Section 4.17
Construction Effects

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Acronyms and Abbreviations

BRT ..... Bus Rapid Transit
CFR ..... Code of Federal Regulations
CTMP ..... Construction Traffic Management Plan
EIS ..... Environmental Impact Statement
ESA ..... Environmental Site Assessment
FTA ..... Federal Transit Administration
LRT ..... Light Rail Transit
Metro ..... Niagara Frontier Transit Metro System, Inc.
Metro Rail ..... Metro Light Rail Transit System
MOU ..... Memorandum of Understanding
NYSDEC ..... New York State Department of Environmental Conservation
NYSDOT ..... New York State Department of Transportation
OCS ..... Overhead Contact System
SEM ..... Sequential Excavation Method
SHPO ..... State Historic Preservation Office
TCE ..... Temporary Construction Easement
UB ..... University at Buffalo

4.17 CONSTRUCTION EFFECTS

This section describes the temporary construction impacts of the Buffalo-Amherst-Tonawanda Corridor Transit Expansion (the Project). A detailed description of temporary construction impacts is described in Appendix D10, "Construction Effects Supplemental Information".

The construction activities summarized in this section are based on the current level of design for the Project alternatives, discussions with construction specialists, and experience on similar projects. Actual construction methods and materials would be site specific and at the discretion of the contractor. All construction methods and materials would be conducted per Metro requirements and would comply with New York State Department of Transportation regulatory requirements. The final means and methods may differ from what is included in this analysis. Final construction sequencing and methods would be adopted during final design.

Table 4.17-1 summarizes work activities anticipated (organized by roadway associated with the Project alignment) as it pertains to the construction of the LRT Build Alternative and BRT Build Alternative.

Table 4.17-1. Summary of Anticipated Work Activities

Location (Roadway)	Summary of Work Activities	
	LRT Build Alternative	BRT Build Alternative
Main Street and Kenmore Avenue	▪ Construction of underground configuration (tunneling), substations, and supporting infrastructure. ▪ Construction staging. ▪ Construction of Stormwater management practices.	▪ Construction of proposed station on UB South Campus (at-grade station at existing Metro Rail University Station). ▪ Construction of traffic operational improvements. ▪ Construction staging. ▪ Construction of Stormwater management practices.
Niagara Falls Boulevard	▪ Construction of underground configuration (tunneling), substations, and supporting infrastructure. ▪ Construction of at-grade track configuration, substations, and supporting infrastructure including utilities. ▪ Construction of proposed stations. ▪ Construction of park-and-ride facility at Boulevard Mall. ▪ Construction of traffic capacity and operational improvements. ▪ Construction of pedestrian and bicycle improvements. ▪ Construction staging. ▪ Relocation of existing stormwater management practices and construction of stormwater management practices.	▪ Construction of at-grade busway configuration and supporting infrastructure. ▪ Construction of proposed stations. ▪ Construction of park-and-ride facility at Boulevard Mall. ▪ Construction of traffic capacity and operational improvements. ▪ Construction of pedestrian and bicycle improvements. ▪ Construction staging. ▪ Relocation of existing stormwater management practices and construction of stormwater management practices.
Maple Road	▪ Construction of at-grade track configuration, substations, and supporting infrastructure. ▪ Construction of underground configuration (Maple and Sweet Home Intersection) ▪ Construction of proposed stations.	▪ Construction of at-grade busway configuration and supporting infrastructure. ▪ Construction of proposed stations. ▪ Construction of traffic capacity and operational improvements.

Location (Roadway)	Summary of Work Activities	
	LRT Build Alternative	BRT Build Alternative
	▪ Construction of traffic capacity and operational improvements. ▪ Construction of pedestrian and bicycle improvements. ▪ Construction staging ▪ Construction of stormwater management practices.	▪ Construction of pedestrian and bicycle improvements. ▪ Construction staging ▪ Construction of stormwater management practices.
Sweet Home Road	▪ Construction of at-grade track configuration, substations, and supporting infrastructure. ▪ Construction of proposed station. ▪ Construction of traffic capacity and operational improvements. ▪ Construction of pedestrian and bicycle improvements. ▪ Construction staging ▪ Construction of stormwater management practices.	▪ Construction of at-grade busway configuration and supporting infrastructure. ▪ Construction of proposed station. ▪ Construction of traffic capacity and operational improvements. ▪ Construction of pedestrian and bicycle improvements. ▪ Construction staging ▪ Construction of stormwater management practices.
Rensch Road, Mary Talbert Way, and Lee Road (UB North Campus)	▪ Construction of at-grade track configuration, substations, and supporting infrastructure. ▪ Construction of a new structured crossing over Bizer Creek. ▪ Construction of proposed stations. ▪ Construction of pedestrian and bicycle improvements. ▪ Construction staging ▪ Relocation of existing stormwater management practices and construction of stormwater management practices.	▪ Construction of at-grade busway configuration and supporting infrastructure. ▪ Construction of a new structured crossing over Bizer Creek. ▪ Construction of proposed stations. ▪ Construction of pedestrian and bicycle improvements. ▪ Construction staging ▪ Relocation of existing stormwater management practices and construction of Stormwater management practices.
John James Audubon Parkway	▪ Construction of at-grade track configuration, substations, and supporting infrastructure. ▪ Construction of new bridge span over Ellicott Creek (using existing piers). ▪ Construction associated with relocating and replacing the Ellicott Creek Trailway. ▪ Construction of proposed stations. ▪ Construction of park-and-ride facility at I-990 proposed station. ▪ Construction of pedestrian and bicycle improvements. ▪ Construction of geometric changes to the I-990 off-ramp roundabout. ▪ Construction of storage and light maintenance facility. ▪ Construction of park-and-ride facility at the proposed I-990 station. ▪ Construction staging ▪ Relocation of existing stormwater management practices and construction of stormwater management practices.	▪ Construction of at-grade busway configuration and supporting infrastructure. ▪ Construction of new bridge span over Ellicott Creek (using existing piers). ▪ Construction associated with relocating and replacing the Ellicott Creek Trailway. ▪ Construction of proposed stations. ▪ Construction of traffic capacity and operational improvements. ▪ Construction of pedestrian and bicycle improvements. ▪ Construction of geometric changes to the I-990 off-ramp roundabout. ▪ Construction of storage and light maintenance facility. ▪ Construction of park-and-ride facility at the proposed I-990 station. ▪ Construction staging ▪ Relocation of existing stormwater management practices and construction of stormwater management practices.

4.17.1 Affected Environment

This section characterizes temporary effects associated with construction of either Build Alternative. All construction methods and materials would be conducted per Metro requirements

and would comply with New York State Department of Transportation regulatory requirements. The final means and methods may differ from what is included in this analysis. Sequencing and methods would largely be adopted during final design. During final design and prior to any construction, preconstruction evaluations would be completed to determine existing conditions that would affect construction methods, sequencing, and scheduling.

If elements of the Project developed during final design substantially vary from the environmental commitments documented within this Draft EIS, additional environmental documentation may be necessary. This additional documentation, as applicable, will include environmental reevaluation. As construction contracts are awarded, different contractors may arrange for use of properties outside of the public right-of-way for various uses. In these instances, the contractor would be subject to normal city, county, and state building and zoning regulations and be fully responsible for obtaining any necessary permits and environmental approvals for the proposed use.

