City of Havre de Grace

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Susquehanna River Rail Bridge Project
Advisory Board
Of the Mayor and City Council

Advisory Bulletin #13
Safe Pedestrian and Bicycle River Crossing
January 28, 2015

Background

The Advisory Board met on December 4, 2014 and again on January 15 and 27, 2015 to engage in a comprehensive study of the various ways to effect a safe pedestrian and bicycle crossing of the Susquehanna River. This study was undertaken at the request of the Mayor and City Council of Havre de Grace as a result of recent proposals and other efforts to incorporate such a crossing into the design of the proposed Amtrak rail bridge replacement.

The Board expanded this study to include eleven potential ways of conducting pedestrians and bicyclists across the river in a timely, dependable and reliable manner, with special emphasis on closing the Susquehanna River "gap" in existing regional and East Coast Greenway trail systems, as well as connecting components of the Lower Susquehanna Heritage Greenway trail system. The eleven crossing options that were studied all include bicyclists and are captioned:

1. Convert the Existing Amtrak Rail Bridge to Pedestrian Use
2. Incorporate a Pedestrian Walkway into the Proposed Amtrak Rail Bridge
3. Install an Independent Pedestrian Bridge alongside the Proposed Amtrak Rail Bridge
4. Install an Independent Pedestrian Bridge on the Line of Abandoned Piers beyond Craig Park
5. Attach a Pedestrian Bridge to the Route 40 Hatem Bridge
6. Install an Independent Pedestrian Bridge across Garrett Island
7. Attach a Pedestrian Bridge to the CSX Rail Bridge
8. Attach a Pedestrian Bridge to the I-95 Tydings Bridge
9. Install an Independent Bridge at Susquehanna State Park
10. Establish a Regularly Scheduled Water Taxi System
11. Establish a Land-Based Shuttle System

The Board identified a wide range of issues and concerns that would likely be associated with this collective list of crossing options, and examined each issue in great detail. These issues were then applied to each crossing option to determine advantages, disadvantages, fatal flaws and other practical effects that should reasonably be expected. Each of these issues and concerns are explained in detail in Attachment A. The Board did not attempt to estimate project costs or to give weight to its recommendations based on actual cost comparisons.

Although several pedestrian crossing studies have been produced within the past decade or two by several interests, the Board found them to be lacking in detail as to why a particular option was not feasible or not possible, other than to mention existing statutes and public policy statements or to declare overall structure to be unsuitable for the purpose. These may be valid conclusions in the broad sense, but the Board sensed that the general public, special interest groups, and local officials would need to know in much greater detail why one option is truly feasible and the other is not. A detailed analysis of every crossing option under consideration in this advisory bulletin is provided in Attachment B.

Past crossing studies did not include as many crossing options as provided here, and were not timed to foresee the impact and potential opportunities associated with the Amtrak rail bridge replacement project. It is hoped that this study and analysis will be of great value in reducing future discussions and initiatives to practical and feasible river crossings.

River Crossing Recommendations

The Advisory Board has determined that "Option #9 – Install an Independent Bridge at Susquehanna State Park" best meets the primary purpose of a pedestrian and bicycle crossing, while preserving public safety and security, providing an excellent crossing experience, and efficiently connecting with the existing lower Susquehanna River trail systems. There appear to be no significant physical barriers or other difficult circumstances to overcome with regard to this option.

The Board prefers "Option #3 – Install an Independent Pedestrian Bridge alongside the Proposed Amtrak Rail Bridge" as its second choice, provided that the enormous cost issue can be overcome. This option may be more convenient to current routing of the East Coast Greenway, could offer greater use and enjoyment opportunities by the general public, is safer than all remaining bridge options, and would be an economic and tourism driver for Havre de Grace and Perryville.

The Board sees "Option #10 – Establish a Regularly Scheduled Water Taxi System" as the third best option. Even though it provides a very different crossing experience and would involve delays for hikers and bicyclists, this very safe option would offer tourism opportunities and local cruise services not available under any other option. Capital and operational costs are the main drawback, and would require a large public subsidy to remain viable.

The fourth best option would be "Option #6 – Install an Independent Pedestrian Bridge across Garrett Island". As with the other two independent bridge options, this provides a good crossing experience without exposure to transportation dangers or homeland security issues. The location would be nearly as favorable as Option #2, and the bridge would have a significant impact on tourism in Havre de Grace and Perryville. Its very long bridge and approach length, along with personal security concerns, make this somewhat less feasible than the first three options listed above.

The fifth choice of the Board, "Option #7 – Attach a Pedestrian Bridge to the CSX Rail Bridge", is much less feasible and practical than the first four choices, due to the significant public safety, homeland security, and liability issues associated with it. If these issues could be mitigated to every possible extent this would be a very efficient crossing in terms of capital cost, overall accessibility and long-term maintenance. It would also offer a fairly impressive and occasionally very exciting crossing experience.

Five of the remaining six options were found to be entirely impractical or unfeasible, with several having fatal flaws that render them nearly impossible. Those are not recommended for further consideration. The last option, "Option #11 – Establish a Land-Based Shuttle System", is entirely feasible and much less expensive than a water taxi operation, but would be little more than an inter-community public bus service. This option could serve as an interim solution to the need for a crossing.

Recommended Action

The Advisory Board requests that the Mayor and City Council take necessary steps to consolidate these or similar recommendations into a formal communication to the SRRBP Project Team and to all parties, agencies, and stakeholders associated with a pedestrian/bicycle trail crossing as soon as possible.

Respectfully submitted,

Volney H. Ford
Chairman

Attachment A In-depth Presentation of Safe Crossing Issues
Attachment B In-depth Analysis of Safe Crossing Options

Susquehanna River Rail Bridge Crossing Advisory Board
Advisory Bulletin #13
Safe Pedestrian and Bicycle River Crossing

Attachment A
In-depth Presentation of Safe Crossing Issues

Overview

An in-depth study and analysis of a safe, practical, and feasible means of conducting pedestrians and bicyclists across the lower Susquehanna River requires an examination of all contributing factors from two parallel points of view. First, one must consider the public safety, public accessibility, and general maintenance issues associated with any particular crossing option. Second, each crossing option must be considered as having unique physical characteristics and constraints that may be significantly or profoundly affected by these same safety, accessibility and maintenance issues.

The following specific issues and concerns were found to impact most of the crossing options, and have formed the basis of opinions and conclusions developed by the Advisory Board with regard to each crossing option discussed in Attachment B. It is hoped that the foregoing discussion of issues will further educate and enlighten the public, elected officials, and the trail-using communities with regard to all issues relating to a safe and practical pedestrian crossing of the Susquehanna River.

Crossing Design

The design of a fixed pedestrian bridge, whether attached to an existing or proposed rail/highway bridge or constructed independently, should be at least twelve feet wide and ideally up to twenty feet in width, to safely accommodate pedestrians, bicyclists, three-wheeled bicycles, kayaks in tow, and lightweight service and emergency vehicles. There should also be enough room for a lightweight service or emergency vehicle to safely pass pedestrians and bicyclists on the bridge.

