Appendix D Air Quality, Greenhouse Gas Emissions, and Resilience

Appendix D: Air Quality, Greenhouse Gas Emissions, and Resilience

D.1 INTRODUCTION

This document provides additional detail on the methodology and assumptions used for the air quality, greenhouse gas, and resilience analyses FRA prepared for the Western Rail Yard Infrastructure Project (see Chapter 7, "Air Quality, Greenhouse Gas Emissions, and Resilience").

D.2 POLLUTANTS FOR ANALYSIS

Ambient air quality is affected by air pollutants produced by both motor vehicles and stationary sources. Emissions from motor vehicles are referred to as mobile source emissions, while emissions from fixed facilities are referred to as stationary source emissions. Ambient concentrations of carbon monoxide (CO) are predominantly influenced by mobile source emissions. Particulate matter (PM), volatile organic compounds (VOCs), and nitrogen oxides (nitric oxide [NO] and nitrogen dioxide [NO_2], collectively referred to as NO_x) are emitted from both mobile and stationary sources. Fine PM is also formed when emissions of NO_x, sulfur oxides (SO_x), ammonia, organic compounds, and other gases react or condense in the atmosphere. Emissions of sulfur dioxide (SO_2) are associated mainly with stationary sources, and some sources utilizing non-road diesel such as large international marine engines. On-road diesel vehicles currently contribute very little to SO_2 emissions since the sulfur content of on-road diesel fuel, which is federally regulated, is extremely low. Tropospheric ozone is formed in the atmosphere by complex photochemical processes that include NO_x and VOCs. Ambient concentrations of CO, PM, NO_2, SO_2, ozone, and lead are regulated by the U.S. Environmental Protection Agency (USEPA) under the Clean Air Act (CAA), and are referred to as 'criteria pollutants'; emissions of VOCs, NO_x, and other precursors to criteria pollutants are also regulated by USEPA.

D.2.1 CARBON MONOXIDE

CO, a colorless and odorless gas, is produced in the urban environment primarily by the incomplete combustion of gasoline and other fossil fuels. In urban areas, approximately 80 to 90 percent of CO emissions are from motor vehicles. CO concentrations can diminish rapidly over relatively short distances; elevated concentrations are usually limited to locations near crowded intersections, heavily traveled, and congested roadways, parking lots, and garages. Consequently, CO concentrations from mobile sources are generally analyzed on a local (microscale) basis.

The Preferred Alternative is not expected to significantly alter traffic conditions; therefore, FRA determined that a quantified assessment of mobile CO concentrations is not warranted. However, FRA did analyze potential CO concentrations from the Platform ventilation system as well as construction sources (i.e., on-site construction equipment and on-road construction vehicles).

D.2.2 NITROGEN OXIDES, VOCS, AND OZONE

NO_x emissions are of principal concern because of their role, together with VOCs, as precursors in the formation of ozone. Ozone is formed through a series of reactions that take place in the atmosphere in the presence of sunlight. Because the reactions are slow, and occur as the pollutants are advected downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. The effects of NO_x and VOC emissions from all sources are therefore generally examined on a regional basis. The contribution of any action or project to regional emissions of these pollutants would include any added stationary or mobile source emissions.

In addition to being a precursor to the formation of ozone, NO_2 (one component of NO_x) is also a regulated pollutant. Since NO_2 is mostly formed from the transformation of NO in the atmosphere, it has generally been of concern further downwind from large stationary point sources, and not a local concern from mobile sources. (NO_x emissions from fuel combustion consist of approximately 90 percent NO and 10 percent NO_2 at the source.) However, with the promulgation of the 2010 1-hour average standard for NO_2, local sources, such as vehicular emissions, may also be of concern.

The Preferred Alternative would not have a significant effect on the overall volume of vehicular travel in the metropolitan area; therefore, FRA determined that there would be no measurable impact on regional NO_x emissions, ozone levels, or NO_2 emissions predicted from mobile sources.

FRA evaluated the potential impacts on local NO_2 concentrations from continuous emissions associated with the Platform ventilation systems as well as emissions from construction sources.

D.2.2.1 *1-HOUR NO_2*

The 1-hour average NAAQS for NO_2 was promulgated in 2010. As a result, local ground-level sources of this pollutant, such as non-road construction sources, may be a focus of analysis in the future. However, for non-road construction sources, the monthly/annual variation in the types of equipment deployed on the construction site and the utilization of the equipment fluctuates on an hourly basis—making it difficult to quantify emissions from such sources in any given hour. In addition, the statistical basis of the 1-hour NO_2 standard (a three-year statistical average of modeled concentrations), makes it difficult to accurately model construction sources. The reason for this is that construction equipment—unlike stationary air pollution sources (such as an exhaust stack on a building) that operate on a regular basis at a defined location—moves throughout the Project Site over the entire construction period. This is especially true for Platform work which will be sequenced to optimize track outages (i.e., four tracks out of service at a time and advance in a linear fashion). USEPA guidance on modeling 1-hour NO_2 discusses intermittent emissions,[1] stating that the intermittent nature of the actual emissions… in many cases, when coupled with the probabilistic form of the standard, could result in modeled impacts being significantly higher than actual impacts would realistically be expected to be for these emission scenarios.[2]

Furthermore, USEPA recommends that compliance demonstrations for the 1-hour NO_2 NAAQS be based on emission scenarios that can logically be assumed to be relatively continuous or which occur frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations.[3]

[1] USEPA Memorandum, "Additional Clarification Regarding Application of Appendix W, Modeling Guidance for the 1-Hour NO_2 National Ambient Air Quality Standard," March 1, 2011.

[2] Ibid.

[3] Ibid.

This is not the case with equipment operating episodically at various locations across a construction site. Moreover, substantial uncertainty still exists as to 1-hour NO_2 background concentrations at ground level, especially near roadways, since these concentrations have not yet been adequately measured by NYSDEC and no attainment determinations have been made by USEPA although initial monitored concentrations are below the NAAQS. Therefore, given the limitations on information available regarding NO_2 near-road background values, and the current lack of guidance and uncertainties regarding analysis methodologies, a 1-hour NO_2 analysis was not conducted for construction sources.

D.2.3 **LEAD**

Airborne lead emissions are currently associated principally with industrial sources. The CAA has banned lead in gasoline, and the Preferred Alternative would not emit lead from any other component. Therefore, FRA determined that an analysis of this pollutant was not warranted.

D.2.4 **RESPIRABLE PARTICULATE MATTER—PM_{10} AND $PM_{2.5}$**

PM is a broad class of air pollutants that includes discrete particles with a wide range of sizes and chemical compositions, as either liquid droplets (aerosols) or solids suspended in the atmosphere. The constituents of PM are both numerous and varied, and they are emitted from a wide variety of sources (both natural and anthropogenic). Natural sources include the condensed and reacted forms of naturally occurring VOCs; salt particles resulting from the evaporation of sea spray; wind-borne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and material from live and decaying plant and animal life; particles eroded from beaches, soil, and rock; and particles emitted from volcanic and geothermal eruptions and from forest fires. Naturally occurring PM is generally greater than 2.5 micrometers in diameter. Major anthropogenic sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines, and home heating), chemical, and manufacturing processes, construction activities, agricultural activities, as well as wood-burning stoves and fireplaces. PM also acts as a substrate for the adsorption (accumulation of gases, liquids, or solutes on the surface of a solid or liquid) of other pollutants, often toxic, and some likely carcinogenic compounds.

