

A11 - Columbus-Indianapolis-Chicago Parametric Analysis

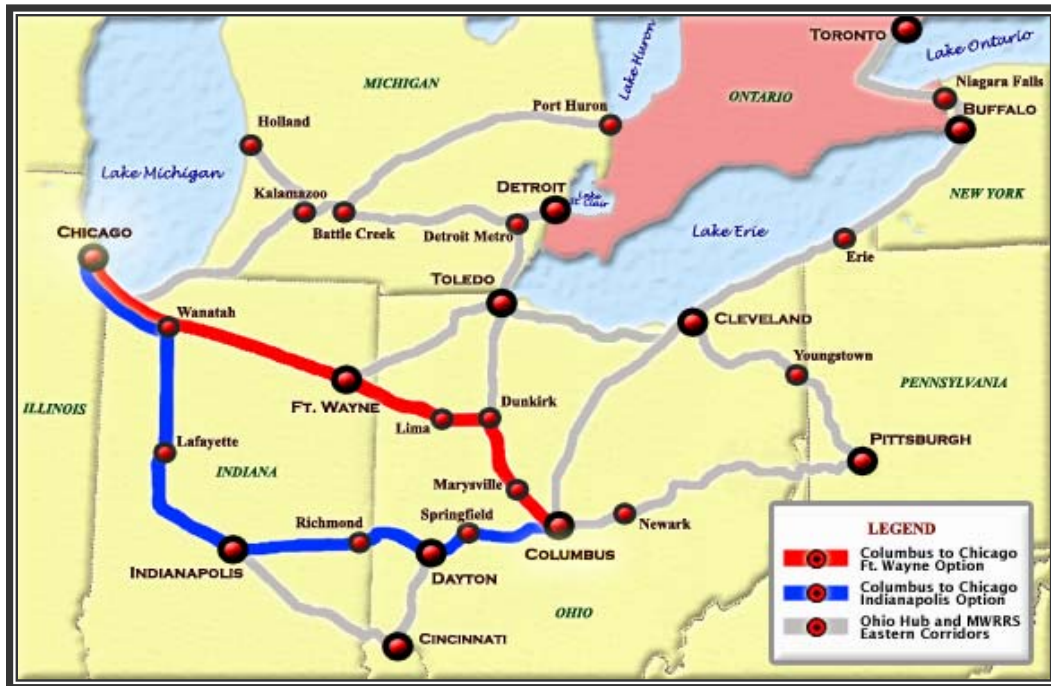
Technical Memorandum: Parametric Analysis – Chicago to Columbus Rail Options and the Columbus to Indianapolis Link

December 12, 2006

As shown in Exhibit 1, two Columbus to Chicago route alternatives have been evaluated for the Ohio Hub rail system:

- A detailed evaluation has been completed of a proposed Columbus to Chicago connection via Marysville and Dunkirk, joining the MWRRS at Fort Wayne. These results are fully documented in the updated Ohio Hub report.
- A parametric analysis was performed of an alternative Columbus to Chicago routing via Indianapolis. This assumed that 109-miles of abandoned line from Dayton to Indianapolis through Richmond would be restored.¹

Exhibit 1 – Columbus to Chicago Route Alternatives via Fort Wayne or Indianapolis



This document is organized as follows:

- First, the performance of two options for connecting Columbus to Chicago, via Fort Wayne or via Indianapolis, will be compared.
- Second, the collateral impacts of both the Fort Wayne and Indianapolis connections on the MWRRS and Ohio Hub networks will be identified.

¹ No feasibility assessment has been performed for restoring the abandoned corridor.

- Third, Indiana DOT requested a sensitivity be developed for using CSX’s Connersville line to connect Columbus to Indianapolis via Hamilton. This avoids the need to restore the abandoned rail corridor via Richmond. A comparison of all Indianapolis to Cincinnati/Dayton route alternatives, which also includes the existing MWRRS corridor via Shelbyville, will be provided.
- Finally, recommendations for progressing this study to a Feasibility level of analysis and incorporating freight impacts will be proposed.

