BRANDYWINE INDUSTRIAL TRACK:

Structure # 1, **Augustine Road Overpass**

A cursory inspection was performed on December 17th 2004 of the Augustine Road overpass, a multi-span steel truss framed bridge over the Brandywine Creek. This bridge is also over the north terminus of the existing trail section within Brandywine Park.

The bridge appears to be in good condition. A cursory inspection of the bridge did not reveal any immediate dangers to the placement of the proposed trail. The inspection was performed from ground level, which is 75 to 125 feet below the bridge (Fig. 1.1).

It is recommended, if this corridor progresses into a Planning Study, to perform a comprehensive bridge inspection to determine the condition of the trusses and concrete deck slab for the bridge section that is above the proposed trail alignment.

Fig. 1.1- View from below at the northern terminus of the existing trail

Structure # 2, CSX Railroad Bridge Overpass

A cursory inspection was performed on December 17th 2004 of a multi-span stone arched railroad bridge over the Brandywine Creek (Fig. 2.1). The existing trail segment within Brandywine Park currently terminates under this bridge.

The inspection did not reveal any immediate dangers to the placement of the proposed trail under this bridge. The inspection was performed from ground level, which is some 75 to 100 feet below the bridge. Minor cracking and recent repairs to the stone (Fig. 2.2 & 2.3) are located at various locations throughout the structure. The approximate width between the piers (outside face to outside face) is approximately 61' -0" ±.

It is recommended, if this corridor progresses into a Planning Study, to perform a comprehensive bridge inspection to determine the condition of the stone and its mortar joints for the arched bridge section that is above the proposed trail alignment.

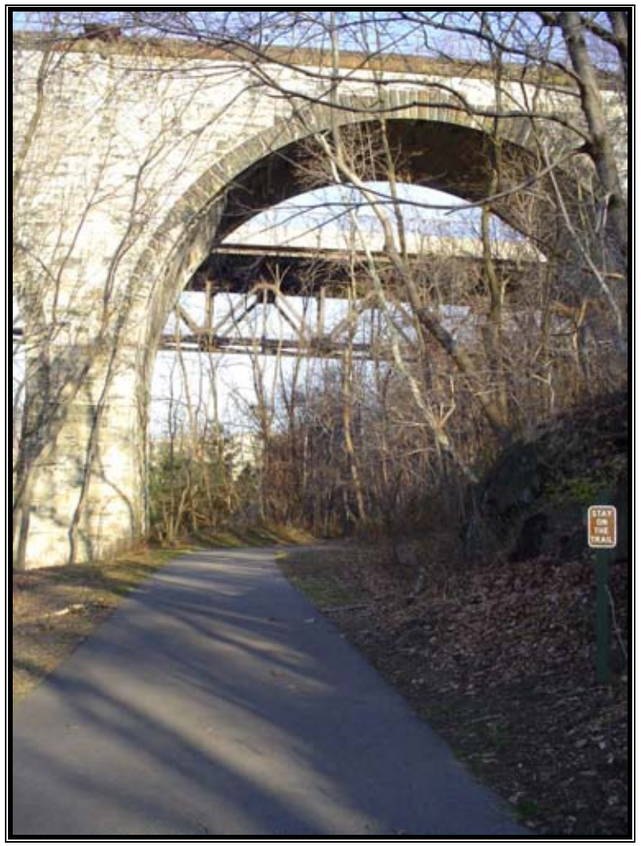

Fig. 2.1- View of stone railroad bridge over the northern terminus of the existing trail

