

# **APPENDIX E: Climate Change Supporting Documentation**

# Stationary Source Analysis

# **PRYSMIAN BRAYTON POINT SOMERSET, MA**

## **STATIONARY ASSET MEPA ENERGY ANALYSIS**



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## Executive Summary

This report contains the energy use assessment to support the MEPA requirements for stationary sources for a cable manufacturing plant located in Somerset, MA. In addition to manufacturing space, the project also includes several other support buildings for an approximate total of 799,105 SF. Prysmian Power Cables USA, LLC (the Proponent) are the project owners. This report provides details of the building energy analysis for all of the proposed buildings within the project scope.

The following summarizes the proposed development programs for the Project as currently contemplated:

1. Manufacturing– Approximately 601,560 SF manufacturing and testing space
2. Office– Approximately 31,237 SF of Office and employee support space
3. Warehouse – Approximately 166,308 SF raw material warehouse & finished storage space

The proponent is committed to demonstrating carbon emissions reductions through incorporating energy efficiency measures into the project's design. A Basis of Design and an 'Energy Efficient' design alternative has been analyzed to show energy consumption and savings against the baseline case. Results are summarized in Table 1 below.

**Table 1: Energy and Greenhouse Gas Savings**

	Energy Consumption (MMBtu/yr)				CO2 Emissions (tons/yr)				
	Base Case	Basis of Design	Heat Pump Alternate	Percent Savings	Base Case	Basis of Design	Heat Pump Alternate	BoD % Savings	HP Alt % Savings
Manufacturing & Workshops	164,182	163,865	162,209	0.2%	15,831	15,801	15,641	0.2%	1.2%
Offices & Employee Support	2,360	911	892	61.4%	171	88	86	48.8%	49.9%
Warehouse & Storage	7,327	5,761	4,650	21.4%	580	555	448	4.3%	22.7%
<b>Total</b>	<b>173,868</b>	<b>170,537</b>	<b>167,751</b>	<b>1.9%</b>	<b>16,583</b>	<b>16,444</b>	<b>16,175</b>	<b>0.8%</b>	<b>2.5%</b>

## 1. Energy Conservation Measures

The project incorporates multiple energy conservation measures (ECMs). The following measures are included in the basis of design:

- Improved building envelope: walls, roof and fenestration
- Low window-to-wall ratio
- Reduced interior lighting power density
- High efficiency DOAS with heat recovery for office/employee ventilation
- High efficiency VRF System for office/employee space conditioning
- No mechanical cooling and lower heating setpoints in manufacturing & storage program types
- High efficiency service water heaters

The basis of design has also been compared against a heat pump- alternative summarized in this report and referred to as 'Energy Efficient Alternative'. This design assumes all spaces are conditioned by air-source heat pumps instead of Electric Resistance and carries a lighting power density that is 20% lower than the LPDs found in MA amended IECC Tables C405.3.2(1)(2).

## **2. Modeling Methodology**

The energy analysis was conducted using eQUEST v3.65. eQUEST uses the DOE2.3 simulation engine to estimate annual energy consumption by simulating a year of building operations based on a typical weather year and user inputs.

It is important to keep in mind the limitations of energy models when reviewing this information. Energy consumption is highly dependent on weather conditions, equipment operations & maintenance and the actual operating schedule of the building. The numbers generated will not necessarily be an accurate projection of actual energy costs but can serve as an accurate comparison between alternatives.

The prescribed methodology for the MEPA stationary asset analysis requires comparing a Baseline building model that conforms to the minimum Code requirements as defined by ASHRAE 90.1-2016 with Massachusetts amendments to the proposed design following Appendix G modeling protocols. The purpose of this energy modeling exercise is to compare energy end-use estimated for the design against the ASHRAE Baseline and prioritize energy conservation measures.

## **3. Energy Savings Analysis**

The analysis shows that the Basis of Design is demonstrating a 1.9% reduction in energy consumption from the baseline scenario and 0.8% reductions in CO<sub>2</sub> emissions. The Energy Efficient Alternative is demonstrating a 3.5% reduction in energy consumption from the baseline and a 2.5% reduction in CO<sub>2</sub> emissions. See Table 1 in the Executive Summary for detailed energy use for each program type.

## **4. Description**

The approximate 800,000 SF campus consists of seven separate buildings which have been aggregated into three (3) Program Space types for purposes of this analysis. Inputs and results reported in the analysis are organized around the three major program types, manufacturing, warehouse and office. It is anticipated that the warehouse and storage spaces will have a similar HVAC design to the manufacturing and workshop spaces but without the intense manufacturing process loads.

The systems serving the manufacturing and warehouse space types are being sized for a heating setpoint of 65F with no anticipated mechanical cooling. Office will be fully conditioned with space heating setpoint of 72F and cooling setpoint of 70F. Ventilation shall be in accordance with IMC 2015 and ASHRAE 62.1 2016 requirements. It is anticipated that the manufacturing and warehouse spaces will be in constant use every day of the year while the office and employee spaces will be closed weekends and holidays.

## 4.1 Building Envelope:

The design includes an envelope that will exceed the minimum requirements of ASHRAE 90.1-2016 Table 5.5-5 and also meets the insulation requirements of Section C406.8: Enhanced Envelope Performance. Low-e glazing that exceeds Baseline requirements is proposed for all fenestrations. The wall to window ratio (WWR) is limited well below the ASHRAE allowance.

Envelope details can be found on the Table of Inputs provide at the end of this report. A summary of the envelope performance is provided in Table 2 Below.

**Table 2: Weighted UA by Program Type**

	ASHRAE 90.1-2013 (Table 5.5-5 and Appendix G fenestration limits)		IECC 2018 (30% Fixed WWR)		Proposed	
<b>Manufacturing</b>						
	% Vert Area	U Value	% Vert Area	U Value	% Vert Area	U Value
Fenestration	2%	0.420	30%	0.380	2%	0.250
Walls, Above Grade	98%	0.055	70%	0.064	98%	0.023
Roof	n/a	0.032	n/a	0.032	n/a	0.025
Aggregate vertical assembly U		0.062		0.159		0.028
Aggregate total assembly U		0.041		0.071		0.026
<b>Warehouse</b>						
Fenestration	6%	0.420	30%	0.380	2%	0.250
Walls, Above Grade	94%	0.055	70%	0.064	98%	0.023
Roof	n/a	0.032	n/a	0.032	n/a	0.025
Aggregate vertical assembly U		0.077		0.159		0.028
Aggregate total assembly U		0.048		0.077		0.026
<b>Office</b>						
Fenestration	31%	0.420	30%	0.380	29%	0.250
Walls, Above Grade	69%	0.055	70%	0.064	71%	0.023
Roof	n/a	0.032	n/a	0.032	n/a	0.025
Aggregate vertical assembly U		0.168		0.159		0.089
Aggregate total assembly U		0.125		0.119		0.069

## 4.2 Internal and Process Loads:

An anticipated process load of 7.87 W/sf within the Manufacturing and workshop space has been derived using load data provided by the Proponent from an existing cable manufacturing facility located in Pikkala, Finland. TGE is using the provided total annual energy consumption data provided and the current project's manufacturing and workshop floor area gross floor area of the current project's manufacturing and workshop spaces. As a result of such a high internal process load and the lack of mechanical cooling, the manufacturing and workshop spaces do not experience any heating demand throughout the entire year.

Nominal process loads are assumed for the office and warehouse program types based on previous TGE projects. See the input tables in section 5 for specific equipment power densities by program type.

The MEP is proposing lighting power densities (LPD) that are in accordance with the Additional Efficiency Package - C406.3: Reduced Lighting Power found in IECC 2018 by specifying LPDs that are 10% lower than the values found in MA amended Tables C405.3.2.(1)(2). The energy efficient alternative assumes a 20% reduction from the LPDs listed in the MA amended tables. See the input tables in section 5 for specific LPD Inputs by program type.

## 4.3 HVAC Basis of Design:

**Manufacturing/Workshop:** The manufacturing and testing workshops will be heated to 65F using Air Rotation Units (ARU) each sized to 30,000 CFM. There is no mechanical cooling anticipated within the manufacturing or test workshops, but fans inside may operate without heating coil to promote air movement within the spaces. The Basis of Design for the ARUs is similar to 'Arizon' and equipped with an outside air economizer similar to 'Powmatic', which includes a 150-kW electric resistance heating coil.

**Office/Employee:** The office and employee support spaces will be conditioned using air-cooled condensing units providing 450 MBH heating/cooling to constant volume indoor terminal units via Variable Refrigerant Flow (VRF) System. Ventilation is provided via two (2) Dedicated Outdoor Air Systems (DOAS) on the roof of each building. DOAS units provide approximately 172 MBH of cooling.

**Warehouse/Storage:** The warehouse and storage spaces utilize the same ARU design as the Manufacturing and workshop spaces.

## 4.4 HVAC Alternative:

An all-heat pump alternative referred to as the 'Energy Efficient Alternative' was also compared to the Baseline and the Basis of Design to assess the alternative's greenhouse gas reduction impact. The feasibility of this design alternative is still being investigated by the design team. The following HVAC parameters were changed in the alternate.

**Manufacturing & Storage:** The manufacturing and warehouse program types provide heating via packaged rooftop heat pump units manufactured by Trane. The units can operate in heat pump mode down to 6°F. Electric resistance back-up heat is used during temperatures below 6°F.

## 4.5 Modeled Baseline:

The baseline for this analysis is following the Performance Rating Method as outlined in Appendix G of ASHRAE 90.1-2013 while using the minimum requirements found in ASHRAE 90.1-2016. The Baseline also incorporates (3) Additional Efficiency Packages from IECC Section C406 as amended by the Massachusetts Building Code into both the baseline and the proposed cases. At this time, the three C406 Packages are anticipated to be:



1. C406.2 HVAC Performance: Equipment shall exceed minimum efficiency requirements by 10%
2. C406.3 Reduced Lighting Power Density: Connected lighting power shall be less than 90% of the total allowable lighting power using the LPD values listed in MA amended Tables C405.3.2(1)(2)
3. C406.8 Enhanced Envelope Performance: Total UA of building thermal envelope shall be not less than 15% below the Total UA in accordance with Section C402.1.5

## 5. Modeling Inputs

**Table 3: Table of Inputs by Program Type**

Building Component	Baseline 90.1-2016 (prescriptive) + C406 Additional Efficiency Packages	Basis of Design	High Performance Alternative
Program Type	Manufacturing		
Floor Area	575,586 SF		
Program Type	Workshops		
Floor Area	25,974 SF		
Hours of Operation	Continuous, 24/7/365		
Temperature setpoints	Constant Occupied Heating Setpoint: 65°F No Mechanical Cooling		
<b>Building Exterior Envelope (Construction Assemblies)</b>			
Roofs, <i>Insulation entirely above deck</i>	R-30.0 ci; U-0.032 C406.8 Modeled U-0.027	R-40.0 ci; U-0.025	Identical to Basis of Design
Walls, above grade, <i>Steel-framed</i>	R-13 + R-10ci, U-0.055 C406.8 Modeled U-0.046	R-43.7ci, U-0.023	
Slab-on-Grade Floors <i>Unheated</i>	R-15 for 24in. F-0.52	R-15 for 24in. F-0.52	
Window-to-Wall Ratio ( <i>WWR</i> )	Identical to Basis of Design	2% (LS3P Assumption)	
Vertical Fenestration <i>Metal framing, fixed</i>	U-0.38 C406.8 Modeled U-0.32	U-0.25	
Solar Heat Gain Coefficient ( <i>SHGC</i> )	0.38	0.37	
Visible Transmittance ( <i>VLT</i> )	41.8% ( <i>1.10 VLT/SHGC</i> )	69%	
Infiltration ( <i>AC/H</i> )	0.225	0.225	
<b>HVAC Systems and Controls</b>			
Primary HVAC System	System 9: Heating & Ventilation	Air Rotation Units w/ electric resistance heating coil	20T Packaged Rooftop Heat Pump Units
Fan Control	Constant Volume	Constant Volume, Make Up Air Economizer	Constant Volume, OA Damper
Air-side Cooling	none	none	none
Air-side Heating	Fossil Fuel Furnace, C406.2 Modeled 88% eff	Electric Resistance (150 kW/ea)	Elec Heat Pump: COP 2.84
Energy Recovery	n/a	n/a	n/a
Fan Power	0.300 (W/sf)	0.277 W/cfm (10hp/30,000 CFM/ea)	0.372 W/cfm (5hp/8,000/ea)
Supply CFM	Identical to Basis of Design	Manufacturing: 300,000 CFM Workshops: 5,575 CFM	Identical to Basis of Design
Heating Capacity	<i>auto-sized based on load</i> Manufacturing: 17,122 MBH Workshops: 360 MBH	Manufacturing: 14,000 MBH Workshop: 285 MBH	Manufacturing: 4,884 MBH Workshops 270 MBH
Ventilation	Identical to Basis of Design	Manufacturing 16,000 CFM Workshop 270 CFM	Identical to Basis of Design
Domestic Hot Water	Electric Resistance <12kW & >20 gal (EF=0.96)	20 Gal; 3.5 kW, 12 GPH @ 100° Rise	Identical to Basis of Design
<b>Interior Loads</b>			

<b>Lighting LPD (W/SF)</b>			
Manufacturing	1.42 w/sf C406.3 Modeled 1.28 W/sf	<1.28 (10% Reduction)	<1.14 (20% Reduction)
Building Type 'extra-high-bay (>50' floor to ceiling) from MA Table C405.3.3(2) chosen due to foot candle requirements			
Equipment EPD (W/SF)	Identical to Basis of Design	7.87 W/sf <sup>2</sup>	Identical to Basis of Design
<sup>2</sup> (Process load derived from 2021 load data from Prysmian's Manufacturing plant in Pikkala, Finland 2021 load data provided by Prysmian)			
<b>On-Site Renewables (Roof PV)</b>			
Estimated Total annual PV (kWh)	3,083,200 kWh		
Estimated % Total Roof 'Solar Ready'	50% Usable Roof Area		

Building Component	Baseline 90.1-2016 (prescriptive) + C406 Additional Efficiency Packages	Basis of Design	High Performance Alternative
Program Type	Offices		
Floor Area	22,931		
Program Type	Employee Building		
Floor Area	8,306		
Hours of Operation	Mon-Sat: 9am-5pm, Closed Sun & Holidays		
Temperature setpoints	Heating: Occupied 70°F/Unoccupied 64 °F Cooling: Occupied 76°F/Unoccupied 82°F		
<b>Building Exterior Envelope (Construction Assemblies)</b>			
Roofs, <i>Insulation entirely above deck</i>	R-30.0 ci; U-0.032 C406.8 Modeled U-0.027	R-40.0 ci; U-0.025	Identical to Basis of Design
Walls, above grade <i>Steel-framed</i>	R-13 + R-10ci, U-0.055 C406.8 Modeled U-0.050	R-43.7ci, U-0.023 5" insulated wall panel (R-8.74/in)	
Window -to-Wall Ratio (WWR)	Identical to Basis of Design	Office: 29%; Employee: 8.5% (LS3P Assumptions)	
Vertical Fenestration <i>Metal frm, fixed</i>	U-0.38 C406.8 Modeled U-0.32	U-0.25	
Solar Heat Gain Coefficient (SHGC)	0.38	0.37	
Visible Transmittance (VLT)	41.8% (1.10 VLT/SHGC)	69%	
Infiltration (cfm/ft <sup>2</sup> )	0.225	0.225	
<b>HVAC Systems and Controls</b>			
Primary HVAC System	System 3: Packaged Single Zone - AC	VRF Indoor Units, ventilation provided by DOAS w/ Heat Recovery	Identical to Basis of Design
Fan Control	Constant Volume	DOAS: Variable Speed; VRF: Constant Volume	
Air-side Cooling	DX SEER - 13 (<65K Btu/h) C406.2 Modeled EER - 12.5	DOAS: EER-12.5 / SEER 15.6 VRF CU EER-11.7	
Air-side Heating	Fossil Fuel Furnace, 82% eff C406.2 Modeled eff 88%	DOAS: COP <sub>47</sub> - 3.66 VRF: COP <sub>47</sub> - 3.5	
Energy Recovery	Office: n/a per OA req't Employee: 50% Total Enthalpy	DOAS: 54.7% Total Enthalpy	
Fan Power	Office: 0.94 W/cfm Employee: 1.02 W/cfm	DOAS: 0.937 W/cfm VRF Terminals 0.261 W/cfm	
Supply CFM	<i>auto-sized Based on Load</i> Office: 24,500 CFM Employee: 8,000 CFM	Office: 16,000 CFM Employee 30,000 CFM	
Cooling Capacity	<i>auto-sized based on load</i> Office: 980.1 MBH Employee: 243.0 MBH	DOAS (office): 136.4 MBH (Employee) 36.4 MBH VRF 450 MBH	