1. Evaluation of Chicago to Columbus Route Options

Exhibit 1 shows the two routes under consideration for providing a direct connection between Chicago and Columbus. However, only endpoint riders from Columbus to Chicago really have any choice of route. Riders to or from intermediate cities cannot be diverted. Also, if the Panhandle line east of Columbus to Pittsburgh were developed, riders originating from Newark, OH or Pittsburgh, PA would also have a choice.

The interstate highway network (I-70 and I-64) requires that Columbus motorists drive via Indianapolis, which is less direct, but faster than the more direct highway route over US 33/US 30, a much slower semi-limited access highway to Chicago. The circuitry of the highway network creates an stronger market opportunity to establish a rail service that does not parallel an interstate highway, and is therefore, a more competitive route option.

The proposed Panhandle routing from Pittsburgh to Chicago via Columbus and Fort Wayne would be time-competitive to the original Ohio Hub route connecting to MWRRS service at Cleveland. However, the Cleveland route is a little faster than going via Columbus, so the current assumption is that Pittsburgh to Chicago traffic stays on its original route via Cleveland. This analysis evaluates Columbus to Chicago alternatives assuming the Panhandle is developed, and therefore includes riders from intermediate stations along the Panhandle line as well as from Columbus proper.

The forecasted through riders from Columbus to Chicago would be about 325,000 via Fort Wayne, or 150,000 via Indianapolis which takes more than an hour longer. If both lines were built, through traffic would route via Fort Wayne since it is a shorter route, and the Indianapolis line would carry only local traffic. However, since long-haul riders comprise only a small share of the total demand forecast for each route, most traffic will be generated locally at intermediate stations along the route. Exhibit 2 summarizes the ridership and revenue forecast for each route.

Exhibit 2 – Total 2025 Ridership and Revenue Forecast, Chicago Route Alternatives

Ridership (millions)	Ft Wayne-Columbus only	Indianapolis – Dayton only	Both Routes Together
Ft Wayne-Columbus	1.12 / \$36 mill	-	1.12 / \$36 mill
Indianapolis-Dayton	-	0.95 / \$18 mill	0.80 / \$15 mill
TOTAL	1.12 / \$36 mill	0.95 / \$18 mill	1.92 / \$51 mill

The ridership in Exhibit 2 breaks down as follows:

- The 2025 ridership forecast on the Fort Wayne to Columbus line is for 1.12 million riders, of which through riders comprise 325,000 or 29%.
- The 2025 ridership forecast for the Indianapolis to Dayton segment is for 0.95 million riders, of which through riders comprise only 150,000 or 16%. If the Fort Wayne alternative were also opened, the through ridership would be diverted and the Indianapolis-Dayton forecast would be reduced to 0.80 million riders.

The through Columbus-Chicago ridership comprises no more than 29% of total ridership of the Fort Wayne line and only 15% of the forecasted traffic via Indianapolis. There would be a substantial penalty – more than a 50% loss in Columbus-Chicago through riders – for trying to force these riders to take a longer route through Indianapolis. The key findings are that:

- The Fort Wayne route is more than an hour faster than the route via Indianapolis and offers a better alternative to Columbus-Chicago through riders. Fort Wayne and Lima are also strong intermediate cities that are served by this route. This route is recommended as the Columbus to Chicago link.
- However, ridership of a Indianapolis to Columbus link, even without any Columbus-Chicago through traffic, appears to be strong enough to sustain a viable corridor based on local traffic alone. As a result, further detailed evaluation of options for adding eastbound connectivity from Indianapolis to the 3-C corridor is recommended for a future phase of work.

In conclusion, while the most effective route (in terms of ridership and revenue) from Columbus to Chicago is via Fort Wayne, the suggested Columbus to Indianapolis link would also be very strong. It appears that both routes offer viable corridors with minimal competition between the routes, since they serve different intermediate markets.

