HOOSIER HERITAGE PORT AUTHORITY RAILROAD TRACK INSPECTION REPORT AND REHABILITATION PLAN Tipton, Hamilton and Marion Counties

I. INTRODUCTION

A. Background and Scope of Work

The Hoosier Heritage Port Authority (HHPA) has retained the services of Jannotti Rail Consulting, Inc. (referred to in this report as the "Consultant") to inspect, evaluate and provide a report for the track on the passenger railroad extending through Tipton, Hamilton and Marion Counties. The Consultant shall provide a rehabilitation plan based on the inspection which categorizes priority locations. The Track Inspection and Rehabilitation Plan is based on the inspections performed in October, 2016 which concentrated on bringing the Railroad up to FRA Class Two level of service. Also included in the Report's Scope of Work is to provide options for reconnecting the HHPA to Norfolk Southern Railway on the northern end in Tipton, Indiana. The "Plan" also includes an "Order of Magnitude Estimate of Probable Costs" (Attachment V) that can be utilized for the rehabilitation planning and securing the adequate funding.

The Consultant's inspection is based on the minimum criteria set forth by the Federal Railroad Administration's (FRA); "Track Safety Standards" Title 49, Part 213 for Class Two track.

The Consultant recognizes that the minimum criteria required by the FRA for making safe and reliable movements over a section of track are the absolute minimum standards which should be adhered to regarding freight and/or passenger rail service. The trackage was inspected with the emphasis on Class Two Track standards which are described below.

B. Executive Summary

"Every railroad tells its' own story", and this Railroad is no different. The HHPA Mainline pays testimony to the attention to drainage and the engineering, construction and subsequent maintenance of the line throughout its history. The Consultant has never encountered a 37 mile length of track where there has been so little drainage issues for the majority of the trackage. There are isolated locations that must be corrected, but generally the Railroad is high and dry. The light rail, joints, and turnouts are in surprisingly good to fair condition overall. Work regarding those items will be required to bring the track to a "reliable" Class Two level of service but overall the steel components of the track are in relatively good condition. Crosstie conditions have been improved with a 4,849 tie replacement from Fishers to 38th Street in 2013, however a quantity of ties will still be required in isolated locations to cover all Class Two

requirements within that section of the line. Tie conditions from Fishers to Tipton will require significant tie replacement.

The grade crossings on the HHPA Mainline range from very good to very poor in condition and are individually itemized for work requirements in the Rehabilitation Plan reviewed and defined below. Grade crossings typically displayed acceptable track structure but many had limited flangeways which questions their adequacy for Class Two passenger service. Some grade crossings will require complete rebuild where rails were loose and "pumping" from car traffic.

A significant question throughout the railroad is raising and maintaining an overall rating of Class Two standards. This could involve significant changes including moving insulated joints to provide adequate warning distance at grade crossing signals; upgrading tie replacement schedules to maintain better track structure; altering or replacing many grade crossings to allow for better flangeways; and replacing bridge timber decks on curves to meet super-elevation requirements.

The final focus of this report is to provide foresight on making a connection to existing Norfolk Southern (NS) track at the north end of the railroad. Roughly half a mile of track is in place, but has been reclaimed by residences, localities and nature leading up to the proposed interchange. The poor condition of the track will require multiple new grade crossings and complete rebuild to remove the railroad's isolation.

This Class Two rehabilitation plan is based on a two phased approach to repairs commencing on that section of track with the highest priority then continuing the rehabilitation on the remaining section. This Plan must be considered as flexible and is subject to "re-routing" should the demands of the railroad change or Class requirements change. The recommended repairs and "Plan" is best highlighted in Part III of this report. The total Order of Magnitude – Estimate of Probable Costs for the two phased HHPA Class Two Track Rehabilitation Plan is $3,715,000.

C. Hoosier Heritage Port Authority Rail Line Description

The Hoosier Heritage Port Authority (HHPA) track is a north / south railroad that stretches from Milepost 39.3 in Tipton at State Route 28 to Milepost 3.0 at Belt Junction. The railroad comprised a portion of the former Norfolk and Western Railway's Western Region's Fort Wayne Division. The railroad has not been operated on since December of 2015. The then operating portion of the railroad terminated at SR 28 to the north and ended on the southern end at Milepost 5.1 at 38th Street in Indianapolis. The unique character of the passenger railroad is that it has been disconnected at the northern end from present day Norfolk Southern Railway in Tipton and CSX at Belt Junction.

The HHPA trackage can best be characterized as a single track, predominantly tangent with mild curvature and grade, light rail, with numerous grade crossings and a well-drained ballast and subgrade section. Crossties are primarily 7" x 8" and 9" ties and 8'6" in length. The single main track has 78 public grade crossings (by Timetable) with and without electronic warning devises between the "inspected portions of the railroad (MP

39.3 – MP 5.1). Fourteen turnouts were inspected on the single main track and one off the main track at the wye tracks in Davin. There are 10 combination open and closed deck bridges and 10 combined stone arch and wide culvert bridges identified on the track chart.

D. Inspection and Procedure

The following report is based on a hi-rail track inspection performed by the Consultant, Paul Jannotti in association with Samuel Jannotti. Accompanying the inspectors were Mrs. Rhonda Klopfenstein and Mr. Glen Schwartz, representatives from the HHPA. The inspection was performed on October 4 and 5, 2016, and consisted of a complete review of the main track, turnouts and grade crossings along the line from Fishers (MP16) north to Tipton and the Wye Tracks in Davin and the following day from Fishers south to 38th Street (MP 5.1) respectively. A short section of track was not inspected between Kessler Boulevard and 56th Street due to track equipment occupying the track.

The hi-rail inspection concentrated on crossties, grade crossings, switch timber and critical measurements at turnouts, gage and the condition of rail, joints, switch points, frogs, switch machines and guard rails. Special considerations became strikingly apparent on upgrading most of the line to Class Two, which has become the major focus of this Report and accompanying rehabilitation plan. The Consultant provides a walking inspection of the track on and approaching the bridges and the timber guard rails. Only a cursory review of the superstructure is performed and not a full "bridge inspection" of the structural members, sub-structure and foundation system.

E. FRA Track Safety Standards

Highlighted below and included for informational purposes to familiarize the reader with FRA requirements, the Consultant includes a quick note regarding the FRA Track Safety Standards. FRA Class 2 level of service is the minimum track safety standards requirements set forth by the Federal Railroad Administration (FRA) to operate the railroad at 25 miles per hour for freight traffic and 30 miles per hour for passenger service. FRA Class One level of service restricts operations to 10 miles per hour for freight traffic and 15 miles per hour for passenger service. All references made within this report to FRA Class of track and speed regarding development and implementation of a track maintenance and capital rehabilitation plan will consider passenger and freight service at the minimum Class Two track even if the track is at locations that will not operate at 25 MPH (freight) or 30 MPH (passenger). Though the railroad is presently isolated from freight activity, the rehabilitation plan considers the possibility of freight service in the future and the typical FRA requirements and magnitude of operation for that level of service.

All FRA classes of track require defined systematic inspections of the track and the periodic "review" of the FRA or State governing body. If a segment of track does not meet all of the requirements for its intended class, it is reclassified to the next lowest class of track for which it does meet all the requirements. If a track segment does not

meet the requirements of even Class One standards, operations may continue provided certain conditions and limitations are met.

Table 1 below lists a number of selected track criteria and surface parameters that are measured by the FRA "Track Safety Standards" that delineate the minimum requirements for Class 1, 2 and 3 track.

