All Aboard Florida Passenger Rail Project – West Palm Beach to Miami, Florida

Supplemental Environmental Assessment – West Palm Beach Vehicle Maintenance Facility

Prepared Pursuant to 42 U.S.C. §4332, 49 U.S.C. §303 and 64 Fed. Reg. 28455

Approved:

David Valenstein, Chief
Environmental and Planning Division
Federal Railroad Administration

October 22, 2014
Date

The Federal Railroad Administration (FRA) evaluated the potential environmental and related impacts of constructing and operating an intercity passenger rail service proposed by All Aboard Florida - Operations LLC (AAF) between West Palm Beach and Miami, FL. FRA and AAF conducted an environmental review in 2012/2013, including preparing and issuing both an Environmental Assessment (EA) (*Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida*) and a Finding of No Significant Impact (FONSI). Initial evaluation of environmental impacts for the EA and FONSI included a Vehicle Maintenance Facility (VMF) to support AAF passenger service at an existing rail maintenance yard in Fort Lauderdale (Andrews Yard), which Florida East Coast Railway, L.L.C. (FECR) owns and operates. However, the Andrews Yard location is unavailable in a configuration necessary for AAF's use at this time; therefore, AAF has identified an alternative location. This Supplemental EA (SEA) provides information regarding potential environmental impacts associated with the VMF at the WPB Rail Yard, and compares those to the impact analyses conducted for the originally proposed VMF location at the Andrews Yard in Fort Lauderdale. This evaluation considers the potential for physical, economic, social, cultural, and biological impacts to the environment, and includes analyses and modeling results evaluated for current and future operations at the WPB Rail Yard. Written comments should be provided in writing to FRA at the address below, or sent to AAFSEA_Comments@vhb.com, on or before November 24, 2014.

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October 2014

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1 Introduction

1.1 Proposed Action

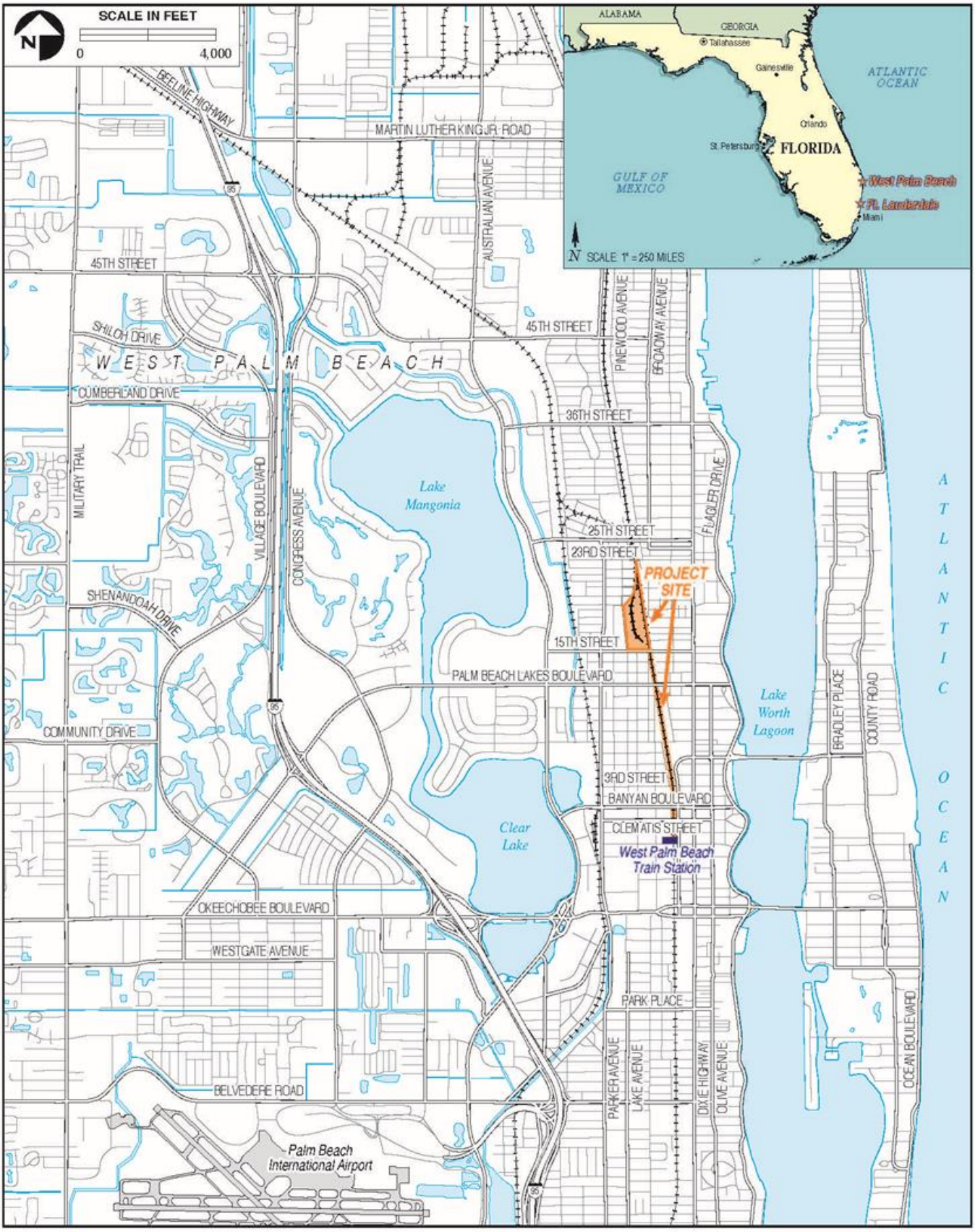
Pursuant to the National Environmental Policy Act (NEPA) of 1969[1] and Council on Environmental Quality (CEQ) NEPA regulations,[2] the Federal Railroad Administration (FRA) evaluated the potential environmental and related impacts of constructing and operating an intercity passenger rail service proposed by All Aboard Florida - Operations LLC (AAF) between West Palm Beach and Miami, FL. FRA and AAF conducted an environmental review in 2012/2013, including preparing and issuing both an Environmental Assessment (EA) and a Finding of No Significant Impact (FONSI) (AAF 2012; FRA 2013).

Initial evaluation of environmental impacts for the EA and FONSI included a Vehicle Maintenance Facility (VMF) to support AAF passenger service at an existing rail maintenance yard in Fort Lauderdale (Andrews Yard), which Florida East Coast Railway, L.L.C. (FECR) owns and operates. Since the publication of the 2012 EA, FECR has committed a substantial portion of the Andrews Yard's property to a transload freight facility. The available excess land will not sustain the needs for a VMF on the property. The configuration of the property would require AAF to construct duplicate buildings at two locations in the yard to service trains, increasing the cost of the facility. Additionally, only 7 sets of seven-car trains could be stored at any time. The AAF trainsets will eventually have 8 sets of ten-car trains, causing a physical constraint on the mainline of Andrews Yard. Because of the configuration constraints, the train washing station would need to be built within the mainline right-of-way located outside of the Andrews Yard property, requiring additional moves to wash trains. AAF would also require the use of at least 30 feet of the mainline right-of-way for access tracks and storage tracks. This use of the mainline would interfere with freight operations at the Andrews Yard. For these reasons, AAF has identified an alternative location. The proposed WPB yard would allow all maintenance and washing buildings to be located directly within the storage area, would provide storage for 10-car trainsets and would not cause the fouling of mainline tracks.

This Supplemental EA (SEA) provides information regarding potential environmental impacts associated with the VMF at the WPB Rail Yard (Project), and compares those to the impact analyses conducted for the originally proposed VMF location at the Andrews Yard in Fort Lauderdale. This evaluation considers the potential for physical, economic, social, cultural, and biological impacts to the environment, and includes analyses and modeling results evaluated for current and future operations at the WPB Rail Yard.

The new location, the West Palm Beach (WPB) Rail Yard, is an active FECR freight yard currently used for staging and building freight trains, which includes assembling freight rail cars to be picked up when a locomotive goes to the WPB Rail Yard to drop off empty rail cars. The WPB Rail Yard is an approximately 27-acre site located in WPB, east of Division Avenue, between 15th Street and 23rd Street (Figure 1-1). Under existing operations, four freight trains stop daily at this facility: two during the day (from 7:01 AM to 10:00 PM) and two at night (from 10:01 PM to 7:00 AM). Each train has an approximate total idling time of 45 minutes, which includes the time the train remains stationary, the staging and time required for building the freight.

1 42 U.S.C. § 4321 et seq.
2 40 CFR Parts 1500-1508



Project Vicinity

All Aboard Florida Intercity Passenger Rail Project

U.S. Department of Transportation
Federal Railroad Administration

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1.2 Project Proponent

AAF is a subsidiary of Florida East Coast Industries, LLC (FECI), which is a transportation, infrastructure and commercial real estate company based in Coral Gables, Florida. Florida East Coast Railway, L.L.C. (FECR), an affiliate of FECI, owns the right-of-way and existing railroad infrastructure within the corridor between Miami and Jacksonville, over which FECR operates a freight rail service (FECR Corridor). AAF has an exclusive, perpetual easement granted by FECR whereby AAF may develop and operate the proposed passenger rail service within the FECR Corridor. AAF will operate the proposed passenger rail service within the FECR Corridor in coordination with FECR's continued freight service.

1.3 Project History

AAF is proposing to construct and operate a privately owned and operated intercity passenger railroad system that will connect Orlando and Miami, with intermediate stops in Fort Lauderdale and West Palm Beach, Florida. AAF proposes to implement the Project through a phased approach. Phase I would focus on the West Palm Beach to Miami section while Phase II would focus on the Orlando to West Palm Beach section.

AAF has applied for federal funds through the Railroad Rehabilitation and Improvement Financing (RRIF) program, which is a loan and loan guarantee program administered by FRA as described in 49 Code of Federal Regulations (CFR) part 260. Under this program, the FRA Administrator is authorized to provide direct loans and loan guarantees that may be used to acquire, improve, or rehabilitate rail equipment or facilities or develop new intermodal or railroad facilities. Because AAF has applied for a loan under FRA's RRIF program, FRA is required under NEPA to conduct an analysis of the potential environmental impacts resulting from the Project. NEPA compliance is a prerequisite for RRIF approval, and FRA will not approve the Project for a RRIF loan until the NEPA process is complete. A RRIF loan, if approved, would be part of an overall capital structure put in place by AAF to finance the infrastructure improvements.

1.3.1 Phase I

AAF proposes to implement the Project through a phased approach. Phase I would provide rail service on the West Palm Beach to Miami section while Phase II would extend service to Orlando. Phase I would provide passenger rail service along the 66.5 miles of the FECR Corridor connecting West Palm Beach, Fort Lauderdale, and Miami. AAF has obtained private financing and is proceeding to implement Phase I.

FRA and AAF conducted an environmental review of Phase I in 2012/2013, including preparing and issuing both an EA and a FONSI (AAF 2012; FRA 2013). Phase I of the Project, as described in the 2012 EA, includes constructing three new stations (West Palm Beach, Fort Lauderdale and Miami), purchasing five train sets, adding a second track along most of the 66.5-mile corridor and adding 16 new round-trip intercity passenger train trips (32 one-way trips) on the West Palm Beach to Miami section of the FECR Corridor. FRA concluded that Phase I has independent utility.[3] FRA has made no decision under the Railroad Rehabilitation and Improvement Financing (RRIF) program as to whether a loan would be provided for Phase I.

3 In this case, "independent utility" means that Phase I could be advanced and serve a transportation need even if Phase II were not constructed.

As a result of the environmental review process conducted by FRA in cooperation with AAF for Phase I, AAF is authorized to construct the Phase I component of the Project as reviewed and approved in the 2012 EA and FRA's subsequent FONSI. Since the FONSI, AAF proposed and FRA has evaluated a new location for the proposed Fort Lauderdale Station and issued a re-evaluation decision that found no significant difference from the location evaluated in the 2012 EA. Because AAF is now proposing to construct a vehicle maintenance facility in a different location than the location evaluated in the 2012 EA, and because that new location has the potential for different environmental impacts than the Fort Lauderdale VMF location previously evaluated, FRA has determined that a Supplemental EA is necessary to assess the proposed West Palm Beach VMF.

1.3.2 Phase II

Phase II of the Project includes adding a second track within 128.5 miles of the FECR Corridor between Cocoa and West Palm Beach, constructing a new railroad line parallel to State Road (SR) 528 between the Orlando International Airport (MCO) and Cocoa and constructing a new VMF on property owned by the Greater Orlando Airport Authority (GOAA) near MCO. The proposed service would use a new Intermodal Station at MCO that is being constructed by GOAA as an independent action. The Project includes purchasing five additional passenger train sets and would add 16 new round-trip intercity passenger train trips (32 one-way trips) on the new railroad segment and on the FECR Corridor between Cocoa and West Palm Beach. No additional trips beyond those considered in the 2012 EA (16 round-trip intercity passenger train trips [32 one-way trips]) would be added on the West Palm Beach to Miami section.

Because Phase II loan approval is a separate Federal action, FRA has undertaken a separate NEPA review of the proposed extension. Given that operations would cover the full corridor from Orlando to Miami, the Draft Environmental Impact Statement (EIS) (DEIS), under review concurrent with this SEA, analyzes the effects of completing both phases of the Project.[4]

1.4 Permits and Approvals

FRA is the lead agency for NEPA review for the Project. The Applicant, AAF, if approved, will secure financing and will own the system and be responsible for the Project's design, construction, operation, and maintenance.

Pursuant to NEPA,[5] Council on Environmental Quality (CEQ) NEPA regulations,[6] and FRA's NEPA procedures (FRA 1999), FRA has evaluated the potential human and natural environmental impacts of relocating the Fort Lauderdale Vehicle Maintenance Facility to the WPB Rail Yard in this SEA.

FRA has consulted with the State Historic Preservation Officer (SHPO) and requested concurrence with FRA's finding of no adverse effect to historic properties. No other federal or state agency permits or approvals are required for this Project.

4 The DEIS was published on September 19, 2014. It is available online at http://www.fra.dot.gov/Page/P0672.
5 42 U.S.C. §4321 *et seq*.
6 40 CFR parts 1500-1508

1.5 Coordination and Consultation

FRA sent a coordination letter to United States Fish and Wildlife Service (USFWS) on August 18, 2014, seeking concurrence that this Project would not impact Federal or state-listed threatened or endangered species. USFWS concurred with these findings on a letter dated August 27, 2014 (see Appendix A). FRA also contacted the SHPO on August 18, 2014, seeking concurrence that the new site location would not impact any historic resources or archaeological sites. SHPO subsequently requested additional information (see Appendix A).

The following agencies and authorities were on the Phase I EA distribution list, and will receive copies of this Draft SEA:

- Federal Agencies:
    - Federal Aviation Administration
    - Federal Highway Administration
    - Federal Transit Administration
    - National Marine Fisheries Service
    - United States Army Corps of Engineers
    - United States Coast Guard
    - United States Department of Transportation
    - United States Environmental Protection Agency
    - United States Fish and Wildlife Service

- State Agencies:
    - Florida Division of Historical Resources/State Historic Preservation Officer
    - State of Florida Clearinghouse (Distribution to State Agencies)

- Other Organizations:
    - Palm Beach Metropolitan Planning Organization
    - South Florida Water Management District

- Local Government Authorities:
    - City of West Palm Beach
    - Palm Beach County

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2 Purpose and Need

The purpose for Phase I of the Project from West Palm Beach to Miami, Florida, as described in the 2012 EA, is to address South Florida's current and future needs by enhancing its transportation system, improving safety and air quality, creating jobs, providing a transportation alternative for millions of Floridians and tourists, and supporting economic development by:

- Returning the existing Florida East Coast Railway, L.L.C. (FECR) corridor to a dual-track system to allow for the restoration of fast, dependable, and efficient passenger service in Southeast Florida; and
- Implementing a privately owned, operated, and maintained intercity passenger rail service that will connect downtown West Palm Beach to downtown Miami, with one stop in downtown Fort Lauderdale.

Through Phase I, AAF plans to enhance mobility and improve safety in the region, particularly along the Interstate 95 corridor (I-95), by reintroducing passenger rail service, which ceased in 1968, between downtown West Palm Beach and downtown Miami with one stop in downtown Fort Lauderdale. This development will provide a transportation solution for millions of Floridians and tourists.

The purpose of the proposed VMF is to accommodate the storage and maintenance needs of the passenger trains associated with the Project. Necessary services include fueling, routine maintenance, overnight train storage, vehicle washing, and daily cleaning and stocking.

The WPB Rail Yard is needed to provide a suitable location for a VMF to support the AAF passenger service. The proposed location would place the layover facility (overnight train storage) at one end of the passenger rail line in order to reduce or eliminate non-revenue trips. Utilizing FECR's existing WPB Rail Yard would eliminate the need to acquire parcels or change land uses. The maintenance activities planned to be conducted at the VMF would be performed within the existing footprint of the WPB Rail Yard.

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3 Proposed Action

AAF has proposed a new location for the VMF, associated with the Project, at the West Palm Beach (WPB) Rail Yard. Proposed operational and physical changes at the existing WPB Rail Yard would provide the capacity for maintaining and staging passenger trains. In order to perform necessary maintenance services, physical changes to the existing WPB Rail Yard require new facilities and buildings, and additional dedicated tracks. Together, these proposed changes comprise the Project evaluated in this Draft Supplemental Environmental Assessment (SEA), which Section 3.2 describes in detail.

3.1 Alternatives Considered

Initial evaluation of environmental impacts in the 2012 EA considered locating the VMF, which would support AAF passenger service, at an existing rail maintenance yard in Fort Lauderdale (Andrews Yard), which FECR owns and operates. However, the Andrews Yard location is unavailable in a configuration necessary for AAF's use at this time; therefore, this site was eliminated from consideration.

Initial evaluation of environmental impacts for the EA and FONSI included a Vehicle Maintenance Facility (VMF) to support AAF passenger service at an existing rail maintenance yard in Fort Lauderdale (Andrews Yard), which Florida East Coast Railway, L.L.C. (FECR) owns and operates. Since the publication of the 2012 EA, FECR has committed a substantial portion of the Andrews Yard's property to a transload freight facility. The available excess land will not sustain the needs for a VMF on the property. The configuration of the property would require AAF to construct duplicate buildings at two locations in the yard to service trains, increasing the cost of the facility. Additionally, no more than 7 seven-car trains could be stored at any time. The AAF trainsets will eventually have 8 ten-car trains, causing a physical constraint on the mainline of Andrews Yard. Because of the configuration constraints, the train washing station would need to be built within the mainline right-of-way located outside of the Andrews Yard property, requiring additional moves to wash trains. AAF would also require the use of at least 30 feet of the mainline right-of-way for access tracks and storage tracks. This use of the mainline would interfere with freight operations at the Andrews Yard.

AAF has identified an alternative location. The new location of the West Palm Beach Rail Yard (WPB Rail Yard) is a 27-acre FECR freight layover yard currently used for staging and building freight trains, which includes assembling freight rail cars to be picked up when a locomotive goes to the WPB Rail Yard to drop off empty rail cars (Figure 3-1). Project construction would occur entirely within the footprint of the existing FECR Corridor and existing WPB Rail Yard, and would not require any property acquisition.

The principal difference between the two locations is the proximity of the proposed VMF to the WPB Station (the nearest train station for both sites). The VMF at Andrews Yard would have been located approximately 30 miles from the WPB Rail Station, requiring approximately 60 miles of rail travel (round trip) in order to reach the VMF. The existing WPB Rail Yard is 0.9 miles from the WPB Station. This proximity reduces the number of at-grade crossings required during travel from the train station

to the VMF. Travel to and from Andrews Yard would have involved 63 crossings, while the WPB Rail Yard will require only four at-grade crossings in each direction.

3.2 Proposed Vehicle Maintenance Facility

The proposed location for the VMF is the WPB Rail Yard, which is an approximately 27-acre site located in West Palm Beach, east of Division Avenue, between 15th Street and 23rd Street (Figure 3-1). At this location, there are currently 9 tracks within the FECR main line (two main line tracks and 7 storage tracks), a row of maintenance and staff buildings, and 2 storage tracks within the central portion of the site. The western portion of the site is used to stage containers and trucks. Access to the site is from 15th Street. The proposed changes at this facility would expand capacity for staging and maintaining passenger trains. In order to perform these necessary services, physical changes to the WPB Rail Yard would include new facilities and buildings, four additional tracks, and moving the existing mid-yard tracks (Figure 3-2). Together, these proposed changes comprise the Proposed Action evaluated in this SEA.

The Proposed Action at the WPB Rail Yard would modify the existing WPB Rail Yard to accommodate storage and maintenance services for passenger trains by:

- Adding four tracks within the existing WPB Rail Yard for train refueling, storage, crew change-out, train cleaning, washing, and light repairs, which would include two storage tracks and two light repair tracks.
- Constructing facilities for electrical and mechanical rooms, parts storage, repair equipment, wastewater treatment, and waste storage.
- Providing men's and women's restrooms, showers, and locker room trailers.
- Installing a security fence to separate passenger operations from freight movements and operations.
- Expanding parking for approximately 30 worker/visitor vehicles as well as one to two commercial vehicles.
- Shifting two FECR intermodal tracks and one stub track to the northwest in order to accommodate the AAF storage and maintenance tracks.

All Project improvements, including the new buildings, will occur within the existing footprint of the WPB Rail Yard. Existing FECR yard buildings are aligned parallel to the FECR tracks. The AAF buildings and facilities, housed in the Shop Canopy, would be built between the first and second FECR building. The Shop Canopy would include electrical and mechanical rooms; a fire pump room; electronic parts, storage, and repair room; industrial waste treatment; storage; and sand, grease, motor oil, and other oil storage. The proposed VMF at the WPB Rail Yard would not include passenger loading or unloading, which would only occur at passenger rail stations.

AAF expects that the number of light poles illuminating the WPB Rail Yard would not change, but light poles may be relocated within the WPB Rail Yard. Utility poles may need to be relocated within the WPB Rail Yard and along the corridor between the WPB Rail Yard and the WPB Station.

3.3 Train Operations and Track Improvements

Under existing operations, four freight trains stop daily at this facility: two during the day (from 7:01 AM to 10:00 PM) and two at night (from 10:01 PM to 7:00 AM). Each train idles for approximately 45 minutes, which includes the time the train remains stationary, the staging and time required for building the freight.

With the Project, eight round-trip daily AAF train sets would require servicing at the VMF. Maintenance operations would occur between 10:00 PM and 5:00 AM, with the train sets entering the VMF between 8:00 PM and 10:00 PM. Outbound train sets would exit between 5:00 AM and 7:00 AM. The train sets would consist of two locomotives and eight cars and would operate at a maximum speed of 20 miles per hour (mph) along the majority of the track, but would slow to approximately 5 mph when approaching or leaving the WPB Rail Yard. During the day, crew changes would idle for a total of 10 minutes while at the WPB Rail Yard. Passenger trains are expected to idle for no more than 30 minutes for routine activities conducted at the VMF, which are conducted in both the daytime and nighttime.

The WPB Rail Yard, the location of the proposed VMF, is 0.9 miles north of the WPB Station. Approximately 16 passenger train trips would occur between the WPB Station and the WPB Rail Yard daily (eight trips northbound and eight trips southbound). Passenger trains will be moving at an average speed of 25 mph on this segment. In accordance with the commitments established under the prior FONSI, locomotive warning horns would be replaced with stationary wayside horns at the 15th Street intersection just south of the Yard where severe, unmitigated noise impacts would occur as a result of the Project.

The Project would enhance public safety with respect to local vehicular and pedestrian traffic. The Project would upgrade crossing signal equipment at the four at-grade crossings within the Project Study Area (15th Street, 3rd Street, Banyan Boulevard [1st Street], and Clematis Street). Upgraded crossing signal equipment includes devices such as flashing lights, signage, pavement markings, median barriers, and four-quadrant gates. The Project would also implement electronic warning systems, which would monitor and communicate train locations and speeds, and would stop trains if a crossing were not clear. Upgrades to road-crossings would be coordinated with and/or communicated to local emergency responders, as activations at the road crossings would be more frequent with the increased frequency of train traffic.

Explanation of Features

- Proposed AAF Tracks
- FECR Tracks
- FECR Stub Tracks to be removed
- Existing Yard Buildings
- Fiber Optic Regen Building
- Shop Canopy Outline
- Building Outline
- Proposed Safety Fence
- Existing Fiber Optic Duct Bank
- Existing FECR R/W
- Limits of Asphalt Pavement

WPB Rail Yard Layout

All Aboard Florida Intercity Passenger Rail Project

N

450 Feet

U.S. Department of Transportation
Federal Railroad Administration

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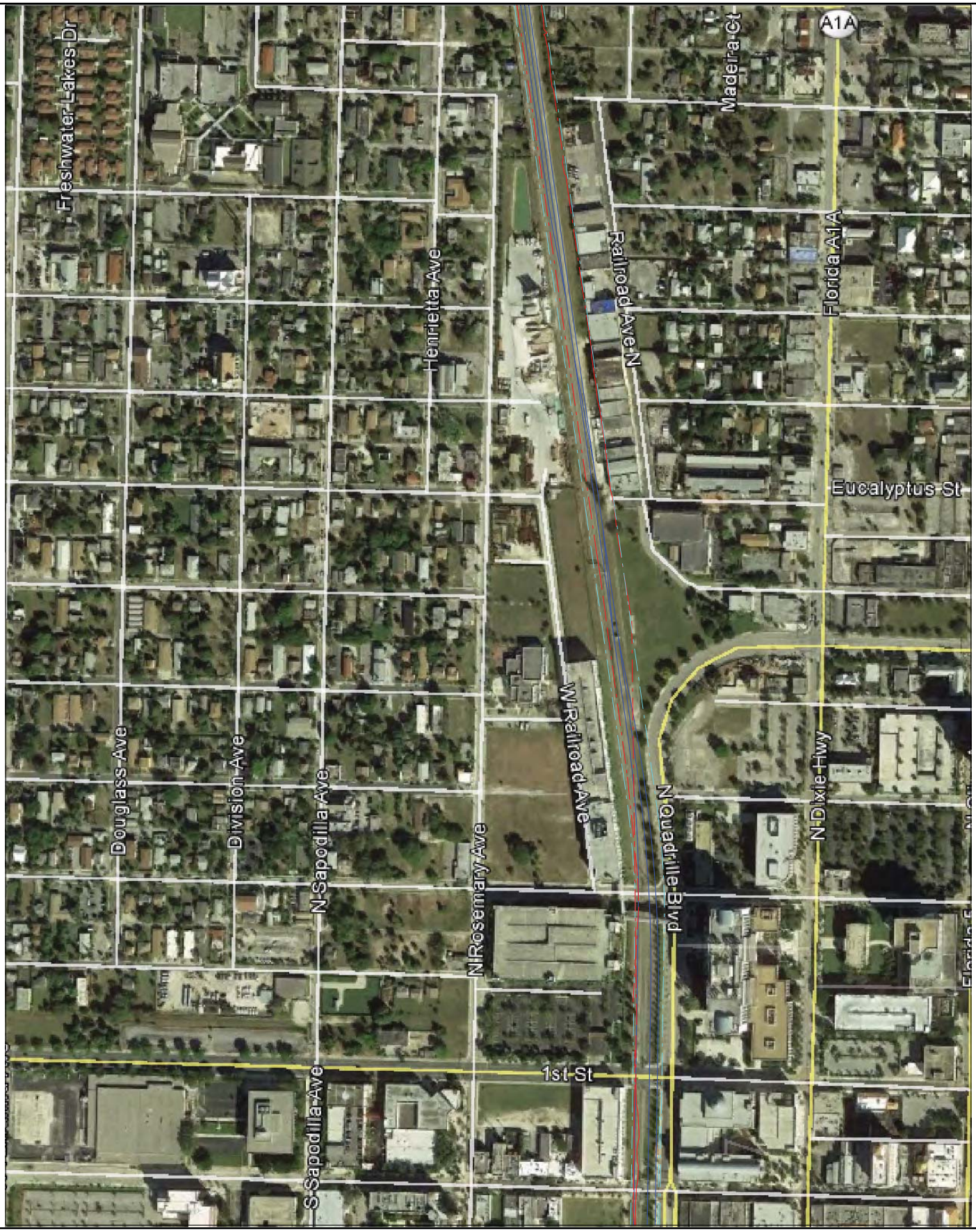
Project # 6063-12-0212



Explanation of Features

- Proposed AAF Tracks
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- Building Outline
- Proposed Safety Fence
- Existing Fiber Optic Duct Bank
- Existing FECR R/W
- Limits of Asphalt Pavement

WPB Rail Yard Layout (south)

All Aboard Florida Intercity Passenger Rail Project

N

450 Feet

U.S. Department of Transportation
Federal Railroad Administration

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4 Affected Environment, Environmental Consequences and Mitigation

4.1 Introduction

This chapter addresses the affected environment of the proposed VMF and layover facility associated with the AAF Project from Miami to West Palm Beach. It also assesses the likely environmental impacts associated with constructing and operating the VMF. The Council on Environmental Quality (CEQ) regulations define the level of impacts that federal agencies must address and consider in order to satisfy the requirements of the NEPA process.[7] The CEQ regulations categorize these impacts as direct, indirect, and cumulative, and define them as:

- *Direct Impacts* result from the proposed action and occur at the same time and place.
- *Indirect Impacts* result from the proposed action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect impacts may include growth-inducing impacts and other impacts related to induced changes in the pattern of land use, population density or growth rate, and related impacts on air, water, and other natural systems, including ecosystems.
- *Cumulative Impacts* result from the combined incremental impacts of the proposed action and takes into account the combination of all the impacts on a resource, ecosystem, or human community that are directly or indirectly induced by all actions over time.

This SEA only addresses resources that the VMF is reasonably likely to impact. The subject of this SEA includes constructing and operating a new VMF at the existing FECR WPB Rail Yard, improving track and signal equipment between the VMF and the West Palm Beach Station, and operating 16 round-trip passenger trains per day on this segment of track. Table 4-1 provides a list of resource categories that this SEA does not discuss in detail, along with the rationale for their exclusion based on the FRA's *Procedures for Considering Environmental Impacts* (FRA 1999). Table 4-2 provides the list of resource categories that this SEA does discuss in detail, along with the rationale for their inclusion.

7 40 CFR Parts 1508.7 and 1508.8

Table 4-1 Resource Categories Not Applicable

Category	Rationale
Water Quality	No water resources occur on or near the site
Ecological Systems	Site is entirely developed and lacks natural vegetation or communities
Wetlands	No wetlands occur on or near the site
Threatened and Endangered Species	Site is entirely developed and does not provide habitat for threatened or endangered species
Wildlife	Site is entirely developed and does not provide habitat for wildlife
Flood Hazards and Floodplains	Site is not within a floodplain
Coastal Zone Management	Site is not within the Coastal Zone
Aesthetic and Design Quality	VMF would not change the existing aesthetics of the FECR Yard as seen from public streets
Barriers to the Elderly and Handicapped	Site is not accessible to the public
Land Use	Use of the existing FECR Yard would not require a change in land use or ownership
Public Health	Site is not accessible to the public
Recreational Opportunities	No recreational resources occur on or near the site
Section 4(f) Properties	No Section 4(f) properties (parks, recreation areas, wildlife refuges) occur on or adjacent to the site.

Source: Federal Railroad Administration. *Procedures for Considering Environmental Impacts*. Federal Register 64:28545. May 26, 1999. https://www.fra.dot.gov/eLib/Details/L02710. Accessed August 15, 2014.

Table 4-2 Applicable Resource Categories

Category	Rationale
Air Quality	The Project would result in emissions from increased train traffic
Noise and Vibration	The Project would increase ambient noise and vibration levels within the Project Study Area
Historic Resources	Historic properties are present within the Project Study Area
Hazardous Materials and Solid Waste	Potentially contaminated sites are within and adjacent to the site
Transportation	The Project would increase average daily traffic volume and associated trains would pass through existing at-grade crossings
Social and Economic Environment	The Project would affect the local economy through jobs creation and municipal tax collections.
Environmental Justice	The Project Study Area contains minority and/or low-income populations
Safety	The Project could affect safety at grade crossings
Energy	The Project would require increased electricity consumption to service new buildings and power equipment

Source: Federal Railroad Administration. *Procedures for Considering Environmental Impacts*. Federal Register 64:28545. May 26, 1999. https://www.fra.dot.gov/eLib/Details/L02710. Accessed August 15, 2014.

4.2 Air Quality

This section provides the baseline air quality conditions within the Project Study Area as well as the potential impacts to air quality from the operation of the Project. The air quality provisions that are applicable to the Project include the 1990 Clean Air Act (CAA) Amendments,[8] and the CEQ Regulations.

The CAA, last amended in 1990, requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for six "criteria" pollutants considered harmful to public health and the environment (EPA 2012a).[9] The NAAQS identify two types of air quality standards: primary and secondary. Primary standards provide public health protection, including protecting the health of "sensitive" populations, such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The concentration of various pollutants in the atmosphere determines air quality in a given location. The EPA established the NAAQS for criteria pollutants that include ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter equal to or less than ten microns in diameter (PM_{10}) and 2.5 microns in diameter ($PM_{2.5}$), and lead (Pb). The NAAQS represent the maximum levels of background pollution considered safe, with an adequate margin of safety, to protect public health and welfare. Transportation sources, particularly motor vehicles, are the primary sources of CO, oxides of nitrogen, and hydrocarbons also known as volatile organic compounds (VOCs).

The CAA Amendments place most of the responsibility to achieve compliance with the NAAQS on individual states. Therefore, the EPA requires each state to prepare a State Implementation Plan (SIP). A SIP is a compilation of goals, strategies, schedules, and enforcement actions that would lead the state into compliance with all NAAQS. The EPA or the appropriate state or local agency can declare areas not in compliance with a standard as nonattainment. In order to reach attainment, NAAQS exceedances may not occur more than once per year. A nonattainment area can reach attainment when they meet the NAAQS for a period of ten consecutive years.

4.2.1 Affected Environment

The Project is located in an attainment area for all criteria pollutants, pursuant to the CAA Amendments (EPA 2012b).

4.2.2 Environmental Consequences

This evaluation includes the calculation of air pollutant emissions resulting from the operation of the Project to determine if the Project would result in either beneficial or adverse impacts to air quality as required by the CAA Amendments. The associated analysis included potential emissions (estimated) from passenger train engines operating on the main line and turning into the WPB Rail Yard, and the following assumptions:

- Maintenance trip distance – 0.9 mile;

8 42 U.S.C. § 7401, et. seq.
9 40 CFR Part 50

- Round trip distance for each passenger engine serviced – 1.8 miles;
- Engine speed over the transit distance – 15 mph (average);
- Emission factors – Tier 4 Line Haul locomotive;
- Engine horsepower – 4,000;
- Number of trains serviced per day – 5 train sets;
- Total estimated travel time for all trains/day – 1.6 hr./day; and
- Number of train sets to access or leave yard – 16.

Emissions from increased train traffic associated with the Project would result in less than 1 ton per year of any pollutant (Table 4-3) (AMEC 2014a). Therefore, the Project would not result in a significant increase in air pollution emissions nor would it significantly reduce the beneficial impacts of the overall Phase I project by reducing emissions from vehicle traffic from roadways as described in the Phase I EA.

Table 4-3 Calculated Projected Emissions Associated with the Project

Air Pollutant	Emissions (tons per year)
Carbon Oxide (CO)	0.923
Nitrogen Oxides (NO_x)	0.721
Particle Pollution ($PM_{2.5}$)	0.010
Particle Pollution (PM_{10})	0.011
Sulfur Dioxide (SO_2)	0.000
Volatile Organic Compounds (VOCs)	0.030
Carbon Dioxide (CO_2)	0.000
Methane (CH_4)	0.000
Nitrous Oxide (N_2O)	0.000

Source: AMEC. 2014a. Addendum to Environmental Assessment Reevaluation of Potential Environmental Impacts of the Proposed West Palm Beach Rail Yard for the All Aboard Florida Passenger Rail Project from West Palm Beach to Miami, Florida. July 2014.

In the 2012 EA, the original location for the VMF (Andrews Yard in Fort Lauderdale), would require approximately 30 miles of travel before AAF trains would go into revenue service. In comparison, the WPB Rail Yard would require only 0.9 miles of travel before AAF trains go into revenue service. Reduced travel time associated with the WPM Rail Yard would result in significantly lower pollutant emissions. Although the Project would result in increased pollutant emissions near the WPM Rail Yard, the Project would result in less pollutant emissions overall compared to the 2012 EA conditions.

As the Project is located in an attainment area for all criteria pollutants (EPA 2012b), pursuant to the CAA Amendments, a determination of conformity with the SIP or plan to maintain the NAAQS is not required. Pursuant to this exclusion, a development, or select analysis, of emissions inventories of criteria pollutants of the Project is not necessary for General Conformity determination purposes.

4.3 Noise and Vibration

This section presents background on fundamentals and metrics used to describe noise and vibration and characterizes existing and future noise and vibration conditions. Noise and vibration are assessed according to guidelines specified in FRA's *High-Speed Ground Transportation Noise and Vibration Impact Assessment* guidance manual, the Federal Transit Administration's (FTA) *Noise and Vibration Impact Assessment* guidance manual, and the Federal Highway Administration (FHWA) guidelines as defined for Florida application by FDOT for traffic operations (FRA 2012; FTA 2006; FDOT 2011).

Noise

Noise is defined as unwanted sound or, more specifically, a sound that is undesirable because it interferes with communication or is annoying (EPA 1976). Human response to noise can vary according to the type and characteristics of the noise source, the distance between the noise source and the receptor, the sensitivity of the receptor, and the time of day.

