Feasibility on Proposed Amtrak Service
Cleveland-Columbus-Cincinnati

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Phase I Feasibility Report on Proposed Amtrak Service

Cleveland-Columbus-Cincinnati

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I. Introduction and Background

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I.A. General Discussion

Introduction

Since the early 1980's, numerous studies have considered the possibilities and requirements for the reintroduction of intercity passenger rail service along the Cleveland-Columbus-Cincinnati corridor, commonly referred to as the Ohio "3-C Corridor". Intercity passenger service last operated over this route in 1970, six months before the creation of Amtrak. The interest in reinstating this service has gathered support in recent years, and on February 26, 2008, Ohio Governor Ted Strickland requested then Amtrak President and CEO Alex Kummant to undertake a feasibility study of the 3-C Corridor. A contract and scope of work was executed by Amtrak and the Ohio Rail Development Commission (ORDC) on December 31, 2008. Key financial provisions of the study include forecasts of ridership and revenue, estimates for capital infrastructure improvements, capital costs for equipment procurement and equipment maintenance facilities, and identification of ongoing operating support requirements.

The 3-C corridor generally extends southwest from Cleveland to Cincinnati via Columbus and Dayton. However, within this broad corridor there are multiple route combinations and numerous potential station stops that could be served by a 3-C intercity passenger train service. The rail routes for the corridor study that were identified by ORDC as candidates for this service are described in Exhibit 1.

Between Cleveland and Greenwich there are three potential routes that were evaluated. These east-end routes are Cleveland to Greenwich via Elyria, Cleveland to Greenwich via Akron, and Cleveland to Greenwich via Berea. From Greenwich to Dayton via Columbia there is a single central route. West of Dayton there are five alternative routes into Cincinnati. These various route segments can be combined into 15 alternative corridor routes. It should be noted that all possible 3-C route segment combinations over which intercity passenger service could operate are owned by freight railroad companies, except for a short segment of abandoned track along the Akron route.

Initial physical inspections from public grade crossings were conducted by Amtrak personnel to assess the general characteristics and condition of tracks and other infrastructure of all selected route segments. Also noted were any observed operating and infrastructure impediments to passenger train service along the various alternative route segments. Based on the results of these initial Amtrak inspections, ORDC directed Amtrak to narrow the focus of the study to a more comprehensive evaluation of the most direct and efficient route segments, while continuing to develop a high level assessment of all other potential route combinations.

The route selected by ORDC for more comprehensive evaluation is the shortest, most-direct route from Cleveland to Cincinnati via Berea, Columbus, Dayton, and Middletown. This route would utilize tracks owned by NS (Norfolk Southern, 119 miles), CSX (120 miles), and the IORY (Indiana and Ohio Railway, 16 miles). A route map can be found in Exhibit 2. For the balance of this report the route described in Exhibit 2 will be referred to as the "3-C" route.

The first segment of the 3-C route, the NS line from Cleveland's Lakefront Station to Berea, is a high density, well-maintained double track line. Beginning at the east end of the proposed 3-C Corridor, westbound passenger trains would depart Amtrak's Cleveland Lakefront Station at Milepost 181.2 on the NS Dearborn District. From that point to the "Drawbridge" (a movable bridge and junction point), the NS can be expected to handle approximately 100 trains daily and more than 100 million gross tons annually, from the combined traffic of the Dearborn District and the Chicago Line, which join at the "Drawbridge". This traffic includes Amtrak's daily "Capitol Limited" (Chicago-Washington, DC service) and "Lake Shore Limited" (Chicago-New York-Boston service). The NS trackage between the Lakefront Station and Berea is a well maintained double-track line with heavy continuous welded rail (CWR). Train operations are controlled by a centralized Train Control System (TCS). While the track itself is physically capable of a 79 MPH maximum authorized speed, the traffic density and congestion due to Rockport Yard operations and the yard's proximity to the proposed Berea passenger train interchange with CSX may restrict passenger train trip times through this area. At Berea, where passenger trains would transfer from NS tracks to CSX tracks, typical combined traffic levels for both railroads can reach 120 to 160 trains per day.

At Berea passenger train control would pass from NS to CSX for the trip to Columbus. The 40-mile line segment from Berea to Greenwich is double-tracked, in very good condition, and in recent pre-recession years handled approximately 60 to 80 freight trains daily. Although the line appears to be in very good condition, track, wayside signal, and warning device upgrades (including modification of at-grade crossing starts) may be identified as necessary by CSX to support 79 MPH passenger train speeds.

From Greenwich westward to Dayton via Columbus there is only one route segment that was addressed in this study. This "central" corridor route starts with a 16-mile CSX single-track segment from Greenwich to Crestline. From Crestline to Galion, a distance of 9 miles, the route is double-tracked. The combined 25-mile double-track and single-track route segment from Greenwich to Galion handles about 20-25 freight trains per day. This route utilizes traffic control for train operations. The final CSX route segment, controlled by a TCS system, is a single track line from Galion to Columbus. This last 58-mile segment currently handles no more than 12 freight trains daily. Although these lines also appear to be in very good condition, track, wayside signal, and warning device upgrades (including modification of at-grade crossing starts) will likely be identified as necessary by CSX to support 79 MPH passenger train speeds.

Through Columbus the route segment ownership, track configurations, and operations are very complex and require a high level of coordinated dispatching among the freight railroads. The City of Columbus has some of the highest rail traffic congestion in the state. The 3-C route would take passenger trains through Control Point (CP) 138 – a major interlocking and choke point in downtown Columbus. A control point is a localized arrangement of track turnouts (switches) or rail crossings (one track crossing another) with signals that control train movement. The control signals and switches can be operated from either a localized or a centralized dispatching office. The purpose of control points is to provide safe and efficient movement of trains through an area where multiple tracks converge, diverge, or cross. Control points are often designated by the nearest milepost (MP). For example CP 138 is very close to MP 138. Exhibit 3 describes the layout, ownership, maintenance, and dispatching responsibilities for the CP 138 tracks.

In Columbus, trackage approaching CP 138 from the east consists of 4 mainline tracks and 1 industry track operated by CSX, NS, and Ohio Central Railroad. Exhibit 4 describes the layout of these tracks and their relationship to the Convention Center and CP 138. On the west approach there are 3 NS mainline tracks (one used by CSX trains), and both the east and west approach tracks converge to only two tracks through CP 138, which is partially located below the Columbus Convention Center. The City of Columbus has proposed locating new station tracks and platforms below the Convention Center within the limits of CP 138. A major challenge at Columbus would be maintaining current levels of freight traffic fluidity through CP 138 and at the same time adding 8 passenger trains daily into and out of a station located within CP 138.

Departing Columbus westbound, control of passenger train operations passes back to the NS. CP 138 is a major congestion point, but it has a virtual twin located one mile to the west at CP 139, commonly known as Scioto Junction. While the track layouts of the two control points are much different, both, either independently or in combination, can cause serious traffic flow problems for Columbus. Exhibit 5 describes how multiple NS and CSX mainline and connecting tracks converge and cross in a maze at Scioto Junction, immediately west of the Scioto River.

Westward from Columbus, there is a 12-mile segment from Scioto Junction to West Jefferson that is double-tracked with TCS signal controls. The remaining 59-mile segment to Dayton is a single track with TCS signal controls but presently has very few long passing sidings. The single track is adequately maintained to handle 20-25 daily freight trains, although the current traffic level is closer to 10 freight trains per day due to the recession-related downturn in freight traffic volumes.

The track through Springfield currently has speed restrictions of 15, 20 and 25 miles per hour because of many curves and roadway grade crossings. It is unlikely these speed restrictions can be significantly improved without extensive infrastructure investment, which this study does not anticipate for startup passenger service.

West of Moraine Yard in Dayton, 3-C trains would travel 34 miles along the NS double track line to Sharonville Yard. This line is in excellent condition with TCS signalization and is currently capable of handling 79 MPH passenger train speeds. Freight traffic levels on this line segment for the period selected for capacity modeling are 25 trains per day. However, at Sharonville Yard there is a long history of traffic congestion as freight trains are held back trying to get into and out of the CSX Queensgate Yard and the NS Gest Yard near the Cincinnati riverfront. The Queensgate and Gest yards congestion and potential mitigation costs are the key reasons that ORDC selected the Boat House station site for the end point of the 3-C service. "Mill Junction", at the west end of the NS Sharonville Yard where traffic from the 3-C route joins traffic from the NS Hamilton line and the IORY Oasis Line, is another of Cincinnati's more serious choke points. Without infrastructure improvements, this would be a concern for 3-C passenger train operations, which would be handed off from the NS to the IORY at Mill Junction for the final 16-mile leg of the 3-C route. Mill Junction is described in Exhibit 6.

From Mill Junction, 3-C passenger trains would travel over the "Oasis Line" of the IORY to a site near the "Boat House" area along the Cincinnati riverfront. The IORY from Mill to the Boat House is a low density freight line adequately maintained to meet the current required levels of service and FRA safety standards. The line is currently signaled at control points with maximum authorized freight train speeds of 35 MPH from Mill to Undercliff Yard (11 miles) and 25 MPH from Undercliff Yard to the Boat House area (5 miles). The Class I host freight railroads agree with Ohio that using the IORY and a Boat House station location would avoid passenger train impacts on the highly congested Queensgate (CSX) and Gest (NS) Yard area near Cincinnati Union Terminal. Amtrak also supports this view because of the likelihood of higher on-time performance (OTP) operating over the IORY route. Exhibit 7 provides a view of the "Boat House" area along the IORY Oasis Line at the Ohio River.

This study has attempted to evaluate the various 3-C route segments and potential station stops selected by ORDC and then distill the results to identify an optimized startup service. This optimized service could be defined as that combination of route segments, station stops, ridership, capital investments, and operating costs that has the best opportunity for long-term viability and growth. The goal of the proposed service is to provide an affordable, convenient, energy-efficient, and environmentally-friendly transportation alternative to highway and airline modes. The proposed 3-C corridor route can be easily accessed by more than 60% of the state's population.

The host freight railroads' operating divisions and associated route miles for the 3-C route are given in Table 2 located in Section II.A.

Demographics:

One of the primary characteristics of a successful intercity rail passenger corridor is a substantial population in the key cities served. The metropolitan areas of Cleveland, Columbus, Dayton and Cincinnati together have a Metropolitan Statistical Area (MSA) population of roughly 6.9 million people. The Cleveland-Akron-Elyria Combined Statistical Area had a 2006 estimated census population of 2.9 million, the 15th largest in the United States. Cleveland is home to a half dozen colleges and universities, including Case Western Reserve University, a world-renowned research and teaching institution. In studies conducted by *The Economist* in 2005, Cleveland (along with Pittsburgh) were ranked as the most livable cities in the United States, and Cleveland was ranked as the best city for business meetings in the continental U.S.