The design live-load rating of the bridge should be sufficient to support a dense congregation of users, such as a walk-a-thon event, a large standing assembly of people observing an event beyond the bridge, a close pack of marathon runners, or even a large crowd of people fleeing in panic. The minimum height of any type of overhead enclosure system that may be required for safety should be at least ten feet, and preferably twelve feet or more in proportion to walkway width.

ADA Accessibility Requirements

A fixed pedestrian bridge across the Susquehanna River will surely be classified as a public facility and as a pedestrian way, under the Americans with Disabilities Act, with no allowance for special waivers. The current law provides that the entire pedestrian bridge, along with its access points and approaches, must comply with maximum allowable grade requirements and barrier-free conditions, all the way to ground-level handicap parking spaces at each end. No slope along the entire path of travel can exceed twelve inches of rise in twelve feet of run, and no slope can run more than twenty-five feet in length without a five-foot insertion of level walkway. Putting this into perspective, an ADA-compliant path of travel rising ten feet would require a combination of ramp and level sections extending one-hundred forty feet in length.

Each end of the pedestrian bridge and its ADA-compliant approach walkways would require a public parking lot having paved handicap parking spaces that are located closer to the walkway entry points than other parking spaces serving the bridge. This requirement could become problematic where persons without disability would be able to exit an elevated bridge landing by going immediately down a stairway to a non-ADA-accessible parking area at the base of the abutment, while the handicapped would be obliged to travel a far greater distance to a different accessible parking area.

While ADA accessibility would not be an issue along a nearly level bridge deck and landing area, it would become a significant to severe design challenge at many existing bridge landings, and along potential walkway routes within existing bridge structure that encounter sudden vertical misalignments. Specific accessibility issues will be discussed under crossing options provided in Attachment B.

Bridge Landing Access

The pedestrian bridge, whether attached to another bridge or constructed independently, will require a public parking lot at each end, located as close as practical to the bridge entry point for public safety, emergency response, handicap accessibility, and custodial service. The required number of parking spaces will be determined by the code enforcement authorities having jurisdiction, based on their interpretation of bridge use and occupancy. Parking lots and access lanes or roads will be subject to the usual regulations on paving, landscaping, stormwater management, critical area, and other site requirements.

Each parking lot will require access by a two-way paved road or driveway leading to existing public roads or streets. Some existing bridge landing locations are convenient to nearby public streets and some have no access at all within hundreds of yards or much farther. Many landing locations are severely encumbered with private property, steep slopes and cliffs, railroad/highway operations, and elevated abutments. These conditions will be specifically examined under crossing options provided in Attachment B.

Bridge Carriage

A new pedestrian/bicycle bridge must either be carried independently, or in conjunction with an existing or proposed rail/highway bridge. As recommended above, such a bridge or incorporated walkway should be twelve to twenty feet in width, and would require a very significant live load rating. With the potential of large numbers of people and light emergency vehicles on the bridge, its loading could easily approach that of a two-lane vehicular bridge serving all but heavy trucks.

If incorporated with an existing or proposed rail/highway bridge, there are essentially three ways the pedestrian bridge can be carried: a) extended in cantilever alongside the host bridge, b) on the deck of the host bridge, or c) within or below the understructure of the host bridge. In rare cases it could be carried as an elevated bridge over the existing road/railway, which is not considered feasible with regard to the bridges of this study.

A cantilevered pedestrian bridge causes the host bridge to be eccentrically loaded (much more weight on one side) and greatly leverages that load by virtue of its being extended so far outward from the central structure. Conversely, structural flexure and vibration of the host bridge caused by passage of heavy traffic is greatly magnified at the outer edges of the cantilever. Such conditions could only be mitigated by strengthening the entire cross-structure and counterweighting the opposite side of the host bridge, which in turn would require major upgrading of the entire bridge span structure. In addition, a cantilevered pedestrian deck with its safety enclosure would greatly impede routine bridge inspection and repair, as truck-mounted inspection booms would need to reach over, around, and under the walkway enclosure to get at the host bridge understructure.

A pedestrian bridge located on the existing deck or bearing structure of a host bridge is ideal from a structural perspective, and would unquestionably be the least expensive to construct and maintain, provided such a deckway were available and currently not in use. The primary concerns would be proximity to existing rail/vehicular traffic and the elimination or preemption of an active vehicular lane or railroad track.

Carriage of a pedestrian bridge through or within the existing structure of a host bridge immediately raises concerns about river navigation clearance, structural capacity, conflict with existing structural members, and interference with host bridge maintenance. Even though a central axis of loading could be more or less maintained, individual components of the host bridge structure, including cross-structure and bracing, would require major strengthening and redesign to accept a radically different directional loading imposed by the pedestrian bridge.

A cursory examination of all four existing rail/highway bridges reveals that the primary structure, cross-structure, bracing, and pier configurations have such exceptional variation or are so congested with cross-structure and bracing from one end to the other that it is very difficult, if not impossible, to pass a pedestrian bridge deck cleanly through without abrupt changes in elevation or sudden offsets in the path of travel. Arched-truss spans in particular result in cross-structures that climb and descend at rates that well-exceed ADA ramp limitations.

A pedestrian bridge can be carried under a host bridge by means of suspension cables from the primary structure, provided that sufficient river navigation clearance is maintained, the host bridge structure is upgraded and modified to carry the load, and the pedestrian bridge is strengthened or braced to resist sway. Host bridge modifications to accept this configuration would be extensive and very costly, if at all practical or even possible.

A pedestrian bridge can be carried directly on the host bridge piers without imposing any loads on the host bridge structure, provided that sufficient river navigation clearance can be maintained. The overriding difficulties with this option are available pier-top bearing area, conflict with host bridge cross-structure at the piers, and uneven pier elevations. Pier-to-pier spans of the pedestrian bridge would in most cases be very long, requiring huge span beams and robust sway-bracing that would be greatly out of proportion to the pedestrian bridge architecture.

Navigational Clearances

The SRRBP Project Team, with U. S. Coast Guard concurrence, is recommending a sixty-foot minimum bridge clearance above mean high tide for the proposed Susquehanna River Rail (Amtrak) Bridge. The Board prefers a sixty-five-foot clearance here, and recommends a minimum twenty-foot clearance above normal river level beyond navigable waters, in the vicinity of Rock Run Mill. This upriver clearance would allow for a maximum flood-stage river level with large debris floating on the surface.

When considering any pier-to-pier, cable-suspended, or host-structure-attached pedestrian bridge option, or an independent pedestrian bridge, the underside must maintain sufficient clearance above water, whether over the main channel of navigation or elsewhere. All bridges upriver of the existing Amtrak bridge currently have higher clearances over the main channels that it does, either due to very high natural landings or by use of through-truss spans. Although some of these span clearances would be reduced by installing a pedestrian bridge directly underneath, in no case should they be lower than the USCG inland waterway standard of sixty-five feet, even though the proposed new Amtrak bridge may be approved for a sixty-foot clearance.