Due to the wide range of sound levels that commonly exist in the environment, sound is expressed in decibels (dB), a unit of measure based on a logarithmic scale. A 10-dB increase in noise level corresponds to a doubling in perceived loudness. Sound levels are typically measured and reported according to the A-weighted decibel (dBA), which relates to the human response to sound at different frequencies. The frequency of sound is measured in Hertz (Hz). Humans can normally detect sounds ranging from about 20 to 15,000 Hz. "A-weighting" adjusts the sound level at different frequencies to approximate the human ear's sensitivity because sounds are not heard equally well. Humans are most sensitive to frequencies in the 1,000 to 4,000 Hz range. A-weighted sound levels are commonly used in measurement of community environmental noise. Unless otherwise noted, all decibel measurements presented in this noise analysis are dBA. Figure 4-1 provides an example of the types of activities that result in varying degrees of sound levels in dBA.

Environmental noise fluctuates over time, so noise levels over a stated period of time (1 hour) are commonly represented by the "equivalent sound level," Leq. The "day-night average" sound level (Ldn) is a noise metric that represents the equivalent sound energy over a 24-hour period, with a 10-dB penalty added to noise events occurring between 10:00 PM and 7:00 AM. This penalty is intended to compensate for generally lower background noise levels at night and the additional annoyance of nighttime noise events. Ldn takes into account how loud noise events are, how long they last, how often they occur, and whether they occur during the day or night.

FRA and FTA guidelines separate noise-sensitive land uses into categories based on sensitivity (FTA 2006). Buildings where nighttime sensitivity to noise is important are defined as Category 2, and include homes, hospitals, and hotels. The noise metric used for Category 2 land uses is Ldn, which describes the average 24-hour noise environment with emphasis given to noise generated during nighttime hours (10:00 PM to 7:00 AM). Category 3 land uses include institutional facilities that are used primarily during daytime and evening hours, such as schools, libraries, theaters, places of worship, and certain historical sites and parks. The noise metric used for Category 3 land uses is the loudest-hour Leq which occurs during the times that the location is being used (such as the hours during church services).

The noise analysis was performed for Category 2 and Category 3 noise-sensitive land uses within the vicinity of the Project Area (no Category 1 land uses[10] were identified).

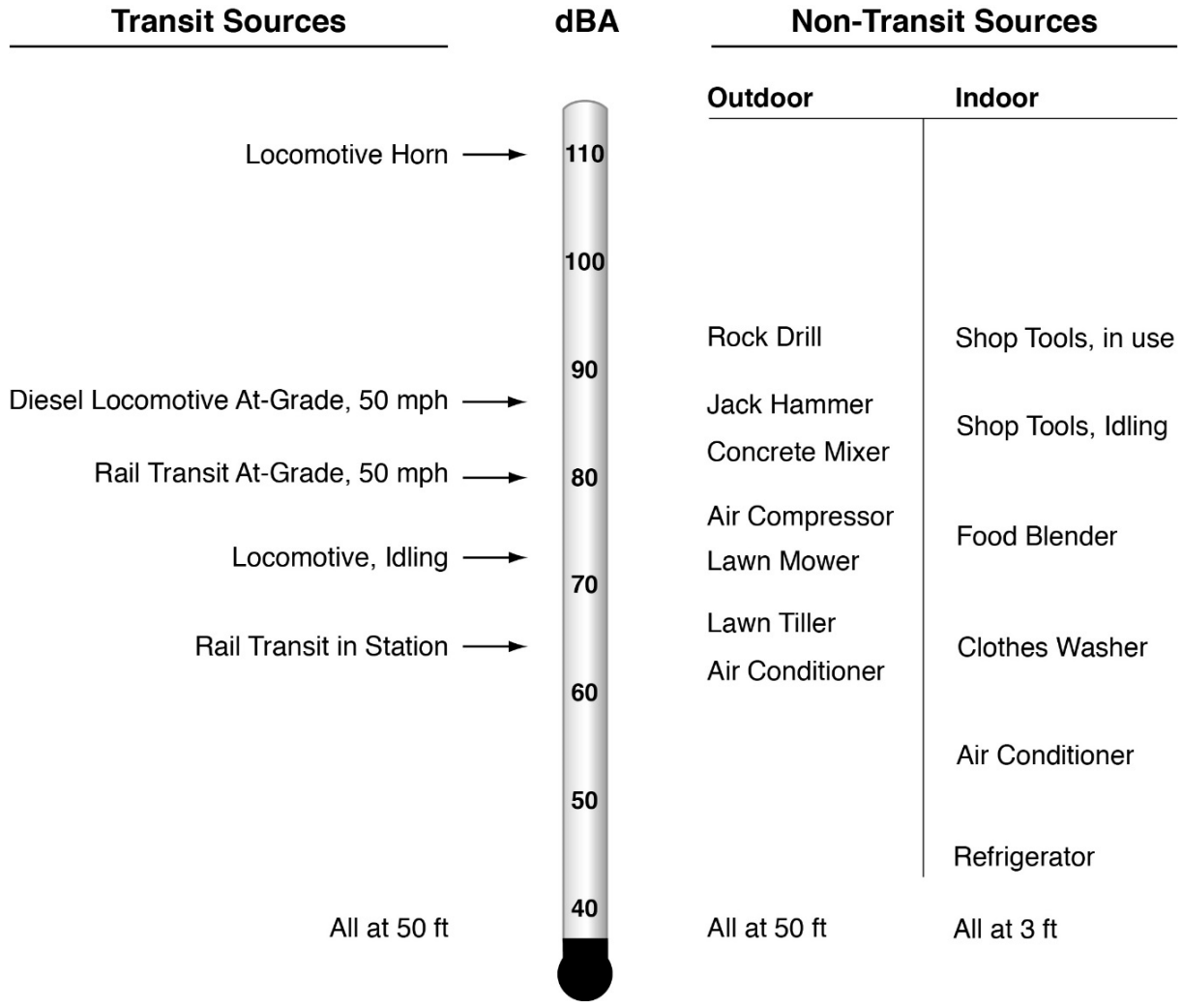


Figure 4-1 Sound Levels of Typical Noise Sources and Noise Environments

Source: Federal Transit Administration. 2006. Transit Noise and Vibration Impact Assessment. USDOT Report Number FTA-VA-90-1003-06, May 2006.

Vibration

Vibration is the oscillating motion of a structure or material that can result in the perceptible movement of building floors, rattling of windows, shaking of items on shelves, and rumbling sounds. Vibration may be described in terms of the acceleration, velocity, or displacement that occurs during the oscillatory

10 Category 1 land uses include areas where quiet is an essential element in their intended purpose, such as land set aside for serenity and quiet, outdoor amphitheaters, concert pavilions, recording studios, concert halls, and National Historic Landmarks with significant outdoor use.

motion (FTA 2006). For describing the human response to vibration, the vibration velocity expressed in decibels (VdB) with a reference value of one micro-inch per second is used. The vibration levels that commonly exist in the environment range from approximately 40 to 100 VdB. At low amplitude, vibration may interfere with sensitive equipment. At higher amplitude, vibration may be perceptible to humans and cause annoyance. At very high amplitude, vibration can cause damage to susceptible buildings. Figure 4 -2 depicts typical levels of ground-borne vibration.

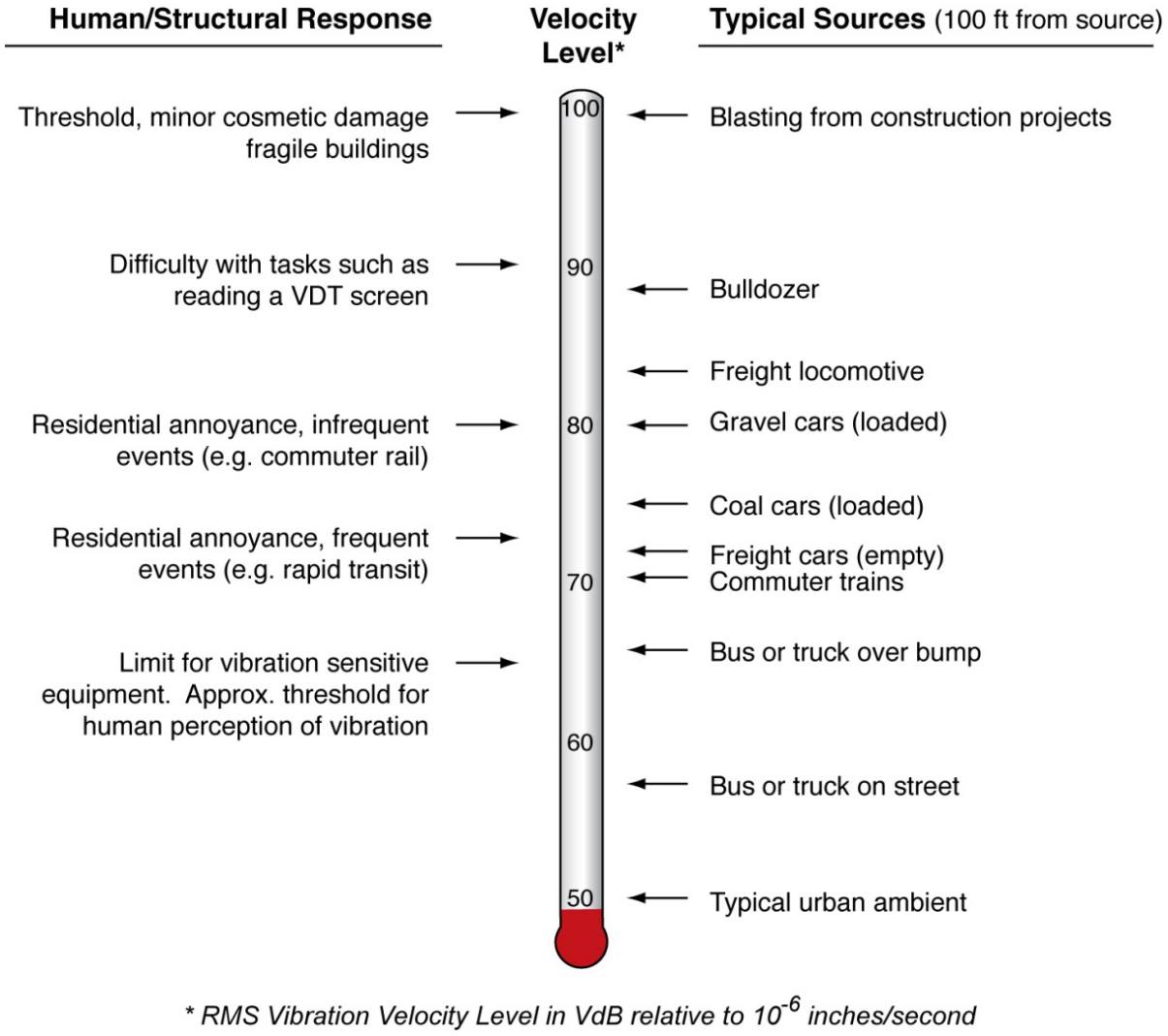


Figure 4-2 Typical Levels of Ground-Borne Vibration

Source: Federal Transit Administration. 2006. Transit Noise and Vibration Impact Assessment. USDOT Report Number FTA-VA-90-1003-06, May 2006.

Vibration that propagates into buildings can cause the floors, walls, and ceilings of a room to radiate sound called ground-borne noise (GBN). GBN normally is characterized as a low-frequency 'rumbling' sound. GBN is often not a concern for at-grade transit sources and buildings with windows and doors exposed to the transit sources because the contribution of noise from airborne paths can be more significant than the contribution of GBN.

Figure 4-3 depicts the basic concept of ground-borne vibration and GBN for a rail system. When train wheels roll on rails, the forces between the wheels and the rails generate vibration that is transmitted through the rails, rail bed, and soils into building structures. How efficiently vibration propagates into adjacent buildings is dependent upon the operating conditions and type of train, the track design, the geologic characteristics of the surrounding soil, and the construction of the building.

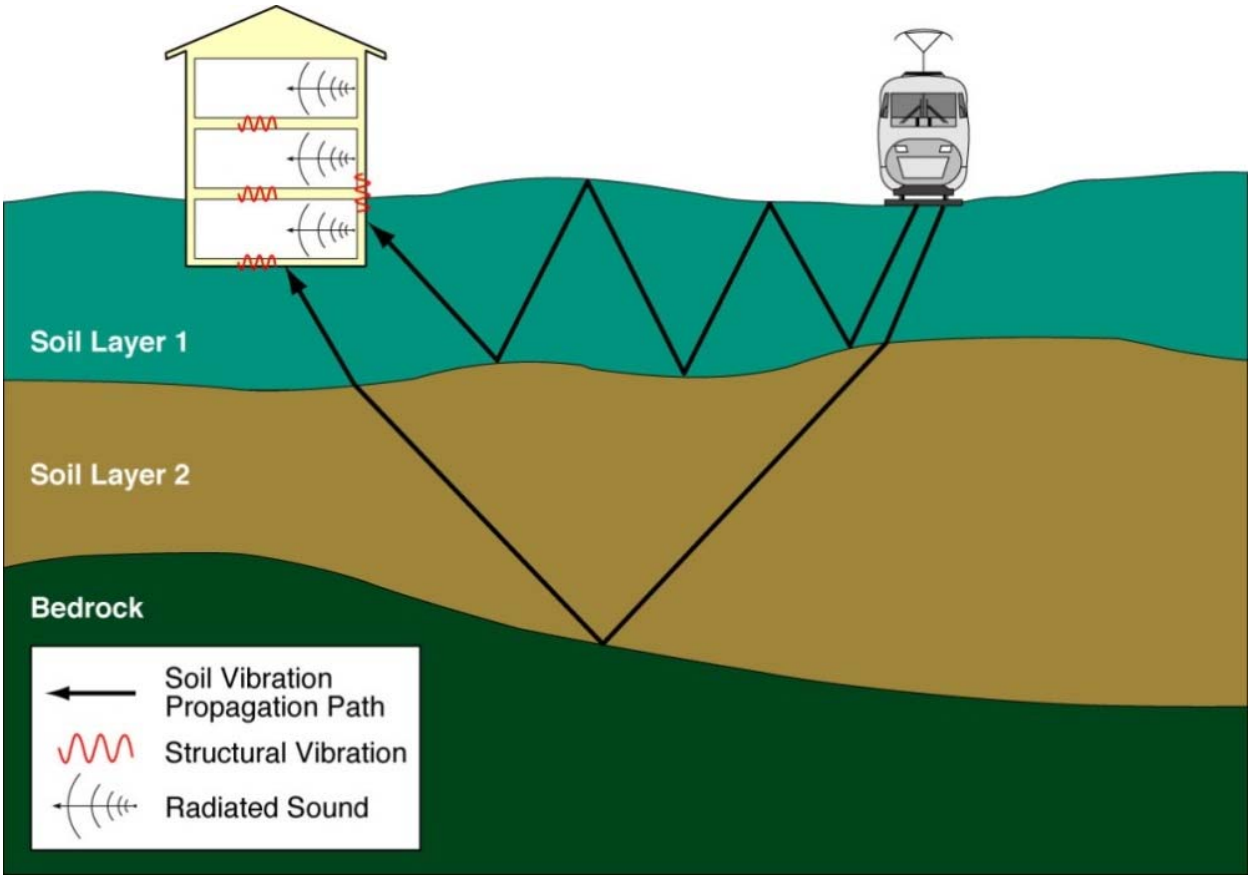


Figure 4-3 Propagation of Ground-Borne Vibration and Ground-Borne Noise into Buildings

Source: Federal Transit Administration. 2006. *Transit Noise and Vibration Impact Assessment*. USDOT Report Number FTA-VA-90-1003-06, May 2006.

Methodology

The Project Area assessed in this report includes the WPB Rail Yard and the mainline corridor between the WPB Rail Yard and the proposed WPB Passenger Station to the south. Noise modeling was completed in order to understand the existing and future conditions. The modeling analysis, provided in its entirety in Appendix B, provides:

- A comparison of modeled and observed noise levels at four monitoring locations around the WPB Rail Yard to validate the modeling approach;
- An updated noise impact analysis of 21 noise-sensitive receptors located adjacent to the Project Area;
- Observed vibration levels at two locations around the WPB Rail Yard to establish site-specific vibration sources and propagation conditions; and
- An updated vibration impact analysis.

Noise and vibration monitoring was conducted at four locations in order to verify the existing conditions that were modeled. Three of the monitoring locations were on the west side of the WPB Rail Yard (North End, Middle, and South end) and better represent the WPB Rail Yard activities. A fourth monitoring location to the East better captured the mainline train traffic (see Figure 4-4).

The results of the noise monitoring correlated with the noise model. Minor differences between observed and modeled noise levels at each monitoring location were due to the average WPB Rail Yard conditions obtained during the limited monitoring period (24 hours).

The results of the vibration monitoring identified existing vibration levels associated with current freight use along the mainline currently exceed FTA impact criteria in several locations. The existing condition vibration levels were calculated based on the use of the revised model. The future conditions were modeled based on the FTA model.

4.3.1 Affected Environment

4.3.1.1 Noise

Existing noise conditions are from current FECR freight operations occurring at the WPB Rail Yard. Approximately 14 freight trains per day operate on the main line. Freight trains are on average 8,150 feet in length, and consist of two locomotives (89 feet each) and 101 rail cars (79 feet each). Approximately half of the freight operations occur at night (10:00 PM to 7:00 AM) and half during the day (7:00 AM to 10:00 PM) (FRA n.d.). The average train speed along the portion of main line adjacent to the WPB Rail Yard is 42 mph. Noise sources included train activity on the intermodal track, auxiliary equipment at the WPB Rail Yard, and vehicular traffic on Division Avenue and 15th Avenue East.

A noise impact analysis was completed for Category 2 and Category 3 noise-sensitive land uses within the vicinity of the Project (no Category 1 land uses were identified). The impact analysis for Category 2 land uses was performed by identifying clusters and selecting a representative parcel, or receptor, in each of the 17 clusters identified, and modeling existing Ldn noise impacts. Four churches were identified as Category 3 land uses and existing Leq(h) noise levels were modeled at each church. Land use clusters are shown in Figure 4-4; which also includes the location of the noise monitors that validated the noise modeling.

Explanation of Features

- Corridor Centerline
- Noise Monitoring Location
- Vibration Monitoring Location
- Church
- Category 2 Representative Receptor
- Category 3 Receptors – Churches
- Category 2 Parcel
- Existing Yard Building
- Existing FECR R/W
- Category 2 Receptors – Clusters

Data Sources: ESRI 2012, FRA 2012, FGDL 2012, AMEC 2014.

Monitoring and Cluster Locations

All Aboard Florida Intercity Passenger Rail Project

N

0 450 Feet

U.S. Department of Transportation
Federal Railroad Administration

4-4

Path: P:\EAT\2012\PROJECTS\All Aboard Florida\NEPA EIS\ORL to MIA EIS\Technical Memo 5-Noise and Vibration\GIS\Westford\Task1\Task1\MXD\WPB Yard - Monitoring and Cluster Locations.mxd

Project # 6063-12-0212

The noise sources modeled and the resulting noise impacts at each land use cluster location are provided in Table 4-4. This table shows that existing noise conditions among the residential cluster land uses range from 62 to 78 Ldn.

Table 4-4 Existing Condition Noise Impacts (Ldn) by Cluster Location

	Cluster																
Existing Source	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
Fixed-Guideway Sources (Mainline)																	
Mainline Away from Yard	-	-	-	-	62.0	64.2	65.0	67.0	71.5	71.5	61.7	-	-	-	-	-	-
Mainline Away from Yard – WH1	-	-	-	-	-	-	-	-	77.3	77.3	67.5	-	-	-	-	-	-
Mainline Near Yard	70.0	71.0	62.6	60.6	-	-	-	-	-	-	-	63.5	60.8	54.7	54.9	59.2	62.1
Mainline Near Yard - WH	75.8	76.8	68.4	66.4	-	-	-	-	-	-	-	69.3	66.6	60.5	60.7	65.0	67.9
North Siding	57.6	58.2	-	-	-	-	-	-	-	-	-	-	-	-	46.1	50.8	54.3
North Siding - WH	65.6	66.2	-	-	-	-	-	-	-	-	-	-	-	-	54.1	58.8	62.3
South Siding	-	-	52.9	51.0	-	-	-	-	-	-	-	55.9	47.4	45.9	-	-	-
South Siding - WH	-	-	60.9	59.0	-	-	-	-	-	-	-	63.9	55.4	53.9	-	-	-
Intermodal Track	51.3	49.2	52.3	-	-	-	-	-	-	-	-	55.9	47.9	49.7	50.3	55.9	58.5
Highway/Transit Sources																	
Automobile	-	-	-	-	-	-	-	-	-	-	-	-	-	59.7	59.7	-	-
Stationary Sources (Yard)																	
Idling - Siding	58.0	58.9	47.5	43.1	-	-	-	-	-	-	-	42.0	44.4	38.5	38.8	46.7	52.5
Idling - Intermodal Track	47.5	43.9	47.5	42.0	-	-	-	-	-	-	-	45.1	47.5	44.8	45.9	55.1	59.5
Auxiliary Equipment - General	47.1	48.7	40.7	37.4	-	-	-	-	-	-	-	42.5	45.2	47.8	49.3	55.3	46.2
Auxiliary Equipment - North Side	62.5	-	-		-	-	-	-	-	-	-	-	-	-	-	58.0	59.1
Total	77	78	70	68	62	64	65	67	78	78	69	72	68	65	65	68	71

Source: AMEC. 2014. All Aboard Florida Proposed West Palm Beach Rail Yard Response to Questions. September 2014.
1 WH indicates contribution from warning horn

4.3.1.2 Vibration

Based on the monitoring results provided in Appendix B, the vibration impact analysis was updated by making appropriate adjustments to the measured vibration levels. A vibration curve was established for the vibration levels observed at location VM2 (see Figure 4-4). Figure 4-5 shows the curve that was established, as well as the second degree polynomial equation that was fitted to the curve in order to calculate vibration levels at intermediate distances. For distances greater than 160 ft, it was assumed that baseline vibration level was 74 VdB.

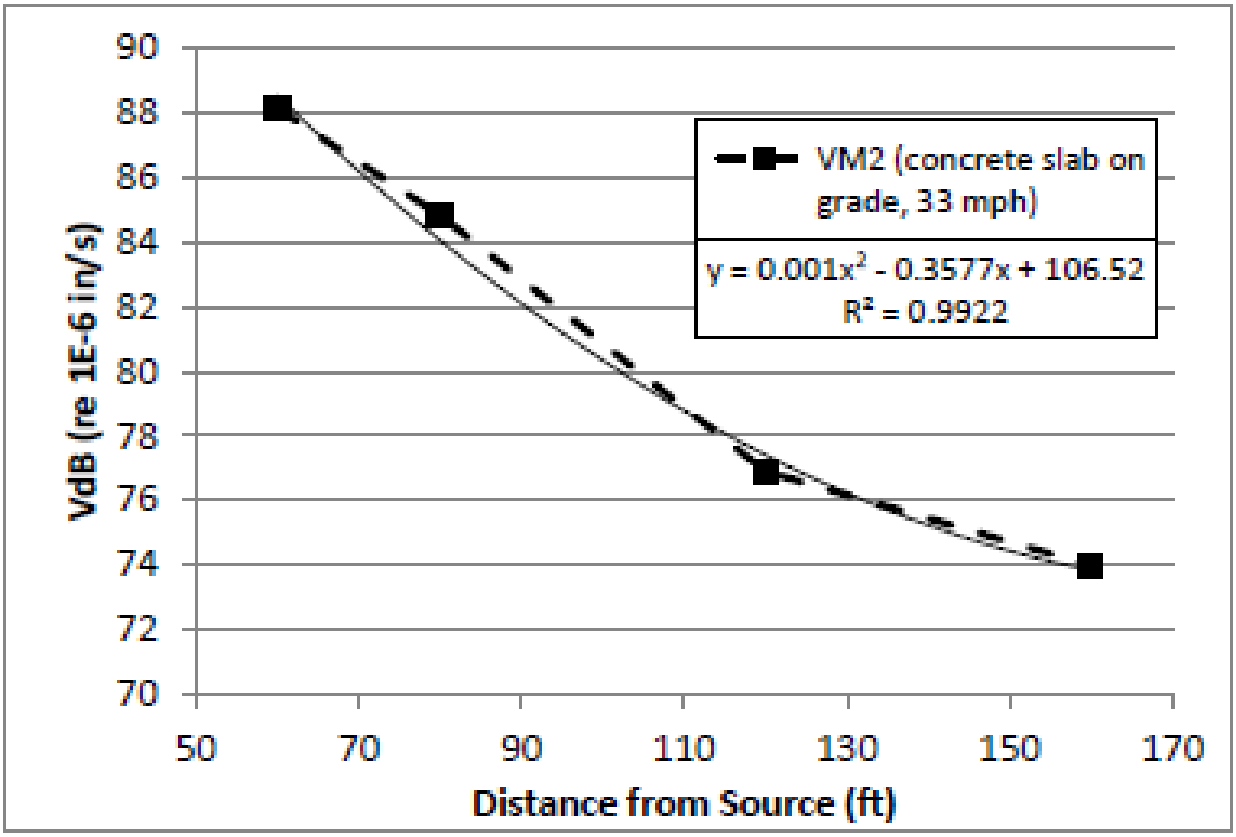


Figure 4-5 Vibration Curve

Source: AMEC, *All Aboard Florida Proposed West Palm Beach Rail Yard Noise and Vibration Supplemental Assessment Report*, September 2014.

Using the vibration curve above, the residential and recreational land use clusters identified for noise were used to determine vibration levels at vibration-sensitive receptors. For each land use cluster, the most significant vibration source was considered.

Currently 14 freight train events (10 mainline and 4 WPB Rail Yard inbound/outbound) regularly occur near the Project. Therefore, current conditions were assessed using Infrequent Events criteria to determine the impact at each land use cluster or receptor.

Using the vibration curve given in Figure 4-5, additional adjustments were made to account for differences in operating speed. The impact analysis results for the current operations are provided in Table 4-5, along with applicable impact criteria. Vibration levels that exceed the Infrequent Events criteria are shown in bold and italics.[11]

11 "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. USDOT Report Number FTA-VA-90-1003-06, section 8.1.1, *Transit Noise and Vibration Impact Assessment*, May 2006.

Table 4-5 Existing Vibration Levels

Cluster/ Church	Existing Vibration Impact Assessment						
	Source	Speed (mph)	Distance (ft)[1]	Infrequent Criteria	Occasional Criteria	Frequent Criteria	Vibration Level
				VdB (re 1E-6 in/s)			
1	Mainline	42	70	80	75	72	*88*
2	Mainline	42	60	80	75	72	*91*
3	Mainline	42	220	80	75	72	77
4	Mainline	42	295	80	75	72	77
5	Mainline	42	300	80	75	72	77
6	Mainline	42	215	80	75	72	77
7	Mainline	42	190	80	75	72	77
8	Mainline	42	70	80	75	72	*88*
9	Mainline	42	70	80	75	72	*88*
10	Mainline	42	70	80	75	72	*88*
11	Mainline	42	315	80	75	72	77
12	Mainline	42	190	80	75	72	77
13	Mainline	42	290	80	75	72	77
14	Intermodal	5	385	80	75	72	58
15	Intermodal	5	350	80	75	72	58
16	Intermodal	5	150	80	75	72	59
17	Intermodal	5	100	80	75	72	64
Church 1	Mainline	42	165	83	78	75	77
Church 2	Mainline	42	200	83	78	75	77
Church 3	Mainline	42	215	83	78	75	77
Church 4	Mainline	42	300	83	78	75	77

Source: AMEC. 2014. *All Aboard Florida Proposed West Palm Beach Rail Yard Noise and Vibration Supplemental Assessment Report*. September 2014.

1 For distances outside the range of the baseline curve (> 160 ft) a value of 74 VdB was assumed

4.3.2 Environmental Consequences

4.3.2.1 Noise

The Proposed Action would be implemented within a developed urban region with inherently high ambient noise levels, due to the existing rail yard operations and the proximity to the FECR Corridor. As a result of the Project, passenger rail operations would be added to the existing FRA freight operations, resulting in increased noise levels at the WPB Rail Yard and along the 0.9 miles of track between the WPB train station and the VMF. It was conservatively assumed that future condition modeling should include the following operations as a result of the Project:

- Mainline Away from Yard: 12 trains/day, 4 trains/night, throttle < 6, speed 20 mph, 2 locos, 8 cars

- Mainline Away from Yard with Warning Horn: 12 trains/day, 4 trains/night, throttle < 6, speed 20 mph, 2 locos, 8 cars, warning horn
- Yard Inbound/Outbound – South: 12 trains/day, 4 trains/night, throttle < 6, speed 5 mph, 2 locos, 8 cars, warning horn
- Idling: 8 trains/day, 4 trains/night, 30 minutes of idling per train

For clusters 16 and 17, the additional noise created by the proposed intermodal track alignment was also taken into account in the modeling. However, based on the absence of wheel squeal from freight operations along the curves of existing intermodal tracks during the monitoring effort, and that the proposed intermodal tracks have curve radii (approximately 400-feet) equal to or greater than curve radii of the existing intermodal tracks (approximately 400-feet), wheel squeal associated with existing or proposed operations along intermodal tracks was not included in the modeling.

Future condition noise levels were modeled using the same approach as existing, with updated inputs to include the additional operations that would occur as a result of the Project. Table 4-6 details the individual noise sources anticipated from the Project. The noise analysis assumed that train-mounted horns would be used on the approach to grade crossings in order to determine where pole-mounted horns would be installed, consistent with AAF's commitment to use pole-mounted horns at all locations where severe noise impacts would occur.

The noise assessment reported that FTA impact criteria was exceeded at several locations, mainly associated with FRA-mandated train horn activation at nearby intersections on the mainline track. The anticipated operational noise impacts would result from ongoing FECR freight operations, project-related noise, and existing background noise. Increases in noise levels would primarily result from using warning horns at grade crossings. Accordingly, stationary wayside horns would replace locomotive warning horns at the 15th Street intersection just south of the WPB Rail Yard in order to eliminate the severe noise impacts identified at Clusters 9, 10, and 12. Results from the impact analysis using train-mounted horns are provided in Table 4-7; results using pole-mounted horns are provided in Table 4-8. Using stationary wayside warning horns (rather than the warning horns on the locomotives) would reduce the impacts to a Moderate Impact to eight Category 2 parcels.

Table 4-6 Noise Modeling Inputs from Proposed Passenger Operations

Source	Description
Fixed-Guideway Sources	
Mainline Away From Yard	12 trains/day, 4 trains/night, throttle < 6, speed 20 mph, 2 locos, 8 cars
Mainline Away From Yard - WH	12 trains/day, 4 trains/night, throttle < 6, speed 20 mph, 2 locos, 8 cars, warning horn
Yard I/O - South	12 trains/day, 4 trains/night, throttle < 6, speed 5 mph, 2 locos, 8 cars, warning horn
Stationary Sources	
Idling	8 trains/day, 4 trains/night, 30 minutes of idling per train

Source: AMEC. 2014. *All Aboard Florida Proposed West Palm Beach Rail Yard Noise and Vibration Supplemental Assessment Report.* September 2014.

Table 4-7 Results of Noise Impact Analysis – Train Mounted Warning Horns

Cluster/ Receptor	Existing Noise Level	Project Noise Level	Impact Criteria		Impact Category	Total Noise Level	Noise Level Increase	# of Impacts	
			Moderate	Severe				Moderate	Severe
Category 2 Land Uses – Noise Exposure in Ldn									
Cluster 1	77	68	65	75	Moderate	78	1	2	0
Cluster 2	78	69	65	75	Moderate	79	1	4	0
Cluster 3	70	68	64	70	Moderate	72	2	4	0
Cluster 4	68	67	63	68	Moderate	71	3	2	0
Cluster 5	62	55	59	64	No Impact	63	1	0	0
Cluster 6	64	57	60	66	No Impact	65	1	0	0
Cluster 7	65	58	61	66	No Impact	66	1	0	0
Cluster 8	67	60	62	67	No Impact	68	1	0	0
Cluster 9	78	76	65	75	Severe	80	2	0	2
Cluster 10	78	76	65	75	Severe	80	2	0	3
Cluster 11	68	66	63	68	Moderate	70	2	2	0
Cluster 12	71	73	65	71	Severe	75	4	0	3
Cluster 13	68	64	63	68	Moderate	69	1	3	0
Cluster 14	64	64	60	66	Moderate	67	3	6	0
Cluster 15	65	64	61	66	Moderate	68	3	6	0
Cluster 16[1]	68	58	--	--	Moderate	71	3	3	0
Cluster 17[1]	71	54	--	--	Moderate	72	1	2	0
Totals								34	8
Category 3 Land Uses – Noise Exposure in Leq(day)									
Church 1	65	58	66	71	No Impact	66	1	0	0
Church 2	58	57	62	67	No Impact	60	2	0	0
Church 3	63	64	64	70	No Impact	67	4	0	0
Church 4	55	59	60	66	No Impact	61	6	0	0

Source: AMEC. 2014. *All Aboard Florida Proposed West Palm Beach Rail Yard Noise and Vibration Supplemental Assessment Report.* September 2014.

1 Impact determination made based on comparison of cumulative noise exposure increase to existing noise, Figure 3-2 of FTA Manual. Cumulative noise exposure ("Total Noise Level") calculated as the sum of Project Noise Level and a revised Existing Noise Level that takes into account the realignment of the Intermodal Track. Revised Existing Noise Level not shown in Table.

Table 4-8 Results of Noise Impact Analysis – Pole-Mounted Warning Horns

Cluster/ Receptor	Existing Noise Level	Project Noise Level	Impact Criteria		Impact Category	Total Noise Level	Noise Level Increase	# of Impacts	
			Moderate	Severe				Moderate	Severe
Category 2 Land Uses – Noise Exposure in Ldn									
Cluster 1	77	63	65	75	No Impact	78	1	0	0
Cluster 2	78	63	65	75	No Impact	78	0	0	0
Cluster 3	70	62	64	70	No Impact	71	1	0	0
Cluster 4	68	61	63	68	No Impact	69	1	0	0
Cluster 5	62	55	59	64	No Impact	63	1	0	0
Cluster 6	64	57	60	66	No Impact	65	1	0	0
Cluster 7	65	58	61	66	No Impact	66	1	0	0
Cluster 8	67	60	62	67	No Impact	68	1	0	0
Cluster 9	78	65	65	75	No Impact	78	0	0	0
Cluster 10	78	65	65	75	No Impact	78	0	0	0
Cluster 11	68	55	63	68	No Impact	69	1	0	0
Cluster 12	71	67	65	71	Moderate	73	2	3	0
Cluster 13	68	58	63	68	No Impact	68	0	0	0
Cluster 14	64	58	60	66	No Impact	65	1	0	0
Cluster 15	65	59	61	66	No Impact	66	1	0	0
Cluster 16[1]	68	58	--	--	Moderate	71	3	3	0
Cluster 17[1]	71	54	--	--	Moderate	72	1	2	0
Totals								8	0
Category 3 Land Uses – Noise Exposure in Leq(day)									
Church 1	65	52	66	71	No Impact	65	0	0	0
Church 2	58	51	62	67	No Impact	59	1	0	0
Church 3	63	53	64	70	No Impact	63	0	0	0
Church 4	55	53	60	66	No Impact	57	2	0	0

Source: AMEC. 2014. All Aboard Florida Proposed West Palm Beach Rail Yard Noise and Vibration Supplemental Assessment Report. September 2014.

1 Impact determination made based on comparison of cumulative noise exposure increase to existing noise, Figure 3-2 of FTA Manual. Cumulative noise exposure ("Total Noise Level") calculated as the sum of Project Noise Level and a revised Existing Noise Level that takes into account the realignment of the Intermodal Track. Revised Existing Noise Level not shown in Table.

4.3.2.2 Vibration

Vibration impact assessments were performed for the section of track between the WPB Rail Yard and WPB Station where operating speeds will average approximately 15 mph, with a maximum of 20 mph. Any slower, and vibration impacts from passenger trains would be negligible. For future operations impact analysis, the FTA model for ground-borne vibrations was used.

The future condition vibration impacts, which include the passenger rail operations, are presented in Table 4-9 for each land use cluster and receptor. Based on these results, no parcels experience additional vibration events that exceed the Occasional Events criteria.[12]

Table 4-9 Future Condition Vibration Levels

Cluster/ Church	Project Vibration Impact Assessment						
	Source[2]	Speed (mph)	Distance (ft)[1]	Infrequent Criteria	Occasional Criteria	Frequent Criteria	Vibration Level
				VdB (re 1E-6 in/s)			
1	Mainline	5	70	80	75	72	63
2	Mainline	5	60	80	75	72	64
3	Mainline	5	220	80	75	72	50
4	Mainline	20	295	80	75	72	63
5	Mainline	20	300	80	75	72	63
6	Mainline	20	215	80	75	72	62
7	Mainline	20	190	80	75	72	63
8	Mainline	20	70	80	75	72	75
9	Mainline	20	70	80	75	72	75
10	Mainline	20	70	80	75	72	75
11	Mainline	20	315	80	75	72	64
12	Mainline	20	190	80	75	72	63
13	Mainline	20	290	80	75	72	63
14	Yard	5	385	80	75	72	58
15	Yard	5	350	80	75	72	54
16	Intermodal	5	55	80	75	72	73
17	Intermodal	5	55	80	75	72	73
Church 1	Mainline	20	165	83	78	75	65
Church 2	Mainline	20	200	83	78	75	63
Church 3	Mainline	20	215	83	78	75	62
Church 4	Mainline	20	300	83	78	75	63

Source: AMEC. 2014. All Aboard Florida Proposed West Palm Beach Rail Yard Noise and Vibration Supplemental Assessment Report. September 2014.