As described below, USEPA regulates PM in two size categories: particles with an aerodynamic diameter of less than or equal to 2.5 micrometers ($PM_{2.5}$) and particles with an aerodynamic diameter of less than or equal to 10 micrometers (PM_{10}, which includes $PM_{2.5}$). $PM_{2.5}$ has the ability to reach the lower regions of the respiratory tract, delivering with it other compounds that adsorb to the surfaces of the particles, and is also extremely persistent in the atmosphere. $PM_{2.5}$ is mainly derived from combustion material that has volatilized and then condensed to form primary PM (often soon after the release from a source) or from precursor gases reacting in the atmosphere to form secondary PM.

Gasoline and diesel-powered vehicles, especially heavy duty trucks and buses operating on diesel fuel, are significant sources of respirable PM, most of which is $PM_{2.5}$; PM concentrations may consequently be locally elevated near roadways. The Preferred Alternative would not result in any permanent significant increases in truck traffic near the Project Site or in the region. Therefore, FRA determined that an analysis of potential PM concentrations from mobile sources was not warranted.

FRA evaluated the potential impacts on local PM concentrations from continuous emissions associated with the Platform ventilation systems as well as construction sources.

D.2.5 **SULFUR DIOXIDE**

SO_2 emissions are primarily associated with the combustion of sulfur-containing fuels (oil and coal). SO_2 is also of concern as a precursor to $PM_{2.5}$ and is regulated by USEPA as a $PM_{2.5}$ precursor under the New Source Review permitting program for large sources. Due to the federal restrictions on the sulfur content in diesel fuel for on-road and non-road vehicles, no significant quantities of SO_2 are emitted from vehicular sources; therefore, analysis of SO_2 from mobile sources is not warranted.

As part of the Project, the emergency generators would utilize ultra-low sulfur distillate (ULSD) fuel oil; which has a negligible level of sulfur; therefore, impacts of SO_2 would not be significant. In addition, since USEPA mandates the use of ultra-low sulfur diesel (ULSD)[4] fuel for all highway and nonroad diesel engines, sulfur oxides SO_x emitted from the Preferred Alternative's construction activities would be negligible. Nevertheless the *CEQR Technical Manual* identifies SO_2 emissions associated with the use of fuel oil; therefore, potential regional emissions of SO_2 from stationary sources were examined.

D.3 OPERATIONAL AIR QUALITY

D.3.1 LIFE SAFETY EQUIPMENT

The Preferred Alternative would include the operation of five emergency diesel generators to provide emergency power to critical functions in the WRY, including the ventilation system, in the event of a power failure. Three generators, each rated at 2,500 kilowatts (kW), would serve the Western Rail Yard Infrastructure Project, while two generators, each rated at 2,000 kW, would provide service to the Eastern Rail Yard site, replacing two existing diesel generators, with the new generators located near the WRY generators. The Project Sponsor would design these new generators to meet applicable air quality standards, which would be equipped with selective catalytic reduction for control of NO_x. Furthermore, the emergency generators would be regulated under the federal New Source Performance Standards (NSPS) under 40 CFR 60 IIII for Stationary Compression Ignition Internal Combustion Engines and would comply NOx, CO, PM_{10}, and $PM_{2.5}$ emission limits.

The generators would provide power to the LIRR ventilation systems in the event of a utility power interruption. Under normal conditions, LIRR would operate the generators intermittently for short times to ensure their reliability and availability in the event of a power outage.

USEPA has determined that the nature of intermittent sources "when coupled with the probabilistic form of the" NO_2 1-hour standard may not contribute significantly to the annual distribution of daily maximum 1-hour concentrations, and recommends that compliance demonstrations consider emission scenarios that can be assumed to be relatively continuous or with a significant frequency. Subsequently, FRA does not consider emissions from the diesel generators to be significant on an annual or daily basis due to their limited usage, and no further analysis is warranted.

D.3.2 PLATFORM VENTILATION SYSTEM

The Project Sponsor has designed the ventilation system for the Preferred Alternative to maintain safe conditions for LIRR employees. In the event of a fire or smoke emergency, the ventilation system would provide safe egress and aid firefighting response. The design would incorporate a series of exhaust and make-up fan plants (the Northwest, Northeast, and Southeast fan plant) connected to intake and discharge louvers. The ventilation system design includes fan plants connected to a series of plenums and ducts, integrated into the Platform structure.

Additionally, the Northwest Fan Plant would include localized exhaust hoods in order to directly vent locomotive engine exhaust when firing diesel fuel. Currently, LIRR operates train service to/from eastern Long Island where no electrified rail service is available. Trains on these lines use two 3,000 hp EMD DM-30 dual mode locomotives (at the front and rear of the train) to provide direct service between eastern Long Island and Penn Station using both the eastern non-electrified rails and the western electrified rails. The EMD DM-30 locomotives are fitted with USEPA Tier I locomotive engines.

[4] USEPA required a major reduction in the sulfur content of diesel fuel intended for use in locomotive, marine, and nonroad engines and equipment, including construction equipment. As of 2015, the diesel fuel produced by all large refiners, small refiners, and importers must be ULSD fuel, with sulfur levels in nonroad diesel fuel limited to a maximum of 15 parts per million.

In coordination with LIRR, FRA assumed five dual-mode trains would arrive at the WRY for morning service to Penn Station and would subsequently be stored in the WRY until evening service return trips to eastern Long Island. While parked in the WRY, the dual-mode trains would operate a single EMD DM-30 engine firing diesel fuel. The localized exhaust hoods would be placed over locations where LIRR dual-mode locomotives would park in the railyard, and emissions would exhaust to ambient air. FRA assumed that all locomotive engine emissions would be exhausted from a single Fan Plant location. Therefore, FRA performed a refined analysis of the locomotive emissions for each of the three Fan Plant locations.

Based on previous information provided by LIRR, FRA assumed that trains would be operating at a low idle load of 0.3 percent (approximately 10 hp for the EMD DM-30 locomotive) to provide electrical power between 8 AM and 3 PM. Over the three hour period between 3 PM and 6 PM, engines LIRR would perform 15-minute pre-run testing for each engine before departing Penn Station. FRA estimated the 15-minute average engine load (and subsequently, the 1-hour average engine load) based on a representative notch profile (see **Table D-1**.) Within the first hour of this period (3 PM to 4 PM), FRA assumed two trains would each perform the 15-minute pre-run test and depart the WRY and the remaining three trains would continue idle operations. Similarly, FRA assumed two trains would depart the WRY in the next hour (4 PM to 5 PM) and the remaining single train would continue idle operations. FRA assumed the remaining train would depart the WRY in the last hour (5 PM to 6 PM).

Table D-1
Representative Pre-Run Test Notch Profile

Notch	Average Load	Percent Time by Notch
Idle	0.3%	59.8%
1	5%	12.4%
2	10%	12.3%
3	24%	5.8%
4	35%	3.6%
5	46%	3.6%
6	68%	1.5%
7	86%	0.2%
8	100%	0.8%
Average Load Factors		
15-Minute Average Load	8.3%	
1-Hour Average Load	2.3%	

D.3.2.1 *EMISSION RATES AND STACK PARAMETERS*

The NO_x, PM (both $PM_{2.5}$ and PM_{10}), and CO emissions profile for the Platform ventilation system over a typical day are presented in **Table D-2**.