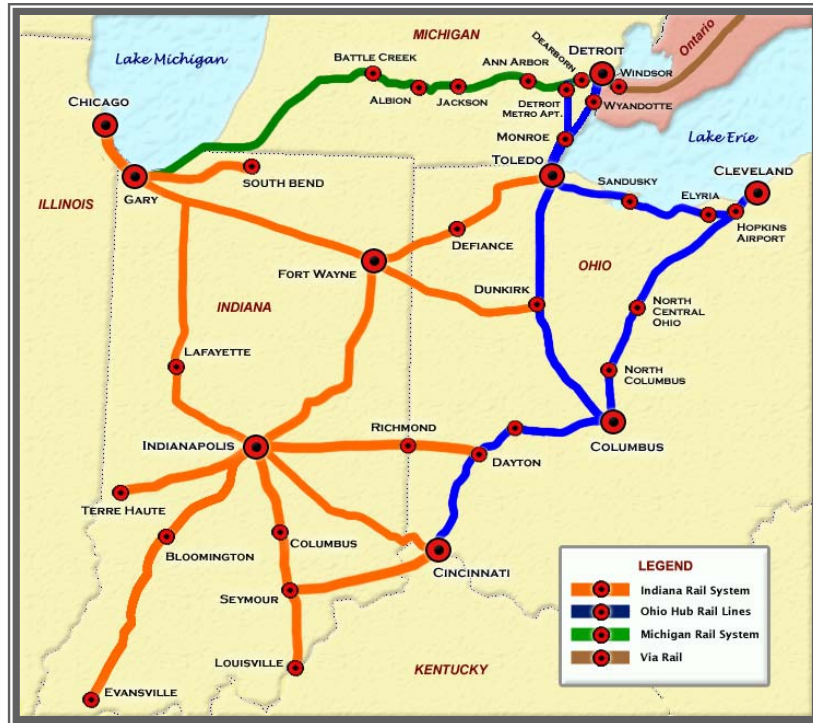
2. Columbus Connectivity Impacts to MWRRS and Ohio Hub Networks

The development of direct connectivity from Chicago to Columbus has implications for planning of the MWRRS and Ohio Hub systems. It leads to the development of a highly integrated passenger rail network that could link all major Midwestern cities with efficient passenger rail connections. By developing the combined MWRRS, Indiana and Ohio Hub systems, Chicago, Cleveland, Columbus, Toledo, Detroit, Fort Wayne and Indianapolis would all become major rail passenger hubs that are served by multiple interconnecting routes.

In particular, the development of the proposed Columbus to Chicago route via Fort Wayne would transform Fort Wayne into a major passenger rail hub. The only missing link that still needs to be added would be a connection from Indianapolis to Fort Wayne. This would create a through passenger corridor all the way from Louisville to Detroit

using a combination of already-planned routes.² Preliminary work by TEMS presented to Indiana DOT has recommended the development of this route as part of an Indiana Rail Plan. Both Indianapolis and Fort Wayne would become hubs in a possible Indiana statewide rail system, shown in Exhibit 3.

Exhibit 3 – Possible Indiana Statewide Rail System



At the present time, the MWRRS Steering Committee has not approved inclusion of any Columbus extension as a part of the MWRRS. Therefore, proposed Ohio Hub extensions to both Fort Wayne and Indianapolis are being evaluated as part of the Ohio Hub system. It is anticipated that a direct rail service would be developed from Columbus to Chicago without requiring any change of trains in Fort Wayne. The expected impacts of these extensions are:

- **Fort Wayne to Columbus:** The addition of this shortcut would impact both MWRRS and Ohio Hub corridor planning.
 - **Ohio Hub Impacts.** Fort Wayne to Columbus is itself a proposed new Ohio Hub corridor that is fully evaluated in the updated Ohio Hub Incremental Corridors update. This route also has significant potential interaction with the proposed Panhandle extension; in combination with the Panhandle it would transform Columbus into a second major hub on the Ohio rail system.

