



### What has VTA done to improve the design and minimize potential noise of BART trains that are on elevated track?

North of Berryessa Road, the BART tracks will be elevated and include a 4-6 foot high soundwall above the elevated tracks to reduce BART train noise to levels below the federal and state criteria. South of Berryessa Road to Mabury Road, in the Berryessa BART Station campus area, the project design includes an 8-foot high community wall along residential areas to the east to reduce BART train and station traffic noise.

### Will freight trains still use the corridor with BART? How does the vibration of the UPRR train compare to the vibration the BART train will make?

The Union Pacific Railroad (UPRR) will continue to operate in the northern part of the corridor from the future Warm Springs Station to Montague Expressway. The vibration created by a BART train traveling at 67 miles per hour is approximately the same as the vibration created by UPRR trains traveling at 10 miles per hour. In addition the duration of the vibration levels is far less because of higher BART train speeds. BART train vibration levels are required to be mitigated to the federal criteria, but freight trains are not because freight trains were in operation prior to homes and businesses being built along the freight corridor.



### How Can I Contact VTA if I Have Questions or Concerns?

The BART Silicon Valley Community Outreach Team provides timely, pertinent project information and responds to project inquiries or concerns via the project hotline or email. The BART Silicon Valley website, at [vta.org/bart](http://vta.org/bart), links to project fact sheets, news releases, maps, calendars/schedules, graphics, videos, and other multimedia resources, and will be updated as activities occur. Program updates and information are also available via

Facebook [facebook.com/bartsv](https://www.facebook.com/bartsv) and Twitter [twitter.com/bartsv](https://twitter.com/bartsv). In addition to information provided,

residents, businesses, commuters, and the general public will receive project updates via public meetings, news stories, newsletters, signage, email updates, and fliers during construction.

If you are interested in receiving email updates, please go to the Communications tab on our website ([vta.org/bart](http://vta.org/bart)) to sign up for GovDelivery, a subscription service that allows VTA to communicate with you via email.



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## Phase I – Berryessa Extension Noise And Vibration

### Introduction

During the construction of transit projects, noise and vibration are two subjects for which VTA receives the most questions or concerns. Well utilized transit systems are located in densely populated areas and appropriate measures are taken to reduce noise and vibration impacts to communities.

VTA conducted extensive federal and state environmental analyses for the BART Silicon Valley project which identified residences that could be impacted by noise or vibration during construction, and/or operation of future BART service. The following information provides an overview of what causes noise and vibration, how impacts are determined and what mitigation measures are planned.

### Noise and Vibration Due to Construction

#### What about noise impacts during construction?



During construction, a variety of noise and vibration generating equipment will be required to build the project. Noise and vibration impacts related to construction will be mitigated through the use of temporary noise and visual barriers, restricting the hours of construction, using techniques to minimize impacts while pile

driving (driving steel beams deep into the ground) where feasible, and a number of other actions. Noise and vibration monitoring stations along the corridor will record existing and construction noise and vibrations levels, and alert VTA if thresholds are exceeded.

#### Will permanent soundwalls be installed prior to major construction?

Where soundwalls will not interfere with construction activities, they will be installed as early as possible. Some soundwalls will not be installed until major construction is complete to ensure that they are not damaged during the construction, conflict with underground utility work, or block access to construction areas.

#### What about vibration impacts during construction?

Construction vibration impacts may occur from pile driving, bulldozers, and other heavy equipment. Mitigation measures will include alternate construction methods in vibration sensitive areas, along with vibration monitoring to ensure compliance with the federal vibration criteria.



### Noise and Vibration due to Future Train Service

#### How and what noise and vibration will be generated from future BART train service?

Transit noise and vibration are generated by BART trains in motion. The noise comes from the electric motors that propel the train and the rolling noise of the steel wheels on the tracks. Vibrations result from the weight of the train rolling over the tracks. In addition to the train, noise and/or vibration is generated by the project's system equipment, passenger stations, buses, and parking facilities.

