

NORFOLK SOUTHERN RAILWAY CO. SHENANDOAH VALLEY RAIL CORRIDOR BRIDGE EVALUATION

STRASBURG, VIRGINIA
SHENANDOAH COUNTY

for

**NORTHERN SHENANDOAH VALLEY
TRANSPORTATION PRESERVATION CORP.**

5534 N. Main St.
Mt. Jackson, VA 22842

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OFFICES LOCATED THROUGHOUT PENNSYLVANIA

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1. INTRODUCTION

This evaluation was performed to identify and evaluate bridges on the Norfolk Southern Railway Co. Shenandoah Valley Rail Corridor as part of a potential real estate transaction between the Northern Shenandoah Valley Transportation Preservation Corp. and Norfolk Southern Railway Co. (NS). This included twenty-five (25) bridges between Mileposts B62.80 and CW97.60. It is noted there is an additional twenty-four (24) bridges on the line as indicated in the Michael Baker Report (see Appendix G), however these bridges have been in service as recent as 2021 and carried 286 kip freight loading. It is assumed these bridges will require little or no work to place back in service. As a result, the twenty-five (25) bridges discussed here-in were evaluated to determine required costs to place the line in service.

The objectives of this study include:

- Evaluate the condition of twenty-five (25) bridges through cursory field inspection and document deficiencies to determine total cost of rehabilitation or replacement to place bridges back in railroad service.
- Perform a complete routine inspection of all bridge components on Bridge 76.40 over Narrow Passage Run and Bridge 78.90 over Big Stoney Creek.
- Incorporate a parallel trail into the cost estimate of each structure.

As outlined here-in, it is our opinion that all bridges can be rehabilitated to carry frequent railroad traffic utilizing freight cars up to 286 kips with minimal reconstruction required. The bridges were generally found to be in fair to satisfactory condition, with some isolated problems that must be addressed to place the bridges back in service. It is our understanding the bridges carried 286 kip freight loading prior to being taken out of service. No load induced distress was noted on the bridge system. The recommended rehabilitation work, which includes timber tie deck replacements, replacement of existing buried timber tie superstructures with new reinforced concrete superstructures, repair of undermining and erosion at approach tracks, and clearing of trees at several bridges, will allow the line to be opened to traffic up to and including 286 kip freight loads.

Further, it is our opinion an adjacent trail can be constructed at each bridge to accommodate a rails-with-trails pedestrian and bicycle trail. Recommended construction includes lengthening of structures under fill, construction of a trail structure that is connected to and carried by the steel rail bridge superstructure for longer bridge spans, and construction of an adjacent trail bridge at shorter bridge spans.

Our recommendations at each site and opinion of probable costs are include here-in. It is assumed the work will be phased as follows:

Phase 1: Will include all work necessary to place railroad back in service to accommodate freight operations.

Phase 2: Will include construction of the adjacent rails-with-trails.

2. RESULTS AND OPINION OF PROBABLY COSTS

Bridges on this line are generally in fair to satisfactory condition, with some isolated problems that must be addressed to place the bridges back in service. Steel bridge superstructures and bents typically exhibit paint peel and extensive surface rust with some areas exhibiting pitting and minor section loss. Some advanced section loss was identified but occurs in locations that are not critical and does not affect the load carrying capacity of the bridges. No signs of load induced distress were noted on any steel superstructure or steel bent. Reinforced concrete substructure units typically exhibit some minor deterioration such as hairline shrinkage cracks, scale, and minor spalling. Stone masonry components typically exhibit minor to moderate mortar loss, with a few broken stones noted on some substructure units.

Open timber tie decks are typically in poor to serious condition with extensive rot and decay noted. It is recommended that all timber tie decks be replaced in entirety. Several culverts with timber slabs under fill are noted along the line. These timbers sound hollow when struck by a hammer and exhibit signs of center rot. It is recommended the timbers be replaced with new cast-in-place or reinforced concrete slabs. A few bridges exhibit undermining of the approach track or approach track troughs. These areas should be excavated and reconstructed utilizing modular block retaining walls to retain ballast. Trees and heavy vegetation are growing adjacent to wingwalls, piers and the bridge spans, and are affecting the structures in some locations. In some cases trees and brush are growing through steel members and are beginning to distort lattice and some bracing. This brush must be removed to preserve each bridge and permit rail traffic.

Our opinion of probable cost to repair all bridges such that railroad service can be returned and construct a pedestrian trail adjacent to the track is as follows:

PHASE 1: Repair existing bridges as required to carry frequent railroad loading (286 kips).	
CONSTRUCTION TOTAL:	\$16,915,783
ENGINEERING TOTAL (design/permitting/bidding):	\$2,537,367
CONSTRUCTION ADMINISTRATION AND INSPECTION:	\$1,691,578
TOTAL ENGINEERING AND CONSTRUCTION:	\$21,144,728
PHASE 2: Construct trail at each bridge as indicated here-in.	
CONSTRUCTION TOTAL:	\$36,165,824
ENGINEERING TOTAL (design/permitting/bidding):	\$5,424,874
CONSTRUCTION ADMINISTRATION AND INSPECTION:	\$3,616,582
TOTAL ENGINEERING AND CONSTRUCTION:	\$45,207,280
TOTAL ENGINEERING AND CONSTRUCTION (PHASES 1 AND 2):	\$66,352,008

The following assumptions were made:

- 2023 Construction Costs were used as the baseline. Escalation in the amount of 5% per year was applied for a period of 5-years for Phase 1 and 10-years for Phase 2. Construction year is unknown.
- A 25% Contingency is included.

- Significant costs are included for access during construction of the pedestrian and bicycle trail. It is assumed the railroad will be in service when the trail is constructed.
- Engineering = 15% of total construction cost.
- Construction Administration and Inspection = 10% of total construction cost.

3. BRIDGE INVENTORY

Twenty-five (25) bridges were inspected on the Norfolk Southern Railway Co. Shenandoah Valley Rail Corridor. Bridges from Milepost B82 to Milepost B84 were inspected from NS Right-of-Way due to out of service track. Bridges from CW84 to CW97.60 were inspected from public or private property without accessing NS Right-of-Way. Refer to *Appendix A* for a location map for each bridge and *Appendix B* for the Bridge Inventory. Of special interest are the steel bridges over Narrow Passage Run (Bridge 76.40) and Big Stoney Creek (Bridge 78.90). Previous Michael Baker International inspection reports from 2021 were provided for most of the bridges (refer to *Appendix G*). No existing structure plans were provided.

Bridge 62.80: Bridge 62.80 is a single span timber slab bridge that carries a mainline and siding track of the Shenandoah Valley Rail Corridor over an UNT in Strasburg, VA. The year constructed is unknown. The stream through the structure is at a low point with fill on either side of the structure. It is likely that this structure sees little to no flow. The structure consists of a timber slab superstructure supported by timber bearings on top of stone masonry abutments. The total out-to-out length of the structure is 11'-0" with a 5'-4" clear span. The bridge seats are 32" wide with approximately 36" from top of stone masonry bridge seat to the top of rail. The structure is 35' wide.

Bridge 63.90: Bridge 63.90 is a four span steel deck girder bridge with an open timber tie deck that carries the Shenandoah Valley Rail Corridor over South Fork Run and Battlefield Road in Fishers Hill, VA. Flow is from north to south. The year constructed is unknown. The structure consists of four steel deck girder spans bearing on steel bearing plates. The total length of the steel superstructure is 262'-0" out-to-out. A 45' long reinforced concrete ballast retaining trough is provided in the East Approach. Foundations consist of reinforced concrete abutments and stone masonry piers with reinforced concrete extensions.

Bridge 65.40: Bridge 65.40 is a single span stone masonry arch that carries the Shenandoah Valley Rail Corridor over Snapps Run near Fishers Hill, VA. Flow is from north to south. The year constructed is unknown. The structure consists of a stone masonry arch with stone masonry wingwalls and headwalls. The arch is approximately 60'-0' long with a clear span of approximately 10'-0'.

Bridge 66.70: Bridge 66.70 is a three span steel multi-beam bridge that carries the Shenandoah Valley Rail Corridor over Highway 651 near Toms Brook, VA. The year constructed is unknown. The structure consists of three multi-beam spans consisting of seven beams per span. Spans 1 and 3 consist of steel rolled beams with rolled steel diaphragms, and Span 2 consists of welded steel girders with rolled steel diaphragms. The total length of the steel superstructure is 127'-0" out-to-out. A reinforced concrete deck is provided on top of the steel beams with an out-to-out width of 25'-0".

A ballasted deck is provided over the structure. The substructure consists of two reinforced concrete abutments and two reinforced concrete piers. Reinforced concrete slope protection is provided between each pier and abutment.

Bridge 67.60: Bridge 67.60 is a twelve span steel deck girder bridge that carries the Shenandoah Valley Rail Corridor over Toms Brook and a private road in Toms Brook, VA. Flow is from north to south. The year constructed is unknown. The structure consists of twelve steel deck girder spans with varying span lengths. The total out-to-out length of the bridge deck is 510'-0". The abutments are stone masonry with reinforced concrete extensions. The piers consist of a combination of stone masonry piers with reinforced concrete extensions and steel bent towers.

Bridge 68.20: Bridge 68.20 is a single span steel deck girder bridge with an open timber tie deck that carries the Shenandoah Valley Rail Corridor over Jordan Run near Toms Brook, VA. Flow is from north to south. The year constructed is unknown. The structure consists of a single span consisting of a pair of rolled steel beams with I-beam diaphragms and angle upper lateral bracing. The total out-to-out length of the bridge deck is 19'-1". The abutments are stone masonry with reinforced concrete extensions. The wingwalls consist of timber piles retaining large riprap and embankment at each corner.

Bridge 71.60: Bridge 71.60 is a twenty-two span bridge consisting of nine steel deck girder spans and thirteen timber trestle spans in the East Approach. The structure carries the Shenandoah Valley Rail Corridor over Pugh's Run near Woodstock, VA. The year constructed is unknown. The main spans consist of built-up riveted steel deck girders on stone masonry abutments and piers with reinforced concrete extensions and steel bent towers. The East Approach structure consists of a timber slab superstructure on timber pile bents with reinforced concrete caps. The total out-to-out length of the structure is approximately 560'-0" with the main span having an out-to-out deck length of approximately 380'-0" and the timber trestle spanning 180'-0" out-to-out.

Bridge 74.00: Bridge 74.00 is a single span stone masonry arch bridge that carries the Shenandoah Valley Rail Corridor over an UNT in Woodstock, VA. No flow was present during the time of inspection. The year constructed is unknown. The structure consists of a stone masonry arch with stone masonry wingwalls and headwalls. The arch is approximately 75'-0' long with a clear span of approximately 12'-0'.

Bridge 75.00: Bridge 75.00 is a single span timber slab bridge that carries the Shenandoah Valley Rail Corridor over an unnamed drainage channel in Woodstock, VA. The year constructed is unknown. No flow was present during the time of inspection. It is anticipated that little flow enters this structure since it does not outlet into any distinguishable drainage feature approximately 50' from Route 11. The structure consists of a timber slab superstructure bearing on stone masonry abutments with reinforced concrete bridge seats. The total out-to-out length of the structure is 8'-6" with a 5'-6" clear span. The bridge seats are 18" wide. The structure is 15' wide.

Bridge 76.40: Bridge 76.40 is a thirteen span steel deck girder bridge that carries the Shenandoah Valley Rail Corridor over Narrow Passage Run near Willow Grove, VA. Flow is from north to south. The year constructed is unknown. The five East Approach spans consist of rolled steel beams bearing on steel pile bents. The six main bridge spans consist of steel built-up riveted deck girders

bearing on three stone masonry piers with reinforced concrete extensions and two steel bent piers. Both abutments are stone masonry with reinforced concrete extensions. The two West Approach spans consist of rolled steel beams bearing on steel pile bents and reinforced concrete U-Wings. An open timber tie deck is provided on the structure with a foot walk and steel post/cable handrail on the north side. The total out-to-out length of the bridge deck is 619'-6".

Bridge 78.60: Bridge 78.60 is a single span stone masonry arch bridge that carries the Shenandoah Valley Rail Corridor over an UNT in Edinburg, VA. No flow was present during the inspection, and it is assumed the stream flows from north to south. The year constructed is unknown. The structure consists of a stone masonry arch with stone masonry wingwalls and headwalls. The arch is approximately 100'-0" long with a clear span of approximately 10'-0".

Bridge 78.90: Bridge 78.90 is a seven span steel deck girder bridge that carries the Shenandoah Valley Rail Corridor over Stoney Creek and Massie Farm Lane in Edinburg, VA. Flow is from north to south. The year constructed is unknown. Each of the seven spans consists of built-up riveted steel girders of varying span lengths. The total out-to-out length of the bridge deck is 322'-8". The substructure consists of two stone masonry abutments with concrete extensions, two stone masonry piers with concrete extensions, two steel bent piers, and one steel bent tower. A reinforced concrete ballast retaining trough is provided in the West Approach behind the West Abutment supported on a stone masonry foundation.

Bridge 84.40: Bridge 84.40 is a single span timber slab bridge that carries the Shenandoah Valley Rail Corridor over an unnamed drainage channel in Mt. Jackson, VA. The year constructed is unknown. Standing water was present during the time of inspection. The structure consists of a timber slab superstructure bearing on reinforced concrete bridge seats on top of stone masonry abutments. The total out-to-out length of the structure is 9'-0" backwall to backwall with a 5'-0" clear span. The bridge seats are approximately 24" wide. The structure is approximately 16'-6" wide.

Bridge 84.50: Bridge 84.50 is a single span timber slab bridge that carries the Shenandoah Valley Rail Corridor over an unnamed drainage channel in Mt. Jackson, VA. The year constructed is unknown. No flow was present during the time of inspection. The structure consists of a timber slab superstructure bearing on reinforced concrete bridge seats on top of stone masonry abutments. Only one course of stone masonry is visible. The total out-to-out length of the structure is 10'-6" backwall to backwall with a 6'-5" clear span. The bridge seats are approximately 24" wide. The structure is approximately 17'-6" wide.

Bridge 86.10: Bridge 86.10 is a single span steel deck beam bridge that carries the Shenandoah Valley Rail Corridor over Bank Street in Mt. Jackson, VA. The year constructed is unknown. The superstructure consists of two rolled steel beams under each rail with steel channel diaphragms and steel angle upper lateral bracing. The out-to-out length of the bridge deck is 20'-10". The abutments consist of stone masonry with reinforced concrete extensions and U-wings. Reinforced concrete ballast retaining troughs are present at both approaches supported on the reinforced concrete U-Wings.

Bridge 86.20: Bridge 86.20 is a three span steel deck girder bridge that carries the Shenandoah Valley Rail Corridor over Mill Creek and Bryce Boulevard in Mt. Jackson, VA. The year constructed

is 1923 based on stamped plate observed on bridge. The superstructure consists of three built-up riveted deck girder spans with steel angle cross-frames and lateral bracing. The out-to-out length of the bridge deck is approximately 270'-0". The abutments consist of stone masonry with reinforced concrete extensions. Behind the abutments are stone masonry U-Wings supporting reinforced concrete ballast retaining troughs. The piers are stone masonry with reinforced concrete extensions.

Bridge 87.80: Bridge 87.80 is a single span timber slab bridge that carries the Shenandoah Valley Rail Corridor over an unnamed drainage channel near Mt. Jackson, VA. The year constructed is unknown. No flow was present during the time of inspection. The structure consists of a timber slab superstructure bearing on timber bearings on top of stone masonry abutments. The total out-to-out length of the structure is 10'-8" backwall to backwall with an 8'-4" clear span. The bridge seats are approximately 15" wide. The structure is approximately 15' wide.

Bridge 87.90: Bridge 87.90 is a single span timber slab bridge that carries the Shenandoah Valley Rail Corridor over an unnamed drainage channel near Mt. Jackson, VA. The year constructed is unknown. The channel was dry during the time of inspection. The structure consists of two timber slab superstructure sections, a north and south section. The south section is elevated higher with an under clearance of 48" while the north section has an under clearance of 29". The timber slabs bear on reinforced concrete abutments which are stepped to accommodate the two slab elevations. The total out-to-out length of the structure is 13'-5" backwall to backwall. The bridge seats are 32" wide with approximately 26" from top of bridge seat to the top of the timber parapet. The structure is 32' wide.

Bridge 89.80: Bridge 89.80 is a six span steel deck girder bridge that carries the Shenandoah Valley Rail Corridor over Holmans Creek and a farm road near Quicksburg, VA. The year constructed is unknown. The superstructure consists of six built-up riveted deck girder spans with steel angle cross frames and lateral bracing. The out-to-out length of the bridge deck is approximately 260'-0". The abutments consist of stone masonry with reinforced concrete extensions. Behind the abutments are stone masonry U-Wings with reinforced ballast retaining troughs carrying the approach track. A single stone masonry pier with reinforced concrete extensions is provided at the midpoint of the structure. A steel bent tower is provided on either side of the pier between the pier and abutments.

Bridge 94.30: Bridge 94.30 is a seven span steel deck beam bridge that carries the Shenandoah Valley Rail Corridor over an unnamed drainage channel near New Market, VA. The year constructed is unknown. The superstructure consists of seven rolled steel deck beam spans with two beams under each rail with steel channel diaphragms and steel angle upper lateral bracing. The out-to-out length of the bridge deck is approximately 140'-4". The abutments consist of stone masonry with reinforced concrete bridge seats, backwalls, and wingwalls. The six piers consist of stone masonry with reinforced concrete caps.

Bridge 94.35: Bridge 94.35 is a two span steel deck beam bridge that carries the Shenandoah Valley Rail Corridor over an unnamed drainage channel near New Market, VA. The year constructed is unknown. The superstructure consists of two rolled steel deck beam spans with two beams under each rail with steel channel diaphragms and steel angle upper lateral bracing. The out-to-out length of the bridge deck is approximately 40'-4". The abutments consist of stone

masonry with reinforced concrete bridge seats, backwalls, and wingwalls. The pier is assumed to be stone masonry encased in reinforced concrete.

Bridge 95.40: Bridge 95.40 is a single cell reinforced concrete box culvert that carries the Shenandoah Valley Rail Corridor over an unnamed drainage channel near New Market, VA. The year constructed is unknown. The box culvert has a clear span of 12'-0" and a total length of 41'-0". Reinforced concrete headwalls and wingwalls are provided at each end of the culvert. A farm fence is provided at the inlet opening at the north end of the culvert.

Bridge 95.71: Bridge 95.71 is a single span steel deck beam bridge that carries the Shenandoah Valley Rail Corridor over an unnamed drainage channel near Timberville, VA. The year constructed is unknown. The superstructure consists of a single rolled steel deck beam span with two beams under each rail with steel channel diaphragms and steel angle upper lateral bracing. The out-to-out length of the bridge deck is approximately 19'-8". The abutments are reinforced concrete with wingwalls that are integral to the backwalls.

Bridge 97.36: Bridge 97.36 is a two span steel deck girder bridge that carries the Shenandoah Valley Railroad Corridor over Honey Run Creek in Timberville, VA. The year constructed is unknown. The superstructure consists of two built-up riveted steel deck girder spans with steel angle cross frames and upper lateral bracing. The out-to-out length of the bridge deck is approximately 90'-0". The abutments consist of stone masonry with reinforced concrete bridge seats and backwalls. The pier consists of stone masonry with a reinforced concrete cap and scour apron. Timber approach spans are provided behind each backwall. The timber is in good condition with some minor erosion under the spans that does not affect the structural stability of the track above.

Bridge 97.60: Bridge 97.60 is a four span steel deck girder bridge that carries the Shenandoah Valley Railroad Corridor over North Fork Shenandoah River in Timberville, VA. The year constructed is unknown. The superstructure consists of two built-up riveted steel deck girder spans with steel angle cross frames and upper lateral bracing. The out-to-out length of the bridge deck is approximately 184'-0". The abutments consist of stone masonry with reinforced concrete bridge seats and backwalls. The piers are reinforced concrete with reinforced concrete aprons. Variable length reinforced concrete approach troughs are provided in each approach.

4. INSPECTION FINDINGS

Inspections occurred between July 24, 2023 and July 27, 2023. A representative of Northern Shenandoah Valley Transportation Preservation Corp. accompanied SMA field inspectors to guide and provide access to each structure included in the scope of work. It is noted that the weather was sunny and warm (temperatures ranging from the high 80's to mid 90's) on the days of the inspection. The inspection began at Bridge 62.80 and worked west ending at Bridge 99.70.

The inspection scope included a visual inspection of all bridge components to establish the overall condition of the bridge and identify maintenance needs for each bridge. A visual inspection was completed from the ground and bridge deck without specialized access equipment for bridges from

Milepost B82 to Milepost B84. Bridges from CW84 to CW99.70 were inspected from the ground only from public or private property without specialized access equipment.

Bridge 62.80: Bridge 62.80 is in poor condition overall. The superstructure consists of a timber slab on timber bearings. All superstructure timbers were sounded and are hollow throughout with indication of heartwood rot. No fill material is currently being lost through any part of the superstructure.

The foundations consist of stone masonry abutments with open joints throughout. There are several missing/spalled stones on the bridge seat of the West Abutment for an 8'-10" length. Minor settlement is noted in both abutments under the mainline track.

Bridge 63.90: Bridge 63.90 is in fair condition overall. The track alignment on the approaches is good. The timber ties on the open timber deck are in good condition and approximately 10% of the ties are deteriorated and need replaced. The steel deck girder superstructure is in fair condition with approximately 60% of paint remaining, minor surface rust in exposed areas, and some pitting with no section loss.

The substructure is in fair condition with some cracking noted in the reinforced concrete abutments and in the reinforced concrete portion of the piers, heaviest on the pier caps between bearings. The stone masonry exhibits minor mortar loss. The reinforced concrete approach span in the East Approach is undermined full width for approximately 10'L behind the East Abutment. Timber piles are present with deterioration noted. No signs of settlement or movement are noted.

Bridge 65.40: Bridge 65.40 is in fair condition overall. The arch barrel and headwalls exhibit mortar loss with no movement or shifted stones. The sidewalls and wingwalls exhibit mortar loss with the free end of the NE Wing (15'L x 20'H) separating from the remainder of the wingwall. It is estimated that approximately 25% of the stone masonry joints are open.

Bridge 66.70: Bridge 66.70 is in good condition overall. The superstructure is in good condition with only minor paint loss noted on the steel superstructure. The reinforced concrete deck is in good condition with only minor scaling and hairline cracking noted.

The reinforced concrete piers and abutments are in good condition with minor scaling and hairline cracking noted. The reinforced concrete slope protection at both abutments exhibits some heaving and settlement at various cracked slabs.

Bridge 67.60: Bridge 67.60 is in good condition. The superstructure is in good condition with only minor paint loss noted on the steel superstructure. The timber ties on the open timber deck are solid and approximately 30% of the ties are deteriorated and need replaced. The steel deck girder superstructure is in fair condition with approximately 75% of paint remaining with minor surface rust in the exposed areas.

The abutments exhibit some spalling and open joints in the stone masonry and hairline cracking in the reinforced concrete extensions. The piers exhibit cracking at the north and south ends below the steel inserts (old truss connections). The steel bents are in good condition with approximately 50%

of paint remaining with surface rust, minor pitting, and minor section loss in exposed areas, mainly at the lower bearing areas. The reinforced concrete pedestals under the steel bents exhibit some spalling and delaminated concrete but are sound below and around the bearings. Trees and other vegetation are growing in and around the steel bent towers, some of which have grown through the lattice bracing.

Bridge 68.20: Bridge 68.20 is in fair condition. The superstructure is in good condition with only minor paint loss noted on the steel superstructure. Peeled paint and minor surface rust is present on the lower flanges and base of the webs. The timber ties exhibit advanced rot and are unsound throughout the deck.

The abutments exhibit mortar loss in the stone masonry joints and minor spalling and hairline cracking in the reinforced concrete extensions. The outside edges of the bridge seat cap and the approach slabs are spalled. The surface spalling is occurring outside of the bridge seats and at the ends of the backwalls/approach slabs. The wingwalls are in fair condition. The timber pile wingwalls exhibit some deterioration and leaning piles but are effective in retaining riprap.

Bridge 71.60: Bridge 71.60 is in fair condition overall. The superstructure in the main spans is in good condition with only minor paint loss noted on the steel superstructure. Peeled paint and minor surface rust is present on the lower flanges and base of the webs. The superstructure in the East Approach is in fair to poor condition with unsound timber stringers with leakage present. In the gaps in some of the stringers, timber cross members are visible above with signs of deterioration.

The abutments and piers of the main spans exhibit minor mortar loss in the stone masonry and minor spalling and hairline cracking in the reinforced concrete. The main span steel bent towers exhibit some surface rust and minor pitting in the steel, primarily at the bearing areas. The steel bent towers bear on reinforced concrete pedestals with minor spalling present on the edges of the caps. Trees and other vegetation are growing in and around the steel bent towers, some of which have grown through the lattice bracing. The timber pile bents in the East Approach spans are in poor condition with approximately 1/3 to 1/2 of the timber piles sounding hollow with signs of deterioration at the ground line and at the caps.

Bridge 74.00: Bridge 74.00 is in fair condition overall. The arch barrel and headwalls exhibit mortar loss with minor movement or shifted stones noted. The arch barrel, sidewalls and wingwalls exhibit mortar loss and spalled stones. It is estimated that approximately 25% of the stone masonry joints are open. A stone is missing from the top of the North Headwall at the west end.

Bridge 75.00: Bridge 75.00 is in poor condition overall. The superstructure consists of a timber slab on timber bearings. All superstructure timbers were sounded and are hollow throughout with indication of heartwood rot. No fill material is currently being lost through any part of the superstructure.

The foundations consist of stone masonry abutments with open joints and some spalled stones throughout the bottom visible stone course. The reinforced concrete bridge seats exhibit minor cracking with efflorescence throughout.

Bridge 76.40: Bridge 76.40 is in fair condition overall. The superstructure is in good condition with only minor paint loss. Some areas of peeled paint exhibit minor surface rust, primarily on the lower flanges and base of the webs. The timber tie deck is in good condition on the six main spans, but in poor condition on the seven approach spans with extensive rot and broken ties noted. The foot walk has a few broken welds between steel grate panels. A foot walk panel is missing over the main bridge Pier 3. The steel post and cable handrailing is in good condition.

The stone masonry and reinforced concrete abutments and piers exhibit very minor mortar loss in the stone masonry sections with minor scaling and hairline cracking in the reinforced concrete. The steel pile bent piers on the approach spans are in good condition with minor surface rust noted. The main span steel bent piers exhibit some surface rust and minor pitting in the steel, primarily at the bearing areas. The steel bent piers bear on reinforced concrete pedestals that exhibit some spalling and delamination, worst at the north pedestal on Bent #2 of the main bridge spans.

Bridge 78.60: Bridge 78.60 is in good condition overall. The arch barrel, sidewalls, headwalls and wingwalls exhibit very minor mortar loss throughout. It is estimated that approximately 10% of the stone masonry joints are open. Heavy vegetation is present on the South Headwall and Wingwalls.

Bridge 78.90: Bridge 78.90 is in fair condition overall. The superstructure is in good condition with only minor paint loss noted throughout the steel. Some areas of peeled paint exhibit minor surface rust, primarily on the lower flanges and base of the webs. The timber tie deck is in severe condition with all ties exhibiting extensive heartwood rot and advanced deterioration.

The stone masonry abutments exhibit minor mortar loss in the stone masonry with scaling and hairline cracking in the reinforced concrete extensions. The East Wingwalls have full height vertical cracks in the reinforced concrete extensions at the midlength point. The two steel bent piers have minor paint peel with surface rust noted in exposed areas, primarily at the bearing areas and on cross bracing. The reinforced concrete pedestals are in good condition with some repair areas present around the steel bent bearings. The stone masonry piers with reinforced concrete extensions are in good condition with some cracking, open joints, and spalled stones noted in the masonry and hairline cracking noted in the reinforced concrete extensions. The steel bent tower has minor paint peel with surface rust noted in exposed areas, primarily at the bearing areas and on cross bracing. The reinforced concrete pedestals exhibit hairline cracking with moderate efflorescence, primarily at the cold joints. The footings are exposed on the steel bent tower foundations with scour up to 4' vertical depth noted along the upstream end of the North Pedestals. Timber flood debris is lodged against the upstream ends of the North Pedestals.

Bridge 84.40: Bridge 84.40 is in poor condition overall. The superstructure consists of a timber slab. All superstructure timbers were sounded and are hollow throughout with indication of heartwood rot. No fill material is currently being lost through any part of the superstructure.

The abutments are in fair condition. The visible stone masonry is in fair condition with open joints noted throughout. The reinforced concrete bridge seats and wingwalls are in good condition with minor hairline cracking and efflorescence present.

Bridge 84.50: Bridge 84.50 is in poor condition overall. The superstructure consists of a timber slab. All superstructure timbers were sounded and are hollow throughout with indication of heartwood rot. No fill material is currently being lost through any part of the superstructure.

The abutments are in good condition. The visible single course of stone masonry is in good condition with no spalled or missing stones with mortar joints intact. The reinforced concrete bridge seats and wingwalls are in good condition with minor hairline cracking and efflorescence present.

Bridge 86.10: Bridge 86.10 is in good condition overall. The superstructure is in good condition with approximately 80% of the paint remaining. Some areas of weathering and peeled paint are present, mainly below the ties, at the lower flanges, and at the lower portion of the webs. The timber tie deck is in poor condition with all ties exhibiting extensive heartwood rot and advanced deterioration.

The abutments are in good condition. The stone masonry is in good condition with no open joints present. The reinforced concrete extensions and U-Wings exhibit minor scaling and hairline cracking with efflorescence. Some material has eroded from under the NE and SW Wings at the front face of the abutment, but it appears the reinforced concrete wasn't cast down to the original footing.

Bridge 86.20: Bridge 86.20 is in good condition overall. The superstructure is in good condition with approximately 90% of the paint remaining. Some paint peel is present with surface rust, primarily on the lower flanges and lower portion of the webs. The timber tie deck appears to be in fair condition when observed from below.

The abutments are in good condition with some scaling and edge spalling present, primarily on the caps and backwalls. The stone masonry is in good condition with minimal open joints noted in both the abutment stems and approach structures. The piers are in good condition with some spalled stones in the masonry and spalled caps in the reinforced concrete. Both piers have vegetation growth on all sides with small trees growing in some of the open joints.

Bridge 87.80: Bridge 87.80 is in poor condition overall. The superstructure consists of a timber slab supported on timber bearings. All superstructure timbers were sounded and are hollow throughout with indication of heartwood rot. No fill material is currently being lost through any part of the superstructure.

The foundations consist of stone masonry abutments with open joints and some spalled stones throughout the bottom visible stone course.

Bridge 87.90: Bridge 87.90 is in poor condition overall. The superstructure consists of a timber slab on reinforced concrete abutments. All superstructure timbers were sounded and while most sound solid, heavy leakage and rot was noted between timbers. No fill material is currently being lost through any part of the superstructure.

The substructure consists of reinforced abutments in good condition with only minor scaling, hairline cracking and efflorescence noted.

Bridge 89.80: Bridge 89.80 is in fair condition overall. The superstructure is in good condition with approximately 80% of the paint remaining. Some paint peel is present with surface rust, primarily on the lower flanges and lower portion of the webs. The timber tie deck appears to be in poor condition when observed from below with signs of decay and rot throughout. Ballast is being lost in all four corners due to deteriorated timber ballast retainers. The approach ties will need replaced due to decay and rot throughout.

The abutments are in good condition with some scaling and edge spalling present, primarily on the caps and backwalls. The West Abutment backwall is heavily spalled/deteriorated behind the girders. The stone masonry pier with reinforced concrete extensions is in good condition with a few cracked/spalled stones. The steel bent towers are in good condition with 80% of paint remaining with some areas of paint feel and surface rust present, primarily at the bearing areas and on the cross bracing. Trees and other vegetation are growing in and around the steel bent towers, some of which have grown through the lattice bracing.

Bridge 94.30: Bridge 94.30 is in fair condition overall. The superstructure is in good condition with approximately 40% of the paint remaining. Some paint peel is present with surface rust, primarily on the lower flanges and lower portion of the webs. The timber tie deck is in fair condition with approximately 25% of the timber tie deck exhibiting deterioration and rot.

The abutments are in good condition with minor spalling noted on some of the stone masonry. Some scaling and minor edge spalling is noted on the reinforced concrete. The piers are in fair condition with edge spalling and delamination noted in the concrete caps (not under the bearings). Cracking is noted in the vertical and horizontal surfaces of the caps, up to 1/4" wide. Trees and other vegetation are growing in and around the superstructure and substructure units, some which have grown through the bridge deck between ties.

Bridge 94.35: Bridge 94.35 is in fair condition overall. The superstructure is in good condition with approximately 60% of the paint remaining. Some paint peel is present with surface rust, primarily on the lower flanges and lower portion of the webs. The timber tie deck is in poor condition with approximately 50% of the timber tie deck exhibiting deterioration and rot.

The abutments are in fair condition with some spalling and delamination on the East Abutment bridge seat along the front face from the SE bearing to the NE Wingwall (12'-0L x 2'-0"W x 3"D). The pier is in fair condition with some minor hairline cracking and efflorescence. Trees and other vegetation are growing in and around the superstructure and substructure units, some which have grown through the bridge deck between ties.

Bridge 95.40: Bridge 95.40 is in fair condition overall. Map cracking is present throughout the box culvert with moderate efflorescence present, especially along the underside of the top slab. The bottom edge of the slab is spalled at both the north (7'L x 2.0'W x 10"D) and south (5'L x 2.0'W x 10"D) ends with delaminated and unsound concrete around most of the spalling. There is a spall at the fixed end of the NE Wingwall that is 2.5'H x 1.0'W x 3"D. The South Headwall exhibits a 1/16" wide crack along the cold joint between the top slab of the culvert and the headwall for a length of approximately 5'.

Bridge 95.71: Bridge 95.71 is in fair condition overall. The superstructure is in fair condition with approximately 50% of the paint remaining. Some paint peel is present with surface rust, primarily on the lower flanges and lower portion of the webs. The timber tie deck is in fair condition with approximately 50% of the timber tie deck exhibiting deterioration and rot.

The abutments are in good condition with just some minor scaling and hairline cracking noted throughout.

Bridge 97.36: Bridge 97.36 is in fair condition overall. The superstructure is in fair condition with approximately 60% of the paint remaining. Some random paint peel is present with surface rust, primarily on the lower flanges and lower portion of the webs. The timber tie deck is in poor condition with approximately 90% of the timber tie deck exhibiting deterioration and rot. The timber approach slabs are in good condition with some minor deterioration to the outside timbers. Some erosion is occurring under the slabs on the ends but is not affecting the stability of the structure.

The abutments are in good condition with some minor open joints noted in the stone masonry. Some edge spalling is noted on the reinforced concrete bridge seats at the ends. The pier is in good condition with some minor open joints noted in the stone masonry. The reinforced concrete cap and apron have some minor scaling throughout. Bag mix concrete repairs are visible in the pier cap along the front face of the pier in front of the bearings. Vegetation has grown under/along the superstructure and on the substructure that is in the fouling zone of the track.

Bridge 97.60: Bridge 97.60 is in fair condition overall. The superstructure is in good condition with approximately 80% of the paint remaining. Some random paint peel is present with surface rust, primarily on the lower flanges and lower portion of the webs. The timber tie deck is in fair condition with approximately 30% of the timber tie deck exhibiting deterioration and rot.

The abutments are in fair condition with some spalling and delaminated concrete noted in the reinforced concrete extensions. The stone masonry is in good condition with a few spalled stones and intact mortar joints. The piers are in fair condition with some spalling noted along the Pier 3 cap. The bank in the SW corner of the structure has been eroded away for a 40'L x 20'W x 18'H section behind the West Abutment.