Heating Capacity	<i>auto-sized based on load</i> Office: 1175 MBH Employee: 417.2 MBH	DOAS (office): 60 MBH (Employee) 20.5 MBH VRF 450 MBH	
Ventilation	Identical to Basis of Design	Offices: 1,000 CFM Employee: 1,200 CFM	
Domestic Hot Water	Electric Resistance <12kW & >20 gal (EF=0.96)	20 Gal; 3.5 kW, 12 GPH @ 100° Rise	
<b>Interior Loads</b>			
Lighting LPD (W/SF) <i>Office, (Open Plan)</i>	0.64 w/sf ( <i>MA Table C405.3.3(2)</i> ) C406.3 Modeled 0.58 W/sf	<0.58 W/sf ( <i>10% Reduction</i> )	0.51 W/sf ( <i>20% Reduction</i> )
Equipment EPD (W/SF)	Identical to Basis of Design	0.5 W/sf ( <i>TGE Assumption</i> ) <sup>1</sup>	Identical to Basis of Design
<sup>1</sup> (Office EPD assumed from previous office analysis)			

Building Component	Baseline 90.1-2016 (prescriptive) + C406 Additional Efficiency Packages	Basis of Design	Energy Efficient Alternative
Program Type	Raw Warehouse		
Floor Area	42,070 SF		
Program Type	Finished Storage		
Floor Area	124,238 SF		
Hours of Operation	Continuous, 24/7		
Temperature setpoints	Constant Occupied Heating Setpoint: 65°F No Mechanical Cooling		
<b>Building Exterior Envelope (Construction Assemblies)</b>			
Roofs, <i>Insulation entirely above deck</i>	R-30.0 ci; U-0.032 C406.8 Modeled U-0.027	R-40.0 ci; U-0.025	Identical to Basis of Design
Walls, above grade <i>Steel-framed</i>	R-13 + R-10ci, U-0.055 C406.8 Modeled U-0.050	R-43.7ci, U-0.023 5" insulated wall panel (R-8.74/in)	
Window -to-Wall Ratio <i>(WWR)</i>	Identical to Basis of Design (up to <30% maximum)	2% (LS3P Assumption)	
Vertical Fenestration <i>Metal framing, fixed</i>	U-0.38 C406.8 Modeled U-0.34	U-0.25	
Solar Heat Gain Coefficient <i>(SHGC)</i>	0.38	0.37	
Visible Transmittance <i>(VLT)</i>	41.8% (1.10 VLT/SHGC)	69%	
Infiltration <i>(cfm/ft<sup>2</sup>)</i>	0.225	0.225	
<b>HVAC Systems and Controls</b>			
Primary HVAC System	System 9: Heating & Ventilation	Air Rotation Units w/ electric resistance heating coil	Packaged Rooftop Heat Pump Units
Fan Control	Constant Volume	Constant Volume, Make Up Air Economizer	Constant Volume OA Damper
Air-side Cooling	none	none	none
Air-side Heating	Fossil Fuel Furnace C406.2 Modeled 82% eff	Electric Resistance (150 kW/ea)	Elec Heat Pump: COP 2.84
Energy Recovery	n/a	n/a	n/a
Fan Power	0.3 W/cfm	0.277 W/cfm	0.372 W/cfm (5hp/8,000 CFM/ea)
Supply CFM	Identical to Basis of Design	Raw Warehouse: 21,000 CFM Finished Storage: 35,000 CFM	Identical to Basis of Design
Heating Capacity	<i>auto-sized based on load</i> Warehouse: 1313.8 MBH Finished Storage: 2000.3 MBH	Raw Warehouse: 370.216 MBH Finished Storage: 1093.3 MBH	Warehouse: 358.3 MBH Storage: 597.1 MBH
Ventilation	Identical to Basis of Design	Raw Warehouse: 2,250 CFM Finished Storage: 3,150 CFM	Identical to Basis of Design
Domestic Hot Water	Electric Resistance < 12kW & > 20 gal	20 Gal; 3.5 kW, 12 GPH @ 100° Rise	Identical to Basis of Design
<b>Interior Loads</b>			
Lighting LPD (W/SF) (MA Table C405.3.3(1))	Warehouse: 0.45 w/sf C406.3 Modeled 0.41 W/sf Storage: 0.51 w/sf C406.3 Modeled 0.46 W/sf	Warehouse: <0.41 W/sf Finished Storage <0.46 W/sf (10% Reduction)	Raw Warehouse: 0.36 W/sf Finished Storage: 0.40 W/sf (20% Reduction)
Equipment EPD (W/SF)	Identical to Basis of Design	0.1 W/sf (TGE Assumption)	Identical to Basis of Design

**Table 4: Table of Outputs by Program Type:**

Manufacturing/Workshop Energy Consumption			
Modeled Area	601,589 SF		
Building Total Area	601,560 SF		
	Baseline	Basis of Design	Alternate HP
Natural Gas	(Therm)	(Therm)	(Therm)
Interior Lighting	-	-	-
Task Lights	-	-	-
Process Energy	-	-	-
Space Heating	-	-	-
Space Cooling	-	-	-
Heat Rejection	-	-	-
Pumps	-	-	-
Fans	-	-	-
Refrigeration	-	-	-
Heat Pump Auxilliary	-	-	-
DHW	-	-	-
Exterior Lighting	-	-	-
<i>Baseline Onsite Renewables (C406.5)</i>	-	-	-
Sub-Total	-	-	-
Electricity	(kWh)		(kWh)
Interior Lighting	6,637,329	6,637,329	5,899,830
Task Lights	-	-	-
Process Energy	40,646,736	40,646,736	40,646,736
Space Heating	-	-	-
Space Cooling	-	-	-
Heat Rejection	-	-	-
Pumps	-	-	-
Fans	837,136	744,352	996,608
Refrigeration	-	-	-
Heat Pump Auxilliary	-	-	-
DHW	-	-	-
Exterior Lighting	-	-	-
Sub-Total	48,121,201	48,028,417	47,543,174

Office/Employee Energy Consumption			
Modeled Area	31,822 SF		
Building Total Area	31,237 SF		
	Baseline	Basis of Design	Alternate HP
Natural Gas	(Therm)	(Therm)	(Therm)
Interior Lighting	-	-	-
Task Lights	-	-	-
Process Energy	-	-	-
Space Heating	15,064	-	-
Space Cooling	-	-	-
Heat Rejection	-	-	-
Pumps	-	-	-
Fans	-	-	-
Refrigeration	-	-	-
Heat Pump Auxilliary	-	-	-
DHW	-	-	-
Exterior Lighting	-	-	-
Sub-Total	15,064	-	-
Electricity	(kWh)		(kWh)
Interior Lighting	52,376	52,376	46,134
Task Lights	-	-	-
Process Energy	53,277	53,277	53,277
Space Heating	-	84,314	84,884
Space Cooling	25,510	14,666	14,363
Heat Rejection	-	-	-
Pumps	-	795	789
Fans	107,897	42,626	42,679
Refrigeration	-	-	-
Heat Pump Auxilliary	-	9	9
DHW	24,062	24,062	24,062
Exterior Lighting	-	-	-
Sub-Total	263,122	272,125	266,197

Warehouse/Storage Energy Consumption			
Modeled Area	166,354 SF		
Building Total Area	166,308 SF		
	Baseline	Basis of Design	Alternate HP
Natural Gas	(Therm)	(Therm)	(Therm)
Interior Lighting	-	-	-
Task Lights	-	-	-
Process Energy	-	-	-
Space Heating	33,294	-	-
Space Cooling	-	-	-
Heat Rejection	-	-	-
Pumps	-	-	-
Fans	-	-	-
Refrigeration	-	-	-
Heat Pump Auxilliary	-	-	-
DHW	-	-	-
Exterior Lighting	-	-	-
Sub-Total	33,294	-	-
Electricity	(kWh)		(kWh)
Interior Lighting	672,107	672,107	588,808
Task Lights	-	-	-
Process Energy	142,818	142,818	142,818
Space Heating	-	737,516	272,517
Space Cooling	-	-	-
Heat Rejection	-	-	-
Pumps	-	-	-
Fans	357,176	136,411	182,641
Refrigeration	-	-	-
Heat Pump Auxilliary	-	-	176,425
DHW	-	-	-
Exterior Lighting	-	-	-
Sub-Total	1,172,101	1,688,852	1,363,209

**Table 5: Simulation Results – Energy consumption by Fuel Source and Program Type**

Warehouse/Storage	Units	Baseline	Basis of Design	Alternate HP
Natural Gas	Therm	33,285	-	-
Electricity	kWh	1,171,777	1,688,385	1,362,832
Office/Employee	Units			
Natural Gas	Therm	14,787	-	-
Electricity	kWh	258,285	267,122	261,303
Energy Source	Units			
Natural Gas	Therm	-	-	-

Electricity	kWh	48,118,881	48,026,102	47,540,882
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## 6. Efficiency Incentives Analysis

The following available incentives can provide reduction in investment costs for the Electric Heating Alternatives analyzed for the project. As the design progresses, the design and development team will continue to review available incentives and grants for various clean energy technologies to determine the most appropriate HVAC system for the development.

- I. **MassSave Incentives:** As the design progresses the development team will meet with representatives from the utilities to review the MassSave Incentives Program and determine a good approach for this development.
- II. **DOER AECs:** ASHPs that meet the eligibility requirements determined by the Department of Energy Resources (DOER) can become qualified to receive AECs based in the alternative energy the system generates.



- END OF REPORT -

# Prysmian Brayton Point

Prototype Model Summary with MEPA GHG Emission Factors

## Prototype Model Results

			Manufacturing/Lab	Office/Employee Space	Warehouse/Storage
Energy Usage	Base Case	Electricity (MWh)	48,121	263	1,172
		Natural Gas (MMBtu)	0	1,506	3,329
		Total (MMBtu)	164,190	2,404	7,329
	Design Case	Electricity (MWh)	48,028	272	1,689
		Natural Gas (MMBtu)	0	0	0
		Total (MMBtu)	163,873	928	5,762
		Savings from Base	<b>0.2%</b>	<b>61.4%</b>	<b>21.4%</b>
	Heat Pump Alternative	Electricity (MWh)	47,543	266	1,363
		Natural Gas (MMBtu)	0	0	0
		Total (MMBtu)	162,217	908	4,651
		Savings from Base	<b>1.2%</b>	<b>62.2%</b>	<b>36.5%</b>
	GHG Emissions	Base Case	Electricity (tpy)	15,736	86
Natural Gas (tpy)			0	88	195
Total (tpy)			15,736	174	578
Design Case		Electricity (tpy)	15,705	89	552
		Natural Gas (tpy)	0	0	0
		Total (tpy)	15,705	89	552
		Savings from Base	<b>0.2%</b>	<b>48.9%</b>	<b>4.5%</b>
Heat Pump Alternative		Electricity (tpy)	15,547	87	446
		Natural Gas (tpy)	0	0	0
		Total (tpy)	15,547	87	446
		Savings from Base	<b>1.2%</b>	<b>50.0%</b>	<b>22.9%</b>

### Conversion Factors

kBtu to kWh	0.2931	US EIA 2020 ISO New England
lbs to tons	0.0005	
Natural Gas: MMBtu to lbs	117	
Electricity: MWh to lbs	654	



# Mobile Source Analysis

**Prysmian - Brayton Point  
Mesoscale Analysis**

	2022	2029	2029	2029	2029	2029
	Existing	No-Build	Build	Mitigation- Roadway Improvements	Mitigation- TDM Reduction	Build Mitigation
<b>OXIDES OF NITROGEN (NOx)</b>						
Emissions (kg/d)	8.9	4.5	4.9	4.6		4.6
Project Contribution (kg/d)			0.36	-0.27	-0.01	0.08
					-0.28	
<b>VOLATILE ORGANIC COMPOUNDS (VOC)</b>						
Emissions (kg/d)	19.4	13.9	14.4	14.2		14.1
Project Contribution (kg/d)			0.50	-0.27	-0.01	0.22
					-0.28	
<b>GREENHOUSE GAS (CO<sub>2</sub>)</b>						
Emissions (short tons per year)	5,362	5,124	5,524	5,213		5,205
Project Contribution (short tons per year)			400	-311	-8	81
Project Contribution (short tons per year)					-319	

**Prysmian - Brayton Point  
Build With Mitigation**

Link No.	Description	Roadway		Emission Factor (g/mi)	Seasonally Adjusted ADT (veh/day)	VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Peak Period Factor	Period Volume (vehicles)	Peak Traffic Data		Off-Peak Traffic Data		Link Emissions			
		Link Length (miles)	Speed (mph)							Average Delay (sec)	Adjusted Delay (veh-sec)	Average Delay (sec)	Adjusted Delay (veh-sec)	NO <sub>x</sub> (grams)	VOC (grams)		
1	Brayton Point Road S of Access/O'Neill	30	0.31	0.15	1,229	199	183	0.52	640	0	0	589	0	56	98		
2	Access Rd	30	0.19	0.15	0	0	0	0.52	0	5	0	0	4	0	0		
3	O'Neill Rd	30	0.15	0.14	1,131	88	81	0.52	589	0	0	0	0	24	76		
4	Brayton Point Road, Access/O'Neill to Wilbur Ave/Rte 10	30	0.52	0.15	3,147	853	784	0.52	1,640	21	33,858	1,508	19	252	304		
5	Wilbur Ave/Rte 103, E of Brayton Point Road	40	0.18	0.11	8,409	789	725	0.52	4,381	4	15,333	4,028	3	167	559		
6	Brayton Point Road, N of Wilbur Ave/Rte 103	30	0.21	0.13	8,802	963	885	0.52	4,586	17	79,334	4,217	16	238	628		
7	Wilbur Ave/Rte 103, Brayton Point Rd to I-195 WB Ramp	40	0.21	0.19	15,638	1,711	1,573	0.52	8,147	8	67,619	7,491	7	629	1,120		
8	I-195 WB Offramp to Wilbur Ave EB	25	0.22	0.16	3,196	366	337	0.52	1,665	20	33,971	1,531	18	115	241		
9	I-195 WB Onramp from Wilbur Ave EB	35	0.23	0.09	246	29	27	0.52	128	0	0	118	0	5	17		
10	Wilbur Ave/Rte 103, Ramps to Ramp	40	0.11	0.12	12,835	736	676	0.52	6,687	0	0	6,148	0	170	804		
11	I-195 WB Offramp to Wilbur Ave WB	25	0.29	0.15	5,311	802	738	0.52	2,767	413	1,142,432	2,544	372	235	429		
12	Wilbur Ave/Rte 103, I-195 WB Offramp to I-195 EB Onramp	40	0.11	0.13	18,244	1,046	961	0.52	9,505	0	0	8,739	0	263	1,147		
13	I-195 EB Onramp from Rte 103 EB	35	0.22	0.10	5,114	586	539	0.52	2,664	0	0	2,450	0	108	355		
14	Wilbur Ave/Rte 103, I-195 EB Onramp to Home St/Park E	40	0.06	0.14	23,211	726	667	0.52	12,092	0	3,023	11,118	0	197	1,390		
15	Home St	30	0.05	0.14	688	18	16	0.52	359	232	83,354	330	209	5	41		
16	Park & Ride Lot Entrance	30	0.05	0.13	639	17	15	0.52	333	349	116,383	306	315	4	38		
17	Wilbur Ave/Rte 103, Home/P&R to I-195 EB Onramp	40	0.04	0.16	23,063	481	442	0.52	12,015	1	15,620	11,048	1	148	1,356		
18	I-195 EB Onramp from Rte 103 WB	35	0.18	0.10	2,950	277	254	0.52	1,537	0	0	1,413	0	54	198		
19	Wilbur Ave/Rte 123, WB onramp to I-195 EB to Lees River	40	0.04	0.15	20,113	419	385	0.52	10,478	9	95,351	9,634	8	121	1,181		
20	Shell Station Drive	30	0.02	0.13	0	0	0	0.52	0	0	0	0	0	0	0		
21	Wilbur Ave/Rte 103, W of Lees River Ave	40	0.09	0.18	16,424	770	708	0.52	8,557	11	96,263	7,868	10	259	1,025		
22	Lees River Ave, Rte 103 to I-195 EB Offramp	30	0.06	0.18	7,671	240	220	0.52	3,997	17	65,943	3,675	15	81	468		
23	I-195 EB Offramp to Lees River Ave	25	0.18	0.14	4,180	392	360	0.52	2,178	40	86,451	2,002	36	105	297		
24	Lees River Ave, EB Offramp to WB Onramp	30	0.12	0.16	7,819	489	449	0.52	4,073	0	0	3,745	0	147	512		
25	I-195 WB Onramp from Lees River Ave	35	0.19	0.08	3,590	355	327	0.52	1,870	0	0	1,720	0	55	241		
26	Lees River Ave, N of I-195 WB Onramp	30	0.07	0.14	8,311	303	279	0.52	4,330	0	0	3,981	0	82	510		
										Arterial		1,934,936		3.5		13.0	
										Arterial		8,864,757.94		Daily Total (kg)		NO <sub>x</sub> VOC	
										Arterial		1,934,936		1,601,210			
										Arterial		8,864,757.94					