² However, an Indianapolis-Fort Wayne-Columbus route would be more circuitous than the current planned MWRRS connection in downtown Cincinnati. It was therefore not considered as an option for this study.

- **MWRRS Impacts.** The most significant impact is the requirement for additional train frequency west of Fort Wayne to Chicago - from 8 up to 14 round trips per day. This may require further capacity additions to the MWRRS corridor west of Fort Wayne. In addition, the connection to the Columbus line within the city of Fort Wayne would require the location of a planned MWRRS flyover to be changed. The updated Ohio Hub plan recommends shifting the MWRRS flyover farther west, to enable a connection from the Fort Wayne station to the Columbus line directly over the CP Mike interlocking, and provides added funds to do this.³
- **Indianapolis to Dayton:** The addition of this shortcut would have a significant effect on both MWRRS and Ohio Hub corridor planning.
 - **MWRRS Chicago to Indianapolis.** Through Columbus to Chicago riders would not be routed this way, but additional riders from Hamilton, Dayton and Springfield to Chicago would boost the MWRRS corridor north of Indianapolis by about 150,000 riders.
 - **MWRRS Indianapolis to Cincinnati.** Only local riders headed to downtown Cincinnati would remain on the Shelbyville line, resulting in a reduction from 600,000 to 400,000 riders, the same as a stand-alone MWRRS network, since the shortcut would take nearly all the 3-C connecting traffic.
 - **Ohio Hub 3-C Dayton to Columbus.** The shortcut would provide a faster route from Indianapolis not only to Columbus, but also to Pittsburgh, Cleveland and Buffalo. Adding the Indianapolis market would generate almost as much ridership for the 3-C corridor as does Cincinnati. This would result in nearly doubling the ridership of the Dayton to Columbus segment. The added passenger volumes would require an additional 6-8 train frequencies, which may require additional line capacity mitigation. This route also has significant potential interaction with the proposed Panhandle extension.

³ For a map of Fort Wayne rail lines, see: http://www.fwarailfan.net/fortwayne_loc.htm. The Fort Wayne station could be accessed from Indianapolis by constructing a southeast quadrant connection between the NS New Castle district and the Chicago line at “Junction” interlocking, just west of the rail station. As an alternative to building the flyover at CP Mike, NS freight volume through CP Mike might be reduced by restoring an abandoned section of track from “Junction” to “Runnion” that was abandoned in 1999, see: http://www.fwarailfan.net/fortwayne_rte.htm. This would reconnect the New Castle subdivision to the NS mainline that swings through Fort Wayne on a northerly alignment. If restored, this connection would clearly have to be grade-separated. It is suggested that this possibility for avoiding the need for the flyover at CP Mike might be included as part of a future alternatives assessment.

3. Parametric Analysis of Indianapolis to Columbus Alternatives

Because of the difficulties associated with restoring the abandoned Panhandle line from Dayton to Indianapolis via Richmond, Indiana DOT requested the Connorsville line be evaluated as an alternative to the Richmond route. This assumes that the Indianapolis connection to the east carries only local traffic and that through Columbus to Chicago riders are routed via Fort Wayne. This gives a conservative assessment of the feasibility of connecting Indianapolis to the 3-C corridor without impacting the financial viability of the faster Columbus-Chicago route via Fort Wayne.

Exhibit 4 shows three possible ways for connecting Indianapolis to Columbus:

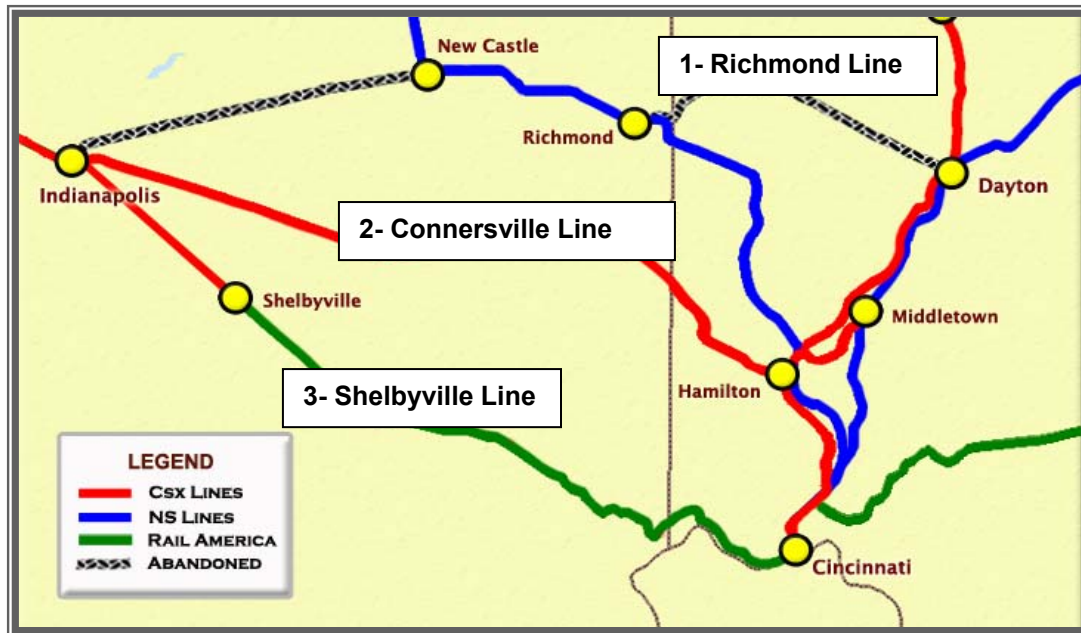
- 1) **Richmond Line.** The original alternative would reestablish direct rail service by restoring 109 miles of abandoned PRR Panhandle track from Dayton to Indianapolis. Optionally, a 27-mile segment of active NS line from Richmond to New Castle could be incorporated into the middle part of the alignment, to reduce the mileage of new track construction that would be needed.⁴ Obviously, capital costs as well as the need to reclaim portions of rails-to-trails segments may be a concern for the viability of this proposal.⁵
- 2) **Connorsville Line.** The alternative that Indiana DOT suggested would utilize the existing Amtrak route from Indianapolis to Hamilton. At Hamilton, trains could turn north towards Columbus as well as south towards Cincinnati. This route was evaluated both as an alternative to the Richmond line and also as a combined alternative to both the Shelbyville and Richmond lines. Although the alignment is optimal for neither Cincinnati nor Columbus⁶, it offers a possible compromise that could achieve economies of scale and reduce costs by combining both Indianapolis-Cincinnati and Indianapolis-Columbus services on a single line. It also offers a practical alternative for instituting an Indianapolis-Columbus service that does not require restoration of track over an abandoned rail corridor.
- 3) **Shelbyville Line.** The original proposed Midwest Regional Rail System (MWRRS) Chicago-Cincinnati line via Shelbyville, would connect with the Ohio Hub 3-C corridor at Cincinnati. Indianapolis to Columbus riders could connect by changing trains at Cincinnati.

⁴ The New Castle to Indianapolis segment is not actually a part of the original PRR Panhandle alignment but is a former ex-NYC “Big Four” parallel line from Indianapolis to Springfield. Restoring this segment would not conflict with the proposed Indianapolis to Richmond bike trail on the former PRR alignment.

⁵ There may be possible significant freight benefits to restoring this route since the Dayton-Richmond link would establish a direct NS freight route from Columbus to St. Louis and Kansas City; and restoration of the New Castle to Indianapolis segment could bring NS directly into Indianapolis on its own rail line. An evaluation of these possible freight benefits is beyond the scope of the current study but noted for future analysis.

⁶ While no detailed operational studies are yet completed, it is considered that this route would take about 10-15 minutes longer than the direct routes via Shelbyville and Richmond, respectively.