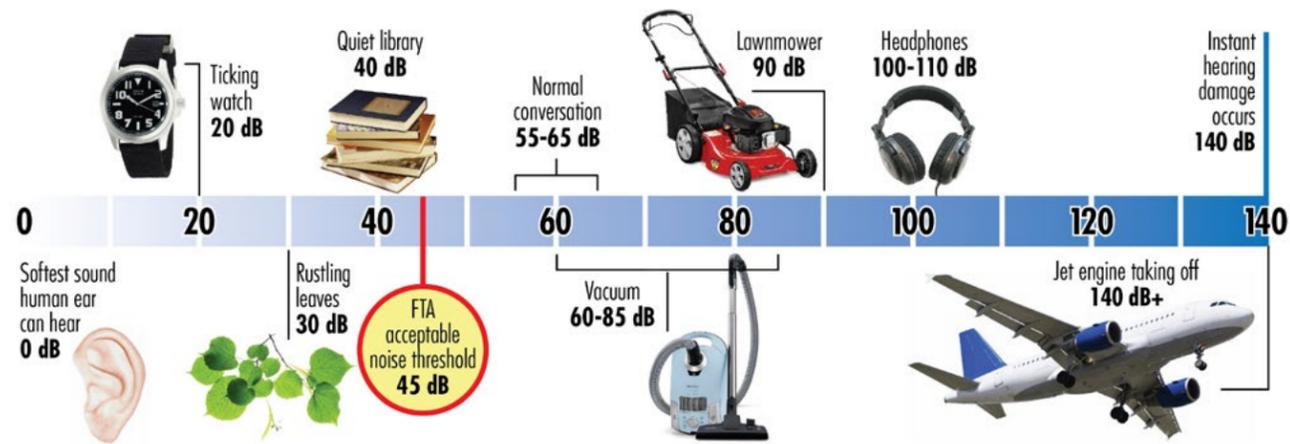
#### What are considered sensitive areas for noise and vibration?

Certain structures or areas are considered sensitive to noise and vibration. Examples include: residences and buildings where people normally sleep, hospitals, hotels, schools, libraries, churches, and certain parks and recreational facilities.

#### Are there regulations transit projects have to adhere to related to noise and vibration impacts?

Yes. The Federal Transit Administration requires an in-depth noise and vibration assessment for rail projects such as BART Silicon Valley. Federal criteria dictate how impacts are determined and when measures to reduce noise (mitigations) are required.





Below is the process VTA utilized to determine if structures or areas sensitive to noise or vibration would require measures to reduce noise per federal criteria. The criteria are based on standards developed through well-documented research of community reaction to noise and vibration from transit projects. The analysis requires identifying the noise/vibration source, identifying ways to reduce the noise/ vibration source, such as project design features, walls, soil type, topography and vegetation, and information about the noise/vibration receiver, such as type of structure, height, and distance from the noise/vibration source.

**Identification of Areas Sensitive to Noise and Vibration**

Noise and vibration measurements were taken throughout the project corridor to document existing noise and vibration levels. Additional measurements were taken at noise/vibration-sensitive areas within 350 feet of the future BART tracks or 250 feet from proposed station locations and BART system equipment. This process helped to identify sensitive structures and areas and establish base levels of existing noise already in the corridor.

**Assessment of Future Noise and Vibration Levels**

VTA recorded existing BART train and system noise and vibration to calculate future levels of the project. Design information on the type, location, and configuration of the future BART tracks were also used to project the noise and vibration levels that would be generated by future train service.

**Determining Impacts and if Mitigation is Needed**

Federal Exterior Noise Impact Criteria were used to evaluate noise-sensitive structures and areas near the project. Existing (background) noise measurements and future train service noise projections were analyzed incorporating other project design features and existing factors to determine potential impacts. VTA is also required to implement mitigation measures for project noise impacts that exceed the State of California interior noise criteria of 45 decibels (dB) per day. If these thresholds are exceeded, VTA is required to provide mitigation measures to reduce the noise impact to below federal and state levels. Homeowners whose

residences were identified as requiring mitigations, have been contacted and analysis conducted through a Residential Noise Insulation Program.