VMT (per day) 12,653 11,634  
VMT (per year) 4,618,328 4,246,430.0

VMT Total (per year)		8,864,757.94
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	EF (g/s)	NOx Idle (g/day)	Idle (kg/day)	EF (g/s)	VOC Idle (g/day)	Idle (kg/day)
Arterial	0.0003	607	0.61	0.0003	615	0.61
Peak Period	0.0003	502	0.50	0.0003	509	0.51
Off-Peak Period	0.0003	502	0.50	0.0003	509	0.51
Total (Including Link)		4.63			14.16	

**Prysman - Brayton Point**

**Build**

Link No.	Description	Roadway		Emission Factor (g/mi)	Seasonally Adjusted ADT (veh/day)	VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Peak Period Factor	Period Volume (vehicles)	Peak Traffic Data		Off-Peak Traffic Data		Link Emissions		
		Link Length (miles)	Speed (mi/hr)							AADT (veh/day)	Average Delay (sec)	Adjusted Delay (veh-sec)	Period Volume (vehicles)	Average Delay (sec)	Adjusted Delay (veh-sec)	NO <sub>x</sub> (grams)
1	Brayton Point Road S of Access/O'Neill	30	0.31	0.15	1,229	199	183	0.52	640	0	0	589	0	0	56	98
2	Access Rd	30	0.19	0.15	0	0	0	0.52	0	5	0	0	4	0	0	0
3	O'Neill Rd	30	0.15	0.14	1,131	88	81	0.52	589	0	0	0	0	0	24	76
4	Brayton Point Road, Access/O'Neill to Wilbur Ave/Rte 10	30	0.52	0.15	3,147	853	784	0.52	1,640	9	14,757	1,508	8	12,211	252	304
5	Wilbur Ave/Rte 103, E of Brayton Point Road	40	0.18	0.11	8,409	789	725	0.52	4,381	7	28,475	4,028	6	23,564	167	559
6	Brayton Point Road, N of Wilbur Ave/Rte 103	30	0.21	0.13	8,802	963	885	0.52	4,586	9	39,896	4,217	8	33,015	238	628
7	Wilbur Ave/Rte 103, Brayton Point Rd to I-195 WB Ramp	40	0.21	0.19	15,638	1,711	1,573	0.52	8,147	72	583,721	7,491	64	483,044	629	1,120
8	I-195 WB Offramp to Wilbur Ave EB	25	0.22	0.16	3,196	366	337	0.52	1,665	20	33,971	1,531	18	28,112	115	241
9	I-195 WB Onramp from Wilbur Ave EB	35	0.23	0.09	246	29	27	0.52	128	0	0	118	0	0	5	17
10	Wilbur Ave/Rte 103, Ramps to Ramp	40	0.11	0.12	12,835	736	676	0.52	6,687	0	0	6,148	0	0	170	804
11	I-195 WB Offramp to Wilbur Ave WB	25	0.29	0.15	5,311	802	738	0.52	2,767	413	1,142,432	2,544	372	945,392	235	429
12	Wilbur Ave/Rte 103, I-195 WB Offramp to I-195 EB Onramp	40	0.11	0.13	18,244	1,046	961	0.52	9,505	0	0	8,739	0	0	263	1,147
13	I-195 EB Onramp from Rte 103 EB	35	0.22	0.10	5,114	586	539	0.52	2,664	0	0	2,450	0	0	108	355
14	Wilbur Ave/Rte 103, I-195 EB Onramp to Home St/Park E	40	0.06	0.14	23,211	726	667	0.52	12,092	0	3,023	11,118	0	2,502	197	1,390
15	Home St	30	0.05	0.14	688	18	16	0.52	359	232	83,354	330	209	68,978	5	41
16	Park & Ride Lot Entrance	30	0.05	0.13	639	17	15	0.52	333	349	116,383	306	315	96,310	4	38
17	Wilbur Ave/Rte 103, Home/P&R to I-195 EB Onramp	40	0.04	0.16	23,063	481	442	0.52	12,015	1	15,620	11,048	1	12,926	148	1,356
18	I-195 EB Onramp from Rte 103 WB	35	0.18	0.10	2,950	277	254	0.52	1,537	0	0	1,413	0	0	54	198
19	Wilbur Ave/Rte 123, WB onramp to I-195 EB to Lees River	40	0.04	0.15	20,113	419	385	0.52	10,478	9	95,351	9,634	8	78,906	121	1,181
20	Shell Station Drive	30	0.02	0.13	288	0	0	0.52	0	0	0	0	0	0	0	0
21	Wilbur Ave/Rte 103, W of Lees River Ave	40	0.09	0.18	16,424	770	708	0.52	8,557	11	97,975	7,868	10	81,077	259	1,025
22	Lees River Ave, Rte 103 to I-195 EB Offramp	30	0.06	0.18	7,671	240	220	0.52	3,997	16	64,544	3,675	15	53,412	81	468
23	I-195 EB Offramp to Lees River Ave	25	0.18	0.14	4,180	392	360	0.52	2,178	40	86,451	2,002	36	71,541	105	297
24	Lees River Ave, EB Offramp to WB Onramp	30	0.12	0.16	7,819	489	449	0.52	4,073	0	0	3,745	0	0	147	512
25	I-195 WB Onramp from Lees River Ave	35	0.19	0.08	3,590	355	327	0.52	1,870	0	0	1,720	0	0	55	241
26	Lees River Ave, N of I-195 WB Onramp	30	0.07	0.14	8,311	303	279	0.52	4,330	0	0	3,981	0	0	82	510

VMT (per day) 12,653 11,634

VMT (per year) 4,618,328 4,246,430.0

Arterial 2,405,953

1,990,989

3.5

Daily Total (kg)

NO<sub>x</sub>

VOC

VMT Total (per year) 8,864,757.94

	EF (g/s)	NOx Idle (g/day)	Idle (kg/day)	EF (g/s)	VOC Idle (g/day)	Idle (kg/day)
Arterial	0.0003	754	0.75	0.0003	764	0.76
Peak Period	0.0003	624	0.62	0.0003	632	0.63
Off-Peak Period	0.0003	624	0.62	0.0003	632	0.63
Total (Including Link)		4.90	4.90		14.43	14.43

**Prysman - Brayton Point**

**No Build**

Link No.	Description	Roadway		Emission Factor (g/mi)	Seasonally Adjusted ADT (veh/day)	VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Peak Period Factor	Period Volume (vehicles)	Peak Traffic Data		Off-Peak Traffic Data		Link Emissions			
		Link Length (miles)	Speed (mi/hr)							AADT (veh/day)	Average Delay (sec)	Adjusted Delay (veh-sec)	Period Volume (vehicles)	Average Delay (sec)	Adjusted Delay (veh-sec)	NO <sub>x</sub> (grams)	VOC (grams)
1	Brayton Point Road S of Access/O'Neill	30	0.31	0.15	197	32	29	0.52	102	0	0	0	94	0	0	9	16
2	Access Rd	30	0.19	0.15	0	0	0	0.52	0	5	0	0	4	0	0	0	0
3	O'Neill Rd	30	0.15	0.14	1,131	88	81	0.52	589	0	0	0	542	0	0	24	76
4	Brayton Point Road, Access/O'Neill to Wilbur Ave/Rte 10	30	0.52	0.15	2,115	573	527	0.52	1,102	9	9,749	8	1,013	8	8,068	169	204
5	Wilbur Ave/Rte 103, E of Brayton Point Road	40	0.18	0.11	8,114	761	700	0.52	4,227	6	26,420	6	3,887	6	21,863	161	540
6	Brayton Point Road, N of Wilbur Ave/Rte 103	30	0.21	0.13	8,704	952	876	0.52	4,535	9	40,358	8	4,169	8	33,397	236	621
7	Wilbur Ave/Rte 103, Brayton Point Rd to I-195 WB Ramp	40	0.21	0.19	14,998	1,641	1,509	0.52	7,814	65	508,287	59	7,185	59	420,621	603	1,075
8	I-195 WB Offramp to Wilbur Ave EB	25	0.22	0.16	3,098	355	326	0.52	1,614	19	30,827	17	1,484	17	25,510	112	233
9	I-195 WB Onramp from Wilbur Ave EB	35	0.23	0.09	295	35	33	0.52	154	0	0	0	141	0	0	6	21
10	Wilbur Ave/Rte 103, Ramps to Ramp	40	0.11	0.12	12,343	707	650	0.52	6,430	0	0	0	5,913	0	0	164	774
11	I-195 WB Offramp to Wilbur Ave WB	25	0.29	0.15	5,311	802	738	0.52	2,767	365	1,008,516	328	2,544	328	834,574	235	429
12	Wilbur Ave/Rte 103, I-195 WB Offramp to I-195 EB Onramp	40	0.11	0.13	17,703	1,015	933	0.52	9,223	0	0	0	8,480	0	0	255	1,113
13	I-195 EB Onramp from Rte 103 EB	35	0.22	0.10	5,114	586	539	0.52	2,664	0	0	0	2,450	0	0	108	355
14	Wilbur Ave/Rte 103, I-195 EB Onramp to Home St/Park E	40	0.06	0.14	22,719	710	653	0.52	11,836	0	2,959	0	10,883	0	2,449	192	1,361
15	Home St	30	0.05	0.14	688	18	16	0.52	359	199	71,428	179	330	179	59,109	5	41
16	Park & Ride Lot Entrance	30	0.05	0.13	1,19	17	15	0.52	333	312	103,844	281	8,480	281	85,934	4	38
17	Wilbur Ave/Rte 103, Home/P&R to I-195 EB Onramp	40	0.04	0.16	22,571	470	432	0.52	11,759	1	13,523	1	10,812	1	11,191	145	1,327
18	I-195 EB Onramp from Rte 103 WB	35	0.18	0.10	2,754	258	237	0.52	1,435	0	0	0	1,319	0	0	51	185
19	Wilbur Ave/Rte 123, WB onramp to I-195 EB to Lees River	40	0.04	0.15	1,47	19,817	413	0.52	10,324	9	89,306	8	9,493	8	73,903	120	1,163
20	Shell Station Drive	30	0.02	0.13	2,88	6	6	0.52	307	0	0	0	283	0	0	2	34
21	Wilbur Ave/Rte 103, W of Lees River Ave	40	0.09	0.18	16,424	770	708	0.52	8,557	10	87,279	9	7,868	9	72,225	259	1,025
22	Lees River Ave, Rte 103 to I-195 EB Offramp	30	0.06	0.18	7,524	235	216	0.52	3,920	16	62,715	14	3,604	14	51,898	79	459
23	I-195 EB Offramp to Lees River Ave	25	0.18	0.14	4,131	387	356	0.52	2,152	37	79,409	33	1,979	33	65,713	104	293
24	Lees River Ave, EB Offramp to WB Onramp	30	0.12	0.16	7,671	480	441	0.52	3,997	0	0	0	3,675	0	0	144	502
25	I-195 WB Onramp from Lees River Ave	35	0.19	0.08	3,491	346	318	0.52	1,819	0	0	0	1,672	0	0	53	234
26	Lees River Ave, N of I-195 WB Onramp	30	0.07	0.14	8,261	301	277	0.52	4,304	0	0	0	3,957	0	0	81	507
										Arterial		2,134,620		3.3		12.6	
										VMT (per day)		11,959		10,996		Daily Total (kg)	
										VMT (per year)		4,365,198		4,013,684.1		NO <sub>x</sub>	
										VMT Total (per year)		8,378,882.55		1,766,454		VOC	

VMT Total (per year)		8,378,882.55
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	EF (g/s)	NOx Idle (g/day)	EF (g/s)	VOC Idle (g/day)
Arterial	0.0003	669	0.0003	678
Peak Period	0.0003	554	0.0003	561
Off-Peak Period	0.0003	554	0.0003	561
Total (Including Link)	4.54	13.87	4.54	13.87



**Prysman - Brayton Point Existing**

Link No.	Description	Roadway Link Length (miles)	Emission Factor (g/mi)	Seasonally Adjusted ADT (veh/day)	VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Peak Period Factor	Peak Traffic Data			Off-Peak Traffic Data			Adjusted Delay (veh-sec)		Link Emissions			
								AAADT (veh/day)	Period Volume (vehicles)	Average Delay (sec)	Adjusted Delay (veh-sec)	Period Volume (vehicles)	Average Delay (sec)	Adjusted Delay (veh-sec)	NO <sub>x</sub> (grams)	VOC (grams)			
1	Brayton Point Road S of Access/O'Neill	30	0.33	98	16	15	0.52	51	0	0	47	0	0	0	10	12			
2	Access Rd	30	0.19	0	0	0	0.52	0	5	0	0	4	0	0	0	0			
3	O'Neill Rd	30	0.15	1,033	81	74	0.52	538	0	0	495	0	0	49	106				
4	Brayton Point Road, Access/O'Neill to Wilbur Ave/Rte 10	30	0.52	1,869	506	465	0.52	974	9	8,567	895	8	7,089	333	283				
5	Wilbur Ave/Rte 103, E of Brayton Point Road	40	0.18	7,671	719	661	0.52	3,997	6	23,580	3,675	5	19,513	342	771				
6	Brayton Point Road, N of Wilbur Ave/Rte 103	30	0.21	8,212	898	826	0.52	4,278	9	37,864	3,934	8	31,333	492	895				
7	Wilbur Ave/Rte 103, Brayton Point Rd to I-195 WB Ramp	40	0.21	14,359	1,571	1,444	0.52	7,481	48	356,831	6,878	43	295,287	1,325	1,573				
8	I-195 WB Offramp to Wilbur Ave EB	25	0.22	2,950	338	311	0.52	1,537	18	27,207	1,413	16	22,515	234	342				
9	I-195 WB Onramp from Wilbur Ave EB	35	0.23	197	24	22	0.52	102	0	0	94	0	0	9	21				
10	Wilbur Ave/Rte 103, Ramps to Ramp	40	0.11	11,851	679	624	0.52	6,174	0	0	5,677	0	0	354	1,117				
11	I-195 WB Offramp to Wilbur Ave WB	25	0.29	5,114	773	710	0.52	2,664	304	809,969	2,450	274	670,271	497	639				
12	Wilbur Ave/Rte 103, I-195 WB Offramp to I-195 EB Onramp	40	0.11	17,015	975	897	0.52	8,864	0	0	8,150	0	0	552	1,610				
13	I-195 EB Onramp from Rte 103 EB	35	0.22	4,868	558	513	0.52	2,536	0	0	2,332	0	0	229	512				
14	Wilbur Ave/Rte 103, I-195 EB Onramp to Home St/Park E	40	0.06	21,784	681	626	0.52	11,349	0	1,702	10,435	0	1,409	416	1,956				
15	Home St	30	0.05	492	13	12	0.52	256	47	11,913	236	42	9,858	8	44				
16	Park & Ride Lot Entrance	30	0.05	443	12	11	0.52	231	169	39,024	212	152	32,293	6	40				
17	Wilbur Ave/Rte 103, Home/P&R to I-195 EB Onramp	40	0.04	21,637	451	415	0.52	11,272	1	8,454	10,365	1	6,996	315	1,903				
18	I-195 EB Onramp from Rte 103 WB	35	0.18	2,655	249	229	0.52	1,383	0	0	1,272	0	0	109	270				
19	Wilbur Ave/Rte 123, WB onramp to I-195 EB to Lees River	40	0.04	19,031	397	365	0.52	9,915	8	74,359	9,116	7	61,534	259	1,672				
20	Shell Station Drive	30	0.02	344	4	3	0.52	179	0	0	165	0	0	2	30				
21	Wilbur Ave/Rte 103, W of Lees River Ave	40	0.09	15,736	738	678	0.52	8,198	8	67,224	7,538	7	55,630	565	1,480				
22	Lees River Ave, Rte 103 to I-195 EB Offramp	30	0.06	7,180	224	206	0.52	3,740	16	59,098	3,439	14	48,905	169	660				
23	I-195 EB Offramp to Lees River Ave	25	0.18	3,934	369	339	0.52	2,050	30	61,076	1,884	27	50,542	217	426				
24	Lees River Ave, EB Offramp to WB Onramp	30	0.12	7,376	461	424	0.52	3,843	0	0	3,533	0	0	309	733				
25	I-195 WB Onramp from Lees River Ave	35	0.19	3,344	331	304	0.52	1,742	0	0	1,602	0	0	113	339				
26	Lees River Ave, N of I-195 WB Onramp	30	0.07	7,917	289	265	0.52	4,125	0	0	3,793	0	0	173	731				
					VMT (per day)	11,356	10,441											7.1	18.2
					VMT (per year)	4,144,797	3,811,031.0											NO <sub>x</sub>	VOC
					Arterial											1,586,868	1,313,175		
					VMT Total (per year)											7,955,828.13			