Columbus, the state capitol of Ohio, had a 2006 estimated MSA population of around 1.7 million. The Columbus-Marion-Chillicothe Combined Statistical Area had a 2006 estimated census population of 2.0 million. Columbus was recently acknowledged by *Money Magazine* as the 8th best large city in the U.S. to inhabit; it is also recognized as an emerging "global city", i.e., a city deemed to be an important node point in the global economic system. The Columbus metropolitan area is home to 13 colleges and universities and numerous community colleges and technical schools. The largest school in Columbus, Ohio State University, is also the largest college campus in the state of Ohio and in the United States with some 53,000 students.

The Dayton MSA 2008 estimated census population of 837,000 makes it the fourth largest metropolitan area in Ohio. The National Museum of the United States Air Force is located at Wright-Patterson Air Force Base, in Riverside just outside of Dayton. The museum is the world's largest and oldest military aviation museum. The museum draws over 1.3 million visitors per year and is one of the single most visited tourist attractions in Ohio. Dayton is home to two major universities - the University of Dayton and Wright State University – as well as Sinclair Community College, one of the largest community colleges in the nation. In 2008, the award-winning *Site Selection* magazine ranked Dayton the #1 medium sized metropolitan area in the nation for growth and expansion.

The Cincinnati-Middletown-Wilmington, OH - KY/IN Combined Statistical Area had a 2006 estimated census population of 2.1 million. The Greater Cincinnati Area is home to the University of Cincinnati, Xavier University, Miami University, and Northern Kentucky University. Cincinnati State College is a vocational school which boasts the Midwest Culinary School, one of the best culinary institutes in the U.S. In 2009 Cincinnati, "the Queen City", was listed fourth on CNN's Top 10 cities for new graduates. With household names like Proctor and Gamble, Kroger, and Fifth Third Bank, the Cincinnati area can boast of being headquarters to ten Fortune 500 and eighteen Fortune 1000 companies.

While the 3-C Corridor's large population density is perhaps the most important characteristic for a successful corridor operation, the concentration of colleges and universities along the corridor is another major component for success.

Historically, throughout its national system, Amtrak has enjoyed steady ridership support from college students.

In addition to the 3-C cities and Dayton, the other 2 proposed station stops along the corridor are Southwest Cleveland (150th Street/Puritas) and North Cincinnati (Sharonville). The following Table 1 describes the estimated population for each of the 4 major metropolitan areas to be served, which in total represent about 60% of the state's population.

TABLE 1

Metropolitan Statistical Area	Population (2008 est.)
Cleveland	2,088,000
Columbus	1,773,000
Dayton	837,000
Cincinnati	2,155,000
Combined MSAs	**6,853,000**
State of Ohio Population	11,486,000

Competitive Transportation Modes:

Cleveland, Columbus, and Cincinnati are connected by I-71, a 65-MPH interstate highway. Dayton is located along I-75. Non-stop travel time by interstate highway between Cincinnati and Cleveland is around 4 to 4-1/2 hours. Non-stop travel time from Columbus to Cleveland is about 2-1/2 hours, while the time from Columbus to Cincinnati is roughly 2 hours.

Greyhound Lines Inc. operates routes serving Cleveland, Columbus, Dayton, and Cincinnati. Depending on origin and destination pairs, frequency varies from 3-7 daily round trips. Cleveland to Cincinnati travel time by bus is 4 hours and 50 minutes.

Cities along the corridor with intra-corridor air service include Cleveland, Columbus, Dayton, and Cincinnati. Flight frequency varies from 3-5 daily round trip flights. Flight time is around an hour for any origin-destination pair.

Current Amtrak Service:

Two long distance Amtrak train services operate through Cleveland daily, although they stop at inconvenient times during the night. The two trains are the Lake Shore Limited operating between Chicago and New York/Boston and the Capitol Limited operating between Chicago and Washington. With their current schedules, the Lake Shore Limited and Capitol Limited would not provide attractive connecting service with the proposed 3-C trains. Cincinnati is served in the middle of the night by Amtrak's tri-weekly Cardinal, operating between Chicago and New York. However, the Cardinal uses Cincinnati Union Terminal, while the 3-C trains are planned to utilize a new, but possibly temporary, station

at the Boat House area along the Ohio River. So here too there is minimal potential for connecting service between the two routes. Other cities along the corridor currently do not have passenger rail service. Next to Phoenix, AZ, Columbus is the largest metropolitan area in the United States without direct intercity passenger rail service.

Route Inspections:

Following the directive from ORDC to Amtrak to narrow the study focus to the most-direct 3-C route segments, Amtrak personnel participated in physical inspections of the route with host freight railroad officials, documenting existing infrastructure conditions and operating characteristics. These joint inspections and preliminary discussions with corporate and local operating and engineering personnel allowed detailed infrastructure and operating information to be collected than was possible with the earlier high-level inspections from public grade crossings. In addition to the field work and discussions with the host freight railroads, other rail transportation studies for this corridor that have been issued in the past by various groups were also reviewed. Following implementation of a formal MOU between the freight railroads and ORDC, a more in-depth review of the proposed passenger train service will be undertaken by the freight railroads.

Explanation of Host Freight Railroads Position on Study Results:

Although there have been general operational discussions, field inspections, and review of preliminary capacity additions analyses with the host freight railroads, the freight railroads have not agreed to the reintroduction of passenger rail services to the 3-C Corridor, or the terms and conditions of that reintroduction, and have not agreed to the specific infrastructure improvement proposals, draft schedules and other freight railroad-related comments in this report. Instead, they reflect only the findings to date and best judgment recommendations of the study team.

Although there have been general operational discussions, field inspections, and review of preliminary capacity additions analyses with the host freight railroads, the specific infrastructure improvement proposals, draft schedules and other railroad-related comments in this report have not been negotiated or agreed to with the host freight railroads. Detailed discussion and initiation of formal negotiations with the host freight railroads are required if the ORDC decides to proceed with implementation of this 3-C service. Implementation of service is also subject to availability of rolling stock, to completion of a package of infrastructure improvements, which are ultimately agreed to by the host freight railroads, and to recruit and train Amtrak passenger service and equipment maintenance personnel.

All proposed train schedules shown in this feasibility study are dependent upon timeslots made available by the host freight railroads. Timeslots are subject to further discussion based on traffic volumes, operating conditions and other considerations in existence at the time of actual service commencement on the route. Given likely freight growth following the current recession and the

possibility of changing operating conditions on the route at the time of service commencement, revisions to the proposed schedules shown in this study may be required.

I.B. Rolling Stock

This route alternative assessment assumes that the trainsets required for the 3-C service will operate in "push-pull mode," that is, 1 locomotive and 1 non-powered control unit (NPCU) located on opposite ends of the train consist to allow the train to reverse its direction at the end-point stations without actually turning around the trainset. Each train consist will be made up of 1 locomotive, 1 non-powered control unit (NPCU), 5 coaches, and 1 food service car with business class seating. This consist makeup is based on ridership estimates developed by AECOM, Amtrak's consultant that specializes in ridership and revenue forecasting, and on the frequency of service and the train origination stations as selected by ORDC. It should be understood that the current car supply situation at Amtrak is extremely tight and due to the significant number of trainsets and coaches required for the initiation of 3-C service, it is unlikely that equipment for this service could be generated from rehabilitation of cars in the existing Amtrak storage inventory. Therefore, for the purpose of developing capital costs, this report assumes procurement of new rolling stock rather than rehabilitation of stored Amtrak cars. The number of trainsets and/or makeup of train consists can be modified as future demand dictates or as the State desires. It should be noted that the delivery of new rolling stock will likely take several years.

I.C. Station Facilities

The availability of station facilities and station sites varies considerably along the 3-C Corridor. For example, the Cleveland Lakefront Station is operational today and has suitable building and parking facilities. This station will need additional platform construction and track upgrading, but otherwise is in satisfactory condition to serve 3-C Corridor trains. By contrast, all other station stops selected by ORDC for the 3-C route will require construction of new station buildings and waiting areas, platforms, and parking lots. For the purposes of this report, it is assumed that all station facilities, with the exception of the existing Amtrak Cleveland Lakefront Station, will be provided by parties other than Amtrak, including platforms, parking, and waiting areas. The assumption is that local communities desiring a station stop will provide such facilities, as well as ongoing maintenance. Such station facilities must, of course, be ADA-compliant.

Station stops shown in the Table 2 schedule have been selected by the ORDC. However, these station stops can be modified depending upon the willingness and abilities of the communities to provide facilities and as ORDC directs. These station locations and platform designs must be reviewed and approved by the host freight railroads.

Regarding station platform design and construction, it should be noted that there is industry-wide discussion underway of the United States Department of Transportation's (USDOT) Notice of Proposed Rulemaking concerning amendments to the Department's Americans with Disabilities Act (ADA)

regulations, specifically Docket OST-2006-23985. In this notice, the DOT proposes that new commuter and intercity rail stations shall provide level-entry boarding to all accessible cars in each train using the station. Because this notice is still under consideration and no new rules have been promulgated, questions of station platform designs, dimensions and construction cannot be fully addressed and may therefore delay station (platform) development efforts in the future.

I.D. Schedules

The ORDC and many of Ohio's communities have expressed the desire to establish intercity rail passenger service in the most expeditious way possible. This study, therefore, has concentrated on incremental and focused improvements; including setting the maximum authorized speeds, where practical, to 79 MPH. As directed by ORDC, no "high-speed" (110 MPH) scenarios were considered within the scope of this feasibility study.

To develop a provisional schedule, the study utilized field inspection results, existing host freight railroads' track profile charts, station dwell times, Amtrak's standard schedule development methodology, and an assumed 79 MPH maximum authorized timetable operating speed. Woodside Consulting, a contractor for ORDC specializing in train operations modeling and railroad capacity analysis, was provided with the provisional schedule by Amtrak as a basis for conducting modeling and capacity analysis of the 3-C route. Projected freight traffic levels at the startup of passenger service were provided to Woodside by CSX and NS. Preliminary capacity analyses conducted by Woodside indicate that, with implementation of the recommended infrastructure improvements described in Section II.B.1, Table 4, the provisional schedule can be achieved. However, the host freight railroads have advised that they will not be able to confirm that the provisional schedules are acceptable until additional capacity analyses are completed. The Table 2 provisional schedules were created to provide a basis for a reasonable assessment of ridership/revenue potential and other corridor operations parameters. At ORDC's request, additional train modeling and capacity analyses must be employed to determine if shorter trip times could be developed with additional infrastructure and/or operating refinements and also whether additional selective station stops could increase overall corridor ridership It must be emphasized that both Table 2 schedules and Table 4 Proposed Infrastructure Improvements are preliminary and subject to revision pending further train modeling and capacity analysis. For the Table 2 schedule, trip time between Cleveland and Cincinnati is 6 hours and 30 minutes. Trip time between Columbus and Cleveland is 3 hours and 13 minutes, and trip time between Columbus and Cincinnati is 3 hours and 7 minutes. The draft schedules proposed to the host freight railroads have not been negotiated or approved.

