Heartland Rail Connectivity Initiative
FY24-25 Federal-State Partnership for Intercity Passenger Rail

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1. Project Description

The Heartland Rail Connectivity Initiative consists of four components that will plan for intercity passenger rail service in Central Ohio, and expedite its implementation.

1. **Safety Assessment to Minimize At-Grade Crossings** – examines improvements for at-grade crossings along rail alignments in Central Ohio.
2. **Columbus Convention Center Station Design** – the Columbus Convention Center is located above active freight rail lines and has been identified as a primary station location for multiple planned rail and transit projects.
3. **Right-of-Way Analysis for New, Expanded Service** – this task explores non-freight corridors such as highways and utility corridors for potential use as passenger rail alignments. It also examines various options (freight rail, roads, etc.) for connecting the Columbus Convention Center Station to the John Glenn Columbus International Airport (CMH).
4. **Rail-Oriented Development Analysis and Governance Framework** – this task will: (1) explore ways in which rail-oriented development can be facilitated at new stations, including examining the potential for value capture and private rail operation, and (2) develop governance agreements for the implementation and operation of new passenger rail in Ohio.

A. Build vs No Build

A Build and No-Build base case must be developed to properly carry out a BCA. Heartland Rail is a Project Planning and Project Development initiative. Following the recommendations in the NOFO, the BCA should therefore be based on the “underlying project”, not on the planning and design work alone. To that end, the Build and No-Build are defined in this section.

The **Build** scenario for the purposes of this Benefit Cost Analysis (BCA) assumes the following conditions:

- **Passenger rail service is in operation** along the 3C+D Corridor, the Midwest Connect Corridor, and possibly additional corridors that stop at the Columbus Convention Center Passenger Station
- The Columbus Convention Center Passenger **Rail Station is constructed**
- Numerous **grade-separations** replace existing at-grade crossings along rail corridors
- There is convenient **Airport Access rail service** between CMH Airport and the Convention Center Passenger Station

- **Higher density development** exists around passenger rail stations in Central Ohio (compared to what is expected in these areas in the No Build)

In contrast, in the **No Build** scenario, there is no passenger rail serving Central Ohio, and all current at-grade crossings remain unimproved.

B. Sources of Benefits

Much of the benefit of Heartland Rail derives from its effects in expediting implementation and informing the design of future passenger rail. There are also other benefits that vary depending on the component.

Benefits of Heartland Rail Initiative Overall

The reduced vehicle miles traveled (VMT) and improved travel safety from a mode shift to passenger rail is enhanced by all the components, which (1) enable a **more efficient** design of the station and future passenger rail corridors, leading to shorter travel times and attracting more passengers, and/or (2) reduce the implementation time for future passenger rail, so that VMT reduction benefits **begin sooner,** and/or (3) make the station area a more attractive destination, leading to additional ridership, jobs, and making a future passenger rail system and the communities served more sustainable.

The benefits of individual components are discussed below.

Safety Assessment to Mitigate At-Grade Crossings

- **Reduced crashes:** identifies safety upgrades, which could be implemented well in advance of passenger rail operations, to reduce or eliminate rail-vehicle crashes at these locations.
- **Expedited passenger rail implementation:** this component speeds up the implementation of rail by identifying the type and cost of at-grade crossing improvements needed for potential alignments through the Central Ohio region.
- **Travel time savings:** where grade separations are proposed, vehicular travel times will be reduced, including improved emergency response times.

Columbus Convention Center Station Design

- **Expedited Implementation:** this component designs the station now to expedite construction when passenger service returns to Columbus. It also ensures that future hotel, Convention Center, or other developments near the existing freight rail tracks do not preclude future use of this location for a passenger rail station.

This land is owned by the City of Columbus and the Convention Center Authority, so control of the real estate is assured.

- **Travel Time Savings:** A more-efficient station design will expedite boarding and deboarding, and facilitate timely passage of travelers transferring between passenger rail and other modes.

Right-of-Way Analysis for New, Expanded Service and Airport Access

- **Travel Time Savings (long-distance):** identifying non-freight corridors for future passenger rail has the potential to reduce travel time compared to passenger rail operating on Columbus' heavily used freight rail corridors
- **Travel Time Savings (Airport Access):** this task will identify high-performing connections between the Columbus Convention Center Station and the CMH airport. With 9 million airport passengers annually, many heading to the Convention Center or other downtown locations, the travel time savings for this mode (compared to local bus and rental car options) will be substantial.
- **Travel Cost Savings:** connecting CMH to inter-city passenger rail will improve airport access from both within and outside the region, reducing air travel costs with less need for long-term parking, and by providing some air travelers with more flights to choose from (e.g., air travelers living in Wheeling WV who are currently opting for the 1.2-hour drive to the Pittsburgh airport, would have the option of a 2-hour traffic-free trip to the Columbus Airport, which might have lower-cost flights to some destinations).
- **Reduced VMT (long-distance):** identifying faster, grade-separated alignments for passenger rail will boost mode-shift to rail
- **Reduced VMT (Airport Access):** Adding airport access to passenger rail will increase ridership, and reduce VMT generated by airport-to-downtown travel. Further, if found to be feasible, a privately-operated service linking the airport and the Convention Center will facilitate returning rail to Columbus sooner **(Expedited passenger rail implementation).**

Rail-Oriented Development and Governance Analysis

The governance aspect of this component will assist in **expediting passenger rail implementation** in Ohio. The rail-oriented development aspects will enable and encourage high-density development in the station area, bringing more opportunities within walking distance of passenger rail stations, thereby increasing ridership. Similar to transit-oriented development, rail-focused development near stations creates a positive feedback loop where passengers attract development, in turn attracting more trips, encouraging additional development, and so on. This will **increase property**

values and tax revenues, and with proper value capture mechanisms in place, can help support operations, making passenger rail more sustainable.