Table D-2
Diesel Exhaust Hood System Emission Profile (g/s)

Time Period	NO_x	PM	CO
12 AM–8 AM(1)	0.000	0.000	0.000
8 AM–3 PM	0.093	0.003	0.028
3 PM–4 PM	0.340	0.010	0.101
4 PM–5 PM	0.303	0.009	0.090
5 PM–6 PM	0.142	0.004	0.042
6 PM–12 AM(1)	0.000	0.000	0.000

Notes:
Emissions represent total emissions from all diesel locomotives operating within the WRY site.
(1) LIRR do not store dual-mode locomotives at the WRY site overnight (from 6 PM to 8 AM the following day). Therefore, FRA modeled no diesel exhaust emissions during the overnight period.

D.3.2.2 *BACKGROUND CONCENTRATIONS*

To estimate the maximum expected total pollutant concentrations, FRA added the modeled concentrations from the emission sources to a background value that accounts for existing pollutant concentrations from other sources (see **Table D-3**). The background levels are based on concentrations monitored at the nearest NYSDEC ambient air monitoring stations over the most recent three-year period for which data are available (2017–2019), with the exception of annual NO_2, which is based on five years of data, consistent with current DEP guidance (2015–2019). For the 24-hour PM_{10} concentration the highest of the second-highest measured value over the three-year period will be used, consistent with applicable guidance. $PM_{2.5}$ impacts are assessed on an incremental basis and will be compared with the *CEQR Technical Manual* $PM_{2.5}$ *de minimis* criteria (see Chapter 12, Section 412). The $PM_{2.5}$ 24-hour average background concentration of 19.67 µg/m^3 (based on the 98th percentile concentrations, averaged over 2017 to 2019 was used to establish the *CEQR Technical Manual de minimis* value.

Table D-3
Maximum Background Pollutant Concentrations

Pollutant	Average Period	Location	Concentration (µg/m^3)	NAAQS (µg/m^3)
NO_2	1-hour	IS 52, Bronx	110.6	188
	Annual	IS 52, Bronx	37.9	100
$PM_{2.5}$	24-hour	Division Street, Manhattan	19.67	35
	Annual	Division Street, Manhattan	9.0	12
PM_{10}	24-hour	Division Street, Manhattan	38	150
Source: New York State Air Quality Report Ambient Air Monitoring System, NYSDEC, 2015–2019.				

D.3.2.3 *MODEL SELECTION*

As prescribed in **Appendix B**, “Methodology Report,” Chapter 4, “Air Quality, Greenhouse Gas Emissions, and Resilience,” FRA evaluated potential air quality impacts from the Platform ventilation system using the USEPA American Meteorological Society/Environmental Protection Agency Regulated Model (AERMOD) Version 19191.[5] AERMOD is a state-of-the-art dispersion model, applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain, including updated treatments of the boundary layer theory, understanding of turbulence and dispersion, and includes handling of terrain interactions. AERMOD calculates pollutant concentrations from one or more points (e.g., exhaust stacks) based on hourly meteorological data, and has the capability to calculate pollutant concentrations at locations where the plume from the exhaust stack is affected by the aerodynamic wakes and eddies (downwash) produced by nearby structures. FRA performed the analysis of potential impacts from exhaust stacks assuming stack tip downwash, urban dispersion and surface roughness length (using an urban population of 8,000,000), with and without building downwash, and elimination of calms. AERMOD also incorporates the algorithms from the PRIME model, which is designed to predict impacts in the “cavity region” (i.e., the area around a structure which under certain conditions may affect an exhaust plume, causing a portion of the plume to become entrained in a recirculation region). FRA used the Building Profile Input Program (BPIP) program for the PRIME model (BPIPRM) to determine the projected building dimensions modeling with the building downwash algorithm enabled. The modeling of downwash from sources accounts for all obstructions within a radius equal to five obstruction heights of the stack.

[5] USEPA. *User’s Guide for the AMS/EPA Regulatory Model (AERMOD)*. Office of Air Quality Planning and Standards. USEPA-454/B-19-027. Research Triangle Park, North Carolina. August 2019.

D.3.2.4 *NO_2 CONCENTRATIONS*

As described in Chapter 4 of **Appendix B**, FRA estimated 1-hour NO_2 concentrations from the Platform ventilation systems using the AERMOD model's Plume Volume Molar Ratio Method (PVMRM) module to analyze chemical transformation within the model. The PVMRM module incorporates hourly background ozone concentrations to estimate NO_x transformation within the source plume. FRA obtained ozone concentrations from the Queens College NYSDEC monitoring station. FRA selected the Queen College station as the most representative ozone monitoring station that has complete five years of hourly data available. NO_2 locomotive engine emissions generally range from 5 to 17 percent of total NO_x.[6,7] Therefore, FRA conservatively assumed an initial NO_2 to NO_x ratio of 20 percent at the exhaust stack.

The potential NO_2 1-hour concentrations represent the five-year average of the annual 98th percentile of the maximum daily 1-hour average, added to background concentrations for each hour.

Annual NO_2 concentrations from stationary sources will be estimated assuming that all NO_x emitted by these operations is fully transformed to NO_2, following USEPA's Tier 1 guidance.[8]

D.3.2.5 *METEROLOGICAL DATA*

FRA use meteorological data provided by NYSDEC. The data set consists of five consecutive years of meteorological data, with surface data collected at LaGuardia Airport, and concurrent upper air data collected at Brookhaven, New York. The meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevation over the five-year period.

D.3.2.6 *RECEPTOR PLACEMENT*

FRA modeled discrete receptors (i.e., locations at which concentrations are calculated) along existing and future building façades to represent potentially sensitive locations such as operable windows and intake vents. Rows of receptors were spaced at regular intervals on the modeled buildings and multiple elevations. FRA also placed receptors at publicly accessible ground-level locations, including sidewalks and open spaces.

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[6] Matthew A. Breuer, Daniel A. Burgard. "Bridge-based Remote Sensing of NOx Emissions from Locomotives." *Atmospheric Environment 198 (2019) 77-82.*

[7] Sierra Club. *AERMOD Modeling of Air Quality Impacts of the Proposed Morrow Pacific Project*. October, 2012.

[8] EPA. *Memorandum: Clarification on the use of AERMOD Dispersion Modeling for Demonstrating Compliance with the NO_2 National Ambient Air Quality Standard*. September 30, 2014.

D.4 CONSTRUCTION AIR QUALITY

D.4.1 ON-SITE CONSTRUCTION ACTIVITY ASSESSMENT

To determine which construction periods constitute the worst-case periods for the pollutants of concern (PM, CO, NO_2), FRA calculated construction-related emissions for each calendar year throughout the duration of construction on a rolling annual and peak day basis for $PM_{2.5}$. $PM_{2.5}$ is selected for determining the worst-case periods for all pollutants analyzed, because the ratio of predicted $PM_{2.5}$ incremental concentrations to impact criteria is anticipated to be higher than for other pollutants. Therefore, FRA used initial estimates of $PM_{2.5}$ emissions throughout the construction years for determining the worst-case periods for analysis of all pollutants. Generally, emission patterns of PM_{10} and NO_2 would follow $PM_{2.5}$ emissions, since they scale with diesel engine horsepower. While CO emissions may have a somewhat different pattern, FRA anticipates them to be highest during periods when the most activity would occur. Based on the resulting multi-year profiles of annual average and peak day average emissions of $PM_{2.5}$, FRA identified March 2023 and the 12-month period from June 2022 to May 2023 as the worst-case short-term and annual period, respectively, since the highest project-wide emissions were predicted in these periods. During the worst-case short-term period, Platform construction activities at Tracks 23 to 26 are projected to occur simultaneously with the Tunnel Encasement activities; during the worst-case annual period, Platform construction activities at Tracks 23 to 30 are projected to occur simultaneously with the Tunnel Encasement activities.

