2.0 Purpose

The purpose of this document is to present the findings of the field investigation and concept design study, as well as recommend appropriate track relocation and bridge modifications to provide the maximum contiguous land for redevelopment within the limits of the Northwest Triangle (NWT) in the City of York, Pennsylvania, as shown on the attached maps and drawings.

This study is a conceptual-level investigation and set of recommendations and is not meant to serve as an engineering or design document. Further investigation and engineering will be required for any subsequent design. HDR considered several possible track and bridge configurations as part of this study, however, only three were considerable feasible given constraints presented by York Railway and the site itself.

The alignments shown here are referred to as Alternates A, B and C, and are described below:

Alternate A is designed to provide a land mass large enough to place the proposed stadium within the NWT, as demonstrated on **Figure A**. This would require track relocation, bridge modification and removing existing facilities.

Alternate B is designed to provide land for redevelopment along the Codorus Creek waterfront as demonstrated on **Figure B**. This would require track relocation, bridge modification and removing existing facilities.

Alternate C may also be referred to as the 'do nothing' approach and would leave the existing track configuration largely unchanged, as shown in **Figure C**. However, this alternate does consider the removal of several existing facilities within the NWT in order to provide land for redevelopment.

3.0 Work Plan

The method and criteria used for determining track relocation and bridge modifications shown here were developed with the following sequence of production and reviews:

1. Collect and review previous studies and reports concerning the Northwest Triangle.
2. Obtain mapping, bridge plans and various materials from York Railway and the City.
3. Conduct field investigation of existing facilities.
4. Conduct interview with York Railway officials for operations overview.
5. Develop concept track layout.
6. Develop project cost estimates.
7. Summarize findings and provide recommendations.
8. Review DRAFT Report with City and York Railway.
9. Revise Report to include review comments and issue FINAL Report.

The basic criteria used to establish and evaluate the proposed relocation and bridge modifications were established by HDR based on discussions with the City, York Railway and previous track / bridge design experience. The project and alternate specific criteria include:

General:

- Provide minimum 100-ft tangent track between reverse curves.
- Maintain access to York Railway warehouse, and NS Connection.
- Assume Agmark facility and related track / pits may be relocated or removed.
- Assume Ohio Blender facility and related track may be relocated or removed.
- Avoid curves or turnouts within grade-crossings.
- Land area for redevelopment is minimum 20-ft. from centerline of track.
- Minimum acceptable radius is 460-ft, which is equal to a No. 8 turnout.
- Maximum car length = 60-ft.
- Consider current AREMA bridge loading (Cooper E-80).
- Maintain location of the historic Western Maryland headhouse at N. George Street.

- **Alternate A:**
- Relocate Central Branch within NWT and remove West Branch from NWT.
- Maintain alignment of the existing York Railway Mainline (former W Md. main).
- Provide degree of curve on Central Branch suitable for 10-mph train operations.
- Upgrade Bridge No. 15.60 (TPT) to provide load capacity equal to or greater than Bridge No. 13.52 (TPG).
- Convert Bridge No. 13.52 (TPG) to pedestrian walkway over Codorus Creek.

- **Alternate B:**
- No upgrades required for Bridge No. 13.52 (TPG).
- Convert Bridge No. 15.60 (TPT) to pedestrian walkway over Codorus Creek.

- **Alternate C:**
- Maintain alignment of the existing York Railway Mainline, Central Branch and West Branch.

Note: Surveying was not performed as part of this concept design effort; however such information will be required for any subsequent design.

4.0 Data and Information Sources

Sources of data and information used to prepare this report include:

Data	Source	Date
Valuation Maps	York Railway	Not Available
GIS Mapping	City of York	Not Available
Bridge Plans (Br. No. 15.60)	CSX Transportation	1895
Bridge Inspection Report	York Railway	2003
Railroad Relocation Design Report	City of York (PB)	1998
ADC York Co. Map	ADC – Map People	2001

5.0 Operations Overview

HDR conducted an interview with York Railway officials to gain a greater appreciation for rail operations within and adjacent to the limits of the Northwest Triangle. The following information was provided by the General Manager of York Railway and was considered during the concept design process.