Table 1
49 CFR PART 213 TRACK SAFETY STANDARDS

	Class 1	**Class 2**	**Class 3**
Gage	4'8" to 4'10"	4'8" to 4'9-3/4"	4'8" to 4'9-3/4"
		May Not Be More Than	
Alignment Deviation in 62'chord (tangent & curved track)	5"	3"	1-3/4"
Track Surface Runoff in 31'	3-1/2"	3"	2"
Profile Deviation in 62'	3"	2-3/4"	2-1/4"
Deviation from Zero Cross level On Tangents	3"	2"	1-3/4"
Difference in Cross level between Any 2 Points < 62' apart	3"	2-1/4"	2"
Variation in Cross level on spirals In 31'	2"	1-3/4"	1-1/4"
Rail End Mismatch, Tread	¼"	¼"	3/16"
Rail End Mismatch, Gage	¼"	3/16"	3/16"

	Class 1	**Class 2**	**Class 3**
	Minimum Number of Non-Defective Ties per 39'		
Tangent Track and Curves ≤ 2 degrees	5	8	8
Turnouts and Curved track over 2 degrees	6	9	10
Maximum Distance from Center line Joint to a Non-Defective Tie	24"	24"	18"
Replacement of Center Cracked Joint Bars	Mandatory	Mandatory	Mandatory
Replacement of Cracked, Broken Or excessively worn joint bars (not including center cracks)	Optional	Optional	Mandatory
Minimum # of Bolts per single Rail-end at Joint	One	Two	Two
Torch Cut Bolt Holes in Rail At Joints	Permitted	Prohibited	Prohibited
Torch Cut Bolt Holes in Joint Bars	Permitted	Permitted	Prohibited

SELECTED FRA TRACK SAFETY STANDARDS

Figure 1 below depicts the maximum distance that the centerline of one adequate crosstie shall be from the rail joint for Classes 1 and 2 track.

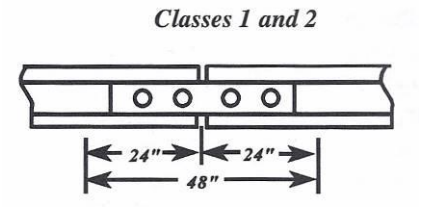


Figure 1

F. Overview

An initial investment and program to rehabilitate or simply maintain track and bridges to any FRA Class of track should take into account the density and nature of the rail traffic and the level of maintenance required to keep it at that level for any reasonable length of time. The variation of upgrade is determined by the existing condition of the track structure and the proposed volume and nature (freight or passenger or both) of the rail traffic the track will be subjected to. On typical track improvements, it is often preferred to upgrade the track to the next FRA Class of proposed operating service. Though the operating objective or "speed" is not desired or perhaps even attainable, it provides for a more reliable operation and longevity of repairs as track and structures continue to deteriorate over time and under traffic.

For clarification in this report, it is important to make a distinction between FRA Class of Track and level or Class of service. The FRA Track Safety Standards (49 CFR Part 213) basically considers both as one and the same. Level of service or Class of Service entails the speed desired on the railroad or any particular section of the railroad. FRA Class of Track will refer to the track safety standards as they pertain to standard criteria for the track structure regardless of the desired or proposed speed of the railroad. The Track Rehabilitation Plan provided below focuses on both Class Two level of service and Class of Track pertaining to the longevity and effectiveness of the rehabilitation.

When developing and implementing an extended comprehensive maintenance and capital track program for the main track, the track has been evaluated based on the existing conditions of the track and right-of-way, the intended Class of Track (Class Two) and the projected rail traffic or traffic volume the track is expected to be subjected to.

II. TRACK AND RIGHT-OF-WAY REVIEW AND DISCUSSION

The following narrative describes the general conditions of the trackage inspected and right-of-way separated into elements of the track structure.

A. Subgrade

The subgrade of the overall trackage on the HHPA can be best described as good. There were no sections of track showing signs of significant subsidence due to under-grade failure. On the contrary, the surface appearance of the railroad shows that is was built to a complimentary standard, high and dry with substantial drainage relief emphasized.

A sag was filled in over an under-grade drainage facility adjacent to the Indiana Transportation Museum which was brought up by Mrs. Klopfenstein and Mr. Schwartz. Also Bridge 38.87 had a sagging Southern approach. As typical with bridges, even on roadways, the transition from the existing approaches to the more solid structure often creates vertical surface problems. The sag on this approach is probably not due to any subgrade failure, however.

B. Vegetation

The FRA addresses vegetation in the Track Safety Standards publication as requiring vegetation to be controlled so that it does not create the following conditions:

- create a fire hazard to track carrying structures;
- obstruct visibility of way-side signage along the right-of-way;
- obstruct visibility at Highway grade crossings;
- interfere with railroad employees performing normal track-side duties;
- prevent the proper functioning of signal and communication lines; or
- prevent employees from visually inspecting moving equipment from their normal duty stations.

Levels of criteria for vegetation for different FRA Classes of track are not distinguished in the Track Safety Standards.

Wayside Brush and Overhanging Limbs

Vegetation encroaching on the track structure was identified frequently along the length of the Hoosier Heritage Port Authority Railroad, in part due to the railroad being out of

operational service since December of 2015. There were a few trees that had fallen over the track which required removal to continue the track inspection and locations identified that were fouling and encroaching on the envelope.

The propensity of the vegetation encroaching on the track structure may not be fully "fouling" the track currently as described in the above Track Safety Standards, but it was identified at numerous locations along the single track as potential to foul in the near future. With this in mind, it is prudent to address the brush cutting during the initial rehabilitation effort which typically minimizes the cost of the work since it is done with already mobilized contractors and avoids the necessity of returning to perform the work at a short juncture after the rehabilitation is complete. The Railroad does not have operable windows on its passenger cars but brush and overhanging limbs should be removed to maintain personnel and passenger safety as well as conforming to the FRA safety standards.

North of Carbon Street

North of Carbon Street

Dead Tree near MP 13.5

MP 22.7

The numerous grade crossings and proximity of the line to busy car traffic necessitates the removal of wayside brush and growth to provide a 200 foot line of sight on each quadrant of grade crossings from both limits of the right-of-way. This is especially important to maintain safe passage for both rail service and car traffic where cantilevers and lights are not provided.

Track Structure Weeds

There was only one location where the inner track weeds were significantly prevalent and that was on the south leg of the Wye track in Davin.

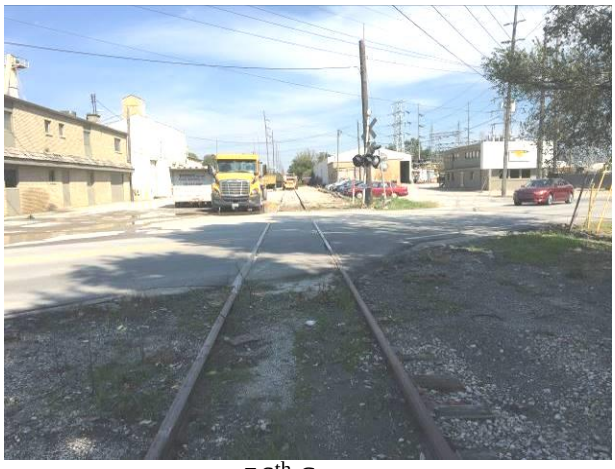
The main track had some locations where single dead strands of vegetation was sticking up out of the track structure but it was generally not damaging to the track structure. It is evident that the continued weed spraying program by the HHPA has well-kept control of the weeds along the whole length of the main track.

One location on the north end had a very hard to kill plant on the shoulders of the track which the Consultant is familiar with. It is an ancient plant growth called "Equisetum" or "horsetail" and is typically not affected by typical weed spraying. It is prudent to mention this type of plant to the weed spraying contractor in advance. Many national track weed spraying contractors are familiar with this particular vegetation.

C. Drainage

Proper drainage is essential to the stability of any class of track structure and most believe it is the single most important track and roadbed item to maintain reliable train service. The Consultant concurs with that philosophy. The solidity of any Class of track structure is based on the foundation for which the track sits; drainage is the pillar of that foundation.

Regarding overall drainage, it was evident that the railroad was very well engineered and constructed originally and maintained throughout the course of time. Rarely does a track inspection over 37 miles of track exhibit such a high and dry right-of-way with so few drainage problem locations. There were only a few "standing" water locations identified where the drainage was infiltrating the track structure along the entire railroad. Those included 56th Street where the hy-rail truck had to be taken off the track and set back on after skipping between Kessler Boulevard and 56th Street due to the track equipment occupying the track. The other location was between the embedded street running track at Logan Street in Noblesville and the two bridges north.



56th Street

Noblesville

Short sections of open track between four lane grade crossings with medians in the center showed signs of no drainage but were not severely damaging to the track structure. Ties at these locations were well attended to recognizing they "could" be problem locations.

There are some grade crossings on the line that have dirt, fines and debris infiltrating the ballast section on the track approaches due to poor drainage flow paths from the adjacent roadway. To correct the drainage at some crossings could be a formidable task on both the budget and the maintenance effort. Every railroad, especially in the north where snow plowing is prevalent and anti-skid is applied to roadways for vehicle traction, the track suffers and the problems are further amplified.