4.17.1.1 Project Construction Phases for Each Build Alternative

The Project will involve a multiyear design and construction phase that would be completed following completion of the environmental process and pending available funding. Before revenue service (start of service open to the public) could begin, the following major steps would occur:

- **Preliminary and Final Design** begins with the conceptual engineering plans presented in this Draft EIS (see Appendix B2, "Conceptual Design Plans") being further developed through preliminary design. Environmental, cultural, and geotechnical surveys would be conducted during preliminary design. Upon approval of the preliminary design plans, final design would be completed and will include all required permitting. The final design submission would include sealed construction plans; erosion and sediment control plans; traffic control plans; traffic signal plans; construction specifications/special provisions; quantity summary; and cost estimates.
- **Pre-Construction Activities** typically include construction contract development; procurement of a preferred contractor, community outreach and education programs; environmental permits and approvals; property acquisition; advance utility relocations; and vehicle procurement. Metro will define the preferred method for procuring a contractor prior to construction.
- **Construction Activities** include those items required to physically operate the Project for revenue service. Construction of the LRT Build Alternative would include dedicated light-rail tracks, overhead contact system (OCS) or catenary systems, stations, traffic signal and safety systems, power substations, tunneling and grade separations, structures, maintenance and storage facilities, and ancillary facilities. Construction of the BRT Build Alternative would include dedicated running BRT travel lanes (busways), stations, structures, traffic signal and safety systems, maintenance and storage facilities, and ancillary facilities.

Construction of both Build Alternatives would also include temporary work, defined by the approved traffic management plan, to maintain vehicular and pedestrian traffic.

- **Testing and Commissioning** of either the LRT Build Alternative or BRT Build Alternative vehicles and systems would follow construction, along with Project-wide systems testing. Systems to be tested include communication systems, fare collection systems, and traffic signal systems. For the LRT Build Alternative only, new LRT vehicle testing could be conducted on the existing system during non-revenue hours. Because there is limited ability to store new or replace LRT vehicles in the existing yard, construction from University Station to the planned light-rail vehicle maintenance and storage facility at the I-990 Station would be sufficiently complete in order to test the light-rail vehicles prior to operation. Additional project-wide systems testing for the LRT Build Alternative would also follow construction activities, including traction power substations and the OCS.

4.17.1.2 Construction Education and Outreach Plan for Each Build Alternative

A community education and outreach plan will be developed for the preferred Project Build Alternative and ~~No Build Alternative~~ available on the Project website: www.nftametrotransitexpansion.com. The purpose of this plan is to address any construction-related impacts and provide general construction scheduling information, coordinate construction work with adjacent business activities, and assist with the resolution of issues that could develop between residents, motorists, the contractor, and Metro. The details of the program would be included in a Construction Education and Outreach Plan, which would be completed pre-construction and implemented by Metro during construction.

4.17.1.3 Construction Methods

The Project would require the construction of infrastructure elements not found in typical roadway projects. For the LRT Build Alternative, construction elements include tunnels, emergency exit stair shafts, transit vehicle storage yard, power substations, signal bungalows, safety warning systems, track bed, trackwork, and OCS poles and wires. For the BRT Build Alternative, construction elements include transit vehicle storage yard, safety warning systems, and dedicated busways. Various methods would be used to construct the Project, depending on the geography, soil conditions, and the design. Based on the conceptual design, locations described in Appendix D10, "Construction Effects Supplemental Information" have been identified as potential construction staging areas, subject to property owner approval. The contractor would be responsible for verifying and identifying any additional staging areas and may consider staging construction equipment and materials within the Project corridor, if applicable and available.

AT-GRADE CONFIGURATION

An at-grade configuration would position the LRT Build Alternative and the BRT Build Alternative at the same level as the existing ground surface. The LRT Build Alternative would be primarily at-grade with the exception of the tunnel from Main Street to Kenmore Avenue and the underground configuration at the Maple Road and Sweet Home Road intersection. The BRT Build Alternative would be at-grade for the entire route. To accommodate the transit guideway,

reconfiguration or reconstruction of streets would be required along Niagara Falls Boulevard, Maple Road, Sweet Home Road, Mary Talbert Way, and John James Audubon Parkway. Street reconstruction activities would be required at proposed at-grade crossing locations and within the affected street right-of-way, and would allow for track or busway construction, crossing gates or safety warning systems, and traffic signals. Street reconfiguration and reconstruction activities would also provide beneficial infrastructure modifications to the existing intersection geometry, street curbs, gutters, medians, and sidewalks to accommodate the at-grade configuration of both Build Alternatives. Construction of the at-grade configurations would involve vehicular and pedestrian traffic detours, temporary lane closures, and temporary driveway closures. Additional temporary lane and roadway closures will be defined by the approved construction plans. The equipment utilized during construction would be consistent with street construction; pavement cutting machinery, excavators, and cranes necessary for at-grade construction.

UNDERGROUND CONFIGURATION (LRT BUILD ALTERNATIVE ONLY)

The LRT Build Alternative will require the construction of the following underground configurations.

University Station

Construction of the underground portion of the LRT Build Alternative, running from the existing University Station, under Main Street and Kenmore Avenue would use the sequential excavation method (SEM) process. The SEM would utilize a combination of hard rock drill-and-blast methods to connect the tunneling section between Main Street and the existing end of the Metro Rail line, along with segments of cut-and-cover under Kenmore Avenue and Niagara Falls Boulevard. Any hard rock blasting would utilize the latest in strategic controlled explosive techniques that minimize construction impacts and include techniques such as predictive blast damage modeling and contour blasting. Contour blasting involves small-diameter and decoupled charges in a closely spaced and lightly weighted blasting pattern.

The SEM which would be used in the segment north of University Station and continue eastbound, then loop westbound at the intersection of Main Street and Kenmore Avenue, involves explosives and is typically performed using the following steps: drilling blast holes and loading them with explosives, detonating the blast followed by ventilation to remove blast fumes, removal of the blasted rock (mucking), dewatering existing underground water through piping, scaling crown and walls to remove loosened pieces of rock, installing initial ground support, and repeating the cycle; periodically advancing the construction ventilation systems and utilities.

The SEM process will be designed to control vibrations to within allowable limits as defined by the construction type (drywall / masonry / stone / historical structures / etc.) of nearby structures. Any controlled blasting will be performed by qualified blasting specialists using pre-construction surveys to identify baseline conditions. Test blasts to confirm vibrations and noise are within limits will occur, within the Project corridor, prior to production blasting. Instrumentation and a

monitoring program will be established to record vibration and noise throughout blasting program.

Dewatering

Groundwater encountered during deep excavation activities will need to be properly tested and treated prior to discharge in accordance to state and federal regulations. Temporary water storage will be established to test groundwater as defined by the discharge and treatment protocols established by final construction plans. The tunnel design concept includes the construction of a low point pump station that would tie directly into the existing Metro Rail drainage system. The pump system will be designed to accommodate water volume. If the drainage system requires replacement to accommodate the increased volume, then the drainage system will be upgraded to handle the additional drainage needs associated with the construction of the proposed LRT Build Alternative tunnel.

Kenmore Avenue and Niagara Falls Boulevard

Construction of the underground portion of the LRT Build Alternative, running under Kenmore Avenue and Niagara Falls Boulevard would use a cut-and-cover tunnel method. The alignment would continue west and then make a tight turn north from Kenmore Avenue onto Niagara Falls Boulevard. The LRT Build Alternative alignment would continue underground on Niagara Falls Boulevard until emerging from a portal near the intersection of Niagara Falls Boulevard and Kenilworth Avenue.

Cut-and-cover is a method of construction for shallow tunnels where a section is first excavated and then covered with a temporary deck for traffic while the permanent tunnel roof is constructed. Equipment for the underground configuration would include large-diameter augers for drilling, dewatering of existing underground water, excavators, cranes, trucks for hauling materials and equipment, and concrete mixers.

Maple Road and Sweet Home Road Intersection (LRT Build Alternative only)

The LRT Build alternative would traverse under the intersection of Maple Road and Sweet Home Road through the construction of a structured underground configuration. Construction is expected to include excavation of shallow bathtub sections and bridges and/or structures to facilitate vehicle travel over the track. Equipment for the grade separation would include large-diameter augers for drilling, excavators, cranes, trucks for transporting materials and equipment, and concrete mixers.