Specific Benefits of Mode Shift to Rail and Reduced VMT

The section above mentions mode shift to rail as a benefit of each of the components – either by improving the quality of the future passenger rail service, or by bringing its implementation closer in time so that benefits can begin sooner.

The specific assessable benefits of mode shift to rail include the following:

- **Reduced vehicle miles traveled**, leading to
  - Fewer crashes on the highway
  - Reduced vehicle emissions
  - Reduced energy use
  - Reduction in vehicle operating costs
- **Reduction in air trips**, leading to
  - Reduced emissions
- **Health benefits from encouraging walking and cycling at the destinations**

2. Benefit Valuations

At this early stage in the Project Lifecyle process, it is challenging to put dollar values on benefits, with future ridership levels and even the locations of stations and grade separations currently unknown. However, a sense of the value potential of the following benefits is provided below:

- Safety
- Emissions and Energy Use
- Operating Cost Savings
- Travel Time Savings
- Active Transportation Health Benefits

C. Safety

When trips shift from cars to trains, there are substantial safety benefits from reduced vehicle miles traveled (VMT) on the roads. Crashes happen daily, including fatal crashes and injuries of various levels of severity. Damage ranges from a current USDOT-approved value of $13.7 million for a fatality, down to simple fender-benders causing a few hundred dollars in damages. The USDOT BCA Guidance provides a value of 4.3 cents ($0.043) for the safety cost per mile driven. Applying this to selected sample trips from planned passenger rail corridors show the safety benefit of taking

these trips off the roads. **Table 1** shows the value of the reduction in injuries, fatalities, and property damage per one-way diverted auto trip, and for 100 passenger round-trips shifted to passenger train.

The detailed ridership projections needed to put the numbers from Table 1 in an annual context are not available. However, utilizing the annual ridership for the two Corridor ID corridors shown in Table 4 of the narrative, 100 round trips for these city pairs would be the ridership expected for one or two average days – indicating substantial potential benefits over the course of a 20-year benefit cost analysis period for systemwide trips.

Table 1: Safety Benefits of Diverting Trips to Passenger Rail

Sample Trip Destination Pairs	**Driving Distance** (miles, one way)	**Safety Cost** ($ per one-way vehicle trip)	**Safety Benefit of 100 Passenger Round Trips** (mode shift removing 66 vehicle round trips[1])
Cincinnati - Cleveland	250	$10.75	$1,414
Columbus – Chicago	325	$13.98	$1,839
Columbus - Pittsburgh	185	$7.96	$1,047

Sources: mileage from Google Maps; safety value from USDOT BCA Guidance, Table A-14. Vehicle occupancy of 1.52 persons per vehicle is from USDOT BCA Guidance Table A-3

A second source of safety benefits comes from at-grade crossing improvements on active freight rail lines. Heartland Rail will look at right-of-way alternatives and specific crossing upgrades needed for passenger rail operations. As noted in Section 8 in the Narrative, there have been rail-highway crashes at six grade crossings along planned passenger rail corridors in the MORPC region over the 2020-2024 period. Safety upgrades, such as installing gate arms that block the road and sidewalk in advance of a train, reduce the incidence of rail-involved crashes. Closing crossings to traffic or grade-separating them eliminates these crashes.

[1] 66 vehicle round trips based on 100 round trips divided by 1.52 persons per vehicle per USDOT BCA Guidance Table A-3

D. Emissions

Mode shifts from air and vehicle travel to passenger rail reduces emissions from these modes, which are more-polluting and less energy-efficient than passenger rail.

Using these same sample destination pairs and applying the USDOT BCA Guidance value of $0.013 per mile for the value of avoided vehicle emissions, yields the per-trip values shown in the table below.

Table 2: Emissions Benefits of Diverting Trips to Passenger Rail

Sample Trip Destination Pairs	**Driving Distance** (miles, one way)	**Emissions Cost** ($ per one-way vehicle trip)	**Emissions Benefit of 100 Passenger Round Trips** (mode shift to rail removing 66 vehicle round trips)
Cincinnati - Cleveland	250	$3.25	$428
Columbus – Chicago	325	$4.23	$556
Columbus - Pittsburgh	185	$2.41	$316

Sources: mileage from Google Maps; safety value from USDOT BCA Guidance, Table A-14. Vehicle occupancy of 1.52 persons per vehicle is from USDOT BCA Guidance Table A-3

Rail travel also produces emissions. Preliminary calculations for the 3C+D service[2] indicate $1,236 in emissions costs for each round trip between Cincinnati and Cleveland. Compared to the $428 in emissions costs for a single auto round trip, a passenger train would only need to carry 6 people to reduce emissions compared to driving.