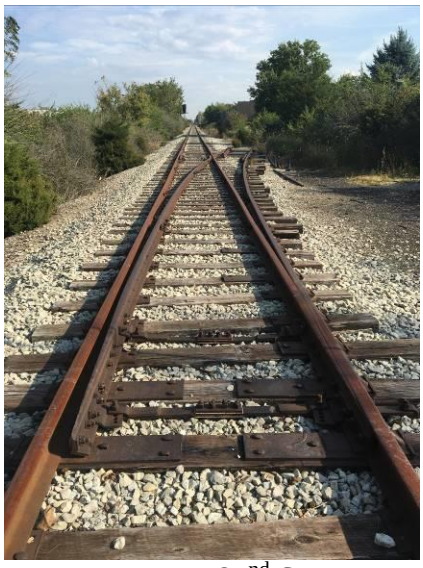
Median at Keystone Avenue

The crossings that have poor drainage conditions often create surface problems on the approaches to the crossings. Though there are a few crossings that have this condition it presently is not a problem due to the infrequency and slow speed of the rail traffic. The problems will become more prevalent on the subject crossings when the track is upgraded to Class Two level of speed and service. The impact of the higher speed on the track below magnifies track surface irregularities and the track becomes generally harder to maintain. As discussed above, the overall line has been well engineered and constructed with attention to drainage so therefore the Plan will need to concentrate on correcting these drainage issues using existing facilities and perhaps installing pipes and inlets during the rehabilitation effort.

At 96th Street the right-of-way fills up with water during storm events on the southeast quadrant. It does not infiltrate the track or its subgrade but it creates some serious ponding that has become an issue with adjacent landowners. Further south, an estimated 500 feet, there is a turnout and side track on the east side of the Main track. A worn, corrugated galvanized pipe may have collapsed under the side track lead which has created the problem. The galvanized pipe outlets into a cross drain that goes under the railroad just south of the turnout and into the main drainage for the area to the north of the track. The inlet to the pipe is somewhat obstructed but needs to be cleaned out and perhaps the flow will be more adequate. Otherwise it may be prudent to put in another main track cross drain before the turnout and send the drainage to the west side of the track earlier.


Sluice Pipe under Main Track


Galvanized Pipe Under Siding


Turnout at 82nd Street

D. Embankment Stabilization

There were no locations that exhibited any problems regarding sloughing off embankments, slides or damaging fill failure.

E. Ballast Section and Track Surface

Ballast Section

The overall condition of the ballast section on the HHPA Mainline is generally in fair to good condition with the exception of numerous grade crossing approaches and some bridge approaches. The benefit of the superb drainage and the high and dry original engineering and construction lent itself to a clean ballast foundation that has lasted. Though the traffic volume is very light with no freight and "mild" passenger service now, a railroad exhibiting this magnitude of substantial clean ballast with good surface and alignment, also discussed below, pays tribute to those that have maintained it. Every Railroad tells its own story, and the story with this line is that it was well engineered, constructed and maintained over its history.

Typical of many railroads, brand new highway overpasses that cross over railroads don't design in adequate drainage for the railroad underneath and will ruin the track's ballast section by fouling it with dirt and fines during and after the construction of the bridge. The track at the Overhead Bridge where Route 52 intersects with I-69 will need to be cribbed or undercut to remove and replace the fouled ballast. Though that is not a problem now the higher speed will cause deleterious impact on the track surface.

Track Surface and Alignment

The general track surface and alignment of the Main track can best be described as good. The surfacing work that will be required to bring the specific sections of railroad to Class Two speed and service will be surprisingly less than what the Consultant had originally, (without seeing the Railroad) anticipated.

An important consideration with the surfacing is the frequency of defective ties within any track that is raised and lined. If the track is only "safety tied", that is spot tied every 3 or 4 ties to make it safe for movements on say storage tracks, then the defective or nearly defective ties do not raise and consequently you have less support then if you left the track at the existing elevation. The tie replacement program will take this into consideration.

F. Crossties

A general statement regarding the overall tie conditions on the line can best be described by line section. A tie replacement program occurred in 2013 where 4,849 ties were replaced from Milepost 16 down to 38th Street at MP 5.1. The tie conditions in that section of the railroad are relatively fair in relation to Class Two level of service but additional spot work will be required to bring the track to a "reliable and lasting" level of Class Two track. The north end of the line, that is, north of Milepost 16.5 has received some tie replacement work. In the direct area of MP 16 which was rehabilitated through to Lantern Road at Milepost 16.5 received a tie replacement, as did Noblesville from Bridge 22.62 through the reverse curves north.

In order to get a subjective sampling of the tie conditions on the 34.2 operating section of the Railroad, the Consultant takes a count of 100 ties and rates them per expected years of effective life.

Twenty tie sample counts were taken on the HHPA Mainline track inspection. Tie counts are randomly selected counts at different locations with an emphasis placed on general locations that included cuts and fills, tangents and curves, open areas and heavily vegetated areas. The tie counts are representative and random samplings of the tie conditions at any particular location. The more counts taken, the more precise the representative sample on the subject Railroad becomes.

The twenty sample tie counts are included in Attachment II – Tie Inspection Reports for HHPA at the end of this report. One of the twenty sample counts was discarded due to the track being covered with gravel with what appeared like a former grade crossing on the siding track in Fishers. Each sample consisted of rating each tie in a 100 tie block for defective, one to five years effective life, five (six) to ten years life, ten (eleven) to fifteen

years, fifteen to twenty years of extended life. It should be noted that zero (0) ties are defective ties now. Tie count locations commence with a yellow keel mark on the base of the rail with an arrow in the direction the tie count was taken. The mark identifies the location for duplicate review.

The numbers in the small squares on the top row of boxes on the tie count sheet are there for showing the reader the order in which they are documented when the inspector is performing the tie count and the order of presence there may be defective clusters at any particular location. The order is from top to bottom and left to right across the sheet.

To reflect the samplings and adequately portray the two prioritized line sections from Fishers to 38th Street as Priority One and Fishers to Tipton as Priority Two, the Consultant broke the tie counts into two corresponding sections. The question was asked during the inspection if by immediate eye "does this southern section meet Class Two standards now?" The Consultant's answer was a relatively immediate no. Upon reviewing the one-hundred tie sample counts the general tie conditions show that it most certainly does meet Class Two track standards in some locations but not others.

One exception is the joint ties. Of the eight tie samples taken from Fishers to 38th Street there were 7 joints that did not have any effective ties underneath or within the 24 inches either side of the rail end. (Refer above to Figure One). There were four joints with a five year or less life remaining tie under the joint and a defective tie. To rehabilitate the track to a reliable Class Two standard that will not lose its longevity within four or five years or less, the Consultant believes the defective tie under the joint should be replaced and share the joint burden with the five year tie.

The second exception is clusters of defective ties in a row. Though the 2013 tie replacement program replaced 4,849 ties and the change-out was generally well distributed to break up clusters, some clusters still remain. Surprisingly the eight tie cluster was just south of 116th Street.

Overall, another healthy contingency of ties should be allotted in the Rehabilitation Plan to break-up any further clusters identified and to bring all the joint tie conditions up to acceptable FRA Class Two standards.

As can be seen by the Tie Inspection Reports, the percentages for defective and five year ties ranged from 11% to 42%, so the overall average is not necessarily indicative of what is out in the field.

Of the eleven tie samplings taken on the north end Milepost 16.5 through to State Route 28 at Milepost 39.3, the defective tie count ranged from 37% to 64% with an overall average of 53% defective. Couple the five year ties with the defective ties and an overall

average of 66% ties have five years or less remaining life. The possibility is by the time the Priority Two is completed the five year ties become due! Therefore to accomplish a "reliable" plan, additional ties are included in the rehabilitation.

These tie count reports and breakdown samplings were developed from old PRR MW methods for evaluating the maintenance of track. The Consultant has modified the forms to better suit the application.

While crosstie conditions are indisputably important to the adequacy and acceptability of the track structure, it is theoretically possible to have a large percentage of defective ties in track and still meet FRA requirements. As shown in Table 1, both Class 2 and Class 3 can have as few as eight non-defective ties in each 39' rail length of tangent and curves $\leq$ 2 degrees providing they are distributed uniformly. That means roughly 65% of the ties in track can be defective and still be acceptable Classes 2 and 3 track, again if properly distributed. Class One track can have as many as 75% defective if distributed correctly.