FRA analyzed dispersion of the relevant air pollutants from the construction area during these periods. The chapter also presents broader conclusions regarding potential concentrations during non-peak construction periods, which FRA did not model, based on the multi-year emissions profiles and the modeled peak period results.

D.4.1.1 *ENGINE EMISSIONS*

Based on the construction activity schedule developed for the Preferred Alternative (see Attachments 1 to 3 to this appendix), FRA estimated the sizes, types, and number of units of construction equipment. FRA developed emission rates for NO_X, CO, PM_{10}, and $PM_{2.5}$ from truck engines using the USEPA Motor Vehicle Emission Simulator (MOVES2014b) emission model.[9] Using the NONROAD emission module included in the MOVES2014b emission model, FRA developed emission factors for NO_x, CO, PM_{10}, and $PM_{2.5}$ from on-site construction engines, which include exhaust and crankcase emissions.

D.4.1.2 *DUST EMISSIONS*

FRA also calculated dust emissions from construction activities (e.g., excavation, grading, and transferring of excavated materials into dump trucks) based on USEPA procedures delineated in AP-42 Table 13.2.3-1.[10]

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[9] USEPA, Motor Vehicle Emission Simulator (MOVES), User Guide for MOVES2014a, November 2015. *The user guide was not updated for the MOVES 2014b emission model.

[10] USEPA, Compilations of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Ch. 13.2.1, NC, http://www.epa.gov/ttn/chief/ap42, January 2011.

D.4.1.3 *SOURCE SIMULATION*

For short-term model scenarios (predicting concentration averages for periods of 24 hours or less), all stationary sources, such as compressors, pumps, or concrete trucks, which idle in a single location while unloading, were simulated as point sources. FRA simulated other engines, which would move around the site on any given day, as area sources. For periods of 8 hours or less (less than the length of a shift), the analysis assumed that all engines would be active simultaneously. All sources would move around the site throughout the year and were therefore be simulated as area sources in the annual analyses.

D.4.1.4 *ON-ROAD SOURCES ASSESSMENT*

Since emissions from on-site construction equipment and on-road construction-related vehicles may contribute to concentration increments concurrently, on-road emissions adjacent to the construction sites were included with the on-site AERMOD dispersion analysis (in addition to on-site truck and non-road engine activity) to address all local project-related emissions cumulatively.

D.4.2 **CONSTRUCTION MESOSCALE ANALYSIS**

The pollutants of concern on a regional basis are CO, PM_{10}, $PM_{2.5}$, NO_x, SO_2, and VOCs. FRA calculated emissions from on-road construction trucks and worker vehicles and from non-road construction equipment on an annual basis for each year of the Preferred Alternative's construction period based on the emissions modeling procedures described above for the microscale analysis.

D.5 GREENHOUSE GAS EMISSIONS AND RESILIENCY

D.5.1 **OPERATIONAL GREENHOUSE GAS EMISSIONS**

Based on the design of the Platform ventilation systems, FRA conservatively assumed the fan equipment would operate at capacity throughout the year. The equipment capacity and annual estimated usage are presented in **Table D-4**.

Table D-4
Platform Ventilation System
Electricity Consumption

Fan Plant	Plant Capacity (kW)	Annual Electricity Consumption (kWh)
Northwest Fan Plant	1,566	13,718,121
Northeast Fan Plant	671	5,879,195
Southeast Fan Plant	447	3,919,463
Diesel Hood Exhaust Fans	268	2,351,678
Western Rail Yard Total	2,953	25,868,456

FRA used an emission factor of 0.289 kg CO2e per kWh based on Citywide electrical consumption and their associated GHG emissions.[11] The electricity use associated with the Platform ventilation system, emission factors, and resulting GHG emissions associated with the Platform's ventilation systems would result in 7 thousand metric tons of CO_2e per year. Electricity emission factor conservatively assumed represented the latest data available for New York City and not the future build year. Therefore, FRA expects future emissions to be lower as GHG emissions associated with the generation of electricity is reduced with increased renewable energy and the elimination of high emission fuels.

[11] The City of New York Mayor's Office of Long-Term Planning and Sustainability. *Inventory of New York City Greenhouse Gas Emissions in 2019*. https://nyc-ghg-inventory.cusp.nyu.edu/

1.0.1 CONSTRUCTION GREENHOUSE GAS EMISSIONS

The number of vehicle trips by mode (i.e., worker vehicles, construction-related trucks) generated by construction under the Preferred Alternative was calculated using worker and truck estimates, worker modal splits (how the workers access the site per mode of transportation: automobile, transit, or walking), and the average vehicle occupancy. FRA then used these vehicle trips to develop annual vehicle miles traveled (VMT) associated with commuting workers and construction-related truck trips. An average round-trip commute distance of 25.3 miles (based on the average trip to work distance for the New York Metropolitan Area)[12] for construction workers in the New York City Region was used. FRA based the distances for truck deliveries on estimates of the origin and destination of materials for the Preferred Alternative provided by the Project Sponsor. FRA used Table 18-8 of the *CEQR Technical Manual* to determine the percentage of vehicle miles traveled by road type and the USEPA's MOVES2014b model to obtain an estimate of car and truck GHG emission factors used to calculate the associated emissions attributable to the Preferred Alternative.

The Preferred Alternative would result in construction worker travel of 11,257,080 VMT. Additionally, the Preferred Alternative would result in construction truck trips totaling 11,850,180 VMT. FRA used these data as the basis for the GHG emissions calculations from mobile sources, applying emission factors as described above for operational mobile source emissions.

FRA estimated on-site emissions from non-road construction engines based on specific estimates of construction activity and fuel consumption data from USEPA's NONROAD emissions model. To estimate total fuel consumption throughout the duration of construction activities, FRA used the detailed schedule data of non-road construction engines, including the number, type, power rating, and hours of operation for all construction engines provided by the Project Sponsor coupled with fuel consumption rate data from USEPA's NONROAD model. FRA estimated that non-road construction engines would require approximately 1.5 million gallons of diesel equivalent throughout the duration of construction. FRA then multiplied the quantity of fuel by an emission factor of 10.30 kilograms CO_2e per gallon of diesel fuel.[13]

FRA based estimates of upstream emissions related to the production of construction materials on the expected quantity of iron or steel and cement. Although the Preferred Alternative will use other materials, cement and metals have the largest embodied energy and direct GHG emissions associated with their production, and substantial quantities would be used for the Preferred Alternative.

The Project Sponsor estimated that construction would require 13,596 metric tons of cement. FRA applied an emission factor of 0.928 metric tons of CO_2e per metric ton of cement produced to estimate emissions associated with energy consumption and process emissions for cement production.[14] The precise origin of cement for the Preferred Alternative is unknown at this time; the Project Sponsor's Contractor will would select the cement vendor at the time of construction.

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[12] NYSDOT. *2009 NHTS, New York State Add-On*. Key Tables. Table 3: Average Travel Day Person-Trip Length by Mode and Purpose, trip-to work distance for SOV in NYMTC 10-county area. 2011.

[13] EPA. Emission Factors for Greenhouse Gas Inventories. 26 March 2020.

[14] The Portland Cement Association. Life Cycle Inventory of Portland Cement Manufacture. 2006.