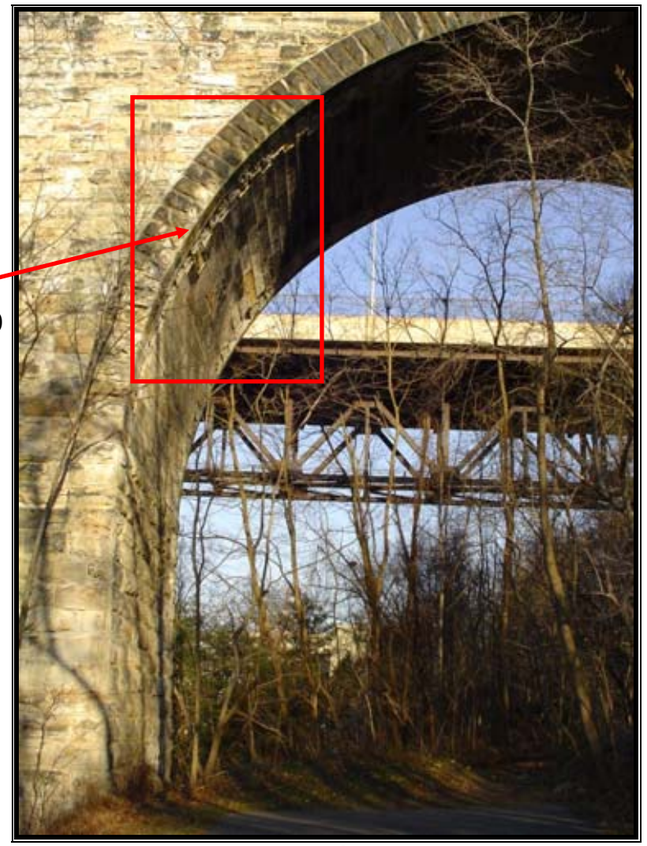

Fig. 2.2- View of arch condition
View from northern terminus of the existing trail

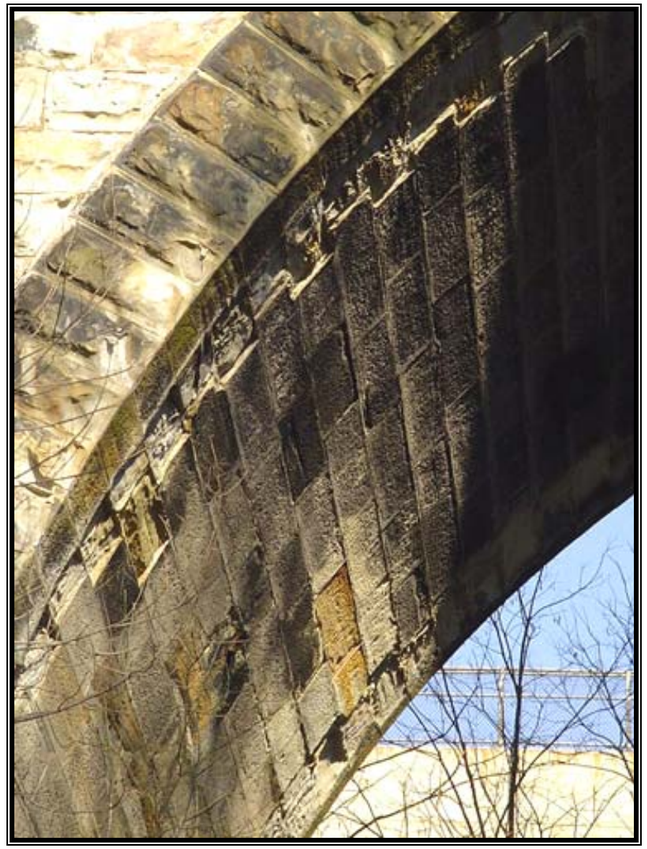

Fig. 2.3- Typical deterioration of stone and repair work

Structure # 3, **Interstate-95 Overpass**

A cursory inspection was performed on December 17th 2004 of Interstate-95, a multi-span steel framed bridge over both Brandywine Creek and the existing trail segment within Brandywine Park.

A visual inspection of the structure did not reveal any immediate dangers to the placement of the proposed trail under this bridge. The visual inspection was from ground level, which is some 75 to 100 feet below the bridge. It appears as if the bridge is relatively new or has been recently rehabilitated (Fig. 3.1).

It is recommended, if this corridor progresses into a Planning Study, to perform a comprehensive bridge inspection to determine the condition of the beams, concrete deck slab, and the concrete surface of the pier for the bridge section that is above the proposed trail alignment.

Fig. 3.1- View of I-95 over existing RTT segment within Brandywine Park

Structure # 4, **Washington Street Bridge Overpass**

A cursory inspection was performed on December 17th 2004 of the Washington Street Bridge, a multi span formed concrete bridge over Brandywine Creek (Fig. 4.1) and the existing rail corridor. The bridge is presently used for vehicular traffic.

The bridge is in fair condition, despite signs of minor deterioration. The concrete has patchwork in various areas and exposed rebar (Fig. 4.2). The exposed rebar is evident from the staining of the concrete (Fig. 4.3). In many places, cracking extends the entire length of the concrete member accompanied by efflorescence (Fig. 4.4). The cracked concrete and evidence of compromised rebar is of concern.