Obviously, a track with tie conditions described above is not going to last long even for infrequent freight service. The increased load on the remaining non-defective ties will lead to their premature failure. That failure increases the incidence of defective clusters. "Clusters" are numerous defective ties in a row. In turn, the track is downgraded to the next acceptable level or "Class" of track. It takes only one defective tie cluster to drop a segment of track from Class 6 or 110 mph to Class One.

In considering the tie replacement program, the percentage of defective ties that must be replaced is primarily contingent on the existing defective tie count, defective ties at joints, the spacing of the ties, the rail section, the proximity to turnouts and bridges, the density of traffic and how long it will be until the next tie and surfacing cycle. As noted above, ties under joints that are supported by one defective tie and a five year tie will have the railroad struggling to keep up with FRA standards for Class Two track soon after the track is fully rehabilitated.

As a note, typically tie replacement programs of any magnitude on any railroad or facility will often neglect grade crossings or areas where the track is covered with dirt and debris. These locations are often the locations that cause the greatest problems because they haven't been exposed and had the required tie replacement. In a tie replacement program, there should be accommodations made to expose the track, at least for inspection and possible replacement of the ties if necessary. Any track is only as good as it is at its weakest link. Many times light traffic gravel grade crossings or dirt covered track become that weakest link.

G. Bridge Timber

There are 10 combination open and closed deck bridges and 10 combined stone arch and wide culvert bridges identified on the track chart. As defined above, the Consultant performs a full inspection of the open deck bridge timbers and deck but only a cursory review of the structures from what is visible from the deck. Under-grade stone arch structures and culverts that were not apparent from the hy-rail vehicle were generally not

inspected. All open deck bridges were inspected on foot and were all in generally fair to good condition. Both recent and former work was easily identified.

The six foot stone arch bridge at 18.30 had some minor grout loss at the west side wing wall which was undermining the southeast approach wall. Some shoring and ballast should be installed there and on the closed deck.

The inner track guard rail or "rails between the rails" that come to a point and stretch out as much as 30 feet from the headwall of both sides of a bridge are installed to deflect a derailed car wheel flanges back to a position that will keep the car on the bridge. Most railroads have taken them off the approaches because standard tie insertion equipment cannot install a tie under the inner set of rails. Production tie gangs will skip them all together with the intention that a "hand" crew will come back and install them later. That very infrequently happens so typically there are numerous and dangerously few effective crossties at one of the most critical areas on every railroad, bridge approaches.

Bridges 20.71 and 20.80 both had good bridge deck timber and well distributed effective ties on the approaches under the "nose" of the inner track guard rail. Bridge 22.62 in Noblesville requires additional ties on the south end approach within the nose area of the inner track guard rail. Gauge at this location measured 57-5/8". All the ties between Bridge 22.62 and 22.69 have been recently replaced and the rail on the high side of the curve through Bridge 20.80 was replaced.

Bridge 20.80

Bridge 20.71

Bridge 20.71

Bridge 29.29 had fair deck timber and ballast is needed on the north end approach. There is a mild sag on that north end approach probably due to lack of ballast. Bridge 38.87 also had a sagging approach on the south end and a cluster of 8 defective ties in a row under the inner track guard rail. There is as much as a 4-1/2" sag on the north approach to Bridge 5.59 which will be corrected during the rehabilitation.

H. Rail

The primary rail section on the Hoosier Heritage Port Authority line is 9020# RA with various other sizes off of grade crossings. The Consultant visually encountered 112# RE, 115# RE, 132# RE and 136# RE off of some grade crossings. The Wye tracks in Davin had 9020#, 8090# and even a little 110# off the main tracks. The majority of the rail on the Main track was in surprisingly good condition. Very few areas required any full or partial continuous rail replacement. Spot locations where the rail is embedded in dirt and debris typically requires a rail replacement.

The most notable item on the entire inspection and something that this Consultant never encountered before, was a strange welded bead of what appeared to be stainless steel over the top of the center of each rail that was roughly three feet long and spaced about every

four feet on each rail head. The intermittent pattern started at the turnout at Fall Creek Milepost 6.1 and extended to roughly 900 feet north of 39th Street.

On further investigation, the material is stainless steel and is welded into an electric arc burned groove in the center of the rail head that maintains the electric shunt in rusty rail conditions so the circuit is not lost when trains are approaching grade crossings that are protected with electric warning devices. There is a railroad in Minerva, Ohio that performs the same procedure to maintain the circuit and it is conjectured that it was developed and implemented by the same owner.

The stainless "bead" has peeled up in certain locations and the Consultant feared it could pierce the rubber tires of the hy-rail during the inspection. It did not, but the peeled up sections revealed the "burned head" below which creates an even greater fear, that the burned rail has compromised the integrity of the rail. A broken head at 10 miles per hour is not a "good thing".

As earlier described the propensity of the rail is primarily good. There was only one location that had significant curve wear on the high side and the same magnitude of tread wear on the low side. Tread worn rail is the depth of the head itself. Gauge worn rail is

wear on the gauge surface of the rail head typically the high side of curves. Both were observed at the two bridges in Noblesville (Bridges 22.62 and 22.69). As described earlier, the high side of Bridge 22.69 was already changed out recently.

The picture to the right shows an insulated joint on the south approach to Bridge 22.62. The track is curved and the high side rail is curve worn. Though the curve wear is hard to see in the picture of the painted insulated joint, the width of the head of the adjacent inner track guard rail can reveal the magnitude of the curve wear on the running rail. Though the gauge wear is significant, the rail probably has significant life remaining.

The above picture was not from HHPA Railroad but is included as an example of a "Dutchman".

The inspection revealed a small number or "Dutchman" from one end of the line to the other. A "Dutchman" is a short section of rail anywhere from an inch to 10 feet or more where the rail has broken off and is either jointed in the track with joint bars on both ends and very close to one another or a short piece of rail that is secured within a joint bar by a bolt within that jointed section. The short piece of rail may be within the joint bar limits and not bolted but still "relatively" secured with the adjacent joint bars (splice). Typical of industry trackage, Dutchman are a quick and easy repair for the ends of the rail which might simply break-off the rail end and are still secured by the joint bars. Most Dutchman are not problematic but will become problematic in the future especially under Class Two level of service. The "Dutchman" will be replaced with the rehabilitation effort and are included in the Plan as a "Miscellaneous Rail Replacement" contingency item.

When considering the reconnection to Norfolk Southern on the north end of the line in Tipton, the track that is covered with grass and dirt will probably not yield reusable rail, plates and joint bars. Typical of a track that is covered with dirt, vegetation and debris the rail base and web are severely corroded. Joint bars have section loss that when reused and tightened thoroughly with new track bolts, nuts and washers still "move" under traffic and are loose fitting under the head of the rail. This is typical of a track structure that is not drained, or embedded in gravel, asphalt and concrete and not exposed. Some locations severely corrode steel components of the track structure because of highly corrosive cinders, highly acidic aggregate and coal fines. The Plan will include new or Class One Relay Rail and Other Track Materials (OTM) to reconnect the line in Tipton.

I. Other Track Materials (OTM)

Joints – Bolt, Nut, Washer Assemblies

The Mainline track has generally joints that are tight with the full complement of bolt assemblies as designed, however there are loose joints and loose bolts at numerous isolated locations. A loose joint has all the bolts frozen or loose and the bars could be moved if kicked. If a loose joint was encountered on the inspection it would be red-ribboned for later identification. Loose joints can create rail-ends to mismatch on the gauge side of the rail head which can derail cars.

The line had an inordinate amount of cracked and broken bars. They were no doubt previously identified however because they were paint marked by a previous inspector. The propensity of the cracked bars were typically between the outside bolt holes and did not need to be replaced in 10 mile per hour traffic. Though cracked bars of the defect described are allowed in Class 2 track, a healthy contingency of replacement bars will be included in the rehabilitation plan and will be replaced when the work commences. The inspection found numerous cracked bars but there were no bars that were singularly or both broken in the center that would warrant immediate replacement.

There were two sets of compromise joint bars found that were welded together at the center just south of 96th Street. They, like the cracked bars were paint marked by a previous inspector and are obviously being watched, however they will require replacement in the rehabilitation also.

Typically on most track rehabilitation projects bolt tightening is incidental to raise, line and surfacing track to remove surface and alignment imperfections. The number of bolts is estimated and paid for on a unit price per new bolt assembly (bolt, nut, and washer) furnished and installed. Cracked or broken bars are replaced, either with an inventory furnished by the Owner or furnished and installed by the track contractor. A separate pay item for replacement bars minimizes the "unknown" factor that a track contractor will overestimate to protect his/her pricing. The other end of the coin is that the contingency needs to be "watched" as work progresses so that only the cracked and broken bars are being replaced and the replacement counts are accurate.