5. Maintenance Recommendations

Summary of Maintenance and Trail Costs

Bridge	Cost for Railroad Rehabilitation	Cost for Trail Installation	Total Cost
Bridge 62.80	\$314,200	\$0	\$314,200
Bridge 63.90	\$709,500	\$772,500	\$1,482,000
Bridge 65.40	\$144,900	\$100,000	\$244,900
Bridge 66.70	\$630,900	\$213,500	\$844,400
Bridge 67.60	\$765,000	\$1,382,000	\$2,147,000
Bridge 68.20	\$43,800	\$520,000	\$563,800
Bridge 71.60	\$1,400,000	\$1,213,700	\$2,613,700
Bridge 74.00	\$90,600	\$50,000	\$140,600
Bridge 75.00	\$175,500	\$247,050	\$422,550
Bridge 76.40	\$1,310,400	\$3,473,500	\$4,783,900
Bridge 78.60	\$150,000	\$100,000	\$250,000
Bridge 78.90	\$472,700	\$1,144,200	\$1,616,900
Bridge 84.40	\$168,000	\$247,050	\$415,050
Bridge 84.50	\$165,500	\$247,050	\$412,550
Bridge 86.10	\$473,400	\$369,500	\$842,900
Bridge 86.20	\$413,000	\$1,034,000	\$1,447,000
Bridge 87.80	\$175,500	\$247,050	\$422,550
Bridge 87.90	\$170,400	\$132,650	\$303,050
Bridge 89.80	\$555,600	\$1,057,400	\$1,613,000
Bridge 94.30	\$280,550	\$855,900	\$1,136,450
Bridge 94.35	\$135,600	\$356,600	\$492,200
Bridge 95.40	\$11,175	\$190,000	\$201,175
Bridge 95.71	\$78,000	\$269,300	\$347,300
Bridge 97.36	\$284,000	\$1,029,000	\$1,313,000
Bridge 97.60	\$562,800	\$965,600	\$1,528,400
**Total:	\$11,133,325	\$18,650,250	\$29,783,575

**Does not include Mobilization, E&S, Contingency, or Escalation. See Appendix F: Cost Estimate.

Anticipated maintenance needs include:

Bridge 62.80: Bridge 62.80 will require a full superstructure replacement. Demolition work will include removing the existing timber slab superstructure, bearing timbers, and track. Reconstruction work will include installation of reinforced concrete bridge seats, installation of a new reinforced concrete (cast-in-place or precast) slab superstructure including reinforced concrete parapets, and installation of new track over the structure and on both approaches.

Substructure work includes concrete repairs at the spalled/missing stones in the West Abutment just below the bridge seat and repointing all stone masonry.

To incorporate the trail, it is assumed that the deteriorated siding track will be removed to accommodate the trail. The 35' wide superstructure will provide adequate width to accommodate both the mainline track and a trail. See the Trail Adjacent to Ground Track Typical Section over structure in Appendix D.

Bridge 63.90: Bridge 63.90 will require full replacement of the open timber tie deck due to rotted/deteriorated ties.

The substructure will require epoxy injection crack sealing of the cracks in the caps of Piers 1 and 3 between the bearings and on the stem of Pier 3. The 45' long East Approach reinforced concrete trough should be removed and the area filled in with retaining walls provided on either side to retain fill. The track structure will then be replaced in that section of the East Approach.

To incorporate the trail, a cantilever steel support structure will be mounted to the side of the existing steel deck girders supporting a nail laminated timber or fiber reinforced polymer (FRP) deck with steel safety railing. Reinforced concrete abutments will be required to support the trail at each of the pedestrian structure. See the Cantilever Trail Superstructure Typical Section in Appendix D.

Bridge 65.40: Bridge 65.40 will require repointing of approximately 25% of the stone masonry joints. This includes the arch barrel, side walls, headwalls, and wingwalls.

The substructure will require reconstruction at the free end of the NE Wing to repair the collapsing/separating portion of the wingwall. Riprap should be placed along the NE streambank and at the free end of the NE Wing to protect against further erosion.

No additional work will be required over the bridge to incorporate the trail. The width of the structure is sufficient for both the railroad and a trail. See the Trail Adjacent to Ground Track Typical Section over structure in Appendix D.

Bridge 66.70: Bridge 66.70 will not require any repairs to the superstructure or substructure. Some minor vegetation will need to be removed from the track structure over the bridge, but that would be considered a track item due to the ballasted deck.

To incorporate the trail, the track will need to be shifted several feet to the north or south on the bridge deck. With approximately 23' between curbs, adequate space is available to add the trail if the track is shifted several feet. New track will be placed on the bridge deck with waterproofing membrane applied to the top of the reinforced concrete bridge deck. The installation of a protective fence would be required along the top of the reinforced concrete curb on the side of the deck with the trail and between the trail and track. With the track being realigned through the bridge, ballast retaining structures would be required in each approach. See the Trail Adjacent to Ground Track Typical Section over structure in Appendix D.

Bridge 67.60: Bridge 67.60 will require full replacement of the open timber tie deck due to rotted/deteriorated ties.

The substructure will require tree and vegetation clearing/removal around the four steel bent towers to prevent further damage to the steel.

To incorporate the trail, a cantilever steel support structure will be mounted to the side of the existing steel deck girders supporting a nail laminated timber or fiber reinforced polymer (FRP) deck with steel safety railing. Reinforced concrete abutments will be required to support the trail at each end of the pedestrian structure. See the Cantilever Trail Superstructure Typical Section in Appendix D.

Bridge 68.20: Bridge 68.20 will require a full replacement of the open timber tie deck due to rotted/deteriorated and unsound ties.

The substructure will require reinforced concrete repairs at the ends of the bridge seats and ends of the backwalls/approach troughs. The stone masonry portions of the abutments and wingwalls will need repointed.

To incorporate the trail, a separate substructure and superstructure adjacent to the existing structure will be required. The substructure will consist of reinforced concrete abutments with a steel superstructure supporting a nail laminated timber or fiber reinforced polymer (FRP) deck with steel safety railing. See the Independent Trail Superstructure Typical Section in Appendix D.

Bridge 71.60: Bridge 71.60 will require a full replacement of the open timber tie deck due to rotted/deteriorated and unsound ties.

The substructure will require tree and vegetation clearing and removal around the three steel bent towers to prevent damage to the steel.

The timber pile bent substructure in the East Approach spans require replacement of 25-30 of the 78 total piles. Due to the cost associated with removing the superstructure to drive replacement piles, it is suggested that the thirteen East Approach spans are removed, retaining walls are added to both sides, and fill is provided to rebuild the subgrade for the new track structure. This will eliminate the lifetime maintenance costs of rehabilitating the timber trestle when members become deteriorated.

To incorporate the trail, a cantilever steel support structure will be mounted to the side of the existing steel deck girders supporting a nail laminated timber or fiber reinforced polymer (FRP) deck with steel safety railing. Reinforced concrete abutments will be required to support the trail at each of the pedestrian structure. See the Cantilever Trail Superstructure Typical Section in Appendix D.

Bridge 74.00: Bridge 74.00 will require repointing of approximately 25% of the stone masonry joints. This includes the arch barrel, side walls, headwalls, and wingwalls. A reinforced concrete repair is required at the west end of the North Headwall to fill the void caused by the missing cap stone and stone below. Tree and brush removal is required behind the headwalls and wing walls.

No additional work will be required over the bridge to incorporate the trail. The width of the structure is sufficient to hold both the railroad and a trail. See the Trail Adjacent to Ground Track Typical Section over structure in Appendix D.

Bridge 75.00: Bridge 75.00 will require a full superstructure replacement. This includes removing the existing timber slab superstructure and replacing it with a reinforced concrete (cast-in-place or precast) slab superstructure and reinforced concrete parapets.

The substructure will require repointing of the stone masonry to extend the life of the abutments.

To incorporate the trail, 15' long reinforced concrete abutment extensions will need to be installed along with new wingwalls on the side the trail is placed. A separate reinforced concrete slab will be required to accommodate the trail next to the railroad. A steel safety fence will be required along the top of the parapet and between the trail and tracks over the structure. See the Trail Adjacent to Ground Track Typical Section over structure in Appendix D.

Bridge 76.40: Bridge 76.40 will require an open timber tie deck replacement on all spans. A new walkway and railing will be required for the full length of the bridge deck.

The substructure will require reinforced concrete encasement of the north pedestal of steel Bent 2 of the main bridge spans. Each of the two steel bent piers on the main bridge spans will require tree and vegetation clearing and removal to prevent damage to the steel.

To incorporate the trail, a cantilever steel support structure will be mounted to the side of the existing steel deck girders supporting a nail laminated timber or fiber reinforced polymer (FRP) deck with steel safety railing. Reinforced concrete abutments will be required at each end of the structure. A separate substructure and superstructure adjacent to the existing structure will be required adjacent to both the East and West Approach spans. The substructure will consist of reinforced concrete abutments and piers with a steel superstructure supporting a nail laminated timber or fiber reinforced polymer (FRP) deck with steel safety railing. See the Cantilever Trail Superstructure Typical Section and Independent Trail Superstructure Typical Section in Appendix D.

Bridge 78.60: Bridge 78.60 will require repointing of approximately 10% of the stone masonry joints. This includes the arch barrel, side walls, headwalls, and wingwalls. The South Headwall and Wingwalls will require tree and vegetation clearing and removal to prevent damage to the stone masonry units.

No additional work will be required over the bridge to incorporate the trail. The width of the structure is sufficient to hold both the railroad and a trail. See the Trail Adjacent to Ground Track Typical Section over structure in Appendix D.

Bridge 78.90: Bridge 78.90 will require a full replacement of the open timber tie deck due to rotted/deteriorated and unsound ties.

The steel bent tower will require removal of timber flood debris from the upstream ends of the North Pedestals. Once removed, riprap should be placed at the upstream ends of the North Pedestals to protect the foundations. Tree and vegetation removal is required at the base of Steel Bent #1.

To incorporate the trail, a cantilever steel support structure will be mounted to the side of the existing steel deck girders supporting a nail laminated timber or fiber reinforced polymer (FRP) deck with steel safety railing. Reinforced concrete abutments will be required at each end of the pedestrian structure. See the Cantilever Trail Superstructure Typical Section in Appendix D.

Bridge 84.40: Bridge 84.40 will require a full superstructure replacement. This includes removing the existing timber slab superstructure and replacing it with a reinforced concrete (cast-in-place or precast) slab superstructure and reinforced concrete parapets.

The substructure will require repointing of the stone masonry to extend the life of the abutments.

To incorporate the trail, 15' long reinforced concrete abutment extensions will need to be installed along with new wingwalls on the side the trail is placed. A separate reinforced concrete slab will be required to accommodate the trail next to the railroad. A steel safety fence will be required along the top of the parapet and between the trail and tracks over the structure. See the Trail Adjacent to Ground Track Typical Section over structure in Appendix D.

Bridge 84.50: Bridge 84.50 will require a full superstructure replacement. This includes removing the existing timber slab superstructure and replacing it with a reinforced concrete (cast-in-place or precast) slab superstructure and reinforced concrete parapets.

The substructure will require repointing of the stone masonry to extend the life of the abutments.

To incorporate the trail, 15' long reinforced concrete abutment extensions will need to be installed along with new wingwalls on the side the trail is placed. A separate reinforced concrete slab will be required to accommodate the trail next to the railroad. A steel safety fence will be required along the top of the parapet and between the trail and tracks over the structure. See the Trail Adjacent to Ground Track Typical Section over structure in Appendix D.

Bridge 86.10: Bridge 86.10 will require a full replacement of the open timber tie deck due to rotted/deteriorated and unsound ties.

The substructure will require reinforced concrete repairs at the locations of undermined encasement at both abutments.

To incorporate the trail, a separate substructure and superstructure adjacent to the existing structure will be required. The substructure will consist of reinforced concrete abutments with a steel superstructure supporting a nail laminated timber or fiber reinforced polymer (FRP) deck with steel safety railing. See the Independent Trail Superstructure Typical Section in Appendix D.

Bridge 86.20: Bridge 86.20 will require a full replacement of the open timber tie deck due to rotted/deteriorated and unsound ties.

The substructure will require vegetation removal from both pier stems. The substructure units will require monitoring of the broken/cracked stones.

To incorporate the trail, a cantilever steel support structure will be mounted to the side of the existing steel deck girders supporting a nail laminated timber or fiber reinforced polymer (FRP) deck with steel safety railing. Reinforced concrete abutments will be required at each end of the pedestrian structure. See the Cantilever Trail Superstructure Typical Section in Appendix D.

Bridge 87.80: Bridge 87.80 will require a full superstructure replacement. This includes removing the existing timber slab superstructure and replacing it with a reinforced concrete (cast-in-place or precast) slab superstructure and reinforced concrete parapets.

The substructure will require repointing of the stone masonry to extend the life of the abutments.

To incorporate the trail, 15' long reinforced concrete abutment extensions will need to be installed along with new wingwalls on the side the trail is placed. A separate reinforced concrete slab will be required to accommodate the trail next to the railroad. A steel safety fence will be required along the top of the parapet and between the trail and tracks over the structure. See the Trail Adjacent to Ground Track Typical Section over structure in Appendix D.

Bridge 87.90: Bridge 87.90 will require a full superstructure replacement. This includes removing the existing timber slab superstructure and replacing it with a reinforced concrete (cast-in-place or precast) slab superstructure and parapets.

The substructure will not require any maintenance work.

To incorporate the trail, a 15' long reinforced concrete slab and 15' long reinforced concrete bridge seat extensions will need to be installed on the north end of the existing reinforced concrete abutments. A steel safety fence will be required along the top of the parapet and between the trail and tracks over the structure. See the Trail Adjacent to Ground Track Typical Section over structure in Appendix D.

Bridge 89.80: Bridge 89.80 will require a full replacement of the open timber tie deck due to rotted/deteriorated ties. All of the approach ties in both approach pans will need replaced. The deteriorated timber ballast retainers will need to be replaced at all four corners of the structure due to the deteriorated/ineffective state of the current ballast retainers.

The substructure will require reinforced concrete repair at the West Backwall to repair deteriorated/spalled concrete between the girders. Each of the two steel bent towers will require tree and vegetation clearing and removal to prevent damage to the steel.

To incorporate the trail, a cantilever steel support structure will be mounted to the side of the existing steel deck girders supporting a nail laminated timber or fiber reinforced polymer (FRP) deck with steel safety railing. Reinforced concrete abutments will be required at each end of the pedestrian structure. See the Cantilever Trail Superstructure Typical Section in Appendix D.

Bridge 94.30: Bridge 94.30 will require full replacement of the open timber tie deck due to rotted/deteriorated ties.

The substructure will require epoxy injection crack sealing of the cracks in the reinforced concrete pier caps. The structure will require tree and vegetation clearing and removal under and around the superstructure and substructure units.

To incorporate the trail, a separate substructure and superstructure adjacent to the existing structure will be required. The substructure will consist of reinforced concrete abutments and piers with a steel superstructure supporting a nail laminated timber or fiber reinforced polymer (FRP) deck with steel safety railing. See the Independent Trail Superstructure Typical Section in Appendix D.

Bridge 94.35: Bridge 94.35 will require a full replacement of the open timber tie deck due to rotted/deteriorated ties.

The substructure will require reinforced concrete repair at the East Abutment to repair the spalled and delamination portion of the bridge seat. The structure will require tree and vegetation clearing and removal under and around the superstructure and substructure units.

To incorporate the trail, a separate substructure and superstructure adjacent to the existing structure will be required. The substructure will consist of reinforced concrete abutments and piers with a steel superstructure supporting a nail laminated timber or fiber reinforced polymer (FRP) deck with steel safety railing. See the Independent Trail Superstructure Typical Section in Appendix D.

Bridge 95.40: Bridge 95.40 will require reinforced concrete repair at the north and south ends of the top slab and at the fixed end of the NE Wing. The South Headwall will require epoxy injection crack sealing along the crack in the cold joint between the headwall and the top slab.

To incorporate the trail, a 15' long precast reinforced concrete culvert extension will be required. See the Trail Adjacent to Ground Track Typical Section over structure in Appendix D.

Bridge 95.71: Bridge 95.71 will require a full replacement of the open timber tie deck due to rotted/deteriorated ties.

The substructure will not require any maintenance work.

To incorporate the trail, a separate substructure and superstructure adjacent to the existing structure will be required. The substructure will consist of reinforced concrete abutments and piers with a steel superstructure supporting a nail laminated timber or fiber reinforced polymer (FRP) deck with steel safety railing. See the Independent Trail Superstructure Typical Section in Appendix D.

Bridge 97.36: Bridge 97.36 will require a full replacement of the open timber tie deck due to rotted/deteriorated ties. It is recommended that the timber approach slabs are removed, filled in, and ballast retainers are provided at all four corners.

The structure will require tree and vegetation clearing and removal under and around the superstructure and substructure units.

To incorporate the trail, a separate substructure and superstructure adjacent to the existing structure will be required. The substructure will consist of reinforced concrete abutments and piers with a steel superstructure supporting a nail laminated timber or fiber reinforced polymer (FRP) deck with steel safety railing. See the Independent Trail Superstructure Typical Section in Appendix D.

Bridge 97.60: Bridge 97.60 will require full replacement of the open timber tie deck due to rotted/deteriorated ties.

The reinforced concrete abutment extensions and Pier 3 cap will require reinforced concrete repairs to address the heavy edge spalling on and below the caps. Bank stabilization will be required in the SW corner behind the West Abutment to repair the washout/erosion that has occurred. Embankment material with R-4 rock lining will be provided.

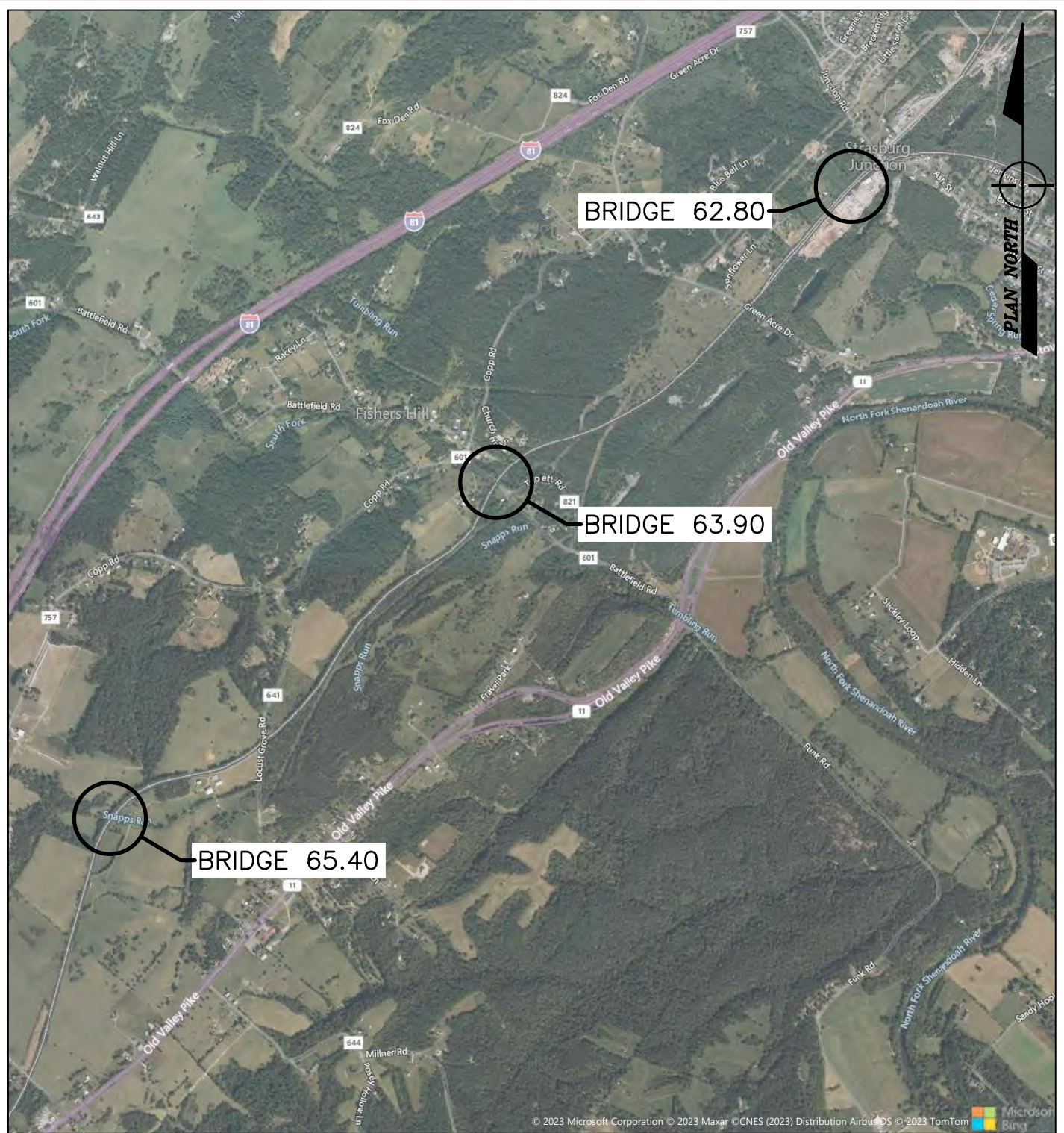
To incorporate the trail, a cantilever steel support structure will be mounted to the side of the existing steel deck girders supporting a nail laminated timber or fiber reinforced polymer (FRP) deck with steel safety railing. Reinforced concrete abutments will be required at each end of the pedestrian structure. See the Cantilever Trail Superstructure Typical Section in Appendix D.

APPENDIX A

LOCATION MAP

APPENDIX A

LOCATION MAP



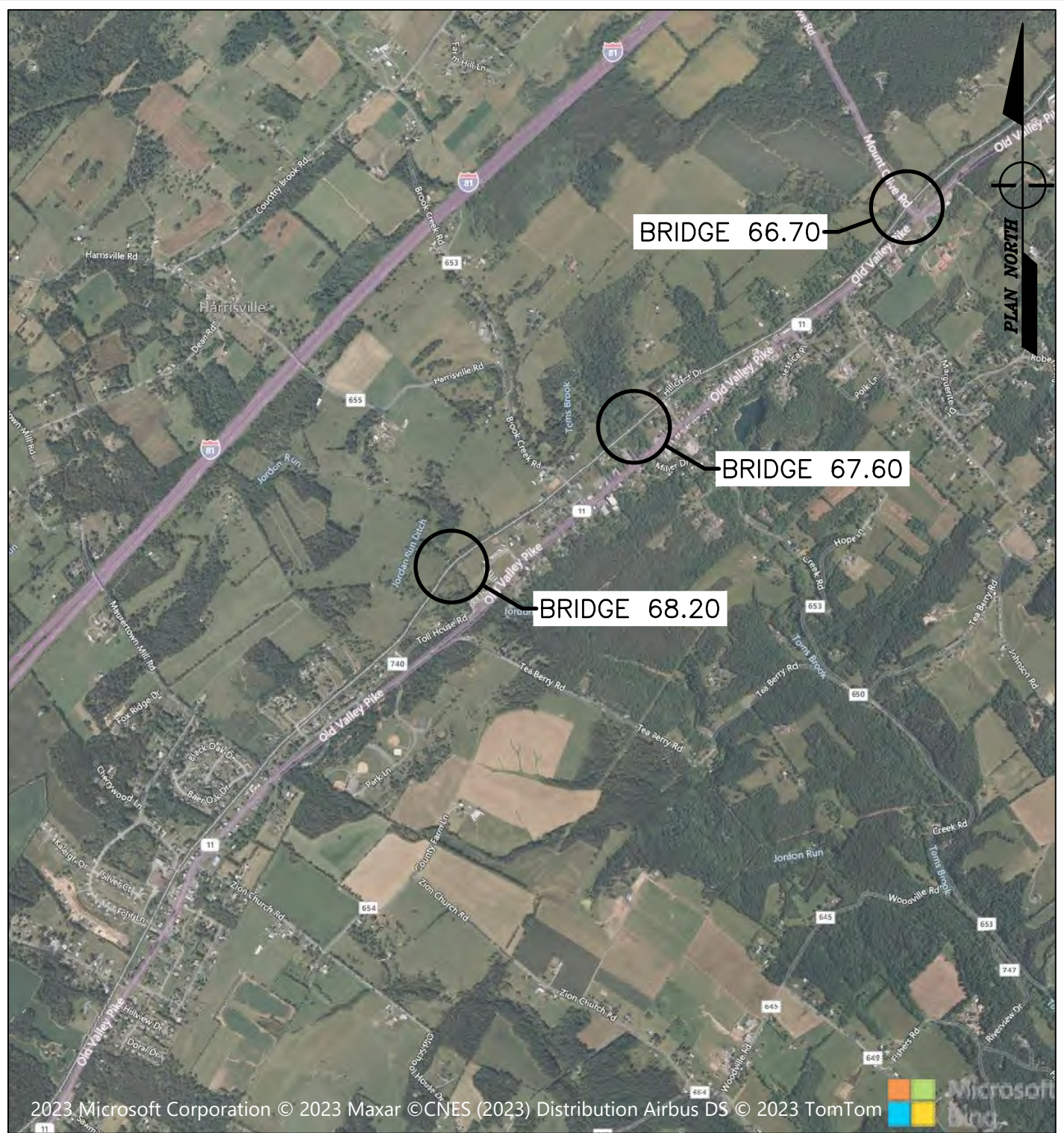
1731 N. Juniata Street
Hollidaysburg, PA 16648
Phone: 814.696.6280 Fax: 814.696.6240

PROJECT LOCATION MAP

NORFOLK SOUTHERN RAILWAY CO.
SHENANDOAH VALLEY RAIL
CORRIDOR BRIDGE EVALUATION

SCALE: 1" = 2000'

23-1502



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PROJECT LOCATION MAP

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CORRIDOR BRIDGE EVALUATION

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23-1502



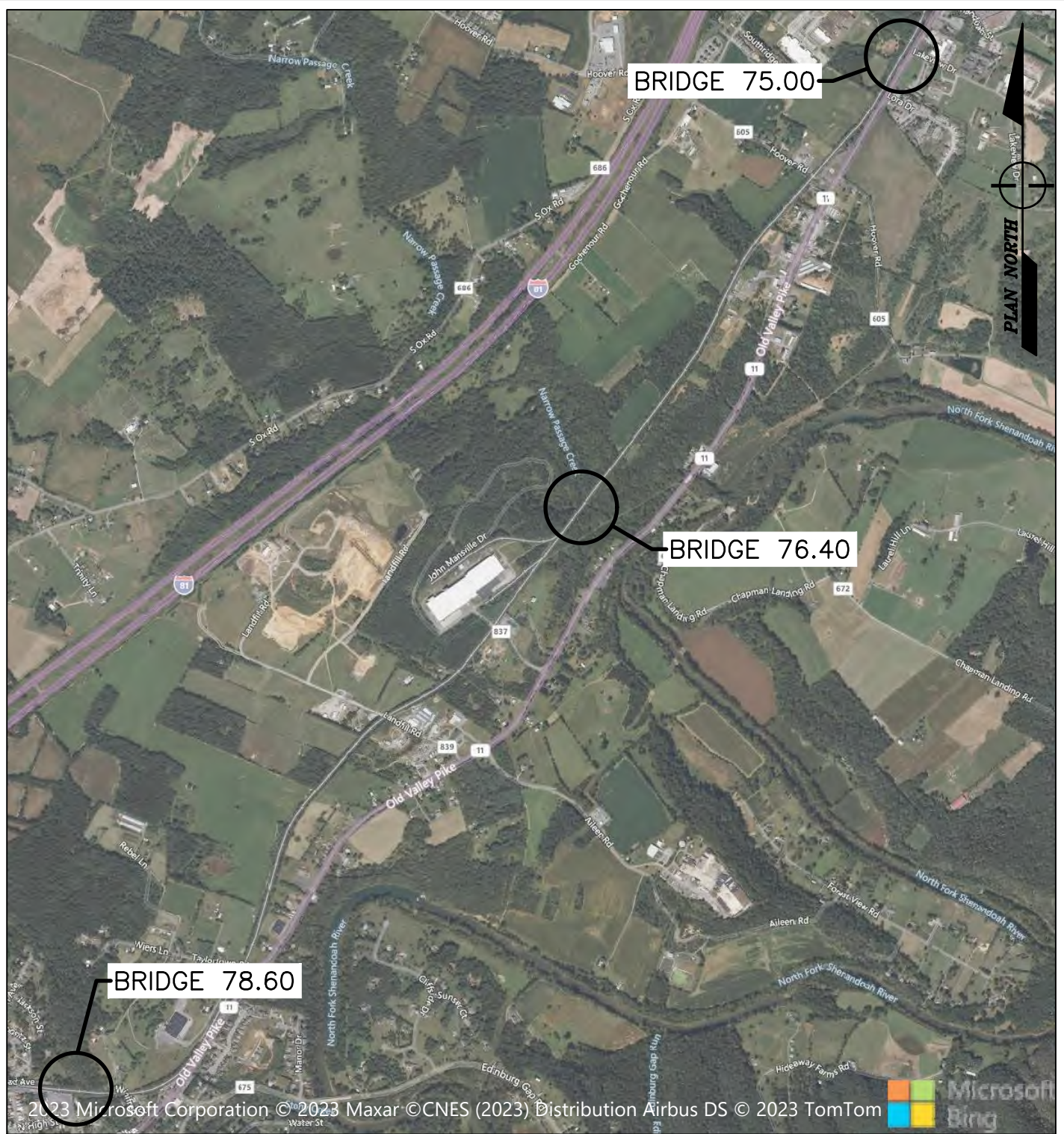
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23-1502



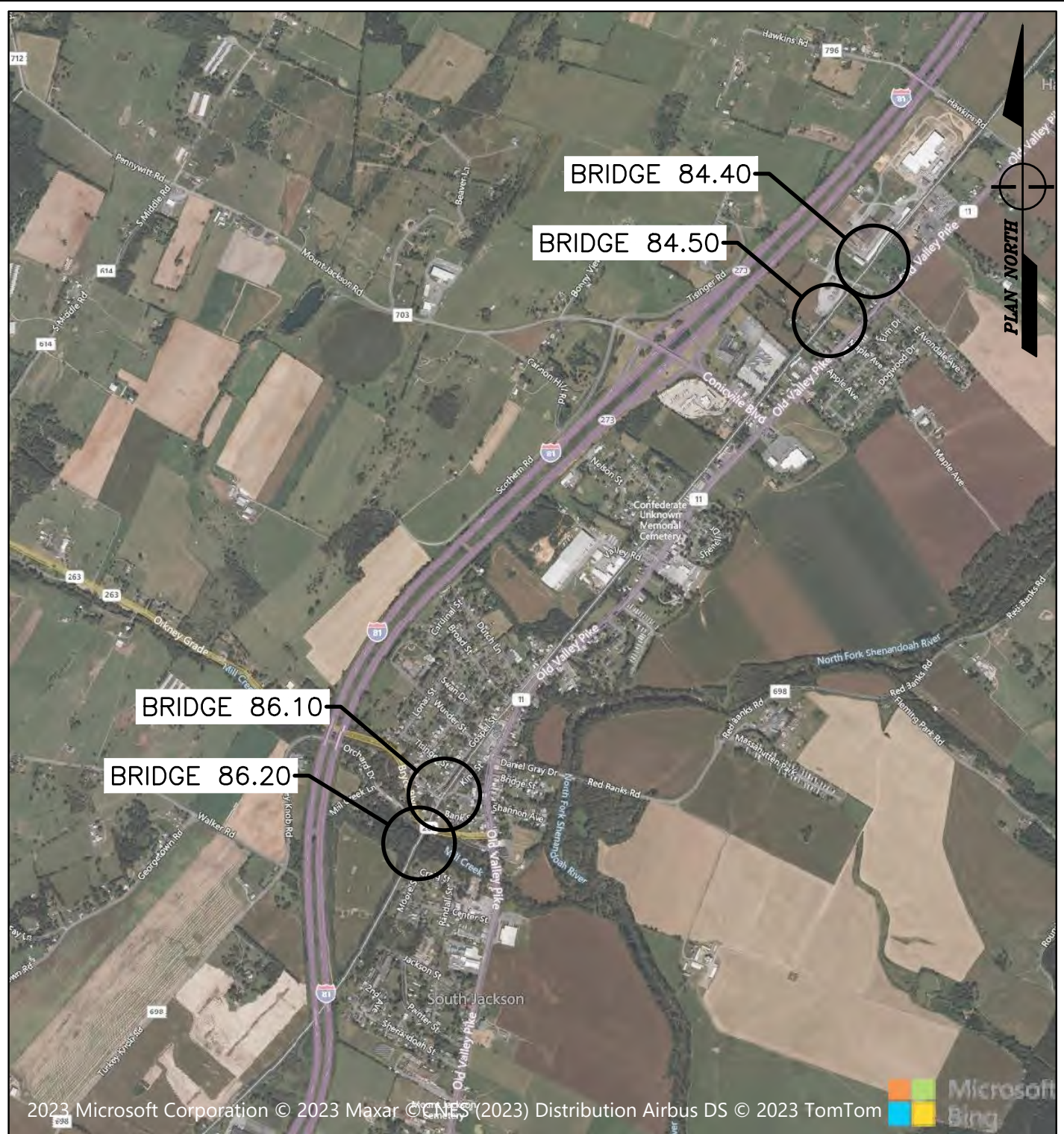
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23-1502



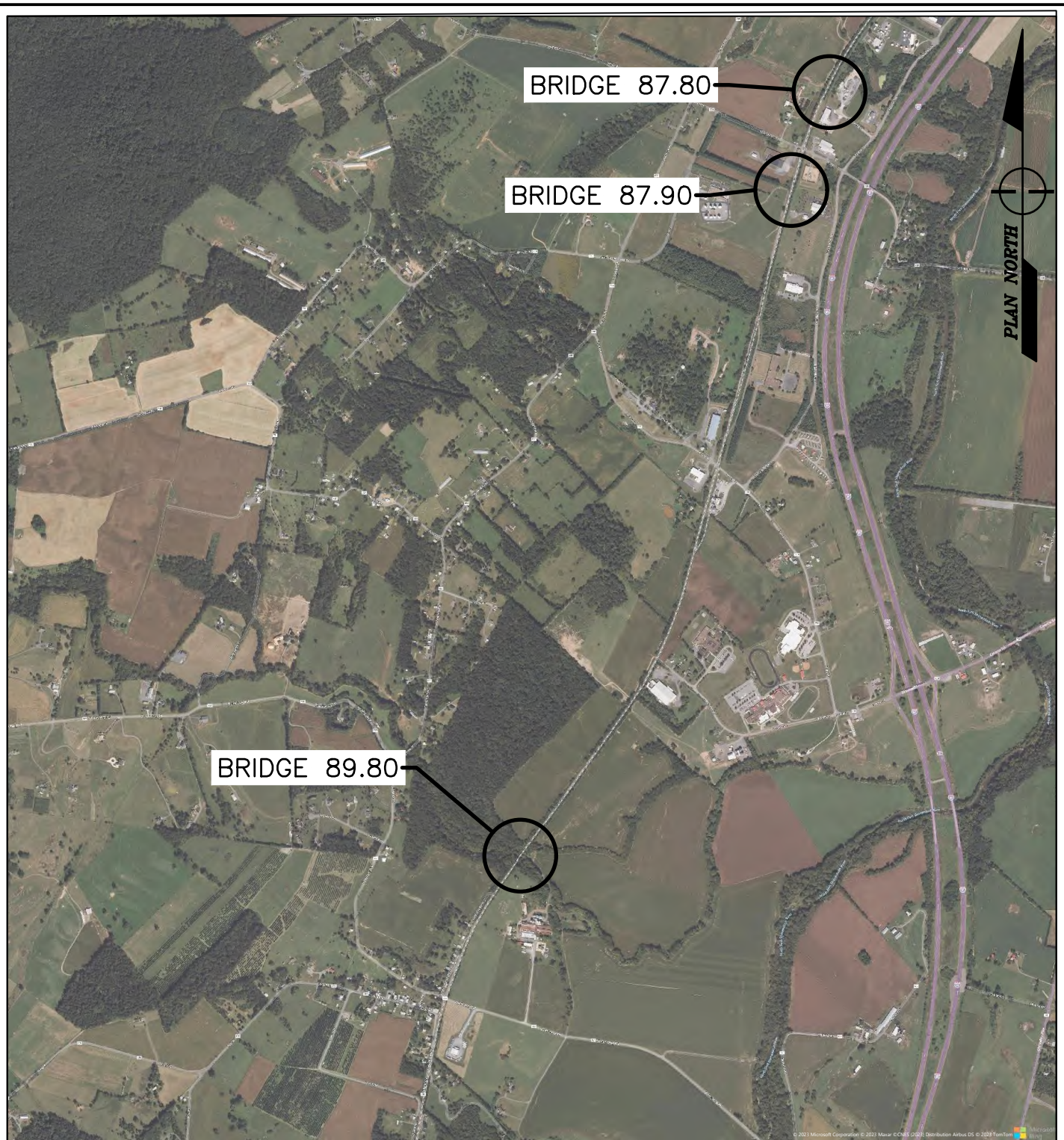
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CORRIDOR BRIDGE EVALUATION