VMT Total (per year)		7,955,828.13
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	EF (g/s)	NOx Idle (g/day)	Idle (kg/day)	EF (g/s)	VOC Idle (g/day)	Idle (kg/day)
Arterial	0.0006	998	1.00	0.0004	679	0.68
Peak Period	0.0006	825	0.83	0.0004	562	0.56
Off-Peak Period	0.0006	825	0.83	0.0004	562	0.56
Total (Including Link)		8.91				19.40

**Prysman - Brayton Point**  
**Build With Mitigation**

Link No.	Description	Roadway Link Length Speed (miles)	Emission Factor (g/mi) CO <sub>2</sub>	Seasonally Adjusted			VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Annual Weekday Trips (veh/yr)	Peak Period Factor	Peak Traffic Data			Weekday			Off-Peak Traffic Data			Link Emissions CO <sub>2</sub> (grams)					
				AAADI (veh/day)	ADT (veh/day)	ADT (veh/day)					Period (vehicles)	Average Delay (sec)	Adjusted Delay (veh-sec)	Volume (vehicles)	Average Delay (sec)	Adjusted Delay (veh-sec)	Period (vehicles)	Average Delay (sec)	Adjusted Delay (veh-sec)						
1	Brayton Point Road S of Access/O'Neill	30	0.31	1,229	1,229	72,470	66,634	448,721	0.52	233,773	0	0	214,948	0	0	56,602,149									
2	Access Rd	30	0.19	406.9	0	0	0	0	0.52	215,071	5	0	197,752	4	0	24,729,700									
3	O'Neill Rd	30	0.15	399.4	1,131	32,261	29,663	412,824	0.52	215,071	0	0	197,752	0	0	25,044,199									
4	Brayton Point Road, Access/O'Neill to Wilbur Ave/Rte 11	30	0.52	419.3	3,147	311,199	286,139	1,148,726	0.52	5,984,559	21	12,358,181	1,470,245	19	10,226,718	180,695,232									
5	Wilbur Ave/Rte 103, E of Brayton Point Road	40	0.18	3,407	8,409	287,821	264,644	3,069,253	0.52	1,673,915	4	28,957,007	1,539,029	3	4,631,273	219,378,099									
6	Brayton Point Road, N of Wilbur Ave/Rte 103	30	0.21	3,696	8,802	351,501	323,196	3,212,844	0.52	2,973,594	8	24,680,829	2,736,141	7	20,424,031	599,460,555									
7	Wilbur Ave/Rte 103, Brayton Point Rd to I-195 WB Ramp	40	0.21	5,001	15,638	624,455	574,170	5,707,735	0.52	607,810	20	12,399,326	538,865	18	10,260,766	115,664,493									
8	I-195 WB Offramp to Wilbur Ave EB	25	0.22	4,507	3,196	133,718	122,950	1,166,675	0.52	467,955	0	0	42,990	0	0	6,089,991									
9	I-195 WB Onramp from Wilbur Ave EB	35	0.23	2,950	246	10,754	9,888	89,744	0.52	2,440,591	0	0	2,244,059	0	0	179,513,914									
10	Wilbur Ave/Rte 103, Ramps to Ramp	40	0.11	3,484	12,835	268,465	246,846	4,684,650	0.52	1,009,900	413	41,698,763	928,576	372	345,068,154	242,041,983									
11	I-195 WB Offramp to Wilbur Ave WB	25	0.29	4,306	5,311	292,871	269,287	1,938,476	0.52	3,469,193	0	0	3,189,831	0	0	270,642,025									
12	Wilbur Ave/Rte 103, I-195 WB Offramp to I-195 EB Onramp	40	0.11	3,695	18,244	381,611	350,881	6,659,024	0.52	972,496	0	0	894,184	0	0	125,049,862									
13	I-195 EB Onramp from Rte 103 EB	35	0.22	3,045	5,114	213,949	196,721	1,866,680	0.52	4,413,636	0	1,103,409	4,058,221	0	913,100	198,092,372									
14	Wilbur Ave/Rte 103, I-195 EB Onramp to Home St/Park	40	0.06	3,897	23,211	264,818	243,493	8,471,858	0.52	130,913	232	30,424,167	120,371	209	25,176,793	5,017,612									
15	Home St	30	0.05	3,994	688	6,546	6,019	251,284	0.52	121,562	349	42,479,846	111,773	315	35,153,182	4,324,935									
16	Park & Ride Lot Entrance	30	0.05	3,707	639	6,078	5,589	233,335	0.52	4,385,583	1	5,701,259	4,032,428	1	4,717,940	144,463,171									
17	Wilbur Ave/Rte 103, Home/P&R to I-195 EB Onramp	40	0.04	4,290	23,063	175,423	161,297	8,418,011	0.52	561,055	0	0	515,876	0	0	61,290,621									
18	I-195 EB Onramp from Rte 103 WB	35	0.18	3,162	2,950	100,990	92,858	1,076,931	0.52	3,824,528	9	34,803,205	3,516,552	8	28,800,561	120,199,182									
19	Wilbur Ave/Rte 123, WB onramp to I-195 EB to Lees Riv	40	0.04	4,093	20,113	152,981	140,662	7,341,080	0.52	3,123,209	11	35,136,098	2,871,707	10	29,076,038	249,267,404									
20	Shell Station Drive	30	0.02	378.3	0	0	0	0	0.52	1,458,744	17	24,069,279	1,341,277	15	19,917,957	77,856,817									
21	Wilbur Ave/Rte 103, W of Lees River Ave	40	0.09	4,620	16,424	281,089	258,454	5,994,916	0.52	794,829	40	31,554,694	730,824	36	26,112,333	111,439,136									
22	Lees River Ave, Rte 103 to I-195 EB Offramp	30	0.06	4,634	7,671	87,525	80,477	2,800,021	0.52	1,486,797	0	0	1,367,070	0	0	145,710,480									
23	I-195 EB Offramp to Lees River Ave	25	0.18	4,058	4,180	143,069	131,548	1,525,652	0.52	682,617	0	0	627,649	0	0	67,768,800									
24	Lees River Ave, EB Offramp to WB Onramp	35	0.12	4,255	7,819	178,416	164,048	2,853,867	0.52	1,580,306	0	0	1,453,050	0	0	83,551,361									
25	I-195 WB Onramp from Lees River Ave	35	0.19	272.2	3,590	129,697	119,253	1,310,266	0.52	1,580,306	0	0	1,453,050	0	0	83,551,361									
26	Lees River Ave, N of I-195 WB Onramp	30	0.07	393.5	8,311	110,621	101,713	3,033,356	0.52	3,934,443	0	0	3,516,552	0	0	39,344,443									
Arterial										706,251,463	Arterial										584,441,524	Total (tons/year)			3,934,443
VMT per year										8,864,757.94	VMT per year										8,864,757.94	Total			8,864,757.94

Arterial	Peak Period Off-Peak Period	EF (g/s)	Idle (tons/year)	Weekday Idle (g/year)	EF (g/s)	Idle (tons/year)	Total Idle (g/year)	Total Idle (tons/year)
Total		0.8985	#####	699.51	#####	578.86	#####	5,212.80

**Prysman - Brayton Point**

Link No.	Description	Roadway Speed (miles)	Seasonally Adjusted				Weekday			Peak Traffic Data				Weekday				Off-Peak Traffic Data		Link Emissions	
			Factor	AAADT (veh/day)	ADT (veh/day)	ADT (veh/day)	VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Annual Weekday Trips (veh/yr)	Peak Factor	Period (veh)	Average Delay (sec)	Adjusted Delay (veh-sec)	Volume (vehicles)	Average Delay (sec)	Adjusted Delay (veh-sec)	CO <sub>2</sub> (grams)	Link Emissions			
1	Brayton Point Road S of Access/O'Neill	30	0.31	406.9	1,229	72,470	66,634	448,721	0.52	233,773	0	0	214,948	0	0	56,602,149					
2	Access Rd	30	0.19	409.8	0	0	0	0	0.52	215,071	0	0	197,752	0	0	24,729,700					
3	O'Neill Rd	30	0.15	399.4	1,131	32,261	29,663	412,824	0.52	1,598,459	0	0	1,470,245	0	0	250,444,199					
4	Brayton Point Road, Access/O'Neill to Wilbur Ave/Rte 11	30	0.52	419.3	3,147	311,199	286,139	1,148,726	0.52	1,599,008	7	5,386,132	5,500,267	8	4,457,165	180,695,232					
5	Wilbur Ave/Rte 103, E of Brayton Point Road	40	0.18	327.1	8,409	287,821	264,644	3,069,253	0.52	1,673,915	9	14,562,194	15,390,029	6	12,050,596	249,378,999					
6	Brayton Point Road, N of Wilbur Ave/Rte 103	30	0.21	369.6	8,902	351,501	323,196	3,212,844	0.52	2,973,594	72	213,058,003	2,736,141	64	176,311,060	599,460,555					
7	Wilbur Ave/Rte 103, Brayton Point Rd to I-195 WB Rm	40	0.21	500.1	15,638	62,445	57,170	5,707,735	0.52	607,810	20	12,399,326	538,865	18	10,260,766	115,664,493					
8	I-195 WB Offramp to Wilbur Ave EB	25	0.22	450.7	3,196	133,718	122,950	1,166,675	0.52	467,955	0	0	42,990	0	0	6,089,991					
9	I-195 WB Onramp from Wilbur Ave EB	35	0.23	295.0	246	10,754	9,888	89,744	0.52	2,440,591	0	0	2,244,059	0	0	179,513,914					
10	Wilbur Ave/Rte 103, Ramps to Ramp	40	0.11	348.4	12,835	268,465	246,846	4,684,650	0.52	1,009,900	413	41,698,735	928,576	372	345,068,154	242,041,983					
11	I-195 WB Offramp to Wilbur Ave WB	25	0.29	430.6	5,311	292,871	269,287	1,938,476	0.52	3,469,193	0	0	3,189,831	0	0	270,642,025					
12	Wilbur Ave/Rte 103, I-195 WB Offramp to I-195 EB Onramp	40	0.11	369.5	18,244	381,611	350,281	6,659,024	0.52	972,496	0	0	894,184	0	0	125,049,862					
13	I-195 EB Onramp from Rte 103 EB	35	0.22	304.5	5,114	213,949	196,721	1,866,680	0.52	4,413,636	0	1,103,409	4,058,221	0	913,100	198,092,372					
14	Wilbur Ave/Rte 103, I-195 EB Onramp to Home St/Park	40	0.06	389.7	23,211	264,818	243,493	8,471,858	0.52	130,913	232	30,424,167	120,371	209	25,176,793	5,017,612					
15	Home St	30	0.05	399.4	688	6546	6,019	251,284	0.52	121,562	349	42,479,846	111,773	315	35,153,182	4,324,935					
16	Park & Ride Lot Entrance	30	0.05	370.7	639	6,078	5,589	233,335	0.52	4,385,583	1	5,701,259	4,032,428	1	4,717,940	144,463,171					
17	Wilbur Ave/Rte 103, Home/P&R to I-195 EB Onramp	40	0.04	429.0	23,063	175,423	161,297	8,418,011	0.52	561,055	0	0	515,876	0	0	61,290,621					
18	I-195 EB Onramp from Rte 103 WB	35	0.18	316.2	2,950	100,990	92,858	1,076,931	0.52	3,824,528	9	34,803,205	3,516,552	8	28,800,561	120,199,182					
19	Wilbur Ave/Rte 123, WB onramp to I-195 EB to Lees Riv	40	0.04	409.3	20,113	152,981	140,662	7,341,080	0.52	0	0	0	0	0	0	0					
20	Shell Station Drive	30	0.02	378.3	0	0	0	0	0.52	3,123,209	11	35,760,740	2,871,707	10	29,592,946	249,267,404					
21	Wilbur Ave/Rte 103, W of Lees River Ave	40	0.09	462.0	16,424	281,089	258,454	5,994,916	0.52	1,458,744	16	23,558,719	1,341,277	15	19,495,455	77,856,817					
22	Lees River Ave, Rte 103 to I-195 EB Offramp	30	0.06	463.4	7,671	87,525	80,477	2,800,021	0.52	794,829	40	31,554,694	730,824	36	26,112,333	111,439,136					
23	I-195 EB Offramp to Lees River Ave	25	0.18	408.8	4,180	143,069	131,548	1,525,652	0.52	1,486,797	0	0	1,367,070	0	0	145,710,480					
24	Lees River Ave, EB Offramp to WB Onramp	35	0.12	425.5	7,819	178,416	164,048	2,853,867	0.52	682,617	0	0	627,649	0	0	67,768,800					
25	I-195 WB Onramp from Lees River Ave	30	0.19	272.2	3,590	129,697	119,253	1,310,266	0.52	1,580,306	0	0	1,453,050	0	0	83,551,361					
26	Lees River Ave, N of I-195 WB Onramp	30	0.07	393.5	8,311	110,621	101,713	3,033,356	0.52												
										Arterial		879,172,880				726,710,985				3,934,443	
										Arterial		4,618,328				4,246,430				Total (tons/year)	
										Arterial		879,172,880				726,710,985				Total (tons/year)	
										Arterial		879,172,880				726,710,985				Total (tons/year)	

Weekday	8,864,757.94		8,864,757.94
Weekday	8,864,757.94		8,864,757.94

EF (g/s)	0.8985	#####	0.8985	#####	869.79
Idle (g/year)	0.8985	#####	0.8985	#####	719.78
Weekday	8,864,757.94		8,864,757.94		5,524.00
Weekday	8,864,757.94		8,864,757.94		5,524.00

