 - State Highway Agency
(22) OWNER:	01 - State Highway Agency	(26) FUNCTIONAL CLASS OF INVENTORY RTE:	01 - Rural - Principal Arterial - Interstate
(37) HISTORICAL SIGNIFICANCE:	5 - Not eligible	(100) STRAHNET HIGHWAY:	Is on an Interstate STRAHNET route
(101) PARALLEL STRUCTURE:	L - Left structure (South or West)	(102) DIRECTION OF TRAFFIC:	1-way traffic
(103) TEMPORARY STRUCTURE:		(104) HIGHWAY SYSTEM OF INVENTORY ROUTE:	1 - Structure/Route is on NHS
(105) FEDERAL LANDS HIGHWAYS:	0-Not Applicable	(110) DESIGNATED NATIONAL NETWORK:	Inventory route on National Truck Network
(112) NBIS BRIDGE LENGTH:	Yes		

NAVIGATION DATA

(38) NAVIGATION CONTROL:	0 - No navigation control on waterway (bridge permit not required)	(39) NAVIGATION VERTICAL CLEAR:	000.0 FT
(111) PIER OR ABUTMENT PROTECTION:		(116) MINIMUM NAVIGATION VERT. CLEARANCE, VERT. LIFT BRIDGE:	FT
		(40) NAV HORIZONTAL CLEARANCE:	0000.0 FT

PROPOSED IMPROVEMENTS

(75A) TYPE OF WORK:		(95) ROADWAY IMPROVEMENT COST:	$ 000000
(75B) WORK DONE BY:		(96) TOTAL PROJECT COST:	$ 000000
(76) LENGTH OF IMPROVEMENT:	00000.0 FT	(97) YR OF IMPROVEMENT COST EST:	
(94) BRIDGE IMPROVEMENT COST:	$ 000000	(114) FUTURE AVG DAILY TRAFFIC:	041354
		(115) YR OF FUTURE ADT:	2033

	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
12 - Reinforced Concrete Deck	2 - Low	4197	sq. ft.	4197	0	0	0
	98.75' X 42.50' = 4196.88 SF						
104 - Prestressed Concrete Closed Web/Box Girder	2 - Low	576	ft.	571	2	3	0
	(0.5' + 31.5' + 32.0' + 31.5' + 0.5') X 6 beams = 576'						
210 - Reinforced Concrete Pier Wall	2 - Low	60	ft.	54	6	0	0
	(42.0' - 12.0') X 2 = 60.0'						
215 - Reinforced Concrete Abutment	2 - Low	90	ft.	88	2	0	0
	44.67' X 2 = 89.34'						
234 - Reinforced Concrete Pier Cap	2 - Low	84	ft.	84	0	0	0
	42.0' X 2 piers = 84.0'						
302 - Compression Joint Seal	2 - Low	85	ft.	85	0	0	0
	42.5' X 2 = 85.0'						
321 - Reinforced Concrete Approach Slab	2 - Low	1620	sq. ft.	1496	120	4	0
	39.50' X 20.50' X 2 = 1619.50 SF						
331 - Reinforced Concrete Bridge Railing	2 - Low	198	ft.	198	0	0	0
	98.75' X 2 = 197.50'						

PHOTO 1 Elevation, Condition

Description West side.

PHOTO 2 Elevation, Condition

Description East side.

PHOTO 3 Condition

Description Roadway north.

PHOTO 4 Condition

Description Roadway south.

PHOTO 5 Condition

Description North joint and approach slab.

PHOTO 6 Condition

Description South joint and approach slab.

PHOTO 7 Condition

Description Span A facing south.

PHOTO 8 Condition

Description Span A Beam 4.

PHOTO 9 Condition

Description Span A Beam 4.

PHOTO 10 Condition

Description Span B facing north.

PHOTO 11 Condition

Description Span C facing north.

PHOTO 12 Condition

Description Span C Beam 1.

PHOTO 13 Condition

Description South abutment.

PHOTO 14 Condition

Description Pier 2 north side.

PHOTO 15 Condition

Description Pier 2 south side.

PHOTO 16 Condition

Description Pier 3 south side.

PHOTO 17 Condition

Description Pier 3 north side.

PHOTO 18 Condition

Description North abutment.

PHOTO 19 Condition

Description North abutment.

PHOTO 20 Condition

Description US channel facing west through Span B.

Miscellaneous Asset Data

Asset Management

Load Rating 2:

Has the dead load or the structural condition of the primary load carrying members changed since the last inspection? No

Extended Frequency: Submittal Date:

Inspector:

INDOT Reviewer:

This bridge has been accepted into the Extended Frequency Program. Approval Date:

Joints: ** Indicate location, type, and rating of lowest rated joint.*

Transverse A 4
South/West

Comments:

The joints are leaking.

Terminal Joints: **Rating of lowest rated terminal joint.* N

Comments:

Concrete Slopewall: **Rating of lowest rated slopewall.* N

Comments:

Bearings: ** Indicate type, and rating of lowest rated bearing.*

2 - Elastmeric 7

Comments:

Approach Slabs: ** Indicate if present & condition rating.*

1 - Approach Slabs 5 - Fair condition, no settlement, moderate cracking and spalls, crack spacing > .5'

Comments:

Longitudinal and transverse cracking in south slab. Spall in south slab at joint.

Paint: ** Indicate if paint present , year painted & condition rating.*

N - No Paint Not Rated

Comments:

Endangered Species: ** If yes, add one photo to the dropdown field*

Bats: seen or heard under structure? * N - No evidence of bats

Birds/swallows/nests seen? Empty nests present? * N - No Birds and/or Nests Visi

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BRIDGE Culvert Geometry:

Barrel Length:

Height:

Width:

NBI Data come from National Inventory

NBI 113: Scour Critical Bridges	8	NBI 113a Scour Critical Bridges Comments	Scour @ P.#2,#3 Spread footings, NO piles, scour, poor channel details

To Be Completed by Hydraulics

Scour Analysis Status	1-Scour Analysis on file	Scour Analysis Date	10/09/2020	Scour Analysis Determination

Hydraulics Comments

To Be Completed by Bridge Inspection

Scour Critical Safety Status	1-Bridge is NOT scour Critical based on analysis findings	Date of Counter Measure Placed or Field Verified

Bridge Inspectoin Comments "Although the low scour elevation is below the low footing elevation, the bridge will not be
scour critical since the existing footings are keyed into rock."

Scour Delineators installed

LOAD RATING - BRADIN

Load Rating Date: 20-OCT-06

National Bridge Inventory (NBI):

(66B) INVENTORY RATING (H):	32	(31) DESIGN LOAD:	6
(65) INVENTORY RATING METHOD:	3	(70) BRIDGE POSTING:	5
(66) INVENTORY RATING:	51	(41) STRUCTURE OPEN/POSTED/CLOSED:	A
(63) OPERATING RATING METHOD:	3	(66C) TONS POSTED:	
(64) OPERATING RATING:	68	(66D) DATE POSTED/CLOSED:	

Posting Configurations:

Emergency Vehicles:

EV2: LEGAL RF:	2.614
EV3: LEGAL RF:	1.745

2-Axles:

H20-44: LEGAL RF:	2.168
ALTERNATE MILITARY: LEGAL RF:	1.744

3-Axles:

HS20: LEGAL RF:	1.916
AASHTO TYPE 3: LEGAL RF:	2.367

4-Axles:

SU4: LEGAL RF:	1.989
TOLL ROAD LOADING NO. 2: ROUTINE PERMIT RF:	

Other Configurations:

H20-44: DESIGN RF:	1.611
NRL: LEGAL RF:	1.627

5-Axles:

AASHTO TYPE 3S2: LEGAL RF:	2.042
SU5: LEGAL RF:	1.882
TOLL ROAD LOADING NO. 1: ROUTINE PERMIT RF:	

6+-Axles:

AASHTO TYPE 3-3: LEGAL RF:	2.481
LANE TYPE: LEGAL RF:	2.877
SU6: LEGAL RF:	1.744
SPECIAL TOLL ROAD TRUCK: ROUTINE PERMIT RF:	
SU7: LEGAL RF:	1.657
MICHIGAN TRAIN TRUCK NO. 5: ROUTINE PERMIT RF:	
MICHIGAN TRAIN TRUCK NO. 8: ROUTINE PERMIT RF:	
SUPERLOAD-11 AXLES: SPECIAL PERMIT RF:	1.635
SUPERLOAD-13 AXLES: SPECIAL PERMIT RF:	1.619
SUPERLOAD-14 AXLES: SPECIAL PERMIT RF:	1.1
SUPERLOAD-19 AXLES (152.5T): SPECIAL PERMIT RF:	1.466
SUPERLOAD-19 AXLES (240.045T): SPECIAL PERMIT RF:	1.211

Date Reported: 04/10/2019

Priority: Green - 3

Work Code: Approach Repair

Deficiency Description:
Pothole in south slab. 1'x1'

Work Description:

Date Repairs Completed:

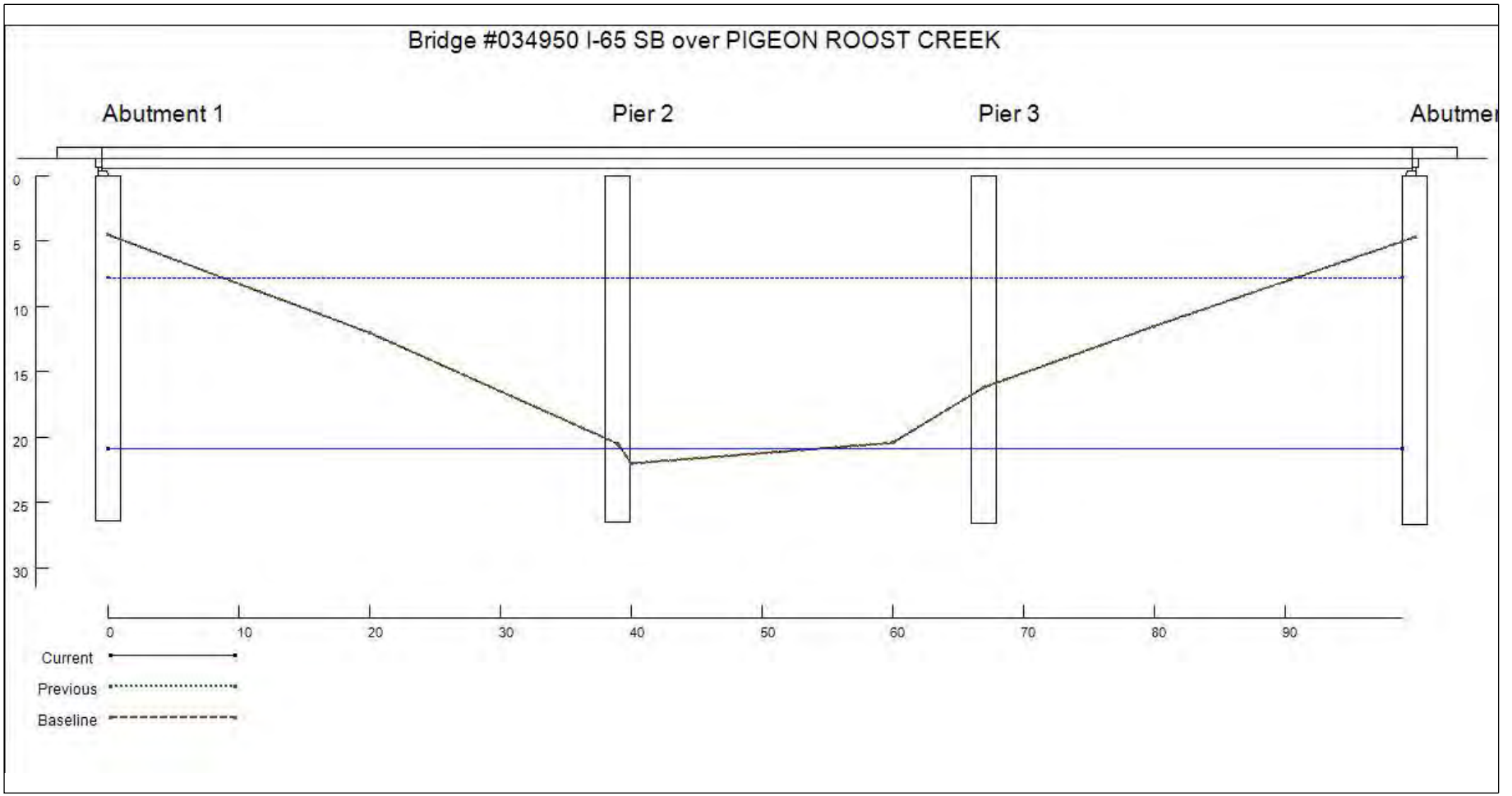
Maintenance Comments:

Stage: Open

PHOTO 1 Description South joint and approach slab.

Channel Measurement

Date of Channel Measurements:	07/06/2017	Number of Fixed Objects in Channel:	4
Distance Measured From:	0	Water Level:	20.83
Depth Measured From:	0	High Water Mark:	7.77
Number of Measurement Points Taken:	8	Measurement Type:	Depth from Reference Point



INDOT BRIDGE INSPECTION DIVISION

SCOUR PLAN OF ACTION

GENERAL INFORMATION

District: 05

NBI Number: **034950** **Facility Carried :** **I-65 SB**

Feature Intersected: **PIGEON ROOST CREEK** **Location:** **04.58 S SR 56**

SCOUR STATUS SUMMARY

Scour Critical Rating: **8** **Substructure Rating:** **7** **Channel and Channel Protection Rating:** **7**

Culvert Rating: **N** **Waterway Adequacy Appraisal:** **7**

Scour/Flood History:

INITIAL SCOUR INSPECTION

Bridge Scour Critical Components:

Trigger:

Initial Scour Inspection following Trigger(Date/Findings):

MONITORING PLAN

Monitoring Required after Initial Scour Inspection (Y/N):

Reason for Bridge Monitoring:

If monitoring is required after initial inspection, the Bridge Scour Monitoring Log shall be used.

Person or Agency that will monitor the bridge:

Monitoring Methodology:

Monitoring History/Comments:

Monitoring Termination Criteria:

Bridge Owner Contact Information (Primary):

COUNTERMEASURE INFORMATION AND RECOMMENDATIONS

Existence/Type of Countermeasures Present:

Countermeasures Observations:

Countermeasures Recommendations:

EMERGENCY TRAFFIC INFORMATION AND RECOMMENDATIONS

Closure Plan:

Suggested Detour Route:

Re-opening Procedures:

Provide recommendations as needed, such as reduced routine inspection frequency, need for future underwater inspections, countermeasure recommendations, and other comments.

Scour POA Author (Name/Title) **Date**

Scour POA Approved (Name/Title) **Date**

Scour POA Updated (Name/Title) **Date**

NBI 008: Structure Number	034950	**NBI 007: Facility Carried by Structure**	I-65 SB
NBI 006: Feature Intersected	PIGEON ROOST CREEK	**NBI 009: Location**	04.58 S SR 56

Date/Time | Inspectors Name | Type of Monitoring

Bridge Condition Due to Scour

Actions Taken

Comments/Conclusions

File Description	Pier 3 south side.
File Type Category	Condition

File Description	Pier 2 south side.
File Type Category	Condition

File Description	US channel facing west through Span B.
File Type Category	Condition

File Description	Span A facing south.
File Type Category	Condition

File Description	Span A Beam 4.
File Type Category	Condition

File Description	East side.
File Type Category	Condition, Elevation

File Description	Pier 2 north side.
File Type Category	Condition

File Description	Span B facing north.
File Type Category	Condition

File Description	Span A Beam 4.
File Type Category	Condition

File Description	South abutment.
File Type Category	Condition

File Description	West side.
File Type Category	Condition, Elevation

File Description	Roadway north.
File Type Category	Condition

File Description	South joint and approach slab.
File Type Category	Condition

File Description	North joint and approach slab.
File Type Category	Condition

File Description	North abutment.
File Type Category	Condition

File Description	Span C Beam 1.
File Type Category	Condition

File Description	Pier 3 north side.
File Type Category	Condition

File Description	Span C facing north.
File Type Category	Condition

File Description	North abutment.
File Type Category	Condition

File Description	Roadway south.
File Type Category	Condition

Bridge Inspection Report

I65-023-04227 A
COUNTY LINE RD
over
I-65

Inspection Date: 04/14/2021

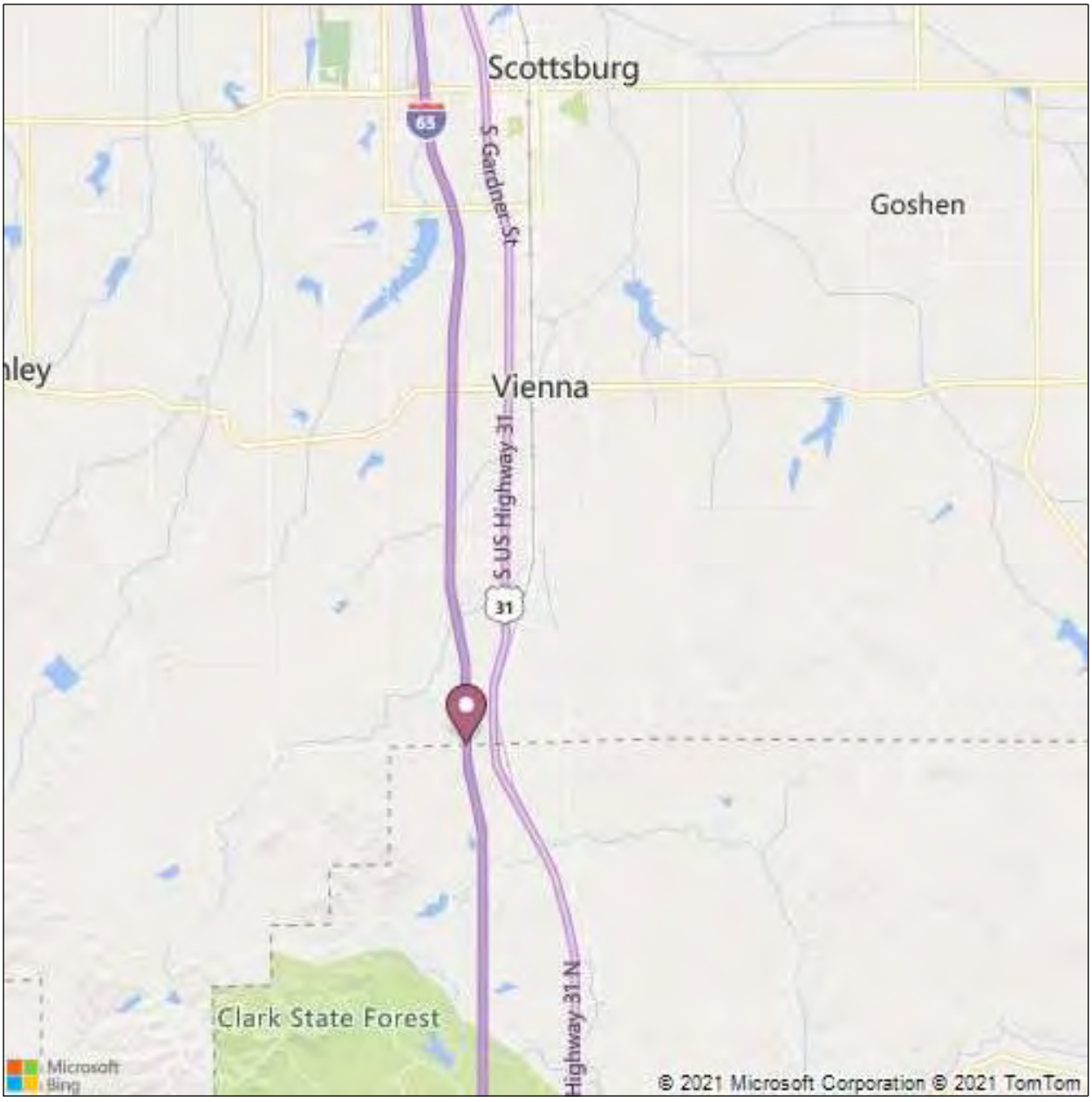
Inspected By: Stephen F. Hurst

Inspection Type(s): Routine

TABLE OF CONTENTS

Latitude: 38.60507

Longitude: -85.78148



Latitude: 38.60507

Longitude: -85.78148

General Inspection Notes: Overall the structure is in satisfactory condition.