The Project Sponsor estimated that construction would require 7,716 metric tons of steel and other metals (e.g., structural, rebar, aluminum). FRA applied an emission factor of 0.6 metric tons of CO_2e per metric ton of steel product produced to estimate emissions associated with production energy consumption,[15] and 0.65 metric tons of CO_2e per metric ton of steel product produced for process emissions associated with steel production were applied.[16]

1.0.2 RESILIENCE

The Preferred Alternative would introduce critical infrastructure—the Platform over the railyard and the Tunnel Encasement—with very long design lifespans (assumed to be greater than 100 years). Accordingly, FRA reviewed the Preferred Alternative in the context of climate scenarios projected for 2100. FRA also considered interim years (2050s, 2080s) for adaptive resilience design (i.e., considering potential future resilience measures if necessary which may not be implemented by the 2030 analysis year).

FRA considered flooding impacts on the Preferred Alternative as well as any potential impact for affecting other uses by reviewing the elevations of infrastructure and uses introduced by the Preferred Alternative. Furthermore, FRA considered relevant protection measures and identified any potential vulnerabilities or potential flooding risks.

The assessment will include considerations of current and future projections of sea level rise, storm surge, temperature, and precipitation as determined by local, state, federal agencies. Areas of the Preferred Alternative that would be effected were identified and the severity of the effects were discussed. ✷

[15] Arpad Horvath et al. Pavement Life-cycle Assessment Tool for Environmental and Economic Effects, Consortium on Green Design and Manufacturing. UC Berkeley. 2007.

[16] Based on 42.3 teragrams of CO_2e emitted and 65,460 thousand tons produced; Source: EPA. *Inventory of U.S. Climate Change and Sinks: 1990–2009*. April 15, 2011.

Western Railyard Platform
Construction Equipment Information

	Equipment	Quantity	Duration of Activity		Engine Information			On-Site Usage Factors		EPA MOVES-NONROAD Factors							
			Start Date	End Date	Engine Type	Size (hp)	NONROAD SCC	Daily use	Average Use	Average Engine Load	PM25 Factor (g/hp-hr)	PM10 Factor (g/hp-hr)	NOx Factor (g/hp-hr)	VOC Factor (g/hp-hr)	CO Factor (g/hp-hr)	SO2 Factor (g/hp-hr)	Fuel Factor (gal/hp-hr)
Platform	Excavator w/ Hoe Ram	2	Oct-21	Feb-26	diesel	150	2270002036175	75%	50%	59%	0.5900	0.0239	0.4027	0.0104	0.1404	0.0021	0.0312
	Backhoe	2	Oct-21	Feb-26	diesel	92	2270002066100	75%	50%	21%	0.2100	0.0598	0.5680	0.1121	0.4572	0.0011	0.0144
	Concrete Pump	1	Oct-21	Feb-26	diesel	110	2270006010175	75%	25%	43%	0.4300	0.1040	1.1785	0.1042	0.5952	0.0018	0.0225
	Hydraulic Rough Terrain Crane	1	Oct-21	Feb-26	diesel	280	2270002045300	75%	50%	43%	0.4300	0.0100	0.1465	0.0155	0.0406	0.0016	0.0225
	Generator	2	Nov-21	May-25	diesel	100	2270006005100	100%	75%	43%	0.4300	0.0719	1.0673	0.1336	0.4339	0.0020	0.0250
	Crawler Crane	1	Dec-21	Jun-25	diesel	362	2270002069600	75%	100%	59%	0.5900	0.0103	0.1357	0.0227	0.0472	0.0022	0.0312
	Caisson Drill Rig	4	Jan-22	Jul-25	diesel	580	2270002033600	100%	75%	43%	0.0298	0.0272	0.4334	0.0805	0.1324	0.0018	0.0225
	Air Compressor	8	Feb-22	Aug-25	diesel	50	227000601550	100%	75%	43%	0.0155	0.0123	0.7645	0.0454	0.1067	0.0017	0.0250
	Compressor-Generator	2	Oct-21	Feb-26	diesel	50	227000600550	75%	70%	43%	0.4300	0.0571	1.0127	0.1097	0.3015	0.0019	0.0250
	Hand Tools	10	Jan-22	Feb-26	electric	N/A	N/A	75%	50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Bar Bending Machine	1	Oct-21	Feb-26	gasoline	50	226500304075	75%	20%	54%	0.5400	0.0229	0.4109	0.4376	3.6251	0.0705	0.0423
	Concrete Vibrators	1	Oct-21	Feb-26	electric	20A	N/A	75%	10%	N/A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Concrete Finishers	2	Oct-21	Feb-26	gasoline	5	226000304025	75%	10%	54%	0.5400	1.7597	0.5257	2.3535	51.3283	0.1035	0.0723
	Hand Tools	3	Jun-22	Feb-26	electric	N/A	N/A	75%	50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	350T Crawler Crane	2	Jun-22	Feb-26	diesel	365	2270002069600	75%	70%	59%	0.0124	0.0102	0.1346	0.0227	0.0468	0.0022	0.0312
	Welding Generator	2	May-24	Nov-24	diesel	25	227000600525	90%	70%	43%	0.0537	0.0554	0.9579	0.1987	0.4337	0.0023	0.0250
	Welder Rack	1	May-24	Nov-24	electric	N/A	N/A	90%	70%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Hand Tools	10	Aug-22	Feb-26	electric	N/A	N/A	75%	50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	HiRail Bucket Truck	4	Aug-22	Feb-26	diesel	270	2270002081300	75%	75%	59%	0.0287	0.0235	0.2882	0.0297	0.0990	0.0022	0.0312
	Cable Pulling Trailer	1	Aug-22	Feb-26	diesel	270	2270002081300	75%	15%	59%	0.0287	0.0235	0.2882	0.0297	0.0990	0.0022	0.0312
	Welders	5	Aug-22	Feb-26	electric	N/A	N/A	75%	25%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tunnel	Excavator w/ Hoe Ram	2	Oct-21	Jun-23	diesel	150	2270002036175	75%	50%	59%	0.5900	0.0239	0.4027	0.0104	0.1404	0.0021	0.0312
	Bobcat	2	Oct-21	Jun-23	diesel	92	2270002072100	75%	50%	21%	0.2100	0.0858	0.6108	0.1680	0.5632	0.0011	0.0144
	Generator	2	Jan-22	Aug-24	diesel	100	2270006005100	50%	50%	43%	0.0757	0.0719	1.0673	0.1336	0.4339	0.0020	0.0250
	Crawler Crane	1	Jan-22	Aug-24	diesel	362	2270002069600	100%	100%	59%	0.0125	0.0103	0.1357	0.0227	0.0472	0.0022	0.0312
	Excavator	4	Jan-22	Aug-24	diesel	200	2270002036300	100%	100%	59%	0.0198	0.0172	0.1811	0.0094	0.0665	0.0021	0.0312
	SOE Drill Rig	2	Jan-22	Dec-22	diesel	300	2270002033300	75%	75%	43%	0.0368	0.0340	0.5075	0.0757	0.1588	0.0018	0.0225
	Jet grout Drill Rig	2	Dec-22	May-23	diesel	300	2270002033300	75%	75%	43%	0.0368	0.0340	0.5075	0.0757	0.1588	0.0018	0.0225
	Compressor-Generator	8	Jun-22	Feb-24	diesel	150	227000600550	100%	70%	43%	0.0644	0.0571	1.0127	0.1097	0.3015	0.0019	0.0250
	Hand Tools	10	Jun-22	Feb-24	electric	N/A	N/A	75%	50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Bar Bending Machine	1	Jun-22	Feb-24	gasoline	50	226500304075	75%	20%	54%	0.0210	0.0229	0.4109	0.4376	3.6251	0.0705	0.0423
	Concrete Vibrators	1	Jun-22	Feb-24	electric	N/A	N/A	75%	10%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Concrete Finishers	2	Jun-22	Feb-24	gasoline	5	226000304025	75%	10%	54%	1.6190	1.7597	0.5257	2.3535	51.3283	0.1035	0.0723
	Hand Tools	3	May-22	Apr-24	electric	N/A	N/A	75%	50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Crawler Crane	1	Sep-22	May-23	diesel	200	2270002069600	50%	50%	59%	0.0125	0.0103	0.1357	0.0227	0.0472	0.0022	0.0312
	Hand Tools	10	Sep-22	May-23	electric	N/A	N/A	75%	50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Welding Generator	4	Sep-22	May-23	diesel	25	227000600525	75%	50%	43%	0.0622	0.0594	0.9775	0.1987	0.4537	0.0023	0.0250
	Welder Pack Rig	1	Sep-22	May-23	electric	N/A	N/A	75%	25%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Overbuild - Site 1	Tower Crane	4	Apr-25	Oct-26	diesel	300	2270002045300	90%	75%	43%	0.0070	0.0309	0.6290	0.0155	72.7622	0.0016	0.0225
	Welding Generator	2	Apr-25	Oct-26	diesel	25	227000600525	90%	70%	43%	0.0503	0.0554	0.9579	0.1987	0.4337	0.0023	0.0250
	Welder Rack	1	Apr-25	Oct-26	electric	N/A	N/A	90%	70%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Hand Tools	10	Apr-25	Oct-26	electric	N/A	N/A	75%	50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Welders	5	Apr-25	Oct-26	electric	N/A	N/A	75%	25%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Generator	2	Apr-25	Oct-26	diesel	100	2270006005100	100%	75%	43%	0.0599	0.0665	1.0360	0.1336	0.4060	0.0020	0.0250
	Bar Bending Machine	1	Sep-25	Oct-26	gasoline	50	226500304075	75%	20%	54%	0.0210	0.0229	0.4109	0.4376	3.6261	0.0705	0.0423
	Concrete Vibrators	1	Sep-25	Oct-26	electric	N/A	N/A	75%	10%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Concrete Finishers	2	Sep-25	Oct-26	gasoline	5	226000304025	75%	10%	54%	1.6190	1.7597	0.5257	2.3535	51.3282	0.1035	0.0723
	Hand Tools	10	Sep-25	Oct-26	electric	N/A	N/A	75%	50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Generator	5	Sep-25	Oct-26	gasoline	50	2270006005100	75%	75%	43%	0.0599	0.0665	1.0360	0.1336	0.4060	0.0020	0.0250
	Concrete Pump	1	Sep-25	Oct-26	diesel	270	2270006010175	80%	80%	43%	0.0874	0.0966	1.1179	0.1042	0.5561	0.0018	0.0225
	SFRM Pump	1	Feb-26	Oct-26	electric	N/A	N/A	90%	90%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Hand Tools	5	Jun-26	Oct-26	electric	N/A	N/A	50%	50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Material Hoist	2	Jun-26	Oct-26	electric	N/A	N/A	90%	90%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Hand Tools	20	Feb-26	Oct-26	electric	N/A	N/A	75%	50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Cable Pullers	4	Feb-26	Oct-26	electric	N/A	N/A	90%	15%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Welders	2	Feb-26	Oct-26	electric	N/A	N/A	50%	35%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Hand Tools	30	Jan-26	Oct-26	electric	N/A	N/A	75%	50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Personnel/Material Hoist	4	Oct-25	Oct-26	electric	N/A	N/A	90%	90%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Western Railyard Platform
Construction Equipment Information