**Prysman - Brayton Point**  
No Build

Link No.	Description	Roadway Link Length Speed (miles)	Emission Factor (g/mi) CO <sub>2</sub>	Seasonally Adjusted			VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Annual Weekday Trips (veh/yr)	Peak Period Factor	Peak Traffic Data			Weekday			Off-Peak Traffic Data			Link Emissions CO <sub>2</sub> (grams)
				ADT (veh/day)	ADT (veh/day)	ADT (veh/day)					Period (vehicles)	Average Delay (sec)	Adjusted Delay (veh-sec)	Volume (vehicles)	Average Delay (sec)	Adjusted Delay (veh-sec)	Period (vehicles)	Average Delay (sec)	Adjusted Delay (veh-sec)	
1	Brayton Point Road S of Access/O'Neill	30	0.31	406.9	197	197	11,595	10,661	71,795	0.52	37,404	0	0	34,392	0	0	0	0	0	9,056,344
2	Access Rd	30	0.19	409.8	0	0	0	0	0	0.52	215,071	0	0	197,752	0	0	0	0	0	24,729,700
3	O'Neill Rd	30	0.15	399.4	1,131	1,131	32,261	29,663	412,824	0.52	402,090	0	0	369,711	0	0	0	0	0	168,267,196
4	Brayton Point Road, Access/O'Neill to Wilbur Ave/Rte 11	30	0.52	419.3	2,115	2,115	209,087	192,250	771,801	0.52	1,542,902	6	6	1,418,638	6	6	2,944,747	6	6	174,355,049
5	Wilbur Ave/Rte 103 E of Brayton Point Road	40	0.18	327.1	8,114	8,114	277,722	255,358	2,961,560	0.52	1,655,114	9	9	1,521,833	8	8	7,979,951	8	8	246,591,251
6	Brayton Point Road, N of Wilbur Ave/Rte 103	30	0.21	369.6	8,704	8,704	347,574	319,585	3,176,947	0.52	2,852,032	65	65	2,622,368	59	59	153,526,512	59	59	57,495,430.6
7	Wilbur Ave/Rte 103, Brayton Point Rd to I-195 WB Ramp	40	0.21	500.1	14,998	14,998	598,927	550,697	5,474,400	0.52	589,108	19	19	541,669	17	17	9,311,297	17	17	112,124,970
8	I-195 WB Offramp to Wilbur Ave EB	25	0.22	450.7	3,098	3,098	129,604	119,167	1,130,778	0.52	56,106	0	0	51,588	0	0	0	0	0	7,307,989
9	I-195 WB Onramp from Wilbur Ave EB	35	0.23	295.0	295	295	12,904	11,865	107,693	0.52	2,347,082	0	0	2,158,080	0	0	0	0	0	172,635,986
10	Wilbur Ave/Rte 103, Ramps to Ramp	40	0.11	348.4	12,343	12,343	258,179	237,389	4,505,162	0.52	1,009,900	365	365	928,576	328	328	304,619,381	328	328	262,041,983
11	I-195 WB Offramp to Wilbur Ave WB	25	0.29	430.6	5,311	5,311	292,871	269,287	1,938,476	0.52	3,366,333	0	0	3,095,254	0	0	0	0	0	125,049,862
12	Wilbur Ave/Rte 103, I-195 WB Offramp to I-195 EB Onramp	40	0.11	369.5	17,703	17,703	370,297	340,478	6,461,586	0.52	972,496	0	0	894,184	0	0	0	0	0	193,895,499
13	I-195 EB Onramp from Rte 103 EB	35	0.22	304.5	5,114	5,114	213,949	196,721	1,866,680	0.52	4,320,127	0	0	3,972,242	0	0	893,754	0	0	501,761.2
14	Wilbur Ave/Rte 103, I-195 EB Onramp to Home St/Park	40	0.06	389.7	22,719	22,719	259,208	238,335	8,292,369	0.52	130,913	199	199	120,371	179	179	21,574,691	179	179	4,324,935
15	Home St	30	0.05	399.4	688	688	6,546	6,019	251,284	0.52	121,562	312	312	111,773	281	281	31,365,752	281	281	141,382,932
16	Park & Ride Lot Entrance	30	0.05	370.7	639	639	6,078	5,589	233,335	0.52	4,292,074	1	1	4,935,885	1	1	4,084,574	1	1	57,204,579
17	Wilbur Ave/Rte 103, Home/P&R to I-195 EB Onramp	40	0.04	429.0	22,571	22,571	171,683	157,858	8,238,523	0.52	3,763,422	9	9	3,464,964	8	8	26,974,748	8	8	118,435,869
18	I-195 EB Onramp from Rte 103 WB	35	0.18	316.2	2,754	2,754	94,257	86,667	1,005,136	0.52	523,652	0	0	481,484	0	0	0	0	0	1,629,401
19	Wilbur Ave/Rte 123, WB onramp to I-195 EB to Lees Riv	40	0.04	409.3	1,981.7	1,981.7	150,737	136,599	7,233,337	0.52	11,221.1	0	0	103,175	0	0	0	0	0	249,267,404
20	Shell Station Drive	30	0.02	378.3	590	590	2,444	2,064	215,386	0.52	3,123,209	10	10	2,871,707	9	9	26,362,275	9	9	76,359,570
21	Wilbur Ave/Rte 103, W of Lees River Ave	40	0.09	462.0	16,424	16,424	281,089	258,454	5,994,916	0.52	1,430,691	16	16	1,315,483	14	14	18,942,952	14	14	110,128,088
22	Lees River Ave, Rte 103 to I-195 EB Offramp	30	0.06	463.4	7,524	7,524	85,841	78,929	2,746,174	0.52	785,478	37	37	28,984,125	33	33	23,985,120	33	33	142,961,225
23	I-195 EB Offramp to Lees River Ave	25	0.18	405.8	4,131	4,131	141,386	130,001	1,507,703	0.52	1,458,744	0	0	1,341,277	0	0	0	0	0	65,912,121
24	Lees River Ave, EB Offramp to WB Onramp	35	0.12	425.5	7,671	7,671	175,049	160,953	2,800,021	0.52	663,916	0	0	610,453	0	0	0	0	0	83,056,974
25	I-195 WB Onramp from Lees River Ave	35	0.19	272.2	3,491	3,491	126,144	115,986	1,274,368	0.52	1,570,955	0	0	1,444,452	0	0	0	0	0	0
26	Lees River Ave, N of I-195 WB Onramp	30	0.07	393.5	8,261	8,261	109,967	101,112	3,015,407	0.52	0	0	0	0	0	0	0	0	0	0
Arterial										779,136,307	644,755,635			3,713.96			Total (tons/year)			
Arterial										4,365,198	4,013,684			8,378,882.55			Total			
Arterial										8,378,882.55	8,378,882.55			8,378,882.55			Total			

Link No.	Description	Speed (miles)	Emission Factor (g/mi) CO <sub>2</sub>	ADT (veh/day)	ADT (veh/day)	ADT (veh/day)	VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Annual Weekday Trips (veh/yr)	Peak Period Factor	Period (vehicles)	Average Delay (sec)	Adjusted Delay (veh-sec)	Volume (vehicles)	Average Delay (sec)	Adjusted Delay (veh-sec)	Link Emissions CO <sub>2</sub> (grams)
1	Brayton Point Road S of Access/O'Neill	30	0.31	197	197	197	11,595	10,661	71,795	0.52	37,404	0	0	34,392	0	0	9,056,344

Link No.	Description	Speed (miles)	Emission Factor (g/mi) CO <sub>2</sub>	ADT (veh/day)	ADT (veh/day)	ADT (veh/day)	VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Annual Weekday Trips (veh/yr)	Peak Period Factor	Period (vehicles)	Average Delay (sec)	Adjusted Delay (veh-sec)	Volume (vehicles)	Average Delay (sec)	Adjusted Delay (veh-sec)	Link Emissions CO <sub>2</sub> (grams)
1	Brayton Point Road S of Access/O'Neill	30	0.31	197	197	197	11,595	10,661	71,795	0.52	37,404	0	0	34,392	0	0	9,056,344

**Prysmian - Brayton Point Existing**

Link No.	Roadway Link Length Type (miles)	Emission Factor (g/mi) CO <sub>2</sub>	Seasonally Adjusted		Weekday			Peak Traffic Data			Off-Peak Traffic Data			Link Emissions		
			AAADT (veh/day)	ADT (veh/day)	VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Annual Weekday Trips (veh/yr)	Peak Period Factor	Period Volume (vehicles)	Average Delay (sec)	Adjusted Delay (veh-sec)	Period Volume (vehicles)	Average Delay (sec)	Adjusted Delay (veh-sec)	CO <sub>2</sub> (grams)	CO <sub>2</sub> (grams)
1	Brayton Point Road S of Access/O'Neill	30	0.31	476.8	98	5,298	5,331	35,898	0.52	18,702	0	17,196	0	0	5,306,147	
2	Access Rd	30	0.19	480.2	0	0	0	0	0.52	196,369	5	180,556	4	0	26,460,082	
3	O'Neill Rd	30	0.15	468.0	1,033	29,455	27,083	376,926	0.52	355,335	0	312,649	0	0	174,268,813	
4	Brayton Point Road, Access/O'Neill to Wilbur Ave/Rte 1	30	0.52	491.4	1,869	184,774	169,895	682,056	0.52	1,458,744	9	1,341,277	8	2,587,632	192,851,142	
5	Wilbur Ave/Rte 103 E of Brayton Point Road	40	0.18	382.6	7,671	262,574	241,430	2,800,021	0.52	1,561,604	9	1,435,854	5	7,122,178	272,673,377	
6	Brayton Point Road N of Wilbur Ave/Rte 103	30	0.21	438.2	8,212	327,937	301,529	2,997,458	0.52	2,730,470	48	2,510,595	43	107,779,825	644,263,321	
7	Wilbur Ave/Rte 103, Brayton Point Rd to I-195 WB Ramp	40	0.21	585.4	14,359	573,399	527,225	5,241,064	0.52	37,404	0	34,392	0	0	125,167,354	
8	I-195 WB Offramp to Wilbur Ave EB	25	0.22	528.4	2,950	123,432	113,493	1,076,931	0.52	2,253,573	0	2,072,100	0	0	5,707,268	
9	I-195 WB Offramp from Wilbur Ave EB	35	0.23	345.6	1,977	86,033	79,910	717,995	0.52	974,496	304	2,974,883	274	244,648,843	193,874,933	
10	Wilbur Ave/Rte 103, Ramps to Ramp	40	0.11	407.5	11,851	247,893	227,931	4,325,673	0.52	3,235,420	0	2,974,883	0	0	273,345,509	
11	I-195 WB Offramp to Wilbur Ave WB	25	0.29	504.9	5,114	282,024	259,313	1,866,680	0.52	925,741	0	851,195	0	0	295,232,192	
12	Wilbur Ave/Rte 103, I-195 WB Offramp to I-195 EB Onramp	40	0.11	432.2	17,015	355,896	327,237	6,210,302	0.52	4,142,459	0	3,808,881	0	514,199	139,426,943	
13	I-195 EB Onramp from Rte 103 EB	35	0.22	356.7	4,868	203,663	187,263	1,776,936	0.52	93,509	47	84,158	42	3,598,232	4,200,013	
14	Wilbur Ave/Rte 103, I-195 EB Onramp to Home St/Park	40	0.06	455.8	21,784	248,548	228,533	7,951,341	0.52	14,243,795	169	14,243,795	152	11,787,113	3,509,191	
15	Home St	30	0.05	468.0	492	467.5	4,299	179,489	0.52	504,950	1	464,288	0	0	158,568,268	
16	Park & Ride Lot Entrance	30	0.05	434.5	443	4.208	3,869	161,540	0.52	27,141,058	8	3,327,398	7	22,459,934	133,031,656	
17	Wilbur Ave/Rte 103, Home/P&R to I-195 EB Onramp	40	0.04	502.0	21,637	164,576	151,324	7,897,494	0.52	60,185	0	60,185	0	0	1,113,896	
18	I-195 EB Onramp from Rte 103 WB	35	0.18	370.3	2,655	19,031	18,572	969,238	0.52	2,992,296	8	2,751,337	7	20,304,863	279,462,742	
19	Wilbur Ave/Rte 123, WB onramp to I-195 EB to Lees Riv	40	0.04	478.8	19,031	144,752	135,096	6,946,005	0.52	1,365,235	16	1,255,297	14	17,850,327	85,395,810	
20	Shell Station Drive	30	0.02	443.3	344	1,309	1,204	125,642	0.52	748,074	30	22,292,603	27	18,447,711	123,021,993	
21	Wilbur Ave/Rte 103, W of Lees River Ave	40	0.09	540.6	15,736	269,307	247,620	5,743,652	0.52	1,402,639	0	1,289,689	0	0	161,080,348	
22	Lees River Ave, Rte 103 to I-195 EB Offramp	30	0.06	543.1	7,180	81,914	75,318	2,620,532	0.52	635,863	0	584,659	0	0	73,957,524	
23	I-195 EB Offramp to Lees River Ave	25	0.18	476.0	3,934	134,653	123,810	1,435,908	0.52	1,505,499	0	1,384,266	0	0	93,284,211	
24	Lees River Ave, EB Offramp to WB Onramp	30	0.12	498.6	7,376	168,317	154,763	2,692,328	0.52	0	0	0	0	0	0	
25	I-195 WB Onramp from Lees River Ave	35	0.19	318.9	3,344	120,814	111,085	1,220,522	0.52	0	0	0	0	0	0	
26	Lees River Ave, N of I-195 WB Onramp	30	0.07	461.2	7,917	105,385	96,899	2,889,765	0.52	0	0	0	0	0	0	
		Arterial		579,207,001	4,130,62	3,811,031	479,308,915	4,130,62	3,811,031	479,308,915	Total (tons/year)					
		Total		7,955,828.13	7,955,828.13	7,955,828.13	7,955,828.13	7,955,828.13	7,955,828.13	7,955,828.13	Total					

Arterial		Weekday	Total
EF (g/s)	1,055.4	7,955.828.13	7,955.828.13
Weekday Idle (g/year)	#####	#####	#####
Idle (tons/year)	#####	#####	#####
EF (g/s)	1,055.4	7,955.828.13	7,955.828.13
Weekday Idle (g/year)	#####	#####	#####
Idle (tons/year)	#####	#####	#####
EF (g/s)	1,055.4	7,955.828.13	7,955.828.13
Weekday Idle (g/year)	#####	#####	#####
Idle (tons/year)	#####	#####	#####
EF (g/s)	1,055.4	7,955.828.13	7,955.828.13
Weekday Idle (g/year)	#####	#####	#####
Idle (tons/year)	#####	#####	#####

Arterial		Weekday	Total
EF (g/s)	1,055.4	7,955.828.13	7,955.828.13
Weekday Idle (g/year)	#####	#####	#####
Idle (tons/year)	#####	#####	#####
EF (g/s)	1,055.4	7,955.828.13	7,955.828.13
Weekday Idle (g/year)	#####	#####	#####
Idle (tons/year)	#####	#####	#####
EF (g/s)	1,055.4	7,955.828.13	7,955.828.13
Weekday Idle (g/year)	#####	#####	#####
Idle (tons/year)	#####	#####	#####
EF (g/s)	1,055.4	7,955.828.13	7,955.828.13
Weekday Idle (g/year)	#####	#####	#####
Idle (tons/year)	#####	#####	#####