1 For distances outside the range of the baseline curve (> 160 ft) a baseline value of 74 VdB was assumed.

2 For Clusters 16 and 17, the source is assumed to be the revised intermodal track servicing freight traffic, 4-trains per day, thus "Infrequent Criteria" is appropriate. A +8 VdB adjustment was made due to primary stiff suspension usually considered for freight trains.

12 "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. USDOT Report Number FTA-VA-90-1003-06, section 8.1.1, *Transit Noise and Vibration Impact Assessment*, May 2006.

4.4 Cultural Resources

Cultural resources, as defined by the National Historic Preservation Act of 1966 (NHPA),[13] as amended, are any "districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering and culture" (NPS 1981). Cultural resources are both above and below ground. Archaeological sites or resources represent the locations of prehistoric or historic activities. The term "historic structures" includes houses, buildings, bridges, and constructed features that, with few exceptions, are at least 50 years old. Historic landscapes consist of culturally modified lands. Linear historic resources can include canals, roads, railroads, or other manmade linear features. Historic districts consist of historic structures and other elements that retain identity and integrity as a whole. Sacred sites, cemeteries, and burial places also qualify as cultural resources, although they are generally not eligible for listing in the National Register of Historic Places (NRHP).

Section 106 of the NHPA requires all federal agencies to take into account, prior to authorizing an undertaking, the effect of that undertaking on cultural resources listed in or eligible for listing in the NRHP. NHPA establishes specific criteria for eligibility to the NRHP:

(1) Association with events which significantly contribute to our history;

(2) Associated with persons significant in our history;

(3) Embodying distinctive architectural styles or methods, high artistic values, or representing a significant entity whose components may lack individual distinction; or

(4) Have the potential to yield information important to prehistory or history. A key factor in determining eligibility is an evaluation of the integrity of location, design, setting, materials, workmanship, feeling, and association of the resources under consideration (NPS 2002).

AAF, as a non-federal party, is assisting FRA in meeting its obligations under Section 106, and has conducted studies to determine if any cultural resources exist within the Project's Area of Potential Effect (APE) that are listed or eligible for listing in the NRHP.

4.4.1 Affected Environment

AAF previously surveyed portions of the WPB Rail Yard and the FECR Corridor between the WPB Rail Yard and WPB Station as part of the Cultural Resource Assessment Report (CRAR) for the Orlando to WPB Segment (Janus Research Inc. 2013). Accordingly, this survey is not comprehensive for areas located outside of the FECR Corridor right-of-way. The AAF CRAR survey did not identify any significant resources, other than the FECR Corridor itself, within or adjacent to the portion of the boundary surveyed. The FECR Corridor is a historic linear resource adjacent to the east edge of the WPB Rail Yard, and is eligible for listing in the NRHP (Janus Research Inc. 2013).

AAF reviewed the Florida Master Site File (FMSF), county and local site inventories, published and unpublished CRM reports, county Property Appraiser's records, and other relevant historical research materials to identify known historic resources within the areas of the APE for the Project not included in the AAF CRAR. AAF developed the methodology for this cultural resource assessment in consultation with

13 16 U.S.C. § 470(f)

the Florida Division of Historic Resources (FDHR), which is the State Historic Preservation Office (SHPO) of Florida. All cultural resource investigations and consultations in accordance with:

- Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations for *Protection of Historic Properties*;[14]
- Field methods, data analysis, and reporting standards embodied in FDHR *Cultural Resource Management (CRM) Standards and Operational Manual* (February 2003);
- Chapter 1A-46 (Archaeological and Historical Report Standards and Guidelines), Florida Administrative Code; and
- Professional guidelines set forth in the Secretary of Interior's Standards and Guidelines for Archaeology and Historic Preservation at 48 Florida Regulations 44716, as amended and annotated.

No previously recorded archaeological sites, historic cemeteries, or historic bridges are located within or adjacent to the APE. The Project is not within or adjacent to any Archaeological Predictive Zones for Palm Beach County as described in *Prehistoric Resources in Palm Beach County: A Preliminary Predictive Study* (Kennedy et al. 1991). Table 4-10 provides a list of historic resources, not previously analyzed as part of the AAF CRAR, that are within the APE.

Table 4-10 Historic Resources within the Project Area and Adjacent Parcels

Site Name	Florida Master Site File	Site Location	Survey Number	National Register Status
Dunbar Village Public Housing	8PB1328	Historic district adjacent to the west edge of the boundary	19933	Eligible for the National Register individually or as a contributing resource[1]
40 Different[2] Structures	8PB1328	Previously recorded structures adjacent to but outside of the station boundary	NA	Some structures are part of National Register–listing. However, site file forms shows the surveyor suggested they were ineligible individually and not contributing resource to a National Register district
10 Different Structures		Adjacent to but outside of the station boundary	NA	Structures have not been evaluated by the SHPO regarding National Register eligibility
24 Different Parcels	NA	Parcels with HARB[3] dates are located adjacent to but outside of the boundary	NA	Approximately 15 parcels do not currently correspond to previously recorded resources

Source: Florida Master Site File (FMSF) resource forms and GIS data on file with the FMSF; CRM reports including *CRAR for the AAF Passenger Rail Project from Orlando to West Palm Beach* (Janus Research 2013), *Historic Structures Survey and Evaluation for Dunbar Village Low Rent Housing Project FLA 9-1 in West Palm Beach, Florida* (Uguccioni 2010), and *Prehistoric Resources in Palm Beach County: A Preliminary Prediction Study. Florida* (Kennedy et al. 1991); and GIS Property Appraiser Data for Palm Beach County available from the FGDL.

1 Letter from Robert F. Bendus, State Historic Preservation Officer, August 25, 2014

2 Inconsistencies with the reports were encountered for these structures

3 Historic Architectural Review Board

NA = not available

14 36 CFR Part 800

4.4.2 Environmental Consequences

The Project would have no effect on structures located along the existing FECR Corridor as a result of increased train traffic or noise. There would be no effect on the visual setting of these properties, and no change in the FECR historic corridor itself.

Dunbar Village (8PB 1328) is a 246-unit public housing complex in the West Tamarind neighborhood of West Palm Beach. The complex was constructed in 1939-1940, shortly after the passage of the Housing Act of 1937, and was one of the first public housing complexes in Florida. The northernmost 13 buildings of the complex have been demolished in a HUD-approved redevelopment program to improve and modernize the complex. An additional 17 buildings are proposed for demolition in the near future. Phase I, the Sabal Palms Place project, consists of nine new townhouse units recently constructed on Tamarind Avenue. Phase II, the Paul Lawrence Dunbar Senior Complex, a 99-unit development, will be constructed using a HUD loan. Phase III, a 120-unit complex of garden-style apartments, is planned but not currently programmed for construction.

The Project will not directly affect the Dunbar Village historic district. The VMF will be located in the center of the existing yard, separate from the housing complex by existing freight yard tracks, buildings, and storage areas. As discussed in Section 4.3, there will be no noise or vibration impacts that would affect the remaining buildings within this district, and there would be no change in the visual setting. For these reasons, FRA recommends a finding of no adverse effect to the Dunbar Village Historic District.

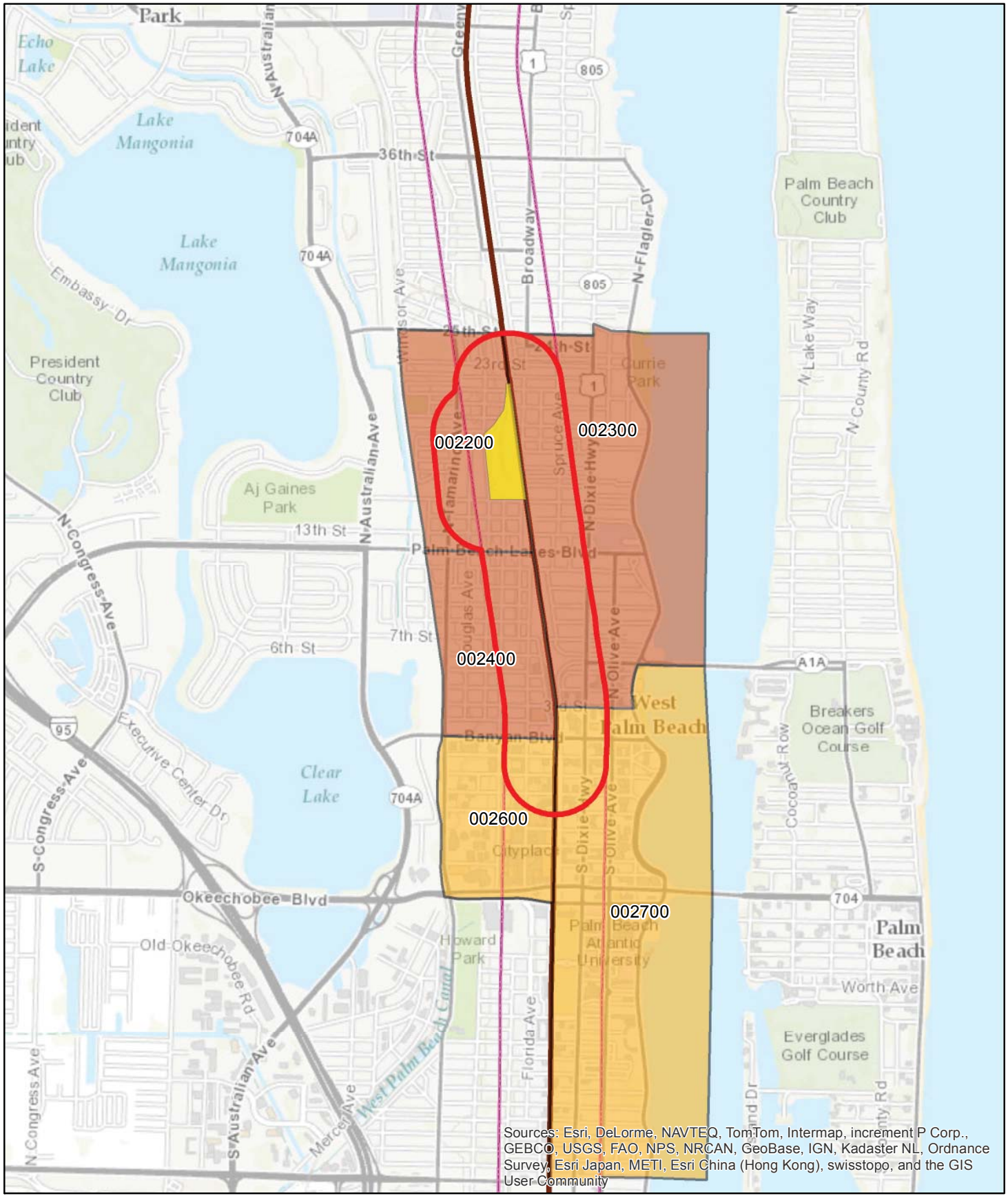
4.5 Hazardous Materials and Solid Waste

This section describes potential and confirmed sources of subsurface contamination and/or waste materials within the Project Study Area. It also describes the potential impacts that may occur from existing or potential releases and regulated materials.

4.5.1 Affected Environment

This evaluation included a survey of potentially contaminated sites, performed in accordance with Part 2, Chapter 22 of the Florida Department of Transportation (FDOT) *Project Development and Environment (PD&E) Guidelines Manual* (FDOT 2008), to evaluate potential impacts associated with the Project. The area surveyed included the footprint of the WPB Rail Yard and a 150-foot circumferential buffer from the perimeter of this facility. The purpose of this survey was to identify sites where contamination of soil and/or groundwater by petroleum or hazardous materials has occurred, where contamination of these same materials may exist, and where the potential for contamination exists due to past and present land use.

As shown in Figure 4-6, the survey revealed the locations of sixteen potentially contaminated sites at and around the WPB Rail Yard. Seven of these sites may pose a high risk to the site from migration of contaminated materials (Table 4-11) (AMEC 2014a).



Explanation of Features

- Rail Yard
- 1000' Rail Yard Buffer
- AAF Railway Line
- 1000' Railway Buffer
- Census Tract
- Census Tract, Minority>19.8%
- Census Tract, Minority>50%

Data Sources: ESRI Imagery, US Census Bureau 2010, AMEC

West Palm Beach Rail Yard Minority Population

All Aboard Florida Intercity Passenger Rail Project

N 0 1,000 2,000 Feet

U.S. Department of Transportation Federal Railroad Administration

4-6

Path: K:\KJSProjects\AAF Environmental Justice\MXD\PalmBeachRailYardMinorityPopulation2.mxd

Table 4-11 High-risk Contamination and Hazardous Waste Site

Map ID	Facility Name	Address	City	Regulatory Lists	Regulatory Status	Distance to Project (feet)
H-1	ND	ND	ND	ND	ND	ND
H-2	Rinker Materials	809 N. Railroad Ave.	WPB	NFRAP / NONTSD / FRS / STRCRA / TANKS / ERNS	ERNS acid release. Tanks removed - No tank closure documentation	71
H-3	West Palm Beach	ND	WPB	PCS	EPA letter of violation	74
H-4	Keels Service Station	720 15th St.	WPB	TANKS / LUST	Discharge 1991	70
H-5	Century Link West/FECR	601 N. 15th St.	WPB	PCS / FRS / STRCRA / FRS / TANKS	Tanks removed - No tank closure documentation	0
H-6	West Palm Beach Lift Station #21	Grant St./ Division Ave.	WPB	TANKS / LUST	Discharge in 2012 and cleanup required	30
H-7	Adams Volkswagen	2409 Pinewood Ave.	WPB	TANKS	Tanks removed - No tank closure documentation	96

Source: Environmental Data Management, Inc. (EDM). 2014. Florida Department of Environmental Protection (FDEP). 2013. http://depedms.dep.state.fl.us/Oculus/servlet/login. Accessed August 18, 2014; Florida Department of Environmental Protection (FDEP). 2013. http://depedms.dep.state.fl.us/Oculus/servlet/login. Accessed August 18, 2014.
ND = No Data

As shown in Figure 4-6, this evaluation identified one potentially contaminated site within the WPB Rail Yard (Map ID H-5) and one immediately adjacent to the rail yard (Map ID N-4). Although these sites may not pose a high risk to the Project, their proximity to the WPB Rail Yard, and the limited information available about the sites, warrants their consideration during site planning and development.

Florida East Coast Railway – Onsite Facilities. Operations at the existing WPB Rail Yard have included the use and storage of petroleum products. This site is a potentially high-risk site due to the limited information available related to the closure of former on-site tanks. No closure documentation with respect to these tanks was available at the time of this evaluation (EDM 2014, FDEP 2013). The following information related to petroleum storage at the WPB Rail Yard was obtained during this evaluation:

- FECR formerly operated one 4,000-gallon aboveground storage tank (AST). The installation and removal dates are unknown (EDM 2014).
- One 12,000-gallon underground storage tank was installed in 1985 and removed in 1998, (FDEP 2013).
- One 600-gallon emergency generator AST, previously owned and operated by Century Link, was on the site in 1999. The 700-gallon AST was reportedly removed and replaced in 2001 (EDM 2014).

West Palm Beach City - Lift Station #21. This location is off-site and adjacent to the northwest corner of the WPB Rail Yard. Groundwater sampling conducted to date does not indicate petroleum-impacted groundwater has migrated to the WPB Rail Yard property. The following information describes the known groundwater impacts at Lift Station #21:

- An emergency generator operates on this site, and is fitted with a 1,000-gallon AST (FDEP 2013).
- The facility is a listed Leaking Underground Storage Tank (LUST) site. The release of at least 25 gallons of diesel fuel took place in 2012. The site's cleanup status is active. Two source removal excavations took place at this property, as reported in a Limited Site Assessment Report prepared Eco Advisors, LLC, dated November 2012. This document reports on the excavation of excessively contaminated soil within 10 feet of the northern property boundary of the proposed WPB Rail Yard (FDEP 2013, EDM 2014).
- A letter dated May 8, 2013, prepared by Palm Beach County, indicates assessment will be required on the FECR property to the northeast of the WPB substation (EDM 2014).

4.5.2 Environmental Consequences

The majority of potentially contaminated sites identified by this evaluation are within developed areas adjacent to the existing FECR Corridor. However, the proposed rail infrastructure upgrades associated with the Project would be completely within the existing FECR Corridor, would result in minimal subsurface disturbance, and would not impact existing contaminated areas. Therefore, these sites do not pose a high risk to the Project.

Based on the limited ground disturbance currently planned within the existing FECR Corridor and at the WPB Rail Yard the Project is not expected to encounter impacted soil and/or groundwater.

AAF would perform vehicle washing, maintenance, and fueling at the WPB Rail Yard. Planned operations at this facility would also include the use of hazardous materials. The Project would not include the use or storage of hazardous materials outside the WPB Rail Yard property. Typical materials that AAF would store and use at the WPB Rail Yard include diesel fuel, motor oils, lubricants, and degreasers. Table 4-12 provides an inventory of the typical materials stored at existing vehicle maintenance facilities and is representative of the types and quantities of hazardous materials that AAF anticipates storing at the WPB Rail Yard.

Table 4-12 Anticipated Hazardous Products Storage at the WPB Rail Yard

Capacity	Contents
Mobile Fueling	Diesel Fuel
500-gallon AST (1)	Gasoline
250-gallon AST (1)	Conventional Oil
250-gallon AST (1)	Hydraulic Oil
250-gallon AST (1)	Waste Oil

AST = Aboveground Storage Tank

Passenger trains traveling between the WPB Station and the WPB Rail Yard would not be carrying, storing, or using hazardous materials with the exception of on-board fuel, lubricants, and relatively small quantities of materials required for the operation of passenger trains.

4.6 Transportation

This section provides an overview of the existing transportation infrastructure within the Project Study Area as well as the potential impacts to such infrastructure from the operation of the Project.

4.6.1 Affected Environment

The Project Study Area associated with this transportation evaluation includes the WPB Rail Yard, which is between 15th and 23rd Streets, and the FECR Corridor between Clematis Street and 23rd Street. Transportation infrastructure within the Project Study Area includes local roads serving the WPB Rail Yard and at-grade crossings crossed by the FECR Corridor, as described below.

4.6.1.1 Local Roads Serving VMF

The local roadway network near the WPB Rail Yard is characteristic of an urban setting, with urban speed limits and signalized intersections. The local roadway network is a grid of north-south and east-west oriented streets. Land use surrounding the project site is primarily residential, local roads generally have two lanes (one in each direction), limited or no sidewalk vegetation, and are typical of residential, urban areas. Several of the larger local roads such as 36th Street consist of two lanes (one in each direction) and have center dividers with planted vegetation.

Larger traffic arteries running though the Project Study Area include North Australian Avenue west of the WPB Rail Yard and U.S. Route 1 (U.S. 1) east of the WPB Rail Yard, which are oriented in a north-south direction, and Palm Beach Lakes Boulevard south of the site, which is oriented in an east-west direction. The segments of North Australian Avenue and U.S. 1 near the WPB Rail Yard are four-lane roads with no center divider. In 2013, North Australian Avenue had an Annual Average Daily Traffic (AADT) of approximately 22,200 and U.S. 1 had an AADT of approximately 17,700 (FDOT 2013). Palm Beach Lakes Boulevard is also a four-lane road in the segment directly south of the WPB Rail Yard, and had an AADT of approximately 28,000 in the same year (FDOT 2013). As Palm Beach Lakes Boulevard approaches Interstate 95, to the west, it widens into a six-lane roadway with a center median.

All vehicles accessing the WPB Rail Yard use the existing entrance on 15th Street, which has an AADT of approximately 3,300 vehicles, including 211 trucks (FDOT 2013). Access to the WPB Rail Yard from this two-lane street is on the southeastern corner of the facility.

4.6.1.2 At-Grade Crossings

The Project is completely within an existing area of the FECR Corridor that crosses four roadways at signalized and/or gated crossings: 15th Street, 3rd Street, Banyan Boulevard (1st Street), and Clematis Street. As previously noted, the AADT for 15th Street is 3,300 vehicles, including 211 trucks. The AADT for Banyan Boulevard (1st Street) is 39,500 vehicles, including 2,923 trucks. FDOT does not monitor

traffic for 3rd Street or Clematis Street (FDOT 2013). Table 4-13 summarizes existing freight operating characteristics and average crossing closures along the FECR Corridor in Palm Beach County.

Table 4-13 Summary of Existing (2011) Freight Operating Characteristics and Average Crossing Closures in Palm Beach County

	Palm Beach County
Time to Activate and Close the Gate (seconds)[1]	30
Average Train Length (feet)	8,150
Average Train Speed (miles per hour)[2]	59.4
Time to Clear (sec)	94
Time to Bring the Gate Back Up (seconds)	15
Total Time to Activate and Clear (sec)	139
Crossings (Trains per Day)	18
Closure (minutes per day)	41.6
Maximum Crossings per Hour[3]	1
Maximum Delay per Hour (minutes)[4]	2.3

Source: AAF. 2012. Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida. http://www.fra.dot.gov/eLib/details/L04278. Accessed September 12, 2013.

1 FRA regulations require 20 seconds to activate and close the gate prior to the train entering the railroad crossing and 10 seconds to bring the gate back up. FDOT uses 30 seconds to activate and close the gate prior to the train entering the railroad crossing and 15 seconds to bring the gate back up. To account for the worst-case scenario, FDOT timings were used in this analysis.

2 2011 freight speed for Palm Beach, Martin, St. Lucie, Indian River, and Brevard Counties was obtained from Section 3.3.1.1 of the Environmental Assessment for the All Aboard Florida Passenger Rail Project – West Palm Beach to Miami, Florida, dated October 31, 2012.

3 Maximum crossings per hour includes north-bound and south-bound trains combined

4 Maximum Delay per Hour calculated as the Total Time to Activate and Clear multiplied by the Maximum Crossings per Hour.

4.6.2 Environmental Consequences

This section provides an analysis of the potential impacts of the Project on transportation systems. Impacts to local traffic include roadway crossing delays and through VMF implementation. Roadway crossing delays were determined by calculating delay times resulting from the Project and comparing them to the modeling results presented in the Phase I EA.

4.6.2.1 Local Roads Serving VMF

All vehicles accessing the WPB Rail Yard would use the existing entrance on 15th Street. The Project would increase average daily traffic volume on this street by approximately 25 to 30 employee vehicles and one to two delivery vehicles. This increase would have a minimal impact on local roadways and traffic patterns.

4.6.2.2 At-Grade Crossings

The Project includes a total of 16 daily train trips between the WPB VMF and the WPB Station. Twelve passenger trains would travel between the WPB Rail Yard and the WPB Station between 7:01 AM and

10:00 PM. This includes two passenger trains in the morning traveling southbound, two passenger trains late in the day traveling northbound, and four roundtrip passenger trains during the day for crew changes. Four passenger trains would travel between the WPB Rail Yard and the WPB Station between 10:01 PM and 7:00 AM. This includes two passenger trains traveling southbound in the early morning and two passenger trains traveling northbound late at night.

The Project is completely within an existing area of the FECR Corridor that crosses four roadways at signalized and/or gated crossings within the 0.9-mile section between the WPB Rail Yard and the WPB Station. The four crossings are at 15th Street, 3rd Street, Banyan Boulevard (1st Street), and Clematis Street. The addition of 16 passenger train round trips per day would cause additional closures at these crossings; however, closures from passenger trains would be much shorter than closures from existing freight traffic. On average, an at-grade crossing requires 30 seconds to activate and close the gates, and 15 seconds to bring the gate back up. For freight trains (average length 8,150 feet and average speed approximately 59.4 mph), a single train crossing results in an average crossing closure of 139 seconds (see Table 4-13), or 2.3 minutes. For passenger trains (average length 725 to 900 feet and average speed 20 mph), a single train crossing results in an average crossing closure of between 69.7 and 76 seconds, or 1.2 to 1.3 minutes. The addition of 16 passenger trains would result in additional closures of 18.6 to 20.3 minutes per day.

The Project would enhance public safety through crossing improvements at each of the four at-grade crossings within the Project Study Area. This includes upgraded warning devices such as flashing lights, signage, pavement markings, median barriers, and four-quadrant gates. The Project would also implement electronic warning systems, which would monitor and communicate train locations and speeds, and would stop trains if a crossing were not clear. Upgrades to road-crossings would be coordinated with and/or communicated to local emergency responders, as activations at the road crossings would be more frequent with the increased frequency of train traffic. The delays, however, would be minimal, as passenger trains should clear a typical crossing in approximately one minute.

4.7 Social and Economic Environment

This section provides an overview of existing social and economic profiles within the Project Study Area as well as the potential impacts to these resources from the operation of the Project. The Project Study Area associated with this social and economic assessment is comprised of five census tracts within 1,000 feet of the WPB Rail Yard in Palm Beach County (Census Tracts 22, 23, 24, 26, and 27).

The social profile provides a picture of the population distribution, and the means to determine the impacts, if any; the Project would have on surrounding communities and the economy of the area. The economic profile consists of economic characteristics that include unemployment rates, labor force characterization, dominant business sector types, and median household income.

4.7.1 Affected Environment

The Project Study Area is within an urban setting, Table 4-14 provides the total populations of the State of Florida, Palm Beach County, the City of West Palm Beach, and the five census tracts that comprise the

Project Study Area. The population residing within the Project Study Area amounts to 12.8 percent of the city's population, but less than 1 percent of the county's population (USCB 2010a).

Table 4-14 Total Populations at the State, County, City, and Project Study Area

Region	Total Population	Population within the Project Area Buffer[1]	Percent of Population within the Project Area Buffer[1]
Florida	18,801,310	12,813	0.07
Palm Beach County	1,320,134	12,813	0.97
West Palm Beach	99,919	12,813	12.8

Source: United States Census Bureau (USCB). *2010. U.S. Census Tracts in Florida (with Selected Fields from 2010 Summary File 1)*. http://www.census.gov. Accessed August 20, 2014.
1 Census tracts found within the Project Study Area

Table 4-15 describes the existing labor force and dominant business sectors identified for the State of Florida, Palm Beach County, the City of West Palm Beach, and the Project Study Area. According to the 2007-2011 American Community Survey (ACS), the following four business sector types employ the greatest percentage of the labor force in these areas: educational services, health care, and social assistance; retail trade; professional, scientific, management, administrative, and waste management services; and arts, entertainment, recreation, accommodation, and food services. The greatest number of people in the labor force within the Project Study Area work in educational services, health care, and social assistance and retail trade (31 percent) (USCB 2011a).

Table 4-15 Existing Labor Force and General Employment Data for the State, County, City, and Project Study Area

Area	Total Population Employed in Labor Force	Industry Type (Percent of Workforce)				Percent Unemployed
		Educational Services, Health Care & Social Assistance	Retail Trade	Professional, Scientific, Management, Administrative & Waste Management Services	Arts, Entertainment & Recreation, Accommodation & Food Services	
Florida	8,258,511	20.5	13.1	12.0	11.3	6.2
Palm Beach County	579,516	20.0	13.4	14.0	11.2	6.3
West Palm Beach	47,681	19.3	12.4	14.3	12.5	7.0
Project Area Buffer[1]	5,242	18.4	16.6	13.2	14.3	7.2

Source: United States Census Bureau (USCB). 2011. *2007-2011 American Community Survey 5-Year Estimates*. http://www.census.gov/acs/www. Accessed August 20, 2014.
1 Census tracts found within the Economic and Social Environment Assessment Area

Table 4-16 describes the median household income for the state of Florida, Palm Beach County, the City of West Palm Beach, and the Project Study Area. According to the 2007-2011 ACS, the weighted average of median household income for the Project Study Area is approximately 23 percent lower than the average household income for Palm Beach County, and nearly 12 percent lower than the average household income for West Palm Beach (USCB 2011a).

Table 4-16 Median Household Income for the State, County, City, and Project Study Area

Region	Median Household Income (Total State/County)
Florida	$47,827
Palm Beach County	$52,951
West Palm Beach	$45,806
Project Study Area	$40,538[1]

Source: United States Census Bureau (USCB). 2011. *2007-2011 American Community Survey 5-Year Estimates*. http://www.census.gov/acs/www. Accessed August 20, 2014.
1 Weighted by census tract

Section 4.7, *Environmental Justice*, presents information pertaining to minority and low-income populations identified within the Project Study Area.

4.7.2 Environmental Consequences

As the Project occurs entirely within the footprint of an existing rail yard and rail corridor, which already bisect the communities that have developed following the construction of the railroad, the Project would not result in new neighborhood fragmentation or loss of continuity among neighborhoods. The Project would not require property acquisition, and no property conversions from private ownership to transportation use would take place. Therefore, the Project would not result in required residential or commercial relocations, the loss of revenues generated by business enterprises, or the loss of assessed land taxes.

The Project would establish 20 to 30 new jobs, resulting in direct socioeconomic benefits in the form of increased local labor income. The implementation of the VMF is anticipated to increase the tax valuation of the WPB Rail Yard, thereby increasing municipal property tax collections.

4.8 Environmental Justice

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Population and Low-Income Populations*, requires that federal agencies consider whether a proposed project would have a disproportionately high adverse impact on minority or low-income populations. CEQ has oversight of the federal government's compliance with NEPA, including EO 12898. CEQ's guidance indicates that an environmental justice analysis should identify if a disproportionately high adverse human health or environmental impact occurs on minority or low-income populations (CEQ 1997a). Furthermore, USDOT Order 5610.2(a) establishes USDOT policy to consider environmental justice principles in all USDOT

programs, policies, and activities. USDOT Order 5610.2(a) also sets forth the steps to prevent disproportionately high and adverse impacts to minority or low-income populations.

CEQ, with input from the EPA and other affected agencies, developed a guidance document to assist federal agencies with their NEPA procedures so that environmental justice concerns are effectively identified and addressed. CEQ's guidance document indicates that

> "minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. A minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds." (CEQ 1997a)

CEQ's guidance for environmental justice indicates that low-income populations in an affected area "should be identified with the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty (CEQ 1997a)." According to the United States Census Bureau (USCB), weighted average poverty thresholds for 2011 ranged from $10,788 to $11,702 annual income for individuals, and $13,596 to $50,059 for households, depending on age and the number of people in the household (USCB 2011b).

For the purposes of this assessment, thresholds to determine meaningfully greater minority and low-income populations include census tracts where minority and low-income populations are 10 percent higher than the Community of Comparison (COC). The COC for the Project is the City of West Palm Beach.

4.8.1 Affected Environment

This section provides an overview of the existing conditions related to minority and low-income populations within the Project Study Area. The Project Study Area associated with this assessment is the same as described under Section 4.6, which includes the five census tracts within 1,000 feet of the WPB Rail Yard in Palm Beach County (Census Tracts 22, 23, 24, 26, and 27).

4.8.1.1 Race

The minority population refers to persons whose race or ethnicity is something other than 'White alone,' as identified by the US Census. The minority population includes the following racial and ethnic categories: Black or African American; American Indian and Alaskan Native; Asian, Native Hawaiian and Other Pacific Islander; Some Other Race; Two or More Races; and Hispanic or Latino. Table 4-17 summarizes the minority and Hispanic or Latino populations for the state, county, city, and the Project Study Area.

Table 4-17 Summary of Minority and Hispanic or Latino Populations for the State, County, City, and Project Study Area

Region	Minority Population	
	Total	**%**
Florida	7,771,368	41.6
Palm Beach County	512,241	39.1
West Palm Beach	55,779	56.5
Project Study Area[1]	4,773	44.4
Census Tract 22	1,625	100.0
Census Tract 23	927	51.8
Census Tract 24	893	80.0
Census Tract 26	298	25.6
Census Tract 27	1,030	20.4

Source: United States Census Bureau (USCB). 2011. *2007-2011 American Community Survey 5-Year Estimates*. http://www.census.gov/acs/www. Accessed August 20, 2014.
1 Census tracts found within the Project Study Area

According to the 2011 ACS, the minority population within the Project Study Area is 44.4 percent. This is higher than the total percentage of the population considered minority in Palm Beach County (39.1 percent), but lower than the total percentage of the population considered minority in the City of West Palm Beach (56.5 percent). Among the five census tracts that comprise the Project Study Area, Census Tracts 22, 23, and 24 have minority populations above 50 percent (see Figure 4-7). No other census tracts have minority populations that are meaningfully greater than the COC (≥66.5 percent, which is 10 percent higher than the percent minority population of the City of West Palm Beach) (USCB 2011a).

4.8.1.2 Low-Income

The percentage of the population below the poverty level depends on the population for which poverty status has been determined, rather than the total population in a given area. Table 4-18 summarizes poverty status within the state, county, city, and the Project Study Area.

Table 4-18 Summary of Poverty Data (2007-2011 ACS 5-year estimates) for the State, County, City, and Project Study Area

Region	Total Population Assessed	Population Below Poverty	Percent Below Poverty
Florida	18,282,511	2,679,400	14.7
Palm Beach County	1,290,963	171,135	13.3
West Palm Beach	95,966	18,014	18.8
Project Study Area[1]	9,612	2,735	28.5
Census Tract 22	1,625	847	52.1
Census Tract 23	1,783	605	33.9
Census Tract 24	1,076	464	43.1
Census Tract 26	1,139	121	10.6
Census Tract 27	3,989	698	17.5

Source: United States Census Bureau (USCB). 2011. *2007-2011 American Com1munity Survey 5-Year Estimates*. http://www.census.gov/acs/www. Accessed August 20, 2014.
1 Census tracts found within the Project Study Area

According to the 2011 ACS, 28.5 percent of the population within the Project Study Area has been below the poverty level in 2010 or 2011. This is higher than the total percent of the population below poverty in Palm Beach County (13.3 percent) and the City of West Palm Beach (18.8 percent). Among the five census tracts that comprise the Project Study Area, Census Tract 22 has a low-income population above 50 percent. Census Tracts 23 and 24 have minority populations that are meaningfully greater than the COC (≥28.8 percent, which is 10 percent higher than the percent of the population below poverty of the City of West Palm Beach) (see Figure 4-8) (USCB 2011a).

Dunbar Village is a public housing complex that is west of the WPB Rail Yard and within Census Tract 22. The presence of this development, which is owned and operated by the West Palm Beach Housing Authority, explains the high minority and low-income populations found within this census tract and the Project Study Area.

4.8.2 Environmental Consequences

As noted in Section 4.6.2, the Project would not result in residential displacement, job loss, or neighborhood fragmentation due to the acquisition and conversion of property; therefore, there would be no disproportionate impacts to environmental justice communities from changes in land use.

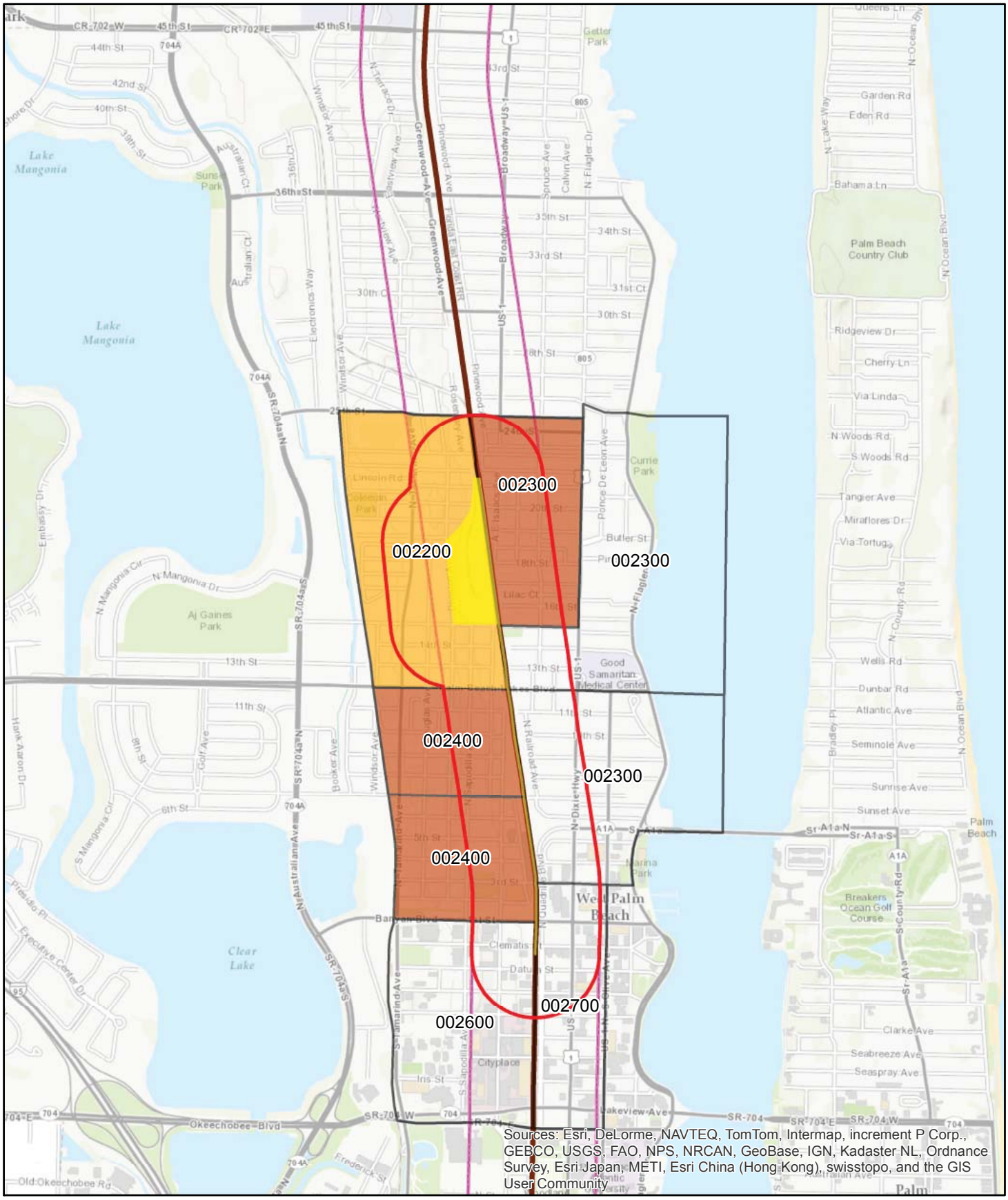
While there are several census tracts that have minority and low-income populations greater than 50 percent and/or are meaningfully greater than the COC, there would be no disproportionate adverse impacts to environmental justice communities. As there would be no negative environmental consequences associated with any resource area, there would be no negative impact to communities within the Project Study Area.