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TABLE 2

PROPOSED 3-C CORRIDOR TRAIN SCHEDULES

8 Daily Trains Serving Columbus, 6 Daily Trains Serving Cleveland and Cincinnati

DAILY	DAILY	DAILY	DAILY	Read Down	STATION	Read Up	DAILY	DAILY	DAILY	DAILY
	6:30a	11:30a	3:30p	↓	Cleveland Lakefront Station	↑	9:45a	1:45p	6:45p	
	6:43a	11:43a	3:43p	↓	Cleveland 150th Street Station	↑	9:31a	1:31p	6:31p	
6:53a	9:53a	2:53p	6:43p	↓	Columbus	↑	6:32a	10:32a	3:32p	7:22p
8:24a	11:24a	4:24p		↓	Dayton	↑		8:40a	1:40p	5:40p
9:37a	12:37p	5:37p		↓	Sharonville	↑		7:48a	12:48p	4:48p
10:00a	1:00p	6:00p		↓	Cincinnati Boat House	↑		7:15a	12:15p	4:15p

II. Discussion of Route Improvements

II.A. General Description of Required Improvements

The proposed 3-C route would use the tracks of three host freight railroads, including 2 separate segments of the Norfolk Southern, as summarized below in Table 3. It is critical to note that the implementation of this service and its future growth must necessarily avoid degradation of the current freight operations of the host railroads over which the passenger service must operate.

TABLE 3

Host Railroad	Railroad Division	Line Segment	Route Miles
NS	Dearborn Division	Cleveland-Berea	12
CSX	Great Lakes Division	Berea-Columbus	120
NS	Lake Division	Columbus-Sharonville	107
IORY	Oasis Line	Sharonville-Cincinnati	16
		TOTAL ROUTE	**255**

In order to avoid added congestion and loss of operating fluidity on the host freight railroads, and to provide consistently reliable service for passenger trains, an analysis of the 3-C route capacity was needed to identify specific infrastructure improvements that must be in place prior to startup of service. The location of the recommended improvements that Woodside Consulting identified and the scope of work to be done are described in the following Table 4. With the exception of line items 11 and 12, the locations and extent of work for these infrastructure improvements are based on the results of the preliminary report prepared by Woodside and presented to ORDC, Amtrak, CSX and NS on July 22, 2009.

Line item 11 was developed jointly by Amtrak and Woodside in an effort to develop an efficient, non-congestion operation of passenger trains through Sharonville Yard. Exhibit 8 describes the proposed layout for the track and bridge improvements at Sharonville Yard.

The concept behind line item 12, a proposed new connection track at Mill Junction between NS and IORY, was developed by Amtrak utilizing field inspections and discussions with NS corporate and local engineering and operations personnel. The importance of the need for a new connecting track at Mill Junction cannot be overemphasized. As discussed earlier in this report, Mill Junction is a major congestion point in the Cincinnati terminal region. It is common for freight trains trying to reach the NS Gest Yard or CSX Queensgate Yard near the riverfront to encounter trains backed up all the way to Sharonville Yard. This is the same congestion that impacts the use of Cincinnati Union

Terminal, which is adjacent to Gest and Queensgate yards, and led the ORDC to select the Boat House station area for the end point of the 3-C service. There is an existing NS-IORY connection at Mill, but passenger trains frequently would be subjected to congestion and delays by using this connection track.

Significant track and signal upgrading, described in Section II.B.2, Table 5, will be required to achieve a study-recommended maximum authorized speed of 49 MPH for the entire Oasis Line. The existing Undercliff Yard is located approximately 5 miles from the end of the line where a Boat House station is proposed. It is anticipated that Undercliff Yard could be used for the Cincinnati layover facility and as the train crew on-duty point, although the study team has had only preliminary conversations with the IORY on this topic. Expectations are that, once track and signal upgrading is completed, IORY would be able to handle the 3-C passenger trains effectively and with the highest priority.

In addition to the preliminary list of track infrastructure improvements described in Table 4, additional mainline track and road crossing signal upgrades to the route will be necessary for the implementation of new passenger service at maximum authorized speeds of 79 MPH. These track upgrading projects are listed in Table 5 in Section II.B.2. The increase in train operating speeds for 3-C passenger service will require modifications to roadway grade crossing signal warning devices over the entire route. Modification of grade crossing signal actuation locations, called "crossing starts", is also discussed further in Section II.B.2. ORDC, in cooperation with the host freight railroads, may also want to consider pursuing grade crossing consolidations as a way to reduce roadway signal costs and improve crossing safety. It is recommended discussions be initiated with the State of Ohio about any additional grade crossing warning devices or closures that may be deemed appropriate for the route. The crossing start work estimates developed by Amtrak are based on a review of the track profile charts of the host freight railroads, however, the freight railroads have not yet reviewed or approved the proposed work estimates. In addition, the future maintenance increases due to higher speeds and additional infrastructure needed for passenger trains has not been discussed and agreed upon by the host freight railroads.

Along with track infrastructure improvements required by the host freight railroads, capital expenditures would be required for the construction of equipment maintenance and layover facilities, as described in Section III.

II.B. Capital Requirements

II.B.1. Proposed Infrastructure Improvements

While capacity projects named in the following Table 4 make intuitive sense and appear to be logical capacity improvements, the host freight railroads will not be able to confirm the utility of these projects until additional capacity analyses are completed. Additional capacity improvements may be necessary. All recommended infrastructure improvements, whether in Table 4, or as a result of further capacity studies by the host freight railroads, must be reviewed and approved by the host freight railroads, and completed prior to startup of passenger service.

TABLE 4

Project No.	Location	Description of Infrastructure Improvement
1	NS/CSX-Berea Interlocking	Construct new connecting track and crossovers for the movement of passenger trains between NS and CSX
2	CSX Greenwich Subdivision	Construct 17.0 miles of new 2nd main from CP54 to CP71
3	CSX Edison Siding	Rehabilitate and extend the existing 0.8 mile siding to a total length of 3.1 miles
4	CSX Paget Siding	Construct new 2.1 mile siding near Delaware loop track
5	CSX Powell Road Siding	Construct new 2.0 mile siding east of Worthington
6	CSX/NS-Columbus Crossovers	Install new crossovers to create a paired track arrangement for use by both CSX and NS trains
7	CSX/NS-Columbus Station Track	Construct a new station track and crossover to serve a proposed Convention Center Station
8	NS-Plattsburg to Brooks	Construct 5.2 miles of 2nd main from Plattsburg to Brooks
9	NS-Cold Springs to Enon	Construct 6.0 miles of 2nd main from Cold Springs to Enon
10	NS-Riverside to Dayton	Construct 7.7 miles of 2nd main from Riverside to Dayton plus one set of universal crossovers
11	NS-Sharonville	Convert existing yard lead to 2nd main; construct 2.1 mile by-pass track through Sharonville Yard; install 3 crossovers and construct new bridge
12	NS/IORY-Sharonville	Construct connecting track between NS and IORY to allow train movement to and from the Oasis Line and a proposed Boat House Station, while avoiding the choke point at Mill Junction

II.B.2. Recommended Track and Signal Upgrading

For passenger operations at conventional maximum timetable speeds, various segments of the 3-C route will require one-time track upgrading over and above current routine capital maintenance programs. The 3-C operation presumes a maximum authorized speed of 79 MPH, where practical, between Cleveland and Sharonville. From Sharonville west, passenger trains would operate over the Oasis Line of the IORY at a maximum speed of 49 MPH.

Table 5 describes the route segments identified by the study team that would require track and road crossing signal upgrading to support the proposed 79 MPH maximum authorized passenger train speed over the 3-C route. The extent of the upgrading work described in Table 5 is subject to the review and concurrence of the host freight railroads.

TABLE 5

Railroad/ Division	Description
NS/ Dearborn	Connecting Track at Cleveland: install CWR, new ties, ballast and surface
CSX/ Great Lakes	Install ties, ballast and surface, road crossing signal improvements
NS/Lake	Install ties, ballast and surface, road crossing signal improvements
IORY/ Oasis Line	Install CWR, ties, ballast and surface, road crossing signal improvements

Because the 3-C route, except for a short section of the NS Dearborn Division, does not currently support passenger train operations, at-grade road crossing signal protection would have to be modified throughout the service corridor. The Federal Railroad Administration (FRA) specifies the minimum elapsed time that must occur between the actuation of road crossing signals by an approaching train and the train actually reaching the road crossing. Because passenger trains typically travel at higher speeds than freight trains, the distance between the road crossing and the signal actuation point, commonly referred to in the rail industry as the "crossing start", must be increased to meet the FRA minimum elapsed time requirement. Over the length of the 3-C Corridor there are currently about 230 grade crossings with train-activated warning devices The signal circuit modification work for these crossings is preliminarily estimated to cost approximately $15.0 million including 30% contingencies. Additional signal upgrading and maintenance requirements are subject to concurrence by the host freight railroads and will require appropriate contractual negotiations.

II.B.3. Positive Train Control - PTC

In addition to capital infrastructure improvements and track upgrading, another cost item that must be considered is the implementation of Positive Train Control (PTC). The Amtrak Reauthorization Act (PRIIA) of 2008 requires installation of PTC on certain rail lines by the year 2015, but the scope, costs and funding responsibility associated with this requirement cannot be determined at this time and it is therefore not addressed in this report. PTC is defined as a system to prevent train-to-train collisions, over-speed operations, incursions into established maintenance of way work zone limits, and the movement of a train through a switch left in the wrong position.