	Equipment	Quantity	Duration of Activity		Engine Information			On-Site Usage Factors		EPA MOVES-NONROAD Factors							
			Start Date	End Date	Engine Type	Size (hp)	NONROAD SCC	Daily use	Average Use	Average Engine Load	PM25 Factor (g/hp-hr)	PM10 Factor (g/hp-hr)	NOx Factor (g/hp-hr)	VOC Factor (g/hp-hr)	CO Factor (g/hp-hr)	SO2 Factor (g/hp-hr)	Fuel Factor (gal/hp-hr)
Overbuild - Site 2	Tower Crane	4	Dec-23	Apr-26	diesel	300	2270002045300	90%	75%	43%	0.0096	0.0309	0.6290	0.0155	72.7622	0.0016	0.0225
	Welding Generator	2	Dec-23	Apr-26	diesel	25	227000600525	90%	70%	43%	0.0577	0.0554	0.9579	0.1987	0.4337	0.0023	0.0250
	Welder Rack	1	Dec-23	Apr-26	electric	N/A	N/A	90%	70%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Hand Tools	10	Dec-23	Apr-26	electric	N/A	N/A	75%	50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Welders	5	Dec-23	Apr-26	electric	N/A	N/A	75%	25%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Generator	2	Dec-23	Apr-26	diesel	100	2270006005100	100%	75%	43%	0.0698	0.0665	1.0360	0.1336	0.4060	0.0020	0.0250
	Bar Bending Machine	1	Jun-24	Jul-26	gasoline	50	226500304075	75%	20%	54%	0.0210	0.0229	0.4109	0.4376	3.6261	0.0705	0.0423
	Concrete Vibrators	1	Jun-24	Jul-26	electric	N/A	N/A	75%	10%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Concrete Finishers	2	Jun-24	Jul-26	gasoline	5	226000304025	75%	10%	54%	1.6190	1.7597	0.5257	2.3535	51.3282	0.1035	0.0723
	Hand Tools	10	Jun-24	Jul-26	electric	N/A	N/A	75%	50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Generator	5	Jun-24	Jul-26	gasoline	50	2270006005100	75%	75%	43%	0.0645	0.0665	1.0360	0.1336	0.4060	0.0020	0.0250
	Concrete Pump	1	Jun-24	Jul-26	diesel	270	2270006010175	80%	80%	43%	0.0937	0.0966	1.1179	0.1042	0.5561	0.0018	0.0225
	SFRM Pump	1	Nov-24	Oct-26	electric	N/A	N/A	90%	90%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Hand Tools	5	Mar-25	Oct-26	electric	N/A	N/A	50%	50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Material Hoist	2	Mar-25	Oct-26	electric	N/A	N/A	90%	90%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Hand Tools	20	Mar-25	Oct-26	electric	N/A	N/A	75%	50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Cable Pullers	4	Mar-25	Oct-26	electric	N/A	N/A	90%	15%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Welders	2	Mar-25	Oct-26	electric	N/A	N/A	50%	35%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Hand Tools	10	Jul-25	Oct-26	electric	N/A	N/A	75%	50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Welders	2	Jul-25	Oct-26	electric	N/A	N/A	50%	35%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Material Hoist	4	Jul-25	Oct-26	electric	N/A	N/A	50%	75%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Hand Tools	30	Jun-25	Oct-26	electric	N/A	N/A	75%	50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Personnel/Material Hoist	4	Jun-24	Oct-26	electric	N/A	N/A	90%	90%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Western Railyard Platform
Construction Truck Information