Tie Plates

The line trackage was generally well supported with primarily single shouldered tie plates, however some locations will require a contingency for plates, similar to the bars but not nearly as extensive, to be installed when replacement cross ties are installed. If the plates are not fully used, they need to be inventoried where they are protected from theft and utilized later as needed.

Rail Anchors

Typical with most light lines there were few rail anchors attached to the rail to restrict longitudinal movement.

J. Special Trackwork (Turnouts)

This Consultant considers drainage and turnouts as the most maintenance intensive single-track items on the railroad and the most probable to cause catastrophic service failure if not attended to properly. The maintenance attention to "details" on turnouts, namely, to the switch timbers, frog and point welding, tight joints, clips, rods, slide plates, etc., surface and drainage, profile grinding new and old stock rails and points and attention to critical measurements, make the most dramatic difference to the longevity of the components that make up the turnouts.

Fifteen turnouts were inspected on the Mainline and Wye Track in Davin and ranged generally from fair to good condition with two rated poor, mostly because of individual components that need replaced or repaired. Those two included the East Wye Track in

Davin, off the Mainline and 46th Street turnout that had generally poor timber and the frog.

Switch and Frog Inspection Reports used to inspect and record the results of each turnout are in Attachment III. Turnouts that require switch timber replacement are individually listed with lengths and quantities in Attachment IV - Switch Timber - Scope of Work – Bill of Material. The Switch Timber Bill of Material must be considered as flexible and used as a guide for the Order of Magnitude Estimate. Individual switch timbers will require field verification prior to bidding the work or a track contractor commencing the rehabilitation work.

As a general maintenance item, all turnouts require profile grinding.

Profile grinding stock rails and switch points refer to grinding the cold-roll metal flow of steel off the rail (stock rail) that receives the scissors point at a switch. Rail traffic work hardens the rail it runs on and creates a lip of steel that flows over the side of the rail on tangent track. That metal "flow" or lip, if not ground off, will obstruct the switch point from closing flush up against the stock rail. Rail traffic over the new rail and turnouts will "cold flow" the rail at an accelerated rate because the new rail has not been "work hardened" yet.

The switch point, narrow at the point to receive the approaching wheel flange and gapped by the flow of the stock rail can break off the tip of the point or worst case, derail the approaching, facing, traffic because it doesn't close. Almost 100% of the time the point breaks off and thus accelerates the deterioration of the switch point (and stock rail) with every move of traffic. Similarly, the back-side of the point should be ground off so it doesn't obstruct proper closure. This "profile grinding" should be done on the stock rail from six inches ahead of the point to the head separation of the closed point to the stock rail and where the flow begins behind the back face of the point. Though it may seem as a trivial item of concern, profile grinding at turnouts should be a part of the annual programmed maintenance regimen for all turnouts.

A listing of individual items observed on the inspection are noted below:

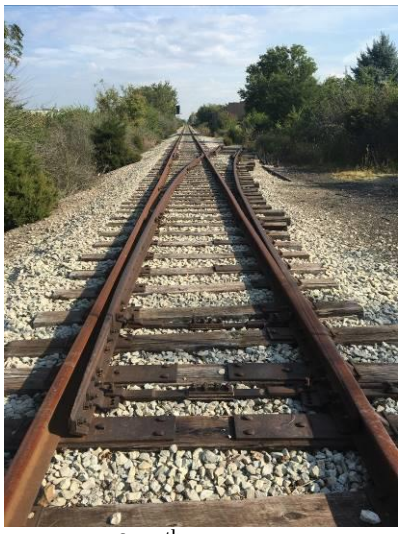
South of 46th Street Turnout – Clamped (out of service – O/S) turnout. Chipped right hand point. Braces are loose and switch timber throughout the turnout are poor. Frog is poor and should be replaced or at least the risers welded. This is where the aforementioned stainless steel bead commences heading south.

South of 56th Street Turnout – O/S, Frog is poor, reverse move back to back measurement is O/S, Frog needs replaced.

A cracked frog point is sometimes "weld-able" if it does not migrate through the entire point and definitely into the casting. It has been the prudent action to simply replace the frog then to attempt to cut out the fracture and build the point from scratch. Even the best of frog welders cannot always make a weld of this magnitude and have it last for any length of time. The fact that the track will be raised to Class Two level of service negates the option of welding. The frog must be replaced.

South of 82nd Street Crossing – Chipped left hand point needs welding. Needs headblock timber (gauge rod at location presently), worn frog but fair. Small 1-1/4" break out off a rail trailing out of the frog. It will be replaced in the miscellaneous rail replacement item in during the rehabilitation. Heel block missing a bolt.

South of 96th Street Crossing – Clamped for normal moves O/S. Discussed above regarding the drainage. Chipped left hand point, loose bolts in frog area and worn risers that need welding. Poor switch timber through closure and frog. Right hand stock rail tread worn.



South of 96th Street Crossing

The picture below shows switch timber in place on the Main Track just south of the above turnout. The prior turnout has been straight railed (taken out). In order to surface the track efficiently and the surface to "hold", straight railed turnout timber must be replaced with regular ties.

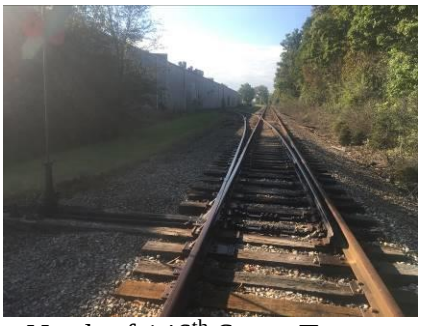
South of 96th Street Crossing

South of Milepost 16 (South Run-around Turnout – Fishers) – Switch rods are close to switch timber, mildly chipped reverse left hand point. Switch timber are good but measurement for Face and Check gauge need correction on reverse move.

South of Milepost 16

North Run-around Turnout at Fishers – Right hand point needs welded. Broken left hand heel block.

North of 146th Street Turnout



North of 146th Street Turnout

North of 146th Street Turnout – Poor timber on trailing end. Chipped switch point four inches long requires minor weld. Reverse move Check and Face measurements need correction. Frog point needs welded.

South of Chestnut Street Turnout – Joints approaching frog are loose. Braces slightly loose. Loose frog bolts.

South Indiana Transportation Museum – Left hand switch point chipped – needs welded, Right hand point chipped 3 inches from point against stick rail. Mainline (normal) guard rail loose. Worn riser on frog needs welded.

North Indiana Transportation Museum – Frog point needs welded. Switch rods are rubbing against switch timber.

S. of Chestnut St Turnout

North Indiana Transportation Museum

South Wye Turnout

South Wye Turnout – Frog bolts are loose.

North Wye Turnout – Risers on frog need welded.

North Wye Turnout

North Wye Turnout

North of 249th Street Turnout – Chipped left hand switch point needs welded. Frog has chip out of casting but that is not a traffic issue but should be monitored. Bars are broken on high and low side curve closure rails. Back to back gauge 53-1/8" on reverse side. Timber are generally poor.

North of County Line Road Turnout – Good Turnout

East Wye Turnout (off the Main Track) – Needs headblock timber (Switch machine timber) and point and closure rail timber.


East Wye Turnout

Though the listing may alarm the reader of extensive problems throughout the turnouts on the line, on the contrary, the listing primarily depicts mild items that require correction for long term maintenance and stability. Serious items have been noted with replacements or out-of-service status. Generally the turnouts are in good condition.

As a general note, and there is no switch points on the Main Track that have been recommended for replacement, when or if replacing worn switch points, it is typically prudent to replace the adjacent stock rail with a full-head, Class One relay or new rail with every installation.

K. Grade Crossings

There are a total of 78 public grade crossings on the operating section of the Railroad as listed on the ITM Timetable No. 9, of which the Consultants inspected all the crossing from Milepost 5.1 through to State Route 28 in Tipton at MP 39.3. A further review was performed to evaluate possible options to reconnect to the Norfolk Southern Mainline at Independence Street at 39.6.

The grade crossings inspected on the line ranged from very good to very poor and are therefore listed singularly below. "Positive flangeways" as written for description below refer to flangeways provided by timber, rubber, concrete or steel where the pavement or surface material has a defined surface to pave against as opposed to just pavement with no defined structure to maintain the flangeway clearance.