TRACKWORK INSTALLATION (LRT BUILD ALTERNATIVE ONLY)

Light-rail track construction for the LRT Build Alternative would include the installation of the fixed-guideway elements, such as ballast, ties, rail, track embedment (non-ballasted), train signals and the OCS. The OCS includes poles, support hardware, and wires. These items would be placed in construction staging areas throughout the corridor to minimize haul distances and facilitate construction. All construction staging areas would be the responsibility of the contractor.

BUSWAY INSTALLATION (BRT BUILD ALTERNATIVE ONLY)

Busway construction for the BRT Build Alternative would include installing the dedicated bus guideway elements. Similar to roadway construction, this would include subgrade preparation, paving, striping, and signage. Construction equipment and materials would be placed in construction staging areas throughout the corridor to minimize haul distances and facilitate construction. All construction staging areas would be the responsibility of the contractor.

STATIONS

Ten stations would be constructed along the Project alignment. Stations for both the LRT Build Alternative and the BRT Build Alternative would be similar as they would provide platforms for level entry onto transit vehicles. Construction of the LRT Build Alternative at-grade stations would construct the 300-foot long high level station platforms, along with stairs and ramps. Station furnishings, including canopies, railings, lighting, seating, signage, bike racks, and fare vending equipment, would be installed. For the BRT Build Alternative, the same type of construction would occur except that the platforms would be 150-feet long low-level station platforms. Construction of the stations would utilize equipment used in typical highway and building construction. The facility would require foundation construction by means of excavators, backhoes, concrete pumps, and vibrators. The platform and canopy construction would utilize cranes and concrete placing equipment.

PARKING FACILITIES

Park-and-ride lots would be constructed at two proposed station locations for the Project, including the Boulevard Mall and I-990 Stations. Construction of the two park-and-ride surface facilities would involve initial demolition of each site where existing structures and pavement are present, subgrade preparation of the parking area, paving, and striping. Concrete curbs, lighting, driveways, sidewalks, and landscaping would be installed, as necessary. Construction would utilize excavation and grading equipment, asphalt pavers, rollers, and trucks for materials and equipment.

ACCESS MODIFICATION OF I-990 OFFRAMP AT JOHN JAMES AUDUBON PARKWAY

The Access Modification Report (AMR) provided within Appendix C3, “Access Modification Report” documents the proposed modifications to the roundabout recently constructed at John James Audubon Parkway and the Southbound I-990 ramps. The Project would need to modify the roundabout to implement a transit service along the Project alignment.

During conceptual design for the Project, the roundabout was constructed as part of the roadway improvements required for the construction of the Muir Woods Student Housing development. Safety concerns were identified related to the Project alignment traversing through the middle of the recently constructed roundabout, creating multiple points of conflicts between the Project and the traveling public. The Project will reconstruct the roundabout, shifting the roundabout to the west by approximately 60 feet. The Project will also install gates and signals to enhance the safety operations on the off ramp. A signage plan has also been developed identifying the proper signage required for the roundabout.

LIGHT MAINTENANCE/STORAGE FACILITY

North of the I-990 and John James Audubon Parkway interchange, the Project would include a storage facility to store either LRT vehicles or BRT vehicles overnight and perform end-of-line light maintenance and cleaning. Construction of the light maintenance and storage facility would utilize equipment used in typical highway and building construction. Light-rail tracks would also be installed for the LRT Build Alternative. The facility would require foundation construction by means of excavators, backhoes, concrete pumps, and vibrators. The building construction would utilize cranes and concrete placing equipment.

CONSTRUCTION STAGING AREA AND TRUCK ROUTES

Staging areas would be used for storage of construction materials and equipment, location of temporary offices for field personnel, and fabrication of construction materials. For any parcel that would be identified as a staging area, site clearance and demolition of existing structures (as needed) would occur before major construction activity. Construction staging areas would be primarily located on acquired or leased sites characterized as industrial, commercial, or vacant. The Project will also temporarily utilize the Gateway Park for construction staging as described in Chapter 5, Section 4(f). Parcels to be fully acquired (none have been identified) will require the relocation of existing businesses and residences. Temporary construction easements (TCEs) would not impact existing buildings on the properties or change the primary function of the existing use. TCEs are temporary and would only be required for Project related construction activities, and the sites would be returned to preconstruction conditions once construction is completed. No parcels have been identified for full acquisition to be used for construction staging only.

Construction staging would be located on the proposed parking facility for the Boulevard Mall park-and-ride. This would be a permanent acquisition that would be converted from a construction staging to the Project to the park-and-ride facility to support operation of the Project. Coordination with the Town of Amherst and UB North Campus are on-going to identify publicly owned parcels for potential staging areas.

Staging areas associated with the tunnel blasting and well as cut-and-cover construction would also be used for storage and preparation of precast type segments, ventilation lines, shaft support (air, water, electricity), workshops, mixing and processing slurry for excavation, and post-excavation slurry treatment. Two sites have been identified, UB South Campus parking lot fronting Main Street, and the Northeast corner property of Kenmore Avenue and Niagara Falls Boulevard.

4.17.2 Construction Consequences of the Build Alternatives

Table 4.17-2 through Table 4.17-18 summarizes the temporary impacts associated with Project construction activities. Typical construction-related impacts would include traffic, air quality, noise and vibration, contaminated soils, and hazardous materials. Construction impacts and corresponding mitigation strategies will be accounted for during preliminary and final design.

Proposed mitigation strategies and adherence to applicable construction regulations will reduce the severity of temporary impacts to neighborhoods, businesses, and the natural environment.

A detailed description of temporary construction impacts is described in Appendix D10, "Construction Effects Supplemental Information".

Table 4.17-2. Summary of Transportation Construction Impacts and Mitigation Measures

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
Transit, Pedestrian and Bicycle Interruptions	▪ N/A	▪ Direct Contractor to maintain safe pedestrian traffic and to maintain public access to intersecting roads, residences, business establishments, adjacent property, bus stops, pedestrians, and bicyclists. Where sidewalks, walkways, trails or shoulders must be temporarily closed to facilitate construction, safe pedestrian and bicycle passage will be maintained on one side of the roadway, unless other temporary pedestrian accommodations are provided in the contract documents. Construction zone pedestrian access would be maintained in accordance with the Accessibility Guidelines for Pedestrian Facilities in the Public Right of Way.	▪ Direct Contractor to maintain safe pedestrian traffic and to maintain public access to intersecting roads, residences, business establishments, adjacent property, bus stops, pedestrians, and bicyclists. Where sidewalks, walkways, trails or shoulders must be temporarily closed to facilitate construction, safe pedestrian and bicycle passage will be maintained on one side of the roadway, unless other temporary pedestrian accommodations are provided in the contract documents. Construction zone pedestrian access would be maintained in accordance with the Accessibility Guidelines for Pedestrian Facilities in the Public Right of Way.
Traffic Interruptions	▪ N/A	▪ Development and execution of a CTMP. ▪ Establish milestone dates to minimize construction durations. ▪ Refine the construction staging plan to reduce the need for street closures and detours. ▪ Implement capacity and safety enhancements early in construction phase to reduce the impacts of later phases of the Project. ▪ Direct Contractor to shuttle construction workers from remote parking sites to construction areas, when reasonable.	▪ Development and execution of a CTMP. ▪ Establish milestone dates to minimize construction durations. ▪ Refine the construction staging plan to reduce the need for street closures and detours. ▪ Implement capacity and safety enhancements early in construction phase to reduce the impacts of later phases of the Project. ▪ Direct Contractor to shuttle construction workers from remote parking sites to construction areas, when reasonable.
Parking displaced by property easements	▪ N/A	▪ Property owner compensation according to federal requirements dictated by the Uniform Standards of Professional Appraisal Practice (USPAP) and Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as codified in 42 USC Sections 4601 et seq., and the applicable implementing regulations set forth in 49 CFR Part 24 (collectively, "the Uniform Act"). ▪ Property owner compensation according to the NYS Eminent Domain Procedure Law and the Uniform Relocation Assistance and Real Property Acquisition Policies Act.	▪ Property owner compensation according to federal requirements dictated by the Uniform Standards of Professional Appraisal Practice (USPAP) and Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as codified in 42 USC Sections 4601 et seq., and the applicable implementing regulations set forth in 49 CFR Part 24 (collectively, "the Uniform Act"). ▪ Property owner compensation according to the NYS Eminent Domain Procedure Law and the Uniform Relocation Assistance and Real Property Acquisition Policies Act.