		Work task	Truck Type	Average Number of Vehicles Per Day	Duration of Activity		Vehicle Activity				MOVES Vehicle Emission Factors																				
							Within Non-Attainment Area		Total Travel		PM2.5			PM10			NOx			VOC			CO			SO2			CO2e		
					Start Date	End Date	Estimated Round Trip Distance (miles/truck)	Vehicle Miles (VMT/day)	Estimated Round Trip Distance (miles/truck)	Vehicle Miles (VMT/day)	Onroad Emission Factor (g/mi)	Cruise Emission Factor (g/veh)	Idling Emission Factor (g/hr)	Onroad Emission Factor (g/mi)	Cruise Emission Factor (g/veh)	Idling Emission Factor (g/hr)	Onroad Emission Factor (g/mi)	Cruise Emission Factor (g/veh)	Idling Emission Factor (g/hr)	Onroad Emission Factor (g/mi)	Cruise Emission Factor (g/veh)	Idling Emission Factor (g/hr)	Onroad Emission Factor (g/mi)	Cruise Emission Factor (g/veh)	Idling Emission Factor (g/hr)	Onroad Emission Factor (g/mi)	Cruise Emission Factor (g/veh)	Idling Emission Factor (g/hr)	Onroad Emission Factor (g/mi)	Cruise Emission Factor (g/veh)	Idling Emission Factor (g/hr)
Platform	Area 1A Tracks 27-30	Track Outage Protection, Track Demolition & Site Preparation	Dump Truck	8	Oct-21	Dec-21	30	240	80	640	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Excavation and Caisson Drilling	Dump Truck	20	Nov-21	Apr-22	30	600	80	1,600	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Concrete Shear Walls and Columns	Concrete Truck	10	Dec-21	Jul-22	15	150	15	150	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Precast Superstructure Erection	Concrete Truck	25	Jun-22	Aug-22	15	375	15	375	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Underdeck MEP Installation/Architectural Fitout	Tractor Trailer	8	Sep-22	Jan-23	30	240	500	4,000	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
	Area 1B Tracks 23-26	Track Outage Protection, Track Demolition & Site Preparation	Dump Truck	10	Aug-22	Oct-22	30	300	80	800	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Excavation and Caisson Drilling	Dump Truck	20	Sep-22	Mar-23	30	600	80	1,600	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Concrete Shear Walls and Columns	Concrete Truck	10	Nov-22	Apr-23	15	150	15	150	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Precast Superstructure Erection	Concrete Truck	25	Mar-23	May-23	15	375	15	375	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Underdeck MEP Installation/Architectural Fitout	Tractor Trailer	8	May-23	Oct-23	30	240	500	4,000	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
	Area 1C Tracks 19-22	Track Outage Protection, Track Demolition & Site Preparation	Dump Truck	10	May-23	Jul-23	30	300	80	800	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Excavation and Caisson Drilling	Dump Truck	20	May-23	Aug-23	30	600	80	1,600	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Concrete Shear Walls and Columns	Concrete Truck	10	Jul-23	Dec-23	15	150	15	150	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Precast Superstructure Erection	Concrete Truck	25	Nov-23	Jan-24	15	375	15	375	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Underdeck MEP Installation/Architectural Fitout	Tractor Trailer	8	Jan-24	Jun-24	30	240	500	4,000	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
	Area 1D Tracks 15-18	Track Outage Protection, Track Demolition & Site Preparation	Dump Truck	10	Jan-24	Mar-24	30	300	80	800	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Excavation and Caisson Drilling	Dump Truck	20	Jan-24	Apr-24	30	600	80	1,600	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Concrete Shear Walls and Columns	Concrete Truck	10	Apr-24	Jun-24	15	150	15	150	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Precast Superstructure Erection	Concrete Truck	30	May-24	Jul-24	15	450	15	450	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Underdeck MEP Installation/Architectural Fitout	Tractor Trailer	8	Aug-24	Dec-24	30	240	500	4,000	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
	Area 2E Tracks 10-13	Track Outage Protection, Track Demolition & Site Preparation	Dump Truck	10	Jul-24	Aug-24	30	300	80	800	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Excavation and Caisson Drilling	Dump Truck	20	Aug-24	Nov-24	30	600	80	1,600	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Concrete Shear Walls and Columns	Concrete Truck	10	Sep-24	Dec-24	15	150	15	150	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Precast Superstructure Erection	Concrete Truck	25	Nov-24	Jan-25	15	375	15	375	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Underdeck MEP Installation/Architectural Fitout	Tractor Trailer	8	Jan-25	Jul-25	30	240	500	4,000	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
	Area 2F Tracks 4-7	Track Outage Protection, Track Demolition & Site Preparation	Dump Truck	10	Feb-25	Mar-25	30	300	80	800	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Excavation and Caisson Drilling	Dump Truck	20	Mar-25	May-25	30	600	80	1,600	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Concrete Shear Walls and Columns	Concrete Truck	10	Apr-25	Aug-25	15	150	15	150	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Precast Superstructure Erection	Concrete Truck	25	Aug-25	Sep-25	15	375	15	375	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Underdeck MEP Installation/Architectural Fitout	Tractor Trailer	8	Sep-25	Feb-26	30	240	500	4,000	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
	Area 2G Tracks 1-4	Track Outage Protection, Track Demolition & Site Preparation	Dump Truck	10	Oct-25	Nov-25	30	300	80	800	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Excavation and Caisson Drilling	Dump Truck	0	Jan-00	Jan-00	30	0	80	0	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Concrete Shear Walls and Columns	Concrete Truck	10	Nov-25	Jan-26	15	150	15	150	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Precast Superstructure Erection	Concrete Truck	25	Dec-25	Jan-26	15	375	15	375	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Underdeck MEP Installation/Architectural Fitout	Tractor Trailer	8	Feb-26	May-26	30	240	500	4,000	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
	Building C AC Substation	Excavation & Foundations	Dump Truck	10	Apr-23	Jan-24	30	300	80	800	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Superstructure Construction	Concrete Truck	7	Feb-24	Aug-24	15	105	15	105	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Exteriors	Tractor Trailer	4	Apr-24	Sep-24	30	120	130	520	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Mechancial, Electrical and Plumbing (Excl. AC Sub)	Tractor Trailer	6	Apr-24	Jun-25	30	180	500	3,000	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Architectural Fitout	Tractor Trailer	10	May-24	Jul-25	30	300	130	1,300	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
	Building A	Excavation & Foundations	Dump Truck	10	Oct-25	Jan-26	30	300	80	800	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Superstructure Construction	Concrete Truck	10	Feb-26	Mar-26	15	150	15	150	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Exteriors	Tractor Trailer	6	Mar-26	May-26	30	180	130	780	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Mechancial, Electrical and Plumbing (Excl. AC Sub)	Tractor Trailer	5	Mar-26	May-26	30	150	500	2,500	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Architectural Fitout	Tractor Trailer	5	Mar-26	May-26	30	150	130	650	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
	Building B	Excavation & Foundations	Dump Truck	10	Oct-25	Jan-26	30	300	80	800	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Superstructure Construction	Concrete Truck	10	Feb-26	Mar-26	15	150	15	150	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Exteriors	Tractor Trailer	6	Mar-26	May-26	30	180	130	780	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Mechancial, Electrical and Plumbing (Excl. AC Sub)	Tractor Trailer	5	Mar-26	May-26	30	150	500	2,500	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Architectural Fitout	Tractor Trailer	5	Mar-26	May-26	30	150	130	650	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
Tunnel		Temp. Utilities/Site Preparation/Temp. Structures	Tractor Trailer	2	Oct-21	May-23	30	60	130	260	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Support of Excavation/Jetgrouting	Dump Truck	5	Jan-22	Jul-23	30	150	80	400	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Soil & Rock Excavation	Dump Truck	15	Mar-22	Nov-23	30	450	80	1,200	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Concrete	Concrete Truck	8	Jun-22	Jan-24	15	120	15	120	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Waterproofing & Roof Protection Stab	Tractor Trailer	1	May-22	Mar-24	30	30	130	130	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		Backfill/Final Utilities	Tractor Trailer	2	Jul-22	Jul-24	30	60	130	260	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8
		High Line Underpinning	Tractor Trailer	5	Sep-22	Apr-23	30	150	130	650	0.0998	0.0245	0.3048	0.4400	0.1266	0.3313	3.2649	0.7092	17.2316	0.8933	0.3614	12.6090	1.0687	0.2239	6.0634	0.0135	0.0028	0.0492	2,147.6	441.9	7,813.8