MP 5.1 - 38th Street The north approach to the crossing will require additional cross ties. Typical and similar to a production tie replacement gang at inner track guard rails over bridges, insulated joint ties that require replacement are often overlooked because of the fear of breaking the wires, especially if there is not a signal maintainer available to repair them. The track looks solid as evidenced by road traffic but there are numerous inside rubber flanges missing.

MP 5.1 – 38th Street

MP 5.1 – 38th Street

MP 6.2 – 46th Street Crossing like many more below do not have a positive flangeway. Track is relatively solid.

MP 6.2 – 46th Street

MP 6.4 – Keystone Avenue Poor alignment and drainage approaching crossing. Ties are fair in median and track looks solid under crossing.

MP 6.4 – Keystone Avenue

MP 6.7 - 52nd Street No positive flangeway grade crossing.

MP 6.7 – 52nd Street

MP 7.3 – 56th Street Previously described drainage location, no positive flangeway.

MP 8.0 – Kessler Blvd. No positive flangeway, track solid.


MP 8.0 – Kessler Blvd.


MP 8.5 – Allison Road


MP 8.5 – Allison Road

MP 8.5 – Allison Road Four panels are failing and should be removed and asphalt paved, track solid.

MP 8.7 – 62nd Street Both rails within the crossing are vertically bouncing with vehicle traffic, crossing must be fully replaced.

MP 9.5 – 65th Street Asphalt, no positive flangeway. Track solid.

MP 10.3 – 71st Street Asphalt, no positive flangeway. Track solid.

MP 11.0 – 75th Street Asphalt, no positive flangeway. Track solid.


MP 8.7 – 62nd Street


MP 10.3 – 71st Street


MP 11.0 – 75th Street

MP 11.2 – Knue Road Timber failing in the middle of the crossing. Lags need pulled and small hole needs cold patched with asphalt.

MP 12.3 - 82nd Street Tub crossing mild misalignment in crossing at median. Broken up asphalt in flanges. Track appears solid.

MP 12.8 – 87th Street East rail is bouncing under traffic, approach alignment can be an issue for Class Two service. Crossing must be fully replaced. Site of cracked then welded compromise joints previously discussed.

MP 13.7 – 96th Street Concrete tub crossing, solid track.


MP 12.3 – 82nd Street


MP 12.8 – 87th Street


MP 13.7 – 96th Street

MP 16.5 – Lantern Road Asphalt, no positive flangeway.

MP 17.3 – 126th Street Broken up asphalt with no positive flangeway. Track appears solid.

MP 17.8 – 131st Street Asphalt, no positive flangeway. Some loose joints on approach. Painted so they are monitored by prior inspector.

MP 21.2 - Private Crossing Double track, timber flangeway, filled in with dirt and debris.

MP 21.3 – Chestnut Timber flangeway, some failing but track structure appears solid.


MP 16.5 – Lantern Road


MP 17.3 – 126th Street


MP 21.3 - Chestnut

MP 21.8 – Division Street through Logan Street Embedded street running track in concrete tubs with continuous welded rail. Sturdy track.



MP 21.8 – Division Street through Logan Street

MP 24.5 – 196th Street West rail is loose in the crossing and vibrating under vehicle traffic. Crossing requires full replacement of track and surface.

MP 25.5 – 206th Street Broken flangeway timber but crossing and track appear solid.

MP 26.6 – 216th Street Rail is bouncing under vehicle traffic. Crossing must be replaced.

MP 28.1 – Wiley Street No flangeway. Asphalt pavement up to head of rail on gauge side. Will require a flangeway for Class Two Track.

MP 28.5 – Jackson Street Rail is bouncing under vehicle traffic. Crossing must be replaced in full.

MP 28.9 – Park Street Broken up timber crossing. Scheduled to be replaced in spring.

MP 24.5 – 196th Street

MP 28.1 – Wiley Street

MP 28.9 – Park Street

MP 31.7 – North Street Broken up flangeway timbers, may be considered for full replacement.

MP 34.1 – State Route 19 Good crossing – deserves a picture.

MP 34.3 – Kauffman Street Crossing has broken up flangeway timbers that should be removed. Timber can possibly be "kicked up" under train and/or vehicle traffic and do damage to the undercarriage of either. The track appears solid. Removal of the flangeway timber and accompanying asphalt paving should provide a flangeway for safer higher speed train traffic.


MP 31.7 – North Street


MP 34.1 – State Route 19


MP 34.3 – Kauffman St.

MP 34.4 – Main Street Similar to Kauffman Street, failing flangeway timbers should be removed and asphalt paving should provide flangeway.

MP 34.5 – Meridian Street Flangeway timber was removed and paved in as recommended above, but the flangeway was not provided. Also, lags that may be surfacing out of the broken timbers should be removed to avoid damaging vehicle traffic. Therefore, some timbers should be removed just because the lags are not securing them down.

MP 34.6 – County Line Road Flangeways must be provided for train movements.


MP 34.4 – Main Street


MP 34.5 – Meridian Street


MP 34.6 – County Line Road

MP 36.1 – County Route 450 Gauge is 58" within crossing and has been tar and chipped filling in the flangeways. Crossing track and surface must be fully replaced.

MP 36.6 – County Route 400 Flangeways must be restored where crossing was tar and chipped over.

MP 37.1 – County Route 350 Flangeways must be restored where crossing was tar and chipped over.


MP 36.1 – County Route 450

The listing of the public grade crossings as depicted on the ITM Timetable No. 9 is included in Attachment I.

L. Track Gauge

There were no FRA wide gauge violations found on the inspection pertaining to Class One Track. Some locations that were pushing the limit and should be monitored or corrected are listed below:

The south end approach to embedded street running track at Division Street had 57-1/2" gauge on west rail and compromise joint. Not pushing.

Just south of Bridge 22.62, 57-5/8" was on the high side insulated joint approaching the bridge.

County Route 450 S measures 58" gauge within the crossing.

III. CONNECTION TO NORFOLK SOUTHERN RAILWAY IN TIPTON

A. General Discussion

As discussed above, included in the Report's Scope of Work is to provide options for reconnecting the HHPA to Norfolk Southern Railway on the northern end in Tipton, Indiana for access into the general railroad freight system.

Attachment VI – Connection to NS Tipton – Conceptual Plans and Options, the four sheets depict two options to connect to Norfolk Southern Railway in Tipton and Sheets 3 and 4 show the work required to rebuild the approach track to the options. The work in Sheets 3 and 4 is required for either option.

As a general description, the present termination of the track in Tipton ends at the former grade crossing at Washington Street. There the track is removed through Washington Street, covered with vegetation and grass between Washington and North Streets,

removed at North Street and Independence Streets, then partially or completely covered with grass and dirt through to Main Street. The track appears to be removed under Main Street.

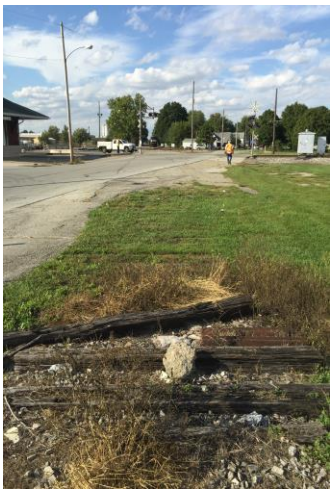
Facing North through Washington Street

Facing north through Independence Street

Facing north of Independence Street

Facing south toward Independence Street

Facing south from Main Street



Facing north into Main Street

As the pictures show there is some considerable work to perform to rebuild the track and grade crossings just to access the Norfolk Southern Mainline. As a general note, the track covered with dirt and grass is probably not reusable. Typically rail and other track materials (OTM) will corrode when buried in dirt and debris. If the rail is adequate it can be utilized as inventory for siding and spur tracks.

At the end of the inspection on the south end and to set the hy-rail truck off the track at Sutherland Avenue, the side track adjacent to the Mainline was observed and was built with 110# rail which may be considered as “seed” rail for restoring the track on the north

end at Tipton. The plates and joint bars were present and the length may make the rebuild less costly if the side track "run-around" is not deemed necessary. The rail, plates and joint bars looked to be in good enough condition to at least be considered for reuse. The No. 11 turnout on the north end of the siding was 9020 and also could be considered for reuse for a replacement of some of the out-of-service frogs recommended for replacement (56th and maybe 46th Street turnouts).