II.B.4. Order of Magnitude Summary of Track Upgrading Capital Cost

		$ Millions
a.	Replace jointed rail with CWR on the IORY Oasis Line	$ 9.9
b.	Replace jointed rail with CWR on the connecting track between Cleveland station and shop	$ 0.5
c.	Replace cross ties in mainline track, including the Cleveland connecting track	$14.7
d.	Ballast and surface mainline track the Cleveland connecting track	$ 2.9
e.	Adjust roadway crossing starts	$11.6
	Subtotal	$39.6
	30% Contingency	$11.9
	TOTAL	$51.5

III. Equipment Maintenance and Layover Facilities

The proposed maintenance of equipment and provision of turnaround and layover services for the 3-C Corridor is not typical compared with other existing Midwestern passenger service corridors. The existing Midwest corridor operations utilize a pool of shared equipment that is maintained at centralized major maintenance facilities, primarily at Chicago. The 3-C service, because it has no effective means to connect with the Midwest equipment pool, must rely on stand-alone facilities for all of its equipment maintenance and repairs.

Therefore, this study recommends the construction of a shop and repair facility in Cleveland to perform all maintenance, repairs, washing, fueling and sanding, as well as layover and turnaround servicing, for the entire fleet of 3-C cars and locomotives. This should include the capability in future years to perform heavy repairs as the equipment ages. It should be noted this facility is planned, not only for the maintenance needs of the initial 3-C Corridor, but also for the future

Cleveland Hub System with passenger train service proposed to be initiated from Cleveland to Pittsburgh, Buffalo, Detroit, and other points.

The property for the proposed Cleveland maintenance site, a mostly abandoned yard located approximately 1 mile east of the existing Amtrak Lakefront Station, is owned by CSX and is connected to the station via an existing track. Currently in FRA Class I condition (10 MPH maximum speed), this track will require upgrading to handle efficient train movements between the shop and the station. Exhibit 9 describes a conceptual location layout for the proposed maintenance facility and its proximity to the existing Cleveland Lakefront Station. No substantive discussions have taken place with CSX by either ORDC or Amtrak as to acquisition of this property.

The concept for the maintenance facility includes a 2-track enclosed shop building with inspection pits, 1 weather-protected (canopied) track for conducting layover and turnaround services, a materials storage area, a coach and locomotive wash building, and an appropriately sized industrial waste water treatment plant. Industrial waste water runoff from the shop, the equipment wash building, and all fueling areas will require EPA-approved containment, storage, treatment, and safe handling. The shop building should include space for a supervisory office, separate shower and locker facilities for train crews and mechanical staff, an "on-duty" room for train and on-board service (OBS) crews, and storage space for cleaning equipment and for communications facilities.

The Cleveland maintenance facility should include the following equipment, machinery, and services for maintenance, repair, and servicing of 3-C equipment.

Servicing and Supplies:

- Fuel, sand, and engine supplies, which include such items as lube oil, antifreeze, engine water,, and toilet supplies
- Servicing of locomotive and coach toilets
- Provision of potable water and food supply services, presumably by outside vendors.

Dispatching Inspections:

- FRA daily inspection
- Power brake inspections
- A "Right and Ready" inspection is usually a joint inspection by different departments, such as Mechanical, Transportation, and OBS to insure the equipment is presentable and the crew members on that train agree that the equipment is "good to go"

Preventive Maintenance (PM):

- Annual wheelset calibration
- FRA weekly PM
- FRA 30-, 92-, 184-day, annual, bi-annual inspections
- Progressive Overhaul at 3 million miles of equipment operation.

- Winterization/Hot-weather work
- COT&S means "clean, oil, test and stencil", which refers to an air brake inspection required by the FRA for all railroad cars and locomotives; these inspections occur every 4 or 5 years depending on the type of equipment; the equipment is then stenciled with the inspection date, thereby setting up the next inspection due date

Cleaning and Washing:

- "Turnaround" coach cleaning is the quick removal of trash and debris, vacuuming, and light hand cleaning that occurs upon train arrival at end-point stations when the trainset is to be utilized within a few hours for an outbound train.
- In Cleveland, exterior and underside coach and locomotive washing requires an enclosed wash rack building spanning at least 2 tracks
- Coach and locomotive windows require hand washing
- Coach and food service car fumigation is required every 60 days

Repairs:

- There are 2 levels of minor repairs – less than 45 minutes work and less than 2 hours work
- Medium repairs require over 2 hours work
- Heavy repairs can take a full day or longer to complete

Required Key Shop Machinery:

- Drop tables for locomotive and coach wheels and truck change outs and other parts replacement; "truck", also referred to as "bogie", is the chassis or framework under the ends of locomotives and rail cars, consisting of wheels, bearings, axles, springs, bolsters, and center pin, and upon which locomotives and rail cars are supported and guided along the rails
- Wheel truing machine for re-profiling wheels; this machine removes surface defects and re-establishes the proper circular and cross profile of wheels by shaving shallow layers of steel from the wheel tread
- Heavy duty overhead cranes
- Wheelset inspection machine

All tracks used for layover services will require external 480-volt connections for use by trainsets in standby mode. When a trainset is in standby mode, all electrical power needed for lighting, heating, cooling, or other auxiliary electrical services on the train is supplied by an external power source, rather than by the locomotive's generator. Except in cold conditions (below 45° F), when in standby mode, the locomotive's diesel engine is shut down to conserve diesel fuel whenever the trainset is idle for extended periods, such as overnight layovers. Also required at layover tracks are connections for potable water and work platforms on both sides of each track for maintenance crew access. The site

should include sufficiently sized paved parking, as well as fencing and lighting for employee safety and for security of layover equipment.

In addition to the primary maintenance facility in Cleveland, the proposed 3-C operating schedule will require layover and turnaround facilities at Columbus and Cincinnati. Two potential sites, neither of which has been discussed in detail with the host freight railroads, are the NS Grandview Yard in Columbus, roughly 1.5 miles west of the proposed Convention Center Station, and the I&ORY Undercliff Yard in Cincinnati, about 5 miles east of the proposed Boat House Station. Exhibit 10 describes the location of Grandview Yard relative to the Columbus Convention Center. Exhibit 11 describes the same for Undercliff Yard and the Boat House area. These layover facilities would consist of two layover tracks of sufficient capacity to hold 1 full trainset each. Frequently, at layover facilities, there will be a need to store 2 trainsets during overlapping time periods, although the arrival and departure of each trainset may occur at different times. Having 2 layover tracks instead of 1 long track allows individual trainsets to be moved efficiently into and out of a layover track without handling a second idled trainset. The track length proposed by this study includes extra footage to allow for longer future train lengths resulting from ridership growth. Also, all of the proposed maintenance facility sites have sufficient space to add layover tracks, if necessary, because of potential future added train frequencies. An order-of-magnitude cost estimate for construction of the 3 maintenance facilities, including track work, is $55 million including 30% contingencies.

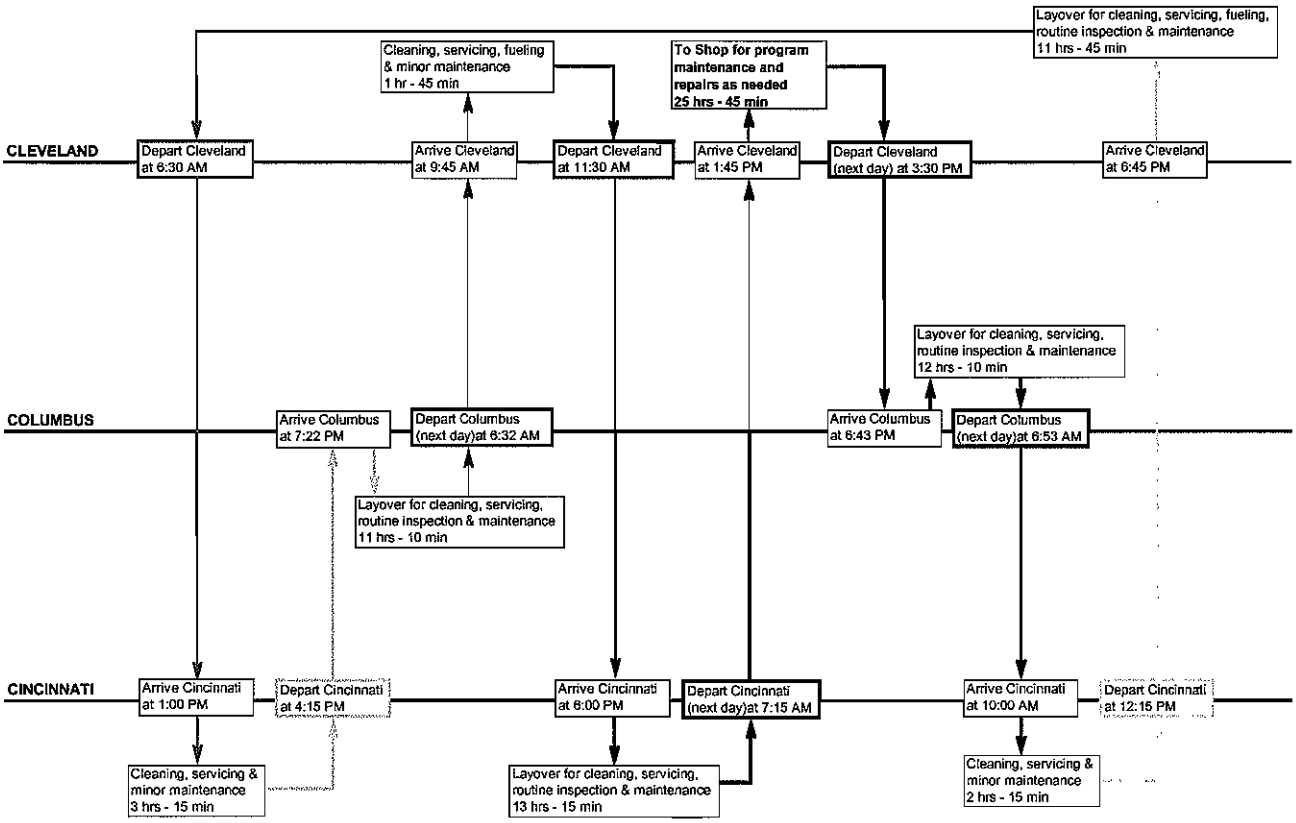
The following Table 6 describes the cycling of one equipment consist in 3-C service. Each colored arrow represents a train number under which the equipment consist is operating during the time given. Note that the train assignment schedule for train and on-board-service crews does not necessarily follow the same cycling as the equipment consists. In the schedule described in Table 6, every fifth day 1 of the 5 equipment sets would layover in the Cleveland shop for 25 hours and 45 minutes. In this time period work ranging from routine inspections and maintenance to heavy repairs could be performed. In an 8-day period, each of the 5 trainsets will be in Cleveland 5 times – twice for a quick turnaround to the next outbound train, once for an overnight layover, and twice for shop maintenance. On any given night, 2 trainsets will layover in Cleveland, 2 trainsets will layover in Columbus, and 1 trainset will layover in Cincinnati. All locomotive fueling will be performed at the Cleveland mechanical facility. No regular locomotive fueling is expected to occur in Columbus or Cincinnati.