**Prysmian - Brayton Point**

**Weekday Traffic**

Link No.	Roadway Description	Existing			No Build			Build			Build with Mitigation			
		Roadway S.A.F.	Roadway ADT (veh/day)	Seasonal ADT (veh/day)	Roadway ADT (veh/day)	Seasonal ADT (veh/day)	Traffic Increase (existing)	Roadway ADT (veh/day)	Seasonal ADT (veh/day)	Traffic Increase (existing)	Roadway ADT (veh/day)	Seasonal ADT (veh/day)	Traffic Increase (existing)	Traffic Increase (no-build)
1	Brayton Point Road S of Access/O'Neil	100%	98	98	197	197	100%	1,229	1,229	1,229	1,229	1150%	525%	525%
2	Access Rd	100%	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!
3	O'Neil Rd	100%	1,033	1,033	1,131	1,131	10%	1,131	1,131	1,131	1,131	10%	0%	10%
4	Brayton Point Road, Access/O'Neil to Wilbur Ave/Rte 103	100%	1,869	1,869	2,115	2,115	13%	3,147	3,147	3,147	3,147	68%	49%	68%
5	Wilbur Ave/Rte 103, E of Brayton Point Road	100%	7,671	7,671	8,114	8,114	6%	8,409	8,409	8,409	8,409	10%	4%	10%
6	Brayton Point Road, N of Wilbur Ave/Rte 103	100%	8,212	8,212	8,704	8,704	6%	8,802	8,802	8,802	8,802	7%	1%	7%
7	Wilbur Ave/Rte 103, Brayton Point Rd to I-195 WB Ramps	100%	14,359	14,359	14,998	14,998	4%	15,638	15,638	15,638	15,638	9%	4%	9%
8	I-195 WB Offramp to Wilbur Ave EB	100%	2,950	2,950	3,098	3,098	5%	3,196	3,196	3,196	3,196	8%	3%	8%
9	I-195 WB Onramp from Wilbur Ave EB	100%	197	197	295	295	50%	246	246	246	246	25%	-17%	25%
10	Wilbur Ave/Rte 103, Ramps to Ramp	100%	11,851	11,851	12,343	12,343	4%	12,835	12,835	12,835	12,835	8%	4%	8%
11	I-195 WB Offramp to Wilbur Ave WB	100%	5,114	5,114	5,311	5,311	4%	5,311	5,311	5,311	5,311	4%	0%	4%
12	Wilbur Ave/Rte 103, I-195 WB Offramp to I-195 EB Onramp	100%	17,015	17,015	17,703	17,703	4%	18,244	18,244	18,244	18,244	7%	3%	7%
13	I-195 EB Onramp from Rte 103 EB	100%	4,868	4,868	5,114	5,114	5%	5,114	5,114	5,114	5,114	5%	0%	5%
14	Wilbur Ave/Rte 103, I-195 EB Onramp to Home St/Park	100%	21,784	21,784	22,719	22,719	4%	23,211	23,211	23,211	23,211	7%	2%	7%
15	Home St	100%	492	492	688	688	40%	688	688	688	688	40%	0%	40%
16	Park & Ride Lot Entrance	100%	443	443	639	639	44%	639	639	639	639	44%	0%	44%
17	Wilbur Ave/Rte 103, Home/P&R to I-195 EB Onramp	100%	21,637	21,637	22,571	22,571	4%	23,063	23,063	23,063	23,063	7%	2%	7%
18	I-195 EB Onramp from Rte 103 WB	100%	2,655	2,655	2,754	2,754	4%	2,950	2,950	2,950	2,950	11%	7%	11%
19	Wilbur Ave/Rte 123, WB onramp to I-195 EB to Lees Riv	100%	19,031	19,031	19,817	19,817	4%	20,113	20,113	20,113	20,113	6%	1%	6%
20	Shell Station Drive	100%	344	344	590	590	71%	0	0	0	0	-100%	-100%	-100%
21	Wilbur Ave/Rte 103, W of Lees River Ave	100%	15,736	15,736	16,424	16,424	4%	16,424	16,424	16,424	16,424	4%	0%	4%
22	Lees River Ave, Rte 103 to I-195 EB Offramp	100%	7,180	7,180	7,524	7,524	5%	7,671	7,671	7,671	7,671	7%	2%	7%
23	I-195 EB Offramp to Lees River Ave	100%	3,934	3,934	4,131	4,131	5%	4,180	4,180	4,180	4,180	6%	1%	6%
24	Lees River Ave, EB Offramp to WB Onramp	100%	7,376	7,376	7,671	7,671	4%	7,819	7,819	7,819	7,819	6%	2%	6%
25	I-195 WB Onramp from Lees River Ave	100%	3,344	3,344	3,491	3,491	4%	3,590	3,590	3,590	3,590	7%	3%	7%
26	Lees River Ave, N of I-195 WB Onramp	100%	7,917	7,917	8,261	8,261	4%	8,311	8,311	8,311	8,311	5%	1%	5%

# Prysmian - Brayton Point

## Emissions Factors By Link (g/mi)

### Emission Factors From MOVES3

Roadway Segments	2022 Existing			2029 No Build			2029 Build			2029 Build-Mit		
	NO <sub>x</sub>	CO <sub>2</sub>	VOC	NO <sub>x</sub>	CO <sub>2</sub>	VOC	NO <sub>x</sub>	CO <sub>2</sub>	VOC	NO <sub>x</sub>	CO <sub>2</sub>	VOC
1 Brayton Point Road S of Access/O'Neill	0.33	476.82	0.40	0.15	406.91	0.26	0.15	406.91	0.26	0.15	406.91	0.26
2 Access Rd	0.33	480.21	0.57	0.15	409.78	0.37	0.15	409.78	0.37	0.15	409.78	0.37
3 O'Neill Rd	0.32	468.00	0.68	0.14	399.36	0.45	0.14	399.36	0.45	0.14	399.36	0.45
4 Brayton Point Road, Access/O'Neill to Wilbur Ave/Rte 103	0.34	491.36	0.29	0.15	419.27	0.19	0.15	419.27	0.19	0.15	419.27	0.19
5 Wilbur Ave/Rte 103, E of Brayton Point Road	0.25	382.64	0.56	0.11	327.07	0.37	0.11	327.07	0.37	0.11	327.07	0.37
6 Brayton Point Road, N of Wilbur Ave/Rte 103	0.29	433.18	0.52	0.13	369.61	0.34	0.13	369.61	0.34	0.13	369.61	0.34
7 Wilbur Ave/Rte 103, Brayton Point Rd to I-195 WB Ramps	0.44	585.36	0.52	0.19	500.12	0.34	0.19	500.12	0.34	0.19	500.12	0.34
8 I-195 WB Offramp to Wilbur Ave EB	0.36	528.39	0.53	0.16	450.72	0.34	0.16	450.72	0.34	0.16	450.72	0.34
9 I-195 WB Onramp from Wilbur Ave EB	0.20	345.62	0.46	0.09	295.04	0.30	0.09	295.04	0.30	0.09	295.04	0.30
10 Wilbur Ave/Rte 103, Ramps to Ramp	0.27	407.45	0.86	0.12	348.36	0.57	0.12	348.36	0.57	0.12	348.36	0.57
11 I-195 WB Offramp to Wilbur Ave WB	0.34	504.94	0.43	0.15	430.56	0.28	0.15	430.56	0.28	0.15	430.56	0.28
12 Wilbur Ave/Rte 103, I-195 WB Offramp to I-195 EB Onramp	0.30	432.17	0.86	0.13	369.48	0.57	0.13	369.48	0.57	0.13	369.48	0.57
13 I-195 EB Onramp from Rte 103 EB	0.21	356.66	0.48	0.10	304.50	0.32	0.10	304.50	0.32	0.10	304.50	0.32
14 Wilbur Ave/Rte 103, I-195 EB Onramp to Home St/Park & Ride Lo	0.32	455.83	1.50	0.14	389.71	1.00	0.14	389.71	1.00	0.14	389.71	1.00
15 Home St	0.32	468.00	1.80	0.14	399.36	1.20	0.14	399.36	1.20	0.14	399.36	1.20
16 Park & Ride Lot Entrance	0.29	434.47	1.79	0.13	370.71	1.19	0.13	370.71	1.19	0.13	370.71	1.19
17 Wilbur Ave/Rte 103, Home/P&R to I-195 EB Onramp	0.36	501.96	2.20	0.16	429.03	1.47	0.16	429.03	1.47	0.16	429.03	1.47
18 I-195 EB Onramp from Rte 103 WB	0.23	370.31	0.56	0.10	316.18	0.37	0.10	316.18	0.37	0.10	316.18	0.37
19 Wilbur Ave/Rte 123, WB onramp to I-195 EB to Lees River Ave	0.34	478.79	2.20	0.15	409.34	1.47	0.15	409.34	1.47	0.15	409.34	1.47
20 Shell Station Drive	0.30	443.28	4.30	0.13	378.25	2.88	0.13	378.25	2.88	0.13	378.25	2.88
21 Wilbur Ave/Rte 103, W of Lees River Ave	0.40	540.62	1.04	0.18	462.00	0.69	0.18	462.00	0.69	0.18	462.00	0.69
22 Lees River Ave, Rte 103 to I-195 EB Offramp	0.39	543.12	1.53	0.18	463.43	1.02	0.18	463.43	1.02	0.18	463.43	1.02
23 I-195 EB Offramp to Lees River Ave	0.31	475.97	0.60	0.14	405.80	0.39	0.14	405.80	0.39	0.14	405.80	0.39
24 Lees River Ave, EB Offramp to WB Onramp	0.35	498.58	0.83	0.16	425.48	0.55	0.16	425.48	0.55	0.16	425.48	0.55
25 I-195 WB Onramp from Lees River Ave	0.18	318.92	0.53	0.08	272.22	0.35	0.08	272.22	0.35	0.08	272.22	0.35
26 Lees River Ave, N of I-195 WB Onramp	0.31	461.16	1.32	0.14	393.49	0.88	0.14	393.49	0.88	0.14	393.49	0.88

**Prysmian - Brayton Point**  
Weekday Vehicle Delay

Link No.	Description	Directions	Existing				No Build				Build				Build-Mit			
			Delay By Approach NB or EB (sec)	Delay By Approach SB or WB (sec)	Adjusted Delay* NB or EB (sec)	Adjusted Delay* SB or WB (sec)	Combined Delay (sec)	Delay By Approach NB or EB (sec)	Delay By Approach SB or WB (sec)	Adjusted Delay* NB or EB (sec)	Adjusted Delay* SB or WB (sec)	Combined Delay (sec)	Delay By Approach NB or EB (sec)	Delay By Approach SB or WB (sec)	Adjusted Delay* NB or EB (sec)	Adjusted Delay* SB or WB (sec)	Combined Delay (sec)	
1	Brayton Point Road S of Access/O'Neill	2	0.0	0.0	0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	
2	Access Rd	2	9.2	0.0	0	0	0	0	0	0	9.2	0.0	0	0	0	0	0	
3	O'Neill Rd	2	17.6	0.0	0	0	0	0	0	0	17.6	0.0	0	0	0	0	0	
4	Brayton Point Road, Access/O'Neill to Wilbur Ave/Rte 103	2	11.8	1.7	0	0	0	0	0	0	11.8	1.7	0	0	0	0	0	
5	Wilbur Ave/Rte 103, E of Brayton Point Road	2	17.7	0.0	0	0	0	0	0	0	17.7	0.0	0	0	0	0	0	
6	Brayton Point Road, N of Wilbur Ave/Rte 103	2	95.4	17.7	0	0	0	0	0	0	95.4	17.7	0	0	0	0	0	
7	Wilbur Ave/Rte 103, Brayton Point Rd to I-195 WB Ramps	2	17.7	0.0	0	0	0	0	0	0	17.7	0.0	0	0	0	0	0	
8	I-195 WB Offramp to Wilbur Ave EB	1	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0	
9	I-195 WB Onramp from Wilbur Ave EB	1	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0	
10	Wilbur Ave/Rte 103, Ramps to Ramp	2	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0	
11	I-195 WB Offramp to Wilbur Ave WB	1	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0	
12	Wilbur Ave/Rte 103, I-195 WB Offramp to I-195 EB Onramp	2	0.3	0.0	0	0	0	0	0	0.3	0.0	0	0	0	0	0	0	
13	I-195 EB Onramp from Rte 103 EB	1	93.0	0.0	0	0	0	0	0	93.0	0.0	0	0	0	0	0	0	
14	Wilbur Ave/Rte 103, I-195 EB Onramp to Home St/Park & Rldt	2	0.3	0.0	0	0	0	0	0	0.3	0.0	0	0	0	0	0	0	
15	Home St	2	338.5	0.0	0	0	0	0	0	338.5	0.0	0	0	0	0	0	0	
16	Park & Ride Lot Entrance	2	1.5	0.0	0	0	0	0	0	1.5	0.0	0	0	0	0	0	0	
17	Wilbur Ave/Rte 103, Home/P&R to I-195 EB Onramp	2	1.5	0.0	0	0	0	0	0	1.5	0.0	0	0	0	0	0	0	
18	I-195 EB Onramp from Rte 103 WB	1	15.0	0.0	0	0	0	0	0	15.0	0.0	0	0	0	0	0	0	
19	Wilbur Ave/Rte 123, WB onramp to I-195 EB to Lees River Ave	2	16.4	0.0	0	0	0	0	0	16.4	0.0	0	0	0	0	0	0	
20	Shell Station Drive	2	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0	
21	Wilbur Ave/Rte 103, W of Lees River Ave	2	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0	
22	Lees River Ave, Rte 103 to I-195 EB Offramp	2	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0	
23	I-195 EB Offramp to Lees River Ave	1	29.8	0.0	0	0	0	0	0	29.8	0.0	0	0	0	0	0	0	
24	Lees River Ave, EB Offramp to WB Onramp	2	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0	
25	I-195 WB Onramp from Lees River Ave	1	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0	
26	Lees River Ave, N of I-195 WB Onramp	2	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0	
<b>PM PEAK CONDITION</b>			<b>Existing</b>				<b>No Build</b>				<b>Build</b>				<b>Build-Mit</b>			
<b>DELAY BY APPROACH (seconds)</b>			<b>EB</b>	<b>WB</b>	<b>NB</b>	<b>SB</b>	<b>EB</b>	<b>WB</b>	<b>NB</b>	<b>SB</b>	<b>EB</b>	<b>WB</b>	<b>NB</b>	<b>SB</b>	<b>EB</b>	<b>WB</b>	<b>NB</b>	<b>SB</b>
1	2: Lees River Ave & I-195 EB Off Ramp		29.8	15.0	0.0	0.0	36.9	20.4	17.3	0.0	0.0	39.7	18.2	22.5	39.7	18.2	22.5	39.7
2	3: Wilbur Ave & Lees River Ave		16.4	0.0	0.0	31.6	0.5	0.5	2.3	398.3	0.5	2.6	464.8	0.5	2.6	464.8	0.5	2.6
3	5: Home St/Park & Ride & Wilbur Ave		0.3	1.5	93.0	338.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	7: Wilbur Ave & I-195 WB Off Ramp		0.0	0.0	0.0	304.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	9: I-195 WB Off Ramp & Wilbur Ave		0.0	0.0	17.7	0.0	0.0	0.0	0.0	19.1	0.0	0.0	20.4	0.0	0.0	0.0	0.0	20.4
6	10: Brayton Point Road & Wilbur Ave		95.4	11.8	17.6	17.7	130.1	17.7	12.5	17.7	17.8	143.3	13.0	16.6	16.6	7.0	41.3	34.6
7	11: O'Neill Road & Brayton Point Road		9.2	0.0	0.0	0.0	9.3	0.0	0.0	0.0	0.0	9.8	0.0	9.8	0.0	0.0	0.0	0.0