B. Option One – Reconstructing Original Connection

As shown on the Track Charts (Attachment I) and the Valuation Map (Attachment VI after Sheet Four) for Tipton the original connection had the track to track diamond crossing at grade within the Main Street grade crossing. The pictures above show the probable removal of the track and the replacement of the pavement on Main Street approaching the NS Mainline Track. Based on the track chart and Val map, it is very apparent the NS Mainline interlocking has been significantly modified.

To reconnect the HHPA line to NS in Option One from the Match Point, a long diagonal grade crossing through Main Street will be required with a track to track crossing at grade with the NS Main and an additional 290 feet of grade crossing and track to connect to the east wye track accessing the NS yard to the north with a Number 8 turnout. The construction of the No. 8 turnout will require realignment of the East Wye Track which may or may not impact the second crossing north of the diamond on Main Street.

The No. 8 turnout will probably be balked at by NS because of its tighter curvature, but the east Wye track approaching the proposed turnout is sharper than the curvature in the turnout and it fits well into the location.

Another limiting condition that creates a red-flag even in the Consultant's mind, is the track "diamond" crossing within the limits of the vehicle grade crossing. Diamonds are very hard to maintain on their own and require extensive attention. A diamond that must have a "retrofitted" surface material to maintain vehicle traffic would be that much harder to maintain. The other issue is the crisscross intersecting flangeways for the two-way train traffic creates an unpassable motorcycle hazard on the roadway.

It is the opinion of the Consultant that though the same connection or similar connection was present in the past, this Option One is not a recommended alignment to present to Norfolk Southern.

C. Option Two – Constructing Diamond Avoiding the Main Str. Grade Crossing

Sheet Two of Four shows Option Two whereby the connection avoids the diamond track crossover located within the Main Street grade crossing. This alignment steers away from the historic alignment with reverse curves to access and cross the NS main roughly 15 feet from the Main Street grade crossing. The connection is actually shorter in length and again avoids the track diamond in the grade crossing. The track construction still

requires a grade crossing on the north side of the NS Main and again probably will impact the East Wye Track grade crossing over Main Street as well.

Based on what can be discerned on the attached Val Map for the previous Tipton connection, the proposed alignment to cross the NS Main 15 feet from the roadway in Option Two, will probably require acquisition of adjacent property. There were as many as four tracks within that right-of-way approaching the NS Main in the past, depending on which prior track the ROW is referenced, there may or may not be some property acquisition required.

IV. CLASS TWO LEVEL OF SERVICE TRACK REHABILITATION PLAN

A. General - Estimate Description

The following Rehabilitation Plan concentrates on bringing the HHPA Main Line Track to a reliable Class Two level of track and service. Though there will be locations that will not permit Class Two speeds for freight and passenger trains, all track will be brought up to Class Two Track safety standards. The Plan includes an Estimate of Probable Costs in Attachment V. As a general note, the estimates for cost and quantity are conservative, allowing for minor changes in the scope of work for any one phase. The estimates should cover the work proposed that needs to be done within the five year time frame barring any unforeseen increase spikes in pricing. Other considerations will be defined below in the applicable sections.

The Switch Timber Replacement – Scope of Work – Bill of Material, Attachment IV is a support document for quantities and lengths of the switch timber replacement and should be used in conjunction with the Rehabilitation Plan. Actual lengths of the specific defective switch timber were not measured during the inspection but have been estimated based on the inspection reports. The Switch Timber Bill of Material will require verification of timber lengths prior to receiving bids for the work.

The cost estimate is presented with Priority One on the south end from Milepost 16.5 in Fishers to Milepost 5.1 and Priority Two from Fishers north to State Route 28 (Milepost 39.3). Input regarding priority of work was discussed with Mrs. Klopfenstein and Mr. Schwartz and confirmed as they saw fit. Economies of volume can be realized if the work is staged with one contractor doing all or the majority of each phase of the prioritized work over a period of time and sufficient funding is in place. The cost estimate takes into account these economies.

Estimated lengths of the grade crossings were taken from scaling off of Google Earth and have no survey backup or measured in the field data to support the estimated quantity. Grade crossing that were candidates for total replacement were estimated by the lengths of the timber, rubber or concrete panels or tubs that existed in the present construction and were verified through the scaling off Google Earth, thus the Plan Estimate is considered “Order of Magnitude”.

As a note, all grade crossings that required replacement considered only full width timber instead of rubber flange or concrete panels or tubs for the replacement except the rubber flange recommended for the Main Street connection to NS in Tipton. Full width timber grade crossings span the width of the crossing without asphalt paving between rails in the gauge. To lessen the responsibility of the Railroad to pave broken up pavement within the gauge and the roughly two feet from near rail on the outside of the track, the Consultant considers the full width timber option as less demanding on later budgets and reduces public complaints. The rubber flange and asphalt grade crossing on Main Street in Tipton is conducive to whatever Option One would be required to provide an adequate grade crossing surface approaching and exiting the diamond track and vehicle crossing at grade.

The Order of Magnitude - Estimate of Probable Costs in Attachment V has been separated into two categories based on priority and two additional categories for the options to connect to Norfolk Southern in the north at Tipton. Column Three which refers to the Connection to NS – South Track Rehabilitation refers to the track removed or grown over with vegetation which must be rebuilt to get to the Sheet Match Points for both Options.

B. Category - Estimate Description

Items 1, 2 and 3 refer to the crosstie replacement program which includes the replacement of crossties based on the one-hundred tie count sampling and from what was visually inspected. Tie replacements at specific locations have been generally estimated and should be verified and marked for replacement prior or subsequent to receiving bids for the work. The overall tie replacement program concentrates on supporting joints, breaking up defective tie clusters, providing adequate approaches to turnouts and prioritizing high-percentage defective locations. Locations where the track is covered with dirt and debris or gravel private crossings need to be cleaned to a level of adequacy that the ties can be inspected for replacement. Most locations can be cleaned relatively easily utilizing a track regulator brought on by the track contractor doing the work. The debris “windrow” however would still have to be cleaned up and removed upon completion. Other locations will require carefully digging out the dirt and debris by hand or with the help of a back-hoe. A contingency is afforded in the cost estimate to account for missing or damaged plate replacement. Whatever that is not used in the replacement program can be inventoried for the Priority Two or the next programmed project.

The eight crosstie counts from Milepost 5.1 to 16.5 (11.4 miles) significantly varied as discussed above. Numerous defective clusters were identified and defective joint ties were recorded in the prior 4,849 tie installation section. After deducting bridges, turnouts and grade crossings the 11.4 miles was reduced to 57,720 feet of tie installation trackage or 10.9 miles. In order to accommodate the varied percentages of the eight samplings taken and estimate a conservative tie count per mile in the prior tie installation section the Consultant chose to error on the side of conservativism and recommends installing 275 ties per mile (10.9) or roughly 3000.

The recommended tie count on the MP 16.5 through to MP 39.3 at State Route 28 with a total footage deduction of 5,152 track feet for bridges, turnouts and grade crossings is 750 ties per mile for 21.8 miles. The "rounded up" tie count per mile allows for a safety tie installation on the south, north and east Wye Tracks. The eleven tie counts were relatively consistent with defective and 5 year percentages which permitted an easier tie installation amount to satisfy Class Two track level of service. The defective and 5 year tie combination will be adequately sustained for a period of "a reasonable length of time" as discussed above. It must be understood however, the tie installation cycles will have to be implemented as ties continue to deteriorate over time and service. Twenty five to thirty mile per hour track under only passenger service will typically deteriorate less rapidly then freight service at 25 miles per hour.

Switch timber counts listed on the Switch Timber Replacement – Scope of Work are also conservative and require verification and actual marking.

Item 5 – Brush Cutting and Vegetation Control is specific to what was described in the above narrative and does not include the annual weed spraying that should be done on the entire property every year as has been the recent history. It is evident that the current weed spraying contractor has been performing a good job and probably should be retained to continue the annual spraying program. Track contractors would probably sub-out this work and legitimately charge ten percent mark-up. The estimate includes a general, one time pricing to cut the encroaching brush on the line from 15 feet both sides of centerline track six inches to twenty-five feet above top of rail.

Incorporated into the brush cutting program should be identifying and cutting dead and leaning trees that are outside the 15 foot cutting limits but still within the right-of-way that are probably going to fall over the track in the near future. Refer to the picture on Page 7 of the dead tree about to fall at approximately Milepost 13.5.