4.9 Safety

This section describes the proposed conditions at the WPB Rail Yard and at-grade crossings within the Project Study Area, as described in Section 4.5, with respect to the health and safety of the residents and communities that the construction and operation of the Project may impact. The Project would comply with all relevant health and safety regulations, including the Americans with Disability Act of 1990 (ADA),[15] and would not adversely impact the public's health or safety.

During construction, all contractors would be subject to the contractor's site health and safety plan. Site security measures would include fencing, gates, and proper signage. If contractors encounter any petroleum contaminated soils or groundwater during site construction activities, they would implement Best Management Practices (BMPs) to handle and dispose of the material in accordance with the applicable environmental regulations.

15 41 U.S.C. § 12101, et seq.



Explanation of Features

- Rail Yard
- 1000' Rail Yard Buffer
- AAF Railway Line
- 1000' Railway Buffer
- CBG
- CBG, Poverty > 21,72%
- CBG, Poverty > 50%

Data Sources: ESRI Imagery, US Census Bureau 2010, AMEC

West Palm Beach Rail Yard Poverty Population

All Aboard Florida Intercity Passenger Rail Project

N

0 500 1,000

Feet

U.S. Department of Transportation
Federal Railroad Administration

4-7

Path: F:\KJSProjects\AAF Environmental Justice\MXD\PalmBeachRailYardPovertyPopulation2.mxd

Explanation of Features

- AAF Railway Line
- Rail Yard 150' Buffer
- West Palm Beach Rail Yard
- 1000' Railway Buffer
- Mile Post
- High
- Medium
- Low
- No

Data Sources: ESRI Imagery, FEMA 2012, AMEC 2014

Contaminated Sites Map for West Palm Beach Rail Yard

All Aboard Florida Intercity Passenger Rail Project

N

0 500 1,000

Feet

U.S. Department of Transportation
Federal Railroad Administration

4-8

Path: F:\FECI\FECI_GDB\MXD\EA\PalmBeachRailYardContaminatedSitesMap.mxd

With respect to design and Project use, the Project would implement BMPs to ensure there is adequate lighting and site visibility to prevent criminal activity and to provide safe working conditions for all facility operations. The Project would include a security fence to separate passenger operations from freight movements and operations.

The Project would enhance public safety with respect to local vehicular and pedestrian traffic. The Project would elevate public safety by upgrading crossing signal equipment at the four at-grade crossings within the Project Study Area (15th Street, 3rd Street, Banyan Boulevard [1st Street], and Clematis Street). Upgrades to road-crossings would be coordinated with and/or communicated to local emergency responders, as activations at the road crossings would be more frequent with the increased frequency of train traffic. The delays, however, would be minimal, as passenger trains should clear a typical crossing in less than one minute.

The ADA provides for equal opportunity for individuals with disabilities to access public and private facilities. Although the WPB Rail Yard is not a public-use facility, the construction of new buildings would comply with the requirements of the ADA as well as any other applicable federal, state and local provisions related to providing access for persons with disabilities.

4.10 Energy

This section provides an overview of the existing conditions related to energy at the WPB Rail Yard, as well as the potential impacts to this resource that could result from the Project.

This evaluation was performed in accordance with the guidance issued in the 1999 FRA "Procedures for Considering Environmental Impacts" and the EPA's 1994 *Energy Efficiency Reference for Environmental Reviewers* (EPA 1994b). NEPA requires an analysis of the Project's impact to identify any potential conflicts between utility operators and availability of energy resources.

4.10.1 Affected Environment

Florida Power & Light Company (FPL) provides electricity to the WPB Rail Yard. Aboveground electrical transmission/distribution lines are located along and within the FECR Corridor. The WPB Rail Yard currently has light poles across the parcel.

4.10.2 Environmental Consequences

The Project would require an increase in electricity to service the new buildings and power equipment; however, the additional amount of electricity anticipated for the Project would be minimal, and would not create an adverse impact or disproportionate demand on the existing or planning electrical grid. The Project may also require upgrades to lighting equipment. Impacts to aerial electric lines would be temporary and would likely be limited to relocating utility poles within the WPB Rail Yard and potentially between the WPB Rail Yard and the WPB Station, if tracks require shifting. The number of light poles at the WPB Rail Yard would not change with the addition of the passenger train facilities, though the location of individual poles may change. The Project includes an onsite emergency generator for use in the event of a power outage.

4.11 Construction Impacts and Mitigation

Impacts from the construction of the Project would be temporary and occur during and immediately following construction. The time required for specific construction impacts to dissipate is dependent on the type of activity performed and resource potentially impacted. Most construction impacts cease immediately after the completion of an activity. Some specific construction impacts are unknown at this time, as they depend on several factors yet to be determined. These factors include final design, location of staging, identification of specific materials and equipment, construction methodologies, and location of areas for the disposal of construction and demolition waste. AAF anticipates that construction of the WPB Rail Yard would last between six and nine months.

4.11.1 Air Quality

Overall, impacts from construction associated with the Project to air quality would be negligible. The primary pollutant associated with construction operations would be fugitive dust emissions from vehicle traffic (i.e., trucks, front-end loaders, etc.) on unpaved areas and emissions from these same vehicles by way of tailpipe emissions. Due to the relatively small area of construction, impacts from upgrading the WPB Rail Yard would be minor. Contractors would control fugitive dust impacts through watering or other palliative measures. Tailpipe emissions would be exceptionally small when considered relative to current tailpipe emissions from other vehicles in the area.

4.11.2 Noise and Vibration

Noise

Based on FTA guidelines, the analysis estimated the combined noise level in 1 hour generated by the two noisiest pieces of construction equipment. For anticipated track work and building construction, the analysis assumed that a rail saw and bulldozer were the noisiest pieces of equipment, which have a typical noise level of 90 and 85 dBA, respectively, at 50 feet from the source (FTA 2006). To provide a conservative estimate, the analysis assumed both pieces of equipment would operate at the same time, which would result in a cumulative noise of 91.2 dBA at 50 feet. Equipment was assumed to be in use at the Heavy Construction Equipment Boundary along the west side of the WPB Rail Yard and the FECR Corridor right-of-way boundary (Figures 4-9 and 4-10) and the noise levels were propagated away from the source. Noise impact criteria are provided in Table 4-19. Based on these criteria, noise levels would not exceed the impact criteria for commercial or industrial areas. Construction of the VMF yard would not exceed noise impact criteria at adjacent residences except those immediately adjacent to the northwest corner of the yard. Construction noise from the mainline track segments would affect the first row of residences along the mainline. In total, 19 parcels would be impacted during the day and 67 parcels would be impacted if construction occurred during the nighttime. Impact contours are depicted in Figures 4-9 and 4-10.

Explanation of Features

- Existing FECR R/W
- Yard Construction Boundary
- Noise Impact Contour, Category 2, Day (55 ft)
- Noise Impact Contour, Category 2, Night (180 ft)
- Vibration Impact Contour, Category 2 (75 ft)
- Vibration Impact Contour, Category 3 (60 ft)

Data Sources: ESRI 2012, FRA 2012, FGDL 2012, AMEC 2014.

Construction Noise & Vibration Impact Analysis

All Aboard Florida Intercity Passenger Rail Project

N 0 500 Feet

U.S. Department of Transportation
Federal Railroad Administration

4-9

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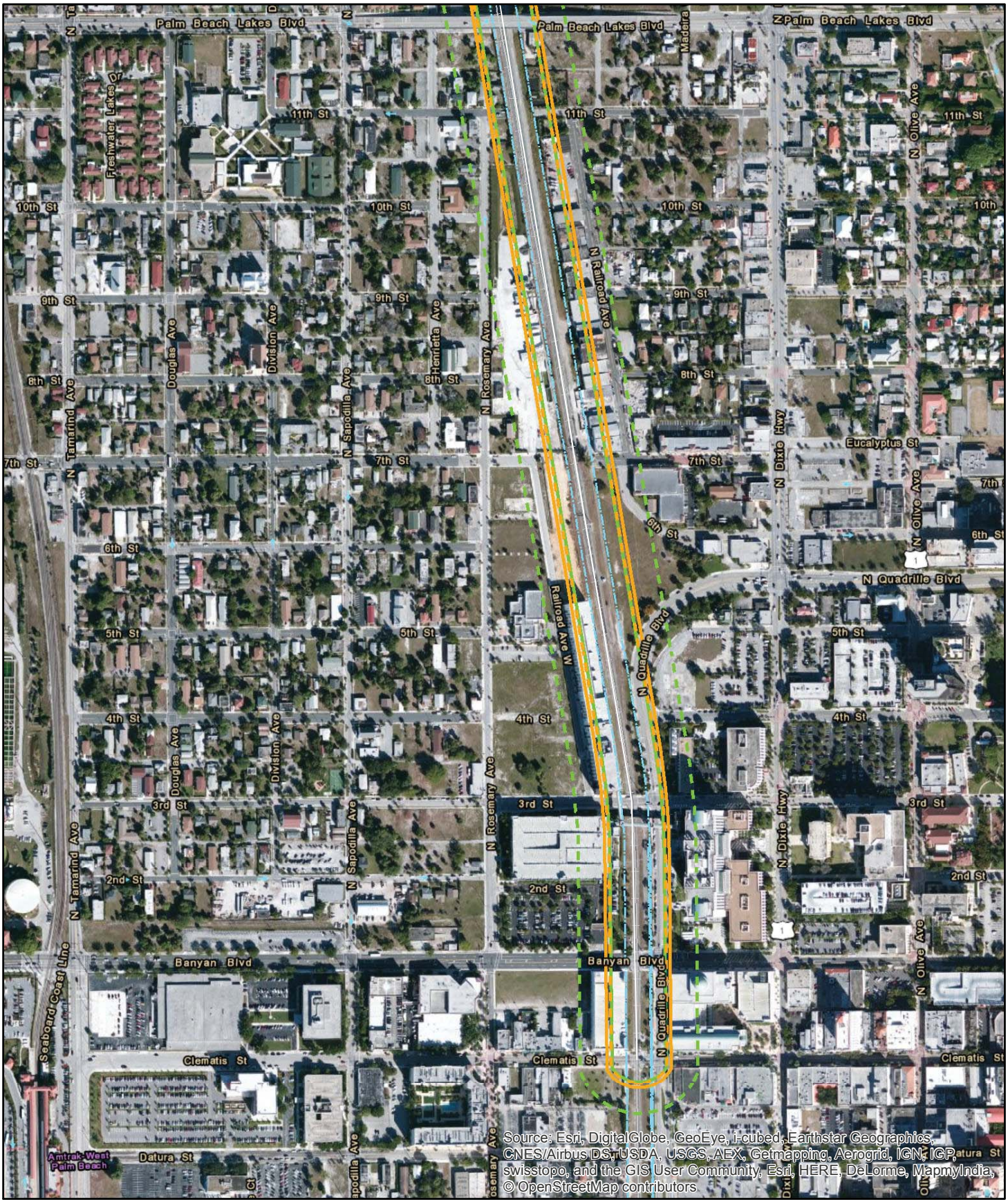
Project # 6063-12-0212



Explanation of Features

- Existing FECR R/W
- Yard Construction Boundary
- Noise Impact Contour, Category 2, Day (55 ft)
- Noise Impact Contour, Category 2, Night (180 ft)
- Vibration Impact Contour, Catgeory 2 (75 ft)
- Vibration Impact Contour, Catgeory 3 (60 ft)

Data Sources: ESRI 2012, FRA 2012, FGDL 2012, AMEC 2014.

Construction Noise & Vibration Impact Analysis

All Aboard Florida Intercity Passenger Rail Project

N 0 500 Feet

U.S. Department of Transportation
Federal Railroad Administration

4-10

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Project # 6063-12-0212

Table 4-19 Construction Noise Impact Assessment

Parameter	Day (0700-2200)	Night (2200-0700)
Noise Level (dBA) at 50 feet	91.2	91.2
Impact Criteria (one-hour L_{eq})	90	80
Residential Impact Contour (feet)	55	180
Number of Impacted Parcels	19	67

Source: AMEC. 2014. Addendum to Environmental Assessment Reevaluation of Potential Environmental Impacts of the Proposed West Palm Beach Rail Yard for the All Aboard Florida Passenger Rail Project from West Palm Beach to Miami, Florida. July 2014.

Construction noise would be monitored by AAF to verify compliance with local ordinances and county noise restrictions, such as the *Palm Beach County Unified Land Development Code, Article 5 – Supplementary Standards,*[16] which includes county-wide restrictions on construction noise. All necessary permits would be obtained, anticipated exceedances would be outlined, and noise impacts would be limited to daytime hours. The contractor would prohibit certain noise-generating activities during nighttime hours and provide additional noise control measures to meet the noise restrictions, as necessary.

To meet required noise restrictions, AAF would require all contractors to implement the following noise control measures, as required by the Palm Beach Code:

- Avoid nighttime construction in residential neighborhoods;
- Locate stationary construction equipment as far as possible from noise sensitive sites;
- Route construction-related truck traffic along roadways that would cause the least disturbance to residents;
- Monitor and maintain equipment to meet noise limits;
- Minimize using generators to power equipment;
- Limit using public address systems; and
- Limit or avoid certain noisy activities during nighttime hours such as aboveground jackhammering and impact pile driving.

These proposed measures would reduce the limited and temporary construction noise impacts from the Project. It is unlikely that all residential construction noise impacts can be eliminated because noise levels from any typical construction project would likely exceed the criteria provided in the *Palm Beach County Unified Land Development Code*. However, the contractors would follow best practices and employ the noise reduction measures listed above. Construction noise would be limited to the daytime, in order to eliminate nighttime impacts. AAF would be required to comply with local regulations to ensure that the work is performed in accordance with local ordinances and county codes.

16 Available at http://www.pbcgov.com/pzb/ePZB/pdfarticles.htm

Vibration

Construction vibration was assessed to determine the potential for human annoyance impacts as well as potential structural damage to vibration-sensitive buildings. Vibration levels from the piece of construction equipment estimated to produce the most severe impacts (large bulldozer) were assessed, based on the methodology outlined in the FTA Manual.

For human annoyance impacts, construction vibration was calculated in root mean square (rms) velocity levels expressed in vibration decibels, similar to operations noise and vibration assessments. Construction vibration is analyzed in terms of peak particle velocity (PPV) for potential structural impacts. Because the source PPV of a large bulldozer does not exceed the most stringent FRA structural vibration impact criteria, a full structural impact assessment was not necessary. No structural vibration impacts would occur in the Project Area.

A summary of Construction Vibration Impact Assessments is presented in Table 4-20. This table shows the source levels of a large bulldozer, FTA impact criteria, impact contour distances, and the number of parcels affected (25 Category 2 parcels and 12 Category 3 parcels would be impacted). Analysis was performed for Category 2 and Category 3 parcels, as there are no Category 1 parcels near the Project Area. Impact contours were determined by propagating the source vibration levels outward from either the FECR Corridor (away from the WPB Rail Yard) or the Heavy Construction Equipment Boundary (along the west side of the WPB Rail Yard) until levels no longer exceeded applicable impact criteria.

Table 4-20 Construction Vibration Impacts

Parameter (Large Bulldozer)	Category 2	Category 3
Vibration Level at 25 ft (VdB[1])	87	87
Impact Criteria (VdB[1])	72	75
Impact Contour Distance (ft)	75	60
Number of Impacted Parcels	25	12

Source: AMEC. 2014. Addendum to Environmental Assessment Reevaluation of Potential Environmental Impacts of the Proposed West Palm Beach Rail Yard for the All Aboard Florida Passenger Rail Project from West Palm Beach to Miami, Florida. July 2014.

1 re 1 µin/ s

Mitigation measures are available to help reduce expected vibration levels; however, the information available during the preliminary engineering phase is not sufficient to define specific construction vibration mitigation measures. AAF would develop and implement a mitigation plan during the final design and construction phases of the Project. No structural damage is anticipated and vibration impacts would be annoyance-based; therefore, the following are potential mitigation measures that may be considered and implemented during final design and construction:

- Operate earth-moving equipment on the construction lot as far away from vibration-sensitive sites as possible.

- Phase demolition, earth-moving, and ground-impacting operations so as not to occur in the same time period. Unlike noise, the total vibration level produced could be significantly less when each vibration source operates separately.
- Avoid nighttime construction activities.

4.11.3 Hazardous Materials and Solid Waste

Based on upgrades currently planned within the existing FECR Corridor, and at the WPB Rail Yard, the Project should not encounter contaminated soil and/or groundwater. In the event it is necessary for construction activities to occur in contaminated areas, AAF would conduct a Phase II investigation. If the construction of the Project cannot avoid contaminated sites, AAF would develop technical special provisions, such as Remedial Action Plans, as part of the Phase II investigation. Further, AAF would minimize impacts from all known contamination through remedial actions prior to construction. If ground-disturbing activities encounter any contaminated or hazardous wastes during construction, contractors would handle and dispose of these materials in accordance with regulatory requirements.

The Project would generate construction and demolition waste such as used railroad ties, steel rail, excess soil, rock, organic material, asphalt, concrete, and wood. Contractors would handle, transport, and dispose all construction and demolition waste according to federal, state, and local regulations as well as industry BMPs. Contractors would recycle materials to the extent practicable.

4.11.4 Social and Economic

The Project would result in construction jobs, which would produce socioeconomic benefits in the form of additional jobs and labor income. The number of construction jobs has yet to be determined.

4.12 Secondary and Cumulative Impacts

As previously described in this chapter, the Project would result in direct impacts to a range of resources. This section considers those direct impacts in conjunction with the Project's potential indirect or secondary impacts, along with the cumulative impacts that could result from the incremental impact of the Project when added to other past, present, and reasonably foreseeable future actions. The information provided in this section is consistent with CEQ and other agency guidance documents:

- Considering Cumulative Effects Under the National Environmental Policy Act (CEQ 1997b);
- Guidance on the Consideration of Past Actions in Cumulative Effects Analysis (CEQ 2005b);
- Secondary and Cumulative Impact Assessment in the Highway Project Development Process (FHWA 1992);
- Interim Guidance: Questions and Answers Regarding Indirect and Cumulative Impact Considerations in the NEPA Process (FHWA 2003); and
- Cumulative Effects Evaluation Handbook (FDOT 2012).

4.12.1.1 Potential Secondary Impacts

The Project would not result in indirect adverse impacts to the resource areas discussed in this chapter. However, it would have an indirect beneficial impact to local economic conditions through personal spending attributable to the 20 to 30 permanent operational jobs and an undetermined number of temporary construction jobs.

Additionally, the Project would support the overall AAF passenger rail project from West Palm Beach to Miami, which would:

- Enhance regional roadway transportation by reducing the number of vehicles on the regional network, thereby providing additional transportation capacity and decreasing roadway congestions and the potential for vehicular accidents between West Palm Beach and Miami;
- Improve overall air quality and decrease use of petroleum-based fuels as a result of the potential reduction in regional vehicle miles traveled;
- Improve accessibility and mobility between West Palm Beach and Miami by offering an alternative transportation option;
- Result in the potential for additional economic value from induced transit-oriented development associated with the new passenger rail stations in West Palm Beach, Fort Lauderdale, and Miami; and
- Increase local and regional economic activity through the generation of jobs (i.e., local labor income), additional tax revenues, associated direct and indirect spending, promotion of tourism, and savings realized from reduced highway maintenance costs.

4.12.1.2 Potential Cumulative Impacts

The CEQ regulations define a cumulative impact as

> "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."[17]

The intent of the cumulative impacts analysis is to determine the magnitude and significance of cumulative impacts, both beneficial and adverse, and to determine the contribution of the Project to those aggregate impacts. The Project would not result in cumulative impacts that would be collectively significant and adverse. Rather, it would have slight beneficial contributions to cumulative impacts by contributing to a reduction in regional vehicle miles traveled (VMTs), which would improve air quality and congestion on the regional transportation network.

Cumulative impacts occur when a proposed project (considered in conjunction with past, present, and future activities):

- Results in a violation of state water quality standards;

17 40 CFR Part 1508.7

- Results in significant adverse impacts to functions of wetlands or other surface waters within the same drainage basin, when considering the basin as a whole; and
- Results in jeopardizing a listed threatened or endangered species and/or habitats critical to their existence.

This evaluation along with the Phase I EA and the Phase II DEIS has demonstrated that the Project would not create or influence any of these conditions; therefore, it would not result in adverse cumulative impacts.

History has shown that transportation improvement projects usually have cumulative effects in terms of new residential and new commercial development. However, as demonstrated in the Phase I EA and Phase II DEIS, changes in land use patterns, population density, and growth rates would occur in the region regardless of the Project.

The Project is consistent with strategies and policies of the adopted Strategic Regional Policy Plan of the Treasure Coast Regional Planning Council, which includes Palm Beach County. Regional Goal 7.1 of this plan identifies the region's desire for "a balanced and integrated transportation system." Further, Strategy 7.1.1 of the Strategic Regional Policy Plan proposes to

> "[d]evelop a balanced, complete and fully integrated transportation system which, as a minimum, includes the following:…(3) commuter rail service with stations linking the coastal cities and towns of the Region, (4) a regional mass transit system linking commuter rail stations, major commercial airports, seaports, colleges, and principle urban areas within the Region." (TCRPC 1995).

For these reasons, particularly the consistency with future planning objectives, the cumulative impacts of the Project would not be adverse.

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6 Acronyms, Abbreviations and Glossary

Acronyms

AADT	Annual Average Daily Traffic
AAF	All Aboard Florida – Operations LLC
ACS	American Community Survey
ADA	Americans with Disabilities Act
APE	Area of Potential Effect
AST	above ground storage tank
BMP	Best Management Practices
CAA	Clean Air Act
CEQ	President's Council on Environmental Quality
CFR	Code of Federal Regulation
CH_4	methane
CO	carbon monoxide
COC	Community of Comparison
CO_2	carbon dioxide
CRAR	Cultural Resource Assessment Report
CRM	Cultural Resource Management
dB	decibels
dBA	A-weighted decibel
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
EDM	Environmental Data Management, Inc.
EIS	Environmental Impact Statement
EO	Executive Order
EPA	United States Environmental Protection Agency
FDEP	Florida Department of Environmental Protection

FDHR	Florida Division of Historic Resources
FDOT	Florida Department of Transportation
FECR Corridor	Florida East Coast Corridor
FECI	Florida East Coast Industries, Inc.
FECR	Florida East Coast Railway LLC
FHWA	Federal Highway Administration
FMSF	Florida Master Site File
FONSI	Finding of No Significant Impact
FPL	Florida Power & Light Company
FRA	Federal Railroad Administration
GBN	ground-borne noise
GOAA	Greater Orlando Airport Authority
I-95	Interstate 95
LBG	Louis Berger Group
L_{dn}	A-weighted average day-night sound level
$L_{eq}(h)$	A-weighted hourly equivalent sound level
LUST	Leaking Underground Storage Tank
MCO	Orlando International Airport
mph	miles per hour
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NO_x	oxides of nitrogen
NPS	National Park Service
NRHP	National Register of Historic Places
O_3	ozone
Pb	lead
PD&E	Project Development and Environment

PL	Public Law
PM_{10}	particulate matter sized 10 micrometers or less
$PM_{2.5}$	particulate matter sized 2.5 micrometers or less
RRIF	Railroad Rehabilitation and Improvement Financing
SEA	Supplemental Environmental Assessment
SEL	Sound Exposure Level
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO_2	sulfur dioxide
SR	State Road
TCRPC	Treasure Coast Regional Planning Council
U.S.C.	United States Code
USCB	United States Census Bureau
USDOT	United States Department of Transportation
USFWS	United States Fish & Wildlife Service
VdB	vibration decibels
VMF	Vehicle Maintenance Facility
VMT	vehicle miles traveled
VOC	volatile organic compound(s)
WPB	West Palm Beach

Glossary

A

Accessibility: The ease with which a site or facility may be reached by passengers and others necessary to the facility's intended function. Also, the extent to which a facility is usable by persons with disabilities, including wheelchair users.

Adverse: Negative or detrimental.

Affected Environment: The physical, biological, social, and economic setting potentially affected by one or more of the alternatives under consideration.

Air Pollution: A general term that refers to one or more chemical substances that degrade the quality of the atmosphere.

Americans with Disabilities Act (ADA): Federal regulation establishing legal requirements for accessibility for those with disabilities.

Area of Potential Effect (APE): The area potentially affected by the construction and operation of the Project; for archaeological properties, considered to be the area of ground proposed to be disturbed during construction of the undertaking, including grading, cut-and-fill, easements, staging areas, utility relocation, borrow pits, and biological mitigation areas; for historic architecture, considered to be the proposed construction footprint and properties near the undertaking where the undertaking would result in a substantial change from the historic use, access, or noise and vibration levels that were present 50 years ago, or during the period of significance of a property, if different.

At-Grade: At ground surface level; used to describe roadways, track alignments, and road-track intersections.

Attainment: An air basin is considered to be in attainment for a particular pollutant if it meets the federal or state standards set for that pollutant. See also **Maintenance** and **Nonattainment.**

A-Weighted Sound Level: A measure of sound intensity that is weighted to approximate the response of the human ear so it describes the way sound will affect people in the vicinity of a noise source.

B

Baseline: Foundation or basis to use for comparison purposes.

Best Management Practices (BMPs): Methods designed to minimize adverse effects to the environment. Examples of BMPs include practices for erosion and sedimentation controls, watering for dust control, perimeter silt fences, rice straw bales, and sediment basins.

C

Carbon Dioxide (CO_2): A colorless, odorless gas that occurs naturally in the atmosphere; fossil fuel combustion emits significant quantities of CO_2.

Carbon Monoxide (CO): A colorless, odorless gas generated in the urban environment primarily by the incomplete combustion of fossil fuels in motor vehicles.

Clean Air Act (CAA): The law that defines the U.S. Environmental Protection Agency's responsibilities for protecting and improving the nation's air quality and the stratospheric ozone layer. The CAA protects the general public from exposure to airborne contaminants that are known to be hazardous to human health.

Construction: The act or process of building.

Corridor: A geographic belt or band that follows the general route of a transportation facility (e.g., highway or railroad).

Criteria Pollutants: Pollutants for which federal and state air quality standards have been established: carbon monoxide (CO), sulfur oxides (SO_x), nitrogen oxides (NO_x), ozone (O_3), particulate matter with a diameter of 10 microns or less (PM_{10}), particulate matter with a diameter of 2.5 microns or less ($PM_{2.5}$), and lead (Pb).

Cultural Resources: Resources related to the tangible and intangible aspects of cultural systems, living and dead, that are valued by a given culture or contain information about the culture. Cultural resources include, but are not limited to, sites, structures, buildings, districts, and objects associated with or representative of people, cultures, and human activities and events.

Cumulative Impact: (1) CEQ — the result of two or more individual impacts that, when considered together, are considerable or that compound or increase other environmental impacts; (2) NEPA — an impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.

D

Decibel (dB): A logarithmic measurement of noise intensity.

Degreasers: Chemical products/substances that remove greases and oils from surfaces.

Disproportionately High Adverse Effects: An Environmental Justice term used to describe the unequal treatment to low income and minority populations as a result of a proposed project and action. Executive Order 12898 directs each federal agency to identify and address disproportionately high and adverse human health or environmental effects of its projects and actions.

Disturbance: A discrete natural or human-induced event that causes a change in the condition of an ecological system.

E

Ecosystem: An interconnected network of living organisms, including people, and their local physical environment; often viewed as an ecological unit.

Effect: A change in the condition or function of an environmental resource or environmental value as a result of human activity.

Endangered Species: Any species listed under the federal Endangered Species Act as being in danger of or threatened with extinction throughout all or most of its range.

Environmental Impact Statement (EIS): Documentation required by the National Environmental Policy Act (NEPA) for certain actions "significantly affecting the quality of the human environment." An

EIS is a decision-making tool that presents detailed analysis of a proposed action and alternatives to the proposed action. The EIS presents the project's potential effects – both beneficial and adverse – and any mitigation measures to reduce adverse effects.

Environmental Justice: Identifying and addressing the potential for disproportionately high and adverse effects of programs, policies, and activities on minority and low-income populations.

Ethnicity: A grouping or categorization of people based on shared cultural traits such as ancestral origin, language, custom, or social attitude.

F

Federal Railroad Administration (FRA): An agency within the U.S. Department of Transportation that administers financial assistance programs and regulates the operation and safety of freight and passenger rail throughout the United States.

Footprint: The area covered by a facility or affected by construction activities.

G

General Conformity Rule: The requirement that federal, state, tribal, and local governments in air quality nonattainment or maintenance areas ensure that federal actions conform to the initiatives established in the applicable state implementation plan or tribal implementation plan.

Grade Crossing: The intersection of a railroad and a highway at the same elevation (grade); an intersection of two or more highways; an intersection of two railroads. Same as at-grade crossing.

Greater Orlando Airport Authority (GOAA): Operating agency for the Orlando International Airport and Orlando Executive Airport in Orlando, Florida.

Greenhouse Gases: A class of air pollutants believed to contribute to the greenhouse global warming effect, including nitrogen oxides (NO_x), hydrocarbons (HC), and carbon dioxide (CO_2).

Groundwater: Water contained and transmitted through open spaces within rock and sediment below the ground surface.

H

Habitat: An environment where plants or animals naturally occur; an ecological setting used by animals for a particular purpose (e.g., roosting habitat or breeding habitat).

Hazardous Materials: Any material that, because of quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety, or the environment, if released.

Hazardous Waste: A hazardous material that is no longer of use and will be disposed of. Hazardous waste is regulated by the U.S. Environmental Protection Agency under the Resource Conservation and Recovery Act.

Hydrocarbons: Various organic compounds, including methane, emitted principally from the storage, handling, and combustion of fossil fuels.

I

Impact: A change in the condition or function of an environmental resource or environmental value as a result of human activity.

Indirect Impact: The consequences of a project's direct impacts. These impacts are generally not quantifiable and may occur over a larger area or a longer period.

Infrastructure: The facilities required for a societal function or service (such as transportation and utility infrastructure – roads, bridges, railroads, pipelines, power lines, etc.).

Intermodal: Transportation that involves more than one mode (e.g., walk, bike, auto, transit, taxi, train, bus, and air) during a single journey.

Intermodal Station: A transit station that provides connections among more than one mode of transportation.

L

Lead (Pb): A stable element that can have toxic effects and that persists and accumulates in the environment, humans, or animals.

Lead Agency: The public agency that has the principal responsibility for carrying out or approving a project or action and is responsible for preparing environmental review documents in compliance with CEQ and/or NEPA.

L_{eq}: A measure of the average noise level during a specified period of time.

L_{eq}(h), dBA: Equivalent or average noise level for the noisiest hour, expressed in A-weighted decibels.

M

Maintenance: An air basin that was formerly in nonattainment but now meets the established standards for that pollutant. See also **Attainment** and **Nonattainment**.

Mitigation: Action or measure undertaken to minimize, reduce, eliminate, or rectify the adverse impacts of a project, practice, action, or activity.

Mobility: Movement of people across areas.

N

National Ambient Air Quality Standards (NAAQS): Federal standards stipulating the allowable ambient concentrations of specific criteria pollutants.

National Environmental Policy Act (NEPA): Federal legislation that establishes national policies and goals for the protection of the environment and requires federal agencies to consider the environmental impacts of major federal projects or decisions, to share information with the public, to identify and assess reasonable alternatives, to identify appropriate measures to mitigate potential impacts, and to coordinate efforts with other planning and environmental reviews taking place. Codified at: 42 U.S.C.A. § 4331 et seq.

Nitrogen Oxides (NO_x): A class of pollutant compounds that include nitrogen dioxide (NO_2) and nitric oxide (NO), both of which are emitted by motor vehicles. See **Criteria Pollutants**.

Nonattainment: An air basin that exceeds federal or state standards for a particular pollutant.

See also Attainment and Maintenance.

O

Ozone (O_3): A photochemical oxidant that is a major cause of lung and eye irritation in urban environments.

P

Particulate Pollution: Air pollution such as dust, soot, and smoke that is irritating but usually not poisonous. Particulate pollution also can include bits of highly toxic solid or liquid substances. Of particular concern are particles smaller than, or equal to, 10 microns (PM_{10}) or 2.5 microns ($PM_{2.5}$) in size.

Phase II Investigation: Part of an Environmental Site Assessment, which assesses whether identified historic on-site or off-site hazardous uses have impacted the soil and/or groundwater conditions beneath a property.

Potentially Contaminated Site: Land that may contain substances in or under the land that are potentially hazardous to health or the environment, but have not been tested yet for contamination.

Poverty Level: The income at which a family or individual is considered poor. In 2009 the U.S. Census Bureau defined the poverty level for a family of four as an income of $21,954 or less.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Purpose and Need: The reason(s) why a project or action is undertaken, and the need(s) it is intended to meet or fulfill.

R

Reasonably Foreseeable Future Action: Those future actions that are likely to occur or probable, rather than those that are merely possible. Used in determining indirect and cumulative impacts for a Proposed Action.

Right-of-Way: A legal right of passage over a defined area of real property. In transit usage, the corridor along a roadway or railway that is controlled by a transit or transportation agency/authority.

S

Secondary Impact: Reasonably foreseeable indirect consequences to the environment caused by a proposed project that would occur either in the future or in the vicinity of, but not the same location as, the direct impacts associated with the project.

Section 4(f): Provisions originally enacted as Section 4(f) of the U.S. Department of Transportation Act of 1966 codified in 49 United States Code, Subtitle I, Section 303(c). Section 4(f) addresses the potential for conflicts between transportation needs and the protection of land for recreational use and resource conservation by providing protection for publicly owned parkland, recreation areas, and historic sites from use. Specifically, the provisions prohibit the Secretary of Transportation from approving any program or project that would require the use of any publicly owned land from a public park, recreation

area, wildlife or waterfowl refuge, or land of an historic site of national significance as determined by the officials having jurisdiction over these lands unless there are no feasible and prudent alternatives to the use of these lands.

Section 6(f): Section 6(f) of the Land and Water Conservation Fund Act of 1964 prohibits the conversion of property acquired or developed with funds granted through the act to a nonrecreational purpose without the approval of the National Park Service. Section 6(f) directs the

Department of the Interior to ensure that replacement lands of equal value (monetary), location, and usefulness are provided as conditions to such conversions.

Sensitive Receiver: Noise-sensitive locations where increased annoyance can occur, such as residences, schools, hotels/motels, medical facilities, or other vibration-sensitive receivers.

Sensitive Receptors: Locations considered more sensitive to adverse effects from air pollution (e.g., residences; preschools and kindergarten through grade 12 schools; daycare centers; health-care facilities such as hospitals, retirement homes, and nursing homes; and parks and/or playgrounds).

Significant: In CEQ usage, describes an impact that is sufficiently adverse, intense, or prolonged to require mitigation. In NEPA, to determine an impact is significant the context and intensity (the degree to which the effects on quality of human environment are controversial, whether the action threatens a violation of federal, state or local law, and others) of the action must be considered.

Sound Exposure Level (SEL): A time-integrated metric (i.e., continuously summed over a time period) that quantifies the total energy in the A-weighted sound level measured during a transient noise event. SEL accounts for both the duration and the loudness of a noise event.

State Implementation Plan (SIP): Statewide plan for complying with the federal Clean Air Act. The SIP consists of narrative, rules, and agreements that Florida will use to clean up polluted areas.

Sulfur Oxides (SOx): Sulfur-oxygen compounds that include the important criteria pollutants sulfur dioxide (SO_2) and sulfur trioxide (SO_3).

T

Train set: A complete single train, including engine(s) and cars.

Travel Time: The time spent traveling from a place of origin to a place of destination. Total travel time includes the time required to reach a station or an airport, time spent waiting for the next scheduled train or flight, time spent getting to the boarding area, time spent checking and retrieving luggage, time spent getting a rental car or taxi, as well as time spent to reach the final destination.

V

Vehicle Maintenance Facility (VMF): A dedicated facility for vehicle fueling, maintenance, repair and washing.

Vibration: A rapid linear motion of a particle or of an elastic solid about an equilibrium position.

Volatile Organic Compounds (VOCs): Colorless gaseous compounds originating, in part, from the evaporation and incomplete combustion of fuels. In the presence of sunlight VOCs react to form ozone, a pollutant regulated by the Clean Air Act Amendments.