SCALE: 1" = 2000'

23-1502



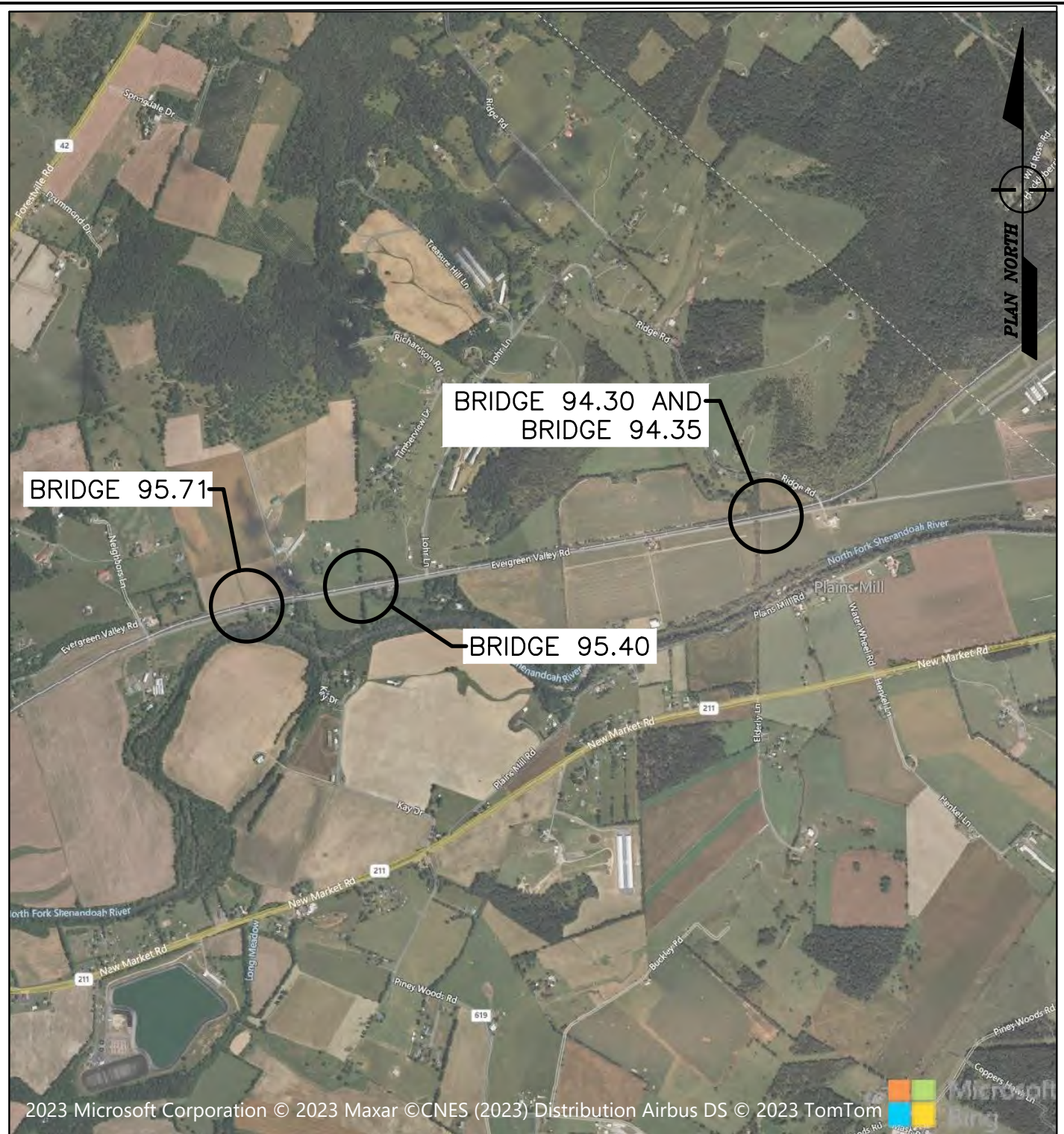
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23-1502



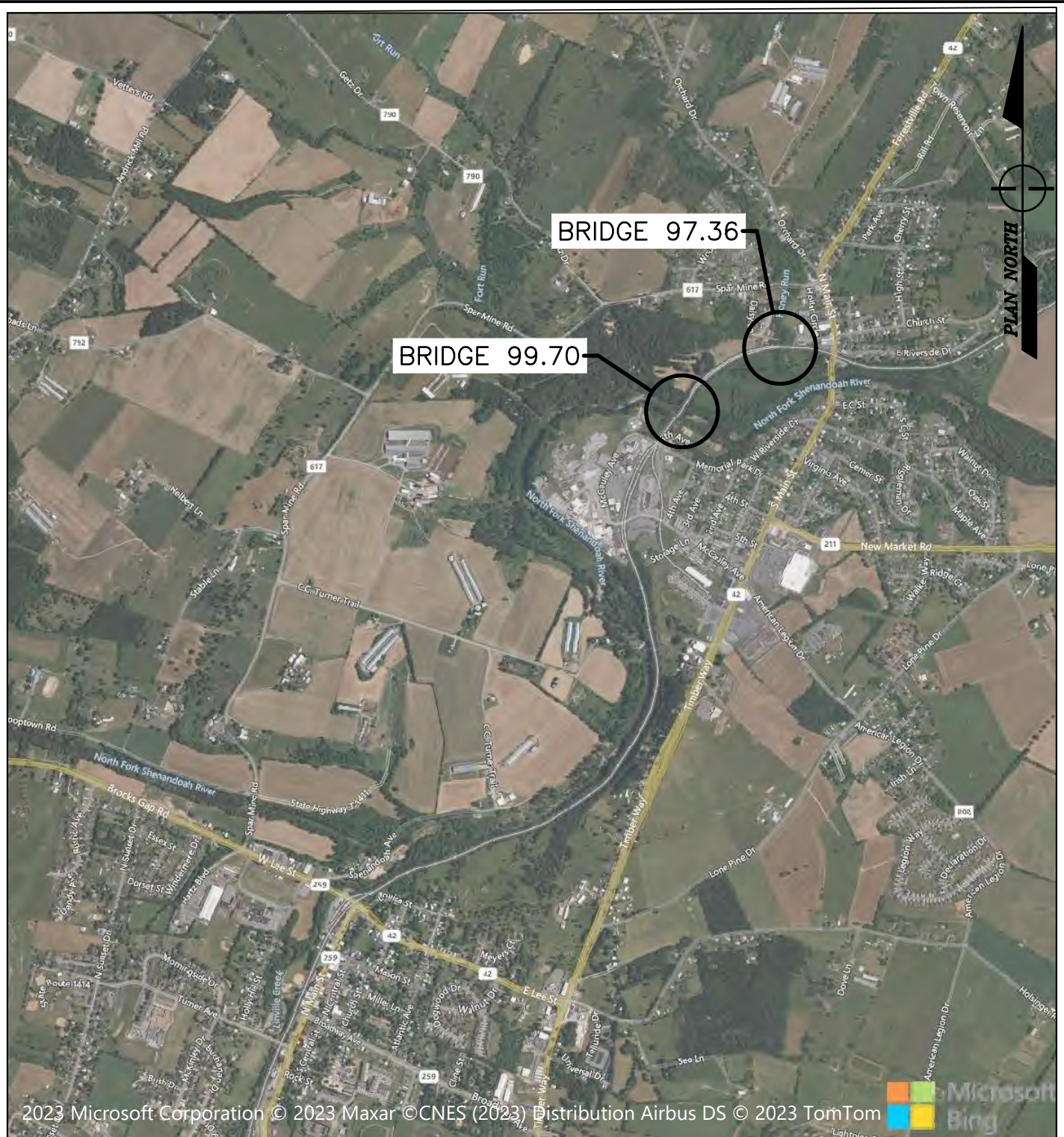
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SCALE: 1" = 2000'

23-1502



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PROJECT LOCATION MAP

NORFOLK SOUTHERN RAILWAY CO.
SHENANDOAH VALLEY RAIL
CORRIDOR BRIDGE EVALUATION

SCALE: 1" = 2000'

23-1502

APPENDIX B

BRIDGE INVENTORY

SHENANDOAH VALLEY RAILROAD CORRIDOR																
INVENTORY DATA																
Branch	Mile Post	Bridge Number	Latitude	Longitude	Feature(s) Intersected	County	State	Superstructure Material	Bridge Type	Deck Type	Substructure Type	No. Tracks	No. Spans	Span Length(s)	Total Length	Year Built
Main	B62.80	62.80	38.995719	-78.379819	UNT	Shenandoah	VA	Timber	Slab	Ballast	Stone Masonry	2	1	11'-0"	11'-0"	Unknown
Main	B63.90	63.90	38.984472	-78.397136	South Fork Run/Battlefield Road	Shenandoah	VA	Steel	Deck Girder	Open	Stone Masonry and Concrete	1	4	65'-6"	262'-0"	Unknown
Main	B65.40	65.40	38.971442	-78.416286	Snapps Run	Shenandoah	VA	Stone Masonry	Arch	Ballast	Stone Masonry	1	1	10'-0"	10'-0"	Unknown
Main	B66.70	66.70	38.954864	-78.428794	Highway 651	Shenandoah	VA	Steel	Deck Girder	Varies	Reinforced Concrete	1	3	42'-4"	127'-0"	Unknown
Main	B67.60	67.60	38.946353	-78.442514	Tom's Brook/Private Road	Shenandoah	VA	Steel	Deck Girder	Open	Varies	1	12	Varies	510'-0"	Unknown
Main	B68.20	68.20	38.941139	-78.457806	Jordan Run	Shenandoah	VA	Steel	Deck Girder	Open	Stone Masonry and Concrete	1	1	19'-1"	19'-1"	Unknown
Main	B71.60	71.60	38.903744	-78.490081	Pugh's Run	Shenandoah	VA	Steel	Deck Girder	Open	Varies	1	22	Varies	380'-0"	1925
Main	B74.00	74.00	38.875508	-78.514667	UNT	Shenandoah	VA	Stone Masonry	Arch	Ballast	Stone Masonry	1	1	12'-0"	12'-0"	Unknown
Main	B75.00	75.00	38.862928	-78.521417	UNT	Shenandoah	VA	Timber	Slab	Ballast	Stone Masonry and Concrete	1	1	8'-6"	8'-6"	Unknown
Main	B76.40	76.40	38.845969	-78.536831	Narrow Passage Run	Shenandoah	VA	Steel	Deck Girder	Open	Varies	1	13	Varies	621'-0"	Unknown
Main	B78.60	78.60	38.823569	-78.560872	UNT	Shenandoah	VA	Stone Masonry	Arch	Ballast	Stone Masonry	1	1	10'-0"	10'-0"	Unknown
Main	B78.90	78.90	38.822858	-78.569353	Stoney Creek/Massie Farm Lane	Shenandoah	VA	Steel	Deck Girder	Open	Varies	1	7	Varies	321'-4"	Unknown
Main	CW84.40	84.40	38.765169	-78.624458	UNT	Shenandoah	VA	Timber	Slab	Ballast	Stone Masonry and Concrete	1	1	10'-0"	10'-0"	Unknown
Main	CW84.50	84.50	38.763614	-78.626086	UNT	Shenandoah	VA	Timber	Slab	Ballast	Stone Masonry and Concrete	1	1	10'-6"	10'-6"	Unknown
Main	CW86.10	86.10	38.744606	-78.645272	Bank Street	Shenandoah	VA	Steel	Deck Girder	Open	Reinforced Concrete	1	1	20'-10"	20'-10"	Unknown
Main	CW86.20	86.20	38.743736	-78.645833	Mill Creek / Bryce Boulevard	Shenandoah	VA	Steel	Deck Girder	Open	Varies	1	3	Varies	425'-0"	1923
Main	CW87.80	87.80	38.727633	-78.660889	UNT	Shenandoah	VA	Timber	Slab	Ballast	Stone Masonry	1	1	14'-6"	14'-6"	Unknown
Main	CW87.90	87.90	38.731206	-78.662603	UNT	Shenandoah	VA	Timber	Slab	Ballast	Reinforced Concrete	1	1	13'-5"	13'-5"	Unknown
Main	CW89.80	89.80	38.698247	-78.675767	Holman's Creek	Shenandoah	VA	Steel	Deck Girder	Open	Varies	1	6	51'-8"	310'-0"	Unknown
Main	CW94.30	94.30	38.649553	-78.722806	Unnamed Drainage Crossing	Shenandoah	VA	Steel	Beams	Open	Stone Masonry and Concrete	1	7	20'-0"	140'-4"	Unknown
Main	CW94.35	94.35	38.649439	-78.723628	Unnamed Drainage Crossing	Shenandoah	VA	Steel	Beams	Open	Stone Masonry and Concrete	1	2	20'-0"	40'-4"	Unknown
Main	CW95.40	95.40	38.646811	-78.742900	Unnamed Drainage Crossing	Shenandoah	VA	Concrete	Box Culvert	Ballast	Reinforced Concrete	1	1	12'-0"	12'-0"	Unknown
Main	CW95.71	95.71	38.646014	-78.748600	Unnamed Drainage Crossing	Shenandoah	VA	Steel	Beams	Open	Reinforced Concrete	1	1	19'-8"	19'-8"	Unknown
Main	CW97.36	97.36	38.638906	-78.776056	Honey Run Creek	Shenandoah	VA	Steel	Deck Girder	Open	Stone Masonry and Concrete	1	2	45'-0"	90'-0"	Unknown
Main	CW97.60	97.60	38.636494	-78.780997	North Fork Shenandoah River	Shenandoah	VA	Steel	Deck Girder	Open	Stone Masonry and Concrete	1	4	46'-0"	184'-0"	Unknown

APPENDIX C

INSPECTION REPORTS

Summary Classification Report

Inventory Data				Summary	
Railroad:	Shenandoah Valley	Bridge No.:	76.40	Classification:	D (Closed)
Branch:	Main	Bridge Type:	Deck Girder	A = Good	
Mile Pole:	B76.40	Deck Type:	Open	B = Maintenance 1 - 2 - 3 years	
Year Built:	Unknown	No. of Spans:	13	C = Structural 1 - 2 - 3 - 4 - 5 years	
Crossing:	Narrow Passage Run	Span Length:	See Ref. Measurements	D = Slow Order for repairs; or,	
		Total length:	621'-0"	D = Out Of Service	
Municipality:	Shenandoah County	No. of Tracks:	1		
County:	Shenandoah	Rail:	100 RE		
State:	Virginia	Alignment:	Tangent	Date Inspected:	07/27/23
Latitude:	38.845969	Timetable Speed:	Unknown	Inspection Type:	Regular
Longitude:	-78.536831			Last Inspection:	Unknown
Owner:	Norfolk Southern Corporation			Underwater Inspection:	No

Running Rails: East-West / East to Woodstock

East Approach: Spans 1-5 (with Bents B:E1 through B:E5)

Main Spans: 1-6 (with East Abutment, Piers P1-P3, Bents B:M1-B:M2, and West Abutment)

West Approach: Spans 1-2 (with Bents B:W1-B:W2)

See Page 4 "Additional Notes and Sketches" for Structure Sketch and Span Lengths

Drawings available:

No

Inspection Data	
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Inspector Notes/Maintenance Recommendations:

It is recommended that the timber tie deck is replaced in both the East and West Approach spans due to the deteriorated

Item Inspected	Class	Remarks
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Item Inspected	Class	Remarks
General		
1. Approach Track	D	Both approach tracks are overgrown with trees and vegetation. The approach ties are deteriorated and broken throughout both approaches.
2. Track on Bridge	D (Closed)	Several ties on both approach spans are crushed, rotted, and broken throughout.
a. Alignment and Gauge	-	
b. Rail, Joints and Guard Rail	-	
c. Depth of Ballast	-	
3. Condition of Stream	A	The stream consists of cobbles and boulders with bedrock visible at various locations. Scour is present at Pier P2 of the Main Spans. Flow is primarily in Span 3 with higher water flow in Span 4.
4. Riprap	n/a	
5. General Cleanliness	B-1	Debris is noted on the bridge seats and around the bearings. Vegetation is present in both approaches, under the steel trestle spans, and in/around steel bent lattice bracing.
6. Paint Condition (year painted)	B-3	Approximately 80% paint remaining. Surface rust is present on lower flangers and horizontal surfaces. Some minor pitting and rust scale buildup is present at the bearings.
7. Clearance Signs	n/a	

Inspector 1: Dave Houser

Inspector 2: Brice Barrett	Signature - Bridge Engineer
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Date Report Prepared:	08/09/23	Date Reviewed:	08/09/223
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	Page 1 of 4
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Summary Classification Report

Railroad:	Shenandoah Valley	Branch:	Main	Bridge No.:	76.40
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Inspection Data (continued)

Item Inspected	Class	Remarks
Deck Girder/Deck Beam		
8. Foundations	C-1	The abutment foundations are not visible. No signs of settlement are noted. Pier P3 appears to have concrete underpinning w/ scour along both sides. The Bent B:M2 North Pedestal is heavily spalled (up to 8" depth), deteriorated, and unsound with one anchor bar visible in the spall.
9. Abutments and Bridge Seats	C-5	The abutments are stone masonry with reinforced concrete extensions and bridge seats. The masonry exhibits some cracked and spalled stones, primarily along outer corners. The concrete is in good condition with some cracking ranging from hairline to 3/8" w/ efflorescence and edge spalling under girder bearings. There is a crack up to 3/8" wide on the East Abutment below Girder 1.
10. Wing Walls	C-5	The wing are stone masonry flared wings on the East Abutment and stone masonry U-Wings with concrete caps at the West Abutment. Mortar loss is noted below cap stones on the East Abutment with occasional cracked stones.
11. Piers	C-4	Piers P1, P2 and P 3 are stone masonry w/ reinforced concrete extensions and caps. The stone masonry is in fair condition with some cracking and spalled stones. Vertical cracks are present through multiple stones w/ spalls on west face of Pier P3. Pier P2 has cracks on the north end and both sides nearly full height with no movement or displacement visible. The two steel bents are in good condition with surface rust and some heavier pitting noted at the bearings.
12. Backwalls	A	The backwalls are reinforced concrete with some scaling and hairline cracking noted.
17. Ties and Guard Rails	A	The timber tie deck is in good condition with minor splitting and checking noted. Several ties exhibit early stages of heartwood rot. The ties are 10"W x 13" to 15" H x 12'-0' L.
18. Footwalk and Handrailing	D (footwalk)	The footwalk consists of steel grating with steel stringers supported by a steel crossbeam mounted to the superstructure. One section of grating is missing over Pier 3. Several welds are broken between panels. Steel post and cable handrailing is provided in good condition.
20. Deck System	n/a	
21. Parapet Walls	n/a	
22. Ballast Depth/Waterproofing	n/a	
23. Bearings, Sole Plates, Masonry Plates	A	The bearings consist of steel masonry and sole plates with surface rust. Segmental roller and fixed bearings are provided for Spans 3 and 4. Surface rust and minor pitting is noted but rollers and retainer plates are in place.
24. Girder/Beam	A	The superstructure consists of built-up riveted steel deck girders with minor paint peel and surface rust noted, primarily at the bearing areas and along the lower flanges.
31. End and Intermediate Stiffeners	A	Steel angle bearing and intermediate stiffeners are provided with paint peel and surface rust noted at the bottom of the stiffeners.
32. Top Lateral System/Floorbeam Brackets	A	The top lateral bracing consists of steel angles with paint peel and surface rust noted long the top of the horizontal leg of the angles.
33. Bottom Lateral System	A	Provided in Spans 3 and 4 only. The bottom lateral bracing consists of steel angles with paint peel and surface rust noted long the top of the horizontal leg of the angles.
34. Cross-Frames/Diaphragms	A	The built-up riveted crossframes consist of steel angle struts and crossmembers with paint peel and surface rust noted long the top of the horizontal leg of the angles.
36. Pins, Nuts, Rivets and Bolts	A	Surface rust and minor deterioration is noted on the anchor bolts. The rivets on the superstructure and steel bents exhibit varying degrees of paint peel, surface rust, and minor pitting.

Additional Notes:

This page is for Main Spans 1-6 including main span substructure units.

Summary Classification Report

Railroad:	Shenandoah Valley	Branch:	Main	Bridge No.:	76.40
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Inspection Data (continued)

Item Inspected	Class	Remarks
Trestles		
8. Foundations	A	The foundations are not visible. No signs of settlement are noted.
9. Abutments and Bridge Seats	A	Steel bents with steel backwalls are provided at east end of the East Approach spans and west end of the West Approach spans. The west end of the East Approach spans are supported by the East Abutment and the east end of the West Approach spans are supported by the West Abutment (see Page 2).
10. Wing Walls	A	The wingwalls consist of steel H-Piles with steel panel lagging provided off of the back of the backwalls parallel to the tracks (U-Wings). Minor surface rust is noted throughout.
11. Piers	A	The piers consist of steel pile bents with peeling paint and surface rust noted throughout.
12. Backwalls	A	The backwalls consist of steel H-Piles with steel panel lagging. Minor surface rust is noted throughout.
17. Ties and Guard Rails	D (Closed)	The ties are in poor condition with crushing, rot, and broken ties throughout. Some ties are missing on the West Approach spans. The ties are 9-1/2"W x 8-1/2" H x 12'-0' L.
18. Footwalk and Handrailing	C-3	The footwalk consists of steel grating with steel angle outer stringers supported by a steel crossbeam mounted to the superstructure. Several welds are broken between panels. Steel post and cable handrailing is provided in good condition.
20. Deck System	n/a	
21. Parapet Walls	n/a	
22. Ballast Depth/Waterproofing	n/a	
23. Bearings, Sole Plates, Masonry Plates	A	The bearings consist of steel bearing plates anchored to the top of the steel pile bent caps. Some surface rust and minor pitting is noted on the bearing plates.
37. Stringers	A	The stringers consist of two rolled beams with welded bearing stiffeners provided at the steel pile bents. Paint peel with surface rust and minor pitting is noted, primarily at the bearing areas and lower flanges.
38. Caps	A	The caps consist of rolled steel beams with three bearing stiffeners provided on each side of the beam under each stringer. Paint peel with surface rust and minor pitting is noted, primarily on the lower flanges.
39. Sills	n/a	
40. Posts and Piles	A	Each bent is comprised of four steel H-Piles. Each pile is welded to the cap. The piles are in good condition with some random paint peel and surface rust noted throughout.
41. Bracing - Transverse	A	Sway bracing is provided in various configurations based on the exposed height of the bent. The bracing consists of steel beams fit between piles. The flanges of the beam bracing are welded to each pile. The bracing is in good condition with some paint peel and surface rust noted. All welds are in good condition.
42. Bracing - Longitudinal	n/a	
43. Hardware	A	All components of the steel trestle spans are welded except for the bearing plate connection to the cap, which are bolted. All anchor bolts are present and in good condition with only minor deterioration noted.

Additional Notes:

This page is for East Approach Spans 1-5 and West Approach Spans 1-2 including East and West Approach Span substructure units.

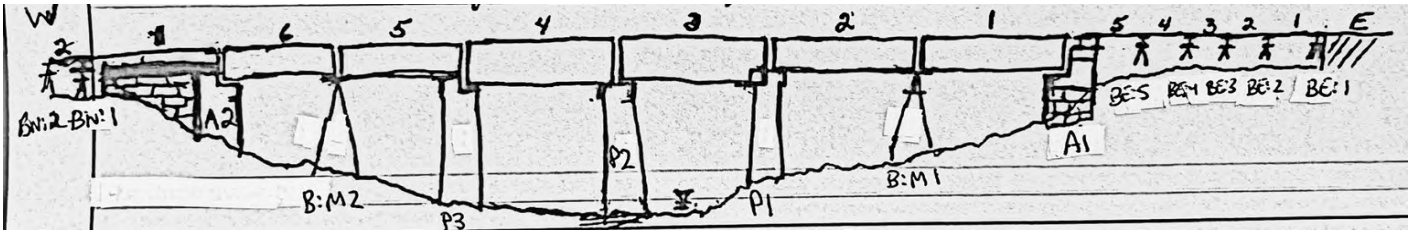
Summary Classification Report

Railroad: Shenandoah Valley	Branch: Main	Bridge No.: 76.40
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Inspection Data (continued)

Item Inspected	Class	Remarks
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Additional Notes and Sketches



Spans Lengths:

-East Approach Spans

Spans 1-4 = 20'-6", Span 5 = 24'-0"

-Main Spans

Span 1 = 63'-6", Span 2 = 62'-6", Spans 3 & 4 = 103'-0", Span 5 = 63'-6", Span 6 = 64'-6"

-West Approach Spans

Span 1 = 33'-0", Span 2 = 22'-0"

B:E1 - Steel bent with steel backwall retained with steel piles (East Approach)

B:E2 through B:E5 - Steel bents (East Approach)

A1: Concrete capped stone masonry East Abutment

B:M1 - Steel bent (Main Spans)

P1 through P3 - Concrete capped stone masonry piers (Main Spans)

B:M2 - Steel bent (Main Spans)

A2: Concrete capped stone masonry West Abutment

B:W1: Steel bent (West Approach)

B:W2 - Steel bent with steel backwall retained with steel piles (West Approach)

Summary Classification Report

Inventory Data					Summary	
Railroad:	Shenandoah Valley	Bridge No.:	78.90		Classification:	D (Closed)
Branch:	Main	Bridge Type:	Deck Girder		A = Good	
Mile Pole:	B78.90	Deck Type:	Open		B = Maintenance 1 - 2 - 3 years	
Year Built:	Unknown	No. of Spans:	7		C = Structural 1 - 2 - 3 - 4 - 5 years	
Crossing:	Stoney Creek/	Span Length:	See Ref. Measurements		D = Slow Order for repairs; or,	
	Massie Farm Lane	Total length:	321'-4"		D = Out Of Service	
Municipality:	Town of Edinburg	No. of Tracks:	1			
County:	Shenandoah	Rail:	85#			
State:	Virginia	Alignment:	Tangent		Date Inspected:	07/26/23
Latitude:	38.822858	Timetable Speed:	Unknown		Inspection Type:	Regular
Longitude:	-78.569353				Last Inspection:	Unknown
Owner:	Norfolk Southern Corporation				Underwater Inspection:	No

Reference Measurements:

Running Rails: East-West / East to Strasburg

Span Lengths: Span 1 = 49'-0", Span 2 = 48'-10", Span 3 = 49'-0", Span 4 = 28'-2", Span 5 = 48'-10", Span 6 = 49'-0",
Span 7 = 48'-6"

Drawings available:

No

Inspection Data

Inspector Notes/Maintenance Recommendations:

It is recommended that the entire timber tie deck is replaced due to the deteriorated condition of the ties. It is also recommended that the timber flood debris is removed from the upstream end of the steel bent tower and riprap be placed along the upstream bent tower footings as scour protection. It is also recommended that trees and vegetation are removed from the base of Steel Bent #1.

Item Inspected	Class	Remarks
General		
1. Approach Track	D	Trees and heavy vegetation are noted on both approaches with deteriorated ties. Concrete ballast troughs are provided on both approaches. Ballast retainers have deteriorated in all four corners at the ballast troughs.
2. Track on Bridge	D (Closed)	Ties are heavily deteriorated throughout.
a. Alignment and Gauge	-	
b. Rail, Joints and Guard Rail	-	
c. Depth of Ballast	-	
3. Condition of Stream	C-1	A heavy debris dam is present across Span 4 and most of Span 5 against the North Bent Tower Pedestals. Scour is present at the pedestal footings up to 4' below top of footing where accessible. General stream conditions include good alignment, stable vegetated banks w/ various rock outcrops and streambed material consisting primarily of cobbles and boulders with some finer material.
4. Riprap	n/a	Needed but not provided.
5. General Cleanliness	B-1	Heavy brush and vegetation on approaches and wingwalls with rust scale on the girder lower flanges.
6. Paint Condition (year painted)	B-3	Surface rust is present throughout the lower flanges and steel bents. Approximately 75% of the paint remains throughout the structure. Rust scale buildup is present on the girder lower flanges.
7. Clearance Signs	n/a	

Prepared by:

Inspector 1: Dave Houser

Inspector 2: Brice Barrett

Date Report Prepared:

08/09/23

R. Allan Derr

Digitally signed by: R. Allan Derr
DN: CN = R. Allan Derr email = aderr@stiffier-mcgraw.com C = US O = Stiffier
McGraw
Date: 2023.08.11 10:47:39 -0400

Signature - Bridge Engineer

Date Reviewed:

08/09/23

Summary Classification Report

Railroad:	Shenandoah Valley	Branch:	Main	Bridge No.:	78.90
Inspection Data (continued)					
Item Inspected		Class	Remarks		
Deck Girder/Deck Beam					
8. Foundations	C-5	The West Abutment has stone masonry (one course) visible below the concrete stem. The East Abutment and pier footings are not visible. Minor scour is noted along the west side of Pier 1. Bent 2 and 3 square footings are visible with up to 4' height exposed on Bent 2 North Pedestal which is not fully accessible due to debris. No settlement is noted on any substructure units.			
9. Abutments and Bridge Seats	C-5	The abutments consist of stone masonry with reinforced concrete stem extensions and bridge seats cast on of the stone. The concrete portion is in good condition with minor cracking and efflorescence. The stone masonry is in fair condition with some cracked or spalled stones and open joints. The cracked/spalled stones are primarily on the outer corners of the stems.			
10. Wing Walls	A	The wings are stone masonry in good condition with minor mortar loss and occasional cracked stones. The East Wings have concrete extensions with each having one heavy full section vertical crack near the midlength through the concrete portion. The West Wings support a reinforced concrete approach ballast trough.			
11. Piers	C-4	The piers are stone masonry with reinforced concrete cap extensions. The concrete is in good condition with minor cracking and efflorescence. The stone masonry is in fair condition with occasional vegetation/tree growth in joints and mortar loss. Several spalled and cracked stones with wider open joints are present on the SE corner of Pier 2. Several spalled stones are present at the NW corner of Pier 1. See Page 3 for Steel Bents.			
12. Backwalls	A	The backwalls are reinforced concrete in good condition with minor cracking and efflorescence present. One large crack is present near the top of the West Backwall at the south end.			
17. Ties and Guard Rails	D (Closed)	The timber tie deck needs replaced due to heavy deterioration throughout. Nearly all ties are rotted and ineffective. Ties are 8"W (varies) x 11"H x 12'-0"L.			
18. Footwalk and Handrailing	n/a	Not provided.			
20. Deck System	n/a				
21. Parapet Walls	n/a				
22. Ballast Depth/Waterproofing	n/a				
23. Bearings, Sole Plates, Masonry Plates	C-5	The steel bearing plates and sole plates are in good condition with surface rust and minor pitting present. The shim plate is out of alignment under the Span 1 Girder 2 Bearing 1 at the East Abutment.			
24. Girder/Beam	A	The superstructure consists of built-up riveted steel deck girders in good condition with minor pitting and rust scale buildup on the tops of the lower flanges.			
31. End and Intermediate Stiffeners	A	The steel angle stiffeners exhibit rust scale and minor section loss at the bottom of the angles, primarily at the bearing areas / end of the spans.			
32. Top Lateral System/Floorbeam Brackets	A	The top lateral bracing consists of steel angles with paint peel and surface rust noted long the top of the horizontal leg of the angles.Rust scale buildup and pitting is present on top of the upper connecting plates.			
33. Bottom Lateral System	A	The bottom lateral bracing consists of steel angles with paint peel and surface rust noted long the top of the horizontal leg of the angles. Rust scale buildup and pitting is present on top of the lower connecting plates.			
34. Cross-Frames/Diaphragms	A	The built-up riveted crossframes consist of steel angle struts and crossmembers with paint peel and surface rust noted long the top of the horizontal leg of the angles.			
36. Pins, Nuts, Rivets and Bolts	A	Minor section loss is noted on the sole plate rivets heads at the bearings. The rivets on the superstructure and steel bents exhibit varying degrees of paint peel, surface rust, and minor pitting.			
Additional Notes:					
					Page 2 of 3

Summary Classification Report

Railroad: Shenandoah Valley Branch: Main Bridge No.: 78.90

Inspection Data (continued)

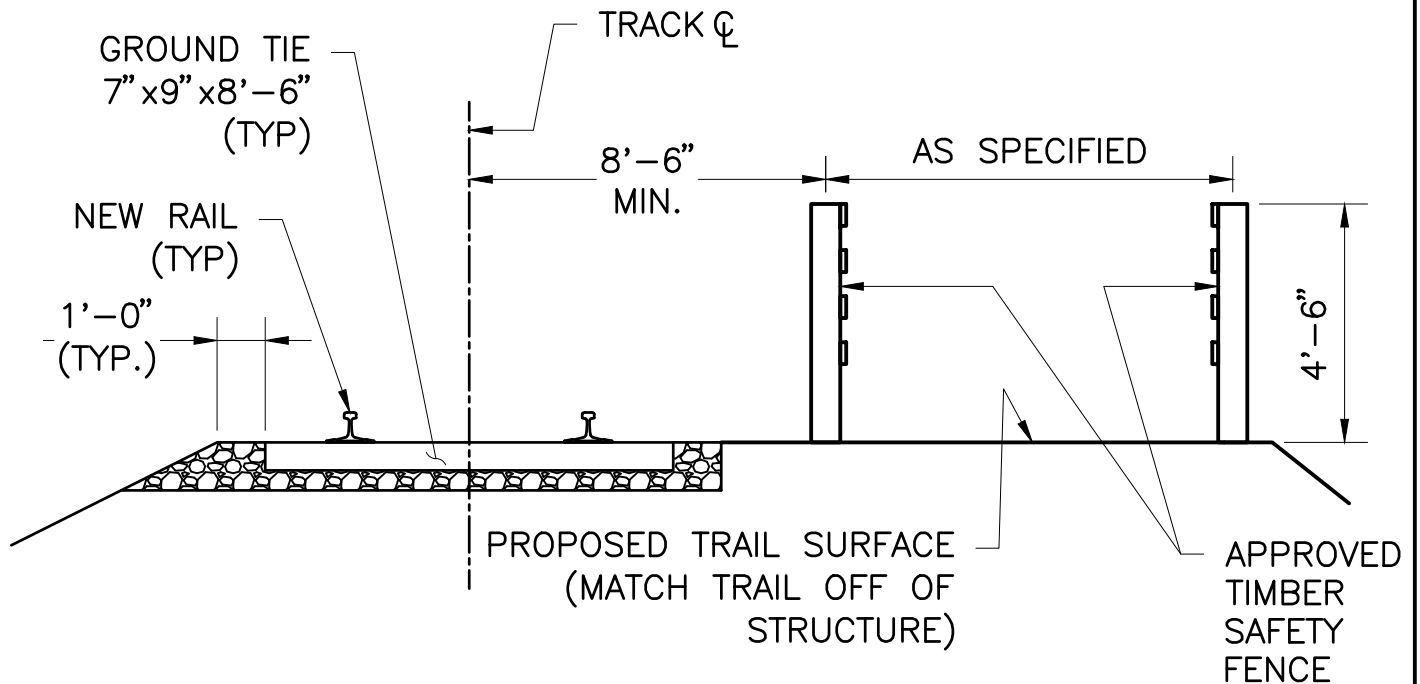
Item Inspected	Class	Remarks
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Additional Notes and Sketches

19. Piers Continued: The steel bents consist of single bents at the west end of Span 1 and the east end of Span 7. A bent tower is present at Span 4. The concrete pedestals exhibit hairline cracking with efflorescence. The steel bents exhibit paint loss and surface rust throughout with some pitting on the bearing plates and lower connections.