TABLE 6

Maintenance Cycle For One Set Of Equipment In Proposed 3-C Service

(Based On One Set of Equipment Cycling Through All 8 Daily 3-C Trains In A 5-Day Period)

Each Of The 8 Colors Represents A Daily Train Frequency (Or Departure)
Arrows Indicate The Flow From One Trainset Activity To The Next



IV. Ridership/Revenue Forecast Summary

Revenue/Ridership forecasts were determined based on the schedules defined in Table 5. Since the desire of the state and communities is to re-establish Amtrak service in the most expeditious way possible, this study did not focus on "high-speed" scenarios but rather on incremental and focused improvements, including raising or maintaining the speeds on the entire 3-C route to 79 MPH, where practical, which would result in a reasonably attractive service. AECOM, Amtrak's contractor that specializes in ridership and revenue forecasting, prepared the estimated forecasts, which are included in Attachment 1.

V. Annual Operating Expense/Operating Contract Requirement

Estimates of costs to operate the 3-C service were developed by Amtrak based on the schedules defined in Table 5... The projected expenses associated with operations over this route are presented in Section VI.

VI. Summary of Key Numbers – Proposed 3-C Corridor Service

This section summarizes key elements of the route between Cleveland, Columbus, and Cincinnati.

Length of Route (miles)	255
No. of Freight Rail Carriers ("Host Railroads")	3
Proposed Scheduled Running Time (hours: minutes)	6:30
"Order of Magnitude" Capital Cost ($ millions)	
Capital for Infrastructure Improvements	$236.2
Capital for Track Upgrading	$ 51.4
Capital for Mechanical Facilities	$ 55.0
Capital for Equipment Procurement	$175.0
Estimated Annual Ridership (for 2009)	478,000
Estimated Annual Revenue ($ millions)	$12.2
Estimated Annual Operating Expense ($ millions)	$29.2
Estimated Annual Operating Subsidy ($ millions)	$17.0

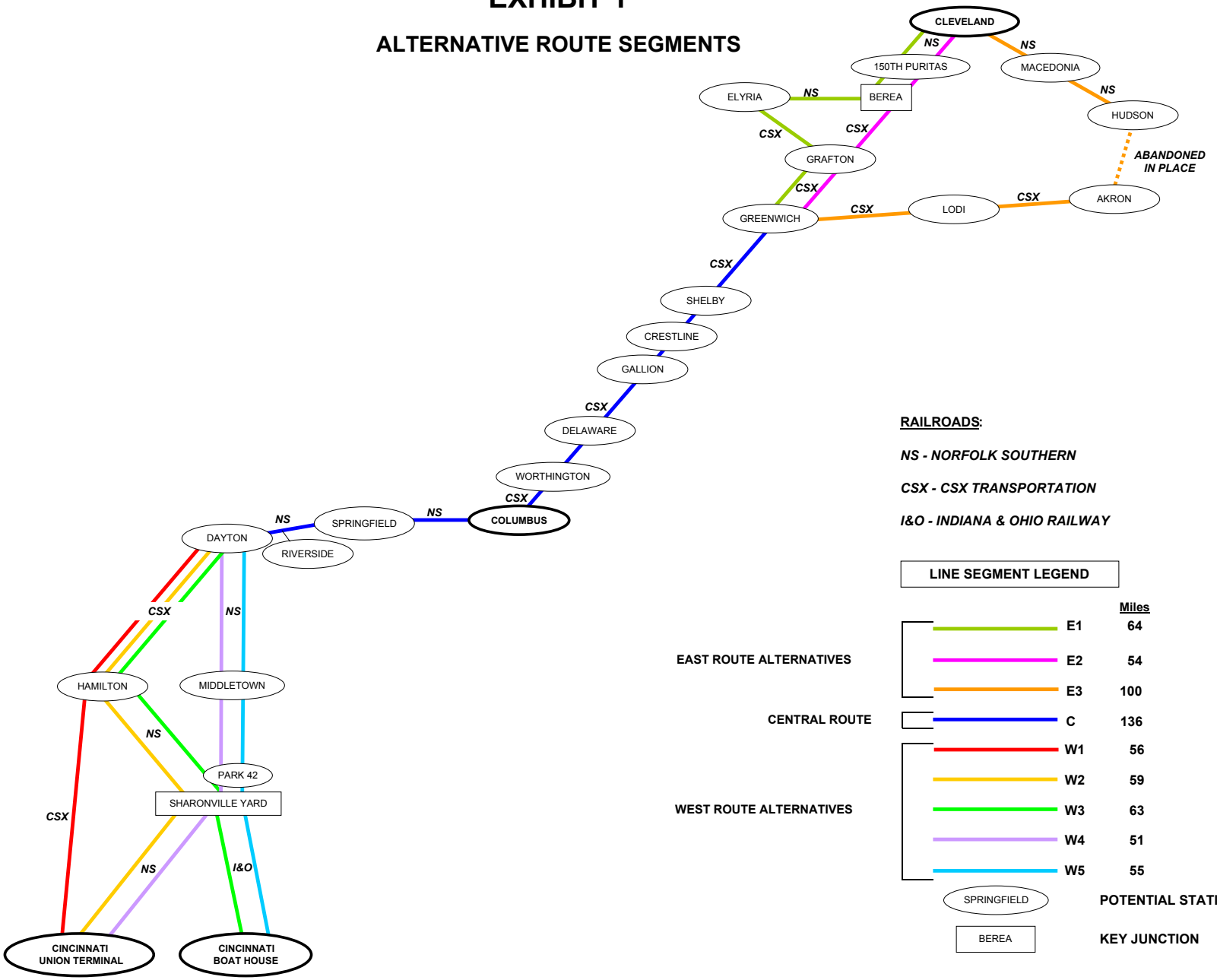
VII. Mobilization Costs (one-time expense)

There are a number of up-front expenses that would be incurred by Amtrak should the corridor service be funded. These include rolling stock procurement, personnel recruitment and training, radio equipment, uniforms for on-board personnel, etc. These costs are summarized below:

	$Millions
Training & Qualification Expenses – Train, Engine and Onboard Services Personnel	$5.9
Mechanical Training	$0.2
Uniforms, radios and other miscellaneous equipment	$0.2
Total Projected Mobilization Costs	$6.3

EXHIBIT 1

ALTERNATIVE ROUTE SEGMENTS



RAILROADS:

NS - NORFOLK SOUTHERN

CSX - CSX TRANSPORTATION

I&O - INDIANA & OHIO RAILWAY

LINE SEGMENT LEGEND

		Miles
EAST ROUTE ALTERNATIVES	E1	64
	E2	54
	E3	100
CENTRAL ROUTE	C	136
WEST ROUTE ALTERNATIVES	W1	56
	W2	59
	W3	63
	W4	51
	W5	55

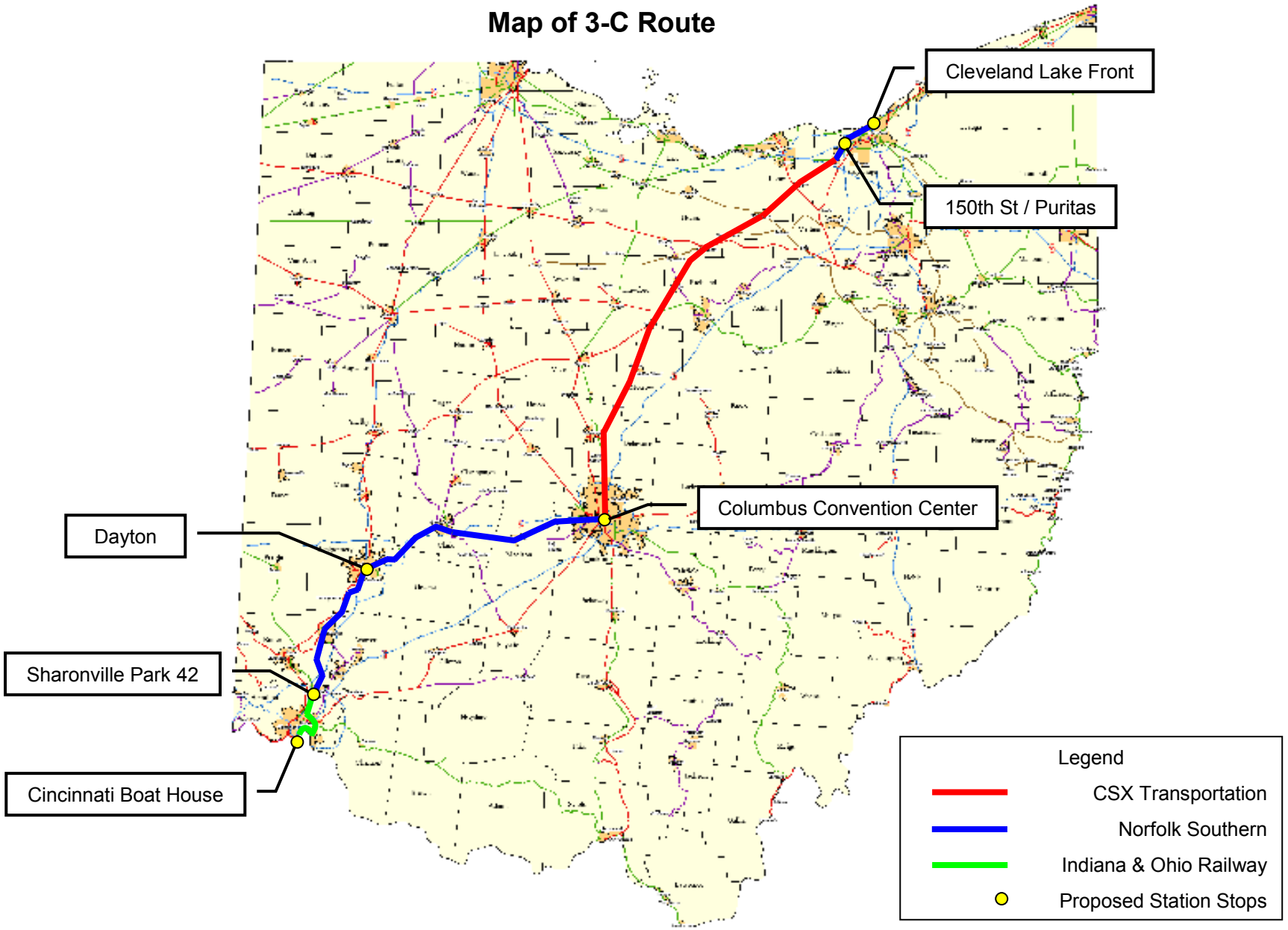
SPRINGFIELD — POTENTIAL STATIONS

BEREA — KEY JUNCTION

AMTRAK 9/15/2009 1:27 PM

EXHIBIT 2

Map of 3-C Route



OWNERSHIP / MAINTENANCE / DISPATCHING NEAR CP 138

Industry Track

Ohio Central RR


EXHIBIT 4
CP 138 and Columbus Convention Center
CSX / NS – One Main Track Each
Ohio Central RR – 2 Main Tracks & 1 Industry Track
5 Tracks Converge to 2 Main Tracks
3-C Route with 2 Main Tracks Under the Convention Center
CP 138
Columbus Convention Center
To Cleveland
To Scioto Jct.
N
E Hubbard Ave
Hull Alley
Kerr St
Cedar St
N Pearl St
E Lincoln St
N Wall St
W Lincoln St
Brickel St
Hamlet St
N 4th St
23
E Russell St
N Innerbelt
Eden Alley
W Poplar Ave
E Goodale St
670
3
Cleveland
Buckingham St
Jack Gibbs Blvd
Park St
Spruce St
Vine St
School Alley
N High St
Ohio Center Way
N 3rd St
N 5th St
Neilston St
N 6th St
McCoy St
Grove St
Edward St
N Front St
E Nationwide Blvd
W Nationwide Blvd
Mt Vernon Ave
E Naghten St