It is recommended, if this corridor progresses into a Planning Study, to perform a comprehensive bridge inspection to determine the condition and repair of the concrete and rebar for the bridge section that is above the proposed trail alignment.

Fig. 4.1- General view of bridge over the Brandywine Creek from rail corridor

Fig. 4.2- Evidence of concrete repair directly over area of proposed trail

Fig. 4.3- Staining of rebar directly over area of proposed trail

Fig. 4.4- Concrete repair with efflorescence

ELLENDALE-MILTON INDUSTRIAL TRACK:

Structure # 5, West Railroad Bridge over Pemberton Branch

A cursory inspection was performed on November 4th 2004 of a 6 span timber railroad bridge over Pemberton Branch. The spans vary in length from 9'-9" ± to 12'-0" ± numbered sequentially from west to east, respectively.

The superstructure is in good to fair condition with no major signs of deterioration. The superstructure consists of approximately 0'-7" ± square beams spaced 0'-9" ±. Curbs on the bridge are made from similar sized timber. The overall width is 10'-4" ± and overall length is 67'-4" ± from centerline of west abutment to centerline of east abutment.

The girders and piers are in fair condition. The substructure consists of six girders, consisting of three timbers each measuring 0'-10" wide by 1'-4" deep, evenly distributed over the abutments and piers. The piers consist of timber caps above five timber piles, two battered and three straight (Fig. 5.1). The substructure shows signs of wear, due to weathering of timber members. The piers have various repairs to the piles. Pile repairs consisted of fiberglass jacketing and steel banding (Fig. 5.2 and 5.3). The piers are supported by typical cross bracing (Fig. 5.4). Additionally, the cross bracing has been repaired in several locations using banding at the ends (Fig. 5.5).

The abutments are in poor condition. The abutments are made of large timber lagging against piles. There is evidence of moderate to severe rot in the abutments. The wing walls have severe rot, including holes 5 inches in diameter and 2.5 deep into lagging (Fig. 5.6 and 5.7). Evidence on insect infestation is present in the form of "mud tubes" which are common to Termites.

It is recommended, if this corridor progresses into a Planning Study, to perform a comprehensive bridge inspection to determine the condition and extent of the required repairs. This cursory inspection and evaluation yields that many of the wood beams need to be treated and conditioned and several of the large timbers, at the bridge abutments, should be replaced. Additionally, further investigation should be conducted to determine the condition of the piles, piers, pile jacketing/ banding, and to determine the capability of supporting the vehicular load of an emergency vehicle after bridge improvements and bridge/ trail modifications have been made to accommodate a RTT facility.

Fig. 5.1- Typical pier arrangement

Fig. 5.2- Jacketing around pile 1 at pier 5

Fig. 5.3- Jacketing at pier 2

Fig. 5.4- Typical cross bracing between piers

Fig. 5.5- Banding on cross bracing at pier 4

Fig. 5.6- Rot in wing wall 2’6” deep

Fig. 5.7- Rot in wing wall 5 inches

Structure # 6, **East Railroad Bridge over Ingram Branch**

A cursory inspection was performed on November 4th 2004 of an 8 span timber railroad bridge over Ingram Branch. The spans vary in length from 9 feet ± to 13 feet ± numbered sequentially from west to east, respectively.

The superstructure is in good to fair condition with no major signs of deterioration. The superstructure consists of approximately 0'-7" ± square beams spaced 0'-9" ±. Curbs on the bridge are made from similar sized timber. The overall width is 10'-4" ± and overall length is 93'-1" ± from centerline of the west abutment to centerline of the east abutment.

The girders and piers are in fair condition. The substructure consists of six girders, consisting of three timbers each measuring 0'-10" wide by 1'-4" deep, evenly distributed over the abutments and piers. The piers consist of timber caps above five timber piles, two battered and three straight (Fig. 6.1). The substructure shows signs of wear, due to weathering of timber members. The piers seem to be in good shape and show no visual signs of deterioration.

The abutments are in poor condition. The abutments are made of large timber lagging against piles (Fig. 6.2). There is evidence of moderate to severe rot in the abutments (Fig.6.3). The wing walls show evidence of past repairs (Fig. 6.4). Some lagging will need to be replaced, due to significant rot. There is evidence on insect infestation, in the form of "mud tubes" which are common to Termites (Fig. 6.5). In addition, the west abutment has an exposed timber aiding the slope protection. This timber has been undermined with moderate erosion (Fig. 6.6). A metal tag on pier 7 indicates that the structure had been rebuilt in 1988 by Osmose (Fig. 6.7).