APPENDIX D

P_{ROPOSED} T_{YPICAL} S_{ECTIONS}



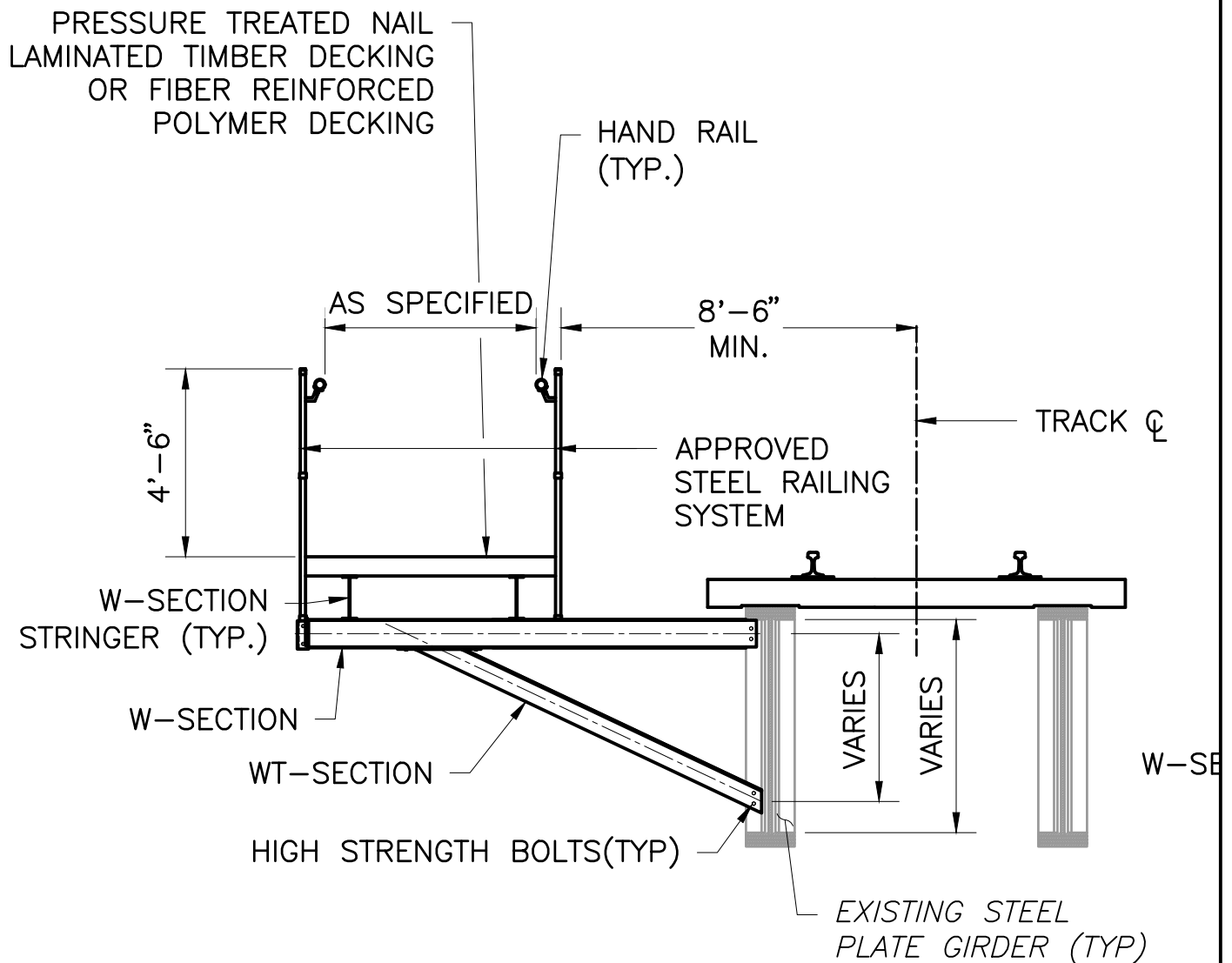
1731 N. Juniata Street
Hollidaysburg, PA 16648
Phone: 814.696.6280 Fax: 814.696.6240

PROPOSED TYPICAL SECTION

TRAIL ADJACENT TO
GROUND TRACK

NOT TO SCALE

23-1502



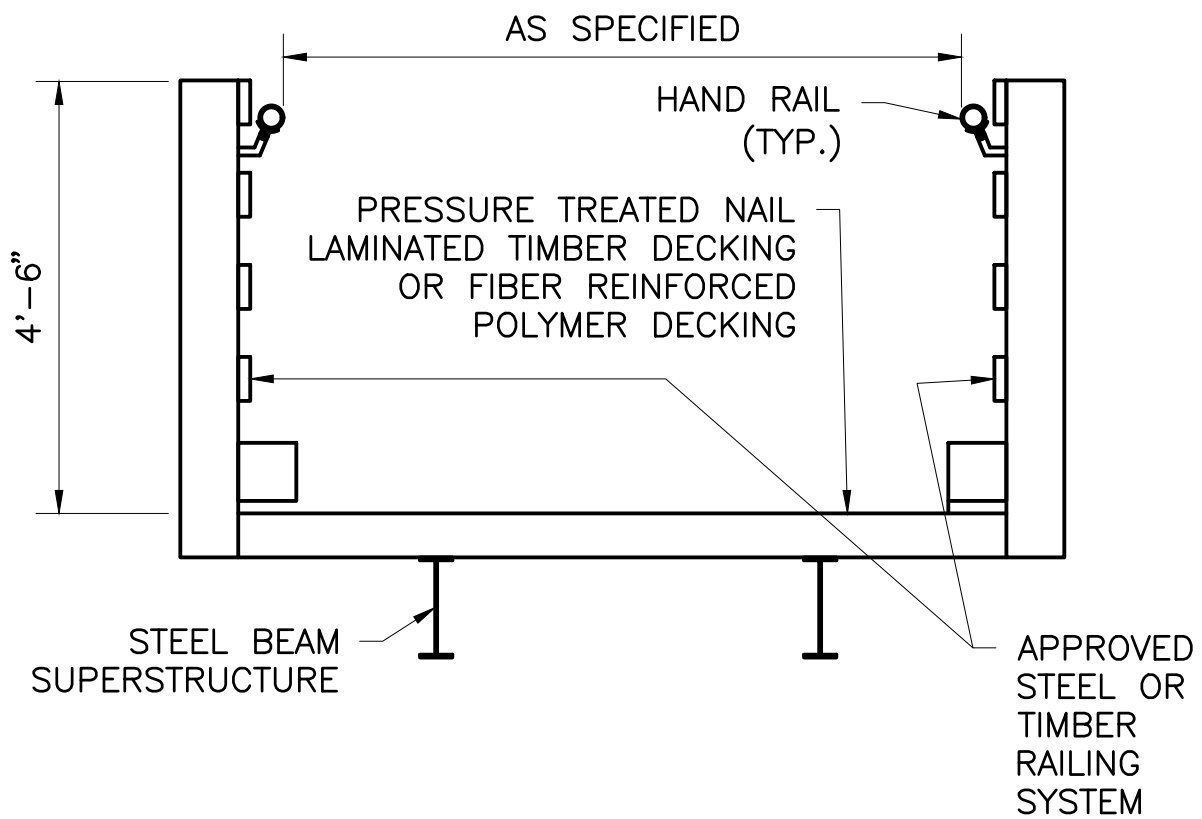
1731 N. Juniata Street
Hollidaysburg, PA 16648
Phone: 814.696.6280 Fax: 814.696.6240

PROPOSED TYPICAL SECTION

CANTILEVER TRAIL
SUPERSTRUCTURE

NOT TO SCALE

23-1502



PROPOSED TYPICAL SECTION

INDEPENDENT TRAIL
SUPERSTRUCTURE

NOT TO SCALE

23-1502

APPENDIX E

P_HOTOGRAPHS



Photo 1: Track on Bridge



Photo 2: Through Structure



Photo 3: Typical Condition of Timber Slab



Photo 4: Spalled/Broken Stones At South End of West Abutment



Photo 1: General Condition of Timber Tie Deck



Photo 2: Pier 3 Bridge Seat With Wide Cracks



Photo 3: Typical Reinforced Concrete Portion of Pier



Photo 4: Typical Stone Masonry Portion of Pier



Photo 5: Undermined East Approach Ballast Trough



Photo 6: Typical Condition of Girders (From SE looking West)



Photo 1: South Elevation



Photo 2: Through Arch (From South End)



Photo 3: Arch Barrel (From South End)



Photo 4: North End of Structure (From NW Wing)



Photo 5: NE Wing with Free End Separation



Photo 6: Track on Structure



Photo 1: South Elevation



Photo 2: West Approach



Photo 3: Bridge Deck



Photo 4: Underside of Typical Span (Span 2 Shown)



Photo 5: Typical Pier (East Side of Pier 2 Shown)



Photo 6: North Abutment



Photo 1: General Condition of Timber Tie Deck



Photo 2: Vegetation Growth in Steel Bent Tower Bracing



Photo 3: Typical Pier



Photo 4: Typical Steel Bent Tower Pedestal



Photo 1: General Condition of Bridge Deck

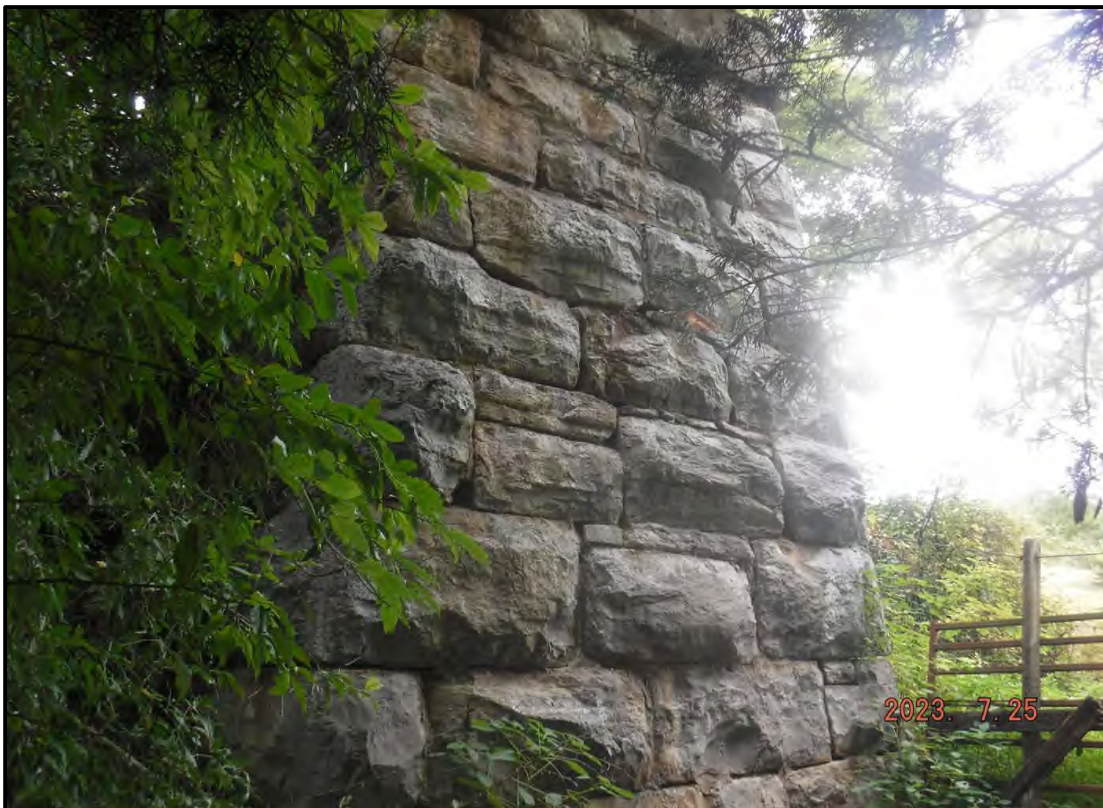


Photo 2: West Abutment



Photo 3: East Abutment



Photo 4: Typical Wingwall (NE Wing Shown)



Photo 1: General Condition of Timber Tie Deck



Photo 2: Typical Bridge Seat (West Abutment Shown)



Photo 3: Through Girders (From West Abutment)



Photo 4: Typical Timber Pile Bent



Photo 5: Typical Underside of Timber Slab



Photo 6: East Abutment



Photo 7: Typical Pier



Photo 8: Typical Steel Bent Tower



Photo 1: Track on Structure



Photo 2: Missing Stones West End of North Headwall



Photo 3: Arch Barrel (From North)



Photo 4: Through Stone Arch (From North)



Photo 5: South Headwall



Photo 6: Typical Wingwall (NE Wing Shown)



Photo 1: Track on Structure



Photo 2: Typical Wingwall (SW Wing Shown)



Photo 3: East Abutment (From South)



Photo 4: West Abutment (From South)



Photo 5: Typical Underside of Timber Slab



Photo 6: Typical Stone Masonry Abutment Open Joints



Photo 1: General Condition of Deck (Main Spans)



Photo 2: Missing Walkway Grate over Pier 3 of Main Spans



Photo 3: General Condition of Deck (Approach Spans, West Shown)



Photo 4: Typical Steel Pile Bent (Typical for Approach Spans)



Photo 5: North Side of Main Spans (From East)



Photo 6: Typical Vegetation in Steel Bent Bracing



Photo 7: Spalled Concrete on Main Span Bent 2 North Pedestal



Photo 8: Spalled Concrete on Main Span Bent 2 North Pedestal



Photo 1: North Headwall



Photo 2: Through Stone Arch (From North)



Photo 3: Through Stone Arch (From South)



Photo 4: South Headwall



Photo 1: General Condition of Timber Tie Deck



Photo 2: Flood Debris Against the North Side of the Steel Bent Tower



Photo 3: West Abutment



Photo 4: Typical Steel Bent (West Side of Bent 2 Shown)



Photo 5: Typical Pier (West Side of Pier 2 Shown)



Photo 6: Typical Exposed Footing (Steel Bent Tower)



Photo 7: East Abutment



Photo 8: Typical Griders



Photo 1: Track on Bridge (From Crossing to the West)



Photo 2: North Elevation



Photo 3: Through Structure (From North)



Photo 4: Underside of Timber Slab



Photo 1: Through Structure (From North)



Photo 2: West Abutment (From North)



Photo 3: East Abutment (From North)



Photo 4: Underside of Timber Slab



Photo 1: North Elevation of Girders



Photo 2: South Elevation of Girders



Photo 3: General Condition of Timber Tie Deck



Photo 4: West Abutment



Photo 5: East Abutment



Photo 6: Underside of Span



Photo 1: General Condition of Timber Tie Deck



Photo 2: East Abutment



Photo 3: Typical Pier (East Side of Pier 2 Shown)



Photo 4: Typical Bearing and West Abutment Bridge Seat (From South)



Photo 5: Typical Underside of Span



Photo 6: Typical Girders



Photo 1: East Abutment (From South)



Photo 2: West Abutment (From South)



Photo 3: Typical Timber Slab



Photo 4: South Elevation



Photo 1: East Abutment (From South)



Photo 2: West Abutment (From South)



Photo 3: Typical Timber Slab (From South)



Photo 4: Typical Timber Slab (From North)



Photo 1: General Condition of Timber Tie Deck



Photo 2: Typical Girders (South Side from East)



Photo 3: Typical Pier (West Side of Pier 1 Shown)



Photo 4: Typical Steel Bent Tower



Photo 5: Typical Steel Bent Tower Bearing and Pedestal



Photo 6: East Approach Trough Structure Behind East Abutment



Photo 1: General Condition of Timber Tie Deck



Photo 2: South Elevation



Photo 3: East Abutment



Photo 4: West Abutment



Photo 5: Typical Underside of Span



Photo 6: Typical Spalled Bridge Seat (Outside of Bearings)



Photo 1: General Condition of Timber Tie Deck



Photo 2: West Abutment



Photo 3: East Abutment



Photo 4: West Side of Pier



Photo 1: South Elevation



Photo 2: North Elevation



Photo 3: Through Culvert (From North)

Photo 4:



Photo 1: General Condition of Timber Tie Deck



Photo 2: South Elevation



Photo 3: East Abutment



Photo 4: West Abutment



Photo 5: Typical Underside of Span



Photo 6: Typical Beam



Photo 1: North Elevation



Photo 2: East Abutment Bridge Seat



Photo 3: West Abutment



Photo 4: Typical Underside of Span



Photo 5: East Side of Pier



Photo 6: West Side of Pier



Photo 1: Erosion/Washout at SW Corner of Structure



Photo 2: Erosion/Washout at SW Corner of Structure



Photo 3: Looking West Up Drainage Ditch at SW Corner of Structure



Photo 4: Piers (From SW)



Photo 5: Piers (From NW)



Photo 6: West Abutment

APPENDIX F

COST ESTIMATE



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/31/2023
CHK'D: JFS 08/31/2023

SUMMARY COST ESTIMATE

BRIDGE NO.	Description	PHASE 1 (1) Bridge Rehabilitation for Rail Service	PHASE 2 (2) Trail Construction	Total Cost
-	Mobilization and Demobilization (10%)	\$968,200.00	\$1,621,800.00	\$2,590,000.00
-	Erosion and Sedimentation Pollution Control (5%)	\$484,100.00	\$810,900.00	\$1,295,000.00
62.80	Single Span over UNT	\$314,200.00	\$0.00	\$314,200.00
63.90	Four Span over South Fork Run/Battlefield Road	\$709,500.00	\$772,500.00	\$1,482,000.00
65.40	Single Span over Snapps Run	\$144,900.00	\$100,000.00	\$244,900.00
66.70	Three Span over Highway 651	\$630,900.00	\$213,500.00	\$844,400.00
67.60	Twelve Span over Tom's Brook/Private Road	\$765,000.00	\$1,382,000.00	\$2,147,000.00
68.20	Single Span over Jordan Run	\$43,800.00	\$520,000.00	\$563,800.00
71.60	Twenty-two Span over Pugh's Run	\$1,400,000.00	\$1,213,700.00	\$2,613,700.00
74.00	Single Span over UNT	\$90,600.00	\$50,000.00	\$140,600.00
75.00	Single Span over UNT	\$175,500.00	\$247,050.00	\$422,550.00
76.40	Thirteen Span over Narrow Passage Run	\$1,310,400.00	\$3,473,500.00	\$4,783,900.00
78.60	Single Span over UNT	\$150,000.00	\$100,000.00	\$250,000.00
78.90	Seven Span over Big Stoney Creek	\$472,700.00	\$1,144,200.00	\$1,616,900.00
84.40	Single Span over UNT	\$168,000.00	\$247,050.00	\$415,050.00
84.50	Single Span over UNT	\$165,500.00	\$247,050.00	\$412,550.00
86.10	Single Span over Bank Street	\$473,400.00	\$369,500.00	\$842,900.00
86.20	Three Span over Mill Creek/Bryce Boulevard	\$413,000.00	\$1,034,000.00	\$1,447,000.00
87.80	Single Span over UNT	\$175,500.00	\$247,050.00	\$422,550.00
87.90	Single Span over UNT	\$170,400.00	\$132,650.00	\$303,050.00
89.80	Six Span over Holman's Creek	\$555,600.00	\$1,057,400.00	\$1,613,000.00
94.30	Seven Span over Unnamed Drainage Channel	\$280,550.00	\$855,900.00	\$1,136,450.00
94.35	Two Span over Unnamed Drainage Channel	\$135,600.00	\$356,600.00	\$492,200.00
95.40	Single Span over Unnamed Drainage Channel	\$11,175.00	\$190,000.00	\$201,175.00
95.71	Single Span over Unnamed Drainage Channel	\$78,000.00	\$269,300.00	\$347,300.00
97.36	Two Span over Honey Run Creek	\$284,000.00	\$1,029,000.00	\$1,313,000.00
97.60	Four Span over North Fork Shenandoah River	\$562,800.00	\$965,600.00	\$1,528,400.00
CONSTRUCTION SUB-TOTAL =		\$11,133,325	\$18,650,250	\$29,783,575.00
CONTINGENCY (25%) =		\$2,783,331	\$4,662,563	\$7,445,893.75
ESCALATION (3) =		\$2,999,126	\$12,853,011	\$15,852,137.73
CONSTRUCTION TOTAL =		\$16,915,783	\$36,165,824	\$53,081,606.48
ENGINEERING (DESIGN/PERMITTING/BIDDING) =		\$2,537,367	\$5,424,874	\$7,962,240.97
CONSTRUCTION ADMINISTRATION & INSPECTION =		\$1,691,578	\$3,616,582	\$5,308,160.65
TOTAL ENGINEERING AND CONSTRUCTION =		\$21,144,728	\$45,207,280	\$66,352,008.10

(1) Phase 1: Includes all work required to place railroad bridges back in service for railroad loading.

(2) Phase 2: Includes construction of trail at each bridge site as indicated here-in. This work will be done under normal operation of the railroad.

(3) Escalation: Includes escalation equal to 5% over 5 years for Phase 1 and 10 years for Phase 2.



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 62.80 - Single Span over UNT

Estimate = \$314,200.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Demolition of Existing Timber Superstructure	LS	LS	\$50,000.00	\$ 50,000.00
2	Repointing Stone Masonry Abutments	250	LF	\$50.00	\$ 12,500.00
3	Cement Concrete (3500 psi)	30	CY	\$5,000.00	\$ 150,000.00
4	Reinforcement Bars, Epoxy Coated	3,000	LB	\$3.00	\$ 9,000.00
5	Construct Standard Ballasted Track W/ New Rail & OTM	61	TF	\$700.00	\$ 42,700.00
6	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$50,000.00	\$ 50,000.00
				SUB-TOTAL =	\$ 314,200.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 63.90 - Four Span over South Fork Run/Battlefield Road

Estimate = \$1,482,000.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Epoxy Injection Crack Repair (Pier Cap Cracks)	500	LF	\$75.00	\$ 37,500.00
2	Replace Timber Tie Deck	262	TF	\$1,300.00	\$ 340,600.00
3	Graduated Timber Tie Approaches	65	TF	\$800.00	\$ 52,000.00
4	Demolition of East Approach Trough	LS	LS	\$50,000.00	\$ 50,000.00
5	Retaining Wall (Includes Fill Behind Walls)	1,080	SF	\$180.00	\$ 194,400.00
6	Construct Standard Ballasted Track w/ New Rail & OTM	50	TF	\$700.00	\$ 35,000.00
7	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$100,000.00	\$ 100,000.00
8	Reinforced Concrete Abutment for Trail	2	EA	\$150,000.00	\$ 300,000.00
9	Fabricated Structural Steel for Trail Superstructure	20,000	LB	\$7.00	\$ 140,000.00
10	Nail Laminated Timber Deck for Trail Superstructure	1,600	SF	\$50.00	\$ 80,000.00
11	Steel Railing System for Trail Superstructure	610	LF	\$250.00	\$ 152,500.00
				SUB-TOTAL =	\$ 1,482,000.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 65.40 - Single Span over UNT

Estimate = \$244,900.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Repoint Stone Masonry	1,000	LF	\$50.00	\$ 50,000.00
2	Cement Concrete (3,000 psi)	17	CY	\$5,000.00	\$ 85,000.00
3	Reinforcement Bars, Epoxy Coated	1,700	LB	\$3.00	\$ 5,100.00
4	R-8 Rock Lining	16	SY	\$300.00	\$ 4,800.00
5	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$100,000.00	\$ 100,000.00
				SUB-TOTAL =	\$ 244,900.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 66.70 - Three Span over Highway 651

Estimate = \$844,400.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Construct Standard Ballasted Track w/ New Rail & OTM	127	TF	\$700.00	\$ 88,900.00
2	Realign Track	1,000	TF	\$100.00	\$ 100,000.00
3	Waterproofing Membrane	410	SY	\$200.00	\$ 82,000.00
4	Retaining Wall (Includes Fill Behind Wall)	2,000	SF	\$180.00	\$ 360,000.00
5	Steel Railing System	654	LF	\$250.00	\$ 163,500.00
6	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$50,000.00	\$ 50,000.00
				SUB-TOTAL =	\$ 844,400.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 67.60 - Twelve Span over Tom's Brook/Private Road

Estimate = \$2,147,000.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Replace Timber Tie Deck	510	TF	\$1,300.00	\$ 663,000.00
2	Graduated Timber Tie Approaches	65	TF	\$800.00	\$ 52,000.00
3	Clearing and Grubbing Around Steel Bent Towers	1	LS	\$50,000.00	\$ 50,000.00
4	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$100,000.00	\$ 100,000.00
5	Reinforced Concrete Abutment for Trail	2	EA	\$300,000.00	\$ 600,000.00
6	Fabricated Structural Steel for Trail Superstructure	36,000	LB	\$7.00	\$ 252,000.00
7	Nail Laminated Timber Deck for Trail Superstructure	3,100	SF	\$50.00	\$ 155,000.00
8	Steel Railing System for Trail Superstructure	1,100	LF	\$250.00	\$ 275,000.00
				SUB-TOTAL =	\$ 2,147,000.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 68.20 - Single Span over Jordan Run

Estimate = \$563,800.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Replace Timber Tie Deck	20	TF	\$1,300.00	\$ 26,000.00
2	Cement Concrete (3000 psi)	1	CY	\$5,000.00	\$ 5,000.00
3	Reinforcement Bars, Epoxy Coated	100	LB	\$3.00	\$ 300.00
4	Repoint Stone Masonry	250	LF	\$50.00	\$ 12,500.00
5	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$75,000.00	\$ 75,000.00
6	Reinforced Concrete Abutment for Trail	2	EA	\$200,000.00	\$ 400,000.00
7	Fabricated Structural Steel for Trail Superstructure	1,000	LB	\$7.00	\$ 7,000.00
8	Nail Laminated Timber Deck for Trail Superstructure	160	SF	\$50.00	\$ 8,000.00
9	Steel Railing System for Trail Superstructure	120	LF	\$250.00	\$ 30,000.00
				SUB-TOTAL =	\$ 563,800.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 71.60 - Twenty-two Span over Pugh's Run

Estimate = \$2,613,700.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Replace Timber Tie Deck	380	TF	\$1,300.00	\$ 494,000.00
2	Graduated Timber Tie Approaches	65	TF	\$800.00	\$ 52,000.00
3	Clearing and Grubbing Around Steel Bent Towers	LS	LS	\$50,000.00	\$ 50,000.00
4	Retaining Wall (Includes Fill Behind Walls)	3,600	SF	\$180.00	\$ 648,000.00
5	Foreign Borrow Excavation (Material Below Walls)	1,000	CY	\$30.00	\$ 30,000.00
6	Construct Standard Ballasted Track w/ New Rail & OTM	180	TF	\$700.00	\$ 126,000.00
7	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$100,000.00	\$ 100,000.00
8	Reinforced Concrete Abutment for Trail	2	EA	\$300,000.00	\$ 600,000.00
9	Fabricated Structural Steel for Trail Superstructure	26,600	LB	\$7.00	\$ 186,200.00
10	Nail Laminated Timber Deck for Trail Superstructure	2,300	SF	\$50.00	\$ 115,000.00
11	Steel Railing System for Trail Superstructure	850	LF	\$250.00	\$ 212,500.00
				SUB-TOTAL =	\$ 2,613,700.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 74.00 - Single Span over UNT

Estimate = \$140,600.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Repoint Stone Masonry	1,000	LF	\$50.00	\$ 50,000.00
2	Cement Concrete (3000 PSI)	2	CY	\$5,000.00	\$ 10,000.00
3	Reinforcement Bars, Epoxy Coated	200	LB	\$3.00	\$ 600.00
4	Clearing and Grubbing Behind Headwalls and Wing Walls	LS	LS	\$30,000.00	\$ 30,000.00
5	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$50,000.00	\$ 50,000.00
				SUB-TOTAL =	\$ 140,600.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 75.00 - Single Span over UNT

Estimate = \$422,550.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Demolition of Existing Timber Slab	LS	LS	\$75,000.00	\$ 75,000.00
2	Clearing and Grubbing	LS	LS	\$20,000.00	\$ 20,000.00
3	Repoint Stone Masonry Abutments (RR Portion)	250	LF	\$50.00	\$ 12,500.00
4	Cement Concrete (RR Portion)	11	CY	\$2,000.00	\$ 22,000.00
5	Reinforcement Bar, Epoxy Coated (RR Portion)	1,100	LB	\$3.00	\$ 3,300.00
6	Construct Standard Ballasted Track W/ Existing Rail & OTM	61	TF	\$700.00	\$ 42,700.00
7	Cement Concrete (Trail Portion)	51	CY	\$2,000.00	\$ 102,000.00
8	Reinforcement Bar, Epoxy Coated (Trail Portion)	5,100	LB	\$3.00	\$ 15,300.00
9	Steel Railing System (Trail Portion)	211	LF	\$250.00	\$ 52,750.00
10	Class 3 Excavation (Trail Portion)	200	CY	\$50.00	\$ 10,000.00
11	No. 57 Coarse Aggregate (Trail Portion)	10	CY	\$100.00	\$ 1,000.00
12	Structural Backfill (Trail Portion)	160	CY	\$100.00	\$ 16,000.00
13	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$50,000.00	\$ 50,000.00
				SUB-TOTAL =	\$ 422,550.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 76.40 - Thirteen Span over Narrow Passage Run

Estimate = \$4,783,900.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Replace Timber Tie Deck	620	TF	\$1,300.00	\$ 806,000.00
2	Graduated Timber Tie Approaches	65	TF	\$800.00	\$ 52,000.00
3	Cement Concrete (3500 psi)	8	CY	\$5,000.00	\$ 40,000.00
4	Reinforcement Bars, Epoxy Coated	800	LB	\$3.00	\$ 2,400.00
5	Clearing and Grubbing Around Main Bridge Span Steel Bents	1	LS	\$100,000.00	\$ 100,000.00
6	Replace Footwalk & Railing	620	TF	\$500.00	\$ 310,000.00
7	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$250,000.00	\$ 250,000.00
8	Reinforced Concrete Abutment for Trail (Cantilever Superstructure Portion)	2	EA	\$300,000.00	\$ 600,000.00
9	Reinforced Concrete Abutment for Trail (Independent Superstructure Portion)	2	EA	\$100,000.00	\$ 200,000.00
10	Reinforced Concrete Piers for Trail (Independent Superstructure Portion)	8	EA	\$100,000.00	\$ 800,000.00
11	Fabricated Structural Steel for Trail Superstructure	50,500	LB	\$7.00	\$ 353,500.00
12	Nail Laminated Timber Deck for Trail Superstructure	9,400	SF	\$50.00	\$ 470,000.00
13	Steel Railing System for Trail Superstructure	3,200	LF	\$250.00	\$ 800,000.00
				SUB-TOTAL =	\$ 4,783,900.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 78.60 - Single Span over UNT

Estimate = \$250,000.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Repoint Stone Masonry	1,000	LF	\$50.00	\$ 50,000.00
2	Tree and Brush Removal Within 50' of Bridge	LS	LS	\$100,000.00	\$ 100,000.00
3	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$100,000.00	\$ 100,000.00
				SUB-TOTAL =	\$ 250,000.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 78.90 - Seven Span over Big Stoney Creek

Estimate = \$1,616,900.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Replace Timber Tie Deck	323	TF	\$1,300.00	\$ 419,900.00
2	Remove Debris from Channel	LS	LS	\$20,000.00	\$ 20,000.00
3	R-8 Rock Lining	26	SY	\$300.00	\$ 7,800.00
4	Clearing and Grubbing Around Steel Bent #1	LS	LS	\$25,000.00	\$ 25,000.00
5	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$100,000.00	\$ 100,000.00
6	Reinforced Concrete Abutment for Trail	2	EA	\$300,000.00	\$ 600,000.00
7	Fabricated Structural Steel for Trail Superstructure	23,100	LB	\$7.00	\$ 161,700.00
8	Nail Laminated Timber Deck for Trail Superstructure	2,000	SF	\$50.00	\$ 100,000.00
9	Steel Railing System for Trail Superstructure	730	LF	\$250.00	\$ 182,500.00
				SUB-TOTAL =	\$ 1,616,900.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 84.40 - Single Span over UNT

Estimate = \$15,300.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Demolition of Existing Timber Slab	LS	LS	\$75,000.00	\$ 75,000.00
2	Clearing and Grubbing	LS	LS	\$20,000.00	\$ 20,000.00
3	Repoint Stone Masonry Abutments (RR Portion)	100	LF	\$50.00	\$ 5,000.00
4	Cement Concrete (RR Portion)	11	CY	\$2,000.00	\$ 22,000.00
5	Reinforcement Bar, Epoxy Coated (RR Portion)	1,100	LB	\$3.00	\$ 3,300.00
6	Construct Standard Ballasted Track W/ Existing Rail & OTM	61	TF	\$700.00	\$ 42,700.00
7	Cement Concrete (Trail Portion)	51	CY	\$2,000.00	\$ 102,000.00
8	Reinforcement Bar, Epoxy Coated (Trail Portion)	5,100	LB	\$3.00	\$ 15,300.00
9	Steel Railing System (Trail Portion)	211	LF	\$250.00	\$ 52,750.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 84.50 - Single Span over UNT

Estimate = \$15,300.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Demolition of Existing Timber Slab	LS	LS	\$75,000.00	\$ 75,000.00
2	Clearing and Grubbing	LS	LS	\$20,000.00	\$ 20,000.00
3	Repoint Stone Masonry Abutments (RR Portion)	50	LF	\$50.00	\$ 2,500.00
4	Cement Concrete (RR Portion)	11	CY	\$2,000.00	\$ 22,000.00
5	Reinforcement Bar, Epoxy Coated (RR Portion)	1,100	LB	\$3.00	\$ 3,300.00
6	Construct Standard Ballasted Track W/ Existing Rail & OTM	61	TF	\$700.00	\$ 42,700.00
7	Cement Concrete (Trail Portion)	51	CY	\$2,000.00	\$ 102,000.00
8	Reinforcement Bar, Epoxy Coated (Trail Portion)	5,100	LB	\$3.00	\$ 15,300.00
9	Steel Railing System (Trail Portion)	211	LF	\$250.00	\$ 52,750.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 86.10 - Single Span over Bank Street

Estimate = \$842,900.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Replace Timber Tie Deck	21	LF	\$13,000.00	\$ 273,000.00
2	Graduated Timber Tie Approaches	65	TF	\$800.00	\$ 52,000.00
3	Cement Concrete	28	CY	\$5,000.00	\$ 140,000.00
4	Reinforcement Bars, Epoxy Coated	2,800	LB	\$3.00	\$ 8,400.00
5	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$25,000.00	\$ 25,000.00
6	Reinforced Concrete Abutment for Trail	2	EA	\$150,000.00	\$ 300,000.00
7	Fabricated Structural Steel for Trail Superstructure	500	LB	\$7.00	\$ 3,500.00
8	Nail Laminated Timber Deck for Trail Superstructure	170	SF	\$50.00	\$ 8,500.00
9	Steel Railing System for Trail Superstructure	130	LF	\$250.00	\$ 32,500.00
				SUB-TOTAL =	\$ 842,900.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 86.20 - Three Span over Mill Creek/Bryce Boulevard

Estimate = \$1,447,000.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Replace Timber Tie Deck	270	LF	\$1,300.00	\$ 351,000.00
2	Graduated Timber Tie Approaches	65	TF	\$800.00	\$ 52,000.00
3	Removal of Vegetation From Both Piers	LS	LS	\$10,000.00	\$ 10,000.00
4	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$50,000.00	\$ 50,000.00
5	Reinforced Concrete Abutment for Trail	2	EA	\$300,000.00	\$ 600,000.00
6	Fabricated Structural Steel for Trail Superstructure	19,500	LB	\$7.00	\$ 136,500.00
7	Nail Laminated Timber Deck for Trail Superstructure	1,700	SF	\$50.00	\$ 85,000.00
8	Steel Railing System for Trail Superstructure	650	LF	\$250.00	\$ 162,500.00
				SUB-TOTAL =	\$ 1,447,000.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 87.80 - Single Span over UNT

Estimate = \$15,300.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Demolition of Existing Timber Slab	LS	LS	\$75,000.00	\$ 75,000.00
2	Clearing and Grubbing	LS	LS	\$20,000.00	\$ 20,000.00
3	Repoint Stone Masonry Abutments (RR Portion)	250	LF	\$50.00	\$ 12,500.00
4	Cement Concrete (RR Portion)	11	CY	\$2,000.00	\$ 22,000.00
5	Reinforcement Bar, Epoxy Coated (RR Portion)	1,100	LB	\$3.00	\$ 3,300.00
6	Construct Standard Ballasted Track W/ Existing Rail & OTM	61	TF	\$700.00	\$ 42,700.00
7	Cement Concrete (Trail Portion)	51	CY	\$2,000.00	\$ 102,000.00
8	Reinforcement Bar, Epoxy Coated (Trail Portion)	5,100	LB	\$3.00	\$ 15,300.00
9	Steel Railing System (Trail Portion)	211	LF	\$250.00	\$ 52,750.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 87.90 - Single Span over UNT