Listed below are the general operations for each branch owned by York Railway within the Northwest Triangle. Please note **Figure 1**, which demonstrates how York Railway lines converge over Codorus Creek and from points south and east within the limits of the Northwest Triangle.

Note: Values shown below for 2005 are denoted with an asterisk (*) and represent the period from January through June 2005.

5.1 Existing Rail Operations:

Central Branch (former Maryland & Pennsylvania Railroad)

- Customers: Scrap Dealer, Festerman, American Rock Salt
- Annual Traffic: 710-cpy (cars/year) 2004, 980-cpy 2005* (approx. 1500 anticipated) Salt deliveries are dictated by inclement weather (i.e. cold or wet winter predictions require more frequent deliveries).

Note: Daily traffic on the central branch may reach a maximum of 15-cpd, but must be delivered in 5-car train sets due to customer limitations. Cars are typically stored on the Grantley or Festerman siding until delivery.

York Railway's maximum length and weight car are the jumbo covered hoppers (60-ft long, 100-ton lading) used for salt deliveries on the Central Branch.

West Branch (former Maryland & Pennsylvania Railroad)

- Customers: Alpha Green Supreme (a.k.a. Ohio Blender), York Railway Warehouse (serving ES3), and Norfolk Southern (for through movements)

- Annual Traffic:
  Ohio Blender: 109-cpy 2004, 54-cpy 2005*
  Warehouse: 1,694-cpy 2004, 853-cpy 2005*, (approx. 5,200 anticipated)

York Mainline (former Western Maryland Railroad)

- Customer: Agmark and Hanover Terminal (at Cole Steel building)
  The Agmark operation includes an agricultural materials transloading facility at the former Western Maryland freight house, but provides no storage. Note this facility is owned by York Railway. York Railway also delivers boxcar paper products for storage at the Cole-Steel building at Loucks Mill Road.
- Annual Traffic: Agmark: 1,650-cpy 2004, 551-cpy 2005* Cole-Steel: estimated 500-cpy

Traffic generated from other railroads includes 7283-cars from *Norfolk Southern* in 2004, and 2970-cars in 2005* as well as 1300-cars from *CSX* in 2004 and 683-cars in 2005*. The balance of cars not enumerated above were delivered to other customers outside the immediate vicinity of the Northwest Triangle, however, much of this freight passed through the NWT.

Based on the freight movements noted above, combined with multiple switching operations due to limited storage space, York Railway estimates that there may be some locations within the Northwest Triangle that see as many as 40,000-cars over a single point in one year. York Railway will at times operate two crews with multiple shifting in order to accommodate their traffic and multiple switching operations.

In the period between 2000 and 2005, York Railway generated approximately $3 Million in revenue from transportation of agricultural goods for the Agmark and Ohio Blender facilities.

5.2 Future Operations:

York Railway is currently planning for additional traffic to serve ES3, their single largest customer. ES3 will soon complete additions to the York County Warehouse and has recently added new customers, all of which means additional freight. York Railway is also investigating development and use of a new transloading facility between Codorus Creek and Loucks Mill Road. This project has been delayed, if not postponed, due to negotiation between ES3 and the property owner. In general, York Railway predicts growth in their business with ES3 and other potential shippers.

5.3 Planned City Redevelopment:

York Railway has indicated that any changes or redevelopment within the Northwest Triangle or areas adjacent which are served by their tracks or facilities would disrupt or eliminate their business operations. As noted above and demonstrated on **Figure 1** all York Railway tracks converge within the Northwest Triangle.

City plans for redevelopment within the Northwest Triangle present challenges for both safety and rail operations. York Railway does not encourage placing pedestrian traffic in close proximity to operating tracks, but might find the proposed changes acceptable if special provisions were made to separate pedestrian and railroad traffic and provides limit access points by use of barriers. Such provisions may include pedestrian bridges/overpass (preferred), pedestrian crossings with gates, fencing, or trees and shrubs. In addition, lighting and signs may be added for safety and security.