Safety Enclosures

If a new pedestrian/bicycle bridge is constructed as part of a host bridge, or as an independent bridge above navigable waters, public policy and regulations will surely require that the entire elevated walkway be provided with a continuous guard system sufficient to prevent rail/highway objects from striking pedestrians, prevent cyclists from pitching over the side, prevent bridge users from dropping or throwing objects off the bridge, and deter suicide attempts. If the pedestrian pathway is aligned under an existing bridge deck, protection from falling objects and hazardous liquids must also be ensured.

Safety enclosures will vary in design depending on the nature of danger threats and height above ground or water. Any high-elevation walkway can be expected to require guards at least eight feet in height if not enclosed completely over the top. Enclosures may also require very small diameter openings in the guard matrix or fabric to prevent dropping of stones on boaters or extending objects toward adjacent vehicles or trains. It should be noted that the more effective a safety enclosure design is, the more unsightly and tunnel-like it will appear, and the more disappointing the crossing experience will become, especially with regard to panoramic view and photography.

Bridge Movement

Steel bridge structures tend to be very flexible in conditions of high wind and under rapid movement of heavy trucks and trains. With freight traffic, a railroad bridge span is subjected to individual carloads and locomotives of less than one-hundred feet each, passing at speeds of up to sixty miles-per-hour, and weighing between 80,000 and 450,000 pounds each. A typical six-lane highway bridge can routinely experience as many as twelve tractor-trailers and dump trucks at once per span, weighing 50,000 to 80,000 pounds each and moving seventy miles-per-hour.

Depending on where and how a pedestrian bridge is carried by a host bridge, sudden and intense movements of the steel structure can be quite disconcerting and often terrifying to the user. A side-cantilever pedestrian bridge would significantly magnify this problem, being similar to a person sitting at the end of a diving board as another person jumps on it farther back. Steel bridge structure is said to be a "very living thing", with intentionally designed flexibility and movement that can be quite shocking to the lay person.

Normal expansion and contraction of bridge components, especially at isolation joints between spans, can be a serious danger to unaware bridge users, especially children and bicyclists. We think of such movement as gradual with temperature change, and therefore non-threatening. In reality, some joints and connections can remain "stuck" in one position until tension and compression forces build enough to overcome static friction, then release suddenly and unexpectedly. Movement issues will be further discussed under crossing options provided in Attachment B.

Vehicular Traffic Dangers

Locating a pedestrian and bicycle pathway directly alongside a lane of highway traffic traveling at speeds of 65 to 80 miles-per-hour, even with a concrete Jersey wall barrier in between, offers little protection from road spray, high-speed accidents, break-away loads from truck crashes, and truck flip-overs from high wind. There is also danger to a bridge user who would cross the barrier into a lane of traffic for any reason, even if responding to a vehicular accident. High-speed snow plowing operations can create pathway blockages and can seriously injure a pedestrian on the bridge, even with a strong chain link barrier in place.

Placing a pedestrian bridge in cantilever offers a bit more protection if the walkway elevation is lower than the main bridge deck and if it is heavily protected with an enclosed guard system. There remains little protection from road spray and plow-thrown snow, however. Snow plowing accumulation can overload the cantilevered walkway, block its use for weeks, and damage its guard enclosure system.

Rail Traffic Dangers

A pedestrian walkway system that is located on a railway deck, cantilevered alongside it, or even cantilevered several feet below it is subject to a wide assortment of dangers, particularly at higher speed freight operations and very high speed passenger operations. Train operators seldom have the ability to react to fast-developing equipment or load failures as they occur, and often do not know they are happening until much damage is done or the train has ground to an emergency stop.

A pedestrian or bicyclist on a host railroad bridge is essentially a person who is much too close to a moving train under any circumstances, whether on land or bridge. Aside from derailment, the greatest dangers to a person standing close to a moving train at significant speed are dragging equipment or shifted carload. A good example of dragging equipment is a broken load chain or load strap, which can whip by unseen, many feet beyond the train car, with fatal results. Chains and shifted loads have been known to tear out several hundred feet of barrier fencing without the train operator being aware of it while happening.

Other proximity dangers include pressure-thrown ballast stones, leaking hazardous materials, thrown snow and ice (most locomotives have plows at the front), car-top breakaways of sheet ice, unsecured or falling train car equipment, and so forth. Most of these dangers cannot be resisted with any certainty by the most robust chain link enclosures, due to the overwhelming dynamic forces of a train in motion. The pedestrian would not be in a reasonably safe environment unless train speeds were drastically limited and sophisticated dragging equipment detectors were installed at both bridge approaches.

Although derailments are significantly controlled (kept within rail alignment) on bridges by a pair of guard rails within the track rails, cars can separate and tip over at speed, sometimes causing open loads to break loose, tank cars to be punctured, and open hopper cars to spill hundreds of tons. Such accidents occur quickly and dramatically, with so much noise and confusion, and with so many transferred impacts that a bridge pedestrian often cannot decide which way to flee until it is too late. Hazardous cargo poses a special danger in these situations, as wind direction, deadly chemicals, and intense fire or explosions become factors, and the pedestrian is left with only two long and narrow directions in which to flee the scene.

Very high speed trains and electrified railways present an additional set of dangers. Trains passing close by at speeds of 120-150 miles-per-hour create a "bow wave" and a terminal suction that can throw a pedestrian or bicyclist to the ground. Airborne objects, such as ballast stones and simple debris can produce serious injuries unless a nearly solid barrier fence is installed. Overhead electrification, which includes catenary and high transmission lines, carry very high voltages that can "leap" a significant distance to a grounding source without direct contact. Live catenary has been known to break and dangle without shutting down the system. A full metal grounded enclosure, extending well above the head of a bicyclist, would be necessary to protect bridge users from potential electrocution.

Personal Security

In addition to the many traffic dangers described above, the bridge user is exposed to personal dangers associated with two features of a pedestrian crossing of the Susquehanna River. First and foremost is the sheer length of the crossing which, taking into account landing distance to a parking area at each end, would be about a mile. Second, a high or fully-enclosed safety guard system, even if made with open-weave chain link fabric, is nearly impossible to see through at a shallow angle, such as from the shoreline.

In the event a user is accosted or attacked by another person some distance out on the span, the victim simply cannot be seen or heard from shore, especially when vehicular or rail traffic is nearby. The adage "safety in numbers" would certainly apply during periods of significant bridge use; however, there would be many times when only one or two users are present, and the bridge will often be vacant. When accosted, the unfortunate user can only flee to the closest landing, and the perpetrator can safely exit the other end, particularly on a bicycle, before the situation is known to others and/or authorities can respond.