Bridge History:
1959 : New Bridge : DES # Unknown - Contract # B-4622
1986 : Rehab A : Bridge Deck Overlay 1 : DES # 8348070 - Contract # B-15051
2024 : Replace Superstructure : DES # 2001603 - Contract # R-41529 - Letting Date 7/12/2023

Miscellaneous:
Changed Item 26 FUNCTIONAL CLASSIFICATION OF INVENTORY ROUTE from 09-Rural-Local to 08-Rural-Minor Collector due to updated classification maps.

County updated to Scott base on 17 digit route id of facility carried 37200000002000001 KF 01/08/2018

Maintenance/Deficiencies:
There are no open maintenance items.

IDENTIFICATION

(1) STATE CODE:	185 - Indiana
(8) STRUCTURE:	034930
(5 A-B-C-D-E) INV. ROUTE:	1 - 4 - 2 - 00000 - 0
(2) HIGHWAY AGENCY DISTRICT:	05 - Seymour
(3) COUNTY CODE:	072 - SCOTT
(4) PLACE CODE:	00000 - N/A
(6) FEATURES INTERSECTED:	I-65
(7) FACILITY CARRIED:	COUNTY LINE RD
(9) LOCATION:	04.46 N SR 160
(11) MILEPOINT:	0000.000

(12) BASE HIGHWAY NETWORK:	0
(13A) INVENTORY ROUTE:	
(13B) SUBROUTE NUMBER:	
(16) LATITUDE:	38.60507
(17) LONGITUDE:	-85.78148
(98) BORDER	
A) STATE NAME:	
B) PERCENT	%
(99) BORDER BRIDGE STRUCT. NO:	

STRUCTURE TYPE AND MATERIAL

(43) STRUCTURE TYPE, MAIN:	
A) KIND OF MATERIAL/DESIGN:	2 - Concrete continuous
B) TYPE OF DESIGN/CONSTR:	02 - Stringer/Multi-beam or Girder
(44) STRUCTURE TYPE, APPROACH SPANS:	
A) KIND OF MATERIAL/DESIGN:	0 - Other
B) TYPE OF DESIGN/CONSTR:	00 - Other

(45) NUMBER OF SPANS IN MAIN UNIT:	004
(46) NUMBER OF APPROACH SPANS:	0000
(107) DECK STRUCTURE TYPE:	1 - Concrete Cast-in-Place
(108) WEARING SURFACE/PROT SYS:	
A) WEARING SURFACE:	3 - Latex Concrete or similar additive
B) DECK MEMBRANE:	0 - None
C) DECK PROTECTION:	0 - None

AGE OF SERVICE

(27) YEAR BUILT:	1959
(106) YEAR RECONSTRUCTED:	1986
(42) TYPE OF SERVICE:	
A) ON BRIDGE:	5 - Highway-pedestrian
B) UNDER BRIDGE:	1 - Highway, with or w/out pedestrian

(28) LANES:	
A) ON BRIDGE:	02
B) UNDER BRIDGE:	04
(29) AVERAGE DAILY TRAFFIC:	000102
(30) YEAR OF AVERAGE DAILY TRAFFIC:	2004
(109) AVERAGE DAILY TRUCK TRAFFIC:	10 %
(19) BYPASS DETOUR LENGTH:	007 MI

GEOMETRIC DATA

(48) LENGTH OF MAX SPAN:	0066.0 FT
(49) STRUCTURE LENGTH:	00210.0 FT
(50) CURB/SIDEWALK WIDTHS:	
A) LEFT	00.7 FT
B) RIGHT:	00.7 FT
(51) BRDG RDWY WIDTH CURB-TO-CURB:	024.0 FT
(52) DECK WIDTH, OUT-TO-OUT:	029.4 FT
(32) APPROACH ROADWAY	024.0 FT
(33) BRIDGE MEDIAN:	0 - No median
(34) SKEW:	00 DEG
(35) STRUCTURE FLARED:	0 - No flare
(10) INV RTE, MIN VERT CLEARANCE:	99.99 FT
(47) TOT HORIZ CLEARANCE:	024.0 FT
(53) VERT CLEAR OVER BR RDWY:	99.99 FT
(54) MIN VERTICAL UNDERCLEARANCE:	
A) REFERENCE FEATURE:	H
B) MIN VERT UNDERCLEAR:	14.4 FT
(55) LATERAL UNDERCLEARANCE RIGHT:	
A) REFERENCE FEATURE:	H
B) MIN LATERAL UNDERCLEAR:	010.8 FT
(56) MIN LATERAL UNDERCLEAR ON LEFT:	027.3 FT

INSPECTIONS

(90) INSPECTION DATE:	04/14/2021
(92) CRITICAL FEATURE INSPECTION:	
A) FRACTURE CRITICAL REQUIRED/FREQUENCY:	N
B) UNDERWATER INSPECTION REQUIRED/FREQUENCY:	N
C) OTHER SPECIAL INSPECTION REQUIRED/FREQUENCY:	N
(91) DESIGNATED INSPECTION FREQUENCY:	24 MONTHS
(93) CRITICAL FEATURE INSPECTION DATE:	
A) FRACTURE CRITICAL DATE:	
B) UNDERWATER INSP DATE:	
C) OTHER SPECIAL INSP DATE:	

CONDITION

(58) DECK:	7 - Good Condition (some minor problems)
(58.01) WEARING SURFACE:	7 - Good Condition
(59) SUPERSTRUCTURE:	6 - Satisfactory Condition (minor deterioration)
(60) SUBSTRUCTURE:	6 - Satisfactory Condition (minor deterioration)
(61) CHANNEL/CHANNEL PROTECTION:	N - Not Applicable
(62) CULVERTS:	N - Not Applicable

CONDITION COMMENTS

(58) DECK: 7 - Good Condition (some minor problems)

Comments:
There are minor transverse cracks with efflorescence space greater than 10' on the underside of the deck.

Barrier wall: There is minor cracking in both barrier walls.

(58.01) WEARING SURFACE: 7 - Good Condition

Comments:
There is a minor spall at the south end of the west joint.

(59) SUPERSTRUCTURE: 6 - Satisfactory Condition (minor deterioration)

Comments:
Span B: Beam 1 has multiple spots with small spalls and delamination on the north side. Beam 4 has a small spall in bottom flange. South vertical side of south coping/curb has cracking and delamination.

(60) SUBSTRUCTURE: 6 - Satisfactory Condition (minor deterioration)

Comments:
Abutment 1: Minor cracks in backwall.
Pier 2: There is spalling on all 3 columns with the worst on column 3.
Pier 4: There is spalling on column 2.
Abutment 4: Minor cracks in backwall.

(61) CHANNEL/CHANNEL PROTECTION: N - Not Applicable

Comments:

(62) CULVERTS: N - Not Applicable

Comments:

LOAD RATING AND POSTING

(31) DESIGN LOAD:	5 - HS 20	(66) INVENTORY RATING:	32
(70) BRIDGE POSTING	5 - Equal to or above legal loads	(65) INVENTORY RATING METHOD:	1 - Load Factor (LF)
		(66B) INVENTORY RATING (H):	26
(41) STRUCTURE OPEN/POSTED/CLOSED:	A - Open	(66C) TONS POSTED :	
		(66D) DATE POSTED/CLOSED:	
(64) OPERATING RATING:	54		
(63) OPERATING RATING METHOD:	1 - Load Factor (LF)		

APPRAISAL

SUFFICIENCY RATING:	88.4	(36) TRAFFIC SAFETY FEATURE:	
STATUS:	2	36A) BRIDGE RAILINGS:	1
(67) STRUCTURAL EVALUATION:	6	36B) TRANSITIONS:	1
(68) DECK GEOMETRY:	5	36C) APPROACH GUARDRAIL:	1
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL:	3	36D) APPROACH GUARDRAIL ENDS:	1

(71) WATERWAY ADEQUACY: N - Not Applicable
Comments:

(72) APPROACH ROADWAY ALIGNMENT: 8 - Equal to present desirable criteria
Comments:

(113) SCOUR CRITICAL BRIDGES: N - Not over waterway
Comments:

CLASSIFICATION

(20) TOLL:	3 - On Free Road	(21) MAINT. RESPONSIBILITY:	01 - State Highway Agency
(22) OWNER:	01 - State Highway Agency	(26) FUNCTIONAL CLASS OF INVENTORY RTE:	08 - Rural - Minor Collector
(37) HISTORICAL SIGNIFICANCE:	5 - Not eligible	(100) STRAHNET HIGHWAY:	Not a STRAHNET route
(101) PARALLEL STRUCTURE:	N - No parallel structure	(102) DIRECTION OF TRAFFIC:	2-way traffic
(103) TEMPORARY STRUCTURE:		(104) HIGHWAY SYSTEM OF INVENTORY ROUTE:	0 - Structure/Route is NOT on NHS
(105) FEDERAL LANDS HIGHWAYS:	0-Not Applicable	(110) DESIGNATED NATIONAL NETWORK:	Inventory route not on network
(112) NBIS BRIDGE LENGTH:	Yes		

NAVIGATION DATA

(38) NAVIGATION CONTROL:	N - Not applicable, no waterway	(39) NAVIGATION VERTICAL CLEAR:	000.0 FT
(111) PIER OR ABUTMENT PROTECTION:		(116) MINIMUM NAVIGATION VERT. CLEARANCE, VERT. LIFT BRIDGE:	FT
		(40) NAV HORIZONTAL CLEARANCE:	0000.0 FT

PROPOSED IMPROVEMENTS

(75A) TYPE OF WORK:		(95) ROADWAY IMPROVEMENT COST:	$ 000000
(75B) WORK DONE BY:		(96) TOTAL PROJECT COST:	$ 000000
(76) LENGTH OF IMPROVEMENT:	00000.0 FT	(97) YR OF IMPROVEMENT COST EST:	
(94) BRIDGE IMPROVEMENT COST:	$ 000000	(114) FUTURE AVG DAILY TRAFFIC:	000171
		(115) YR OF FUTURE ADT:	2033

- No items available

PHOTO 1 Elevation, Condition

Description South side.

PHOTO 2 Elevation, Condition

Description South side.

PHOTO 3 Elevation, Condition

Description North side.

PHOTO 4 Condition

Description Roadway east.

PHOTO 5 Condition

Description West joint.

PHOTO 6 Condition

Description East joint.

PHOTO 7 Condition

Description Span A facing west.

PHOTO 8 Condition

Description Span B facing east.

PHOTO 9 Condition

Description Span B south coping and beam.

PHOTO 10 Condition

Description Span C facing west.

PHOTO 11 Condition

Description Span D facing east.

PHOTO 12 Condition

Description West abutment.

PHOTO 13 Condition

Description Pier 2 east side.

PHOTO 14 Condition

Description Pier 3 east side.

PHOTO 15 Condition

Description Pier 4 facing east.

PHOTO 16 Condition, Other

Description Pier 4 column 2.

PHOTO 17 Condition

Description East abutment.

Miscellaneous Asset Data

Asset Management

Load Rating 2:

Has the dead load or the structural condition of the primary load carrying members changed since the last inspection? No

Extended Frequency: Submittal Date:

Inspector:

INDOT Reviewer:

This bridge has been accepted into the Extended Frequency Program. Approval Date:

Joints: ** Indicate location, type, and rating of lowest rated joint.*

Transverse A 7
North/East

Comments:

The joints are in good condition.

Terminal Joints: **Rating of lowest rated terminal joint.* N

Comments:

Concrete Slopewall: **Rating of lowest rated slopewall.* N

Comments:

Bearings: ** Indicate type, and rating of lowest rated bearing.*

1 - Steel 6

Comments:

There is corrosion on the bearings.

Approach Slabs: ** Indicate if present & condition rating.*

N - No Approach Slabs

Comments:

Paint: ** Indicate if paint present , year painted & condition rating.*

N - No Paint Not Rated

Comments:

Endangered Species: ** If yes, add one photo to the dropdown field*

Bats: seen or heard under structure? * N - No evidence of bats

Birds/swallows/nests seen? Empty nests present? * N - No Birds and/or Nests Visi

BRIDGE Culvert Geometry:

Barrel Length:

Height:

Width:

NBI Data come from National Inventory

NBI 113: Scour Critical Bridges	N	NBI 113a Scour Critical Bridges Comments

To Be Completed by Hydraulics

Scour Analysis Status	N/A-Bridge not over water	Scour Analysis Date	Scour Analysis Determination

Hydraulics Comments

To Be Completed by Bridge Inspection

Scour Critical Safety Status

Date of Counter Measure Placed or Field Verified

Bridge Inspectoin Comments

Scour Delineators installed

LOAD RATING - BRADIN

Load Rating Date: 12-FEB-09

National Bridge Inventory (NBI):

(66B) INVENTORY RATING (H):	26	(31) DESIGN LOAD:	5
(65) INVENTORY RATING METHOD:	1	(70) BRIDGE POSTING:	5
(66) INVENTORY RATING:	32	(41) STRUCTURE OPEN/POSTED/CLOSED:	A
(63) OPERATING RATING METHOD:	1	(66C) TONS POSTED:	
(64) OPERATING RATING:	54	(66D) DATE POSTED/CLOSED:	

Posting Configurations:

Emergency Vehicles:

EV2: LEGAL RF:	1.815
EV3: LEGAL RF:	1.221

2-Axles:

H20-44: LEGAL RF:	2.201
ALTERNATE MILITARY: LEGAL RF:	1.997

3-Axles:

HS20: LEGAL RF:	1.51
AASHTO TYPE 3: LEGAL RF:	2.119

4-Axles:

SU4: LEGAL RF:	1.897
TOLL ROAD LOADING NO. 2: ROUTINE PERMIT RF:	

Other Configurations:

H20-44: DESIGN RF:	1.318
NRL: LEGAL RF:	1.331

5-Axles:

AASHTO TYPE 3S2: LEGAL RF:	1.933
SU5: LEGAL RF:	1.692
TOLL ROAD LOADING NO. 1: ROUTINE PERMIT RF:	

6+-Axles:

AASHTO TYPE 3-3: LEGAL RF:	2.066
LANE TYPE: LEGAL RF:	
SU6: LEGAL RF:	1.524
SPECIAL TOLL ROAD TRUCK: ROUTINE PERMIT RF:	
SU7: LEGAL RF:	1.392
MICHIGAN TRAIN TRUCK NO. 5: ROUTINE PERMIT RF:	
MICHIGAN TRAIN TRUCK NO. 8: ROUTINE PERMIT RF:	
SUPERLOAD-11 AXLES: SPECIAL PERMIT RF:	.914
SUPERLOAD-13 AXLES: SPECIAL PERMIT RF:	1
SUPERLOAD-14 AXLES: SPECIAL PERMIT RF:	.742
SUPERLOAD-19 AXLES (152.5T): SPECIAL PERMIT RF:	.851
SUPERLOAD-19 AXLES (240.045T): SPECIAL PERMIT RF:	.733

Channel Measurement

Date of Channel Measurements:

Distance Measured From:

Depth Measured From:

Number of Measurement Points Taken:

Number of Fixed Objects in Channel:

Water Level:

High Water Mark:

Measurement Type:

INDOT BRIDGE INSPECTION DIVISION

SCOUR PLAN OF ACTION

GENERAL INFORMATION

District: 05

NBI Number: 034930 **Facility Carried :** COUNTY LINE RD

Feature Intersected: I-65 **Location:** 04.46 N SR 160

SCOUR STATUS SUMMARY

Scour Critical Rating: N **Substructure Rating:** 6 **Channel and Channel Protection Rating:** N

Culvert Rating: N **Waterway Adequacy Appraisal:** N

Scour/Flood History:

INITIAL SCOUR INSPECTION

Bridge Scour Critical Components:

Trigger:

Initial Scour Inspection following Trigger(Date/Findings):

MONITORING PLAN

Monitoring Required after Initial Scour Inspection (Y/N):

Reason for Bridge Monitoring:

If monitoring is required after initial inspection, the Bridge Scour Monitoring Log shall be used.

Person or Agency that will monitor the bridge:

Monitoring Methodology:

Monitoring History/Comments:

Monitoring Termination Criteria:

Bridge Owner Contact Information (Primary):

COUNTERMEASURE INFORMATION AND RECOMMENDATIONS

Existence/Type of Countermeasures Present:

Countermeasures Observations:

Countermeasures Recommendations:

EMERGENCY TRAFFIC INFORMATION AND RECOMMENDATIONS

Closure Plan:

Suggested Detour Route:

Re-opening Procedures:

Provide recommendations as needed, such as reduced routine inspection frequency, need for future underwater inspections, countermeasure recommendations, and other comments.

Scour POA Author (Name/Title) **Date**

Scour POA Approved (Name/Title) **Date**

Scour POA Updated (Name/Title) **Date**

NBI 008: Structure Number	034930	**NBI 007: Facility Carried by Structure**	COUNTY LINE RD
NBI 006: Feature Intersected	I-65	**NBI 009: Location**	04.46 N SR 160

Date/Time

Inspectors Name

Type of Monitoring

Bridge Condition Due to Scour

Actions Taken

Comments/Conclusions

File Description	Pier 4 column 2.
File Type Category	Condition, Other

File Description	North side.
File Type Category	Condition, Elevation

File Description	South side.
File Type Category	Condition, Elevation

File Description	Span C facing west.
File Type Category	Condition

File Description	Span B south coping and beam.
File Type Category	Condition

File Description	Pier 2 east side.
File Type Category	Condition

File Description	Span B facing east.
File Type Category	Condition

File Description	South side.
File Type Category	Condition, Elevation

File Description	Pier 4 facing east.
File Type Category	Condition

File Description	Pier 3 east side.
File Type Category	Condition

File Description	West abutment.
File Type Category	Condition

File Description	Roadway east.
File Type Category	Condition

File Description	Span A facing west.
File Type Category	Condition

File Description	West joint.
File Type Category	Condition

File Description	East joint.
File Type Category	Condition

File Description	East abutment.
File Type Category	Condition

File Description	Span D facing east.
File Type Category	Condition

Bridge Inspection Report

I65-028-04232 A
LAKE ROAD
over
I-65

Inspection Date: 04/14/2021

Inspected By: Chris Everman

Inspection Type(s): Routine

TABLE OF CONTENTS

Latitude: 38.67094

Longitude: -85.78355

Latitude: 38.67094

Longitude: -85.78355

History:
The bridge was built in 1959 under Contract B-4598.
The bridge received a deck overlay in 1986 under Contract B-15051, Des # 8348090.

The bridge is to have a superstructure replacement under Contract R-41529, Des # 2001607, due to let on 7/12/25023.

Condition:

Superstructure is in satisfactory condition with some minor cracking and spalling in the girders. There is some cracking and spalling with exposed rebar on the interior bents. There is spalling at the joints with bituminous patches and some collision damage to the base of the north barrier wall in two locations.

Inventory Items:

Changed Item 26 FUNCTIONAL CLASSIFICATION OF INVENTORY ROUTE from 07-Rural-Major Collector to 17-Urban-Collector due to updated classification maps.