Table 4.17-3. Summary of Acquisition and Displacement Construction Impacts and Mitigation Measures

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
Temporary activities include construction staging, materials stockpiling, and hauling of dirt and materials within final TCE	▪ N/A	▪ Property owner compensation according to federal requirements dictated by the Uniform Standards of Professional Appraisal Practice (USPAP) and Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as codified in 42 USC Sections 4601 et seq., and the applicable implementing regulations set forth in 49 CFR Part 24 (collectively, "the Uniform Act"). ▪ Property owner compensation according to the NYS Law and the Uniform Relocation Assistance and Real Property Acquisition Policies Act.	▪ Property owner compensation according to federal requirements dictated by the Uniform Standards of Professional Appraisal Practice (USPAP) and Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as codified in 42 USC Sections 4601 et seq., and the applicable implementing regulations set forth in 49 CFR Part 24 (collectively, "the Uniform Act"). ▪ Property owner compensation according to the NYS Law and the Uniform Relocation Assistance and Real Property Acquisition Policies Act.

Table 4.17-4. Summary of Land Use Impacts and Mitigation Measures

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
Temporary activities include construction staging, construction access, temporary changes to access, and temporary parking loss	▪ N/A	▪ As part of the final contractor agreement, construction incentives and disincentives to minimize construction durations will be provided as feasible and practical ▪ Require Contractor to maintain safe storage of construction materials and utilize construction barriers and tarps that are uniform and well maintained. ▪ Require that temporary construction lighting avoid glare that affects traffic on the roadway or that causes annoyance or discomfort for residences adjoining the alignment, when reasonable. ▪ Coordinate with emergency service providers as well as schools and hospitals near the construction zone to minimize the impact of construction activities on their operations. ▪ Require that there are no short-term temporary lane and/or shoulder closures during major holidays and major events.	▪ As part of the final contractor agreement, construction incentives and disincentives to minimize construction durations will be provided as feasible and practical ▪ Require Contractor to maintain safe storage of construction materials and utilize construction barriers that are uniform and well maintained. ▪ Require that temporary construction lighting avoid glare that affects traffic on the roadway or that causes annoyance or discomfort for residences adjoining the alignment, when reasonable. ▪ Coordinate with emergency service providers as well as schools and hospitals near the construction zone to minimize the impact of construction activities on their operations. ▪ Require that there are no short-term temporary lane and/or shoulder closures during major holidays and major events.

Table 4.17-5. Summary of Economic Impacts and Mitigation Measures

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
Temporary activities include construction staging, construction access, and temporary parking loss, access restrictions, loss of landscaping, loss of business signage, traffic congestion, noise, dust, and aesthetic disruptions	▪ N/A	▪ Provide timely construction information regarding construction zones, traffic delays, road closures, and detours to the public, public agencies, emergencies services, and others. ▪ Direct Contractor to maintain safe and adequate public access to businesses for vehicles, pedestrians, and bicyclists. If access cannot be maintained, the Contractor would be required to notify the affected business in a timely manner and will be directed to conduct work in off peak business hours when reasonable. ▪ Direct Contractor to install temporary business signs to identify business entrances and to direct customers to affected businesses. ▪ Develop a strategic marketing plan to help reduce impacts to businesses during construction.	▪ Provide timely construction information regarding construction zones, traffic delays, road closures, and detours to the public, public agencies, emergencies services, and others. ▪ Direct Contractor to maintain safe and adequate public access to businesses for vehicles, pedestrians, and bicyclists. If access cannot be maintained, the Contractor would be required to notify the affected business in a timely manner and will be directed to conduct work in off peak business hours when reasonable. ▪ Direct Contractor to install temporary business signs to identify business entrances and to direct customers to affected businesses. ▪ Develop a strategic marketing plan to help reduce impacts to businesses during construction.

Table 4.17-6. Summary of Community Facility Impacts and Mitigation Measures

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
Temporary activities include access restrictions, increased traffic congestion, lane closures, and detours	▪ N/A	▪ Provide construction incentives and disincentives to minimize construction durations. ▪ Require that temporary construction lighting avoid glare that affects or causes annoyance or discomfort for facilities adjoining the alignment, when reasonable. ▪ Coordinate with emergency service providers as well as schools and hospitals near the construction zone to minimize the impact of construction activities on their operations. ▪ Require that there are no short-term temporary lane and/or shoulder closures during major holidays and major events.	▪ Provide construction incentives and disincentives to minimize construction durations. ▪ Require that temporary construction lighting avoid glare that affects or causes annoyance or discomfort for facilities adjoining the alignment, when reasonable. ▪ Coordinate with emergency service providers as well as schools and hospitals near the construction zone to minimize the impact of construction activities on their operations. ▪ Require that there are no short-term temporary lane and/or shoulder closures during major holidays and major events.

Table 4.17-7. Summary of Visual Resource Impacts and Mitigation Measures

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
Temporary activities include removal of vegetation (including existing landscaping), presence and movement of construction machinery, equipment, building materials, temporary roads and access ways, construction cranes, temporary construction fences, construction screens, signage, and construction site lighting.	▪ N/A	▪ Direct Contractor to minimize removal of existing vegetation, where applicable. In the event of vegetation removal for construction, the Contractor will replace the vegetation and return conditions equivalent to existing conditions. ▪ Direct Contractor to manage all surplus construction materials and waste generated in accordance with applicable federal, state, and local laws and regulations. ▪ Require Contractor to maintain safe storage of construction materials; remove construction waste and debris from the work site and dispose of waste containers at regular intervals; and utilize construction barriers that are uniform and well maintained. ▪ Require construction equipment to be stored at Project construction staging areas and construction staging areas to be well maintained and screened from view of sensitive land uses like residences, when reasonable. ▪ Require that temporary construction lighting be designed, installed, and operated to avoid glare that affects traffic on the roadway or that causes annoyance or discomfort for residences adjoining the alignment, when reasonable. ▪ Require that temporary construction signage be installed.	▪ Direct Contractor to minimize removal of existing vegetation, where applicable. In the event of vegetation removal for construction, the Contractor will replace the vegetation and return conditions equivalent to existing conditions. ▪ Direct Contractor to manage all surplus construction materials and waste generated in accordance with applicable federal, state, and local laws and regulations. ▪ Require Contractor to maintain safe storage of construction materials; remove construction waste and debris from the work site and dispose of waste containers at regular intervals; and utilize construction barriers that are uniform and well maintained. ▪ Require construction equipment to be stored at Project construction staging areas and construction staging areas to be well maintained and screened from view of sensitive land uses like residences, when reasonable. ▪ Require that temporary construction lighting be designed, installed, and operated to avoid glare that affects traffic on the roadway or that causes annoyance or discomfort for residences adjoining the alignment, when reasonable. ▪ Require that temporary construction signage be installed.

Table 4.17-8. Summary of Archaeological Resource Impacts and Mitigation Measures

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
Ground disturbances as a result of the construction of Project tunnels, alignment, stations, and other ancillary or supporting Project infrastructure	▪ N/A	▪ The Project will continue to survey for the presence of archaeological resources in advance of Project construction. ▪ Coordinate with SHPO and FTA regarding the Project's impact on archaeological resources. ▪ Direct Contractor to manage and implement the stipulations of the unanticipated discoveries plan in the event of the discovery of an archaeological resource during construction.	▪ The Project will continue to survey for the presence of archaeological resources in advance of Project construction. ▪ Coordinate with SHPO and FTA regarding the Project's impact on archaeological resources. ▪ Direct Contractor to manage and implement the stipulations of the unanticipated discoveries plan in the event of the discovery of an archaeological resource during construction.