Estimate = \$3,900.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Demolition of Existing Timber Slab Superstructure and Masonry Substructure	LS	LS	\$75,000.00	\$ 75,000.00
2	Clearing and Grubbing	LS	LS	\$20,000.00	\$ 20,000.00
3	Cement Concrete (RR Portion)	13	CY	\$2,000.00	\$ 26,000.00
4	Reinforcement Bar, Epoxy Coated (RR Portion)	1,300	LB	\$3.00	\$ 3,900.00
5	Construct Standard Ballasted Track W/ Existing Rail & OTM	65	TF	\$700.00	\$ 45,500.00
6	Cement Concrete (Trail Portion)	13	CY	\$2,000.00	\$ 26,000.00
7	Reinforcement Bar, Epoxy Coated (Trail Portion)	1,300	LB	\$3.00	\$ 3,900.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 89.80 - Six Span over Holman's Creek

Estimate = \$1,613,000.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Replace Timber Tie Deck	260	TF	\$1,300.00	\$ 338,000.00
2	Graduated Timber Tie Approaches	65	TF	\$800.00	\$ 52,000.00
3	Replacement Crossties	100	TF	\$400.00	\$ 40,000.00
4	Replacement Ballast Retainers	4	EA	\$10,000.00	\$ 40,000.00
5	Cement Concrete (3500 PSI)	2	CY	\$5,000.00	\$ 10,000.00
6	Reinforcement Bars, Epoxy Coated	200	LB	\$3.00	\$ 600.00
7	Clearing and Grubbing Around Steel Bents	LS	LS	\$75,000.00	\$ 75,000.00
8	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$100,000.00	\$ 100,000.00
9	Reinforced Concrete Abutment for Trail	2	EA	\$300,000.00	\$ 600,000.00
10	Fabricated Structural Steel for Trail Superstructure	18,200	LB	\$7.00	\$ 127,400.00
11	Nail Laminated Timber Deck for Trail Superstructure	1,600	SF	\$50.00	\$ 80,000.00
12	Steel Railing System for Trail Superstructure	600	LF	\$250.00	\$ 150,000.00
				SUB-TOTAL =	\$ 1,613,000.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 94.30 - Seven Span over Unnamed Drainage Crossing

Estimate = \$1,136,450.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Replace Timber Tie Deck	141	TF	\$1,300.00	\$ 183,300.00
2	Graduated Timber Tie Approaches	65	TF	\$800.00	\$ 52,000.00
3	Epoxy Injection Crack Repair	70	LF	\$75.00	\$ 5,250.00
4	Clearing and Grubbing Around/Under Spans	LS	LS	\$40,000.00	\$ 40,000.00
5	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LF	\$10,000.00	\$ 10,000.00
6	Reinforced Concrete Abutment for Trail	2	EA	\$100,000.00	\$ 200,000.00
7	Reinforced Concrete Piers for Trail	6	EA	\$75,000.00	\$ 450,000.00
8	Fabricated Structural Steel for Trail Superstructure	6,200	LB	\$7.00	\$ 43,400.00
9	Nail Laminated Timber Deck for Trail Superstructure	1,200	SF	\$50.00	\$ 60,000.00
10	Steel Railing System for Trail Superstructure	370	LF	\$250.00	\$ 92,500.00
				SUB-TOTAL =	\$ 1,136,450.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 94.35 - Two Span over Unnamed Drainage Crossing

Estimate = **\$492,200.00**

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Replace Timber Tie Deck	41	TF	\$1,300.00	\$ 53,300.00
2	Graduated Timber Tie Approaches	65	TF	\$800.00	\$ 52,000.00
3	Reinforced Concrete Repair at East Abutment	1	CY	\$5,000.00	\$ 5,000.00
4	Reinforcement Bars, Epoxy Coated	100	LB	\$3.00	\$ 300.00
5	Clearing and Grubbing Around/Under Spans	LS	LS	\$25,000.00	\$ 25,000.00
6	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$10,000.00	\$ 10,000.00
7	Reinforced Concrete Abutment for Trail	2	EA	\$100,000.00	\$ 200,000.00
8	Reinforced Concrete Piers for Trail	1	EA	\$75,000.00	\$ 75,000.00
9	Fabricated Structural Steel for Trail Superstructure	1,800	LB	\$7.00	\$ 12,600.00
10	Nail Laminated Timber Deck for Trail Superstructure	330	SF	\$50.00	\$ 16,500.00
11	Steel Railing System for Trail Superstructure	170	LF	\$250.00	\$ 42,500.00
				SUB-TOTAL =	\$ 492,200.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 95.40 - Single Span over Unnamed Drainage Crossing

Estimate = \$201,175.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Epoxy Injection Crack Repair (South Headwall)	5	LF	\$75.00	\$ 375.00
2	Special Concrete Repairs	27	SF	\$400.00	\$ 10,800.00
3	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$50,000.00	\$ 50,000.00
4	Precast Reinforced Concrete Box Culvert Extension for Trail	15	LF	\$6,000.00	\$ 90,000.00
5	Steel Railing System	200	LF	\$250.00	\$ 50,000.00
				SUB-TOTAL =	\$ 201,175.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 95.71 - Single Span over Unnamed Drainage Crossing

Estimate = **\$347,300.00**

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Replace Timber Tie Deck	20	TF	\$1,300.00	\$ 26,000.00
2	Graduated Timber Tie Approaches	65	TF	\$800.00	\$ 52,000.00
3	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$25,000.00	\$ 25,000.00
4	Reinforced Concrete Abutments for Trail	2	EA	\$100,000.00	\$ 200,000.00
5	Fabricated Structural Steel for Trail Superstructure	900	LB	\$7.00	\$ 6,300.00
6	Nail Laminated Timber Deck for Trail Superstructure	160	SF	\$50.00	\$ 8,000.00
7	Steel Railing System for Trail Superstructure	120	LF	\$250.00	\$ 30,000.00
				SUB-TOTAL =	\$ 347,300.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 97.36 - Two Span over Honey Run Creek

Estimate = \$1,313,000.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Replace Timber Tie Deck	90	TF	\$1,300.00	\$ 117,000.00
2	Graduated Timber Tie Approaches	65	TF	\$800.00	\$ 52,000.00
3	Clearing and Grubbing Around/Under Spans	LS	LS	\$40,000.00	\$ 40,000.00
4	Repoint Stone Masonry Abutments	500	LF	\$50.00	\$ 25,000.00
5	Demolition of Timber Approach Slabs	LS	LS	\$10,000.00	\$ 10,000.00
6	Replacement Ballast Retainers	4	EA	\$10,000.00	\$ 40,000.00
7	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$50,000.00	\$ 50,000.00
8	Reinforced Concrete Abutment for Trail	2	EA	\$200,000.00	\$ 400,000.00
9	Reinforced Concrete Piers for Trail	3	EA	\$150,000.00	\$ 450,000.00
10	Fabricated Structural Steel for Trail Superstructure	4,000	LB	\$7.00	\$ 28,000.00
11	Nail Laminated Timber Deck for Trail Superstructure	720	SF	\$50.00	\$ 36,000.00
12	Steel Railing System for Trail Superstructure	260	LF	\$250.00	\$ 65,000.00
				SUB-TOTAL =	\$ 1,313,000.00



Northern Shenandoah Valley Transportation
Preservation Corp.
Bridge Repair Cost Summary

Project No. 23-1502.101
BY: BRB 08/11/2023
CHK'D: RAD 08/11/2023

Bridge 97.60 - Four Span over North Fork Shenandoah River

Estimate = \$1,528,400.00

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Replace Timber Tie Deck	184	TF	\$1,300.00	\$ 239,200.00
2	Graduated Timber Tie Approaches	65	TF	\$800.00	\$ 52,000.00
2	Special Concrete Repairs	304	SF	\$400.00	\$ 121,600.00
3	Structural Backfill	800	CY	\$150.00	\$ 120,000.00
4	R-4 Rock Lining	200	SY	\$150.00	\$ 30,000.00
5	Temporary Access Road and Easements to Facilitate Construction of Trail	LS	LS	\$100,000.00	\$ 100,000.00
6	Reinforced Concrete Abutments for Trail	2	EA	\$300,000.00	\$ 600,000.00
7	Fabricated Structural Steel for Trail Superstructure	13,300	LB	\$7.00	\$ 93,100.00
8	Nail Laminated Timber Deck for Trail Superstructure	1,200	SF	\$50.00	\$ 60,000.00
9	Steel Railing System for Trail Superstructure	450	LF	\$250.00	\$ 112,500.00
				SUB-TOTAL =	\$ 1,528,400.00

APPENDIX G

MICHAEL BAKER INSPECTION REPORTS

Appendix G

Asset 9970

Date of Inspection: 05/10/2021

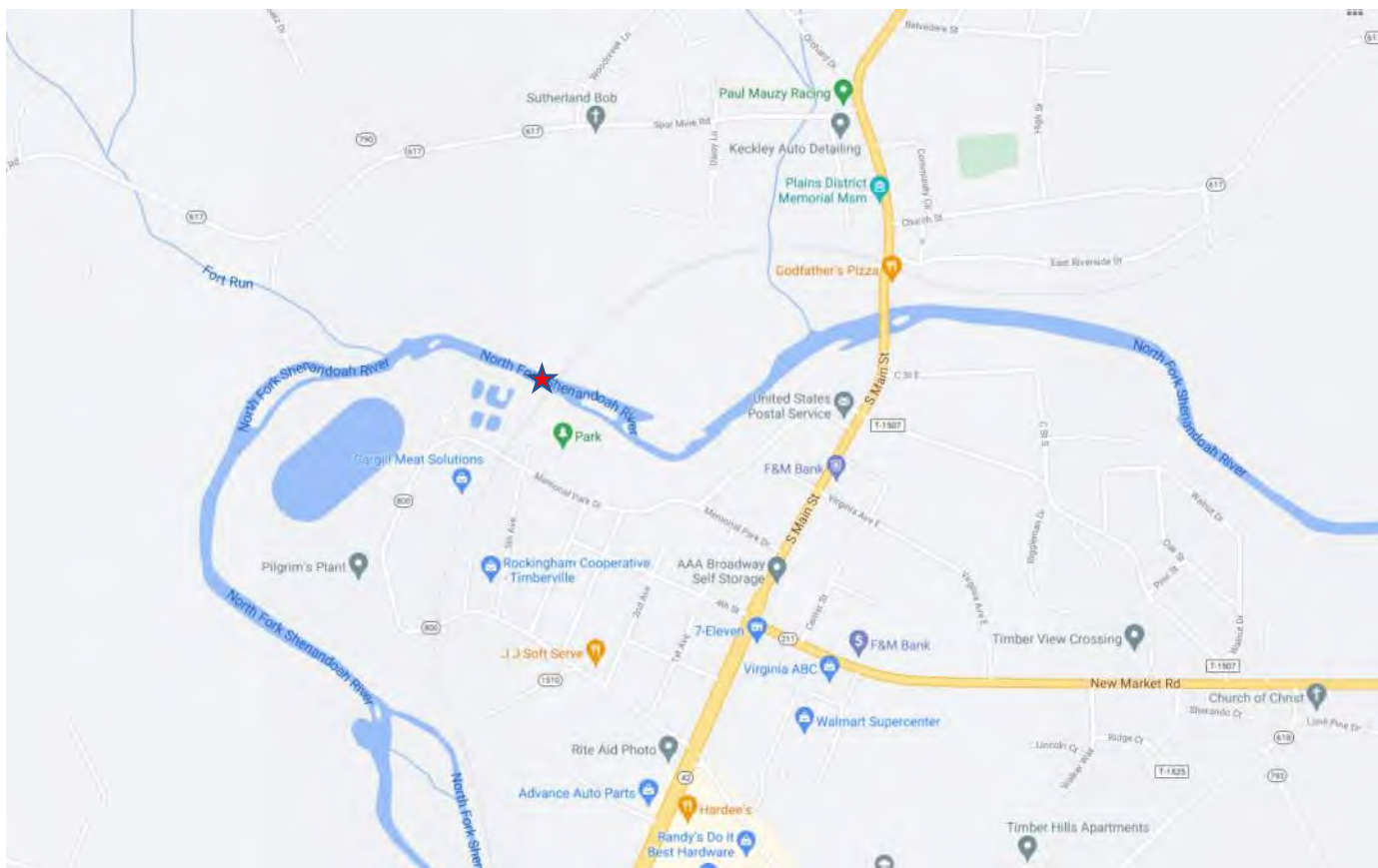


Asset 9970 over North Fork Shenandoah River
N 38° 38' 11.38", W 78° 46' 51.59"
Four Span Steel Girder Bridge, 184'-0"

Location Map

Asset 9970

Date of Inspection: 05/10/2021



Summary

Asset 9970	Date of Inspection:	05/10/2021
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Access

Asset 9970 over the North Fork Shenandoah River was reached from the Memorial Park Drive side. The bridge is about 0.09 miles from the at-grade crossing on Memorial Park Drive. At time of inspection there was minor vegetation growth along the path. The top of structure has deteriorated railroad ties and was not safe to cross. There was no access to Abutment B.

Details of structure

Asset 9970 is a four-span bridge with a total length of approximately 184'. The out-out width of the structure was measured at 10'-1". For labeling, Abutment A is on the south end of the bridge. Proceeding west to east girders are numbered G1-G2. Upstream is on the left (west) while looking from Abutment A to Abutment B.

The superstructure consists of two steel built-up girders with a total of five cross frames equally spaced in each span. Lateral bracing is also present and attached between each cross frame. Girders are spaced approximately 8'-0" apart on center. Member configuration consists of L-angles that make up girder flanges, plates that make up both the web and bottom and top flanges. Typical span length was measured to be 44' long. Field measured dimensions for girders: depth = 5'-0", flange width = 14", top and bottom cover plate thickness = 1/2", filler plate thickness = 3/4". Top of deck consists of timber railroad ties typically 12" wide x 12" high.

The substructure consists of two concrete abutments with stone elements and three wall concrete piers with caps and footings. Abutments have U-back wingwalls.

Summary of Conditions

The conditions of the timber railroad ties vary from highly deteriorated (with some missing) to mildly deteriorated. See Photos #1-#2.

In general, the steel superstructure elements are in good condition. Surface rust exists on all steel members. The superstructure exhibits trace evidence of paint with no protective value remaining. At time of inspection no measurable section loss was observed to members. See Photos #2-#3.

The concrete abutments are in fair condition with minor cracking, some with efflorescence. Top of abutments at bearing area have areas of delamination and spalling. The stone portions of the abutments are in fair condition with minor loss of mortar. Piers are in good/fair condition with minor cracking and some minor spalls. Top of footing exposed for all piers with an area of undermining under Pier 3.

Abutment A has spalling and delamination full width x up to 6' high x 3" deep. Area of erosion along downstream side of abutment measures 40' long x 35' wide x 6' deep. See Photos #4-#5.

Pier 1 is in good condition. Spall on upstream pier cap 4' long x 6" high x 2" deep. Top of footing is exposed up to 10". See Photo #6.

Pier 2 is in good condition. Map cracking is present on all faces; some with efflorescence. Top of footing is exposed up to 10". See Photo #7.

Pier 3 is in fair condition. Map cracking on faces; some with heavy efflorescence. Footing is exposed full height and width with undermining. See Photo #8.

Abutment B was not accessible at time of inspection. From Abutment A side, condition is like Abutment A. Spalling and delamination full width x up to 6' high x 3" deep.

Summary

Asset 9970	Date of Inspection:	05/10/2021
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Repair Recommendations

There were no significant structural deficiencies noted during this initial inspection. In our opinion the structure retains sufficient structural capacity to support service as a pedestrian/cycling bridge. An in-depth inspection and subsequent load rating would further inform these conclusions. Specific repair actions recommended include:

- Remove railroad ties and install new timber deck planks.
- Repair/seal cracks in abutments and piers and regrout stone portions of abutment.
- Repair spalls in abutments and piers.
- Install a suitable transition from the gravel railroad bed at both ends of the structure, including grade transitions and installation of a safety guardrail at the transition to the structure.
- Install a pedestrian railing that meets current safety standards.
- Preparation and painting of the entire superstructure is recommended.
- Repair erosion areas at both abutments.
- Repair erosion and undermining area at Pier 3.

Photos

Asset 9970

Date of Inspection: 05/10/2021



Photo #1

Looking north at top of structure toward Abutment B.

Deteriorated railroad ties throughout. Structure was not safe to cross.



Photo #2

Timber railroad ties exhibit minor to severe section loss.

Several timber railroad ties missing and severely deteriorated.

Photos

Asset 9970

Date of Inspection: 05/10/2021



Photo #3

Looking at structure from downstream end.

Typical girder configuration with failed protective coating with minor surface rust thought out.



Photo #4

Abutment A near downstream side.

Spall and delamination at top of abutment:
Full width x up to 6' high.

Photos

Asset 9970

Date of Inspection: 05/10/2021



Photo #5

Abutment A downstream side.

Area of erosion:
40' long x 35' wide x 6' high



Photo #6

Pier 1 upstream side.

Spall at top of pier:
4' long x 6" high x 2" deep

Photos

Asset 9970

Date of Inspection: 05/10/2021



Photo #7

Looking north at Pier 2.

Footing of pier is exposed up to 10".



Photo #8

Looking north at Pier 3.

Map cracking on faces; some with heavy efflorescence.

Footing is exposed full height and width with undermining

Appendix G

Asset 9736

Date of Inspection: 05/11/2021

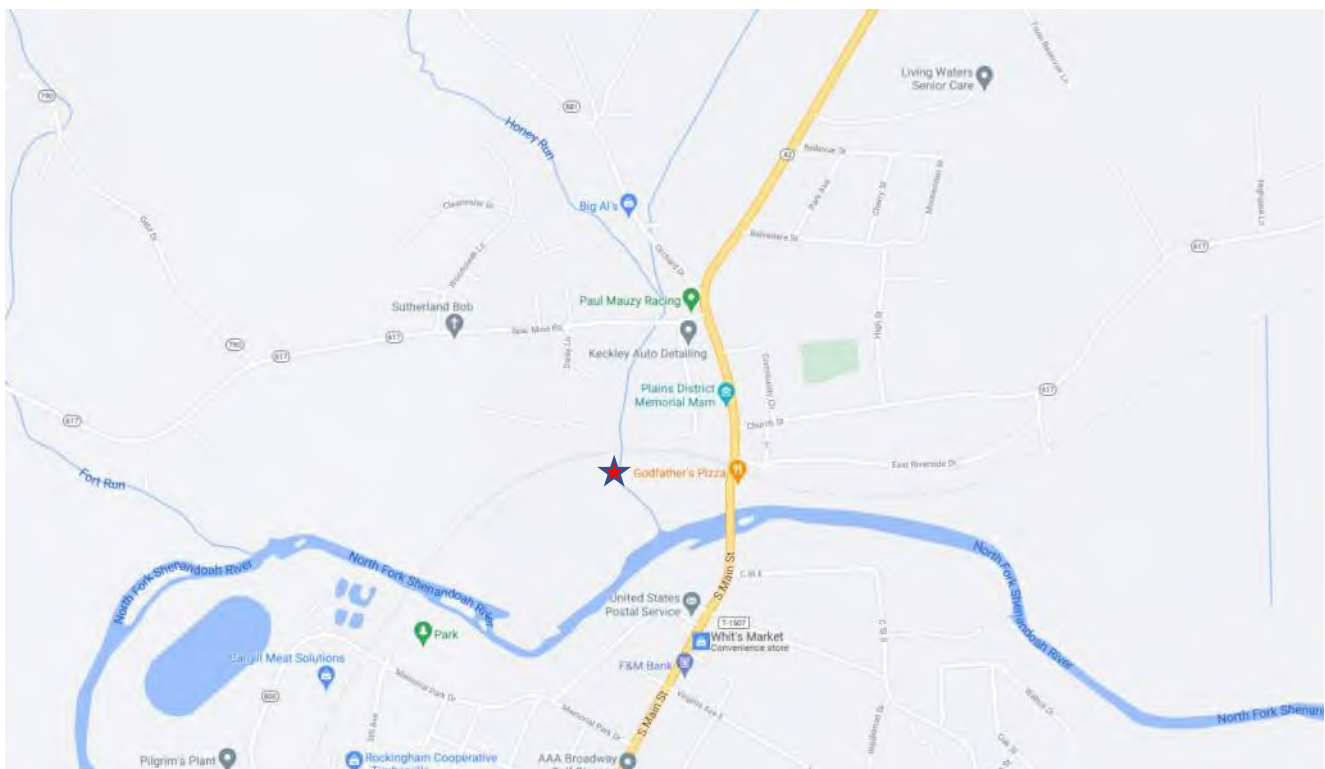


Asset 9736 over Honey Run Creek
N 38° 38' 20.06", W 78° 46' 33.80"
Two Span Steel Girder Bridge, 90'-0"

Location Map

Asset 9736

Date of Inspection: 05/11/2021



Summary

Asset 9736	Date of Inspection:	05/11/2021
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Access

Asset 9736 over the Honey Run Creek was reached from the North Main Street side. The bridge is about 0.12 miles from the at-grade crossing on North Main Street. At the time of inspection there was minor vegetation growth along path. Top of structure had deteriorated railroad ties and was unsafe to cross.

Details of Structure

Asset 9736 is a two-span bridge with a total span length of approximately 90'-0". The out-out width of the structure was measured at 10'-0". For labeling, Abutment A is on the west end of the bridge. Proceeding north to south girders are numbered G1-G2. Upstream is on the left (north) while looking from Abutment A to Abutment B.

The superstructure consists of two steel built-up girders with a total of five cross frames equally spaced in each span. Lateral bracing is also present and attached between each cross frame. Girders are spaced approximately 8'-0" apart on center. Member configuration consists of L-angles that make up girder flanges, plates that make up both the web and bottom and top flanges. Typical span length was measured to be 45' long. Field measured dimensions for girders: depth = 4'-8", flange width = 16.75", top and bottom cover plate thickness = 0.6" filler plate thickness = 0.6". Top of deck consist of timber railroad ties typically 12" wide x 12" high.

The substructure consists of two concrete abutments with stone elements and one wall pier with stone elements and a concrete cap and footing. Abutments have U-back wing walls.

Summary of Conditions

The conditions of the timber railroad ties vary from highly deteriorated (with some missing) to mildly deteriorated. See Photos #1 and #2.

In general, the steel superstructure elements are in good condition. Surface rust exists on all steel members. The superstructure exhibits a protective coating that is failing throughout. At the time of inspection, no measurable section loss was observed on members. Dense vegetation growth in Span 1 encroaching on structure. See Photo #3.

Abutment A is in fair condition with minor cracking, some with efflorescence and minor loss of mortar in the stone portion of the abutment. Spall on cap near G2, 4' long x 8" high x 6" deep x 5' wide. Areas of erosion and undermining are present behind the abutment at the approach slab (longitudinal railroad ties) on both the upstream and downstream sides. The area on the upstream side is 7' long x 3' wide x 10' high, and on the downstream side is 7' long x 10' wide x 3.5' high. See Photos #4-#6.

Pier 1 is in good condition with minor cracking and some minor spalls. Top of footing is exposed up to 3' high on Span 2 side. On Span 1 side two stone blocks are missing. See Photo #7.

Abutment B is in fair condition with minor cracking, some with efflorescence and minor loss of mortar in the stone portion of the abutment. On the upstream side there is a spall on top 5.5' long x 10" high x 6" deep x 5' wide. On the downstream side there are spalls 4' long x 9" high x 6" deep, 8" wide x 6" deep x 10" high and 1' long x 1' wide x 1" deep. Some mortar is missing between the stones. The area of erosion and undermining present behind the abutment is up to the full width 21.8' long x 3.75' wide x 17" high. See Photos #8-#10.

Summary

Asset 9736

Date of Inspection: 05/11/2021

Repair Recommendations

There were no significant structural deficiencies noted during this initial inspection. In our opinion the structure retains sufficient structural capacity to support service as a pedestrian/cycling bridge. An in-depth inspection and subsequent load rating would further inform these conclusions. Specific repair actions recommended include:

- Remove railroad ties and install new timber deck planks.
- Perform detailed site assessment and repair/seal any cracks found in abutments and piers and re-grout stone portions of abutments and pier as needed.
- Repair spalls in abutments and pier.
- Install a suitable transition from the gravel railroad bed at both ends of the structure, including grade transitions and installation of a safety guardrail at the transition to the structure.
- Install a pedestrian railing that meets current safety standards.
- Preparation and painting of the entire superstructure is recommended.
- Repair erosion areas and undermining at both abutments.

Photos

Asset 9736

Date of Inspection: 05/11/2021



Photo #1

Looking east at top of structure
toward Abutment B.



Photo #2

Looking at typical view of
superstructure in Span 2.

Photos

Asset 9736

Date of Inspection: 05/11/2021



Photo #3

Looking at downstream side of Span 1.

Dense vegetation growth in span encroaching structure.



Photo #4

Looking at Abutment A.

Area of erosion on upstream side
7' long x 3' wide x 10' high.

Area of spall:
4' long x 8" high x 6" deep x 5'
wide.

Photos

Asset 9736

Date of Inspection: 05/11/2021



Photo #5

Abutment A upstream side.

Behind abutment at approach slab (longitudinal railroad ties) area of erosion and undermining on both the upstream and downstream sides.

Area of erosion:
7' long x 3' wide x 10' high.



Photo #6

Abutment A downstream side.

Behind abutment at approach slab (longitudinal railroads ties) area of erosion and undermining on both the upstream and downstream sides.

Area of erosion:
7' long x 10' long x 3.5' high.

Photos

Asset 9736

Date of Inspection: 05/11/2021



Photo #7

Looking at Pier 1 on Span 2 side.

Top of footing is exposed up to 3' high.



Photo #8

Looking at Abutment B.

Some mortar missing between stones.

Photos

Asset 9736

Date of Inspection: 05/11/2021



Photo #9

Abutment B at approach ties
behind abutment.

Area of erosion:
21.8' long x 3.75' wide x 17" high.
Undermined full width



Photo #10

Looking at Abutment B top of
pedestal downstream side.

Area of spall:
4' long x 9" high x 6" deep.

Appendix G

Asset 9571

Date of Inspection: 05/11/2021

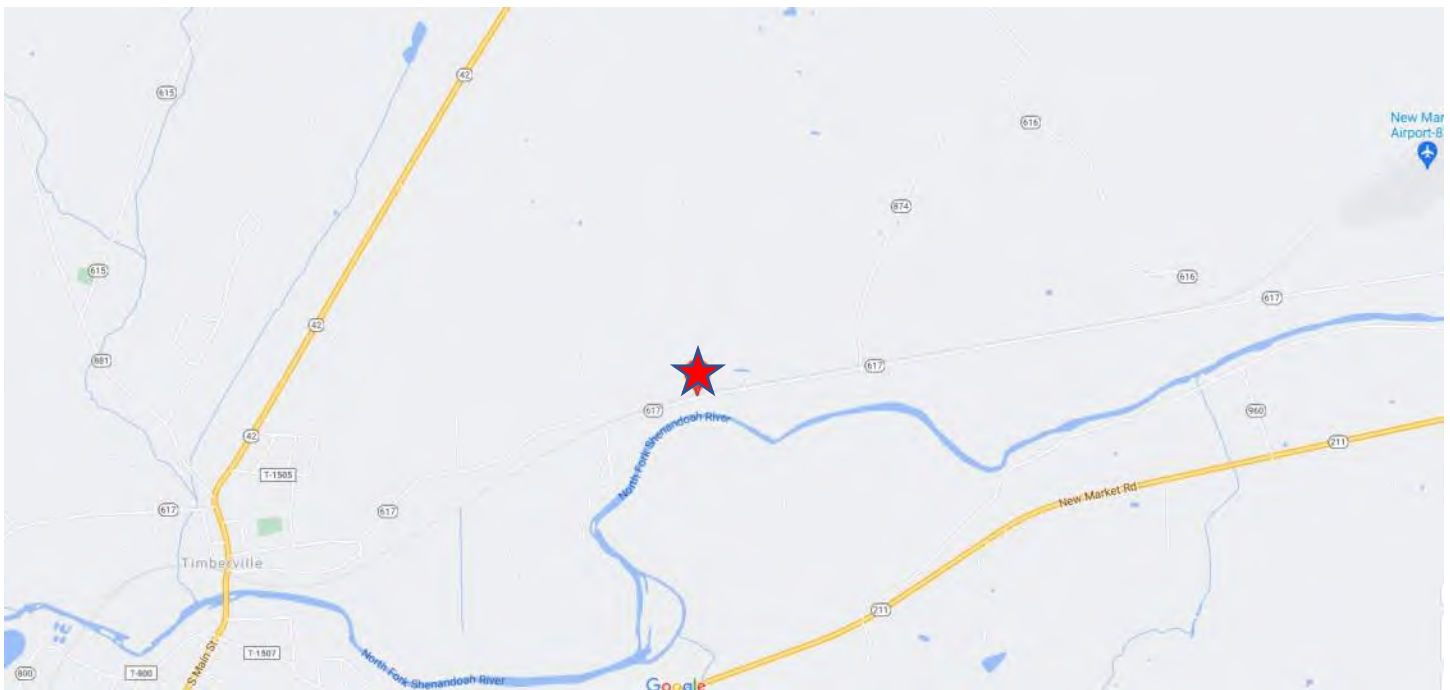


Asset 9571 over Unnamed Drainage Crossing
N 38° 38' 45.65", W 78° 44' 54.96"
Single Span Steel Girder Bridge, 19'-8"

Location Map

Asset 9571

Date of Inspection: 05/11/2021



Summary

Asset 9571	Date of Inspection:	05/11/2021
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Access

Asset 9571 over unnamed drainage way was reached from Evergreen Valley Road. The bridge is about 0.28 miles from Neighbors Lane. Structure was easily accessed from the roadway shoulder. Top of structure has deteriorated rail ties. Was able to access other side by crossing underneath.

Details of Structure

Asset 9571 is a single span bridge with a total length of approximately 19'-8". The out-to-out of the structure was measured at 10'-0". For labeling, Abutment A is on the west end of the bridge and Abutment B is on the east end of the bridge. Proceeding north to south girders are numbered G1-G4. Upstream is on the left (North) while looking from Abutment A to Abutment B.

The superstructure spans consist of four steel girders with four diaphragms equally spaced in each girder bay. Girders G1 and G2 are spaced 12.75' on center with vertical channel section diaphragms. Girders G3 and G4 mirror G1 and G2. Girders G2 and G3 are spaced 3.89' on center. The diaphragms between these girders are horizontal channel sections attached to the girder webs using angles. Lateral bracing is present between G2 and G3 and is attached to each diaphragm. Field measured dimensions for girders: depth = 24", flange width = 7.25". The top of deck consists of timber rail ties typically 12" wide x 12" high.

The substructure consists of two concrete abutments. Abutments have elephant ear wingwalls.

Summary of Conditions

The conditions of the timber railroad ties are mildly deteriorated. See Photo #1.

In general, the steel superstructure elements are in good condition. Surface rust exists on all steel members. The superstructure exhibits a protective coating that is failing throughout. At the time of inspection, no measurable section loss was observed to members. There is mild vegetation growth in span encroaching on structure. See Photos #2-#3.

The concrete abutments are in good condition with minor cracking. Both abutment bearing seats have debris and stones on pedestals. Top of abutments at bearing area are in good condition with minor spalls at both abutments.

Abutment A is in good condition. Spall near G1 on upstream side 3" long x 3" wide x 2" deep. See Photo #4.

Abutment B is in good condition. Spall near G1 on upstream side 3" long x 3" wide x 2" deep. See Photo #5.

Repair Recommendations

There were no significant structural deficiencies noted during this initial inspection. In our opinion the structure retains sufficient structural capacity to support service as a pedestrian/cycling bridge. An in-depth inspection and subsequent load rating would further inform these conclusions. Specific repair actions recommended include:

- Remove railroad ties and install new timber deck planks.
- Repair/seal cracks in abutments.
- Repair spalls in abutments.
- Install a suitable transition from the gravel railroad bed at both ends of the structure, including grade transitions and installation of a safety guardrail at the transition to the structure.
- Install a pedestrian railing that meets current safety standards.
- Preparation and painting of the entire superstructure is recommended.
- Clean bearing areas.

Photos

Asset 9571

Date of Inspection: 05/11/2021



Photo #1

Looking west toward Abutment A.



Photo #2

Looking at typical view of
superstructure toward Abutment B.Superstructure exhibits surface
rust with failed protective coating.

Photos

Asset 9571

Date of Inspection: 05/11/2021



Photo #3

Looking at G3 and G4

Mild vegetation growth
encroaching beams.

Beams exhibit surface rust with no
measurable section loss.



Photo #4

Looking at Abutment A.

Upstream end near G1.

Spall 3" long x 3" wide x 2" deep.

Top of abutment seat covered in
debris and erosion stones.

Photos

Asset 9571

Date of Inspection: 05/11/2021



Photo #5

Looking at Abutment B.

Upstream end near G1.

Spall 3" long x 3" wide x 2" deep.

Top of abutment seat covered in debris and erosion stones.



Photo #6

Typical downstream elevation.

Appendix G

Asset 9540

Date of Inspection: 05/11/2021

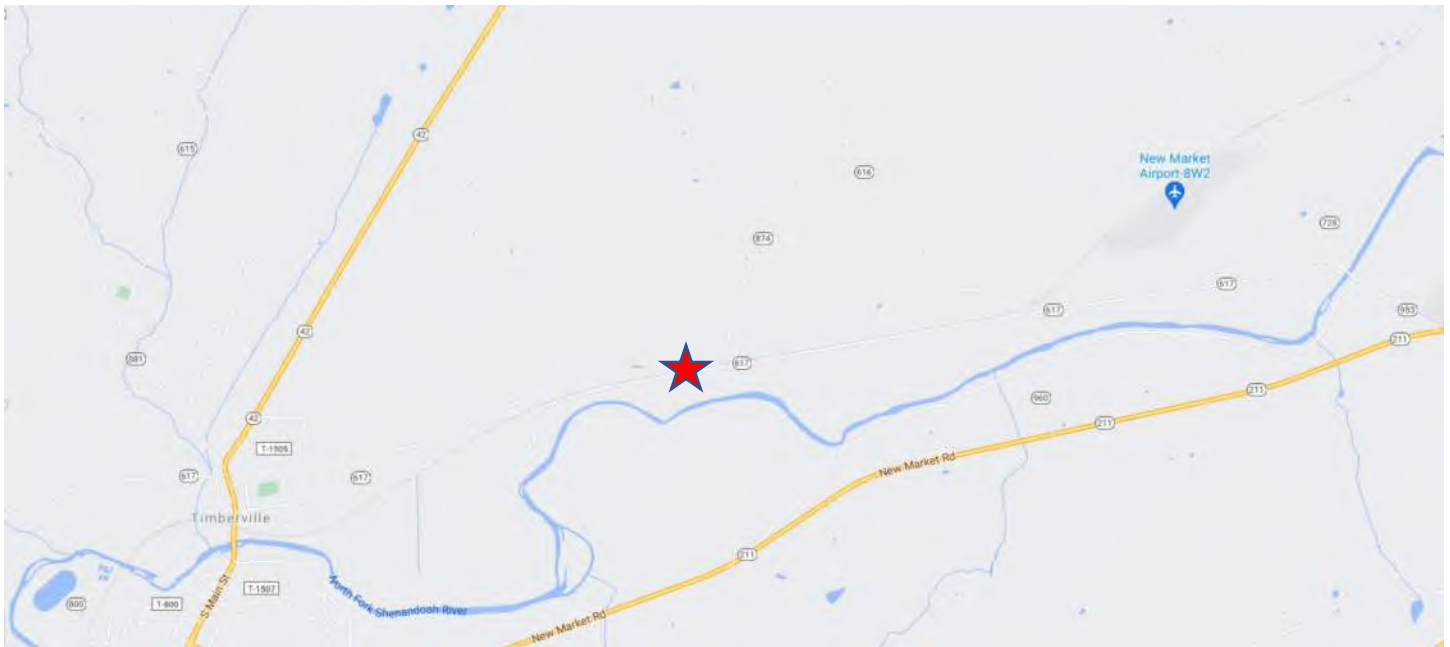


Asset 9540 over Unnamed Drainage Crossing
N 38° 38' 48.52", W 78° 44' 34.44"
Single Barrel Concrete Culvert, 41'-0"

Location Map

Asset 9540

Date of Inspection: 05/11/2021



Summary

Asset 9540	Date of Inspection:	05/11/2021
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Access

Asset 9540 over an unnamed drainage way was reached from Evergreen Valley Road. The culvert is about 0.17 miles west of Lohr Lane. The structure was easily accessed from the roadway shoulder.