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8 Distribution List

This Supplemental EA is being distributed to Federal, state and municipal agencies and to the interested parties listed below. This list includes those entities that the Federal Railroad Administration's *Procedures for Considering Environmental Impacts* require as part of the review of the document, including representatives of government agencies and community groups concerned with the Proposed Project. Copies of this EA are also available at the libraries listed below and through the FRA website (https://www.fra.dot.gov/Page/P0672). For more information regarding this document or for additional copies of this report please contact:

John Winkle
FRA Environmental Specialist
Office of Railroad Policy and Development
1200 New Jersey Ave. SE
Washington, D.C. 20590
(202) 493-6067
john.winkle@dot.gov

Federal Elected Officials

- Senator Bill Nelson
- Senator Marco Rubio
- Representative Alcee Hasting (District 20)
- Representative Theodore Deutch (District 21)
- Representative Lois Frankel (District 22)

Federal Agencies

- Federal Aviation Administration
- Federal Highway Administration
- Federal Transit Administration
- National Marine Fisheries Service
- United States Army Corps of Engineers
- United States Coast Guard
- United States Environmental Protection Agency (Washington D.C. and Regional)
- United States Fish and Wildlife Service

State Elected Officials

- Governor Rick Scott
- Representative Dave Kerner (District 87)
- Senator Jeff Clemens (District 27)
- Senator Maria Sachs (District 34)

State Agencies

- Florida Department of Environmental Protection
- Florida Department of Transportation
- Florida Division of Historical Resources/State Historic Preservation Officer
- State Environmental Management Office
- State of Florida Clearinghouse

County Elected Officials and Departments

- Broward County
- Palm Beach County

Local/Regional Agencies and Organizations

- East Central Florida Regional Planning Council
- Palm Beach Metropolitan Planning Organization
- South Florida Regional Planning Council
- South Florida Water Management District
- Treasure Coast Regional Planning Council

Municipalities

- City of Fort Lauderdale
- Palm Beach Gardens
- City of West Palm Beach

Appendix A: Agency Coordination

- A-1: SHPO Consultation Materials
- A-2: USFWS Consultation Materials

U.S. Department
of Transportation

**Federal Railroad
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

August 18, 2014

Ms. Ginny Jones
Bureau of Historic Preservation
Division of Historical Resources
Florida Department of State
500 South Bronough Street
Tallahassee, FL 32399

RE: All Aboard Florida Passenger Rail Project (Project) from Miami to West Palm Beach – Vehicle Maintenance Facility Relocation

Dear Ms. Jones:

The Federal Railroad Administration (FRA) is in the process of completing a Supplemental Environmental Assessment (SEA) for the above-referenced Project to be undertaken by All Aboard Florida - Operations LLC (AAF). In January 2013, FRA issued a Finding of No Significant Impact (FONSI) for the All Aboard Florida Passenger Rail Project (Project) from Miami to West Palm Beach Environmental Assessment (AAF EA).

Since the publication of the AAF EA, the Florida East Coast Railway, the owner of the Fort Lauderdale rail maintenance yard location, has planned other rail uses at the Fort Lauderdale site. This circumstance has necessitated that AAF find a new location for the rail maintenance facility in lieu of the Fort Lauderdale yard. AAF proposes to construct a new vehicle maintenance (VMF) and layover facility at an existing Florida East Coast Railway (FECR) freight yard in West Palm Beach, located north of 15th Street.

Portions of the WPB Rail Yard and the FECR Corridor between the WPB Rail Yard and WPB Station were previously surveyed during the Orlando to WPB Segment of the AAF Cultural Resources Assessment Report (CRAR; FMSF Survey No. 19480). No significant resources, other than the FECR Corridor itself, were identified within or adjacent to the portion of the boundary surveyed during the AAF CRAR survey.

No previously recorded archaeological sites, historic cemeteries, or historic bridges are located within or adjacent to the APE for the WPB VMF. The project area is not within or adjacent to any Archaeological Predictive Zones for Palm Beach County. Historic resources within the APE, not previously analyzed for the AAF EA, were evaluated for potential impacts. Based on a review of these sites, the WPB VMF will not have any direct impact on archaeological sites or historic resources and is not anticipated to have any indirect impact to historic resources (e.g., noise or vibration).

FRA has evaluated the Project and finds that the WPB VFM at the new site would have no adverse effect on historic properties. FRA seeks the concurrence of your office with the findings pursuant to 36 CFR 800.5(c)(1). Please respond within thirty days of your receipt of this letter. FRA may consider your lack of response as concurrence with the above finding, as provided in 36 CFR 800.S(c)(l).

In the event your office disagrees with this finding, please notify us via email, and overnight or private delivery service to ensure timely receipt of your communications.

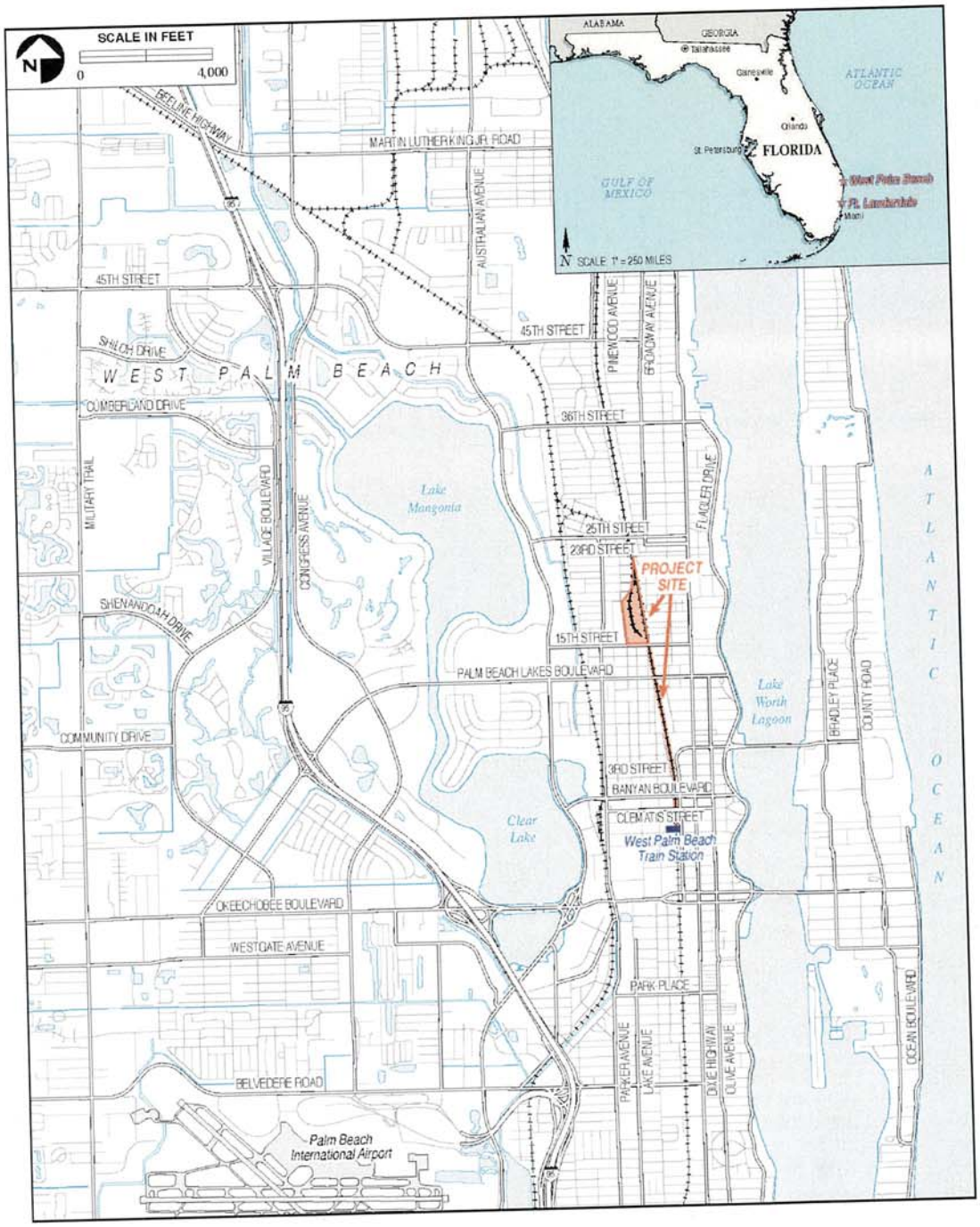
If you have questions or wish to discuss this project further, please contact John Winkle from my office at (202) 493-6067 or john.winkle@dot.gov.

Sincerely,

David Valenstein
Chief, Environment and Systems Planning Division

Enclosure – Site Location

WPB Rail Yard Site Location



FLORIDA DEPARTMENT of STATE

RICK SCOTT
Governor

KEN DETZNER
Secretary of State

David Valenstein
US Department of Transportation
Federal Railroad Administration (FRA)
1200 New Jersey Avenue SE
Washington, D.C. 20590

August 25, 2014

Attn: John Winkle

RE: DHR Project File No.: 2014-3758/Received by DHR: August 25, 2014
Project: *All Aboard Florida Passenger Rail Project from Miami to West Palm Beach: Vehicle Maintenance Facility (VMF) Relocation*
County: Palm Beach

Dear Mr. Valenstein:

This office reviewed the referenced project for possible effects on historic properties listed, or eligible for listing, on the *National Register of Historic Places (NRHP).* The review was conducted in accordance with Section 106 of the *National Historic Preservation Act of 1966*, as amended, and its implementing regulations in *36 CFR Part 800: Protection of Historic Properties.*

This proposed project involves the restoration of passenger rail service between Miami and West Palm Beach utilizing the existing Florida East Coast Rail (FECR) right-of-way (ROW). The current submission from your office is in reference to the new location for a VMF in support of the All Aboard Passenger Rail Project. The portion of the project that included the new VMF location was surveyed in 2013 (2013-4404). The Area of Potential Effect (APE) for the survey did not take into account this new activity at the VMF. According to our GIS records the Dunbar Village Public Housing Complex (8PB1328), an NRHP-eligible historic district is immediately adjacent to the proposed VMF facility and therefore, is vulnerable to impacts from the proposed VMF. Due to the close proximity of 8PB1328 to the proposed VMF, and the change in the proposed project at this location, this office requests that the effects of the proposed VMF on 8PB1328 be assessed.

If you have any questions, please contact Ginny Jones, Transportation Compliance & Review Architectural Historian, by email *ginny.jones@dos.myflorida.com*, or by telephone at 850.245.6333 or 800.847.7278.

Sincerely

Robert F. Bendus, Director
Division of Historical Resources
& State Historic Preservation Officer

U.S. Department
of Transportation
Federal Railroad Administration

1200 New Jersey Ave, SE
Washington, DC 20590

OCT 16 [illegible]

Ms. Ginny Jones
Bureau of Historic Preservation
Division of Historical Resources
Florida Department of State
500 South Bronough Street
Tallahassee, FL 32399

RE: All Aboard Florida Passenger Rail Project from Miami to West Palm Beach – Vehicle Maintenance Facility Relocation

Dear Ms. Jones:

The Federal Railroad Administration (FRA) has reviewed the August 25, 2014 letter from Mr. Robert Bendus, State Historic Preservation Officer, concerning the proposed relocation of the All Aboard Florida (AAF) Passenger Rail Project Vehicle Maintenance Facility (VMF). The AAF project proposes to implement passenger rail service between Miami and Orlando, FL with intermediate stops in Ft. Lauderdale and West Palm Beach (WPB). The first phase of the AAF project will implement service between Miami and WPB and was cleared under an Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) issued by FRA. One of the elements of the AAF project cleared under that EA/FONSI was a VMF located in Ft. Lauderdale. In the time since the EA/FONSI, the Ft. Lauderdale location has become unavailable and AAF is proposing to construct the VMF in a new location near the proposed Miami station.

In the August 25 letter, the Division of Historic Resources (DHR) requested that the FRA evaluate the effects of the proposed relocated VMF on the adjacent Dunbar Village Public Housing Complex (8PB 1328), a property that DHR has determined is eligible for the National Register of Historic Places (NRHP) as a historic district.

Dunbar Village (8PB 1328) is a 246-unit public housing complex in the West Tamarind neighborhood of West Palm Beach (City). The complex was constructed in 1939-1940, shortly after the passage of the Housing Act of 1937, and was one of the first public housing complexes in Florida. Over time, the complex has become significantly deteriorated. The northernmost 13 buildings of the complex have recently been demolished in a U.S. Department of Housing and Urban Development (HUD)-approved redevelopment program to improve and modernize the complex. An additional 17 buildings are proposed for demolition in the near future. According to the City's website, Phase I, the Sabal Palms Place project, consists of nine new townhouse units recently constructed on Tamarind Avenue. Phase II, the Paul Lawrence Dunbar Senior Complex, a 99-unit development, will be constructed using a HUD loan. Phase III, a 120-unit complex of garden-style apartments, is planned but not currently programmed for construction.

The Project will not directly affect the Dunbar Village historic district. As shown on the attached figure, the VMF will be located in the center of the existing yard, separated from the housing complex by existing freight yard tracks, buildings, and storage areas. The freight tracks are currently used to store and load freight trains, and this use is anticipated to continue in the future. The VMF will be approximately 500 feet east of the boundary of the historic district. There will be no new noise or vibration impacts that would affect the remaining buildings within this district, and there would be no change in the visual setting. For these reasons, FRA recommends a finding of no adverse effect for the Dunbar Village Historic District.

FRA has evaluated the Project and finds that the WPB VFM at the new site would have no adverse effect on historic properties. FRA seeks the concurrence of your office with the findings pursuant to 36 CFR 800.5(c)(1). Please respond within thirty days of your receipt of this letter. FRA may consider your lack of response as concurrence with the above finding, as provided in 36 CFR 800.5(c)(l).

In the event your office disagrees with this finding, please notify us via email, and overnight or private delivery service to ensure timely receipt of your communications.

If you have questions or wish to discuss this project further, please contact John Winkle from my office at (202) 493-6067 or john.winkle@dot.gov.

Sincerely,

FOR

David Valenstein
Chief, Environment and Systems Planning Division

Enclosures –
Figure 1 - Proposed VMF

Explanation of Features

- Proposed AAF Tracks
- FECR Tracks
- FECR Stub Tracks to be removed
- Existing Yard Buildings
- Fiber Optic Regen Building
- Shop Canopy Outline
- Building Outline
- Proposed Safety Fence
- Existing Fiber Optic Duct Bank
- Existing FECR R/W
- Limits of Asphalt Pavement

WPB Rail Yard Layout

All Aboard Florida Intercity Passenger Rail Project

N

450 Feet

U.S. Department of Transportation
Federal Railroad Administration

3-1

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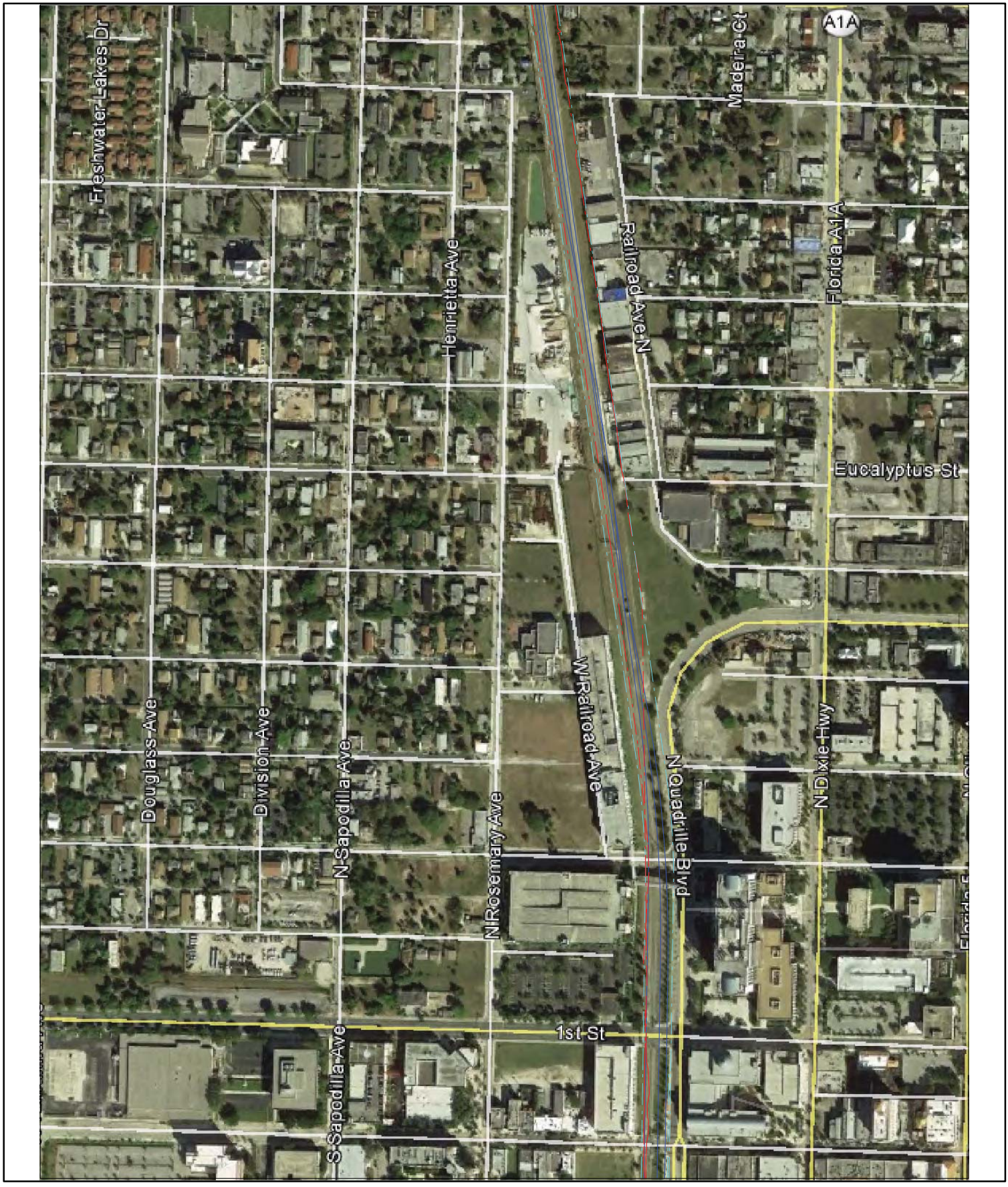
Project # 6063-12-0212



Explanation of Features

- Proposed AAF Tracks
- FECR Tracks
- FECR Stub Tracks to be removed
- Existing Yard Buildings
- Fiber Optic Regen Building
- Shop Canopy Outline
- Building Outline
- Proposed Safety Fence
- Existing Fiber Optic Duct Bank
- Existing FECR R/W
- Limits of Asphalt Pavement

WPB Rail Yard Layout (south)

All Aboard Florida Intercity Passenger Rail Project

N

450 Feet

U.S. Department of Transportation
Federal Railroad Administration

3-2

\\vhb\proj\Orlando\61827.00 FRA NEPA Support\graphics\FIGURES\8x11portrait.indd

Project # 6063-12-0212

U.S. Department
of Transportation

**Federal Railroad
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

August 18, 2014

Mr. Jay Harrington
North Florida Ecological Services Office
U.S. Fish and Wildlife Service
7915 Baymeadows Way, Suite 200
Jacksonville, Florida 32256-7517

RE: All Aboard Florida Passenger Rail Project (Project) from Miami to West Palm Beach – Vehicle Maintenance Facility Relocation

Dear Mr. Harrington:

The Federal Railroad Administration (FRA) is in the process of completing a Supplemental Environmental Assessment (SEA) for the above-referenced Project to be undertaken by All Aboard Florida - Operations LLC (AAF). In January 2013, FRA issued a Finding of No Significant Impact (FONSI) for the All Aboard Florida Passenger Rail Project (Project) from Miami to West Palm Beach Environmental Assessment (AAF EA).

Since the publication of the AAF EA, the Florida East Coast Railway, the owner of the Fort Lauderdale rail maintenance yard location, has planned other rail uses at the Fort Lauderdale site. This circumstance has necessitated that AAF find a new location for the rail maintenance facility in lieu of the Fort Lauderdale yard. AAF proposes to construct a new vehicle maintenance (VMF) and layover facility at an existing Florida East Coast Railway (FECR) freight yard in West Palm Beach (WPB), located north of 15th Street.

In the 2012 EA the potential impacts to federally- and state-listed species and critical habitat were evaluated through field surveys and a review of existing data and literature. Since the Project travels through a highly urbanized area within Palm Beach, Broward, and Miami-Dade Counties, and any direct impacts would be limited to the existing right-of-way, FRA concluded that the Project had little potential to significantly impact wildlife and habitat. On October 25, USFWS concurred with FRA's determination of no adverse effect. The proposed

West Palm Beach VMF is adjacent to the FECR Corridor evaluated in the EA, and is a developed (paved) active freight yard within a developed residential area. The proposed Project is therefore expected to have "No Effect" on listed species (wood stork, Florida scrub jay, eastern indigo snake) which have a low potential of occurrence on the site due to specific habitat requirements and known ranges. FRA finds the prior determinations also apply to the WPB Rail Yard location.

Therefore, FRA concludes that a determination of "no effect" is reasonably justified, and recommends that these species be dismissed from further analysis in the Environmental Assessment. Please respond within thirty days of your receipt of this letter. FRA may consider your lack of response as concurrence with the above finding.

In the event your office disagrees with this finding, please notify us via email, and overnight or private delivery service to ensure timely receipt of your communications.

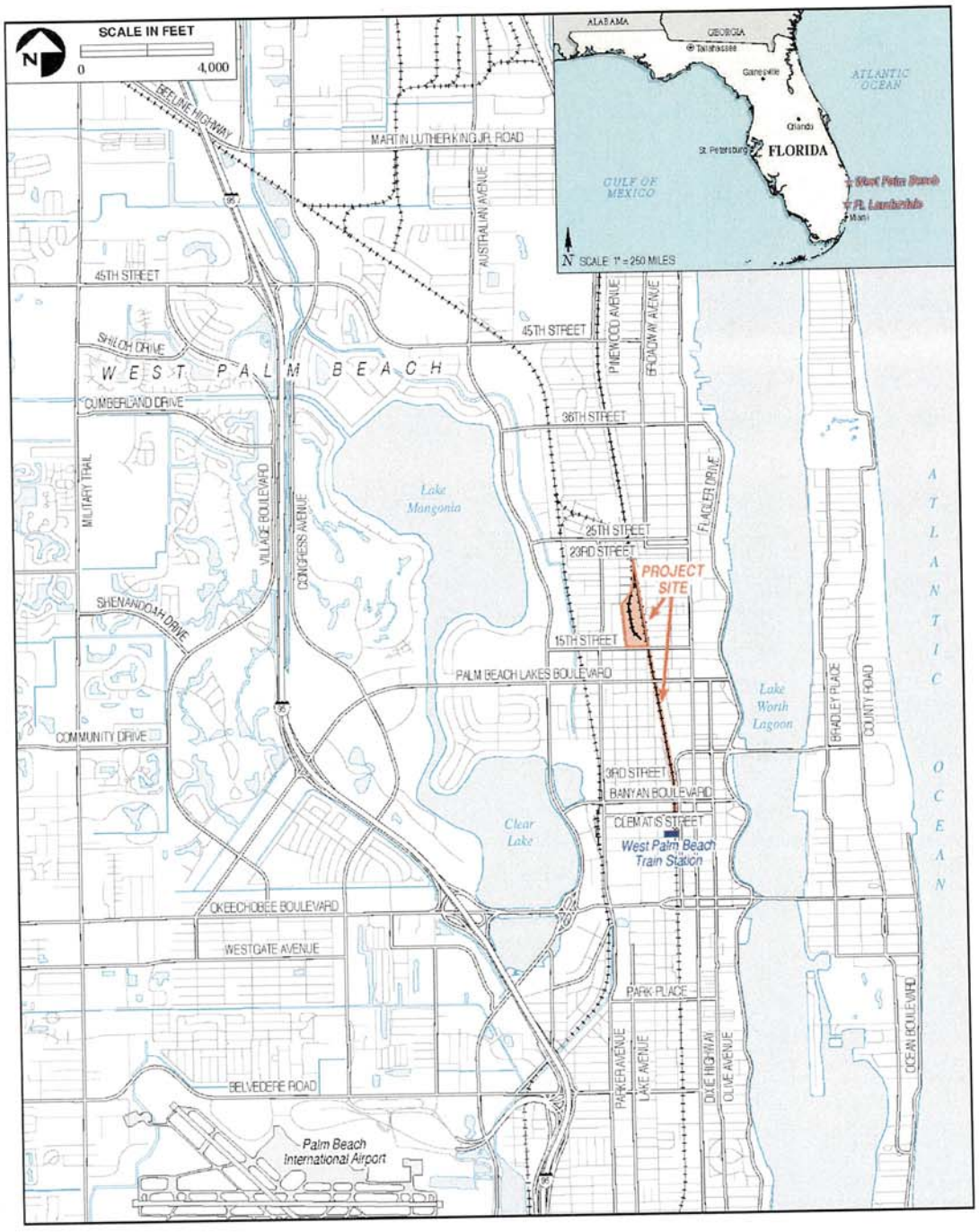
If you have questions or wish to discuss this project further, please contact John Winkle from my office at (202) 493-6067 or john.winkle@dot.gov.

Sincerely,

David Valenstein
Chief, Environment and Systems Planning Division

Enclosure – Site Location Map

WPB Rail Yard Site Location



From: Wrublik, John [mailto:john_wrublik@fws.gov]
Sent: Wednesday, August 27, 2014 8:15 AM
To: Winkle, John (FRA)
Subject: All Aboard Florida Vehicle Maintenance Facility Relocation

Dear. Mr. Winkle,

The U.S. Fish and Wildlife Service (Service) has received the letter from the Federal Railroad Administration (FRA) dated August 18, 2014, regarding the new proposed location for a Vehicle Maintenance Facility, north of 15th Street in West Palm Beach, Florida. The FRA has determined that the project will "not affect" Federally listed species. The Service notes that the project footprint is located in a highly urbanized area that does not contain habitat for Federally listed species. Therefore, the Service supports the FRA's determination. Thank you for your assistance in protecting Federally listed species.

Sincerely,

John M. Wrublik
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, Florida 32960
(772) 469-4282

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Appendix B: Noise and Vibration Analysis

- B-1: All Aboard Florida Proposed West Palm Beach Rail Yard Noise and Vibration Assessment Modeling Report
- B-2: All Aboard Florida Proposed West Palm Beach Rail Yard Noise and Vibration Assessment Monitoring Report

MEMO

To	**Lisa Standley, Ph.D. VHB Principal & FRA Representative**	File No.	**6063120212**
From	**Lucien Tender, P.E.**	cc:	**Charlene Stroehlen, P.E.**
Tel	**813-636-1529**		**Sam Arden, E.I.T.**
Fax			**Brian Cook**
Date	**September 11, 2014**		**Frank Babic, P.E. INCE**

Subject: All Aboard Florida Proposed West Palm Beach Rail Yard Noise and Vibration Assessment Modeling Report

1.0 INTRODUCTION

The objective of this supplemental analysis is to update the noise and vibration impact assessment for the West Palm Beach (WPB) Rail Yard performed previously as part of the Supplemental Environmental Assessment (SEA). Updates to the previous assessment include incorporation of noise and vibration monitoring results (Noise and Vibration Monitoring Report) to establish baseline conditions, as well as incorporation of additional noise sources that had not been included. The Project Area assessed in this report includes the WPB Rail Yard, as well as the mainline corridor between the yard and the proposed WPB Passenger Station to the south.

This report provides 1) a comparison of modeled to observed noise levels at four monitoring locations around the WPB Rail Yard to validate the modeling approach, 2) an updated noise impact analysis of 21 noise-sensitive receptors located adjacent to the Project Area, 3) a review of observed vibration levels at two locations around the WPB Rail Yard to establish site-specific vibration sources and propagation conditions and 4) an updated vibration impact analysis.

The results of the noise monitoring correlated well with the noise model once significant noise sources had been accounted for in the model. Minor differences between observed and modeled noise levels at each monitoring location were due to the limited representation of average WPB Rail Yard conditions obtained from just over 24 hours of monitoring. The noise assessment reported exceedances of the FTA impact criteria at several locations, mainly associated with the use of FRA-mandated train horn activation at nearby intersections on the mainline track. These impacts will be mitigated through implementation of way-side horns.

The results of the vibration monitoring identified existing vibration levels associated with current freight use along the mainline currently exceed FTA impact criteria in several locations. The current vibration levels were calculated based upon the use of the revised model. The assessment of future passenger train operations was based on the FTA model. Under project conditions no exceedance of impact criteria is verified, as Project vibration levels are much less than those currently experienced due to existing freight traffic.

2.0 COMPARISON OF MODELED AND OBSERVED NOISE LEVELS

Confirmatory noise monitoring was conducted from August 19, 2014 to August 21, 2014 at four locations representative of noise-sensitive receptors in proximity to the WPB Rail Yard. These locations were chosen to confirm the modeling approach and represent all the activities at the WPB Rail Yard. The proposed WPB Rail Yard layout is provided in **Appendix 1**, **Figure 1**. Three locations are on the west side of the WPB Rail Yard (North End, Middle Section and South end) and better represent the WPB Rail Yard activities. A fourth location to the East better captures the mainline train traffic (**Figure 2**).

During monitoring, the following noise sources were observed, which have been included in the updated model:

- Mainline Freight Traffic – Noise from through traffic that is generally traveling at speeds greater than 20 miles per hour (mph) with pass-by events lasting on the order of minutes (between 2-4 minutes is typical).
- Yard Inbound/Outbound Traffic – Noise from trains utilizing the WPB Rail Yard that are generally traveling at speeds of around 5 mph in and around the WPB Rail Yard. WPB Rail Yard Inbound/Outbound traffic includes trains that access both the WPB Rail Yard siding tracks to the east of existing buildings and WPB Rail Yard intermodal tracks to the west of existing buildings.
- Warning Horns - Near crossings (approximately ¼ mile) warning horns were observed.
- Idling – Idling trains at either intermodal or siding tracks that have just arrived or are preparing to depart.
- Auxiliary Equipment, General – This includes general vehicular traffic and mechanical noise observed on the WPB Rail Yard.
- Auxiliary Equipment, North Building – A point noise source was observed from the northernmost WPB Rail Yard building.
- Division Avenue Traffic – Close to Division Ave, noise from automobile traffic was observed.
- 15th Street Traffic – Close to 15th Street Traffic, noise from automobile traffic was observed.

During monitoring, noise from special track work (crossovers and switches) and coupling was observed but at noise levels that were negligible in comparison to major noise sources such as freight traffic and WPB Rail Yard activity. There is no PA system on site and no wheel squeal was observed during the monitoring effort.

Table 1 provides a summary of the observed noise sources at each location and how they supported or refuted initial modeling assumptions. **Figures 2** and **3** depict the four noise monitoring locations in relation to the noise-sensitive receivers.

Table 1: Summary of Modeled and Observed Noise Conditions

Source	Model Assumptions	Modeling Scenario				Conditions Within Monitoring Window			
		Noise Monitoring Location				Noise Monitoring Location			
		NM1	NM2	NM3	NM4	NM1	NM2	NM3	NM4
Mainline Freight Traffic	5 trains/day, 5 trains/night, 42 mph, 2 locos, 101 cars	M	M	M	M	O	O	O	O
Yard Inbound/Outbound Traffic	2 trains/day, 2 trains/night, 5 mph, 2 locos, 12 cars	M	M	M	M	Upd	Upd	Upd	Upd
Warning Horn	Sounded by each train 1/4 mile from 23rd St. and 15th St.	M	M	M	M	O	O	O	O
Idling	Each of 4 trains that use yard for 30 minutes each			M	M	N/O	N/O	O	O
Special Track work	Includes crossovers/switches					Neg	Neg	Neg	Neg
Wheel Squeal	Possible on tight curves					N/O	N/O	N/O	N/O
Coupling	From possible train building					Neg	Neg	N/O	N/O
PA System	Loudspeaker on yard property					N/O	N/O	N/O	N/O
Auxiliary Equipment	General machine equipment, observed throughout the day					Upd	Upd	Upd	Upd
Yard Vehicle Traffic	General traffic including loading, unloading, etc.					Upd	Upd	Upd	Upd
Division Ave. and 15th St Vehicle Traffic	100 cars/hour day, 25 cars/hour night, 25 mph					N/O	Upd	Upd	N/O

Definitions:
M – Noise source modeled
O – Noise source observed similar to modeled
Upd – Noise source observed but requires update to be consistent with typical operations and input assumptions
Neg – Noise source observed but negligible in relation to other sources
N/O – Noise source not observed

Based on the observations of significant noise sources during noise monitoring, the model was updated to include additional noise sources such as train activity on the intermodal track, auxiliary equipment at the WPB Rail Yard, and vehicular traffic on Division Avenue and 15th Avenue East. A description of the individual noise sources considered, as well as their distance from each noise monitoring location, is provided in Table 2.

Table 2: Noise Source Distance to Receptors for Existing Freight and Yard Operations

Source	Description	NM1	NM2	NM3	NM4
Fixed-Guideway Sources		**Distance (ft)**			
Mainline Away from Yard	7 trains/day, 7 trains/night, throttle @ 8, speed 42 mph, 2 locos, 101 cars	na	na	na	na
Mainline Away from Yard - WH	7 trains/day, 7 trains/night, throttle @ 8, speed 42 mph, 2 locos, 101 cars, warning horn	na	na	na	na
Mainline Near Yard - WH	5 trains/day, 5 trains/night, throttle @ 8, speed 42 mph, 2 locos, 101 cars, warning horn	230	665	145	70
North Siding - WH	1 train/day, 1 train/night, throttle @ 1, speed 5 mph, 1 loco, 12 cars, warning horn	185	na	na	na
Intermodal Track	1 train/day, 1 train/night, throttle @ 1, speed 5 mph, 1 loco, 12 cars	80	305	115	425
South Siding - WH	1 train/day, 1 train/night, throttle @ 1, speed 5 mph, 1 loco, 12 cars, warning horn	na	620	125	110
Highway/Transit Sources		**Distance (ft)**			
Division Ave. Automobiles	60 cars/hour day, 25 cars/hour night, 25 mph	na	10	30	na
Stationary Sources		**Distance (ft)**			
Idling - Siding	1 train/day, 1 train/night, 30 minutes of idling per train	185	620	450	110
Idling - Intermodal Track	1 train/day, 1 train/night, 30 minutes of idling per train	80	305	250	425
Auxiliary Equipment	45 minutes of activity each hour from 7a-10p, 45 minutes of activity total 10p-7a	200	160	300	220
Auxiliary Equipment – North Building	45 minutes of activity each hour from 7a-10p, 45 minutes of activity total 10p-7a	175	na	na	na

Notes:
na: source not applicable to noise monitoring location
Decay coefficient for fixed-guideway sources = 15
Decay coefficient for stationary sources = 25

Next, field monitoring results were adjusted to better represent long-term/typical activities in the vicinity of the Project Area. Although noise monitoring accurately establishes noise levels at particular receptors as a function of individual noise sources, it is difficult to capture long-term noise level averages in 24-48 hours of monitoring. Current train operations on the FECR corridor are not consistent, and the measurements used for the modeling effort were adjusted to be consistent with railroad operations. This allowed for a confirmatory comparison of modeled and adjusted observed $L_{eq}(h)$ and L_{dn} values at each noise monitoring location, which are provided in Table 3. These results show that the model provides accurate estimates of sound level conditions and can be used for modeling of project noise conditions.

Table 3: Comparison of Modeled to Observed Noise Levels

Noise Monitoring Location	Modeled			Observed			Modeled - Observed		
	$L_{eq}(d)$	$L_{eq}(n)$	L_{dn}	$L_{eq}(d)$	$L_{eq}(n)$	L_{dn}	$L_{eq}(d)$	$L_{eq}(n)$	L_{dn}
NM1	66	65	72	69	62	71	-3	3	1
NM2	63	60	67	64	59	67	-1	1	0
NM3	65	67	73	65	67	73	0	0	0
NM4	69	71	77	67	68	74	2	3	3

3.0 UPDATE TO NOISE IMPACT ANALYSIS

Using the updated and validated noise model, a noise impact analysis was performed for Category 2 and Category 3 noise-sensitive land uses within the vicinity of the Project Area (no Category 1 land uses were identified). The impact analysis for Category 2 land uses was performed by identifying a representative parcel, or receptor, in each of the 17 clusters identified in **Figures 2** and **3** and modeling existing and proposed noise levels in terms of L_{dn}. For clusters 16 and 17, the additional noise created by the proposed intermodal track alignment (**Figure 1**) was taken into account as well. However, based on the absence of wheel squeal in audio recordings of freight operations along the curves of existing intermodal tracks during the monitoring effort and that the proposed intermodal tracks have curve radii (approximately 400-feet) equal to or greater than curve radii of the existing intermodal tracks (approximately 400-feet), wheel squeal associated with existing or proposed operations along intermodal tracks was not included in the modeling. For Category 3 land uses, four churches were identified and are identified in **Figures 2** and **3**. Existing and proposed noise levels were modeled at each church in terms of $L_{eq}(h)$.

Proposed noise levels were modeled using the same approach as existing, with different model inputs. Table 4 gives a list and description of the individual noise sources anticipated as part of the proposed project.

Table 4: Noise Source Inputs to Proposed Passenger Operations

Source	Description
Fixed-Guideway Sources	
Mainline Away From Yard	12 trains/day, 4 trains/night, throttle < 6, speed 20 mph, 2 locos, 8 cars
Mainline Away From Yard - WH	12 trains/day, 4 trains/night, throttle < 6, speed 20 mph, 2 locos, 8 cars, warning horn
Yard I/O - South	12 trains/day, 4 trains/night, throttle < 6, speed 5 mph, 2 locos, 8 cars, warning horn
Stationary Sources	
Idling	8 trains/day, 4 trains/night, 30 minutes of idling per train

To determine the noise level at each noise-sensitive receptor, the distance from each receptor to each individual noise source was determined in order to calculate the cumulative existing and

cumulative proposed noise exposure at each receptor. For residential clusters, a representative parcel (as indicated in **Figures 2** and **3**) was selected and the distance was calculated from the noise source to the nearest edge of the structure using aerial imagery. For category 3 receptors, the nearest edge of the church was used. Table 5 provides existing noise sources, proposed noise sources, and distances. A distance coefficient of 15 was used for the linear noise decay equation, while 25 was used for stationary noise decay equation following the Create Rail Noise Model (HMMH, 2006).