Table 4.17-9. Summary of Park and Recreational Resource Impacts and Mitigation Measures

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
Temporary disturbances to parks and recreational facilities because of the construction of Project tunnels only for the LRT Build Alternative, alignment, stations, and other ancillary or supporting Project infrastructure.	▪ N/A	▪ Provide construction incentives and disincentives to minimize construction durations. ▪ Require Contractor to maintain safe storage of construction materials; remove construction waste and debris from the work site and dispose of waste containers at regular intervals; and utilize construction barriers that are uniform and well maintained ▪ At Gateway Park, direct Contractor to follow all stipulations required by Metro and the Town of Amherst as it relates to returning the park to existing conditions (if not improved) after Project construction is complete. ▪ Direct Contractor to minimize removal of existing vegetation, where applicable. In the event of vegetation removal for construction, the Contractor will replace the vegetation and return conditions equivalent to existing conditions. ▪ Require that temporary construction lighting be designed, installed, and operated to avoid glare that affects park and recreational users or that causes annoyance or discomfort, when reasonable. ▪ Direct Contractor to maintain safe public access to park and recreational resources, when reasonable. Where sidewalks, walkways, or shoulders must be temporarily closed to facilitate construction, safe pedestrian passage be maintained on one side of the roadway, unless other temporary pedestrian accommodations are provided in the contract documents. ▪ Construction zone pedestrian access would be maintained in accordance with the Accessibility Guidelines for Pedestrian Facilities in the Public Right of Way. ▪ Direct Contractor to include specific provisions for pedestrian and bicycle access to Ellicott Creek Trailway during construction of the Project Alignment along John James Audubon Parkway. Where applicable and practical, this will include information on available detours, trail alternatives, and signage.	▪ Provide construction incentives and disincentives to minimize construction durations. ▪ Require Contractor to maintain safe storage of construction materials; remove construction waste and debris from the work site and dispose of waste containers at regular intervals; and utilize construction barriers that are uniform and well maintained. ▪ At Gateway Park, direct Contractor to follow all stipulations required by Metro and the Town of Amherst as it relates to returning the park to existing conditions (if not improved) after Project construction is complete. ▪ Direct Contractor to minimize removal of existing vegetation, where applicable. In the event of vegetation removal for construction, the Contractor will replace the vegetation and return conditions equivalent to existing conditions. ▪ Require that temporary construction lighting be designed, installed, and operated to avoid glare that affects park and recreational users or that causes annoyance or discomfort, when reasonable. ▪ Direct Contractor to maintain safe public access to park and recreational resources, when reasonable. Where sidewalks, walkways, or shoulders must be temporarily closed to facilitate construction, safe pedestrian passage be maintained on one side of the roadway, unless other temporary pedestrian accommodations are provided in the contract documents. ▪ Construction zone pedestrian access would be maintained in accordance with the Accessibility Guidelines for Pedestrian Facilities in the Public Right of Way. ▪ Direct Contractor to include specific provisions for pedestrian and bicycle access to Ellicott Creek Trailway during construction of the Project Alignment along John James Audubon Parkway. Where applicable and practical, this will include information on available detours, trail alternatives, and signage.

Table 4.17-10. Summary of Geology, Soils, and Prime Farmlands Resource Impacts and Mitigation Measures

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
Construction for underground Project segments (LRT Build Alternative only), at-grade alignment configurations, proposed stations, storage and light maintenance facility, and supporting systems and infrastructure	▪ N/A	▪ Direct Contractor to execute SEM protocols for tunnel excavation and controlled blasting as defined by the final construction plans, including monitoring program. ▪ Direct Contractor to properly treat, manage, and dewater groundwater encountered during deep excavation activities in accordance to state and federal regulations. ▪ Direct Contractor to properly treat and manage contaminated soils and groundwater in accordance to state and federal regulations. ▪ Direct Contractor to execute safety protocols associated with the potential to encounter hydrogen sulfide gas encountered during excavation. ▪ Require the Contractor to develop and implement a Dust Control Plan that includes pro-active measures to prevent discharge of dust into the atmosphere. In areas not subject to traffic, apply products and materials including vegetative cover, mulch, and spray adhesives on soil surfaces to prevent airborne migration of soil particles. In areas subject to traffic, apply products and materials including water sprinkling, polymer additives, barriers, windbreaks, and wheel washing. ▪ Require sediment and erosion controls and stormwater maintenance facilities to be implemented in accordance with the 2010 Western New York Stormwater Coalition Stormwater Management Plan as well as all applicable state and federal permit requirements.	▪ Direct Contractor to properly treat and manage contaminated soils in accordance to state and federal regulations. ▪ Require the Contractor to develop and implement a Dust Control Plan that includes pro-active measures to prevent discharge of dust into the atmosphere. In areas not subject to traffic, apply products and materials including vegetative cover, mulch, and spray adhesives on soil surfaces to prevent airborne migration of soil particles. In areas subject to traffic, apply products and materials including water sprinkling, polymer additives, barriers, windbreaks, and wheel washing. ▪ Require sediment and erosion controls and stormwater maintenance facilities to be implemented in accordance with the 2010 Western New York Stormwater Coalition Stormwater Management Plan as well as all applicable state and federal permit requirements.

Table 4.17-11. Summary of General Ecology, Wildlife, and Water Resource Impacts and Mitigation Measures

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
Construction activities will include tunneling (LRT Build Alternative only), construction of the Project alignment, and construction of Project stations, construction of a bridge across Bizer Creek, and other	▪ N/A	▪ Direct Contractor to conduct tree clearing during the winter hibernation period for Northern Long-Eared Bat. ▪ Direct Contractor to conduct tree clearing during, as much as possible, outside the migratory bird nesting season: ▪ Tree removal would be timed, as much as possible, to occur outside the migratory bird nesting season, which occurs generally from April 1–	▪ Direct Contractor to conduct tree clearing during the winter hibernation period for Northern Long-Eared Bat. ▪ Direct Contractor to conduct tree clearing during, as much as possible, outside the migratory bird nesting season. ▪ Tree removal would be timed, as much as possible, to occur outside the migratory bird nesting

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
ancillary or supporting Project infrastructure that would result in short-term and long-term impacts to natural resources.		September 15 and as early as March 1 for some species. ▪ If tree removal must occur during the nesting season, two biological surveys would be conducted: one 15 days before and a second 72 hours before the construction. The surveys would be performed by a biologist and survey reports will document the presence or absence of any protected bird in TCE and any other such habitat within 300 feet of the construction work area. If a protected bird were found, surveys would be continued to locate any nests. If an active nest were located, construction within 300 feet of the nest would be postponed until the nest is vacated and juveniles have fledged and when there is no evidence of a second attempt at nesting. ▪ Avoidance measures would be incorporated into the design of the project, where feasible. If construction were to require removal of a protected tree, a permit would be required in accordance with applicable local codes and ordinances. ▪ After construction is complete, trees will be planted that are at least three inches in diameter and three to four feet in height. Planted trees would be maintained such that 90 percent are in good condition after 6 months and irrigation would be carried out until the tree is established. ▪ Direct Contractor to revegetate disturbed areas in accordance with a Landscape Restoration Plan to include native plant species. ▪ Disturbed areas not used for transportation infrastructure would be revegetated with species indigenous to Western New York to the extent practicable in accordance with a landscape plan. ▪ Direct Contractor to use netting to capture construction debris and avoid its potential to fall within waterways. ▪ Require erosion and sediment controls in accordance with the 2016 New York State Standards and	season, which occurs generally from April 1–September 15 and as early as March 1 for some species. ▪ If tree removal must occur during the nesting season, two biological surveys would be conducted: one 15 days before and a second 72 hours before the construction. The surveys would be performed by a biologist and survey reports will document the presence or absence of any protected bird in the TCE and any other such habitat within 300 feet of the construction work area. If a protected bird were found, surveys would be continued to locate any nests. If an active nest were located, construction within 300 feet of the nest would be postponed until the nest is vacated and juveniles have fledged and when there is no evidence of a second attempt at nesting. ▪ Avoidance measures would be incorporated into the design of the project, where feasible. If construction were to require removal of a protected tree, a permit would be required in accordance with applicable local codes and ordinances. ▪ After construction is complete, trees will be planted that are at least three inches in diameter and three to four feet in height. Planted trees would be maintained such that 90 percent are in good condition after 6 months and irrigation would be carried out until the tree is established. ▪ Direct Contractor to revegetate disturbed areas in accordance with a Landscape Restoration Plan to include native plant species. ▪ Disturbed areas not used for transportation infrastructure would be revegetated with species indigenous to Western New York to the extent practicable in accordance with a landscape plan.