Proximity of a pedestrian/bicycle bridge to urban areas offers convenience of access and increases the number of potential users, but it also tends to increase temptation, convenience and opportunity for unlawful persons, especially when a troubled neighborhood area is within easy walking distance. Personal security and fear of attack have become major issues in urban settings where much shorter pedestrian overpasses and tunnels exist. Well-placed and concealed security cameras with full-time monitoring should be installed and will help in many ways, but time and distance remains a critical disadvantage.

Personal Emergencies

Emergencies resulting from foul play, accidents or illness present the same problems of plea for aid and awareness by others, again due to bridge length and sight restriction. A person in real distress is usually incapable of moving off the bridge, and often incapable of shouting for help, having no other option but to hope for another person to appear on the scene. Factors that help mitigate such situations on a mile-long bridge are frequency and numbers of users, openness of the guard system, cell phones, security cameras, and perhaps a system of emergency telephones.

Emergency response measures would need to be specially tailored and well-practiced for the unusual characteristics of a mile-long pedestrian bridge, especially if it is not readily accessible from an adjacent vehicular lane of travel. Emergency response teams serving both ends of the bridge would require the ability to quickly bring in a narrow and lightweight treatment/transport vehicle, as well as other service vehicles to handle multiple emergencies. Protocols would need to be established as to first responder procedures in advance of special vehicle arrivals, when time and distance factors are taken into account. It should be noted that bridge superstructures, overhead electrification, pedestrian guard enclosures and tricky wind conditions will normally rule out helicopter rescue directly from a bridge.

Emergency and Panic Egress

All modern structures subject to human use and occupancy are designed to provide for emergency and panic egress (escape) as safely as possible. The goal is to move persons to an area of refuge, usually the unrestricted outdoors, in an orderly manner with as little panic as possible. A mile-long pedestrian bridge, mostly or fully enclosed with an unbreakable guard system, and with only two narrow paths of travel as much as a half-mile each in length, can be a disaster in the making and grossly exceeds current life safety standards for safe and efficient egress.

Although highly mobile persons can usually escape a dangerous scene created at any one point along the bridge such as a stationary rail car on fire, serious problems can suddenly develop with an increase of occupancy or a more imminent danger. Typical worst-case scenarios may begin with a throng of runners in a marathon event, or a large and long crowd of people watching a fireworks display. In the face of an actual or perceived calamity, such as a cargo fire, a sudden train derailment, a terrorist bomb, or even a loaded barge striking a pier, the crowd may panic and trample many to death or individually fail to escape quickly enough, resulting in a much greater disaster than from the underlying cause.

It is the very length, narrowness, strong enclosure system, and proximity of transportation dangers inherent with most Susquehanna River crossing options that exponentially increases the chances of a panic egress. Conversely, by lowering and widening a pedestrian bridge, moving it well away from transportation bridges, decreasing bridge length or dividing it into two or more bridges, avoiding full enclosure systems, and locating it beyond sight of spectator events, the chances of a panic egress are virtually eliminated.

Vandalism and Graffiti

Anyone who has had the opportunity to walk across a short pedestrian bridge or through a pedestrian tunnel that is not closely supervised by remote cameras or facility staff will see plenty of graffiti, vandalism and general abuse, especially in urban areas. Such disfigurement seems to be much more pronounced where the perpetrator can work largely unseen, where locations tend to be more dramatic, and where surfaces are more suitable for spray art. Decking and solid guard panels would be most prone to such disfigurement. Widespread graffiti and vandalism increases concern for public safety and can have a significant negative impact on bridge use.

Vista Quality

The greatest benefit of a pedestrian/bicycle bridge across the lower Susquehanna River, besides being a way to cross the river, is the beautiful vista and dramatic viewing platform that it would provide. Unfortunately, the vista quality and viewing or photographic opportunities would be compromised to a disappointing degree by higher safety guards and barriers usually required along any bridge that is at a high elevation. Where pedestrian bridge is attached to a host bridge, the view would be further blocked by the host bridge itself, or its understructure. In many cases there would be no point in using the bridge except to get across. Vista quality should therefore be a major factor in selecting an appropriate crossing and in designing a guard system.

Homeland Security

Since the tragic events of September 11, 2001, both rail bridges and both highway bridges below the Conowingo Dam have been identified as strategic assets by the Department of Homeland Security and have been placed under continuous observation due to their vulnerability to potential sabotage. The partial or total loss of any one of these bridges would have a profound impact on regional transportation, as well as our local economy.

All four existing bridges, as well as the proposed new Amtrak bridge, are steel structures having critical structural members and structural connections that become the "Achilles heel" of the entire structure. This is the nature of all trussed steel bridges and most steel beam spans, which are the types represented by our local bridges. Bridge and demolition experts have long known that placement of a very small amount of powerful explosive in the right place, with the right shaping of the charge, can result in immediate and catastrophic structural failure, especially if the bridge is heavily loaded.

The best measures to prevent such a disastrous occurrence are good surveillance and the prevention of persons from getting anywhere near bridge structure at any time, except when within a fast-moving vehicle. Both of these measures become seriously degraded when a pedestrian bridge is positioned next to, or within critical structure of a host bridge. Not only is the critical structure of the host bridge made much more accessible, but the mere presence of people next to or within the structure renders surveillance identification and reaction time nearly useless.

For instance, the understructure of an open-deck bridge such as the Tydings Bridge is inaccessible from its deck, even to persons on foot outside of their automobiles. The understructure can only be reached by scaling the high piers from the river. Such activity would immediately be deemed suspicious through surveillance, and enough reaction time would be available to initiate a direct response and to stop traffic. Unauthorized persons seen on rail bridges can also trigger an alert long before they reach superstructure or are able to rappel into the substructure.

A bridge trespasser is one who is not supposed to be on or within the bridge under any circumstances and can usually be seen in plenty of time for authorities to take appropriate action. A bridge walkway user is not a trespasser, and would not be assumed to be a threat to the host bridge until he or she were to take some suspicious action at the very last moment, when it would be too late to respond in any meaningful way. Enough high explosive to destroy most or part of a steel bridge can be easily carried in a hiker's backpack. Tool-like objects attached to a hiker could often appear as trail gear. The difference between a typical trail hiker and a similarly equipped saboteur or terrorist is very difficult to determine from any distance, even with the best of surveillance cameras.

Screening guards and panels along the walkway would further disrupt surveillance and conceal sudden sabotage activity, which could include quickly cutting through a chain link guard for direct access to the host bridge structure. The entire pedestrian bridge profile could, in many cases, block the view of a significant portion of host bridge structure from distant camera positions. In summary, good bridge security is all about non-accessibility, surveillance, and sufficient reaction time.