It is recommended, if this corridor progresses into a Planning Study, to perform a comprehensive bridge inspection to determine the condition and extent of the required repairs. This cursory inspection and evaluation yields that many of the wood beams need to be treated and conditioned and several of the large timbers, at the bridge abutments, should be replaced. Additionally, further investigation should be conducted to determine the condition of the piles, piers, and to determine the capability of supporting the vehicular load of an emergency vehicle after bridge improvements and bridge modifications have been made to accommodate a RTT facility.

Fig. 6.1- Typical Pier

Fig. 6.2- Typical abutment

Fig. 6.3- Typical wing wall timber deterioration

Fig. 6.4- Typical repair on abutment

Fig. 6.5- Evidence of insect infestation

Fig. 6.6- Timber used for slope protection

Fig. 6.7- Metal tag on pier 7, indicating when the structure was rebuilt

CLAYTON-EASTON LINE:

Structure # 7, **Railroad Bridge over Harrington Beaverdam Ditch in Marydel**

A cursory inspection was performed on November 4th 2004 of the remains of a concrete structure at Harrington Beaverdam Ditch. A concrete stamp in the culvert suggests this structure was constructed in 1914. The approximate length of superstructure is 70'-0" ±. The approximate width of super structure is 25'-9" ±. The span over the stream no longer exists. The site contains several large pieces of concrete scattered around the site. The approximate distance from top of the existing culvert to the water level is 14'-2" ±. Stream flow is north to south.

The location and orientation of the culvert suggests the stream ran through this structure at one time. Today, the stream runs west of the culvert, with the top of water below the elevation of the riprap in the culvert (Fig. 7.1). Many structural defects such as major cracking, differential footing settlement, major spalling of concrete, efflorescence in concrete, and scoured out foundation, have rendered this structure unusable.

The north face west wing wall is directly in the path of the stream flow, which has lead to significant scour (Fig. 7.2). Differential settlement at the south face east wing wall (Fig. 7.3) has cracked and separated the wing wall (Fig. 7.4). The site contains remnants of timber piles, located along the west bank of the stream and inside the culvert.

The structure is unusable in its present state, due to the deterioration and missing span over the stream. It is recommended, if this corridor progresses into a Planning Study, that this structure be removed and a new and independent RTT bridge structure be provided.

Fig. 7.1- South elevation

Fig. 7.2- North face –west wing wall directly in path of steam

Fig. 7.3- Cracked south face – east wing wall

Fig. 7.4- Differential settlement at south face – east wing wall

KENTMERE TRACK:

Structure # 8, Railroad Tunnel West of Rising Sun Lane

A cursory inspection was performed on December 17th 2004 of a simply supported concrete and stone railroad tunnel. The length is approximately 241'- 0" ± in length and 32'- 0" ± in width spanning north to south. The height is approximately 27'- 0" ± tall from ground to bottom of concrete girders. The concrete girders are approximately 3'- 0" ± in depth with approximately a 0'- 9" ± of earth on the top of the structure (Fig. 8.1).

The superstructure is in fair condition. The superstructure consists of simply supported T-shaped concrete girders with a layer of earth above. The girders seem to be in fair condition despite cracking and efflorescence (Fig. 8.2). Located on the exterior of the north abutment, an existing staircase is deteriorated. The staircase is in poor condition and will need to be restricted from use, by trail users, or removed (Fig. 8.3). The top of the structure is an earthen covering with a well managed turf surface (Fig. 8.4), which appears to be maintained by the adjoining residence.

The abutments are in fair to poor condition. The abutments are made of large stone. The stone appears to be in fair condition despite large amounts of efflorescence (Fig. 8.5). The joints of the stone are in fair to poor condition with some evidence of repair. Vegetation is also growing, in locations, within the rock and joints of the abutments. A large amount of debris lines the south abutment. The abutments on the north side are stabilized with buttresses (Fig. 8.6). The bearings for this tunnel were not visible and condition is unknown.

If this corridor progresses into a Planning Study then the following recommendations are: the abutments need to be repaired as needed which include crack and mortar repair; the staircase on the north abutment will need extensive repair or replacement if it is to function as a usable staircase; it is recommended that the staircase is to be closed off to public access if it is not to be repaired; additionally, it is necessary to conduct a more comprehensive inspection to provide a more accurate condition in determining the usability of this tunnel.