IDENTIFICATION

(1) STATE CODE:	185 - Indiana
(8) STRUCTURE:	034970
(5 A-B-C-D-E) INV. ROUTE:	1 - 4 - 1 - 00000 - 0
(2) HIGHWAY AGENCY DISTRICT:	05 - Seymour
(3) COUNTY CODE:	072 - SCOTT
(4) PLACE CODE:	00000 - N/A
(6) FEATURES INTERSECTED:	I-65
(7) FACILITY CARRIED:	LAKE ROAD
(9) LOCATION:	01.06 S SR 56
(11) MILEPOINT:	0000.000

(12) BASE HIGHWAY NETWORK:	0
(13A) INVENTORY ROUTE:	
(13B) SUBROUTE NUMBER:	
(16) LATITUDE:	38.67094
(17) LONGITUDE:	-85.78355
(98) BORDER	
A) STATE NAME:	
B) PERCENT	%
(99) BORDER BRIDGE STRUCT. NO:	

STRUCTURE TYPE AND MATERIAL

(43) STRUCTURE TYPE, MAIN:	
A) KIND OF MATERIAL/DESIGN:	2 - Concrete continuous
B) TYPE OF DESIGN/CONSTR:	02 - Stringer/Multi-beam or Girder
(44) STRUCTURE TYPE, APPROACH SPANS:	
A) KIND OF MATERIAL/DESIGN:	0 - Other
B) TYPE OF DESIGN/CONSTR:	00 - Other

(45) NUMBER OF SPANS IN MAIN UNIT:	004
(46) NUMBER OF APPROACH SPANS:	0000
(107) DECK STRUCTURE TYPE:	1 - Concrete Cast-in-Place
(108) WEARING SURFACE/PROT SYS:	
A) WEARING SURFACE:	3 - Latex Concrete or similar additive
B) DECK MEMBRANE:	0 - None
C) DECK PROTECTION:	0 - None

AGE OF SERVICE

(27) YEAR BUILT:	1959
(106) YEAR RECONSTRUCTED:	1986
(42) TYPE OF SERVICE:	
A) ON BRIDGE:	1 - Highway
B) UNDER BRIDGE:	1 - Highway, with or w/out pedestrian

(28) LANES:	
A) ON BRIDGE:	02
B) UNDER BRIDGE:	04
(29) AVERAGE DAILY TRAFFIC:	001550
(30) YEAR OF AVERAGE DAILY TRAFFIC:	2004
(109) AVERAGE DAILY TRUCK TRAFFIC:	10 %
(19) BYPASS DETOUR LENGTH:	004 MI

GEOMETRIC DATA

(48) LENGTH OF MAX SPAN:	0068.0	FT	(35) STRUCTURE FLARED:	0 - No flare	
(49) STRUCTURE LENGTH:	00223.0	FT	(10) INV RTE, MIN VERT CLEARANCE:	99.99	FT
(50) CURB/SIDEWALK WIDTHS:			(47) TOT HORIZ CLEARANCE:	024.0	FT
A) LEFT	00.0	FT	(53) VERT CLEAR OVER BR RDWY:	99.99	FT
B) RIGHT:	00.0	FT	(54) MIN VERTICAL UNDERCLEARANCE:		
(51) BRDG RDWY WIDTH CURB-TO-CURB:	024.0	FT	A) REFERENCE FEATURE:	H	
(52) DECK WIDTH, OUT-TO-OUT:	029.4	FT	B) MIN VERT UNDERCLEAR:	15.04	FT
(32) APPROACH ROADWAY	024.0	FT	(55) LATERAL UNDERCLEARANCE RIGHT:		
(33) BRIDGE MEDIAN:	0 - No median		A) REFERENCE FEATURE:	H	
			B) MIN LATERAL UNDERCLEAR:	011.0	FT
(34) SKEW:	16	DEG	(56) MIN LATERAL UNDERCLEAR ON LEFT:	029.0	FT

INSPECTIONS

(90) INSPECTION DATE:	04/14/2021	(91) DESIGNATED INSPECTION FREQUENCY:	24 MONTHS
(92) CRITICAL FEATURE INSPECTION:		(93) CRITICAL FEATURE INSPECTION DATE:	
A) FRACTURE CRITICAL REQUIRED/FREQUENCY:	N	A) FRACTURE CRITICAL DATE:	
B) UNDERWATER INSPECTION REQUIRED/FREQUENCY:	N	B) UNDERWATER INSP DATE:	
C) OTHER SPECIAL INSPECTION REQUIRED/FREQUENCY:	N	C) OTHER SPECIAL INSP DATE:	

CONDITION

(58) DECK:	7 - Good Condition (some minor problems)	(60) SUBSTRUCTURE:	6 - Satisfactory Condition (minor deterioration)
(58.01) WEARING SURFACE:	6 - Satisfactory Condition	(61) CHANNEL/CHANNEL PROTECTION:	N - Not Applicable
(59) SUPERSTRUCTURE:	6 - Satisfactory Condition (minor deterioration)	(62) CULVERTS:	N - Not Applicable

CONDITION COMMENTS

(58) DECK: 7 - Good Condition (some minor problems)

Comments:
Minor vertical cracking in the parapet walls with several spalls in the bottom of the north wall.

(58.01) WEARING SURFACE: 6 - Satisfactory Condition

Comments:
Spalling and bituminous patching the length of both joints. The spalls have been patched with bituminous material.

(59) SUPERSTRUCTURE: 6 - Satisfactory Condition (minor deterioration)

Comments:
General: Light vertical cracks in girders at about five feet from piers on each side of piers. Pack rust on bearing plates. There is some minor cracking and spalls in Beam 1 in Span C over the median and west shoulder.

(60) SUBSTRUCTURE: 6 - Satisfactory Condition (minor deterioration)

Comments:
General: Minor cracking in backwalls, previous spalls have been patched and sealed.
Pier 2: Small spall in column 1. 2' vertical spall with exposed rebar in column 2. 2' vertical crack in column 3.
Pier 3: Spall with exposed rebar in column 3.

(61) CHANNEL/CHANNEL PROTECTION: N - Not Applicable

Comments:

(62) CULVERTS: N - Not Applicable

Comments:

LOAD RATING AND POSTING

(31) DESIGN LOAD:	5 - HS 20	(66) INVENTORY RATING:	31
(70) BRIDGE POSTING	5 - Equal to or above legal loads	(65) INVENTORY RATING METHOD:	1 - Load Factor (LF)
		(66B) INVENTORY RATING (H):	22
(41) STRUCTURE OPEN/POSTED/CLOSED:	A - Open	(66C) TONS POSTED :	
		(66D) DATE POSTED/CLOSED:	
(64) OPERATING RATING:	52		
(63) OPERATING RATING METHOD:	1 - Load Factor (LF)		

APPRAISAL

SUFFICIENCY RATING:	77.5	(36) TRAFFIC SAFETY FEATURE:	
STATUS:	0	36A) BRIDGE RAILINGS:	1
(67) STRUCTURAL EVALUATION:	6	36B) TRANSITIONS:	1
(68) DECK GEOMETRY:	4	36C) APPROACH GUARDRAIL:	1
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL:	4	36D) APPROACH GUARDRAIL ENDS:	1

(71) WATERWAY ADEQUACY: N - Not Applicable
Comments:

(72) APPROACH ROADWAY ALIGNMENT: 8 - Equal to present desirable criteria
Comments:

(113) SCOUR CRITICAL BRIDGES: N - Not over waterway
Comments:

CLASSIFICATION

(20) TOLL:	3 - On Free Road	(21) MAINT. RESPONSIBILITY:	01 - State Highway Agency
(22) OWNER:	01 - State Highway Agency	(26) FUNCTIONAL CLASS OF INVENTORY RTE:	17 - Urban - Collector
(37) HISTORICAL SIGNIFICANCE:	5 - Not eligible	(100) STRAHNET HIGHWAY:	Not a STRAHNET route
(101) PARALLEL STRUCTURE:	N - No parallel structure	(102) DIRECTION OF TRAFFIC:	2-way traffic
(103) TEMPORARY STRUCTURE:		(104) HIGHWAY SYSTEM OF INVENTORY ROUTE:	0 - Structure/Route is NOT on NHS
(105) FEDERAL LANDS HIGHWAYS:	0-Not Applicable	(110) DESIGNATED NATIONAL NETWORK:	Inventory route not on network
(112) NBIS BRIDGE LENGTH:	Yes		

NAVIGATION DATA

(38) NAVIGATION CONTROL:	N - Not applicable, no waterway	(39) NAVIGATION VERTICAL CLEAR:	000.0 FT
(111) PIER OR ABUTMENT PROTECTION:		(116) MINIMUM NAVIGATION VERT. CLEARANCE, VERT. LIFT BRIDGE:	FT
		(40) NAV HORIZONTAL CLEARANCE:	0000.0 FT

PROPOSED IMPROVEMENTS

(75A) TYPE OF WORK:		(95) ROADWAY IMPROVEMENT COST:	$ 000000
(75B) WORK DONE BY:		(96) TOTAL PROJECT COST:	$ 000000
(76) LENGTH OF IMPROVEMENT:	00000.0 FT	(97) YR OF IMPROVEMENT COST EST:	
(94) BRIDGE IMPROVEMENT COST:	$ 000000	(114) FUTURE AVG DAILY TRAFFIC:	002589
		(115) YR OF FUTURE ADT:	2030

PHOTO 1 Condition

Description West Joint facing South

PHOTO 2 Condition

Description Deck facing East

PHOTO 3 Condition

Description Damage to North Barrier Rail Mid Span

PHOTO 4 Condition

Description Damage to North Barrier Rail over Span C facing East

PHOTO 5 Condition

Description Deck facing West

PHOTO 6 Condition, Maintenance - Bridge

Description East Joint facing South

PHOTO 7 Elevation, Condition

Description Side facing South

PHOTO 8 Condition

Description Abutment #1 facing West

PHOTO 9 Condition

Description Underside Span A facing West

PHOTO 10 Condition

Description Bent #2 facing East

PHOTO 11 Condition

Description Spall West Side Bent #2 Center Column

PHOTO 12 Condition

Description Bent #2 facing Southwest

PHOTO 13 Condition

Description Underside Span B facing East

PHOTO 14 Condition

Description Bent #3 facing East

PHOTO 15 Condition

Description Bent #3 facing West

PHOTO 16 Condition

Description Underside Span C facing West

PHOTO 17 Condition

Description Minor Spalls and Cracks in Beam #1 Span C

PHOTO 18 Condition

Description Bent #4 facing Northeast

PHOTO 19 Condition

Description Bent #4 facing West

PHOTO 20 Condition

Description Underside Span D facing East

PHOTO 21 Condition

Description Abutment #5 facing East

PHOTO 22 Other, Maintenance - Bridge

Description Erosion under Span D facing North

PHOTO 23 Elevation, Condition

Description Side facing North

Miscellaneous Asset Data

Asset Management

Load Rating 2:

Has the dead load or the structural condition of the primary load carrying members changed since the last inspection? No

Extended Frequency: Submittal Date:

Inspector:

INDOT Reviewer:

This bridge has been accepted into the Extended Frequency Program. Approval Date:

Joints: ** Indicate location, type, and rating of lowest rated joint.*

Transverse South/West	A	4 - Poor Condition, leaking, noising damage, areas of adhesion loss

Comments:

Spalls with damage to joint material. West joint is mostly patched over with bituminous material.

Terminal Joints: **Rating of lowest rated terminal joint.* N

Comments:

Concrete Slopewall: **Rating of lowest rated slopewall.* N

Comments:

Bearings: ** Indicate type, and rating of lowest rated bearing.*

1 - Steel 6

Comments:

Approach Slabs: ** Indicate if present & condition rating.*

N - No Approach Slabs

Comments:

Paint: ** Indicate if paint present , year painted & condition rating.*

N - No Paint Not Rated

Comments:

Endangered Species: ** If yes, add one photo to the dropdown field*

Bats: seen or heard under structure? * N - No evidence of bats

Birds/swallows/nests seen? Empty nests present? * N - No Birds and/or Nests Visi

BRIDGE Culvert Geometry:

Barrel Length:

Height:

Width:

NBI Data come from National Inventory

NBI 113: Scour Critical Bridges	N	NBI 113a Scour Critical Bridges Comments

To Be Completed by Hydraulics

Scour Analysis Status	N/A-Bridge not over water	Scour Analysis Date	Scour Analysis Determination

Hydraulics Comments

To Be Completed by Bridge Inspection

Scour Critical Safety Status	Date of Counter Measure Placed or Field Verified

Bridge Inspectoin Comments

Scour Delineators installed

LOAD RATING - BRADIN

Load Rating Date: 02-MAR-09

National Bridge Inventory (NBI):

(66B) INVENTORY RATING (H):	22	(31) DESIGN LOAD:	5
(65) INVENTORY RATING METHOD:	1	(70) BRIDGE POSTING:	5
(66) INVENTORY RATING:	31	(41) STRUCTURE OPEN/POSTED/CLOSED:	A
(63) OPERATING RATING METHOD:	1	(66C) TONS POSTED:	
(64) OPERATING RATING:	52	(66D) DATE POSTED/CLOSED:	

Posting Configurations:

Emergency Vehicles:

EV2: LEGAL RF:	1.694
EV3: LEGAL RF:	1.159

2-Axles:

H20-44: LEGAL RF:	1.848
ALTERNATE MILITARY: LEGAL RF:	1.641

3-Axles:

HS20: LEGAL RF:	1.46
AASHTO TYPE 3: LEGAL RF:	1.937

4-Axles:

SU4: LEGAL RF:	1.732
TOLL ROAD LOADING NO. 2: ROUTINE PERMIT RF:	

Other Configurations:

H20-44: DESIGN RF:	1.113
NRL: LEGAL RF:	1.488

5-Axles:

AASHTO TYPE 3S2: LEGAL RF:	1.899
SU5: LEGAL RF:	1.604
TOLL ROAD LOADING NO. 1: ROUTINE PERMIT RF:	

6+-Axles:

AASHTO TYPE 3-3: LEGAL RF:	1.948
LANE TYPE: LEGAL RF:	
SU6: LEGAL RF:	1.609
SPECIAL TOLL ROAD TRUCK: ROUTINE PERMIT RF:	
SU7: LEGAL RF:	1.53
MICHIGAN TRAIN TRUCK NO. 5: ROUTINE PERMIT RF:	
MICHIGAN TRAIN TRUCK NO. 8: ROUTINE PERMIT RF:	
SUPERLOAD-11 AXLES: SPECIAL PERMIT RF:	.914
SUPERLOAD-13 AXLES: SPECIAL PERMIT RF:	.916
SUPERLOAD-14 AXLES: SPECIAL PERMIT RF:	.713
SUPERLOAD-19 AXLES (152.5T): SPECIAL PERMIT RF:	.917
SUPERLOAD-19 AXLES (240.045T): SPECIAL PERMIT RF:	.733

Date Reported: 04/21/2021

Priority: Green - 3

Work Code: Joint Repair

Deficiency Description:

Spalls at the joints have been repaired with bituminous material.
Lake Road over I-65 at RP 28+27

Work Description:

Date Repairs Completed:

Maintenance Comments:

Stage: Open

PHOTO 1 Description West Joint facing South

Stage: Open

PHOTO 2 Description East Joint facing South

Channel Measurement

Date of Channel Measurements:

Distance Measured From:

Depth Measured From:

Number of Measurement Points Taken:

Number of Fixed Objects in Channel:

Water Level:

High Water Mark:

Measurement Type:

INDOT BRIDGE INSPECTION DIVISION

SCOUR PLAN OF ACTION

GENERAL INFORMATION

District: 05

NBI Number: **034970** **Facility Carried :** **LAKE ROAD**

Feature Intersected: **I-65** **Location:** **01.06 S SR 56**

SCOUR STATUS SUMMARY

Scour Critical Rating: **N** **Substructure Rating:** **6** **Channel and Channel Protection Rating:** **N**

Culvert Rating: **N** **Waterway Adequacy Appraisal:** **N**

Scour/Flood History:

INITIAL SCOUR INSPECTION

Bridge Scour Critical Components:

Trigger:

Initial Scour Inspection following Trigger(Date/Findings):

MONITORING PLAN

Monitoring Required after Initial Scour Inspection (Y/N):

Reason for Bridge Monitoring:

If monitoring is required after initial inspection, the Bridge Scour Monitoring Log shall be used.

Person or Agency that will monitor the bridge:

Monitoring Methodology:

Monitoring History/Comments:

Monitoring Termination Criteria:

Bridge Owner Contact Information (Primary):

COUNTERMEASURE INFORMATION AND RECOMMENDATIONS

Existence/Type of Countermeasures Present:

Countermeasures Observations:

Countermeasures Recommendations:

EMERGENCY TRAFFIC INFORMATION AND RECOMMENDATIONS

Closure Plan:

Suggested Detour Route:

Re-opening Procedures:

Provide recommendations as needed, such as reduced routine inspection frequency, need for future underwater inspections, countermeasure recommendations, and other comments.

Scour POA Author (Name/Title) **Date**

Scour POA Approved (Name/Title) **Date**

Scour POA Updated (Name/Title) **Date**

NBI 008: Structure Number	034970	**NBI 007: Facility Carried by Structure**	LAKE ROAD
NBI 006: Feature Intersected	I-65	**NBI 009: Location**	01.06 S SR 56

Date/Time

Inspectors Name

Type of Monitoring

Bridge Condition Due to Scour

Actions Taken

Comments/Conclusions

File Description	Underside Span A facing West
File Type Category	Condition

File Description	Spall West Side Bent #2 Center Column
File Type Category	Condition

File Description	Abutment #1 facing West
File Type Category	Condition

File Description	Side facing South
File Type Category	Condition, Elevation

File Description	Abutment #5 facing East
File Type Category	Condition

File Description	Bent #3 facing East
File Type Category	Condition

File Description	Bent #4 facing West
File Type Category	Condition

File Description	Bent #2 facing East
File Type Category	Condition

File Description	Bent #2 facing Southwest
File Type Category	Condition

File Description	Underside Span B facing East
File Type Category	Condition

File Description	Erosion under Span D facing North
File Type Category	Maintenance - Bridge, Other

File Description	Underside Span D facing East
File Type Category	Condition

File Description	Bent #3 facing West
File Type Category	Condition

File Description	Underside Span C facing West
File Type Category	Condition

File Description	Bent #4 facing Northeast
File Type Category	Condition

File Description	Minor Spalls and Cracks in Beam #1 Span C
File Type Category	Condition

File Description	Side facing North
File Type Category	Condition, Elevation

File Description	Deck facing West
File Type Category	Condition

File Description	East Joint facing South
File Type Category	Condition, Maintenance - Bridge

File Description	Damage to North Barrier Rail Mid Span
File Type Category	Condition

File Description	Damage to North Barrier Rail over Span C facing East
File Type Category	Condition

File Description	West Joint facing South
File Type Category	Condition

File Description	Deck facing East
File Type Category	Condition

AMERICAN STRUCTUREPOINT INC.

Excerpt from Engineering Assessment Report

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M E M O R A N D U M

DATE:	October 15, 2020
TO:	INDOT Stage 1 Design Reviewer
FROM:	Patrick Wooden, PE, Project Manager
RE:	Des. 1700135, et al., I-65 ATL in Clark, Scott Co – Final Engr Assessment
CC:	Karlei Metcalf, INDOT Project Manager

The enclosed Final Engineering Assessment Report, dated January 2019, was completed for the development of the I-65 corridor between Memphis Road in Clark County and SR 56 in Scott County. This corridor study report is provided in lieu of an abbreviated engineering assessment for this project.

In accordance with this report, the recommendations identified as 'Scenario B' are being pursued for final design and plans development. In the project development, the following deviations from the report's recommendations are noted for Reviewer's information and reference.