6.0 Track Alignment

6.1 Existing:

York Railway currently operates on three lines within the NWT, the Central Branch, serving points south, the West Branch and the Mainline. These lines are demonstrated on **Figure C**. The tracks are arranged so they may deliver cars to the Agmark, Ohio Blender, and the Warehouse facilities. The West Branch and Mainline are connected on the north bank of Codorus Creek opposite the Northwest Triangle, therefore requiring both Bridge No. 15.60 (TPT) and Bridge No. 13.52 (TPG).

6.2A Proposed (Alternate A):

The track configuration in **Figure A** uses a 10-degree curve and a reverse curve to move the Central Branch southwest towards Bridge No. 13.52 and a No. 8 turnout for connection to the Mainline. The Mainline and Central Branch leading to the Norfolk Southern connection are connected using No. 8 turnouts and a reverse curve. This connection is required for York Railway to receive deliveries from Norfolk Southern through Poor House Yard. This alternate would eliminate four grade-crossings, 2 on Beaver Street, 1 on W. North Street and 1 on Gas Avenue. Elimination of grade crossings is always considered a benefit to the traveling public.

6.2B Proposed (Alternate B):

The concept alignment for Alternate B is demonstrated on **Figure B** and was designed to provide the maximum land mass possible without rehabilitating or reconstructing Bridge No. 15.60 (TPT). This configuration also requires a new connection between the WM Mainline and the Norfolk Southern connection. This track alignment would remove portions of the WM Mainline and therefore provide land along the Codorus Creek waterfront within the NWT. This alternate would eliminate three grade-crossings on Beaver Street near Codorus Creek, which would improve safety for the traveling public.

6.2C Proposed (Alternate C):

The Alternate C track alignment, shown in **Figure C**, maintains the existing York Railway alignment with several notable track removals. As stated in the general

assumptions, the Agmark and Ohio Blender sites have been removed to allow for land redevelopment.

7.0 Bridge Investigation

7.1 Existing:

As part of this study HDR has reviewed recent bridge inspection reports and load rating summaries provided by York Railway. HDR has not conducted a bridge inspection or load rating as part of this concept design study. A summary of findings is noted below.

Bridge No. 15.60 (Through-Pin-Truss):

Bridge No. 15.60, formerly owned and maintained by the Western Maryland Railroad, is a two-span, through-pin-truss (TPT) bridge approximately 286-ft long. According to original plans obtained from CSX Transportation each truss is 140'-7" measured from pin to pin and was constructed in 1895-96. Please see **Figure 3** for details. An elevation view of the bridge is shown in **Photo 3**. The bridge is load rated for 288,000-lbs. cars. A review of the 2003 inspection report indicates that the bridge is in good / fair condition overall. The areas noted with deficiencies were generally non-structural. The pin-connected truss is an antiquated construction method that requires maintenance to compensate for inevitable pin wear. Through trusses limit both horizontal and vertical clearances. It appears that this bridge is not structurally adequate or does not provide adequate clearance for some car movements on the York Railway system. It is also worth noting that this bridge is built on a 2-deg. 30-min. curve and a skew. These combined factors complicate the geometry of the bridge for design, fabrication, and construction.

Bridge No. 13.52 (Through-Plate-Girder)

Bridge No. 13.52 formerly owned and maintained by the Maryland and Pennsylvania Railroad, is a two-span, through-plate-girder (TPG) bridge approximately 218-ft. long. According to inspection reports each span is approximately 109-ft long. Original plans were not available and the construction date is unknown. The bridge is load rated for 315,000-lbs. cars. A review of the 2003 inspection report indicates that the bridge is in good / fair condition overall. The areas noted with deficiencies were generally non-structural. The through-plate-girder limits horizontal clearances, but not vertical. It appears that York Railway uses this bridge for car movements that can not be carried over Bridge No. 15.60 due to structural capacity or vertical clearances. Removing this bridge from the York Railway systems would inhibit freight movements of larger and heavier cars. An elevation of the bridge is shown in **Photo 2**.