Details of Structure

Asset 9540 is a single barrel concrete culvert with an out-out width of approximately 41'-0". The barrel opening was measured at 12'-0".

The culvert consists of one concrete barrel with 18' long concrete headwalls and concrete wingwalls.

Summary of Conditions

The condition of the timber railroad ties is mildly deteriorated. See Photo #1.

Water and vegetation growth are present throughout the barrel and at the ends. See Photo #5.

Headwalls are in fair condition. The downstream headwall has a spall 5' long x 1.5' high x up to 10" deep and cracking 4' long x 1/16" wide. The upstream headwall has a spall 5' long x 9.5" high x 3" deep on. See Photos #2-#4.

The barrel is in good condition. There are hairline full height vertical cracks throughout. See Photo #5.

Wingwalls are in fair condition with minor spalling and cracking. The downstream southeast wingwall has a spall 6" high x 3" wide x 2" deep. The spall on the upstream side of the northeast wingwall measured 6" long x 5" wide x 1" deep. See Photo #6.

Repair Recommendations

There were no significant structural deficiencies noted during this initial inspection. In our opinion the structure retains sufficient structural capacity to support service as a pedestrian/cycling trail. An in-depth inspection and subsequent load rating would further inform these conclusions. Specific repair actions recommended include.

- Remove railroad ties.
- Repair/seal cracks in wingwalls and barrel.
- Repair spalls in wingwalls and headwalls.
- Install a pedestrian railing integrated into the existing culvert along the opening that meets current safety standards.

Photos

Asset 9540

Date of Inspection: 05/11/2021



Photo #1

Top of rail above culvert.

Timber rails are mildly deteriorated.



Photo #2

Downstream headwall at southwest corner.

Area of spall:
5' long x 1.5' high x up to 10" deep

Photos

Asset 9540

Date of Inspection: 05/11/2021



Photo #3

Upstream headwall

Area of spall:
5' long x 9.5" high x 14" wide x 3"
deep



Photo #4

Downstream headwall

Southeast corner cracking:
4' long x 1/16" wide

Photos

Asset 9540

Date of Inspection: 05/11/2021

Photo #5

Looking into barrel from downstream end.

Vegetation growth at front of barrel.

Inside barrel full height hairline vertical cracks in random locations.



Photo #6

Southeast wingwall on downstream end.

Area of spall:
6" high x 3" wide x 2" deep



Appendix G

Asset 9435

Date of Inspection:

05/11/2021

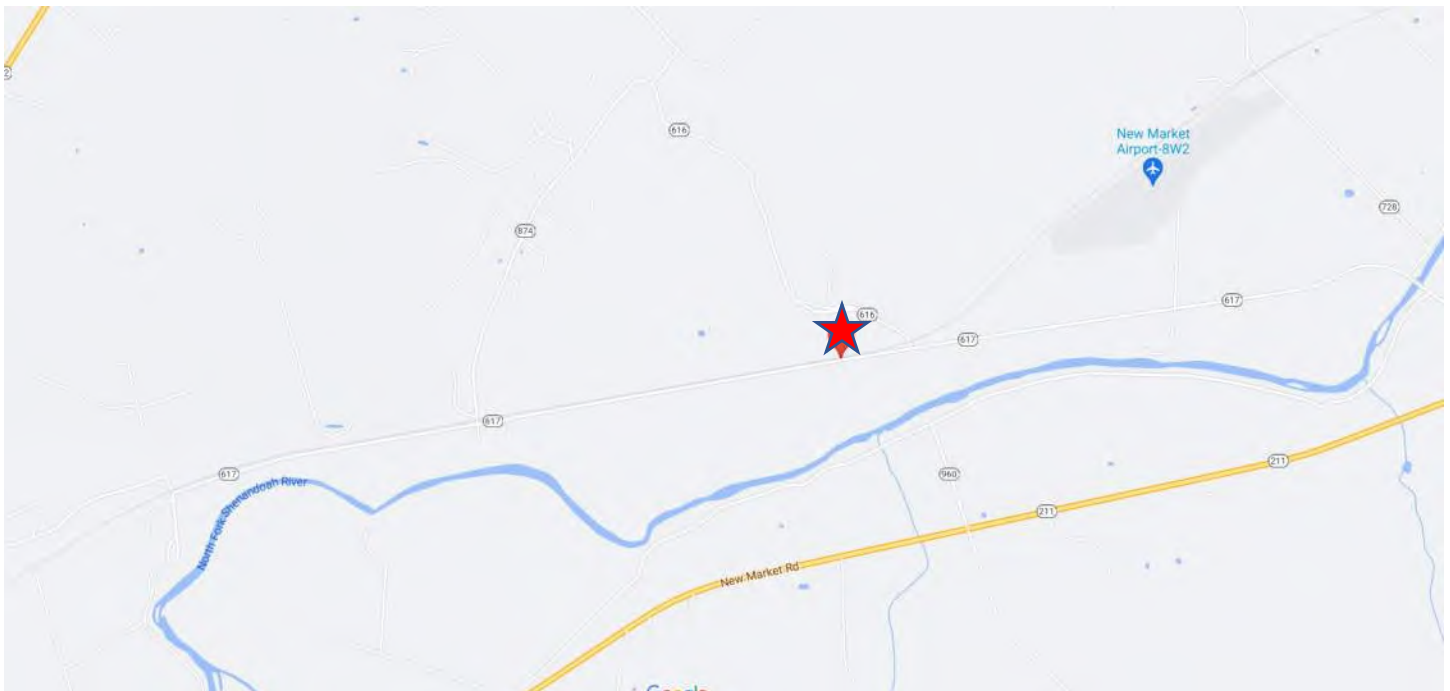


Asset 9435 over Unnamed Drainage Crossing
N 38° 38' 57.98", W 78° 43' 25.06"
Two Span Steel Double Girder Unit Bridge, 40'-4"

Location Map

Asset 9435

Date of Inspection: 05/11/2021



Summary

Asset 9435	Date of Inspection:	05/11/2021
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Access

Asset 9435 over unnamed drainage way was reached from Evergreen Valley Road. The bridge is about 0.17 miles from the at-grade crossing at Ridge Road. At time of inspection there was minor vegetation growth along path.

Details of structure

Asset 9435 is a two-span steel multi-girder bridge with a total length of approximately 40'-4". The out-to-out width of the structure was measured at 11'-0". For labeling, Abutment A is on the west end of the bridge. Proceeding north to south girders are numbered G1-G4. Upstream is on the left (north) while looking from Abutment A to Abutment B. Top of structure has deteriorated railroad ties.

The superstructure consists of four steel I-girders with a total of four cross frames equally spaced in each span. Lateral bracing is also present and attached between each cross frame. Girders are spaced approximately 1'-0" apart on center between Girders G1 & G2 and Girders G3 & G4, Girders G2 and G3 are spaced approximately 4'-0" on center. Typical span length was measured to be 20'-2" long. Field measured dimensions for girders are depth = 24" and flange width = 7.5". Flange and web thickness were both measured at 0.5" thick. The deck consists of timber railroad ties typically 12" wide x 12" high.

The substructure consists of two concrete abutments with stone elements and one concrete wall pier with caps and footing. Abutments have elephant ear wingwalls.

Summary of Conditions

The conditions of the timber railroad ties vary from highly deteriorated (with some missing) to mildly deteriorated. See Photo #1.

In general, the condition of the steel superstructure elements is in good condition. Surface rust exists on all steel members. The superstructure exhibits trace evidence of paint with no protective value remaining. At time of inspection no measurable section loss was observed to members. See Photos #2-#3.

The concrete abutments are in fair condition with minor cracking, some with efflorescence. Abutment A has minor cracking at both wingwalls. There is also accumulation of debris on top of the bearing seat. Abutment B has spalling and delamination full width x up to 6' high x 3" deep. See Photos #5-#6. Stone portions of the abutments are in fair condition with minor loss of mortar. The pier is in fair condition with minor cracking and some minor spalls. Accumulation of debris on upstream side of the pier is present. See Photo #4.

Repair Recommendations

There were no significant structural deficiencies noted during this initial inspection. In our opinion the structure retains sufficient structural capacity to support service as a pedestrian/cycling bridge. An in-depth inspection and subsequent load rating would further inform these conclusions. Specific repair actions recommended include:

- Remove railroad ties and install new timber deck planks.
- Repair/seal cracks in abutments and pier and regrout stone portions of abutment.
- Repair spalls in abutments.
- Install a suitable transition from the gravel railroad bed at both ends of the structure, including grade transitions and installation of a safety guardrail at the transition to the structure.
- Install a pedestrian railing that meets current safety standards.
- Clean and paint superstructure.

Photos

Asset 9435

Date of Inspection: 05/11/2021



Photo #1

Looking west at top of structure toward Abutment A.

Timber railroad ties deteriorated.



Photo #2

Span 1, double girder unit G1 and G2 at Abutment A.

Surface rust on girders and superstructure elements with failed coating.

Photos

Asset 9435

Date of Inspection: 05/11/2021



Photo #3

Span 1, Girder G4 at Abutment A.

Surface rust on girders and superstructure elements with failed coating.

Accumulation of debris on bearing seat.



Photo #4

Looking at Pier on upstream side.

Accumulation of debris on upstream side.

Photos

Asset 9435

Date of Inspection: 05/11/2021



Photo #5

Abutment B upstream side.

Concrete spall:
2' long x 1' high x 2" deep.



Photo #6

Abutment B.

Concrete spall:
7.5' long x 1' wide x 1.5" deep.

Stone elements have mortar loss
throughout.

Appendix G

Asset 9430

Date of Inspection:

05/11/2021

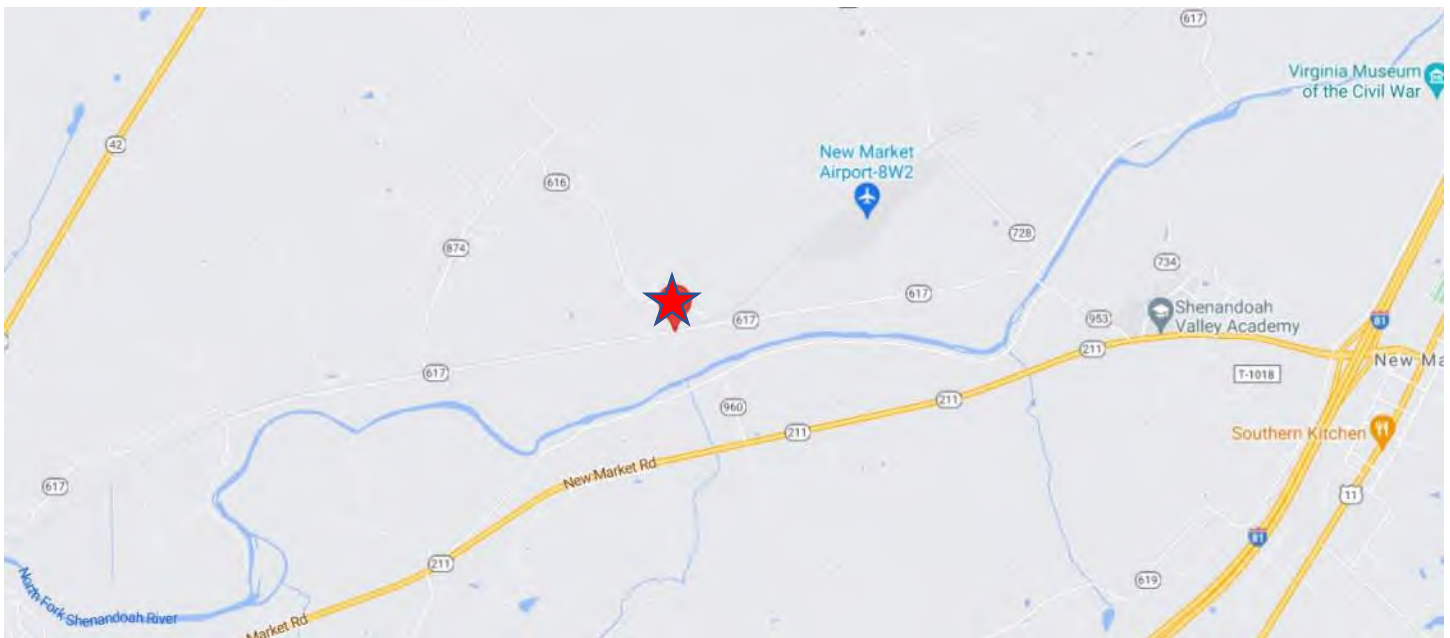


Asset 9430 over Unnamed Drainage Crossing
N 38° 38' 58.39", W 78° 43' 22.10"
Seven Span Steel Double Girder Unit Bridge, 140'-4"

Location Map

Asset 9430

Date of Inspection: 05/11/2021



Summary

Asset 9430

Date of Inspection: 05/11/2021

Access

Asset 9430 over unnamed drainage way was reached from Evergreen Valley Road. The bridge is about 0.12 miles from the at-grade crossing at Ridge Road. At time of inspection there was minor vegetation growth along the path.

Details of Structure

Asset 9430 is a seven-span steel multi-girder bridge with a total length of approximately 140'-4". The out-to-out width of the structure was measured at 10'-0". For labeling, Abutment A is on the west end of the bridge. Proceeding north to south girders are numbered G1-G4. Upstream is on the left (north) while looking from Abutment A to Abutment B. Top of structure has deteriorated railroad ties.

The superstructure consists of four steel I-girders with a total of four cross frames equally spaced in each span. Lateral bracing is also present and attached between each cross frame. Girders are spaced approximately 1'-0" apart on center between Girders G1 & G2 and G3 & G4, Girders G2 and G3 are spaced approximately 4'-0" on center. Typical span length was measured to be 20'-2" long. Field measured dimensions for girders are depth = 24" and flange width = 7.5". Flange and web thickness was measured at 0.5" thick. The deck consists of timber railroad ties typically 12" wide x 12" high.

The substructure consists of two concrete abutments with stone elements and six concrete wall piers with stone elements with concrete caps and footing. Abutments have elephant ear wingwalls.

Summary of Conditions

The conditions of the timber railroad ties vary from highly deteriorated (with some missing) to mildly deteriorated. See Photo #1.

In general, the steel superstructure elements are in good condition. Surface rust exists on all steel members. The superstructure exhibits trace evidence of paint with no protective value remaining. At time of inspection no measurable section loss was observed to members. See Photos #2-#3.

The concrete abutments are in fair condition with minor cracking, some with efflorescence. Stone portions of the abutments are in fair condition with minor loss of mortar. Piers are in fair condition with minor cracking and some minor spalls. Wingwalls exhibit hairline to 1/16" wide map cracking with efflorescence throughout.

Abutment A is in fair condition. There is map cracking in both wingwalls with efflorescence. Accumulation of debris on top of bearing seat. See Photo #3.

Piers are in fair condition. Spalls typical at all piers, see the following table for locations and size:

Pier	Locations	Defect
1	Span 1 side under G1 & G2	Spall 18" long x 9" wide x 1" deep
1	Span 2 under G1 & G2	Spall 3' long x 14" wide x 1" deep
2	Span 2 under G1 & G2	Longitudinal crack 12" long x 1/16" wide
2	Upstream end of cap	Map cracking up to 1/4" wide
3	Span 3 under G1 & G2	Spall 4'-7" long x 5" wide x 1/2" deep
3	Span 4 under G1 & G2	Spall 7' long x 9" high x 2" deep (See Photo #4)
4	Span 4 under G1 & G2	Missing stone (See Photo #5)
4	Upstream end of Cap	Spall/Delam 3' long x 1' wide x 1" deep
5	Downstream end of Cap	Spall 18" long x 6" wide x 1/2" deep
6	Span 6 face	Longitudinal crack full height x up to 1/16" wide
6	Span 7 face	3-Longitudinal cracks full height x up to 1/4" wide

Abutment B is in fair condition. There is map cracking with effloresce on upstream wingwall. See Photo #6.

Summary

Asset 9430

Date of Inspection: 05/11/2021

Repair Recommendations

There were no significant structural deficiencies noted during this initial inspection. In our opinion the structure retains sufficient structural capacity to support service as a pedestrian/cycling bridge. An in-depth inspection and subsequent load rating would further inform these conclusions. Specific repair actions recommended include:

- Remove railroad ties and install new timber deck planks.
- Repair/seal cracks in abutments and piers and regrout stone portions of abutment.
- Repair spalls in piers.
- Install a suitable transition from the gravel railroad bed at both ends of the structure, including grade transitions and installation of a safety guardrail at the transition to the structure.
- Install a pedestrian railing that meets current safety standards.
- Clean and paint superstructure.

Photos

Asset 9430

Date of Inspection: 05/11/2021



Photo #1

Looking west at top of structure toward Abutment A.

Timber railroad ties deteriorated.



Photo #2

Span 1, between Girders G2 and G3.

Surface rust on girders and superstructure elements with failed coating.

Photos

Asset 9430

Date of Inspection: 05/11/2021



Photo #3

Span 1, Girder G1 at Abutment A.

Surface rust on girders and superstructure elements with failed coating.

Accumulation of debris on bearing seat.



Photo #4

Pier 3, Span 4, under Girder G1 and Girder G2.

Concrete spall:
7' long x 9' high x 2' deep.

Photos

Asset 9430

Date of Inspection: 05/11/2021



Photo #5

Pier 4, Span 4 under G1 & G2.

One missing stone on pier face.



Photo #6

Abutment B upstream wingwall.

Area of map cracking with efflorescence throughout.

Appendix G

Asset 8984

Date of Inspection: 05/12/2021



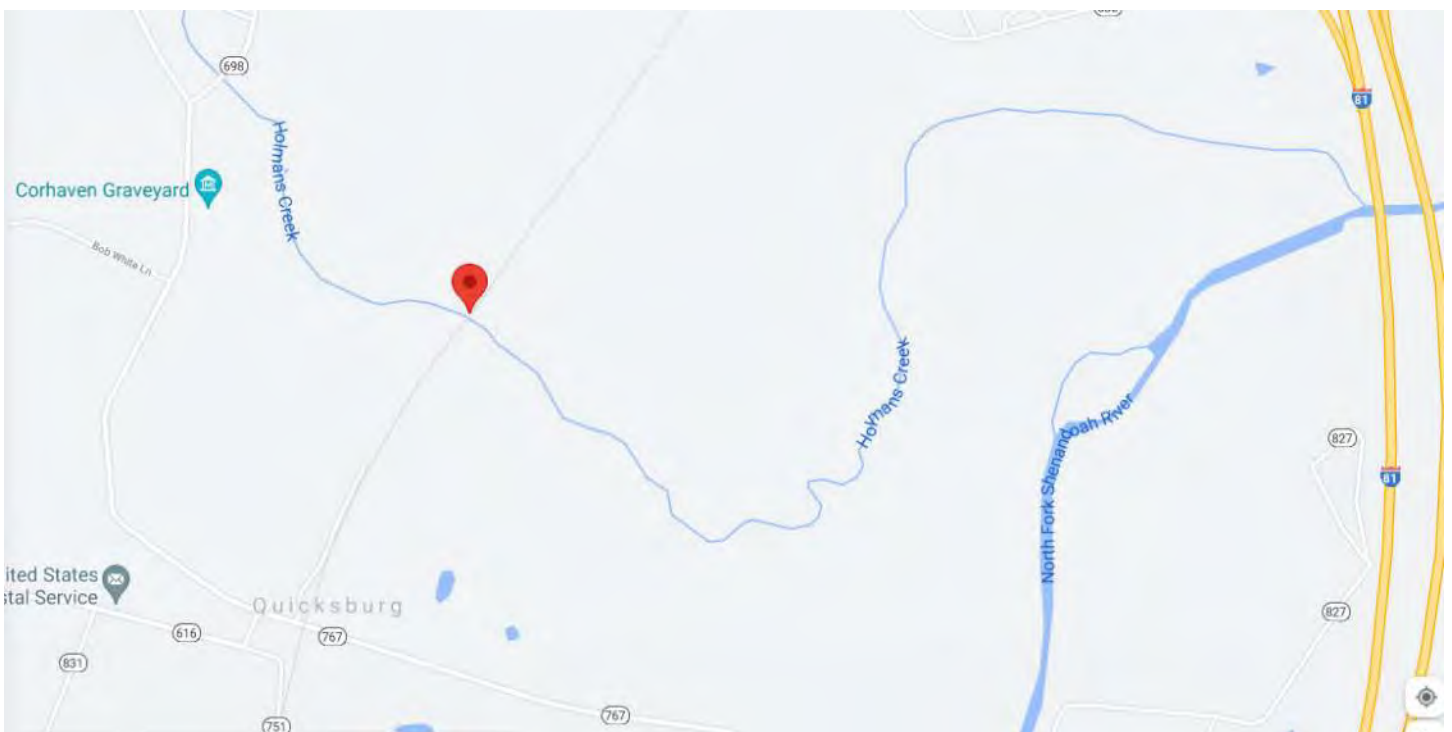
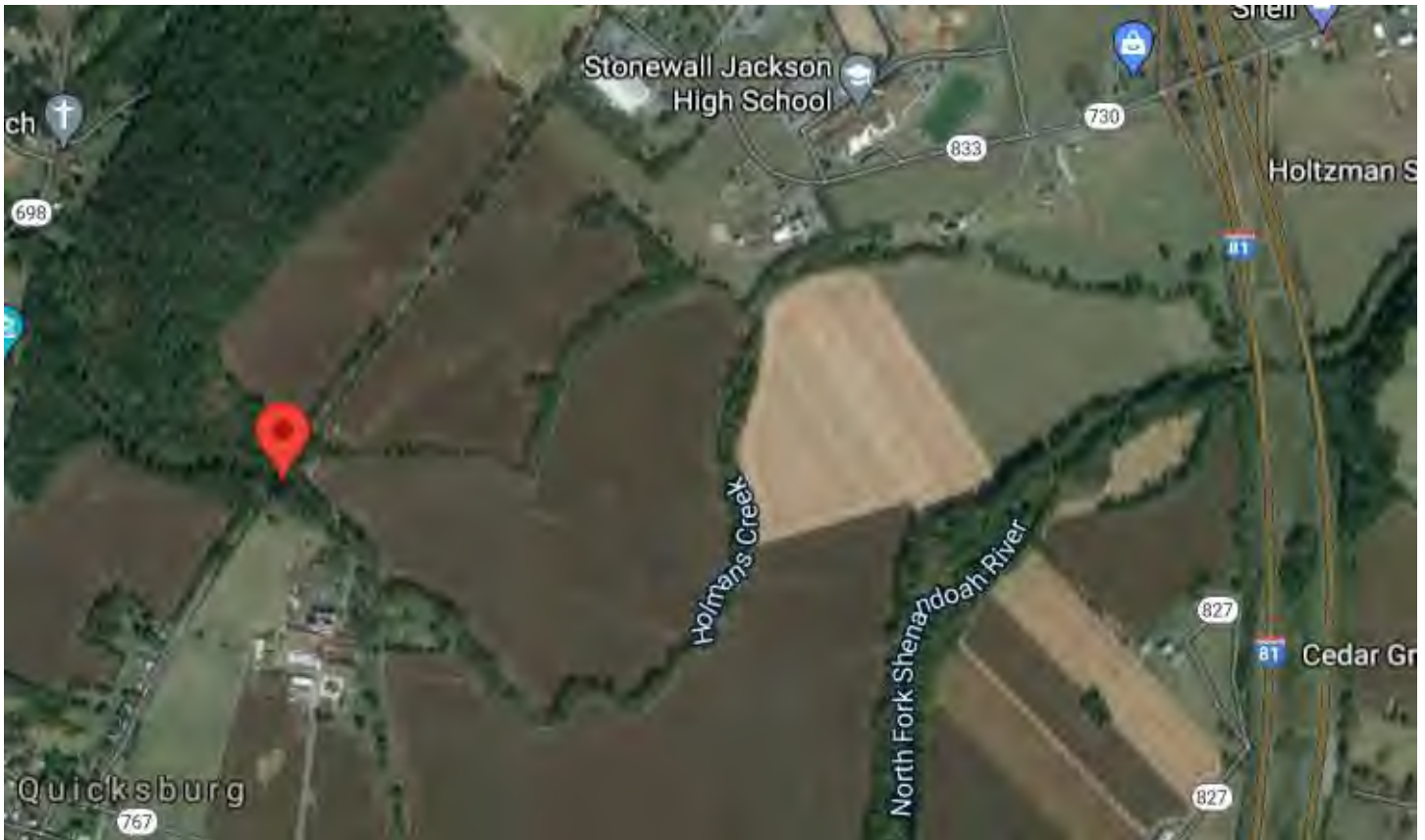
Asset 8984 over Holmans Creek
N 38° 41' 53.68", W 78° 40' 32.78"
Six Span Steel Girder Bridge, 310'-0"



Summary

Asset 8984

Date of Inspection: 05/12/2021



Summary

Asset 8984

Date of Inspection: 05/12/2021

Access

Asset 8984 crosses Holmans Creek. Abutment A is about 0.4 miles from Quicksburg Road and was easily accessed by a walk down the railroad line from Quicksburg Road. Abutment B is about 0.6 miles from Stonewall Lane and was easily accessed by a walk down the railroad line from Stonewall Lane. At the time of inspection there was minor vegetation growth along the path. The top of structure has deteriorated railroad ties and was not safe to cross.

Details of Structure

Asset 8984 is a six-span bridge with a total length of approximately 310'-0". The out-to-out width of the structure was measured at 10'-1". For labeling, Abutment A is on the south end of the bridge. Proceeding west to east girders are numbered G1-G2. Upstream is on the left (west) while looking from Abutment A to Abutment B.

The superstructure has a total of 6 spans and each span consists of two steel built-up girders. Spans 1 and 6 have a total of five cross frames equally spaced. Spans 2 and 5 have a total of seven cross frames equally spaced. Spans 3 and 4 have a total of seven cross frames equally spaced with a transverse stiffener between each cross frame. Channel section diagonal struts are present between each cross frame in all spans. Girders are spaced approximately 8'-0" apart on center. Member configuration consists of L-angles that make up girder flanges, plates that make up both the web and top and bottom flanges. Physical limitations to access most of the structure prohibited the ability to measure the span lengths.

The substructure consists of two concrete abutments with stone elements, two metal piers supported by concrete footings that support three spans each and one stone wall pier with concrete cap. Abutments have U-back wing walls.

Summary of Conditions

The conditions of the timber railroad ties vary from highly deteriorated to mildly deteriorated. See Photos #1 and #10.

In general, the steel superstructure elements are in good condition. Surface rust exists on all steel members. At the time of inspection, no measurable section loss was observed to members.

Abutment A has an area of erosion along the upstream side of the abutment. Erosion measures 4'-8" deep x 9' long x 3' wide. There are five railroad ties undermined. See Photos #5 and #6.

Pier 1 supports Spans 1-3 and is in fair condition. See Photos #2 and #3.

Pier 2 is in good condition. See Photo #4.

Pier 3 supports Spans 3-6 and is in fair condition. See title page photo.

The steep slopes and dense vegetation at Abutment B limited access to the sides and face of the abutment; therefore, the condition of those elements could not be assessed. Erosion behind the upstream wingwall measured 3'-6" deep x 5'-6" long x 2'-6" wide. See Photo #7. There are two areas of erosion behind the downstream wingwall. Erosion areas are 4' deep x 6' long x 2' wide and 6' deep x 2' long x 2' wide. There are 3 undermined railroad ties on the downstream side. See Photos #8 and #9.

Summary

Asset 8984

Date of Inspection: 05/12/2021

Repair Recommendations

There were no significant structural deficiencies noted during this initial inspection. In our opinion the structure retains sufficient structural capacity to support service as a pedestrian/cycling bridge. An in-depth inspection and subsequent load rating would further inform these conclusions. Specific repair actions recommended include:

- Remove railroad ties and install new timber deck planks.
- Install a suitable transition from the gravel railroad bed at both ends of the structure, including grade transitions and installation of a safety guardrail at the transition to the structure.
- Install a pedestrian railing that meets current safety standards.
- Repair timber wingwalls and erosion areas at both abutments.

Photos

Asset 8984

Date of Inspection: 05/12/2021



Photo #1

Looking north at top of structure toward Abutment B.



Photo #2

Looking at the structure from Abutment A downstream side.

The girders in Span 1 and 6 are half the depth of the girders in Spans 2-5.

Photos

Asset 8984

Date of Inspection: 05/12/2021



Photo #3

Looking at the metal pier that supports Spans 1-3 from the downstream side. The other metal pier that supports Spans 4-6 is similar.



Photo #4

Looking at the concrete pier that supports Spans 3 and 4 from the upstream side.

Photos

Asset 8984

Date of Inspection: 05/12/2021



Photo #5

Abutment A upstream side

Area of erosion:
4'-8" deep x 9' long x 3' wide



Photo #6

Abutment A upstream side

Five ties undermined

Photos

Asset 8984

Date of Inspection: 05/12/2021



Photo #7

Abutment B erosion behind
wingwall upstream side

Area of erosion:
3'-6" deep x 5'-6" long x 2'-6" wide



Photo #8

Abutment B erosion behind
wingwall downstream side

Area of erosion:
4' deep x 6' long x 2' wide
Three ties undermined

Photos

Asset 8984

Date of Inspection: 05/12/2021



Photo #9

Abutment B erosion behind wingwall downstream side

Area of erosion:
6' deep x 2' long x 2' wide



Photo #10

Condition of timber railroad ties
from Abutment B end

Appendix G

Asset 8763

Date of Inspection:

05/12/2021

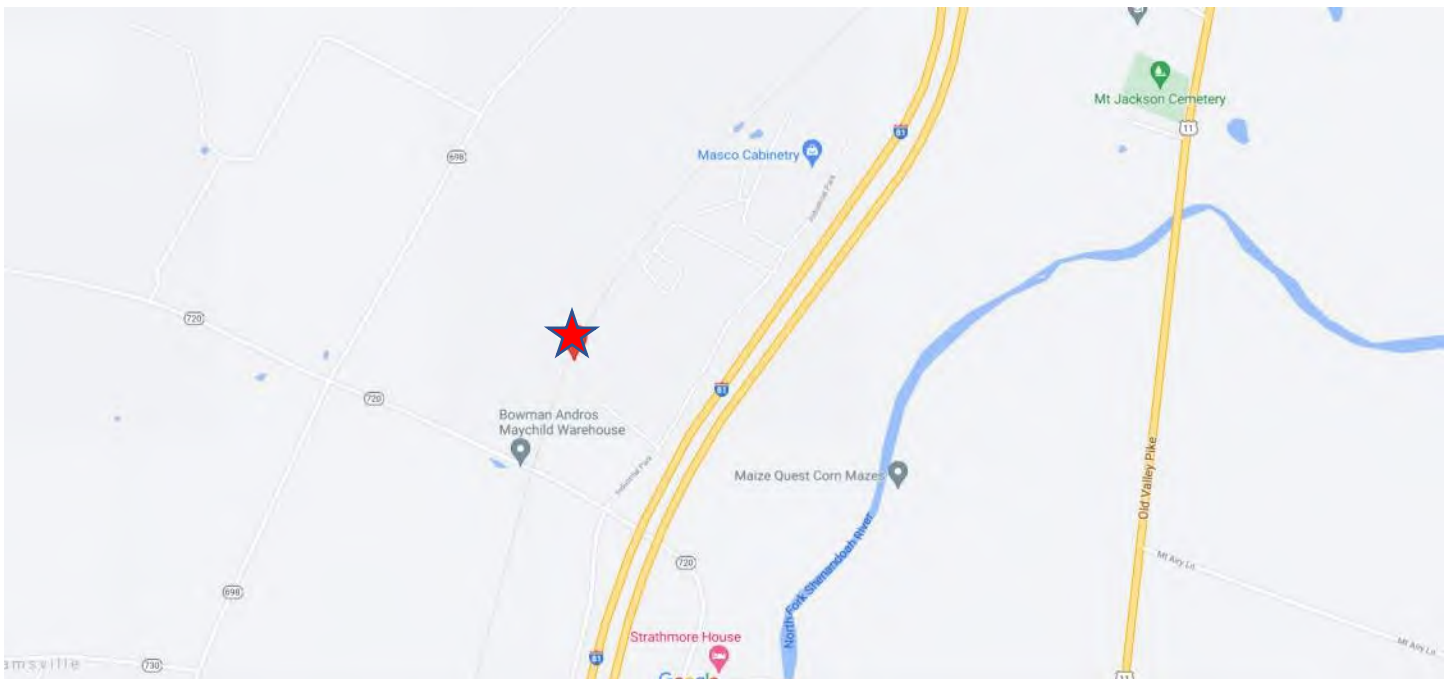


Asset 8763 over Unnamed Drainage Crossing
N 38° 43' 39.38", W 78° 39' 39.25"
Single Barrel Culvert, 15'-0"

Location Map

Asset 8763

Date of Inspection: 05/12/2021



Summary

Asset 8763	Date of Inspection:	05/12/2021
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Access

Asset 8763 over unnamed drainage way was reached from Wissler Road. The culvert is about 0.17 miles north of Wissler Road. The path along the trail to reach the culvert was easily accessible with only minor vegetation growth.

Details of Structure

Asset 8763 is a single barrel culvert with an out-out width of approximately 15'-0". The culvert opening is approximately 8'-6" wide. Drainage under structure was wet at time of inspection.

The culvert consists of timber top slab, headwalls and wingwalls. The interior walls are stone.

The headwalls are measured 13'-5" long.

Summary of Conditions

The conditions of the timber railroad ties are mildly deteriorated. See Photo #1.

Timber members are in good condition. See Photos #3.

Wingwalls are in fair condition. Minor area of erosion behind southwest upstream wingwall, 4' long x 2' wide x up to 6" deep. Area of erosion at southeast downstream wingwall, 4' long x 1' wide x up to 3" deep. See Photos #1-#2.

Repair Recommendations

There were no significant structural deficiencies noted during this initial inspection. In our opinion the structure retains sufficient structural capacity to support service as a pedestrian/cycling trail. An in-depth inspection and subsequent load rating would further inform these conclusions. Specific repair actions recommended include:

- Remove railroad ties.
- Repair erosion behind wingwalls.
- Install a pedestrian railing that meets current safety standards along culvert opening.

Photos

Asset 8763

Date of Inspection: 05/12/2021



Photo #1

Top of rail looking at southwest upstream wingwall.

Area of erosion:
4' long x 2' wide x up to 6" deep.



Photo #2

Southeast downstream wingwall

Area of erosion:
4' long x 1' wide x up to 3" deep.

Photos

Asset 8763	Date of Inspection:	05/12/2021
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Photo #3

Looking at downstream elevation.