Items 6, 7 and 8 on the Estimate considers a full package of tightening all joints on the Mainline Track. The items cover replacing broken, missing and frozen bolts that need to be torch burned and replaced. The estimate also includes the Contractor furnishing replacement bars for broken or cracked joint bars that will be encountered during the tightening work. Locations that are scheduled for out-of-face surfacing will probably end up with more broken bars then originally encountered without the surfacing, because of the lighter 9020# rail section. The tightening and replacement sequence should proceed after the track has been raised. The replacement joint bar contingency was estimated as fairly high based on the inspection. Again surplus bars may be inventoried or held by the track contractor providing there is a "solid" quantity identification that bars have been actually replaced.

The miscellaneous rail replacement Item 9 considers replacement of damaged or broken rails, rails that break in the surfacing program due to the light rail section or the removal of "Dutchman".

Continuous rail replacement (Item 10) are longer sections of track that may have numerous curve or severely tread worn rail scheduled for a continuous replacement.

There were no locations identified on this inspection that required the removal of significant lengths of curve or tread worn rail. It is the opinion of the Consultant to recommend the replacement of the "beaded" stainless steel rail identified on the southern end of the line. The rail was, or appeared to be, arc torch cut on the center of the head for the application of the welded stainless. The Consultant does not know the maintenance activity of the specific rail in question but believes the integrity of the rail is subject and recommends its replacement.

The cost of the replacement is included in the Cost Estimate. However, the former track speed through that location was 15 miles per hour which impacts the rail significantly less than 25 miles per hour for passenger and freight. Proposed speed at the end of the line for the fair-ground traffic may realistically be only 10 miles per hour operationally. The rail can be monitored by visual inspection with the replacement deferred until the second phase thus relieving the initial investment of Phase One by the estimated $229,000. If the rail begins to fail, the Phase Two work would include that replacement.

The FRA requires a periodic continuous search for internal defects on Classes 3 and above track. If the rail does not fail there is still an option to have it tested for internal defects to better determine its integrity.

Discussed above regarding the siding and the reuse of the 110# rail, bars and plates, it is anticipated in the future that the need for a run-around or the flexibility of having the track present operationally outweighs the benefit of utilizing the rail and accompanying OTM for relaying into the Mainline Track. Therefore the rail for the rail replacement will be estimated to be furnished by the contractor. There were no other long continuous rail replacements identified in the inspection.

The possibility of reusing the replaced subject "bead" rail, in the opinion of the Consultant, is not an option for sidings or replacement rails in ten mile per hour sections. The option to reuse the rail with limitations on where it can be used, sidings and not the Mainline Track for example, can be more difficult to adhere to in reality and it may be more simple (and safe) to sell the rail as scrap and credit the project costs.

Items 11A through 11F account for associated work at grade crossings. Items 11A, B and C entail construction or renewal of gravel private crossings, crossings to be replaced with full width timber and rubber flangeway both with asphalt pavement. Item 11D is patching asphalt at identified crossings and Item 11E consists of cutting in a flangeway on existing crossings.

The Consultant discussed the logistics and utilization of skid steers with milling attachments, jack hammering and specific large scale milling equipment. Generally it is up to the contractor to determine the most economic and productive equipment to use in this repair. Milling machines with carbide tips will require precision to avoid hitting the rail. Four and two foot wide milling machines are an option which could mill the gauge asphalt down and repave the gauge with planking embedded in the asphalt to provide a direct paving barrier and then be removed after the asphalt cools. There is an 18 inch milling attachment to a skid steer whereby the head can be tilted to provide a one or two

inch paving notch into the existing asphalt and be angled to maintain the minimum 3 inches deep by 3 inches wide at the surface.

Milling machines that can mill out the gauge ought to be utilized on the field surface if the asphalt is breaking out adjacent to the head of the rail. No flangeway is necessary obviously, but the crossing can be fully repaired at that time if necessary. The work may or may not require a detour but flagging traffic control will be an absolute.

Item 11F – Relocation of Insulated Joints on Approach Circuits is an allowance item to accommodate lengthening the circuit starts if required on grade crossings equipped with warning devices that have been installed at distances for the slower speeds.

The conservative allowance is based on relocating all the insulated joints in the higher speed locations outside former Yard Limits as shown on the historic track charts. It should be noted that the majority of the insulated joints on the line were older and may not require relocation. The Consultant found it prudent however to include the cost of the relocation in the Cost Estimate.

Verification of required sight distances at grade crossings without warning devices that may have become obstructed with buildings, signs, vegetation, etc. will be required and approved by the appropriate Authorities.

Items 13, 14 and 15 are items for spot and out-of-face surfacing track and turnouts after the ties and timbers have been replaced or at heavily utilized areas. Out-of-Face surfacing is raising, lining, surfacing and dressing the track with a minimum of a one-inch raise. The "spot surfacing" Item does not perform a consistent "raise" over all the track, but it brings up low spots to the general elevation of the track around it. The frequency of the tie renewals and the increased speed of the train service has dictated that a full out-of-face surfacing cycle be initiated to accommodate significant loss of surface and alignment due to the heavy tie replacement at those (all) locations.

The rebuild track item (Item 16) entails removing the existing track and excavating enough material to allow for installing six inches of sub-ballast and six inches of ballast underneath the ties at the new track elevation. The pricing includes a complete rebuild with new or Class One Relay rail, bars and plates, new 7" x 9" ties and all the required surfacing and alignment for a new or rebuilt track.

There have been few gauge problems identified in the two day track inspection, however a "contingency" item is included in the Rehabilitation Plan. This Item is a place-holder should extensive gauging be identified. Most locations identified with "widening" gauge were high-side joints where a collection of tie replacements would repair the locations.

There were no full turnouts that were considered for complete reconstruction. Rebuild Number 8 Turnout (Item 18A) has also been included in the Estimate as a placeholder should new customers be identified if the freight operation resumes.

Items 19 through 24 are self-explanatory and cover work that should be done on a priority basis when track work commences on the property or before. Replacing Switch Points and Stock Rails have not been identified but is on the Estimate as a placeholder. Profile Grinding is recommended on all turnouts. For safety and longevity of switch components the profile grinding should be implemented promptly and includes making any necessary adjustments to the switch stand to close the points after flow has been ground off. Item 21 – Miscellaneous Turnout Repairs is an allowance item for work that is required and has been specifically itemized above.

Since "drainage, drainage, drainage" is a cliché on Railroads and it wouldn't be proper for this Report to omit this most important issue of maintaining track, Item 25 - Install Drainage Facilities is an allowance item that refers to correcting the drainage at subject grade crossings, the installation of a sluice under the Main Track south of 96th Street, and cribbing the track under the Overhead bridge at I-69.

C. Class Two Track Speed Locations

The Consultant has performed a cursory review of the Valuation Maps and track charts from a simple track perspective to identify track sections for the Class Two speed. The existing track charts identify track speeds from the past and may or may not be duplicated after the track has been rehabilitated.

It must be understood that actual field measurements of superelevation on open deck bridges as well as existing grade crossings on curves need to be measured and verified to accommodate the higher track speeds. Though the track charts reveal speed limits on the Mainline Track, it is not a "given" that grade crossings and new bridge timber were dapped and constructed to accommodate the earlier speeds. The out-of-face surfacing program in the Rehabilitation effort can adjust the track for the higher speeds at most locations but the fixed bridges and grade crossings may limit the speeds through those areas. Circuit starts at public grade crossings that are protected with flasher warning devices will probably require relocation and have an allowance in the cost estimate for that work.

D. Class Two Track Rehabilitation Plan - Estimate of Probable Costs

The estimated order of magnitude cost to complete the HHPA Class Two Track Rehabilitation Plan is as follows:

Phase One –	Rehabilitate Section 5.1 to 16.5	$1,065,000
Phase Two –	Rehabilitate Section 16.5 to 39.3	$2,650,000
Connection to NS – HHPA Track Rehabilitation		$ 651,000
Connection to NS Option 1 -		$ 841,000
Connection to NS Option 2 -		$ 732,000

The total Order of Magnitude – Estimate of Probable Costs for the two phased HHPA Class Two Track Rehabilitation Plan is $3,715,000.

The Consultant wishes to thank Mrs. Rhonda Klopfenstein and Mr. Glen Schwartz for their assistance on the property throughout the inspection.

The End