Exhibit 4 - Indianapolis to Columbus Route Alternatives



Scenarios Assessed. Exhibit 5 shows the forecast 2025 passenger ridership for different combinations of rail lines east of Indianapolis. The structure of the analysis is as follows: first the performance of the MWRRS Shelbyville line was examined both without and with Ohio Hub connectivity; then, the Richmond line was added to establish a direct Indianapolis-Columbus link; next the Connersville line was evaluated as an alternative to the Richmond line; finally the Connersville line was evaluated as an alternative to *both* the Richmond and Shelbyville lines. All results are presented in terms of forecast 2025 ridership.

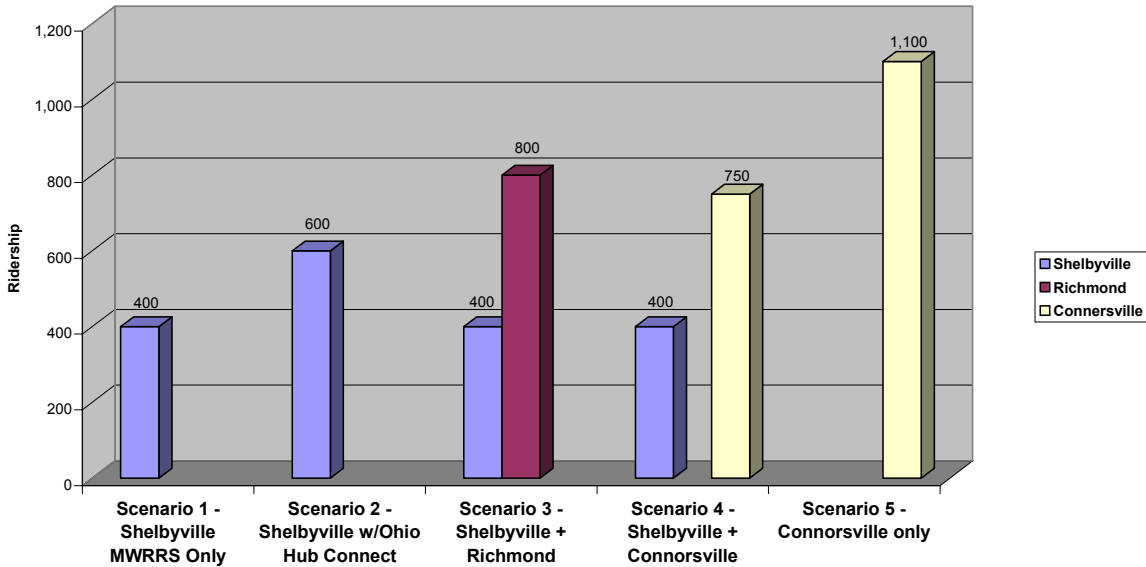
- **Scenario 1 – Shelbyville, MWRRS Base without Ohio Hub Connectivity.** Only the Shelbyville line is operational in Scenario 1. This scenario reflects the base MWRRS forecast of about 400,000 annual trips on the Shelbyville line from Indianapolis to Cincinnati, without eastern rail connectivity to Dayton or beyond. The Chicago to Indianapolis segment carries about 700,000 riders.
- **Scenario 2 – Shelbyville with Ohio Hub Connectivity.** When the Ohio Hub “core” system⁷ opens, there is a small west-to-east traffic shift as Indianapolis traffic finds a faster route to Cleveland, and as Cincinnati riders to Cleveland, Toledo and Detroit use Ohio Hub trains instead of the MWRRS. Indianapolis to Cincinnati ridership increases to about 600,000 riders, while Chicago to Indianapolis ridership slightly declines to about 600,000 riders. This reflects an overall increase in ridership of the MWRRS Cincinnati route, but shifts the load from the west towards the east end of the corridor. This shift is actually favorable to the route economics since it promotes more balanced train loading and better seat utilization and load factors on the MWRRS corridor.