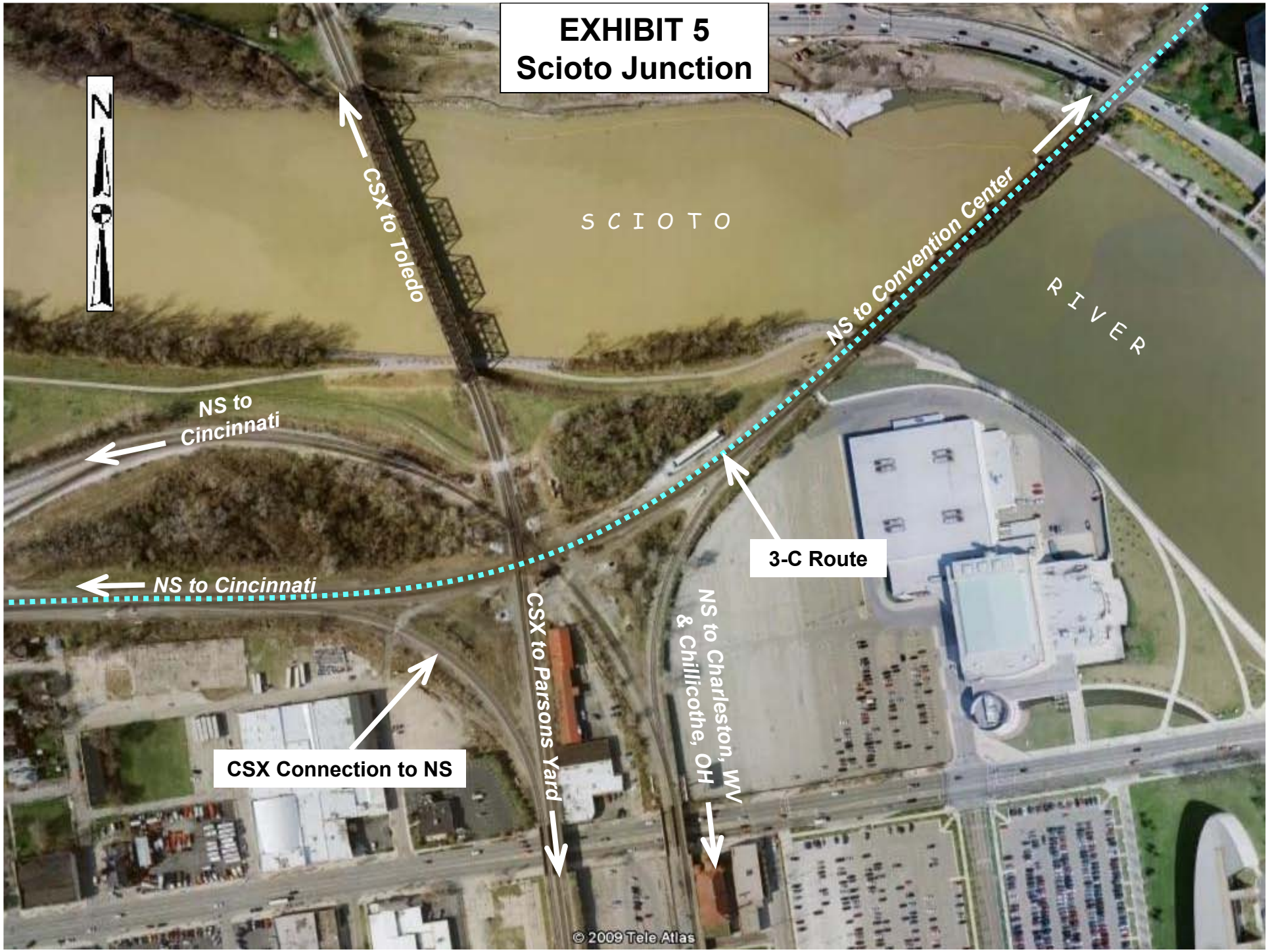


EXHIBIT 5
Scioto Junction
N
CSX to Toledo
SCIOTO
NS to Convention Center
RIVER
NS to
Cincinnati
NS to Cincinnati
3-C Route
CSX Connection to NS
CSX to Parsons Yard
NS to Charleston, WV
& Chillicothe, OH
© 2009 Tele Atlas

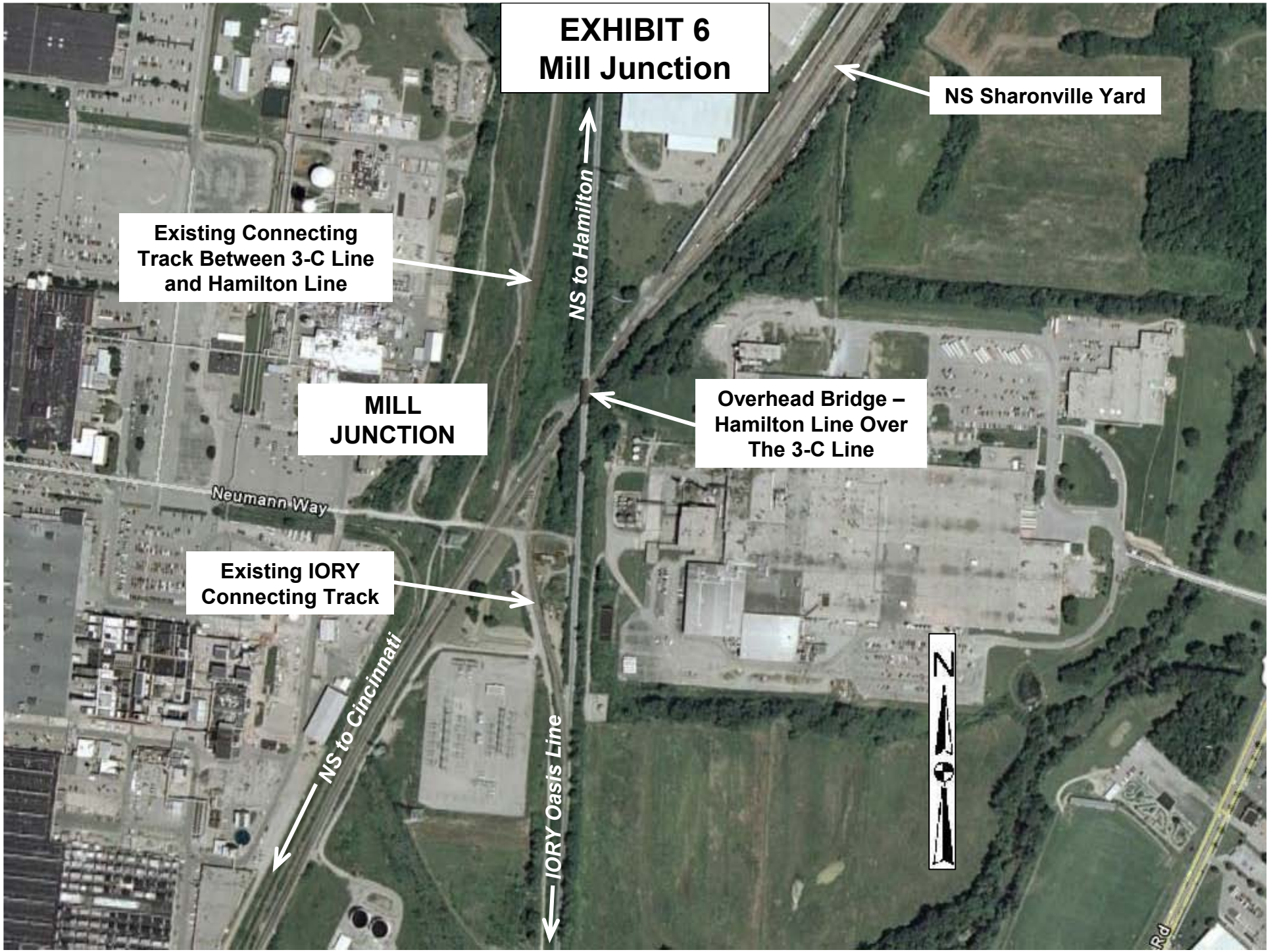


EXHIBIT 6
Mill Junction
NS Sharonville Yard
NS to Hamilton
Existing Connecting Track Between 3-C Line and Hamilton Line
MILL JUNCTION
Overhead Bridge – Hamilton Line Over The 3-C Line
Neumann Way
Existing IORY Connecting Track
NS to Cincinnati
IORY Oasis Line
N