Ownership and Liability Issues

All pedestrian options must operate under some form of ownership, whether exclusively or in association with a host bridge entity. Likewise, general liability must be assumed exclusively, or in association with a host bridge entity and its users. These issues are less complex when the pedestrian bridge itself is owned and maintained by a government agency, even though there will always be some exposure to claims of liability for harm. Liability exposure increases somewhat under ownership by a public corporation, and somewhat further under the ownership of a quasi-public not-for-profit corporation.

Ownership, liability and maintenance issues become more complex under joint use agreements. In such arrangements, liability and maintenance issues are less problematic where the host and parasitic bridges are both owned by agencies at the same level of government. They become more complex when the parasitic bridge is owned by a quasi-governmental entity or by a lower level government agency.

Liability and maintenance issues incur further complexities when the host rail bridge owner/operator is a public corporation with transportation "tenants" that include a private for-profit corporation and a public agency, all having very different modes of operation. The most difficult relationship, with the most amount of potential liability, could occur between a private for-profit host bridge owner/operator and a public or quasi-public owner of the parasitic pedestrian structure.

These various relationships have an impact on determination of liability, quality of maintenance, limitations of maintenance, provisions for public safety, and operational priorities in many different ways, and can be a significant determining factor in the final choice of the most favorable means of crossing the Susquehanna River on foot or bicycle.

Risk of Closure

As demonstrated above, public safety and security can be compromised by any number of adverse circumstances or events, regardless of the most prudent designs and measures put into place. A combination of serious accidents and/or felonious assaults, a terrorist attack, or a single disaster can force public officials to temporarily or permanently close the pedestrian bridge to public use, resulting in a great waste of public funds and loss of the crossing. Choice of the most favorable crossing location should therefore be influenced by its having the lowest risk of long-term closure.

(end)

Susquehanna River Rail Bridge Crossing Advisory Board
Advisory Bulletin #13
Safe Pedestrian and Bicycle River Crossing

Attachment B
In-depth Analysis of Safe Crossing Options

Overview

This analysis was performed by members of the Advisory Board without reliance upon professional engineering or comparative cost studies, and was not particularly influenced by earlier conclusions and recommendations of railroad operators or Maryland Department of Transportation agencies. Each crossing option was considered as having unique physical characteristics and constraints that could be significantly or profoundly affected by safety, ADA accessibility, homeland security, and maintenance issues, as presented and explained in Attachment A.

The Board readily concedes that all crossing options discussed herein are theoretically possible, given enough funding, waiver of statutory requirements, re-engineering of existing structures, and compromise of public safety. The purpose of this analysis is to show which options are grossly impractical (not possible in any reasonable sense), which are possible with significant compromise if issues, and which can be considered more or less practical.

Two crossing options were ruled out of this analysis due to their fundamental impracticality in serving the needs of hikers and bicyclists on a reliable basis. These were commuter train service between the Perryville and (proposed) Havre de Grace stations, and an elevated cable car system stretching across the river.

Option #1 – Convert the Existing Amtrak Rail Bridge to Pedestrian Use

The existing two-track deck truss steel bridge with a through-truss swing section, completed in 1905, is planned for replacement in the near future due to its limited traffic capacity, speed restrictions, high cost of maintenance, and impediment to river navigation, among other reasons. With the replacement study phase nearing completion, it has become clear that this bridge must be removed entirely to allow room for new twin bridges having four-tracks and high-speed rail capacity. The proposed new bridges will be raised about thirteen feet at railhead above the main channel to provide for unobstructed river navigation without the need for a movable bridge section.

Although the very strong and nearly level deck surface of the existing bridge, with landings in downtown Perryville and Havre de Grace, would seem ideal for a generous pedestrian crossing with a high load rating, other conditions and constraints render this structure entirely unsuitable, even if it were not directly in the path of the new bridges. Its closer pier spacing and very narrow swing span opening at the main channel would not only remain in place, but would cause greater navigational conflicts with the adjacent new bridge piers having a longer spacing.

The swing span, if left in place for pedestrians, would require operation by the owning authority (not necessarily the railroad) every time a tall boat needs to pass through, which is a difficult and expensive process, and which would defeat the purpose of elevating the new bridges. In addition, the swing span could not swing open unless the new rail bridges were located far enough away from it to allow horizontal clearance. If the swing span was replaced with an elevated fixed-span connection to accommodate the main channel clearance requirement, such an elevation would require a very long and unattractive ADA-compliant approach ramp from each direction.

In addition, this bridge would continue to be extraordinarily expensive to own and maintain with its advanced age and labor-intensive structural system. Its architecture and dense structural assembly would detract from the architectural grace of the new bridges and seriously clutter the riverscape. Lastly, there is simply not enough space to accommodate three double-track bridge landings in Perryville or Havre de Grace without massive property takings and street disruptions. The Advisory Board believes this option is wholly impractical, if not impossible, under all circumstances surrounding the rail bridge replacement project, and should not be pursued further.

Option #2 – Incorporate a Pedestrian Walkway into the Proposed Amtrak Rail Bridge

Incorporating a pedestrian/bicycle walkway with the necessary twelve to twenty foot width under, between, or alongside the proposed new rail bridges presents numerous design, safety and clearance challenges. The new bridges are severely constrained in height by the need to maintain at least a sixty-foot river clearance and descend to original track grade to align with the Perryville station and the Harrisburg freight line intersection. With every inch of elevation being critical to this calculation, there is certainly no room to attach a pedestrian crossing underneath either bridge.

Installing a pedestrian bridge between the two new rail bridges, especially if its deck is lowered as much as possible below track level to offer some safety protection and to conceal, or eliminate the need for, an unsightly guard system visible from shore, would seem to offer an excellent and relatively inexpensive structural solution. The two bridges could carry the platform nestled between them, with their side beams acting as solid guards, and a heavy-duty cage "roof" offering some protection from falling objects as well as preventing pedestrians from climbing onto the tracks.

The disadvantages of the center-nestled scheme are the inability to see anything beyond the interior of the walkway and to seek help from or to be seen by people not on the bridge in situations of distress. It would amount to little more than a mile-long tunnel with daylight at the top, and would invite the greatest opportunities for felonious attack, vandalism and graffiti, and would create the least feeling of personal security of any other crossing option. A further concern is the need for the railroad to provide a safe, open catwalk for its workers on the bridge while traffic is running which would ordinarily occupy the center space and allow the bridges to be much closer together.

The fatal flaw in a center-nestled scheme is that it would require spreading the two rail bridges farther apart, which would create an unworkable bridge alignment with regard to the protection of Otsego

Street in Havre de Grace and Rogers Tavern in Perryville, while maintaining proper high-speed rail arc in Havre de Grace and track alignment in Perryville.

Installing a pedestrian bridge along outside edge of either new rail bridge creates a full cantilever situation with all of its attendant motion and vibration problems discussed in Attachment A, and would require some type of an unsightly full-guard system that would destroy the architectural appeal of the new bridge, along with any opportunity for accent lighting along the one side. The user would only be able to see out from, and be seen, along one side of the host bridge.