# Prysman - Brayton Point

## Weekday Average Daily Traffic (ADT) for Mesoscale Roadway Network

Roadway Segments	Speed (mph)	Existing Volume (ADT)	2029 No-Build Volume (ADT)	2029 Build Volume (ADT)	2029 Build-Mit Volume (ADT)	K Factor	S.A.F.	Unadjusted PM Peak Hour			
								Existing	No-Build	Build	Build-Mit
1 Brayton Point Road S of Access/O'Neill	30	98	197	1,229	1,229	10.2%	1.00	10	20	125	125
2 Access Rd	30	0	0	0	0			0	0	0	0
3 O'Neill Rd	30	1,033	1,131	1,131	1,131			105	115	115	115
4 Brayton Point Road, Access/O'Neill to Wilbur Ave/Rte 103	30	1,869	2,115	3,147	3,147			190	215	320	320
5 Wilbur Ave/Rte 103, E of Brayton Point Road	40	7,671	8,114	8,409	8,409			780	825	855	855
6 Brayton Point Road, N of Wilbur Ave/Rte 103	30	8,212	8,704	8,802	8,802			835	885	895	895
7 Wilbur Ave/Rte 103, Brayton Point Rd to I-195 WB Ramps	40	14,359	14,998	15,638	15,638			1460	1525	1590	1590
8 I-195 WB Offramp to Wilbur Ave EB	25	2,950	3,098	3,196	3,196			300	315	325	325
9 I-195 WB Onramp from Wilbur Ave EB	35	197	295	246	246			20	30	25	25
10 Wilbur Ave/Rte 103, Ramps to Ramp	40	11,851	12,343	12,835	12,835			1205	1255	1305	1305
11 I-195 WB Offramp to Wilbur Ave WB	25	5,114	5,311	5,311	5,311			520	540	540	540
12 Wilbur Ave/Rte 103, I-195 WB Offramp to I-195 EB Onramp	40	17,015	17,703	18,244	18,244			1730	1800	1855	1855
13 I-195 EB Onramp from Rte 103 EB	35	4,868	5,114	5,114	5,114			495	520	520	520
14 Wilbur Ave/Rte 103, I-195 EB Onramp to Home St/Park & Ride Lot	40	21,784	22,719	23,211	23,211			2215	2310	2360	2360
15 Home St	30	492	688	688	688			50	70	70	70
16 Park & Ride Lot Entrance	30	443	639	639	639			45	65	65	65
17 Wilbur Ave/Rte 103, Home/P&R to I-195 EB Onramp	40	21,637	22,571	23,063	23,063			2200	2295	2345	2345
18 I-195 EB Onramp from Rte 103 WB	35	2,655	2,754	2,950	2,950			270	280	300	300
19 Wilbur Ave/Rte 123, WB onramp to I-195 EB to Lees River Ave	40	19,031	19,817	20,113	20,113			1935	2015	2045	2045
20 Shell Station Drive	30	344	590	0	0			35	60	0	0
21 Wilbur Ave/Rte 103, W of Lees River Ave	40	15,736	16,424	16,424	16,424			1600	1670	1670	1670
22 Lees River Ave, Rte 103 to I-195 EB Offramp	30	7,180	7,524	7,671	7,671			730	765	780	780
23 I-195 EB Offramp to Lees River Ave	25	3,934	4,131	4,180	4,180			400	420	425	425
24 Lees River Ave, EB Offramp to WB Onramp	30	7,376	7,671	7,819	7,819			750	780	795	795
25 I-195 WB Onramp from Lees River Ave	35	3,344	3,491	3,590	3,590			340	355	365	365
26 Lees River Ave, N of I-195 WB Onramp	30	7,917	8,261	8,311	8,311			805	840	845	845

**Prysmian - Brayton Point**

**Weekday ATRVolumes**

Wednesday, June 8, 2022				Wednesday, June 8, 2022				Wednesday, June 8, 2022				Wednesday, June 8, 2022				Wednesday, June 8, 2022				
Wilbur Ave. W of Brayton Pt Rd EB				Wilbur Ave. W of Brayton Pt Rd WB				Brayton Point Rd, S of I-195 NB				Brayton Point Rd, S of I-195 SB								
Begin Time	Volume	V/C Ratio	Peak Period Data	Begin Time	Volume	V/C Ratio	Peak Period Data	Begin Time	Volume	V/C Ratio	Peak Period Data	Begin Time	Volume	V/C Ratio	Peak Period Data	Begin Time	Volume	V/C Ratio	Peak Period Data	
			Hours				Hours				Hours				Hours				Hours	
12:00 AM	27	0.02	0	12:00 AM	23	0.02	0	12:00 AM	2	0.00	0	12:00 AM	2	0.00	0	12:00 AM	2	0.00	0	
1:00 AM	15	0.01	0	1:00 AM	45	0.04	0	1:00 AM	1	0.00	0	1:00 AM	1	0.00	0	1:00 AM	1	0.00	0	
2:00 AM	14	0.01	0	2:00 AM	8	0.00	0	2:00 AM	3	0.00	0	2:00 AM	3	0.00	0	2:00 AM	3	0.00	0	
3:00 AM	14	0.01	0	3:00 AM	8	0.01	0	3:00 AM	3	0.00	0	3:00 AM	3	0.00	0	3:00 AM	3	0.00	0	
4:00 AM	88	0.06	0	4:00 AM	42	0.03	0	4:00 AM	9	0.01	0	4:00 AM	1	0.00	0	4:00 AM	1	0.00	0	
5:00 AM	249	0.16	0	5:00 AM	102	0.06	0	5:00 AM	16	0.01	0	5:00 AM	1	0.00	0	5:00 AM	1	0.00	0	
6:00 AM	362	0.23	0	6:00 AM	235	0.15	0	6:00 AM	35	0.02	0	6:00 AM	5	0.00	0	6:00 AM	5	0.00	0	
7:00 AM	498	0.31	0	7:00 AM	423	0.26	0	7:00 AM	78	0.05	1	7:00 AM	24	0.02	0	7:00 AM	24	0.02	0	
8:00 AM	541	0.34	1	8:00 AM	396	0.25	0	8:00 AM	49	0.03	1	8:00 AM	34	0.02	0	8:00 AM	34	0.02	0	
9:00 AM	420	0.26	0	9:00 AM	362	0.23	0	9:00 AM	44	0.03	1	9:00 AM	32	0.02	0	9:00 AM	32	0.02	0	
10:00 AM	433	0.27	0	10:00 AM	395	0.25	0	10:00 AM	34	0.02	0	10:00 AM	23	0.01	0	10:00 AM	23	0.01	0	
11:00 AM	481	0.30	0	11:00 AM	435	0.27	0	11:00 AM	42	0.03	1	11:00 AM	35	0.02	1	11:00 AM	35	0.02	1	
12:00 PM	502	0.31	0	12:00 PM	495	0.31	1	12:00 PM	38	0.02	0	12:00 PM	48	0.03	1	12:00 PM	48	0.03	1	
1:00 PM	511	0.32	1	1:00 PM	492	0.31	1	1:00 PM	28	0.02	0	1:00 PM	39	0.02	1	1:00 PM	39	0.02	1	
2:00 PM	561	0.35	1	2:00 PM	572	0.36	1	2:00 PM	47	0.03	1	2:00 PM	50	0.03	1	2:00 PM	50	0.03	1	
3:00 PM	618	0.39	1	3:00 PM	618	0.46	1	3:00 PM	43	0.03	1	3:00 PM	72	0.05	1	3:00 PM	72	0.05	1	
4:00 PM	646	0.40	1	4:00 PM	739	0.47	1	4:00 PM	37	0.02	0	4:00 PM	74	0.05	1	4:00 PM	74	0.05	1	
5:00 PM	692	0.43	1	5:00 PM	759	0.47	1	5:00 PM	54	0.03	1	5:00 PM	67	0.04	1	5:00 PM	67	0.04	1	
6:00 PM	524	0.33	1	6:00 PM	462	0.29	1	6:00 PM	35	0.02	0	6:00 PM	50	0.03	1	6:00 PM	50	0.03	1	
7:00 PM	423	0.26	0	7:00 PM	417	0.26	0	7:00 PM	26	0.02	0	7:00 PM	44	0.03	1	7:00 PM	44	0.03	1	
8:00 PM	292	0.18	0	8:00 PM	301	0.19	0	8:00 PM	28	0.02	0	8:00 PM	25	0.02	0	8:00 PM	25	0.02	0	
9:00 PM	171	0.11	0	9:00 PM	188	0.12	0	9:00 PM	10	0.01	0	9:00 PM	20	0.01	0	9:00 PM	20	0.01	0	
10:00 PM	104	0.07	0	10:00 PM	107	0.07	0	10:00 PM	9	0.01	0	10:00 PM	13	0.01	0	10:00 PM	13	0.01	0	
11:00 PM	62	0.04	0	11:00 PM	72	0.05	0	11:00 PM	7	0.00	0	11:00 PM	11	0.01	0	11:00 PM	11	0.01	0	
<b>Total</b>	<b>8,250</b>		<b>7</b>	<b>4,093</b>			<b>4,196</b>	<b>7</b>	<b>7,721</b>			<b>4,196</b>	<b>7</b>	<b>676</b>			<b>676</b>		<b>9</b>	<b>350</b>
<b>Roadway Capacity</b>	<b>1,600</b>	<b>32%</b>	<b>507</b>	<b>1,600</b>	<b>26%</b>	<b>446</b>	<b>446</b>	<b>7</b>	<b>1,600</b>	<b>3%</b>	<b>42</b>	<b>42</b>	<b>1,600</b>	<b>1.09</b>	<b>2%</b>	<b>36</b>	<b>1,600</b>	<b>0.109</b>	<b>0.516</b>	<b>0.521</b>
<b>Peak Hour (H) Factor</b>		<b>0.084</b>	<b>0.496</b>	<b>Peak Hour (H) Factor</b>		<b>0.098</b>	<b>0.543</b>	<b>Peak Hour (H) Factor</b>		<b>0.115</b>	<b>0.528</b>	<b>Peak Hour (H) Factor</b>		<b>0.115</b>	<b>0.528</b>	<b>Peak Hour (H) Factor</b>		<b>0.109</b>	<b>0.516</b>	<b>0.521</b>
<b>Peak Period Volume Factor</b>				<b>Peak Period Volume Factor</b>				<b>Peak Period Volume Factor</b>				<b>Peak Period Volume Factor</b>				<b>Peak Period Volume Factor</b>			<b>Peak Period Volume Factor</b>	<b>Average Data</b>
																				<b>0.102</b>

# Prysmian - Brayton Point

## Mesoscale Roadway Data

Link No.	Description	Speed (mph)	Link Length (miles)	Start Elev (ft)	Finish Elev (ft)	Grade (%)	Directions
1	Brayton Point Road S of Access/O'Neill	30	0.31	46	18	1.7	2
2	Access Rd	30	0.19	48	30	1.8	2
3	O'Neill Rd	30	0.15	42	30	1.5	2
4	Brayton Point Road, Access/O'Neill to Wilbur Ave/Rte 103	30	0.52	44	100	2.0	2
5	Wilbur Ave/Rte 103, E of Brayton Point Road	40	0.18	99	96	0.3	2
6	Brayton Point Road, N of Wilbur Ave/Rte 103	30	0.21	99	107	0.7	2
7	Wilbur Ave/Rte 103, Brayton Point Rd to I-195 WB Ramps	40	0.21	99	50	4.4	2
8	I-195 WB Offramp to Wilbur Ave EB	25	0.22	38	60	1.9	1
9	I-195 WB Onramp from Wilbur Ave EB	35	0.23	40	28	-1.0	1
10	Wilbur Ave/Rte 103, Ramps to Ramp	40	0.11	43	48	0.9	2
11	I-195 WB Offramp to Wilbur Ave WB	25	0.29	27	47	1.3	1
12	Wilbur Ave/Rte 103, I-195 WB Offramp to I-195 EB Onramp	40	0.11	49	41	1.4	2
13	I-195 EB Onramp from Rte 103 EB	35	0.22	40	32	-0.7	1
14	Wilbur Ave/Rte 103, I-195 EB Onramp to Home St/Park & Ride Lot	40	0.06	39	33	1.9	2
15	Home St	30	0.05	33	37	1.5	2
16	Park & Ride Lot Entrance	30	0.05	33	35	0.8	2
17	Wilbur Ave/Rte 103, Home/P&R to I-195 EB Onramp	40	0.04	33	27	2.8	2
18	I-195 EB Onramp from Rte 103 WB	35	0.18	25	22	-0.3	1
19	Wilbur Ave/Rte 123, WB onramp to I-195 EB to Lees River Ave	40	0.04	25	20	2.4	2
20	Shell Station Drive	30	0.02	20	19	0.9	2
21	Wilbur Ave/Rte 103, W of Lees River Ave	40	0.09	20	3	3.6	2
22	Lees River Ave, Rte 103 to I-195 EB Offramp	30	0.06	20	30	3.2	2
23	I-195 EB Offramp to Lees River Ave	25	0.18	22	28	0.6	1
24	Lees River Ave, EB Offramp to WB Onramp	30	0.12	30	44	2.2	2
25	I-195 WB Onramp from Lees River Ave	35	0.19	44	26	-1.8	1
26	Lees River Ave, N of I-195 WB Onramp	30	0.07	44	49	1.4	2

## Project Data

### TRAFFIC DATA

Project Name Prysman - Brayton Point  
Project County Bristol  
Existing Year 2022  
No-Build Year 2029  
Build Year 2029  
Build with Mitigation Year 2029  
Seasonal Adjustment Factor 1.00  
K-Factor 10.2%

### Idle Emission Factors

Year	NOx (g/hr)	VOC (g/hr)	CO2 (g/hr)
2022	2.26	1.54	3799.47
2029	1.13	1.14	3234.75

Restricted Speed Zone (RSZ)		
Round Trips per year (IN/OUT)	5	unitless
Distance In	14.440	Nautical miles
Distance Out	14.440	Nautical miles
Vi	5	Av Speed
Vref	16	vessel's maximum speed
Pref	20930	vessel's total installed propulsion power
SM	1.10	Sea Margin
LF	34%	Load Factor
Ppi	7194.7	Propulsion engine operating power
Ai	5.776	Time in mode per trip
LLAF	pollutant dependent	Low Load Adjustment Factor

  

	Pollutant	NOX	VOC	CO2
EF	g/kWh	2.6	0.5265	657.23
Controlled EF (SCR)	g/kWh	0.26	0.26325	657.23
LLAF	unitless	1.00	1.00	1.00
Emissions per RT	g/RT	10804	10939	27311465
<b>RSZ Annual Emissions</b>	<b>TPY</b>	<b>0.0595</b>	<b>0.0603</b>	<b>150.5295</b>

$$P_{p,i} = P_{ref} \times \left(\frac{V_i}{V_{ref}}\right)^3 \times SM \quad \text{Equation 3.13}$$

Where  $P_{p,i}$  = propulsion engine operating power for operating mode  $i$  (kW)  
 $P_{ref}$  = vessel's total installed propulsion power (kW)  
 $V_i$  = average speed in operating mode  $i$  (kn)  
 $V_{ref}$  = vessel's maximum speed (kn)  
 $SM$  = sea margin, which accounts for average weather conditions, assumed to be 1.10 for coastal operations and 1.15 for at-sea operations (unitless)

$$E_{p,i} = P_{p,i} \times A_i \times EF \times LLAF_i \quad \text{Equation 3.15}$$

Where  $E_{p,i}$  = propulsion engine emissions for operating mode  $i$  (g)  
 $P_{p,i}$  = propulsion engine operating power for operating mode  $i$  (kW)  
 $A_i$  = time spent in operating mode  $i$  (h)  
 $EF$  = emission factor (g/kWh)  
 $LLAF_i$  = low load adjustment factor for operating mode  $i$  (unitless)

dependent on engine type (SSD/MSD). See Note **MSD BASED ON 750 kW speed**  
 90% reduction for NOX, 50% for VOC, 0% for CO2.

Maneuvering		
RT	5	Round Trips per year (IN/OUT)
Maneuvering Distance In	0.773	Nautical miles
Maneuvering Distance Out	0.773	Nautical miles
Vi	2	Av Speed
Vref	16	vessel's maximum speed
Pref	20930	vessel's total installed propulsion power
SM	1.10	Sea Margin
LF	14%	Load Factor
Ppi	2877.9	Propulsion engine operating power
Ai	0.773	Time in mode per trip
LLAF	pollutant dependent	Low Load Adjustment Factor

  

	Pollutant	NOX	VOC	CO2
EF	g/kWh	2.6	0.5265	657.23
Controlled EF (SCR)	g/kWh	0.26	0.26325	657.23
LLAF	unitless	1.08	1.47	1.11
Emissions per RT	g/RT	625	861	1623405
<b>Maneuvering Annual Emissions</b>	<b>TPY</b>	<b>0.0034</b>	<b>0.0047</b>	<b>8.9475</b>

dependent on engine type (SSD/MSD). See Note  
 90% reduction for NOX, 50% for VOC, 0% for CO2.