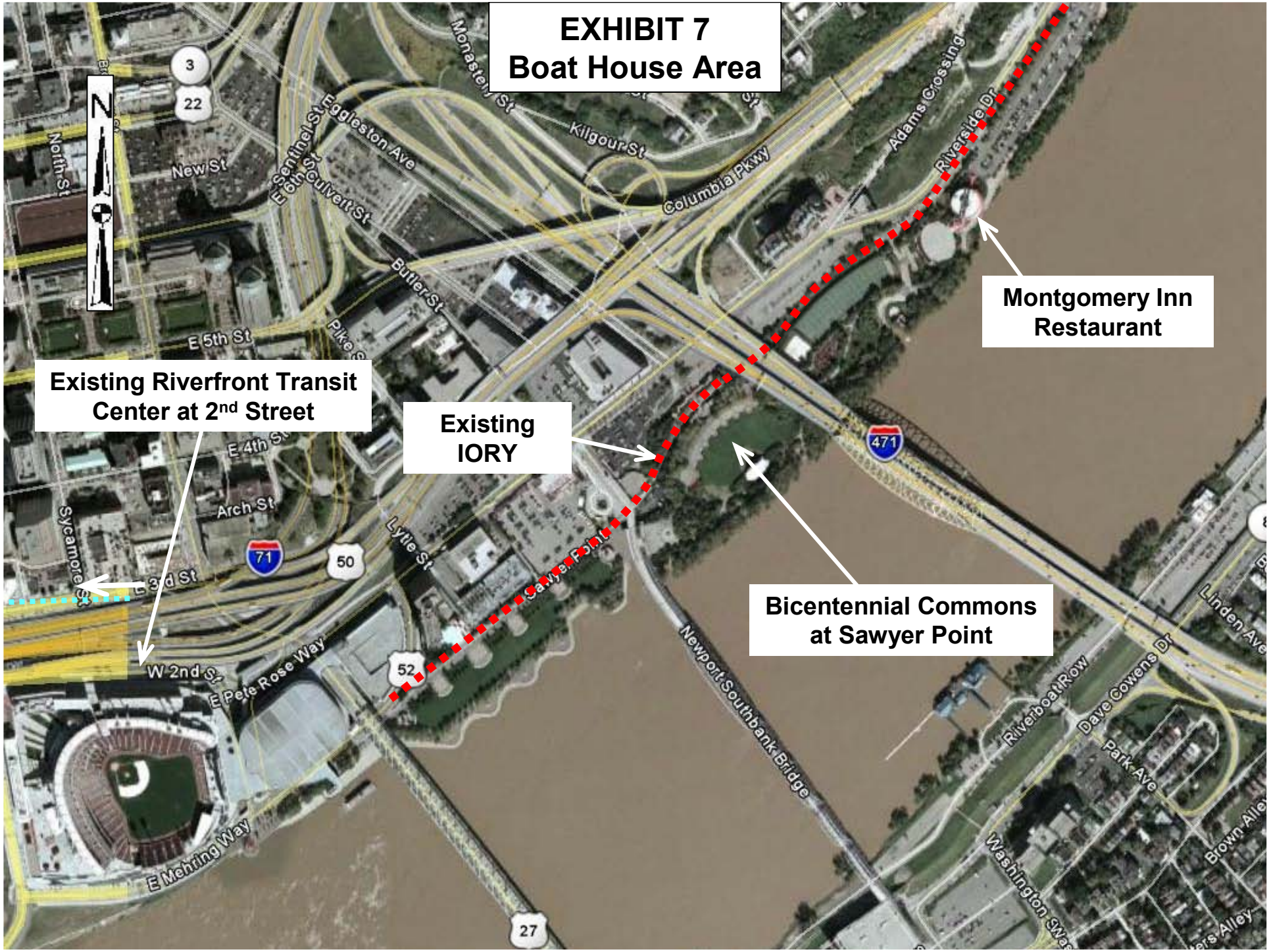


EXHIBIT 7
Boat House Area
Montgomery Inn Restaurant
Existing Riverfront Transit Center at 2nd Street
Existing IORY
Bicentennial Commons at Sawyer Point
N
3
22
North St
New St
Eggleston Ave
E 6th St
Culvert St
Monastery St
Kilgour St
Columbia Pkwy
Adams Crossing
Riverside Dr
Butler St
E 5th St
E 4th St
Arch St
Sycamore St
E 3rd St
W 2nd St
E Pete Rose Way
E Mehring Way
Lytle St
Sawyer Point
Newport Southbank Bridge
Riverboat Row
Dave Cowens Dr
Park Ave
Linden Ave
Brown Alley
Washington St
71
50
52
27
471

EXHIBIT 8

Sharonville By-Pass Track and IORY Connection

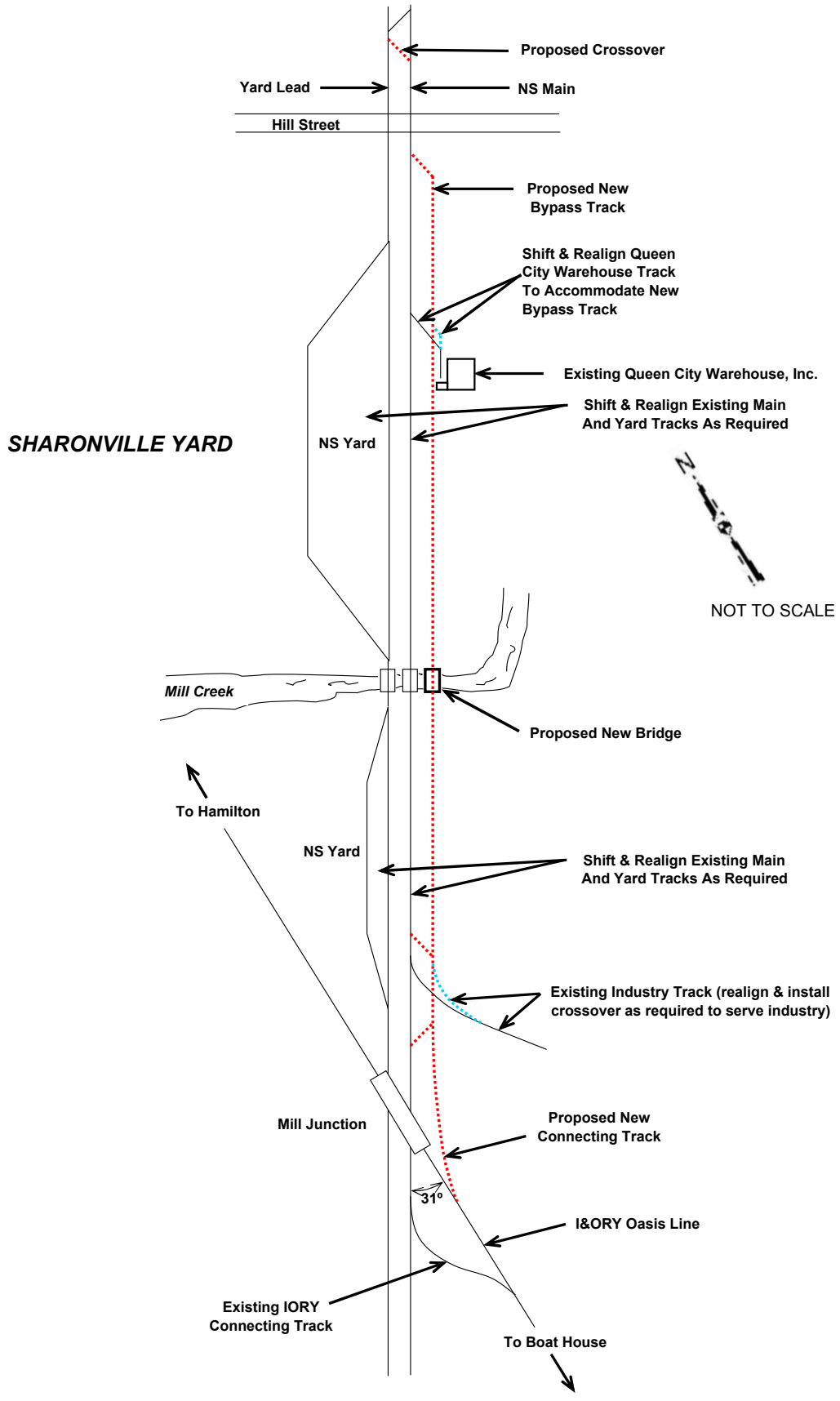
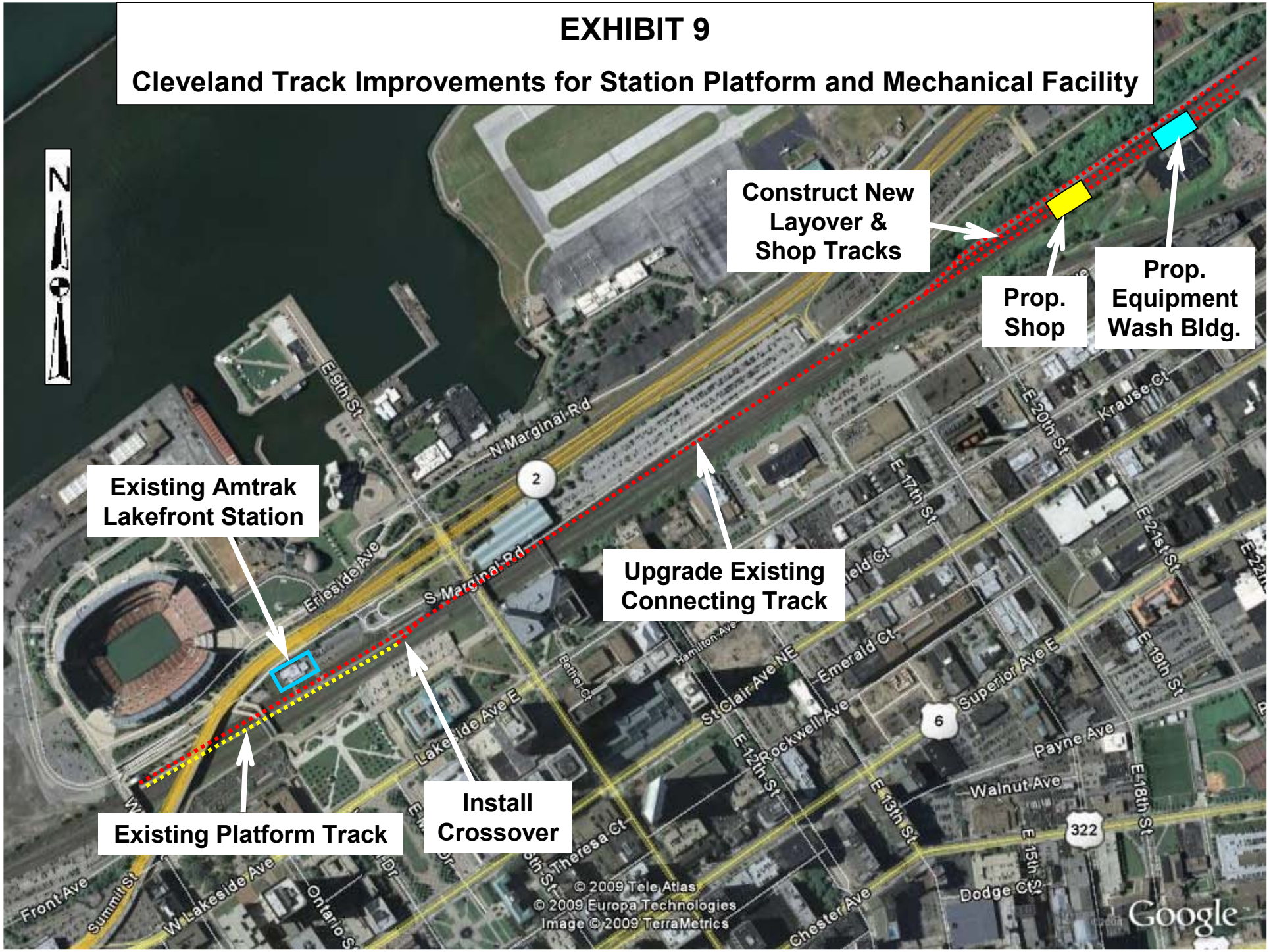