All three host bridge attachment methods discussed here would require some means of ADA compliant discharge at both ends, which is complicated by the high abutments and close street underpasses. Ramping these discharges to street grade would require an enormous amount of space and distance, and would be a major eyesore at the gateway to downtown Havre de Grace.

Homeland security would not be as much of a concern along this bridge in comparison to the other bridges, due to its proposed solid-beam design (no vulnerable truss connections). All of the other safety concerns and exposures to danger from being very close to freight and high-speed rail operations, discussed in much detail in Appendix A, would apply to each of these bridge attachment methods, leaving the pedestrian at considerable risk of physical harm, no matter how many protective measures are taken.

This crossing option would be the most complex in terms of liability, maintenance issues, and number of parties involved (Amtrak, Norfolk Southern and MARC, as well as the walkway owner). The Advisory Board concludes that this crossing option is untenable for all the reasons provided above and discussed in Appendix A, and therefore should not be pursued further.

Option #3 – Install an Independent Pedestrian Bridge alongside the Proposed Amtrak Rail Bridge

This option, while similar in some respects to Option #2, offers a number of advantages and eliminates a number of safety issues attendant with actual attachment to the new Amtrak bridges. Under this scheme, a third and independent bridge would be constructed alongside the new rail bridges, preferably at the downriver side, incorporating architecture and spans that exactly match the rail bridges to preserve bridge appearance, accent lighting and river clearance.

By isolating this bridge from the other two, homeland security concerns would become significantly reduced issue. There would be no effect on rail and bridge alignments, and all the dangers of proximity to rail operations would also be significantly reduced. There would be fewer joint liability and maintenance issues, as this bridge could be wholly owned and maintained by an entity other than the railroad, even though encroaching on railroad right-of-way and landing on its property. This bridge could also be fitted with side guards as low as four feet to greatly enhance the crossing experience and to allow for spectator events, even though its deck would be some seventy feet above the river. Lowering the side guards would, however, require a compromise of public policy due to bridge height.

Having spans and beam profiles with both rail bridges (although with fewer and thinner beams and a narrower deck), this would be the strongest independent pedestrian bridge among all the options, capable of supporting normal emergency vehicles and light maintenance trucks, and perhaps even heavy firefighting equipment. The feeling of openness and low guards would help to discourage felonious activity and vandalism. There is no question that this option would provide the most spectacular crossing experience with its unobstructed view of the Chesapeake Bay, and would directly connect the Perryville and Havre de Grace downtown areas in the interest of tourism.

To prevent conflict with Rogers tavern in Perryville and Otsego Street in Havre de Grace on the upriver side, the downriver side location is also deemed best for bridge landing opportunities. By being a separate bridge, it can discharge directly at the top of both railroad abutments and gradually slope downward to street level parking areas alongside the railroad embankments. The Havre de Grace landing should only require public property already available and railroad property used by agreement; however, the Perryville landing would require significant use of the Perry Point VA Hospital property as well as railroad property for its slope and parking area.

The overwhelming issue associated with this bridge option is its enormous cost. Although lighter and somewhat narrower than either rail bridge, the long spans and architecturally matching beams would make it at least two-thirds as costly as one of the rail bridges. The Advisory Board concludes that this option provides the greatest overall number of river crossing advantages and a low number of public safety disadvantages, but concedes that cost alone could be its fatal flaw.

<u>Option #4 – Install an Independent Pedestrian Bridge on the Line of Abandoned Piers beyond Craig Park</u>

This option has been in the realm of public discussion for several decades, and on the whole would seem to be a reasonable proposal. All but one or two piers from the bridge that was once there remain in place, and appear to be large enough and spaced closely enough together to carry a pedestrian/ bicycle bridge with structural span efficiency. Unfortunately, those piers are no longer in any condition to support new structure, and would require such a degree of repair and rebuilding as to be economically unfeasible and historically unrecognizable.

The original bridge was carried as a compression load directly on those piers, which were low enough that a movable (swing) span had to be installed at the main channel. A modern fixed-span bridge on the same piers would require vertical columns or pier extensions, reacting in cantilever to resist wind forces, to clear both the main channel and off-channel water, for which the old piers were never designed. Leaving the old piers in place would seriously impede river navigation through the new rail bridge piers located close by. In addition, this bridge would block the view of the imposing new rail bridges and their proposed accent lighting from the most dramatic downriver vantage point.

The Advisory Board considers that this option is entirely unfeasible and should not be pursued further, based on unsuitable piers, river navigation issues, cluttering of the riverscape and cost of pier modification.

Option #5 – Attach a Pedestrian Bridge to the Route 40 Hatem Bridge

The Advisory Board has photographed and studied the existing structure of this bridge from end to end, in the attempt to find some practical way to insert or attach a pedestrian/bicycle bridge of sufficient width to it. There are major physical obstacles to either carriage method, which become the fatal flaws in this scheme, all other concerns of safety, homeland security and maintenance of the host bridge notwithstanding. The one favorable condition is ease of discharge to parking areas at both landings.

It would seem that the most advantageous method would be to pass a pedestrian bridge through the central understructure, keeping it high enough to maintain river clearance (both channels of this bridge now have an eighty-seven foot clearance). Unfortunately, this is nearly impossible because the cross-structure of this bridge and most of its piers change elevation rapidly and block the path of travel due to its inconsistent support and bracing configurations. The abrupt vertical changes in the pathway would prevent bicycle use and ADA accessibility, even requiring stairways in some places.

A side cantilever arrangement would result in eccentric (unbalanced) structural loading of the host bridge, shaking from traffic, and overloading beyond its current structural capacity, all of which are explained in detail in Attachment A. Since its original construction in 1939, the bridge has been upgraded many times to its practical loading limits, including the addition of concrete Jersey walls which are themselves extended in cantilever beyond the main structure. The side cantilever walkway would also meet a major barrier at each main "camelback truss" support pier of the superstructure, which extends out about eight feet beyond the bridge deck.

Both methods of attachment would result in additional loading of the entire bridge system that would require extensive reinforcement of most very complex structure above and below the roadway, at an expense that would easily exceed the cost of an independent pedestrian bridge. Every one of the safety, homeland security, and bridge maintenance issues related to a vehicular bridge attachment, as described in Attachment A, would apply in this case. The Advisory Board concludes that this crossing option is not practical or feasible in any configuration, and should not be pursued further.

Option #6 – Install an Independent Pedestrian Bridge across Garrett Island

Garrett Island is an interesting location for a pedestrian/bicycle bridge due to its proximity to both municipalities and its changing scenery from river to dense woodland and back to river. A fairly high ancient volcanic mount exists near the west side of the island, about halfway between the Hatem and CSX bridges, which would provide a very convenient and handicap-accessible way to descend from bridge height to nature trails on the island if the bridge touched upon peak.