Fig. 8.1- West end of tunnel

Fig. 8.2- Typical exterior beam cracking and efflorescence on west end

Fig. 8.3- Deteriorated stair case on north abutment

Fig. 8.4- Tunnel roof with maintained turf, view from west

Fig. 8.5- Heavy efflorescence on south abutment – west end

Fig. 8.6- North abutment with buttress

Structure # 9, **Railroad Bridge over Rising Sun Lane**

A cursory inspection was performed on December 17th 2004 of a single span steel railroad bridge along, the Kentmere Track, over Rising Sun Lane. The span is approximately 47'-0" in length and 18'-6" in width spanning east to west, respectively. The clearance under the bridge is of concern; the approximate existing minimum clearance is 15'-6" (Fig.9.1).

The superstructure is in fair to poor condition. The superstructure consists of simply supported steel girders on concrete and stone abutments. The girders seem to be in fair shape despite damage from vehicles and heavy rust. vehicle damage is located on the south face of the exterior beam in the northbound lane (Fig. 9.2). The heavy rust is evident throughout the structure from the parapet to the beams and diaphragms (Fig. 9.3). There is flaking of what resembles lead based paint on all the steel components of the bridge. The deck is made from timbers approximately 0'-7" square. These timbers are rotted with vegetation growing within. In addition, there is a large amount of debris on the superstructure (Fig. 9.4).

The abutments are in poor condition. The abutments are primarily made of large stone (Fig. 9.5 & 9.6). The stone appears to be in good condition; however the joinery of the stone is in poor condition. Many joints are non existent, or have been repaired and again are compromised (Fig. 9.7). The abutment seat is cast in place concrete that has severe cracking. This raises a concern of the bearing of the girders on the present bearing seat.

The wing walls on the East abutment are in poor condition. The north wing wall on the east abutment is made of heavy timber (Fig. 9.8). The timbers are severely rotted (Fig. 9.9) along with vegetation growing within. The South wing wall on the east abutment appears to have been replaced, due to the wing wall being constructed of cast in place concrete (Fig. 9.10) rather than heavy timber or stone. Repaired concrete at the joint of this wing wall and the east abutment is now failing (Fig. 9.11). The wing walls on the west side are made of the same large stone as the abutment and show signs of the same types deterioration. The bearings for this bridge were not visible and condition is unknown.

If this corridor progresses into a Planning Study then the following recommendations are: evaluate and make necessary repairs to the abutments; the east wing walls will need extensive work if not replacement; the superstructure steel will need proper removal of potential lead paint chips and a proper determination of the condition of the steel; the deck requires complete replacement; additionally, it is necessary to conduct a comprehensive inspection to provide a more accurate condition and to determine the capacity to support the vehicular load of an emergency vehicle.

Fig. 9.1- South elevation

Fig. 9.2- Evidence of vehicular damage on south exterior girder

Fig. 9.3- Typical rust and paint flaking at strut and exterior beam

Fig. 9.4- View of superstructure from east

Fig. 9.5- East abutment

Fig. 9.6- West abutment

Fig. 9.7- Typical mortar joint damage

Fig. 9.8- North wing wall at east abutment

Fig. 9.9- Bowed north wing wall

Fig. 9.10- South wing wall

Fig. 9.11- Compromised repair at south wing wall - east abutment

Structure # 10, **Railroad Bridge (abutments only) over Rockford Road**

A cursory inspection was performed, on December 17th 2004, of the remnants of a railroad bridge over Rockford Road and only the original abutments remain. The abutments are oriented in an east to west direction. The distance between the two abutments is several hundred feet in length. The west abutment is extremely close in proximity to an access road leading to several private properties along Brandywine Falls Road. The east abutment is in the middle of a small business park. Clearance issues may occur with the roadways below if a structure were to be reconstructed in this same location.

The abutments are in fair to poor condition (Fig.10.1 & 10.2). The widths at the top of the abutments are approximately 8'- 6" ±. Due to neglect, the abutments are in need of repair. The timber wing walls on the east abutment are rotted. The joints of the west abutment are deteriorated and crumbling. However, the stone appears to be in good condition.

It is recommended, if this corridor progresses into a Planning Study, to perform a more comprehensive bridge inspection to more accurately assess the condition of mortar joints, stone, and load capacity. Additionally, in many locations the stone will have to be re-pointed and set to ensure proper fixity.

Fig. 10.1- East abutment

Fig. 10.2- West abutment