Hotelling		
Time docked per berthing	240	hrs
Number of berthings per year	5	unitless
Aux Engine	190	kW
Medium or High Speed Diesel (MSD or HSD)		
Load (Table E.1)		Default from Table E.1

  

	Pollutant	NOX	VOC	CO2
EF	g/kWh	2.0	0.4212	695.702
Controlled EF (SCR)	g/kWh	0.2	0.2106	695.702
Emissions per berth	g/berth	9120	9603	31724011
<b>AUX Eng. Annual Emissions</b>	<b>TPY</b>	<b>0.0503</b>	<b>0.0529</b>	<b>174.8496</b>

  

Boiler		
Load (Table E.2)	0	kW
		Default from Table E.1

  

	Pollutant	NOX	VOC	CO2
Emissions per berth	g/berth	0	0	0
<b>Boiler Annual Emissions</b>	<b>TPY</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>

$$E_{a,i} = P_{a,i} \times A_i \times EF \quad \text{Equation 3.16}$$

Where  $E_{a,i}$  = auxiliary emissions for operating mode  $i$  (g)  
 $P_{a,i}$  = auxiliary engine operating power for operating mode  $i$  (kW)  
 $A_i$  = time spent in operating mode  $i$  (h)  
 $EF$  = emission factor (g/kWh)

90% reduction for NOX, 50% for VOC, 0% for CO2.

$$E_{b,i} = P_{b,i} \times A_i \times EF \quad \text{Equation 3.17}$$

Where  $E_{b,i}$  = boiler emissions for operating mode  $i$  (g)  
 $P_{b,i}$  = boiler load for operating mode  $i$  (kW)  
 $A_i$  = time spent in operating mode  $i$  (h)  
 $EF$  = emission factor (g/kWh)

	Pollutant	NOX	VOC	CO2
Ship Emissions Totals	TPY	0.1133	0.1180	334.3
	kg/day	6.4071	6.7310	16601.0

Restricted Speed Zone (RSZ)		
Round Trips per year (IN/OUT)	5	unitless
Distance In	14.440	Nautical miles
Distance Out	14.440	Nautical miles
Vi	5	kts
Vref	9	kts
Pref	7500	kW
SM	1.10	unitless
LF	61%	unitless
Ppi	4583.3	kW
Ai	5.776	hrs
LLAF	pollutant dependent	unitless

  

Pollutant	NOX	VOC	CO2
EF	2.6	0.5265	657.23
Controlled EF (NO SCR)	2.6	0.5265	657.23
LLAF	1.00	1.00	1.00
Emissions per RT	68829	13938	17398608
<b>RSZ Annual Emissions</b>	<b>TPY 0.3794</b>	<b>0.0768</b>	<b>95.8939</b>

$$P_{p,i} = P_{pref} \times \left(\frac{V_i}{V_{ref}}\right)^3 \times SM \quad \text{Equation 3.13}$$

Where  $P_{p,i}$  = propulsion engine operating power for operating mode  $i$  (kW)  
 $P_{pref}$  = vessel's total installed propulsion power (kW)  
 $V_i$  = average speed in operating mode  $i$  (kn)  
 $V_{ref}$  = vessel's maximum speed (kn)  
 $SM$  = sea margin, which accounts for average weather conditions, assumed to be 1.10 for coastal operations and 1.15 for at-sea operations (unitless)

$$E_{p,i} = P_{p,i} \times A_i \times EF \times LLAF_i \quad \text{Equation 3.15}$$

Where  $E_{p,i}$  = propulsion engine emissions for operating mode  $i$  (g)  
 $P_{p,i}$  = propulsion engine operating power for operating mode  $i$  (kW)  
 $A_i$  = time spent in operating mode  $i$  (h)  
 $EF$  = emission factor (g/kWh)  
 $LLAF$  = low load adjustment factor for operating mode  $i$  (unitless)

dependent on engine type (SSD/MSD). See Note **MSD BASED ON 750 kW speed**  
 NO CONTROL

Maneuvering		
RT	5	unitless
Maneuvering Distance In	0.773	Nautical miles
Maneuvering Distance Out	0.773	Nautical miles
Vi	2	kts
Vref	9	kts
Pref	7500	kW
SM	1.10	unitless
LF	24%	unitless
Ppi	1833.3	kW
Ai	0.773	hrs
LLAF	pollutant dependent	unitless

  

Pollutant	NOX	VOC	CO2
EF	2.6	0.5265	657.23
Controlled EF (NO SCR)	2.6	0.5265	657.23
LLAF	1.00	1.00	1.00
Emissions per RT	3686	746	931694
<b>Maneuvering Annual Emissions</b>	<b>TPY 0.0203</b>	<b>0.0041</b>	<b>5.1351</b>

dependent on engine type (SSD/MSD). See Note  
 NO CONTROL

Hotelling			
Time docked per berthing	240	hrs	email on 7/8/2022
Number of berthings per year	5	unitless	email on 7/8/2022
Aux Engine Medium or High Speed Diesel (MSD or HSD) Load (Table E.1)	190	kW	Default from Table E.1

  

Pollutant	NOX	VOC	CO2
EF	2.0	0.4212	695.702
Controlled EF (NO SCR)	2.0	0.4212	695.702
Emissions per berth	91200	19207	31724011
<b>AUX Eng. Annual Emissions</b>	<b>TPY 0.5027</b>	<b>0.1059</b>	<b>174.8496</b>

  

Boiler			
Load (Table E.2)	0	kW	Default from Table E.1

  

Pollutant	NOX	VOC	CO2
EF	2.0	0.1053	961.8
Emissions per berth	0	0	0
<b>Boiler Annual Emissions</b>	<b>TPY 0.0000</b>	<b>0.0000</b>	<b>0.0000</b>

$$E_{a,i} = P_{a,i} \times A_i \times EF \quad \text{Equation 3.16}$$

Where  $E_{a,i}$  = auxiliary emissions for operating mode  $i$  (g)  
 $P_{a,i}$  = auxiliary engine operating power for operating mode  $i$  (kW)  
 $A_i$  = time spent in operating mode  $i$  (h)  
 $EF$  = emission factor (g/kWh)

NO CONTROL

$$E_{b,i} = P_{b,i} \times A_i \times EF \quad \text{Equation 3.17}$$

Where  $E_{b,i}$  = boiler emissions for operating mode  $i$  (g)  
 $P_{b,i}$  = boiler load for operating mode  $i$  (kW)  
 $A_i$  = time spent in operating mode  $i$  (h)  
 $EF$  = emission factor (g/kWh)

Pollutant	NOX	VOC	CO2
Ship Emissions Totals	TPY 41.9023	8.1868	275.9
	kg/day 41.9023	8.5156	10952.8

**Ulisse Cable Layer**

**Methodology from Ports Emissions Inventory Guidance, EPA-420-B-20-046**

Vincent R. Tino, CCM - 7/21/2022

$$P_{p,i} = P_{ref} \times \left(\frac{V_i}{V_{ref}}\right)^3 \times SM \quad \text{Equation 3.13}$$

Where  $P_{p,i}$  = propulsion engine operating power for operating mode  $i$  (kW)  
 $P_{ref}$  = vessel's total installed propulsion power (kW)  
 $V_i$  = average speed in operating mode  $i$  (kn)  
 $V_{ref}$  = vessel's maximum speed (kn)  
 $SM$  = sea margin, which accounts for average weather conditions, assumed to be 1.10 for coastal operations and 1.15 for at-sea operations (unitless)

$$E_{p,i} = P_{p,i} \times A_i \times EF \times LLAF_i \quad \text{Equation 3.15}$$

Where  $E_{p,i}$  = propulsion engine emissions for operating mode  $i$  (g)  
 $P_{p,i}$  = propulsion engine operating power for operating mode  $i$  (kW)  
 $A_i$  = time spent in operating mode  $i$  (h)  
 $EF$  = emission factor (g/kWh)  
 $LLAF$  = low load adjustment factor for operating mode  $i$  (unitless)

Restricted Speed Zone (RSZ)					
Round Trips per year (IN/OUT)	5	unitless			
Distance In	14.440	Nautical miles			
Distance Out	14.440	Nautical miles			
Vi	5	kts			
Vref	8	kts			
Pref	3776	kW			
SM	1.10	unitless			
LF	69%	unitless			
Ppi	2596.0	kW			
Ai	5.776	hrs			
LLAF		pollutant dependent			
		Pollutant	NOX	VOC	CO2
EF		g/kWh	2.6	0.5265	657.23
Controlled EF (SCR)		g/kWh	0.26	0.26325	657.23
LLAF		unitless	1.00	1.00	1.00
Emissions per RT		g/RT	3898	3947	9854572
<b>RSZ Annual Emissions</b>		<b>TPY</b>	<b>0.0215</b>	<b>0.0218</b>	<b>54.3143</b>

dependent on engine type (SSD/MSD). See Note **MSD BASED ON 750 kW speed**  
 90% reduction for NOX, 50% for VOC, 0% for CO2.

Maneuvering					
RT	5	unitless			
Maneuvering Distance In	0.773	Nautical miles			
Maneuvering Distance Out	0.773	Nautical miles			
Vi	2	kts			
Vref	8	kts			
Pref	3776	kW			
SM	1.10	unitless			
LF	28%	unitless			
Ppi	1038.4	kW			
Ai	0.773	hrs			
LLAF		pollutant dependent			
		Pollutant	NOX	VOC	CO2
EF		g/kWh	2.6	0.5265	657.23
Controlled EF (SCR)		g/kWh	0.26	0.26325	657.23
LLAF		unitless	1.00	1.00	1.00
Emissions per RT		g/RT	209	211	527712
<b>Maneuvering Annual Emissions</b>		<b>TPY</b>	<b>0.0012</b>	<b>0.0012</b>	<b>2.9085</b>

dependent on engine type (SSD/MSD). See Note  
 90% reduction for NOX, 50% for VOC, 0% for CO2.

Hotelling					
Time docked per berthing	240	hrs			email on 7/8/2022
Number of berthings per year	5	unitless			email on 7/8/2022
Aux Engine					
Medium or High Speed Diesel (MSD or HSD)					
Load (Table E.1)	190	kW			Default from Table E.1
		Pollutant	NOX	VOC	CO2
EF		g/kWh	2.0	0.4212	695.702
Controlled EF (SCR)		g/kWh	0.2	0.2106	695.702
Emissions per berth		g/berth	9120	9603	31724011
<b>AUX Eng. Annual Emissions</b>		<b>TPY</b>	<b>0.0503</b>	<b>0.0529</b>	<b>174.8496</b>
Boiler					
Load (Table E.2)	0	kW			Default from Table E.1
		Pollutant	NOX	VOC	CO2
Emissions per berth		g/berth	0	0	0
<b>Boiler Annual Emissions</b>		<b>TPY</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>

$$E_{a,i} = P_{a,i} \times A_i \times EF \quad \text{Equation 3.16}$$

Where  $E_{a,i}$  = auxiliary emissions for operating mode  $i$  (g)  
 $P_{a,i}$  = auxiliary engine operating power for operating mode  $i$  (kW)  
 $A_i$  = time spent in operating mode  $i$  (h)  
 $EF$  = emission factor (g/kWh)

90% reduction for NOX, 50% for VOC, 0% for CO2.

$$E_{b,i} = P_{b,i} \times A_i \times EF \quad \text{Equation 3.17}$$

Where  $E_{b,i}$  = boiler emissions for operating mode  $i$  (g)  
 $P_{b,i}$  = boiler load for operating mode  $i$  (kW)  
 $A_i$  = time spent in operating mode  $i$  (h)  
 $EF$  = emission factor (g/kWh)

Ship Emissions Totals			NOX	VOC	CO2
		TPY	0.0729	0.0759	232.1
		kg/day	2.5380	2.5851	6776.8

**Cable Enterprise Cable Layer**  
**Methodology from Ports Emissions Inventory Guidance, EPA-420-B-20-046**  
 Vincent R. Tino, CCM - 7/21/2022

Restricted Speed Zone (RSZ)		
Round Trips per year (IN/OUT)	5	unitless
Distance In	14.440	Nautical miles
Distance Out	14.440	Nautical miles
Vi	5	km
Vref	9	kts
Pref	8988	kW
SM	1.10	unitless
LF	61%	unitless
Ppi	5492.7	kW
Ai	5.776	hrs
LLAF	pollutant dependent	unitless

  

	Pollutant	NOX	VOC	CO2
EF	g/kWh	2.6	0.5265	657.23
Controlled EF (SCR)	g/kWh	0.26	0.26325	657.23
LLAF	unitless	1.00	1.00	1.00
Emissions per RT	g/RT	8248	8352	20850492
<b>RSZ Annual Emissions</b>	<b>TPY</b>	<b>0.0455</b>	<b>0.0460</b>	<b>114.9193</b>

$$P_{p,i} = P_{pref} \times \left(\frac{V_i}{V_{ref}}\right)^3 \times SM \quad \text{Equation 3.13}$$

Where  $P_{p,i}$  = propulsion engine operating power for operating mode  $i$  (kW)  
 $P_{pref}$  = vessel's total installed propulsion power (kW)  
 $V_i$  = average speed in operating mode  $i$  (kn)  
 $V_{ref}$  = vessel's maximum speed (kn)  
 $SM$  = sea margin, which accounts for average weather conditions, assumed to be 1.10 for coastal operations and 1.15 for at-sea operations (unitless)

$$E_{p,i} = P_{p,i} \times A_i \times EF \times LLAF_i \quad \text{Equation 3.15}$$

Where  $E_{p,i}$  = propulsion engine emissions for operating mode  $i$  (g)  
 $P_{p,i}$  = propulsion engine operating power for operating mode  $i$  (kW)  
 $A_i$  = time spent in operating mode  $i$  (h)  
 $EF$  = emission factor (g/kWh)  
 $LLAF$  = low load adjustment factor for operating mode  $i$  (unitless)

dependent on engine type (SSD/MSD). See Note **MSD BASED ON 750 kW speed**  
 90% reduction for NOX, 50% for VOC, 0% for CO2.

Maneuvering		
RT	5	unitless
Maneuvering Distance In	0.773	Nautical miles
Maneuvering Distance Out	0.773	Nautical miles
Vi	2	kts
Vref	9	kts
Pref	8988	kW
SM	1.10	unitless
LF	24%	unitless
Ppi	2197.1	kW
Ai	0.773	hrs
LLAF	pollutant dependent	unitless

  

	Pollutant	NOX	VOC	CO2
EF	g/kWh	2.6	0.5265	657.23
Controlled EF (SCR)	g/kWh	0.26	0.26325	657.23
LLAF	unitless	1.00	1.00	1.00
Emissions per RT	g/RT	442	447	1116543
<b>Maneuvering Annual Emissions</b>	<b>TPY</b>	<b>0.0024</b>	<b>0.0025</b>	<b>6.1539</b>

dependent on engine type (SSD/MSD). See Note  
 90% reduction for NOX, 50% for VOC, 0% for CO2.

Hotelling			
Time docked per berthing	240	hrs	email on 7/8/2022
Number of berthings per year	5	unitless	email on 7/8/2022
Aux Engine Medium or High Speed Diesel (MSD or HSD) Load (Table E.1)	190	kW	Default from Table E.1

  

	Pollutant	NOX	VOC	CO2
EF	g/kWh	2.0	0.4212	695.702
Controlled EF (SCR)	g/kWh	0.2	0.2106	695.702
Emissions per berth	g/berth	9120	9603	31724011
<b>AUX Eng. Annual Emissions</b>	<b>TPY</b>	<b>0.0503</b>	<b>0.0529</b>	<b>174.8496</b>

  

Boiler			
Load (Table E.2)	0	kW	Default from Table E.1

  

	Pollutant	NOX	VOC	CO2
Emissions per berth	g/berth	0	0.1053	961.8
<b>Boiler Annual Emissions</b>	<b>TPY</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0000</b>

$$E_{a,i} = P_{a,i} \times A_i \times EF \quad \text{Equation 3.16}$$

Where  $E_{a,i}$  = auxiliary emissions for operating mode  $i$  (g)  
 $P_{a,i}$  = auxiliary engine operating power for operating mode  $i$  (kW)  
 $A_i$  = time spent in operating mode  $i$  (h)  
 $EF$  = emission factor (g/kWh)

90% reduction for NOX, 50% for VOC, 0% for CO2.

$$E_{b,i} = P_{b,i} \times A_i \times EF \quad \text{Equation 3.17}$$

Where  $E_{b,i}$  = boiler emissions for operating mode  $i$  (g)  
 $P_{b,i}$  = boiler load for operating mode  $i$  (kW)  
 $A_i$  = time spent in operating mode  $i$  (h)  
 $EF$  = emission factor (g/kWh)

Ship Emissions Totals	Pollutant	NOX	VOC	CO2
	TPY	0.0982	0.1014	295.9
	kg/day	4.9459	5.0231	12863.6