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
		Specifications for Erosion and Sediment Control ("Blue Book") ▪ Require a Stormwater Pollution Prevention Plan that would meet the requirements of State Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Construction Activity (GP-0-25-001). ▪ Direct contractor to follow the requirements of the NYSDOT Highway Design Manual, Chapter 8 Highway Drainage, specifically Inlet protection at existing stormwater inlets, sediment controls to prevent erosion and sediment from leaving the construction sites, dust control measures, spill prevention and containment measures, stabilized construction entrance/exits, and vegetative measures to stabilize exposed soils. ▪ Constructing the tunnel segments will require dewatering of groundwater. Monitoring wells were installed along the tunnel segments, as well as geotechnical subsurface soil conditions identifying the water table levels. The Project will be designed to protect adjacent structures from changes in groundwater flow and elevation. ▪ Yearly water table measurements will occur through final design and construction to continue to monitor relative pre-construction conditions to minimize changes in the water table levels. ▪ During construction, design requirements would limit the amount of dewatering as a protection measure, utilizing the yearly water table measurements. ▪ Depending on the volume of ground water to be removed during construction, groundwater would be removed via dewatering utilizing one of these methods: existing dewatering systems present within the existing Metro Rail system, centrifuges, filter presses, drying beds, sludge lagoons, or gravity and low-pressure devices. The groundwater would be pumped into the local sewer system or to a nearby water body under the State	▪ Direct Contractor to use netting to capture construction debris and avoid its potential to fall within waterways. ▪ Require erosion and sediment controls in accordance with the 2016 New York State Standards and Specifications for Erosion and Sediment Control ("Blue Book") ▪ Require a Stormwater Pollution Prevention Plan that would meet the requirements of State Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Construction Activity (GP-0-25-001). ▪ Direct contractor to follow the requirements of the NYSDOT Highway Design Manual, Chapter 8 Highway Drainage, specifically Inlet protection at existing stormwater inlets, sediment controls to prevent erosion and sediment from leaving the construction sites, dust control measures, spill prevention and containment measures, stabilized construction entrance/exits, and vegetative measures to stabilize exposed soils. ▪ Depending on the volume of ground water to be removed during construction, groundwater would be removed via dewatering utilizing one of these methods: existing dewatering systems present within the existing Metro Rail system, centrifuges, filter presses, drying beds, sludge lagoons, or gravity and low-pressure devices. The groundwater would be pumped into the local sewer system or to a nearby water body under the State Pollutant Discharge Elimination System (SPD) permit. ▪ Dewatering of groundwater will be tested, treated, and disposed in accordance with all applicable local, State, and Federal regulations. ▪ Direct Contractor to document and execute best management measures to protect surface waters such as turbidity curtains,

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
		Pollutant Discharge Elimination System (SPD) permit. ▪ Dewatering of groundwater will be tested, treated, and disposed in accordance with all applicable local, State, and Federal regulations. ▪ Direct Contractor to document and execute best management measures to protect surface waters, such as turbidity curtains, cofferdams, and temporary piping or diversion of waterways for any in-water construction activities, as necessary, to maintain stream flow and minimize increases in suspended sediment. ▪ Require that new culverts intended to convey surface water have a minimum width of 1.25 x bankfull and would be embedded or three sided (open bottom) to allow for passage of aquatic organisms and small terrestrial species. Provisions for wildlife passage will be incorporated in the culvert design where practicable. ▪ Require measures to reduce and avoid temporary fill placement in wetlands. Should temporary fill placement be unavoidable, these impacts would be included within the Section 401 and 404 permits and an Article 24 "Freshwater Wetlands" permit would be obtained from the USACE and NYSDEC. ▪ Require the Contractor to include erosion and sediment control practices during construction to protect wetlands within the Project study area. ▪ Require post-construction stabilization of the stream banks near in-water construction activities. The disturbed areas would be stabilized with erosion control matting (to prevent sediment from entering the creek) and planted with native riparian and upland vegetation (to prevent invasive species from colonizing and to further stabilize the embankment). ▪ Any wetlands that would be temporarily affected would be restored subsequent to construction following a soil and landscape restoration plan. Restoration measures would include restoring	cofferdams, and temporary piping or diversion of waterways for any in-water construction activities, as necessary, to maintain stream flow and minimize increases in suspended sediment. ▪ Require that new culverts intended to convey surface water have a minimum width of 1.25 x bankfull and would be embedded or three sided (open bottom) to allow for passage of aquatic organisms and small terrestrial species. Provisions for wildlife passage will be incorporated in the culvert design where practicable. ▪ Require measures to reduce and avoid temporary fill placement in wetlands. Should temporarily fill placement be unavoidable, these impacts would be included within the Section 401 and 404 permits and an Article 24 "Freshwater Wetlands" permit would be obtained from the USACE and NYSDEC. ▪ Require the Contractor to include erosion and sediment control practices during construction to protect wetlands within the Project study area. ▪ Require post-construction stabilization of the stream banks near in-water construction activities. The disturbed areas would be stabilized with erosion control matting (to prevent sediment from entering the creek) and planted with native riparian and upland vegetation (to prevent invasive species from colonizing and to further stabilize the embankment). ▪ Any wetlands that would be temporarily affected would be restored subsequent to construction following a soil and landscape restoration plan. Restoration measures would include restoring the grade to pre-construction (or better) conditions and seeding and planting native species, where applicable.

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
		the grade to pre-construction (or better) conditions and seeding and planting native species, where applicable. ▪ Require Contractor to implement standard environmental protection practices for water quality. ▪ The contractor would schedule and conduct their work to minimize soil erosion, not cause or contribute to a violation of water quality standards and prevent sedimentation on lands adjacent to or affected by the work.	▪ Require Contractor to implement standard environmental protection practices for water quality. ▪ The contractor would schedule and conduct their work to minimize soil erosion, not cause or contribute to a violation of water quality standards and prevent sedimentation on lands adjacent to or affected by the work.