Table 5: Summary of Noise Sources and Residential Cluster Distances

Existing	Cluster																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Fixed-Guideway Sources	**Distance (ft)**																
Mainline Away from Yard	--	--	--	--	300	215	190	70	--	--	--	--	--	--	--	--	--
Mainline Away from Yard - WH	--	--	--	--	--	--	--	--	70	70	315	--	--	--	--	--	--
Mainline Near Yard - WH	70	60	220	295	--	--	--	--	--	--	--	190	290	735	715	370	235
North Siding - WH	115	105	--	--	--	--	--	--	--	--	--	--	--	--	670	325	190
Intermodal Track	300	420	260	--	--	--	--	--	--	--	--	150	255	385	350	150	100
South Siding - WH	--	--	235	315	--	--	--	--	--	--	--	150	275	690	--	--	--
Highway/Transit Sources	**Distance (ft)**																
Automobile	--	--	--	--	--	--	--	--	--	--	--	--	--	20	20	--	--
Stationary Sources	**Distance (ft)**																
Idling - Siding	115	105	300	450	--	--	--	--	--	--	--	500	400	690	670	325	190
Idling - Intermodal Track	300	420	300	500	--	--	--	--	--	--	--	375	300	385	350	150	100
Auxiliary Equipment - General	245	210	440	600	--	--	--	--	--	--	--	375	290	230	200	115	265
Auxiliary Equipment – North Side	175	--	--	--	--	--	--	--	--	--	--	--	--	--	--	265	240
Proposed	Cluster																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Fixed-Guideway Sources	**Distance (ft)**																
Mainline Away from Yard	--	--	--	--	300	215	190	70	--	--	--	--	--	--	--	--	--
Mainline Away from Yard - WH	--	--	--	--	--	--	--	--	70	70	315	--	--	--	--	--	--
Yard I/O - South	265	250	260	315	--	--	--	--	--	--	--	130	275	490	470	--	--
Stationary Sources	**Distance (ft)**																
Idling	265	250	500	700	--	--	--	--	--	--	--	500	400	490	470	200	290

Notes:
"--"indicates source not likely at cluster
Decay coefficient for fixed-guideway sources = 15
Decay coefficient for stationary sources = 25

Table 6: Summary of Noise Sources and Church Parcels

Existing	Church			
	1	2	3	4
Fixed-Guideway Sources	**Distance (ft)**			
Mainline Away from Yard	--	--	--	--
Mainline Away from Yard - WH	--	--	215	--
Mainline Near Yard - WH	165	200	--	300
North Siding - WH	210	245	--	--
Intermodal Track	400	560	--	--
South Siding - WH	--	--	--	300
Highway/Transit Sources	**Distance (ft)**			
Automobile	--	--	--	--
Stationary Sources	**Distance (ft)**			
Idling - Siding	210	245	--	--
Idling - Intermodal Track	400	560	--	--
Auxiliary Equipment - General	335	385	--	--
Auxiliary Equipment – North Side	165	--	--	--
Proposed	**Church**			
	1	**2**	**3**	**4**
Fixed-Guideway Sources	**Distance (ft)**			
Mainline	--	--	--	--
Crossing	--	--	215	--
Yard I/O - South	350	390	--	275
Stationary Sources	**Distance (ft)**			
Idling	350	390	--	--

Notes:
"--"indicates source not likely at cluster
Decay coefficient for fixed-guideway sources = 15
Decay coefficient for stationary sources = 25

Finally, a comparison of project to existing noise exposure was made at each cluster or receptor. Results of the comparison, along with a designation of impact, are provided in Table 7. For all receptors except clusters 16 and 17, impact was determined based on a direct comparison of project to existing noise. However, because the project is proposing to move a section of the intermodal track at the north of the yard closer to the residential parcels adjacent to the yard, the impact determination was made by comparing the cumulative noise exposure increase from the project (project noise + existing noise sources utilizing proposed track layout) to the existing noise (utilizing current track layout) using the relationship illustrated in Figure 3-2 of the FTA Manual.

Table 7 presents noise impacts that exist before accounting for the mitigation measures stipulated in the AAF EA's FONSI (i.e., use of stationary wayside warning horns rather than the warning horns on the locomotives where unmitigated impacts exist as a result of the Project).

Table 7: Results of Noise Impact Analysis Before Mitigation

Cluster/ Receptor	Existing Noise Level	Project Noise Level	Impact Criteria		Impact Category	Total Noise Level	Noise Level Increase	# of Impacts	
			Mod	Sev				Mod	Sev
Category 2 Landuses – Noise Exposure in L_{dn}									
Cluster 1	77	68	65	75	Moderate	78	1	2	0
Cluster 2	78	69	65	75	Moderate	79	1	4	0
Cluster 3	70	68	64	70	Moderate	72	2	4	0
Cluster 4	68	67	63	68	Moderate	71	3	2	0
Cluster 5	62	55	59	64	No Impact	63	1	0	0
Cluster 6	64	57	60	66	No Impact	65	1	0	0
Cluster 7	65	58	61	66	No Impact	66	1	0	0
Cluster 8	67	60	62	67	No Impact	68	1	0	0
Cluster 9	78	76	65	75	Severe	80	2	0	2
Cluster 10	78	76	65	75	Severe	80	2	0	3
Cluster 11	68	66	63	68	Moderate	70	2	2	0
Cluster 12	71	73	65	71	Severe	75	4	0	3
Cluster 13	68	64	63	68	Moderate	69	1	3	0
Cluster 14	64	64	60	66	Moderate	67	3	6	0
Cluster 15	65	64	61	66	Moderate	68	3	6	0
Cluster 16[1]	68	58	--	--	Moderate	71	3	3	0
Cluster 17[1]	71	54	--	--	Moderate	72	1	2	0
Category 3 Landuses – Noise Exposure in L_{eq}(day)									
Church 1	65	58	66	71	No Impact	66	1	0	0
Church 2	58	57	62	67	No Impact	60	2	0	0
Church 3	63	64	64	70	No Impact	67	4	0	0
Church 4	55	59	60	66	No Impact	61	6	0	0

[1]Impact determination made based on comparison of cumulative noise exposure increase to existing noise, Figure 3-2 of FTA Manual. Cumulative noise exposure ("Total Noise Level") calculated as the sum of Project Noise Level and a revised Existing Noise Level that takes into account the realignment of the Intermodal Track. Revised Existing Noise Level not shown in Table.

Operational noise impacts projected from the Project Area would result from continuation of ongoing freight operations, project-related noise, and existing background noise, but increases in noise levels would primarily result from the use of warning horns at grade crossings. Accordingly, a design – consistent with the AAF EA FONSI – was analyzed that assumed the use of locomotive warning horns would be replaced with stationary wayside horns where unmitigated noise impacts exist as a result of the Project. Results of the impact analysis under mitigated conditions are provided in Table 8.

Table 8: Results of Noise Impact Analysis After Mitigation

Cluster/ Receptor	Existing Noise Level	Project Noise Level	Impact Criteria		Impact Category	Total Noise Level	Noise Level Increase	# of Impacts	
			Mod	Sev				Mod	Sev
Category 2 Landuses – Noise Exposure in L_{dn}									
Cluster 1	77	63	65	75	No Impact	78	1	0	0
Cluster 2	78	63	65	75	No Impact	78	0	0	0
Cluster 3	70	62	64	70	No Impact	71	1	0	0
Cluster 4	68	61	63	68	No Impact	69	1	0	0
Cluster 5	62	55	59	64	No Impact	63	1	0	0
Cluster 6	64	57	60	66	No Impact	65	1	0	0
Cluster 7	65	58	61	66	No Impact	66	1	0	0
Cluster 8	67	60	62	67	No Impact	68	1	0	0
Cluster 9	78	65	65	75	No Impact	78	0	0	0
Cluster 10	78	65	65	75	No Impact	78	0	0	0
Cluster 11	68	55	63	68	No Impact	69	1	0	0
Cluster 12	71	67	65	71	Moderate	73	2	3	0
Cluster 13	68	58	63	68	No Impact	68	0	0	0
Cluster 14	64	58	60	66	No Impact	65	1	0	0
Cluster 15	65	59	61	66	No Impact	66	1	0	0
Cluster 16[1]	68	58	--	--	Moderate	71	3	3	0
Cluster 17[1]	71	54	--	--	Moderate	72	1	2	0
Category 3 Landuses – Noise Exposure in L_{eq}(day)									
Church 1	65	52	66	71	No Impact	65	0	0	0
Church 2	58	51	62	67	No Impact	59	1	0	0
Church 3	63	53	64	70	No Impact	63	0	0	0
Church 4	55	53	60	66	No Impact	57	2	0	0

[1]Impact determination made based on comparison of cumulative noise exposure increase to existing noise, Figure 3-2 of FTA Manual. Cumulative noise exposure ("Total Noise Level") calculated as the sum of Project Noise Level and a revised Existing Noise Level that takes into account the realignment of the Intermodal Track. Revised Existing Noise Level not shown in Table.

Incorporation of the mitigation measures outlined in the AAF EA FONSI (i.e., use of stationary wayside warning horns rather than the warning horns on the locomotives), would result in Moderate Impact to 8 category 2 parcels.

4.0 OBSERVED VIBRATION LEVELS

Vibration monitoring was conducted from August 20, 2014 to August 22, 2014 at two locations located to the east and southwest of the Yard (see **Figures 2** and **3**) in order to support the modeling approach for vibration conditions. At each monitoring location, four sensors were placed at increasing distances from the corridor. Table 9 provides a summary of the vibration levels observed at each location.

Table 9: Summary of Observed Vibration Conditions

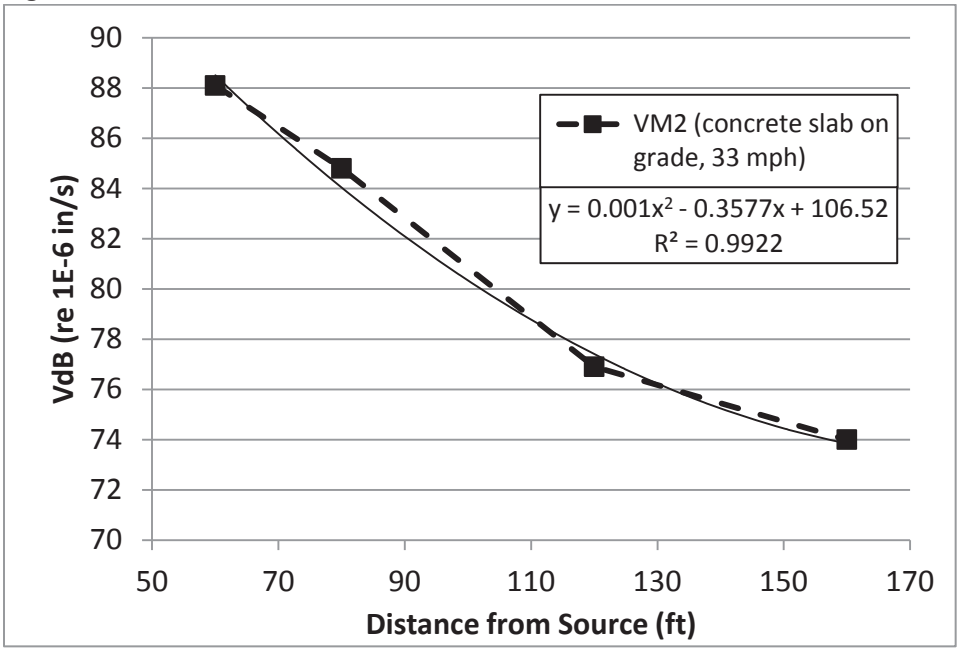
Monitoring Location	Distance to Source (ft)	Background VdB (re 1E-6 in/s)	Train Passby VdB (re 1E-6 in/s)
VM1 (on soil[1], 22 mph)	25	34.5	78.6
	60	41.1	75.7
	80	56.2	72.5
	120[2]	49.1	74.2
Monitoring Location	**Distance to Source (ft)**	**Background VdB (re 1E-6 in/s)**	**Train Passby VdB (re 1E-6 in/s)**
VM2 (concrete slab on grade[3], 33 mph)	60	70.8	88.1
	80	58.6	84.8
	120	64.6	76.9
	160	70.6	74.0

[1] Sensors were installed on soil by means of a steel stake in the ground
[2] Sensor was installed on concrete sidewalk
[3] Sensors were installed on concrete sidewalk (slab on grade)

5.0 UPDATE TO VIBRATION IMPACT ANALYSIS

Based on the monitoring results discussed in Section 3.0, updates to the vibration impact analysis were performed by making appropriate adjustments to the measured vibration levels. First, a vibration curve was established for the vibration levels observed at location VM2. To be conservative, this curve was used as the basis for future vibration calculations as location VM2 represents the most efficient coupling of the sensors to the soil - through concrete slab at grade. **Figure 4** shows the curve that was established, as well as the second degree polynomial equation that was fitted to the curve in order to calculate vibration levels at intermediate distances. For distances greater than 160 ft, it was assumed that baseline vibration level was 74 VdB (re 1E-6 in/s).

Figure 4: Vibration Curve



Using the baseline curve above, referenced to 33 mph, the residential and recreational receptors identified for noise were used to calculate vibration levels at vibration-sensitive receptors. For each receptor, the most significant vibration source was considered. There were no Category 1 land uses or Special Buildings identified in the vicinity of the Project Area.

Currently 14 freight pass-by events (10 mainline and 4 Yard in/out) regularly occur along the project area, and 16 additional events (passenger) are proposed. Therefore, current conditions were assessed using Infrequent Events criteria and proposed conditions were assessed using Occasional Events criteria to gage impact at each Cluster or receptor.

Using the vibration curve given in **Figure 4**, additional adjustments were made to account for differences in operating speed. The results of the impact analysis for the current operations are given in Tables 10, along with applicable impact criteria. Vibration levels related to current freight operations are given in ***bold italics*** if they exceed the Infrequent Events criteria[1].

[1] Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day (Federal Transit Administration (FTA). Transit Noise and Vibration Impact Assessment. USDOT Report Number FTA-VA-90-1003-06, May 2006, section 8.1.1)

Table 10. Existing Vibration Levels at Sensitive Receptors

Cluster/ Church	Existing Vibration Impact Assessment						
	Source	Speed (mph)	Distance (ft)[1]	Infrequent Criteria	Occasional Criteria	Frequent Criteria	Vibration Level
				VdB (re 1E-6 in/s)			
1	Mainline	42	70	80	75	72	***88***
2	Mainline	42	60	80	75	72	***91***
3	Mainline	42	220	80	75	72	77
4	Mainline	42	295	80	75	72	77
5	Mainline	42	300	80	75	72	77
6	Mainline	42	215	80	75	72	77
7	Mainline	42	190	80	75	72	77
8	Mainline	42	70	80	75	72	***88***
9	Mainline	42	70	80	75	72	***88***
10	Mainline	42	70	80	75	72	***88***
11	Mainline	42	315	80	75	72	77
12	Mainline	42	190	80	75	72	77
13	Mainline	42	290	80	75	72	77
14	Intermodal	5	385	80	75	72	58
15	Intermodal	5	350	80	75	72	58
16	Intermodal	5	150	80	75	72	59
17	Intermodal	5	100	80	75	72	64
Church 1	Mainline	42	165	83	78	75	77
Church 2	Mainline	42	200	83	78	75	77
Church 3	Mainline	42	215	83	78	75	77
Church 4	Mainline	42	300	83	78	75	77

[1]For distances outside the range of the baseline curve (> 160 ft) a value of 74 VdB was assumed

For future operations, the FTA model described for ground-borne vibrations was used. The results on Table 11 represent the assessment for the future operations (passenger trains). The main assumptions used for modeling purposes are speed correction, correction due to jointed track, and coupling to wood frame construction houses. Based on the results given in Table 11 no parcels experience additional vibration events that exceed the Occasional Events criteria[2].

[2] "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day (Federal Transit Administration (FTA). Transit Noise and Vibration Impact Assessment. USDOT Report Number FTA-VA-90-1003-06, May 2006, section 8.1.1)

Table 11. Proposed Vibration Levels at Sensitive Receptors

Cluster/ Church	Project Vibration Impact Assessment						
	Source[2]	Speed (mph)	Distance (ft)[1]	Infrequent Criteria	Occasional Criteria	Frequent Criteria	Vibration Level
				VdB (re 1E-6 in/s)			
1	Mainline	5	70	80	75	72	63
2	Mainline	5	60	80	75	72	64
3	Mainline	5	220	80	75	72	50
4	Mainline	20	295	80	75	72	63
5	Mainline	20	300	80	75	72	63
6	Mainline	20	215	80	75	72	62
7	Mainline	20	190	80	75	72	63
8	Mainline	20	70	80	75	72	75
9	Mainline	20	70	80	75	72	75
10	Mainline	20	70	80	75	72	75
11	Mainline	20	315	80	75	72	64
12	Mainline	20	190	80	75	72	63
13	Mainline	20	290	80	75	72	63
14	Yard	5	385	80	75	72	58
15	Yard	5	350	80	75	72	54
16	Intermodal	5	55	80	75	72	73
17	Intermodal	5	55	80	75	72	73
Church 1	Mainline	20	165	83	78	75	65
Church 2	Mainline	20	200	83	78	75	63
Church 3	Mainline	20	215	83	78	75	62
Church 4	Mainline	20	300	83	78	75	63

[1]For distances outside the range of the baseline curve (> 160 ft) a baseline value of 74 VdB was assumed
[2]For Clusters 16 and 17, the source is assumed to be the revised intermodal track servicing freight traffic, 4-trains per day, thus “Infrequent Criteria” is appropriate. A +8 VdB adjustment was made due to primary stiff suspension usually considered for freight trains

6.0 CONCLUSIONS

A supplemental noise and vibration assessment was performed for the proposed AAF WPB Yard and the existing mainline track between the Yard and the proposed WPB Passenger Station to the south. Results of the noise assessment conducted reported several exceedances of the FTA impact criteria, primarily due to passenger trains using warning horns near at-grade crossings. However, these impacts can be mitigated through the use of stationary wayside warning horns, as described in the AAF EA FONSI.

The vibration assessment conducted reported impacts due to existing freight activities above infrequent event criteria at several locations along the mainline. However, no vibration impacts associated with proposed passenger train activities were identified above the Occasional Events criteria due to mainline or the WPB Rail Yard activities.

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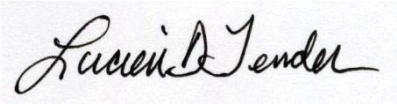

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7.0 REFERENCES

1. Federal Transit Administration (FTA). Transit Noise and Vibration Impact Assessment. USDOT Report Number FTA-VA-90-1003-06, May 2006.

2. HMMH, 2006. Noise Model Based on Federal Transit Administration General Transit Noise Assessment. https://www.fra.dot.gov/eLib/Details/L03727

Appendix A
Figures

Figure 1. Conceptual Yard Layout
Figure 2. Noise and Vibration Monitoring Locations and Clusters
Figure 3. Cluster Locations and Sensitive Receptors

LEGEND

- PROPOSED AAF TRACKS
- FECR TRACKS
- FECR STUB TRACK TO BE REMOVED
- EXISTING YARD BUILDINGS
- FIBER OPTIC REGEN BUILDING
- SHOP CANOPY OUTLINE
- BUILDING OUTLINE
- PROPOSED SAFETY FENCE (ENCLOSED AREA FOR AAF = 8.0 ACRES)
- EXISTING FIBER OPTIC DUCT BANK
- EXISTING FECR R/W
- LIMITS OF ASPHALT PAVEMENT

Figure 1

CONCEPT PLAN

ALL ABOARD FLORIDA
WEST PALM BEACH RUNNING REPAIR FACILITY

8/1/14
1" = 100'

VINAY MUDHOLKAR
AAF SR. VP, RAIL INFRASTRUCTURE

EUGENE SKOROPOWSKI
AAF SR. VP, PASSENGER RAIL DEVELOPMENT

FRAN CHINNICI
FECR SR. VP, ENGINEERING AND PURCHASING

TO BE WORKED OUT IN DETAILED DESIGN

- Final details for AAF shop canopy height and location.
- Roadway access for FECR signals shop and fire truck access needs to be maintained.
- AAF tracks will be paved in order for fluid truck movement near existing warehouses and buildings to be maintained.
- Signal system interface will be provided for proposed turnout near the 15th Street at-grade crossing to avoid trains blocking the crossing.
- Proposed plan for the Northwood Connection needs to be reviewed and coordinated with the yard plan.
- Maximize the access road and loading/unloading area on the FECR intermodal tracks.

Explanation of Features

- Corridor Centerline
- Noise Monitoring Location
- Vibration Monitoring Location
- Church
- Category 2 Representative Receptor
- Category 3 Receptors – Churches
- Category 2 Parcel
- Existing Yard Building
- Existing FECR R/W
- Category 2 Receptors – Clusters

Monitoring and Cluster Locations

All Aboard Florida Intercity Passenger Rail Project

N

0 450 Feet

U.S. Department of Transportation
Federal Railroad Administration

Figure

Path: H:\AllAboardFlorida\Task1\MXD\WPB Yard - Monitoring and Cluster Locations.mxd

Project # 6063-12-0212

Data Sources: ESRI 2012, FRA 2012, FGDL 2012, AMEC 2014.

Explanation of Features

- Corridor Centerline
- Noise Monitoring Location
- Vibration Monitoring Location
- Church
- Category 2 Representative Receptor
- Category 3 Receptors – Churches
- Category 2 Parcel
- Existing Yard Building
- Existing FECR R/W
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Monitoring and Cluster Locations

All Aboard Florida Intercity Passenger Rail Project

N

0 450 Feet

U.S. Department of Transportation
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Figure

Path: H:\AllAboardFlorida\Task1\MXD\WPB Yard - Monitoring and Cluster Locations.mxd

Project # 6063-12-0212

MEMO

To	**Lisa Standley, Ph.D. VHB Principal & FRA Representative**	File No.	**6063120212**
From	**Frank Babic / Mohammed Salim**	cc:	**Lucien Tender**
Tel	**905-568-2929 x 4212**		**Charlene Stroehlen**
Fax	**905-568-1686**		**Sam Arden**
Date	**September 10, 2013**		**Brian Cook**
			Alfredo Rodrigues

Subject: All Aboard Florida Proposed West Palm Beach Rail Yard Noise and Vibration Monitoring Report

1.0 INTRODUCTION

The West Palm Beach (WPB) Rail Yard is an approximately 27-acre site located in WPB, Florida (**Appendix A**, **Figure 1**). This report presents the data collected during a monitoring effort to characterize the existing ambient noise and vibration levels in the vicinity of the WPB Rail Yard. The data collected, as well as, the assessment of the sources captured, will support a confirmatory review of the modeling effort. It also provides additional information for support of the modeling effort.

A separate supplemental noise and vibration assessment modeling report will identify the current noise and vibration levels of existing freight operations near adjacent properties surrounding the operational WPB Yard, and will evaluate potential changes within the adjacent residential communities resulting from proposed operations at the Vehicle Maintenance Facility (VMF) and changes to the intermodal freight track layout.

This baseline report has been prepared to support the supplemental noise and vibration assessment modeling by providing noise and vibration monitoring data of the existing WPB Rail Yard.

2.0 PURPOSE OF THE MONITORING PROGRAM

AMEC completed a noise and vibration monitoring effort between August 19th and 22nd, 2014. The monitoring objective is confirmatory in nature to further define the existing noise and vibration environment, for use in conjunction with the predicted modeling. Data was collected in locations representative of noise-sensitive receptors close to the WPB Rail Yard, as per the approved test plan. This baseline memorandum summarizing the results of the monitoring has been prepared for reference in the supplemental technical noise and vibration report.

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3.0 MONITORING

A total of four (4) noise monitoring locations and two (2) vibration monitoring locations were selected based on the proposed layout of the WPB Rail Yard and adjacent sensitive receptors. **Figure 2** illustrates the noise monitoring locations (NM1 to NM4) and vibration monitoring locations (VM1 and VM2).

In addition, AMEC completed a windshield survey (i.e., review of noise sensitive receptors) around the Yard. The survey included a general review of the area and a focused effort on the first row of buildings adjacent to the Yard. AMEC confirmed that the sensitive receptors are mainly residential buildings. There were no hospitals identified in the area. There are four places of worship located at approximately 165 ft, 200 ft, 215 ft, and 300 ft from the centerline of the mainline, with the closest one being located east of the Yard on Cheerful Street. Two schools are located in the vicinity of the Yard and are approximately 960 ft and 975 ft, to the east and west of the Yard, respectively (**Figure 3**).

3.1 Noise Monitoring

The four noise monitoring locations selected are representative of noise-sensitive receptors in proximity of the Yard. These locations were chosen to confirm the modeling approach and represent all the activities occurring at the Yard. Three locations (NM1 through NM3) are on the west side of the Yard (North End, Middle Section and South End) and better represent the Yard activities. A fourth noise monitoring location (NM4), located on the east side of the mainline tracks, better captures the mainline train activities.

Microphones for sound level measurements were set to a height of 6 ft (for NM1 through NM3) and 12 ft (for NM4) off the ground. The height of NM4 was set higher to get a direct line-of-sight to the train pass-bys. Noise events were recorded during the day and night, and night-time measurements were unattended. Noise meters were equipped with audio recording capabilities that facilitate determining the number of train pass-bys and other related noise events (i.e., train horns, locomotive idling, train building/coupling noise, yard vehicle activity) during the noise monitoring period. Noise meters were set to record noise events when sound levels increased by 5 dB over the background sound levels.

3.2 Vibration Monitoring

Attended vibration measurements were conducted at two locations (VM1 and VM2) noted in **Figure 2**. Train movements at VM1 and VM2 were observed during the daytime and recorded to capture vibration events. Vibration transducers were installed at four setback distances from the track. This provides vibration conditions at varying distances from the vibration source and allows for characterization of representative receptors at varied setback distances. Vibration transducers were installed at the following locations and setbacks:

Vibration Monitoring Location VM1: VM1 is located along the west side of the mainline tracks, south of the Yard and in the vicinity of Henrietta Avenue (between 14th Street and & 15th Street). The transducers were installed at the following setbacks:

- As close to right-of-way (ROW) wall as possible (approximately 25 ft from second track (2 of 4) centerline);
- 60 feet from second track centerline;
- 80 feet from second track centerline; and
- 120 feet from second track centerline.

The accelerometers for VM1 were installed on soil via a mechanical coupler, except at 120 ft. where the accelerometer was installed on the concrete sidewalk.

Vibration Monitoring Location VM2: VM2 is located adjacent to the Yard, east of the mainline tracks and along 18th Street. The transducers were installed at the following setbacks:

- As close to right-of-way (ROW) wall as possible (approximately 60 ft from fourth track (4 of 4) centerline);
- 80 ft from fourth track centerline;
- 120 ft from fourth track centerline; and
- 160 ft from fourth track centerline.

The accelerometers for VM2 where installed on the concrete sidewalk (concrete slab on grade).

Approximate train speeds were calculated utilizing the duration of the pass-bys and the number of cars (train length). The train type and number of cars were also documented for each event.

4.0 INSTRUMENTATION

The following noise and vibration monitoring instrumentation was utilized during the August 19th through 22nd, 2014 field event.

Noise Monitor: Larson Davis model 831 Integrating Sound Level Meter (SLM) equipped with measurement gear including wind screens and bird spikes. The Model 831 uses a Larson Davis Model PRM831 preamplifier and a PCB precision air-condenser microphone, which have been factory calibrated with the SLM unit. The SLM meets ANSI-S1.4-1985(R2001) Type 1 requirements. The SLM calibration was certified within the previous twelve (12) months, and was field calibrated with a Larson-Davis Model CA200 precision acoustic calibrator before and after the measurement.

Vibration Monitor: A 4-channel Crystal Instruments CoCo-80 Dynamic Signal Analyzer was used to measure vertical vibration levels at various setback distances from the railway line. Four PCB make accelerometers (model 393B04) were used for the vibration measurements. The unit measured root mean square (RMS) vibration during train pass-by events. Frequency range 2 hertz (Hz)-200 Hz and minimum sensitivity range from 0.0001 inch/second.

Equipment calibration certificates are provided in **Appendix B**.

5.0 NOISE MONITORING DATA

5.1 Noise Metrics

The noise data metrics recorded and documented at each of the noise monitoring locations are L_{eq} in overall A-weighted decibel (dBA) noise levels. All data was recorded in one-second intervals. Audio recordings were collected when measured sound level data exceed a set noise threshold of L_{90} + 5 dB (L_{90} is the sound levels exceeded 90% of the time during the period). Recorded audio data precedes the triggered event by several seconds and last for several second following the event. Audio recordings were used to identify potential noise sources in the monitoring data, (e.g., vehicle pass-by, people talking, dog barking, emergency vehicle sirens, airplane over-flights, etc.).

6.0 METEOROLOGICAL DATA

Varying meteorological conditions such as high wind and precipitation may influence noise and vibration monitoring results. Therefore, meteorological data collected from the nearest environmental weather station, located approximately 2 miles southeast of the Yard on Seaview Avenue, was reviewed. Hourly weather data for the monitoring period is provided in **Appendix C**. This data includes wind speed, wind direction and precipitation. Vibration monitoring weather conditions were favorable for the measurements.

7.0 MONITORING ERRORS

Data from the noise was downloaded and reviewed for completeness. In the case of incomplete data, the nature of the issue (power outage or damage) is investigated. Power failure was noted for noise monitor NM1. However, this occurred after approximately 31 hours of recording and did not adversely affect overall data collection. The remaining noise monitors (NM2, NM3 and NM4) recorded data for approximately 48 hours.

8.0 DISCUSSION AND RESULTS

8.1 Noise Model Sources

For the purpose of preparing the baseline data for the SEA, the noise sources (including the location and frequency of occurrence) presented in Table 1 were considered and provided in the initial noise modelling of Yard operations. These assumptions represent the current typical daily operations at the Yard and adjacent tracks.

Table 1: List of Previously Modeled Noise Sources

Time of Day	Mainline Freight Traffic	Yard Inbound/Outbound (I/O) Traffic	Warning Horn	Locomotive Idling
Day 07:00 – 22:00	5 trains per day, 42 mph, 2 locos, 101 cars	2 trains/day, 5 mph, 1 locos, 12 cars	Sounded by each train 1/4 mile from 23rd St. and 15th	Each of 2 trains that use yard for 30 minutes each
Night 22:00 – 07:00	5 trains per night, 42 mph, 2 locos, 101 cars	2 trains/night, 5 mph, 1 locos, 12 cars	Sounded by each train 1/4 mile from 23rd St. and 15th	Each of 2 trains that use yard for 30 minutes each

The following are potential noise sources that were not considered in the previous noise modelling for the Yard.

- **Wheel Squeal** – Noise created by train movement through tight curves
- **Special Track Work** – Includes crossovers and switches
- **Train Coupling** – From possible train building in the Yard or siding tracks
- **Public Address (PA) System** – Loudspeaker on Yard property (not observed)
- **Yard Vehicle Traffic** – General traffic related to deliveries, loading, unloading, etc...

The previously modeled and non-modeled sources noted above are to be used as the basis of assessing ambient noise monitoring in the supplemental noise assessment report.

8.2 Noise Monitoring – Sources

Table 2 summarises hourly sound levels (L_{eq}) captured from all four noise monitoring locations (NM1 through NM4), potential noise sources contributing the measured sound levels, daytime L_{eq}, night-time L_{eq} and day-night L_{dn}.

Table 2:Summary of Sound Levels and Noise Sources

	Hourly L_{eq} Sound Levels(dBA)									
Hour	**NM1**	**NM2**	**NM3**	**NM4**	**Mainline Freight**	**Yard I/O**	**Warning Horn**	**Locomotive Idling**	**Special Track work**	**Yard Vehicle Traffic**
00:00 – 01:00	59	59	66	73	2	1	✓	✓	✓	×
01:00 – 02:00	59	58	67	75	1	×	✓	×	×	×
02:00 – 03:00	60	59	68	72	1	×	✓	×	×	×
03:00 – 04:00	51	54	52	46	×	×	×	×	×	×
04:00 – 05:00	59	56	67	74	1	×	✓	×	×	×
05:00 – 06:00	66	62	73	74	2	×	✓	×	×	×

	Hourly L_{eq} Sound Levels(dBA)									
Hour	**NM1**	**NM2**	**NM3**	**NM4**	**Mainline Freight**	**Yard I/O**	**Warning Horn**	**Locomotive Idling**	**Special Track work**	**Yard Vehicle Traffic**
06:00 – 07:00	57	62	61	66	×	×	×	×	×	✓
07:00 – 08:00	68	66	66	54	×	×	×	×	×	✓
08:00 – 09:00	74	65	69	71	1	1	✓	✓	✓	✓
09:00 – 10:00	73	63	59	62	×	×	×	×	×	✓
10:00 – 11:00	73	64	62	60	×	×	×	×	×	✓
11:00 – 12:00	72	64	62	60	×	×	×	×	×	✓
12:00 – 13:00	70	64	58	58	×	×	×	×	×	✓
13:00 – 14:00	69	63	64	53	×	×	×	×	×	✓
14:00 – 15:00	71	64	62	53	×	×	×	×	×	✓
15:00 – 16:00	66	64	68	71	1	1	✓	✓	✓	✓
16:00 – 17:00	63	64	60	52	×	×	×	×	×	✓
17:00 – 18:00	57	64	62	49	×	×	×	×	×	✓
18:00 – 19:00	50	63	63	63	×	×	×	×	×	✓
19:00 – 20:00	50	62	58	48	×	×	×	×	×	×
20:00 – 21:00	62	62	68	72	1	×	✓	×	×	×
21:00 – 22:00	66	62	69	73	1	×	✓	×	×	×
22:00 – 23:00	50	60	55	48	×	×	×	×	×	×
23:00 – 24:00	70	64	74	66	1	×	✓	×	×	×
Daytime L_{eq}	**69**	**64**	**65**	**67**						
Night-time L_{eq}	**63**	**60**	**69**	**72**						
L_{dn}	**71**	**67**	**75**	**77**						

From the noise sources indicated in section 8.1 the following noise sources were not observed or are considered negligible:

- Noise Sources Not Observed:
  - Wheel Squeal
  - Public Address (PA) System
- Noise Sources Considered Negligible:
  - Coupling of trains
  - Special track work

Other noises were observed and documented as having a significant noise contribution to the noise environment in the receptors:

- NM1:
  - Noise generated by the HVAC system associated with the Yard building
  - Back-up Signals from Yard operations
- NM2:
  - Traffic on Division Avenue
  - Back-up Signals from Yard operations
- NM3:
  - Back-up Signals from Yard operations
  - Traffic across tracks on 15th Street
- NM4:
  - No noticeable noise sources of significance

8.3 Noise Monitoring – Baseline Adjustments

Review of the noise monitoring data collected during the field event shows that noise sources of interest were recorded, but may not have occurred as frequently (either more or less) than a typical day. In order to utilize noise monitoring data for the modelling effort, baseline adjustments were made to the noise monitoring data so it was consistent with the operational assumptions for the Yard and adjacent tracks. Comparing the monitored noise sources to the previously modeled noise sources, AMEC noted the following:

For Day Time:

- One fewer freight train pass-by was noted.
- Trains are moving slower than the modeled speed of 42 mph.
- Trains going to the yard are much shorter than indicated in the model.

For Night Time:

- Three more trains were observed on the mainline than were modeled.
- One less train was noted in the yard.

To provide a comparative noise baseline to the modeled sources noted in Table 1, some adjustments to the measured dataset were required. The main discrepancy was the number of trains passing by during the night. This resulted in field-measured exposure times greater than what was previously modeled, or considered typical. Current train operations on the FECR corridor are not consistent, and the field measurements cannot be considered as typical of an average day (as per model assumptions). As the increased exposure times are not considered representative of typical operations, values were adjusted for the noise levels and calculated as per methodology below.

Taking into consideration the previous model data, the expected exposure time for trains passing by is approximately 110 seconds per train or 550 seconds per period (day or night). A review of the measured data showed that the exposure time for passing trains was:

- 755 seconds for day time
- 1,975 seconds for night time

These increases are due to the increased number of trains observed (night time only) and the reduced speeds observed. Therefore, the exposure times were adjusted by reducing the observed train pass by noise for the night hours between 12 am and 5 am. Utilizing the baseline condition of 5 trains per night, the resulting exposure time is 1,190 seconds. This exposure time will be used for the supplemental noise assessment modelling.

It should be noted that no correction was undertaken for speed as the maximum sound pressure level at NM4 (closest to the tracks with direct line of sight) ranges from 86 to 102 dBA and is in line with the approximate Lmax referenced in the FTA guidelines for a diesel locomotive.

The final adjusted L_{eq} and L_{dn} ambient noise levels for the monitoring program are presented in Table 3.

Table 3: Adjusted Sound Pressure Level (measured)

Noise Monitor Location	Daytime Leq [dBA] 07:00 – 22:00	Night-time Leq [dBA] 22:00 – 07:00	Day-Night L_{dn} [dBA]
NM1	69	62	71
NM2	64	59	67
NM3	65	67	73
NM4	67	68	74

8.4 Vibration Monitoring

Vibration monitoring was conducted at two (2) locations for various setback distances from the track. Tables 4 and 5 present the results in terms of RMS values for the background vibration level and for trains passing by.