EXHIBIT 9

Cleveland Track Improvements for Station Platform and Mechanical Facility



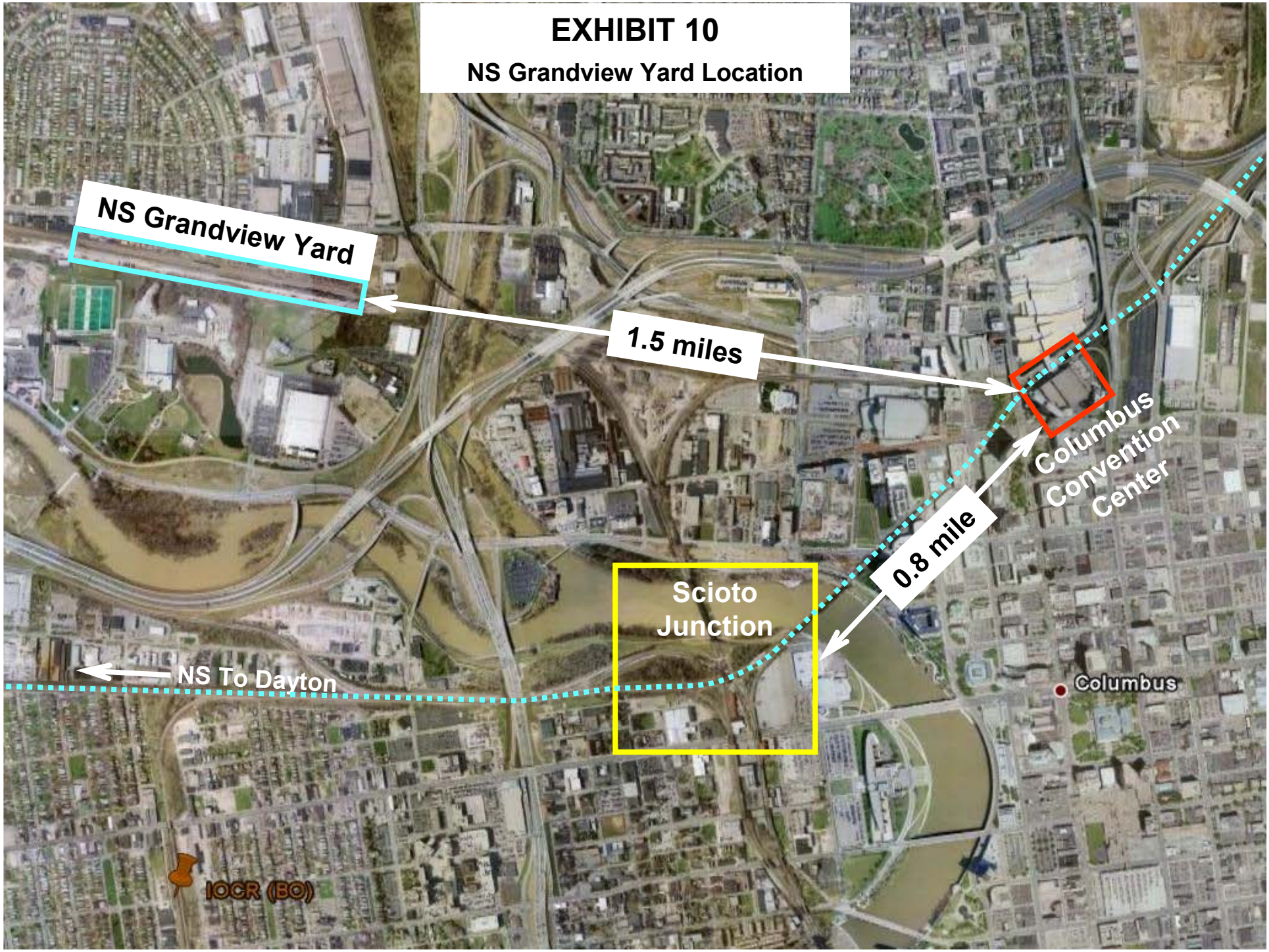


EXHIBIT 10
NS Grandview Yard Location
NS Grandview Yard
1.5 miles
Columbus Convention Center
0.8 mile
Scioto Junction
NS To Dayton
Columbus
IOCR (BO)

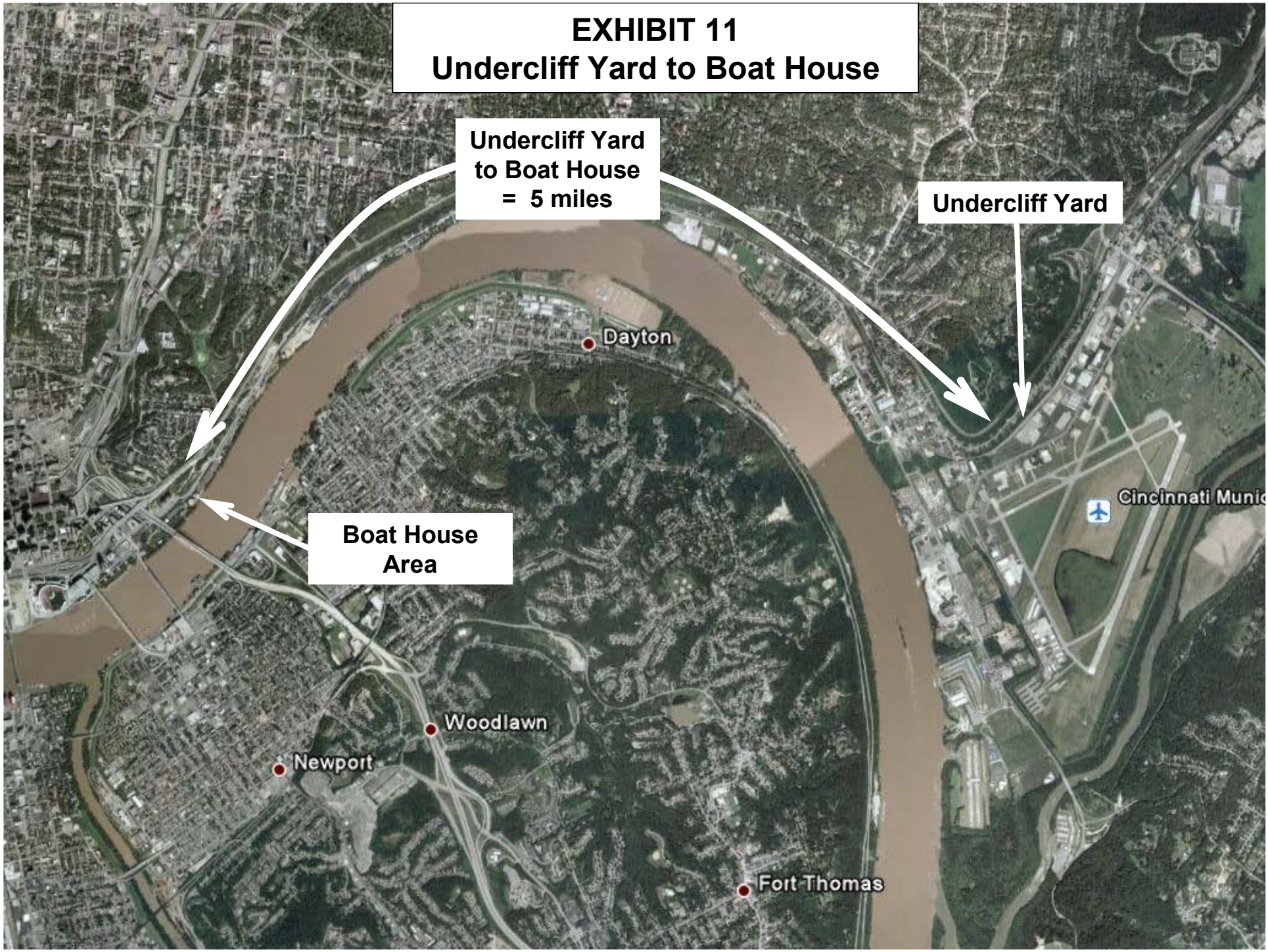


EXHIBIT 11
Undercliff Yard to Boat House
Undercliff Yard to Boat House = 5 miles
Undercliff Yard
Boat House Area
Dayton
Cincinnati Munic
Woodlawn
Newport
Fort Thomas

Acronyms & Definitions

ABS:	Automatic Block Signals, on a specific section or length of track, an arrangement of automatic signals governing each block.
CP:	Control Point
Crossing Starts	The point on the track approach to a grade crossing where crossing signals are actuated by the presence of a train.
CSX:	CSX Transportation, Inc.
CTC:	Centralized Traffic Control, a term applied to a system of railroad operation by means of which the movement of trains over routes and through blocks on a designated section of track or tracks is directed by signals controlled from a designated control point.
CWR:	Continuous Welded Rail
FRA:	Federal Railroad Administration
FRA Class of Track:	FRA classification of track is based on physical conditions and geometry, which determines maximum train speeds that can be operated.
IORY:	Indiana & Ohio Railway Company
MSA:	Metropolitan Statistical Area, a contiguous area of relatively high population density that includes a central urbanized area.
MGT:	Million Gross Tons, a traffic density measure. The movement of one million tons of freight, including the goods, cars and locomotives.
NS:	Norfolk Southern Corporation
OBS:	On Board Services
ORDC:	Ohio Rail Development Commission
OTP:	On-Time Performance
MP:	Milepost
TCS:	Train Control System

3-C Corridor:	The Ohio rail transportation corridor that includes Cleveland, Columbus, and Cincinnati