I-65 over Pigeon Roost Creek (RP 24+73)

The Engineering Report calls for a rigid deck overlay and widening. However, after further assessment by INDOT and the design team, including a site inspection, it was recommended that a superstructure replacement be incorporated into the design at this location. INDOT Seymour District provided concurrence of this design change on October 6, 2020.

Six-Lane Proposed Typical Section

The Engineering Report calls for the inclusion of a 10-foot inside shoulder in each direction of travel, along with the use of double-faced guardrail along the median. At INDOT's direction, the design team prepared a Life Cycle Cost Analysis (LCCA) evaluating different median barrier alternatives. As a result of this analysis, it was recommended concrete median barrier be incorporated into the design throughout the corridor. INDOT Seymour District provided concurrence of this design change on June 15, 2020.

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Additionally, per INDOT direction, it is anticipated the project will utilize in-line storm sewer detention within the median area of the roadway. In order to facilitate safer operations for maintenance of the detention facility, as well as to provide wider travel lanes during construction operations, it was recommended to incorporate 14-foot inside shoulder widths throughout the corridor. INDOT Seymour District provided concurrence of this design change during a coordination meeting on July 9, 2020.

Copies of relevant documentation noting these changes are included within the files of this stage submission. See the correspondence file or bridge design computations for further information.

All other relevant recommendations identified in the report remain applicable to the subject project, except as noted above.

I-65 Improvements in Clark and Scott Counties

Indiana Department of Transportation
Seymour District
Des No: 1700135 (RFP O180210)

Program Analysis and Engineering Assessment Report

January 2019

CMT
Engineers and Consultants

8790 Purdue Road
Indianapolis, IN 46268

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1.0 INTRODUCTION

INDOT currently has multiple projects programmed or planned on I-65 between Memphis Road in Clark County and SR 56 in Scott County. These projects include a full replacement of the I-65 pavement (programmed as Des No. 1700135), mainline bridge superstructure replacements and various large culvert rehabilitations within the study limits. In addition to the restoration of existing assets, there is a desire to widen I-65 to six travel lanes, which is an improvement that has already been occurring in higher-volume segments of the I-65 corridor statewide.

1.1 Purpose of Study

INDOT Seymour District is considering modification of the budget and scope of Des No. 1700135 to include either adding a third travel lane in each direction or perhaps overbuilding the four-lane pavement replacement so any future widening can be accomplished more efficiently than typical. The purpose of this study is to analyze alternative program scenarios that will provide INDOT with a best "plan of action" to ultimately widen this segment of I-65 into a 6-lane facility, along with the full restoration of existing assets in order to accommodate the continued growth of the I-65 corridor.

1.2 Project Location

The project study area is located in Clark and Scott Counties. The limits of this project begin north of the Memphis Road interchange at RP 16+0.52 and extend northerly to south of the SR 56 interchange in Scottsburg, Indiana at RP 28+0.89, a distance of 12 miles. The project includes the existing bridges and culverts along I-65 that are within the project limits, which are further discussed in ***Section 1.4***. The project location can be seen in ***Figure 1***. More detailed maps of the project location can be found in exhibits A.8 in ***Appendix A***.

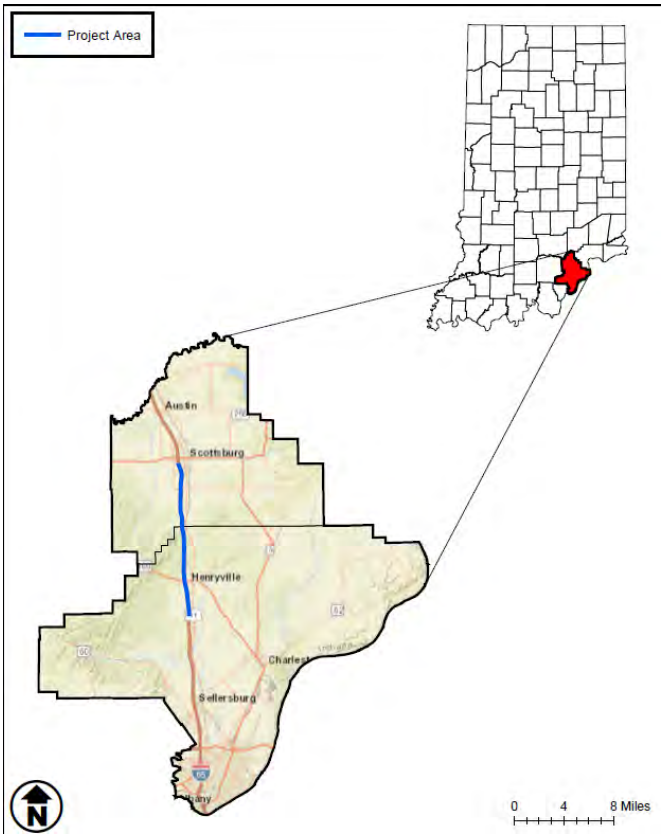

Figure 1 - County Location Map

1.3 Methodology

An economic analysis was performed for each program scenario in accordance with the applicable portions of the 2013 Indiana Design Manual, Section 304-20.0, Life Cycle Cost Analysis, and FHWA technical bulletin, Life Cycle Cost Analysis in Pavement Design (FHWA-

SA-98-079), to determine the most economically favorable scenario. The methodology can be summarized in the following steps.

1. Identify individual rehabilitation projects within the I-65 project limits.
2. Establish logically sequenced rehabilitation program scenarios.
3. Estimate the construction cost for each individual project.
4. Estimate the user-delay cost for each individual project.
5. Compute Present Worth of each scenario (construction cost, user-delay cost).
6. Compare and recommend the preferred alternative.

These steps will be discussed in more detail later in this report. It is to be noted that the economic analysis is not a comparison of pavement alternatives (i.e. pavement life-cycle cost analyses), which will be completed later in the design phases. Rather, it is a comparison of the economic differences in the timing of improvements. Hence, the economic analyses only determine the present worth of initial costs in each program scenario. Then, following development of program scenarios, the program amounts for each program year in 2019 dollars are inflated by the forecast inflation rate to the applicable program year.

1.4 Existing Assets

The project includes the 12 miles of I-65 and the various structures and interchanges that exist within the study limits, all of which will be considered in this analysis. Small pipe work and grading may be required within the project limits in addition to work described below. This may require additional hydraulic analysis. A more detailed description of the existing conditions can be found in the sections below.

1.4.1 Mainline I-65

Within the study limits, I-65 is functionally classified a rural interstate from Memphis Road to approximately RP 26+0.72; where it remains a rural interstate but enters the Scottsburg urbanized boundary. I-65 is an FHWA National Highway System (NHS) route. It travels north-south, connecting I-80 in Northern Indiana and I-10 in Southern Alabama near the city of Mobile. Through the project area, the speed limit is 70 mph. There are two twelve-foot travel lanes in each direction separated by a 60-foot grass median. The cross-section includes a 10-foot paved outside shoulder and a 4-foot paved inside shoulder in each direction. The existing pavement section consists of a composite pavement section. The southern segment was last overlaid in 2012 and the northern segment (roughly from SR 160 to SR 56) was last overlaid in 2016. An example of the existing typical section can be found in Exhibit A.2 in ***Appendix A***.

1.4.2 Mainline Bridges

The project area includes four pairs of mainline bridges, each with twin northbound and southbound structures. Two of the four bridge pairs have already been rehabilitated with superstructure replacements; the other two are currently programed for improvements. The two superstructure replacements that are currently programed will likely be bundled

together regardless of the I-65 improvements. The mainline bridges included in the study area are the following:

- I-65 over Blue Lick Creek at RP 16+49 (Des Nos. 1600744/1600750): Programmed for superstructure replacements with a letting of 11/17/21.
- I-65 over Caney Fork at RP 17+37 (Des Nos. 1600729/1600733): Programmed for superstructure replacements with a letting of 7/13/22.
- I-65 over Brownstown Road at RP 21+28: Superstructure replaced recently including the driving of piles to accommodate a third travel lane; will likely need a deck overlay in the next 20 years.
- I-65 over Pigeon Roost Creek at RP 24+73: Superstructure replaced recently; will likely need a deck overlay in the next 10 years.

1.4.3 Overpasses

In addition to mainline bridges, the project area also includes several overpass bridges. Two of the overpass bridges are programmed for improvements in the fiscal year of 2019, while the other overpasses are anticipated to need improvements within the next few years. The overpass bridges included in the study area listed below:

- Biggs Road over I-65 at RP 16+66 (Des No. 1593025): Programmed for superstructure replacement with a letting of 2/6/19.
- SR 160 over I-65 at RP 17+56 (Des No. 1800736): Programmed for thin deck overlay with a letting of 8/2/20.
- Hebron Church Road over I-65 at RP 20+53 (superstructure replaced recently)
- County Line Road over I-65 at RP 23+67: Superstructure improvements are needed (but project not yet programmed).
- Leota Road over I-65 at RP 26+69: Superstructure improvements are needed (but project not yet programmed).
- Lake Road over I-65 at RP 28+23: Superstructure improvements are needed (but project not yet programmed).

1.4.4 Large Culverts

The project area includes various large crossroad culverts (defined as having total spans between 4’ and 20’), which are listed below. Eight of these culverts are in need of rehabilitation or replacement but none have been programmed:

- CV I65-010-17.70 (no improvements anticipated)
- CV I65-010-18.35 (pipe lining)
- CV I65-010-19.60 (no improvements anticipated)
- CV I65-010-19.90 (paved invert or structure replacement)
- CV I65-010-20.85 (previously lined in 2018)
- CV I65-010-21.10 (pipe lining)
- CV I65-010-22.10 (no improvements anticipated)
- CV I65-010-22.65 (paved invert or structure replacement)
- CV I65-010-22.77 (pipe lining or structure replacement)

- CV I65-072-25.05 (pipe lining)
- CV I65-072-25.72 (previously lined in 2015)
- CV I65-072-25.83 (structure replacement)
- CV I65-072-26.20 (pipe lining or structure replacement)
- CV I65-072-26.95 (no improvements anticipated)
- CV I65-072-27.15 (previously lined in 2015)
- CV I65-072-27.45 (no improvements anticipated)
- CV I65-072-29.00 (no improvements anticipated)
- CV I65-072-29.40SB (no improvements anticipated)

2.0 TRAFFIC ANALYSIS

A capacity analysis was conducted for both the current conditions and future traffic volumes on I-65 maintaining the existing configuration of two travel lanes both northbound and southbound. Traffic counts conducted in 2018 from Count Stations 971090 (1.0 mi. north of Memphis Road) and 971100 (1.0 mi. north of SR 160) were used as the baseline for the analysis. The Highway Capacity Manual [HCM] (6th Edition) methodology was used to analyze I-65 capacity.

2.1 Existing Conditions

I-65 was broken into two separate basic freeway segments for analysis. The first segment was from the Memphis Road interchange to the SR 160 interchange, and the other segment extended from SR 160 north to the SR 56 interchange at Scottsburg. Both segments are considered rural segments, although the northern portion of the segment from SR 160 north to the SR 56 interchange enters the urban boundary of Scottsburg. The interchange ramp junctions at SR 160 were not analyzed as adding capacity to the interchanges is outside the scope of this study. The results of the I-65 capacity analysis for 2018 traffic volumes may be seen in ***Table 1***.

Table 1 - 2018 I-65 Capacity Analysis Results

I-65 Segment	Travel Direction	Level of Service (LOS)
Memphis Road to SR 160	Northbound	C
	Southbound	D
SR 160 to SR 56	Northbound	C
	Southbound	B

Per IDM Figure 53-1, the minimum acceptable for a rural freeway is LOS C and for an urban freeway is LOS D. The study limits of I-65 include both land use types. Using the rural criteria, southbound I-65 south of SR 160 is already operating below the minimum LOS. For the basis of this study, in order to estimate the fiscal year an added travel lanes project is needed, a LOS of D was considered the minimum acceptable.

2.2 Traffic Forecasts

Historical traffic counts from the two count stations within the project limits and discussion with INDOT's Modeling Team were used to develop an appropriate traffic growth rate for this section of I-65. Using known traffic count AADTs from the count stations, growth rates varying between 3.1% and 5.8% were generated. These growth rates seemed excessive and unsustainable to both CMT and INDOT. Based on the Indiana Statewide Travel Demand Model, INDOT's Modeling Team recommended using a 1.0% growth rate. CMT agreed that 1.0% was more appropriate and used it to project traffic volumes.

2.3 Level of Service Review

The HCM 6th Edition basic freeway segment methodology was used to analyze projected traffic volumes to determine approximate years where LOSs would degrade below minimum. As noted previously, the southbound lanes of I-65 between Memphis Road and SR 160 already operate at LOS D. The year that the LOS drops to E in each segment are shown in ***Table 2*** below.

Table 2 - Future I-65 Capacity Analysis Results

I-65 Segment	Level of Service (1.0% Growth)	Level of Service (1.5% Growth)
Memphis Road to SR 160	LOS D in 2018	LOS D in 2018
	LOS E in 2033	LOS E in 2029
SR 160 to SR 56	LOS D in 2047	LOS D in 2038
	LOS E in >2050	LOS E in 2050

Using the 1.0% growth rate, a segment of I-65 does not degrade to a LOS of E until 2033. It wouldn't be until beyond 2050 that the northern section from SR 160 to SR 56 reaches LOS E.

As a secondary check, the LOS was checked using an annual 1.5% growth rate. This was done since the historic traffic counts showed higher recent growth rates. If this higher growth rate is used, the southern section of I-65 degrades to LOS E in the year 2029 (4 years sooner than the 1% growth rate) and the northern section of I-65 reaches LOS E in the year 2050. The full capacity analysis results may be seen in Exhibits B.1 and B.2 in ***Appendix B***.

2.4 Existing Crash History Review

A safety analysis was performed to evaluate crash history of I-65 within the project limits. Clark and Scott County historic crash data were reviewed along I-65 from mile marker 16.5 to mile marker 29.0. The crash data were provided by INDOT for January 2015 through October 2018. A summary of the crashes occurring at each mile of I-65 along our project limits during the study period can be found in ***Table 3***.

The crash history for the study corridor was input into INDOT's RoadHAT 3.0 project to compare segments to similar locations statewide. Indices of crash frequency (ICF) and crash cost (ICC) are calculated to determine how many standard deviations away from average a segment's crash history and severity are compared to other similar segments across Indiana. The project was first divided into four segments of similar length and input into RoadHAT to be analyzed. The project was then also analyzed by the southern segment from Memphis Road to SR 160 and the northern segment from SR 160 to SR 56. Collisions due to deer or other objects in the road have not been included in the RoadHAT analysis. The RoadHAT results for the current year (2018) traffic volumes and crash history from 2015-2018 can be found in ***Table 3*** below.

Table 3 - Crash Analysis

	2015 Total Crashes	2016 Total Crashes	2017 Total Crashes	2018 Total Crashes	Total During Study Period	Injuries & Fatalities		Road HAT Analysis (by equal length segments)		Road HAT Analysis (by northern and southern section)	
						No.	% of Crashes	Index Crash Freq	Index Crash Cost	Index Crash Freq	Index Crash Cost
I-65 MM 16.5 to MM 17.0	7	11	15	11	**44**	10	23%	2.70	3.30	2.70	3.30
I-65 MM 17.0 to MM 18.0	14	19	16	9	**58**	9	16%				
I-65 MM 18.0 to MM 19.0	11	10	11	11	**43**	8	19%				
I-65 MM 19.0 to MM 20.0	13	10	13	13	**49**	9	18%	2.07	3.05	1.37	6.02
I-65 MM 20.0 to MM 21.0	19	7	6	7	**39**	5	13%				
I-65 MM 21.0 to MM 22.0	21	26	6	5	**58**	10	17%				
I-65 MM 22.0 to MM 23.0	11	10	10	9	**40**	2	5%	0.70	2.30		
I-65 MM 23.0 to MM 24.0	10	6	8	3	**27**	2	7%				
I-65 MM 24.0 to MM 25.0	10	8	5	5	**28**	6	21%				
I-65 MM 25.0 to MM 26.0	9	10	15	5	**39**	9	23%	0.63	4.46		
I-65 MM 26.0 to MM 27.0	7	4	4	5	**20**	8	40%				
I-65 MM 27.0 to MM 28.0	5	8	3	1	**17**	7	41%				
I-65 MM 28.0 to MM 29.0	18	6	8	4	**36**	11	31%				

The Road HAT results show that both segments in the project limits have an index crash frequency and index crash cost higher than those of similar corridors. The northern segment from mile marker 26.0 to mile marker 29.0 has a high percent of injuries and fatalities occurring during accidents; which results in an index of crash cost for the northern section that is more than six standard deviations from similar segments. This is not surprisingly due to the high speeds of interstates. The full Road HAT analysis may be seen in Exhibits B.3 in ***Appendix B***.

Out of a total of 498 crashes during the study period, it is to be noted that 96 of these crashes occurred while some sort of construction was happening in the area and 60 out of the 498 crashes were weather related crashes. There is existing cable barrier for majority of the project study area and that railing has been in place for the entirety of the crash data presented above. Three head on collision crashes occurred between mile maker 27.0 and 29.0, where cable-railing had not been installed.

The primary types of collisions of the 498 total crashes were 39% “ran off road” crashes, 17% “same direction sideswipe” crashes, 16% “collision with objects in the roadway or deer” crashes, 15% “rear-end” crashes, and the remaining 13% were an assortment of other types of collisions. As the predominant manner of crash is running off the road, these were sorted by mile maker as seen in ***Table 4*** below.

Table 4 - Ran Off Road Crashes

	Total Run Off Rd Crashes
I-65 MM 16.5 to MM 17.0	16
I-65 MM 17.0 to MM 18.0	25
I-65 MM 18.0 to MM 19.0	25
I-65 MM 19.0 to MM 20.0	21
I-65 MM 20.0 to MM 21.0	16
I-65 MM 21.0 to MM 22.0	29
I-65 MM 22.0 to MM 23.0	11
I-65 MM 23.0 to MM 24.0	6
I-65 MM 24.0 to MM 25.0	13
I-65 MM 25.0 to MM 26.0	12
I-65 MM 26.0 to MM 27.0	4
I-65 MM 27.0 to MM 28.0	5
I-65 MM 28.0 to MM 29.0	12

The analysis of the run off crashes indicates a relative high amount between MM17 and M20, along with between MM21 and MM22. The former is a significant contributor to the high Icc and Icf shown for the segment between Memphis Road and SR 160. It may be beneficial to supplement I-65 with additional guardrail or additional clear zone along this segment. The wider inside and outside shoulders that will be designed in all scenarios will also provide safety benefits.

3.0 PROGRAM SCENARIOS

Three different scenarios were developed and analyzed in order to recommend the best approach at improving the I-65 corridor in Scott and Clark counties. All the scenarios accomplish the need to add a travel lane to I-65, however they each have their unique time lines and programs on how to reach this desired result. Below are descriptions of the three scenarios that are analyzed in the remainder of this report.

3.1 Scenario A Description

Scenario A is meant to have the lowest cost for the initial construction contract. Many of the other work activities are deferred to future years as stand-alone projects.

3.1.1 Mainline Pavement

Scenario A consists of constructing a full depth pavement replacement along I-65 throughout the entire project limits. The pavement replacement project will replace the existing travel lanes. The outside shoulder would be replaced and widened to 12'. Similarly, the inside shoulder would be replaced and widened to 9' (above the 8' minimum due to maintenance of traffic purposes). This 9' inside shoulder would be a temporary over-build and fully replaced as part of a future third-lane widening.

3.1.2 Mainline Bridges

The superstructure replacements planned for the mainline bridges over Blue Lick Creek and Caney Fork would be bundled with this pavement replacement project. As part of this project, these bridges' substructures would be widened to accommodate future expansion.