Table 4: Measured Vibration Levels at Location VM1

VM1		
Distance [ft]	**Background [VdB re 1E-6 in/s]**	**Train Passby [VdB re 1E-6 in/s]**
25	34.5	78.6
60	41.1	75.7
80	56.2	72.5
120(1)	49.1	74.2

(1) This accelerometer was placed on concrete sidewalk and not on ground as for other setbacks

Table 5: Measured Vibration Levels at Location VM2

VM2		
Distance [ft]	**Background [VdB re 1E-6 in/s]**	**Train Passby [VdB re 1E-6 in/s]**
60	70.8	88.1
80	58.6	84.8
120	64.6	76.9
160	70.6	74.0

Figures 4 and 5 present a graphical time history of a train pass-by in VM1 and VM2.

Figure 4: Vibration Levels (1 sec RMS) during train pass-by at VM1

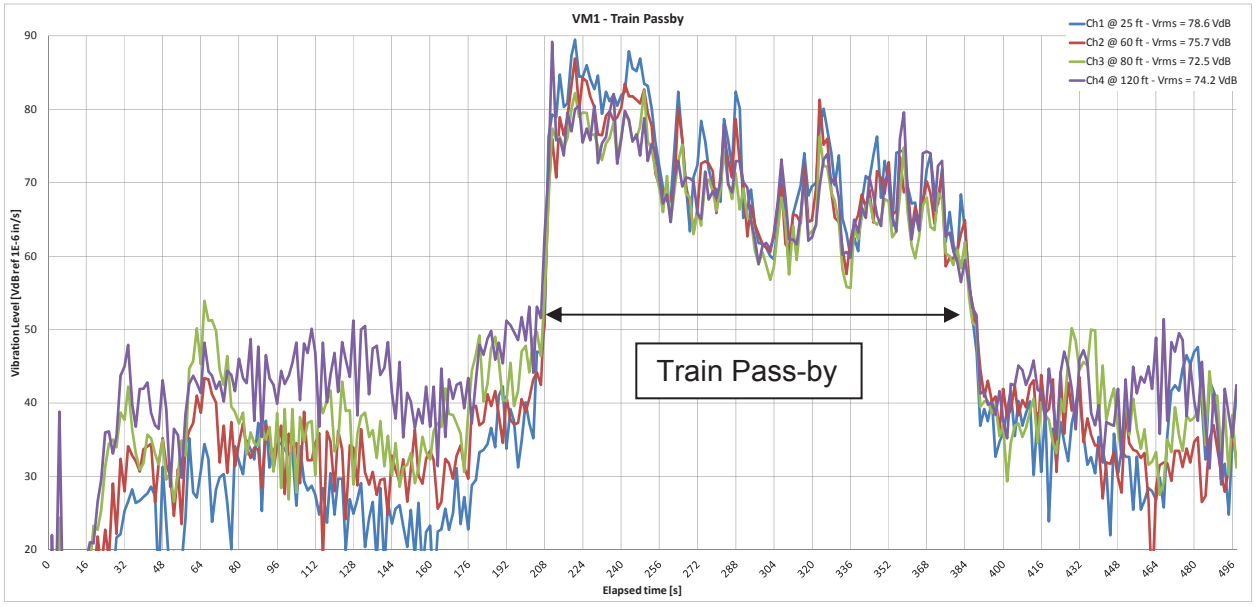
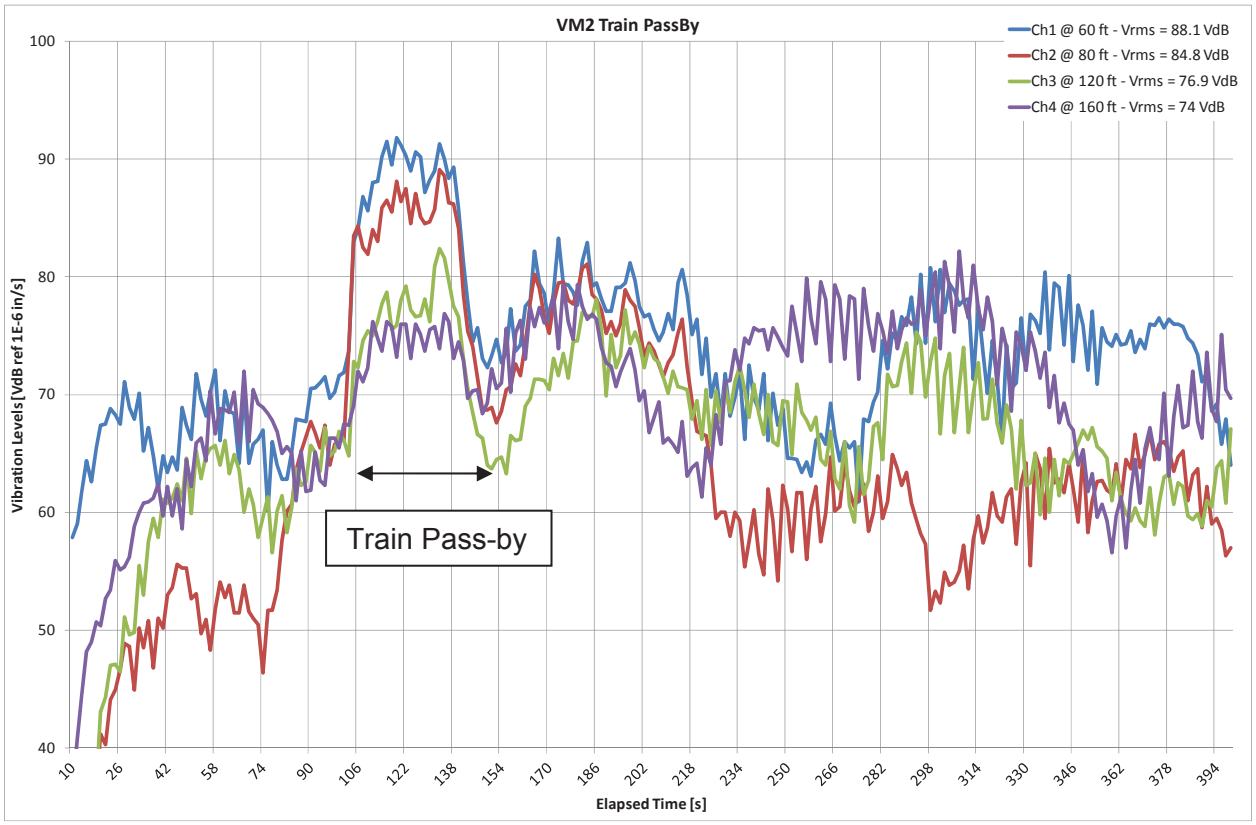


Figure 5: Vibration Levels (1 sec RMS) during train pass-by at VM2



9.0 CONCLUSION

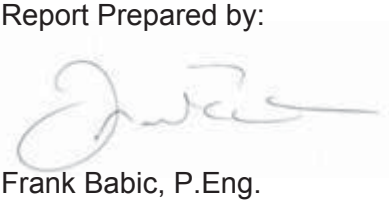
The data collected during the monitoring effort provides all the information required for a confirmatory review of the previous model results and provides additional information for the modeling assumptions (where required). A careful review of the potential noise sources due to Yard activities has provided insight on the type and frequency of noise sources and has also identified potential sources that can be removed from further consideration because they are not present. Other sources not clearly identified in the initial modelling effort have now been identified (e.g. traffic in Division Ave and 15th Street) and should be included in the modeling effort. After review of the assumptions in terms of traffic, and adjusting the measured values in order to have similar exposure time due to rail traffic, it is anticipated that the data presented in section 8.3 will be similar in magnitude to the results utilized for the initial baseline model.

This report was prepared by AMEC and is based on information obtained by, or provided to AMEC. We have relied on the collected data and information provided to us and therefore are not liable or responsible for incomplete, incorrect and inadequate information. The material in it reflects AMEC's judgment in light of the information available to us at the time of preparation.

If you require further information regarding the above or the project in general, please contact the undersigned at (905) 568-2929. Thank you for the opportunity to be of service.

Yours truly,
AMEC Environment & Infrastructure
a Division of AMEC Americas Limited

Report Prepared by:



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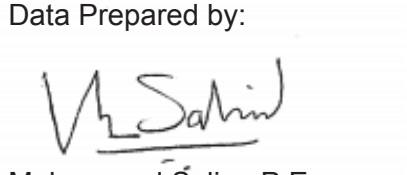

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Reviewed and Updated by:

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10.0 REFERENCES

1. AMEC, “Addendum to Environmental Assessment Re-evaluation of Potential Environmental Impacts of the Proposed West Palm Beach Rail Yard for the All Aboard Florida Passenger Rail Project from West Palm Beach to Miami, Florida”, July 2014.

APPENDIX A

FIGURES

Figure 1

LEGEND

- PROPOSED AAF TRACKS
- FECR TRACKS
- FECR STUB TRACK TO BE REMOVED
- EXISTING YARD BUILDINGS
- FIBER OPTIC REGEN BUILDING
- SHOP CANOPY OUTLINE
- BUILDING OUTLINE
- PROPOSED SAFETY FENCE (ENCLOSED AREA FOR AAF = 8.0 ACRES)
- EXISTING FIBER OPTIC DUCT BANK
- EXISTING FECR R/W
- LIMITS OF ASPHALT PAVEMENT

CONCEPT PLAN

ALL ABOARD FLORIDA
WEST PALM BEACH RUNNING REPAIR FACILITY

8/1/14
1" = 100'

VINAY MUDHOLKAR
AAF SR. VP, RAIL INFRASTRUCTURE

EUGENE SKOROPOWSKI
AAF SR. VP, PASSENGER RAIL DEVELOPMENT

FRAN CHINNICI
FECR SR. VP, ENGINEERING AND PURCHASING

TO BE WORKED OUT IN DETAILED DESIGN

- Final details for AAF shop canopy height and location.
- Roadway access for FECR signals shop and fire truck access needs to be maintained.
- AAF tracks will be paved in order for fluid truck movement near existing warehouses and buildings to be maintained.
- Signal system interface will be provided for proposed turnout near the 15th Street at-grade crossing to avoid trains blocking the crossing.
- Proposed plan for the Northwood Connection needs to be reviewed and coordinated with the yard plan.
- Maximize the access road and loading/unloading area on the FECR intermodal tracks.

Explanation of Features

- Corridor Centerline
- Noise Monitoring Location
- Vibration Monitoring Location
- Church
- Category 2 Representative Receptor
- Category 3 Receptors – Churches
- Category 2 Parcel
- Existing Yard Building
- Existing FECR R/W
- Category 2 Receptors – Clusters

Data Sources: ESRI 2012, FRA 2012, FGDL 2012, AMEC 2014.

Monitoring and Cluster Locations

All Aboard Florida Intercity Passenger Rail Project

N

0 450 Feet

U.S. Department of Transportation
Federal Railroad Administration

Figure 2

Path: H:\AllAboardFlorida\Task1\MXD\WPB Yard - Monitoring and Cluster Locations.mxd

Project # 6063-12-0212

Explanation of Features

- Corridor Centerline
- Noise Monitoring Location
- Vibration Monitoring Location
- Church
- Category 2 Representative Receptor
- Category 3 Receptors – Churches
- Category 2 Parcel
- Existing Yard Building
- Existing FECR R/W
- Category 2 Receptors – Clusters

Data Sources: ESRI 2012, FRA 2012, FGDL 2012, AMEC 2014.

Monitoring and Cluster Locations

All Aboard Florida Intercity Passenger Rail Project

N

0 450 Feet

U.S. Department of Transportation
Federal Railroad Administration

Figure 3

Path: H:\AllAboardFlorida\Task1\MXD\WPB Yard - Monitoring and Cluster Locations.mxd

Project # 6063-12-0212

APPENDIX B

EQUIPMENT CALIBRATION CERTIFICATION

~ Certificate of Calibration and Compliance ~

Microphone Model: 377B02 Serial Number: 141015 Manufacturer: PCB

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Reference Equipment

Manufacturer	Model #	Serial #	PCB Control #	Cal Date	Due Date
Hewlett Packard	34401A	MY41045214	LD-001	3/6/13	3/6/14
Bruel & Kjaer	4192	2657834	CA1270	11/26/13	11/26/14
Newport	BTH-W/N	8410668	CA1187	not required	not required
Larson Davis	PRM915	122	CA-865	9/17/13	9/17/14
Larson Davis	PRM902	4701	CA1450	10/21/13	10/21/14
Larson Davis	2559LF	3216	CA-883	not required	not required
Larson Davis	ADP005	1	LD-017	not required	not required
Larson Davis	PRM916	127	CA924	4/15/13	4/15/14
Larson Davis	CAL250	5025	CA1277	7/25/13	7/25/14
Larson Davis	2201	140	CA-1409	3/22/13	3/21/14
Larson Davis	2900	1079	CA-521A	6/4/13	6/4/14
Larson Davis	PRA951-4	234	CA1154	9/17/13	9/17/14
0	0	0	0	not required	not required
0	0	0	0	not required	not required

Frequency sweep performed with B&K UA0033 electrostatic actuator.

Condition of Unit

As Found: N/A

As Left: New unit in tolerance

Notes

1. Calibration of reference microphone is traceable through PTB.
2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc.
3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540.3 and ISO 17025.
4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications.
5. Open circuit sensitivity is measured using the insertion voltage method following procedure AT603-5.
6. Measurement uncertainty (95% confidence level with coverage factor of 2) for sensitivity is +/-0.20 dB.
7. Unit calibrated per ACS-20.

Technician: Milton Munger MM 3646 Date: January 20, 2014

ilac-MRA A2LA ACCREDITED

CALIBRATION CERT #1662.01

PCB PIEZOTRONICS VIBRATION DIVISION

3425 Walden Avenue, Depew, New York, 14043

TEL: 888-684-0013 FAX: 716-685-3886 www.pcb.com

ID:CAL60-347310654.882

~ Calibration Report ~

Microphone Model: 377B02 Serial Number: 141015 Description: 1/2" Free-Field Microphone

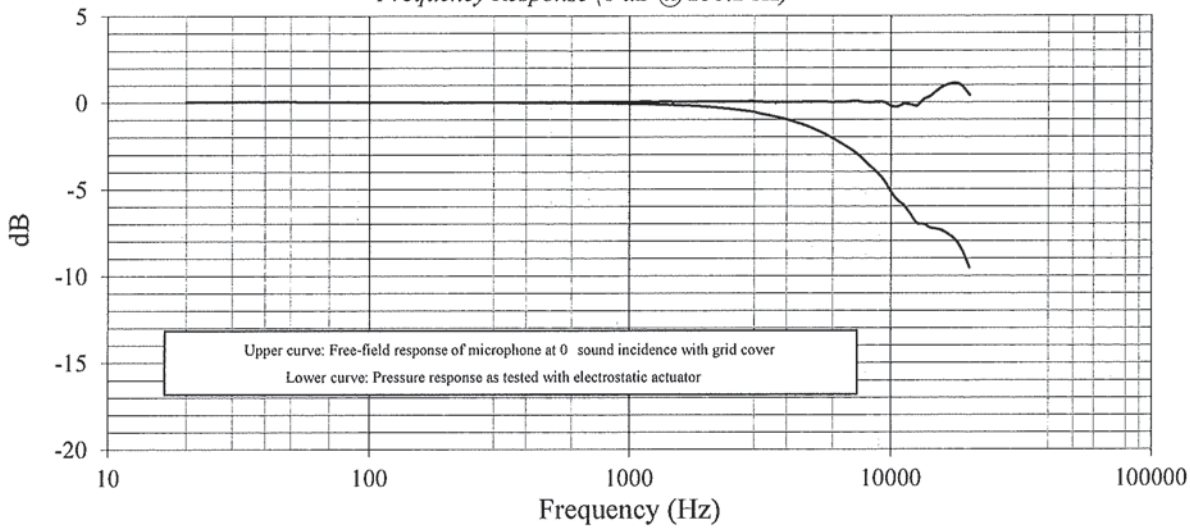
Calibration Data

Open Circuit Sensitivity @ 251.2 Hz: 51.91 mV/Pa
-25.69 dB re 1V/Pa

Polarization Voltage, External: 0 V
Capacitance: 10.9 pF

Temperature: 69 °F (21°C) Ambient Pressure: 983 mbar Relative Humidity: 26 %

Frequency Response (0 dB @ 251.2 Hz)



Freq (Hz)	Lower (dB)	Upper (dB)	Freq (Hz)	Lower (dB)	Upper (dB)	Freq (Hz)	Lower (dB)	Upper (dB)	Freq (Hz)	Lower (dB)	Upper (dB)
20.0	0.03	0.03	1584.9	-0.18	0.03	6683.4	-2.50	0.02	-	-	-
25.1	0.04	0.04	1678.8	-0.19	0.04	7079.5	-2.73	0.05	-	-	-
31.6	0.05	0.05	1778.3	-0.21	0.04	7498.9	-3.02	0.05	-	-	-
39.8	0.05	0.05	1883.7	-0.23	0.05	7943.3	-3.39	0.00	-	-	-
50.1	0.05	0.05	1995.3	-0.26	0.05	8414.0	-3.74	-0.01	-	-	-
63.1	0.03	0.03	2113.5	-0.29	0.05	8912.5	-4.09	0.02	-	-	-
79.4	0.03	0.03	2238.7	-0.33	0.04	9440.6	-4.53	-0.01	-	-	-
100.0	0.02	0.02	2371.4	-0.36	0.05	10000.0	-5.17	-0.22	-	-	-
125.9	0.02	0.02	2511.9	-0.40	0.06	10592.5	-5.65	-0.25	-	-	-
158.5	0.01	0.01	2660.7	-0.45	0.06	11220.2	-5.96	-0.10	-	-	-
199.5	0.01	0.01	2818.4	-0.50	0.06	11885.0	-6.46	-0.14	-	-	-
251.2	0.00	0.00	2985.4	-0.55	0.07	12589.3	-6.97	-0.20	-	-	-
316.2	0.00	0.01	3162.3	-0.65	0.03	13335.2	-7.02	0.17	-	-	-
398.1	-0.01	-0.01	3349.7	-0.72	0.02	14125.4	-7.24	0.35	-	-	-
501.2	-0.02	0.02	3548.1	-0.80	0.02	14962.4	-7.31	0.66	-	-	-
631.0	-0.03	0.01	3758.4	-0.88	0.02	15848.9	-7.43	0.92	-	-	-
794.3	-0.05	0.04	3981.1	-0.98	0.02	16788.0	-7.67	1.05	-	-	-
1000.0	-0.08	0.04	4217.0	-1.09	0.02	17782.8	-8.00	1.11	-	-	-
1059.3	-0.09	0.04	4466.8	-1.21	0.02	18836.5	-8.63	0.88	-	-	-
1122.0	-0.09	0.05	4731.5	-1.34	0.03	19952.6	-9.52	0.41	-	-	-
1188.5	-0.10	0.05	5011.9	-1.49	0.04	-	-	-	-	-	-
1258.9	-0.12	0.04	5308.8	-1.66	0.04	-	-	-	-	-	-
1333.5	-0.13	0.05	5623.4	-1.85	0.03	-	-	-	-	-	-
1412.5	-0.14	0.05	5956.6	-2.06	0.01	-	-	-	-	-	-
1496.2	-0.16	0.04	6309.6	-2.27	0.02	-	-	-	-	-	-

Technician: Milton Munger MM 3646 Date: January 20, 2014

ilac-MRA ACCREDITED
CALIBRATION CERT #1862.01

PCB PIEZOTRONICS
VIBRATION DIVISION

3425 Walden Avenue, Depew, New York, 14043
TEL: 888-684-0013 FAX: 716-685-3886 www.pcb.com

ID:CAL60-3473106544.882

~Calibration Certificate~

THE MODAL SHOP INC. A PCB GROUP CO.
3149 East Kemper Rd.
Cincinnati, OH 45241
Ph : 513-351-9919
Fax: 513-458-2172
www.modalshop.com

Sensor Information

Model Number:	393B04
Serial Number:	34621
Manufacturer:	PCB
ID Number:	46414
Description:	ICP® Accelerometer

Calibration Data

Sensitivity @ 100 Hz:	988.37	mV/g
Phase @ 100 Hz:	-4.45	deg.
Test Level:	1.00	g
Output Bias Level:	11.3	VDC

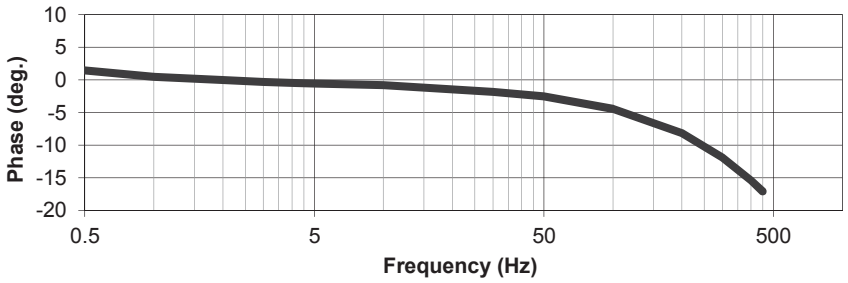
Transducer Specifications

Amp. Range:	± 5	g
Resolution:	0.000003	g
Resonant Freq:	≥ 2500	Hz
Temp. Range:	-18 to 80	°C
	0 to 176	°F
Axis:	Uni-Axial	

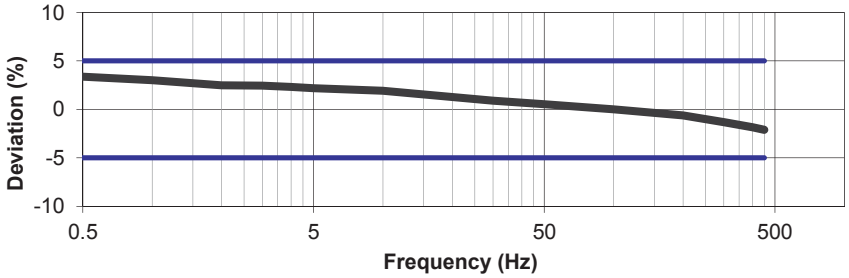
Data Table

Freq. (Hz)	Deviation (%)	Phase (deg)
0.5	3.3741	1.4558
1	3.0130	0.4436
2	2.4905	-0.0503
3	2.4432	-0.3257
4	2.3234	-0.4599
5	2.1893	-0.5564
10	1.9072	-0.8413
30	0.8962	-1.8350
50	0.5431	-2.5397
100	0.0000	-4.4502
200	-0.6342	-8.1607
300	-1.2994	-11.9110
400	-1.8383	-15.4082
450	-2.1025	-17.1048

Phase Response



Amplitude Response



Notes

Results relate only to the items calibrated.

This certificate may not be reproduced except in full, without written permision.

Method: Calibration is performed in compliance with ISO 9001 and ISO 17025

This calibration was performed with TMS 9155 Calibration Workstation version 5.4.0

Calibration traceable to NIST (project number 822/271196).

Back-to-Back Comparison Calibration per ISO 16063-21

Procedures Used: PRD-P220, PRD-P214

Measurement uncertainty (95% confidence level with coverage factor 2) for frequency ranges tested during calibration are as follows: 0.5-1 Hz; 1.10%; >1-10 Hz; ± 0.80%, 11-99 Hz; ±1.20%, 100 Hz; ± 0.75%, 101-920 Hz; ± 1.00%, 921-5000 Hz; ± 1.40%, 5001-10,000 Hz; ± 1.90%, 10,001-15,000 Hz; ± 2.20%, 15,001-20,000 Hz; ± 2.8%.

Customer

TMS Rental
3149 E. Kemper Rd
Cincinnati, OH 45241

User Notes

Lab Conditions

Temperature: 71 (22) °F (°C)
Humidity: 54 %

Cal Date: 23-Jun-14
Due Date:

Unit Condition

As Found: In Tolerance
As Left: In Tolerance

Equipment Used

Description	Manufacturer	Model	Serial	Due Date
Data Aquisition Card	NI	4461	E4F2A4	11/20/2014
Ref Std Conditioner	NI	PCI-6251	136F2A3	1/1/2015
Reference Std	PCB	080A200	110553	12/3/2014
Air Bearing Shaker	PCB	396C11	603	n/a
Ref Std Conditioner	PCB	442A102	305	12/3/2014
SUT Signal Conditioner	PCB	443B101	373	10/9/2014
Power Amplifier	TMS	2100E21-C	1074	n/a
Reference Std	TMS	2129E025	111	1/1/2015
Long Stroke Shaker	TMS	2129E025-779	111	n/a

Approval Information

Technician: Wayne Underwood
Approval:

ACCREDITED
2649.01

Cal ID: 23941 Calibration Lab

~Calibration Certificate~

THE MODAL SHOP INC. A PCB GROUP CO.
3149 East Kemper Rd.
Cincinnati, OH 45241
Ph : 513-351-9919
Fax: 513-458-2172
www.modalshop.com

Sensor Information

Model Number:	393B04
Serial Number:	34428
Manufacturer:	PCB
ID Number:	46415
Description:	ICP® Accelerometer

Calibration Data

Sensitivity @ 100 Hz:	979.12	mV/g
Phase @ 100 Hz:	-4.45	deg.
Test Level:	1.00	g
Output Bias Level:	12.4	VDC

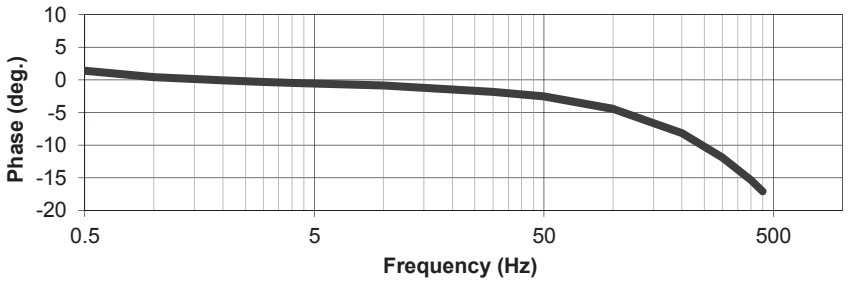
Transducer Specifications

Amp. Range:	± 5	g
Resolution:	0.000003	g
Resonant Freq:	≥ 2500	Hz
Temp. Range:	-18 to 80	°C
	0 to 176	°F
Axis:	Uni-Axial	

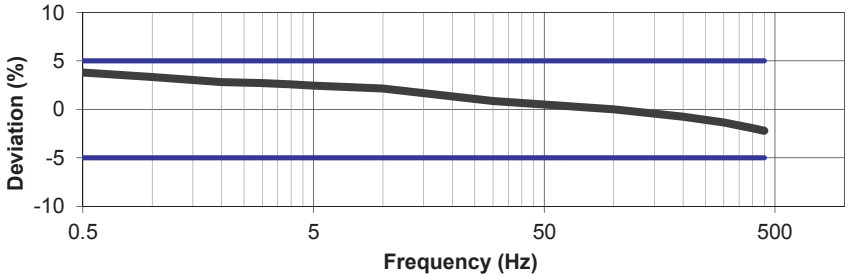
Data Table

Freq. (Hz)	Deviation (%)	Phase (deg)
0.5	3.7911	1.3935
1	3.3565	0.4054
2	2.8006	-0.0781
3	2.7262	-0.3486
4	2.5872	-0.4878
5	2.4433	-0.5772
10	2.1495	-0.8591
30	0.8695	-1.8398
50	0.4972	-2.5343
100	0.0000	-4.4487
200	-0.7458	-8.1531
300	-1.3497	-11.9132
400	-1.9448	-15.3996
450	-2.2100	-17.0912

Phase Response



Amplitude Response



Notes

Results relate only to the items calibrated.

This certificate may not be reproduced except in full, without written permision.

Method: Calibration is performed in compliance with ISO 9001 and ISO 17025

This calibration was performed with TMS 9155 Calibration Workstation version 5.4.0

Calibration traceable to NIST (project number 822/271196).

Back-to-Back Comparison Calibration per ISO 16063-21

Procedures Used: PRD-P220, PRD-P214

Measurement uncertainty (95% confidence level with coverage factor 2) for frequency ranges tested during calibration are as follows: 0.5-1 Hz; 1.10%; >1-10 Hz; ± 0.80%, 11-99 Hz; ±1.20%, 100 Hz; ± 0.75%, 101-920 Hz; ± 1.00%, 921-5000 Hz; ± 1.40%, 5001-10,000 Hz; ± 1.90%, 10,001-15,000 Hz; ± 2.20%, 15,001-20,000 Hz; ± 2.8%.

Customer

TMS Rental
3149 E. Kemper Rd
Cincinnati, OH 45241

User Notes

Lab Conditions

Temperature: 71 (22) °F (°C)
Humidity: 54 %

Cal Date: 23-Jun-14
Due Date:

Unit Condition

As Found: In Tolerance
As Left: In Tolerance

Equipment Used

Description	Manufacturer	Model	Serial	Due Date
Data Aquisition Card	NI	4461	E4F2A4	11/20/2014
Ref Std Conditioner	NI	PCI-6251	136F2A3	1/1/2015
Reference Std	PCB	080A200	110553	12/3/2014
Air Bearing Shaker	PCB	396C11	603	n/a
Ref Std Conditioner	PCB	442A102	305	12/3/2014
SUT Signal Conditioner	PCB	443B101	373	10/9/2014
Power Amplifier	TMS	2100E21-C	1074	n/a
Reference Std	TMS	2129E025	111	1/1/2015
Long Stroke Shaker	TMS	2129E025-779	111	n/a

Approval Information

Technician: Wayne Underwood
Approval:

ACCREDITED
2649.01

Cal ID: 23938 Calibration Lab

~Calibration Certificate~

THE MODAL SHOP INC. A PCB GROUP CO.

3149 East Kemper Rd.
Cincinnati, OH 45241
Ph : 513-351-9919
Fax: 513-458-2172
www.modalshop.com

Sensor Information

Model Number:	393B04
Serial Number:	34616
Manufacturer:	PCB
ID Number:	46418
Description:	ICP® Accelerometer

Calibration Data

Sensitivity @ 100 Hz:	989.61	mV/g
Phase @ 100 Hz:	-4.44	deg.
Test Level:	1.00	g
Output Bias Level:	12.5	VDC

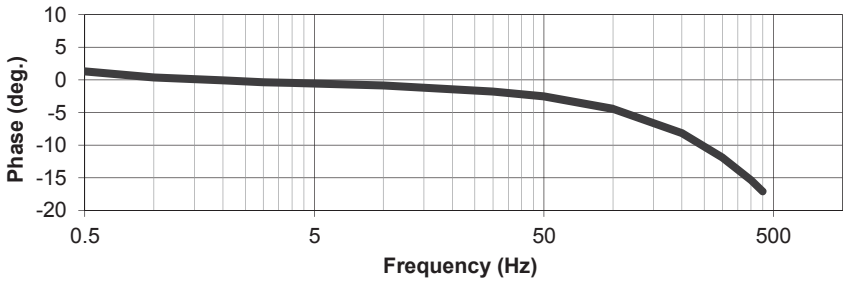
Transducer Specifications

Amp. Range:	± 5	g
Resolution:	0.000003	g
Resonant Freq:	≥ 2500	Hz
Temp. Range:	-18 to 80	°C
	0 to 176	°F
Axis:	Uni-Axial	

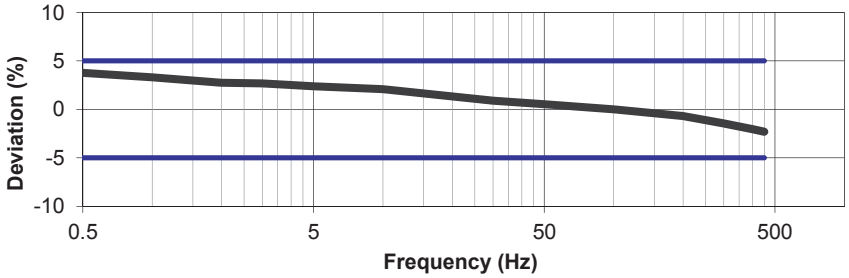
Data Table

Freq. (Hz)	Deviation (%)	Phase (deg)
0.5	3.7729	1.2756
1	3.3092	0.3501
2	2.7396	-0.1002
3	2.6670	-0.3573
4	2.5249	-0.4839
5	2.3806	-0.5759
10	2.0861	-0.8496
30	0.9029	-1.8198
50	0.5361	-2.5218
100	0.0000	-4.4442
200	-0.7013	-8.1538
300	-1.4378	-11.9200
400	-2.0439	-15.3780
450	-2.3040	-17.0870

Phase Response



Amplitude Response



Notes

Results relate only to the items calibrated.

This certificate may not be reproduced except in full, without written permision.

Method: Calibration is performed in compliance with ISO 9001 and ISO 17025

This calibration was performed with TMS 9155 Calibration Workstation version 5.4.0

Calibration traceable to NIST (project number 822/271196).

Back-to-Back Comparison Calibration per ISO 16063-21

Procedures Used: PRD-P220, PRD-P214

Measurement uncertainty (95% confidence level with coverage factor 2) for frequency ranges tested during calibration are as follows: 0.5-1 Hz; 1.10%; >1-10 Hz; ± 0.80%, 11-99 Hz; ±1.20%, 100 Hz; ± 0.75%, 101-920 Hz; ± 1.00%, 921-5000 Hz; ± 1.40%, 5001-10,000 Hz; ± 1.90%, 10,001-15,000 Hz; ± 2.20%, 15,001-20,000 Hz; ± 2.8%.

Customer

TMS Rental
3149 E. Kemper Rd
Cincinnati, OH 45241

User Notes

Lab Conditions

Temperature: 71 (22) °F (°C)
Humidity: 54 %

Cal Date: 23-Jun-14
Due Date:

Unit Condition

As Found: In Tolerance
As Left: In Tolerance

Equipment Used

Description	Manufacturer	Model	Serial	Due Date
Data Aquisition Card	NI	4461	E4F2A4	11/20/2014
Ref Std Conditioner	NI	PCI-6251	136F2A3	1/1/2015
Reference Std	PCB	080A200	110553	12/3/2014
Air Bearing Shaker	PCB	396C11	603	n/a
Ref Std Conditioner	PCB	442A102	305	12/3/2014
SUT Signal Conditioner	PCB	443B101	373	10/9/2014
Power Amplifier	TMS	2100E21-C	1074	n/a
Reference Std	TMS	2129E025	111	1/1/2015
Long Stroke Shaker	TMS	2129E025-779	111	n/a

Approval Information

Technician: Wayne Underwood
Approval:

ACCREDITED
2649.01

Cal ID: 23939 Calibration Lab

~Calibration Certificate~

THE MODAL SHOP INC. A PCB GROUP CO.

3149 East Kemper Rd.
Cincinnati, OH 45241
Ph : 513-351-9919
Fax: 513-458-2172
www.modalshop.com

Sensor Information

Model Number:	393B04
Serial Number:	36798
Manufacturer:	PCB
ID Number:	47989
Description:	ICP® Accelerometer

Calibration Data

Sensitivity @ 100 Hz:	982.86	mV/g
Phase @ 100 Hz:	-4.30	deg.
Test Level:	1.00	g
Output Bias Level:	10.6	VDC

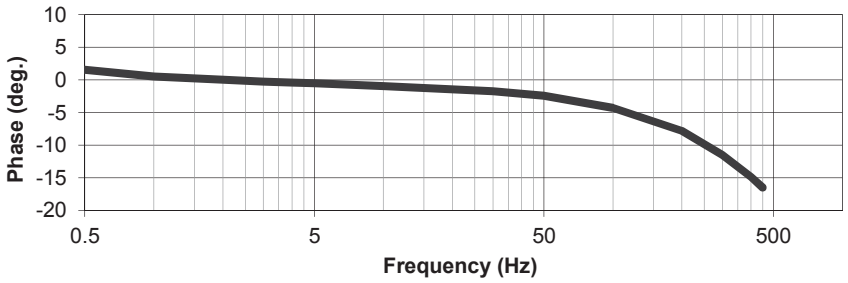
Transducer Specifications

Amp. Range:	± 5	g
Resolution:	0.000003	g
Resonant Freq:	≥ 2500	Hz
Temp. Range:	-18 to 80	°C
	0 to 176	°F
Axis:	Uni-Axial	

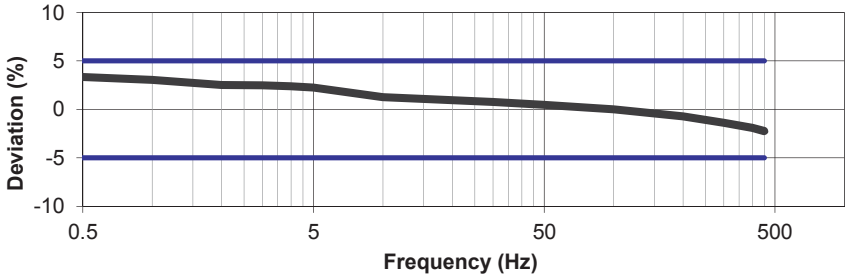
Data Table

Freq. (Hz)	Deviation (%)	Phase (deg)
0.5	3.3583	1.5186
1	3.0399	0.4997
2	2.5311	-0.0035
3	2.4946	-0.2753
4	2.3875	-0.4136
5	2.2632	-0.5121
10	1.2766	-0.9597
30	0.7622	-1.7465
50	0.4735	-2.4441
100	0.0000	-4.2995
200	-0.7037	-7.8494
300	-1.3718	-11.5189
400	-1.9125	-14.8898
450	-2.2249	-16.5276

Phase Response



Amplitude Response



Notes

Results relate only to the items calibrated.