The federal Ground-Borne Vibration Impact Criteria are based on land use and frequency of events. Frequent events are defined as more than 70

vibration events per day, which will occur with the future BART service. VTA will implement mitigation for vibration impacts that exceed the federal criteria. Since impacts related to vibration are site-specific, mitigation measures will vary due to local circumstances, including but not limited to a location's distance from the vibration source, use of the location, and the surrounding environment.

**Noise and Vibration Mitigation Strategies**

**How will VTA mitigate for noise and vibration impacts due to future BART service?**

Soundwalls, track and vehicle maintenance, building insulation, equipment enclosures, and vibration and noise absorbing products under the tracks such as tire derived aggregate (rubber pieces) or floating slab (concrete slab supported by a resilient layer) are examples of mitigation measures that will be constructed as part of the project to mitigate noise and vibration impacts during future BART service.

**Soundwalls** – In addition to existing sound walls which provide noise insulation, approximately 12,500 linear feet of soundwalls will be constructed. Typically, the location of a soundwall is 10 to 15 feet from the center of the BART tracks. In areas where a soundwall is recommended on both sides of the alignment, noise absorbing soundwalls are commonly required to prevent train noise echo.



**Will VTA remove the existing soundwalls and build new soundwalls?**

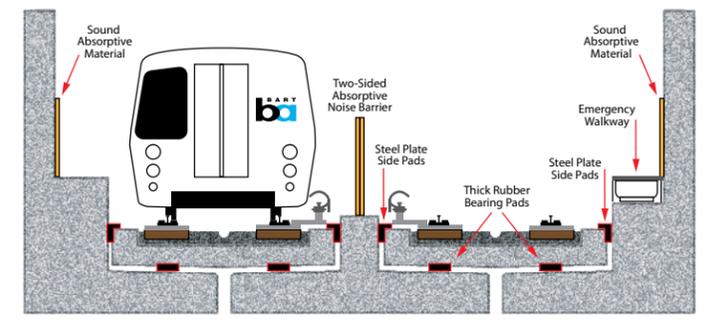
Most of the existing soundwalls will remain, and where required, new soundwalls will be constructed within the project corridor. In limited cases, existing soundwalls may be replaced with new soundwalls to accommodate the construction or relocation of underground utilities.

**Tire Derived Aggregate (TDA)** – Scrap vehicle tires are transformed into a vibration-absorbing TDA material. TDA will be installed beneath the tracks in some locations, to reduce vibration to within federal criteria.

This engineering method was successfully installed by VTA on the Vasona light rail extension in the City of Campbell. TDA is installed as a one-foot thick layer of tire shreds beneath the track bed. This method also provides a good use for recycled tire material.



**Floating Slab** – The BART tracks are affixed to a concrete pad that sits on top of thick rubber bearing pads, which helps absorb vibration generated by the train. Floating slab will be installed at locations where TDA does not provide sufficient vibration mitigation to meet the federal criteria.



**Track Configuration and Maintenance** – Activities such as rail grinding and track inspection reduce rail defects that lead to higher than normal noise and vibration levels. Regular rail grinding helps to minimize noise and vibration generated by trains traveling over defects or imperfections on the rail. The 10 mile Berryessa Extension project is a relatively straight alignment without any major turns. Significantly less noise is generated by trains running on straight tracks.

**Regular Vehicle Maintenance** – Activities such as periodic inspections and tests will help to identify problems and necessary corrective actions to minimize system noise and vibration levels. This includes wheel truing, which is the process of cutting away a thin layer of steel on a wheel's outer diameter to smooth out rough spots and ensure that the wheels are perfectly round.

**Systems Equipment** – Emergency power generators and other electrical equipment will be enclosed in either concrete or brick structures to ensure that there will be no adverse noise effect associated with operations and periodic routine testing.