3.1.3 Large Culverts

All large culvert improvements will take place as planned in the form of rehabilitations (as opposed to replacements), in the year they are currently scheduled, and as stand-alone projects.

3.1.4 Added Travel Lanes

In a future year once capacity needs dictate, a separate contract will be bid that adds the third travel lane. The widening of all the existing mainline bridges from the 4-lane section to the 6-lane section will also be constructed during this later contract. It is also assumed the mainline bridges over Pigeon Roost Creek and Brownstown Road would receive rigid deck overlays.

3.2 Scenario B Description

Scenario B would have the highest cost for the initial construction contract. It constructs the full 6-lane section build-out in one phase. All of the pavement replacement, mainline bridge superstructure replacements/widening (including deck overlays at Pigeon Roost Creek and Brownstown Road), culvert improvements and the third travel-lane addition will be completed under one contract. Since the temporary traffic control and crossovers would be in place, it would be advantageous to replace (instead of rehabilitating) the following culverts: CV 19.90, CV 22.65, CV 22.77 and CV 26.20.

3.3 Scenario C Description

Scenario C is meant to offer a hybrid solution to Scenarios A and B. While Scenario C still divides the improvements into two different main contracts like Scenario A, it eliminates the overbuilding and extra removal required in Scenario A.

3.3.1 Mainline Pavement

In the first contract of Scenario C, the 4-lane section pavement is replaced and the 12-foot outside shoulder in constructed. Scenario C differs from Scenario A by building an inside shoulder that is 12-foot wide of PCCP pavement.

3.3.2 Mainline Bridges

During this first contract, the Blue Lick Creek and Caney Fork bridges will be replaced and widened to accommodate the wider shoulders.

3.3.3 Large Culverts

All large culvert improvements currently planned would be included in the initial construction contract. Since the temporary traffic control and crossovers would be in place, it would be advantageous to replace (instead of rehabilitating) the following culverts: CV 19.90, CV 22.65, CV 22.77 and CV 26.20.

3.3.4 Added Travel Lanes

In the second contract, to complete the full build-out, the 12-foot inside shoulder will be converted into the additional travel lane and a new inside 10-foot PCCP shoulder will be constructed. During this second contract, all four mainline bridges will be widened to the 6-lane condition, and the bridges over Pigeon Roost Creek and Brownstown Road would receive deck overlays.

3.4 Scenario Summary

The table below summarizes the descriptions of the scenarios above and their anticipated timeline of projects.

Table 5 - Scenario Description Summary Table

Fiscal Year	Scenario A	Scenario B	Scenario C
2019	Biggs Road Superstructure Replacement	Biggs Road Superstructure Replacement	Biggs Road Superstructure Replacement
2021	SR 160 Bridge Deck Overlay	SR 160 Bridge Deck Overlay	SR 160 Bridge Deck Overlay
2023[1]	4-Lane Pavement Replacement Blue Lick Creek Bridge Superstructure Replacement Caney Fork Superstructure Replacement CV 18.35 Pipe Lining CV 19.90 Pipe Lining CV 22.77 Pipe Lining, CV 25.05 Pipe Lining, CV 26.20 Pipe Lining	Pavement Replacement with Added Travel Lanes Blue Lick Creek Bridge Superstructure Replacement/Widening Caney Fork Superstructure Replacement/Widening Pigeon Roost Creek Bridge Widening/Deck Overlay Brownstown Road Bridge Widening/Deck Overlay CV 18.35 Pipe Lining CV 19.90 Pipe Replacement CV 22.77 Pipe Replacement CV 25.05 Pipe Lining CV 26.20 Pipe Replacement Leota Road Superstructure Replacement CV 22.65 Pipe Replacement CV 25.83 Pipe Replacement CV 21.10 Pipe Lining Lake Road Superstructure Replacement County Line Road Superstructure Replacement	4-Lane Pavement Replacement Blue Lick Creek Superstructure Replacement Caney Fork Superstructure Replacement CV 18.35 Pipe Lining CV 19.90 Pipe Replacement CV 22.65 Pipe Replacement CV 22.77 Pipe Replacement CV 25.05 Pipe Lining CV 25.83 Pipe Replacement CV 26.20 Pipe Replacement CV 21.10 Pipe Lining
2025	Leota Road Superstructure Replacement CV 22.65 Pipe Invert CV 25.83 Pipe Replacement		Leota Road Superstructure Replacement
2026	CV 21.10 Pipe Lining		
2028	Lake Road Superstructure Replacement		Lake Road Superstructure Replacement
2029	County Line Road Superstructure Replacement		County Line Road Superstructure Replacement
2033	Added Travel Lanes Blue Lick Creek Bridge Widening Caney Fork Bridge Widening Pigeon Roost Creek Bridge Widening/Deck Overlay Brownstown Road Bridge Widening/Deck Overlay		Added Travel Lanes Blue Lick Creek Bridge Widening Caney Fork Bridge Widening Pigeon Roost Creek Bridge Widening/Deck Overlay Brownstown Road Bridge Widening/Deck Overlay

[1] Under Scenario A, the large culvert projects listed for FY 2023 are assumed to be stand-alone construction contracts from the mainline pavement replacement. The stand-alone construction contracts' cost are included in total cost estimate.

Preventative maintenance overlay (HMA) or joint replacements (PCCP) of the pavement constructed in 2023 will likely be needed within the timeframe of this study period. Since it would be needed across all scenarios, it will not influence decisions making. The same can be said for other regular maintenance such as crack sealing.

4.0 Design Criteria and Proposed Typical Sections

4.1 Design Criteria

A full design criteria memorandum is provided as Exhibit A.7 in ***Appendix A***. The geometric design criteria for a 4R freeway project were implemented in selecting the geometry for the improvements on I-65. I-65 will have a design speed of 70 MPH, which is consistent with the current posted speed limit. As the vertical and horizontal alignment are not anticipated to need major changes, the main criteria that was focused on for this study were the cross-section elements. For an interstate with a design speed of 70 MPH, the necessary cross-section requires a 12-foot travel-lane width, a 12-foot paved outside shoulder as the volume of trucks exceeds 250 vehicles per hour, and an inside shoulder of 8 feet for two lanes and 12 feet for three lanes. After discussion with INDOT, it has been decided to use an inside shoulder of 10 feet in order to keep consistency with the adjacent sections of I-65 which have recently been constructed.

4.2 Proposed I-65 Typical Sections

Typical sections were developed for the three options considered for the initial contract, as well as for the full build-out to 6 lanes. In addition, maintenance of traffic schemes for each scenario were laid out to ensure that uniform assumptions were used for calculating the construction cost estimates. The sections below summarize each of the proposed final condition cross-sections.

4.2.1 Four-Lane Proposed Typical Section with Temporary Shoulder

This four-lane proposed section will result from the first contract in Scenario A. The cross-section includes two 12-foot travel lanes in each direction with a 12-foot outside shoulder and a 9-foot inside shoulder. The travel lanes and outside shoulder are assumed to be 13” thick PCCP pavement with a 3” thick subbase and subgrade treatment. The inside shoulder will consist of 10” HMA over treated subgrade. The 9’ is required to maintain two lanes in each direction during construction, and since a future longitudinal joint at a 9’ spacing is not ideal, it is planned to be replaced during the future third lane widening. This geometry preserves the 60’ grass median. The aggregate shoulder will be widened to 2’ so it can support temporary delineators (assumed to be drums) during construction activities. An example of this section can be found in Exhibit A.2 in ***Appendix A***.

The initial contract under Scenario A will not result in changes to the mainline bridge typical sections. The planned superstructure replacements at Caney Fork and Blue Lick Creek will maintain the existing 39'-6" face-to-face width (42'-9" out-to-out), comprised of two 12-foot travel lanes with a 10-foot outside shoulder and a 5'-6" inside shoulder. No cross section

changes would occur at Pigeon Roost Creek and Brownstown Road An example of this section can be found in Exhibit A.3 in ***Appendix A***.

4.2.2 Six-Lane Proposed Typical Section

This six-lane typical section is the ultimate goal and end result for all three analyzed scenarios. The section includes three 12-foot travel lanes in each direction with a 12-foot shoulder outside shoulder and a 10-foot inside shoulder. Due to the additional pavement width of this section, the median is reduced to just less than 36 feet (although remains a depressed median), so this section will require double faced guardrail (cable-barrier systems require a median of at least 36 feet width) to separate the northbound and southbound directions. An example of this section can be found in Exhibit A.2 in ***Appendix A***.

The bridge typical sections at all four locations will match the approach roadway section by providing 60' face-to-face width (63' out-to-out) comprised of three 12-foot travel lanes with 10-foot inside shoulder and a 12-foot outside shoulder. An example of this section can be found in Exhibit A.3 in ***Appendix A***.

4.2.3 Four-Lane Proposed Typical Section with Permanent Shoulder

This four-lane proposed section will be the result after the first contract in Scenario C. The cross-section includes two 12-foot travel lanes in each direction with a 12-foot outside shoulder and a 12-foot inside shoulder. The travel lanes and both shoulders are assumed to be 13” thick PCCP pavement with a 3” thick subbase and subgrade treatment. This geometry retains the 60’ depressed median. An example of this section can be found in Exhibit A.2 in ***Appendix A***.

As part of their superstructure replacements, the initial contract under Scenario C would widen the bridges at Caney Fork and Blue Lick Creek to accommodate the two 12-foot travel lanes and 12-foot inside and outside shoulders with a 48-foot clear face-to-face opening (51' out-to-out). The cross sections at the bridges over Pigeon Roost Creek and Brownstown Road would not be changed during the first contract. An example of this section can be found in Exhibit A.3 in ***Appendix A***.

4.3 Proposed Conceptual MOT Plan

4.3.1 Scenario A

The first phase of Scenario A begins with a pre-stage activity that assumes a full reconstruction of the southbound existing inside 4-foot shoulder and a 1.5” mill and overlay to the northbound and southbound existing outside 10-foot shoulder to prepare them for use as a traffic lane during construction. Southbound I-65 also requires a 2-foot widening to the outside shoulder and a 9-foot widening to the inside shoulder in order to provide a sufficient cross-section for three lanes of traffic in later construction stages. Next, Stage 1 shifts the two southbound lanes of traffic to the existing outside shoulder and outside lane. One lane of northbound I-65 traffic will cross-over and use the inside lane of southbound I-65. Northbound I-65 will be constructed in Stages 1A and 1B; maintaining one lane of

northbound traffic while constructing the proposed pavement on the other side, separated by a temporary barrier wall. Stages 2A and 2B will be the same scheme as Stage 1 but will flip the three lanes of traffic to the newly constructed northbound pavement while maintaining one lane of traffic and building the southbound pavement.

The second phase of Scenario A is a much simpler MOT scheme, as the northbound and southbound traffic do not require any crossovers and can be pushed to the outside shoulder and outside lane of their perspective directions. Blocked off by a temporary barrier, both inside shoulders can be removed, and the additional travel-lanes and permanent shoulders can be constructed in one phase.

The MOT schemes laid out for the pavement replacement will be carried across the bridges and will allow for superstructure replacement and substructure widening operations to be completed. During pre-stage milling and resurfacing of the roadway shoulders, temporary single lane closures will be needed to remove existing lane lines and install temporary markings across the bridges. Stages 1A and 1B will match the roadway for lane locations/directions, but the lanes and shoulders will be slightly narrower due to the narrow existing bridge cross sections. Temporary travel-lanes will narrow to 11 feet and shoulders to 1 foot inside and 1-foot 3-inches outside on the southbound structures, while maintaining 12-foot temporary travel-lanes with 2-foot shoulder widths on the northbound structures. As indicated above, Stages 2A and 2B will simply mirror the lane configurations of Stage 1A and 1B while constructing the southbound sections.

Like the roadway MOT discussion, the second contract for the bridges is simplified by the fact that traffic can remain on their respective sides of the median and push out to the outside shoulders, allowing adequate clearance to construct the full 6-lane configuration.

The MOT typical sections for Scenario A can be found in Exhibits A.4 and A.5 in ***Appendix A***.

4.3.2 Scenario B

The pre-stage, Stage 1A, and Stage 1B are the same scheme as Scenario A, other than the I-65 northbound pavement is built out to the 6-lane section instead of the 4-lane section. The additional pavement constructed for the 6-lane section simplifies Stage 2 into a single stage. For Scenario B, Stage 2, both lanes of southbound traffic will crossover the median and use the inside shoulder and travel lane of northbound I-65. This still leaves enough pavement for the two northbound lanes which use the outside shoulder and travel lane, separated from southbound traffic by a temporary barrier wall. The southbound pavement can be built all at once, which benefits the project schedule as well as the safety of the work zone.

Traffic control across the bridges for the pre-stage and Stages 1A and 1B of Scenario B are the same as Scenario A, except that superstructure and substructure for northbound bridges are simultaneously widened to the full 6-lane section. Stage 2 then is simplified by running

both lanes of southbound traffic contra-flow on the new northbound structures, and separated by a temporary barrier wall, while the southbound structures are widened.

The MOT typical sections for Scenario B can be found in Exhibits A.4 and A.5 in ***Appendix A***.

4.3.3 Scenario C

Scenario C maintenance of traffic scheme differs little from the Scenario A maintenance of traffic scheme. The pre-stage involves the same reconstruction, milling, resurfacing, and widening on the existing shoulders. Stages 1A and Stage 1B diverts one lane of northbound traffic across the median, resulting in 3 lanes of traffic utilizing southbound I-65, while northbound I-65 is constructed while maintaining the other lane of northbound traffic. Also, like Scenario A, Stages 2A and Stage 2B return the northbound traffic onto the newly constructed pavement along with one lane of southbound traffic crossing the median at the beginning of the project limits. The difference from Scenario A is that due to the 12-foot inside shoulder being constructed in the initial contract, there is 3 feet of additional northbound pavement for the MOT scheme.

In the later third-lane contract of Scenario C, the existing traffic lanes can be maintained, and traffic barriers can be placed 4 feet from the edge of travel on the inside shoulder. This will create enough of a buffer for the new inside shoulders and median to be constructed without disrupting the normal traffic patterns.

Again, the initial stages of structure MOT for Scenario C are essentially the same as Scenario A for the bridges. The difference is in Stage 2A and 2B, when three lanes of traffic are running on the new northbound structure, there is sufficient width to allow three-full 12-foot lanes with 2-foot offsets from the outside bridge walls and the temporary barrier wall separating northbound and southbound traffic.

Superstructure widening during the second contract of Scenario C is completed with north and southbound traffic shifted to the outside of each structure while construction occurs on the inside, separated with temporary traffic barrier and 2-foot offsets.

The MOT typical sections for Scenario C can be found in Exhibits A.4 and A.5 in ***Appendix A***.

4.3.4 Ramps

The entrance and exit ramps for the SR 160 interchange and the rest area north of Henryville will require two substages in all three scenarios during construction of the outside lanes and shoulders. In addition to the median crossovers at the north and south ends of the I-65 project limits, two median crossovers for the SR 160 interchange ramps will be required for all scenarios. The pavement of the above ramps will be surfaced to the cross-road but avoid any work to the SR 160 mainline or the rest area PCCP parking areas.

5.0 COST ESTIMATIONS

A key tool in comparing the scenarios was their difference in construction costs accompanying the contracts. A detailed estimated cost was calculated for each scenario. These estimated costs include the construction cost of each project for roadway and bridge items, maintenance of traffic costs, and user-delay costs associated with the duration of construction. Non-construction costs such as design, right of way, utility relocations, mitigation, and construction inspection were assumed to have negligible differences between each scenario. The details of each of the calculated costs are described further in the sections below.

5.1 Methodology and Assumptions

The major roadway and bridge pay items were quantified and assigned unit prices for each scenario. The summary of pay item quantities and unit costs can be found in Exhibits C.1-C.6 in ***Appendix C***. The construction cost estimate includes items to cover the existing pavement removal and the pavement replacement with new PCCP, subbase, subgrade, and compacted shoulder aggregate. Costs for drainage items, earthwork quantities, guardrail, pavement markings, signage, and minor ITS upgrades were also estimated.

The program scenarios and analyses were based upon a preliminary pavement analysis of a full-depth HMA section and a PCCP section. The HMA and PCCP pay-item quantities and costs were calculated and compared, the unit prices used were chosen after reviewing a number of sources and the pavement depths considered the relatively high volume of multiple-unit trucks on I-65. The analysis resulted in the selection of PCCP for the program analysis. The calculations for the analysis can be found in Exhibit C.7 in ***Appendix C***.

Within the project limits, the pavement of the ramps of the interchange at I-65 and SR 160 will be resurfaced to the cross road, but otherwise avoid any work to SR 160 mainline. The existing HMA for entrance and exit ramps at the rest area north of Henryville will also be resurfaced (no work to the existing PCCP areas that comprise the parking areas). Costs for these improvements were included in each scenario's construction cost.

Maintenance of traffic items and associated temporary items were also considered when calculating the construction costs. The pay items in this category are the items that support the maintenance of traffic scheme, such as milling and resurfacing the existing shoulders to prepare them for the additional traffic during construction. The shoulder construction in the pre-stage of the maintenance of traffic includes a full reconstruction of the existing inside southbound shoulder and a 1.5" mill and resurface of both existing outside shoulders. Other items associated with the maintenance of traffic include temporary barrier, the HMA pavement used to widen the existing roadway in the pre-stage, median crossovers at the beginning and end of the project limits, and at the SR 160 interchange. MOT costs are broken out separately to show the additional MOT costs INDOT incurs by constructing the improvements over a period of years rather than in one contract, if any. The efficiencies of

constructing the various programmed improvements concurrently may shorten their total construction time and their corresponding MOT costs.

For lump sum items such as mobilization, construction engineering, clearing right of way, maintenance of traffic, and erosion and sediment control, cost estimates were developed using approximately the same percentage of construction as the I-74 bid tabulations, see Exhibit C.8 in ***Appendix C***.

5.2 Construction Cost Estimate of Initial Projects

5.2.1 Scenario A

INDOT has currently programmed $81.4 million for the four-lane pavement replacement, $3.0 million for the superstructure replacement at Blue Lick Creek and $3.2 million for the superstructure replacement at Caney Fork. These construction cost estimates assumed each project to be stand-alone, with its own MOT costs.

As part of this study, an independent estimate was completed on these projects (see Exhibit C.1 in ***Appendix C***). Also, this study modified the project years to assume the two mainline bridge projects would be bundled with the roadway, offering costs savings on MOT.

Table 6 - INDOT CN Estimate & Study Estimate Cost Comparison

Project	INDOT CN Estimate	Study Estimate
Mainline Pavement Replacement	$81.4 Million	$92.7 Million
Blue Lick Creek Superstructure Replacement	$3.0 Million	$2.7 Million
Caney Fork Superstructure Replacement	$3.2 Million	$2.7 Million
TOTALS	$87.6 Million	$98.1 Million

It should be noted that the study estimate for the mainline pavement replacement includes $7.2 million in the aforementioned shoulder widening required for maintenance of traffic purposes. Neither of these estimates include work to the other two mainline bridges, overpasses, large culverts or the additional third travel lane.

5.2.2 Scenario B

If INDOT was to modify the scope of Des No. 1700135 to a full build-out that includes the third travel lane in each direction, pavement replacement, large culvert improvements and mainline bridge upgrades, the construction cost estimate increases from $92.6 million to $140.4 million (an increase of $47.8 million above the basic pavement replacement). Of the $140.4 million, $13.0 million is needed for the upgrades to the mainline bridges and large culverts. It should be noted that this estimate excludes work to the overpasses, since their horizontal and vertical clearances will allow for the third lane widening. See Exhibit C.4 in ***Appendix C*** for details.