Table 4.17-12. Summary of LRT Build Alternative Noise Impacts and Mitigation Measures

Construction Impact	LRT Build Alternative Mitigation
No Build Alternative	▪ N/A
LRT Build Alternative construction activities would include tunneling, construction of the Project alignment, and construction of Project stations, and other ancillary or supporting Project infrastructure that would result in construction related noise impacts.	▪ During Project final design and final construction plans, develop noise criteria and monitoring plan for noise impacts from tunneling to sensitive receptors to ensure there are no detrimental impacts. ▪ Coordinate work operation to coincide with time periods that would least affect neighboring residences and businesses. Normal work hours would be scheduled per municipal requirements and construction activities would be limited to 70dBA Lmax at 50' in Noise Sensitive Areas when reasonable (schools, places of worship, medical facilities, residential areas). ▪ Implement temporary construction noise abatement measures that would include shrouds or other noise curtains, acoustic fabric, soundproof housings, physical barriers, and/or enclosures to reduce noise from pile drivers, compressors, generators, pumps, and other loud equipment when reasonable. ▪ Restrict the use of impact and drilling equipment including pile drivers, jackhammers, hoe rams, core drills, direct push soil probes (e.g., Geoprobe), pavement breakers, pneumatic tools, and rock drills when reasonable. ▪ Require motorized construction equipment to be equipped with an appropriate well-maintained muffler and require silencers to be installed on both air intakes and air exhaust when reasonable. ▪ Require all construction devices with internal combustion engines to be operated with engine doors closed and with noise-insulating material mounted on the engine housing that does not interfere with the manufacturer guidelines. ▪ Direct Contractor to transport construction equipment and vehicles carrying rock, concrete, or other materials along designated routes that would cause the least disturbance to noise sensitive receptors when reasonable. ▪ Require self-adjusting or manual audible back up alarms for vehicles and equipment used in areas adjacent to sensitive noise receptors. ▪ Direct Contractor to use pre-auguring equipment to reduce the duration of impact or vibratory pile driving when reasonable.

Table 4.17-13. Summary of BRT Build Alternative Noise Impacts and Mitigation Measures

Construction Impact	BRT Build Alternative Mitigation
No Build Alternative	▪ N/A
BRT Build Alternative construction activities will include construction of the Project alignment, and construction of Project stations, and other ancillary or supporting Project infrastructure that would result in construction related noise impacts.	▪ Coordinate work operation to coincide with time periods that would least affect neighboring residences and businesses. Normal work hours would be scheduled per municipal requirements. Nighttime, Saturday morning, and Sunday construction activities would be limited to 70dBA Lmax at 50' in Noise Sensitive Areas when reasonable. ▪ Implement temporary construction noise abatement measures that would include shrouds or other noise curtains, acoustic fabric, soundproof housings, physical barriers, and/or enclosures when reasonable. ▪ Restrict the use of impact and drilling equipment including pile drivers, jackhammers, hoe rams, core drills, direct push soil probes (e.g., Geoprobe), pavement breakers, pneumatic tools, and rock drills when reasonable. ▪ Require motorized construction equipment to be equipped with an appropriate well-maintained muffler and require silencers to be installed on both air intakes and air exhaust when reasonable. ▪ Require all construction devices with internal combustion engines to be operated with engine doors closed and with noise-insulating material mounted on the engine housing that does not interfere with the manufacture guidelines. ▪ Direct Contractor to transport construction equipment and vehicles carrying rock, concrete, or other materials along designated routes that would cause the least disturbance to noise sensitive receptors when reasonable. ▪ Require self-adjusting or manual audible back up alarms for vehicles and equipment used in areas adjacent to sensitive noise receptors. ▪ Direct Contractor to use pre-auguring equipment to reduce the duration of impact or vibratory pile driving when reasonable.

Table 4.17-14. Summary of LRT Build Alternative Vibration Impacts and Mitigation Measures

Construction Impact	LRT Build Alternative Mitigation
No Build Alternative	▪ N/A
LRT Build Alternative construction activities will include tunneling, construction of the Project alignment, and construction of Project stations, and other ancillary or supporting Project infrastructure that would result in construction related vibration impacts.	▪ Project final design and construction plans will develop a Blast Management Plan detailing blasting sequences, operations, safety protocol, mitigation, and monitoring efforts. ▪ Project final design and construction plans related to tunneling will develop vibration criteria and monitoring plan for vibration impacts to existing structures within 25-feet of construction activities. Coordinate with UB to avoid blasting proximate to Allen Hall during use of the performance space in that building. ▪ Coordinate work operation to coincide with time periods that would least affect neighboring residences and businesses. Normal work hours would be scheduled per municipal requirements. ▪ Restrict the use of impact and drilling equipment including caisson drilling, jackhammers, hoe rams, core drills, direct push soil probes (e.g., Geoprobe), pavement breakers, pneumatic tools, and rock drills when reasonable. ▪ Direct Contractor to transport construction equipment and vehicles carrying rock, concrete, or other materials along designated routes that would cause the least disturbance to vibration-sensitive receptors when reasonable.

Table 4.17-15. Summary of BRT Build Alternative Vibration Impacts and Mitigation Measures

Construction Impact	BRT Build Alternative Mitigation
No Build Alternative	▪ N/A
BRT Build Alternative construction activities will include construction of the Project alignment, and construction of Project stations, and other ancillary or supporting Project infrastructure that would result in construction related vibration impacts.	▪ Project final design and construction plans will develop vibration criteria and monitoring plan for vibration impacts to existing structures within 25-feet of construction activities. ▪ Coordinate work operation to coincide with time periods that would least affect neighboring residences and businesses. Normal work hours would be scheduled per municipal requirements ▪ Restrict the use of impact and drilling equipment including caisson drilling, jackhammers, hoe rams, core drills, direct push soil probes (e.g., Geoprobe), pavement breakers, pneumatic tools, and rock drills when reasonable. ▪ Direct Contractor to transport construction equipment and vehicles carrying rock, concrete, or other materials along designated routes that would cause the least disturbance to vibration-sensitive receptors when reasonable.

Table 4.17-16. Summary of Air Quality Impacts and Mitigation Measures

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
Construction of underground (LRT Build Alternative only) and at-grade alignment configurations, proposed stations, storage and light maintenance facility, and supporting systems and infrastructure. Traffic disruption rerouting, and temporary shutdown of traffic as a result of construction activities. Activities related to construction of the Build Alternatives would include increases in particulate matter in the form of fugitive dust (from demolition, ground clearing and preparation,	▪ N/A	▪ Direct Contractor to protect sensitive receptors including hospitals, schools, daycare facilities, building fresh air or ventilation intakes, elderly housing, and convalescent facilities from impacts of diesel exhaust fumes. As practical and feasible, the Contractor will: – Use Tier IV rated construction equipment – Ensure that diesel powered engines are located away from building air conditioners and windows. – Minimize exposure of sensitive receptors in close proximity (50') to diesel exhaust, in terms of both concentration and time. – Limit idling time for diesel powered equipment to three consecutive minutes for delivery and dump trucks and all other diesel-powered equipment with limited exceptions. ▪ Before construction and as site preparations are being made, direct Contractor to complete the following activities as warranted to minimize fugitive dust emissions: – Minimize land disturbance – Use watering trucks to minimize dust – Cover trucks when hauling dirt – Stabilize the surface of dirt piles if they are not removed immediately	▪ Direct Contractor to protect sensitive receptors including hospitals, schools, daycare facilities, building fresh air or ventilation intakes, elderly housing, and convalescent facilities from impacts of diesel exhaust fumes. As practical and feasible, the Contractor will: – Use Tier IV rated construction equipment – Ensure that diesel powered engines are located away from building air conditioners and windows. – Minimize exposure of sensitive receptors in close proximity (50') to diesel exhaust, in terms of both concentration and time. – Limit idling time for diesel powered equipment to three consecutive minutes for delivery and dump trucks and all other diesel-powered equipment with limited exceptions. ▪ Before construction and as site preparations are being made, direct Contractor to complete the following activities as warranted to minimize fugitive dust emissions: – Minimize land disturbance – Use watering trucks to minimize dust – Cover trucks when hauling dirt – Stabilize the surface of dirt piles if they are not removed immediately