An independent bridge at this location, with an approach ramp climbing the hillside to the west of the North Park lagoon to a river clearance height of sixty-five feet, crossing to the Garrett Island mount, then running northeast to a landing in Perryville, would become the longest pedestrian crossing among all the options. A different route, crossing Garrett Island near its downriver tip just south of the Hatem

Bridge would offer a significantly shorter crossing and an open viewscape downriver, but would leave the island inaccessible and would require very large and unsightly ramp structures at both landings.

As with the option of an independent pedestrian bridge next to the new Amtrak bridge, the deck could be left open and unobstructed by high guards or caging even though it is also a high bridge and would require a compromise of public policy with regard to safety. Both landings of a bridge at this location would be very close to the trail system and relatively convenient to visitors of both municipalities. Most of the public safety and personal security concerns provided in Attachment A would apply at this location, however, since it is close to urban areas and since much of its crossing would be concealed by woodlands.

It must also be noted that Garrett Island is now part of a National Wildlife Refuge, and public access and use are currently prohibited without special permit. The Advisory Board considers this crossing option to be feasible, but relatively costly due to its length. The most significant concern would be personal safety and security along its overland hidden section, which would be longer than either of its river crossings, particularly if it is connected to an unsupervised and well-concealed natural area on the island.

Option #7 – Attach a Pedestrian Bridge to the CSX Rail Bridge

The CSX rail bridge, more than one hundred years old, has such a crowded and ever-changing understructure that carriage of a pedestrian bridge through the structure is not physically possible. On the other hand, bridge deck conditions are structurally ideal for a narrower (twelve foot width) pedestrian/bicycle pathway, because the railroad has long used only the upriver side of the original two-track bridge for single-train operation. The downriver side has no tracks or decking crossbeams, but the necessary longitudinal structure remains in place.

Both ends of this bridge land within the municipalities and are fairly close to streets and to the trail system, with opportunity for public parking. Its Garrett Island crossing offers potential long-ramp access to the island, via the volcanic mount, for hikers. A shared use arrangement similar to this exists in downtown Harpers Ferry, West Virginia, where a pedestrian/bicycle path utilizes one side of a much shorter and lower CSX bridge with single-track railroad operation, with trains passing through under a speed restriction.

Although this crossing option is quite feasible and would by far be the least expensive to implement and maintain, many of the safety, homeland security, and personal security issues discussed in Attachment A would definitely apply here. The user would be very closely exposed to freight trains operating more frequently and at much higher speeds than those on the Amtrak bridge. This bridge is also very old (1907) and may require replacement in the not-too-distant future.

The east channel section of this bridge, having a through-truss superstructure, would be much more accessible and vulnerable to sabotage. The entire bridge would be subjected to heavy vibration and shaking as trains rumble past, giving much pause to potential users. And finally, ownership, maintenance and liability issues could be quite difficult to resolve. The Advisory Board concludes that this crossing option is technically viable with much compromise of public safety and homeland security concerns, and a successful negotiation with the CSX Corporation.

Option #8 – Attach a Pedestrian Bridge to the I-95 Tydings Bridge

The structure of this bridge has also been photographed and studied from end to end by the Advisory Board, and found to be more consistent and efficient in its use of steel structure and bracing techniques than that of the Hatem Bridge, built 24 years earlier. In other words, the understructure of the Tydings Bridge maintains the same design configuration across the entire river gorge, which would allow a pedestrian bridge to more easily follow a straight and uniform path through it, if other constraints and impediments did not exist.

The design efficiency of the understructure of this bridge is the primary reason it could never support the additional load of a pedestrian bridge within its structural members. Every main chord, web, brace and cross-beam of the truss system is designed only for a particular directional load. The top chords alone, acting in intricate concert with all other members of the truss system, are the only members designed for the direct or indirect loading of a bridge deck.

The concrete piers of this bridge are very tall and perfectly aligned to carry a pedestrian bridge independent of the main bridge structure, leaving plenty of river navigation clearance. Unfortunately, the bottom cross-brace of the host bridge blocks the way at each pier. More significantly, a pedestrian bridge located at the pier cross-head would offer the perfect opportunity for unobservable access and sabotage at a most critical point in the host bridge structure. In addition, the very long spans between piers would require an enormous amount of new structure just to carry the pedestrian bridge over such a distance.

As with the Hatem Bridge, cantilevering the road deck presents a number of structural, maintenance and safety issues discussed in detail in Attachment A. The difference with this bridge is that both of its outer lanes of travel are already cantilevered entirely, with the additional load of tall concrete Jersey walls along the outer edges. The addition of a pedestrian bridge beyond the existing deck on one side would require longer crossbeams and counterbalancing on the opposite side, adding excessive weight to the overall structure for which it was never designed.

The Advisory Board concludes that structural issues alone are the fatal flaw of this crossing option, followed by most of the homeland security, safety and maintenance issues associated with a vehicular host bridge, and therefore recommends that it not be pursued further. This crossing option is also by far the most difficult to access at its landings, with sheer bluffs and no secondary roads in the vicinity of either landing. The trail system along both sides of the river would also be inaccessible without detouring far inland.

Option #9 – Install an Independent Bridge at Susquehanna State Park

The Susquehanna State Park area differs from that of all other bridge location options in a fundamental way. A pedestrian/bicycle bridge in this area can be lowered much closer to the water surface, being far enough upriver to avoid navigable waters. The Advisory Board recommends a minimum clearance of only twenty feet at this location, which it believes is sufficient to clear the river at maximum flood stage carrying large surface debris.

A much lower bridge has the obvious advantage of being easier and less costly to access at its landings, which would connect with the existing trail system in the State Park at its Harford County landing and beyond the north end of Port Deposit at its Cecil County landing. It would be adjacent to public roads at both landings and costly ramp systems would not be necessary. A gradual increase in grade approaching the bridge, oriented parallel to the river, should be sufficient to gain the necessary elevation to cross.

Other significant advantages include side guards that can be safely lowered to four feet, a pier system that would not be subjected to as much wind force, piers that can be spaced more closely together reducing span structural cost and span beam depth, and the opportunity to access Robert Island. This bridge should be expanded to the maximum recommended width of twenty feet, and should be designed for fishing opportunities and for crossing with dismounted horses.

Robert Island, which belongs to the utility company that owns the Conowingo Dam complex, could be an important component of this crossing option. If a pedestrian bridge crossed to the southeastern end of the island from Rock Run Mill, it could not continue directly across to Port Deposit due to the closeness of Route 222 to the river edge, leaving no available landing or parking area. The only sufficient landing area on the Cecil County side is farther up Route 222, near the Canal Road intersection and opposite the northwestern (upstream) tip of Robert Island. If two separate bridges were built to accommodate these offset crossing locations, an ADA compliant walkway would be required along most of the length of Robert Island to connect the two bridges. The terrain on this island is quite difficult and uneven, with a solid exposed granite spine and several lateral crevasses that would require bridging.