5.2.3 Scenario C

This study developed a "middle" option that completed the pavement replacement currently programmed but provided permanent shoulders and mainline bridges that could be widened to a third lane with much less interruption to traffic. The construction estimate for such a project is $114.6 million. Of the $114.6 million, $10.3 million is needed for the upgrades to the mainline bridges and large culverts. It should be noted that this estimate excludes any work to the overpasses and the additional third travel lane. See Exhibit C.5 in ***Appendix C*** for details.

5.3 Large Culvert Cost Estimates

5.3.1 CV I65-010-18.35

The existing condition of this large culvert has been reviewed and the deterioration has been identified as needing improvement to extend its service life. The scope of a rehabilitation project would include installing pipe lining (as noted in the preliminary hydraulics calculations found in ***Appendix E***). If completed as a stand-alone project, its construction cost estimate is $280,000. If completed as part of a mainline pavement project noted in Scenario B or C, its construction cost estimate decreases to $180,000.

5.3.2 CV I65-010-19.90

The existing condition of this large culvert has been reviewed and the deterioration has been identified as needing improvement to extend its service life. The scope of a rehabilitation project would include installing a paved invert with a second bored pipe of 24" diameter (as noted in the preliminary hydraulics calculations found in ***Appendix E***). If completed as a stand-alone project, its construction cost estimate is $220,000.

Alternatively, since the mainline pavement projects for Scenarios B or C would already have temporary traffic control and crossovers in place, a small structure replacement could be completed to add even more service life above the rehabilitation option. In order to decrease the backwater to 3', the preliminary hydraulic analysis estimates a replacement culvert would need to be a double 9' x 7' reinforced concrete box. The construction cost estimate for this is $1,150,000. Completing a small structure replacement as a stand-alone project is not currently being considered.

5.3.3 CV I65-010-21.10

The existing condition of this large culvert has been reviewed and the deterioration has been identified as needing improvement to extend its service life. The scope of a rehabilitation project would include installing pipe lining (as noted in the preliminary hydraulics calculations found in ***Appendix E***). If completed as a stand-alone project, its construction cost estimate is $550,000. If completed as part of a mainline pavement project noted in Scenario B or C, its construction cost estimate decreases to $520,000.

5.3.4 CV I65-010-22.65

The existing condition of this large culvert has been reviewed and the deterioration has been identified as needing improvement to extend its service life. The scope of a rehabilitation project would include installing a paved invert with a second bored pipe of 18" diameter (as noted in the preliminary hydraulics calculations found in ***Appendix E***). If completed as a stand-alone project, its construction cost estimate is $395,000.

Alternatively, since the mainline pavement projects for Scenarios B or C would already have temporary traffic control and crossovers in place, a small structure replacement could be completed to add even more service life above the rehabilitation option. In order to decrease the backwater to 3', the preliminary hydraulic analysis estimates a replacement culvert would need to be a single 7' x 6' reinforced concrete box. The construction cost estimate for this is $470,000. Completing a small structure replacement as a stand-alone project is not currently being considered.

5.3.5 CV I65-010-22.77

The existing condition of this large culvert has been reviewed and the deterioration has been identified as needing improvement to extend its service life. The scope of a rehabilitation project would include installing a paved invert with a second bored pipe of 24" diameter (as noted in the preliminary hydraulics calculations found in ***Appendix E***). If completed as a stand-alone project, its construction cost estimate is $560,000.

Alternatively, since the mainline pavement projects for Scenarios B or C would already have temporary traffic control and crossovers in place, a small structure replacement could be completed to add even more service life above the rehabilitation option. In order to decrease the backwater to 3', the preliminary hydraulic analysis estimates a replacement culvert would need to be a single 72" round pipe culvert. The construction cost estimate for this is $320,000. Completing a small structure replacement as a stand-alone project is not currently being considered.

5.3.6 CV I65-072-25.05

The existing condition of this large culvert has been reviewed and the deterioration has been identified as needing improvement to extend its service life. The scope of a rehabilitation project would include installing pipe lining (as noted in the preliminary hydraulics calculations found in ***Appendix E***). If completed as a stand-alone project, its construction cost estimate is $390,000. If completed as part of a mainline pavement project noted in Scenario B or C, its construction cost estimate decreases to $240,000.

5.3.7 CV I65-072-25.83

The existing condition of this large culvert has been reviewed and the deterioration has been identified as needing improvement to extend its service life. The scope of a rehabilitation project would include a small structure replacement (as noted in the preliminary hydraulics calculations found in ***Appendix E***). If completed as a stand-alone

project, its construction cost estimate is $450,000. If completed as part of a mainline pavement project noted in Scenario B or C, its construction cost estimate decreases to $250,000.

5.3.8 CV I65-072-26.20

The existing condition of this large culvert has been reviewed and the deterioration has been identified as needing improvement to extend its service life. The scope of a rehabilitation project would include installing a paved invert with a second bored pipe of 18" diameter (as noted in the preliminary hydraulics calculations found in ***Appendix E***). If completed as a stand-alone project, its construction cost estimate is $740,000.

Alternatively, since the mainline pavement projects for Scenarios B or C would already have temporary traffic control and crossovers in place, a small structure replacement could be completed to add even more service life above the rehabilitation option. In order to decrease the backwater to 3', the preliminary hydraulic analysis estimates a replacement culvert would need to be a single 8' x 6' reinforced concrete box. The construction cost estimate for this is $720,000. Completing a small structure replacement as a stand-alone project is not currently being considered.

5.4 Mainline Bridge Cost Estimates

5.4.1 I-65 over Blue Lick Creek

If completed as part of the initial contract of Scenario A (i.e. as part of the 4-lane pavement replacement), then this bridge will receive a superstructure replacement without any deck widening. The substructures would be widened to accommodate a future third travel lane. The construction cost estimate for this work $2.7 million. As part of the second contract of Scenario A (i.e. adding the third travel lane), then this bridge would receive a superstructure widening at a construction cost estimate of $1.0 million. It should be noted, neither of these costs are applicable if this bridge work was completed as stand-alone projects.

If completed as part of the single contract of Scenario B (i.e. as part of the 6-lane added travel lanes), then this bridge will receive a superstructure replacement and full bridge widening to accommodate the third lane at a construction cost estimate of $3.7 million.

If completed as part of the initial contract of Scenario C (i.e. as part of the 4-lane pavement replacement with a permanent inside shoulder), then this bridge will receive a superstructure replacement, widening to accommodate the inside shoulder, and substructure widening to accommodate a future third travel lane. Since it would be included with the mainline project, the construction cost estimate is $3.2 million. As part of the second contract of Scenario C (i.e. adding the third travel lane), then this bridge would receive another superstructure widening at a construction cost estimate of $592,000. It should be noted, neither of these costs are applicable if this bridge work was completed as stand-alone projects.

5.4.2 I-65 over Caney Fork

If completed as part of the initial contract of Scenario A (i.e. as part of the 4-lane pavement replacement), then this bridge will receive a superstructure replacement without any deck widening. The substructures would be widened to accommodate a future third travel lane. The construction cost estimate for this work $2.7 million. As part of the second contract of Scenario A (i.e. adding the third travel lane), then this bridge would receive a superstructure widening at a construction cost estimate of $1.0 million. It should be noted, neither of these costs are applicable if this bridge work was completed as stand-alone projects.

If completed as part of the single contract of Scenario B (i.e. as part of the 6-lane added travel lanes), then this bridge will receive a superstructure replacement and full bridge widening to accommodate the third lane at a construction cost estimate of $3.7 million.

If completed as part of the initial contract of Scenario C (i.e. as part of the 4-lane pavement replacement with a permanent inside shoulder), then this bridge will receive a superstructure replacement, widening to accommodate the inside shoulder, and substructure widening to accommodate a future third travel lane. Since it would be included with the mainline project, the construction cost estimate is $3.2 million. As part of the second contract of Scenario C (i.e. adding the third travel lane), then this bridge would receive another superstructure widening at a construction cost estimate of $592,000. It should be noted, neither of these costs are applicable if this bridge work was completed as stand-alone projects.

5.4.3 I-65 over Pigeon Roost Creek

No work would occur at this bridge as part of the initial contract of Scenario A (i.e. as part of the 4-lane pavement replacement). As part of a future added travel lanes project, this bridge would be widened and receive a rigid deck overlay. If completed as part of the added travel lanes project, then the construction cost estimate is $1.1 million.

If completed as part of the single contract of Scenario B (i.e. as part of the 6-lane added travel lanes), this bridge would be widened and receive a rigid deck overlay for a construction cost estimate of $1.1 million.

No work would occur at this bridge as part of the initial contract of Scenario C (i.e. as part of the 4-lane pavement replacement with a permanent inside shoulder). As part of a future added travel lanes project, this bridge would be widened and receive a rigid deck overlay at a construction cost estimate is $1.1 million.

5.4.4 I-65 over Brownstown

No work would occur at this bridge as part of the initial contract of Scenario A (i.e. as part of the 4-lane pavement replacement). As part of a future added travel lanes project, this bridge would be widened. If completed as part of the added travel lanes project, then the construction cost estimate is $668,000.

If completed as part of the single contract of Scenario B (i.e. as part of the 6-lane added travel lanes), this bridge would be widened for a construction cost estimate of $668,000.

No work would occur at this bridge as part of the initial contract of Scenario C (i.e. as part of the 4-lane pavement replacement with a permanent inside shoulder). As part of a future added travel lanes project, this bridge would be widened at a construction cost estimate is $668,000.

5.5 Construction Cost Comparisons by Scenario

Using the schedule of projects listed in ***Table 5***, along with the construction cost estimate in 2019 dollars for each as just described, ***Table 7*** lists the expected capital expenditures by INDOT by fiscal year. Exhibit A.6 in ***Appendix A*** combines ***Table 5*** and ***Table 7***. Capital costs inflated to the program year are shown in ***Section 7.0***, I-65 Alternative Program Capital Costs Summary.

Table 7 - Construction Cost Estimate

Fiscal Year	Construction Cost Estimate (2019$)		
	Scenario A	Scenario B	Scenario C
2019	$2,041,600	$2,041,600	$2,041,600
2021	$550,000	$550,000	$550,000
2023	$102,051,629[2]	$140,429,183	$114,617,168
2025	$1,994,300		$1,994,300
2028	$1,521,300		$1,521,300
2029	$1,344,200		$1,344,200
2033	$47,449,878		$26,787,929
Total	**$156,952,907**	**$143,020,783**	**$148,856,497**

Scenario A has the lowest amount of costs through fiscal year 2023 since its scope of work is the most limited. Over the life of the scenarios, Scenario B is the most cost effective. As anticipated, Scenario C falls in the middle between the two.

5.6 User Delay Costs

User-delay costs have been calculated to document the additional user-delay costs that would be incurred by the traveling public due to constructing the improvements over a period of years. The efficiencies of constructing the various programmed improvements concurrently reduces the time the traveling public is exposed to construction work zones and their corresponding user-delay costs. And while such costs are not incurred by INDOT,

[2] This cost assumes $8.0 million in improvements to mainline bridges and large culverts that would be bid as stand-alone projects in the same fiscal year under Scenario A.

they can have a significant impact on the public's perception of INDOT. Therefore, the present worth of these costs is provided for each scenario to inform INDOT's decision-making process as to the "best plan of action" from both a funding and motorist-impact perspective. The table below compares the project duration and user delay costs for each scenario.

Table 8 - Project Duration and User Delay Costs

	Scenario A		Scenario B		Scenario C	
Fiscal Year	No. of Month	User Costs	No. of Month	User Costs	No. of Month	User Costs
2019	0		0		0	
2021	0		0		0	
2023	9	$4,392,000	9	$4,392,000	9	$4,392,000
2024	9	$4,716,000	9	$4,716,000	9	$4,716,000
2025	4.5	$2,515,500	9	$5,031,000	4.5	$2,515,500
2028	0		0		0	
2029	0		0		0	
2033	9	$11,700,000	0		9	$11,700,000
2034	9	$13,500,000	0		0	
Total	**40.5**	**$36,823,500**	**27**	**$14,139,000**	**31.5**	**$23,323,500**

6.0 ECONOMIC ANALYSIS

The economic analysis computes the present worth value of the programmed expenditures in each of the three program scenarios described in ***Section 3.0*** above. The following sections describe the economic analysis in more detail.

6.1 Economic Analysis Parameters

In order to compute the economic analysis for each scenario, the following parameters were utilized.

6.1.1 Present Worth

The present worth of a future cost is given by the equation:

$$PW = F \times [1/(1+i)^n]$$

Where: F = future construction cost (in today's dollars)
i = discount rate (per year)
n = number of years from year 0 (analysis period)

6.1.2 Discount Rate

The discount rate (*real* discount rate) reflects the true time value of money (opportunity cost to the public) with no inflation premium and is used in conjunction with noninflated dollar cost estimates of future investments (FHWA-SA-98-079).

The applicable discount rate for the economic climate during which the analysis is performed can be estimated by subtracting the historical inflation rate from the yield on a US Treasury bond. During the 1990s, this yielded a discount rate of about 4% (7%-8% yields (–) 3%-4% inflation), which was FHWA's recommended discount rate at that time and is the Indiana Design Manual's recommended rate, see Exhibits D.1-D.4. During the early 2000s, these economic factors yielded a discount rate of about 3% (2003 Discount Rates for OMB: 2.5% (10-yr.), 3.2% (30-yr.), OMB Circular No. A-94, 2003), see Exhibit D.5.

However, since the recession of 2008, inflation has been significantly lower, as have US Treasury bond yields. Using these same economic factors for 2017 and 2018 yields the following discount rates in ***Table 9*** (see Exhibit D.6):

Table 9 - Discount Rates

	2017	2018
US Treasury Bond Yield	4.208	4.09
Inflation rate (Consumer Price Index)	(-) 2.10	(-) 1.90
Discount rate	2.108	2.19

The US Office of Management and Budget (OMB) currently directs federal agencies to use a discount rate of 0.2% for 20-year analyses and 0.6% for 30-year analyses (Federal Register 2-08-18). See Exhibit D.7.

Following conferral with INDOT, a discount rate of 2% was selected as the primary discount rate for the economic analyses in this report. A second and third analysis for each program scenario was also performed using 1% and 3% discount rates to assess the sensitivity of the analyses to lower and higher discount rates.

6.1.3 Analysis Period

In an economic analysis of pavement alternatives with different life-cycle costs, a 30- or 40-year analysis period is typically used for each alternative. However, since this study only compares the present worth of the initial expenditures within each program scenario, the analysis period is the year in which the last project of each scenario is programmed. For Scenario A, this is 14 years; for Scenario B, it is 10 years; and for Scenario C, it is 14 years.

6.2 Present Worth: Construction Costs

Using the economic analysis factors in ***Section 6.1*** above, the present worth (PW) of each program scenario's construction costs were calculated for the discount rates of 1%, 2%, and

3% and summed on a present-worth spreadsheet. See Exhibits D.8-D.16. The initial construction costs and present worth of construction costs are summarized in the tables below.

Table 10 - PW Construction Costs 1% Discount Rate

Scenario	Discount Rate	2019 Construction Cost ($)	PW Construction Cost ($)	Scenario Savings	Scenario % Savings	PW Rank
A-0	1%	$ 157,552,907	$ 146,972,554	--	--	3
B-0	1%	$ 148,480,583	$ 142,571,990	$ 4,400,564	3%	2
C-0	1%	$ 149,456,497	$ 141,072,141	$ 5,900,413	4%	1

Table 11 - PW Construction Costs 2% Discount Rate

Scenario	Discount Rate	2019 Construction Cost ($)	PW Construction Cost ($)	Scenario Savings	Scenario % Savings	PW Rank
A-1	2%	$ 157,552,907	$ 137,463,447	--	--	3
B-1	2%	$ 148,480,583	$ 136,954,369	$ 509,078	0.4%	2
C-1	2%	$ 149,456,497	$ 133,411,801	$ 4,051,647	3%	1

Table 12 - PW Construction Costs 3% Discount Rate

Scenario	Discount Rate	2019 Construction Cost ($)	PW Construction Cost ($)	Scenario Savings	Scenario % Savings	PW Rank
A-2	3%	$ 157,552,907	$ 128,907,987	--	--	2
B-2	3%	$ 148,480,583	$ 131,637,329	$(2,729,342)	-2%	3
C-2	3%	$ 149,456,497	$ 126,412,853	$ 2,495,133	2%	1

6.3 Present Worth: User-delay Costs

The present worth of the user-delay costs were also calculated for the discount rates of 1%, 2%, and 3% and summed on a present-worth spreadsheet. See Exhibits D.8-D.16. The initial user-delay costs and present worth of user-delay costs are summarized in the tables below.

Table 13 - PW User-Delay Costs 1% Discount Rate

Scenario	Discount Rate	2019 User-Delay Cost ($)	PW User-Delay Cost ($)	Scenario Savings	Scenario % Savings	PW Rank
A-0	1%	$ 36,823,500	$ 32,884,137	--	--	3
B-0	1%	$ 14,139,000	$ 13,447,188	$ 19,436,949	59%	1
C-0	1%	$ 23,323,500	$ 21,256,587	$ 11,627,550	35%	2

Table 14 - PW User-Delay Costs 2% Discount Rate

Scenario	Discount Rate	2019 User-Delay Cost ($)	PW User-Delay Cost ($)	Scenario Savings	Scenario % Savings	PW Rank
A-1	2%	$ 36,823,500	$ 29,460,305	--	--	3
B-1	2%	$ 14,139,000	$ 12,796,139	$ 16,664,166	57%	1
C-1	2%	$ 23,323,500	$ 19,429,805	$ 10,030,500	44%	2

Table 15 - PW User-Delay Costs 3% Discount Rate

Scenario	Discount Rate	2019 User-Delay Cost ($)	PW User-Delay Cost ($)	Scenario Savings	Scenario % Savings	PW Rank
A-2	3%	$ 36,823,500	$ 26,477,565	--	--	3
B-2	3%	$ 14,139,000	$ 12,183,776	$ 4,293,789	54%	1
C-2	3%	$ 23,323,500	$ 17,811,915	$ 8,665,650	33%	2

6.4 Scenario Economic Comparisons

6.4.1 Present Worth: Construction Costs

For the preferred discount rate of 2%, Scenario B (one major contract) would have a 0.4% ($0.5 million) lower present-worth construction cost; Scenario C, 3% ($4.1 million) lower. For the 1% discount rate, Scenario B would have a 3% ($4.4 million) lower present-worth construction cost; Scenario C, 4% ($5.9 million) lower. For the 3% discount rate, Scenario B would have a 2% ($2.7 million) higher present-worth construction cost; Scenario C, 2% ($2.5 million) lower. For all three discount rates, Scenario C has the lowest present-worth construction cost, ranging from 2-4% lower.

6.4.2 Present Worth: User-Delay Costs

For the preferred discount rate of 2%, Scenario B (one major contract) would have a 57% ($19.4 million) lower present-worth user-delay cost; Scenario C, 44% ($10.0 million) lower. For the 1% discount rate, Scenario B would have a 59% ($19.4 million) lower present-worth,

user-delay cost; Scenario C, 35% ($11.6 million) lower. For the 3% discount rate, Scenario B would have a 54% ($14.3 million) higher present-worth user-delay cost; Scenario C, 33% ($8.7 million) lower. For all three discount rates, Scenario B has the lowest present-worth user-delay costs, ranging from 54-59% lower, though Scenario C also has significantly lower present-worth user-delay costs (33-44% lower).

7.0 I-65 Alternative Program Capital Costs Summary

7.1 Inflation Adjustments

As stated previously in the report, economic analyses of program scenarios have been made using real discount rates. This allows present worth values to be calculated and compared without regard to inflation. The construction cost estimates and present worth values in the report to this point have been in 2019 dollars.