This certificate may not be reproduced except in full, without written permision.

Method: Calibration is performed in compliance with ISO 9001 and ISO 17025

This calibration was performed with TMS 9155 Calibration Workstation version 5.4.0

Calibration traceable to NIST (project number 822/271196).

Back-to-Back Comparison Calibration per ISO 16063-21

Procedures Used: PRD-P220, PRD-P214

Measurement uncertainty (95% confidence level with coverage factor 2) for frequency ranges tested during calibration are as follows: 0.5-1 Hz; 1.10%; >1-10 Hz; ± 0.80%, 11-99 Hz; ±1.20%, 100 Hz; ± 0.75%, 101-920 Hz; ± 1.00%, 921-5000 Hz; ± 1.40%, 5001-10,000 Hz; ± 1.90%, 10,001-15,000 Hz; ± 2.20%, 15,001-20,000 Hz; ± 2.8%.

Customer

TMS Rental
3149 E. Kemper Rd
Cincinnati, OH 45241

User Notes

Lab Conditions

Temperature:	70 (21)	°F (°C)
Humidity:	53	%

Cal Date: 19-Aug-14
Due Date:

Unit Condition

As Found: In Tolerance
As Left: In Tolerance

Approval Information

Technician: Wayne Underwood
Approval:

ACCREDITED
2649.01

Cal ID: 24406 Calibration Lab

Equipment Used

Description	Manufacturer	Model	Serial	Due Date
Data Aquisition Card	NI	4461	E4F2A4	11/20/2014
Ref Std Conditioner	NI	PCI-6251	136F2A3	1/1/2015
Reference Std	PCB	080A200	110553	12/3/2014
Air Bearing Shaker	PCB	396C11	603	n/a
Ref Std Conditioner	PCB	442A102	305	12/3/2014
SUT Signal Conditioner	PCB	443B101	373	10/9/2014
Power Amplifier	TMS	2100E21-C	1074	n/a
Reference Std	TMS	2129E025	111	1/1/2015
Long Stroke Shaker	TMS	2129E025-779	111	n/a

THE MODAL SHOP INC.
A PCB GROUP CO.

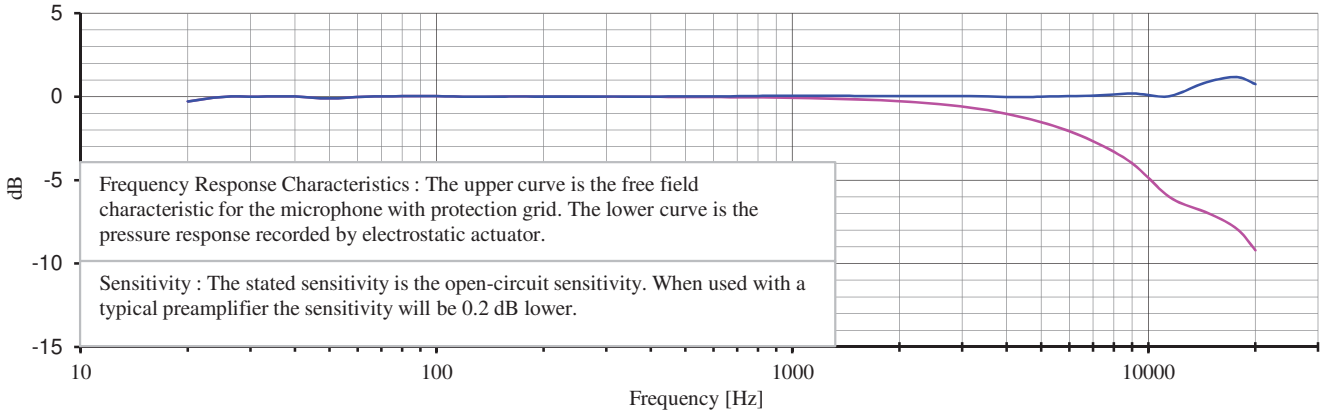
3149 East Kemper Rd.
Cincinnati, OH 45241
Ph : 513-351-9919
Fax: 513-458-2172
www.modalshop.com

~Certificate of Calibration~

Manufacturer:	PCB	**Asset ID:**	48280
Model Number:	377B02	**Customer:**	TMS Rental
Serial Number:	129113	**Calibration Date:**	Jan 10, 2014 12:27:42
Description:	Free-Field Microphone	**Due Date:**	

Sensitivity:	**250 Hz**	**1 kHz**		**Temperature:**	72 (22)	°F (°C)
	-25.59	-25.66	dB re. 1V/Pa	**Humidity:**	26	%
	52.54	52.10	mV/Pa	**Ambient Pressure:**	999.9	mbar

Cal. Results: In Tolerance **Polarization Voltage:** 0 VDC



Traceability: The calibration is traceable through 683/281794-12.

Notes: Calibration results relate only to the items calibrated.
This certificate may not be reproduced, except in full, without written permission.
This calibration is performed in compliance with ISO 9001, ISO 17025 and ANSI Z540.
Measurement uncertainty (250 Hz sensitivity calibration) at 95% confidence level: 0.30 dB.
Calibrated per procedure PRD-P204.

User Note : As Found/As Left In Tolerance

Frequency Response with reference to level at 250 Hz

Frequency (Hz)	Upper (dB)	Frequency (Hz)	Upper (dB)	Frequency (Hz)	Upper (dB)	Frequency (Hz)	Upper (dB)
20	-0.28	**630**	0.01	**4500**	-0.02		
25	-0.02	**800**	0.04	**5000**	0.00		
31.5	0.00	**1000**	0.05	**5600**	0.02		
40	0.01	**1120**	0.05	**6300**	0.04		
50	-0.11	**1250**	0.05	**7100**	0.06		
63	0.00	**1400**	0.05	**8000**	0.13		
80	0.03	**1600**	0.03	**9000**	0.19		
100	0.03	**1800**	0.04	**10000**	0.10		
125	0.00	**2000**	0.04	**11200**	-0.01		
160	0.01	**2240**	0.03	**12500**	0.28		
200	0.00	**2500**	0.04	**14000**	0.74		
250	0.00	**2800**	0.03	**16000**	1.07		
315	0.01	**3150**	0.03	**18000**	1.16		
400	0.00	**3550**	0.01	**20000**	0.75		
500	0.02	**4000**	-0.02				

Technician: Wayne Underwood

Approval: Edward A. Kim

Reference Equipment Used:

Manuf.	*Model*	*Serial*	*Cal. Date*	*Due Date*
GRAS	40AG	77606	9/16/2013	9/16/2014

Certificate of Calibration and Conformance

This document certifies that the instrument referenced below meets published specifications per Procedure PRD-P263; ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 0; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 0; 61252-2002.

Manufacturer:	Larson Davis	Temperature:	71.9	°F
Model Number:	831		22.17	°C
Serial Number:	3220	Rel. Humidity:	17.7	%
Customer:	TMS Rental	Pressure:	986.2	mbars
Description:	Sound Level Meter		986.2	hPa

Note: As Found / As Left: In Tolerance

Upon receipt for testing, this instrument was found to be:

Within the Stated tolerance of the manufacturer's specification

Calibration Date: 14-Feb-14 Calibration Due:

Calibration Standards Used:

Manufacturer	Model	Serial Number	Cal Due	Traceability No.
Larson Davis	LDSigGen/2239	0760/0109	4/12/2014	2012-161465

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at The Modal Shop and/or Larson Davis Corporate Headquarters. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. Calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of The Modal Shop.

Technician: Wayne Underwood Signature:

The Modal Shop, Inc.
3149 East Kemper Road
Cincinnati, OH 45241
Phone: (513) 351-9919
(800) 860-4867
www.modalshop.com

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2014-187252

Instrument Model 831, Serial Number 0003546, was calibrated on 4 Mar 2014. The instrument meets factory specifications per Procedure D0001.8310, ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985 ; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 1; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 1; 61252-2002.

New Instrument
Date Calibrated: 4 Mar 2014
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Stanford Research Systems	DS360	61889	12 Months	3 Feb 2015	61889-020314

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 28 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Tested with PRM831-029388

Signed: Ron Harris

Technician: Ron Harris

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2014-187253

Instrument Model 831, Serial Number 0003547, was calibrated on 4 Mar 2014. The instrument meets factory specifications per Procedure D0001.8310, ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985 ; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 1; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 1; 61252-2002.

New Instrument
Date Calibrated: 4 Mar 2014
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Stanford Research Systems	DS360	61746	12 Months	10 Jul 2014	61746-071013

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 28 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Tested with PRM831-029389

Signed: Ron Harris

Technician: Ron Harris

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
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Certificate of Calibration and Conformance

Certificate Number 2014-187258

Instrument Model 831, Serial Number 0003548, was calibrated on 4 Mar 2014. The instrument meets factory specifications per Procedure D0001.8310, ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985 ; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 1; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 1; 61252-2002.

New Instrument
Date Calibrated: 4 Mar 2014
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Stanford Research Systems	DS360	61889	12 Months	3 Feb 2015	61889-020314

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 28 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Tested with PRM831-029390

Signed: Ron Harris

Technician: Ron Harris

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

~ *Certificate of Calibration and Compliance* ~

Microphone Model: 377B02 Serial Number: 141636 Manufacturer: PCB

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Reference Equipment

Manufacturer	Model #	Serial #	PCB Control #	Cal Date	Due Date
Hewlett Packard	34401A	MY41045214	LD-001	3/6/13	3/6/14
Bruel & Kjaer	4192	2657834	CA1270	11/26/13	11/26/14
Newport	BTH-W/N	8410668	CA1187	not required	not required
Larson Davis	PRM915	122	CA-865	9/17/13	9/17/14
Larson Davis	PRM902	4701	CA1450	10/21/13	10/21/14
Larson Davis	2559LF	3216	CA-883	not required	not required
Larson Davis	ADP005	1	LD-017	not required	not required
Larson Davis	PRM916	127	CA924	4/15/13	4/15/14
Larson Davis	CAL250	5025	CA1277	7/25/13	7/25/14
Larson Davis	2201	140	CA-1409	3/22/13	3/21/14
Larson Davis	2900	1079	CA-521A	6/4/13	6/4/14
Larson Davis	PRA951-4	234	CA1154	9/17/13	9/17/14
0	0	0	0	not required	not required
0	0	0	0	not required	not required

Frequency sweep performed with B&K UA0033 electrostatic actuator.

Condition of Unit

As Found: N/A

As Left: New unit in tolerance

Notes

1. Calibration of reference microphone is traceable through PTB.
2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc.
3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540.3 and ISO 17025.
4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications.
5. Open circuit sensitivity is measured using the insertion voltage method following procedure AT603-5.
6. Measurement uncertainty (95% confidence level with coverage factor of 2) for sensitivity is +/-0.20 dB.
7. Unit calibrated per ACS-20.

MM 3646

Technician: Milton Munger Date: January 20, 2014

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CALIBRATION CERT #1862.01

PCB PIEZOTRONICS VIBRATION DIVISION

3425 Walden Avenue, Depew, New York, 14043

TEL: 888-684-0013 FAX: 716-685-3886 www.pcb.com

ID:CAL60-3473118524.365

~ Calibration Report ~

Microphone Model: 377B02 Serial Number: 141636 Description: 1/2" Free-Field Microphone

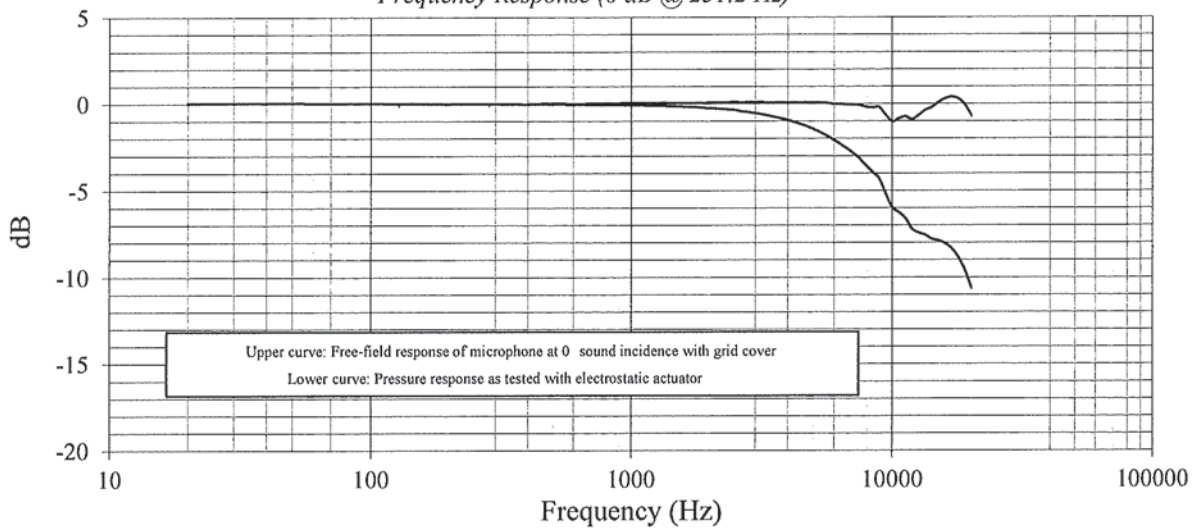
Calibration Data

Open Circuit Sensitivity @ 251.2 Hz: 56.56 mV/Pa
-24.95 dB re 1V/Pa

Polarization Voltage, External: 0 V
Capacitance: 11.1 pF

Temperature: 69 °F (21°C) Ambient Pressure: 983 mbar Relative Humidity: 26 %

Frequency Response (0 dB @ 251.2 Hz)



Freq (Hz)	Lower (dB)	Upper (dB)	Freq (Hz)	Lower (dB)	Upper (dB)	Freq (Hz)	Lower (dB)	Upper (dB)	Freq (Hz)	Lower (dB)	Upper (dB)
20.0	0.04	0.04	1584.9	-0.16	0.05	6683.4	-2.56	-0.04	-	-	-
25.1	0.05	0.05	1678.8	-0.17	0.06	7079.5	-2.83	-0.05	-	-	-
31.6	0.05	0.05	1778.3	-0.19	0.06	7498.9	-3.15	-0.08	-	-	-
39.8	0.05	0.05	1883.7	-0.22	0.06	7943.3	-3.57	-0.18	-	-	-
50.1	0.05	0.05	1995.3	-0.24	0.07	8414.0	-3.95	-0.22	-	-	-
63.1	0.04	0.04	2113.5	-0.27	0.07	8912.5	-4.31	-0.20	-	-	-
79.4	0.03	0.03	2238.7	-0.30	0.07	9440.6	-5.17	-0.65	-	-	-
100.0	0.03	0.03	2371.4	-0.33	0.08	10000.0	-5.96	-1.01	-	-	-
125.9	0.02	0.02	2511.9	-0.35	0.11	10592.5	-6.25	-0.85	-	-	-
158.5	0.01	0.01	2660.7	-0.44	0.07	11220.2	-6.60	-0.74	-	-	-
199.5	0.01	0.01	2818.4	-0.47	0.09	11885.0	-7.21	-0.89	-	-	-
251.2	0.00	0.00	2985.4	-0.53	0.09	12589.3	-7.43	-0.66	-	-	-
316.2	-0.01	0.00	3162.3	-0.59	0.09	13335.2	-7.56	-0.37	-	-	-
398.1	-0.01	-0.01	3349.7	-0.67	0.07	14125.4	-7.79	-0.20	-	-	-
501.2	-0.02	0.02	3548.1	-0.75	0.07	14962.4	-7.88	0.09	-	-	-
631.0	-0.04	0.00	3758.4	-0.83	0.07	15848.9	-8.05	0.30	-	-	-
794.3	-0.05	0.04	3981.1	-0.93	0.07	16788.0	-8.33	0.39	-	-	-
1000.0	-0.07	0.05	4217.0	-1.04	0.07	17782.8	-8.82	0.29	-	-	-
1059.3	-0.08	0.05	4466.8	-1.17	0.06	18836.5	-9.57	-0.06	-	-	-
1122.0	-0.09	0.05	4731.5	-1.30	0.07	19952.6	-10.62	-0.69	-	-	-
1188.5	-0.10	0.05	5011.9	-1.46	0.07	-	-	-	-	-	-
1258.9	-0.11	0.05	5308.8	-1.64	0.06	-	-	-	-	-	-
1333.5	-0.11	0.07	5623.4	-1.84	0.04	-	-	-	-	-	-
1412.5	-0.13	0.06	5956.6	-2.07	0.00	-	-	-	-	-	-
1496.2	-0.14	0.06	6309.6	-2.31	-0.02	-	-	-	-	-	-

Technician: Milton Munger MM 3646 Date: January 20, 2014

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CALIBRATION CERT #1862.01

PCB PIEZOTRONICS VIBRATION DIVISION
3425 Walden Avenue, Depew, New York, 14043
TEL: 888-684-0013 FAX: 716-685-3886 www.pcb.com

ID.CAL60-3473118524.365

~ Certificate of Calibration and Compliance ~

Microphone Model: 377B02 Serial Number: 142338 Manufacturer: PCB

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Reference Equipment

Manufacturer	Model #	Serial #	PCB Control #	Cal Date	Due Date
Hewlett Packard	34401A	MY41045214	LD-001	3/6/13	3/6/14
Bruel & Kjaer	4192	2657834	CA1270	11/26/13	11/26/14
Newport	BTH-W/N	8410668	CA1187	not required	not required
Larson Davis	PRM915	122	CA-865	9/17/13	9/17/14
Larson Davis	PRM902	4701	CA1450	10/21/13	10/21/14
Larson Davis	2559LF	3216	CA-883	not required	not required
Larson Davis	ADP005	1	LD-017	not required	not required
Larson Davis	PRM916	127	CA924	4/15/13	4/15/14
Larson Davis	CAL250	5025	CA1277	7/25/13	7/25/14
Larson Davis	2201	140	CA-1409	3/22/13	3/21/14
Larson Davis	2900	1079	CA-521A	6/4/13	6/4/14
Larson Davis	PRA951-4	234	CA1154	9/17/13	9/17/14
0	0	0	0	not required	not required
0	0	0	0	not required	not required

Frequency sweep performed with B&K UA0033 electrostatic actuator.

Condition of Unit

As Found: N/A

As Left: New unit in tolerance

Notes

1. Calibration of reference microphone is traceable through PTB.
2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc.
3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540.3 and ISO 17025.
4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications.
5. Open circuit sensitivity is measured using the insertion voltage method following procedure AT603-5.
6. Measurement uncertainty (95% confidence level with coverage factor of 2) for sensitivity is +/-0.20 dB.
7. Unit calibrated per ACS-20.

Technician: Milton Munger MM 3646 Date: January 20, 2014

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CALIBRATION CERT #1662.01

PCB PIEZOTRONICS VIBRATION DIVISION
3425 Walden Avenue, Depew, New York, 14043
TEL: 888-684-0013 FAX: 716-685-3886 www.pcb.com

ID:CAL60-347309379.135

~ Calibration Report ~

Microphone Model: 377B02 Serial Number: 142338 Description: 1/2" Free-Field Microphone

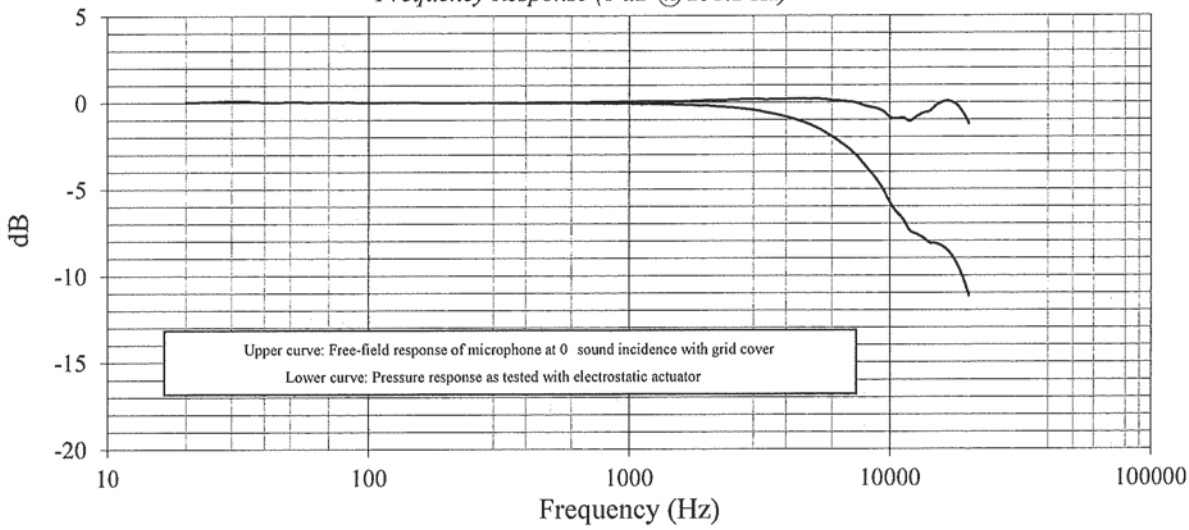
Calibration Data

Open Circuit Sensitivity @ 251.2 Hz: 52.36 mV/Pa
-25.62 dB re 1V/Pa

Polarization Voltage, External: 0 V
Capacitance: 10.6 pF

Temperature: 69 °F (21°C) Ambient Pressure: 983 mbar Relative Humidity: 26 %

Frequency Response (0 dB @ 251.2 Hz)



Freq (Hz)	Lower (dB)	Upper (dB)	Freq (Hz)	Lower (dB)	Upper (dB)	Freq (Hz)	Lower (dB)	Upper (dB)	Freq (Hz)	Lower (dB)	Upper (dB)
20.0	0.04	0.04	1584.9	-0.13	0.08	6683.4	-2.46	0.06	-	-	-
25.1	0.06	0.06	1678.8	-0.15	0.08	7079.5	-2.75	0.03	-	-	-
31.6	0.12	0.12	1778.3	-0.16	0.09	7498.9	-3.11	-0.04	-	-	-
39.8	0.04	0.04	1883.7	-0.18	0.10	7943.3	-3.57	-0.18	-	-	-
50.1	0.05	0.05	1995.3	-0.17	0.14	8414.0	-4.01	-0.28	-	-	-
63.1	0.04	0.04	2113.5	-0.22	0.12	8912.5	-4.47	-0.36	-	-	-
79.4	0.03	0.03	2238.7	-0.24	0.13	9440.6	-5.05	-0.53	-	-	-
100.0	0.02	0.02	2371.4	-0.27	0.14	10000.0	-5.81	-0.86	-	-	-
125.9	0.02	0.02	2511.9	-0.30	0.16	10592.5	-6.35	-0.95	-	-	-
158.5	0.01	0.01	2660.7	-0.34	0.17	11220.2	-6.76	-0.90	-	-	-
199.5	0.01	0.01	2818.4	-0.38	0.18	11885.0	-7.40	-1.08	-	-	-
251.2	0.00	0.00	2985.4	-0.43	0.19	12589.3	-7.61	-0.84	-	-	-
316.2	-0.01	0.00	3162.3	-0.48	0.20	13335.2	-7.82	-0.63	-	-	-
398.1	-0.01	-0.01	3349.7	-0.57	0.17	14125.4	-8.11	-0.52	-	-	-
501.2	-0.02	0.02	3548.1	-0.64	0.18	14962.4	-8.16	-0.19	-	-	-
631.0	-0.03	0.01	3758.4	-0.72	0.18	15848.9	-8.33	0.02	-	-	-
794.3	-0.05	0.04	3981.1	-0.81	0.19	16788.0	-8.66	0.06	-	-	-
1000.0	-0.06	0.06	4217.0	-0.91	0.20	17782.8	-9.22	-0.11	-	-	-
1059.3	-0.07	0.06	4466.8	-1.03	0.20	18836.5	-10.06	-0.55	-	-	-
1122.0	-0.08	0.06	4731.5	-1.16	0.21	19952.6	-11.16	-1.23	-	-	-
1188.5	-0.08	0.07	5011.9	-1.32	0.21	-	-	-	-	-	-
1258.9	-0.09	0.07	5308.8	-1.50	0.20	-	-	-	-	-	-
1333.5	-0.10	0.08	5623.4	-1.70	0.18	-	-	-	-	-	-
1412.5	-0.11	0.08	5956.6	-1.94	0.13	-	-	-	-	-	-
1496.2	-0.12	0.08	6309.6	-2.19	0.10	-	-	-	-	-	-

Technician: Milton Munger MM 3646 Date: January 20, 2014

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APPENDIX C

WEATHER DATA

USAF	WBAN	YR--MODAHRMN	SPD	TEMP	PCP01	PCP06	PCP24	PCPXX	SD
722030	12844	201408190000	10	86	*****	*****	*****	*****	**
722030	12844	201408190053	7	85	0	*****	*****	*****	**
722030	12844	201408190153	6	85	0	*****	*****	*****	**
722030	12844	201408190253	7	84	0	*****	*****	*****	**
722030	12844	201408190353	7	84	0	*****	*****	*****	**
722030	12844	201408190453	5	83	0	*****	*****	*****	**
722030	12844	201408190459	***	****	*****	*****	0	*****	0
722030	12844	201408190553	5	82	0	*****	*****	*****	**
722030	12844	201408190600	5	82	*****	*****	*****	*****	**
722030	12844	201408190653	0	80	0	*****	*****	*****	**
722030	12844	201408190753	0	81	0	*****	*****	*****	**
722030	12844	201408190853	5	79	0	*****	*****	*****	**
722030	12844	201408190953	0	79	0	*****	*****	*****	**
722030	12844	201408191053	0	79	0	*****	*****	*****	**
722030	12844	201408191153	0	81	0	*****	*****	*****	**
722030	12844	201408191200	0	81	*****	*****	*****	*****	**
722030	12844	201408191253	3	84	0	*****	*****	*****	**
722030	12844	201408191353	6	87	0	*****	*****	*****	**
722030	12844	201408191453	6	90	0	*****	*****	*****	**
722030	12844	201408191553	6	90	0	*****	*****	*****	**
722030	12844	201408191653	9	90	0	*****	*****	*****	**
722030	12844	201408191753	8	91	0	*****	*****	*****	**
722030	12844	201408191800	8	91	*****	*****	*****	*****	**
722030	12844	201408191853	11	91	0	*****	*****	*****	**
722030	12844	201408191953	11	92	0	*****	*****	*****	**
722030	12844	201408192053	13	91	0	*****	*****	*****	**
722030	12844	201408192153	10	89	0	*****	*****	*****	**
722030	12844	201408192253	10	88	0	*****	*****	*****	**
722030	12844	201408192353	10	87	0	*****	*****	*****	**
722030	12844	201408200000	10	87	*****	*****	*****	*****	**
722030	12844	201408200053	9	86	0	*****	*****	*****	**
722030	12844	201408200153	6	85	0	*****	*****	*****	**
722030	12844	201408200253	8	85	0	*****	*****	*****	**
722030	12844	201408200353	6	84	0	*****	*****	*****	**
722030	12844	201408200453	6	83	0	*****	*****	*****	**
722030	12844	201408200459	***	****	*****	*****	0	*****	0
722030	12844	201408200553	5	83	0	*****	*****	*****	**
722030	12844	201408200600	5	83	*****	*****	*****	*****	**
722030	12844	201408200653	0	82	0	*****	*****	*****	**
722030	12844	201408200753	3	81	0	*****	*****	*****	**
722030	12844	201408200853	0	81	0	*****	*****	*****	**
722030	12844	201408200953	0	80	0	*****	*****	*****	**
722030	12844	201408201053	0	80	0	*****	*****	*****	**
722030	12844	201408201153	0	81	0	*****	*****	*****	**
722030	12844	201408201200	0	81	*****	*****	*****	*****	**
722030	12844	201408201253	3	84	0	*****	*****	*****	**
722030	12844	201408201353	0	87	0	*****	*****	*****	**

USAF	WBAN	YR--MODAHRMN	SPD	TEMP	PCP01	PCP06	PCP24	PCPXX	SD
722030	12844	201408201453	6	89	0	*****	*****	*****	**
722030	12844	201408201553	6	91	0	*****	*****	*****	**
722030	12844	201408201653	0	91	0	*****	*****	*****	**
722030	12844	201408201753	10	93	0	*****	*****	*****	**
722030	12844	201408201800	10	93	*****	*****	*****	*****	**
722030	12844	201408201840	14	91	*****	*****	*****	*****	**
722030	12844	201408201853	11	91	0	*****	*****	*****	**
722030	12844	201408201953	11	89	0	*****	*****	*****	**
722030	12844	201408202053	3	86	0	*****	*****	*****	**
722030	12844	201408202104	3	87	*****	*****	*****	*****	**
722030	12844	201408202153	0	85	0	*****	*****	*****	**
722030	12844	201408202253	8	87	0	*****	*****	*****	**
722030	12844	201408202353	5	85	0	*****	*****	*****	**
722030	12844	201408210000	5	85	*****	*****	*****	*****	**
722030	12844	201408210053	6	84	0	*****	*****	*****	**
722030	12844	201408210153	7	85	0	*****	*****	*****	**
722030	12844	201408210253	5	84	0	*****	*****	*****	**
722030	12844	201408210353	5	84	0	*****	*****	*****	**
722030	12844	201408210453	5	84	0	*****	*****	*****	**
722030	12844	201408210459	***	****	*****	*****	0	*****	0
722030	12844	201408210553	3	83	0	*****	*****	*****	**
722030	12844	201408210600	3	83	*****	*****	*****	*****	**
722030	12844	201408210653	0	81	0	*****	*****	*****	**
722030	12844	201408210753	3	80	0	*****	*****	*****	**
722030	12844	201408210853	0	79	0	*****	*****	*****	**
722030	12844	201408210953	0	79	0	*****	*****	*****	**
722030	12844	201408211053	3	79	0	*****	*****	*****	**
722030	12844	201408211153	3	82	0	*****	*****	*****	**
722030	12844	201408211200	3	82	*****	*****	*****	*****	**
722030	12844	201408211253	6	85	0	*****	*****	*****	**
722030	12844	201408211353	0	88	0	*****	*****	*****	**
722030	12844	201408211453	6	89	0	*****	*****	*****	**
722030	12844	201408211553	6	90	0	*****	*****	*****	**
722030	12844	201408211635	11	90	*****	*****	*****	*****	**
722030	12844	201408211653	9	91	0	*****	*****	*****	**
722030	12844	201408211722	11	90	*****	*****	*****	*****	**
722030	12844	201408211753	11	91	0	*****	*****	*****	**
722030	12844	201408211800	11	91	*****	*****	*****	*****	**
722030	12844	201408211853	11	91	0	*****	*****	*****	**
722030	12844	201408211953	13	90	0	*****	*****	*****	**
722030	12844	201408212053	9	90	0	*****	*****	*****	**
722030	12844	201408212153	11	89	0	*****	*****	*****	**
722030	12844	201408212253	10	88	0	*****	*****	*****	**
722030	12844	201408212353	8	86	0	*****	*****	*****	**
722030	12844	201408220000	8	86	*****	*****	*****	*****	**
722030	12844	201408220053	7	85	0	*****	*****	*****	**
722030	12844	201408220153	5	85	0	*****	*****	*****	**

USAF	WBAN	YR--MODAHRMN	SPD	TEMP	PCP01	PCP06	PCP24	PCPXX	SD
722030	12844	201408220253	5	84	0	*****	*****	*****	**
722030	12844	201408220353	6	85	0	*****	*****	*****	**
722030	12844	201408220453	5	84	0	*****	*****	*****	**
722030	12844	201408220459	***	****	*****	*****	0	*****	0
722030	12844	201408220553	5	84	0	*****	*****	*****	**
722030	12844	201408220600	5	84	*****	*****	*****	*****	**
722030	12844	201408220653	0	83	0	*****	*****	*****	**
722030	12844	201408220753	3	79	0	*****	*****	*****	**
722030	12844	201408220853	0	81	0	*****	*****	*****	**
722030	12844	201408220953	0	80	0	*****	*****	*****	**
722030	12844	201408221053	0	80	0	*****	*****	*****	**
722030	12844	201408221153	3	82	0	*****	*****	*****	**
722030	12844	201408221200	3	82	*****	*****	*****	*****	**
722030	12844	201408221253	0	83	0	*****	*****	*****	**
722030	12844	201408221321	3	83	*****	*****	*****	*****	**
722030	12844	201408221353	6	85	0	*****	*****	*****	**
722030	12844	201408221453	3	88	0	*****	*****	*****	**
722030	12844	201408221525	3	90	*****	*****	*****	*****	**
722030	12844	201408221553	6	90	0	*****	*****	*****	**
722030	12844	201408221653	8	91	0	*****	*****	*****	**
722030	12844	201408221744	13	91	*****	*****	*****	*****	**
722030	12844	201408221753	13	91	0	*****	*****	*****	**
722030	12844	201408221800	13	91	*****	*****	*****	*****	**
722030	12844	201408221853	9	91	0	*****	*****	*****	**
722030	12844	201408221953	7	91	0	*****	*****	*****	**
722030	12844	201408222011	8	90	*****	*****	*****	*****	**
722030	12844	201408222053	9	90	0	*****	*****	*****	**
722030	12844	201408222153	9	90	0	*****	*****	*****	**
722030	12844	201408222253	9	88	0	*****	*****	*****	**
722030	12844	201408222353	10	86	0	*****	*****	*****	**
722030	12844	201408230000	10	86	*****	*****	*****	*****	**
722030	12844	201408230053	8	86	0	*****	*****	*****	**
722030	12844	201408230153	9	85	0	*****	*****	*****	**
722030	12844	201408230253	6	84	0	*****	*****	*****	**
722030	12844	201408230353	7	84	0	*****	*****	*****	**
722030	12844	201408230453	8	84	0	*****	*****	*****	**
722030	12844	201408230459	***	****	*****	*****	0	*****	0
722030	12844	201408230553	3	83	0	*****	*****	*****	**
722030	12844	201408230600	3	83	*****	*****	*****	*****	**
722030	12844	201408230653	3	80	0	*****	*****	*****	**
722030	12844	201408230753	0	80	0	*****	*****	*****	**
722030	12844	201408230853	5	80	0	*****	*****	*****	**
722030	12844	201408230953	3	80	0	*****	*****	*****	**
722030	12844	201408231053	3	79	0	*****	*****	*****	**
722030	12844	201408231153	6	80	0	*****	*****	*****	**
722030	12844	201408231200	6	80	*****	*****	*****	*****	**
722030	12844	201408231253	6	84	0	*****	*****	*****	**

USAF	WBAN	YR--MODAHRMN	SPD	TEMP	PCP01	PCP06	PCP24	PCPXX	SD
722030	12844	201408231353	6	88	0	*****	*****	*****	**
722030	12844	201408231453	8	88	0	*****	*****	*****	**
722030	12844	201408231553	6	90	0	*****	*****	*****	**
722030	12844	201408231653	8	91	0	*****	*****	*****	**
722030	12844	201408231753	8	92	0	*****	*****	*****	**
722030	12844	201408231800	8	92	*****	*****	*****	*****	**
722030	12844	201408231853	13	91	0	*****	*****	*****	**
722030	12844	201408231953	13	91	0	*****	*****	*****	**
722030	12844	201408232053	13	90	0	*****	*****	*****	**
722030	12844	201408232153	11	89	0	*****	*****	*****	**
722030	12844	201408232253	11	87	0	*****	*****	*****	**
722030	12844	201408232353	8	86	0	*****	*****	*****	**
722030	12844	201408240000	8	86	*****	*****	*****	*****	**
722030	12844	201408240053	9	86	0	*****	*****	*****	**
722030	12844	201408240153	8	85	0	*****	*****	*****	**
722030	12844	201408240253	8	85	0	*****	*****	*****	**
722030	12844	201408240353	10	85	0	*****	*****	*****	**
722030	12844	201408240453	7	84	0	*****	*****	*****	**
722030	12844	201408240459	***	****	*****	*****	0	*****	0
722030	12844	201408240553	3	83	*****	*****	*****	*****	**
722030	12844	201408240600	3	83	*****	*****	*****	*****	**
722030	12844	201408240653	5	79	*****	*****	*****	*****	**
722030	12844	201408240753	5	80	*****	*****	*****	*****	**
722030	12844	201408240853	5	78	*****	*****	*****	*****	**
722030	12844	201408240953	0	78	*****	*****	*****	*****	**
722030	12844	201408241053	3	78	*****	*****	*****	*****	**
722030	12844	201408241153	6	80	*****	*****	*****	*****	**
722030	12844	201408241200	6	80	*****	*****	*****	*****	**
722030	12844	201408241253	7	84	*****	*****	*****	*****	**
722030	12844	201408241353	7	87	*****	*****	*****	*****	**
722030	12844	201408241453	8	90	*****	*****	*****	*****	**
722030	12844	201408241553	6	91	*****	*****	*****	*****	**
722030	12844	201408241653	11	93	*****	*****	*****	*****	**
722030	12844	201408241753	14	93	*****	*****	*****	*****	**
722030	12844	201408241800	14	93	*****	*****	*****	*****	**
722030	12844	201408241853	9	92	*****	*****	*****	*****	**
722030	12844	201408241953	11	93	*****	*****	*****	*****	**
722030	12844	201408242053	11	91	*****	*****	*****	*****	**
722030	12844	201408242153	10	90	*****	*****	*****	*****	**
722030	12844	201408242253	8	88	*****	*****	*****	*****	**
722030	12844	201408242353	6	86	*****	*****	*****	*****	**

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