7.2A Proposed (Alternate A):

City plans for redevelopment within the NWT, as presented here for Alternate A, would require removing Bridge No. 13.52 (TPG) from rail service and rehabilitating or

replacing Bridge No.15.60 (TPT). Engineering concepts for such work are presented below.

Bridge No. 15.60 (Through-Truss):

Rehabilitating the trusses to provide additional vertical clearance and load-carrying capacity may be possible; however, the engineering and construction challenges related to such work may far outweigh the cost of superstructure replacement.

Replacing the bridge would require a great amount of work as well, including planning, permitting, design for demolition and construction.

Based on previous experience, HDR presumes that the U.S. Army Corps of Engineers would not permit changes in the waterway opening or the construction within the floodway or flood plain that would significantly impact the 100-year flood surface elevation of Codorus Creek. This limitation would require replacing the spans on the existing substructure (pier and abutments) with some modifications to accommodate the new superstructure. The existing span length may require use of new trusses. New through-plate-girder spans may be used for the replacement. The fact that the bridge is built on a curve and skew would control design parameters and construction costs.

Based on discussions with York Railway and previous experience HDR has prepared this concept design and related cost estimate based on a span change-out, where the contractor may employ a “roll-out / roll-in” method of replacing the spans. This technique is frequently used on railroad structures where interruptions to train movements must be kept to a minimum. This technique might employ the following sequence:

1. Complete modifications to the existing substructure (pier and abutments).
2. Erect new spans parallel to the existing bridge on temporary supports.
3. Lift (slightly jack) old spans and roll them onto adjacent temporary supports.
4. Roll new spans onto existing substructure.

The preparation work for this technique may require several months of labor, but the actual change out can typically be completed in a very short period (1-3 days). York Railway has indicated that they may be able to stage freight and locomotives on both sides of Codorus Creek so that there are no major interruptions to their deliveries during the brief track outage for span change-out.

Additionally, and related to track construction, York Railway has indicated that they may be able to move most of their freight over Bridge No. 15.60 once Bridge No. 13.52 is closed for adjacent redevelopment construction. This would be limited to the short period between closure of Bridge No. 13.52 (TPG) to allow stadium construction to begin and span replacement at Bridge No. 15.60 (TPT).

Bridge No. 13.52 (Through-Plate-Girder)

The City has indicated a desire to use Bridge No. 13.52 (TPG) as a pedestrian structure for access over Codorus Creek to the NWT redevelopment area. This would require converting the existing open-deck spans to a walkway complete with deck and handrails. This type of construction is common to railroad bridges within rails-to-trails corridors and is a relatively straightforward design and construction. Major challenges may include determining the existing geometry and thoroughly assessing the bridge condition. It is assumed that the proposed conversion will not require any major structural repairs or painting, both of which could add significant cost. In addition, such a conversion would require future inspections and maintenance.

7.2B Proposed (Alternate B):

Bridge No. 15.60 (Through-Pin-Truss):

The new track configuration for Alternate B does not require modification of the existing bridge. The limited capacity and geometry as well as the age of this structure make a candidate for elimination from the York Railway inventory, provided another connection to the WM main is provided to the NS connection. The bridge could be converted to have a timber deck suitable for pedestrian traffic, again a common technique. If this alternate were selected it is important to note that a detailed inspection and load rating would be required prior to design of the conversion. In addition, the bridge would require significant modifications as well as future inspection and maintenance.

Bridge No. 13.52 (Through-Plate-Girder)

The alignment for Alternate B would require no modifications to Bridge No 13.53 (TPG).

7.2C Proposed (Alternate C):

The alignment for Alternate C would require no modifications to either bridge.

8.0 Estimate of Probable Construction Cost

Based on the assumptions and details of the concept design shown above, as well as the attached figures, HDR has prepared **Tables 8A, 8B and 8C** – Estimate of Probable Construction Cost for the respective design alternates considered here. These estimates consider major work items for demolition and construction and include trackwork, bridge construction / modification as well as related ancillary work required.
Note: The cost estimates DO NOT INCLUDE unknown cost for:

1) Right-of-Way acquisition
2) Utility protection or relocation
3) Business relocation

9.0 Summary and Recommendation

9.1 Summary

HDR has determined that the track relocation, bridge construction, and proposed redevelopment within the Northwest Triangle are feasible as presented here. The implications of the proposed construction to York Railway operations can be considerable. Table 9.1 shown below provides a summary of the estimated cost, land use area and considerations related to each of the alternatives.