However, once the evaluation of alternative scenarios has been made with present worth values and capital costs have been assigned to program years, the capital costs in 2019 dollars must be inflated by a forecast inflation rate to the applicable program year. Per INDOT's direction, a 3%-per-year inflation rate is used to make the adjustments to 2019 dollars.

7.2 Summary of Program Scenarios

Tables 16-18 show the 2019-dollar amounts inflated to the applicable program year at a 3%-per-year inflation rate for each scenario. The amounts shown are the necessary funds to be programmed for each fiscal year in each scenario.

Table 16 - Scenario A Program Amounts

Fiscal Year	Capital Cost	Inflated at 3% Per Year
	2019 $	Fiscal Year $
2019	$2,041,600	$2,041,600
2021	$550,000	$583,495
2023	$102,051,629	$114,860,008
2025	$1,994,300	$2,381,298
2028	$1,521,300	$1,984,951
2029	$1,344,200	$1,806,492
2033	$47,449,878	$71,772,198
Total	**$156,952,907**	**$195,430,043**

Table 17 - Scenario B Program Amounts

Fiscal Year	Capital Cost	Inflated at 3% Per Year
	2019 $	Fiscal Year $
2019	$2,041,600	$2,041,600
2021	$550,000	$583,495
2023	$140,429,183	$158,054,283
Total	**$143,020,783**	**$160,679,378**

Table 18 - Scenario C Program Amounts

Fiscal Year	Capital Cost	Inflated at 3% Per Year
	2019 $	Fiscal Year $
2019	$2,041,600	$2,041,600
2021	$550,000	$583,495
2023	$114,617,168	$129,002,633
2025	$1,994,300	$2,381,298
2028	$1,521,300	$1,984,951
2029	$1,344,200	$1,806,492
2033	$26,787,929	$40,519,146
Total	**$148,856,497**	**$178,319,616**

It is noted that Scenario B requires $35 million fewer inflated dollars than the baseline Scenario A program and Scenario C requires $18 million fewer inflated dollars than the baseline Scenario A program. Because inflation rates may vary over a fourteen-year period, it is recommended that INDOT review the programmed amounts annually and adjust them by any changes in the forecast inflation rate that differs from 3% per year.

7.3 Right of Way Cost Estimate

The existing right of way along the project corridor has been reviewed and there is expected to be sufficient right of way for the pavement and added travel lane improvements.

Temporary right of way may be necessary for the large culvert improvements and the work on the mainline bridges. The temporary right of way will be used for grading purposes and construction access. As a preliminary estimate, it is assumed that mainline bridges will require 0.2 acres of temporary right of way at each end and large culverts will require 0.05

acres of temporary right of way at each end. The culverts with greater than 13 ft/s outlet velocity (refer to Exhibit E.2 in ***Appendix E***) are assumed to require 0.5 acres of permanent right of way for the necessity of an external energy dissipator. The table below summarizes the right of way impact and cost estimate for the structure improvements.

Table 19 - Right of Way Estimate

Structure	# of Parcels Impacted	Temporary R/W (Acres)	Permanent R/W (Acres)	Estimated Cost
I-65 Over Blue Lick Creek	2	0.4	0.0	$20,600
I-65 Over Caney Fork	2	0.4	0.0	$20,600
CV I65-010-18.35	3	0.1	0.0	$30,150
CV I65-010-19.90	3	0.1	0.5	$31,650
CV I65-010-21.10	2	0.1	0.0	$20,150
I-65 Over Brownstown	4	0.4	0.0	$40,600
CV I65-010-22.65	2	0.1	0.5	$21,650
CV I65-010-22.77	2	0.1	0.5	$21,650
I-65 Over Pigeon Roost	4	0.4	0.0	$40,600
CV I65-010-25.05	3	0.1	0.5	$31,650
CV I65-072-25.83	3	0.1	0.0	$30,150
CV I65-072-26.20	2	0.1	0.0	$20,150

8.0 CONSTRUCTION COST REDUCTION OPPORTUNITIES

The purpose of the construction cost estimates in the report was to program construction funds for the I-65 Clark and Scott Counties project. The estimates were intended to represent a reasonable engineer's opinion of probable construction cost in each program year, not the lowest possible bid. Thus, there may be several opportunities for INDOT to reduce the programmed amounts. This section describes where such opportunities may be.

8.1 Construction Cost Methodology & Contingency Amount

The construction cost estimates in the report were largely based upon historic bid data using the Oman program. As a cross-reference, the bid tabs from INDOT's Contract No. R-39226 (I-74 pavement replacement in Ripley and Franklin Counties) was reviewed. This 2017 let project is of similar length and had an engineer's estimate of about $75 million. Also relevant is the project utilized alternate pavement biddings and life-cycle cost adjustments (see results in the table below), both potentially viable for the I-65 project. The following project information is summarized from Exhibit C.8 in ***Appendix C***.

Table 20 – I-74 Bid Information

Number of Bidders	5	
Engineer's Estimate	$74,700,427	
Low Bid (w/o LCC Adj):	$60,837,502	(18.55% below Eng. Estimate)
2nd Lowest Bid (w/o LCC Adj):	$65,738,357	(8.05% high than the low bid)
3rd Lowest Bid (w/o LCC Adj):	$66,527,107	(9.35% high than the low bid)
4th Lowest Bid (w/o LCC Adj):	$68,523,414	(12.64% high than the low bid)

This data was considered highly reliable as a basis for estimating the I-65 project because the size and scope of the projects were very similar, the bids were less than two years old, and there were five bidders.

The fourth-lowest bidder's unit prices were used as a reference when calculating construction costs in the report. It is worth noting the fourth-largest bid unit prices were on average 12.54% higher than the low bid. After taking into account the effects of inflation to the current year, the construction cost estimates in the report include approximately as much as a 6% over an estimate largely based upon the low-bid unit prices. This amount may be considered a "bidding climate contingency". An approximately 6% bidding climate contingency seems to be an appropriate amount for programming purposes.

8.2 Alternate Design/Alternate Bid Process (ADAB) for Pavement-Type Selection

NCHRP Synthesis 499, Alternate Design/Alternate Bid Process (ADAB) for Pavement-Type Selection, documents the state of the practice in ADAB for pavement-type selection from a survey of U.S. departments of transportation and the Ontario Ministry of Transportation. The synthesis found that implementing ADAB contracts can lead to increased competition and reduced pavement material costs. "Its major benefit is the ability to pick the most economic pavement type based on real-time pricing for both alternatives (HMA & PCC) at bid opening."

INDOT's SEP-14 2010 and 2011 ADAB Program was featured as a case study in the synthesis and documented overall savings of 9.0% in 2010 and 5.7% in 2011 (Duncan and Holtz 2012). Similarly, MoDOT's use of ADAB documented lowering of unit prices for HMA paving by 5.1% and PCC paving by 8.6% (Ahlvers 2010).

The synthesis cites two characteristics that make a project suitable for ADAB: high levels of traffic and a high percentage of truck traffic. With 20-year forecast traffic volumes of over 56,000 AADT and truck traffic over 30%, the I-65 project qualifies for use of ADAB.

Use of ADAB on the 2017 I-74 project provides a recent INDOT example that can be useful in estimating the cost-reduction potential of ADAB on this project. From Exhibit C.8, the following information is presented:

Table 21 – I-74 Bid Amounts

Bidder	Unadjusted Bid Amount
No. 1 (low)	$60,837,502
No. 2	$65,738,357
No. 3	$66,527,107
No. 4	$68,532,414
No. 5	$74,919,195 (outlier)
Average	$65,408,845 (not including No. 5)

The low bid using ADAB is 7.0% lower than the average bid (not including the No. 5 bid), which illustrates the effect of ADAB competition on the I-74 project. This percentage differential is consistent with INDOT's and MoDOT's average percentage differentials between ADAB and non-ADAB projects cited above.

In addition, the low bid was 18.6% lower than the Engineer's Estimate. Though the Engineer's Estimate was not available for unit price analysis, this large total-bid differential on a recent (2017) project further demonstrates the cost-saving potential of ADAB bidding.

Based upon the analyses in subsection 9.01 and 9.02 above, if ADAB is used, the construction cost estimates in the report may be high by four to six percent. Given the benefits cited in the NCHRP Synthesis 499 report, and INDOT's own experience, it is recommended that the I-65 project be designed and bid using ADAB.

9.0 CONCLUSIONS

Each scenario addresses the long-term goal of adding capacity to I-65 and restoration of the existing assets. However, how these improvements are bundled and scheduled create differences in in estimated costs, maintenance of traffic schemes, and the present worth of project costs.

The construction costs of Scenario B projects are the lowest of the three scenarios. Scenario B also is completed in the least number of months. After Scenario B, Scenario C has the next lowest construction cost and number of months of construction. Scenario A has the largest construction cost for all of the projects and takes the greatest number of months to be completed.

Scenario A and Scenario C have very similar maintenance of traffic schemes, especially during the construction of the first contract. However, for Scenario C, the MOT scheme for

the second contract is simplified, as motorists can remain in their travel lanes and not be shifted to the outside shoulder as in Scenario A. Scenario C not only requires less MOT phases to complete the projects than Scenario A, but also creates a safer and more productive scheme in Stage 2. By crossing over all traffic to the northbound pavement, the workers will have a much safer work zone (separated from all four traffic lanes by a 60-foot median) and be able to complete the southbound pavement at a quicker rate, as it can all be constructed at once. From a motorist perspective, Scenario B and Scenario C would be highly preferred over Scenario A because of their significantly lower delay and user-delay costs.

In conclusion the following recommendations are made:

1. If funds are made available, it is recommended that Scenario B be incorporated into the Seymour District FY 2019-2029 capital program with the reconstruction of the existing pavement and widening to six lanes being programmed for a FY 2023 letting, as this scenario offers the lower present-worth capital cost and present-worth user-delay costs than Scenario A. Scenario B also provides insurance for the possibility of traffic growth exceeding 1.0-1.5% per year by providing additional capacity about five to six years in advance of the currently forecast need, especially since the southern segment is already operating below the minimum acceptable LOS.
2. If funds cannot be made available for six-laning I-65 in one FY 2023 contract, it is recommended that Scenario C be incorporated into the Seymour District capital program for FY 2019-2033, with the third lane being added in FY 2033, as this scenario offers the best balance of present-worth capital costs, safety, and user-delay costs. Should traffic growth begin to exceed 1.0-1.5% per year, programming of the third lane addition can be re-assessed annually and adjustments made to the capital program to reflect actual traffic growth.

10.0 Report Approval

The Seymour District Technical Services and Capital Program Management Departments shall be consulted if deviation from this document is determined to be necessary during a later phase of project development. The person initiating the change should send a memo to the Seymour District Technical Services Director for concurrence. This memo should be routed through the Seymour District Capital Program Consultant Services Manager and the Project Manager. It should include justification for the change and the estimated cost difference.

11.0 CONCURRENCE

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Appendix B

Traffic Analysis

- Exhibit B.1: Basic Freeway Segment LOS Forecasting Calculations 1.0% Growth Rate
- Exhibit B.2: Basic Freeway Segment LOS Forecasting Calculations 1.5% Growth Rate
- Exhibit B.3: Road HAT Analysis

BASIC FREEWAY SEGMENT LOS FORECAST CALCULATIONS

I-65 Added Travel Lanes

Des. No.	1700135	Proj. No.	18709-03-10
Calcs by:	GTB	Date:	10/30/2018
Rev. by:		Date:	

Segment Location: Between Memphis/Blue Lick Rd, RP 16+00 and SR 160, RP 19+0.25

Count Station ID: 971090 Date of Count Used: 3/12/2018

* All calculations based on Highway Capacity Manual 6th Edition, Chapter 12 - Basic Freeway and Multilane Highway Segments, Methodology

Traffic Data

Route AADT =	46532	veh/day	Pos. Direction	North
Dir. Distribution =	43%	% (pos)	Neg. Direction	South
DHV =	8%	%		
Base Year:	2018			
Annual Growth Rate	1%	%/yr		
Truck Volume Percentage =	32%	% of AADT		

Input Data

	North		South		HCM Exhibit Ref.
Base Free Flow Speed (BFFS)	75	mph	75	mph	
Directional Peak Hour Vol. (V)	1601	veh/hr	2122	veh/hr	
Lane Width Adjustment (f_{LW})	0	mph	0	mph	12-20
Rt. Lat. Clearance (f_{RLC})	0	mph	0	mph	12-21
Total Ramp Density (TRD)	0.31746	ramps/mi	0.31746	ramps/mi	
Speed Adjustment Factor (SAF)	1.0		1.0		HCM Ch. 11
Peak Hour Factor (PHF)	0.9		0.95		
# of Lanes in Anal. Dir. (N)	2	lanes	2	lanes	
Capacity Adjust Factor (CAF)	1.0		1.0		HCM Ch. 11
Density at Capacity (D_c)	45	pc/mi/ln	45	pc/mi/ln	
Exponent Calib. Parameter (a)	2.00		2.00		12-6
Proportion SUTs & TTs (P_T)	32%		32%		
Passenger Car Equivalent (E_T)	3	PCEs	3	PCEs	12-25 thru 12-28

Calculations

	North		South	
Free Flow Speed (FFS) =	73.77178	mph	73.77178	mph
FFS_{adj} =	73.77178	mph	73.77178	mph
Basic Freeway Capacity ('c) =	2400	pc/hr/ln	2400	pc/hr/ln
c_{adj} =	2400	pc/hr/ln	2400	pc/hr/ln
Breakpoint (BP) =	1049.129	pc/hr/ln	1049.129	pc/hr/ln
f_{HV} =	0.610		0.610	
Demand Flow Rate (v_p) =	1459	pc/hr/ln	1832	pc/hr/ln
Mean Speed of Traffic (S) =	71.89	mph	66.91	mph
Density (D) =	20.29	pc/mi/ln	27.38	pc/mi/ln
Level Of Service (LOS) =	C		D	

Forecasting

	Northbound				Southbound			
Year	**v_p**	**S**	**D**	**LOS**	**v_p**	**S**	**D**	**LOS**
2018	1459	71.89	20.29	C	1832	66.91	27.38	D
2019	1474	71.75	20.54	C	1850	66.59	27.78	D
2020	1488	71.61	20.78	C	1869	66.24	28.21	D
2021	1503	71.46	21.03	C	1888	65.89	28.65	D
2022	1518	71.31	21.29	C	1906	65.55	29.08	D
2023	1533	71.15	21.55	C	1925	65.18	29.53	D
2024	1549	70.97	21.83	C	1945	64.78	30.02	D
2025	1564	70.80	22.09	C	1964	64.40	30.50	D
2026	1580	70.62	22.37	C	1984	63.98	31.01	D
2027	1596	70.42	22.66	C	2004	63.56	31.53	D
2028	1612	70.22	22.96	C	2024	63.13	32.06	D
2029	1628	70.02	23.25	C	2044	62.69	32.61	D
2030	1644	69.81	23.55	C	2064	62.24	33.16	D
2031	1660	69.59	23.85	C	2085	61.75	33.76	D
2032	1677	69.36	24.18	C	2106	61.26	34.38	D
2033	1694	69.11	24.51	C	2127	60.76	35.01	E
2034	1711	68.87	24.85	C	2148	60.25	35.65	E
2035	1728	68.61	25.19	C	2170	59.70	36.35	E
2036	1745	68.35	25.53	C	2191	59.17	37.03	E
2037	1763	68.06	25.90	C	2213	58.60	37.76	E
2038	1780	67.79	26.26	D	2235	58.02	38.52	E
2039	1798	67.49	26.64	D	2258	57.40	39.33	E
2040	1816	67.19	27.03	D	2280	56.80	40.14	E
2041	1834	66.87	27.43	D	2303	56.16	41.01	E
2042	1853	66.53	27.85	D	2326	55.51	41.90	E
2043	1871	66.21	28.26	D	2349	54.85	42.83	E
2044	1890	65.85	28.70	D	2373	54.14	43.83	E
2045	1909	65.49	29.15	D	2397	53.42	44.87	E
2046	1928	65.12	29.61	D	2421	D > C	D > C	F
2047	1947	64.74	30.07	D	2445	D > C	D > C	F
2048	1967	64.34	30.57	D	2469	D > C	D > C	F

BASIC FREEWAY SEGMENT LOS FORECAST CALCULATIONS

I-65 Added Travel Lanes

Des. No.	1700135	Proj. No.	18709-03-10
Calcs by:	GTB	Date:	10/30/2018
Rev. by:		Date:	

Segment Location: Between SR 160, RP 19+0.25 and S. of SR 56, RP 28+0.88

Count Station ID: 971100 Date of Count Used: 3/19/2018

* All calculations based on Highway Capacity Manual 6th Edition, Chapter 12 - Basic Freeway and Multilane Highway Segments, Methodology

Traffic Data

Route AADT =	42668	veh/day
Dir. Distribution =	52%	% (pos)
DHV =	8%	%
Base Year:	2018	
Annual Growth Rate	1%	%/yr
Truck Volume Percentage =	22%	% of AADT

Pos. Direction	North
Neg. Direction	South

Input Data

	North		South		HCM Exhibit Ref.
Base Free Flow Speed (BFFS)	75	mph	75	mph	
Directional Peak Hour Vol. (V)	1775	veh/hr	1638	veh/hr	
Lane Width Adjustment (f_{LW})	0	mph	0	mph	12-20
Rt. Lat. Clearance (f_{RLC})	0	mph	0	mph	12-21
Total Ramp Density (TRD)	0.211193	ramps/mi	0.211193	ramps/mi	
Speed Adjustment Factor (SAF)	1.0		1.0		HCM Ch. 11
Peak Hour Factor (PHF)	0.96		0.93		
# of Lanes in Anal. Dir. (N)	2	lanes	2	lanes	
Capacity Adjust Factor (CAF)	1.0		1.0		HCM Ch. 11
Density at Capacity (D_c)	45	pc/mi/ln	45	pc/mi/ln	
Exponent Calib. Parameter (a)	2.00		2.00		12-6
Proportion SUTs & TTs (P_T)	22%		22%		
Passenger Car Equivalent (E_T)	3	PCEs	3	PCEs	12-25 thru 12-28

Calculations

	North		South	
Free Flow Speed (FFS) =	74.12786	mph	74.12786	mph
FFS_{adj} =	74.12786	mph	74.12786	mph
Basic Freeway Capacity ('c) =	2400	pc/hr/ln	2400	pc/hr/ln
c_{adj} =	2400	pc/hr/ln	2400	pc/hr/ln
Breakpoint (BP) =	1034.886	pc/hr/ln	1034.886	pc/hr/ln
f_{HV} =	0.694		0.694	
Demand Flow Rate (v_p) =	1331	pc/hr/ln	1268	pc/hr/ln
Mean Speed of Traffic (S) =	73.15	mph	73.52	mph
Density (D) =	18.20	pc/mi/ln	17.25	pc/mi/ln
Level Of Service (LOS) =	C		B	