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
grading, stockpiling of materials, on-site movement of equipment, and transportation of construction materials), as well as exhaust emissions from material delivery trucks, construction equipment, and workers' private vehicles. Dust emissions typically occur during dry weather, construction activities, or high wind conditions. Temporary impacts to air quality from construction activities would occur during the construction period. Elevated emissions would likely occur immediately adjacent to the construction activities, staging areas, and material hauling routes.		– Use windbreaks to prevent accidental dust pollution – Limit vehicular paths and stabilize temporary roads – Pave all unpaved construction roads and parking areas to road grade for a minimum length of 50 feet from where such roads and parking areas exit the construction site, to prevent dirt from washing onto paved roadways ▪ During construction, the Contractor will perform the following to minimize fugitive dust emissions: – Implement an OSHA-compliant Health and Safety Plan (HASP) for each construction site or a HASP for the entire Project – Cover trucks when transferring materials – Use watering trucks or dust suppressants such as calcium chloride on unpaved traveled paths – Minimize unnecessary vehicular and machinery activities and enforce onsite speed limits – Minimize dirt track-out by washing or cleaning trucks before leaving the construction site. An alternative to this strategy is to pave a few hundred feet of the exit road just before entering the public road ▪ After construction, the Contractor will perform the following to minimize fugitive dust emissions: – Revegetate any disturbed land that is not used – Remove unused material – Remove dirt piles – Revegetate all vehicular paths created during construction to avoid future off-road vehicular activities ▪ Direct Contractor to use solar powered digital signs, including arrow panels and portable variable message signs when reasonable. ▪ Implement an ambient air quality monitoring program during construction that will be overseen by Metro. The program would identify the locations and durations of ambient air quality monitoring and protocols to	– Use windbreaks to prevent accidental dust pollution – Limit vehicular paths and stabilize temporary roads – Pave all unpaved construction roads and parking areas to road grade for a minimum length of 50 feet from where such roads and parking areas exit the construction site, to prevent dirt from washing onto paved roadways ▪ During construction, the Contractor will perform the following to minimize fugitive dust emissions: – Implement an OSHA-compliant Health and Safety Plan (HASP) for each construction site or a HASP for the entire Project – Cover trucks when transferring materials – Use watering trucks or dust suppressants such as calcium chloride on unpaved traveled paths – Minimize unnecessary vehicular and machinery activities and enforce onsite speed limits – Minimize dirt track-out by washing or cleaning trucks before leaving the construction site. An alternative to this strategy is to pave a few hundred feet of the exit road just before entering the public road ▪ After construction, the Contractor will perform the following to minimize fugitive dust emissions: – Revegetate any disturbed land that is not used – Remove unused material – Remove dirt piles – Revegetate all vehicular paths created during construction to avoid future off-road vehicular activities ▪ Direct Contractor to use solar powered digital signs, including arrow panels and portable variable message signs when reasonable. ▪ Implement an ambient air quality monitoring program during construction that will be overseen by Metro. The program would identify the locations and durations of ambient air quality monitoring and protocols to

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
		address any exceedances of National Ambient Air Quality Standards should they be observed. ▪ Develop and execute a CTMP. ▪ Establish aggressive completion and/or milestone dates to minimize construction durations. ▪ Refine the construction staging plan to reduce the need for street closures and detours. ▪ Implement capacity and safety enhancements early in construction phase to reduce the impacts of later phases of the Project. ▪ Direct Contractor to shuttle construction workers from remote parking sites to construction areas, when reasonable.	address any exceedances of National Ambient Air Quality Standards should they be observed. ▪ Develop and execute a CTMP. ▪ Establish aggressive completion and/or milestone dates to minimize construction durations. ▪ Refine the construction staging plan to reduce the need for street closures and detours. ▪ Implement capacity and safety enhancements early in construction phase to reduce the impacts of later phases of the Project. ▪ Direct Contractor to shuttle construction workers from remote parking sites to construction areas, when reasonable.

Table 4.17-17. Summary of Hazardous or Contaminated Materials Impacts and Mitigation Measures

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
Construction activities that result in transport, removal and remediation, accidental spills, and discovery of previously unidentified hazardous or contaminated materials.	▪ N/A	▪ Require the development of a detailed Phase II ESA1 and Soil Management Plan2 before and associated with property acquisition. ▪ Direct Contractor to develop a Field Organic Vapor Monitoring Plan3. ▪ Direct Contractor to develop a Project Health and Safety Plan. ▪ Direct Contractor to submit native construction materials for the appropriate testing in accordance with 6 NYCRR Part 360 series. ▪ Direct Contractor to suppress dust generation in all work zones, especially when excavating contaminated soil. ▪ Direct Contractor to ensure workers in excavation pits or handling hazardous materials will wear appropriate	▪ Require the development of a detailed Phase II ESA4 and Soil Management Plan5 before and associated with property acquisition. ▪ Direct Contractor to develop a Field Organic Vapor Monitoring Plan6. ▪ Direct Contractor to develop a Project Health and Safety Plan. ▪ Direct Contractor to submit native construction materials for the appropriate testing in accordance with 6 NYCRR Part 360 series. ▪ Direct Contractor to suppress dust generation in all work zones, especially when excavating contaminated soil. ▪ Direct Contractor to ensure workers in excavation pits or handling

1 Detailed Site Investigation (a.k.a., Phase II ESA) - A Phase II Environmental Site Assessment is the second stage of a phased contaminated land assessment.

2 Soil Management Plan – A soil management plan addresses excavation, handling, and disposal of contaminated soil. This is also known as a Contaminated Material Handling Plan and can be found under Section 205 - Contaminated Soil in NYSDOT's Standard Specifications

3 Field Organic Vapor Monitoring Plan specifications can be found under Section 205 - Contaminated Soil in NYSDOT's Standard Specifications.

4 Detailed Site Investigation (a.k.a., Phase II ESA) - A Phase II Environmental Site Assessment is the second stage of a phased contaminated land assessment.

5 Soil Management Plan – A soil management plan addresses excavation, handling, and disposal of contaminated soil. This is also known as a Contaminated Material Handling Plan and can be found under Section 205 - Contaminated Soil in NYSDOT's Standard Specifications

6 Field Organic Vapor Monitoring Plan specifications can be found under Section 205 - Contaminated Soil in NYSDOT's Standard Specifications.

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
		respiratory protection and Personal Protective Equipment. ▪ For the removal and remediation of contaminated sites, the Contractor will be required to properly remove, contain, and transport the materials in accordance with the applicable regulations defined in 40 CFR 260-282, 300-355, and 6 NYCRR Part 370 Series. In addition, the contractor would be required to clean its vehicles to prevent off-site contamination. ▪ Require the Contractor to manage discharge of hazardous or contaminated materials or accidental spills during construction according to 40 CFR Part 61, sub-part M and Part 763, 29 CFR 1910.1001, and 12 NYCRR Part 56 and 6 NYCRR Parts 610-614 regulations. ▪ During final design and before start of construction activities an Unanticipated Contamination Discoveries Plan will be developed.	hazardous materials will wear appropriate respiratory protection and Personal Protective Equipment. ▪ For the removal and remediation of contaminated sites, the Contractor will be required to properly remove, contain, and transport the materials in accordance with the applicable regulations defined in 40 CFR 260-282, 300-355, and 6 NYCRR Part 370 Series. In addition, the contractor would be required to clean its vehicles to prevent off-site contamination. ▪ Require the Contractor to manage discharge of hazardous or contaminated materials or accidental spills during construction according to 40 CFR Part 61, sub-part M and Part 763, 29 CFR 1910.1001, and 12 NYCRR Part 56 and 6 NYCRR Parts 610-614 regulations. ▪ During final design and before start of construction activities an Unanticipated Contamination Discoveries Plan will be developed.

Table 4.17-18. Summary of Utility Impacts and Mitigation Measures

Construction Impact	No Build Alternative	LRT Build Alternative Mitigation	BRT Build Alternative Mitigation
Construction activities that result in the relocation or replacement of existing utilities.	▪ N/A	▪ Develop a utility relocation plan during final design and require contractor to advance utility relocation or replacement before construction. ▪ Require Contractor to replace utilities in-kind if not improved from existing conditions, as warranted.	▪ Develop a utility relocation plan during final design and require contractor to advance utility relocation or replacement before construction. ▪ Require Contractor to replace utilities in-kind if not improved from existing conditions, as warranted.