Some future passenger rail trips will be diverted from air travel. To the extent this results in fewer scheduled flights, this would result in significant reductions in emissions. Table 3 presents energy use by mode from the most-recent Transportation Energy Data Book. It shows that per-passenger energy usage for flights is almost 50% higher than passenger rail. Figure 1 shows emissions for different passenger modes.

[2] 3C+D Step 1 application estimated a total travel time of 5:40 for Cincinnati-to-Cleveland service. Table A-5 of the USDOT BCA Guidance indicates an emissions cost of $109 per hour for passenger rail. 5.667x$109=$618 per one-way trip, or $1,236 round trip.

Table 3: Energy Use by Mode

Measured in British Thermal Units (Btus)

Mode	Btu per Vehicle Mile	Btu per Passenger Mile
Cars	4,292	2,787
Personal Trucks	5,845	3,212
Air	270,081	2,243
Intercity Rail	34,987	1,506

Source: Transportation Energy[3] Data Book, Volume 40-2022, Table 2.13 (data is from 2019).

E. Operating Cost Savings

Operating cost savings for rail will result from both the early design and planning work on the right of way, and from the station design.

Vehicle operating cost savings for individuals switching from driving to rail are another factor to be considered in the benefit-cost analysis. While most drivers are aware of the fuel cost of their trips, they may not always consider the costs of vehicle wear and tear, insurance, maintenance, and repairs. The 2026 IRS rate for operating a vehicle is 72.5 cents per mile. Using our sample station pairs, the operating cost of driving is shown in the table below.

Table 4 Avoided Vehicle Operating Costs

Sample Trip Destination Pairs	**Driving Distance** (miles, one way)	**Vehicle Cost Saved per Avoided Trip** ($ per one-way vehicle trip)	**Vehicle Operating Cost Savings of 100 Rail Passenger Round Trips** (mode shift

[3] Transportation Energy Data Book, Edition 40-2022. published by the US Department of Energy https://tedb.ornl.gov/

			removing 66 vehicle round trips)
Cincinnati - Cleveland	250	$181.25	$23,849
Columbus – Chicago	325	$235.63	$31,003
Columbus - Pittsburgh	185	$134.13	$17,648

F. Travel Time

Heartland Rail will reduce future travel times for rail passengers by ensuring that transfers at the Convention Center Station are minimized, and that the final ROW alignment is designed to maximize rail speeds as much as practicable.

With speeds of future rail in Central Ohio currently unknown, it is difficult to evaluate the total travel time saved. Speeds proposed for the Midwest Connect corridor included alternatives ranging from 79 to 110 mph, which are competitive with, or better than, driving speeds. The speeds proposed in the 3C+D corridor, in contrast, are slower than current auto travel. As the population of Central Ohio continues to grow, the incidence of congestion-related travel delays will increase. Congestion is already an issue in Chicago and other proposed station cities.

The current USDOT BCA Guidance values travel time at $20.10 per hour for personal trips, and $34.60 for business trips. Reduced “transfer times” are valued even higher, at $40.20 per hour, which is why an effective multi-modal station design is important for attracting and maintaining ridership.

Also, as mentioned above, grade separations will also improve travel times for vehicles that no longer have to wait for a train to pass. Quantifying the value of travel time savings would be dependent on both the level of vehicle traffic and the frequency of freight rail traffic at these locations.

G. Active Transportation Health Benefits

Passenger rail travel, as well as high-density development around rail stations, both boost active transportation modes, such as walking, biking, scooter rentals, and more.

Heartland Rail’s **Columbus Convention Center Station Design** will be fully integrated with pedestrian, bicycle, and transit modes, and include sidewalk improvements. The **Rail-Oriented Development Analysis** component will support high density development around all stations, which encourages transit use, biking, and walkability.

The BCA Guidance recommends considering the health benefits of encouraging active transportation modes. Specifically, it values walking at $8.36 per trip and cycling at

$7.45 per trip. With passenger rail trip estimates in the hundreds of thousands per year, the value of health benefits is considerable.

Further, these benefits can be assessed for all trips – including induced trips – and are not limited just to mode-shift trips.

3. Costs

The cost of implementing the entire Build scenario is still unknown at this time. Available capital cost data includes construction of the Columbus Convention Center Passenger Rail Station at $150 million. The other components of the **Build** (listed in Section 1 above), have no cost estimates associated with them, including **grade-separations**, construction of **Airport Access** or other passenger rail corridors, and denser **Station Area Development**.

4. Summary

The quantitative ranges for benefits and costs are dependent on decisions to be made in later stages of the project lifecycle. Despite the inability to calculate a reasonable benefit-cost ratio, this document clearly demonstrates passenger rail's varied benefits – Safety, Air Quality, Health Benefits, Operating Costs and Travel Time Savings to name a few.