Appendix G

Asset 8627

Date of Inspection: 05/12/2021



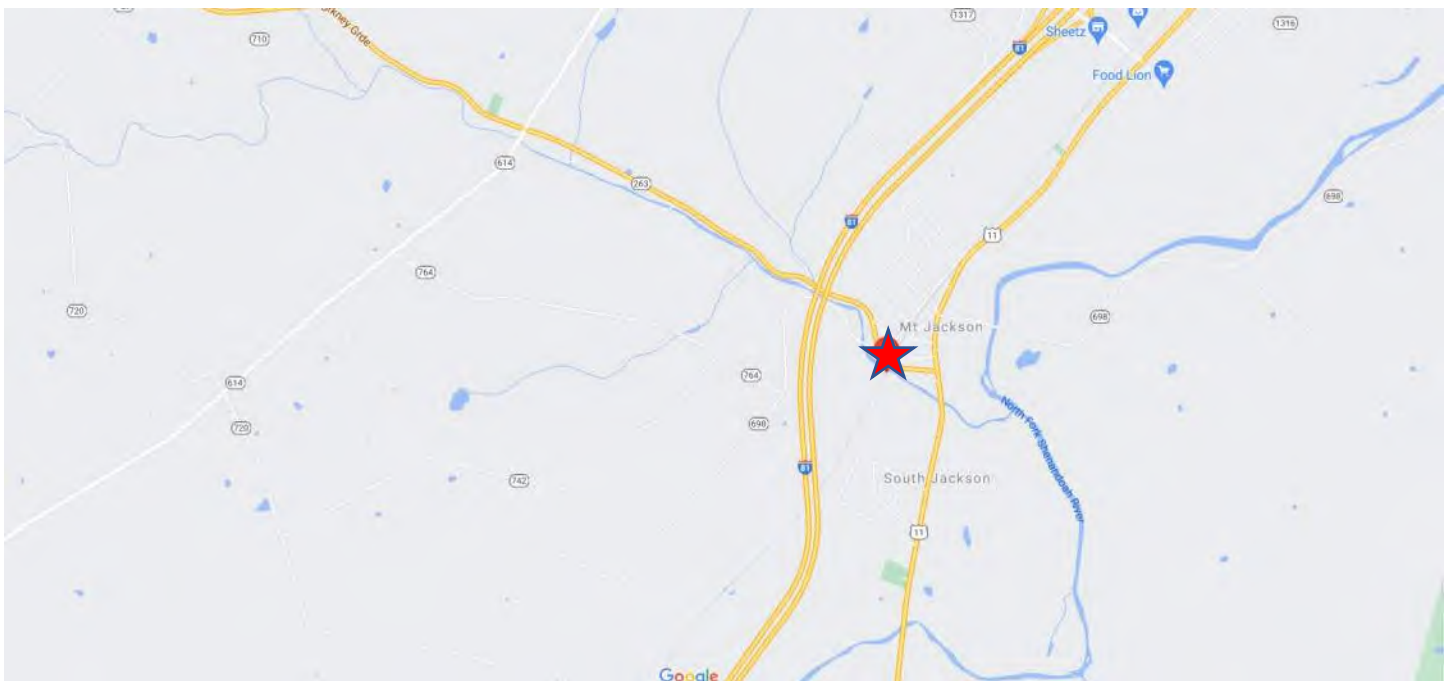
Asset 8627 over North Fork Shenandoah River and Bryce Blvd
N 38° 44' 37.22", W 78° 38' 45.09"
Three Span Steel Girder Bridge, 425'-0"



Location Map

Asset 8627

Date of Inspection: 05/12/2021



Summary

Asset 8627

Date of Inspection: 05/12/2021

Access

Asset 8627 over North Fork Shenandoah River was reached from Bryce Blvd. At time of inspection there was minor vegetation growth along path. Top of structure has deteriorated railroad ties. During the field evaluation we determined the condition was unsafe to cross.

Details of Structure

Asset 8627 is a three-span steel two girder bridge with a total length of approximately 425'-0". The out-to-out width of the structure was measured at 12'-6". For labeling, Abutment A is on the south end of the bridge. Proceeding west to east girders are numbered G1-G2. Upstream is on the left (west) while looking from Abutment A to Abutment B.

The superstructure consists of two steel built up girders with a total of five cross frames equally spaced in each span. Lateral bracing is also present and attached between each cross frame. Girders are spaced approximately 8'-0" apart on center. Member configuration consists of L-angles that make up girder flanges, plates that make up both the web and bottom and top flanges. Field measured dimensions of the girders: depth = 5'-0", flange width = 14", top and bottom cover plate thickness = $\frac{1}{2}$ " and filler plate thickness = $\frac{3}{4}$ ". Top of deck consists of timber railroad ties typically 12" wide x 12" high.

The substructure consists of two concrete abutments with stone elements and two concrete wall piers with stone elements with concrete caps and footings. Abutments have U-back wingwalls.

Summary of Conditions

The conditions of the timber railroad ties vary from highly deteriorated (with some missing) to mildly deteriorated. See Photo #1.

In general, the steel superstructure elements are in good condition. Surface rust exists on all steel members. At time of inspection no measurable section loss was observed to members. See Photos #2, #4-#6.

The concrete abutments are in fair condition with minor cracking, some with efflorescence. Abutments have spalling. Stone portions of the abutments are in fair condition with minor loss of mortar. Piers are in fair condition with minor cracking and some spalls. Wingwalls exhibit hairline to 1/16" wide map cracking with efflorescence throughout.

Abutment A is in fair condition.

Piers are in fair condition. Both piers have minor to moderate vegetation growth. Pier 1 top of cap has surface spalling all the way around. Pier 2 exhibits corner surface spalling on Span 3 side of cap. See Photos #3-#4.

Abutment B is in fair condition. Abutment has several spalls including along edge of bearing seat full width x 3" deep. One spall at top of abutment backwall on the upstream side 2' long x 1' wide x 3" deep. One spall at top of abutment on backwall on downstream side 2' long x 2' wide x 3" deep. On the downstream side on the U-back wingwall, spall 3' long x 2' wide x 3" deep with 1 exposed rebar. See Photos #5-#6.

Repair Recommendations

There were no significant structural deficiencies noted during this initial inspection. In our opinion the structure retains sufficient structural capacity to support service as a pedestrian/cycling bridge. An in-depth inspection and subsequent load rating would further inform these conclusions. Specific repair actions recommended include:

- Remove railroad ties and install new timber deck planks.
- Repair/seal cracks in abutments and piers and regrout stone portions of abutment.
- Repair spalls in abutments and piers.
- Install a suitable transition from the gravel railroad bed at both ends of the structure, including grade transitions and installation of a safety guardrail at the transition to the structure.
- Install a pedestrian railing that meets current safety standards.
- Prepare and paint superstructure.

Photos

Asset 8627

Date of Inspection: 05/12/2021



Photo #1

Looking south at top of structure toward Abutment A.

Timber railroad ties deteriorated.
Structure unsafe to cross.



Photo #2

Span 3, typical underside of the structure.

Surface rust on girders and
superstructure elements with failed
coating.

Photos

Asset 8627

Date of Inspection: 05/12/2021



Photo #3

Pier 1, Span 1 side downstream end of cap.

Top of pier cap exhibit surface spalling all the way around.



Photo #4

Pier 2, Span 3 side, downstream end.

Moderate vegetation growth.

On top of cap surface concrete spall on downstream corner edge.

Photos

Asset 8627

Date of Inspection: 05/12/2021



Photo #5

Abutment B, downstream end wingwall.

Top of abutment on backwall on downstream side

Concrete spall:
2' long x 2' wide x 3" deep.

On U-back wingwall

Concrete spall:
3' long x 2' wide x 3" deep
1 exposed rebar.



Photo #6

Abutment B, upstream side.

Top of abutment backwall on upstream side

Concrete spall:
2' long x 1' wide x 3" deep.

Appendix G

Asset 8620

Date of Inspection:

05/12/2021

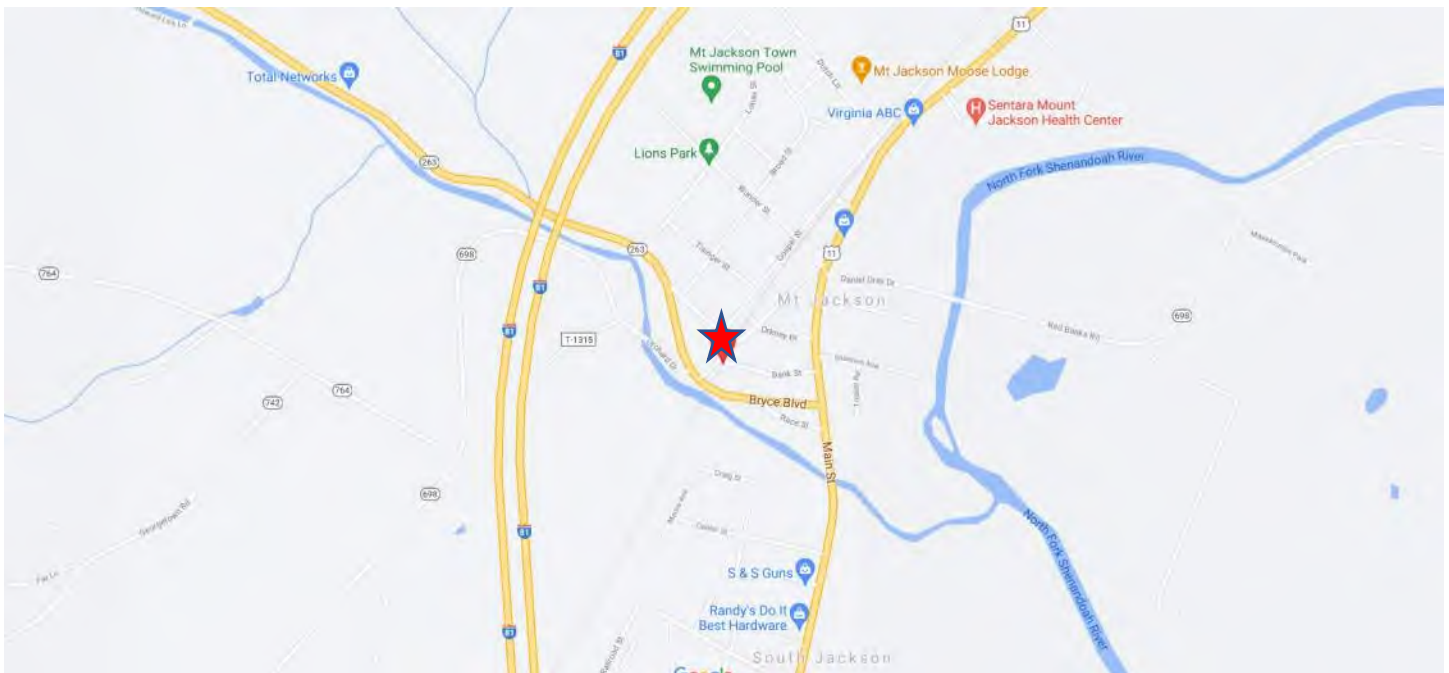


Asset 8620 over Bank Street
N 38° 44' 40.55", W 78° 38' 42.92"
Single Span Steel Double Girder Unit Bridge, 20'-10"

Location Map

Asset 8620

Date of Inspection: 05/12/2021



Summary

Asset 8620	Date of Inspection:	05/12/2021
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Access

Asset 8620 over Bank Street was easily reached from Orkney Drive. The bridge is about 0.04 miles from the at-grade crossing on Orkney Drive. At the time of inspection there was minor vegetation growth.

Details of Structure

Asset 8620 is a single span bridge with a total length of approximately 20'-10". The out-to-out width of the structure was measured at 11'-0". For labeling, Abutment A is on the south end of the bridge. Proceeding west to east girders are numbered G1-G4. Clifford Street is on the left (west) and Bank Street is on the right (east) while looking from Abutment A to Abutment B.

The superstructure consists of two double girder units. Each double girder unit consists of two side by side plate girders connected by a plate between the webs. There are six of these plates along the length of the units. The spacing between the units is 7'-2" on center. Field measured dimensions of the girders: depth = 24", flange width = 7.25", flange thickness = 0.7", web thickness = 1/2". Top of deck consists of timber railroad ties typically 12" wide x 12" high.

The substructure consists of two concrete abutments with stone elements. Abutments have U-back wing walls with timber railroad ties located at each end.

Summary of Conditions

The conditions of the timber railroad ties vary from highly deteriorated (with some missing portions) to mildly deteriorated. See Photos #1-#2.

In general, the steel superstructure elements are in good condition. Surface rust exists on all steel members. The superstructure exhibits trace evidence of paint with no protective value remaining. At time of inspection no measurable section loss was observed to members. See Photo #3.

The concrete abutments are in fair condition with minor cracking, some with efflorescence. The stone portions of the abutments are in good condition with minor loss of grout.

Abutment A has vertical cracking throughout with efflorescence. See Photos #4 & #6.

Abutment B has cracking throughout with efflorescence. See Photo #5-#6.

Repair Recommendations

There were no significant structural deficiencies noted during this initial inspection. In our opinion the structure retains sufficient structural capacity to support service as a pedestrian/cycling bridge. An in-depth inspection and subsequent load rating would further inform these conclusions. Specific repair actions recommended include:

- Remove deteriorated railroad ties and install new timber deck planks.
- Repair/seal cracks in abutments and regrout stone portions of abutment.
- Install a suitable transition from the gravel railroad bed at both ends of the structure, including grade transitions and installation of a safety guardrail at the transition to the structure.
- Install a pedestrian railing that meets current safety standards.
- Prepare and paint the superstructure.

Photos

Asset 8620

Date of Inspection: 05/12/2021



Photo #1

Looking north at Abutment B.

Timber railroad ties shown are mildly deteriorated.



Photo #2

Timber railroad ties exhibit minor to severe section loss.

Timber railroad tie shown is heavily deteriorated.

Photos

Asset 8620

Date of Inspection: 05/12/2021



Photo #3

Looking at both double girder units at Abutment B.

Typical girder configuration with failed protective coating and minor surface rust thought out.



Photo #4

Abutment A.

Minor cracking throughout face with efflorescence.

Photos

Asset 8620

Date of Inspection: 05/12/2021



Photo #5

Abutment B.

Minor cracking throughout face
with efflorescence.



Photo #6

Span looking toward Clifford
Street.

Appendix G

Asset 8452

Date of Inspection:

05/12/2021

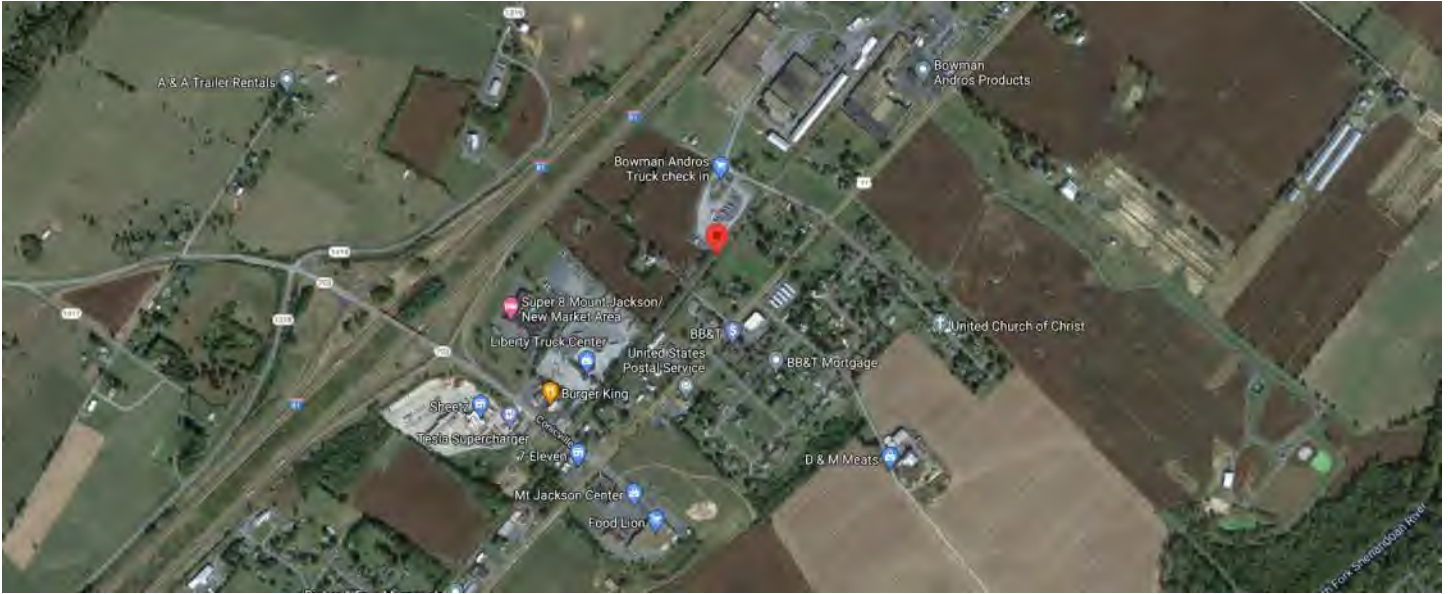


Asset 8452 over Unnamed Drainage Crossing
N 38° 45' 48.99", W 78° 37' 33.91"
Single Barrel Culvert, 17'-0"

Location Map

Asset 8452

Date of Inspection: 05/12/2021



Summary

Asset 8452	Date of Inspection:	05/12/2021
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Access

Asset 8452 over unnamed drainage crossing was reached from W Avondale Ave. The culvert is about 0.11 miles southwest of W Avondale Ave. The structure was easily accessed by walking down the railroad line.

Details of Structure

Asset 8452 is a single barrel culvert with a total out-to-out length of approximately 17'-0". The upstream opening is 6'-4" wide x 2'-11" high. The downstream opening is 6'-3" wide x 3'-0" high.

The culvert consists of one barrel with timber top slab and headwalls along with concrete walls and wingwalls. The concrete walls have stone towards the bottom. The timber top slab is made of 17 timber beams measuring 10" wide x 15" high. The timber headwalls measured 16'-0" long at the upstream side and 14'-8" long at the downstream side.

Summary of Conditions

The conditions of the timber railroad ties are mildly deteriorated. See Photo #1.

Areas of erosion were found behind the upstream headwall measuring 2' long x 1' wide x 10" deep and 3' long x 3' wide x 16" deep. See Photo #2.

Wingwalls are in fair condition. Map cracking measuring up to 1/8" found on all wingwalls. See Photo #3.

Barrel is in fair condition. Culvert was dry at the time of inspection. See Photo #4.

Exterior beam on the upstream side has deterioration measuring 4' long x 11" high x up to 10" wide. See Photo #5.

Timber headwalls are in good condition.

There is significant vegetation growth above the culvert and at each barrel end. See Photos #1 and #6.

Repair Recommendations

There were no significant structural deficiencies noted during this initial inspection. In our opinion the structure retains sufficient structural capacity to support service as a pedestrian/cycling trail. An in-depth inspection and subsequent load rating would further inform these conclusions. Specific repair actions recommended include:

- Remove railroad ties.
- Repair/seal cracks in wingwalls.
- Install a pedestrian railing that meets current safety standards.
- Repair erosion areas at the top of the culvert.

Photos

Asset 8452

Date of Inspection: 05/12/2021



Photo #1

Top of rail above culvert looking south.

Timber railroad ties shown are mildly deteriorated.

Vegetation growth along path.



Photo #2

At upstream headwall.

Areas of erosion:
3' long x 3" wide x 16" deep
2' long x 1' wide x 10" deep

Photos

Asset 8452

Date of Inspection: 05/12/2021



Photo #3

Upstream north wingwall

Typical map cracking found on all wingwalls.



Photo #4

Looking into barrel from the upstream side.

Photos

Asset 8452

Date of Inspection: 05/12/2021



Photo #5

Upstream exterior beam.

Area of decay:
4' long x 11" high x 10" wide



Photo #6

Downstream elevation.

Vegetation growth at front of barrel.

Appendix G

Asset 8438

Date of Inspection: 05/12/2021

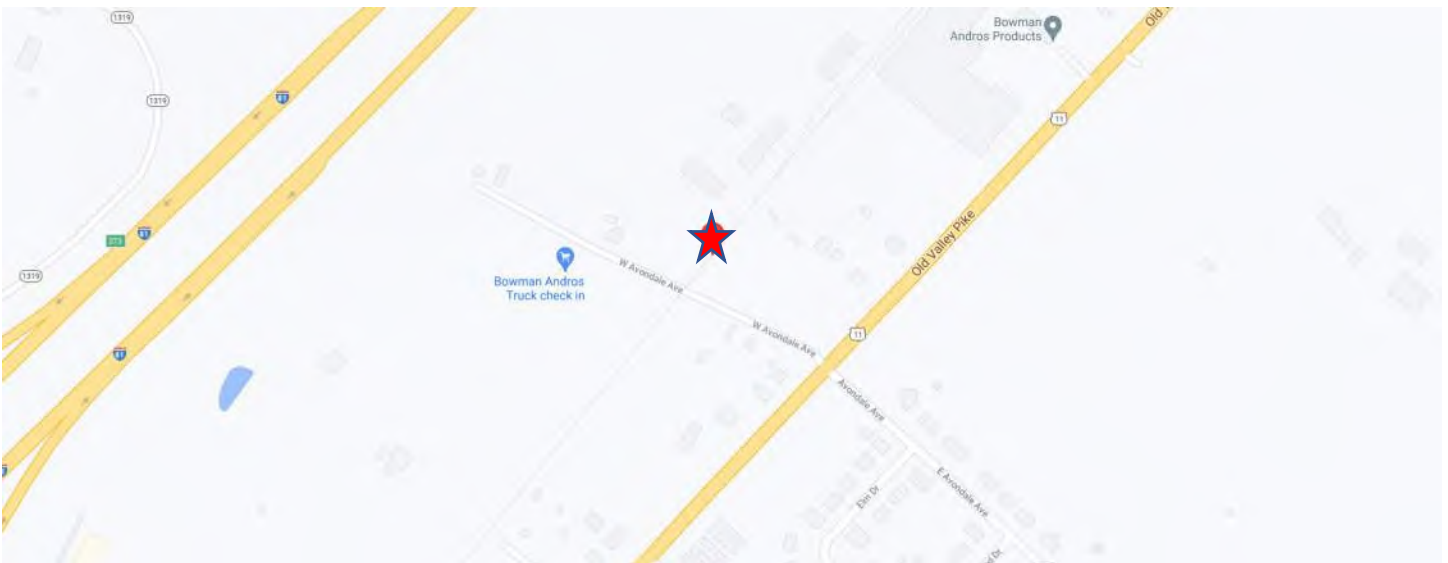


Asset 8438 over Unnamed Drainage Crossing
N 38° 45' 54.63", W 78° 37' 28.07"
Single Barrel Culvert, 16'-6"

Location Map

Asset 8438

Date of Inspection: 05/12/2021



Summary

Asset 8438	Date of Inspection:	05/12/2021
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Access

Asset 8438 over unnamed drainage way was reached from W Avondale Ave. The culvert is about 0.03 miles northeast of W Avondale Ave. The structure was easily accessed by walking down the railroad line.

Details of Structure

Asset 8438 is a single barrel culvert with a total out-to-out width of approximately 16'-6". The barrel opening measured 5'-4" high x 4'-10" wide at the upstream side and 5'-4.5" high x 5'-0" wide at the downstream side. At the time of the inspection the drainage under the culvert was wet.

The culvert consists of one barrel with timber top slab and headwalls along with concrete walls and wingwalls. The concrete walls have stone elements towards the bottom. The timber top slab is made of 19 timber beams measuring 10" wide x 15" high. The timber headwalls measured 17'-3" long at the upstream side and 16'-0" long at the downstream side.

Summary of Conditions

The conditions of the timber railroad ties are mildly deteriorated. See Photo #1.

Area of erosion measuring 5.5' long x 1.5' wide x 1' deep was found next to headwall on the downstream side. See Photo #2.

Wingwalls are in fair condition with minor spalling and cracking. Map cracking measuring up to 1/8" found on all wingwalls. The spalls on the downstream south wingwall measured 19" long x 9" high x 3.5" deep and 10" long x 3" high x 1.5" deep. See Photos #3 and #4.

The barrel is in good condition. There are some hairline full height vertical cracks along the walls. See Photo #5.

Timber headwalls are in good condition.

Repair Recommendations

There were no significant structural deficiencies noted during this initial inspection. In our opinion the structure retains sufficient structural capacity to support service as a pedestrian/cycling bridge. An in-depth inspection and subsequent load rating would further inform these conclusions. Specific repair actions recommended include:

- Remove railroad ties.
- Repair erosion area at the top of the culvert.
- Repair/seal cracks in wingwalls.
- Repair spalls in wingwalls.
- Install a pedestrian railing that meets current safety standards.

Photos

Asset 8438

Date of Inspection: 05/12/2021



Photo #1

Top of rail above culvert looking north.

Timber railroad ties shown are mildly deteriorated.

Vegetation growth along the path.



Photo #2

At upstream headwall.

Area of erosion:
5.5' long x 1.5' wide x 1' deep

Photos

Asset 8438

Date of Inspection: 05/12/2021



Photo #3

Downstream south wingwall

Area of spall:
19" long x 9" high x 3.5" deep



Photo #4

Downstream south wingwall

Area of spall:
10" long x 3" high x 1.5" deep

Photos

Asset 8438

Date of Inspection: 05/12/2021



Photo #5

Looking into barrel from the downstream side.



Photo #6

Downstream elevation.

Appendix G

Asset 7902

Date of Inspection:

05/12/2021

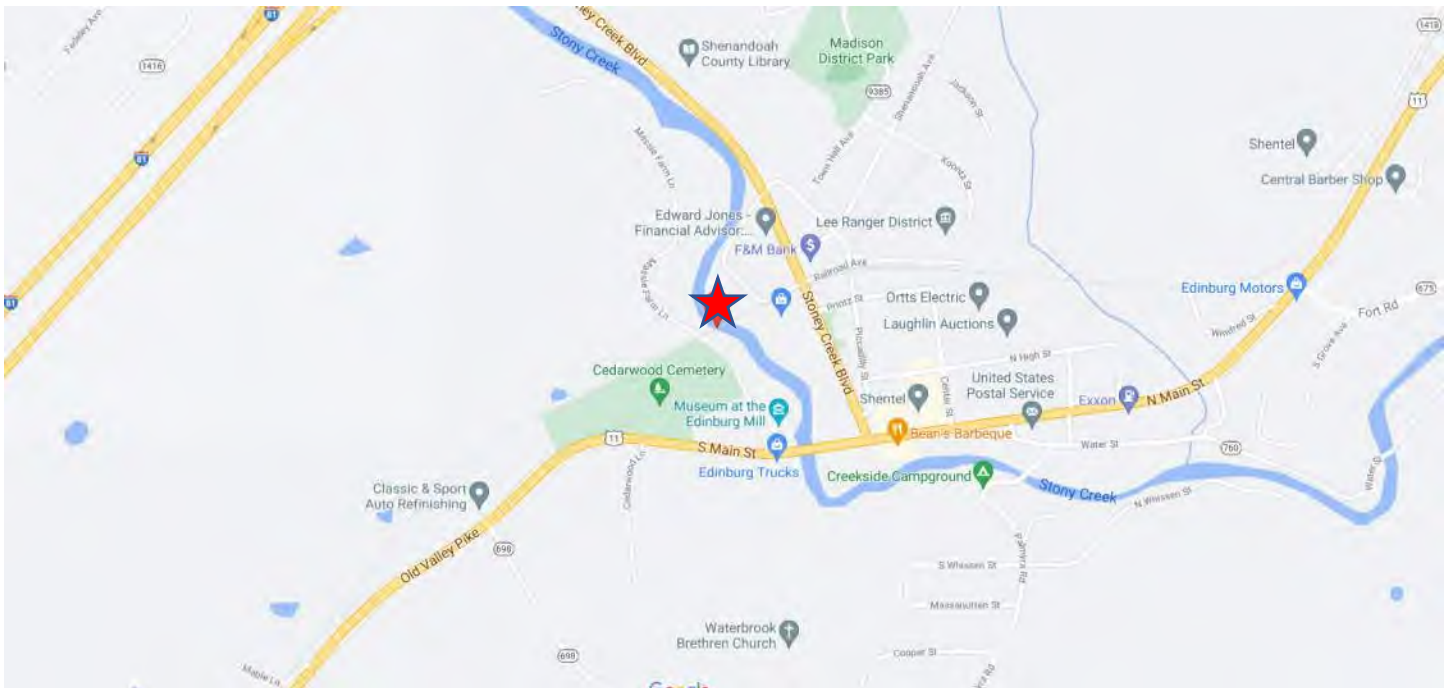


Asset 7902 over Stoney Creek and Massie Farm Lane
N 38° 49' 22.27", W 78° 34' 10.06"
Seven Span Steel Girder Bridge, 375'-0"

Location Map

Asset 7902

Date of Inspection: 05/12/2021



Summary

Asset 7902	Date of Inspection:	05/12/2021
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Access

Asset 7902 over Stoney Creek and Massie Farm Lane was reached from Massie Farm Lane and Creekside Lane. At time of inspection there was heavy vegetation growth along path. Top of structure has deteriorated railroad ties. During the field evaluation we determined the structure was unsafe to cross.

Details of Structure

Asset 7902 is a seven-span steel two girder bridge with a total length of approximately 375'-0". The out-to-out width of the structure was measured at 12'-0". For labeling, Abutment A is on the west end of the bridge. Proceeding north to south girders are numbered G1-G2. Upstream is on the left (north) while looking from Abutment A to Abutment B.

The superstructure consists of two steel built-up girders with a total of five cross frames equally spaced in each span. Lateral bracing is also present and attached between each cross frame. Girders are spaced approximately 8'-0" apart on center. Member configuration consists of L-angles that make up girder flanges, plates that make up both the web and bottom and top flanges. Top of deck consists of timber railroad ties typically 12" wide x 12" high.

The substructure consists of two concrete abutments with stone elements, two concrete wall piers with stone elements and concrete caps and footings and four steel piers with concrete footings. Abutments have U-back wingwalls.

Summary of Conditions

The conditions of the timber railroad ties vary from highly deteriorated (with some missing) to mildly deteriorated.

In general, the steel superstructure elements are in fair condition. Surface rust exists on all steel members. The superstructure exhibits flaking and peeling paint. At time of inspection no measurable section loss was observed to members. See Photos #2 & #4.

The concrete abutments are in fair condition with minor cracking, some with efflorescence. Stone portions of the abutments are in fair condition with minor loss of mortar. Concrete piers are in fair condition with minor cracking and some minor spalls. Metal piers have surface rust on all steel members, existing coating is failing throughout.

Abutment A is in fair condition with minor cracking with efflorescence. See Photo #1.

Piers are in fair condition. Both concrete piers have minor to moderate vegetation growth. Concrete piers exhibit minor cracking, some with efflorescence. Metal piers have peeling paint with minor surface rust. Vegetation growth is encroaching on piers. See Photos #3-#5.

Abutment B is in fair condition with minor cracking with efflorescence. Minor spall on upstream wingwall 1' long x 1' wide x 3" deep. On top of deck heavy vegetations growth. See Photos #6-#7.

Repair Recommendations

There were no significant structural deficiencies noted during this initial inspection. In our opinion the structure retains sufficient structural capacity to support service as a pedestrian/cycling bridge. An in-depth inspection and subsequent load rating would further inform these conclusions. Specific repair actions recommended include:

- Remove railroad ties and install new timber deck planks.
- Repair/seal cracks in abutments and piers and regrout stone portions of abutment.
- Repair spalls in abutments.
- Install a suitable transition from the gravel railroad bed at both ends of the structure, including grade transitions and installation of a safety guardrail at the transition to the structure.
- Install a pedestrian railing that meets current safety standards.
- Prepare and paint superstructure.

Photos

Asset 7902

Date of Inspection: 05/12/2021



Photo #1

Looking at face of Abutment A

Minor cracking with efflorescence throughout.



Photo #2

Span 2, typical underside of structure.

Surface rust on girders and superstructure elements with failed coating.

Photos

Asset 7902

Date of Inspection: 05/12/2021



Photo #3

Pier 2, Span 2 side.

Moderate vegetation growth.

Concrete piers exhibit minor cracking some with effloresce.



Photo #4

Pier 1, Span 1 side.

Moderate vegetation growth.

Surface rust on pier with failed coating.

Photos

Asset 7902

Date of Inspection: 05/12/2021



Photo #5

Piers 3 and 4.

Moderate vegetation growth.

Surface rust on pier with failed coating.



Photo #6

Abutment B, upstream wing wall.

Area of concrete spall:
1' long x 1' wide x 3" deep.

Photos

Asset 7902

Date of Inspection: 05/12/2021



Photo #7

Top of deck looking from Abutment B.

Heavy vegetation growth.

Appendix G

Asset 7643

Date of Inspection: 05/13/2021

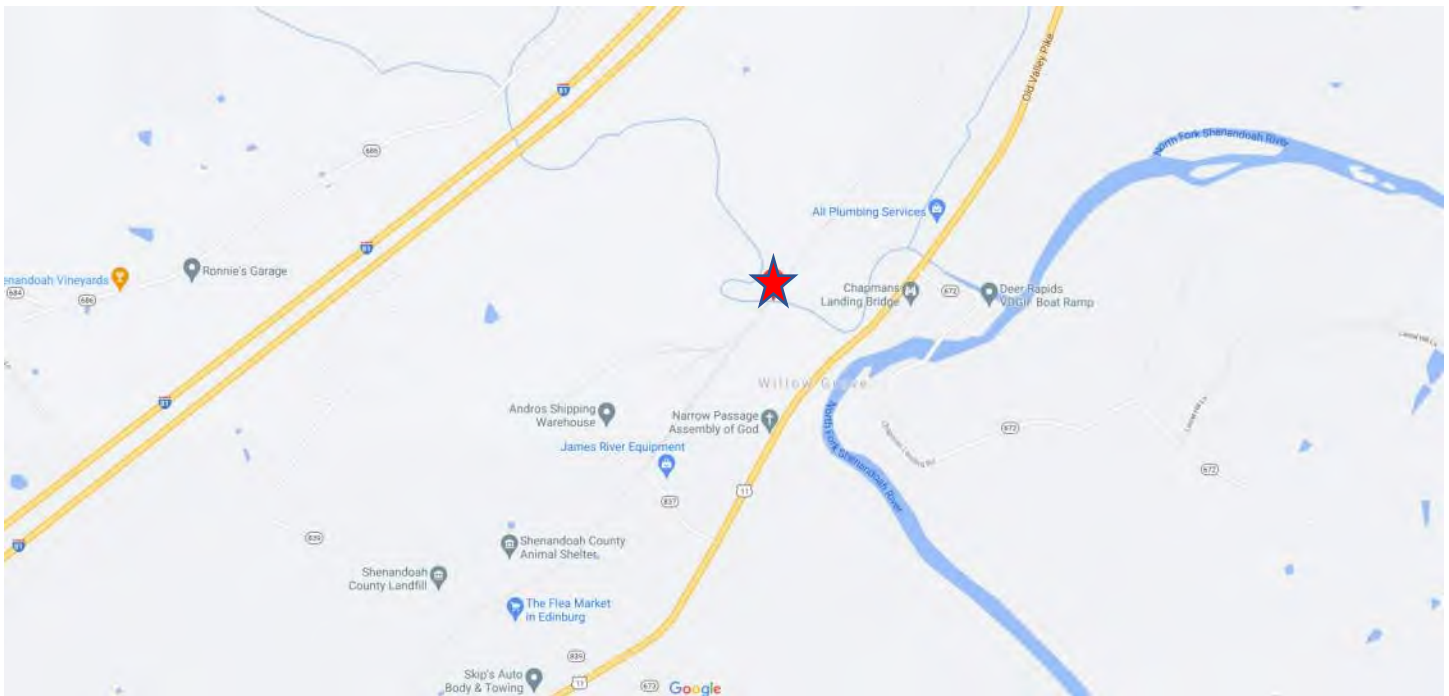


Asset 7643 over Narrow Passage Creek
N 38° 50' 45.03", W 78° 32' 12.71"
Seven Span Steel Girder Bridge, 630'-0"

Location Map

Asset 7643

Date of Inspection: 05/13/2021



Summary

Asset 7643	Date of Inspection:	05/13/2021
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Access

Asset 7643 over Narrow Passage Creek was accessed from a nearby parking lot off Johns Manville Dr and by walking on the overgrown tracks. The north side of the bridge could not be accessed. The structure was unsafe to cross and the closest access point to Abutment B was approximately 0.65 miles away through dense vegetation and overgrown tracks.

Details of Structure

Asset 7643 has seven spans with a total length of approximately 630'-0". The total out-out width of the structure was measured at 15'-2". This includes a 10'-0" railroad line and 5'-2" steel walkway. For labeling, Abutment A is on the south end of the bridge. Proceeding west to east girders are numbered G1-G2. Upstream is on the left (west) while looking from Abutment A to Abutment B.

The superstructure spans consist of two steel rolled girders for Spans 1&2 and built-up girders for Span 3 and subsequent spans. The rolled girders have the following field measurements: depth = 27.5", flange width = 14" and flange thickness of 1". The built-up girders are assumed to be twice the depth of the rolled girders and consist of L-angles that make up girder flanges with plates that make up both the web and top and bottom flanges. Top of deck consists of timber railroad ties typically 12" wide x 12" high and the steel walkway with steel cables for rails and I-beams as posts.

The substructure that was able to be accessed consists of one steel abutment, one steel pier, one intermediate concrete support and one concrete pier. The steel abutment has a steel backwall and U-shaped wingwalls. The upstream wingwall is concrete, and the downstream wingwall is steel. The intermediate support begins approximately 4'-0" after Pier 1. The intermediate support and Pier 2 are made of stone with a concrete cap.