Table 9.1 Track Alignment Concept Design Summary October 2005

Alt.	Land Area (sq. ft.)	Estimated Construction Cost	Considerations	
			PRO	CON
A	549,000	$6,501,000	Allows construction of stadium within NWT.	Removes TPG bridge from York Railway system (i.e. eliminates 1 of 2 bridges.
			Eliminates Grade-Crossing at N. Beaver St.	Longest Schedule
B	492,000	$1,655,000	Provides waterfront land for development.	Removes TPT bridge from York Railway system (i.e. eliminates 1 of 2 bridges.
			Eliminates Grade-Crossing at N. Beaver St.	
C	474,000	$112,000	Least Change	Land provided between operationg tracks.
			Shortest Schedule	

9.2 Discussion

All three alternates present considerable impacts to York Railway operations, most significant of which is the removal of at least two customers from within the NWT. To reduce such impacts these customers may be relocated where they may continue to be served by York Railway.

9.2A Alternate A – This configuration provides the greatest total land mass for development as well as the single largest land mass, but also presents the greatest cost and longest construction schedule. In addition, the proposed 10-degree curve on the Central Branch may have long-term additional costs for maintenance for York Railway.

9.2B Alternate B – This track configuration offers land along the Codorus Creek waterfront along with pedestrian access over the existing TPT bridge. This alternate

would mean less disruption to York Railway operations during construction, but does not provide for stadium construction within the NWT.

9.2C Alternate C – This alternate provides the least disruption to York Railway operations and facilities, has the least cost and provides more land than Alternate B. One major drawback to alternate C is that the land area to be provided would be located between operating tracks, which may present safety concerns and make the land less marketable for business use or less desirable for residential use.

9.3 Recommendations and Proposed Plan of Action

Based on the findings of this study, given the constraints declared above, HDR recommends that the City consider the following Recommendations and Plan of Action:

[Note: HDR understands that the City may have completed or is in the process of completing some of these recommendations at the time of publishing this report.]

1) Closely review the assumptions and findings of this study.
2) Assess general risk of proposed track / stadium location.
3) Consider impacts to York Railway operations (especially transload warehouse).
4) Determine proposed land use types and locations.
5) Approach York Railway with findings of this report and any subsequent decisions in order to begin negotiations. (Note: As a major property owner and business operation, York Railway plays a vital role in success of the project.)
6) Complete property acquisition process.
7) Proceed with preliminary and final engineering design for rail relocation.
8) Closely coordinate efforts of all design aspects (i.e. rail, land-use, stadium, etc)
9) Obtain bids and begin construction.

10.0 Anticipated Project Schedule and Sequence of Construction

Based on the assumptions and details of the concept design shown above HDR has prepared **Figure 2A** - Anticipated Project Schedule – Alternate A. This schedule includes a general timetable for the major work items for design, permitting and construction as related to the trackwork, bridge construction and stadium construction / redevelopment. [Note: HDR has not considered the sequence or duration of stadium construction as part of this study, other than to determine the constructability of track and bridge facilities adjacent to the proposed stadium site within the NWT.]

11.0 Drawing and Figures

HDR has prepared several drawings and figures to demonstrate the results of this study. These figures are listed below. Additionally HDR has provided several figures based on materials provided by other, also noted below.

Prepared by HDR:
Figure 1 Location Map
Figure A Concept Track Alignment – Alternate A
Figure B Concept Track Alignment – Alternate B
Figure C Concept Track Alignment – Alternate C
Figure 2A Anticipated Project Schedule – Alternate A

Provided by Others:
Figure 3 Original Plans for Bridge No. 15.60 over Codorus Creek
Figure 4 Bridge Load Rating Summary and 2003 Bridge Inspection Reports