⁷ The 3-C, Cleveland-Detroit, Cleveland-Pittsburgh and Cleveland-Buffalo-Toronto lines

- **Scenario 3 – Shelbyville with Richmond.** Both the Shelbyville and Richmond lines are operational in Scenario 3. A direct Indianapolis to Columbus shortcut would develop substantial additional ridership. About one-third the ridership of the Shelbyville line (200,000 connecting 3-C riders) would choose a direct route via Dayton, so the Shelbyville line would revert to its original MWRRS forecast of 400,000 riders, reflecting a shifting of Ohio Hub connecting riders to the more direct route via Richmond. However, a faster single-seat ride from Indianapolis to Columbus would attract an additional 600,000 new riders, leading to a forecast of over 800,000 riders per year from Indianapolis to Dayton feeding into the 3-C corridor. This link would also improve connecting ridership on the MWRRS line west of Indianapolis, as loadings on the Chicago to Indianapolis segment would rise above 750,000, about 150,000 more trips than were attained in Scenario 2.
- **Scenario 4 – Shelbyville with Connersville.** This evaluates the Connersville line as an alternative to the Richmond line. As in Scenario 3, an Indianapolis-Columbus shortcut would shift about 200,000 trips away from the Shelbyville line, plus it would attract approximately an additional 550,000 trips from auto; 50,000 less than the Richmond line would. The Indianapolis to Columbus routing via Connersville takes a little longer than going via Richmond but benefits from the intermediate station stops at Hamilton and Middletown.
- **Scenario 5 – Connersville Only.** This scenario evaluates the Connersville line as an alternative to both the Richmond and Shelbyville lines. As a combined corridor, the Connersville routing does quite well, since this single corridor could serve both Indianapolis-Cincinnati and Indianapolis-Columbus trips. Based on the parametric analysis, this single line would attract 1.1 million annual trips, about 100,000 less than the Shelbyville and Richmond corridors combined. It is noted that Indianapolis-Cincinnati ridership would be about 50,000 less than via Shelbyville; and Indianapolis-Columbus ridership would be about 50,000 less than via Richmond. As a stand alone service to Cincinnati the Shelbyville line does better, but in conjunction with Ohio Hub connectivity if only one line can be built, it appears that the Connersville line may do better. The preliminary estimate of the ridership split at Hamilton would be about 2/3 of the riders heading north on the 3-C towards Dayton and Columbus; the remaining 1/3 riders would head south to Cincinnati. To handle this level of ridership by 2025 would require 3-4 daily Indianapolis-Cincinnati trains along with 6-8 Indianapolis-Columbus trains, in addition to the 8 daily Cincinnati-Columbus trains that were already planned for the 3-C corridor.

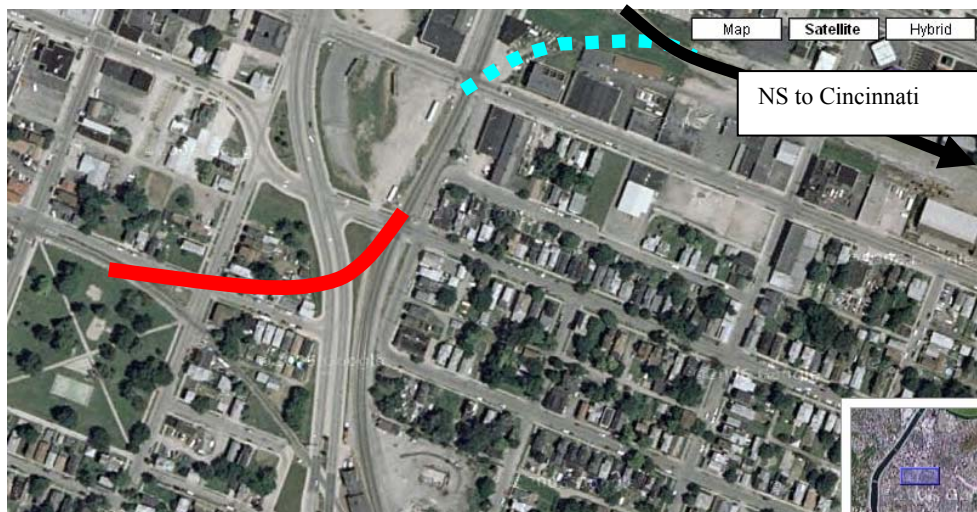
However, in view of the recent increased utilization of the Connersville line by CSX freight trains, an assessment of freight synergies is also needed to be determined whether shared use of the Connersville line, or separate development of the Shelbyville and Richmond line options would produce the greatest public benefit.