Summary of Conditions

The conditions of the timber railroad ties vary from highly deteriorated to mildly deteriorated. See Photos #1 and the Title Page Photo.

In general, the steel superstructure elements are in good condition. Surface rust exists on all steel members. The superstructure exhibits trace evidence of paint with no protective value remaining. At the time of inspection, no measurable section loss was observed to members. See Photos #2-#3.

Abutment A is in good condition with light erosion on the downstream side and surface rust throughout. There is heavy vegetation encroaching on the structure. See Photos #3-#4.

Pier 1 is in good condition with surface rust throughout. See Photo #2.

Pier 2 and intermediate support are in good condition with few areas of missing mortar. See Photos #5-#6.

Pier 3 and subsequent piers could not be assessed due to limited access.

Abutment B condition assessment could not be obtained due to limited access.

Repair Recommendations

There were no significant structural deficiencies noted during this initial inspection. In our opinion the structure retains sufficient structural capacity to support service as a pedestrian/cycling bridge. An in-depth inspection and subsequent load rating would further inform these conclusions. Specific repair actions recommended include:

- Remove railroad ties and install new timber deck planks.
- Perform detailed site assessment and repair/seal any cracks found in abutments and piers and re-grout stone portions of abutments and pier as needed.
- Install a suitable transition from the gravel railroad bed at both ends of the structure, including grade transitions and installation of a safety guardrail at the transition to the structure.
- Install a pedestrian railing that meets current safety standards.
- Preparation and painting of the entire superstructure and steel substructure is recommended.
- Repair erosion areas and encroaching vegetation at abutments.

Photos

Asset 7643

Date of Inspection: 05/13/2021



Photo #1

Timber railroad ties shown are heavily deteriorated.



Photo #2

Pier 1 downstream side

Typical girder configuration for Spans 1&2 with failed protective coating and minor surface rust throughout.

Photos

Asset 7643

Date of Inspection: 05/13/2021



Photo #3

Looking south at Abutment A

Typical girder configuration for Spans 1&2 with failed protective coating and minor surface rust throughout.



Photo #4

Abutment A

Light erosion at corner of downstream wingwall.

Photos

Asset 7643

Date of Inspection: 05/13/2021



Photo #5

Intermediate support and Pier 1

Upstream side looking east.



Photo #6

Intermediate support and Pier 2

Upstream side looking east.

Appendix G

Asset 7164

Date of Inspection: 05/13/2021

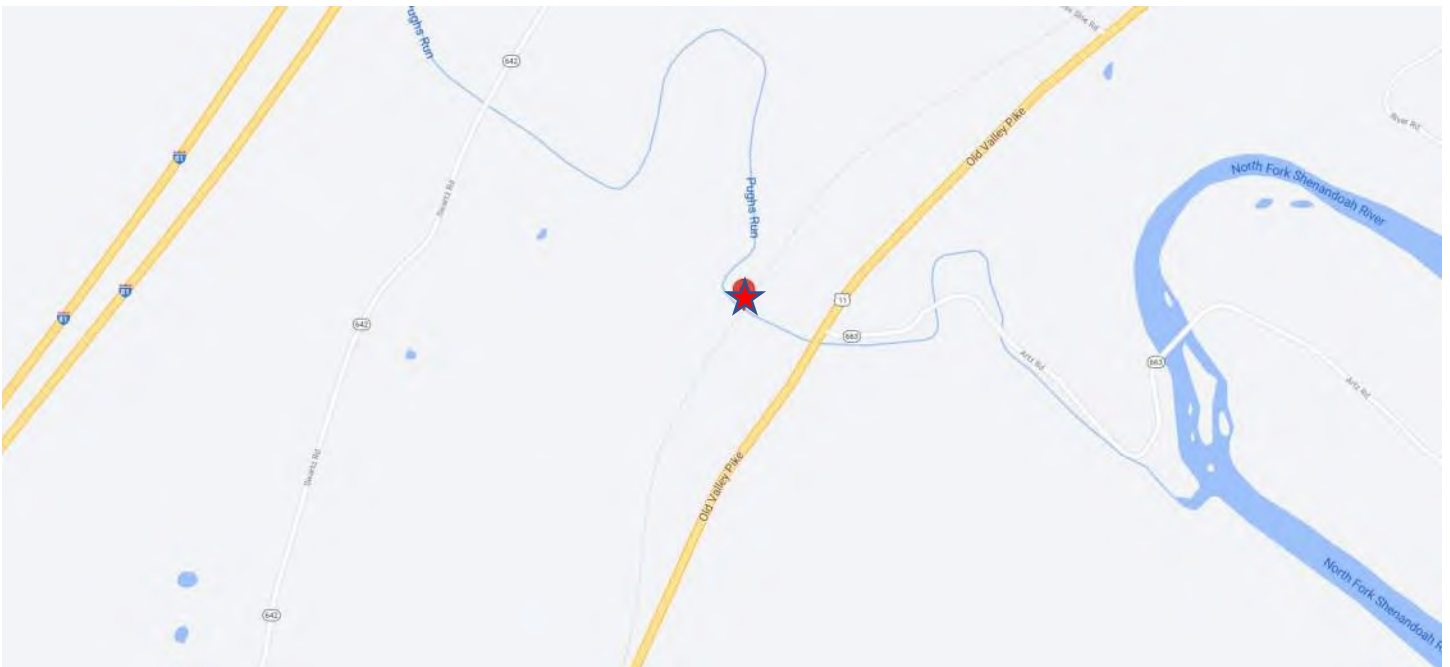


Asset 7164 over Pughs Run
N 38° 54' 12.88", W 78° 29' 24.81"
Nine Span Steel Two Girder Bridge, 380'-0"

Location Map

Asset 7164

Date of Inspection: 05/13/2021



Summary

Asset 7164

Date of Inspection: 05/13/2021

Access

Asset 7164 over Pughs Run was difficult to access. Structure accessed from Old Valley Pike Road through private property and heavy vegetation. Abutment A is about 0.09 miles from Old Valley Pike Road. Abutment B is about 0.48 miles south of the at-grade crossing of Jess Sine Road. Structure was not safe to cross.

Details of Structure

Asset 7164 is a nine-span bridge with a total length of approximately 380'-0". The out-to-out width of structure was measured at 10'-0". For labeling, Abutment A is on the south end of the bridge. Proceeding west to east girders are numbered G1-G2. Upstream is on the left (west) while looking from Abutment A to Abutment B.

The superstructure consists of two steel built-up girders with steel diaphragms and lateral bracing members. Due to the steep slope, the cross-frame members were not able to be inspected. Girders are spaced approximately 8' apart on center. Member configuration consists of L-angles that make up girder flanges, plates that make up both the web and top and bottom flanges. Physical limitations to access most of the structure prohibited the ability to measure the span lengths.

The substructure consists of two concrete abutments with masonry elements, three metal piers supported by concrete footings that support three spans each and two masonry wall piers with concrete cap. Abutments have U-back wing walls.

Summary of Conditions

The condition of the timber railroad ties is mildly deteriorated. See Photo #1.

In general, the steel superstructure elements are in good condition. Surface rust exists on all steel members. The superstructure exhibits moderate paint flaking and peeling with minor steel corrosion. At time of inspection no measurable section loss was observed to members.

Abutment A has an area of erosion along downstream side of abutment. Erosion measures 6' long x 3' wide x 1.5' deep. See Photos #4-#5. Spalling on the upstream wingwall measured 7' long x 15" wide x 2.5" deep. Spalling on the corner measured 5' long x 6" wide x 2" deep. See Photos #5-#6.

Pier 1 supports Spans 1-3 and is in fair condition. See Photos #2-#3.

Pier 2 is in good condition. See Photos #2-#3.

Piers 3-5 condition could not be assessed due to limited access.

Abutment B condition could not be assessed due to limited access.

Repair Recommendations

There were no significant structural deficiencies noted during this initial inspection. In our opinion the structure retains sufficient structural capacity to support service as a pedestrian/cycling bridge. An in-depth inspection and subsequent load rating would further inform these conclusions. Specific repair actions recommended include:

- Remove railroad ties and install new timber deck planks.
- Perform detailed site assessment and repair/seal any cracks found in abutments and piers and re-grout masonry portions of abutments and pier as needed.
- Repair spalls in abutments.
- Install a suitable transition from the gravel railroad bed at both ends of the structure, including grade transitions and installation of a safety guardrail at the transition to the structure.
- Install a pedestrian railing that meets current safety standards.
- Prepare and paint the superstructure, as necessary.
- Repair erosion areas at abutments.

Photos

Asset 7164

Date of Inspection: 05/13/2021



Photo #1

Looking north at top of structure toward Abutment B.



Photo #2

Looking at structure from Abutment A downstream side.

Photos

Asset 7164

Date of Inspection: 05/13/2021



Photo #3

Looking at the metal pier that supports Spans 1-3 from the upstream side.



Photo #4

Abutment A downstream side.

Area of erosion:
6' long x 3' wide x 1.5' deep

Photos

Asset 7164

Date of Inspection: 05/13/2021



Photo #5

Abutment A wingwall upstream side.

Area of spall:
7' long x 15" wide x 2.5" deep



Photo #6

Abutment A upstream side.

Area of spall:
5' long x 6" wide x 2" deep

Appendix G

Asset 6824

Date of Inspection:

05/13/2021

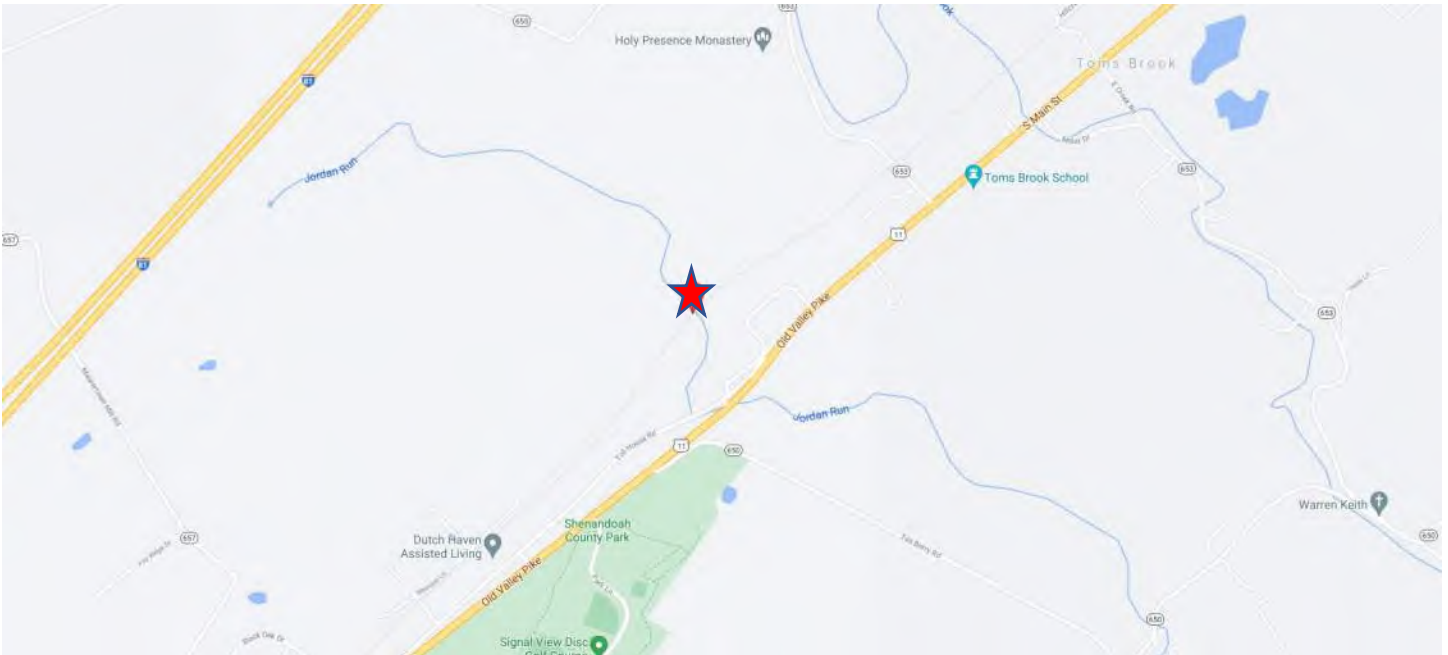


Asset 6824 over Jordan Run
N 38° 56' 28.06", W 78° 27' 4.34"
Single Span Steel Girder Bridge, 19'-1"

Location Map

Asset 6824

Date of Inspection: 05/13/2021



Summary

Asset 6824	Date of Inspection:	05/13/2021
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Access

Asset 6824 over Jordan Run was accessed from Heishmans Park through a field and some brush. The bridge is about 0.10 miles from Heishmans Park.

Details of Structure

Asset 6824 is a single span bridge with a total length of approximately 19'-1". The out-to-out width of the structure was measured at 10'-0". For labeling, Abutment A is on the south end of the bridge. Proceeding west to east girders are numbered G1-G2. Upstream is on the left (west) while looking from Abutment A to Abutment B.

The superstructure consists of two rolled steel I-girders. Top of deck consists of timber railroad ties typically 12" wide x 12" high.

The substructure consists of two concrete abutments with stone elements. Abutments have concrete U-back wingwalls with timber railroad ties located at each end. On each side of the wingwalls there are large timber piles retaining large rocks.

Summary of Conditions

The condition of the timber railroad ties is mildly deteriorated. At time of inspection there was vegetation growth along the path. See Photo #1.

In general, the steel superstructure elements are in good condition. Surface rust exists on all steel members. The superstructure exhibits minor to moderate paint failure. At time of inspection no measurable section loss was observed to members. See Photos #2-#3.

The stone portion of the abutments are in good condition with minor loss of mortar between stones. See Photo #4.

Abutment A has spalling measuring 3.5' long x 2' wide x 1'-6" deep on the concrete backwall. An area of erosion 5' long x 3' wide x 1' deep was found near the downstream wing wall. See Photo #5.

Abutment B has edge spalling on both the upstream and downstream side. A portion of the upstream timber wingwall has fallen away. See Photos #6-#8.

Repair Recommendations

There were no significant structural deficiencies noted during this initial inspection. In our opinion the structure retains sufficient structural capacity to support service as a pedestrian/cycling bridge. An in-depth inspection and subsequent load rating would further inform these conclusions. Specific repair actions recommended include:

- Remove railroad ties and install new timber deck planks.
- Repair/seal cracks in abutments.
- Repair spalls in abutments.
- Install a suitable transition from the gravel railroad bed at both ends of the structure, including grade transitions and installation of a safety guardrail at the transition to the structure.
- Install a pedestrian railing that meets current safety standards.
- Prepare and paint superstructure.
- Repair erosion areas at both abutments.

Photos

Asset 6824

Date of Inspection: 05/13/2021



Photo #1

Looking south at top of structure toward Abutment A

Timber railroad ties shown are mildly deteriorated.



Photo #2

Underside of the girders from the downstream side.

Typical girder configuration with failed protective coating and minor surface rust throughout.

Photos

Asset 6824

Date of Inspection: 05/13/2021



Photo #3

Looking at girders from the downstream side.

Typical girder configuration with failed protective coating and minor surface rust thought out.



Photo #4

Abutment A from downstream side.

Stone portion of abutments are in good condition.

Photos

Asset 6824

Date of Inspection: 05/13/2021



Photo #5

Looking across the structure at Abutment A.

Spall on backwall:
3.5' long x 2' wide x 1'-6" deep.



Photo #6

Abutment B upstream side.

Typical edge spalling.

Photos

Asset 6824

Date of Inspection: 05/13/2021



Photo #7

Abutment B upstream side.

A portion of the upstream timber wingwall has fallen away.



Photo #8

Abutment B downstream side.

Typical edge spalling.

Appendix G

Asset 6765

Date of Inspection: 05/13/2021

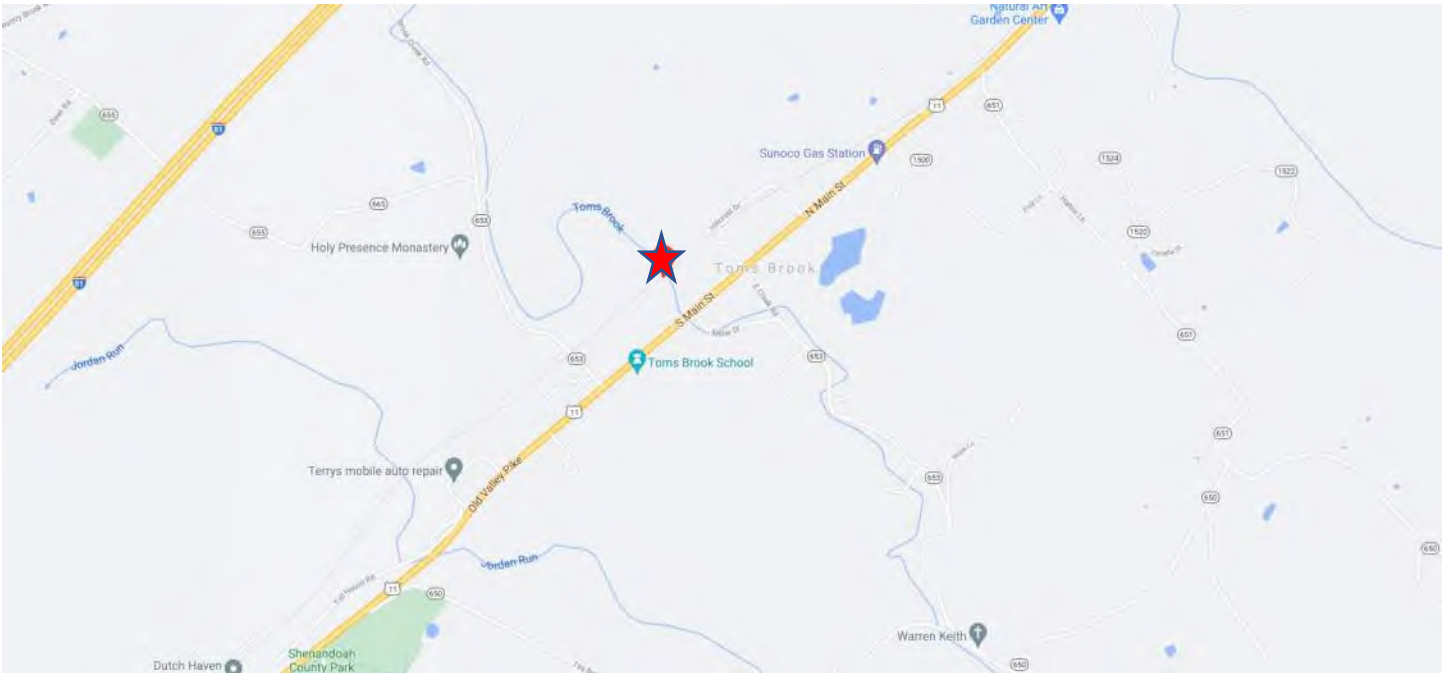


Asset 6765 over Toms Brook
N 38° 56' 46.70", W 78° 26' 33.18"
Twelve Span Steel Girder Bridge, 510'-0"

Location Map

Asset 6765

Date of Inspection: 05/13/2021



Summary

Asset 6765

Date of Inspection: 05/13/2021

Access

Asset 6765 crosses Toms Brook and dense vegetation. Abutment A is located 0.17 miles from the at-grade crossing at Brook Creek Road. Abutment B is located 0.06 miles from the at-grade crossing at Hillcrest Drive. The top of the structure was not safe to cross.

Details of Structure

Asset 6765 is a twelve-span bridge with a total length of approximately 510'. The out-to-out width of the structure was measured at 10'-0". For labeling, Abutment A is on the south end of the bridge. Proceeding west to east girders are numbered G1-G2. Upstream is on the left (west) while looking from Abutment A to Abutment B

The superstructure consists of two steel built-up girders in all spans. Member configuration consists of L-angles that make up girder flanges, plates that make up both the web and top and bottom flanges. Top of deck consists of timber railroad ties typically 12" wide x 12" high.

The substructure consists of two concrete abutments with stone elements, four steel towers supported by concrete footings that support three spans each and three stone wall piers with concrete caps. The steel towers and stone wall piers alternate. Abutments have U-back wing walls.

Summary of Conditions

The condition of the timber railroad ties visible from each abutment are mildly deteriorated. See Photo #1.

In general, the steel superstructure elements are in good condition. Surface rust exists on all steel members. The superstructure exhibits minor to moderate paint failure. At time of inspection no measurable section loss was observed to members. See Photos #2-#3.

Abutment A is in good condition with minor loss of mortar between stones. Abutment A has light erosion on the downstream side and heavy erosion and missing timber beam on the upstream side. See Photos #4-#6.

Pier 1 supports Spans 1-3. Structure is in fair condition with surface rust throughout and scaling at the footings. See Photos #7-#8.

Pier 2 supports Spans 3 and 4. Structure is in good condition with a few areas of missing mortar. See Photo #9.

Piers 3-7 condition assessment could not be obtained due to limited access.

Abutment B has light erosion and missing timber beam on both sides. See Photo #10.

Repair Recommendations

There were no significant structural deficiencies noted during this initial inspection. In our opinion the structure retains sufficient structural capacity to support service as a pedestrian/cycling bridge. An in-depth inspection and subsequent load rating would further inform these conclusions. Specific repair actions recommended include:

- Remove railroad ties.
- Install a suitable transition from the gravel railroad bed at both ends of the structure, including grade transitions and installation of a safety guardrail at the transition to the structure.
- Install a pedestrian railing that meets current safety standards.
- Preparation and paint superstructure.
- Repair erosion areas at both abutments.

Photos

Asset 6765

Date of Inspection: 05/13/2021



Photo #1

Looking south at Abutment A.

Timber railroad ties shown are mildly deteriorated.



Photo #2

Underside of the girders from the downstream side.

Typical girder configuration with failed protective coating and minor surface rust throughout.

Vegetation encroaching on structure.

Photos

Asset 6765

Date of Inspection: 05/13/2021



Photo #3

Underside of the girders from the upstream side.

Typical girder configuration with failed protective coating and minor surface rust throughout.



Photo #4

Abutment A

Abutment is in good condition with few areas of missing mortar.

Photos

Asset 6765

Date of Inspection: 05/13/2021



Photo #5

Abutment A

Upstream side erosion with
missing timber beam.



Photo #6

Abutment A

Downstream side erosion.

Photos

Asset 6765

Date of Inspection: 05/13/2021



Photo #7

Pier 1

Typical steel pier with failed protective coating and minor surface rust throughout.



Photo #8

Pier 1

Second footing on the upstream side with scaling

Photos

Asset 6765

Date of Inspection: 05/13/2021



Photo #9

Pier 2

Stone wall with concrete cap.



Photo #10

Abutment B

Upstream side erosion with missing timber beam.

Appendix G

Asset 6669

Date of Inspection: 05/13/2021

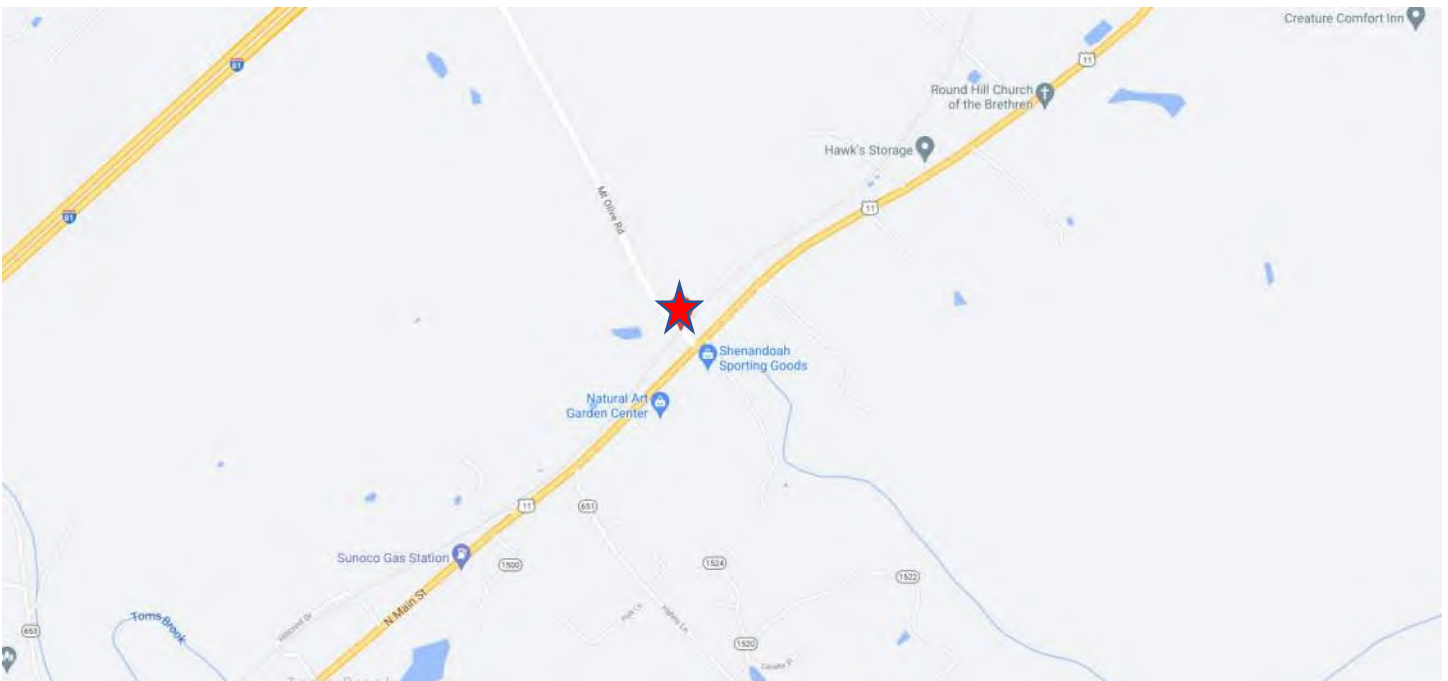


Asset 6669 over Rte 651 Mt Olive Rd
N 38° 57' 17.50", W 78° 25' 43.73"
Three Span Steel Girder Bridge, 127'-0"

Location Map

Asset 6669

Date of Inspection: 05/13/2021



Summary

Asset 6669	Date of Inspection:	05/13/2021
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Access

Asset 6669 over Mt Olive Rd was easily assessed by parking on Mt Olive Rd under the bridge.

Details of Structure

Asset 6669 is a three-span bridge with a total length of approximately 127'-0". The out-to-out width of the structure was measured at 26'-0". For labeling, Abutment A is on the south end of the bridge. Proceeding west to east girders are numbered G1-G7. Interstate 81 is on the left (west) while looking from Abutment A to Abutment B

The superstructure consists of seven rolled steel girders in Spans 1&3 and plate girders in Span 2. Field measurements for the girders in Spans 1 & 3 are: depth = 2'-1", flange width = 12" and flange thickness = 1". Span 2 girders could not be measured but are estimated to be twice as deep as those in Spans 1 & 3. The I-beam diaphragm in the bays of all three spans are riveted to connector plates. Top of deck consists of a concrete deck filled with gravel and timber railroad ties typically 12" wide x 12" high.

The substructure consists of two concrete abutments and two concrete piers. The concrete piers consist of three concrete columns and a concrete cap.

Summary of Conditions

The condition of the timber railroad ties is mildly deteriorated. See Photo #1.

The steel superstructure elements are in good condition with slight paint loss. At time of inspection no measurable section loss was observed to members. See Photos #2-#3.

Abutment A is in good condition with vegetation growth on the slope protection. See Photo #4.

Piers 1 and 2 are in good condition with no noteworthy deficiencies. See Photos #5.

Abutment B is in good condition with the slope protection separated from bearing by 1.5" and settled 2.5". See Photo #6.

Repair Recommendations

There were no significant structural deficiencies noted during this initial inspection. In our opinion the structure retains sufficient structural capacity to support service as a pedestrian/cycling bridge. An in-depth inspection and subsequent load rating would further inform these conclusions. Specific repair actions recommended include:

- Remove railroad ties.
- Remove vegetation from slope protection.
- Install a suitable transition from the gravel railroad bed at both ends of the structure, including grade transitions and installation of a safety guardrail at the transition to the structure.
- Install a pedestrian railing that meets current safety standards.
- Prepare and spot paint the superstructure as needed.

Photos

Asset 6669

Date of Inspection: 05/13/2021



Photo #1

Looking south at Abutment A.

Timber railroad ties shown are mildly deteriorated.



Photo #2

Span 3

Underside of the girders.

Typical girder configuration for Spans 1&3.

Photos

Asset 6669

Date of Inspection: 05/13/2021



Photo #3

Span 2

Underside of the girders.



Photo #4

Abutment A

Vegetation growth on slope protection.

Photos

Asset 6669

Date of Inspection: 05/13/2021



Photo #5

Typical view of Pier 2.



Photo #6

Abutment B

Slope protection separated from bearing 1.5" and settled 2.5".

Appendix G

Asset 6391

Date of Inspection:

05/13/2021



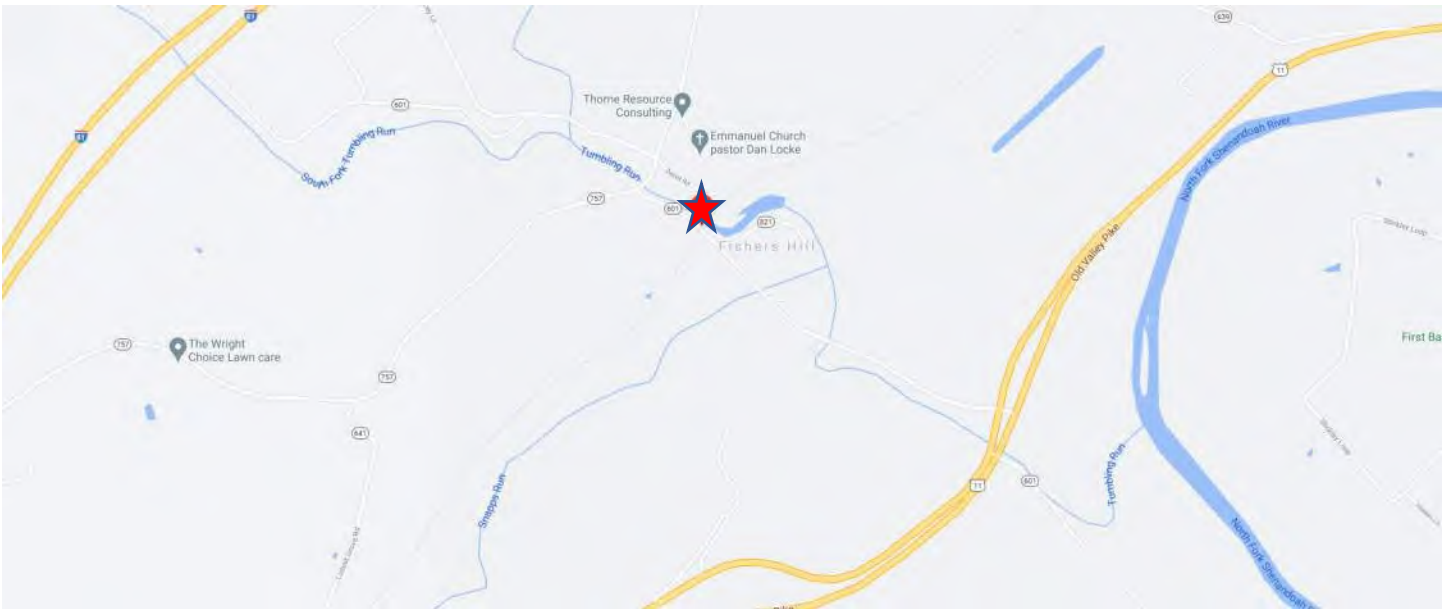
Asset 6391 over Battlefield Rd and Tumbling Run
N 38° 59' 3.73", W 78° 23' 50.09"
Four Span Steel Two Girder Bridge, 262'-0"



Location Map

Asset 6391

Date of Inspection: 05/13/2021



Summary

Asset 6391

Date of Inspection: 05/13/2021

Access

Asset 6391 crosses over Battlefield Rd and Tumbling Run. Abutment A was accessed from Battlefield Rd through heavy vegetation and a steep incline. Abutment B was accessed by a walk down the tracks from a private residence on Church Hill Lane. Top of structure was unsafe to cross.

Details of Structure

Asset 6391 is a four-span bridge with a total span length of approximately 262'-0". The out-to-out width was measured at 10'-0". For labeling, Abutment A is on the south end of the bridge. Proceeding west to east girders are numbered G1-G2. Upstream is on the left (west) while looking from Abutment A to Abutment B

The superstructure consists of two steel built-up girders. Member configuration consists of L-angles that make up girder flanges, plates that make up both the web and top and bottom flanges. Cross frame members are steel angles in a X-pattern. Top of deck consists of timber railroad ties typically 12" wide x 12" high.

The substructure consists of two concrete abutments with masonry elements, two concrete wall piers and one masonry wall pier with concrete top and cap. Abutments have U-back wingwalls.

Summary of Conditions

The condition of the timber railroad ties is mildly deteriorated. See Photo #1.

In general, the steel superstructure elements are in good condition. Surface rust exists on all steel members. The superstructure exhibits trace evidence of paint with no protective value remaining. At time of inspection no measurable section loss was observed to members. See Photos #2-#3.

Abutment A is in good condition with vertical cracking throughout and stone masonry missing mortar. See Photo #4.

Pier 1 is in fair condition with map cracking and heavy efflorescence. See Photo #5.

Pier 2 is in fair condition with areas of missing grout. Separation of stone masonry on upstream side. See Photo #6.

Pier 3 is in fair condition with map cracking and efflorescence. See Photo #7.

Abutment B is in good condition with minor erosion on both sides. Because of the steep slope and heavy vegetation, the condition of the full abutment could not be assessed. There is vegetation growth along the path. See Photo #8 & #9.

Repair Recommendations

There were no significant structural deficiencies noted during this initial inspection. In our opinion the structure retains sufficient structural capacity to support service as a pedestrian/cycling bridge. An in-depth inspection and subsequent load rating would further inform these conclusions. Specific repair actions recommended include:

- Remove railroad ties and install new timber deck planks.
- Perform detailed site assessment and repair/seal any cracks found in abutments and piers and re-grout masonry portions of abutments and pier as needed.
- Install a suitable transition from the gravel railroad bed at both ends of the structure, including grade transitions and installation of a safety guardrail at the transition to the structure.
- Install a pedestrian railing that meets current safety standards.
- Prepare and paint superstructure.
- Repair erosion areas at both abutments.

Photos

Asset 6391

Date of Inspection: 05/13/2021



Photo #1

Looking south at Abutment A.

Timber railroad ties shown are mildly deteriorated.



Photo #2

Span 2

Upstream side looking east.

Photos

Asset 6391

Date of Inspection: 05/13/2021



Photo #3

Span 1

Looking down span.

Typical girder configuration with failed protective coating and minor surface rust throughout.



Photo #4

Abutment A

Abutments are in good condition with few areas of missing mortar and vertical cracking.

Photos

Asset 6391

Date of Inspection: 05/13/2021



Photo #5

Pier 1

At Battlefield Rd looking south.

Map cracking with heavy efflorescence.



Photo #6

Pier 2

Looking north on upstream side.

Map cracking with efflorescence.

Separation of stone masonry.

Photos

Asset 6391

Date of Inspection: 05/13/2021



Photo #7

Pier 3

Looking north on upstream side.

Map cracking efflorescence.



Photo #8

Abutment B

Downstream Wingwall.

Minor erosion

Photos

Asset 6391

Date of Inspection: 05/13/2021



Photo #9

Abutment B

Heavy vegetation along the path.

Additional Trail Bridges - Estimate Costs

Note: Bridges between MP B51.5 and MP B61.0 have current Norfolk Southern bridge inspections and total 872 ft in length. Estimates for bridge trail construction and associated contingency and escalation were calculated by using the average bridge construction per foot calculated from this study.

Bridge Trail Construction Total: \$3,660 per foot

Contingency (25%) + Escalation (5% over 10 years): \$3,505 per foot

Additional Length = 872 feet

Contingency + Escalation

872 feet x \$3,505 per foot = \$3,056,532

Additional Bridge Trail Construction

872 feet x \$3,660 per foot = **\$3,191,520**