Forecasting

	Northbound				Southbound			
Year	**v_p**	**S**	**D**	**LOS**	**v_p**	**S**	**D**	**LOS**
2018	1331	73.15	18.20	C	1268	73.52	17.25	B
2019	1344	73.06	18.40	C	1281	73.45	17.44	B
2020	1358	72.96	18.61	C	1293	73.38	17.62	B
2021	1371	72.87	18.82	C	1306	73.31	17.82	B
2022	1385	72.76	19.04	C	1319	73.23	18.01	C
2023	1399	72.65	19.26	C	1333	73.14	18.23	C
2024	1413	72.53	19.48	C	1346	73.05	18.43	C
2025	1427	72.41	19.71	C	1359	72.96	18.63	C
2026	1441	72.29	19.93	C	1373	72.85	18.85	C
2027	1456	72.15	20.18	C	1387	72.74	19.07	C
2028	1470	72.02	20.41	C	1401	72.63	19.29	C
2029	1485	71.87	20.66	C	1415	72.52	19.51	C
2030	1500	71.71	20.92	C	1429	72.39	19.74	C
2031	1515	71.56	21.17	C	1443	72.27	19.97	C
2032	1530	71.39	21.43	C	1458	72.13	20.21	C
2033	1545	71.22	21.69	C	1472	72.00	20.45	C
2034	1561	71.04	21.97	C	1487	71.85	20.70	C
2035	1576	70.86	22.24	C	1502	71.69	20.95	C
2036	1592	70.66	22.53	C	1517	71.53	21.21	C
2037	1608	70.46	22.82	C	1532	71.37	21.47	C
2038	1624	70.26	23.12	C	1547	71.20	21.73	C
2039	1640	70.04	23.41	C	1563	71.02	22.01	C
2040	1657	69.81	23.74	C	1578	70.84	22.28	C
2041	1673	69.58	24.04	C	1594	70.64	22.57	C
2042	1690	69.34	24.37	C	1610	70.44	22.86	C
2043	1707	69.09	24.71	C	1626	70.23	23.15	C
2044	1724	68.83	25.05	C	1642	70.01	23.45	C
2045	1741	68.56	25.39	C	1659	69.78	23.77	C
2046	1759	68.28	25.76	C	1675	69.56	24.08	C
2047	1776	68.00	26.12	D	1692	69.31	24.41	C
2048	1794	67.70	26.50	D	1709	69.06	24.75	C

BASIC FREEWAY SEGMENT LOS FORECAST CALCULATIONS

I-65 Added Travel Lanes

Des. No.	1700135	Proj. No.	18709-03-10
Calcs by:	GTB	Date:	10/30/2018
Rev. by:		Date:	

Segment Location: Between Memphis/Blue Lick Rd, RP 16+00 and SR 160, RP 19+0.25

Count Station ID: 971090 Date of Count Used: 3/12/2018

* All calculations based on Highway Capacity Manual 6th Edition, Chapter 12 - Basic Freeway and Multilane Highway Segments, Methodology

Traffic Data

Route AADT =	46532	veh/day
Dir. Distribution =	43%	% (pos)
DHV =	8%	%
Base Year:	2018	
Annual Growth Rate	1.5%	%/yr
Truck Volume Percentage =	32%	% of AADT

Pos. Direction	North
Neg. Direction	South

Input Data

	North		South		HCM Exhibit Ref.
Base Free Flow Speed (BFFS)	75	mph	75	mph	
Directional Peak Hour Vol. (V)	1601	veh/hr	2122	veh/hr	
Lane Width Adjustment (f_{LW})	0	mph	0	mph	12-20
Rt. Lat. Clearance (f_{RLC})	0	mph	0	mph	12-21
Total Ramp Density (TRD)	0.31746	ramps/mi	0.31746	ramps/mi	
Speed Adjustment Factor (SAF)	1.0		1.0		HCM Ch. 11
Peak Hour Factor (PHF)	0.9		0.95		
# of Lanes in Anal. Dir. (N)	2	lanes	2	lanes	
Capacity Adjust Factor (CAF)	1.0		1.0		HCM Ch. 11
Density at Capacity (D_c)	45	pc/mi/ln	45	pc/mi/ln	
Exponent Calib. Parameter (a)	2.00		2.00		12-6
Proportion SUTs & TTs (P_T)	32%		32%		
Passenger Car Equivalent (E_T)	3	PCEs	3	PCEs	12-25 thru 12-28

Calculations

	North		South	
Free Flow Speed (FFS) =	73.77178	mph	73.77178	mph
FFS_{adj} =	73.77178	mph	73.77178	mph
Basic Freeway Capacity ('c) =	2400	pc/hr/ln	2400	pc/hr/ln
c_{adj} =	2400	pc/hr/ln	2400	pc/hr/ln
Breakpoint (BP) =	1049.129	pc/hr/ln	1049.129	pc/hr/ln
f_{HV} =	0.610		0.610	
Demand Flow Rate (v_p) =	1459	pc/hr/ln	1832	pc/hr/ln
Mean Speed of Traffic (S) =	71.89	mph	66.91	mph
Density (D) =	20.29	pc/mi/ln	27.38	pc/mi/ln
Level Of Service (LOS) =	C		D	

Forecasting

	Northbound				Southbound			
Year	**v_p**	**S**	**D**	**LOS**	**v_p**	**S**	**D**	**LOS**
2018	1459	71.89	20.29	C	1832	66.91	27.38	D
2019	1481	71.68	20.66	C	1859	66.43	27.99	D
2020	1503	71.46	21.03	C	1887	65.91	28.63	D
2021	1526	71.22	21.43	C	1916	65.36	29.32	D
2022	1549	70.97	21.83	C	1944	64.80	30.00	D
2023	1572	70.71	22.23	C	1974	64.19	30.75	D
2024	1595	70.43	22.65	C	2003	63.58	31.50	D
2025	1619	70.13	23.08	C	2033	62.93	32.31	D
2026	1644	69.81	23.55	C	2064	62.24	33.16	D
2027	1668	69.48	24.01	C	2095	61.52	34.05	D
2028	1693	69.13	24.49	C	2126	60.78	34.98	D
2029	1719	68.75	25.01	C	2158	60.00	35.97	E
2030	1744	68.36	25.51	C	2190	59.19	37.00	E
2031	1771	67.94	26.07	D	2223	58.34	38.11	E
2032	1797	67.51	26.62	D	2257	57.43	39.30	E
2033	1824	67.05	27.20	D	2290	56.53	40.51	E
2034	1851	66.57	27.81	D	2325	55.54	41.86	E
2035	1879	66.06	28.44	D	2360	54.53	43.28	E
2036	1907	65.53	29.10	D	2395	53.48	44.78	E
2037	1936	64.96	29.80	D	2431	D > C	D > C	F
2038	1965	64.38	30.52	D	2467	D > C	D > C	F
2039	1995	63.75	31.29	D	2504	D > C	D > C	F
2040	2024	63.13	32.06	D	2542	D > C	D > C	F
2041	2055	62.44	32.91	D	2580	D > C	D > C	F
2042	2086	61.73	33.79	D	2619	D > C	D > C	F
2043	2117	61.00	34.71	D	2658	D > C	D > C	F
2044	2149	60.22	35.68	E	2698	D > C	D > C	F
2045	2181	59.42	36.70	E	2738	D > C	D > C	F
2046	2214	58.57	37.80	E	2780	D > C	D > C	F
2047	2247	57.70	38.94	E	2821	D > C	D > C	F
2048	2281	56.78	40.18	E	2864	D > C	D > C	F

BASIC FREEWAY SEGMENT LOS FORECAST CALCULATIONS

I-65 Added Travel Lanes

Des. No.	1700135	Proj. No.	18709-03-10
Calcs by:	GTB	Date:	10/30/2018
Rev. by:		Date:	

Segment Location: Between SR 160, RP 19+0.25 and S. of SR 56, RP 28+0.88

Count Station ID: 971100 Date of Count Used: 3/19/2018

* All calculations based on Highway Capacity Manual 6th Edition, Chapter 12 - Basic Freeway and Multilane Highway Segments, Methodology

Traffic Data

Route AADT =	42668	veh/day
Dir. Distribution =	52%	% (pos)
DHV =	8%	%
Base Year:	2018	
Annual Growth Rate	1.5%	%/yr
Truck Volume Percentage =	22%	% of AADT

Pos. Direction	North
Neg. Direction	South

Input Data

	North		South		HCM Exhibit Ref.
Base Free Flow Speed (BFFS)	75	mph	75	mph	
Directional Peak Hour Vol. (V)	1775	veh/hr	1638	veh/hr	
Lane Width Adjustment (f_{LW})	0	mph	0	mph	12-20
Rt. Lat. Clearance (f_{RLC})	0	mph	0	mph	12-21
Total Ramp Density (TRD)	0.211193	ramps/mi	0.211193	ramps/mi	
Speed Adjustment Factor (SAF)	1.0		1.0		HCM Ch. 11
Peak Hour Factor (PHF)	0.96		0.93		
# of Lanes in Anal. Dir. (N)	2	lanes	2	lanes	
Capacity Adjust Factor (CAF)	1.0		1.0		HCM Ch. 11
Density at Capacity (D_c)	45	pc/mi/ln	45	pc/mi/ln	
Exponent Calib. Parameter (a)	2.00		2.00		12-6
Proportion SUTs & TTs (P_T)	22%		22%		
Passenger Car Equivalent (E_T)	3	PCEs	3	PCEs	12-25 thru 12-28

Calculations

	North		South	
Free Flow Speed (FFS) =	74.12786	mph	74.12786	mph
FFS_{adj} =	74.12786	mph	74.12786	mph
Basic Freeway Capacity ('c) =	2400	pc/hr/ln	2400	pc/hr/ln
c_{adj} =	2400	pc/hr/ln	2400	pc/hr/ln
Breakpoint (BP) =	1034.886	pc/hr/ln	1034.886	pc/hr/ln
f_{HV} =	0.694		0.694	
Demand Flow Rate (v_p) =	1331	pc/hr/ln	1268	pc/hr/ln
Mean Speed of Traffic (S) =	73.15	mph	73.52	mph
Density (D) =	18.20	pc/mi/ln	17.25	pc/mi/ln
Level Of Service (LOS) =	C		B	

Forecasting

	Northbound				Southbound			
Year	**v_p**	**S**	**D**	**LOS**	**v_p**	**S**	**D**	**LOS**
2018	1331	73.15	18.20	C	1268	73.52	17.25	B
2019	1351	73.01	18.50	C	1287	73.42	17.53	B
2020	1371	72.87	18.82	C	1306	73.31	17.82	B
2021	1392	72.70	19.15	C	1326	73.18	18.12	C
2022	1413	72.53	19.48	C	1346	73.05	18.43	C
2023	1434	72.35	19.82	C	1366	72.90	18.74	C
2024	1455	72.16	20.16	C	1386	72.75	19.05	C
2025	1477	71.95	20.53	C	1407	72.58	19.38	C
2026	1499	71.72	20.90	C	1428	72.40	19.72	C
2027	1522	71.48	21.29	C	1450	72.21	20.08	C
2028	1545	71.22	21.69	C	1472	72.00	20.45	C
2029	1568	70.96	22.10	C	1494	71.78	20.81	C
2030	1591	70.68	22.51	C	1516	71.54	21.19	C
2031	1615	70.37	22.95	C	1539	71.29	21.59	C
2032	1639	70.06	23.40	C	1562	71.03	21.99	C
2033	1664	69.71	23.87	C	1585	70.75	22.40	C
2034	1689	69.35	24.35	C	1609	70.45	22.84	C
2035	1714	68.98	24.85	C	1633	70.14	23.28	C
2036	1740	68.58	25.37	C	1658	69.80	23.76	C
2037	1766	68.16	25.91	C	1683	69.44	24.24	C
2038	1793	67.71	26.48	D	1708	69.07	24.73	C
2039	1820	67.25	27.06	D	1733	68.69	25.23	C
2040	1847	66.77	27.66	D	1759	68.28	25.76	C
2041	1875	66.25	28.30	D	1786	67.83	26.33	D
2042	1903	65.72	28.96	D	1813	67.37	26.91	D
2043	1931	65.17	29.63	D	1840	66.89	27.51	D
2044	1960	64.58	30.35	D	1867	66.40	28.12	D
2045	1990	63.95	31.12	D	1895	65.87	28.77	D
2046	2019	63.32	31.89	D	1924	65.31	29.46	D
2047	2050	62.63	32.73	D	1953	64.72	30.18	D
2048	2080	61.94	33.58	D	1982	64.12	30.91	D

Index of Crash Frequency and Cost - Form F1

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Location	I-65 MM 16.5 to 19.0	
South project limits to SR160 Interchange		
GIS		
Post		
Analyst	MES	
Date	2/1/2019	

INPUT	
Road Facility Type	Rural Interstate Segment
AADT (veh/day)	46500
Segment Length (mi)	2.5
First Year with Crash Data (yyyy)	2015
Last Year with Crash Data (yyyy)	2018
Number of Crashes (crash/period)	
Fatal and Incapacitating Injury Crashes	13
Non-Incapacitating and Possible Injury Crashes	14
Property Damage Only Crashes	103
Route or Road Type	Rural Interstate Segment
Average Crash Costs ($)	
Fatal and Incapacitating Injury Crashes	629260
Non-Incapacitating and Possible Injury Crashes	29410
Property Damage Only Crashes	4730
Crash Cost Year (yyyy)	2013
OUTPUT	
Expected Crash Frequency (crash/year)	
Fatal and Incapacitating Injury Crashes	0.266
Non-Incapacitating and Possible Injury Crashes	1.72
Property Damage Only Crashes	8.36
All Crashes	10.34
Index of Crash Frequency	**2.70**
Index of Crash Cost	**3.30**

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Location	I-65 MM 16.5 to 19.0	
South project limits to SR160 Interchange		
GIS		
Post		
Analyst	MES	

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Location	I-65 MM 19.0 to 22.0	
SR160 Interchange to Rest Area		
GIS		
Post		
Analyst	MES	
Date	2/1/2019	

INPUT	
Road Facility Type	Rural Interstate Segment
AADT (veh/day)	42700
Segment Length (mi)	3
First Year with Crash Data (yyyy)	2015
Last Year with Crash Data (yyyy)	2018
Number of Crashes (crash/period)	
Fatal and Incapacitating Injury Crashes	12
Non-Incapacitating and Possible Injury Crashes	12
Property Damage Only Crashes	100
Route or Road Type	Rural Interstate Segment
Average Crash Costs ($)	
Fatal and Incapacitating Injury Crashes	629260
Non-Incapacitating and Possible Injury Crashes	29410
Property Damage Only Crashes	4730
Crash Cost Year (yyyy)	2013
OUTPUT	
Expected Crash Frequency (crash/year)	
Fatal and Incapacitating Injury Crashes	0.288
Non-Incapacitating and Possible Injury Crashes	1.98
Property Damage Only Crashes	9.61
All Crashes	11.88
Index of Crash Frequency	**2.07**
Index of Crash Cost	**3.05**

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Location	I-65 MM 19.0 to 22.0	
SR160 Interchange to Rest Area		
GIS		
Post		
Analyst	MES	

Index of Crash Frequency and Cost - Form F1

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Location	I-65 MM 22.0 to MM 25.0	
Rest Area to Urban Boundary		
GIS		
Post		
Analyst	MES	
Date	2/1/2019	

INPUT	
Road Facility Type	Rural Interstate Segment
AADT (veh/day)	42700
Segment Length (mi)	3
First Year with Crash Data (yyyy)	2015
Last Year with Crash Data (yyyy)	2018
Number of Crashes (crash/period)	
Fatal and Incapacitating Injury Crashes	9
Non-Incapacitating and Possible Injury Crashes	1
Property Damage Only Crashes	63
Route or Road Type	Rural Interstate Segment
Average Crash Costs ($)	
Fatal and Incapacitating Injury Crashes	629260
Non-Incapacitating and Possible Injury Crashes	29410
Property Damage Only Crashes	4730
Crash Cost Year (yyyy)	2013
OUTPUT	
Expected Crash Frequency (crash/year)	
Fatal and Incapacitating Injury Crashes	0.288
Non-Incapacitating and Possible Injury Crashes	1.98
Property Damage Only Crashes	9.61
All Crashes	11.88
Index of Crash Frequency	**0.70**
Index of Crash Cost	**2.30**

Index of Crash Frequency and Cost - Form F1

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Location	I-65 MM 22.0 to MM 25.0	
Rest Area to Urban Boundary		
GIS		
Post		
Analyst	MES	

Index of Crash Frequency and Cost - Form F1

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Location	I-65 MM 25.0 to MM 29.0	
Urban Boundary to North Project Limits		
GIS		
Post		
Analyst	MES	
Date	2/1/2019	

INPUT	
Road Facility Type	Rural Interstate Segment
AADT (veh/day)	42700
Segment Length (mi)	4
First Year with Crash Data (yyyy)	2015
Last Year with Crash Data (yyyy)	2018
Number of Crashes (crash/period)	
Fatal and Incapacitating Injury Crashes	25
Non-Incapacitating and Possible Injury Crashes	10
Property Damage Only Crashes	56
Route or Road Type	Rural Interstate Segment
Average Crash Costs ($)	
Fatal and Incapacitating Injury Crashes	629260
Non-Incapacitating and Possible Injury Crashes	29410
Property Damage Only Crashes	4730
Crash Cost Year (yyyy)	2013
OUTPUT	
Expected Crash Frequency (crash/year)	
Fatal and Incapacitating Injury Crashes	0.359
Non-Incapacitating and Possible Injury Crashes	2.64
Property Damage Only Crashes	12.44
All Crashes	15.44
Index of Crash Frequency	**0.63**
Index of Crash Cost	**4.46**

Index of Crash Frequency and Cost - Form F1

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Location	I-65 MM 25.0 to MM 29.0	
Urban Boundary to North Project Limits		
GIS		
Post		
Analyst	MES	

Index of Crash Frequency and Cost - Form F1

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Location	I-65 MM 16.5 to 19.0	
Southern Segment: Memphis Rd to SR 160		
GIS		
Post		
Analyst	MES	
Date	2/1/2019	

INPUT	
Road Facility Type	Rural Interstate Segment
AADT (veh/day)	46500
Segment Length (mi)	2.5
First Year with Crash Data (yyyy)	2015
Last Year with Crash Data (yyyy)	2018
Number of Crashes (crash/period)	
Fatal and Incapacitating Injury Crashes	13
Non-Incapacitating and Possible Injury Crashes	14
Property Damage Only Crashes	103
Route or Road Type	Rural Interstate Segment
Average Crash Costs ($)	
Fatal and Incapacitating Injury Crashes	629260
Non-Incapacitating and Possible Injury Crashes	29410
Property Damage Only Crashes	4730
Crash Cost Year (yyyy)	2013
OUTPUT	
Expected Crash Frequency (crash/year)	
Fatal and Incapacitating Injury Crashes	0.266
Non-Incapacitating and Possible Injury Crashes	1.72
Property Damage Only Crashes	8.36
All Crashes	10.34
Index of Crash Frequency	**2.70**
Index of Crash Cost	**3.30**

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Location	I-65 MM 16.5 to 19.0	
Southern Segment: Memphis Rd to SR 160		
GIS		
Post		
Analyst	MES	

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Location	I-65 MM 19.0 to 29.0	
Northern Segment: SR 160 to SR 56		
GIS		
Post		
Analyst	MES	
Date	2/1/2019	

INPUT	
Road Facility Type	Rural Interstate Segment
AADT (veh/day)	42700
Segment Length (mi)	10
First Year with Crash Data (yyyy)	2015
Last Year with Crash Data (yyyy)	2018
Number of Crashes (crash/period)	
Fatal and Incapacitating Injury Crashes	48
Non-Incapacitating and Possible Injury Crashes	21
Property Damage Only Crashes	219
Route or Road Type	Rural Interstate Segment
Average Crash Costs ($)	
Fatal and Incapacitating Injury Crashes	629260
Non-Incapacitating and Possible Injury Crashes	29410
Property Damage Only Crashes	4730
Crash Cost Year (yyyy)	2013
OUTPUT	
Expected Crash Frequency (crash/year)	
Fatal and Incapacitating Injury Crashes	0.730
Non-Incapacitating and Possible Injury Crashes	6.58
Property Damage Only Crashes	28.31
All Crashes	35.62
Index of Crash Frequency	**1.37**
Index of Crash Cost	**6.02**

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Location	I-65 MM 19.0 to 29.0	
Northern Segment: SR 160 to SR 56		
GIS		
Post		
Analyst	MES	