A more viable option would be to locate the Harford County bridge landing just above the mouth of Deer Creek, where the crossing to Robert Island is shortest in length, and where it would directly align with the other bridge over to Cecil County, in the location proposed above. This bridge would be accessed by first crossing the former Deer Creek railroad bridge, then advancing several hundred feet up the existing trail to the new bridgehead. A Robert Island landing, crossing only its northwestern tip, would extend only short distance, and could be eliminated by installing a continuous bridge across the island. Access from this bridge to the island could be restricted to primitive trail hiking to avoid ADA accessibility issues.

The physical disadvantages of a Deer Creek area crossing are mostly related to maintenance and ADA access. The existing trail that follows the old railroad bed is not readily accessible from the nearby road, and is in no condition to accommodate persons with mobility issues. The existing trail, from a parking lot to new bridgehead, would need to be widened and paved, with a short bridge installed to span the old canal bed between it and the road. A sizable paved parking lot would be required close the Deer Creek trail bridge, and the bridge deck would need to be widened and reinforced to matching specifications of the river crossing bridge(s). These improvements, however, would be less costly than a connecting pathway and crevasse bridging of the same specifications up the length of Robert Island.

The upriver location of either Susquehanna State Park crossing option, being well away from walking distance of urban neighborhoods, would incur far less exposure to vandalism, graffiti, assaults and other undesirable activity. The Susquehanna State Park is host to a large number of hikers, bicyclists, fishermen, picnickers, nature lovers and wildlife observers from dawn to dusk on any given day, which would enhance the feeling of personal safety and security. Almost all categories of Park visitors would be likely to make full use of the pedestrian bridge, providing safety in numbers and immediate assistance to those in need.

A direct crossing from the Deer Creek area in Harford County to the Canal Road area in Cecil County, passing over the upriver tip of Robert Island, would be significantly shorter than any other pedestrian bridge crossing option considered by the Advisory Board. It would also be the least expensive bridge option, when taking into account such associated costs as access ramps and host bridge reinforcement, with the exception of the CSX rail bridge option. Ownership and maintenance of this bridge could logically be incorporated into the Susquehanna State Park system, including its landing area in Cecil County.

General disadvantages of this crossing option are that its remoteness from Perryville and Havre de Grace would have little positive effect there on local tourism. The bridge would not be available as an event observation platform and it would be less likely to host marathons and walk-a-thons. In addition, it would require a much longer time for emergency responders to reach the Harford County landing area.

The Advisory Board recommends this crossing option, more specifically at the Deer Creek landing, as the most practical and feasible of any that it has studied, when all factors outlined in Attachment A are taken into full consideration. The Board is convinced that this option best meets the primary purpose of a pedestrian and bicycle river crossing, whether by bridge, water taxi or land shuttle, by being available and accessible at all times for trail hikers and bicyclists. It also offers the highest degree of personal safety and security, coupled with a beautiful vista and enjoyable crossing experience.

<u>Option #10 – Establish a Regularly Scheduled Water Taxi System</u>

A regularly scheduled water taxi system, operating in a circuit between Havre de Grace, Port Deposit and Perryville, has been a vision within these communities for a number of years, but has never been formally planned or implemented. The Advisory Board believes that such a system could serve hikers and bicyclists on a dependable basis if operated from dawn to dusk, seven days a week, on an arrival/departure schedule that is posted at each landing and on a dedicated internet website.

A system such as this would require at least two dedicated vessels large enough to carry at least thirty passengers, twenty bicycles, and several kayaks. It would also require direct roll-on/roll-off capability, full handicap accessibility, restrooms, an enclosed weather cabin, and seating for all passengers. On weekends and holidays, both vessels could be put into operation to meet increased demand and shorten wait times at the landings.

River crossing ridership should be free of charge; however, these vessels could be put into revenue service for summer night cruises, special events and, special destinations. One of the vessels should always be available for revenue services except when both would be required during the day on peak demand dates. The water taxi system would require a large public subsidy to be viable, whether owned and operated by a public agency or through commercial contract.

The advantages of such a system in comparison to bridge options are lower capital cost, public supervision at all times by the boat crew, alternative uses and revenue opportunities, very enjoyable boating experience, and a safe environment. Many local riders and destination tourists would use the system just to be on the water and to visit the other towns for dining and shopping. This is the only crossing option that could truly appeal to people of all ages and levels of mobility.

The disadvantages of this system are its high operating cost, wait times at the landings, inconvenience to hikers and bicyclists, and difficulty in accommodating large groups. This system would also be subject to cessation in winter and unpredictable closures due to bad weather or unsafe river conditions. This option would obviously not accommodate marathons or walk-a-thons, and would offer limited capacity for observing events from offshore.

The Advisory Board concludes that this is a safe and feasible crossing option, but is not as practical or convenient for pedestrians, hikers and bicyclists who wish to cross the river at any time of day, any day of the year, with no wait involved. The Board is also very concerned about the level of subsidy that would be required to operate and maintain the vessels, and compensate the crews, often at times or route segments with no riders aboard.

Option #11 – Establish a Land-Based Shuttle System

This option is somewhat similar to the concept of a water taxi system, the difference being that special buses would run a regularly scheduled route between the same three communities, with only one or two stops in each. These buses would be configured to quickly load bicycles and kayaks, perhaps as a combination bus/truck vehicle, or an airport-type shuttle pulling a low trailer, and would be ADA accessible.

Transit time between communities would be about the same for both options. The Board estimates that it would take about one hour for a shuttle or water taxi to complete the three-town triangular route. Twenty minutes or so would be required to complete a round trip just between Perryville and Havre de Grace, which could be offered on busier days when a second shuttle or water taxi is put into service.

The advantages of a shuttle system in comparison to a water taxi are its far lower capital and operating costs, year-round operational capability and not being affected by river conditions. In comparison to all crossing options, it offers very little exposure to the elements (if bus stop shelters are provided), the best emergency response conditions, and a high level of personal safety and security. Issues that would need further study are whether to charge a fare and how to prevent locals who have no recreational or tourism purpose from overwhelming the system.

The disadvantages of this option are wait times at the stops, inconvenience to hikers and bicyclists, limitation to small groups, and inability to accommodate marathons and walk-a-thons. Shuttle vehicles would have few alternative uses that could generate revenue and would offer no particular river crossing experience. This is the only option that would not become an attraction in its own right, beyond the primary purpose of proving a way across the river.

The Advisory Board believes that this option would incur the lowest combined capital and operating cost of all options, and would require a much lower public subsidy than the water taxi system. On the other hand, the crossing experience would not exist, and public would have no interest in using this system unless they needed to get across the river with no other means of available transportation. This system would not be particularly attractive to destination tourists who wish to shop and dine in the other two communities. For these reasons the Board concludes that this option is feasible and practical as a simple means of transportation, and could be used for interim service until one of the other crossing options becomes a reality.

(end)