**Exhibit 5- Indianapolis to Cincinnati/Dayton Options
Forecast 2025 Ridership (1,000's)**



Operational and Infrastructure Implications. Adding a Hamilton to Indianapolis connection would affect the route selection for the western end of the 3-C corridor, from Dayton south to Cincinnati. At present, it has been planned that 3-C would utilize the Norfolk Southern line through Middletown and Sharonville. Adding a Hamilton-Indianapolis connection would require the 3-C passenger trains to use the CSX line from Dayton into Cincinnati instead of using the NS route. Indianapolis-Columbus passenger service would also require a new track connection in downtown Hamilton as shown in Exhibit 6.⁸

Exhibit 6 - Required New Track Connections in Hamilton



⁸ Exhibit 6 also shows an optional NS connection track that could be used either to allow CSX Indianapolis freight trains to take advantage of the current directional running arrangement with NS between Cincinnati and Hamilton, or else to be diverted altogether to an improved NS dedicated freight corridor.

With regard to the financial performance of the 3-C corridor, the added ridership from Hamilton plus the connecting Indianapolis traffic would offset the slightly longer running time from Dayton to Cincinnati over the CSX line. However, a full feasibility assessment is needed to determine the specific impacts that switching from the NS to the CSX alignment may have on the 3-C corridor.

4. Next Steps

A further detailed analysis is recommended for developing a joint freight and passenger capacity strategy, focusing on the area bounded by the Indianapolis, Cincinnati and Dayton triangle:

- The study should evaluate in detail the options for upgrading the Shelbyville, Connorsville and Richmond passenger route alternatives that have been identified by this study, as well as for possible shared use of the Connorsville line by both Indianapolis-Cincinnati and Indianapolis-Columbus passenger corridors.
- With regard to freight needs, the study should also evaluate the possibility for creating a dedicated passenger corridor using the CSX alignment between Dayton and Cincinnati. This would implement a complete separation between freight and passenger operations by developing a high capacity dedicated freight corridor for both CSX and NS on the current NS alignment. It should also be noted that:
 - Restoring the abandoned Dayton to Richmond line segment would create a new NS freight direct route from Columbus to the St. Louis and Kansas City gateways.
 - Restoring the New Castle to Indianapolis track would give NS its own line into Indianapolis, while not conflicting with bike trail redevelopment of the Panhandle alignment between Indianapolis and Richmond.
 - The Connorsville line may potentially need to see increased freight traffic as a result of the proposed development of an intermodal hub north of Cincinnati in Butler County. As an alternative to expanded freight use of the Connorsville line, CSX's underutilized St. Louis to Cincinnati rail line might be considered as an alternative.
- Butler County has also expressed a desire to reduce rail grade crossing conflicts caused by the current high level of freight traffic operating through downtown Hamilton. Diverting CSX freights to the parallel NS corridor could do this. Hamilton is also the county seat of Butler County and for this reason it would be advantageous to consider adding as a passenger station stop on the 3-C corridor. Adding a stop at Hamilton would not prevent the ability to also have a stop at Middletown as the current 3-C corridor plan assumes.

All of these factors may potentially enter into the development of a feasibility plan that coordinates passenger and freight capacity needs, and optimizes the requirements for both freight and passenger operations, within the Indianapolis-Cincinnati-Dayton area.