Western Railyard Platform
Construction Worker Auto Information

Section	Area	Work task	Workers Per Day	Duration of Activity: Start Date	Duration of Activity: End Date	Vehicle Trips: Modal Split	Vehicle Trips: Auto Occupancy	Vehicle Trips: Total Autos Per Day	Daily Milage (VMT/day)	PM2.5 Cruise Emission Factor (g/veh)	PM10 Cruise Emission Factor (g/veh)	NOx Cruise Emission Factor (g/veh)	VOC Cruise Emission Factor (g/veh)	CO Cruise Emission Factor (g/veh)	SO2 Cruise Emission Factor (g/veh)	CO2e Cruise Emission Factor (g/veh)
Platform	Area 1A Tracks 27-30	Track Outage Protection, Track Demolition & Site Preparation	12	Oct-21	Dec-21	100%	1.00	12	480	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Excavation and Caisson Drilling	65	Nov-21	Apr-22	100%	1.00	65	2,600	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Concrete Shear Walls and Columns	30	Dec-21	Jul-22	100%	1.00	30	1,200	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Precast Superstructure Erection	30	Jun-22	Aug-22	100%	1.00	30	1,200	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Underdeck MEP Installation/Architectural Fitout	40	Sep-22	Jan-23	100%	1.00	40	1,600	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
	Area 1B Tracks 23-26	Track Outage Protection, Track Demolition & Site Preparation	12	Aug-22	Oct-22	100%	1.00	12	480	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Excavation and Caisson Drilling	60	Sep-22	Mar-23	100%	1.00	60	2,400	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Concrete Shear Walls and Columns	30	Nov-22	Apr-23	100%	1.00	30	1,200	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Precast Superstructure Erection	30	Mar-23	May-23	100%	1.00	30	1,200	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Underdeck MEP Installation/Architectural Fitout	40	May-23	Oct-23	100%	1.00	40	1,600	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
	Area 1C Tracks 19-22	Track Outage Protection, Track Demolition & Site Preparation	12	May-23	Jul-23	100%	1.00	12	480	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Excavation and Caisson Drilling	65	May-23	Aug-23	100%	1.00	65	2,600	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Concrete Shear Walls and Columns	30	Jul-23	Dec-23	100%	1.00	30	1,200	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Precast Superstructure Erection	30	Nov-23	Jan-24	100%	1.00	30	1,200	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Underdeck MEP Installation/Architectural Fitout	40	Jan-24	Jun-24	100%	1.00	40	1,600	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
	Area 1D Tracks 15-18	Track Outage Protection, Track Demolition & Site Preparation	12	Jan-24	Mar-24	100%	1.00	12	480	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Excavation and Caisson Drilling	65	Jan-24	Apr-24	100%	1.00	65	2,600	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Concrete Shear Walls and Columns	30	Apr-24	Jun-24	100%	1.00	30	1,200	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Precast Superstructure Erection	30	May-24	Jul-24	100%	1.00	30	1,200	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Underdeck MEP Installation/Architectural Fitout	40	Aug-24	Dec-24	100%	1.00	40	1,600	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
	Area 2E Tracks 10-13	Track Outage Protection, Track Demolition & Site Preparation	12	Jul-24	Aug-24	100%	1.00	12	480	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Excavation and Caisson Drilling	65	Aug-24	Nov-24	100%	1.00	65	2,600	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Concrete Shear Walls and Columns	30	Sep-24	Dec-24	100%	1.00	30	1,200	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Precast Superstructure Erection	30	Nov-24	Jan-25	100%	1.00	30	1,200	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Underdeck MEP Installation/Architectural Fitout	40	Jan-25	Jul-25	100%	1.00	40	1,600	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
	Area 2F Tracks 4-7	Track Outage Protection, Track Demolition & Site Preparation	12	Feb-25	Mar-25	100%	1.00	12	480	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Excavation and Caisson Drilling	65	Mar-25	May-25	100%	1.00	65	2,600	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Concrete Shear Walls and Columns	30	Apr-25	Aug-25	100%	1.00	30	1,200	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Precast Superstructure Erection	30	Aug-25	Sep-25	100%	1.00	30	1,200	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Underdeck MEP Installation/Architectural Fitout	40	Sep-25	Feb-26	100%	1.00	40	1,600	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
	Area 2G Tracks 1-4	Track Outage Protection, Track Demolition & Site Preparation	12	Oct-25	Nov-25	100%	1.00	12	480	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Excavation and Caisson Drilling	65	Jan-00	Jan-00	100%	1.00	65	2,600	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Concrete Shear Walls and Columns	30	Nov-25	Jan-26	100%	1.00	30	1,200	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Precast Superstructure Erection	20	Dec-25	Jan-26	100%	1.00	20	800	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Underdeck MEP Installation/Architectural Fitout	40	Feb-26	May-26	100%	1.00	40	1,600	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
	Building C AC Substation	Excavation & Foundations	15	Apr-23	Jan-24	100%	1.00	15	600	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Superstructure Construction	12	Feb-24	Aug-24	100%	1.00	12	480	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Exteriors	10	Apr-24	Sep-24	100%	1.00	10	400	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Mechancial, Electrical and Plumbing (Excl. AC Sub)	20	Apr-24	Jun-25	100%	1.00	20	800	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Architectural Fitout	20	May-24	Jul-25	100%	1.00	20	800	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
	Building A	Excavation & Foundations	15	Oct-25	Jan-26	100%	1.00	15	600	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Superstructure Construction	20	Feb-26	Mar-26	100%	1.00	20	800	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Exteriors	10	Mar-26	May-26	100%	1.00	10	400	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Mechancial, Electrical and Plumbing (Excl. AC Sub)	20	Mar-26	May-26	100%	1.00	20	800	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Architectural Fitout	20	Mar-26	May-26	100%	1.00	20	800	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
	Building B	Excavation & Foundations	15	Oct-25	Jan-26	100%	1.00	15	600	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Superstructure Construction	20	Feb-26	Mar-26	100%	1.00	20	800	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Exteriors	10	Mar-26	May-26	100%	1.00	10	400	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Mechancial, Electrical and Plumbing (Excl. AC Sub)	20	Mar-26	May-26	100%	1.00	20	800	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Architectural Fitout	20	Mar-26	May-26	100%	1.00	20	800	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
Tunnel		Temp. Utilities/Site Preparation/Temp. Structures	11	Oct-21	May-23	100%	1.00	11	440	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Support of Excavation/Jetgrouting	25	Jan-22	Jul-23	100%	1.00	25	1,000	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Soil & Rock Excavation	10	Mar-22	Nov-23	100%	1.00	10	400	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Concrete	30	Jun-22	Jan-24	100%	1.00	30	1,200	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Waterproofing & Roof Protection Stab	15	May-22	Mar-24	100%	1.00	15	600	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		Backfill/Final Utilities	20	Jul-22	Jul-24	100%	1.00	20	800	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5
		High Line Underpinning	10	Sep-22	Apr-23	100%	1.00	10	400	0.0146	0.0714	0.1265	0.0635	1.5312	0.0059	343.5